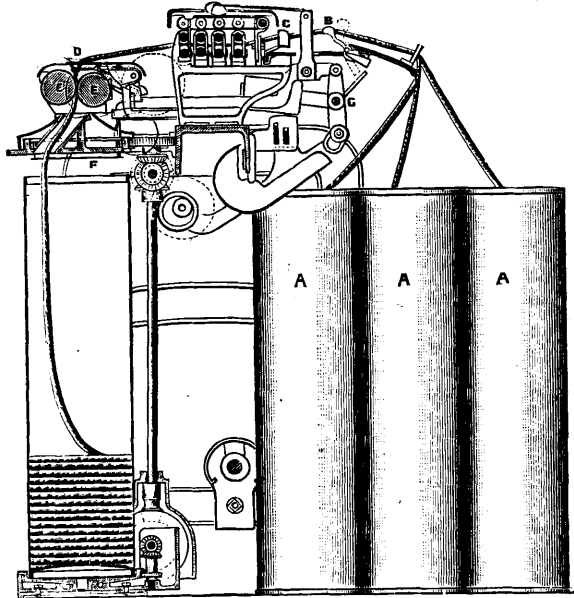


connection with the rocking shaft G stops the machine. The whole of the cans in this head are then removed, replaced by empty ones, and the machine set to work again. There is one tumbler B to each sliver, and if the sliver breaks or the can becomes empty, the tumbler through which it passes overbalances, comes in contact with the oscillating bar on the rocking shaft G, and by simple mechanism stops the machine. The trumpet D of the front stop motion is connected with the same mechanism, its object being to stop the machine when the sliver is light or breaks from any cause, such as roller laps, etc. As the special function of the drawing frame is to lay the fibres of cotton parallel and of equal thickness by frequent doublings, etc., the rollers naturally play a very important part; the gearing is



arranged at one end of the rollers, which run at gradually increasing speeds from the back to the front lines, to attenuate the sliver or give what is called "draft." To maintain the flutes and the bearings of these rollers in good condition, the front, and sometimes the second, lines of rollers are case hardened. The draft from the front to the back rollers is usually arranged to suit the number of ends run into one, that is to say, when six ends are run into one, a draft of six, and for eight ends a draft of eight. It is customary to have three passages of drawing frames, or four passages for fine yarns, each head or passage having six, seven, or eight collars, according to the weight of sliver to be produced. (Platt Bros. & Co., Ltd., Oldham, Eng.)

METALLIC DRAWING ROLLS.

The same constitute one of the two general types of top rolls used in connection with the drawing frame. In their general construction the metallic rolls are somewhat similar to a common bottom steel roll, only that the flutes on both metallic rolls are evenly spaced, whereas on the common steel bottom roll, it will be noticed, said flutes are unevenly spaced. Another point of difference in the two types of rolls is that the flutes are spaced farther apart in the metallic rolls, the pitch thus being coarser. The

reason for spacing the flutes, in both metallic rolls, evenly apart is the fact that the two have to mesh together in a similar manner as a pair of spur gears. However the teeth or flutes of one do not sink as far into the grooves of the other as a regular gear, from the fact that the cotton sliver has to pass between them, and when, unless said sliver was fed in a very large bulk, the fibres would be very liable to be cut or strained from the pressure of contact of the rolls, which action would in turn weaken the sliver and render metallic rolls useless.

The rollers are prevented from meshing together too deeply by having each roll provided with circular collars, one at each end of each roll, so that when the rolls are placed in contact in the frame, the collars on the top roll rest on the respective collars of the bottom roll and thus allow the flutes to enter the grooves only a certain distance and revolve in that position. From this fact, it will be seen that the diameter of these collars is a very important point, and in fact is one of the most important parts of the rolls, for on the proper diameter of the collars depends the successful working of the rolls. If the collar is ground to a smaller diameter than is called for, the flutes will mesh too deeply and consequently cut or injure the fibres; again if the collars are not ground small enough, the flutes then will not mesh deeply enough, and owing to the fact that the revolutions of the top roll are dependent upon its meshing with the bottom roll, it is very apt to slip some of the flutes and thus break the sliver, if not at the same time injure the rolls.

Metallic bottom rolls as used in one frame have different diameters, and also contain a different number of flutes on a roll of the same diameter, or, as it is said, they have a different size fluting or pitch. The pitch of the flutes of the top roll should always correspond with the pitch of the flutes of its bottom roll. The back roll is made with the coarsest flutes, the flutes becoming finer in the succeeding rolls on the frame. Three different spacings of flutes, *i. e.* their pitches, are made, which are 16, 24 and 32 respectively. By these numbers, *i. e.* the pitches of the rolls, is meant the number of flutes and spaces on the roll per one inch of its diameter. This will then indicate that the 16 pitch rolls refer to the back rolls, 24 pitch to the middle rolls and 32 pitch to the front rolls. 16, 24 and 32 as quoted, do not indicate the total number of flutes on any of the rolls, but only the number of flutes and spaces on a roll per one inch of diameter and when consequently a 16 pitch roll, $1\frac{1}{2}$ inch diameter will contain $16 \div (16 \div 2 =) 8 = 24$ flutes and grooves on the roll. The same pitch roll but of a diameter of $1\frac{1}{8}$ inch = $16 \div (16 \div 8 =) 2 = 18$ flutes and grooves on the roll. A 24 pitch roll, $1\frac{1}{4}$ inch diameter = $24 \div (24 \div 4 =) 6 = 30$ flutes and grooves on the roll. A 32 pitch roll, $1\frac{1}{4}$ inch diameter = $32 \div (32 \div 4 =) 8 = 40$ flutes and grooves on the roll.

When a roll contains 16 pitch flutes, the collars are ground down so that they are 0.07 of an inch smaller in diameter than the outside diameter of the flutes, which then allows the flutes of that roll to enter 0.035 of an inch into the grooves of the bottom roll and vice versa, when the diameters of the collars on the bottom are equal to the outside diameter of the flutes. When the collars of the bottom roll are also ground 0.07 of an inch smaller than the outside diameter of the flutes, the flutes of the rolls are allowed to enter 0.035 of an inch farther into the grooves, thus making the total depth of mesh of the flutes of both rolls 0.07 of an inch. The collars on each roll of 24 pitch rolls are ground down 0.06 of an inch smaller than the outside diameter of the flutes, thus making the total depth of mesh for both rolls 0.06 of an inch. The collars on the 32 pitch rolls

are ground down 0.044 of an inch smaller than the outside diameter of the flutes, and when in this case the flutes have a total mesh of 0.044 of an inch. The pitch of the roll, independent of its diameter, indicates the amount to be ground off its collars, thus a 16 pitch roll, $1\frac{1}{2}$ inch diameter, has its collars ground down 0.07 of an inch smaller than the outside diameter of the flutes, a 16 pitch roll $1\frac{1}{4}$ inch or any other diameter calling for the same amount of grinding off of its collars. The object of having different amounts ground off of the collars for the different pitch flutes, is for the purpose of making each different pitch of flutes on the rollers of the same diameter deliver

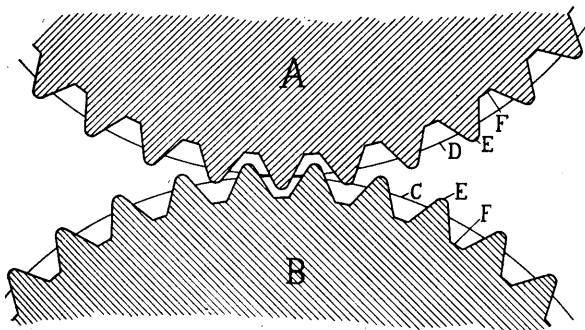


Fig. 1.

the same length of sliver when the rolls are given the same number of revolutions. The slivers on emerging from the front rolls are crumpy, owing to the meshing of the rolls.

In order to illustrate the manner in which the top and bottom rolls mesh into each other, two illustrations are given, of which Fig. 1 is a partial section of the top and bottom rolls, also showing the outlines of the two collars as placed on the rolls. Fig. 2 is a perspective view of the rolls, showing collars in pure rolling contact, but so adjusted as to separate the flutes while permitting them to interlock as shown in Fig. 1. Both illustrations will readily explain themselves by means of letters of reference, of which A indicates the bottom rolls, B the top roll, C the collar on the bottom roll, D the collar on the top roll, E the flutes and F the grooves on both rolls.

Among the advantages claimed for the use of metallic drawing rolls, several may be considered. The chief point in manufacturing at the present time

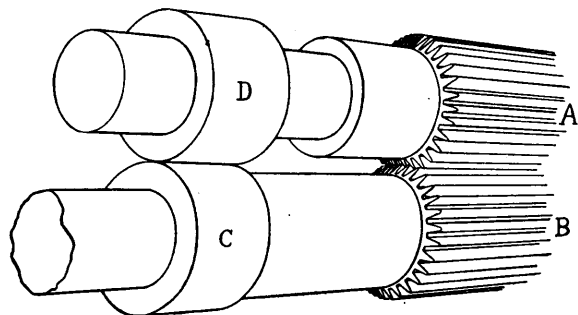


Fig. 2.

is to get off as large a production as possible and at the same time have it up to the standard in quality. Production may be increased by speeding up the machine and increasing the weight of material under operation, but a limit has been found where it is not advisable to overstep, as experience has shown that the life of the machine is shortened and the

product obtained of an inferior nature. The production may also be increased by increasing the diameters of the rolls and keep the speed the same, but the limit has also been found for these diameters, owing to the distances between the pairs of rolls, and which must be maintained, thus setting a limit for them.

On a given diameter of metallic rolls, the flutes and grooves produce a periphery to this roll equal to that of a smooth roll having a larger diameter, thus if the diameter of the metallic roll is made as large as that of the largest smooth roll, it will deliver a larger amount of sliver than the smooth periphery roll, owing to its flutes and grooves, and hence an increased production is obtained. From this fact, it will be seen that to figure the delivery of the front roll, its equivalent of a larger diameter roll must be found and used in the calculation.

The bite of the rolls is positive, as is also the drive of the top roll, from the meshing of its flutes with those of its bottom roll, a feature which prevents the possibility of any slipping between the pair of rolls. This fact also enables the rolls to remain perfectly in contact with less weighting, thus reducing power required to rotate them.

Metallic rolls require little attention after once installed, the cost of maintaining them in working condition being practically nothing.

The draft of metallic rolls is different from that of the leather covered rolls, for which reason the number of teeth in some of the gears in the machine have to be changed in case of changing the latter from leather top rolls to metallic rolls. Equivalent diameters in place of actual diameters of the rolls must also be used in connection with calculations for metallic rolls as previously mentioned, the following equivalents being those to be used in order to figure the drafts and production correctly:

1	inch diameter roll, 32 pitch, to be figured as $\frac{8}{8}$ inch diameter roll.
$1\frac{1}{8}$	" " " 32 " " " " " " " " " "
$1\frac{1}{4}$	" " " 32 " " " " " " " " " "
$1\frac{3}{8}$	" " " 32 " " " " " " " " " "
$1\frac{1}{2}$	" " " 32 " " " " " " " " " "
	24 pitch is figured same as 32 pitch.
$1\frac{1}{8}$	inch diameter roll, 16 pitch, to be figured as $\frac{10}{8}$ inch diameter roll.
$1\frac{1}{4}$	" " " 16 " " " " " " " " " "
$1\frac{3}{8}$	" " " 16 " " " " " " " " " "
$1\frac{1}{2}$	" " " 16 " " " " " " " " " "

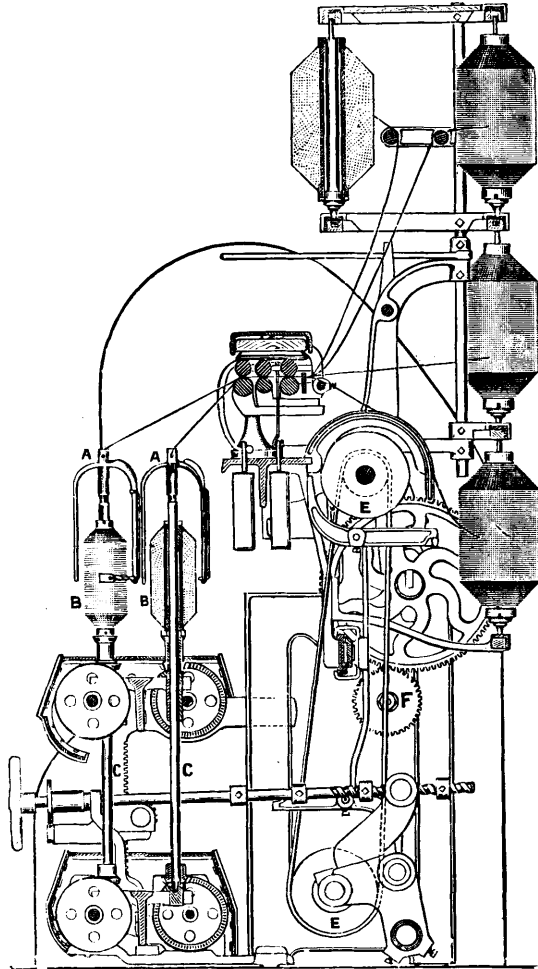
Besides allowing for metallic rolls the equivalents given for obtaining the main draft, we must also add an extra percentage of draft in order to obtain the actual draft, the percentage usually allowed for this extra draft, in connection with average counts of yarns, being about 10%. The same has for its cause the action of the flutes when pushing the sliver into their respective grooves on their mate roll, a feature which cannot help but impart an additional stretch to the sliver.

When using metallic rolls, care must be taken that the flutes are kept clean, for if they become clogged with lint or dirt they will more or less cut the fibres. Never allow the rolls to rust or become rough or nicked. (The Metallic Drawing Roll Co., Indian Orchard, Mass.)

PLATT'S FLYER FRAMES.

The object of these machines is to further elongate and stretch the fibres in the sliver as coming from the drawing frame, however in addition to the drawing process it is necessary at this stage to put in twist to give sufficient strength to the roving, so that it may put on and draw off the bobbin without any

undue stretching. There are four systems of flyer frames, viz.: the slubbing, intermediate, roving and fine roving frame, and which are selected to follow according to the fineness of the roving required. For coarse counts of yarn there are usually two passages



of flyer frames, viz., slubbing and roving; for medium counts three passages, viz., slubbing, intermediate, and roving frames; and for very fine counts four passages, viz., slubbing, intermediate, roving and fine roving frames.

The slubbing frame receives one can per spindle, taken from the third or fourth passage of drawing frame, and draws or elongates the sliver by means of three rows of rollers, producing a roving, three, four, or five times or thereabouts finer than received from the drawing frame.

The bobbins from the slubbing spindles are next put in the creel of the intermediate frame, two bobbins to each spindle, and the drawing and twisting processes are repeated, the same being done in the roving and fine roving frames, where the latter are necessary, according to the counts of yarn to be produced.

All these flyer frames are similar in general construction, but have graduated sizes of rollers and of bobbins, etc., to suit the counts of roving to be produced, therefore a description of one machine will serve for the whole series. On reference to illustration it will be seen that the cotton passes through the three lines of top and bottom rollers to the spin-

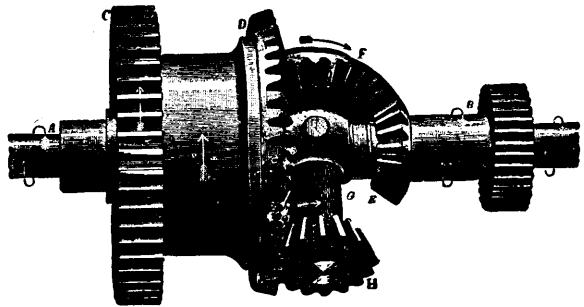
dles. Each spindle has on its upper end a tubular flyer A, which surrounds the bobbin B, which fits on a bobbin wheel running on the collar or bolster of the spindle C. Both the spindles and the bobbins revolve in the same direction, but at different speeds, so as to cause the fibre to be wound on and twisted at the same rate as it is delivered from the rollers. By means of a shortening apparatus the length of traverse is reduced as each layer of roving is placed on the bobbin, and at the same time the strap on the cones E receives a definite movement, and the variable speed from the bottom cone is then transmitted through the winding motion on the driving shaft F to the bobbins B. Usually the front row of fluted rollers are case-hardened. (Platt Bros. & Co., Ltd., Oldham, Eng.)

HOWARD & BULLOUGH'S DIFFERENTIAL MOTION.

A satisfactory differential motion for speeders must combine simplicity, durability and lightness of running. These qualities are found in the differential motion shown in the accompanying illustration, which motion also reduces to a minimum the power to be transmitted through the cone belt. All of the gears on the jack shaft revolve in the same direction as the shaft and thus all "retarding friction" is eliminated, and more than this, the jack shaft which revolves faster than the differential, helps instead of hinders its motion, resulting in more accurate winding and consequently more even and better work.

As seen from the illustration, the jack shaft A is fitted with a short cross shaft G, at each end of which is a bevel gear. The smaller bevel gear H, works into the bell gear bevel D, which is loose on the jack shaft, and the larger bevel gear F, works into the differential bevel gear E. On the other end of the sleeve which carries this latter bevel gear is a spur gear B, which is driven through carriers from the bottom cone.

If the bottom cone is raised and consequently not working the spur gear B, just mentioned, is stationary and there is no winding, the spindles and bobbins being driven at the same speed. When the bottom cone is running, winding takes place as the excess speed of bobbins over spindles is given through the spur gear B. The cones and cone belt, in the machine, are used only to give the extra speed required of the bobbins to enable the roving to be wound on. The spindle driving gear has 40 T. and is fast on the jack shaft while the bobbins are driven through the bell spur gear C 50 T. Therefore, when no winding is taking place, the jack shaft revolves $\frac{1}{5}$ faster than the differential, to give the same speed of spindles and bobbins. The teeth on the various



gears of the differential are so proportioned as to take into account this $\frac{1}{5}$ difference in speed. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

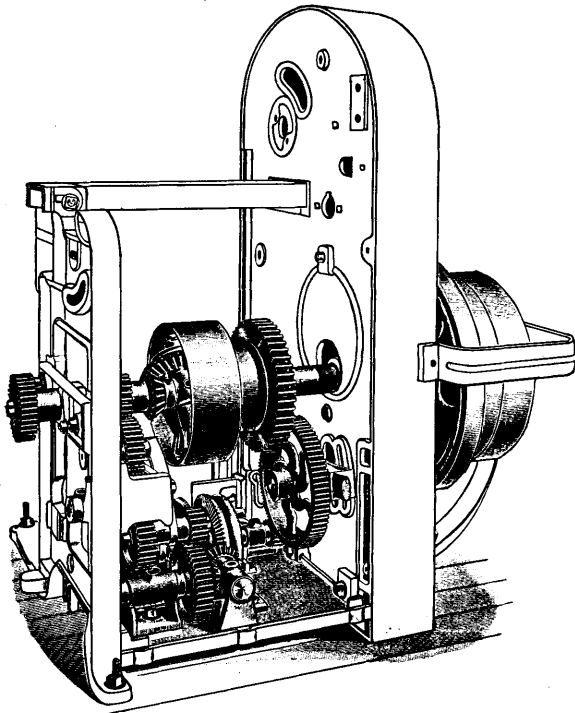
HOWARD & BULLOUGH'S LAY GEARING FOR SPEEDERS.

