

POSSELT'S TEXTILE LIBRARY VOL. VI.

PART 2.

TEXTILE
MACHINERY

Relating to

WEAVING

by

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PREFACE.



THE present book is issued, according to my promise in Part I, to keep machinery relating to weaving up to date before the public. The new book does not infringe with said Part I, treating only such modern machinery and devices needed in the weaving department of an up to date mill as came to my notice since Part I was published.

It is my intention to issue a third volume, three years hence, giving a description of such machinery and devices as will be brought in the market from now until then, in order to keep the subject of modern machinery relating to weaving constantly up to date before the public.

Parts I and II combined, form thus far the most valuable manual to every Textile Manufacturer, Superintendent, Designer, Overseer and Student who wants to keep in touch with the latest and most improved machinery, etc.

Illustrations and reading matter have been most carefully prepared and no time, labor or money spared to bring the various subjects as plain as possible before the reader.

E. A. POSSELT.

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CONTENTS.

SHEDDING MECHANISMS.

	PAGE
Harness Chain Multiplier for Knowles Looms,	1
The Crompton Harness Leveling Device for Dobbies,	2
Improved Harness Lever for Knowles Looms,	3
Improvement to the Knowles Shedding Mechanism,	4
Top Rigging for Cam Looms,	5
Crompton and Knowles Leno Motion,	6
Stafford's Indicating Device for Dobbies,	7
The Crompton Two Weave Shedding Mechanism for Dobby Cotton Looms,	8
Stafford's Improvement to Dobbies,	8
Ingraham's Shedding Mechanism,	9
Draper's Selvage Motion for Cotton Looms,	10
Northrop's Shedding Mechanism for Cotton Looms,	12
Goodyear's Shedding Motion,	13
Oldham's Shedding Motion,	14
Cook's Dobby,	15
Connecting Box and Shedding Motion of Dobby Cotton Looms,	16
Jacey's Harness Operating Device for Cotton Looms,	17
Arnta's Shedding Mechanism,	18
Hilton's Harness Motion,	19
White's Dobby,	19
Schaum's Head Motion for Narrow Ware Looms,	20
Brindle and Steere's Narrow Ware Loom,	21
Steere's Shedding Motion for Narrow Ware Looms,	22
Adjustable Harness Motion Regulators for Narrow Ware Looms,	23

BOX MOTIONS AND SHUTTLE BOXES.

The Crompton Shuttle Changer,	24
Shuttle Box Operating Mechanism for Crompton Looms,	27
Shuttle Box Guide for Crompton Looms,	28
The Mason Shuttle Box Multiplying Mechanism,	29
The Whitin Box Mechanism,	29
The Thomas Shuttle Changing Mechanism for Cotton Looms,	30
Birchall's Shuttle Box Operating Mechanism,	31
Filling Changing Mechanism for Northrop Looms,	32
Northrop's Shuttle Box,	32
Fitz and Reilly's Device for Positioning Shuttles,	33
Device for Guiding Ejected Bobbins from Shuttle in Northrop Looms,	33
Improvement to the Filling Supplying Mechanism for Northrop Looms,	34
Filling End Holder for Northrop Looms,	35
Mason's Filling End Supplying Device for Northrop Looms,	35
Shuttle Detector for Northrop Looms,	36
Improved Shuttle Detector for Northrop Looms,	37
Back Box Plate for Cotton Looms,	38
Gordon's Shuttle Binder Spring,	38
Talk's Shuttle Binder,	39
Talk's Improved Shuttle Binder,	40
The Knowles Swivel Loom,	40
Widmer's Shuttle Driving Mechanism for Narrow Ware Looms,	42
Oldfield's Shuttle Driving Motion for Narrow Ware Looms,	43
Stadler's Method of Operating Shuttles in Narrow Ware Looms,	44
Batten, Shuttle Block and Shuttle for Narrow Ware Looms,	44
Securing Shuttle Blocks to Battens for Narrow Ware Looms,	45
Wollenberg's Batten for Narrow Ware Looms,	46
Supporting Mechanism for Shuttles for Narrow Ware Looms,	47
Oblique Shuttle Drive for Narrow Ware Looms,	47

LET OFF MECHANISMS.

The Mason Warp Slackening Mechanism and Take Up Roll,	48
Robinson's Selvage Slackner for Cotton Looms,	48
Perham's Let Off for Cotton Looms,	49
Northrop's Let Off Mechanism,	50
Arrangement for Regulating the Tension of the Whip Roll,	50
Peckham's Conditional Let Off for Cotton Looms,	51
Cockerille's Positive Let Off for Cotton Looms,	51
Schaum's Let off Mechanism for Narrow Ware Looms,	52
Fischer's Automatic Warp Tension for Narrow Ware Looms,	53
Friction Warp Rack for Narrow Ware Looms,	54
Regulating the Tension of the Pile Warps for Double Plush,	55
Tension Regulator for Warp Beams for Narrow Ware Looms,	55

TAKE UP MECHANISMS.

Clement's Take Up Mechanism,	56
The Crompton Take Up Mechanism for Silk Looms,	56
The Mason Take Up for Cotton Looms,	58
Owen's Take Up Mechanism,	58
Owen's Arrangement for Operating Cloth Roll in Connection with the Take Up for Cotton Looms,	59
Peltier's Take Up Attachment for Cotton Looms,	60
Cloth Take Up Roll for Looms,	60

STOP MOTIONS.

	PAGE
The Fairmount Clutch and Brake Mechanism, - - - - -	61
Connecting the Dwell Stand to the Lay Sword, - - - - -	62
Bardsley's Warp Stop Motion for Cotton Looms, - - - - -	62
Arthur's Warp Stop Motion for Cotton Looms, - - - - -	63
Stop Mechanism for Draper Cotton Looms, - - - - -	64
Filling Stop Motion for Northrop Looms, - - - - -	65
Stop Motion for Northrop Looms for Weaving Blankets, etc., - - - - -	67
Draper's Warp Stop Motion for Cotton Looms, - - - - -	68
Draper's Detector for Warp Stop Motions, - - - - -	69
Allen's Feeler for Warp Stop Motions, - - - - -	69
Northrop's Warp Stop Motion, - - - - -	69
Edward's Detector for Warp Stop Motions, - - - - -	70
Draper's Warp Stop Motion, Using Two Series of Detectors, - - - - -	71
Another Warp Stop Motion for Draper Looms, - - - - -	71
Movable Warp Stop Motion, - - - - -	72
Locating the Detectors of the Warp Stop Motion Nearer to the Harnesses, - - - - -	73
Northrop's Warp Stop Motion in Which the Heddles are Used to Act as Detectors, - - - - -	73
Device for Securing the Proper Acting of Detector Heddles, - - - - -	74
Supporting Rod for Detector Heddles, - - - - -	75
Removable Detector Heddle, - - - - -	76
Allen's Detector Mechanism for Cotton Looms, - - - - -	76
Northrop's Warp Stop Motion, Acting Directly on the Shipper Handle, - - - - -	77
Stop Indicator for Looms, - - - - -	78
Device for Indicating the Reason for the Stopping of Loom, - - - - -	78
Brake Mechanism for Northrop Looms, - - - - -	79
Protector Mechanism for Draper Looms, - - - - -	80
Catterall's Loom Fork, - - - - -	81
Schaefer and Hinkel's Stop Motion for Cotton Looms, - - - - -	81
Lahue's Protector Stop Mechanism, - - - - -	82
Harriman's Slack Alarm and Stop Motion, - - - - -	83

PICKING MECHANISMS.

Goodline and Clark's Picking Mechanism, - - - - -	85
The Knowles Single Box Picking Motion, - - - - -	86
Picker Cam Point for Crompton Cotton Looms, - - - - -	87
McMichael's Picking Motion, - - - - -	88
Ainley's Picking Mechanism, - - - - -	88
Pick Finding Mechanism for Northrop Cam Looms, - - - - -	89
Syme's Picker Stick Motion, - - - - -	90
Picker Stick Check for Single Box Cotton Looms, - - - - -	90
Andrews' Picker Check, - - - - -	91
Adjustable Picker Staff Check, - - - - -	92
Thackeray's Picker Check, - - - - -	93
Begins Picker Stick, - - - - -	94
A Metallic Picker Stick, - - - - -	94
Wardwell's Pickers, - - - - -	95
Picker Rod Clamp for Plain Looms - - - - -	96
Jacques and Painchaud's Lug Stick, - - - - -	97
Houghton's Lug Strap, - - - - -	97
Bearing Strap for the Lug Strap, - - - - -	97
Picker Stick Attachment, - - - - -	98
Durham's Stirrup for Picker Sticks, - - - - -	98

SHUTTLES.

Sergeson's Thread Tension Device, - - - - -	99
Morin's Spring for Shuttle Spindles, - - - - -	99
The Crompton and Knowles Shuttle for Magazine Looms, - - - - -	100
Draper's Self Threading Shuttle, - - - - -	100
Northrop's Self Threading Shuttle, - - - - -	101
Northrop's Improved Self Threading Shuttle, - - - - -	101
Aube's Self Threading Shuttle for Northrop Looms, - - - - -	102
Stimpson's Self Threading Shuttle for Draper Looms, - - - - -	102
Improved Bobbin Holder for Shuttles for Northrop Looms, - - - - -	103
Cunniff's Cop Holder for Shuttles for Northrop Looms, - - - - -	103
Beardsell's Filling Detector for Northrop Looms, - - - - -	103
Littlefield's Cop Skewer for Northrop Looms, - - - - -	104
Cop Skewer for the Use of Worsted Yarn Bobbins in Northrop Looms, - - - - -	104
Cunniff's Holder for Cop Skewers, - - - - -	105
Hamblin's Bobbin Holding Device, - - - - -	106
Another Bobbin Holding Device, - - - - -	106
Hamblin's Self Threading Shuttle, - - - - -	107
Reinforcement Ring for Shuttles, - - - - -	107
Nason's Self Threading Shuttle, - - - - -	107
Ashby's Shuttle, - - - - -	107
Isherwood's Shuttle, - - - - -	108
Leveille's Threading Device for Shuttles, - - - - -	109
Ryon's Threading Device for Shuttles, - - - - -	109
Burgess' Threading Device for Shuttles, - - - - -	110
Donovan's Tension Device for Shuttles, - - - - -	110
Hall's Tension Device for Shuttles for Silk Looms, - - - - -	111
Huster's Shuttle for Narrow Ware and Broad Looms, - - - - -	111
Schaum's Shuttle for Narrow Ware Looms, - - - - -	111
Hamalian's Shuttle for Narrow Ware Looms, - - - - -	112
Tension Device for Shuttles for Narrow Ware Looms, - - - - -	112
Tension Device for Shuttles for Silk Looms, - - - - -	113
Lamothe's Shuttle Threader, - - - - -	113
Melvin's Shuttle Guard, - - - - -	114
Newell's Shuttle Guard, - - - - -	114

TEMPLES.

Hutchins' Temple Motion, - - - - -	115
Held and Poebner's Temple, - - - - -	115
Sykes' Temple, - - - - -	116
Painchaud's Temple, - - - - -	116
Pearson's Temple, - - - - -	117
Cunniff and Kerrigan's Temple, - - - - -	117
Allen's Temple, - - - - -	118
Stimpson's Attachment to Temples, - - - - -	119
Thread Cutting Attachment for Temples, - - - - -	119
Thread Cutting Temple for Northrop Looms, - - - - -	120
Duffy's Temple, - - - - -	120
Willemain's Temple, - - - - -	121

REEDS, HEDDLES, HARNESSES AND SUPPLIES.

	PAGE
The Excelsior Reed,	123
Wood's Reed,	123
Reed for Producing Figured Effects,	123
Reed Pliers,	124
Device for Adjusting Reed and Box Plate,	124
Patterson's Doup Heddle,	124
Wharton's Doup Heddle,	125
Shinn's Switch Heddle,	126
Clamp for Heddle Bars for Northrop Looms,	126
A Rotating Lease Rod,	127
Movable Lease Rod,	127
Device to Prevent Warp Threads from Adhering,	128
Ogden's Pick Out Comb,	128
Carr's Pick Out Comb,	128

JACQUARDS AND CARD CUTTING MACHINERY.

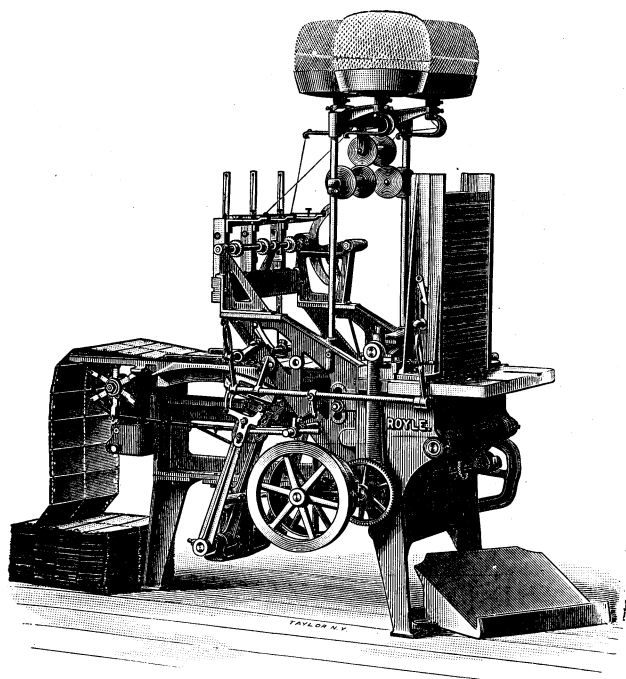
The Knowles Full Open Shed Jacquard,	129
The Crompton and Knowles Double Action Jacquard Machine,	129
Bottom Board for Jacquard Machines,	132
Method of Operating the Griffs in Jacquard Machines,	132
Dean's Driving Mechanism for Rise and Fall Jacquards,	133
Sheldon's Rise and Fall Jacquard,	133
Halton's Lingo for Wire Heddles,	134
Rigby's Lingo,	135
Royle's Foot Power Piano Card Stamping Machine,	135
The Royal Power Piano Machine,	139
Royle's Card Lacing Frame,	140

SPOOLING, WINDING, WARPING AND BEAMING MACHINERY.

Check Motion for the Furbush Spooler,	141
Stop Motion for the Altemus Spooler,	141
McTaggart's Spooler,	142
The Altemus Upright Hosiery Bobbin Winding Machine,	142
Huse's Bobbin Winding Machine,	143
Thread Tension Device for Bobbin Winders,	144
McCausland's Cop Winder,	144
A Combined Twister and Cop Winder,	145
Atherton's Winder and Quiller,	146
Ashley's Quilling Machine,	147
Raistrick's Spooling Machine,	148
Kink Preventer and Signal for Silk Twisters,	148
The Smith Warp Dresser,	149
Eastwood's Self Building Warping Reel,	151
The Denn Section Beam Warper,	151
Draper's Warping Machine,	153
Atherton's Warping Machine,	154
Indicator for Warpers,	155
Bentley's Horizontal Warper,	155
Automatic Tension Governor for Warp Beaming Machines,	156
Beaming Mechanism for Warping Machines,	158
Registering Mechanism for Warping Machines,	159
The Fairmount Cut Marker,	159
Sectional Drum for Beam Warping Machines,	161
Automatic Tension Wire and Bobbin Brake for Warpers,	161
Warper Comb,	162
Reed for Warping Machines,	162
Creel Frame,	162

MISCELLANEOUS.

Eastwood's Broad Silk Loom,	164
Beating up Motion for Ribbon Looms,	164
Beating up the Filling by Means of a Movable Reed,	165
Pitman for Cotton Looms,	165
Clement's Filling Cutter for Northrop Looms,	166
Joy's Thread Cutter for Northrop Looms,	167
Mason's Thread Cutter for Northrop Looms,	168
Locating Shipper Handle and Belt Pulleys in Cotton Looms,	169
Device for Removing Waste Yarn from Filling Carriers,	169
Supplemental Mechanism for Knowles Duck Looms,	170
Glass Beam Bracket for Ribbon Looms,	171
Bentley's Measuring Device for Looms,	171
Jensen and Comar's Measuring Device for Looms,	172
Fischer's Needle Loom,	172
Bobbin Holding Device for Shuttles,	174
Improvement to the Take up for Crompton Silk Looms,	174
A Novel Method of Operating Lease Rod,	174



AUTOMATIC LACER.

THERE ARE

Two... Ways

Of lacing jacquard cards; one by hand, on lacing frames like that shown at the foot of this page; the other automatically, on a lacing machine. Of course, lacing cards by hand is very much the more expensive method. To lace any considerable number of cards within a reasonable period, requires the services of a small army of boys. The frames, besides, take up a great deal of space. In the

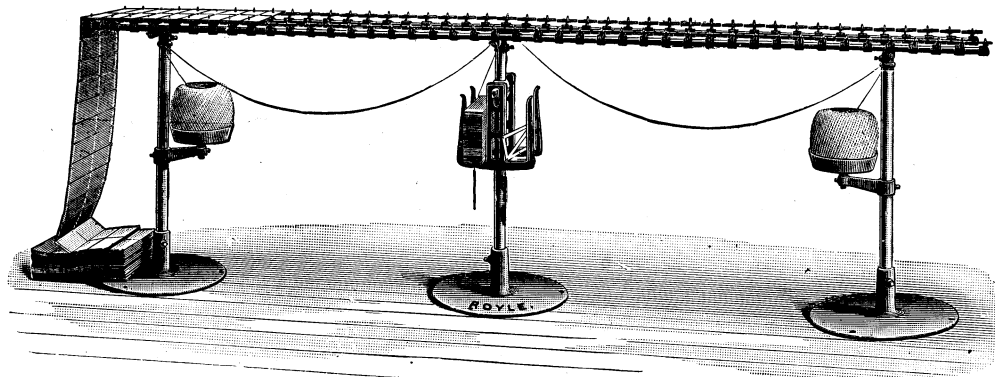
Royle Automatic Lock=Stitch Lacer,

on the contrary, is found a high productive capacity, requiring but a single attendant, condensed into the smallest possible space. A lacing machine costs more in the first place, but once in use is a constant source of revenue. The lacing frame means a small initial outlay and a big expense and wages account to maintain and use it.

JOHN ROYLE & SONS,

of Paterson, N. J.,

Make both Lacing Machines and Lacing Frames, so can serve their customers with whichever they prefer.



HAND LACING FRAME.

SHEDDING MECHANISMS.

HARNES CHAIN MULTIPLIER FOR KNOWLES LOOMS.

The object of the device is to do away with the long pattern chains required for weaving certain fabrics, as towels, with a plain body and headings, and to use a short pattern chain, which is moved in one direction or the other, as desired, and for the length of time desired, according to the pattern to be woven; in this manner permitting the use of a chain with a small number of bars for weaving the pattern desired.

In the illustrations there is shown in connection with the new mechanism a portion of a drop box pattern mechanism and of a multiplier pattern chain, both being of the construction illustrated and described on pages 10, 11 and 12 of "Textile Machinery Part I" under the heading "Mechanism for Operating Shedding and Drop Box Pattern Indicators for Knowles Looms." There is also shown in the illustrations in connection with the new mechanism, a portion of a dobby pattern chain mechanism of the construction illustrated and described on pages 14, 15 and 16 of "Textile Machinery Part I" under the heading "Shedding Mechanism for Fabrics Produced by Two Weaves."

Fig. 1 is a plan view of portions of a drop box pattern mechanism of the description shown on pages 10-12 of Part I, and a portion of the pattern cylinder and its driving mechanism of a double index dobby mechanism of the description shown on pages 14-16 of Part I. Fig. 2 is, on an enlarged scale compared to Fig. 1, a horizontal section through the reverse gears shown at the lower right hand corner of Fig. 1, showing the sliding reverse key in its outward position. Fig. 3 corresponds to Fig. 2, but shows the opposite position of the sliding reverse key. Fig. 4 is an end view of the reversing gear mechanism.

1 indicates the dobby frame, 2 the shaft of the dobby pattern cylinder 3 which is provided with a series of longitudinal grooves 4 in which extend the bars 5 of the pattern chain of which only one is shown.

The pattern chain 5 is provided with two rows of holes 6, arranged alternately to receive the pattern pins, which act on the indicator levers (not shown) of the dobby and thus control the movement of the harness frames.

The end of the dobby pattern cylinder shaft 2 has a worm gear 7 loose thereon, which is held to turn with the shaft 2 by a spring actuated clutch device 8 consisting of a spring actuated arm or dog 8', pivoted at one end on a plate 8'', the hub 8''' of which is fast on the shaft 2. A coiled spring 9 bearing at one end against a collar 10, fast on the end of the shaft 2, and at its other end against the arm or dog 8', acts to keep said dog 8' in engagement with the lugs 7' on the worm gear 7, so that the revolution of the gear 7 will revolve the shaft 2 of the pattern cylinder 3. The shaft 2 can be turned by hand if desired, the dog 8'

slipping by the lugs 7' on the worm gear 7 and the spring 9 contracting, so that the shaft 2 and the pattern cylinder 3 may be turned in either direction independently of said worm gear 7.

Secured to the dobby frame 1 are three arms or brackets 11, 11', 11'', which support the drop box pattern mechanism and also the shafts carrying the system of gears. The driving shaft 12 extends only between the frames 11 and 11' and is about half the length of the two other shafts. (See Fig. 1, dotted

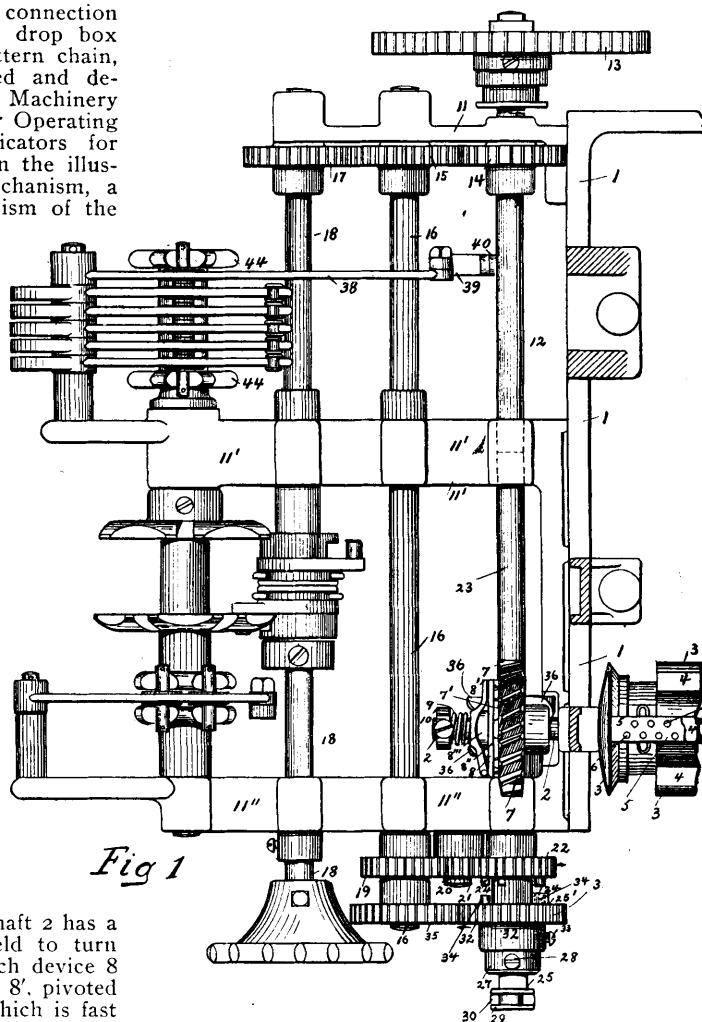


Fig 1

lines.) Gear 13 connects the new mechanism with some driven part of the loom.

The shaft 12 has a gear 14 thereon which meshes with a gear 15, fast on a shaft 16, and drives said shaft 16. The gear 15 also meshes with a gear 17, fast

on the shaft 18 of the drop box pattern mechanism, and drives said shaft 18.

On the shaft 16 is fast a gear 19, which meshes with a gear 20, loose on stud 21. The gear 20 meshes with a gear 22, loose on a shaft 23, which is

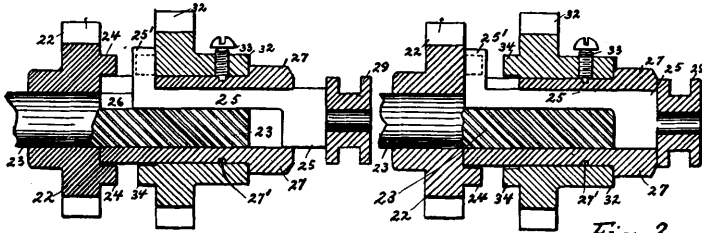


Fig. 2

Fig. 3

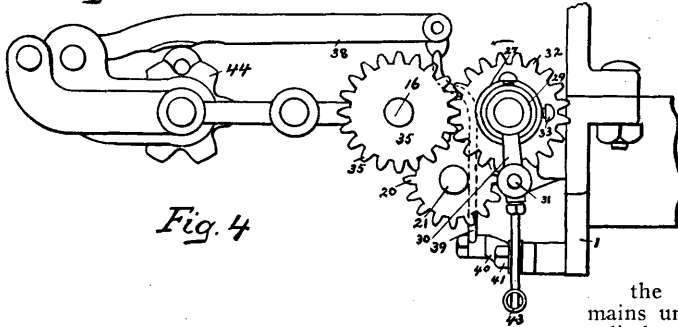


Fig. 4

in alignment with the shaft 12. The gear 22 has two pins 24 on opposite sides thereof, which are adapted to be engaged by the projecting end 25' of the sliding key 25 to cause the shaft 23 to turn with the gear 22 when desired. The sliding key 25 (see Figs. 2 and 3) extends and is adapted to have a longitudinal motion in a slot 26 in the shaft 23 and to turn with said shaft. A collar 27, secured on the end of the shaft 23 by a set screw 28, holds the sliding key 25 in the slot 26 in said shaft. On the outer end of the sliding key 25 is secured a grooved pulley 29, into which extends the yoked end of an arm 30, secured on the end of the longitudinal sliding shaft 31.

On the collar 27 in the end of the shaft 23 is loosely mounted a gear 32, which is provided with a set screw 33, the inner end of which extends in an angular groove 27' in the collar 27, to hold the gear 32 in proper position thereon.

The gear 32 is provided with two pins 34, on opposite sides thereof, which are adapted to be engaged by the projecting end 25' of the sliding key 25 to cause the shaft 23 to turn with the gear 32. With the gear 32 meshes a gear 35, fast on shaft 16.

On the shaft 23 is fast a worm 36, which extends below and engages and turns the worm gear 7 on the shaft 2 of the pattern cylinder 3. The worm 36 has a dwell of one-half a revolution, at which time the sliding key 25 is given its longitudinal motion; but the worm 36 having a whole revolution each pick, the worm gear 7, and dobbie pattern cylinder 3 are made to turn every pick of the loom with the other half of the worm.

By means of a two weave device (shown on pages 14-16 of Part I) the indication may be taken from either row in bar 5 to make the pattern perfect on the goods. In some weaves the pegging of bar 5 used in going forward would not indicate right on the reverse of the chain, in which case the second

row of holes would be used in bar 5, it being understood that one row of holes only may be used in bar 5 or a bar with a single row may be used, as desired.

The automatic movement of the reverse key 25 through sliding rod 31 is controlled and regulated by an additional finger or lever 38 over the drop box pattern chain cylinder 44. A link 39 connects the outer end of the lever 38 with an angle lever 40. The opposite end of the angle lever 40 engages with a collar on the sliding shaft 31. A spring 43, secured to a projection on the angle lever 40 below its pivot point 41, acts to draw the sliding rod 31 in, and the reversing key 25 into engagement with the pins 24 on the gear 22, as shown in Fig. 3. With the key 25 in this position the dobbie pattern cylinder 3 will continue to revolve in one direction; but when a roll on the box pattern chain comes under the lever 38, said lever is raised, and through the connector 39, angle lever 40, sliding rod 31, and arm 30, the key 25 is moved outwardly into the position shown in Fig. 2 to engage with the pins 34 on the gear 32 and cause said gear to revolve with said shaft 23, leaving the gear 22 loose on said shaft. The shaft 23 will then be revolved in an opposite direction through the gear 35, fast on the end of the shaft 16, and likewise the dobbie pattern chain cylinder 3 will be revolved in

the opposite direction. As long as the roll remains under the lever 38 the dobbie pattern chain cylinder 3 will continue to revolve in the same direction. When a roll does not come under the lever 38, said lever will drop and the spring 43 will act to move the sliding rod 31 and through connections the key 25 to engage with the pins 24 on the gear 22 and cause the dobbie pattern chain cylinder 3 to turn in the opposite direction. Thus the dobbie pattern chain is alternated or turned forward or backward automatically, as desired, and for the length of the pattern desired. (Crompton and Knowles Loom Works.)

THE CROMPTON HARNESS LEVELING DEVICE FOR DOBBIES.

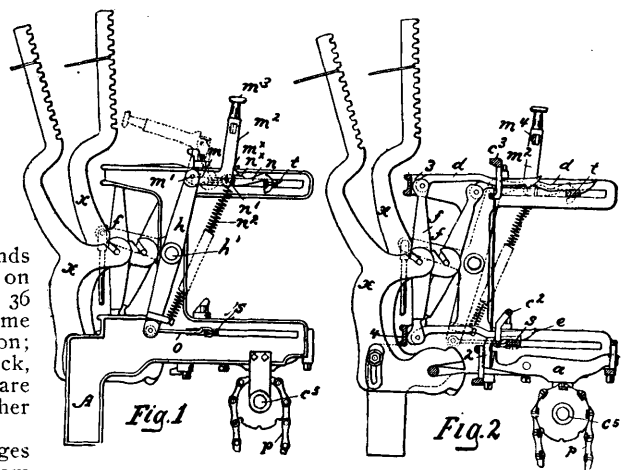


Fig. 1

Fig. 2

The object of this device is to impart to the lifters or depressors or, as they are sometimes termed, "knives" of a dobbie, a movement independent of the movement of the same by the usual harness shifting

devices for the purpose of changing the relative positions of said knives for leveling the harness, to enable the operator to more easily get at the loose or broken threads for adjustment or repair.

Fig. 1 is a side elevation of the new mechanism, Fig. 2 a vertical longitudinal section thereof, and Fig. 3 a detail showing the jointed connection as collapsed for evening.

A indicates the frame, x the harness levers, f the connectors, 3 and 4 stops, t and s lifters, d and e the hooked jacks jointed to the connectors f , c^1 c^2 the grids, c^3 the shaft, p the pattern chain, and a the levers provided at their front ends with toes 2.

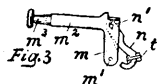
One of the lifters—as for instance s —is connected by a link o with an actuator h , shown as a lever fulcrumed upon a shaft h' , mounted in the frame and actuated by a rod. At its end opposite the link o the said actuator h is connected with the other lifter or blade t through the medium of a jointed connection, consisting of the two members m , n , the former of which is jointed at m' to the actuator h , the latter being hooked at its end to engage an eye in the extended end of the lifter, the said members m and n being jointed together at their adjacent ends, as indicated at n' .

A spring n^2 , connected with one of the members—as for instance the member n —and at its opposite end with a support, as the lower end of the actuator h , tends constantly to hold the two members in their horizontal extended positions, Fig. 1, said members being provided with stop surfaces n^x and m^x to limit the spring actuated movement of the members and give to the latter the firmness and rigidity which are necessary, when in the position shown, to enable the lifter to be reciprocated by the vibrations of the actuator h .

One of the members, as m , is provided with a vertically extended arm m^2 , provided with a handle m^3 , and which is connected by a cross bar m^4 with the vertical arm of the corresponding member of the jointed connection at the opposite side of the loom.

In the normal operation of the loom with the parts as in Fig. 1, the lifters will be vibrated and will engage the hooked jacks and vibrate the harness levers x according as the pattern chain p determines.

If it should be desired to stop the loom for access to and to mend a broken warp thread, the loom will be stopped in its position, substantially as shown in Fig. 1, with the upper lifter at or near its extreme outermost position. The operator, by means of the handle m^3 , now throws the said handle over into its dotted position Fig. 1, thereby breaking the joint



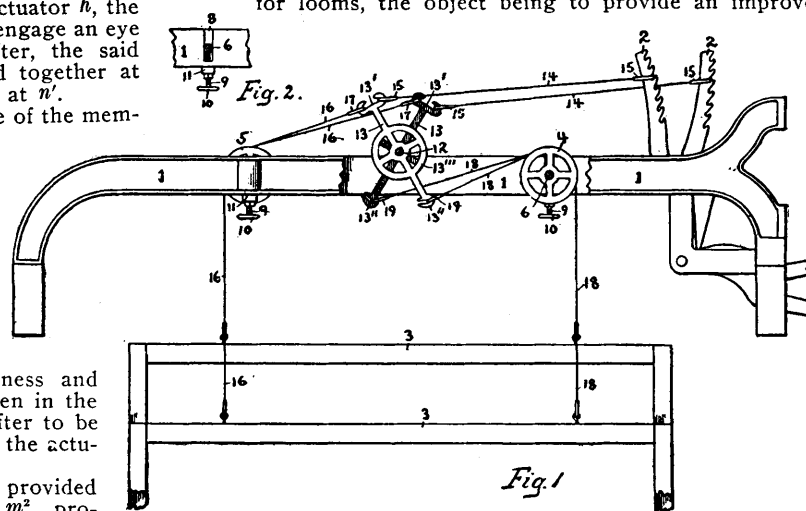
and collapsing the connection, drawing the lifter t , movement of which is also assisted by the weight of the levers of the harnesses connected for the time being, thereto into its dotted position Fig. 1, nearly or quite over the lower lifter s , such movement of the lifter t dropping the harness levers connected with it into the same plane as those controlled by the lower lifter.

This brings all the harnesses and their warps into sub-

stantially the same plane where they are easily accessible to the operator for repairing, etc. When the loom is started, the inward movement of the parts turns the lever h on its pivot h' from its full line position Fig. 1, and since the lifter t was already in its extreme position at the left, the movement of the upper end of the lever actuator h away from it acts to automatically straighten the jointed or toggle connection again into its full line position Fig. 1, so that the next time the upper end of the lever moves to the right, it will push before it the lifter t , said jointed connection thereafter remaining in its extended and rigid position until again broken by the operator, as before described. (*Crompton and Knowles Loom Works.*)

IMPROVED HARNESS LEVER FOR KNOWLES LOOMS.

The improvement relates to shedding mechanism for looms, the object being to provide an improved



jack by means of which equal travel of each end of the harness frame will be obtained, and the top of the harness frame will always extend in a horizontal plane whether in its raised or lowered position.

In the ordinary construction of the shedding mechanism the harness levers or jacks have straight notched arms to which the connectors leading to the harness sheaves are attached. In the improved construction these arms of the jacks are curved instead of straight, and the series of notches in each arm extend in a curved line instead of a straight line.

Fig. 1 shows the upper portion or arches of a loom frame, partially broken away, with the improvements applied thereto, two harness levers or jacks and the upper part of two harness frames being shown; Fig. 2 is a detail showing the manner of adjusting the shaft which carries the sheaves. Fig. 3 shows, on an enlarged scale, one of the angular harness levers or jacks shown in Fig. 1 detached, with the lower notched arm complete.

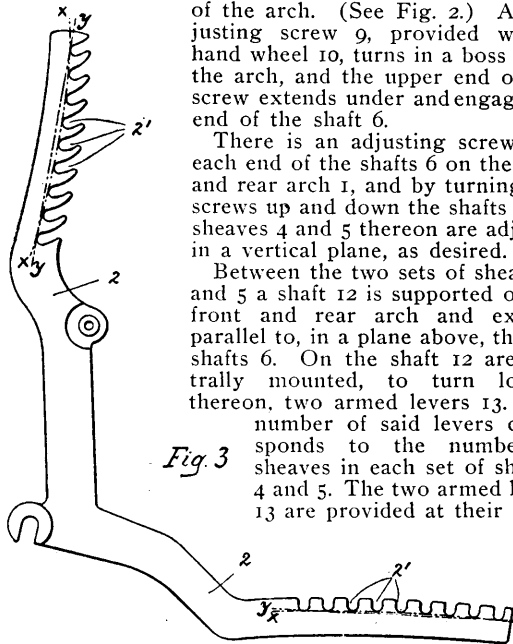
1 are the arches, or upper portion of a loom frame, 2 are the angular harness levers, or jacks, centrally pivoted on a rod. The harness levers 2 have the upright arms with notched inner edges and the horizontal arms with notched inner edges, which are connected by cords to the harness frames 3, the upper portions only of which are shown in Fig. 1. The angular harness levers or jacks 2 have the end portions thereof, where the notches 2' extend, curved

instead of straight, so that the inner ends of the series of notches 2' in each arm of the lever 2 will lie in a curved line *x* between the two end notches instead of a straight line *y*, as shown in Fig. 3.

Two sets of sheaves 4 and 5 extend between the front and rear arch 1, and each set is mounted and turns loosely on a shaft 6, which extends at each end in a vertical groove or recess 8 in the inner side of the arch. (See Fig. 2.) An adjusting screw 9, provided with a hand wheel 10, turns in a boss 11 on the arch, and the upper end of said screw extends under and engages the end of the shaft 6.

There is an adjusting screw 9 at each end of the shafts 6 on the front and rear arch 1, and by turning said screws up and down the shafts 6 and sheaves 4 and 5 thereon are adjusted in a vertical plane, as desired.

Between the two sets of sheaves 4 and 5 a shaft 12 is supported on the front and rear arch and extends parallel to, in a plane above, the two shafts 6. On the shaft 12 are centrally mounted, to turn loosely thereon, two armed levers 13. The number of said levers corresponds to the number of sheaves in each set of sheaves 4 and 5. The two armed levers 13 are provided at their upper



ends with two oppositely extending hooks or open end slots 13', and at their lower ends in this instance with one hook or open end slot 13''.

The levers 13 intermediate their ends are provided with the circular or disk portion 13''', which makes the lever stiffer and more rigid and furnishes a surface for two contiguous levers to slide on, as said levers are moved in opposite directions. The diameter of the circular portion 13''' is a little greater than one-third and less than one-half the length of the lever 13; but the circular portion is small enough so as not to interfere with or come in contact with the connection attached to the lower end of said lever when the lower end is moved to the left, as shown in Fig. 1.

From each harness lever or jack 2 a connection 14 extends to the upper end 13' of the lever 13. Said connection 14 is provided with a metal loop or link 15 at each end, which fits over the notched end of the harness lever and over the hook next to the harness lever on the lever 13. A second connection 16, provided with a loop or link 17 which fits over the other hook on the upper end of the lever 13, leads over the top and outer edge of a sheave of the outer set 5 and is connected at its other end to the top of a harness frame 3 near the end thereof. A third connection 18, provided with a loop or link 19 which fits over the hook on the lower end of the lever 13, leads over the top and outer edge of a sheave of the inner set of sheaves 4, and is connected at its other end to the top of a harness frame 3 near the end thereof.

The curvature of the notched edge of the upright arm of the harness levers 2, previously referred to, when the upright portions of said levers are in their central position—that is, midway between their right

and left extreme position—corresponds to the arc of a circle, the center or axis of which is the point of connection between the connection 14 and the two armed lever 13 when the upper part of said lever is in its central position—that is, midway between the extreme right and left position shown in Fig. 1.

By making the notched edges of the harness levers 2 curved, as previously described, each notch in the upright arm of the lever (when the upright arm of the lever is in its central position) is at the same distance from the point of connection between the connection 14 and the two armed lever 13 (when said lever is in its central position) and the lower arm of the two armed lever 13 must move equal distances from a vertical line drawn through the pivot of said lever and so maintain equal angles of the connections from said lever relative to the sheaves and lift the harness frame the same distance at each end of the frame without regard to what notch 2' in the upright arm of the lever 2 the link 15 on the connection 14 engages.

In the case of straight upright arms of harness levers the distance between the upper and lower notches and the point of connection of the connection 14 with the upper arm of the two armed lever 13 will vary and the angles formed by the connections with the sheaves will vary, so that the harnesses will not lift evenly unless the straps or connections 14 are of different lengths for the different notches.

By making the notched edges of the harness levers curved, it is not necessary to have connections 14 from the harness levers of different lengths for the different notches. The same connection may be used from the top notch as well as from the bottom notch or any intermediate notch, the distance from each to the point of connection of the connector 14 with the upper arm of the two armed lever being the same. (Crompton and Knowles Loom Works.)

IMPROVEMENT TO THE KNOWLES SHEDDING MECHANISM.

In the new construction there are substituted for the two frames as previously used for supporting the two sets of two and three armed levers, a single frame made in one piece, and for said levers, segments of circles or sheaves having grooved edges to receive the connectors leading to the top of the harness frames and the transverse bars or sections of the frame which connect the side bars together are made in the shape of drip pans to catch any drippings of oil with which the parts of the shedding mechanism may be lubricated.

Fig. 1 shows the upper portion or arches of a loom frame and a sectional view of the improvements applied thereto, taken on line 1-1 Fig. 2, looking in the direction of arrow *b*, same figure. Two harness levers or jacks and the upper part of two harness frames are shown. Fig. 2 is a plan view of the central portion shown in Fig. 1, looking in the direction of arrow *a*, same figure. The connections to the harness levers are not shown. Fig. 3 is a side view of the frame detached, looking in the direction of arrow *b*, Fig. 2. The sheaves and their connections are not shown.

Between the loom arches 1 is supported the adjustable and removable frame 4, which carries the two sets of sheaves. The frame 4 consists of the two parallel side bars 5, each having two outwardly extending ears or flanges 6, which extend over the top of the arches 1, as shown in Fig. 2, and are provided

with adjusting screws 7 to level and adjust the frame 4. A lug or knob 8 extends out from each bar 5 and enters a vertical slot 8' in the inner side of the loom arches to hold the frame in place, as shown in Fig. 2.

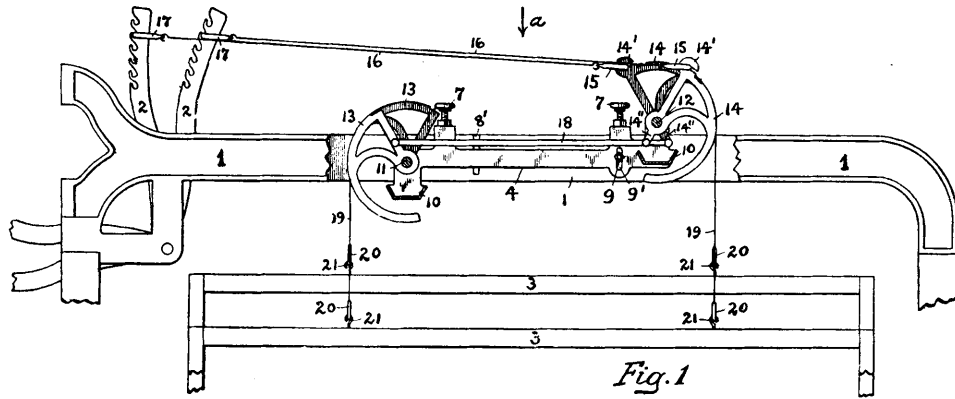
A bolt 9 extends through a hole in the loom arch and through a vertical slot 9' in each side bar 5 of the frame 4 to secure the frame to the loom arches and prevent its being tilted at the end.

The side bars 5 of the frame are connected at each end by the transverse bars or plates 10, which are made integral with the side bars 5, as shown in the drawings, and in the shape of and to form drip pans. Extending over each drip pan 10 and secured in the ends of the bars 5 of the frame 4 are two shafts 11 and 12. Upon said shafts are loosely mounted the segments of circles or sheaves 13 and 14. The shafts 11 and 12 do not lie in the same horizontal plane, but the shaft 12 is mounted in stands 12' which extend above the side bars of the frame.

The sheaves 14 are formed with a hook 14' at the upper end thereof, over which extends a link 15 which is connected by a wire 16 with a link 17, extending over the upright arm of the harness lever 2 and fitting into one of the notches therein. The sheaves 14 are also provided with a downwardly extending arm 14'' below its pivot point, and to said arm is pivotally attached one end of a bar 18. The other end of the bar 18 is pivotally attached to the sheave 13 above its axis, as shown in Fig. 1. Said bar 18 extends in a horizontal plane and parallel with the side bars 5 of the frame 4.

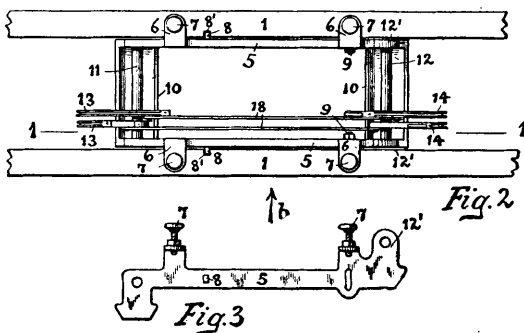
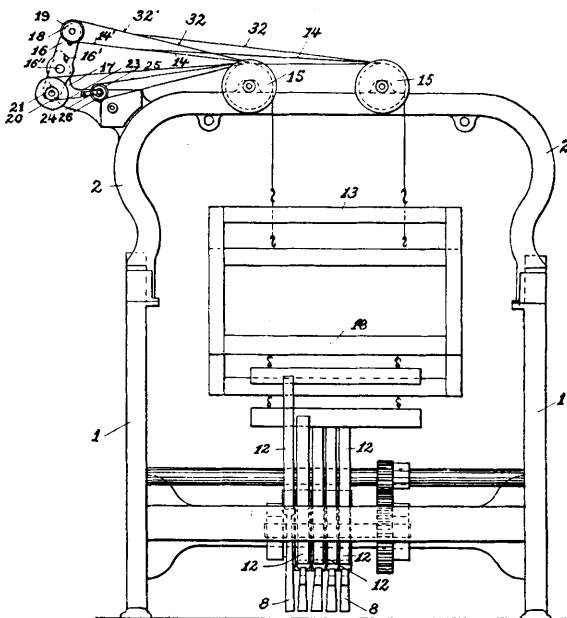
The outer edge of the sheaves 13 and 14 are grooved to receive the cord or connection 19 which is fastened

construction and arrangement of the sheaves and connections, raised equally at each end. (Crompton and Knowles Loom Works.)



TOP RIGGING FOR CAM LOOMS.

The improvement relates to looms in which the harnesses are governed by a series of under cams which are operated from the picking shaft. The object is to simplify the top rigging and to place it to one side of the loom instead of directly over the harness, and thus remove any risk of oil from the journals falling upon the warp. The illustration represents the front view of a loom showing the harness frames,



at one end of the upper part of the sheave and at the other end to a link 20, connected by a screw 21 with the top bar of the harness frame 3.

The operation of the shedding mechanism is thus: As the harness levers 2 swing or move back and forth on their pivotal support, the harness frames through connections 16, sheaves 14 and 13, connector bar 18, and connections 20 to the harness frames, are by the

the under cams and levers, in connection with the improved top rigging.

1 are the loom sides, 2 the top rail or arch, 13 are the harness frames, 12 are the straps connecting the harness frames with the treadles 8.

The top rigging mechanism consists in a main lever 16, centrally pivoted at 16'' upon a stand or bracket

17. This lever can be oscillated back and forth as desired by the harness, or it can be locked by means of a pin 16'. On the upper and lower end of lever 16 are loosely mounted two strap carriers in the form of rolls 18 and 19, and 20 and 21 respectively. Each pair of rolls may be attached together or made in one piece. To the roll 21 is attached one end of a strap 23 which has at its other end a loop 24, carrying two rolls 25 and 26 attached together and turning freely upon a pin. Upon each roll as 18 and 19, (also 20 and 21, 25 and 26) is attached on opposite sides a strap as 14' and 32', to the ends of which are attached two other straps as 14 and 32 which pass over the pulleys 15 and connect with the top part of the harness frames 13. Thus it will be seen that the harness frames connected with each pair of rolls must work in opposite direction, as for instance when the harness frame connected to strap 32' is up the one connected to 14' must be down, and *vice versa*.

The double roller arrangement 20 and 21, 25 and 26, on the lower end of lever 16 is for operating an odd number of harness as three or five, the arrangement alone operating three harness, and if used in connection with the top rolls 18 and 19, five harness.

As is shown in the illustration two harness can be operated alone from the rolls 18 and 19.

The rolls 20 and 21 may be locked to the lever 16 by means of a pin (not shown) and the rolls 25 and 26 used to operate two harness, or in connection with rolls 18 and 19 four harness.

Thus the rigging shown in illustration can be used for either two, three, four or five harness as the case may require. (*Crompton and Knowles Loom Works, Worcester, Mass.*)

CROMPTON & KNOWLES LENO MOTION.

In looms for cross or leno weaving the warp threads are usually divided, the standard warp being drawn from one beam, the whip threads from a second beam. The whip threads after leaving the beam are passed over a "slackner."

The object of the new device is to provide improved means for vibrating the slackner and holding the same in position under the tension of the warp threads drawn thereover.

In the new mechanism we find the auxiliary harness moving mechanism connected with any harness frame to be moved thereby in a manner which will enable said frame to be moved by said auxiliary mechanism without moving the harness lever for that frame, at the same time permitting such harness frame to be moved by its harness lever without moving the auxiliary mechanism.

Fig. 1 in front elevation, shows a sufficient portion of a loom and the new mechanism so that the construction and operation of the latter is readily understood. Figs. 2 and 3 are cross sectional diagrams showing the parts in different positions and Fig. 4 is a detail perspective of the connecting means between the harness lever, the auxiliary harness moving mechanism, and the harness frame.

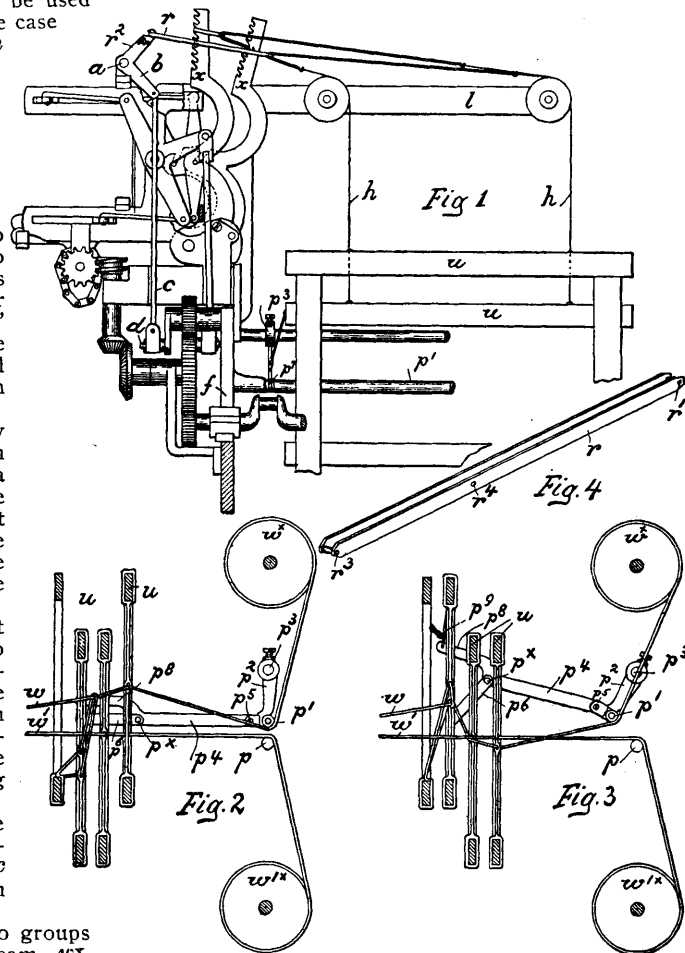
l indicates the arch of the loom frame, *w* the harness levers, *h* the harness straps, *u* the harness frames, *a* the rock shaft, *b* its lever, *c* the actuating connection as connected with crank *d*.

The warp threads are shown as divided into groups *w w'*, the threads *w* being drawn from beam *w^x*,

shown as mounted in an elevated position on the loom frame, the threads *w'* being shown as drawn from a separate beam *w^x*, mounted also in the loom frame, but beneath the beam *w^x*. One set of threads, as *w'* (standard threads) are drawn over the whip roll *p*, whereas the whip threads *w*, which are the threads to be crossed, are drawn from the beam *w^x* down and about the slackner *p'* which is made to vibrate by mounting the same in the free ends of the depending arms *p³*, fast on the shaft *p³* as journaled in the loom frame, and to the lower end of which is jointed at *p⁵*, one end of a toggle lever *p⁴* jointed at *p^x* to its co-operating toggle lever *p⁶*, the latter at its opposite end being jointed at *p⁷* to a fixed support, as the frame *f*.

The lever *p⁴* is provided with an arm *p⁸*, which extends beyond the joint *p^x* and is connected by a link *p⁹* with that one of the harness frames *u* which governs or co-operates in governing the crossing of the thread *w'*, thereby constituting one form of means connected with a moving part of the loom for vibrating the slackner *p'* through the medium of the toggle lever described.

When the harness frame to which the link *p⁹* is connected is raised, it will operate to buckle the toggle levers as shown in Fig. 3, to thereby draw the slackner *p'* toward the harness to give out sufficient lengths of threads *w* to enable the same to be properly



crossed, as shown in said figure. When the said harness frame is dropped to its position Fig. 2, the toggle levers are restored to their normal position, as there shown, said levers then holding said slackner in fixed position.

An advantage for the new mechanism consists in that when the levers p^4 and p^6 are in their normal position Fig. 2, they lie in a direct line between the slackner p^7 and the fixed point p^7 on the frame, so that the tension of the threads w , tending at such times to draw the slackner toward the harnesses, is received directly by the said pin and the frame or support and not by the harness frame or part to which it is connected and by which it is operated.

The connections h , for that harness frame which is to be moved by the auxiliary mechanism instead of being connected directly with and to be moved by the harness lever for that frame are connected by a pin r^1 , with one end of a link like connection r connected with an arm r^2 fast on the rock shaft a of the auxiliary harness moving mechanism, said link being connected with said arm by a pin r^3 . (See Fig. 4.) Intermediate its length, however, and in position close to and at the left of the said harness lever Fig. 1, the link r is provided with another pin r^4 , so that whenever the harness lever passing through the link is vibrated it will engage the pin r^4 and, through the latter and the link, raise and lower the harness frame connected with said link, the latter at such times sliding freely past and without moving the arm r^2 of the auxiliary mechanism. When, however, it is desired to move said harness frame by the arm r^2 of the auxiliary mechanism, as for a half and return movement characteristic of leno weaving, said link slides freely past and without moving the harness lever protruding therethrough. The pins r^3 r^4 , constitute independent connections between the auxiliary harness moving mechanism and frame, and the harness lever and frame enable the latter to be moved by either said auxiliary mechanism or lever independently and without moving the other. (*Crompton and Knowles Loom Works.*)

STAFFORD'S INDICATING DEVICE FOR DOBBIES.

The object of the improvement is such a construction of the indicating device of a dobby as to permit the successful use of wooden pegs.

The improvement is shown in the accompanying illustrations of which Fig. 1 is a view representing in vertical section a pattern barrel as well as part of a pattern chain, also representing in side elevation a pair of indicator fingers, the needle and hooks which are controlled in position by the said indicator fingers, the jack to which said hooks are pivoted, and the harness lever with which said jack is connected. Fig. 2 is a view of the pattern cylinder, pattern chain bars, and indicator fingers in elevation looking from the right hand side in Fig. 1. Figs. 3 and 4 are views in vertical section on the dotted lines 3-3 and 4-4, respectively, in Fig. 1.

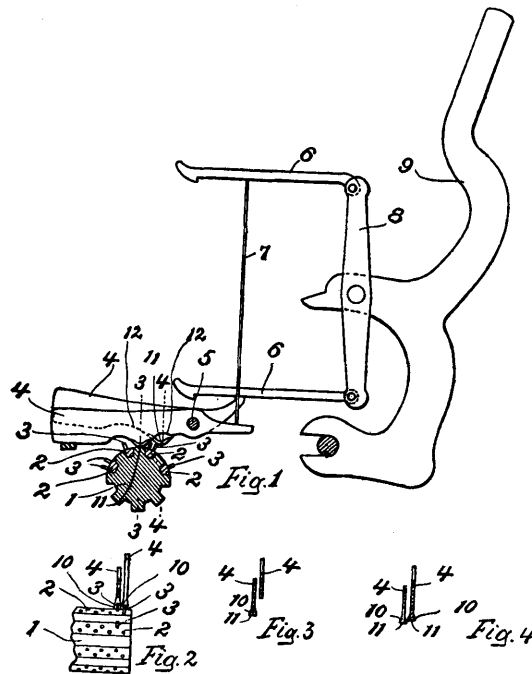
1 indicates the pattern barrel, 2 the pattern chain, 3 the pegs and 4 the indicator fingers as acted upon by the pegs 3.

The indicator fingers 4 are mounted on a rod 5, and control the position of the hooks 6. In Fig. 1 one of the said hooks is shown resting on the inner end of one of said indicator fingers 4. A vertical needle 7 is shown supported by the inner end of the other finger and the other hook rests on the upper end of the said needle. 8 is the jack having the said

hooks pivoted to its opposite ends, and 9 is the harness operating lever to which the jack is connected.

Customarily the surface on the lower edge of each of the indicator fingers with which the pegs 3 engage is grooved to receive the ends of the said pegs, the indicator fingers and the parts which are operated in connection therewith being made as thin as consistent with proper strength and are brought as closely together as possible in order to reduce the necessary length of the bars of the pattern chain to the minimum.

Sometimes in order to reduce the number of bars two rows of indicator pegs (answering two successive sheds) are applied to each bar of the pattern chain, as shown in the illustrations. The indicator pegs upon the bars, both when a single row of pegs is used thereon (single index) and a double row (double index) is used, are spaced closely to agree with the spacing of the indicator fingers. These features of construction give rise to the following disadvantages. The indicator fingers as hung on the rod 5 somewhat loosely are in consequence liable to become shifted slightly to one side or the other of the center lines of the pegs which are intended to act upon the same. Hence in consequence of the close compactness or crowding of the parts, it happens occasionally that a pointed, inclined, or crooked peg on coming into place adjacent to the indicator fingers will pass to one side or the other of the indicator finger or lever which should be moved thereby. This quite frequently is the case at present, and the result is a mispick in the



cloth being woven. With the ordinary construction of indicator fingers, also, it frequently happens that a little defect in the chain or the fingers—for example, an inclined or crooked peg or a slight displacement of the fingers—will cause two fingers to be indicated by a single peg when but one thereof should be indicated, which of course occasions an imperfection in the cloth. For the sake of lightness it frequently is the case that pegs made of wood are employed. Wooden pegs wear out rapidly in consequence of

their contact with the narrow grooved edges of the indicator fingers and it frequently is found difficult to weave satisfactorily on a double index dobby having indicator fingers of ordinary form and construction, for the ends of the wooden pegs which come in contact with the fingers fray out and spread so as to engage with or indicate two adjoining fingers when one of them alone should be indicated.

The object of the new mechanism is to provide an improved construction of indicator fingers free from the foregoing disadvantages. This new construction is clearly shown in the illustrations, showing the projecting portions on the under edges of the indicator fingers and with which the indicator pegs engage, instead of being located at the same point in the length of each of the two indicator fingers which are concerned in controlling the operation of a given harness lever, so that the projections on the pair of fingers come side by side, which is customary in practice, are, on the contrary, located at different places in the lengths of the respective indicator fingers, so that the projection of one finger is located in advance of the similar projection on the other finger of the same pair.

This obviates the likelihood of mispicks resulting from two indicator fingers being raised by the action of a single peg on the pattern chain. Moreover, the lower portion of each of the said projections is broadened, as at 10, so as to present a flat surface 11 to the action of the pegs which is considerably broader than the acting edges of the indicator fingers have heretofore been made. The advantages gained by thus broadening the acting edges of the indicator fingers are very great. It enables a broader peg to be used on the pattern chain, which saves wear upon the indicator finger and also upon the peg, thus facilitating the use of wooden pegs, as well as obviating mispicks in consequence of the peg passing to one side of a finger which has worked a little to one side. Heretofore the construction of the indicator fingers has not permitted of this broadening of the edges of the projections; but by locating the projection on one finger somewhat in advance of the other finger of such pair and in addition cutting away the material of each finger or lever adjacent its projection, as at 12, no difficulty is experienced in giving sufficient breadth to the acting portion of each of the projections and in providing free clearance for the widened portions in the movements of the indicator fingers, while the said fingers are permitted to lie as close together side by side as heretofore. (*Crompton and Knowles Loom Works.*)

THE CROMPTON TWO WEAVE SHEDDING MECHANISM FOR DOBBY COTTON LOOMS.

The mechanism has for its object the weaving of fabrics employing a plurality of pattern surfaces in the form of chains adapted to be operated successively—for example, one during the weaving of a border or end and the other during the weaving of a plain portion or body of a fabric.

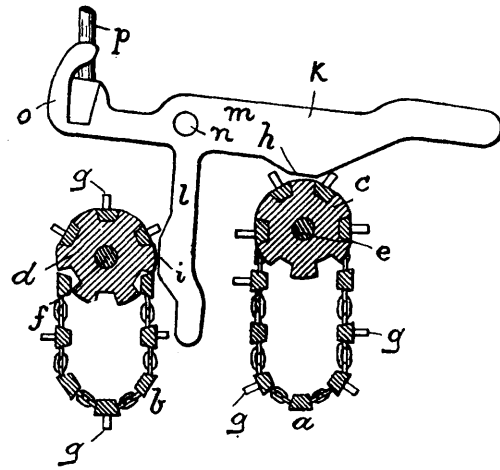
The gist of the new mechanism is to simplify and improve pattern mechanisms of the class referred to, whereby the change from one pattern to another and the operation of the loom is facilitated.

The illustration is a diagrammatical section of the pattern surface relatively to the parts moved thereby, its peculiar construction being the means of permitting a quick exchange from one weave to the other weave.

Examining illustration we find the pattern surfaces, shown as two in number and indicated by *a* and *b*

being chains mounted upon cylinders *c* and *d* fixed upon shafts *e* and *f*, journaled in bearings in or carried by the dobby frames. Loose upon the shafts *e* *f*, respectively, are fixed the worm wheels driven continuously by a worm arranged between them, said worm being driven from some working part of the loom.

The pattern surfaces *a* and *b* are formed (according to the weaves required) with pins or projections *g*, which are adapted to co-operate with and effect the operative movement, rise and fall, of the selecting surfaces *h* *i* on the arms *k* and *l* of the selecting fingers *m* fulcrumed at *n* and constructed in a manner to cause the shifting of the hooks of the dobby, said fingers being provided at their inner ends with the horns *o* and pockets for the reception of the rods *p*.



The arms *k* and *l* stand at right angles with each other, so that one is acted upon by and at the top of its pattern cylinder and the other by and at the side of its pattern cylinder, the latter for this purpose being arranged at a lower level than the former.

The surfaces *a* *b* when operated move continuously, and the clutch devices and their actuating mechanisms are so adjusted that the pattern surfaces are always stopped in a position, as shown in the illustration, with the selecting surfaces *h* *i* standing in position opposite the space between two adjacent or successive projections of their pattern surfaces. In other words, any projection lifting its selecting surface is permitted to pass that surface before the chain carrying that projection is stopped, and by so doing said chain is always left in readiness to immediately engage and move its selecting surface when again set in motion.

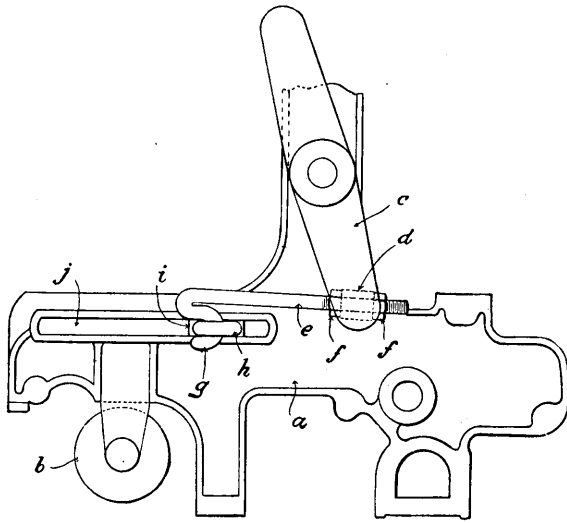
By thus stopping each pattern surface with its co-operating selecting surface in position between two of the pattern surface projections said pattern surface is always in readiness to move said selecting surface on initial movement of the pattern surface, enabling the change from one pattern to the other to be effected more quickly than is possible with mechanisms of this class as heretofore constructed. (*Crompton and Knowles Loom Works.*)

STAFFORD'S IMPROVEMENT TO DOBBIES.

The new construction refers to the hooked rods or links which connect the ends of each knife or lifter in a dobby with the corresponding arms of the

actuating rockers, in turn providing a rod or link having a form of hook which will be free from tendency to slip out of position and to occasion break-

the rocker and cannot by any possibility, in consequence of any amount of wear, work out of place, so as to occasion breakage. (*Crompton and Knowles Loom Works.*)



age of either the hook or the eye, as in the case of the old form of construction.

The accompanying illustration shows in side elevation a portion (as much as is necessary to explain the improvement) of a dobby having the new device applied thereto.

a designates a portion of the dobby frame, and *b* the pattern cylinder. The rocker at one side of the dobby is shown at *c*, the swivel applied to the lower arm of the said rocker being shown at *d*. *e* is a hooked rod or link it having its stem passed through the said swivel and adjustably secured relatively thereto by means of the nuts *f* upon the screw threaded portion of the said stem at opposite sides of the swivel. *g* is the hooked end of the rod or link *e*. *h* is the eye, in which the said hooked end of the rod or link *e* engages, and *i* is one of the knives or lifters, it being provided at the end thereof with the said eye *h*. The slot or guideway in which the end of knife or lifter *i* moves is designated *j*. The characteristic of the improved hook *g* is the fact that it is recurved or reversed, whereby the convex side thereof is presented toward the rocker *c*, so that in the movement which carries the knife or lifter *i* outwardly (it is in the outward movement of the knife or lifter that the latter does its main work — *i. e.*, engages with the selected jack hooks and carries them outward for the purpose of operating the corresponding harness levers and raising the required harness frames) the push is transmitted by the concave side of the hook *g* to the eye *h*.

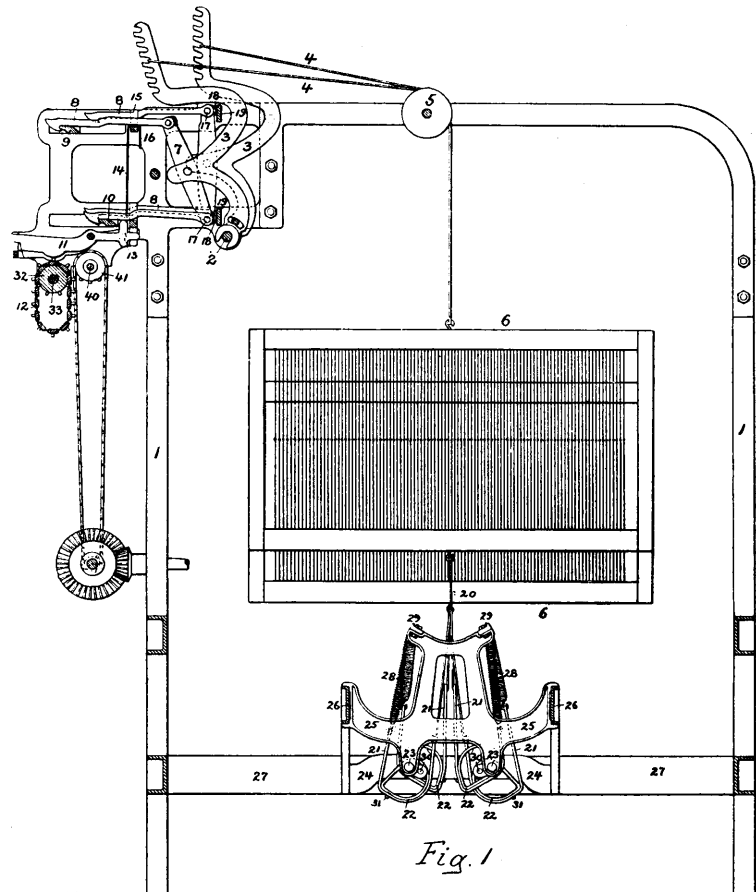
The form of hook *g* is such that it fits securely in place in eye *h* and merely rocks slightly in the said eye in consequence of the curvilinear path of the point of connection of the hooked rod or link *e* with

INGRAHAM'S SHEDDING MECHANISM.

The object of this mechanism is to provide means whereby each pattern lever is caused to control both the upper and lower jacks of a pair, said jacks having a stop for limiting their movement. The driving mechanism for the pattern chain drum is self releasing when meeting with any obstruction, and the construction of the compensating spring under motion whereby the heddles are drawn downward is improved.

Fig. 1 is a front view, partly in section, of sufficient of a loom to illustrate this shedding mechanism. Fig. 2 is a view, on an enlarged scale compared to Fig. 1, of the driving mechanism for the shaft of the pattern chain drum; and Fig. 3 is a plan or top view of the same, partly in section.

1 indicates the frame having in the upper portion a shaft *2*, to which are hung the harness levers *3*, the upper ends of which are notched for the reception of cords *4*, which pass over pulleys *5* and are connected to the harnesses *6*. Hung to each of the harness levers *3* is a lever *7*, which is pivoted about midway of its length and carries both at its upper and lower end a hooked jack *8*, the upper jacks being actuated by a sliding bar *9* and the lower jacks by



a similar bar *10*, reciprocating motion being imparted to these bars by any form of mechanism, so that the

upper bar moves inward as the lower bar moves outward, and vice versa. Each of the lower jacks 8 is under the direct control of a lever 11, actuated by the pins of a pattern chain 12, so that the hooked end of said lower jack may be raised out of range of the bar 10 or dropped into range of the same.

From the side of each of the levers 11 projects a pin 13, around which is bent the lower end of a wire 14, which projects upward to the grid 15, which guides the upper jacks 8, the upper end of each wire 14 being bent so as to form a double yoke 16, occupying the slot of the grid beneath its respective jack 8, the two runs of wire in the yoke lying side by side, so as to provide for the proper support of said jack. The operation of either of the pattern levers 11 will thus effect the simultaneous lift or drop of both upper and lower jacks of the corresponding jack lever 7; each of which has at each end a projecting pin 17, adapted for the reception of the eye at the inner end of the jack lever 8, and on each end of the lever is a projecting segmental web or rib 18, which by contact with a fixed bar or brace 19 on the loom frame serves to arrest the movement of the end of the lever and provides a proper fulcrum bearing for the same when its other end is moved under the action of one of the reciprocating bars 9 or 10.

The lower end of each of the harnesses is connected by a cord 20 to a strap 21, which is secured to a lever 22 by a pin 31; said lever being hung to a rod 23, mounted in frames 24 and 25, which are secured to beams 26, carried by transverse beams 27 of the loom frame. There are two rods 23 and two sets of levers 22, and the strap 21 of each lever is connected at one end to the cord 20 and at the other end to a spring 28, which is secured at its upper end to bar 29, carried by the frames 24 and 25.

Each of the levers 22 has a curved face, eccentric in respect to the axis of the fulcrum rod 23. Hence in the operation of the device the pull of the springs upon the harnesses is graduated to accord with the strain upon the warp, so that the strain upon the harness levers by means of this under motion is equalized.

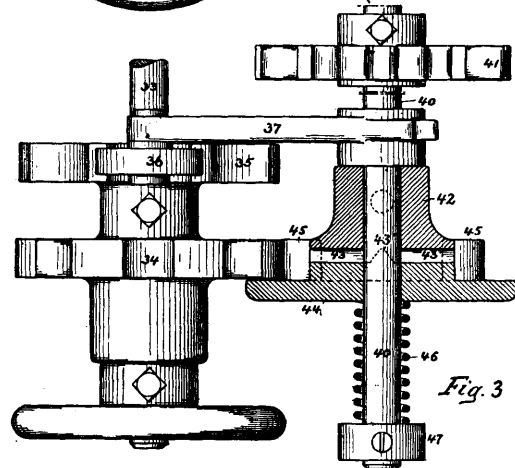
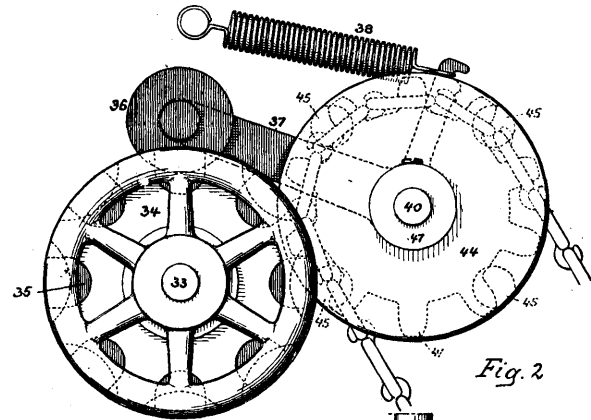
A bar 30 passes through each series of the levers 22 and serves by contact with the upper portion of each lever to limit the outward swing of the same, and thus govern the extent of depression of the harnesses. The best leverages are obtained when each lever 22 has its face partly eccentric and partly flat, as shown, the spring end of the strap leading from the flat face.

The pattern chain drum 32 is secured to a shaft 33, to which is also secured a disk 34, see Fig. 2, having a series of recesses uniformly spaced around its periphery, the hub of said disk also having another disk 35 with peripheral recesses adapted for the reception of a retaining roller 36, which is carried by a lever 37, acted upon by a spring 38, and hung to a shaft 40 adjacent to and parallel with the shaft 33.

Secured to the shaft 40 is a sprocket wheel 41, which is driven by a chain, as shown in Fig. 1, and to said shaft 40 is also secured a hub 42, with notches adapted for the reception of bevel lugs 43, Fig. 3, upon the inner face of a disk 44, which is loosely mounted on the shaft 40 and has on its inner face a series of projecting pins 45, adapted as the disk 44 is rotated to engage successively with successive recesses of the disk 34, so as to impart intermittent movements of partial rotation to the latter. As shown in Fig. 2, there are four of these pins 45 on the disk 44, hence there will be four movements of the disk 34 and consequently of the pattern chain drum and its chain for each rotation of the shaft 40.

The beveled lugs 43 of the disk 44 and the corresponding beveled recesses of the hub 42 are normally

kept in engagement by the action upon the disk 44 of a spring 46, interposed between said disk and a collar 47 at the end of the shaft 40, and in the event of any undue obstruction to the movement of the



pattern chain, the wedge like action of the walls of the recesses of the hub 42 upon the lugs of the disk 44 will cause the latter to be forced outward, so as to free it from the control of the hub. Hence there will be no operation of the pattern chain until the obstruction to its movement has been removed. (Fairmount Machine Co., Phila.)

DRAPER'S SELVAGE MOTION FOR COTTON LOOMS.

The object of this motion is to prevent any undue strain on the selvage threads; the threads of the selvage being woven in a different manner from those in the body of the cloth.

Heretofore in selvage motions for the class of looms to which the improvement refers, the selvage sheds are left open while the lay beats up the filling, thereby causing considerable unnecessary strain on the selvage threads.

In the new device the selvage motion is so constructed and arranged that the selvage sheds are nearly closed while the lay beats up, thus obviating any undue strain on the selvage threads and producing a better and more uniform finished fabric.

Fig. 1 is a front elevation of a sufficient portion of a loom to be understood with the novel selvage motion applied thereto, the lay being omitted. Fig. 2

is a vertical view thereof, taken on the line $x-x$, Fig. 1, looking toward the left. Fig. 3 is a perspective view, partially broken out, of the selvage cam shaft and cams thereon, showing the relative position of the cams. Fig. 4 is a plan of the weave for selvage shown in connection with part of the fabric.

A indicates the loom frame, B the breast beam, A^x the lay, C^x the main harness cam shaft, h h' the main harnesses by which the shedding of the warps w is effected for body portion of the cloth; W indicates the warp beam.

The body of the cloth is shown for simplicity as woven by a two harness motion, the harness frames h h' being connected by flexible connections h^x , attached to the rotatable shaft h^2 , the foot of the frame h being connected with a lever H, provided with a roll engaged and depressed by a cam C on the shaft C^x , a second cam C' thereon acting on a roll carried by and to depress a lever H' connected with the foot of the harness frame h' , said levers being fulcrumed at H^x .

Cross girths A^2 Fig. 2, are provided with stands a , forming bearings (see Fig. 1) for a selvage cam shaft B^x , having fast thereon a gear B^2 , in mesh with a smaller gear C^2 on the main cam shaft C^x , the relative number of teeth in the two gears being such that the gear C^2 makes two complete revolutions for one revolution of the gear B^2 , the latter gear and its shaft B^x being rotated in the direction of arrow r , Fig. 2.

Upon the cam shaft B^x four like cams are arranged in pairs b c and d f , as best shown in Fig. 3, the cams being heart shaped, the points b' d' of the cams b d being diametrically opposite the centers of cams c f , respectively, and *vice versa*, and viewing Fig. 3 the cams are set quartering upon the shaft with the points b' d' ninety degrees apart, the same angle separating the points c' and f' .

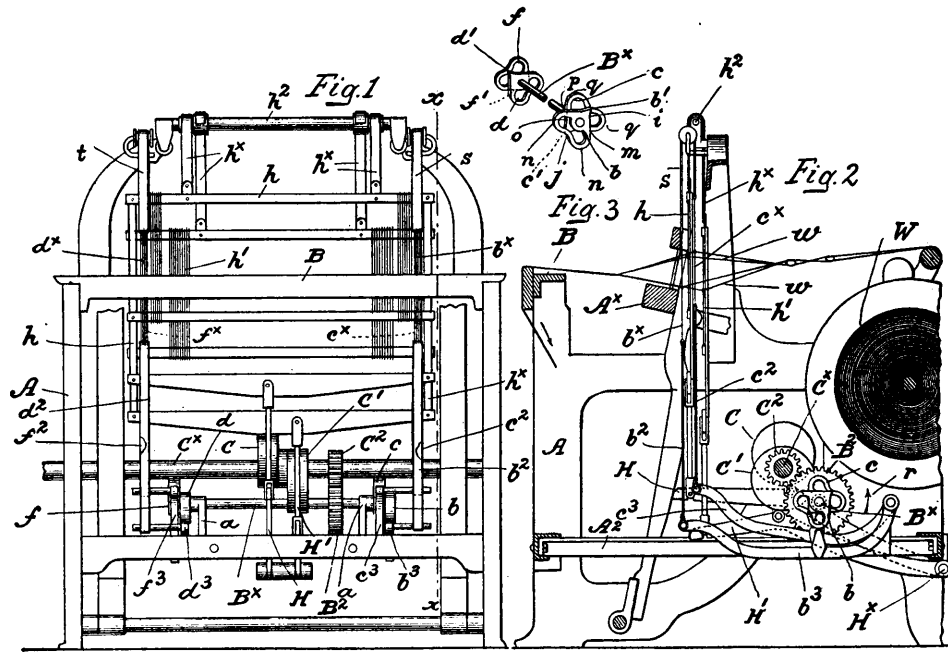
Each selvage has its own harness frames b^x and c^x at the right hand side of the loom, d^x f^x at the left hand side, the former pair being connected by straps b^2 c^2 , respectively, with treadles b^3 c^3 , provided with rolls which are engaged and controlled by the cams b and c , respectively, the frames having an overhead connection s . At the other side of the loom the cams d f act, respectively, upon the treadles d^3 f^3 , connected by straps d^2 f^2 with the corresponding selvage harnesses d^x f^x the latter having a flexible overhead connection t .

In Fig. 2 only the right hand selvage shedding mechanism is shown to avoid confusion; but it will be seen from Figs. 1 and 2 that the main shed and both the selvage sheds are open preparatory to the passage of the shuttle therethrough, and viewing Fig. 2 the front selvage harnesses are shown in front of

the plane of the main harness frame h , while the rear selvage harnesses are back of the plane of the frame h and in front of that of the back plane h' .

By reference to Fig. 4 it will be seen that the selvage motion gives a different weave to the selvage from that in the body of the cloth, the filling being shown in the selvage as crossing the warp in pairs—that is, for two picks the filling will be above, and for the next two picks below a given warp thread, while in the body of the cloth it is one up and one down. When the selvage warps are crossed, the filling is carried around the endmost warp, as at v , to thus give the finished edge to the cloth, the carrying around of the filling alternating at opposite edges.

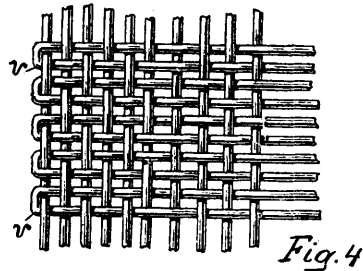
The working of the new motion is such that one



set of selvage warps cross each other when the other set nearly approach each other, and *vice versa*, and during a complete cycle—that is, one revolution of the selvage cam shaft B^x —each set of selvage warps cross twice. The approach of the selvage warps to each other, whether followed by crossing or separation, takes place as the lay beats up the filling, and thus the selvage warps are relieved of any unnecessary strain due to beating up, so that the selvage warps are strained but little, if any, more than the main warps.