This arrangement of gearing was designed to afford every facility for effecting changes in the motion wheels controlling the lift. The parts connected therewith have been re-arranged, and two change places provided instead of one as in their former gearing.

Previously it was the practice to make the change by altering the wheel on the end of the reversing shaft, or the wheel on bottom of upright, gearing with the reversing wheels, but as this course was considered inconvenient and somewhat limited in range, two additional spur wheels, one of which is mounted upon a stud carried by an adjustable quadrant bracket, have been introduced. This latter is the additional change wheel, and can be readily replaced by one containing more or fewer teeth, as circumstances may require. To effect this object the short shaft carrying the bevel wheels is placed horizontally, instead of vertically, and the gearing is connected in the manner shown in the accompanying illustration.

In addition to providing two change places for the lift, this alteration also enables the back cross rail to be dispensed with, thus allowing free access to the main gearing. In fact, by removing this, any part of the gearing can be taken out and replaced with comparative ease. To further facilitate the removal of any of the gearing, the shafts upon which the wheels are mounted work in brackets, which are milled on the under surface, and slide in corresponding grooves in the framing and other supports. The parts are so arranged that it is impossible to fix any of them in the wrong place.

Another advantage of this arrangement is, that it dispenses with the necessity of altering the bevel wheel, gearing with the reversing wheels.

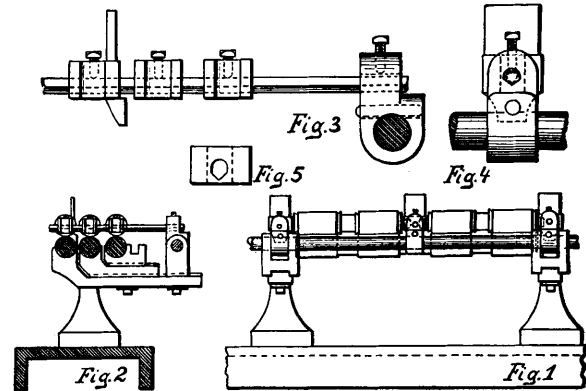


A horizontal bed plate is provided between the frame end and the first string piece, which, while

serving as a rigid support for a portion of the gearing, also acts as a receptacle for collecting any oil that may drip from the bearings. In connection with this new gearing an arrangement for locking the doors is provided so that the machine cannot be started with the doors open and the doors cannot be opened while the machine is running. This safety device does much to prevent accidents. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

HOWARD & BULLOUGH'S ARRANGEMENT OF CAP BARS FOR SPEEDERS.

The figures below illustrate an improved construction of Cap Bars, which prevents the fingers or nebs



being twisted, and which at the same time reduces breakage to a minimum. Figure 1 shows view from back of frame of a cap bar applied to a machine with four spindles in a box. Figure 2 shows the end view of same, and Figures 3, 4 and 5 show enlarged details of cap bar.

As shown in these illustrations, the cap bar is fixed on the roller stand by an independent bracket, and the roller slides are free to move, allowing of the rollers being reset without moving the cap bar. The neb for the front top roller does not have to be disturbed as only the nebs for the other rollers have to be reset when moving the bottom rollers. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

HOUGHTON'S STEEL THREAD BOARD,

comprising Houghton's hardened steel or porcelain thread guides, with steel or brass supports, adjusted either to a common (wooden) back rail or more properly to a Houghton metal back rail.

Thread guides and thread boards, as used in connection with cotton spinning frames and twisters, have until lately received little attention by inventors and mechanics, a feature proven by the fact that the thread boards and guides now in general use are about the same as those used 50 years ago. This assertion will certainly astonish cotton manufacturers more particularly, for the fact that they continually hear of improvements brought in the market in connection with cotton spinning machinery in general. Why the thread guide and its board was thus neglected, is certainly hard to understand, for they are just as necessary for spinning as a spindle, or ring, and any imperfections of the guide will cause trouble, just as quickly as imperfections in the ring or spindle. The breaking of ends during spinning or twist-

ing is a matter that should receive the careful attention of the spinner, especially with the high speed of machinery that is now essential for economical production.

For causes for broken ends, we may quote badly worn or imperfectly adjusted rings or spindles, grooved or badly set thread guides. Since rings and spindles, as they are now made, are very near perfection, probably the commonly used thread guide is the cause for a large portion of these broken ends, since the same old thread board and guides, with all their imperfections, are still extensively used. Any cotton spinner will readily acknowledge that the nearer round spinning rings are, the less breaking of yarn and travelers, and that he would at once discard a ring that was badly out of round. He will also know, that in order to obtain the best results in his department, the mill must buy the best spindles and rings obtainable, and that in turn the thread guide should deliver the thread exactly over the centre of the spindle.

Central adjustment is required of all bodies revolving in conjunction with one another. The more perfect the adjustment, the less power required, and the results are correspondingly better. This physical law certainly also applies to cotton spinning. However, if this identical spinner will closely examine his thread boards, the proportion of guides that deliver the thread exactly over the centre of the spindle is very small, simply because it is practically impossible to adjust the common thread guides exactly, since one turn of the guide out or in, or in plain words, one-sixteenth of an inch, is the limit to their adjustment. Now again, one-sixteenth of an inch either way from the centre, however, makes one-eighth of an inch difference from the opposite sides of the ring, and a similar variation of the guide eye from the centre has the same action on the thread and traveler as a ring would that was so much out of round. A ring one-sixteenth of an inch oblong would be very quickly discarded by the spinner, while he will use without complaint a thread guide which he cannot place better than one-sixteenth of an inch either way from centre, and why will he use them? Simply because he knows they are adjusted as well as they can be. Many times, traveler, ring, spindle, or poor roving, are blamed for the threads breaking, whereas the fault rests with a badly adjusted thread guide.

Another important item for a thread guide, is its thread arrester, and which, unless it is held in right position, is the cause for many broken ends, for if this arrester is not in right position, it either fails to arrest the end when a thread does break, and lets the end whip around and break down the adjoining thread, or in other words, it catches and breaks a thread that is running all right. For this reason, many mills do not use this form of guide having a thread arrester, simply because it is so liable to become displaced, and injure the work rather than benefit it.

The grooving of guides is another cause for broken ends, and was undoubtedly the reason for the introduction of the so called "vibrating guide," and with reference to which there is a difference of opinion among spinners. It certainly cannot be disputed that vibrating the thread will prolong the wear of the guide, but as to what some persons claim, that this vibration permits the twist to run up to the bite of the roll better, we simply have to consider that while during spinning, the vibration one way is with the twist, the opposite vibration is naturally against the twist, and consequently the gain one way is offset by the opposite vibration. There will be also any number of spinners who will have found that the gain made by the longer wear of this guide, is

lost by the greater breakage of travelers and the extra and uneven wear of the rings, caused by this vibration. The vibrating thread guide certainly cannot help but cause an uneven, jerky motion upon the thread and thus in turn upon the traveler, a feature certainly not in its favor.

We now might ask the question; what constitutes a perfect thread board? In answer we find: (1) Easy and accurate adjustment of the thread guides. (2) Permanence of adjustment of the thread guides. (3) The thread board to be of such a make to allow easy renewal of its thread guides when worn, and hold the new guides as solid as a new board would. (4) The thread board to be strongly made, so as to last as long as the frame, and this without any repairs. (5) The thread guides should be of some hard material to prevent grooving. (6) The thread boards should be made of some material that can be easily cleaned. (7) Permitting handy turning back of the thread guides for the purpose of doffing.

In wet twisting, the conditions are quite different from spinning, yet the requirements of a thread board for twisting are the same as for spinning, with the added complications caused by the action of water, which they have to meet. Nicked brass seems to be the most suitable material for the thread board, as wood or steel are quickly injured by the action of water, and plain brass soon becomes sticky and hard to clean. While the thread guides may be, and are, made from brass wire, it wears out so quickly that it is not very desirable for this purpose. Steel besides being very expensive rusts so easily, and enamel wears off so quickly, that porcelain seems to be the most desirable material for a thread guide in wet twisting. One serious objection to the old style of porcelain guides now in use has been no adjustability, and this one thing, lack of adjustment, is probably the cause for 50 per cent. of the breakage in wet twisting.

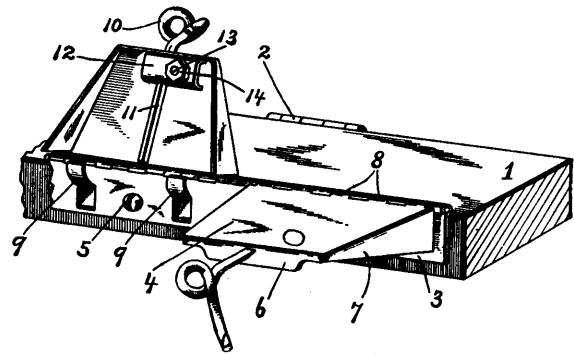


Fig. 1.

These requirements of a thread board, whether for spinning or dry or wet twisting, have been most excellently solved by the Houghton thread boards, as shown by means of the accompanying three illustrations, and of which Fig. 1 shows more particularly the adjustment of hardened steel thread guides to their supports and the adjustment of the latter to a wooden back rail. Fig. 2 shows two different kinds of thread guides, two steel thread guides, as previously explained, are shown down, the other thread guide, as shown turned back, referring to a porcelain thread guide, being shown in this position to illustrate the adjustment of the porcelain pot or eye to the support; all three thread guide supports being shown applied to a Houghton Metal Back Rail. Fig. 3 shows this Houghton thread board (thread guides, thread guide supports, and back rail) turned back for doffing.

The Houghton steel thread guide showing its adjustment to its support, and the adjustment of the latter to a common wooden back rail.

This steel thread guide is characterized by its easy and most accurate adjustment of its eye possible to the proper position over the centre of the spinning spindle, a simple constructed sup-

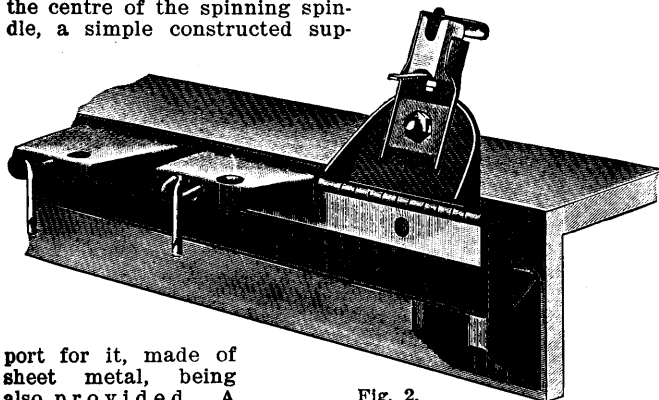


Fig. 2.

port for it, made of sheet metal, being also provided. A clear idea of this thread guide and the manner of its attachment to its support, will be gotten from the accompanying illustration Fig. 1, which is a perspective view of a portion of a common back rail of a spinning frame, showing two Houghton thread guide supports attached to it, each carrying their respective steel thread guide.

Referring to the illustration, 1 indicates a portion of a common wooden back rail of a thread board, which is hinged to the frame of a spinning or twisting machine by means of hinges 2. A sheet metal piece 3 is made as a portion of a hinge for the thread guide support 4, and is secured to the back rail 1 by means of screws 5. These pieces 3 also act to strengthen the board 1 and prevent it from warping, at the same time ensuring accurate spacing of spindles. The thread guide supports 4 are each stamped out of a single piece of sheet metal, forming a body portion and having a depending front flange 6 and side flanges 7. At its rear edge each support 4 is provided with sockets 8 for a hinge pin, and which are below the level of the upper surface of the support. This construction leaves the rear edge of each support entirely unobstructed, so that dirt or dust collecting on it can be readily wiped off.

The flat ends of the side flanges 7 of each support, form stops for holding said support in its normal horizontal position. Stops 9 made of part of the piece 3 and bent out into fingers, can be provided if so required, being however usually omitted. The thread guide 10 is made with an ordinary eye as with regular thread guides, but instead of having a round shank with screw threads at the end, this thread guide is made with a triangular shank 11, which prevents the guide from turning and displacing the snarl catcher and also allows the guide to be hardened without liability of breaking. These guide wires are made from a special drawn steel wire and will show no signs of wear after over two years continual use, without the threads vibrating, they simply have a highly polished appearance. Each thread guide is secured to its support by means of a clamping piece 12, which is U shape in cross section, the flanges or edges of which are notched to correspond to the triangular shape of the thread guide shank. Extending down through each clamping piece 12 from its support 4 is a blank headed screw 13, threaded onto the end of which is a nut 14. The head of the screw 13 fits into an integral socket in the support 4, and to hold the screw from

turning, the head of the latter is provided with small wings or projections. By means of this construction, the smooth head of the screw is brought down flush with the surface of the support 4, so as to retain a smooth uninterrupted face over the entire upper surface of the latter. The thread guide is set in the position desired by simply loosening the nut 14, placing the eye so that it will be directly over the centre of the spindle and then tightening said nut 14, the triangular shape of the shank and its socket preventing any slippage by axial rotation. The guide wires thus adjusted are then held so firmly and solidly that when once adjusted they require no further care from the spinner.

As will be readily understood, these steel thread guides and their supports, as have thus been shown adjusted to a common wooden back rail, can, and more proper so, be also used with a metal back rail having counter balanced hinges, as is shown in connection with Fig. 2. In this instance the sheet metal piece 3 (see Fig. 1) is riveted to the metal back rail in place of screws 5.

The porcelain thread guide and its support. Fig. 2 shows one of these thread guides and its support turned back, in order to more clearly show its construction, *i. e.* the adjustment of the porcelain pot eye or guide, to its support. We see from it that these kind of thread guides have the same easy, perfect, adjustment to their supports as do the steel

guides previously explained, and that each guide support is independent of the others, with a separate adjustment for each thread guide eye. The porcelain pot, *i. e.* porcelain portion of the guide eye, as will be seen from the illustration, is firmly held between the two upturned side flanges of the metal portion of the guide. Other features of this thread guide, as shown in connection with Fig. 2, are its metal threading finger, for guiding the thread to the eye as well as to hold the thread in the eye during

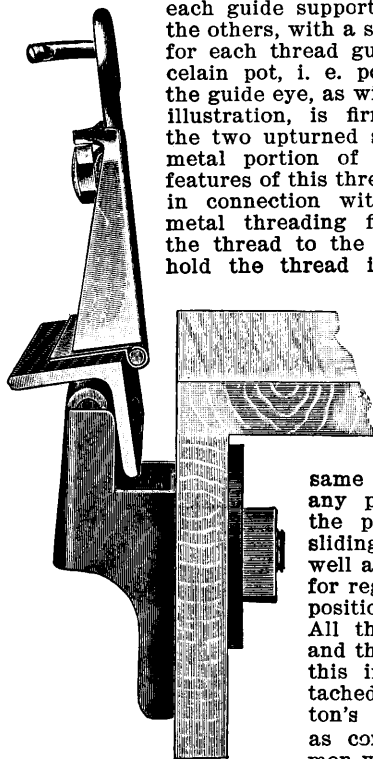


Fig. 3.

spinning or twisting; a stamped out portion of the slot of the guide, bent up for the purpose of a snarl catcher, at the

same time preventing any possible chance of the porcelain pot from sliding backwards; as well as the adjusting nut for regulating the proper position of the guide eye. All three thread guides and their supports are in this instance shown attached to one of Houghton's Metal Back Rails as compared to a common wooden back rail as was shown in connection with Fig. 1. The porce-

lain pot eyes, when grooved, can be removed, and this, as will be readily understood, at little expense (1½ cent per spindle).

For wet twisting the metal portion of this thread

guide and its support are made wholly of brass, in place of steel. These porcelain thread guides are a wonderful improvement over any kind of thread guide ever used for wet twisting, no other porcelain thread guide having any adjustment, neither do they have a snarl catcher. Actual use has proved this snarl catcher to be a great improvement.

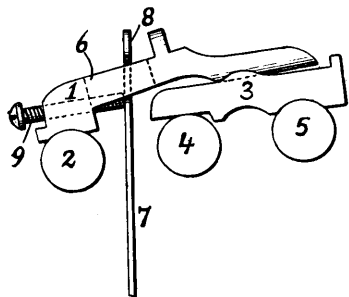
The *Metal Back Rail* for thread boards certainly is another most ingenious adjunct to any spinning or twisting frame. Its hinges, as carried in suitable brackets adjusted to the roller beam of the machine, are so constructed (counter-balanced) that the rail is held in position by its own weight, either while spinning or twisting (see position of back rail shown in Fig. 2) or when turned back for doffing, see Fig. 3, and requires no lifting device or brackets to hold it in the latter position.

In the old wood thread boards, some kind of lifting device and arrangements for holding up the rail while "doffing" has to be provided, and the operator must go to this device to lift and also to drop the back rail. This requires the operator to walk, twice the length of the frame at each doffing, a loss in time overcome by the new metal back rail, since the same can be lifted back or down from any point, and it being self balancing, by its own weight, naturally holds itself up when turned back for doffing, and also down in position for spinning. This saving in time for the operator as well as in the running of the machine, will soon pay annually the whole cost for thread board and metal back rails to any mill. This metal back rail will also prevent all warping or sagging which is characteristic of the wooden back rails used. This feature, considered with the necessity of humidifiers in a spinning room, will also be a strong point in favor of this metal back rail, since they are not affected by the moisture in the air.

DIXON'S TOP ROLL SADDLE FOR SPINNING FRAMES.

The object of the improvement is to provide an adjustable weighting arrangement for the top rolls, the arrangement consisting principally of a specially made top front saddle and a weight strap to be hung from said saddle.

The details of the arrangement are shown in the accompanying illustration, which is a side view, showing the front and rear top roll saddles, bearing on the journals of the top drawing rolls; and the front saddle provided with an adjusting screw, against



which the weight strap bears. In the illustration, 1 indicates the top front roll saddle, having its front end resting on the front roll 2, and its back end on a pivot point on the rear saddle 3, the latter resting with its

front end on the middle roll 4, and its back end on the back roll 5. The front saddle 1, is provided with a vertical slot 6, in which the weight strap 7 hangs, the latter being provided at its top end with a widened part 8 which acts to hold the strap up. Projecting into the slot 6 from the front end of the saddle 1 is a screw 9 and against the end of which the weight strap 7 always

rests, owing to the slanting position of the saddle 1, which causes said weight strap 7 to slide down until it comes in contact with the end of the screw 9.

By means of this screw, the resting position of the weight strap may be changed with a screw driver, thus changing the amount of weight bearing on the front roll to suit the requirements of the yarn being spun. The change may be made while the frame is running and the results immediately seen, thus making the proper regulation easier. (Dixon Lubricating Saddle Co., Bristol, R. I.)

ROLL CLEANING DEVICE FOR SPINNING FRAMES.

The object of this device is to provide a cleaning arrangement for the top rolls of spinning frames, which will automatically change its direction of travel over the rolls when it arrives at each end of the rolls, so that it will continuously travel from side to side between the stands on the machine, and thus require little if any attention from the attendant, who previously had to reverse similar devices by hand.

The new cleaner is shown in the accompanying illustration Fig. 1 in its cross section, Fig. 2 showing its application to the rolls. This adjunct to spinning frames is made of a double-conical form, with the larger portions of the cones forming the centre,

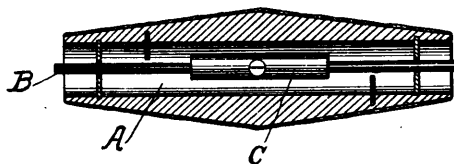


Fig. 1.

and is hollow, as at A, having extending through it a wire rod B, which is of greater length than the body of the cleaner. This rod is free to move through the cleaner and has secured to it at the centre of its length a weight C, which in turn rests in either end of the cleaner and holds it in one or the other tilted positions on the rollers, according to the end to which it is nearer. The weight C is prevented from sliding too far toward either end in the hole A, by means of suitable stop pins projecting from the top and bottom into the hole A, and thus in the path of the weight C.

It may be a question in some minds as to the reason why the cone shape of the cleaner should cause it to travel in the direction of the small end which is in contact with the rolls, for which reason a short explanation will be given.

We know that if a cylindrical roll was placed on the revolving rolls, it would receive rotation but would have no horizontal motion, because all lines, made on the surface of the cylinder by passing planes longitudinally through the centre of the cylinder, would be parallel to each other. But in the case of a cone, as used in this instance, the lines on the surface will not be parallel to each other, but since all of these lines must be parallel to the point of contact with the revolving rolls when they do come in contact, it will be easily seen that each successive line will come in contact with the rolls at a slight distance from the previous point, which distance may be measured by dropping vertical lines from the intersections of these lines on the surface with the base of the cone and measuring the horizontal distance between them.

For example, say we want to find the horizontal movement of the cone during one-half of its revolution, then considering the point of contact D as one point to measure from, we find the other point by dropping a vertical line from the point E to the roll and measuring between the point and the line. It will also be seen from this that a greater angle on the cone will produce a correspondingly larger movement of said cone for every revolution.

Referring again to the cleaning arrangement, when the cleaner is moving across the rolls, say for example, from left to right, it is held in its proper tilted position by the weight C with the rod B protruding from the right hand end of the cleaner. Situated on each side of the frame is a plate F for reversing the travel of the cleaner, said plates being provided with grooves G having small slots in which the bent pieces H rest, these being kept in place by spring attachments. Connected also to the bent pieces H are the circular plates I which are partly in the path of the travel of the cleaner. As the cleaner approaches one end, the wire rod B comes into that groove G and under the bent piece H which holds it down while the cleaner continues to approach, until it finally strikes against the plate I and pushes it back, which in turn moves the bent piece H outwardly, thus releasing the wire rod B, and as the weight C is now on the opposite of the centre of the cleaner, the latter will tip over and begin to travel in the opposite direction, until it comes to the

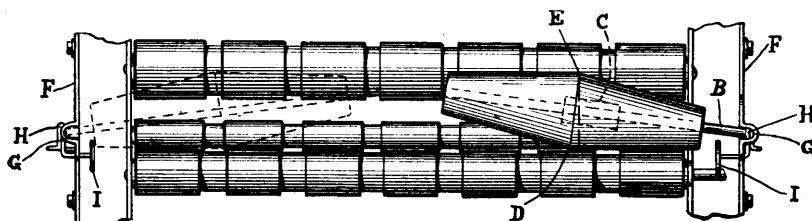


Fig. 2

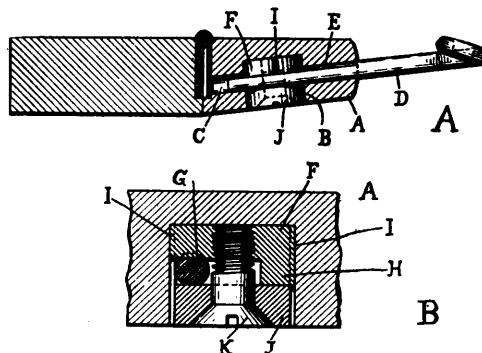
opposite end where the same reversing movement will be given to it. The object of the special arrangement for reversing is to make said reversing more positive, for in case only a plate was used for the rod to strike against, the weight is very liable to be pushed so slowly past the centre of the cleaner that it will often be balanced on the centre and stop the horizontal movement of the cleaner. (Victor Maheu, Willimantic, Conn.)

THE WHITIN GUIDE EYE FOR SPINNING FRAMES.

The improvement consists in a specially shaped guide eye and a clamping device on the finger boards of the machine, for receiving and clamping the stem of said guide eye, so that the same can be easily adjusted, *i. e.* bringing the eye in the proper working position, *i. e.*, directly over the centre of the spindle. The arrangement of the parts of the improvement is best shown by means of the two accompanying illustrations, of which Fig. A is a sectional view through the finger board of a spinning frame, with the guide eye and clamping mechanism shown in full lines; and Fig. B is an enlarged cross sectional view through the finger board, guide eye stem, and clamping mechanism. The letters of reference indicate the parts as follows:

A represents the hinged finger board of a spinning

frame, having the circular recess B in its under side, and a small hole C located on the side of the recess B, to receive the stem of the guide eye D, which has the stem made with a flattened portion E on its upper surface. The clamping mechanism, which is



placed in the circular recess, consists of a circular clamping nut F, having the flat surface G, the projecting boss H, and the two fins I, which are pressed into the sides of the recess B and hold the clamping nut F in position.

A circular clamping head J secures the flattened portion E of the guide eye D between the clamping nut F and the clamping head J, by having said clamping head J centrally countersunk to receive a screw K, which is threaded into the clamping nut F, and thus the left hand side of the clamping nut is pressed against the guide eye D with its right hand side acting as a fulcrum. To adjust the guide eye D, the screw K is loosened, the eye placed over the centre of the spindle and the screw tightened. (Whitin Machine Works, Whitinsville, Mass.)

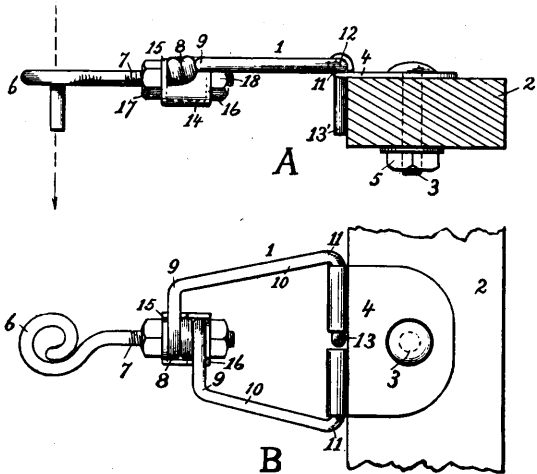
GUIDE HOLDER FOR SPINNING OR TWISTING MACHINES.

This device consists in a wire guide holder arm composed of a single piece of wire, bent to form at its front a guide supporting coil, and at its rear a transversely disposed hinging axis, the latter being provided with a stop projection for sustaining the arm with the yarn guide at proper working position.

Fig. A is a side view and Fig. B a top plan view of this guide holder 1, shown attached to the thread board 2 of a spinning or twisting machine, by means of a bolt 3, extending through a hole in the attaching hinge plate 4 and thread board 2; said bolt being provided with a flat rounded head and a nut 5 on its lower end, thus permitting the hinge plate to be firmly clamped in position, while affording facility for lateral adjustment of the fore end of the guide holder by slightly swinging the plate to right or left on the bolt 3 as an axis. 6 is the guide eye, having a screw threaded shank 7, which in turn is secured in the guide holder 1, which is bent to form a coiled portion 8, that serves as a socket for receiving the shank 7 of the guide, and from which coil the wire members 9 on either side are disposed in outstanding relation and are thence extended rearward forming arm portions 10, their rear ends being

bent inward at 11 or transversely offset in the same horizontal plane, to form the hinging axes or journal portions 12. At the end of one of these journals the wire is bent, as at 13, and terminates in the form of a downwardly projecting stop finger 13'.

Combined with the coil 8, a nut seating guard 14 is provided, the same consisting of a metal piece that bridges the coil and is provided with perforated end portions 15 and 16, that adjacently embrace the ends of the coil 8 and form parallel seats for the retaining



nuts 17 and 18, that are arranged upon the screw threaded shank 7 of the guide at front and rear of the socket. The sides of the guard 14 extend upward, and abut against the outstanding wire members 9 at either side of the coil, thus producing a firm structure and affording a stop against rotation of the guard when the nuts are turned against its ends. By the screw threaded shank 7 and nuts at the ends of the socket coil, facility is afforded for detachment and replacement of guide, as well as for the inward and outward adjustment of the guide to bring its eye in proper alignment with the spinning spindle when applied to use. (C. G. Tideman, Worcester, Mass.)

STEEL SPINNING AND TWISTER RINGS.

Without question, the proper make of spinning and twister rings is of the greatest importance to cotton manufacturers, hence a description of a few of the most prominent makes, their points of advantage, will prove of the greatest of interest.

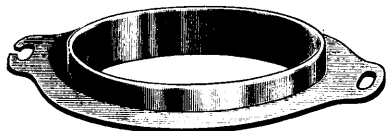


Fig. 1.

rings are reversible, a feature which naturally immensely prolongs their life.

Fig. 2 shows what is known as the "W. S. R. Co.'s Double Adjustable Ring," and which can be used with either Cast Iron or Plate Holders, as preferred.

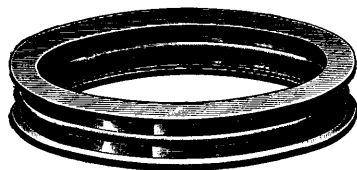


Fig. 2.

Fig. 3 illustrates what is known as the "W. S. R. Co.'s No. 1 or Narrow Flange Ring," which has a rapidly increasing demand, since by means of it a traveler can be used, made from a larger wire without increasing the weight of the traveler, a feature of immense value if we consider



Fig. 3.

that if the traveler is made from heavier wire, its life is increased.

The Double Ribbed Burnished Spinning Ring. It is impossible, by any method of polishing, to produce a new spinning ring that will run as light as one that has been in use several months. Until new rings have become burnished by the action of the travelers, they have always caused a constant breakage of ends, an immense waste of travelers, a falling off in the quantity of yarn produced, and a loss in quality as well, to say nothing of the vexation among the operatives arising from the badly running work, the dissatisfaction among them caused by the increased labor they are called upon to perform, the consequent neglect of their regular work, and the serious effects of these evils upon all succeeding operations. These drawbacks have grown in seriousness as the speed of the spindles has been increased, and some remedy for these evils has been a long felt want.

Some years ago, the Whitinsville Spinning Ring Co., after many experiments, perfected a process by which this long felt want was supplied, the process being known as their patent metallic burnish.

Most remarkable results have been secured by the use of rings burnished by this process. Tests having shown that the use of the burnished ring greatly reduces the consumption of travelers, causes less waste, minimizes the breaking of ends when new rings are started, and materially improves the quality and increases the quantity of yarn spun. When we fully consider the amount of labor performed by the traveler, why should we hesitate to give it all the advantages we can? Often it is the most troublesome part of the supplies needed, because it is a continuous expense, and many are used. The burnished ring aids the traveler in its work, giving it every advantage in ease and lightness of running, since the less the friction between ring and traveler, the less the expenditure for travelers, the burnish reducing friction to a minimum.

Now that the varied advantages of the burnished ring have been set forth, just a word about its durability. When the burnished ring was first introduced, some spinners claimed that the burnishing would affect the life of the ring, and that rings subjected to that process would not prove as durable as rings burnished by the action of the traveler. Since these objections were raised, numerous tests have been made to ascertain the truth in regard to the comparative durability of the burnished and unburnished rings, and in every instance the burnished rings proved the more durable.

The greatest evil in cotton manufacturing is uneven yarn, the removal of which has been the aim and object of inventors and mechanics from almost the very inception of cotton spinning.

In connection with ring spinning, dirty travelers, i. e. travelers loaded with lint, are a prolific source of such uneven yarn. They render the yarn kinky and overstrained, seriously affecting the quality of the product in subsequent processes. Loose waste floating about the room gathers on the traveler, impeding the passage of the yarn, increasing the

weight of the traveler, breaking ends, and adding materially to the work of the operative. Elastic yarns are the best, and the elasticity is largely controlled by the traveler. Unless the traveler is kept free from accumulations of waste or lint, we cannot secure the elasticity desirable, as the finer places in the yarn are so apt to break.

A remedy for that part which dirty travelers play in the making of uneven yarn is the *U. S. Standard Traveler Cleaner*, as shown in Fig. 4, and which keeps

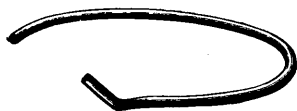


Fig. 4.

the travelers thoroughly cleaned, and does it automatically, requiring no attention on the part of the operator. This cleaner has many points of advantage, whose value

will be readily recognized by practical spinners everywhere. It is neat, simple, cheap, durable, effective, easy to apply, always in place, and is self cleaning. It is the simplest, because it consists of one piece of plain wire. No drilling or tapping of rails necessary to apply it. No screws needed to secure. No getting out of place when once in position.

It is the cheapest, because the cost of applying it is nothing.

It cannot get out of place, because it encircles the ring, is practically a part of the ring, and whatever position the ring may be in, the finger of the traveler cleaner is always at the proper distance from the flange.

It is self cleaning, because the angle given to the projecting finger prevents the accumulation of lint or dirt, and the circulation of air produced by the speed of the bobbin is sufficient to keep it clean.

Another device of the greatest importance to cotton spinners is a *Traveler Cup*, as shown in Fig. 5. This

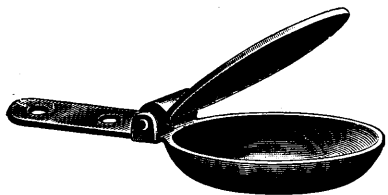


Fig. 5.

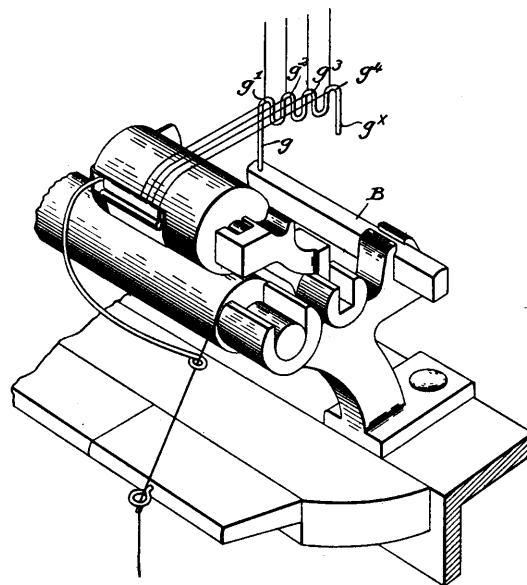
steel plate traveler cup meets a long felt want by providing a place in which travelers can be kept clean, and where they can be easily secured by the operator. The use of this cup saves travelers, and consequently enables the manufacturer to run his plant with greater economy. (Whitinsville Spinning Ring Co., Whitinsville, Mass.)

THREAD GUIDE FOR DRAPER TWISTERS.

The purpose of the new guide is to separate and in that shape guide the minor threads of a set of threads to be twisted in one compound thread, as they pass from the spools on the creel frame to the delivery rolls, so that the attendant can see at a glance whether or not all of the threads of the set are running properly, *i. e.* whether the minor threads of the set of threads as to be twisted in one compound final thread is complete, and thus if one thread breaks he can promptly piece it up. The guide also causes the threads to be delivered uniformly to the rolls, so that the twist is more uniform than where threads of the set are delivered collected.

The accompanying illustration is a perspective view of a sufficient portion of a twister, clearly showing the application of the new guide thereto. The new thread guide, as shown arranged in the illustration, to cooperate, for example, with a set of four minor

threads, is made of stout wire, comprising an upright straight shank *g*, bent laterally at its upper end to form a head, the head being corrugated or crimped in the direction of its length to present a series of downturned open loops or eyes *g*¹ *g*² *g*³ *g*⁴, or as many loops as necessary, according to number of minor threads to be twisted in one compound thread, separated from each other by the intervening oppositely turned loops. The end of the wire at the



extremity of the head is extended downward, as at *g*^x, below the corrugations, to form a species of guard, to prevent by means of it any possible slack minor thread from leaving the guide, should said minor thread slacken sufficiently to swing down out of its proper eye. The shank *g* is secured in upright position in the transverse bar *B* behind the rolls, one of the guides being located back of each top roll for the set of threads passing thereto. (Draper Co., Hopedale, Mass.)