This produces a stronger and much more uniform web of cloth, free from wrinkles and stretched places in the selvage. The two pairs of selvage cams are positioned alike, each relative to its fellow, and all of the cams have the same shape and dimensions. Consequently a detailed description of one will suffice for all. The parts i of cam b are nearest the center of the shaft, the point b' somewhat more distant and equally so with the portion j , and m is set farther from the center, while the lobes n are the farthest from the center. Now regarding cams b and c , in the position shown in Figs. 1, 2 and 3, the treadle rolls are engaged by lobe n and part o , separating the treadles the maximum distance and opening wide the shed of the selvage warps. In the next position the rolls are engaged by parts j and c' , acting to nearly

close the shed, while the next following position restores the treadles to the starting position, the rolls engaging lobe *n* and opening wide the shed. Now the rolls engage the immediate adjacent parts *m* and *p* and they being equidistant from the center of the shaft *B^x* the shed is completely closed. Further rotation brings the rolls into engagement with parts *q* and *i*, so that the shed is opened wide; but this time



the action is just the reverse of the prior one, and the warps are crossed, those formerly in the lower plane being brought into the upper plane of the shed, and *vice versa*. Then the warps are moved by the cams to nearly close the shed, next to open it wide, and thereafter to completely close the shed. The next movement of the cams operate to again cross the warps and open the shed, being the same position as mentioned first, since the movement of rotation of the cams has been divided into eight equal parts in order to make the same clear. (Draper Co.)

wood impregnated with an antifriction compound, so that the sheaves will turn on the studs with a minimum of friction and without necessitating the use of oil or other lubricating material.

Near the outer ends of the bar, studs *c^s* are made, each having two sheaves *d²* *d³* thereon of the described construction, the sheaves *d* and *d²* being in one vertical plane, with the sheaves *d¹* and *d³* in a second parallel plane back of it.

A stand *A^s* extends inward from each loom side, near its lower end, with two vertical bearings *a* and *a¹*, while a double stand *B^s*, bolted to 8 to the upper end of each casting *A¹*, extends inward at each side of the separator *B* and presents two vertical bearings *b* and *b¹*, located vertically above the bearings *a* and *a¹*, respectively.

Two harness frames are shown in the illustrations, each being composed of two upright side rods *f*, adapted to slide vertically in the bearings provided by the stands *A^s* *B^s*, the rods having at their upper ends caps *f^x*, to which are bolted flat cross bars *f¹*, set on edge and connecting the two side bars of each frame.

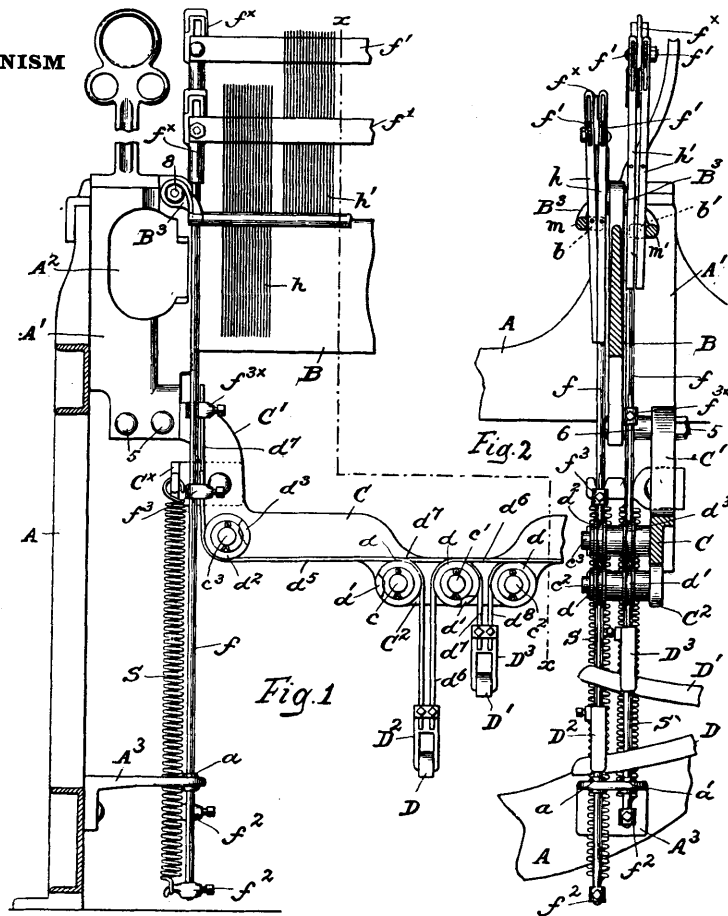
Each harness frame has two adjacent and parallel cross bars, as shown in Fig. 2, to support two series of heddles, which also serve as detectors, the upper ends of the heddles being longitudinally slotted, as shown in Fig. 2, to receive the cross bars and permit a limited relative vertical movement of the heddles. A collar *f²* is adjustably attached to the lower end of each front side bar *f*, to which is connected one end of a strong lifting spring *S*, the upper ends of the

NORTHROP'S SHEDDING MECHANISM FOR COTTON LOOMS.

The main objects of the new mechanism are the simplification and improvement of the shedding mechanism whereby the overhead arch of the loom frame and the overhead connections between the harness frames are completely obviated.

Fig. 1 is a front elevation of a portion of a loom (as much as is necessary to explain the construction and working of the new mechanism), at the left hand side thereof, showing the improvement; and Fig. 2 is a vertical sectional view thereof on the line *x-x*, Fig. 1, looking toward the left.

The loom sides, one of which is shown at *A*, have each an attached casting *A¹*, with an opening *A²*, through which the crank arms are extended, the upper ends of said castings being connected by an integral upright web *B*, extended across the loom and forming a separator for the lower ends of the series of heddles *h h¹*. A cross girth or bar *C* is up turned, outwardly extended at its end, as at *C¹*, and depressed at its central portion, as at *C²*, the said ends being rigidly secured by bolts 5 to the lower ends of the castings *A¹*, sleeves 6 on the bolts (see Fig. 2) being interposed between the bar and the rear side of the castings to support the bar in the proper vertical plane. Three studs *c c¹* *c²* project from the front of the depressed portion *C²* of the cross girth or bar, on each of which is mounted two like sheaves *d d¹*, having elongated hubs, said sheaves being made of



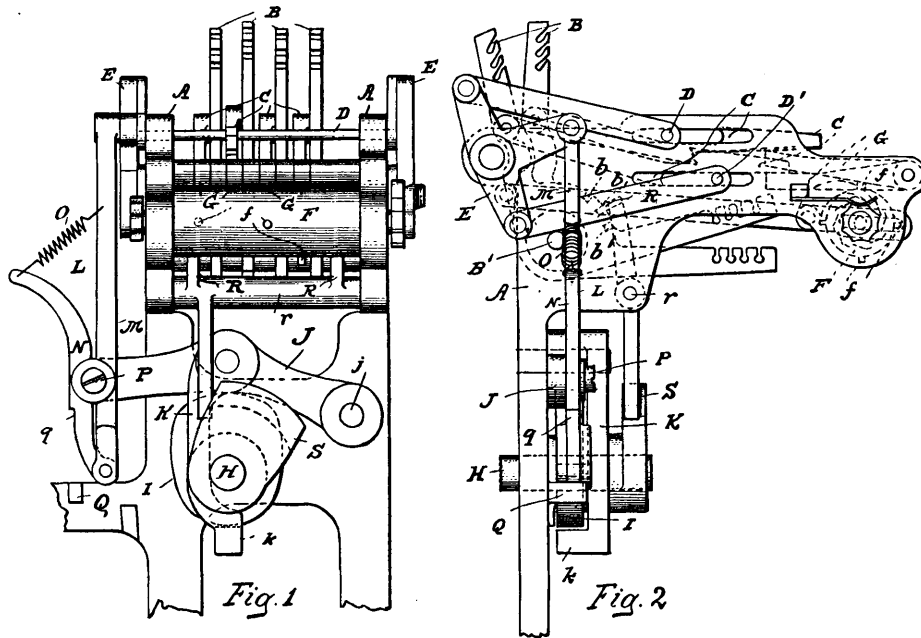
pair of springs at each side of the loom being attached to a bracket C^x bolted to the cross girth C, the springs tending to lift the harness frames.

Treadles D and D' are pivoted at the back of the loom frame, and are depressed by cams, (not shown) the treadles being connected at their outer ends with the harness frames to depress them against the action of the springs. A stirrup D² is engaged by the treadle D, and a flexible connection d² is attached to the stirrup, passed up over the left hand sheave d, Fig. 1, under the sheave d², and up to an adjustable collar f² on the left hand side rod of the front harness frame. A second strap d², attached to the right hand side rod of said frame, passes down under the right hand sheave d², over the right hand and central sheaves d Fig. 1, and down to the stirrup D², so that depression of the treadle D depresses the front harness frame, as shown. The treadle D' engages a similar stirrup D², and one strap d² passes up over the back sheaves d' and under the left hand sheave d² up to a collar f^{2x} on the adjacent side rod of the back harness frame. The second strap d² passes up over the right hand sheave d' thence under right hand sheave d², (not shown) and up a collar to the adjacent side rod of the back harness frame, the said frame being flexibly connected by the straps d² and d² to the treadle D'.

By means of the springs S and the connections between the harness frames and the treadles D D', the said frames are reciprocated to form the sheds, the entire mechanism for reciprocating the frames being located at the lower part of the loom, and each frame is independently operated.

Rods m and m' are supported by the stands B² and extend across the loom at the front and back of the two sets of heddles h and h', respectively to serve as supports for the warps in the lower plane of the shed.

By means of the central group of sheaves on the cross girth C the flexible connections lead vertically to the treadles, and the depressed portion C² of the cross girth brings the tops of said sheaves tangent to the horizontal plane, which is tangent to the bottom of the sheaves d² d² at the ends of the girth. (Draper Co.)



GOODYEAR'S SHEDDING MOTION.

On page 26 of Part I a description of the construction of this shedding mechanism is given; the present improvement relates to the construction of the actuating mechanism for the harness levers.

The operating connections between the main shaft and the harness levers are so constructed that under normal conditions the harness levers are positively actuated, but under abnormal conditions, such as an

obstruction in the mechanism which would prevent the harness levers from being drawn forward by the usual reciprocating knives, the said operating connections yield to the extent necessary to prevent the reciprocating knives from being moved forward beyond the safe limit of movement of the harness levers.

Again the said operating connections are prevented from yielding in case of an excessive strain under otherwise normal conditions upon the connections between the harness levers and heddle frames, due to heavy warp or the like, which would otherwise prevent the harness levers from being thrown to the full extent of their movement. In case the loom is revolved backward, as often happens, the elements of the said operating connections that most directly actuate the harness levers, are not actuated.

Fig. 1 is an end elevation, and Fig. 2 a side elevation of this improved dobby.

A designates the frame of the dobby, B are the harness levers pivoted on the shaft B' and actuated by the notched draw bars C and the transverse reciprocating knives D D' engaging the same and pivoted respectively to the upper and lower ends of the T-shaped rocker arms E, pivoted on the frame of the machine. F are the pattern rollers having the pins f which engage and lift the pivoted fingers G at predetermined intervals, which lift the corresponding draw bars, causing the knife D to push the corresponding draw bars, tilt the corresponding jack levers and operate the corresponding heddle frames. The

draw bars are returned in the return movement of the reciprocating knives by means of the lower knife D'.

H is the main shaft, having secured thereto and rotating therewith the cam I. J is a lever pivoted at j to the frame of the machine above and in line of movement of the cam I.

K is a lever pivoted on and depending from the lever J, resting normally against the shaft H and having the inturned lower end to which is secured a lug k in line of movement of the cam I. Rotation of the shaft causes the high part of the cam to alternately engage the lever J and lug k, imparting a reciprocating vertical swinging movement to the lever J on its pivot. L is a device connecting the lever J and

rocker arm E, and consists of the bar M having a recess, and the bar N having also a recess situated opposite the recess in bar M. These bars are pivoted together at their lower ends, while their upper ends are connected by a spring O. On the free end of lever J is a pin P, which extends into the recesses of the rocker arm actuating bars M and N.

Under normal operating conditions these two bars do not change their relative positions, but are moved up and down in unison by the reciprocation of lever J, causing the arm E by reason of its connection with the upper end of arm M, to rock on its pivot and reciprocate the transverse knives D D'.

Should anything occur in the way of breakage or obstruction to interfere with or prevent the tilting of any particular jack lever and bind the parts directly actuating it, the movement of levers J causes the pin P to spring clear of the recesses in the rocker arm actuating bars M and N, the lever N being moved outwardly on its pivot against the action of its spring O, the bar M and the parts operated thereby remaining stationary.

In the event of any excessive tension in the connections between the jack levers and the heddle frames (due, for example, to heavy warp) which might cause the pin P to spring out of its bearing in the recesses in the rocker arm actuating bars M and N and thus prevent the jack lever from completing its full range of movement, the following mechanism is provided for insuring under these conditions a complete throw of the jack lever and the proper lifting of its corresponding heddle frame.

Q is a lug on the frame of the machine. Before the bars M and N have quite completed their downward movement the outer straight edge q of bar N will strike the lug Q. The time at which the lever N is caused to engage the lug Q is fixed, so that no resistance of the jack lever to further movement due purely to excessive tension will substantially manifest itself until this engagement takes place. During the remaining throw of the lever J there is no possibility of the pin P forcing bar N away from bar M, the lug Q effectually preventing this and consequently the bars M and N will be forced down until the jack lever is thrown to its full extent of movement.

S is a cam on the main shaft for operating locking bar R pivoted on the frame at r. This cam has inclined faces, and is so adjusted with respect to the cam I that it engages and moves the locking bar out of engagement with the notches b and b' on the jack levers during the forward and return throw of the harness levers, but will move said bar into engagement with either notch b or notch b', dependent upon whether the harness levers have been thrown up or down, so that said harness levers will be held firmly in either position for the desired length of time.

The loom can be run backward without operating or affecting the mechanism for directly actuating the harness levers, as the cam I instead of depressing the lever K will simply throw it outwardly on its pivot at each revolution; thus the loom has the capacity of reversal without danger of breakage. (Robert B. Good-year, Phila.)

OLDHAM'S SHEDDING MOTION.

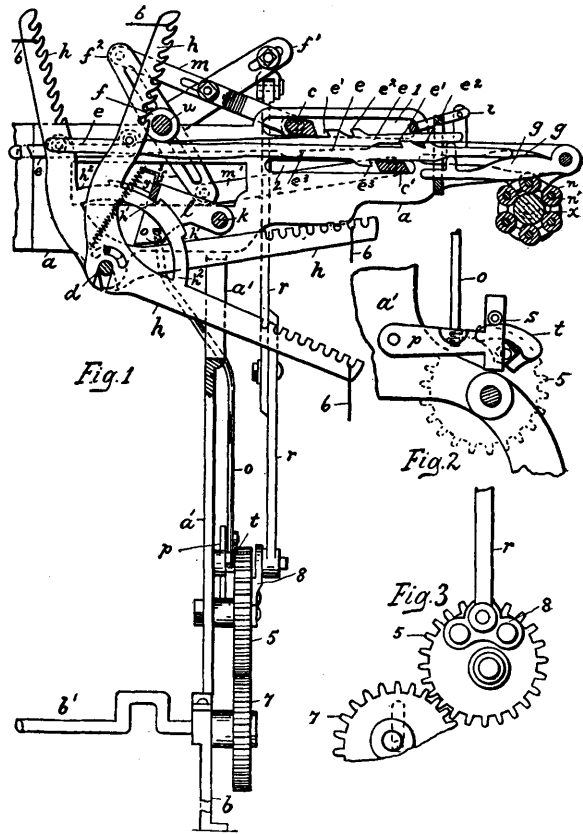
On page 25 of Part I a description of the construction of this shedding motion is given; the object of the new device being to provide a shedding motion to positively control the movement and locking of the heddles.

Fig. 1 is a vertical sectional view of the frame of the dobby containing the immediately connected and moving parts, and shows them in the two directly opposite positions in operation. Fig. 2 is a face view

of the movement controlling the double locking mechanism, and Fig. 3 is an end view showing a portion of the eccentric gear wheel on the crank shaft of the loom meshing with a similar eccentric gear, and to which is pivoted a vertical rod for working the machine.

a designates the frame of the dobby, supported on the standard a', resting on the loom frame b, in which is journaled the crank shaft b'. In the frame of the machine, near its inner end, is a transverse bar d, upon which swing jacks h, to the upper arm of each of which is pivoted a draw bar e, provided with three inclined notches e', e'', and e''', two upon its upper edge and one upon the lower edge. These draw bars are acted upon at their outer ends, so as to be elevated or depressed by pivoted feelers or small levers g, that are raised and allowed to fall by the large or small rolls or balls n of the pattern chain x, the raising or lowering of the draw bars placing the proper notches e' or e'' in a position to be engaged by the sweep of the reciprocating movement of transversely arranged knives c and c', sliding in slots 1 and 2 in the walls of the machine.

Connected to the outer end of the arm f' of the



T-shaped rocker arm f on the transverse bearing or shaft u, is an adjustable depending connecting rod r, having its lower end pivoted to the bracket 8 on the face of the eccentric gear wheel 5. This rocker arm f has adjustable connecting rods m and m', pivoted to the outer ends of the reciprocating transverse knives c and c'. These connecting rods are in turn pivoted to the upper and lower arms f² and f³, respectively, of the T-shaped rocker arm f.

Swinging upon the cross bar k, also secured in the frame of the machine, is a locking frame l, that passes

over all the front edges of the whole number of jacks in the frame and is so constructed as to drop in front or in back, respectively, as shown, of shoulders h' , formed on a rib h^2 forming a part of each of the jacks h .

An additional locking device consisting of a pivoted arm or frame i , holds each jack firmly at the highest point assumed by any heddle frame by dropping into the notch e^2 when the draw bars e are shifted to the right, the frame i being disengaged from this notch e^2 when the pivoted feelers g are dropped by the pattern chain α . A vertical rod o connects the locking frame l at the bottom with a T-shaped pivoted lever p on the standard a' , the said lever being provided with a roller s , which is operated upon at times to raise and lower the rod o by the cam t , secured to the inner face of the eccentric gear wheel 5.

In the operation of the machine connections being made at 6 with the heddle frames, the power supplied by the crank shaft of the loom is communicated by means of the depending arm r , through the eccentric gears 7 and 5, to the vibrating T-shaped arm f and by means of the connecting rods reciprocates the transverse knives c and c' , and as each or any number of jacks are drawn forward or pushed backward by means of the notched draw bars e to their full stroke, the locking frame l rests in a position on the face of the rib h^2 to engage the extension shoulders h' at either point for a sufficient space of time to secure an evenly high or low point to all heddle frames and locking all the jacks firmly at either the forward or backward point in keeping with the heddle frames or harness that are moved or remain stationary to suit the weave. The cam t operates the roller s , which in turn raises and lowers the locking frame l by means of the vertical rod o , and the jacks are therefore all simultaneously released or locked.

When certain of the heddle frames are not required to be moved subsequently from their highest point downward, they are locked in position to prevent accidental misplacement by causing the frame i to engage the notch e^2 , this being accomplished by means of the levers g , which raise and hold the draw bars e above, so as not to be engaged by the reciprocating knife c' . A spiral spring y , of sufficient tension, is secured at one end to the locking frame l and at the other end to the dobby frame a , to prevent accidental misplacement of the locking frame l . The heddle frames have a direct lift and pull down, the notched bars pushing back the jacks by means of the lower knife when forcing the proper heddle frames downward. (George Oldham, Phila.)

COOK'S DOBBY.

The improvement consists in providing means for reducing the number of bars in long harness chains.

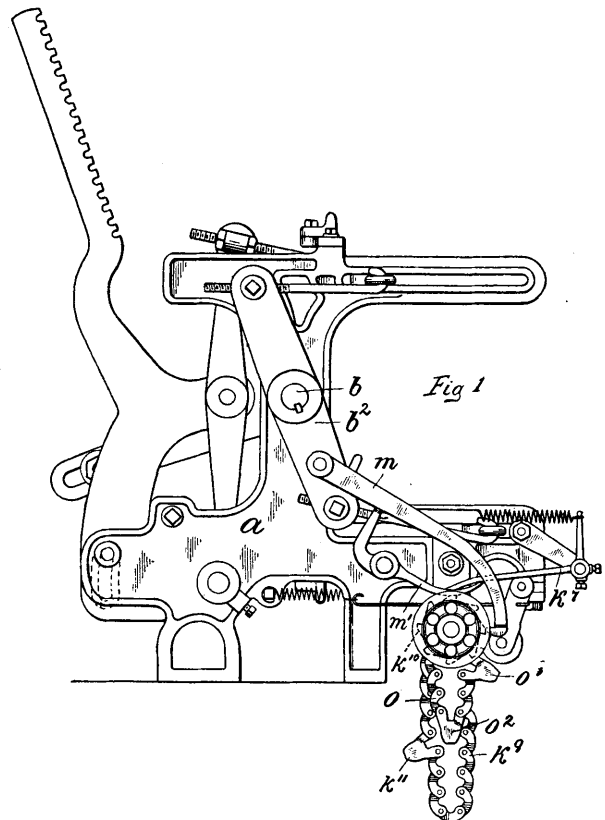
Fig. 1 shows a left hand and Fig. 2 a right hand side elevation of this dobby, clearly showing the mechanism for reducing the number of bars in the harness chain.

a is the frame which has bearings for the rock shaft b on which are keyed the levers b^1 , b^2 , the former being provided with a crank b^3 connected at its end with the pitman b^4 , which receives motion from the crank shaft of the loom and rocks the shaft b . h and i are two pawls pivoted on a stud h^1 , and having hooks at their ends adapted to engage the ratchets k^1 , k^2 on the end of a shaft to which the chain barrel is secured, and which pawls rotate said shaft.

The object is to use one chain for two weaves by using all the uneven numbered bars for one weave, for example plain, and all the even numbered bars for another weave, which for example we call fancy.

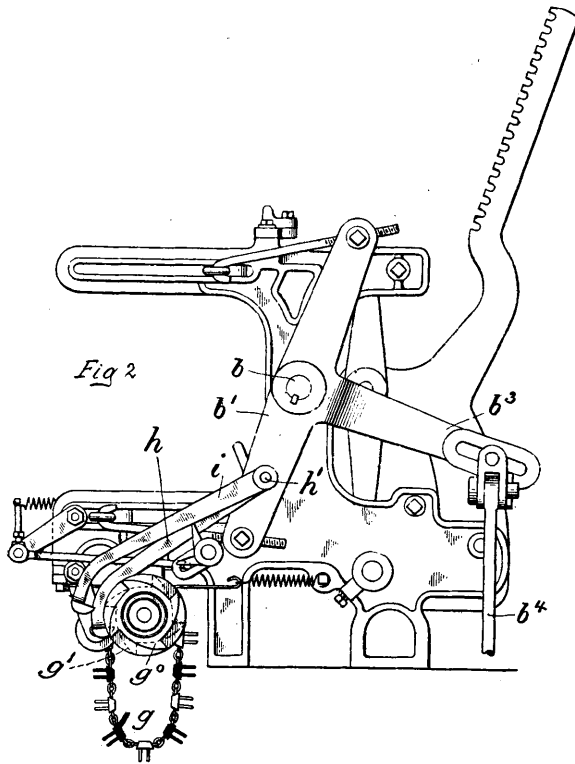
The new mechanism is such as to skip one bar for every pick as long as the loom runs straight. When required by the pattern to change to the other weave, a "changing mechanism" is brought in action, which brings the other weave, or bars, in action, keeping said weave in action until the pattern calls for the first weave, when the said "changing mechanism" is again brought in action and the operation repeated.

Besides the harness chain, another chain, a "tappet chain" o is provided (see Fig. 1), the object of which is to operate in turn through suitable connections, levers h or i , in turn changing the action of the harness chain g from one weave to the other. The harness chain g is shown in two colors in Fig. 2, viz.: outlines for weave No. 1, full black for weave No. 2. The sprocket wheel, carrying the tappet chain o , is fast on the pattern cylinder shaft, the chain of which completes one cycle in the same time as the chain barrel. When the arm m^1 is resting against the plain links of the chain o , the pawl m is prevented from engaging the teeth of the ratchet k^{10} ; but when the lug or tappet o^2 comes to rest underneath said arm m^1 , said pawl



engages the ratchet on the forward stroke of the lower end of the rock lever b^2 , and on the rearward stroke of the latter the pawl partially rotates the ratchet and moves the tappet chain k^2 ahead a distance of one link. Said tappet chain k^2 is therefore advanced one link at each complete cycle of the chain barrel. The first tappet o^1 on the chain o does not come to rest under the arm m^1 so long as the harness chain is operating with its plain bars (or weave No. 1), because since the said tappet o^1 is opposite a fancy bar (or weave No. 2), or is an odd number of links away from the second tappet o^2 , it will be carried past the arm m^1 by the action of the pawl h and ratchet

g^1 instead of resting underneath said arm. In passing underneath the arm m^1 , the said first tappet of course raises the arm and the pawl m starts to take a tooth of the ratchet k^{10} , but before said pawl can engage the tooth, the tappet o^1 has passed underneath the arm m^1 and the latter is restored to its normal position, raising the pawl out of contact with the ratchet.



When by reason of the progression of the chain k^9 its tappet k^{11} comes underneath the arm k^7 , the pawls h, i are shifted, by suitable connections, and the pattern surface at once begins to feed on the fancy bars (or weave No. 2). It continues to do so until the first lug o^1 on the chain o comes to rest underneath the arm m^1 , as said lug will do since the progression of the chain o is now on the alternate links. When this occurs, the pawl m engages the ratchet k^{10} and moves the chain k^9 ahead one link, moving the lug k^{11} out from beneath the arm k^7 , and thereby reshifting the pawls h, i . This changes the feed back again to the plain bars of the pattern surface, on which it is kept until the lug k^{11} again comes to rest underneath the arm k^7 .

It will therefore be seen that the number of times the weave is changed from one to the other and back again depends upon the length of the chain k^9 , or, more properly, upon the recurrence of the lug k^{11} or number of lugs used. (Richard H. Cook, Fall River, Mass.)

CONNECTING BOX AND SHEDDING MOTION OF DOBBY COTTON LOOMS.

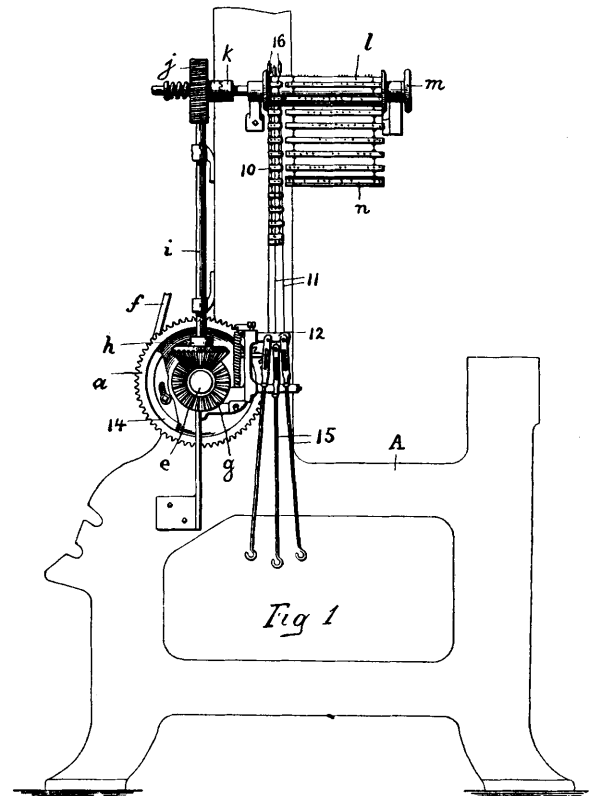
The object of the new mechanism is to arrange the pattern devices or chains which control the harnesses and box motion of a loom, respectively, so that said pattern devices or chains will move together, so that when one chain is advanced or moved back the second

chain will be correspondingly shifted. This will obviate any chance for the weaver to disarrange the proper position between harness and box chains after picking out, or the filling having run out, or any similar reason where the loom had to be stopped and the last proper pick ascertained.

Fig. 1 is an end view of a loom, sufficient parts thereof being shown to illustrate the application of the new device, and Fig. 2 is a front view of the new box motion operating device.

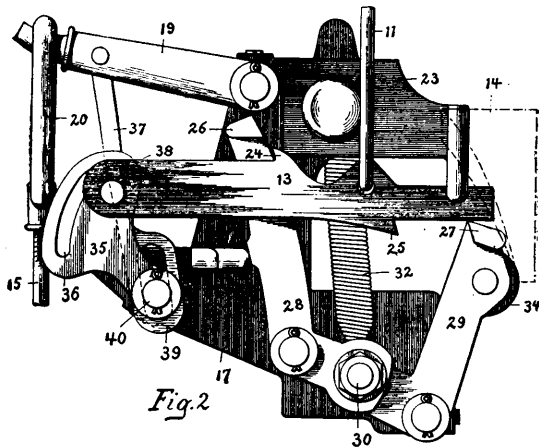
A designates one of the side frames of a loom, journaled in which is the driven shaft e which has secured to it a gear a , forming a crank disk which, by means of the pitman f , is connected to operate the levelers controlling the harness motion. Mounted on the shaft e is a bevel gear g , which meshes with and drives a bevel gear h , secured upon a vertical shaft i , provided with a worm meshing with and driving a worm wheel j , which is loosely mounted on the shaft of the dobbie cylinder l and normally held in engagement with a clutch k by means of a coiled spring, so that the dobbie cylinder l can be turned by the hand wheel m independently of its driving connections.

Mounted on the dobbie cylinder l is a plain pattern chain n , controlling the harness motion of the loom.



Also mounted on the dobbie cylinder l , near the inner end thereof, is a second pattern chain 10 controlling the new box motion actuating device. This pattern chain 10 co-operates with a plurality of fingers 16 (three in this instance) which are connected by means of lifting wires 11 to hook pieces 13 , mounted in and forming part of the box operating mechanism 12 . Bolted upon the face of the gear a is a face cam 14 , by means of which power is applied to the box motion operating device 12 .

The construction of the box motion operating device is clearly illustrated in Fig. 2. It comprises a bracket or framework 17, bolted to the framework of the loom. Mounted on a stud 40 are pieces 35.



having cam slots 36. Fitting into the cam slots 36 are rollers 38, journaled on links 37, which are connected at their upper end to the lifting levers 19. The links 37 are guided at their lower ends by slotted sections 39, engaging the stud 40. Connected to the ends of the lifting levers 19 are connecting pieces 20, adjustably threaded into each of which is a lifting rod 15. The lifting rods 15 extend down to that part of the framework of the loom occupied by the box motion, and said lifting rods may be connected at their lower ends either directly to operate the box motion or any form of multiplying device employed in connection with box motions.

The cam slots 36 are shaped at their ends so that when the parts are in the position illustrated in Fig. 2, the lifting lever 19 will be locked in a raised position. The hook pieces 13, which connect to the pivoted pieces 35, are provided upon their upper edges with abutments 24 and on their lower edges with abutments 25 and are held in place and guided by means of a comb 23.

The actuating blades or sweeps 26 and 27 are carried by bell crank levers 28 and 29, the lower arms of the bell crank levers being connected by means of a pin 30, extending from the bell crank lever 28 through a slot in the bell crank lever 29. A coiled spring 32 is connected at its lower end to the pin 30 and normally acts to open or separate the actuating blades or sweeps 26 and 27, as shown in Fig. 2. Journaled in the bell crank lever 29 in position to engage the face cam 14, before referred to, is a friction roll 34. When the cam 14 engages with and acts upon the friction roll 34, the actuating blades or sweeps 26 and 27 will be moved toward each other. When the cam 14 passes out of engagement with the roll 34, the actuating blades or sweeps 26 and 27 will be moved away from each other by the spring 32.

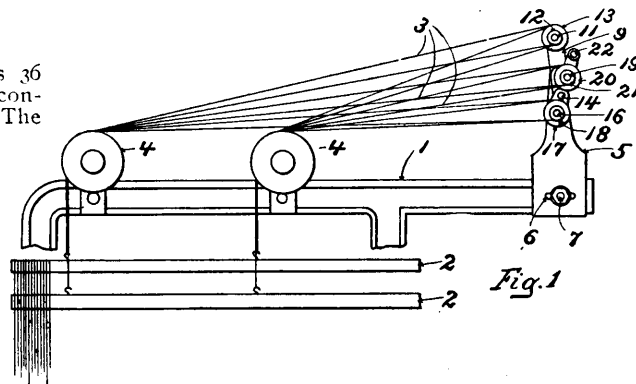
When a peg on the pattern chain 10 passes under one of the hooks 16, the hook 16, through its lifter wire 11, will lower a hook piece 13 so as to bring its lower abutment 25 into the path of the actuating blade or sweep 27. When the actuating blade or sweep 27 is shifted by the cam 14, it will move the hook piece 13 to the position illustrated in Fig. 2, thus lifting up the lifting lever 19, which lifting lever on account of the shape of the cam slot 36 will be locked in its raised position.

If at any time the loom is stopped on account of the giving out of the filling or for any other reason, the operator can turn back or advance the dobby cylinder *l* by means of the hand wheel *m* and the pattern chains *n* and 10 will move together, so that they will always maintain a correct co-operative relation and the loom will always be in condition so that when started up it will correctly weave a pattern. (Parkhill Mfg. Co., Fitchburg, Mass.)

LACEY'S HARNES OPERATING DEVICE FOR COTTON LOOMS.

The device relates to looms for weaving sateens and similar fabrics for the purpose of sustaining the plurality of harness frames that are used in the production of such fabrics and also for the purpose of causing or insuring the proper reciprocal working of the said harness frames.

Fig. 1 shows, in elevation, portions of a loom for weaving sateens with the embodiment of the new device applied thereto. Fig. 2 is a view of certain



parts, looking from the right hand side in Fig. 1. Figs. 3 to 7 are views illustrating the various modes of using the improved devices.

1 designates the loom frame, 2 the harness, 3 the harness straps, and 4 the sheaves over which the said straps pass.

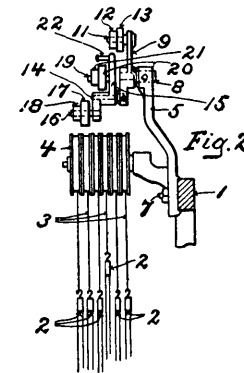
5 designates an adjustable bracket applied to the arch of the loom frame by means of slot 6 and bolt 7. On this bracket 5 is mounted a stud 8, upon which latter in turn is mounted the "main" or "supporting" lever 9, turning upon the said stud as on a pivot.

To the upper arm of lever 9 is applied stud 11, on which is mounted to turn a pair of harness rolls 12 and 13 connected to turn together, the rear roll 13 being slightly the greater in diameter.

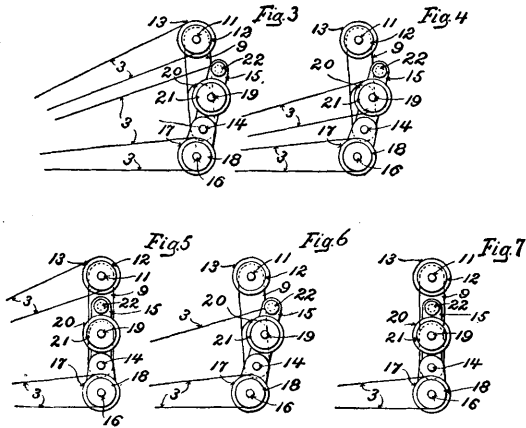
14 designates a stud applied to the lower arm of lever 9, and on the turned or cylindrical projecting portion of the said stud 14, the secondary lever 15 is mounted with capacity to turn. 16 designates a stud carried by the lower arm of lever 15, and 17 and 18 designate harness rolls mounted to turn on the said stud,

the said rolls being connected to each other, so as to rotate in unison, and differing in diameter, as in the case of rolls 12 and 13.

19 designates a stud applied to the upper arm of



lever 15 and having mounted thereon a pair of harness rolls 20 and 21, connected to turn together and differing in diameter. 22 designates a second stud applied to the upper arm of lever 15.



The new device is capable of working with six harness frames. Illustrations show the manner of connecting and operating the harness cording or straps 3. The latter are in part omitted from Fig. 2 in order to better illustrate the novelty of the new devices.

With six harness frames in use the front harness frame will be connected by its straps to the front roll 18, the second harness frame to roll 17, the third harness frame to roll 21, the fourth harness frame to roll 20, the fifth to roll 12, and the sixth harness frame to the roll 13.

When it is desired to employ but five harness frames, the strapping will be connected as in Fig. 3, in which latter the rolls 18, 17, 12, and 13 are utilized in connection with the straps from the first, second, fourth and fifth harness frames, respectively, the strap from the third harness frame being connected with the stud or pin 22.

When it is desired to employ only four harness frames, the straps from said harness frames may be connected with the rolls 18, 17, 21, and 20, respectively, as indicated in Fig. 4. In this case, if desired, the main lever 9 may be held in a fixed position by locking means. If desired, the straps from the four harness frames may be connected with the rolls 18, 17, 12, and 13, as in Fig. 5 and in this case lever 15 will be locked to the main lever 9, so that the said levers shall turn as one upon stud 8.

When it is desired to use only three harness frames, the straps therefrom will be connected, respectively, with the rolls 18, 17, and with the stud or pin 22, as in Fig. 6, all carried by lever 15, the said levers being left free to turn with reference to lever 9 the latter, if desired, being held locked in a fixed position.

When it is desired to use only two harness frames, the straps from the said harness frames will be connected with the respective rolls of any one pair of the three pairs of harness rolls—as, for instance, the rolls 18 and 17, as shown in Fig. 7—and the two levers 9 and 15 may, if desired, be locked to render them immovable.

The devices which have been thus described can be used for working four, three, or two harnesses without holding or securing the levers, if desired. For convenience in locking or holding the levers

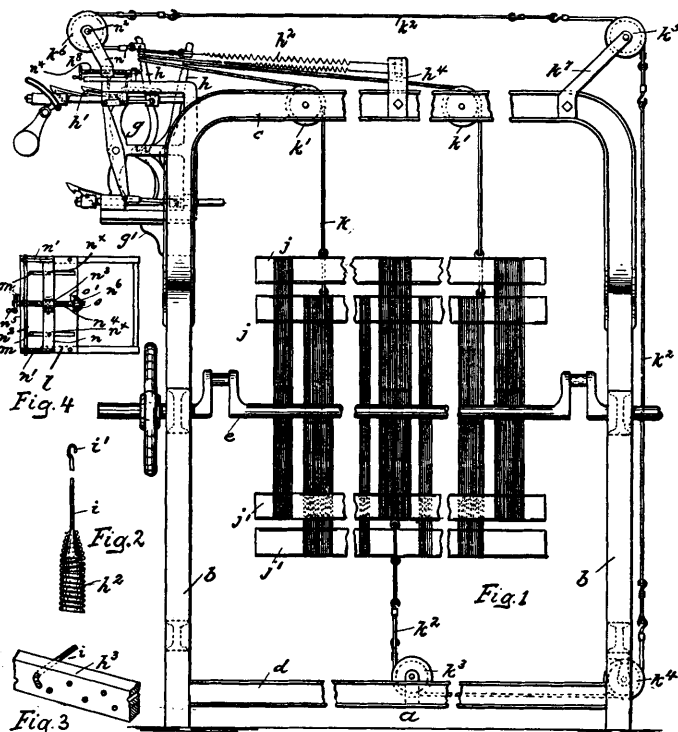
when desired or required, the devices are provided with locking means.

When it is desired to work four or three harness frames without holding the levers, lever 9 may be allowed to fall or turn partly over under the strain which is transmitted through the harness connections, so that its lower arm shall extend inwardly, or lever 9 may be omitted, and lever 15 applied to the supporting stud 8. In working two harness frames, the levers 9 and 15 (in case the entire arrangement is retained in place) may be permitted to swing inward under the strain that is transmitted through the harness connections. If lever 9 is removed and lever 15 mounted on stud 8, then in that case lever 15 will be allowed to swing, as noted. If desired, both the levers may be removed and a pair of rolls corresponding with 17 and 18 mounted on the supporting stud 8 for two harness work.