HOWARD & BULLOUGH'S TWISTER STOP MOTION.

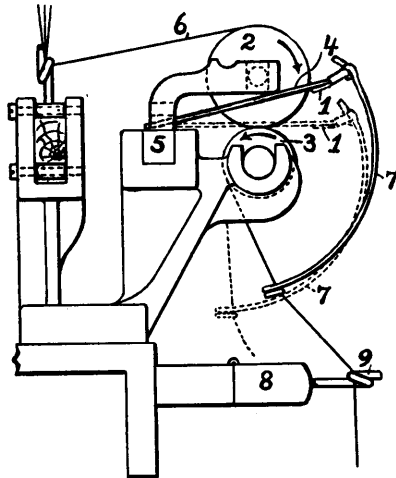
The characteristics of this motion are its simplicity, light weight and quick action. The accompanying illustration represents a side elevation of a twister roll stand, showing this stop motion in full lines in its inoperative position; the position which it assumes after a thread breaks, being shown in dotted lines.

This motion is designed for twisting machines with single line top and bottom rolls, the yarn being delivered from the under side of the bottom roll. When the thread is running properly or unbroken, the motion is held so that the tongue 1 is away from the bite of the rolls 2 and 3 and the side wires 4 out of contact with the bottom roll 3. The free ends of the side wires are L shaped and limit the outward movement of the stop motion by striking the edges of the holes in the cap bar 5, through which the side wires project.

When a thread breaks, the stop motion falls into the dotted position shown in the illustration, and is then drawn back by friction of the side wires 4 on bottom roll 3 until the tongue 1 of the stop motion meets the bite of the rolls 2 and 3 and is drawn between them, this position not being shown in the

illustration. This raises the top roll 2 and prevents it from revolving, thus stopping the delivery of yarn 6 by that roll.

The tongues 1 of this stop motion are made of German silver, so as to prevent wearing the rolls, and are shaped so as to lift the side wires from contact with the bottom roll, which prevents the side wires from grooving the bottom roll. The curved feeler wire 7, through which the thread passes, is



pivotaly connected at the top so that the thread board 8 with guide wire 9 can be lifted without damaging the motion.

One of the advantages of this new stop attachment is that it is fastened to the cap bar instead of the top roll, and will not drop out when the top roll is removed. The pressure on the thread cannot be more than the weight

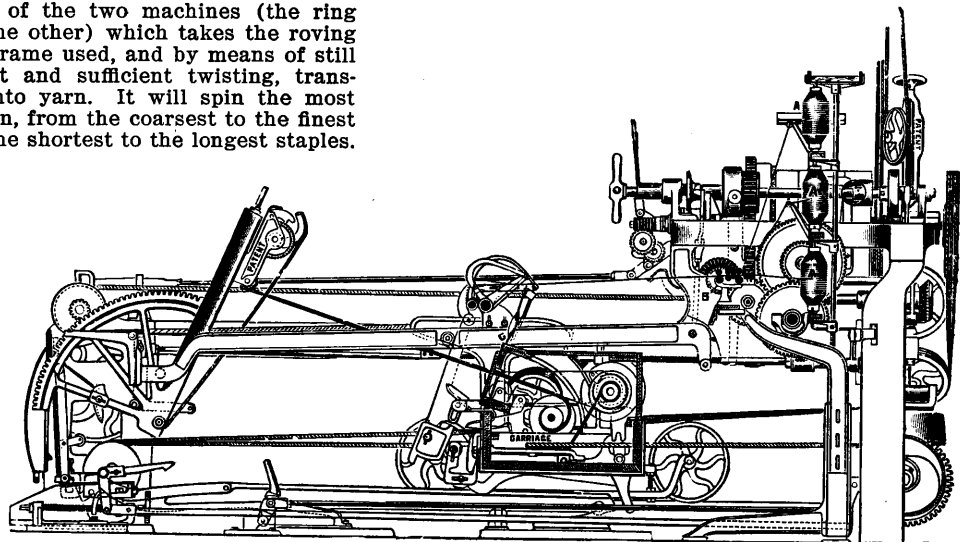
of the motion as it is independent of the rotating parts.

The greatest advantages of this motion are the saving of waste and the prevention of singles. When twisting two ply yarns the device will operate if either thread breaks. As the top roll is stopped no yarn can be delivered until the end is properly pieced up, and the motion is designed in such a way as to keep the broken ends from catching the next ones and breaking them down. Machines equipped with these attachments can be started up after doffing without waiting to piece up. (Howard & Bullough American Machine Co., Pawtucket, R. I.)

PLATT'S SELF ACTING MULE.

The mule is one of the two machines (the ring spinning frame is the other) which takes the roving from the last flyer frame used, and by means of still further drawing out and sufficient twisting, transforms the roving into yarn. It will spin the most varied grades of yarn, from the coarsest to the finest qualities and from the shortest to the longest staples. The leading peculiarity of the mule is that, while the roller beams and rollers are fixed in one position, the carriage which supports the spindle has a backward and forward motion, to and from the roller beams. The illustration is a side elevation of this mule, showing the headstock containing the gearing

for imparting motion to the whole machine, the creel containing the roving bobbins, the draft rollers, the square, viz., that part of the carriage which is underneath the framing of the headstock, and which contains some of the principal mechanism of the machine. The carriage contains the spindles on which the yarn is wound, the fallers, and the tin roller to drive the spindles; and the square contains the winding-on drum, etc. From the bobbins A, placed in the creel, the roving, either single or double as the case may be, passes through the draft rollers B to the spindles C, and by appropriate mechanism the carriage is made to travel outward from the roller beam, the tin roller being driven by ropes and the spindles by bands. The spindles are placed at an angle to the base line of the carriage, inclining towards the rollers, so that during the drawing out of the carriage, when the yarn is receiving the required twist from the rapid revolution of the spindles, the yarn may slip off the end of the spindle, and no winding takes place. Towards the completion of the outward run of the carriage certain changes in the gearing are made; the motion of the draft rollers B ceases, but the spindles C continue to revolve, and as the yarn is thus held by the motionless rollers a further stretch, called "after draft" or "jacking," may be given if necessary. This motion is, however, used only for certain classes of fine yarns. The spindles are then, by the mechanism of the headstock, made to revolve in the opposite direction to their first motion, thus unwinding the spiral coils of yarn on the spindles whilst the faller wire is being depressed to the proper position for guiding the thread on the spindle. In the final or third movement, the carriage begins its traverse towards the rollers, and as it runs in, the spindles revolve and wind on the spun and twisted length of yarn resulting from the previous cycle of movements. The length of the stretch averages about 64 inches, and according to circumstances up to five stretches per minute are made. As stated before, the mule will spin from the coarsest to the finest counts, and yarn has been spun to the astonishing degree of fineness of No. 400, that is, 400x840, or 336,000 yards, or about 190 miles in length, for 1 lb. of cotton. From 300 to 400 hanks to the pound are at times spun from Sea Island cotton. The mule illustrated shows rope taking-in motion, patent nosing motion and other improvements. (Platt Bros. & Co., Ltd., Oldham, Eng.)



PLATT'S SLOW SPEED AND JACKING MOTIONS FOR S. A. MULES.

The Slow Speed Motion employed in connection with this mule gives a slow speed to the spindles when the carriage is completing its inward run, and during the rise of the front or winding faller after the unlocking has taken place, its object being to control more effectively the winding of the yarn at the apex of the chase, and to coil a few turns on the spindle blade. By these means a firmer nose or chase of cop is made, and any tendency to produce snarled yarn is obviated; the motion is giving every satisfaction, particularly when spinning 80's counts and upwards.

A description of this motion is best given by consulting Figs. 1 and 2, which illustrations show that on the rimshaft there are two fast and two loose pulleys, with separate strap guiders and drums on countershaft, the broader fast pulley being for the purpose of driving the mule during drawing out, by a single broad strap in the usual manner, and the other for the slow motion in question.

The taking-in is driven as in the ordinary mule, by a band or rope from the countershaft, and during taking-in each strap is on its own loose pulley, and remains in that position until the carriage is nearing the termination of its inward run, when the slow speed is put into operation.

For the latter motion there is a bracket A, fixed to the spur of square with an adjusting screw, which carries a finger and bowl B, by which the period it is desired to put on slow speed, can be regulated. As the carriage is terminating its inward run, the bowl B comes in contact with an incline bracket C, fixed to a flat slide bar D, in front and on right hand side of headstock below the camshaft, and relieves a round slide bar E, attached to strap guider (on top of headstock over camshaft), which is holding the strap on loose pulley, thereby allowing the strap to go on the fast pulley belonging to the slow speed motion. On the winding or front faller shaft there is a finger F, which, at the completion of the unlocking of fallers, lifts up again the slide bar D, liberates a catch G, thereby allowing the slow speed strap to pass from fast to loose slow speed pulley. The ordinary broad strap on rimshaft is immediately allowed to pass from the loose to fast pulley by rod H, attached to strap guider, being liberated by the slide bar D, and then the mule commences its operation under ordinary conditions.

Platt's Jacking or Stretching Motion.

When this motion is used in connection with the S. A. cotton mule, the cam changes before the carriage completes its outward run; the jacking motion then draws out the carriage very slowly to the full extent of the draw or stretch. During this time the spindles are revolving at the full speed, and continue to do so until the twist motion forces the catch off to allow the strap to go on the loose pulley on the rimshaft.

The motion, as will be seen by consulting diagram

Fig. 3, is arranged with the backshaft driving wheel connected to the arm of an epicyclic train of wheels, as shown in the accompanying illustration.

When the front roller catch box is in gear, the wheel G makes $\frac{2}{3}$ of one revolution, whilst the front roller catch box makes one revolution, *i. e.* $\frac{2}{3}$ revolution of arm *a*, and wheel G for one revolution of roller or wheel C. When the catch box is opened, and the front roller stops, then the arm *a* (or wheel G) runs at $\frac{1}{4}$ speed of the catch box or wheel C, or in other words at $\frac{1}{4}$ the normal speed of carriage.

Other improvements in connection with this Mule which may be adopted, according to requirements,

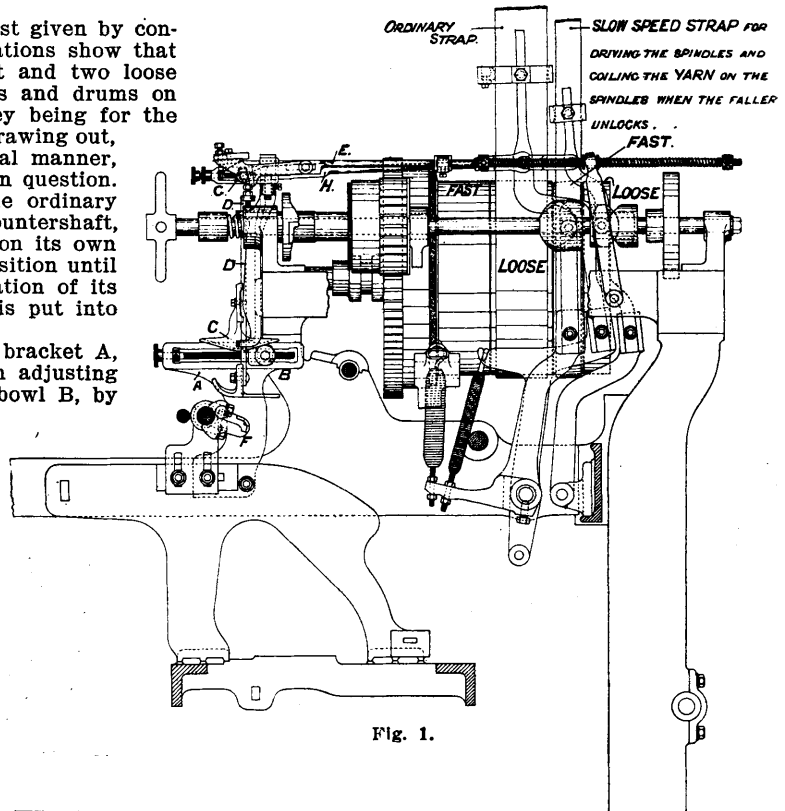


Fig. 1.

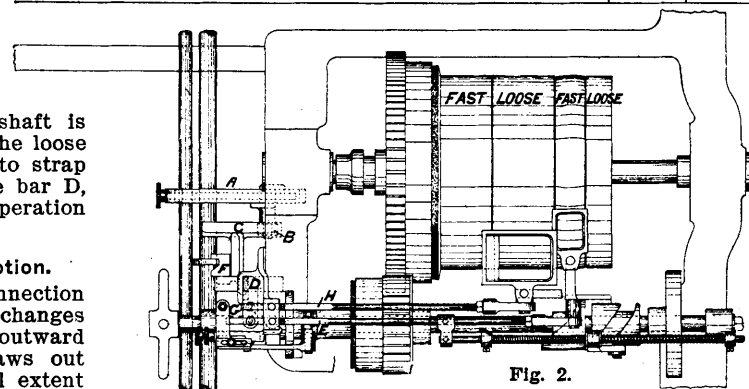


Fig. 2.

are: Automatic Nosing Motion, and quadrant box with 3 catches; Backing Off Chain Tightening Motion; Improved Construction of Square and Carriage Coupling; Guards over carriage wheels, rim band carrier pulley, middle drawing out from floor to scroll and

also over scroll, crown wheel, front roller pinion, change pinion and back roller wheel, backing off wheel on rimshaft, and a sheet iron guard behind the

carriage, and when a portion of the twist in the yarn runs down into the roving.

In order to explain the motion for starting the feed rolls after the carriage has started out, and the mechanism as applied to a mule using the "roller motion while winding," the accompanying illustrations are given and of which Fig. 1 is a side elevation of the head of a mule and the principal parts of the carriage; Fig. 2 is a vertical section through the feed roller clutch mechanism; Fig. 3 is a partial front view of the clutch mechanism, showing its connections and operation. The diagram A as shown in connection with Fig. 1 is a cross section of a clutch member on the feed roll, showing how it drives said feed roll.

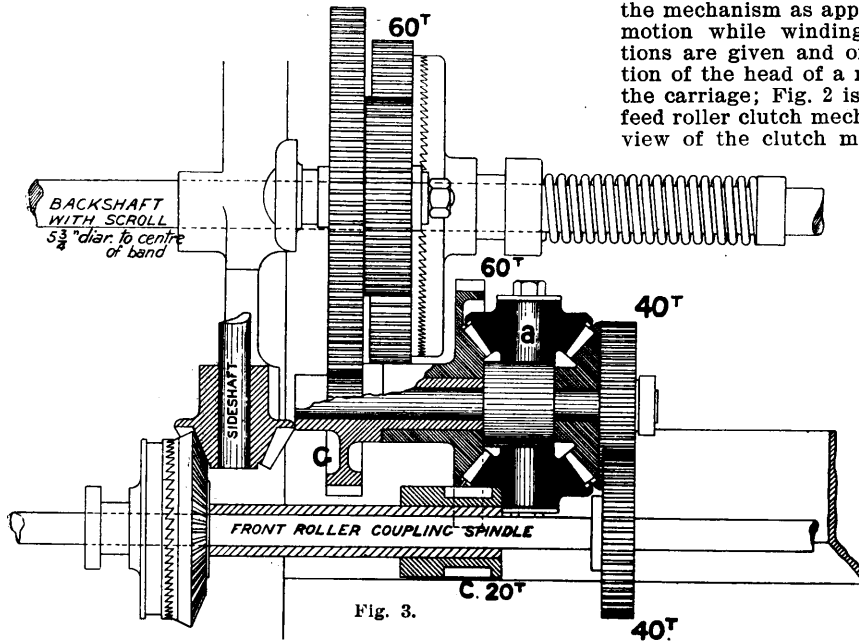


Fig. 3.

headstock; etc., etc. (Platt Bros. & Co., Ltd., Oldham, Eng.)

ANTI-SNARLING MOTION FOR SPINNING MULES.

This motion has for its object to prevent the forming of snarls or kinks in the yarn, by having it become slack for an instant, and when, owing to its twist, the same will have a tendency to kink. This slackness to the yarn occurs when the carriage has just run in and the fallers are getting into position ready for the next outward run of the carriage. When the fallers thus change positions, a certain amount of yarn (varying according to the varying size the cop has been built) is pulled off of the cop, producing in turn kinks, which to prevent is the object of this anti-snarling motion.

The principle by which snaring or kinking of the yarn under operation is prevented, is to start the feed rollers to deliver the roving a moment after the carriage has commenced its outward run, the cop in this manner taking up the slack as previously produced before any more roving is delivered by the feed rolls. In the same manner as thus providing this anti-snarling motion for the ordinary mule, the same can be used to start the feed rollers later on mules having a "roller motion while winding," that is, a short length of roving is delivered by the feed rolls during the run in of the

Numerals of reference in the illustrations, refer to the different parts as follows: 1 indicates the feed roll which is driven through a train of gears to the clutch 2, the clutch member 3 being hollow and having two lugs 4, projecting inwardly from opposite sides of the member, to engage the fingers 5, secured on the feed roller shaft 1, and thus produce rotation of the latter. It will be seen that by having the lugs 4, of the clutch

member 3, set in a position farther away from the fingers 5, when said clutch is rotated by having it thrown in clutch with the other member 6, the feed roll is not rotated for a correspondingly longer space of time, thus giving time for the slack in the yarn, as produced by the movements of the fallers, to be taken up. The clutch member 3, is positioned for each run out of the carriage by having a connection with the heavy sided (unbalanced) wheel 7, by means of a rope 7' which fits into grooves on each. The wheel 7 is loose on the shaft 8 which is journaled in the part of the framing 9, said wheel having attached to its side a lug 10,

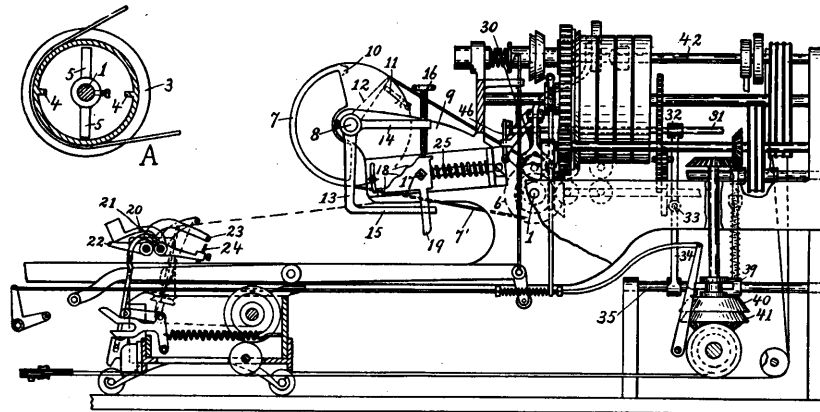


Fig. 1.

and a stop screw 11. Fastened to the shaft 8, is a stop finger 12, which projects between the lug 10 and the screw 11, and when the member 3 is out of clutch, the wheel 7 rotates in the opposite direction until the lug 10 comes against it. On the other end

of the shaft 8 is secured a double angled lever 13, having both ends 14 and 15 extending horizontally toward the head of the mule. The setting screw 16 is fitted into the top lever 14, and has its end resting on the plate 17 when the run in of the carriage is made. The distance that the clutch member is turned back depends upon two items, that is, the distance between the lug 10, and the end of the screw 11, and the lowest position that the stop finger 12 can go. In order to have this distance made automatically variable to suit the different conditions of winding, the plate 17 is made use of.