The mechanism is self contained and complete for six harness frames or less; all strappings from the various rolls are in line with the respective harness frames to be operated; only one size of double pulley or pair of rolls is only required to be used in each of the places where the same is represented in the drawings; and the mechanism is so designed as that the stud 8 of the bracket 5 constitutes the support of either the entire combination of movable levers and rolls, or of a single lever, or of a single double pulley, or pair of rolls. (Fred. Lacey, Valenfield, Canada.)

ARIENTA'S SHEDDING MECHANISM.

Fig. 1 is a front view of a portion of a loom frame, showing the disposition of the mechanism thereon,



and which more particularly refers to the strapping of the harnesses. Figs. 2, 3, and 4 are detail views of the mechanism.

a indicates the loom frame, consisting of end stand-

ards *b*, surmounted by top frame *c* and connected near their bases by rail *d*. *e* designates the main shaft journaled near its ends in the two standards *b*.

g designates the dobby, supported upon brackets *g'* upon the top frame *c*, and which dobby is operated from the main shaft *e* of the loom. *h* are the harness levers controlled by the jacks *h'*. The upper ends of these harness levers are normally held inwardly by the tension of spiral springs *h²*, by which they are connected to a perforated cross bar *h³*, supported upon the brackets *h⁴* upon the top frame *c*. Each of these springs *h²* is tapered somewhat at each of its ends and receives one end of a connecting rod *i*, said end being enlarged and conical in shape, so as to prevent its separation from the spring, as shown in detail in Fig. 2. The rod at one end of each spring is provided at its free end with a hook *i'*, for engaging the upper end of its corresponding harness lever *h*, whereas the rod at the other end extends through one of the apertures in the perforated cross bar *h³*, its extremity being bent so that it cannot be withdrawn through said aperture, as shown in Fig. 3.

j designates the upper set and *j'* the lower set of the harness frames. Said upper harness frames *j* are connected with the upper ends of the harness levers *h* by cords *k*, which pass over pulleys *k'*, journaled in the top frame, and the lower heddle frames *j'* are connected with said upper ends of the harness levers by a series of cords *k²*, which extend downwardly under pulleys *k³* and *k⁴*, journaled in the lower part of the loom frame, and then up along one end of the latter over pulleys *k⁵* and *k⁶*, respectively journaled in brackets *k⁷* and *k⁸*, the former of which is supported upon the top frame of the loom and at one end thereof and the other of which is supported upon the dobby frame thus:

Spanning the dobby frame is a plate *l*, bolted thereto and provided with slots *m* extending longitudinally of the dobby frame. The bracket *k⁵* is supported upon this plate *l* and provides bearings for the pulleys *k⁶*, consisting of an elongated base plate *n*, having forwardly and upwardly projecting arms *n'* at its ends, said arms being connected by a shaft *n²*, upon which said pulleys are journaled. The base plate *n* has downwardly extending pins *n^x*, which project into the slots *m* so as to guide the bracket, and it is provided midway with an enlargement *n³*, through which projects and with which engages a screw *n⁴*, having a hand wheel *n⁵* for rotating it and being journaled at its other end in a projection *n⁶*, mounted on a plate *l*. Collars *o* and *o'*, mounted on said screw on each side of the projection *n⁶*, prevent longitudinal movement of said screw. It will be seen that by manipulating the screw *n⁴* the cords of the harness may be tightened or slackened at will. (Secondo Arienta, Paterson, N. J.)

HILTON'S HARNESS MOTION.

The objects of the mechanism are to make the pattern chain act positively and prevent mispicks in the pattern by a wrong movement of the heddles. This result is obtained by combining with the vibrator finger or lever a yoke that prevents a rebound of the jack when dropped by the roller in the pattern chain.

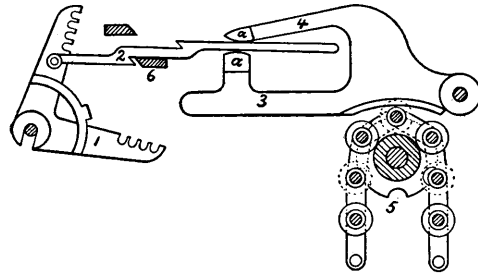
The illustration is a diagram showing a face view of a right angled lever, a jack, an improved vibrator lever and a section of a roller pattern chain.

1 represents the right angled harness lever, 2 the double hook moving jack, 3 the vibrator lever, 4 the yoke, and 5 a section of a roller pattern chain.

The new device consists in the yoke 4, combined with lever 3 and jack 2. The yoke 4 is cast to and

forms a part of the lever 3. The jaw *a* is such that it permits the jack 2 to freely slide between.

When looms are run at a high speed, the roller pattern chain 5 moves quick, and when the roller drops



the lever 3 (if no yoke to prevent) sometimes the lever 3 rebounds and knife 6 will miss the bottom hook in jack 2 and make a mispick. If lever 3 is provided with the yoke 4, a miss cannot happen. (John Hilton, Phila.)

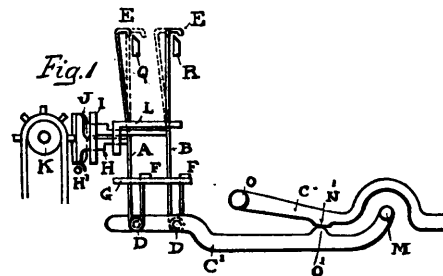
WHITE'S DOBBY.

The construction refers more particularly to dobbies of that class in which hooked U-shaped spring catches are employed for lifting the jacks. Hitherto in this type of dobby two pattern cylinders have usually been employed, the pegged lags of which have acted direct on the catches, thus necessitating a double reading of the pattern and involving a considerable complication of the working parts.

The object of White's Dobby is to simplify the mechanism by the employment of a single pattern cylinder arranged to act on T-shaped needles, which are operated by the pegged lags of the pattern cylinder in such a manner as to throw the hooked extremities of the U-shaped spring catches into position to be raised by the lifting knives of the dobby.

Fig. 1 is a detailed view of this dobby, showing the means for actuating the jack levers. Fig. 2 is a back view of the dobby.

A and B are the U-shaped spring catches, each of which is made with a long and short leg. The long leg projects upward and is formed with a catch extremity E, while the short leg is also formed with a bent end or catch F, which rests on a cross bar of



the grate G, as secured to the dobby frame, when in its normal position. The spring catches are secured at the bent lower end portions of their long and short legs to the jack levers C by studs D.

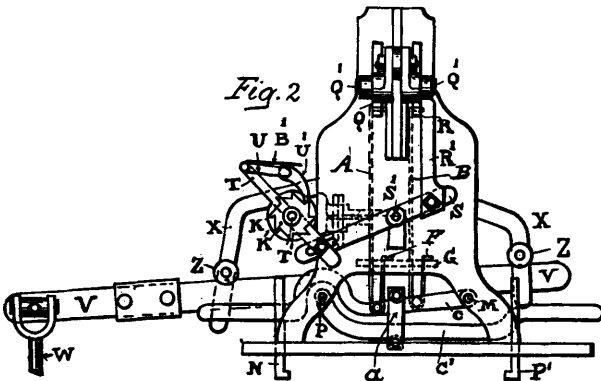
H and J are T-shaped needles, which are acted upon by the lattice pegs on the pattern barrel or cylinder K. The needles are notched, to limit their movement in the grate L. The long needles J act upon the spring catches B, while the short needles H

act upon the catches A. The needles are supported in the grates I and L, the grate L also serving as a guide for the spring catches A and B, as shown.

The jack levers C carry the spring catches, and are pivoted at M and their other extremities move in the grate N. From jack lever C a central link or connection *a* is made to the jacks C', pivoted at P, so that on the lifting of the jacks C, jacks C' will be simultaneously lifted, and consequently the harness attached to them will be raised. The jacks C' work in the grate P'.

In Fig. 1 the links *a* and antifriction bowls shown in Fig. 2 are dispensed with, and the jack levers are so mounted and constructed that on the raising of the lower jack lever it will simultaneously raise the jack lever above it. In this view the U-shaped spring catches A and B are shown secured to the lower jack lever C', pivoted at M. The jack lever C above it is reversely pivoted at O. On the lower jack lever C' is formed a swell or lug O', which when the lower jack lever is raised by the U-shaped spring catches A and B in the manner described bears against the projection N, cast upon the under side of the jack lever C, thereby raising the said lever C' simultaneously with the lever C. By this means we are enabled to obtain an equal lift of the harness as attached to the jack levers.

The action of this improved dobby is thus: Just according to the pegging of the lags on the pattern cylinder K the needles H and J will, as the case may be, thrust forward the spring catches A or B, so that



their catch extremities E will come into position to be raised by the lifting knives Q and R of the dobby. When the needles H and J are relieved from the lattice pegs on the pattern barrel K and the spring catches A and B are released, the spring catches will spring back out of active position as shown in dotted lines in Fig. 1. At the same time the spring catches will cause the return of the needles H and J in readiness to be acted upon by the succeeding pegs of the lattice barrel. A projecting lip on the said needles limits their return movement by coming against the rod H'.

The operation of the lifting knives Q and R is effected by rocking lever V, actuated by connecting rod W, operated from an eccentric or crank on the tappet shaft of the loom. Rocking lever V gives an alternate movement to two arms X, whose ends are passed through slotted brackets (not shown, being situated on the other side of the lever V) in rocking lever V and are supported upon the same by bowls Z, which rest in a slot, groove, or indenture formed in the top edge of such lever. The arms X are connected to the respective lifting knives Q and R, and which they operate. Should any working part get stuck fast, the rocking arm V will continue to work

independently of the arms X, thus preventing any damage.

The lifting knife R, about midway of its length, has attached to it a branch arm R', which with the fall or gravity of the arms X, on being relieved from the rocking lever V operates the two armed lever S, pivoted at S'. The other extremity of the lever S is connected to another two armed lever T, centrally pivoted on the shaft T' of the pattern barrel K. Fixed to the lever T is a small link U, carrying pawl or catch U', which engages with the ratchet wheel K' and turns pattern barrel K, a small blade spring B' keeping the catch U' in gear with the said ratchet wheel. (W. B. White, Jr., Colne, Eng.)

SCHAUM'S HEAD MOTION FOR NARROW WARE LOOMS.

This shedding motion is placed on the frame of the loom in an elevated position, instead of at the base of one of the ends of said frame. The harness levers are arranged relatively to each other and to their actuating cams so as to effect a minimum of friction between moving parts and at the same time provide self lubricating means between frictionally contacting parts. The actuating cams for these harness levers are arranged relatively adjustable, a simple device for leveling the harness levers as occasion requires being provided.

Fig. 1 is a front elevation of a portion of the end of a loom frame, showing the shedding motion. Fig. 2 shows in its side elevation (drawn on a larger scale than in Fig. 1) one of the harness levers.

a designates one of the end frames and *b* the arch, which is formed with a bearing *c*, in which is journaled a horizontal shaft *d*, held in position by a bridge piece *e*. One end of the shaft *d* (the one not shown in Fig. 1) carries a bevel gear which intermeshes with another bevel gear upon the upper end of a vertical shaft which is connected with the driving mechanism of the loom, and by which means shaft *d* is rotated.

Shaft *d* carries a set of elliptical cams *f*, and also a face plate *g*, to which the various cams are secured by bolts *g'*, which penetrate concentric slots *g''* in the cams, and by which arrangement said cams are made relatively adjustable about the shaft *d*.

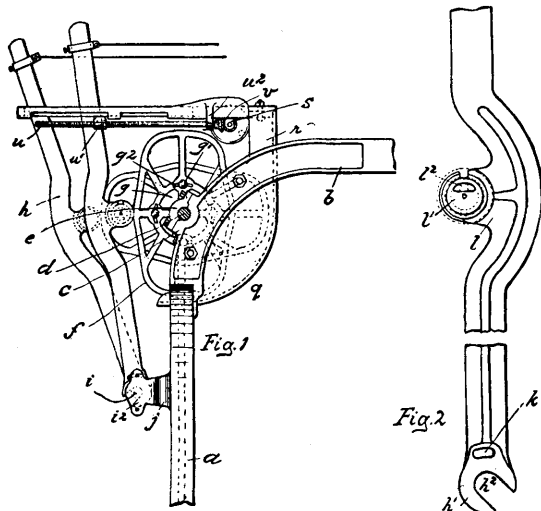
h designates the harness levers, each of which has at its lower end an enlargement *h'*, having an obliquely set notch *h''*, which works on a horizontal supporting rod *i*, constituting an integral connection between the two arms (one of which *i'* is only possible to be shown in Fig. 1) of a bracket *j*, having a supporting plate whereby it is bolted to the end frame *a* of the loom. Slightly above the recess *h''* each harness lever is formed with an elongated arc shaped slot *k*, which, when the several harness levers are assembled and mounted in position upon the bracket *j* is penetrated by a removable rod projecting through and connecting the arms *i'*, *i''* of bracket *j*.

The forwardly extending arm *l* of each harness lever is formed upon one of its faces with an integral circular projection *l'*, being formed with a cavity, which has a duct at its bottom and an opening *l''* provided in the outer wall of said projection. The opposite face of the arm *l* of each harness lever is perfectly flat.

An annular roller surrounds and is journaled upon each of the projections *l'*, and to which said roller corresponds in thickness. This roller constitutes an antifriction element, adapted to bear against the cam corresponding to the particular harness lever upon which it is mounted. These rollers are held in place

by the harness levers, except the one on the end which is held in place by a disk secured to the face of the projection, by a screw.

The cavity v^2 , which is formed in each projection, is a receptacle for the lubricant, and for this purpose



it contains a body of felt, which will readily become saturated with oil. q designates a fender, bolted between and to the top rails b , and which prevents any particles of oil, etc., from being thrown by the cams on to the fabric. The upper portion r of said fender projects some distance above the cams, and supports the leveling device, which consists of a supporting plate bolted to the top of the upwardly projecting portion r of the fender q , and is provided with a series of longitudinal slots for the reception of the various harness levers. This supporting plate is formed on its under face and near its rear end with lugs s , which provide bearings for a horizontal shaft, having a hand wheel at one end.

Underneath this plate another plate is placed, having grooves shaped correspondingly to the edges of the supporting plate; the two plates being connected by a dove tailed arrangement. u designates a threaded shaft which is tapped into a laterally projecting lug u^1 , formed on the movable plate, and which penetrates still another lug u^2 , projecting from the side of the top or supporting plate. The adjoining ends of the two shafts s and u are connected by bevel gearing v . Thus when the hand wheel previously referred to is manipulated, the motion of the shaft s is transferred on to the threaded shaft u , and consequently to the movable plate, which has openings in it which admit the harness levers, and when it is moved forward or outwardly the edges of said openings will engage the various harness levers, which are being drawn upon, by the harness, and bring them all into the same plane and ultimately all out of engagement with the cams. A stop is formed upon the under side of the supporting plate, adapted to limit the inward movement of the movable plate. (O. W. Schaum, Phila.)

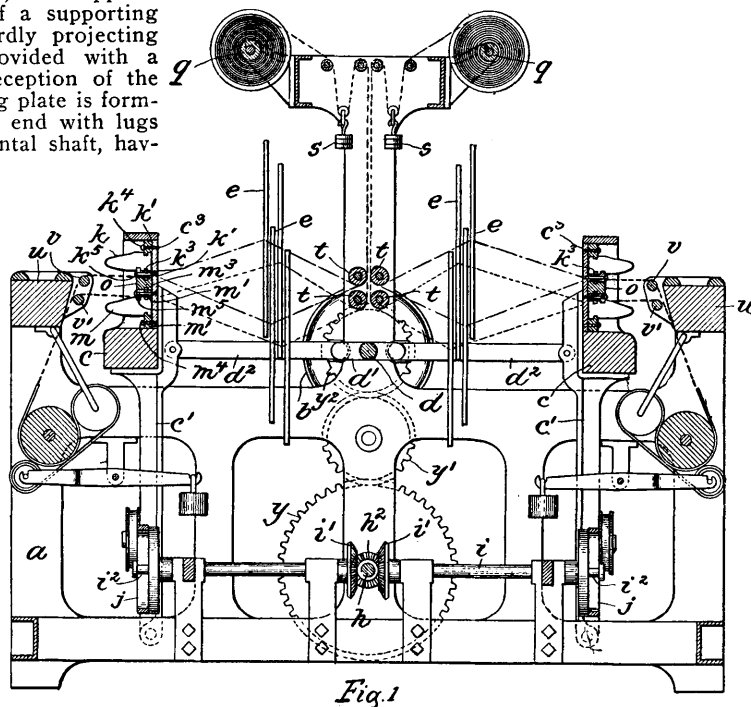
BRINDLE AND STEERE'S NARROW WARE LOOM.

The new construction relates to narrow ware looms—such as used for weaving tape, webbing, fringe, ribbon, etc.,—and has for its object to increase the capacity and effectiveness of such looms. Fig. 1 represents a vertical sectional view of such a loom, and Fig. 2 a front elevation thereof.

a designates the loom frame, b the drive pulley, mounted at one end thereof on the crank shaft d , and c designate two lays mounted at opposite sides of the loom on lay swords c' . The crank shaft d has cranks d' connected by pitmen d^2 to the respective lays c .

For equalizing the strain and wear on the parts, due to the operation of the lays, those cranks d' which operate the lay c on the right side of the loom are set at a half turn or one hundred and eighty degrees from the cranks d' , which operate the lay c on the left side of the loom, so that the two lays when the crank shaft d is revolved alternately approach and recede from each other.

The harnesses e are mounted in guides on the loom frame and are positively operated by bell cranks e^2 connected by links e^3 with the harnesses and by longitudinal rods e^4 with harness levers or jacks f , hooked at their upper ends and fulcrumed on a rod f' . The two sets of levers or jacks f for operating the harnesses on the two sides of the loom are operated by two sets of path cams g on a cam shaft g' , the levers having rolls occupying the paths in said cams. The shaft g' is mounted in bearings attached to the loom frame a and is provided with a bevel gear, which meshes with another bevel gear mounted on the end of a shaft h , which runs longitudinally of the loom and is connected by gearing v, v', v^2 , with the driving pulley b on the crank shaft d .



k and m are the shuttles arranged in two banks, the one above the other on the lay c . k^4, m^4 , are shuttle guides or races attached by screws k^4, k^5 , and m^4, m^5 , to the top portion or back frame e^3 of the lay. Between the shuttle guides of each series are located

the reed spaces occupied by the reeds k^2, m^2 . The reeds k^2 belonging to the upper set or bank of shuttles are located directly above or opposite the shuttle rests or guides provided for the lower set of shuttles, and, *vice versa*, the reeds m^2 of the lower bank are located opposite the shuttle rests of the upper bank.

Each of the shuttles $k m$ is provided with an individual rack $k^3 m^3$, the racks of the upper bank being on the lower side of the shuttles, and those of the lower bank being on the upper side of the shuttles, and located in slots in the inner or adjoining guides $k' m'$ of each shuttle bank, are small gear pinions $k^3 m^3$. Two of these pinions are provided for each shuttle, and the screws $k^5 m^5$, which attach the inner guides $k' m'$ to the lay back c^2 serve as shafts or pintles for said pinions. Located between the upper and lower sets of pinions $k^3 m^3$ and running longitudinally of the lay c is a single rack bar o , having racks $o' o^2$ on its upper and lower edges engaging the teeth of the two sets of pinions $k^3 m^3$. At intervals along the rack bar o the latter is formed with slots o^2 , occupied by headed screws or guide studs o^1 , screwing into the lay, whereby the rack is guided in its longitudinal movements.

The reciprocation of the rack bar o operates both sets of shuttles $k m$ simultaneously across the reed spaces in front of the reeds $k^2 m^2$.

Shafts i with bevel gears i^1 , meshing with a bevel gear h^2 on the shaft h are provided for operating the rack bars o on the two sides of the lay.

Each shaft i has at its outer end a crank i^2 , operating in a vertical slot formed in a slide j . The latter is mounted in guides on the loom frame, and is connected with opposite ends of the rack bar o by means of rods j' and straps j^2 , the latter of which pass over guide pulleys $p p'$ on the lay c . The shaft h is rotated from the belt pulley b as before described, and its rotation imparts motion to the crank i^2 , and it in turn reciprocates the slide j , thereby moving the rack bar o to and fro in the lay c . The gearing is so proportioned as to move the rack bar once for each backward oscillation of the lay.

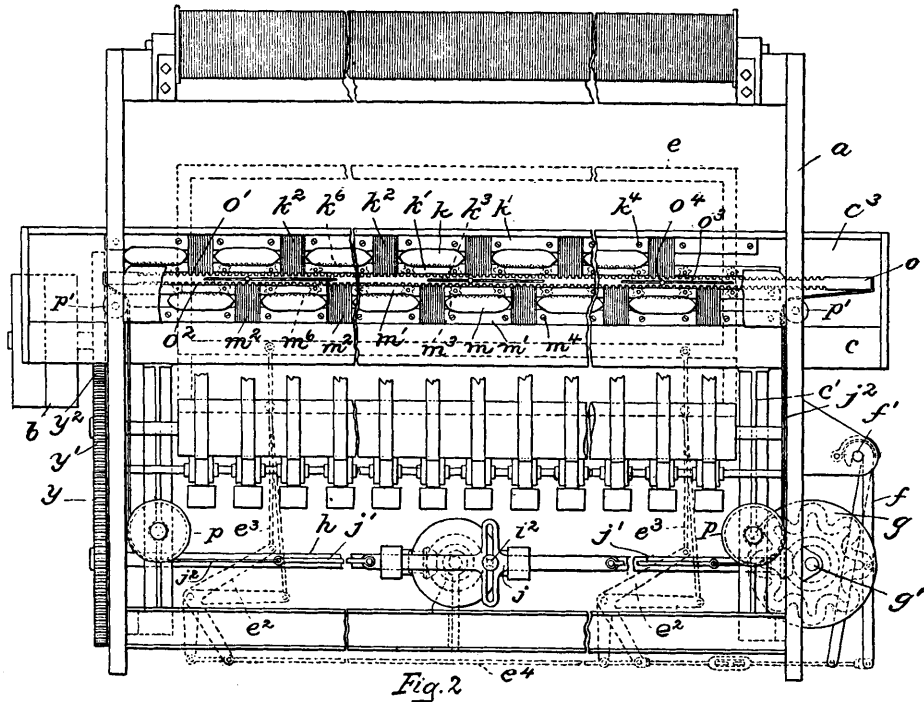
q indicates the two warp beams, s the tension weights for the several sets of warp threads, and t the guide rods or rolls for the warp threads. u represents the two breast beams carrying breast rods v, v' , over which the woven fabrics pass.

The novelty of the new arrangement consists in locating the reeds in one bank opposite the shuttle rests of the other bank, and *vice versa*, so that fabrics woven by the respective banks of shuttles and reeds will alternate with each other. This permits the fabrics to be led to their respective take-ups without

changing their vertical direction, and it also puts each fabric in sight and permits ready access to each fabric. The arrangement, furthermore, prevents the chafing of the warp threads in the two sets of reeds, which would occur were the fabrics superposed or formed one directly above the other and the top threads of one shed allowed to cross the bottom threads of another shed; again different kinds and colors of yarn for the upper and lower fabrics may be used. (Thomas Brindle and Merrill O. Steere, Pawtucket, R. I.)

STEEER'S SHEDDING MOTION FOR NARROW WARE LOOMS.

The object is to do away with overhead arches of the loom frame, in order that the weaver has a clear



view over the whole of the loom and all parts of the warp and warp shed; also, giving convenient access to the cams which operate the harnesses from below.

The illustration shows a longitudinal view of a loom with the device applied thereto, the harnesses being arranged for a double bank shed.

d designates the guides, in which the harnesses c slide up and down, and which are supported by the brackets d^1 on the inside of the end frames f .

The harness frames are connected by means of a screw, having a flat perforated head, with the lifter bars g , which are pivotally connected to the posts g^1 secured by a clamp screw g^2 to the horizontal arm of the bell crank levers h , and whereby said lifter bars g can be accurately adjusted so as to move all parts of the harness frames, and support them equally in all positions.

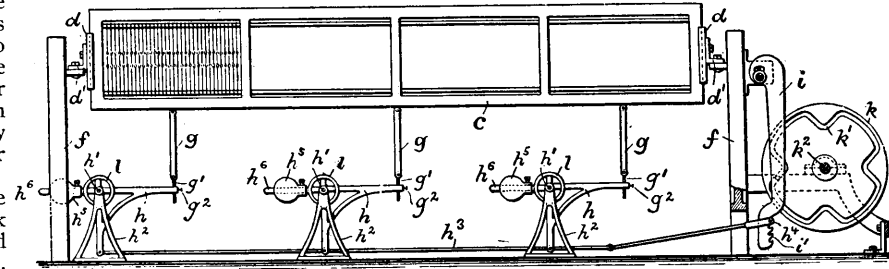
Each bell crank lever h is journaled on a shaft h^1 , supported on frames h^2 . The vertical arms of the bell crank levers h are pivotally connected with a rod h^3 , the end h^4 being connected to a lever i , which is connected at its upper end to a bracket secured on one of the end frames f , and is provided at its lower end with hooks i^1 for regulating the speed of the rod h^3 , and thus in turn regulating the raising of the har-

nesses, *i. e.*, size of shed. The lever *i* is provided with a stud, which extends into the cam slot *k*¹ on the cam disk *k*. Each harness frame is connected with three or more of the bell crank levers *h*, and each harness frame is operated by a separate rod *h*³, a separate lever *i* and a separate cam disk *k*.

The number of cam disks equal the number of harness frames used in the loom, and are secured to the shaft *k*² in the positions required to move the several harness frames at the predetermined time according to the weave. The cam slot *k*¹ is formed as shown in the illustration to operate the harness frame connected therewith four times for each revolution of the cam disk *k*, but may be arranged to suit other changes.

To secure the accurate movement of the bell crank levers *h*, they are provided with the annular rings *l*, the faces of which are finished and form a bearing on the ring of the adjacent bell crank lever, thereby holding the arms of the levers in the required position, allowing the bell crank levers connected with different warp frames to move independent of the adjacent levers and in a true vertical plane.

The weight of each harness frame is as near as possible counterbalanced by the weight *h*⁵, adjustably secured to the extension *h*⁶ of the horizontal arms of the bell crank levers *h*, thereby reducing the friction on the cams. (*O. A. Steere, Pawtucket, R. I.*)



form trunnions which seat in said notches. Each shaft carries a sheave *w*, over which passes and to which is secured by means of a pin or screw *x* a strap or band *y*, the ends of each strap being connected, respectively, to those cords for the particular harness to which motion is to be transmitted. On each of said shafts *u* is also mounted a pair of double sheaves *z*, the one being slightly larger than the other and their common hub *a* being provided with a set screw *b*, whereby the double sheave is adjustably secured on the shaft.

Over one of the sheaves of each double sheave extends a belt or band *c*, the ends of which are connected to the upper ends of hook rods which carry removable weights *e*¹ at their lower ends into which are screwed the threaded shanks of hooks *e*, engaging eyes *f*, carried by the levers *l*. By adjusting each hook in the weight the belt *c* may be maintained in effective engagement with either portion of the double sheave, and so the lift of the harness can be regulated.

g designates a rod which is threaded and screwed into each shaft *u*, which it penetrates and in which it is sustained at an incline in the normal position of the shaft—*i. e.*, that indicated in Fig. 2. A binding nut *h* helps to secure the rod in the position to which it is adjusted. The lower end of the rod carries a weight *i*. By turning the rod in the shaft the position

ADJUSTABLE HARNESS MOTION REGULATORS FOR NARROW WARE LOOMS.

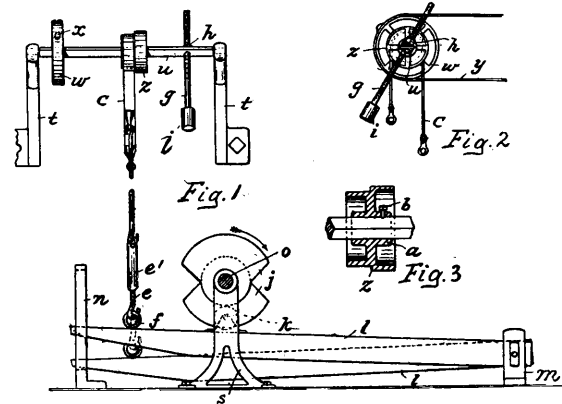
The object is to so construct the harness controlling mechanism of narrow ware looms (as used for weaving hat bands and similar fabrics) that the action thereof will be rendered as even and uniform as possible and devoid of all unnecessary jar; permitting also special adjustment for the harness with reference to shed required, in turn giving the fabric woven luster.

The general construction of a narrow ware loom is too well known to need special illustration or description, hence we will refrain from that part in a general way, only dealing with such parts of the loom to which this mechanism more particularly refers to.

Fig. 1 shows this shedding motion; Figs. 2 and 3 being views in detail.

o is the cam shaft, journaled in one of the end uprights of the loom frame and also sustained partly in bearing brackets *s* disposed outside of the frame, and arranged between said brackets. Mounted on said shaft are cams *j*, against which are adapted to bear rollers *k*, carried on levers *l*, that are fulcrumed in a bracket *m* back of the brackets *s*, said levers extending subjacently with reference to the cams and being movable in a true vertical direction by virtue of guide *n*.

Motion is imparted to shaft *o* by means of a gear fastened to its inner end and meshing with another gear connected to the driving shaft, as extending throughout the length of the loom. From the upper portion of the loom frame projects outwardly over the cam motion structure described, in an inclined position, a pair of arms or brackets *t*, having their upper edges correspondingly notched for the reception of squared shafts *u*, the ends of which are reduced to



of its weight *i* relatively to the shaft will be altered, and by this means the action of the harness controlling mechanism regulated to suit the character of the fabric woven.

In place of leaving the upper end of each rod *g* as protruding out of shaft *u* free, as shown in Figs. 1 and 2, each one of these ends may be secured by spiral springs to a conveniently placed frame and thus the rods maintained in an inclined position. These springs will with this arrangement not only assist the weighted rods in regulating the action of the harness controlling mechanism, but at the same time effect the prompt return of its parts to their respective rest positions. (*G. Kremer and E. Monhof, New York.*)

BOX MOTIONS AND SHUTTLE BOXES.

THE CROMPTON SHUTTLE CHANGER.

This mechanism has for its object to change the shuttles automatically when the filling is broken or exhausted.

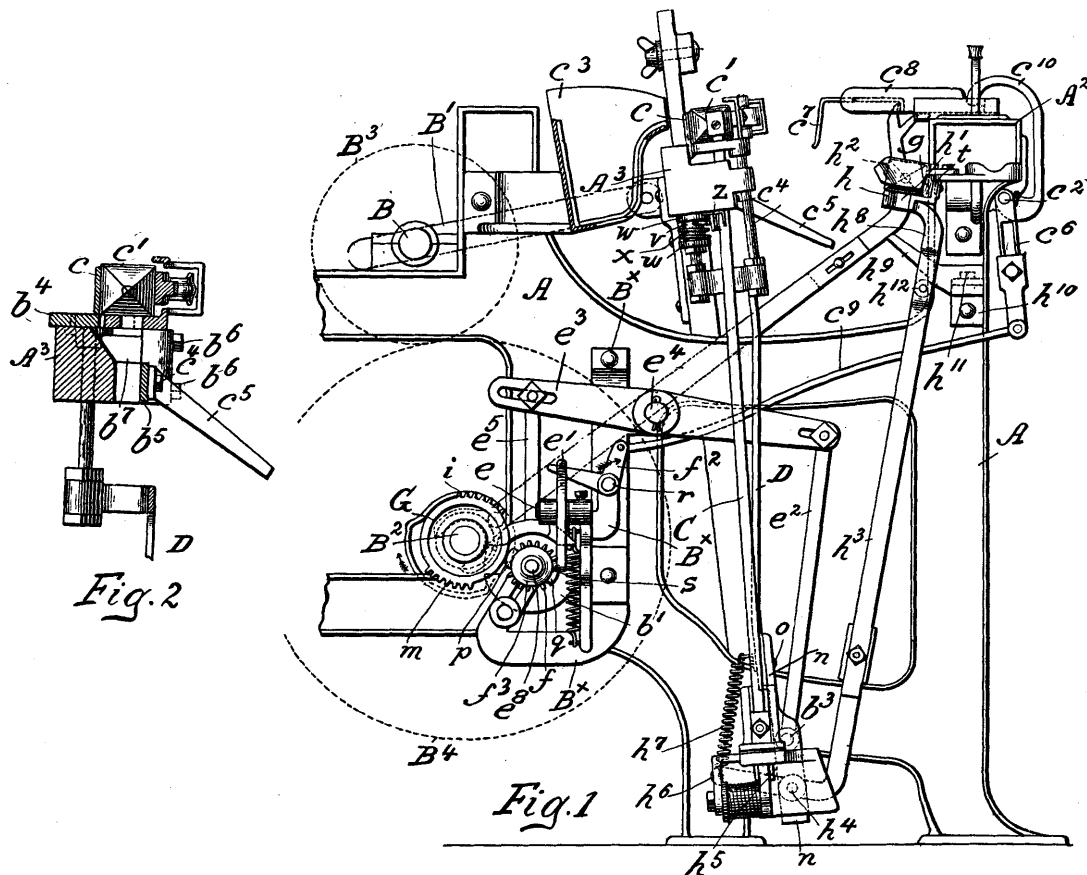
Fig. 1 is a left hand end view of a portion of a loom with the parts represented in the position when the loom is running regularly. Fig. 2 is a sectional detail of the running shuttle box, drawn to a slightly enlarged scale compared to Fig. 1.

A represents the loom frame, A² the breast beam, A³ the lay, B the crank shaft, B' the pitman connecting the crank shaft to the lay, B² the cam shaft and B⁴ a gear wheel (shown dotted in its outline), which meshes with another gear wheel B³ also shown (dotted) in its outline. The cam shaft B² carries a gear G, having two sets of teeth *i* and *m*.

The loom frame has mounted upon it near the cam shaft, a stand B^x having bearings for a shaft e³, which has at its inner end a disk b', over which is fitted a

on it a mutilated gear *f*, which has two teeth removed from one side to leave an empty space and at its opposite side has a large tooth *q*, the shaft e³ having fitted on its outer end a forked gear f³, provided with a tooth *p*, said forked gear being free to slide on the shaft e³. When in inoperative position the space on one side of the gear faces one set of the teeth *i* and *m*, being out of engagement with the same.

When the filling breaks, the filling fork carrier c⁸ is moved backward, carrying the filling fork c⁷ with it and turns the lever c¹⁰ which is connected with a rock shaft c² having an arm c⁹ to which is attached rod c⁶ jointed to an elbow lever f² pivoted at *r* on the stand B^x. One end of said lever f² enters a slot in a second elbow lever e¹ mounted on a stud e of the stand and having at its lower end a roller *s* which enters a groove in the sliding gear f³. By this movement of the rod c⁶ the large tooth *q* of the gear *f* comes in contact with the teeth *i* on the cam G, turning said gear half a revolution, then as the other set of teeth



link e⁵, connected at one end to the lever e³ which is pivoted at e⁴ to the loom frame, said lever being connected at its other end to a link e⁶ which in turn fits over a stud b⁵ extended from a block *n* attached to the shuttle box rod D by a screw *o*. The shaft e³ has fast

m comes around, it moves the gear another half revolution. This raises the rod D as attached to the shuttle box. The casting b⁴ (shown in Fig. 2) as applied to the lay, has rising from it a shuttle aligning wall *c*, which constitutes the back for the running

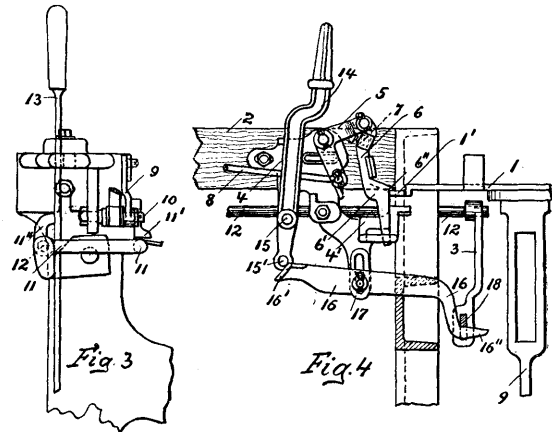
shuttle box, *i. e.*, when the latter is in its operative position in line with the race of the lay; but when the said shuttle box is put into its inoperative (*i. e.*, raised) position by the lifting of the rod D as previously described, then said wall no longer constitutes the rear side of said shuttle box and the shuttle *c'* is free to escape laterally from said box over the wall *c* and into the receptacle *c''* (see Fig. 1) this, the shuttle being forced to do, on the second back stroke of the lay. The casting *b''* is attached at its end to the lay by two bolts *b''* and presents a bar *b''*, the top of which being located below the level of the race of the lay; and behind this bar is a slot *b''* in which the picker stick C is moved. The bar *b''* has connected to its front side, by bolts *c''*, an inclined finger *c''*, which projects forward from the lay and constitutes a guide to determine the line of motion of the shuttle feeder *h* when the latter moves from its inoperative to its operative position. The shuttle feeder *h* consists of a flat plate having a slot *h'*, open at its end to enable the picker stick C to enter said slot and throw the spare shuttle *h''* from said shuttle feeder across the lay, said shuttle feeder being then in its operative position at the level of the race of the lay, and thus actually takes the place of the running shuttle box.

The plate of the shuttle feeder is mounted upon a lever *h''*, pivoted on a stud *h''* (see dotted lines, Fig. 1), held in the forked lower end of the block *n*, secured, by bolt *o* to the rod D, carrying the running shuttle box. The block *n* is shaped to enter, substantially fit, and be guided by grooves *h''* made in the rocker iron, which is attached by a set screw to one end of the rocker shaft on which are mounted the swords A³ of the lay, the said block rising and falling in said grooves as the lever *e''* is turned in one or the other direction to lift or depress the rod D. The lever *h''*, carrying the shuttle feeder, owing to its connection with the said block *n*, rises and falls in unison with the running shuttle box. The short arm *h''* of the lever *h''* has connected to it a spring *h''*, the opposite end of the spring being fixed to the rod D, so that said spring normally acts to hold the shuttle feeder in its inoperative position, as shown in Fig. 1, and in such position a slotted or bifurcated part *h''* on the lever carrying said shuttle feeder embraces a stationary inclined guide or finger *h''*, supported by a set screw *h''* on a suitable bracket *h''*, fixed to the loom side, said finger extending toward the lay. The lever *h''* at the lower end of said bifurcated portion *h''* has a roller *h''* which, as the lever *h''* is lifted with the rod D by the lever *e''*, acts against the under inclined side of the finger *h''* and causes said shuttle feeder to move toward the lay, the latter being supposed at that time to be advancing toward the breast beam, and as the said shuttle boxes are being lifted the said bifurcated portion passes from the finger *h''* upon the end of the inclined guide or finger *e''*, extended from the lay, and the latter finger thereafter continues to act alone as a guide for the lever *h''* as the shuttle feeder comes into its operative position in a line vertical with relation to the line in which the running shuttle box moves on the lay, said finger *e''* also acting as a locking device to insure the movement in unison back and forth with the lay of the said shuttle feeder. These two fingers, when the lay is substantially forward, coincide, forming a sort of bridge, so that the lever *h''* may pass readily from one to the other.

When the filling fails and as the lay swings forward, the lever *e''* will have been moved far enough to start the lever *h''* on its upward movement, which causes the roller *h''*, acting on the under side of the guide or finger *h''*, to start said lever and the shuttle feeder toward the advancing lay, so that in said advancing movement the lever *e''*, yet continuing its

movement, causes the lever *h''* to pass from the guide or finger *h''* onto the guide or finger *e''*, and by the time that the lay completes this forward movement the running shuttle box will have been lifted substantially into its inoperative position and the shuttle feeder will have come nearly into its operative position at the level of the race of the lay, and by the time that the second back stroke of the lay is completed the running box will have been put into inoperative position and the shuttle feeder fully into its operative position. On this second backward stroke of the lay the shuttle in the running shuttle box will be thrown from the open rear side of said running shuttle box over the top of the wall *c* into the receptacle *c''*, and as the lay reaches the proper position in its second back stroke for the shuttle to be picked, the picker stick C acts in the slot *h''* of the shuttle feeder and throws the spare shuttle from the shuttle feeder onto the race of the lay. During the next or third forward stroke of the lay, both shuttle boxes are emptied, and at this time the shuttle box lever *e''* is again moved, this time, however, to lower the running shuttle box and the shuttle feeder and moving the bifurcated portion of the lever *h''* from the finger *e''* onto the finger *h''*, leaving the shuttle feeder in its inoperative position, so that by the time that the lay arrives at the end of its third back stroke the said running shuttle box will receive the shuttle just thrown from the shuttle feeder at the previous back stroke of the lay.

The bottom plate of the shuttle feeder has at each of its outer edges next the operator and near its opposite ends, two uprights *t*. The spring *g* is connected at one end to the upright *t*, the other upright acting as a stop against which the free end of the



spring is normally pressed, the top of said spring at its end being overlapped by a short lip extending backwardly from the said upright.

To the rear side of the lay is connected a stand provided with an ear *u* carrying a stud which enters the hollow hub *v* of lever *w*, a part of the face of which is normally kept in the path of movement of the picker stick by a spring *x* said lever acting as a picker stick check. The position of said lever as regards the line of motion of the picker stick is controlled by a stop *z*.

This shuttle changer is also provided with a stop motion, the object being to provide means to prevent the lay from banging against the stopping bunters when the spare shuttle fails to be supplied from the shuttle feeder mechanism.

Fig. 3 shows in its end view a portion of this stop motion, and Fig. 4 gives a rear view of another portion of it.

A bracket 4 is secured to the inside of the breast beam 2 at the shuttle feeder mechanism end of the loom. On a stud in the upper part of said bracket 4 is pivotally supported an angle lever 5, to one end of which is pivotally connected the upper end of lever 6. A spring 7, extending in a recess in the lever 6 and in the angle lever 5, acts to move the lever 6 outwardly, as shown in Fig. 4. The lower end of the lever 6 extends through a slot or opening in an extension 4' on the bracket 4, and has an offset 6' with a lip 6'' thereon, which in case the lever 6 is not held in its inward position by the end of the shuttle engaging therewith, will extend over an extension 1' on the plate 1 of the shuttle feeder mechanism, as shown in Fig. 4. The other arm of the angle lever 5 has pivotally connected thereto one end of rod 8, its other end being pivotally connected to one arm of angle lever 9, pivoted on stud 10. The other arm of said angle lever 9 rests at 11' on the end of the knock off lever 11, fast on rock shaft 12, as mounted in bearings at the front of the breast beam, and the upwardly extending arm 11'' of the knock off lever 11 engages the shipper lever 13, as shown in Fig. 3, to unlock said lever 13 and stop the loom in the ordinary way.

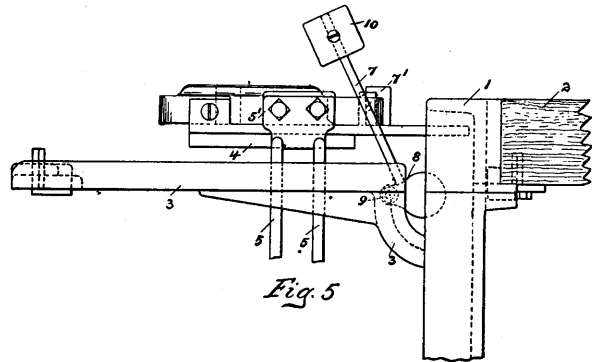
When there is a shuttle on the plate 1 of the shuttle feeder mechanism the lever 6 is engaged by said shuttle and held in such a position that the movement of the shuttle feeder plate 1 to supply a new shuttle to the loom in case of the failure of the filling in the running shuttle will not engage said lever 6 to operate the knock off lever and shipper lever and stop the loom; but in case there is no shuttle on the plate 1 of the shuttle feeder mechanism then the lever 6 will be moved outwardly by the spring 7, as shown in Fig. 4, so that the lip 6'' thereon will extend over and be engaged by the extension 1' on the plate 1 of this mechanism and the raising of the plate 1 will operate, through lever 6, angle lever 4, connector rod 8 and angle lever 9, the knock off lever 11 and shipper lever 13 to stop the loom. In the upward movement of the plate 1 it moves toward the lay, so that the extension 1' thereon will be disengaged from the lip 6'' on the lever 6.

In order to prevent the operation of the shuttle changing mechanism when the operator is placing a new shuttle on the plate 1 of the shuttle feeder mechanism and thus protect the operator from injury by the raising of the plate 1, a supplemental mechanism is provided, consisting of a lever 14, pivoted at 15 on the bracket 4 and having at its lower end a pin 15', which engages the inclined end 16' of a lever 16, pivotally supported on a pin 17, extending in the lower slotted end of the bracket 4. The opposite end of the lever 16 is provided with a lip 16'' which extends under an arm 18, secured on the end of a rod which is connected to the elbow lever as forming a part of the shuttle changing mechanism described in the first part of this article. The end of the arm 18 extends through a slot in the lower end of another arm 3, fast on the rock shaft 12, and a lip on said arm 18 engages with the arm 3 when the arm 18 is in its lower position. When the arm 18 is raised by the movement of the lever 16, caused by the movement to the left of the lever 14 by the operator, as shown in Fig. 4, the lip on arm 18 will not be engaged by the slotted end of the arm 3, fast on the rock shaft 12, so that the rocking of said shaft by the filling fork motion and the movement of the elbow lever (previously referred to) will not move the arm 18 to put into operation the shuttle changing mechanism. After a shuttle has been placed on the plate 1 of the shuttle feeder mechanism the lever 14 is moved to the right to allow the end of the lever 16 to drop down, and with it the arm 18, into position ready to

be engaged and operated by the arm 3 on the rock shaft 12.

This shuttle changer is also provided with a signal attachment for indicating to the weaver that a fresh shuttle is needed on the shuttle feeder.

Fig. 5 is a front view of this signal attachment, showing the spare shuttle holder plate of the shuttle feeder in its raised position.



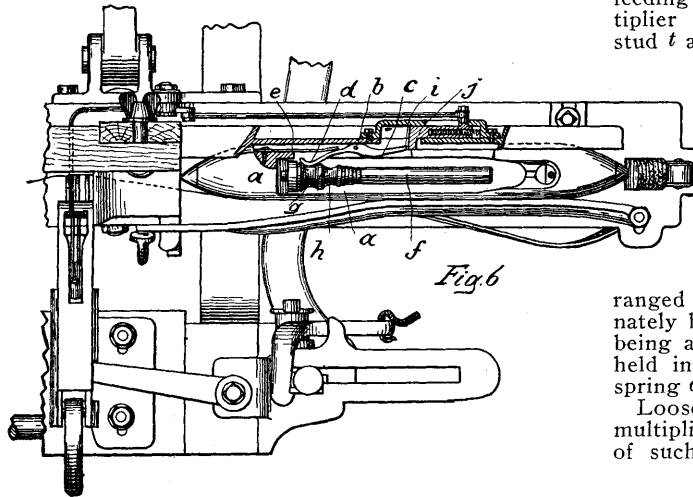
1 indicates a portion of the loom frame, 2 the breast beam, 3 a stand secured to the loom frame and 4 the spare shuttle holder plate bolted to the upper ends 5 of the lever which operates the shuttle feeder. An arm 7 has a weight 8 at one end and is pivotally mounted on a stud 9 as bolted to the stand 3. The opposite end of this arm 7 carries the signal 10. This arrangement permits the arm 7 to move, in a vertical plane from the horizontal (lowered) to a raised position, the weight 8 acting to hold the arm 7 in its lowered position when pushed down by the weaver, but when the projection 7' on the arm 7 is engaged by the upper edge 5' of the two ends 5 of the lever previously referred to, said arm 7 is raised by the upper and forward movement of the shuttle holder plate 4 on the transfer of a shuttle to the lay, the weight holding said arm in raised position until again pushed down by the weaver.

This shuttle changer is also provided with means whereby when the filling is nearly exhausted, it will operate to automatically supply another shuttle. The device is applied to the other side from the shuttle changing mechanism.

Fig. 6 shows a top view of the device as applied to the filling fork end of the loom.

The shuttle *a* is provided with a pivot pin *b* on which is mounted a feeler *c* having a rounded end *d* to engage the filling on the bobbin, a spring *e* holding the same in place. The bobbin *f* is provided with two recessed portions *g h*. The filling in the recess *g* at each pick of the loom will be so reduced at the point where the end *d* of the feeler *c* engages it that said feeler *c* will be moved sufficiently to act effectively and engage with its end *i*, the actuating device *j* at the proper time, the filling in the supplemental recess *h* after the exhaustion of the filling in the recess *g* and the operation of the feeler *c* providing sufficient filling for a number of picks of the shuttle and thus prevent the bobbin from being exhausted before it is changed on the other end of the loom. When the bobbin *f* has the desired quantity of filling, the end *i* of the feeler *c* will be out of engagement with the actuating device *j*; but when the filling on the bobbin has been exhausted to a predetermined point the end *i* of the feeler *c* will be in position to engage the actuating device *j* to operate the same and automatically operate the shuttle supplying mechanism on the other end of the loom. The movement of the actuating device *j* at the proper time

through intermediate connections, acts to raise the filling to a position where it cannot be engaged by the filling fork, thereby leaving the filling fork and its slide free for backward movement and change the



shuttle. This latter mechanism can also be applied to looms of ordinary construction and in which instance said mechanism acts as a stop motion upon exhaust of filling. (*Crompton and Knowles Loom Works.*)

SHUTTLE BOX OPERATING MECHANISM FOR CROMPTON LOOMS.

This mechanism has for its object to provide means for automatically throwing out of operation the pattern surface feed and the multiplier feed on breakage of a pick, or when for any reason it is desired to operate the loom for a considerable period of time with the same shuttle, as when weaving the body of a blanket or other equivalent large body of fabric.

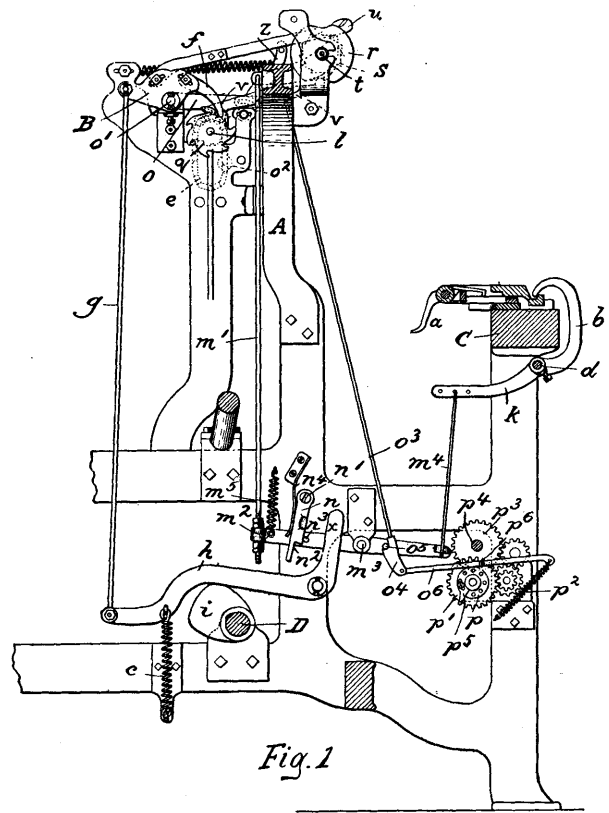
The new mechanism is particularly adapted for use in connection with box mechanisms wherein the pattern surface and multiplier feeds are actuated alternately—as, for instance, when connected with a common actuator and facing in opposite directions—so that one feed will operate on movement of the actuator in one direction, the other being operated on the return movement of the actuator. In mechanisms where two feeds are thus alternately operated, if when the loom is stopped, one feed be thrown out of action and the other not thrown out of action, the latter feed, when the loom is again started, will operate to impart a feeding movement to its mechanism before the first one can pick up or recover the feed which it lost when the loom was stopped, and therefore the said latter feed will overrun the first feed, and thereby throw the two out of proper timing one with relation to the other. To obviate this, when either of the threads is thrown out of action, the other should likewise be thrown out and held out of action until the first has picked up or recovered the feed which it lost in order that in the subsequent operation of the loom the two threads may follow each other in proper order as if no breakage had occurred. This feature is accomplished in the new mechanism.

Fig. 1, in vertical section and partial elevation, shows a sufficient portion of a loom embodying the new mechanism to enable the latter to be understood; and Fig. 2 an enlarged detail showing a rear side view of some of the parts in different positions.

A indicates the frame, C the breast beam, D the cam shaft, *a* the filling fork and its slide, *b* the hooked finger, *d* the stop rod, *k* its arm, *l* the shaft on which the pattern surface *e* is mounted, *q* is the ratchet, *f* its feed pawl which in the present instance constitutes the feeding device for the pattern surface, *r* is the multiplier cam or surface, *s* its ratchet mounted on a stud *t* and actuated by the pawl *u*, which in the present instance constitutes the multiplier feed device, and with the pattern surface feed device *f* are secured to and alternately moved to operate their respective feed mechanisms or surfaces by the actuator B, and the pawl lifters *v* and *z*.

The movable lifter *z* is controlled by the pattern surface *e* which also controls the box mechanism and the pattern feed lifter *v* is controlled by the multiplier surface *r*, the pattern and multiplier feeds being arranged to operate in opposite directions and alternately by the vibrations of the actuator B, the latter being actuated by the rod *g*, connected to a lever *h* held in contact with a cam *i* on the cam shaft by spring *o*.

Loosely mounted upon the stud *t* carrying the multiplier pattern surface is a disengaging device *m*, of such shape and construction, that when moved

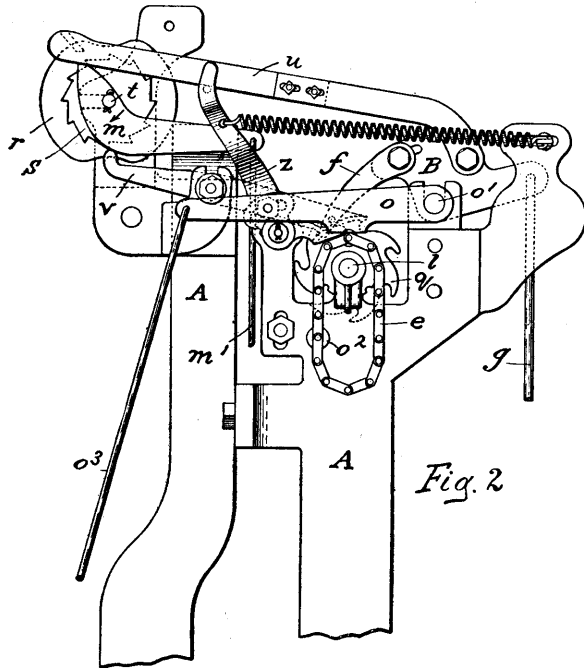


from its full line position Fig. 2, it will act to separate the multiplier feed device *u* and the pattern feed lifter *v* to move the one from possible engagement with the teeth of its ratchet *s* and move the other to remove the pattern feed device *f* from engagement with the teeth of its ratchet *q*. This disengaging device is provided with a radially extended arm, which is connected at its end by a rod *m'* with a lever *m''*, (see Fig. 1)

fulcrumed on the frame at m^3 , and connected at the opposite side its fulcrum by a link m^4 with the arm k of the stop rod d of the automatic filling stop motion for the loom.

When during the operation of the loom the filling slide carrying the filling fork a is moved to the right, Fig. 1, to stop the loom because of the breakage or undue slackening of a pick, the hooked finger b will be moved to rotate the stop rod d and raise its arm k to thereby operate through the link m^4 the lever m^2 and rod m^1 to depress the arm referred to and the disengaging device m and turn the latter in the direction of the arrow Fig. 2, to throw out of action both feed devices.

Means are provided to hold the feed devices disengaged or out of action until such time as they can be again put into action in the same order in which they were operating when stopped, such means being a dog n , pivoted to the frame at n^1 and notched at n^2 to cooperate with a pin n^3 on the lever m^2 , referred to, a spring n^4 acting to press said dog toward the pin.



When the lever m^2 is moved, as described, to throw out of action the multiplier and pattern feeds the pin n^3 is carried below the notch n^2 , permitting the spring n^4 to move the dog over the pin to hold the lever m^2 in its new position with the feed devices out of action, the parts remaining thus held out of action until the proper time, the second pick after that at which the loom was stopped, when the dog n is disengaged to permit the lever m^2 under the action of its spring m^5 to move to again introduce the feed devices into action.

For the release of the dog n , referred to, there is provided the lever h with an upwardly extended arm x , which as the cam i drops said lever, will engage the dog n and move it to release the lever m^2 and at this time if the lever b and filling fork and stick have been restored to their normal position for the operation of the loom, the lever m^2 will by means of spring m^5 assume its normal position.

For throwing out of action both the pattern and multiplier feeds for considerable periods of time when it is desired to weave large bodies of fabric without

change of shuttles, lever o is provided (see Fig. 2,) fulcrumed upon the frame at o^1 and adapted to be raised at the proper time by a roller or rollers o^2 in or on the pattern surface e , said lever being provided with a depending rod o^3 , carrying at its lower end a notched or hooked head o^4 , adapted to lie normally beneath a pin o^5 on the lever m^2 , referred to.

The roller o^2 is introduced into the pattern surface at such point that when in the weaving of the fabric the body portion is reached, it will pass under and lift the lever o , and thereby through its hooked head o^4 and the pin o^5 turn the lever m^2 into its position described for throwing out of action both the multiplier and pattern feeds, said lever being at once locked in this new position by the dog n , referred to. To release the lever m^2 when thus held by the hooked head o^4 at the proper time, said head is connected with a bar o^6 resting upon and held in contact with a cylindrical shoulder p on and rotatable with a toothed wheel p^1 , (see Fig. 1,) a spring p^2 being employed to hold the bar o^6 in operative contact with the said shoulder.

The wheel p^1 is connected by gearing with a gear p^3 in and rotatable with the take up roller or shaft p^4 , said wheel p^1 being also provided adjustably with a finger p^5 , adapted to engage a roller or other stud p^6 , on the bar o^6 , so that at the proper time in the rotation of the wheel p^1 , which time is determined by the gearing between it and the take up roller, the said finger p^5 will engage the stud p^6 and move the bar o^6 and the hooked head o^4 to the right Fig. 1, to release the pin o^5 and the lever m^2 and permit the latter immediately thereafter to be released by the lever h to throw into action both feeds for the finishing of the fabric. (Crompton and Knowles Loom Works.)

SHUTTLE BOX GUIDE FOR CROMPTON LOOMS.

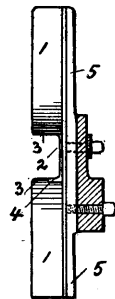
The object is to provide a guide for the inner ends of the shuttle boxes, and which guide is provided with a flange both above and below the level of the raceway to hold the shuttle in position.

The illustration is a vertical section of this shuttle box guide which is secured to the lay by bolts and comprises a plate for guiding the shuttle and a flange projecting outwardly in front of the inner ends of the shuttle boxes to cover the tips of any of the shuttles carried in the boxes.

The flange 1 has a central opening 2 therein on a level with the raceway and curved surfaces 3 at said opening. Through the opening 2 the ingoing or outgoing shuttle passes into or out of one of the cells of the shuttle boxes in line with the raceway, and the curved portions 3 act to force the shuttle into the box as the shuttle boxes are raised or lowered, and the flange 1, above and below the level of the raceway, acts to hold the shuttle in the box when the box is above or below the level of the raceway.

At the lower portion of the opening 2 a horizontal shelf 4 is provided upon the inner surface of the guide plate 5, and on a level with the raceway. This projection 4 is not wide enough to allow of the point of the shuttle engaging therewith as the shuttle boxes are raised or lowered, but serves to form a support for the inner edge of the shuttle to travel on as it is picked from or into the cell of the shuttle boxes.

By placing the guide of the inner end of the shuttle boxes on the shuttle box frame and back of the



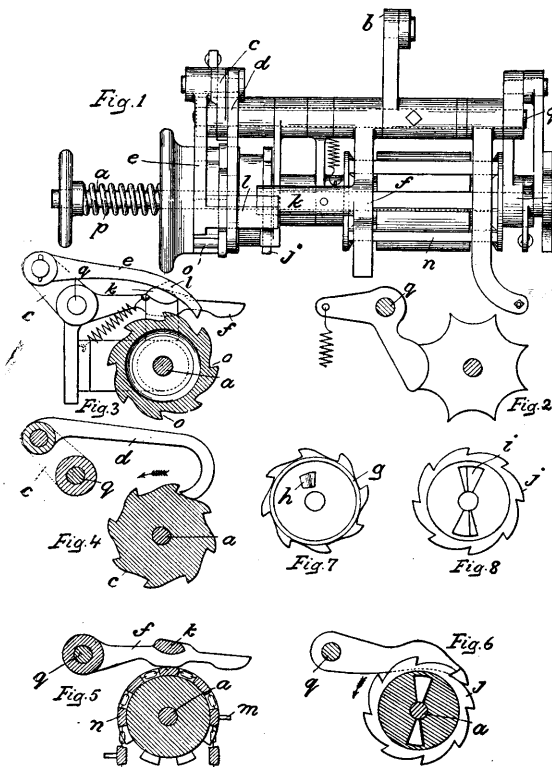
face of the reed, with a lip or flange extending outward from this position far enough to just cover the tip of the shuttles, the whole front of the guide is left clear and free from any danger of entanglement of the several threads of filling extending from the different cells of the shuttle box to the selvage of the cloth. (*Crompton and Knowles Loom Works.*)

THE MASON SHUTTLE BOX MULTIPLYING MECHANISM.

The feature of the mechanism consists in such a construction that the regular feed motion of the filling chain and its multiplying motion cannot be in or out of operation simultaneously, the withdrawal of one compelling the operation of the other, thus guarding against mispicks.

Fig. 1 is a top or plan view, slightly broken away, of the multiplying and chain mechanisms of the loom, and Figs. 2 to 8 are details of it. Both motions are operated through the same system of connections and are on the same shaft.

a is a shaft carrying the chain cylinder and the forward and reverse ratchets for the same. *b* is an arm that transmits a rocking motion to the sleeve on which is attached the arm *c* that operates the ratchet pawls *d* and *e* for the forward and reverse motion of the multiplier. Fig. 2 is a check wheel for holding chain cylinder in position after it is turned by one of the ratchet pawls *d*. Fig. 3 is a ratchet wheel and pawl for operating multiplier. Fig. 4 is the ratchet wheel



and pawl for transmitting a forward movement to the chain cylinder. Fig. 5 shows the chain cylinder in connection with the finger *f* through which the multiplier is operated. Fig. 6 is a check ratchet for holding chain cylinder in position while the multiplier

is being thrown in operation. Fig. 7 is the ratchet wheel *g* having the V-shaped point *h* for engaging the slot *i* in the stationary ratchet wheel *j* shown in Fig. 8. Finger *f* and ratchet pawl *e* are each provided with an arm *k* and *l* respectively, running parallel with each other with their ends slightly overlapping.

When the chain is to be stopped for a certain number of picks a pin *m* is inserted at the proper point in one of the chain bars *n* which raises the finger *f* letting the arm *l* slide under arm *k*, thereby throwing the pawl *e* in engagement with the reverse ratchet wheel *o*. In the stationary ratchet wheel *j* there is slot *i*, one side of which is beveled with the V-shaped projection *h* fitting into it, and thus acting as a clutch when engaged. When the pawl *e* engages with the ratchet wheel *o* the ratchet wheels are moved laterally to the left by means of the incline on the clutch, thus being disengaged the chain cylinder remains at rest until clutch comes around again or it has reached another notch in the wheel *j*, when it is moved back in gear again by means of the spring *p* and is again moved forward by pawl *d*.

By varying the number and location of the multiplying pins *m* the frequency of operation of the multiplying mechanism may be varied, and by varying the number and location of the notches *i* in the ratchet wheel *j* the number of picks taking place while the chain is held stationary may also be varied.

In the device shown there are eight teeth on the ratchet wheel *o*, cooperating with the multiplying pawl, and there are two notches *i* arranged at diametrically opposite points. Therefore a movement equivalent to four teeth takes place between the two notches, and as there are two picks, an outward and a return, for each rocking movement of the shaft *a* it will be understood that eight picks will take place during the period of rest of the chain.

Should there be only one notch *i* in the wheel *j*, sixteen picks will take place during the period of rest of the chain, laying during that time picks of the same color or number.

The number of picks taking place during the period of rest of the chain may be also varied by varying the number of teeth on the ratchet wheel *o*. (*Mason Machine Works.*)

THE WHITIN BOX MECHANISM.

This mechanism refers to two-box looms and has for its object the use of either box for any number of picks before calling the other box. The change of boxes is operated from the shedding motion, and as long as the lower box (being the raised position of boxes) is used it is securely locked in position, the use of the upper box putting the mechanism at rest and thus securing itself in proper position for any number of picks.

Fig. 1 is a side view of part of a loom provided with this box controlling mechanism. Fig. 2 is a side view of the friction clamp (shown enlarged compared to Fig. 1).

1 indicates the side frame of a loom, only so much of which being shown as is required to illustrate the box mechanism; 2 is a cam secured to the cam shaft and which is of such a shape that the dwell 3 holds the lever 5 stationary during more than half the revolution of the cam, and the throw 4-4 acts to operate the lever 5 forward and backward during less than half the revolution of the cam. The lever 5 is pivoted on stud 5', projecting from the frame, and engages at one end with the groove in the cam 2, being provided at the opposite end with the segmental slot 6.

A fork 7 is pivotally secured in the slotted end of lever 5, being provided with the slot 8, and adjustably connected with the rod 9, which is connected to a lever controlled by the pattern chain. The fork 7 has at one of the bifurcated ends the knock off 10 and at the other end the knock off pin 11, adjustably secured in a slot in the end 11¹ of the fork. The rock-

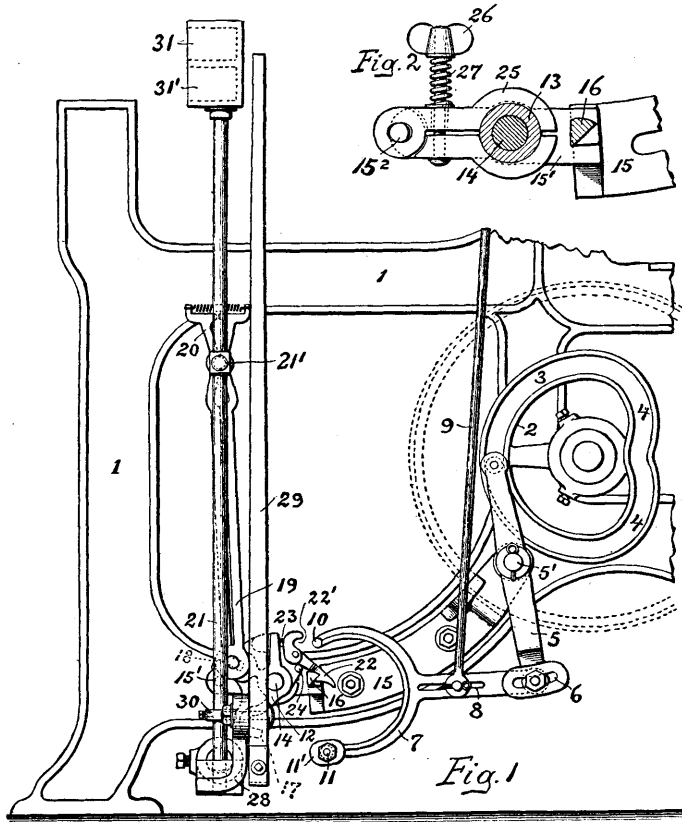
in the bracket 28, which forms the pivotal support of the picker stick 29. The collar 30 is secured to the box rod 21 by a set screw adjusted so as to sustain the box rod on the bracket 28 when the upper box is on a line with the shuttle race on the lay.

How the mechanism operates to lower boxes: Having the parts of the mechanism in positions as shown in Fig. 1, *i. e.*, in the positions they occupy

when the boxes are in the raised position, with the lower box on a line with the shuttle race on the lay, the rotation of the cam 2 will maintain the same in this position until the roller on the upper end of the lever 5 passes from the dwell 3 of the cam and enters the operative part 4, when that end of the lever 5 is moved quickly backward and the lower end with the fork 7 is moved forward. The knock off 10 now encounters the hook on the upper end of the latch lever 22, disengages the catch from the locking post 16, thereby releasing the rocking plate 12, which turns on the post 14, and the box rod 21 with the boxes descends until the downward movement is arrested by the collar 30 coming in contact with the bracket 28.

Raising the boxes: When now the pattern chain raises the rod 9, and through it the fork 7, the knock off pin 11 engages with the hook 17 and turning the rocking plate 12 raises the box rod 21 and the boxes into the position shown in Fig. 1, the latch lever 22 automatically engaging with the lock post 16 and locking the boxes in the raised position.

Boxes at rest: The distance between the knock off end 10 and the knock off pin 11 is such that after the change in the position of the boxes is made the fork 7 may continue to vibrate without disturbing the boxes until a change is required by a projection on the pattern chain or a depression. 31 indicates the upper and 31¹ the lower shuttle box. (*Whitin Machine Works.*)



ing plate 12 (shown in dotted lines) is provided with a sleeve 13 (see Fig. 2) and is journaled on the post 14. Bracket 15 is secured to the same post 14, also the post 5¹, forming the pivotal support for the lever 5, and secures to the bracket 15 the locking post 16, so that when the bracket is secured to the frame 1 these parts are in their relative positions. The rocking plate 12 is provided with the hook 17 (shown in dotted lines) adapted to engage with the knock off pin 11 on one end of the fork 7 and with a slotted bracket 18, in which the lower end of the lifter rods 19 is supported and which are connected with the spring clamp 20, which engages with a stud 21¹, secured to the box rod 21. The latch lever 22 is pivotally supported on the rocking plate 12 and is provided on one side of its pivotal support with a catch engaging with the locking post 16 and at the opposite side with a hook 22¹, adapted to engage with the knock off 10 of the fork 7. A spiral spring 23 holds the latch lever 22 in the normal position against the stop 24.

To a pin 15², projecting from the arm 15¹ of the bracket 15, the clamp 25 is secured, bearing on the sleeve 13 of the rocking plate 12, the thumb nut 26 bearing on the coiled spring 27, regulating the frictional contact of the clamp on the sleeve 13. The lower end of the box rod 21 extends through a hole

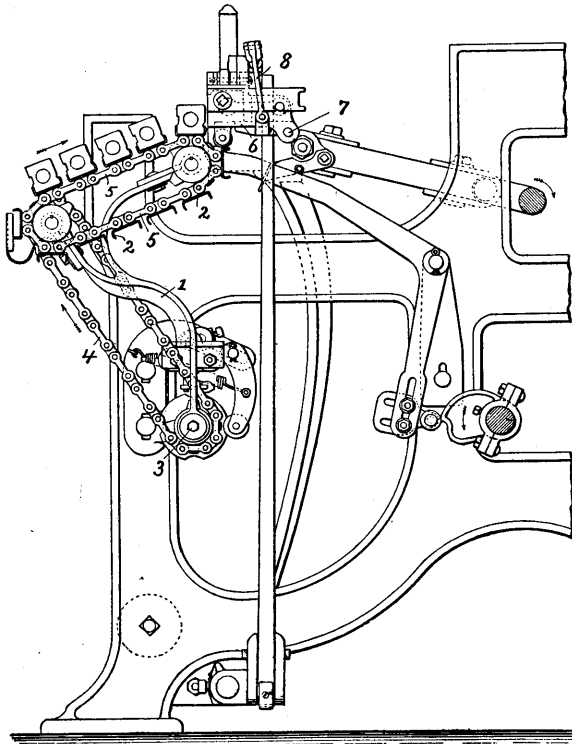
THE THOMAS SHUTTLE CHANGING MECHANISM FOR COTTON LOOMS.

The new device has for its object that when the filling in the shuttle is exhausted or broken such shuttle is automatically discharged and replaced by another shuttle. The mechanism is so constructed that it works in connection with the filling stop motion. The filling motion and the shipper handle being disconnected so that when the filling runs out or breaks instead of the loom being stopped, the shuttle changing mechanism is thrown into action, thus discharging the shuttle, the filling of which may have broken or run out, and replacing it with a fresh shuttle.

The mechanism is so constructed that the fresh shuttles are supplied from the front side of the box and discharged through the bottom, the swell of the shuttle being placed on top so as not to interfere with the changing mechanism.

The illustration is a side view of part of a loom, showing the shuttle carrier 1 and a part of the operative mechanism, the parts inside of the loom frame being omitted. 5 is the endless chain for carrying the shuttles and which is provided with springing clasps 2 for holding the shuttles in position. Shaft 3 drives sprocket chain 4 which drives chain 5. 6 is a

gate which forms the bottom of the shuttle box and works on a pivot 7, from which it can be tilted down-



ward when a shuttle is to be removed, the chain 5 being at the same time moved forward, bringing another shuttle in position to be caught by the gate 6 on its upward stroke and placing it in the shuttle box. Thus as soon as an empty shuttle has reached its destination on the changing side it is thrown out and replaced by a fresh shuttle on the forward stroke of the lay.

To insure the quick removal of the empty shuttle from the box, the gate 6 is connected by means of a link 8, with a deflector in the top of the shuttle box (and over the shuttle) which moves downward in connection with the gate and forces the shuttle out, making the action quicker than if it was left to gravitation alone. (*Whitin Machine Works.*)

BIRCHALL'S SHUTTLE BOX OPERATING MECHANISM.

The object of this mechanism is to provide the loom with means for controlling the boxes from a dobby, Jacquard mechanism, multiplier, etc., whereby the boxes can be operated in regular or irregular intervals, according to the design of fabric to be woven.

Fig. 1 is a side elevation of a loom provided with this shuttle box operating mechanism, only those parts of the loom being shown which are necessary to fully illustrate the nature of the improvement;

Fig. 2 is a detail rear elevation of a portion of Fig. 1, and Fig. 3 an enlarged detail view of a certain box lever controlling and operating mechanism.

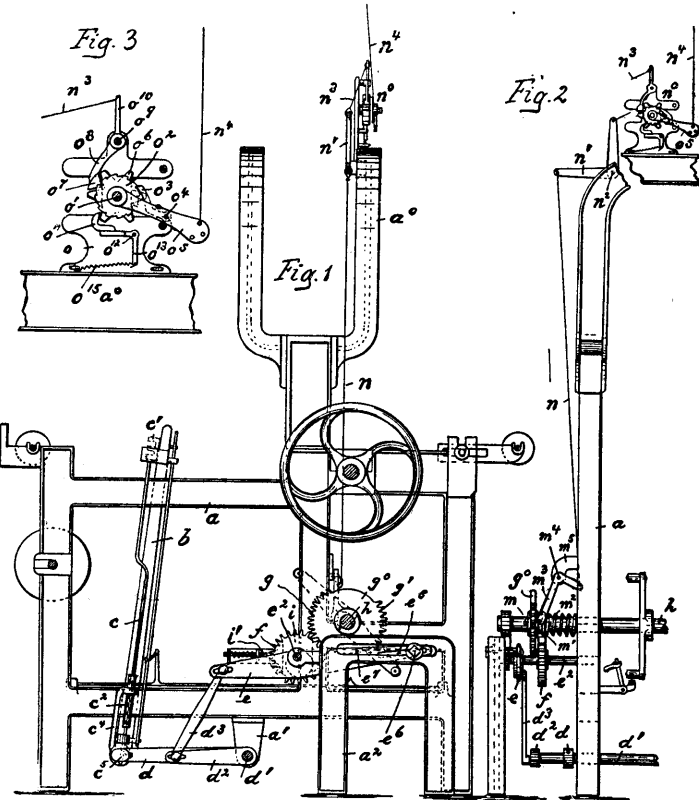
a, represents the loom frame, and b the fulcrum lay sword. The rod c, which carries at its upper end the shuttle boxes (two compartment boxes) c', is guided at its lower portion in a tube c², secured to the fulcrum bracket c⁴. To the lower portion of the rod c, is pivotally secured, as at c⁵, one end of the arm d, the other end of which is securely mounted on a shaft d', extending across the loom and connected with the shuttle box rod on the other side of said loom.

On the shaft d', which has its bearings in the downwardly projecting brackets a' of the loom frame a, is secured one end of the arm d², the other end of which is adjustably and pivotally connected, through link d³, with a forwardly projecting end of the lever e, eccentrically mounted on the shaft e², and carrying a gear wheel f, which is stripped of two teeth diametrically opposite. The rear end of the lever e, is provided with an elongated slot e³, penetrated by a pin e⁴, adjustably arranged in the elongated horizontal slot e⁵ of the auxiliary frame a².

On the picker shaft h is arranged a gear wheel g°, connected with said shaft by a key and feather arrangement m, by means of which latter the gear wheel g° can be laterally moved or shifted on the shaft h.

The gear wheel g°, is provided with two segmental sections g and g', also with a grooved collar m' surrounding the shaft h, and held in normal position by means of the spiral spring m², is clearly shown in Fig. 2.

The grooved collar m' is engaged by pins arranged in the forked end of the angle lever m³, fulcrumed, as at m⁴, to a bracket or projection m⁵ of the loom frame a. The other end of said angle lever is con-



nected, through a cord or wire n , with angle lever n' , which latter is fulcrumed, as at n^2 , to the top or connecting brace a^o of the loom frame.

In the bracket or frame o , projecting from the cross brace a^o , is arranged a shaft o' , on which are securely mounted the ratchet wheel o^2 , and the star wheel o^6 . The notches in the star wheel o^6 , are adapted to be engaged by a block o^7 , carried by the pawl o^8 fulcrumed as at o^9 , and provided with an arm o^{10} , connected through a cord or wire n^3 with the angle lever n' .

The ratchet wheel o^2 , is adapted to be engaged by a pawl o^3 , pivotally secured, as at o^4 , to the link o^5 , loosely mounted with one end on the shaft o' , and having its other end connected through a cord or wire n^4 with a dobby, jacquard mechanism, multiplier, etc.

The star wheel o^6 , is held in position by the hooked end o^{11} of an angle lever o^{12} , which is fulcrumed, as at o^{13} , to the frame o and is controlled by a spiral spring o^{14} .

The gear wheel g^o is normally held out of engagement with the gear wheel f , and whenever a shuttle is called for, the said gear wheel g^o is shifted on the shaft h into the plane of the gear wheel f , and thus into engagement with the same, whereby the latter is operated.

For this purpose the cord or wire n^4 , is pulled upward by the mechanism before referred to, thus causing the pawl o^3 to rotate the ratchet wheel o^2 , and through the shaft o' , the star wheel o^6 .

The block o^7 is forced out of its respective notch of said star wheel, causing the cord or wire n^3 to operate the angle lever n' , and the latter, through the cord or wire n , the angle lever m^3 . When the block o^7 again engages the next following notch of the star wheel o^6 , the pull on the cords or wires n^3 and n is released and the gear wheel g^o , by action of the spiral spring m^2 , is returned to its normal position. (*Robert Atherton, Paterson, N. J.*)

FILLING CHANGING MECHANISM FOR NORTHROP LOOMS.

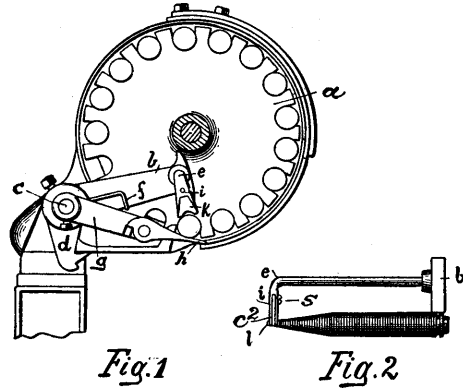
In Northrop looms a filling carrier is automatically transferred from a rotatable feeder or hopper into the shuttle, upon failure or exhaustion of the filling therein, such transfer being accomplished by a pusher or transferrer which engages the filling carrier while it is held in the feeder or hopper. The change is made very rapidly, and the metallic transferrer acts with such force in practice that very often the yarn is cut or damaged. This is not apparent when using a bobbin, as the wood thereof will yield sufficiently to prevent damage to the thread, but with the metal cop spindle as very largely used for a filling carrier, metal is opposed to metal, with sometimes only one layer of thread between, and the thread will be cut or pinched.

In the new mechanism the extremity of the transferrer is provided with a yielding cushion, whereby the impact of the transferrer will not damage any portion of thread between it and the tip of the spindle of the cop or filling carrier.