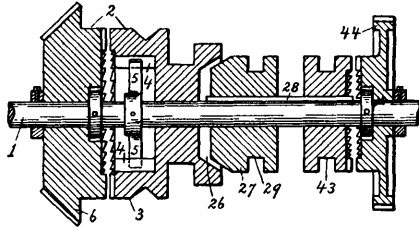


Fig. 2.

It has one side 18 so shaped that when it is moved backward, the screw 16 will fall lower and hence bring the stop finger 12 lower. On the under side of the plate is attached a projection 19, and on the carriage of the mule is placed a lever 20, centered at 21, having the back end, which is heavier, to rest on a projection 22 of the faller 23, and the other end of said lever 20 has a projection 24, which, when the faller rod rises too high, and takes off too much yarn, will strike against the projection 19 as the carriage moves in, and push the plate 17 in, against the spring 25, and when the point of the screw 16 will drop until it strikes the side 18 of said plate 17. By having the plate rest on a slant, it is only moved backward, as just explained, an amount to correspond with the amount of slack in the yarn.

When the carriage starts out and the clutch 2 is locked, the wheel 3 is rotated and in turn causes the wheel 7 to be rotated until the stop screw 11 comes against the stop finger 12, and raises it, causing the lever 15 to come against the framing 9, when said wheel stops and the rope 7 slips in the groove until the clutch 2 is thrown again out and the member 3 freed. The heavy part of the wheel 7 causes it to rotate in the opposite direction until the screw 16 rests on the plate 17, thus the lugs 4 on the wheel 3 are positioned through the rope connection with the wheel 7, unless an extra amount of slack is made, when, as mentioned before, the fallers will raise, causing the projection 24 to come against projection 19 and push the plate 17 inward, allowing the screw to fall lower with a corresponding rotation of the lugs 4 from the fingers 5, thus delaying for a longer time the rotation of the feed roll when the carriage starts out. Immediately that the screw 16 is raised on the outward run, the spring 25 pushes the plate 17 out to its original position, to be moved again as the slackness of the yarn requires it. The screw 16 is adjustable, and can be moved by hand, which is done while the cop is building, as then the work is distributed between it and the plate 17.

When the "roller motion while winding" is used, an extra attachment is necessary, as the position of the lugs 4 in relation to the fingers 5 would be changed by the consequent rotation of said fingers on the feed roller shaft 1.

To prevent this relation from being changed after the lugs have been positioned, the clutch member 3

carrying the lugs 4, must rotate in unison with the feed roller shaft 1 during the extra rotation.

The right end of the clutch member 3 is provided with a conical shaped cavity 26, and a clutch sleeve 27 (sliding on key 28 on the feed roller shaft) fits into the cavity 26 and is also provided with a groove 29 in which a forked lever 30 slides. This lever 30 is secured to the horizontal shaft 31, which is fitted in proper bearings, and has connected to it near its other end a vertical lever 32, the other end of this lever being in turn connected to the horizontal rod 33. This rod 33 passes loosely through the top end of the vertical lever 34, which is rigidly secured to the rock shaft 35. A spring 36 is arranged on the rod 33 between a nut 37 and the lever 34, and another nut 38 is screwed on the rod 33 on the opposite side of the lever 34 from the spring 36. Attached also to the rock shaft 35 is a lever 39, one end of which controls the clutch 40 and 41, the other end being worked by the cam 42 through the levers shown in connection with Fig. 3. The clutch 40-41 controls the inward run of the carriage.

When the carriage completes its outward run, the clutch member 3 is thrown out and its lugs 4 are then positioned in relation to the fingers 5, as has been previously explained. The cam 42 in then throwing the clutch 40-41 in, rotates the rock shaft 35 and moves the vertical lever 34 in a left hand direction. This movement carries the horizontal rod 33 as well as the vertical rod 32 with it. The rod 32, being connected through the shaft 31 to the lever 30, throws the end of that lever so that the clutch 27 sliding in it will be forced into contact with the clutch member 3, and the clutch 27 being keyed sliding on the feed roller shaft 1, when it is in contact with the clutch 3, will cause it to rotate with the feed roller in unison. At the same time that the clutches 27 and 3 are thrown in contact, a clutch 43 is also

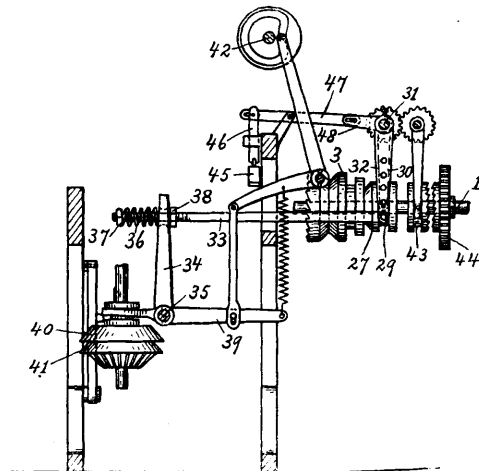


Fig. 3.

thrown into contact with a clutch member 44 carrying gear teeth, and which is continually rotated through a positive drive, by a connection not shown. This rotation is given the feed roll on the run in of the carriage and the position of the lugs 4 to the fingers 5 maintained. When the fallers are raised too high, and the plate 17 is pushed back, a wedge shaped head 45 forces bar 46 upward and through the levers 47 and 48 will rotate the shaft 31 and cause the clutches to move out of contact. (Timothy McAuliffe, Lawrence, Mass.)

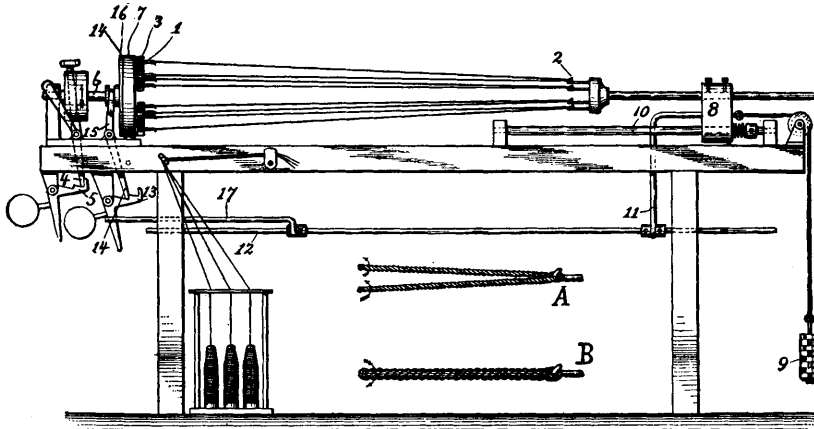
CULVER'S LOOP BANDING MACHINE.

The purpose of this machine is to produce in an economical manner the loop bands as used for driving the spindles of spinning and twisting machinery. Such bands are composed of cotton cord or yarn suitably twisted and doubled to form a loop at one end of the band by which the securing of the banding on the machine, where required to be used, is greatly facilitated.

The manufacture of these bands is done by means of loop banding machines, a specimen of which is shown in the accompanying illustration. It is organized to twist and double a number of the loop bands at one operation; it being claimed to be the first machine of its kind constructed in which two or more bands can be made simultaneously.

In the illustration of this banding machine (a side view of it), its length is somewhat reduced to show the relative proportions of the parts more clearly within a limited space. Detail illustrations A and B are given to show more clearly the formation of the loop band, viz.: A illustrates the operation of twisting the two strands of cord or yarn, and B the doubling of the banding.

The operation of the machine is thus: The machine having been adjusted to twist and double loop banding of the desired length, the operator secures the desired number of coarse threads to one of the twister hooks 1, then hooks the same threads over the corresponding loop hook 2, and secures the other ends of the threads to the other twister hook 1. Having thus formed one loop, the ends of which are fastened to the two twister hooks of the same frame 3,



the operator proceeds to secure in the same manner the other (five in this instance) strands of thread to the twister hooks of the other (five in this instance) twister frames. The operator now starts the machine by moving the belt from the loose to the tight pulley, at the same time moving the arm 4 one notch on the bell crank lever 5. Power is transmitted through shaft 6 to a gear (not shown), which engages with a series of gears, each of which is secured to a short shaft, journaled in standard 7, and thus communicated to the (six pairs in the present machine) twister hooks 1, through suitable gears and pinions in each of the twister frames, thereby twisting twelve strands in the machine simultaneously.

The twisting of these strands (see diagram A) acts to contract the same and draws the block 8 and the weight 9 toward the head stock. The block 8 is moved thereby on the rods 10, and this motion is transmitted through the rod 11 to the rod 12, until

the end of the rod 12 engages with the bell crank lever 13, and knocks off the arm 14, when a spring (not shown) acts through the lever 15 to draw back the disk 16 and withdraw the pins as fast to the disk out of the way of the twister frames 3, thereby permitting the rotation of the twister frames 3 and the doubling of each of the pairs of strands into one band (see diagram B). The doubling of the bands continues to draw the block 8 forward until the end of the rod 17 engages with the bell crank lever 5, to knock off the shipper and stop the machine, when the operator removes the twisted and doubled loop banding from the machine and repeats the operation. (F. S. Culver, Taunton, Mass.)

HUMIDITY AND HUMIDIFIERS.

There is no doubt but that a warm and at the same time humid (moist) atmosphere is the one best adapted for the purposes of spinning cotton yarn, both conditions, heat and moisture, going hand in hand, and play a most important part in the production of smooth and strong yarn; for the fact that the cotton fibres are of a hygroscopic character, *i. e.* have the property of absorbing moisture, and in this way become, for the time being, less brittle, more pliable, and capable of being more thoroughly incorporated among themselves in the formation of a perfect thread. Electricity in the mill as produced by the friction of belts and other moving parts of machinery is a distributing agency among loose fibres and causes fuzziness in yarn, especially in dry weather, but when the presence of moisture in the

air neutralizes this effect considerably. It is also for this purpose that a reasonable degree of humidity is desirable. With reference to proper heat, this has long been easily enough attained by arrangements of steam pipes, made of wrought iron, through which high pressure steam is forced. The higher temperature of the steam enables a much larger radiation to take place than is possible with low pressures, and the pipes used are correspondingly smaller.

Although there are differences of opinion as to the proper temperature for cotton spinning, from 70° to 90° F. is the usual temperature, and while some spinners on coarse

yarns are satisfied with 70° to 75° F., some spinners of fine counts may stop at nothing short of 95° to 100° F., but which may be considered quite unnecessary if proper attention is paid to humidification.

The chief advantages of humidity and proper warmth in a spinning room are, that the cotton will work better, and having more elasticity will spin better, and in turn give better yarn, especially so on dry, hot days. In the card room, however, there is less need of humid atmosphere, besides there is danger of rusting the teeth of the card clothing or the needles of the comber, if such are used.

Regarding the proper amount of humidity to have present in a cotton spinning mill, about 60% of relative humidity is generally considered to be the most advantageous condition, that is considering fibre, machinery as well as the help.

However, as already previously referred to, humidity in a spinning room is not the only factor to be taken into consideration. For example, yarn may

spin well say at 75° F., but if now the temperature should be raised, say 20° F., everything else remaining the same, there will at once occur a vast difference in the humidity of the room, although the actual amount of moisture in the room remains, showing that the relative humidity in the room changes with the increase in temperature.

The term, relative humidity, means the relation in percentage of the amount of moisture in the air at that time weighed in grains per cu. ft. as compared with the amount of moisture that the air would contain if it were perfectly saturated, and when any more moisture would be put in that space, it would be condensed or precipitated.

When entering any well heated room, you may notice that the air is very dry, having a parching effect, although as a matter of fact a cubic foot of air in such a room may contain just as much humidity as in a cubic foot of air outside, and yet we feel different, clearly showing that the actual amount of humidity in the air is not a deciding factor in our estimate of relative humidity. If a shallow dish containing water be placed in a warm room, said water will, by the natural process of evaporation, change into vapor, *i. e.* evaporate, the capacity of the atmosphere to absorb this water, or really hold it up in this invisible condition, varying according to the temperature in the room. The fundamental law for this evaporating of water is that at 32° F. a cubic foot of air will retain 2.13 grains of aqueous vapor, while at 100° F. it will retain 19.84 grains of aqueous vapor, *i. e.* about ten times as much. It will hold no more than the amount stated, the air being then saturated, *i. e.* has its maximum vapor tension or pressure. If the temperature of this saturated air is in turn lowered, if it is compressed into a smaller volume, or if an attempt should be made to add more moisture to this fully saturated air, then the moisture already in it will begin to be deposited in the form of dew, the temperature at which it does this being called the "dew point," which in turn varies according to the temperature of the moisture, *i. e.* the elastic pressure of the particles of vapor increases as their temperature increases, the air itself having nothing whatever to do with the humidity, it simply being a convenient vehicle for heating the vapor as rising from the surface of the water and in so doing increasing its elastic force and enabling still further evaporation to take place; the application of heat to the water itself causing vapor to be given off, and this rising in the atmosphere, will heat the air and so the same result naturally follows.

From the foregoing, it will be readily understood that the greater the heat of a room, the greater the amount of absolute humidity required in order to reach the same amount of relative humidity.

We will now consider the relative humidity. If air

contains a certain amount of moisture, say about one-half of what would cause complete saturation, then the amount of humidity of the air is said to be 50%; so that when we say that air is "dry" we simply mean that the proportion of moisture in the air is little compared with if fully saturated, and for which reason cold air with little moisture in it may be very moist, while warm air with much moisture in it may be very dry; for which reason it will be seen that the expressions "dry air" and "moist air" are only relative terms, and simply express the proportion of aqueous vapor present at the given temperature compared with that which the same volume of air could hold.

It will thus be seen that the point of saturation, *i. e.* the "dew point" is the foundation of our estimate of "Humidity" or moisture in the air, and for which reason we must know this before the percentage of humidity in a room can be ascertained.

Absolute, Maximum and Relative Humidity.

Absolute humidity means the actual amount of vapor present in a given volume of air.

Maximum humidity means the amount of vapor that could be present in the same volume of air under precisely the same conditions of pressure and temperature.

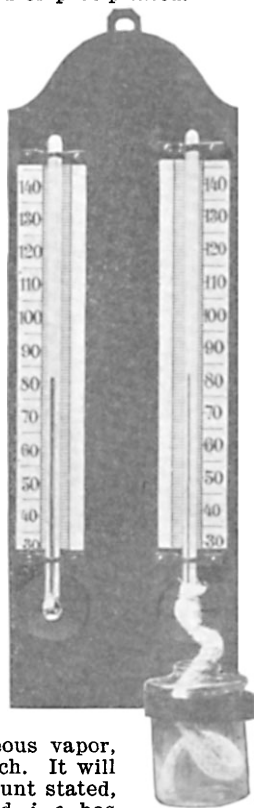
Relative humidity means the ratio of the absolute humidity to the maximum humidity, and this is the humidity we are mostly concerned about with reference to cotton spinning.

The instrument for measuring the degree of relative humidity, *i. e.* drying power of the atmosphere, as we may say, is called the psychrometer or wet bulb hygrometer, or hygrometer for short, and consists of two delicate thermometers placed near each other, the bulb of one of which is kept wet, by being covered with a piece of muslin, the end of which (a kind of wick) dips into a small vessel filled with water. The accompanying illustration shows such a hygrometer, as manufactured by Queen & Co., Phila., Pa.

It is one of nature's laws that when anything evaporates, it absorbs heat, therefore, the water evaporating from the wick which surrounds one of the bulbs of the Hygrometer, absorbs or draws out the heat from the thermometer, thus lowering the temperature. The drier the air, the faster the water evaporates from the bulb and the greater the difference would be between the two thermometers. If the air would be perfectly saturated with moisture, there would be no evaporation taking place from the wick, and consequently the two thermometers would read exactly alike.

After ascertaining the difference between the two thermometers, by consulting table given on page 114 and which has been computed for this purpose by Queen & Co., the relative humidity may be read off direct. As for instance, if the temperature in the room was 100° F., according to the dry thermometer and the wet thermometer read 85° F., *i. e.* a difference of $(100 - 85 =) 15^\circ$, then follow the air temperature column down to the 100 mark, and then follow that line out to the right until the 15th space = 54% humidity.

So fully have the benefits arising from a humid atmosphere been recognized by Cotton Manufacturers during recent years, that various methods of moistening the atmosphere, by specially constructed apparatuses, have come in the market. In some instances water is forced by means of special pumps at a strong pressure, generally of about 135 lbs. per square inch, and after having been filtered through a strainer inside a strainer box, through small apertures, and the water impinging against a fixed surface, which is about $\frac{1}{16}$ inch away, is broken up



Relative Humidity Table.