Fig 1 is an end elevation and partial section, representing a sufficient portion of a filling changing mechanism with the new motion applied thereto. Fig. 2 is a side elevation of the transferrer in engagement with a filling carrier.

a indicates one member of the rotatable feeder, b is the transferrer mounted on stud c , and having the downturned end d and a finger e . f is the lifting spring, g the arm, and h the tip supporting or directing device. The bent end i of the finger e is flattened, transversely slotted, and recessed at its extremity to

receive a rubber cushion k . The main portion of the cushion is shaped to enter the recess previously referred to, and it is extended and reduced in thickness to enter a transverse slot in the end of the finger e of

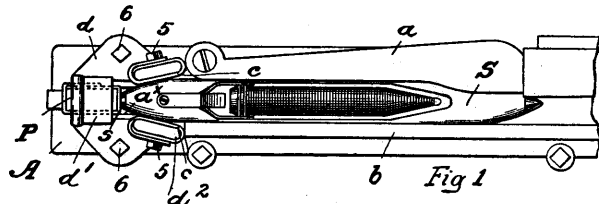


the transferrer, the reduced portion also forming side ribs c^2 , which, entering the slot in the end of finger e adjacent the recess, serve to prevent lateral displacement of the cushion. Screw s secures the cushion in place in the finger e and a concavity is made in the outer end of the cushion, to engage the end of the spindle l of the filling carrier, as shown in Fig. 2. Should a portion of the filling thread be caught between the spindle of the filling carrier and the cushion of the transferrer, the yielding character of the cushion will prevent damage to such portion of the thread. (*Draper Co.*)

NORTHROP'S SHUTTLE BOX.

This shuttle box has for its object to provide means for stopping the shuttle, *i. e.* holding the shuttle more centrally and besides cushioned, to prevent shock as it is brought to rest, a bridge or guard for the picker being also provided to prevent the latter from rising or jumping when starting.

As mentioned above, this construction provides a definite position for the shuttle in the shuttle box,



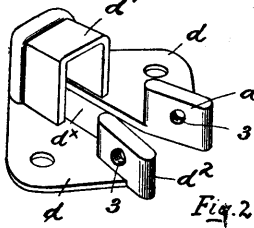
which is of importance particularly in looms provided with automatic filling supplying mechanisms.

Fig. 1 is a top or plan view of a portion of a lay with its shuttle box and a shuttle therein; and Fig. 2 is a perspective view of the casting detached, which provides supports for the shuttle stops, the picker bridge forming a part thereof.

A indicates the lay, which is slotted longitudinally at ax for the picker stick and has at its end a shuttle box comprising a back piece a and front guide b . P is the picker and S the shuttle, the latter being shown at rest in the shuttle box.

At the outer end of the shuttle box there is secured

to the loom a casting comprising a two part base d , connected at the outer end by a raised bridge or guard d' crossing the longitudinal passage d^x , extended through the base plate



and in which the picker stick swings. Each part of the base is shown as upturned at its inner end to form outwardly divergent supports or abutments d^2 , symmetrically located relative to the longitudinal central line of the shuttle box. These abutments are located at the outer end of the shuttle box, as shown in Fig. 1, on opposite sides of the entrance to the passage d^x in the base d of the casting. The stops or abutments are provided with leather cushions c , held in place by bolts 5 Fig. 1, the abutments having bolt receiving holes 3. Bolts 6 secure the base d to the lay. The inclined inner surfaces of the cushions c conform substantially to the inclination of the shuttle just back of its point s , so that as the shuttle arrives fully in the box its inclined sides will meet the inclined faces of the cushions, taking up shock and centering the shuttle in the box. The picker plays freely beneath the guard d' , but any tendency of the picker to lift or jump in starting is prevented by the guard which also prevents the picker from engaging any threads on the hopper that may be slack enough to get in the way. (Draper Co.)

FITZ AND REILLY'S DEVICE FOR POSITIONING SHUTTLES.

In many classes of looms it is necessary that the shuttle be properly positioned in the shuttle box—that is, that the shuttle shall occupy a certain definite position in the box—in order that the mechanism which depends for its proper operation upon the definite position of the shuttle in the shuttle box shall be perfectly free to act whether such mechanism comprises filling supplying means, some form of filling feeler or detector, or some other device.

The device has for its object the production of means for normally acting upon the shuttle to accurately position it in the shuttle box, said means being arranged and adapted to yield should the location of the shuttle relatively thereto preclude entirely the proper positioning of the shuttle—that is, if the shuttle is so far from its proper position that under such circumstances the filling supplying mechanism, filling feeler, or other device would not even tend to operate.

The illustration shows in plan view a portion of a lay and its shuttle box, with the new device applied thereto, the shuttle being shown as properly positioned.

A indicates the lay, B the shuttle box, A^x the picker-stick. A bracket a is secured to the lay near the open end or mouth of the shuttle box, and on said bracket is fulcrumed at a' the shuttle positioning device, shown as an arm b , bent outwardly at b' and carrying on its extremity a pad b^x having a depression b^2 therein to receive the metal point of the shuttle S. The arm has at the other side of the fulcrum a' an extension b^3 of less width than the arm and bent at b^4 , a spring s normally retaining the positioning device in a position against a stop 3, leaving the mouth of the shuttle box open.

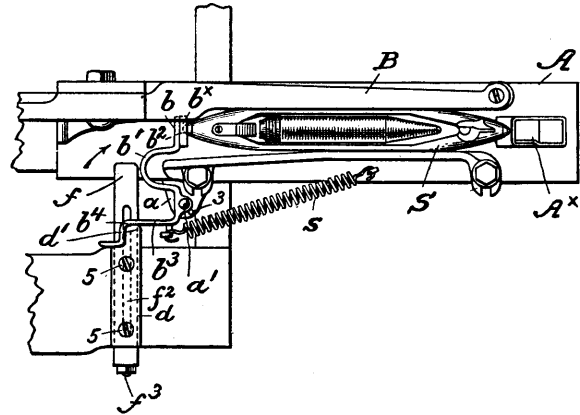
On the breast beam is rigidly secured a guide d , having its rear end extended beyond the breast beam to form a bunter d' , while a sliding bunter f is mounted in the guide d , said bunter being longitudi-

nally slotted at f^2 to receive the attaching bolts or screws 5 of the guide.

The outer end of the sliding bunter is downturned and has secured thereto a rod f^3 extended through an opening in the loom frame, said rod being surrounded between said part of the frame and its head with a spiral spring stronger than spring s .

The fixed bunter d' is in the plane of the extension b^3 of the positioning device, while the sliding bunter f is in the plane of the arm b and in the path of the bent or cam portion b' thereof, the bunter f normally extending considerably beyond the fixed bunter d' .

If the shuttle has entered the shuttle box and has rebounded slightly or has not been thrown quite fully thereinto as the lay beats up, the bunter f will engage the cam b' and will swing the positioning device on its fulcrum in the direction of the arrow, the con-



tinued movement of the lay moving the part b^4 of the extension b^3 into the path of the fixed bunter d' . As the lay completes its forward movement the bunter d' will complete the throw of the positioning device, the pad b^x acting on the end of the shuttle and moving it into the shuttle box into a certain definite position, as clearly shown in the illustration. The recess b^2 receives the shuttle point and prevents direct engagement of the pad therewith.

So long as the shuttle is sufficiently within the box to permit of the positioning device acting upon it at or near its tip, the shuttle will be moved into proper position in the box. It sometimes happens, however, that the shuttle will be so far out of the box, that the positioning device cannot act to push it into position, and in such case the shuttle holds the positioning device from completing its movement. At such time the spring (not shown) of the sliding bunter f will yield as the lay comes forward and the extension b^3 will not be moved far enough to bring it into the path of the fixed bunter d' , thus providing the necessary yield or give to the parts when the positioning device cannot be operated normally. (Draper Co.)

DEVICE FOR GUIDING EJECTED BOBBINS FROM SHUTTLE IN NORTHROP LOOMS.

In Northrop looms mechanism is employed to automatically transfer from a suitable feeder a fresh filling carrier to the shuttle. The introduction of such fresh filling carrier acts upon the filling carrier then in the shuttle to eject it therefrom through a slot in the bottom of the shuttle box. Heretofore the ejected filling carrier has been guided from the shuttle to a suitable receptacle by a chute made movable to permit the free movement of the picker stick.

In the present device a chute of peculiar construction is provided which is rigidly secured to the lay, thereby obviating the necessary devices heretofore used to give sufficient movement to the chute to with-

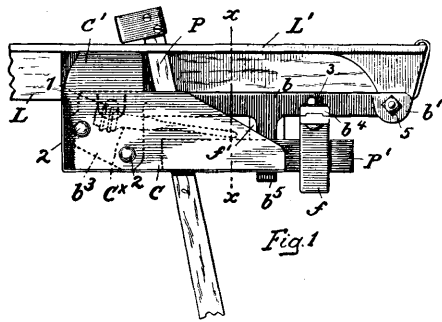


Fig. 1

draw it from the path of the picker stick, thus greatly simplifying the construction and reducing the number of parts of the loom.

Fig. 1, in front elevation, shows one end of the lay with the shuttle box omitted, with the new device applied to the lay. Fig. 2 is a transverse sectional view thereof on the line *x-x* Fig. 1, the picker check strap being omitted. Fig. 3 is a right hand end view of the parts shown in Fig. 1, and Fig. 4 is a perspective view of the chute support detached.

L indicates the lay, L' the race plate which is longitudinally slotted at *a* for the picker stick P and for the ejection of a filling carrier from the shuttle; P' indicates the picker check strap. Beneath the slotted portion of the race plate the lay is cut away at L^x, and within the lower part thereof the chute support is secured, said support being a bar like casting *b*, slightly offset at its outer end at *b'* and at its inner end having a downwardly and outwardly inclined arm *b*². The support is attached to the lay by bolts 5 and 7, the latter passing through a boss *d* on a bracket *d*^x, secured to the back of the lay, said bolt 7 passing through the arm *b*², which is recessed at *b*³, to receive the bolt head.

Referring to Fig. 2 it will be seen that there is a considerable distance between the casting *b* and the adjacent part of the lay beam, forming a slot for the picker stick, a leather cushion *m* being interposed between the casting and lay beam and through which the bolt 7 passes serving not only to position the inner end of the chute support *b*, but also to act as a cushion for the picker stick on its inward throw.

The bolt 5 holds the offset ear *b'* of the support firmly against a lug L², forming a part of the end of the race plate L'.

The guide chute C is attached to the arm *b*² of the chute support by bolts 2, and it is shaped at its inner end at C' to extend upward close to the slot *a* in the race plate, just beyond the end of the inward stroke of the picker stick, thereby avoiding and permitting the full stroke of the latter, while affording a convenient guide for the ejected filling carrier C^x, (see dotted lines Fig. 1) the extended outer end of the chute affording a large guide surface for the ejected filling carrier.

A projection *b*⁴ extended frontward from the chute support *b* receives the picker check strap guide *f*, secured in place by a bolt 3, the loop like check strap P' being attached to a depending leg *f'* secured to the lay Fig. 3. The strap passes around the picker stick, and the front side of the strap is shown as passed behind the guide *f* and in front of a second guide shown as a depending leg *b*⁵ on the casting *b*. These

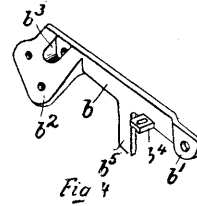


Fig. 4

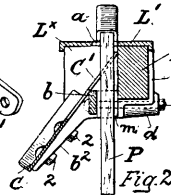


Fig. 2

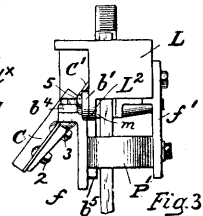


Fig. 3

guides act frictionally on the strap to retard its movement caused by the swing of the picker stick. (Draper Co.)

IMPROVEMENT TO THE FILLING SUPPLYING MECHANISM FOR NORTHPROP LOOMS.

In Northrop looms when transfer of filling has been effected, a strong spring acts to partially rotate the feeder until the filling carrier next to be removed engages a fixed stop, and as this spring is quite powerful the filling carrier receives a hammer blow and has to withstand the shock due to such stoppage of the feeder. To obviate this shock or strain on the filling carriers is the object of the new mechanism.

Fig. 1 is a transverse sectional view of a portion of a loom, taken inside of the filling supplying mechanism with the new device applied thereto. Fig. 2 is another transverse sectional view of the filling supplying mechanism.

When the spring as surrounding the stud *a* is

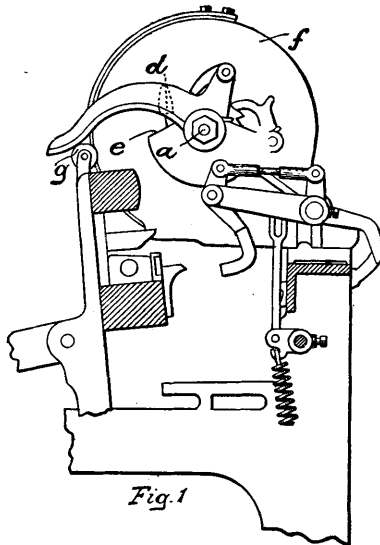


Fig. 1

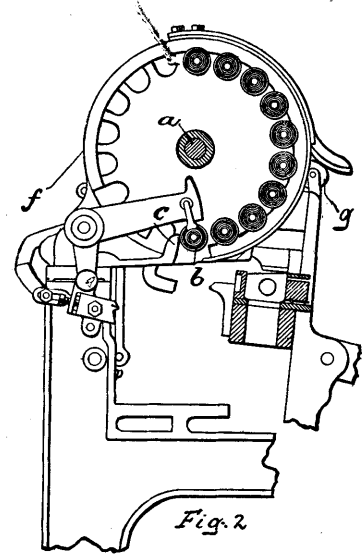


Fig. 2

wound and the parts are in the position shown in Fig. 2, let it be supposed that the filling carrier *b* is removed from the feeder by the transferer when the

lay is forward. As the transferrer returns to normal position, thereafter, the feeder is free to be rotated by this strong spring as surrounding the stud *a*, until the next filling carrier of the series is brought into operative position; but to prevent the shock on such filling carrier due to its engagement with the stop *e* when the feeder is controlled by the spring, means are now provided independent of the filling carrier to limit the feeding action of the spring. This is effected by providing the pawl carrier with a lateral lug *d*, which in the descent of the pawl carrier engages a fixed abutment *e* on the stand *f* just as, or slightly before, the filling carrier reaches its position adjacent the stop *e*, so that the shock and hammer blow due to the sudden stoppage of the action of the spring is taken up by the lug *d* and the abutment *e*, and the momentum of the feeder brings the next filling carrier with but little force against the stop *e*. The outer end of the pawl carrier is then in position to be engaged and lifted by the roller *g* as the lay swings back, thereby winding the spring in readiness for the next feeding movement of the filling feeder, and as the pawl carrier is lifted the endmost filling carrier resting against the stop *e*, holds the feeder until the transferrer is again operated. When the spring is thus wound, the pawl by its engagement with the ratchet wheel maintains the pawl carrier lifted substantially in the position shown in Fig. 1.

By the construction thus described the filling carriers are relieved from shock when the feeding action of the operating spring is stopped, and the liability of breakage or displacement of the filling carriers is entirely obviated.

Should two or more filling carriers be absent from the feeder after transfer, the momentum of the feeder will be sufficient to bring the endmost filling carrier into position against the stop. The actuating means imparts initial feeding movement to the feeder, and the momentum of the latter completes the feeding movement. (*Draper Co.*)

FILLING END HOLDER FOR NORTHPROP LOOMS.

In Northrop looms, as is well known, the several filling carriers are mounted ready for use in a hopper and the filling ends are led to a fixed stud or other device, to which they are secured.

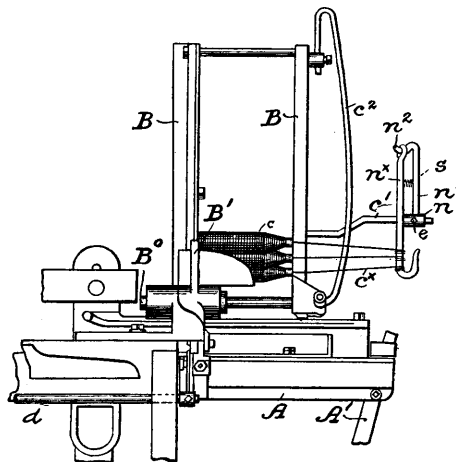
The sharp blow of the picker stick on the shuttle however exerts such a shock on the filling end of a fresh supply of filling just previously transferred from the hopper that it frequently breaks, the filling being unable to resist the sudden strain put upon its end as attached to the holding stud.

The new holder obviates this defect, by providing a filling end holder which is free to yield within certain limits when sudden strain is put upon the filling and to return to normal position when such strain is withdrawn.

The illustration represents in side elevation a circular hopper, having the new holder applied thereto, the latter being shown applied to filling supplying mechanism including a hopper or filling feeder, wherein the filling supplies *e* are held in a hopper *B*, comprising two upright members having guideways at their inner faces to retain in position a series of superposed filling carriers.

A represents the lay, *A'* the picker stick, *d* the controlling or operating shaft, *B'* the pusher or transferrer, having its fulcrum at *B''*, *e'* is the stud connected with the hopper, and *e''* the slack thread controller for preventing entanglement of the filling ends extending from the series of filling carriers in the hopper.

On the stud *e'* is mounted a hub or sleeve *n* (held in place by a set screw *e*) having an upwardly extended arm *n'*, provided with a lateral hooked ear *n''*, upon which is pivotally mounted a depending filling end holder *n^x*, about which the filling ends *e^x* are wound. When a filling carrier is transferred and the shuttle thrown across the lay by the adjacent picker stick, the depending holder *n^x* swings in



toward the hopper *B* when strain is exerted on the filling end, thus obviating a sudden shock thereto and risk of breakage. After the transferred filling carrier has made one or more shots across the lay the filling end can be severed, and the end holder *n^x* returns to normal position. This return of the end holder is assisted by a spring *s*, attached at its ends to the holder and its supporting arm *n'*.

The new holder is also applicable to those filling changing mechanisms wherein a fresh shuttle is transferred from the hopper, the desirability of a yielding filling end holder being as great in the one case as in the other. (*Draper Co.*)

MASON'S FILLING END SUPPLYING DEVICE FOR NORTHPROP LOOMS.

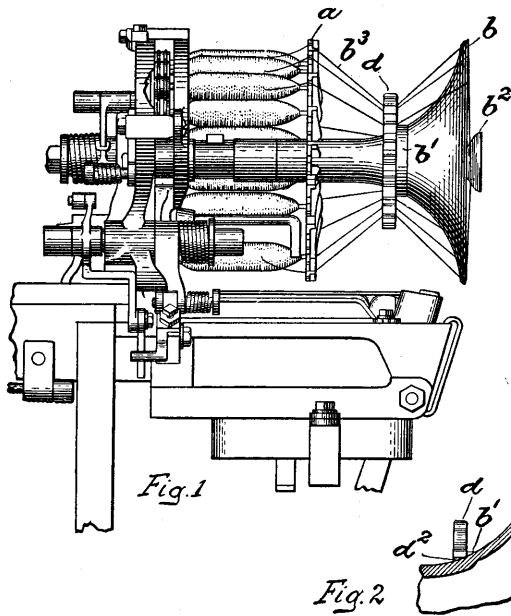
In the previous article we mentioned that the sharp blow of the picker on a shuttle having a fresh supply of filling, subjects the filling end to a very sudden strain or shock, with the result that said filling end frequently breaks before the filling begins to unwind from the end of its carrier.

To overcome this objection, means are provided in the new device for furnishing an additional length of filling end between the filling carrier and the point at which the filling end is held, so that as the shuttle leaves the box this extra length of filling will be given up and time afforded for the filling to unwind before the strain is exerted upon the filling end. By deflecting the filling end between the hopper and the holding device, the requisite slack or extra length of filling is provided, and to prevent tangling of the several slack portions each is normally held substantially taut by a detent, which latter releases the filling when subjected to a slight longitudinal strain.

Fig. 1 is a front elevation of a filling hopper with the filling end holder and a portion of the lay having the device for preventing the filling end from breaking attached thereto. Fig. 2 is a sectional detail showing the manner of securing the detents in place.

In the new device the filling ends are deflected when

let from the disk *a* to the support *b*, as is clearly shown in Fig. 1, thus allowing an additional length or slack portion of filling, as *b*³, which is taken up



as the shuttle leaves the shuttle box with its fresh supply of filling. In order to preserve this slack or extra portion of the filling end and to prevent the several ends from tangling, each filling end is normally engaged by a detent between the hopper and filling end support.

The detents *d*, as more clearly shown in Fig. 2, are made as yielding closed jaws of light spring metal, set into slots or saw cuts *d*² made in the enlarged portion or shoulder *b*¹, forming a part of the support *b*, one of the detents being provided for each filling carrier in the hopper.

When the weaver loads the hopper, he draws off from the filling carrier a sufficient length of filling to enter between the jaws of the appropriate detent, and the loose end is then carried over the support *b* and secured to the stud *b*², the deflection of the filling end thus effected providing sufficient slack or length to be given up when the filling is transferred and the shuttle thrown from the box. A very slight pull on the filling end will suffice to disengage it from the detent, the spring action of which is light and delicate.

So long as a filling carrier remains in the hopper the detent will retain its hold upon the filling end slack and prevent it from flying about or becoming displaced. (*Draper Co.*)

SHUTTLE DETECTOR FOR NORTHROP LOOMS.

Fig. 1 is a partial end elevation of a loom with the new mechanism applied thereto, the outer or right hand end of the filling feeder being omitted. Fig. 2 is a sectional view of the loom, taken inside the filling feeder mechanism, the lay being shown as in its forward position, and Figs. 3 and 4 are illustrations of details.

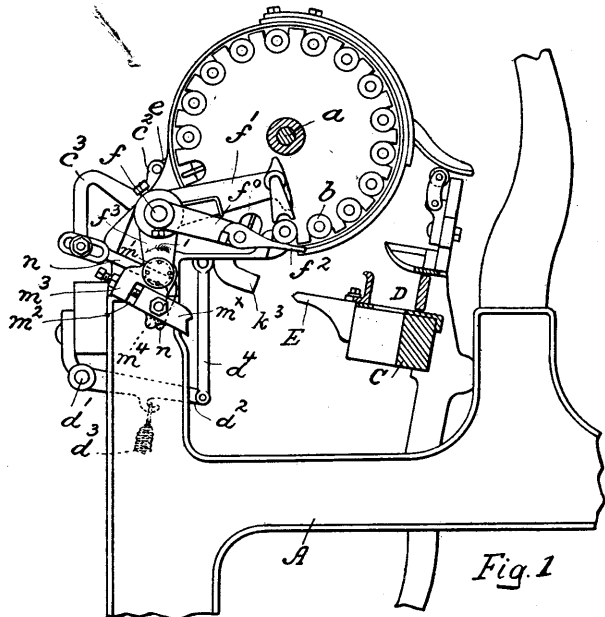
A indicates the loom frame, B the breast beam, C the lay having the bottom of its shuttle box D Fig.

1, cut away below the self threading shuttle S. The filling feeder comprises connected plates, shaped to receive the ends of the filling carriers *b*, Fig. 1, and which plates are mounted to rotate on the stud *a*. *f* indicates the stud having the transferrer *f*¹, mounted thereon, and also the forked depending end *f*². The arm *f*³ is also mounted onto stud *f* and is provided with the tip supporting device *f*². The shaft *d*¹ is adapted to be rotated by the movement of the filling fork in the absence of the filling.

An arm *d*² is secured to the rock shaft *d*¹ and is connected to one end of a spring *d*³, its other end being attached to the loom frame, and a link *d*⁴ is joined to the arm *d*², the upper end of the link having a longitudinal slot *d*⁵ entered by a pin or stud *e*^x on one of the arms *e*¹ of a hub or sleeve *c*, mounted rotatably on the stud *f*, and having a second upturned arm *e*². To this arm one end of an adjustable link *e* is pivotally connected, the other end of the link being jointed at *e*¹ to a short upturned arm *k*¹ of a hub *k*, mounted on the shaft or stud *a*, projecting from the stand *a*¹, which supports the filling feeder as shown in Fig. 2.

A depending arm *k*², forms a part of the hub *k*, and is bent laterally at its lower end *k*³, forming the shuttle feeler or detector and engages the shuttle if the latter is improperly positioned in the shuttle box. A rocker stud *m*, Fig. 4, having a disk like head *m*¹, is mounted on the end *f*³ of the transferrer, the spring *s* normally tending to turn the stud in the direction of the arrow in Fig. 1, the stud *m* having an arm *m*² with an ear *m*³ on one side and a projection *m*⁴ on the other side, while a notched dog *m*^x, adjustably held on the arm *m*², is adapted to be engaged by a bunter E on the lay when a filling carrier is to be transferred to the shuttle.

A third outwardly extended and downturned arm *c*³ on the hub *c* has attached to its extremity a downturned finger *n*, which extends down over the lug *m*⁴



on the arm *m*², (see Fig. 1), and at times controls the latter.

When the loom is running properly, the dog *m*^x is out of the path of the bunter E, and the rock shaft *d*¹ holds the link *d*⁴ down, and the arm *c*³ is

thereby elevated, with the finger *n* toward the front of the loom to thereby act on the lug *m*⁴ and maintain the dog *m*^x in inoperative position, the finger *n* thus forming a detent for the dog. When the filling fails, however, the rock shaft *d*¹ will be turned, elevating

IMPROVED SHUTTLE DETECTOR FOR NORTHROP LOOMS.

The connections between the shuttle feeler and the actuating means for the filling supplying mechanism in a Northrop loom, as explained in the preceding article, are complicated, involving a number of parts, which trouble to overcome is the object of the new construction, securing at the same time a more direct action of the means for preventing the transfer of filling when the shuttle is improperly positioned in the shuttle box.

Fig. 1 is a front elevation of portion of a loom, which explains the action of the new device, as shown applied thereto, in connection with the filling supplying mechanism. Fig. 2 is a perspective view of the shuttle feeler detached. Fig. 3 is a right hand side elevation of the apparatus shown in Fig. 1.

The end *f* of the transferrer has mounted thereon a headed rocker stud *m*, surrounded by a spring *s* Fig. 1, one end of which is attached to the head of the stud and the other end to the part *f*, the spring normally tending to turn the stud in the direction of the arrow *b* Fig. 3, said stud having secured thereto an arm *m*², provided with a laterally extended projection or lug *m*⁴, a notched dog *m*^x being adjustably secured to the arm *m*² by set screws *c* and *e*, said dog when moved into operative position being engaged by a bunter *y* on the lay when a change of filling is to be effected.

In order to prevent filling change if the shuttle is improperly positioned in the shuttle box, the movement of the dog into operative position is controlled by a shuttle feeler, the controlling connection between it and the dog being of a very simple character.

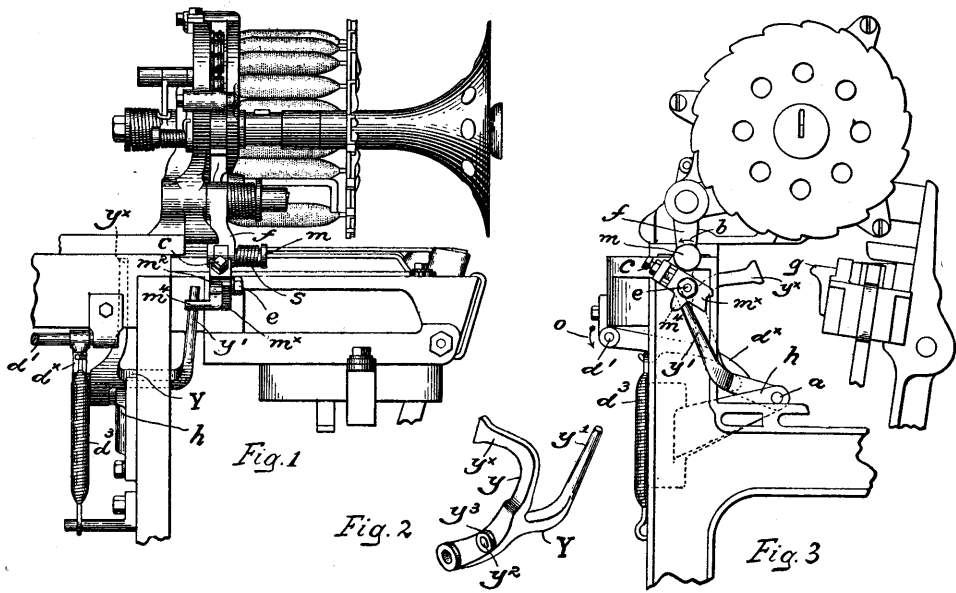
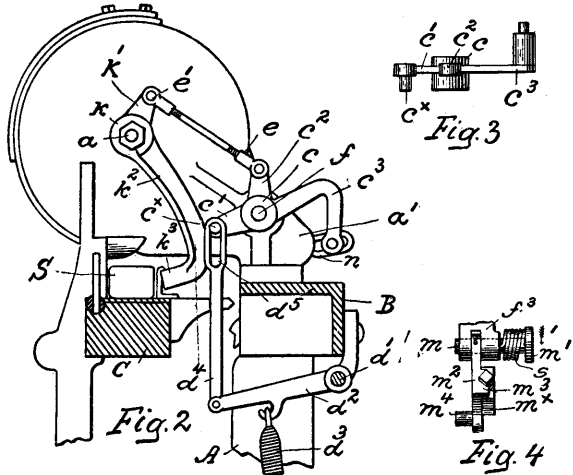
The loom frame is provided with a bracket *h*, on which is pivoted at *a* a yoke *Y* Fig. 2, one of the upturned arms *y* of the yoke, being bent at its upper end to form a shuttle feeler *y*^x, the other arm *y*^t of the yoke being upturned and of sufficient length to directly engage the lug *m*⁴ on the dog supporting arm *m*². The yoke is provided with a lateral stud *y*³, on which is mounted an antifriction roll *y*², (see Fig.

link *d*⁴ and permitting the hub *c* and its arms to turn on the stud *f* so that the spring *s* immediately turns the stud *m* to throw the dog *m*^x into position to be engaged by the bunter *E*, when the lay beats up. The movement of the arm *m*² by its spring causes the lug *m*⁴ to move the finger *n* inward, depressing the arm *c*² and rocking the hub *c* to operate through the link *e* and move the shuttle feeler or detector *k*² across the inner end of the shuttle box, so that if the shuttle is properly positioned the bunter will engage the dog *m*^x and operate the transferrer *f*.

Should the shuttle be improperly positioned, it will meet the end *k*³ of the feeler as the lay beats up and will swing it on its fulcrum, moving the arm *k*¹ in the opposite direction, and through link *e* and arm *c*² the hub *c* will be turned to swing the arm *c*² outwardly, thereby causing the finger *n* to engage the lug *m*⁴ and rock the arm *m*² oppositely to the arrow *b* Fig. 1, depressing the dog *m*^x out of the path of the bunter.

Inasmuch as the transferrer is only operated when the dog is engaged by the bunter, the transferrer will not be operated to transfer a filling carrier to the shuttle when the latter is improperly positioned.

The slot *d*⁵ in the link *d*⁴ permits the described rocking movement of the hub *c* when the link is elevated and the shuttle is improperly positioned. (Draper Co.)



2), said roll being normally engaged by a detent finger *d*^x, fast on the rock shaft *d*¹ and normally maintained in the position by a strong spring *d*³, at-

tached at its ends to the detent finger and to the frame.

When the shuttle feeler and its rigidly attached arm y' are in normal position, the roll y^b will be between the fulcrum a of the yoke and the lug m^4 of the dog support, and the spring d^3 , being stronger than the spring s , the dog will be maintained in inoperative position so long as the detent finger d^x operatively engages the yoke.

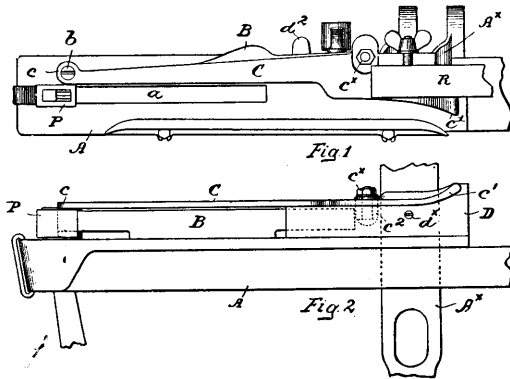
Upon failure of the filling, however, the rock shaft d' is turned in the direction of the arrow o Fig. 3, and against the stress of the spring d^3 , so that the detent finger d^x releases the yoke and permits the shuttle feeler to move toward the lay to detect the position of the shuttle, such detecting movement being effected through the action of the spring s , and if the shuttle is properly positioned in the shuttle box, the feeler is permitted to complete its full detecting movement, so that the controlling arm y' is moved sufficiently to permit the swinging of the dog m^x into position to be engaged by the bunter g as the lay comes forward. Such engagement of the dog and bunter effecting the change of filling.

Should the shuttle be improperly positioned, however, it will be engaged by the feeler, so that the latter can complete its detecting movement, and the controlling arm y' thus operates to prevent the movement of the dog into operative position. (Draper Co.)

BACK BOX PLATE FOR COTTON LOOMS.

The object is the production of a back box plate whereby the cost of production is reduced and the construction simplified.

Heretofore the side and cover of the back box plate have been made as a single piece, and the finishing

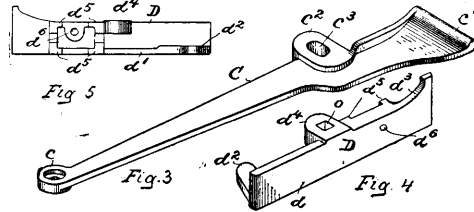


of the front and rear faces of the side and the under face of the cover have been attended by considerable difficulty and expense, owing to the peculiar shape of the casting. In the new construction the side and cover are made separately and thereafter rigidly connected, the separation of the parts enabling the finishing of the faces to be readily and cheaply effected and providing for the ready replacement of either part when necessary.

Fig. 1 is a top or plan view of one end of a lay beam provided with the new back box plate. Fig. 2 is a front elevation thereof. Figs. 3 and 4 are perspective views, slightly enlarged compared to Figs. 1 and 2, of the box plate, cover and side, respectively, and Fig. 5 is a rear side elevation of the box plate side.

A indicates the lay, being longitudinally slotted at a for the picker stick P. A^x is the lay sword, R the hand rail and B the back binder, mounted to rock on the vertical pivot stud b .

The back box plate cover member C is a casting tapering toward its outer end and provided with a socketed eye c for the pivot stud b , the inner end of the cover being broadened and slightly upturned, as at c' . An ear on projection c^2 projects rearwardly



from the plate, provided with a slightly elongated hole c^3 for the reception of the fastening bolt c^x , by which the cover and side of the box plate are connected.

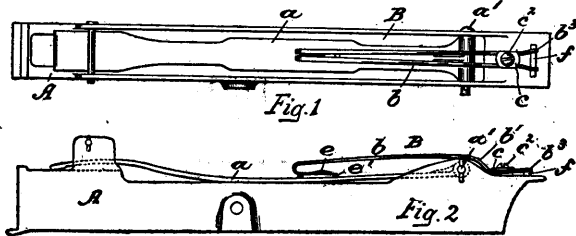
The separate side member D of the box plate (shown separately in Figs. 4 and 5) is cast with a plane front face d and a longitudinal ledge or flange d' on its rear face, at its lower edge, said flange at the outer end being extended to form a foot or support d^2 for the back binder B to move over.

The top of the side member D is curved at its inner end, as at d^3 , to fit the under side of the cover C at its inner end, and a rearwardly extended ear d^4 on the side member extends beneath the ear c^2 of the cover when the members are assembled, said ear d^4 having a hole o to receive the fastening bolt c^x . As best shown in Figs. 4 and 5, the top of the ear d^4 is made slightly higher than the depth of the casting D, adjacent thereto, to bear against the under side of the ear c^2 on the cover C, thus requiring only the opposed faces of said ears to be accurately finished. The side member D is ribbed on the back adjacent the ear d^4 to present, as herein shown, four bearings d^5 , which abut against the face of the lay sword, a hole d^6 in the side member receiving the top bolt d^x Fig. 2, by which it is secured to the lay sword.

When finishing the parts, the front face d of the side member D is readily machined to present a true plane and polished surface, and the bearings d^5 back of the member D can also be as readily finished, and by reason of the fact that the cover member C is a separate piece its under face can also be easily and cheaply finished and polished. (Draper Co.)

GORDON'S SHUTTLE BINDER SPRING.

In looms the binder which acts on the shuttle in the box is generally acted upon by a strong flat spring. These springs are comparatively heavy, and when applied to a shifting shuttle box their aggre-



gate weight acts considerably to the momentum of the lay, and further, these springs have frequently to be bent or changed in shape to adapt them to their work, so that they shall exert the desired pressure

on the binder, again they frequently break transversely because of the strain put on them in use.

To overcome these objections is the purpose of the new binder spring, it consisting of wire bent to present two arms lying side by side, said spring thus being very light and practically indestructible.

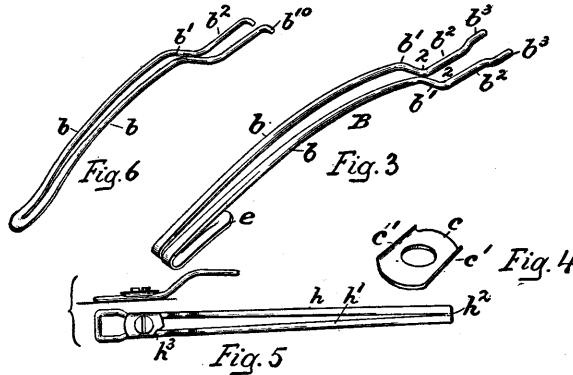


Fig. 1 shows part of a shuttle box presenting one cell with a binder acted upon by the new spring. Fig. 2 is a view of the shuttle box turned over from its position Fig. 1. Fig. 3 shows the spring enlarged and detached. Fig. 4 shows the spring holder detached, and Figs. 5 and 6 show modified forms of springs.

The metallic shuttle box frame A is a one shell box, having its binder *a* pivoted at *a'*. Instead of the usual flat steel spring bent and having a hole for the reception of a screw to confine the spring to the shuttle box, the new spring B is employed, it being composed of wire which will stand up to its work and wear longer without breaking than the flat steel spring.

This new spring is made by bending a piece of strong spring tempered wire to leave two corresponding branches *b*, somewhat inclined with relation each to the other, the said branches having each an inclined portion *b'* and neck portions *b²*, the neck portions being adapted to be embraced by a holder *c*, shown as a washer, it having lips *e* at two of its edges, so that when said holder is set onto the neck portions of the spring and a screw *c²* (see Figs. 1 and 2) is put through the holder and between the two necks, the said neck portions will be firmly seated and held on the shuttle box.

The branches in Figs. 1 to 3 have bent tail pieces *b³* of such shape as to prevent the ends of the branches from being drawn from between the lips *e*.

Figs. 1 to 3 show the best form for shaping the end of the wire spring which contacts with the binder, and in which the free end of the wire spring is shown bent inwardly, as at *e*, to make a spring head which acts against a lump *e'* on the binder, or between projections. The tail pieces of the branches rest on a projection *f* from the shuttle box, so that by turning the screw *c²* in, more or less, the pressure of the free end of the spring on the binder is increased or adjusted to the desired amount.

The double branched spring acts more readily and favorably than could a one branch spring, and the double branched spring is far more durable than any plate spring.

In Fig. 5 is shown a modification wherein the two branches *h h'* have their ends soldered together at *h²*, making the head different from that shown in Fig. 3, the holder *c* resting on the neck portion *h²*.

In Fig. 6 another modification is shown and wherein the wire comprising the acting end or head of the spring is flattened to act on the binder, the free

extremities of the two branches having the two necks *b²* and pointed ends *b³* to enter holes in the shuttle box.

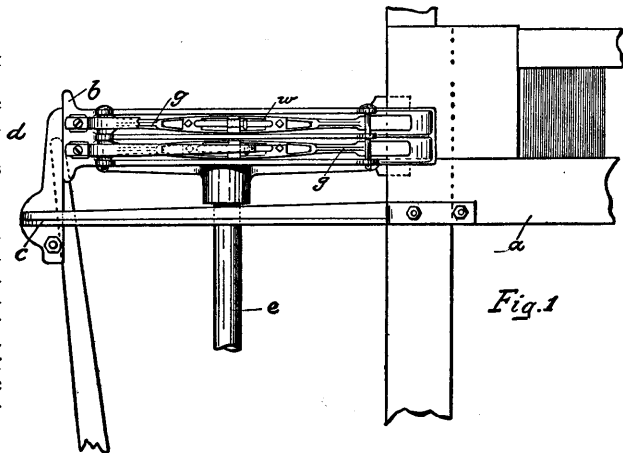
In the illustrations a metallic shuttle box is shown, but the improved spring may be used on any plain loom having one shuttle box at the end of the lay, the spring acting on its usual binder. The wire used may be either round or of any other shape in cross section. (Crompton and Knowles Loom Works.)

TALKS' SHUTTLE BINDER.