AIR TEMPERATURES.	DIFFERENCE BETWEEN THE DRY AND WET THERMOMETERS.																														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
60	100	94	89	84	78	73	68	63	58	53	48	44	39	34	30	26	22	18	14	10	6	2									
65	100	95	90	85	80	75	70	65	61	56	52	48	44	39	35	31	28	24	20	17	13	10	6	3							
70	100	95	90	86	81	77	72	68	64	60	55	52	48	44	40	36	33	29	26	23	19	16	13	10	7	4	1				
75	100	95	91	87	82	78	74	70	66	62	58	55	51	47	44	40	37	34	31	27	24	21	19	16	13	10	7	5	2		
80	100	96	92	87	83	79	75	72	68	64	61	57	54	51	47	44	41	38	35	32	29	26	23	20	18	15	13	10	8	6	3
85	100	96	92	88	84	80	77	73	70	66	63	60	56	53	50	47	44	41	38	36	33	30	28	25	22	20	17	15	13	11	9
90	100	96	92	88	85	81	78	75	71	68	65	62	59	56	53	50	47	44	41	39	36	34	32	29	26	24	22	20	17	15	13
95	100	96	93	89	86	82	79	76	72	69	66	63	60	58	55	52	49	47	44	42	39	37	35	32	30	28	25	23	21	19	17
100	100	97	93	90	86	83	80	77	74	71	68	65	62	59	57	54	51	49	47	44	42	39	37	35	33	31	29	27	25	23	21

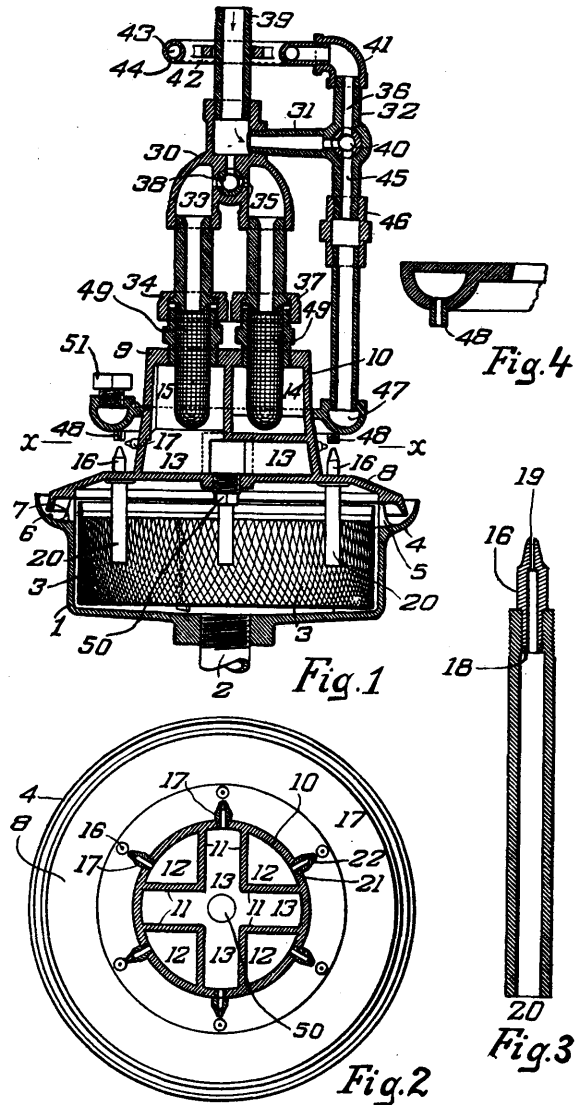
into an infinite number of fine particles, so as to humidify the surrounding atmosphere, whereas in other cases air is forced at high velocities over wet surfaces or through water, and the thus moistened air injected into the rooms.

Clarkson's Humidifier. The objects aimed at in the construction of this humidifier as manufactured by the Globe Moistening Co., of Fall River, Mass., is to provide besides humidifying the atmosphere of the room, also means to blow out the water and air nozzles, either or both, but principally the water nozzles, as well as means for automatically cleansing the exterior of the humidifier from dust, flyings, etc., as will always more or less collect on these apparatuses.

Of the accompanying illustrations, Fig. 1 is a vertical central section of this humidifier, and Fig. 2 a horizontal section of the cover turret at line x-x of Fig. 1 looking down. Fig. 3 is a section of the water nozzle, and Fig. 4 is a sectional detail of the air escape in the lower cleaning ring.

A description of this humidifier is best given by quoting numerals of reference accompanying the illustrations, and of which 1 indicates the water basin, and 2 the water inlet to it. 3 is a strainer, constituting a lining for the bottom and side of basin 1. 4 is an integral upwardly extending flange extending around the water basin, and 5 is an upward extension of the side wall of the basin. 6 is a drip channel formed between the flange 4 and upward extension 5, and 7 the water escape passage from the channel 6 back into the basin 1. The basin cover 8 rests on upward extension 4, with its outer surface sloping downwardly into the drip channel 6 and its lower edge slightly above the bottom of the channel, so that drip water may fall off the cover into the channel and escape back into the basin 1. Cover 8 is formed with an air turret 9, having a plurality of air chambers, the cover 8 with its turret 9 being one casting. The cover 8 is formed within the turret wall 10 with vertical partitions 11, which form, with wall 10, the four quadrant shaped chambers 12 and the intersecting chambers 13, which separate the quadrant chambers one from another. The turret 9 has two independent chambers 14 and 15 in its upper part, chamber 14 communicating with the four quadrant chambers 12 and the chamber 15 communicating with the four intersecting chambers 13.

Cover 8 is provided with six vertical water nozzles 16, which are held in the cover and project outwardly thereof in line with corresponding horizontal air nozzles 17, which are each screw socketed (removable if any of the nozzles become bruised,



jammed, or clogged) in the wall of the turret and lead into the described air chambers therein. The water nozzles 16 are formed with exterior screw threads 18, the exit orifices 19 being constricted relatively to the water tubes 20, which extend from the bottom of the nozzles down into the water basin 1.

The working of a humidifier may be here again referred to, and which consists in that when air is forced through the air nozzles 17 across the water nozzles 16, that water will be sucked up through tubes 20 and distributed as a spray into the room.

30 is a three way cock-body having a side outlet 31 to another three way cock-body 32. Cock-body 30 has its way 33 coupled with turret chamber 15 by a coupling 34 and its way 35 coupled with turret chamber 14 by coupling 37. 38 is a three way valve for cock-body 30, and 39 is the air inlet nozzle to cock-body 30. 40 is the three way valve for cock-body 32. 41 is a coupling connecting way 36 of cock-body 32 with the cleaning ring 42, which is chambered at 43 and provided with a plurality of perforations 44 on its under side, so that air may be blown through the perforations down on the humidifier to blow off dirt, lint and waste, as will always more or less collect on it in a cotton mill, and thus keep the apparatus clean. Cock-body 32 has its way 45 connected by a coupling 46 with the chambered jet cleaning ring 47 (extending circumferentially all around the humidifier), which is provided with air escape ducts 48, discharging against the exits of the air and water nozzles 17 and 16 respectively, and more particularly directly against the latter exits, blowing down into them. Consequently if the water nozzles become clogged a discharge of air under considerable pressure through the air escape ducts 48 will blow out lodgments in the water nozzles, and at the same time also blow off lodgments on the outer surface of cover 8. Screens 49 are employed to prevent any foreign matter from being drawn into the air chambers 12 and 13, the upper ends of these thimble shaped screens being secured in the couplings 34 and 37 respectively. The air turret 9 is formed with an orifice stoppered by a removable plug 50, and when consequently by taking off cover 8 and removing plug 51, the turret can be readily cleaned, if necessary. Similarly the jet cleaning ring 47 is provided with a removable plug 51.

When the two three way valves 38 and 40 are open, air under pressure will come in at 39 and be discharged not only through the air nozzles 17, but also through the orifices 44 of the cleaning ring 42 and the jets 48 of the cleaning ring 47. By properly turning valve 40, air may be wholly shut off from both cleaning rings 42 and 47 respectively, or admitted to one or the other ring, as desired. Again by properly turning valve 38, air may be shut off from either turret chamber 14 or 15, as desired.

SILK.

SIPP'S TWIST TESTER FOR YARNS.

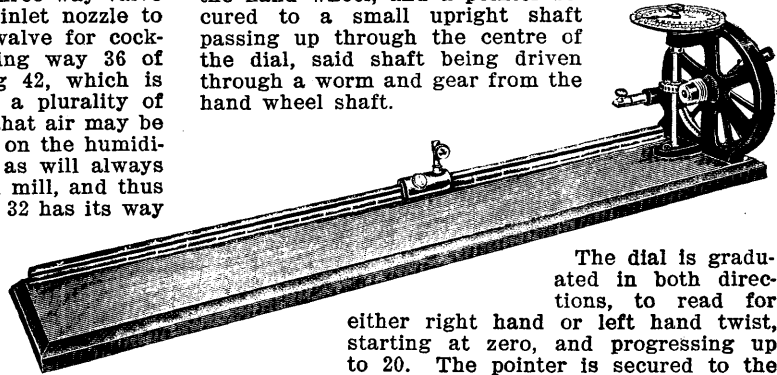
This tester is characterized chiefly by the simplicity with which the number of turns per inch in the yarn tester can be ascertained, in fact it is so constructed that after turning the twist out of the length of thread under consideration, the number of turns per inch can be read directly from the dial, without requiring any calculation whatever. The construction and operation of the tester are best shown by means of the accompanying illustration,

which is a perspective view, showing clearly the arrangement.

It consists principally in an arrangement for holding the thread to be tested, and an indicating arrangement for the turns per inch.

The yarn holder is made up of a revolving clamp for holding one end of the thread, and which is driven from the hand gear wheel shown, through a small pinion on the end of its shaft. A clamp for holding the other end of the thread is placed on a collar which is adjustable on a graduated rod, which is divided off into 20 inches, the clamp being held in any desired position by means of a set screw in the collar holding the upright clamp.

The indicating arrangement consists of a stationary dial, situated above and a little to the side of the hand wheel, and a pointer secured to a small upright shaft passing up through the centre of the dial, said shaft being driven through a worm and gear from the hand wheel shaft.



The dial is graduated in both directions, to read for either right hand or left hand twist, starting at zero, and progressing up to 20. The pointer is secured to the small shaft by means of a thumb screw at the top, and can be easily loosened so as to set said pointer back to zero, without having to turn the handle until it travels back. This, of course, saves a great deal of time, especially where a number of tests have to be made.

In making tests, it is advisable to use 20 inches of thread to be tested, then the turns per inch can be read directly off of the dial after untwisting the thread, because the gearing is so arranged that 20 turns of the revolving clamp will be made while the pointer progresses one whole number on the dial, thus the number indicated on the dial by the pointer, will be the number of turns in one of the threads. In case a less number of inches of yarn are only available for testing, simple calculation is all that is required, viz.:

Using 10 inches of thread—divide number indicated on dial by 2
 “ 5 “ “ “ “ “ “ “ “ 4
 “ 4 “ “ “ “ “ “ “ “ 5

For other lengths of thread to be tested the turns per inch would have to be figured from proportion, for example, suppose only 12 inches are to be tested, then we would have the proportion

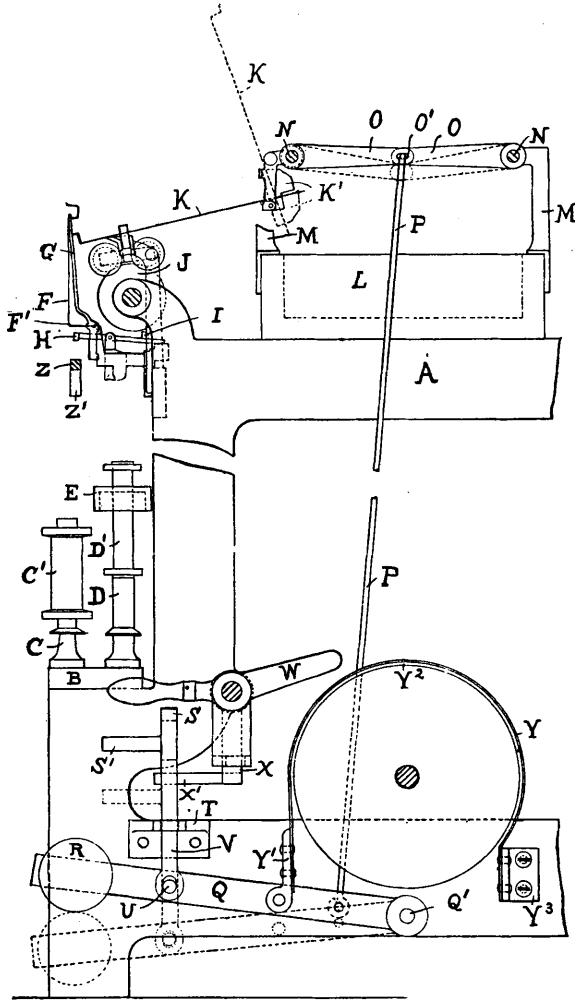
20 : 12 :: number indicated on dial : number turns per inch. (Sipp Electric & Machine Co., Paterson, N. J.)

TYNAN'S SILK SPINNER AND TWISTER.

This machine refers to that class of silk-spinning machinery in which the thread, after previous “cleaning,” is wound from one bobbin onto another, at the same time putting “twist” into the thread. In connection with the spinning and twisting devices of the machine, there are combined two stop motions, one for operating the fallers when a supply thread breaks, the other acting to stop the supply bobbins (and this without operating the stop motion first referred to) at the moment when the shipper lever is shifted onto the loose pulley.

The accompanying illustration is an end view of the machine, clearly showing the several mechanisms referred to, one "bank" only being shown; if a double-bank machine, the spinning and twisting devices, with its "faller stop motion" and "kink preventers," are duplicated for the other side.

A is one of the side frames of the machine, and on which is mounted the spindle rail B. In this spindle rail B are mounted the two series of spindles C and D, one series carrying the supply bob-



bins C¹ and the other carrying the bobbins D¹ onto which the thread is wound. From the bobbins C¹ the thread passes up and around guide and feed rollers and thence down to the bobbin D¹, on which it is laid by a ring traveler mounted on the ring rail E, said traveler putting at the same time the required twist into the thread.

The fallers F of the "faller stop motion" normally remain in vertical position (as shown in the illustration), *i. e.* resting against the faller stand G, but if a thread breaks on its passage from one bobbin to the other, said faller drops down so that the portion F¹ engages with the end of lever H, rocking said lever and bringing its tooth I into engagement with the driving roller J, and thus (through intermediate connections) stop the machine. With this stop motion is combined another stop motion, acting either in connection with said faller stop motion

or independent when the machine is stopped by the operator.

This second stop motion arrests at once the rotation of both series of bobbins and simultaneously throws the lever K (technically called a kink preventer) upward, carrying any paid-out supply thread up with it, thus keeping the threads from becoming slack and forming kinks which always are a disadvantage to perfect yarn.

On each end of the bobbin-supply box L, as mounted on top of the frame A, is secured a bracket M, in which are formed bearings for a shaft N, which extends the entire length of the machine, and has mounted on it the weighted levers or kink preventers K, said shaft having at the driving end of the machine secured to it an arm O provided with a hole O¹, into which is hooked one end of a rod P, having its other end secured to a lever Q, pivoted at Q¹ to the frame of the machine, and carrying at its outer end a weight R. At about its middle portion the lever Q is provided with a stud U, which enters a hole in a latch V; said latch slides in a slotted bracket T and has at its upper end a hook S and handle S¹. On the frame of the machine and above the latch V, is mounted the shipper lever W, formed with a part X and extension X¹, the latter being adapted to engage with the latch V.

A shoulder on the inner end of the bracket T holds the latch V and, in turn, the lever Q in raised position (see full lines in illustration), as is the case when the machine is running, but when the machine is stopped for any cause whatever, the extension X¹ of the shipper lever W engages the latch V and forces the same from its notch in bracket T, thus allowing the lever Q to drop into position shown in dotted lines.

To the lever Q is also secured a brake band Y, by means of a buckle Y¹, said brake band extending over a brake pulley Y² fast to the driving pulley of the machine (not shown), provided the same is driven by means of fast and loose pulleys, or to one of the friction members in case the machine is driven by friction device. At its other end, this brake band Y is fastened to bracket Y³, thus when the lever Q drops, as previously mentioned, the brake band engages the brake pulley Y², and thus immediately stops all running parts of the machine. On the dropping of the lever Q the rod P is simultaneously pulled down, which in turn causes the shafts N to be rocked, causing the balanced lever (kink preventer) K to be tipped so that the weight K¹ is overbalanced and the lever K raises (to the dotted line position shown), carrying the thread with it, and thus prevents kinks in the yarn.

In order that the operator is able to stop the machine without the faller stop motion to operate, a bar Z is provided, extending all the way across in front of the machine, resting on support Z¹ and adapted to be brought in contact with the ends of levers H to thus control their operation.

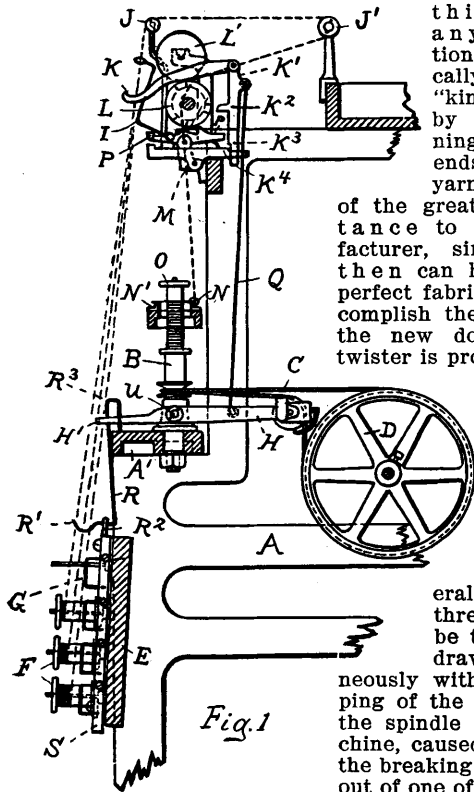
To stop the machine, the operator first raises this bar Z and next knocks off the shipper lever W, which drops the lever Q, and in turn operates, as described, to throw the levers K upward simultaneously with the stopping of the machine. (Joseph E. Tynan, Paterson, N. J.)

TYNAN'S SILK DOUBLER AND TWISTER.

The purpose of the machine is the doubling and twisting together of several single silk threads (after the latter have been previously "cleaned" and twisted as the case may have required) into one thread. The amount of twist to be put into the yarn is regulated by the fabric the yarn is in-

tended for, some fabrics requiring more, some less, again, some hardly any twist.