The objects of this binder are, more sensitive action, superior adjustment and increased lasting qualities.

Fig. 1 is a front view of a portion of the lay and its adjacent parts, showing the shuttle boxes provided with binders; Fig. 2 is a top plan view of the shuttle box detached and of the binder in position therein; Fig. 3 is a view in elevation of the binder; and Fig. 4 a longitudinal sectional view of the latter.

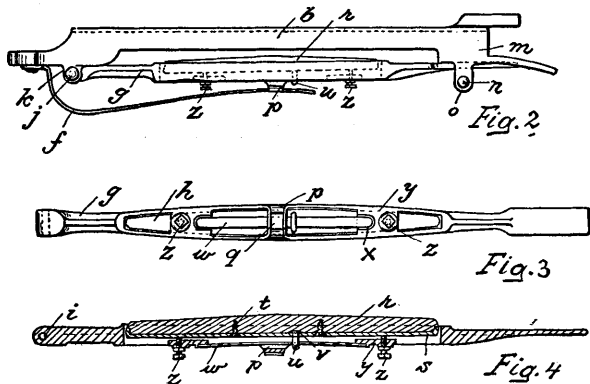
a indicates the lay of the loom, in the extended frame *c* of which are arranged the shuttle boxes *b*, supported by the box rod *e* and guided in the brackets *d* and the end portion of the lay. To the outer end of each shuttle box is secured an elongated (bent or curved) spring *f*, the free end of which bears upon the rear portion of the binder. Said binder consists of an elongated metallic frame *g*, having midway thereof a longitudinal opening *h* formed in it, extending for about two thirds of its length. One end of the body of the binder is penetrated by a vertical orifice *i*, whereby the binder is pivotally secured to the shuttle box by means of a bolt *j*, extending through lugs *k* near the outer end of said shuttle box, while the other end of said binder is flattened and adapted to be disposed against a projection *m* on the inner end of the shuttle box and between said projection and a removable pin *n*, extending through lugs *o*, projecting from extensions *m* on the shuttle box. The opening *h* in the body of the binder is spanned by a bridge piece *p*, having a depression *q* in its outer face for



the reception of the free end of the spring *f*, which bears against said bridge and holds the binder in operative position.

In the opening *h* formed in said body is an elongated shoe *r*, having the shape of *o*, but being a little smaller than said opening. This shoe is formed of hard wood, and is backed by a metallic plate *s*, secured to said shoe by screws *t* and has its free ends curved and embedded in the ends of the shoe.

u designates a staple which penetrates the plate *s* and whose ends are formed into heads *v*. *w* indicates an elastic strip forming a spring which pro-



jects through the staple *u* and whose ends rest in recesses *x*, provided in the outer faces of webs *y*, situated one on each side of the bridge *p*.

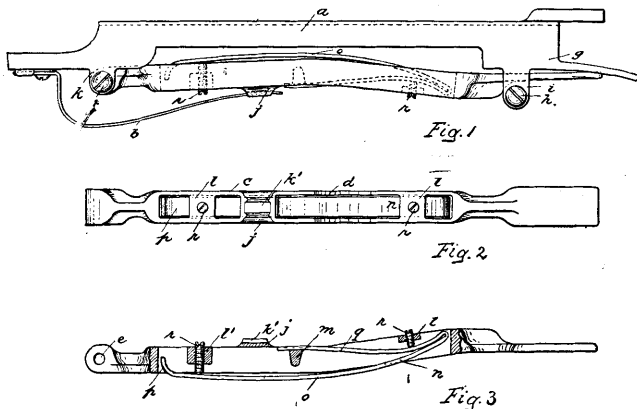
z indicates a pair of adjusting screws which penetrate and work in the webs *y* and by the manipulation of which adjustment of the shoe in the body portion of the binder is effected. It must be remembered that the acting or bearing face of the shoe is not plane, but bulges somewhat.

This construction of a binder renders it possible not only to adjust the acting or bearing portion thereof, technically called the "shoe," so that the binder may be made to act at its best upon the shuttles in stopping the same, but also permits of a removal of said shoe for the purpose of reversing the same, as well as for substituting for it a new one. The removal of the shoe from the body portion of the binder is effected by simply displacing the ends of the spring *w* from their recesses *x* and withdrawing said spring longitudinally, the adjusting screws *z* having been first manipulated so as to reduce the tension on said spring. (Henry Talks and Wm. Melvin, Paterson, N. J.)

TALKS' IMPROVED SHUTTLE BINDER.

This binder is an improved construction over the one explained in the previous article.

Figure 1 is a top plan view of a shuttle box detached from the loom and of the improved binder in position



therein. Fig. 2 is a view in elevation of the improved binder and Fig. 3 is a longitudinal sectional view of the latter.

a indicates a shuttle box to the outer end of which is secured an elongated bent or curved spring *b*, the free end of which bears on the rear portion of the binder, which consists of an elongated metallic frame *c*, having a longitudinal opening *d*, formed in it substantially midway thereof and extending for about two thirds of its length.

One end of the body of the binder is penetrated by a vertical orifice *e*, whereby the binder is pivotally secured to the shuttle box by means of a bolt *f*, extending through lugs *k* near the outer end of said shuttle box, whereas the other end of said binder is flattened and disposed between projection *g* on the inner end of the shuttle box and a removable pin *h*, extending through lugs *i*.

The opening *d* in the body of the binder is spanned by a bridge piece *j*, having a longitudinal depression *k'* in its outer face for the reception of the spring *b*, which bears against said bridge piece and holds the binder in operative position. Near each end of the opening *d* is formed a web or rib *l v*, which connects the two sides of the body of the binder. A similar web or rib *m* also connects the two sides of the binder and is situated in proximity to the bridge piece *j* and between the latter and the web *l*.

n is a metallic spring whose body portion has a slight swell or bend therein, as at *o*, and one of whose ends *p* is turned or bent upwardly and the other of whose end *q* is bent back upon the body portion of said spring, extending to about the middle thereof. Said spring is arranged in the binder under the webs *l v*, with the free extremity of its rebent portion extending over the rib *m*. Set screws *r* are arranged in each of the webs *l v*, and by them said spring is rendered adjustable. The swelled or curved body portion of the spring normally projects beyond the body of the binder and alone affords a bearing surface for the shuttle. (Henry Talks and Wm. Melvin, Paterson, N. J.)

THE KNOWLES SWIVEL LOOM.

In this swivel loom the swivel shuttle rail carrying the swivel shuttles is operated from below, doing away with any overhead mechanism, employing the regular Knowles harness shedding or shuttle box operating mechanism for operating the swivel shuttles.

Fig. 1 is a side elevation of a portion of a loom having the swivel mechanism added, being a view taken looking in the direction of arrow *a* Fig. 3. Fig. 2 is a detached plan view of the lever for moving the shuttle rail horizontally and of the lever for moving it vertically, shown in Fig. 1. Fig. 3 is a front elevation of a portion of a loom having the swivel mechanism added, being a view taken looking in the direction of arrow *b* Fig. 1. Fig. 4 is an enlarged sectional view of the swivel shuttle rail, taken at the line *b* Fig. 3, looking in the direction of arrow *c* same figure. Fig. 5 is an enlarged front view of the central portion of the swivel shuttle rail shown in Fig. 3, with a portion of the rail broken away.

Examining Fig. 3 we find in the construction a sliding pick mechanism employed for controlling the action of the fly shuttle mechanism, i. e., mechanism is provided to move the picking rolls 12 out of or into engagement with the picking shoe 11 by means of sliding rods 14 and 15, the movement of which is controlled through intervening mechanism from the Jacquard. As stated before the Knowles harness or shuttle box operating mechanisms are employed for giving longitudinal motion to the swivel shuttle rail

and to the swivel shuttles independently of any movement of the shuttle boxes, according to the indications of the Jacquard, the cords leading to which are connected with the vibrator levers of said shedding or box operating mechanism.

The swivel shuttle rail 27 carries three sets of longitudinally moving racks 28 for communicating motion through sets of pinions 29, supported in downwardly extending blocks or pieces 27', to three sets of swivel shuttles 30. (See Figs. 4 and 5.)

The swivel shuttle rail 27 has at each end two guide rods 31, 31' extending out therefrom, of which the upper guide rod 31 extends the full length of the rail. Both guide rods 31, 31' are supported and have a sliding motion in castings 32, 32' located at each end of the swivel rail. Each casting 32 and 32' is supported on an upright and vertically moving rod 33 by an adjustable collar 34. A sleeve or collar 35, secured on the front end of arm 36, secured to the lay sword 4 (see Fig. 1), acts as a guide for the upper ends of the upright rods 33. Rod 37 extends out from one end of the swivel rail 27 and is secured thereto at its inner end, and at its outer end has secured thereon a rack bar 38, with which meshes a rack segment 39, pivotally supported on the arm 32'' of the casting 32'. (See Fig. 3.) The rack segment 39 has the outwardly extending arm 39', having a longitudinal slot in its end, to which is pivotally connected the upper end of a vertically moving rod 40.

of the lever 41 is connected by a link or connector 42 with the angle lever 43 of the shedding or box operating mechanism, consisting of the upper and lower partial gears 44 and 45 and vibrator gear 46, carried on the vibrator lever 47 and connected by the connecting arm 48 to the lever 43. A cord 49, in this instance, leads from the vibrator lever 47 to the Jacquard mechanism (not shown) to raise or lower the vibrator lever carrying the vibrator gear and control the movement of the lever 43.

Through lever 43, connector 42, lever 41, upright rod or connector 40, rack segment 39 and rack bar 38 longitudinal motion is communicated to the swivel rail at the proper time.

In addition to the longitudinal motion of the swivel shuttle rail, each set of shuttles has an independent longitudinal motion from one block 27' to an adjoining block and back through the system of pinions 29 and sliding racks 28. Each rack 28 is operated independently from the shedding or box operating mechanism through a connector 52, attached to one of the several angle levers 43, and to one of the several angle levers 53, pivoted on a stand 54, attached to the loom side and a rod or connector 55, attached at its inner end to one of several centrally pivoted levers 56, mounted to swing in a horizontal plane on a stud 57. To the opposite end of each lever 56 is secured a cord 58 passing over a pulley 59 and extending up and attached to the outer end of an angle lever 60, which is pivotally supported on a stand 61, secured upon the top of the swivel rail 27. The opposite end of the angle lever 60 is connected by a link 62 with the sliding plate 63, which is guided and held in position upon the upper side of the swivel shuttle rail 27 by guides 64 and has a downwardly extending projection 63', which extends through a longitudinal slot 65 in the upper part of the swivel rail and into an opening in the upper side of the rack 28. The connections intermediate the end of the lever 56 and the swivel shuttle racks are in duplicate, one set at each end of the loom.

By means of the thus described mechanisms motion is communicated to each set of swivel shuttles independently from the vibrator gears 46 of the shedding or shuttle box operating mechanism through the intervening connections, there being one vibrator gear 46 and intervening connections for each set of swivel shuttles, so that each set can be operated independently of the other, according to the movements of the shedding or shuttle box operating mechanism, regulated by the Jacquard. An up and down motion is communicated to the swivel shuttle rails and the swivel shuttles carried thereon, to raise the same above the race of the lay and allow the movement of the fly shuttles and lower the same to carry the swivel shuttles into the shed by the two vertical upright rods 33. The lower end of each rod 33 is pivotally attached to the front end of an arm or lever 66, fast on rock shaft 50, which extends across the loom and is supported at each end in the lower end of a bracket 51. One of the arms or levers 66 has a rearwardly extending portion or arm, which carries a roll 68, to be engaged by a double cam on the bottom shaft 7. The revolution of this cam

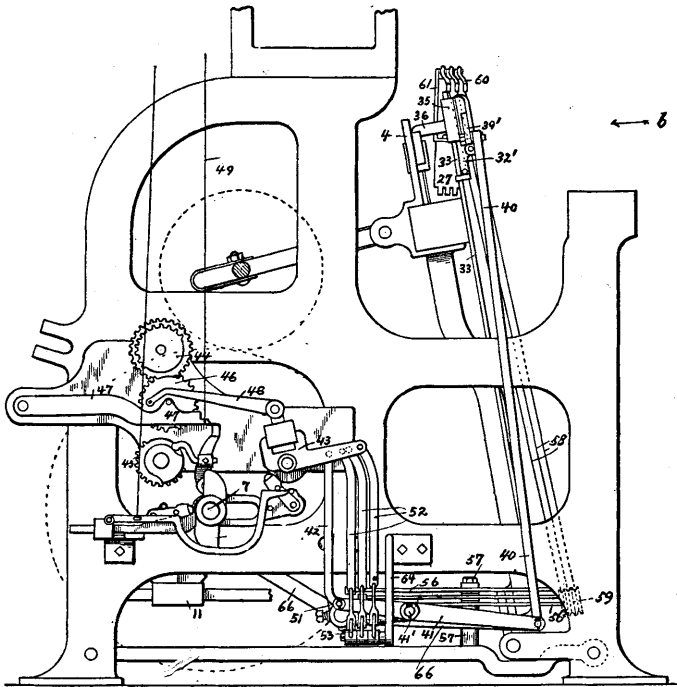


Fig. 1

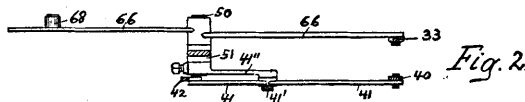


Fig. 2

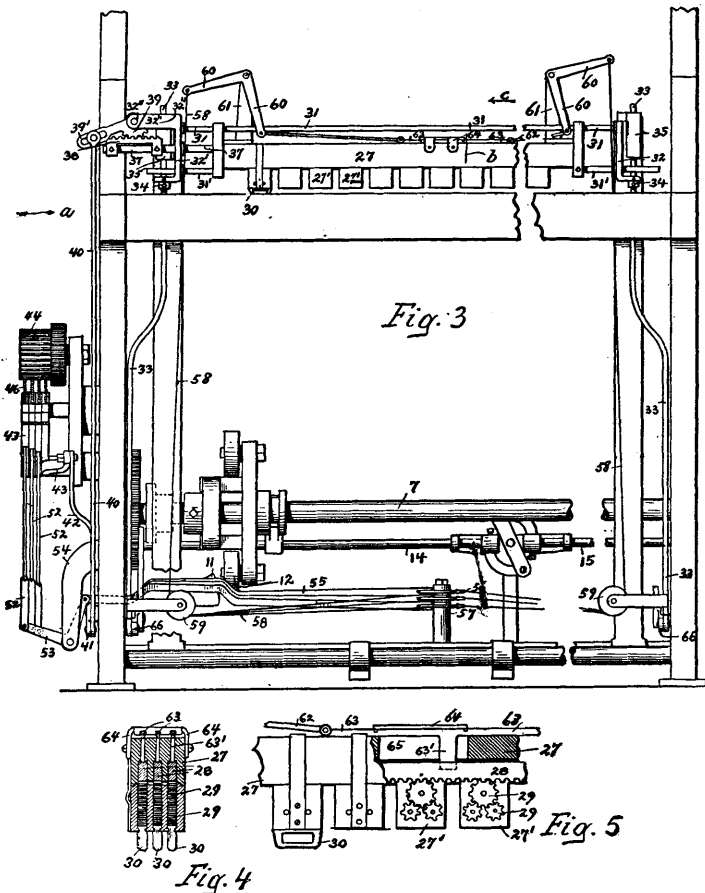
The lower end of said rod 40 is pivotally attached to one end of a lever 41, which is pivotally supported between its ends on a stud 41' in the end of the arm 41'', fast on the shaft 50, mounted in the lower end of the bracket 51. (See Fig. 2.) The other end

through roll 68, depresses the rear end of the arm or lever 66 and rocks the shaft 50 and raises the levers 66, fast on said shaft, and through rods 33 positively raises the swivel shuttle rail and the swivel shuttles carried thereon. The weight of

the swivel shuttle mechanism tends to keep the roll 68 in engagement with its cam on the bottom shaft 7, so that in the continued revo-

rod 33 at each end of the loom), and then the fly shuttle operated, and so on. Each set of swivel shuttles is operated to weave their threads on to the fabric according to the indications of the Jacquard (or any other) pattern mechanism operating through the harness shedding or shuttle box operating mechanism to communicate motion to the swivel shuttles, first in one direction and then in the other.

Instead of using a double cam on the bottom shaft 7 for operating roll 68 on the levers 66, a single cam may be used; but with the double cam two consecutive threads of different color may be woven on the fabric by two sets of swivel shuttles between the ordinary filling threads put in by the fly shuttle. (Crompton and Knowles Loom Works.)



WIDMER'S SHUTTLE DRIVING MECHANISM FOR NARROW WARE LOOMS.

The objects of the mechanism are, to prevent the shuttle noses from dropping, to reduce the friction on the driving mechanism, and to insure a clear passage of the shuttle through the shed.

Fig. 1 is a vertical sectional view of the mechanism and Fig. 2 is an enlarged (compared to Fig. 1) horizontal view of part of it.

a indicates the batten, a series of vertical lathe plates *a*² being connected to its back by screws *a*¹, said plates being connected at their upper ends by a connecting strip *a*³ and near the top of the batten by another strip *a*⁴, which forms a pocket for the reeds.

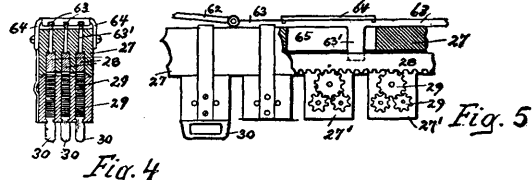
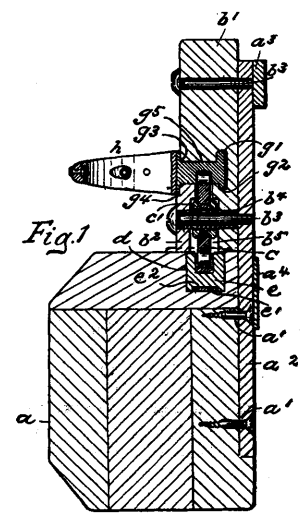
The shuttle block is composed of two sections, the main one *b*¹ has its front portion removed to form a recess for

the reception of the lower one *b*², said sections being secured together by screws *b*³ enclosed in thimbles *b*⁴. In the rear section is formed a cavity *b*⁵ for the reception of the shuttle pinions *c*, said pinions being journaled on the thimbles *b*⁴ for which reason each is provided with a central bore. *d* denotes a longitudinal groove formed in the top surface of the batten, in which is arranged the actuating rack bar *e*, made of soft wood.

To prevent wear and render the rack bar as easily movable as possible, metallic strips *e*¹ are inserted between the lower surface of the rack bar and the corresponding surface of the groove *d*, said strips being inserted in a longitudinal channel *e*² in the rack bar. These strips are arranged in a series with spaces

lution of this cam the low part of said cam will allow the swivel shuttle rail to be lowered by its own weight. This double cam with reference to the bottom shaft permits the swivel shuttle rail and the swivel shuttles to be raised and lowered twice consecutively—that is, the swivel shuttles may be used to make two consecutive picks and put in two colors between two filling threads put in by the fly shuttle. While the swivel shuttle mechanism is in operation, the fly shuttle mechanism is thrown out of operation by the sliding pick mechanism and when the fly shuttle mechanism is in operation, the lever 66 is held or locked down at the end which is engaged by the cam on the bottom shaft 7, as long as the fly shuttle mechanism is in operation, the swivel shuttle mechanism is in its raised position above the shuttle race. As soon as the fly shuttle mechanism is out of operation, the locking mechanism releases the lever 66 and allows the same to come in engagement with and be operated by the double cam.

When the swivel shuttles are to operate, the sliding pick mechanism is automatically operated, and the fly shuttle mechanism thrown out of operation. The swivel shuttle rail carrying the swivel shuttles can now be lowered into and raised out of the shed for two consecutive beats of the lay through the double cam, levers 66, and vertical connector rods 33 (it will be understood that there is a lever 66 and



between, the object being to preserve the flexibility of the rack bar.

Each pinion *c* consists of a toothed disk composed of wood papier mâché or other material having on each of its faces a bushing *c'*, each being provided with a projection *c''*, received by a cavity *c'''* in the face of the pinion. This bushing is made of raw hide which is self lubricating and thus obviating any whistling sound that may accompany the rotation of the pinions.

The shuttle races consist of channels having upper and lower grooves *g'* *g''*, the lower edge *g'''* of the channels being cut away to form another groove *g''''*.

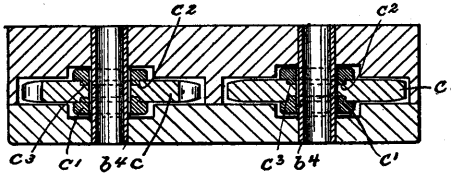


Fig. 2

Between the grooves *g'* and *g''* is thus produced a widened bearing surface *g'''* for the shuttles. Each point of the shuttle *h*, is brought as near as possible to the plane of the back of the latter thus making the shuttle points as far away as possible from the line of convergence of the shed, in turn insuring a clear passage of the shuttle. (A. and S. Widmer, Paterson, N. J.)

OLDFIELD'S SHUTTLE DRIVING MOTION FOR NARROW WARE LOOMS.

The object of the mechanism is to provide ball bearings for the star wheels which drive the shuttles, as well as to those star wheels which drive the toothed rack which operates the star wheels previously referred to, which drive the shuttles; these ball bearings reducing the friction to a minimum.

Fig. 1 is a front view of the batten of a narrow ware loom, partly broken away, to show the new

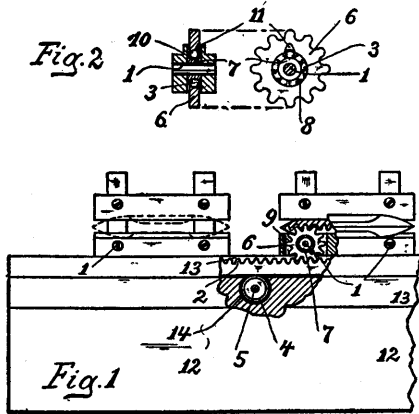


Fig. 1

mechanism. Fig. 2 shows the star wheel, which drives the shuttle, in elevation and section.

Examining illustrations it will be seen that the pin 1, which provides an axial support for the pinion gear 6, does not engage directly the said gear, but engages a disk 7, mounted thereon and of slightly greater thickness than said gear, which latter is form-

ed with a central circular opening 8, large enough to receive the disk, and has cut in the circumferential wall of said central opening, a groove 10. The disk 7 is also formed with a circumferential groove. Interposed between the grooves of the disk and gear is a ring of balls 3. To accomplish the insertion of said balls 3, the pinion gear 6 is provided with a notch 11, cutting into opening 8 nearly to the center of the groove 10 of said pinion. The pinion 6 is made of raw hide, thus by slightly springing the same or by forcing the balls 3 through notch 11, said balls are placed in the position above mentioned. When thus in place, balls 3, while being free to travel in their circular race, are unable to leave the same without springing the gear or forcing the balls through notch 11. The disk 7 equals in thickness approximately the width of the recess 9 and is inserted in said recess as a complete structure, being held in place therein by the insertion of the axial pin 1. The pinion 6 being of somewhat less thickness than disk 7, cannot come in contact with the walls of said recess 9, but may revolve freely upon its supporting ring of balls 3 with no appreciable frictional resistance.

With reference to the rack 2 it will be seen that the same rests at intervals on rollers 4, which latter are also mounted on ball bearings to insure their free revolution. To receive rollers 4, the batten 12 is recessed from its back side, providing circular recesses 14, cutting into the raceway 13. The rollers 4 have formed upon their back side (not shown) a pinion gear which engages narrow inverted supplemental rack teeth (not shown) on the lower side of the rack 2. It will thus be seen that the rollers 4 are not revolved simply by frictional contact with the rack 2. Said rolls are, as stated, formed with teeth that mesh with the supplemental rack teeth previously mentioned, and are thus caused to revolve in unison with the reciprocating movement of the rack. This construction prevents all possibility of flat spots being formed upon the rolls, as might result if the rolls become "stuck" and fail to rotate.

The roller 4 is mounted on pin 5 in substantially the same manner that pinion 6 is mounted on the pin 1; but as said hub is of somewhat greater width a double system of raceways and balls 3 is provided. These raceways are provided in the wall of the circular opening of the roller 4 and in a tubular piece mounted on pin 5, corresponding to disk 7, and like the latter said tubular piece is of slightly greater width than the width of the roller 4, that is adapted to revolve around it.

The balls 3 are inserted in their raceways through notches (not shown) provided in the opposite ends of roller 4, such notches corresponding to the notch 11 of the pinion 6.

The roller 4 and the tubular piece, with the balls 3 inserted between them, form a device complete in itself, adapted to be mounted on pin 5, as before stated. When mounting said device upon the pin 5, a washer is also mounted thereon at each end of the tubular piece and that end of pin 5 that engages the back frame of the batten, passing through a boss, formed on said frame, and by means of a nut, located on the threaded end of the pin, the several elements mounted thereon are clamped between said boss and the head of pin 5.

In securing the latter device in position, the several back frames are so located at the back of the batten 12 as to cause their respective rollers to raise the rack 2 out of engagement with the bottom of the race 13. Suitable arrangements are provided that when the teeth of the rack or those of the engaging pinion gear become worn the gear can be readily adjusted to carry its teeth into close mesh with the rack teeth.

The described manner of supporting the rollers 4 permits the free revolution thereof as the rack 2 is moved reciprocally thereon and positively prevents appreciable friction. (*Edwin Oldfield, Norwich, Conn.*)

STADLER'S METHOD OF OPERATING SHUTTLES IN NARROW WARE LOOMS.

This construction relates to looms in which the shuttles are operated by means of a shuttle rack bar, and the object of the improvement is to prevent the derangement of the shuttles by controlling the movement of the shuttle rack bar.

In looms not provided with such a controlling device, and especially in fast running looms, the shuttle rack bar as it reciprocates in its groove or channel in the batten often moves faster than the loom itself is working and sometimes strikes against the end of the groove with such force as to cause the rack bar to rebound, thereby throwing the shuttles out of place. These improper movements of the

thereby permitting a high rate of speed without disturbing the normal action of the loom. This is accomplished by means of the devices shown, which illustrate the said mechanism as applied to a loom adapted to weave narrow goods, as ribbons, in which the shuttle rack bar is operated by means of marionette hooks and its connecting parts.

Fig. 1 is a front elevation of a part of a loom with the new mechanism attached thereto, showing a portion of the batten, partly in section, and the marionette hooks and their operating pin and the connections with the shuttle rack bar. Fig. 2 is a plan view of the same, the marionette harness being omitted, as is also the top of the batten, exposing to view the shuttle rack bar. Fig. 3 is a section, on an enlarged scale, on the line 3-3 of Fig. 2. Fig. 4 is an enlarged plan view of the sliding plate, upon which is mounted one of the antifriction guide rollers.

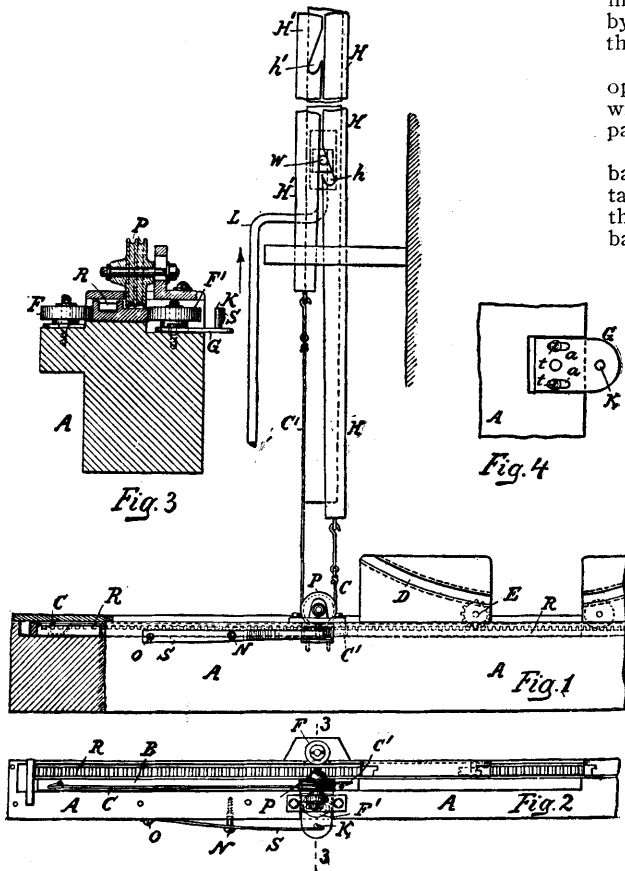
A is the batten, provided with a groove or channel in which the shuttle rack bar R is caused to reciprocate by means of the cords C C', which are attached at one end to the piece B, secured to the side of the shuttle rack bar R, and at the other end to the marionette sticks H H', which latter are operated by the pin W on the driving rod L, engaging with the hooks h h'.

D is the raceway of the shuttle, which latter is operated by means of the pinion E, in engagement with the rack bar R. P is the pulley under which pass the cords C C'.

F is an antifriction guide roller mounted upon the batten A on one side of the rack bar R and in contact therewith. F' is a similar roller mounted upon the sliding plate G on the opposite side of said rack bar R.

The sliding plate G is provided with slots a and is held in position by the guide screw heads t, but so as to permit the plate being moved toward or away from the rack bar R, the extent of such movement being regulated by the length of the slots a. The plate G is also provided with the pin K, against which presses the free end of the spring S, thereby forcing the plate G inward and bringing the roller F' into contact with the side of the rack bar R. The other end of said spring S is made fast to the batten at O, and the degree of pressure of the spring S upon the pin K is regulated by the screw N. The antifriction guide rollers F F' revolve with each movement of the rack bar R, it being held as tightly as desired between the two antifriction guide rollers F F' and its movement prevented, except as the rack bar is pulled to and fro by the cords C C'.

The loom may be run at a high speed without danger of the rack bar running ahead of the proper action of the loom, or rebounding when it strikes the end of the groove, and the derangement of the working of the loom consequent thereon, will thus be avoided. (*William Strange Co., Paterson, N. J.*)



shuttle rack bar cause the relative positions of the marionette hooks to become so changed that they will be operated out of their proper order, resulting in a misweave and necessitating the stopping of the loom.

The object of the new mechanism is to avoid this difficulty by steadying and controlling the action of the shuttle rack bar and preventing its moving in its groove except as it is pulled by its actuating cords,

BATTEN, SHUTTLE BLOCK AND SHUTTLE FOR NARROW WARE LOOMS.

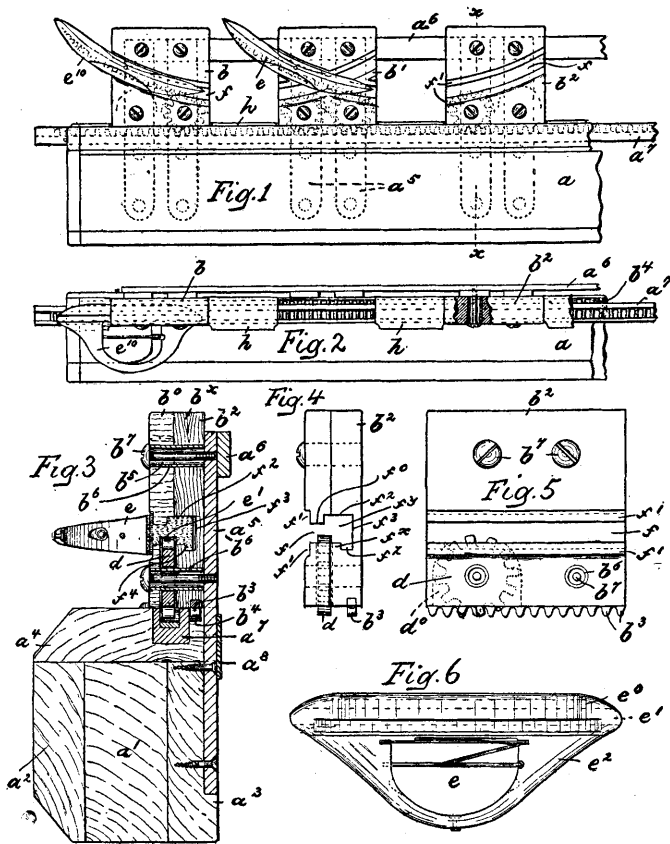
This construction consists in providing a narrow ware or ribbon loom with a batten and shuttle blocks, wherein the shuttle blocks can be readily removed from and readjusted on the batten.

These shuttle blocks are also provided with grooves or races furnishing increased bearing surfaces for the shuttles to be operated therein, whereby all further

dropping or depressing of the noses of the shuttles is prevented and the latter are at all times in proper alignment, yet said grooves or races allow the shuttles a clearance in all directions in case of any roughness which may occur through the ordinary wear and tear of the batten.

Fig. 1 is a front elevation of the improved batten, partly broken away and having two shuttles arranged in the shuttle blocks; Fig. 2 a top plan view of Fig. 1 partly in section, the central shuttle block and the shuttle arranged therein being removed; Fig. 3 an enlarged sectional view on the line $x-x$ of Fig. 1, the shuttle being shown in engagement with its actuating pinion; Figs. 4 and 5 a front and end elevation, respectively of one of the shuttle blocks, showing the same provided with a straight shuttle race; and Fig. 6 an enlarged top plan view of one of the shuttles detached.

a represents the batten, consisting of a series of vertical strips a^1, a^2, a^3 , glued together and also glued



to the horizontal top strip a^4 , the grain of which latter runs at an angle to the top surface of the batten, while the direction of the respective grain of the vertical strips runs in an alternate or opposite direction to each other, by which arrangement the warping of the batten is reduced to a minimum and the shrinkage of the top strip a^4 , if any, will be in a vertical direction. The top strip a^4 is provided near its rear portion with an elongated groove, into which is glued a rack bar b^1 . Adjacent to said rack bar and slidingly arranged in an elongated groove is the actuating rack bar a^5 , adapted to operate a series of pinions d , arranged in recesses a^6 of the shuttle blocks b^2 and revolubly mounted on the sleeves or bushings b^5 , which latter penetrate the vertical holes b^6 . Screws

b^7 , of smaller diameter than the internal diameter of said bushings, secure said shuttle blocks to the vertical braces a^5 . Said vertical braces are secured to the rear portion of the batten by screws or in any desired manner and are connected at or near their top portions by a horizontal brace or connecting bar a^8 .

Each shuttle block is composed of two wooden plates, the grain of the rear one b^x being at right angles to the grain of the front one b^y . Said plates are glued together, and thus furnish a shuttle block of great strength and durability, having its shrinkage and warping reduced to a minimum.

In the shuttle blocks b^2 are arranged the curved or straight shuttle races, each of which consists of the groove f and the adjoining recesses f' (on the front portion of the block) and of the elongated channel or chamber f^y , the back f^z of which is parallel with the back of the shuttle block and at right angles to the top f^x of said channel and forms with said top a sharp edge or corner. In the lower portion of said channel is arranged an elongated groove f^z , which latter, together with the lower recess f' forms a bridge or shoulder f^x , while the top portion of the channel f^y , together with the upper recess f' , forms a bridge or shoulder f^y .

The shuttle races are adapted to be engaged by the runners e^0 of the shuttles e , which runners for that purpose conform in shape to that of the shuttle races. Each runner is provided in its lower portion with an elongated rack bar e^1 , adapted to be engaged by the teeth of the pinions d .

Each shuttle is constructed of two pieces—that is to say, of the runner e^0 and of the nose or front portion e^2 —which are glued together, the runner having been previously bent to the proper curve from a piece of straight grained wood. The nose or front portion of the shuttle is also of straight grained wood and thus furnishes, together with its runner, a shuttle which is very durable and strong, (as there is no cross grain to it), especially on the points which are apt to chip off; however, the shuttles may be machined out of one piece of straight grained wood after the same has been bent into the proper shape or curve.

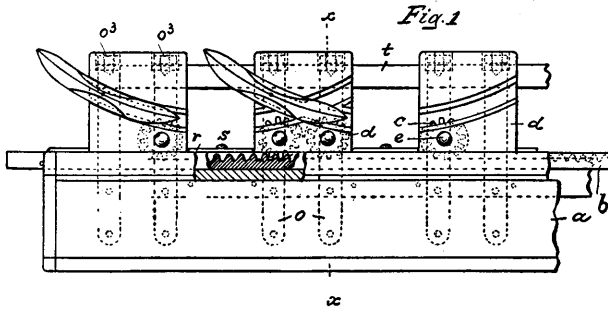
By the peculiar construction of the shuttle blocks, the greatest bearing surface for the shuttle is furnished by the rear plate b^x , the shuttles being run on the end grain of the wood, which is the hardest wearing surface in any piece of wood.

Each shuttle block b^2 is provided at its lower rear portion with a rack bar b^3 glued into a groove in said block, adapted to engage the rack bar b^1 in the top of the batten a , whereby the shuttle blocks are held in proper position, the grooves or races for the shuttles being always in true and proper alignment. This alignment is made possible by the screws b^7 penetrating holes b^6 in the shuttle blocks, which holes are of larger diameter than said screws. (O. W. Schaum, Phila.)

SECURING SHUTTLE BLOCKS TO BATTENS FOR NARROW WARE LOOMS.

This arrangement is an improvement to parts described in the previous article and consists in providing means for securing the shuttle blocks to the battens.

Fig. 1 is a front elevation of a portion of a batten, partly in section, and of three shuttle blocks arranged thereon. Fig. 2 an enlarged sectional view on the line *x-x* of Fig. 1, the actuating pinion and its axle being shown in full.



a represents the batten, provided in its top portion with an elongated groove in which is slidingly arranged the actuating rack bar *b* for the pinions *c* in the shuttle blocks *d*, which pinions are revolvably mounted on axles *e*.

The rear portion of the top of the batten *a* is beveled, as at *f*, and supports the shuttle blocks *d*, which are each provided with a bottom surface *g*, inclined correspondingly with the bevel *f* of the batten.

Each shuttle block is held in normal position by means of brackets *o*, constituting a backing for the shuttle block and having their lower ends secured to the batten *a* by means of screws *m*, while the upper portion of each bracket carries an arm or projection *o'*, provided with an aperture *o²*, in which is adjustably arranged a set screw *o³*, adapted to bear upon a

metallic disk *o⁴*, arranged in a socket *o⁵* in the recessed top portion of the shuttle block. The bottom of the socket *o⁵* is inclined reversely to the plane of the inclined bottom surface of the shuttle block, by which arrangement a firm and accurate connection between the shuttle block *d* and the batten *a* is attained.

The exposed portions of the actuating rack bar *b* are covered by plates *r*, occupying the space between adjoining shuttle blocks and removably secured to the batten by screws *s*. The vertical brackets *o* are connected at or near their top portions by a horizontal brace or connecting rod or bar *t*, secured to said brackets by screws *t'*.

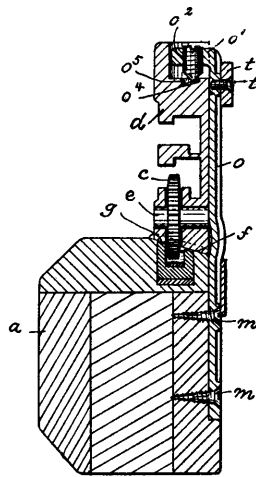


Fig. 2

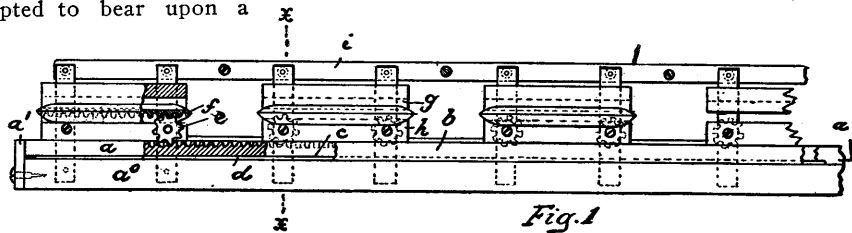
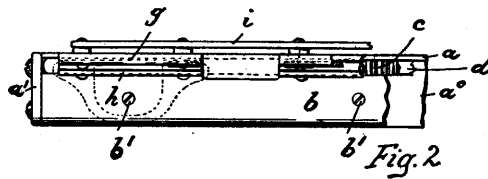


Fig. 1



WOLLENBERG'S BATTEN FOR NARROW WARE LOOMS.

The object is to produce a batten for weaving narrow ware fabrics, which can be easily and quickly taken apart for the purpose of repairing or adjusting the actuating rack bar for the pinions operating the shuttles.

Fig. 1 is a front elevation of a portion of this batten and of the parts carried thereby, with certain portions broken away. Fig. 2 is a top plan view of the left hand portion of Fig. 1, and Fig. 3 an enlarged sectional view on the lines *x-x* of Fig. 1.