A uniform count (i. e., size) of the yarn with an equal amount of twist (turns per inch) throughout



of the greatest importance to the manufacturer, since only then can he produce perfect fabrics. To accomplish these results, the new doubler and twister is provided with a stop motion, which stops the revolution of the bobbins from which the several supply threads as to be twisted are drawn, simultaneously with the stopping of the rotation of the spindle of the machine, caused either by the breaking or running out of one of the supply threads, doffing, etc. In other words, the motion of every part of the machine is arrested at the same moment.

To explain the operation of the different motions of the machine, the accompanying illustrations are given, and of which Fig. 1 is a vertical cross section of the machine, showing the threads being drawn from bobbins placed upon a creel, said threads, after passing over guides and feed rolls, being twisted and laid upon the bobbin on the twister spindle. Fig. 2 is a front elevation, enlarged compared to Fig. 1, of the creel with the supply bobbins, the brake bar and the bobbin brakes. Fig. 3 is a plan view, slightly enlarged compared to Fig. 2, showing the action of the brake mechanism upon a supply bobbin.

Examining illustration Fig. 1, we find on the frame A of the machine the spindle rail A1, in which the spindles B are mounted, said spindles being driven by means of driving band C from driving pulley D. On the frame A is also mounted the creel board E, upon which are mounted, as required, one, two, three, or more banks of supply bobbins F, said bobbins being acted upon by brakes G.

Each thread, as to be in turn doubled with one or more similar threads, after leaving the bobbins F, passes up and through a faller I, from which they pass as single threads over and partly around guide rollers J, J1 and feed rolls L, L1, and thence through a guide eye M to the traveler N (as adjusted to ring rail N1), and in turn onto the bobbin O as carried on spindle B. The rolls L, L1 revolve, and feed the threads to the traveler N, which puts the required amount of twist into the yarn. The

roller L is provided with mortices adapted to be engaged by a claw formed on the rock lever P whenever said lever is rocked by the dropping of a faller I on account of its supply thread breaking.

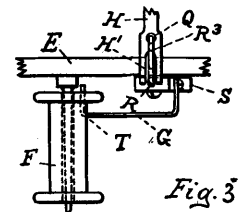
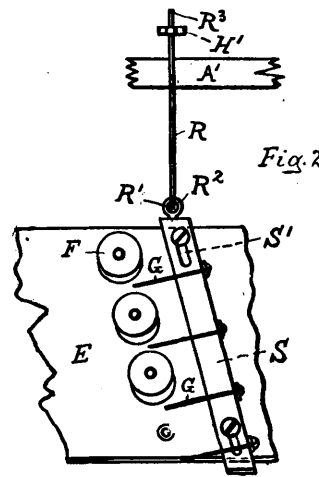
Above this rock lever P is situated a lever K, having a latch K1, which is supported by a shoulder K2 resting on the back end K4 of the faller stand, a lug K3, limiting the drop of said latch K1. To this latch K1 is pivoted one end of a wire link Q, the other end of it being connected to the movable lever H, over which the driving band C passes.

When a faller I drops, the lever P is rocked, causing the claw as formed on the rock lever P to engage one of the mortices on roller L, thereby causing the lever P to be moved back so that it engages the latch K1 and causes the shoulders K2 to be pushed from its support. This causes said latch K1 to drop and the lever H to be tilted, in turn slackening the driving band C and stopping the rotation of the spindles B.

For applying the brake to the bobbin simultaneously with the stopping of the spindle, the outer end of the lever H is provided with a fork H1, which passes through a hook R3 of a support R, connecting the end of lever H with the brake bar S (see Fig. 2). To this brake bar S are secured the brake wires G, which are bent at right angles at their end, as shown at T, in Fig. 3, for conveniently engaging the head of the bobbins.

The brake bar S is slidably mounted in slots S1 on the creel E; thus it will be seen that when the lever H is tipped on account of the stopping of the machine, the front end H1 of said lever H, as it raises (on account of the rear end of said lever dropping—see fulcrum U), will also raise the brake bar S (through support R), thus bringing the brake wires G into engagement with the heads of the bobbins, and at once stop the rotation of the same.

When the stop motion has thus operated, and the operator has to piece broken ends, he simply presses the support R inward, allowing the eye R2 of the brake bar S to drop into the hook R1 of



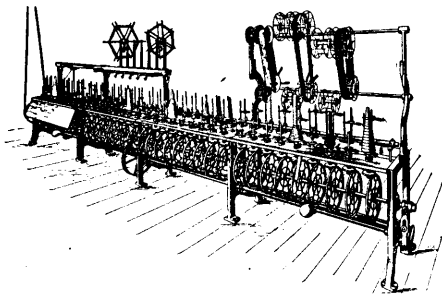
the support R, thus removing the brake wires G from engagement with the heads of the bobbins F, permitting the operator to piece any broken end.

When the machine has to be started, the operator presses down the lever K, thus raising the lever H, which in turn tightens the driving band C and starts the machine running, the hook R1 at the same time springs automatically back into place and allows the brake bar S to assume its normal position. (Joseph E. Tynan, Paterson, N. J.)

WINDING, SPOOLING, WARPING AND BEAMING MACHINERY.

THE ALTEMUS HOSIERY WINDER.

A perspective view of this prominent winder for knit goods manufacturers, is given in the accom-



panying illustration. This winder is built with a variable motion for driving its spindles, and arranged to work either from pin swifts for hosiery skein yarns (as is shown at the left hand section of the machine in the illustration), or from wire swifts for woolen yarns (as is seen by consulting the right hand section of the machine in the illustration) as the case may require.

As will be readily seen from the illustration, the spindles of the machine are driven by friction, *i. e.* the disks of said spindles being driven by bearing on the periphery of their respective large friction wheels as situated in the lower portion of the machine.

A most important portion of this machine is its variable motion, which changes the position of the large friction wheels with reference to their acting on their respective disks of the spindles; said large friction wheels being made to move by means of a grooved cam as situated on the side of the machine, opposite to that carrying the fast and loose pulleys, bodily with their shaft laterally, and when consequently said friction wheels will change their position on the disk, *i. e.* work on a larger or smaller diameter of said disk, as the case may be. By this arrangement, it will be seen that the friction wheel will constantly change its position with relation to the respective friction disks, and thus produce the characteristic variable motion to the spindle as the cop is built. This variable motion is produced without gears, and consequently is simple in its construction and working, and easily adjusted.

The "guide" and the "former" of the bobbin in the machine, are combined with frictionless parts to the yarn, *i. e.* by porcelains, and as the

yarn winds onto the bobbin, it raises the former wheel correspondingly. A yarn stripper, for cleaning the threads to be wound, is also provided to the machine. The power required for operating the machine is very little, and which consequently is another important item in favor of this machine. (Jacob K. Altemus, Philadelphia, Pa.)

THE NO. 50 UNIVERSAL WINDING MACHINE.

On pages 152 and 153 of Part 1 of this work a thorough description of the Universal Winding Method has been given, and which remains identical to their modern, otherwise designated as No. 50 Machine, in the construction of which the objects aimed at are: The highest practicable speed; The largest possible product; Occupying the smallest floor space; Requiring the least driving power; Running the least oil, wear and tear, and least care;

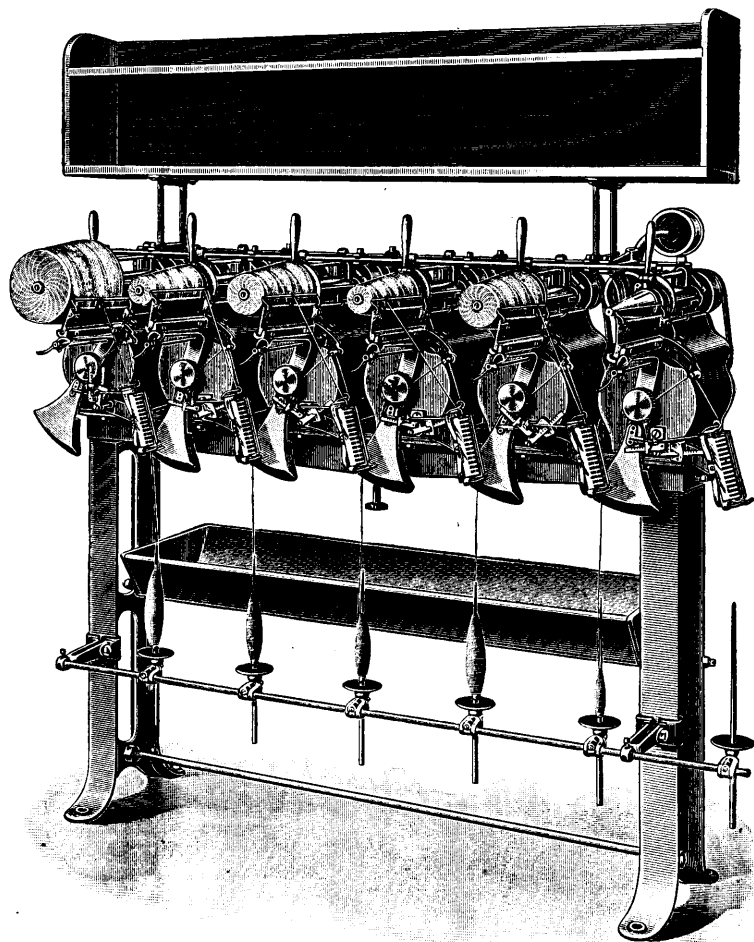


Fig. 1.

Making minimum waste, *i. e.* economical winding; winding the most compact and attractive package, and this in the best form for the market and for transfer purposes in mills.

This winder, as compared to other machines of this type, is essentially a high speed machine, and naturally requires a perfect oiling arrangement. Exhaustive study and experiment have resulted in the development of this element to the highest efficiency in this machine, the oiling being entirely automatic, *i. e.* self oiling, and requires no attention from the operator, except the filling of the reservoirs about once in two months. The spindle bearings are supplied through a new system of ring oilers, the gears run in an oil tight case, which also supplies the cam shaft bearings, and the idler pulleys carry their own reservoirs. Oil is constantly flowing from the reservoirs through the bearings and back again to the reservoirs, being used over and over again, thus reducing the cost of lubrication and care of machines. The machine is practically wear proof, and all bearings are absolutely protected from insinuation of lint or dust and also from leakage. This latter point will especially appeal to manufacturers, for in the handling of textiles it is vitally important to prevent damage to material by oil. Anyone having experience in yarn mills knows that the lint and fly deposited on machines act as a wick to spread the oil, and constant wiping will hardly prevent an accumulation of grease. In the Universal Winder No. 50, this problem has had effective treatment, and all exposed parts are kept perfectly free from oil. Besides the saving in wear and tear on the machine and in operators' time, by the effective lubricating system, there is also a considerable saving in driving power, the Universal Machine being guaranteed by its builders to be the lightest running winder of its class on the market.

Another item of importance that has been developed in the design of this new machine is the economizing of floor space. Considerable ingenuity is shown in the compacting of the structure, and the mechanism is lightened and simplified to the utmost extent, consistent with strength and durability. The new Universal Winder occupies considerable less floor space than usually allotted to similar types of machinery in winding rooms, and it lends itself to a grouping which secures the greatest economy of space with the highest operative efficiency.

The machine is built in two types, *viz.*: one for winding singles, the other for winding two or more ply. The first mentioned type of the machine, and of which a perspective view is given in Fig. 1, is more particularly adapted for winding soft spun yarn in conical form for delivery to knitting machines, whereas the other type of winder refers to doubling either 2 or 3 ends of fine yarn, in cylindrical form for delivery to twisters. In its general construction the latter resembles the first mentioned machine, the only difference being that the feeding attachments are in duplicate for each single end fed, the single ends as to be united, passing over a carrier pulley upon the top box of the machine, from which they descend to the spindle, previously passing through the traverse guide, which distributes the compound thread evenly over the cylindrical surface of the package. The regularity of the tension thus given to each single thread, produces such perfect alignment of the singles to be united, as to insure uniformity and full strength in the doubled yarn, and the finally twisted threads. Poor quality and waste from "cork-screw" twist as often caused by clearer waste or flyings being twisted in the yarn, making an inch or two of very coarse yarn, is en-

tirely eliminated; an extra sensitive stopping device preventing the running in of loose ends. Spools are by this winder dispensed with, saving first cost and cost of renewal from loss and breakage incidental to their use; also a large percentage of labor in the operation of twisters is saved.

Tension. In winding soft spun yarn, retention of its elasticity and uniformity of twist is of primary importance, and special attention has been given to this requirement in the construction of the machines, by providing a sensitive, automatic tension device,

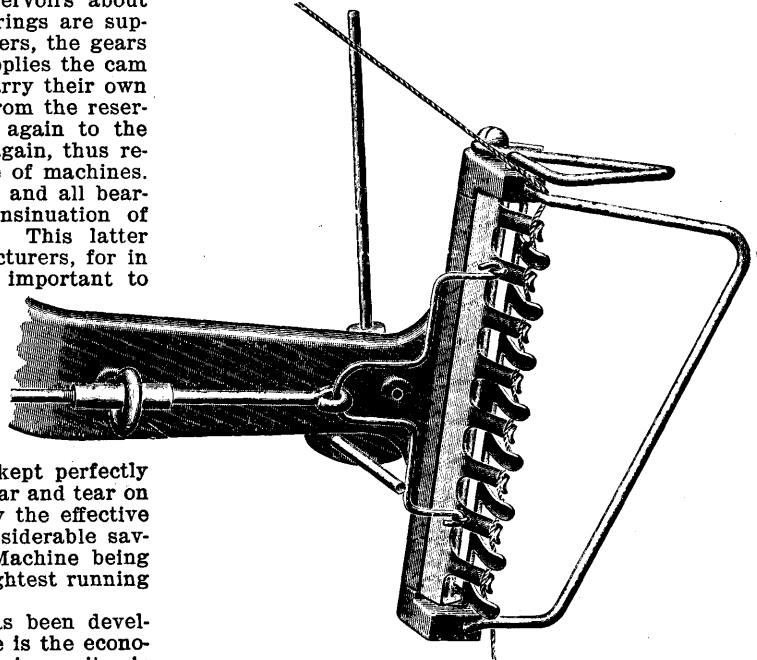


Fig. 2.

as shown more in detail in Fig. 2, the same consisting of highly polished steel blades with rounded surfaces bearing lightly against the yarn. These blades at the same time also act as yarn cleaners, by throwing off the loose specks and knubs from the surface of the yarn. As the package in process of winding increases in diameter, the tension on the thread wound is automatically reduced to compensate for the increased speed at which the yarn is drawn from the supply cop or bobbin. The tension can be adjusted with great delicacy for the finest yarns, thereby avoiding all strain and insuring delivery of thread to the winding spindle with perfect regularity. As the yarn is not injured by being drawn over rough felt pads or rigid supports, it retains all its original elasticity and strength.

Slub Detector and Stop Motion. The machines are also provided with a slub detector of improved design, which can be adjusted to clean all counts and grades of yarn, its object being to automatically stop the winding of the thread by the machine when a slub is present in the thread to be wound, the stopping in winding taking place without having to break the thread, the detecting mechanism acting as soon as the slub comes in contact with the detector rod of the device. A slub refers to any enlargement in the thread, caused by a large knot or bunch of fibres incorporated in a lump into the thread. This new device will enable the operator to readily cut the slub out of the thread and piece it together again in the cone winder; and without having to unwind.

in connection with the winder for doubling purposes, a quantity of combined thread from the package on which it had been wound, in order to find where the

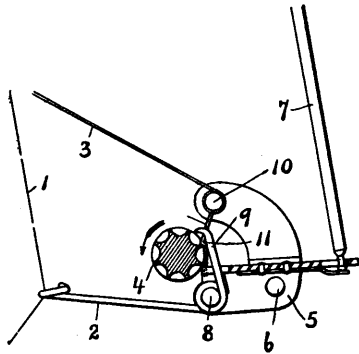


Fig. 3.

“single” began, thus saving a great deal of time and waste material, besides producing a better wind than when the thread on the package had been disturbed.

The new device is made to work in connection with the thread stop motion for automatically stopping the wind when a thread breaks.

the details of both arrangements being best explained by means of the accompanying illustration Fig. 3, which is a side view of the new detecting mechanisms and the stop motion, showing the position of the slub detector when a slub in the thread has caused it to act to stop the winding on the respective cone.

Referring to this illustration, the thread 1 as coming from the cop (see Fig. 1 for it) is passed up through a regular tension arrangement (see Fig. 1 and 2 for it) to a drop wire 2 of the thread stop motion, and then through the eye of this wire to a

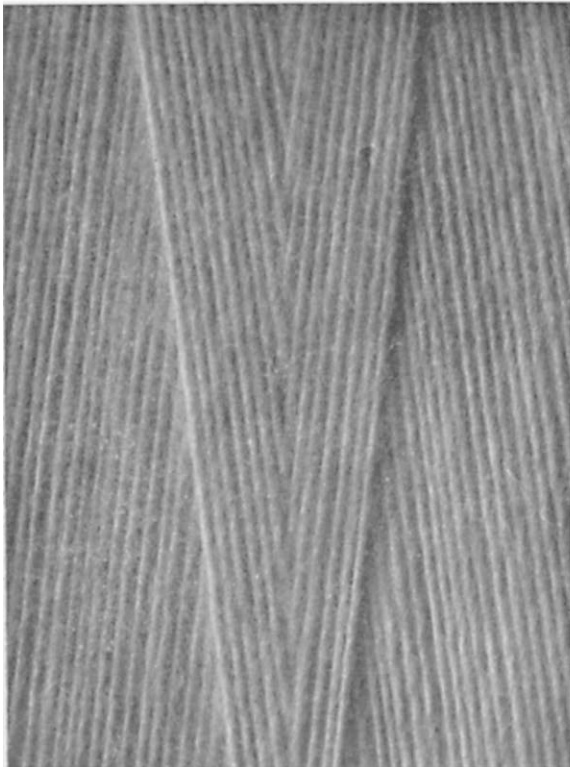


Fig. 4.

detector 3 of the slub detecting arrangement, which is provided at its outer end with a narrow longi-

tudinal slit for the thread to pass through but small enough so as to prevent any slub from passing.