The lay consists of the rabbeted or recessed base *a^o* and the top of the lay *b* proper, which latter is removably secured to the said base by means of a series of screws *b'*, and forms with the back *a* of the base *a^o* an elongated groove, in which is slidingly arranged the actuating rack bar *c*, which rests upon an elongated strip *d*, extending the entire length of the batten and bearing with its rounded end portions against the ends or stops *a'* of the said batten. The strip *d* is of a width substantially equal to the width of the rack bar *c*, and is loosely and thus removably placed within the elongated groove heretofore mentioned.

The rack bar *c* actuates the pinions *e*, which in turn operate the shuttles *f*, guided in the guide blocks *g* and *h*, secured to the back *i* of the lay or batten.

When the rack bar is to be taken out for the purpose of repairing the top or lay proper, the latter is removed by simply loosening the screws *b'* and the shoe or supporting strip *d* withdrawn from its normal position, whereby the said rack bar is allowed to drop out of engagement with its respective pinions

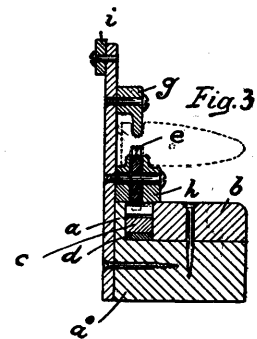
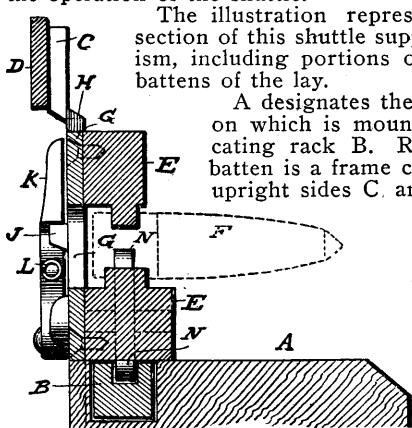


Fig. 3

upon the top of the base a° , from where it can easily be taken. On the other hand, when the lower surface of the rack bar has been worn off at certain places and thus the engagement of its teeth with the pinions cannot be relied upon, the shoe or supporting strip d is slightly raised up at said places by inserting between the lower surface of the shoe and the top of the base strips of paper, cardboard, or the like. (Isaac Wollenberg, Paterson, N. J.)

SUPPORTING MECHANISM FOR SHUTTLES FOR NARROW WARE LOOMS.

The construction refers to a guide or carrier of a shuttle for narrow ware looms, whereby said shuttle or carrier, or both, may be readily removed without disturbing the other adjacent parts on the beam or batten, provision being also made for locking the block or carrier in position without interfering with the operation of the shuttle.



The illustration represents a vertical section of this shuttle supporting mechanism, including portions of the beams or battens of the lay.

A designates the batten of a lay, on which is mounted the reciprocating rack B. Rising from said batten is a frame consisting of the upright sides C and the cross bar D, the latter connecting the upper ends of the former.

A block forming a guide and carrier for the shuttle F, consists of upper and lower bars

E, separated to form a race for the shuttle and having secured to them the connecting plates G, whose inner sides are inclined and freely connected with inclined sides of the uprights C after the manner of a dovetailed joint H, whereby the guide may be raised and lowered on said uprights while being prevented from lateral displacement.

Projecting from the plates G are the studs or lugs J, adapted to be engaged by the dogs K, which are mounted on the uprights C and are drawn toward each other, and thus held in engagement with said studs by spring L.

Mounted on the guides are the pinions N, which engage with the rack on the shuttle F and with the rack B of the beam or batten, by the operation of which the shuttle receives reciprocating motion.

When, however, for any purpose it is desired to remove the guide or shuttle, or both, the dogs are drawn outwardly, so as to clear the studs J, when the guide may be raised or entirely removed, the block and shuttle thus being accessible.

When the guide is returned to its normal position, the studs J ride on the noses of the dogs until they clear the shoulders of the same, when said dogs spring inwardly and engage with the studs J, thus also again controlling the guide against upward displacement.

The adjustment of the plates G is accomplished by vertical and horizontal slots, respectively, in the upper and lower portion of the said plates, whereby they may be vertically separated to a greater or less ex-

tent and moved laterally. The device is applicable to straight, circular, and fly shuttle lays. (M. Saile and S. D. Wright, Phila.)

OBLIQUE SHUTTLE DRIVE FOR NARROW WARE LOOMS.

In this loom the batten is furnished with straight shuttles, reciprocated above and below slanted slots, through which the warp passes in a slanting direction. By this arrangement the slots may be placed closer together, (leaving space only for a driving gear) thus permitting a greater number of fabrics to be woven in a given width of the loom.

Fig. 1 is a front view and Fig. 2 a back view of the batten.

b are the slanted slots from both sides of which extend grooves c , running parallel to the oblique sides of the slots b and extending over and below the neighboring slots b . In said grooves, fit the shuttles d , which are reciprocated in the following manner: In a recess of the batten is journaled a rack f , which is shifted to and fro by cords g , guided around pulleys h and fixed to the rack f . The pulleys rotate on pivots i . In an angle bracket k , fastened to the back side of the batten, are located the journals l , just in the middle between two slots b . To these journals l are fixed cog wheels m , which mesh with the rack, so that by the reciprocating movement of the latter the journals l are correspondingly rotated. The journals l carry two other driving wheels n , one above each other. The back side of each of the shuttles is provided with a rack which is also embedded in its groove c , but is made accessible from behind by a recess s , so that it may be engaged by one of the pinions n on journals l . Each shuttle will thus be reciprocated by two pinions n —a lower one at the right side of its corresponding slot and an upper

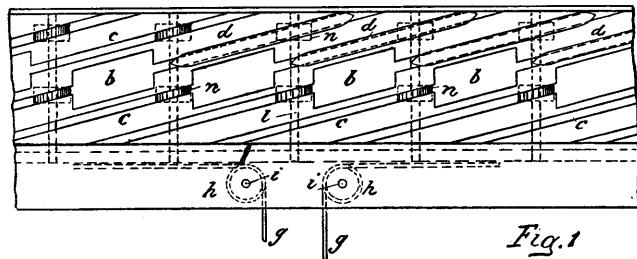


Fig. 1

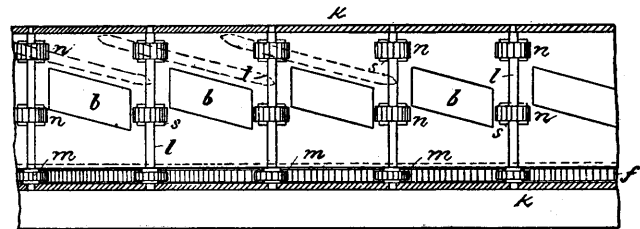


Fig. 2

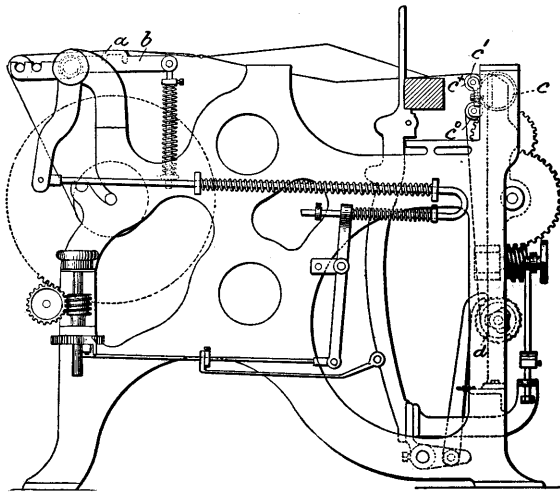
one at the left side of the slot. The lower pinion, engaging the shuttle, first drives it in the inclined direction to the upper pinion, which, receiving the shuttle, carries it to the end of its stroke and back again to the lower pinion. (Wilms and Schroers, Barmen and Krefeld, Ger.)

LET OFF MECHANISMS.

THE MASON WARP SLACKENING MECHANISM AND TAKE UP ROLL.

The illustration is a side elevation of parts of a loom having the devices added.

The slackening device has for its object the slackening of the warp as the filling is beat in by the lay, so as to relieve, to some extent, the warp threads of the



strain when the reed strikes the fell of the cloth. This is accomplished by means of a rest or cross bar *a*, on arms *b*, between the whip roll and lease rods and running parallel with them. This rest *a* is worked up and down against the warp in the desired manner by means of a connection of levers between the arm *b* and the lay sword. In place of the regular breast beam there is used a take up roll *c*, which is a sand roll, holding the cloth tightly, and around which the cloth passes in its travel to the cloth roll *d*.

The use of take up roll *c* in place of a breast beam greatly lessens the distance between the reed and the place where the cloth is held taut, in turn doing away with bagging of the cloth when the reed beats up the filling. Between the take up roll *c* and the lay is placed a vertically adjustable cloth supporting roll *c'*, mounted on stands *c''*.

The face of the cloth woven can be varied by means of this roll or bar, for when it is desired to have the filling show more prominently than the warp, or, in other words, to "cover" more, the roll or bar can be raised. This acts to tighten the warp threads when the filling is being beaten in, and the latter by reason of its greater slackness can be lifted by the reed dents at the moment of beating in, to thereby cover the warp threads, and by lowering the cloth support *c'*, the upper warp threads are slackened, and made to cover, or be shown more distinctly, as is sometimes desired.

The cloth in passing from the reed goes over roll *c'*, over and under the take up roll *c* to roll *c''*, and thence to the cloth receiving roll *d*. (*Mason Machine Works.*)

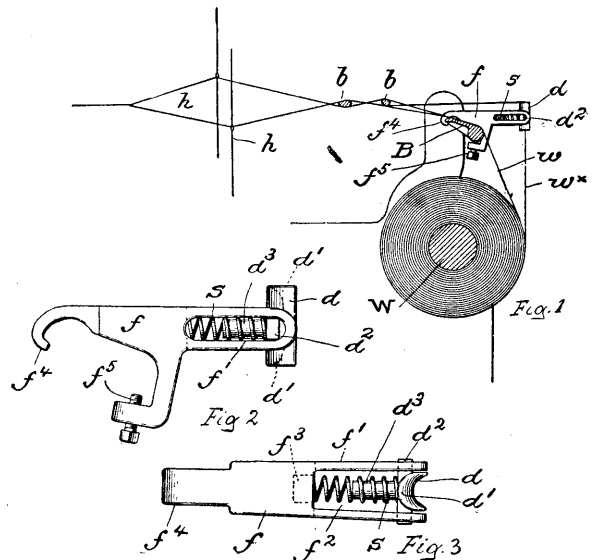
ROBINSON'S SELVAGE SLACKNER FOR COTTON LOOMS.

In weaving, the selvage threads are subjected to much greater strain than the threads of the body warp, owing to the fact that as the lay beats up, the reed spreads the warps laterally at the fell and as the lay recedes the cloth contracts. This lateral movement of the warp threads is greatest at the selvage, and as a consequence the selvage threads are unduly strained and thus frequently break. The object of the new device is to relieve this excessive strain on the selvage thread, in turn improving quality and quantity of production.

Fig. 1 in section, represents a portion of a loom with the new device applied thereto. Fig. 2 is an enlarged side elevation of the new selvage warp guide, and Fig. 3 is a top or plan view thereof.

Referring to Fig. 1, the main or body warp threads *w* are led from the warp beam *W*, up over a whip bar *B*, and pass thence to the lease rods *b* and the harnesses *h*. The selvage warp threads *w^x* at each side are gathered together and pass over yielding mounted guides (one at each end of the whip bar or roll) to the lease rods.

These guides consist of a longitudinally grooved bar *d*, rounded at its ends as at *d'*, and having lateral lugs *d²*, which enter and are guided by horizontal slots *f'* in a stand *f*, bifurcated at its rear end at *f²*. Fig. 3, to receive the guide, which occupies an upright position. A spring *s* rests at one end in a socket *f³* in the stand and at its other end surrounds a stem *d³*, extended forward from the guide, the spring tending to maintain the guide in its rearward position. The



stand has a jaw *f⁴* and a clamping screw *f⁵* to hold it in place on the end of the whip bar *B*.

When the lay beats up and the reed exerts a greater tension on the selvage warps *w^x*, they act to draw the guides *d* forward, compressing the controlling springs

s more or less, according to the strain, so that while said warps are maintained at the proper working tension the guides yield to relieve the undue strain. As the lay moves back the strain on the selvage warp is reduced and the slack is taken up by the guide springs.

The selvage threads are thus yieldingly supported independently of the body warp, and are free to yield when subjected to strain without reference to body warp. (*Mason Machine Works, Taunton, Mass.*)

PERHAM'S LET OFF FOR COTTON LOOMS.

This device consists in a let off mechanism for looms in which the pressure of the brake mechanism is made to vary with the thickness or diameter of the layers of the threads upon the warp beam, being greatest when the layers are thickest and least when the threads are almost expended, so that the rotation of the warp beam is varied in accordance with the depth of the layers on the beam and a uniform amount of thread is let off at all times.

Fig. 1 represents in side elevation a portion of a loom having its warp beam equipped with this let off mechanism. Fig. 2 shows additional means for locking the warp beam against rotation when the reeds of the lay beam are in engagement with the cloth. Examining Fig. 1 it is seen that the warp beam has at its ends, flanges *e*, and is provided with a gear wheel *f*, meshing with a pinion *g* on a stud shaft *h*, journaled in the frame. The stud shaft *h* is equipped with a friction or brake wheel *i*, with which the brake mechanism coacts in retarding the rotation of the warp beam as the warp threads are gradually drawn therefrom during weaving. *j* is a long lever pivoted at *k* to the loom frame and having its upper end *j'*

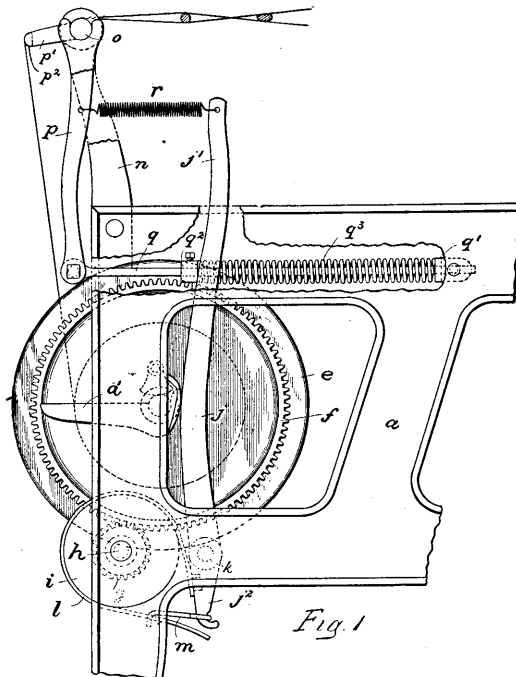


Fig. 1

extending above the framework of the machine. One end of the strap *l* passes around the rim of the brake wheel *i* and is secured to the lower end *j*² of the lever *j* slightly below the pivot *k*, while its other end is secured to the extreme lower end of the lever *j* by

a link *m*, having a hooked end adapted to take in any one of several holes made in the strap *l*.

If the upper end *j'* of the lever *j* is moved to the right, the strap *l* is freed from frictional engagement with the brake wheel, and if moved to the left the friction of the strap against the wheel is increased.

Upon supports *n*, extending up from the frame *a* of the loom is mounted a shaft *o*, having a depending arm *p* and laterally and rearwardly projecting arms *p*¹, connected by a bar *p*², constituting a feeler. The lower end of the arm *p* is pivoted to rod *q*, passing loosely

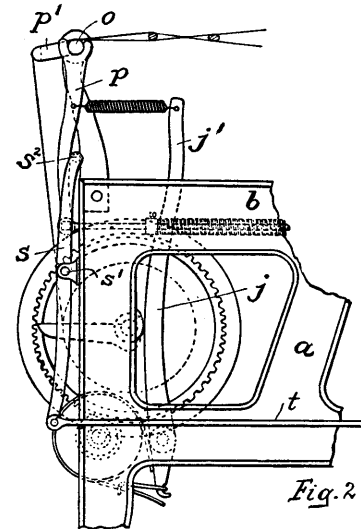


Fig. 2

through an eye *q'* on a bracket secured to the loom frame, said rod being provided with an adjustable collar *q*², and between it and the eye *q'* and around the rod *q* is placed a presser spring *q*³.

The upper end *j'* of the lever *j* is connected to the arm *p*, at a distance from the shaft *o* of about one third of its length, by a tension spring *r*.

The warp threads, previously wound upon the warp beam, pass over the bar *p*² of the feeler and from thence to the heddles. The springs are adjusted until the parts are in normal position and the brake strap locks the brake wheel against movement. Then the warp threads, under the tension of the cloth roll and the take up devices, draw upon the feeler with sufficient pressure to throw the lower end of the arm *p* to the right against the pressure of the spring *q*³, and thereby allow the upper end of the lever *j'* to move to the right far enough to decrease the frictional engagement of the brake mechanism, so that the warp beam can slowly rotate and the threads can be drawn from it. When the beam is first put on the loom, the layers of thread are so deep that the threads pass from it over the feeler at an angle greater than a right angle to the latter, where they exercise their least stress or force upon it and their greatest stress upon the brake, and as they are gradually reeled off, the diameter of the layers becomes less and less and the pressure upon the feeler is correspondingly increased as the threads approach a right angle to it.

Therefore it will be seen that the friction of the strap and brake wheel is greatest when the leverage of the threads upon the warp beam is greatest, and least when the diameter of the layers of thread upon the warp beam is diminished, and consequently their leverage upon the beam is decreased. The main pressure of the warp is borne and resisted by the spring *q*³, which is also sufficient to normally

counterbalance the spring r , but when the tension of the warp is sufficient to compress the spring q , the movement of the feeler arm changes the tension of the spring r and causes the lever j to release the brake wheel sufficiently to relieve the tension on the warp.

Means are also provided for locking the warp beam against rotation when the reeds of the lay strike the cloth and what increases the tension on the warp threads, and consequently partially rotates the warp beam (in looms working on conditional friction let off), so that at the next pick the warp threads are more or less loose, resulting more or less in an irregular and uneven fabric.

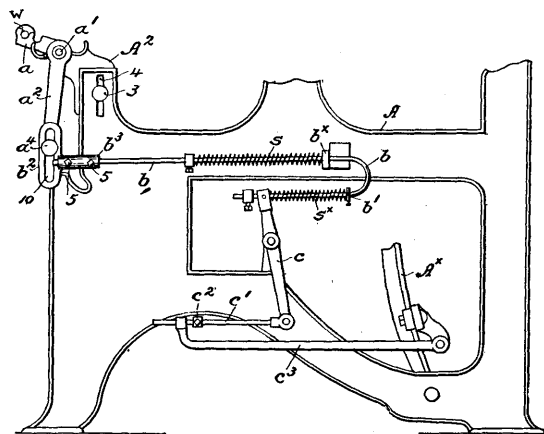
To remedy this trouble a locking lever s is employed in connection with the new let off mechanism which locking lever is fulcrumed at s' on the loom frame a , and has a projection s^2 at its upper end to extend behind the arm p . The lower end of the lever is connected by a link t with the lay sword, (not shown) so that each time the lay is thrown forward the upper end of the lever is thrust rearward until the projection s^2 engages the lever p and prevents it from yielding under the increased tension of the warp threads, and consequently the brake mechanism remains locked to the brake wheel and the warp beam is prevented from unwinding.

When the lay is in its inoperative position, the projection s^2 is withdrawn from the lever p , which is thus free to move. (Charles F. Perham, Lowell, Mass.)

NORTHROP'S LET OFF MECHANISM.

This mechanism has for its object the production of means for permitting the whip roll stand of the let off mechanism to be raised or lowered, as desired, without interfering with the position or operation of the other parts of the mechanism.

The illustration is a side elevation of a loom provided with the new mechanism shown as applied to the well known "Bartlett" let off mechanism, which latter includes a rocking carrier for the whip roll W , the carrier comprising the supporting arms a , attached to a rock shaft a' which has a depending rocker arm a^2 , pivotally connected with a bent rod b , longitudinal-



ly movable in a fixed bearing b^x on the loom side A , said rods having springs s s^x , the latter being held between an adjustable collar b' on the rod and the perforated end of a lever c . A link c' connects the lever with the usual pawl carrier, (not shown), and a collar c^2 on the link is engaged by the actuator rod c^2 , connected with and operated by the lay sword A^x .

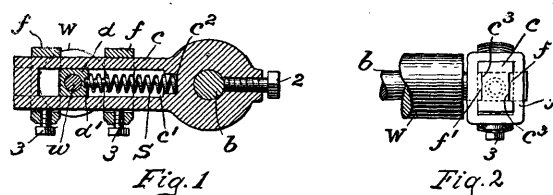
Usually the rod b is jointed or pivoted directly upon the rocker arm a^2 ; but in the new mechanism the

stands A^2 for the whip roll rock shaft a' are made vertically adjustable by means of set screws or bolts 3 and vertical slots 4 in the loom sides, and as the stands thus can be raised or lowered, as desired, a simple and efficient self adjusting coupling or connection between the rocker arm a^2 and the rod b is thus devised.

The lower end of the rocker arm a^2 is provided with a boss which supports a headed pin or stud a^4 , the latter entering a longitudinally slotted upright fin b^2 on the sleeve like body b^3 of the coupling member, which latter receives the end of the tension rod b and is secured thereupon by set screws 5. The stud a^4 enters the slot 10, and when the whip roll stands A^2 are vertically adjusted the stud slides up or down along the slot, so that the position and operation of the other parts of the let off will not be interfered with, while the pivotal connection between the rocker arm a^2 and rod b is always maintained. (Draper Co.)

ARRANGEMENT FOR REGULATING THE TENSION OF THE WHIP ROLL.

The object of the mechanism is to provide means for the yielding of the whip roll under the strain as applied to the warp during weaving, providing springs capable of being easily regulated to the proper tension



required by the fabric woven, since certain kinds of goods require more or less tension than others.

Fig. 1 is an enlarged sectional view of one of the guides for the whip roll journal boxes, showing the arrangement of the means for regulating the movement of the roll; and Fig. 2 is a rear end elevation of one of the guides with a part of the whip roll and the rock shaft to which the guides are secured.

The device is to be attached to the top of the rear end stand of the loom frame (and above the warp beam) as usually carrying the whip roll, etc., one of the devices being applied to each side of the loom.

b indicates the rock shaft of a loom, supported at each side by the end stands of a loom frame, and to which shaft are attached by set screws 2, two guides c , one at each side of the loom, extending rearwardly above the warp beam, being longitudinally slotted at c^1 to receive the journal boxes d , of the journals w , extended from the end of the whip roll W . A spring S is interposed between each journal box and the inner end of the slot c^1 , a pin a^1 on the box entering the outer end of the spring, while the inner end of the spring is held in a recess c^2 in the guide c .

By means of the springs the roll W is yieldingly maintained at or near the outer ends of the guides, while it is movable toward the fell of the cloth when sufficient strain is exerted upon the warps.

The guides c are longitudinally grooved on their inner and outer faces, as at c^3 , to receive the ears f^1 on the inner sides of two like stops f , mounted on each arm in front of and behind the box d , said stops being loop like or open to embrace and slide upon the guides. Set screw 3 extends through each stop and bears against the guide to hold the stop securely in adjusted position.

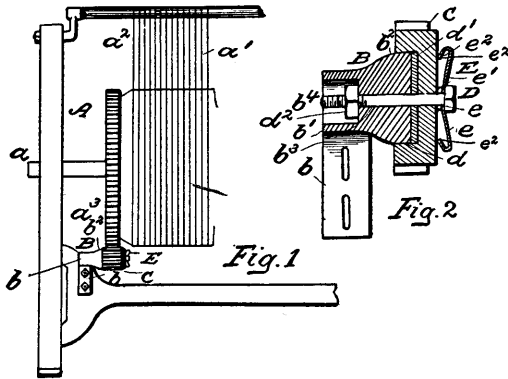
The extent of movement of the journal boxes and consequently of the whip roll W , is regulated by the

position of the stops *f* on the guide arms *c* without reference to the strength of the springs *S*, while the latter will still yieldingly control the movement of the roll within the limits set. (*Draper Co.*)

PECKHAM'S CONDITIONAL LET OFF FOR COTTON LOOMS.

The objects of this device are, first, to provide a let off by means of which cloth may be evenly woven; secondly, to construct such let off of but few parts, and, thirdly, to provide means for preventing the operators from tampering with the let off so as to thin the cloth.

Fig. 1 is an end view showing a portion of a loom having the new device applied thereto. Fig. 2 is a



vertical longitudinal sectional view of the let off device shown on an enlarged scale.

A designates a part of the frame of the loom, *a* the warp beam, *a'* the warp threads, *a²* the whip roll, and *a³* a large gear wheel mounted on and carried by the warp beam *a*.

B designates a bracket, comprising a plate *b* bolted to the frame *A*, and a stud *b'*, formed with said plate at the upper end thereof. This stud is of increased diameter at its outer end *b²* and is formed with a central bore *b³* which terminates in a socket *b⁴* in the end of the stud.

C is a gear wheel which is in mesh with the gear wheel *a³* of the warp beam. It is formed in one side with a circular socket *d* which accommodates the end *b²* of the stud, said end forming the bearing on which said wheel rotates. In this socket is located a friction disk *d'* interposed between the end of the stud and the body of the wheel.

D is a bolt passed through a central opening in wheel *C* and also through the bore *b³*, its extreme threaded end being extended into the socket *b⁴*. Upon this end is a nut *d²* screwed up to the inner end of the socket. *E* is a spring bearing plate interposed between the head *e* of the screw *D* and the outer face of the wheel *C*. This plate is formed with four radiating arms *e'*, which are bent slightly outward, and their extreme ends *e²* are bent inward so as to bear against the face of the wheel. In this way the amount of friction it is desired to place against the wheel *C* can be controlled by the turning of the screw *D*. As the latter is tightened the wheel is brought more tightly against the friction pad located within its socket.

By locating the screw nut within the socket of the stud, operators are prevented from tampering therewith. Since there are practically only four pieces in the entire attachment, the danger of the latter getting out of order is reduced to a minimum. The new device will also reduce the chance for "smashes," for if the shuttle stops between the reed and the cloth, the friction will let off quick enough to loosen the warp, and thereby prevent a smash. (*James M. Peckman, Fall River, Mass.*)

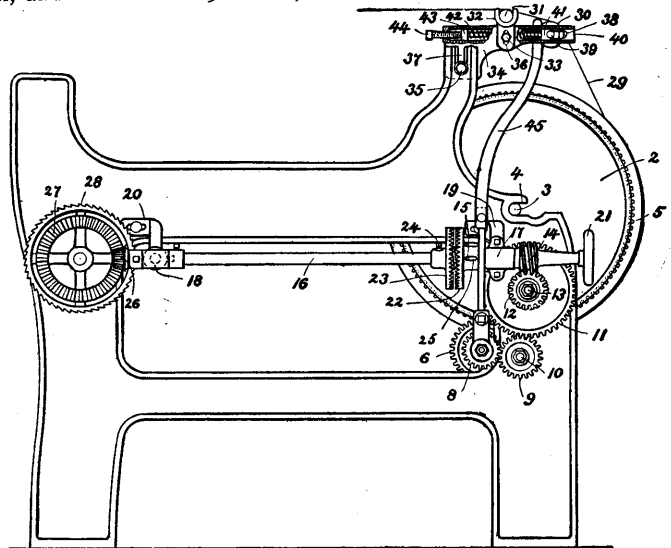
COCKERILLE'S POSITIVE LET OFF FOR COTTON LOOMS.

The illustration represents in side elevation one side frame of a loom with the new device applied thereto, certain small portions adjacent to the whip roll being represented as broken away or in section in order to better illustrate certain features otherwise not visible.

1 designates the loom frame. 2 is the warp beam, mounted and supported by journals 3 in bearings 4, provided therefor in the side frames of the loom. 5 is the gear with which the warp beam is provided. 6 is a pinion meshing with the said gear and mounted upon a short shaft supported on the loom side, the said shaft having also a pinion 8, which meshes with a pinion 9, that is mounted to turn on a stud or pin 10, applied to the loom side, the said pinion 9 meshing also with a gear 11.

12 is a worm gear which turns in unison with the spur gear 11, both being mounted on stud 13, applied to the loom side.

14 is a worm which engages with the teeth of the worm gear 12, said worm being formed or provided on the sleeve applied to one end of the side shaft 16. 17 and 18 are bearings in which the side shaft 16 is mounted to turn, said bearings being connected with brackets 19 and 20, which are bolted to the loom side.



The sleeve previously referred to, is free to turn upon the shaft 16 independently of the latter and is equipped with a hand wheel 21, enabling it to be turned by hand for the purpose of adjusting the warp beam—that is to say, turning the said wheel to partially unwind the warps therefrom or to wind them thereon, as and when required. Upon the forward end of the sleeve 16 is mounted one member 22 of a finely toothed

clutch. A pin 15, projecting from the sleeve, passes through a slot 25 in the hub of said clutch member 22 and compels the sleeve and said clutch member to turn in unison. The other member 23, of the said clutch is fixed upon the side shaft 16, by means of the clamping screw 24. A spiral spring is interposed between the two clutch members 22 and 23, and normally holds the member 22 pressed away from the member 23 and out of engagement therewith. Fast upon the forward end of the side shaft 16 is mounted the beveled pinion 26, which meshes with the beveled gear 27, which rotates in unison with the ratchet wheel 28 of the take up mechanism.

The warp yarns 29, on their way from the warp beam 2, pass over a whip roll 30 and then over a guide roll 31, from which last it extends to the heddles. The guide roll 31 has its ends journaled in bearings in brackets 32, the latter being fixed by bolts 33 to the stands 34, the said stands in turn being fastened by bolts 35 to the loom sides. Each bracket 32 is slotted vertically, as at 36, to enable it to be adjusted up and down upon the corresponding stand 34, and the upwardly projecting portion at the rear of each side frame is slotted vertically at 37 to permit of vertical adjustment of the corresponding stand 34, upon the said side frame. Each stand 34, projects rearwardly, and it is slotted transversely, as at 38, for the reception of the journal 39, which is provided on the corresponding end of the whip roll 30, the slot permitting horizontal movement of the said journal forward and rearward in the loom. Each stand 34, is formed also with a horizontally extending hole or opening 40, in which is placed a block 41, a spiral spring 42, and a second block 43. The spring 42 is compressed between the blocks 41 and 43, and serves to press the block 41 against the journal 39 of the whip roll 30, and to bear the whip roll 30 rearwardly in the loom.

44 is a set screw acting against the block 43, and by means of which the tension of the spring 42 may be adjusted as required. The tension of the spring 42 determines the tension at which the warp yarns shall be maintained in the course of the weaving.

45 indicates a lever having the free extremity thereof extended up to a position in advance of one end of the whip roll 30. The lower end of the said lever is sleeved on the short shaft which carries pinion 8, and an intermediate portion of the lever engages with the clutch member 22. To the upper end of lever 45 an adjustable projection is applied in the form of a bolt, having one end thereof arranged to come in contact with one end of the roll 30, the threaded stem of the said bolt fitting a threaded hole in the upper end of the lever 45, and having a lock nut applied thereto.

In practice the parts will occupy normally the positions in which they are represented at the right hand side in the illustration with the clutch member 22 separated from the clutch member 23, and the warp beam stationary. In the course of the weaving as the take up motion draws forward the web and increases the tension of the warps, the forward movement which the increased strain or tension of the warps will communicate to the whip roll 30 will cause the said whip roll to press forward the lever 45, which will close the clutch member 22 into engagement with the clutch member 23, which is fast upon the side shaft 16. Thereupon the worm 14 will be caused to rotate in unison with the side shaft 16 and will transmit, through the gearing which has been described, movement to the warp beam and thereby unwind a supply of warp yarns therefrom. Sufficient warp yarns having been unwound from the warp beam to allow the whip roll to recede under the action of the spring 42, the lever 45 and movable clutch member 22 will be allowed to move under the action of the spring as interposed between the two clutch members 22 and 23, so as to

open the clutch and cause the unwinding movement of the warp beam to discontinue. In brief, an increase of tension on the warp yarns acts through the whip roll and the lever 45 to close the clutch, so as to cause the warp beams to be driven positively from the side shaft 16 for the purpose of delivering the required fresh portion of the warp yarn. A sufficient quantity or portion of warp yarns having been unwound, the return of the whip roll enables the clutch to be opened again, so as to arrest the unwinding movement of the warp beam.

An important characteristic of the new device is the fact that the motion by which the warp beam is actuated at the required times for unwinding fresh supplies of the warp yarns, is taken from a moving member of the take up motion which is the part of the loom effective in governing or determining the number of picks to the inch in the web, and by providing mechanism such as aforesaid, so as to connect at the required times the warp beam with the take up ratchet, enabling the warp beam to be operated from this take up ratchet, a definite and certain relation between the letting off and the taking up being secured and maintained—that is to say, a predetermined and exact proportion of the one to the other is the result. It is easier to even up the tension and it enables the same tension to be maintained on the warp yarns from one end thereof to the other throughout the weaving.

The roll 31 supports the warp yarns intermediate the whip roll and the heddles and constitutes a fixed rest for the said yarns. This roll takes a large part of the strain which comes upon the yarn at the time of the beat up, thereby relieving the whip roll of the sudden pull forward which is communicated to the warps at such time and holding the warp yarns firmly while the last pick is being driven home by the reed, securing better results in the weaving. The capacity for effecting vertical adjustment of this roll 31, enables to vary within certain limits the action of the warp yarns upon the whip roll. The angle which the warps make in passing around the whip roll varies according as the diameter of the warp beam diminishes in the course of the weaving, becoming greater as the said diameter decreases. A difference in this angle varies the readiness with which a certain degree of tension of the warp yarns acts to carry the whip roll forward. By raising or lowering the guide roll 31, the angle that is formed by the yarn in passing the whip roll is regulated, so that by giving the proper elevation to the said guide roll greater uniformity of angle from the time of beginning with a full beam to practically the emptying of the said beam is secured, than would be possible if the guide roll were not employed. (*Henry C. Cockerille and Jeremiah Clark, Lowell, Mass.*)

SCHAUM'S LET OFF MECHANISM FOR NARROW WARE LOOMS.

In the illustration this let off mechanism is shown in side elevation, a portion of the rear framework of the loom, being also shown, partially in section and partially in dotted lines.

1 indicates the rear portion of the framework of the loom, and 2, 3 and 4 designate three of the cross beams which form a part of the frame and which support the improved let off mechanism. 5 represents one of a pair of side frames or supports having several arms whereby it is secured to the various cross beams. In bearings 7, formed at intervals in the side frames, are journaled the ends of the beam shafts.

The shafts for the ground warp beams 8 and 9 are designated by 10 and 11, and the shafts for the edge and binder warp beams 12 and 13, the latter of which

beams is situated above the former, are designated by 14 and 15.

16 designates levers each of which constitutes one of a pair that are fulcrumed in the side frame 5 at points 17 below the bearings 7 of each ground warp beam, and 18 and 19 each designate one of a pair of similarly fulcrumed levers, the former being for the edge warp and substantially like the levers 16 in shape and the latter being for the binder warp and differing slightly in form from said levers 16. The various pairs of levers are connected by one or more rods 20, serving as racks for weights 21.

22 indicates levers fulcrumed upon and shorter than the various levers previously referred to, each of which is provided upon its under side with a heel or lug 23, with which the longer levers are adapted

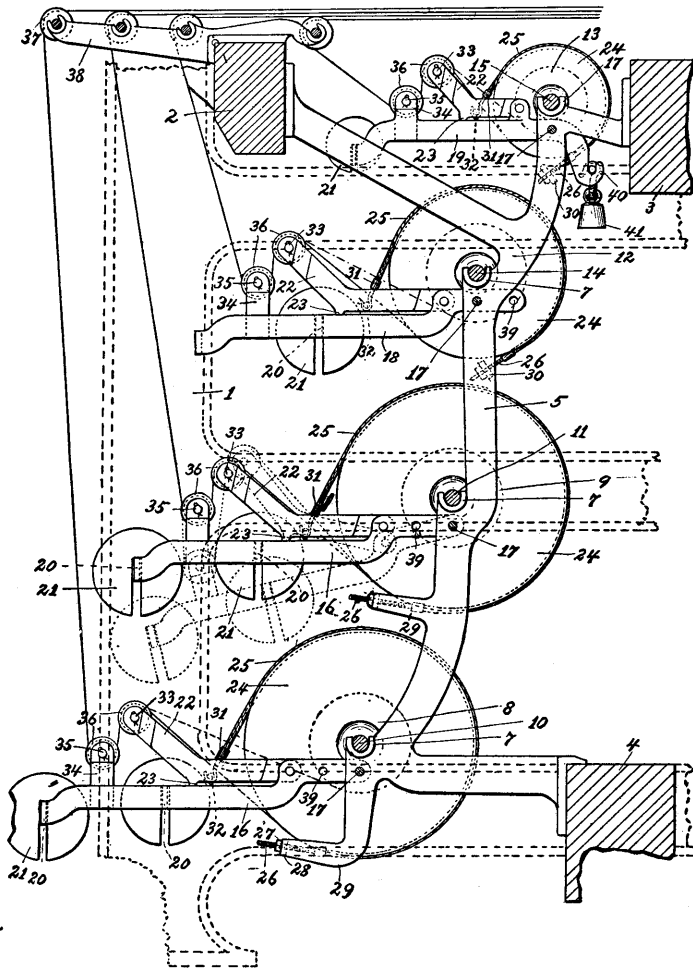
fulcrumed in the longer levers that their fulcruming points are somewhat contiguous to the points of securing the bands to said levers, so that when their rear ends are actuated their forward ends will have appreciable movement. The shorter levers 22 are angular in shape, their free ends being held by the bands 25 considerably above their fulcrumed ends.

At the ends of the shorter levers and upon rods 33, connecting them, and in vertical brackets 34 integrally formed with each longer lever, and upon rods 35, connecting corresponding brackets, are journaled rollers 36 for the warp which extends from each beam to and over the rollers 36, carried by the levers, and then over other rollers 37, journaled in a pair of arms 38, mounted on the beam 2. Of the longer levers, each of the lower three is adjustably fulcrumed upon the side frames 5 by means of a series of fulcruming apertures 39. The uppermost pair of levers 19 is provided at the rear end with a connecting bar 40 and serves as a rack for the counterbalance weights 41.

In view of the foregoing it will be seen that the motion of the shed in opening will act to raise the longer levers into contact with the heels 23 of the shorter levers, thereby raising the latter and tending to throw out of operation the braking device for the beams, which each disk and band therefore constitutes. This tendency to throw out of operation the braking device is, however, immediately counterbalanced by the consequent tendency of the longer levers to fall. Thus the tension is preserved constantly uniform.

The peculiar arrangement of the levers, permits of a comparatively great movement of the longer levers and an increasing of the distance between them and the shorter levers, leaving to the shorter levers for the most part the function of directly affecting the operation of the braking device. When each longer lever drops, the fulcrumed end of the shorter lever will also drop, moving about its pin 32 as a fulcruming point when said lever is moved downwardly as far as the band 25 will permit. The effect of the dropping of the rear or fulcrumed end of this longer lever is to augment the increasing of the distance between the levers, which would otherwise be the function of the longer lever alone.

Whether the loom is in normal or active operation or not—as, for instance, when it is necessary, on account of an error or mispick to pick out the web and let the warp back—the tension by means of the improved mechanism is constantly uniform, for though the lower or longer lever may drop considerably, its weight is always more or less acting on the warp in conjunction with that of the shorter lever. (O. W. Schaum, Phila.)



to contact when raised. Each of the warp beams is provided at its ends with a peripherally grooved disk 24, in which fit flexible friction devices, each consisting of a band 25, provided at one end with a threaded pin 26, having an adjusting nut 27 and extending, in the case of the two lower or ground warp beams, through enlargement 28 on the end of projections 29, formed upon the side frames 5, and in the case of the upper or binder and edge warps through projections 30, formed on said side frames. The forward end of each band 25, is provided with a hook 31, engaging a bent pin 32, formed upon each lever 22 which are so

FISCHER'S AUTOMATIC WARP TENSION FOR NARROW WARE LOOMS.

This device relates to that type of let off motions, wherein a friction strap passing around the flanges of the beam imparts thereto the required friction under the control of the warp threads.

The illustration is a side elevation of the new device, showing a part of the loom frame in section and the warp threads as delivered from the beams.

Secured to the loom frame, in desired position to receive the warp beams 2, 3, and 4 (or more), are the