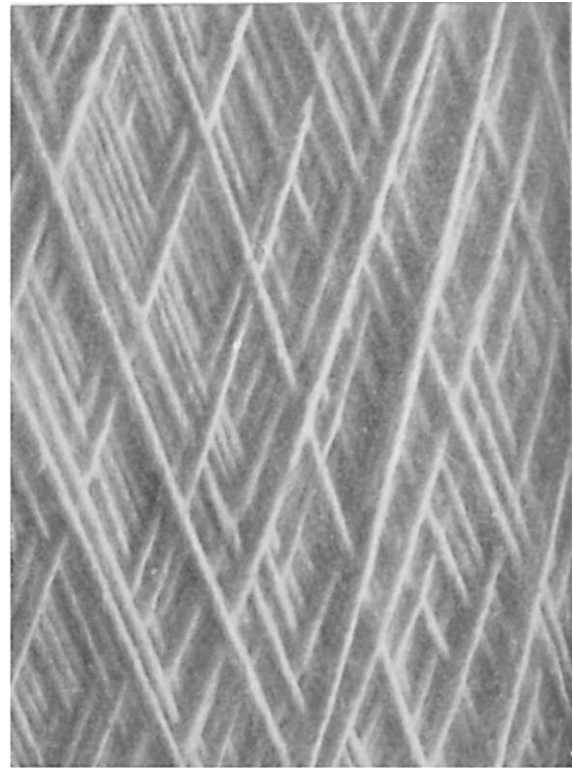


Fig. 5.

From here the thread is passed to the winding arrangement (see Fig. 1 for it).

As mentioned before the two stop motions have a majority of their parts common to both motions, and consist principally of a rotating corrugated roll 4 and a movable plate 5 pivoted at 6, said plate 5 controlling the stop mechanism on the winding machine through the rod 7. The drop wire 2 is pivoted on the plate 5 at the point 8 and has its inner end 9 made hook shaped, so that when the thread 1 breaks and allows the drop wire 2 to fall, the hooked end 9 will come in contact with the rotating corrugated roll 4 and consequently be lifted by its continued movement, which in turn will cause the swing plate 5 to be lifted about its pivot 6, with the outer end connected to the rod 7 moving down at the same time, and through the proper mechanism stop the winding until the thread is pieced up again.

The detector 3 is also pivoted in the plate 5 at an upper point 10, and has its lower end 11 made with a shoulder about half way between the pivot 10 and its extreme end, which will engage with the revolving roll 4 when a slub in the thread comes under the detector 3 and raises it, since it cannot pass through the slit in said arm. The shoulder in the piece 11 prevents it from entering too far into the corrugations of roll 4, but enables the roll to raise it, which in turn through its connection to the plate 5 will raise it about the pivot 6 in the same manner as for the first stop mechanism, and thus prevent further winding until the slub is removed.

From the illustration which shows the detector 3, in the position for stopping the winding, it will be seen that a slub in the thread, instead of breaking

the thread when it comes in contact with detector 3 will raise the latter and slide out of the slit, which will free the thread and at the same time stop the winding through the mechanism described, thus making the matter of cutting out the slub an easy and quick task for the operator.

The advantages claimed for the Universal Winder in comparison with Drum Winders, based upon an average of 15's single soft spun hosiery yarn may be summarized as follows: 40% saving in waste of material; 15% saving in labor cost of winding; 25% saving in cost of packing cases; 25% saving in freight on packing cases; 60% saving in mill floor space; 25% saving in warehouse space; 50% saving in power; 75% saving in oil; 75% saving in labor, (oiling and care of machines).

Universal Winding vs. Drum Winding. Since these two systems are frequently referred to in practical work in the mill, and as possible the average manufacturer is not thoroughly familiar with the difference in the principle of these two systems of winding, the accompanying two illustrations Figs. 4 and 5 are given. As previously mentioned, a thorough description of the Universal method of winding will be found in Part 1 of this work, showing on page 153 a completed package. Fig. 4 shows this Universal method of winding then explained, in connection with a portion of a package magnified, about five times its actual size; Fig. 5 showing (similarly magnified) a portion of a drum wound cone. (Universal Winding Co., Boston, Mass.)

TENSION DEVICE FOR LARGE UNIVERSAL WINDING MACHINES.

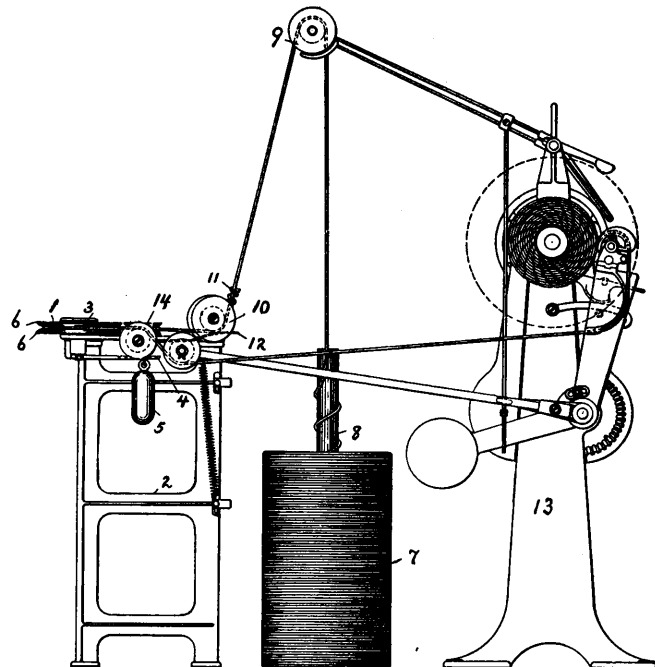
The new device refers to the very large styles of Universal Winding Machines, and is clearly shown in the accompanying illustration, which is a view illustrating the arrangement of the tension device in connection with their No. 7 winding machine, which in this instance is designed for winding heavy cord and twine in Universal packages of from 25 to 50 lbs. each. Hard twisted twine is very liable to kink and tangle in handling, and to avoid this and the knots resultant from breakages, the tension and cord controller is designed.

The tension wheel 1 is a grooved wheel which turns with or about a central shaft extending through an opening in a bearing constituting part of a frame 2, one side of the hub of the wheel lying upon said bearing, and at the opposite side of the wheel is a friction disk 3, which may be brought to bear with more or less pressure upon the side of the wheel, pressing the latter against its bearing, the wheel thus being clamped with more or less pressure between the bearings, so as to increase or vary the friction to any desired extent.

The disk 3 is connected with the shaft to which is pivoted a lever 4, bearing with its short arm upon some part of the frame and supporting an adjustable weight 5 upon its long arm, whereby the pressure upon the disk may be varied as required, while the disk is prevented from turning by the extension of the short arm of the lever into a slot in the frame. The cord or thread is laid in the groove of the wheel, and as the latter must turn with the travel of the thread, the friction applied to the wheel is brought upon the cord or thread, securing the desired tension.

In order to secure a positive adhesion of the cord or thread to the wheel, and at the same time permit it to enter and leave freely the grooves thereof, and also to cheapen and facilitate the construction of the wheel, the same is made of two sections, or parts, each having a hub section and a rim 6, and between the rim and the hub section extends vertically a series of arms, and when the sections are brought together the arms of one section alternate with the arms of the other section. The rims 6 are so disposed that when the sections are brought together the rims will be separated, while the arms extend from the rims toward the hub in such a manner that the arms of one section will intersect those of the other. The arms are bent or projected, each series to one side, so as to enter the spaces between the arms of the other opposite section, forming a substantially V-shaped groove at the rim of the wheel. Such groove, however, instead of having continuous opposing faces, consists of alternate ribs and spaces, so that the thread or cord which is laid in the groove of the wheel, instead of lying in one plane, is waved, being bent over each arm in the opposite recess, whereby even if the thread or cord lies loosely in the groove of the wheel, it will so bite or hold upon the arms thereof that there can be no possible slippage, and the wheel, of necessity, turns positively with the travel of the cord or thread.

In order to carry the thread freely from the supply 7, a post 8 is arranged axially on a line with and within the supply and around which the thread is coiled loosely, as shown, which tends to prevent it from twisting or tangling in passing from the supply. To maintain it in proper position in passing from the supply, a pulley 9 is arranged above or in line with the supply, and in order to direct the thread or cord from the said pulley to the tension wheel 1, a guide pulley 10, arranged as shown, is used.



The Guide Pulley is a grooved pulley, and to direct the thread properly thereto a guide in the form of a coiled wire 11 is used, and which guide is supported by the frame of the machine in proper position; and to prevent the thread from falling out of the groove of the wheel 10 a yielding finger 12 is

used, being a spring finger fastened to the frame and extending into the groove of the wheel below the same or near the bottom and yielding for the passage of knots, etc. From the tension wheel 1 the thread or cord extends to the winding machine 13.

In order to secure an extended arc of contact of cord and tension wheel, the pulley 14, which conducts the cord to the wheel, is arranged as near as possible to the point where the cord leaves the wheel.

The lever bearing the roll 9 is pivoted and maintained at its highest elevation by a spring attached to the frame of the machine. A rod is also attached to this lever connecting with the stopping mechanism of the spindle, so that any depression of the arm will operate to stop the machine quickly. Where the twine in delivery from the package 8 kinks or tangles between that point and the roller 9, the arm is pulled down by the operation of the machine to such a point that the knock-off lever operates before the twine breaks. The operative can then remove the kink, and the arm being restored to its original position, the machine can be once more put in operation, thus preventing breakages and knots in the twine, and producing a better product. (Universal Winding Co., Boston, Mass.)

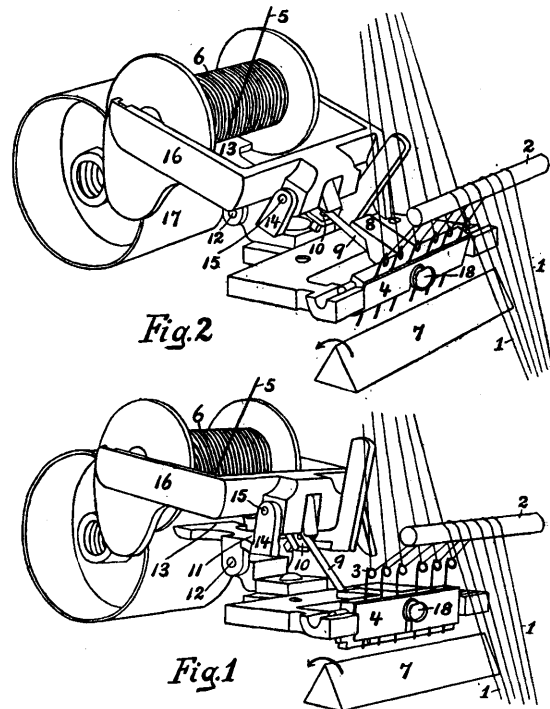
HORROCK'S STOP MOTION FOR HALL'S DRUM SPOOLER.

In the process of winding 2, 3, 4 or more ends together upon one spool for the purpose of afterwards twisting the compound strand into one thread, the requirement is that this winding is done with the minor threads kept at equal tension, with as few breakages as possible, and with the threads continuous in their length, that is, that no minor thread must be absent. Thus, a stop motion is required for these winders, which, if one of the minor threads breaks or runs out for one reason or the other, shall automatically stop the spool as well as the further winding of the unbroken threads, and this must be done before the end of the broken thread is wound upon the spool, since otherwise waste to the wound material would result by being compelled to unwind some of the wound compound thread until getting to the starting of the "single." To prevent this trouble is the purpose of the Horrock's stop motion, which is shown in perspective view in the two accompanying illustrations, showing the motion in its two extreme positions, viz: Fig. 1 shows Spool being driven by drum and winding, and stop-motion wires lifted clear of revolving triangular shaft. Fig. 2 shows spool lifted clear off drum, by raising brake lever—winding stopped—stop motion wires dropped and having been acted upon by revolving triangular shaft.

The threads 1 as coming from their respective cops or bobbins as arranged in the creel or cop or bobbin stand of the machine, are in turn conducted through clearer plates, over a drag board 2, which is adjustable, whence they pass through the eyelets of detector or drop wires 3, as are slidably mounted in a tilting box 4, over the carrier pulleys upon the top box (not shown) of the machine, from which they descend as a compound thread 5 to the spool 6, on their way passing through traverse guides (not shown), which distribute the yarn evenly over the spool. In operation, should one of the minor threads 1 break, the wire suspended upon it drops and comes in contact with the triangular shaft 7, which is revolving in the direction of the arrow. The wires 3, as mentioned before, are mounted in a tilting box 4, from the top of which there is a horizontal projection 8, holding in position a small prop 9, which

is adjustably fastened to a lug 10. A movable brake lever 11 is provided, pivoted at 12, having at its one end a shoe 13 to stop the revolution of the spool when said shoe goes into action, and at the other end a vertical piece 14, having at its upper end a pin 15, which has the spool carrier 16 as well as the lug 10, pivoted upon it. 17 indicates the drum which, by means of friction, rotates the spool.

When one of the threads 1 runs out or breaks, its detector wire 3, being thus liberated by the thread being absent or slack, will drop into the path of the revolving triangular shaft 7, causing in turn to tip the box 4, which in turn will release the prop 9, which then allows the brake lever 11 to rise, while at the same time the spool 6 and its carrier 16 descends to meet the rising brake shoe 13. Through this double movement, the brake is brought into action to stop the spool in half the time that would be taken if the spool did not descend. It is this remarkably quick action which has rendered this machine so popular with the trade. A severe test



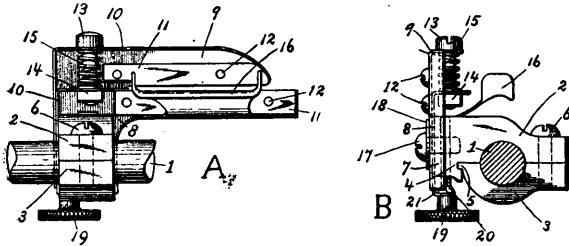
was tried with this machine; that of breaking a thread at each cop or bobbin, the method of breaking being to hold the cop or bobbin, and in each case the end was left at some distance from the spool, thus enabling a new connection to be made without loss of time, omitting the making of waste by breaking the other minor threads as going on the same spool. There is thus no necessity or temptation to the employee to break down all the threads and tie them up together in a bunch knot, the presence of which in doubled yarns so greatly deteriorates them. Another common defect in doubling yarns for twisting, is the laying of the foundation for "corkscrewing," in the latter process, owing to one of the minor threads of the compound strand being wound at a different tension than the others. This trouble is overcome in the Hall winder, a perfectly uniform drag being given to each minor thread throughout

the entire operation of doubling-winding. The machine will wind the most tender yarns, the drag being so easily adjusted that it does not affect the stop-motion, which is quite as quick in its action when winding tender yarns with little drag as it is with coarse yarns where more drag is desired, consequently permitting a change in winding fine counts, and tender yarns to coarse counts and strong yarns, and vice versa, to be made immediately.

When less than six minor threads are to be doubled, loosen thumb screw 18 and remove the respective detector wires for threads omitted from box 4, after which tighten screw 18 again. (F. A. & P. Hall, Lawrence, Mass.)

HOUGHTON'S THREAD GUIDE FOR SPOOLERS.

The object of the improvement is to provide means, on a thread guide for spooling machines, for setting the guide to suit different counts of yarns, as well as for setting the guide to different elevations for different lengths of spools, at the same time providing means for introducing the thread parallel with the face of the thread guide jaws. The improvement consists essentially of a hub which is clamped upon the lifter rail, and jaw carrying pieces stamped from sheet metal, which have a sliding connection with the hub, in turn permitting said jaw carrying pieces to be



moved up or down so as to vary the elevation of the guiding jaws. This sliding connection of the jaw carrying pieces also permits a variation in the width of the slot between the guide jaws to be made to suit different counts of yarn. The accompanying illustrations will give a clear idea of the various parts of the new device.

Fig. A is a front view of the new thread guide, and Fig. B an end view of it showing the positions of the parts in their proper relations to each other. Numerals of reference indicate thus:

1 represents the traverse or lifter rail, which is moved up and down in the operation of a spooling machine and which carries the required number of thread guides. The thread guide consists of two castings 2 and 3, the top casting 2 being provided with a transverse groove 4 for receiving a tongue or projection 5 from the bottom piece 3, said parts being drawn together and fastened onto the lifter rail 1 by screw 6.

Projecting rearwardly from the top clamp piece 2, is a lug 7, forming a vertical way upon which the L-shaped jaw carrying pieces 8 and 9 are either individually or simultaneously adjusted. The jaw carrying pieces 8 and 9 are stamped from sheet metal and are provided with flanges 10 which serve to stiffen said jaw carrying pieces and also permit them to be fitted accurately together.

Mounted in each of the jaw carrying pieces 8 and 9 is a steel jaw piece 11, adjustably secured in place by screws 12.

To regulate the space between the steel jaws 11 in order to set the guide to different numbers of thread, a screw 13 is provided, which is threaded into a nut 14 and has a coiled spring 15 mounted on it, normally tending to separate the thread guide jaws 11, so that by tightening the screw 13, the slot between the jaws can be narrowed, while by loosening said screw, the slot can be widened.

In order to prevent the thread from binding while passing between the thread guide jaws 11, it should pass between the jaws on a line parallel with their faces, and to accomplish this, the lower L-shaped jaws carrying supports 8 are provided with an extension 16, having a rounding upper surface for guiding the thread in the desired direction and turned up ends acting as stops for preventing the thread from passing out from between the thread guide jaws 11.

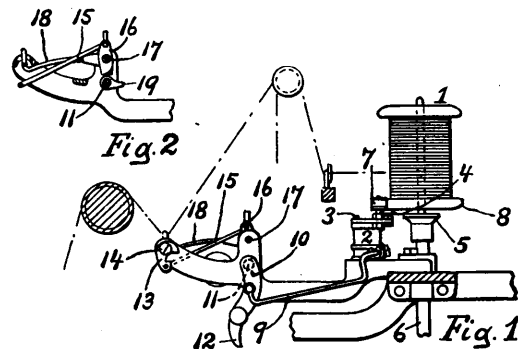
To secure either an individual or simultaneous adjustment of the jaw carrying pieces in the thread guide, the clamp screw 17 is turned to loosen the washer 18, which holds the jaw carrying pieces 8 and 9 in place, and when this has been done the jaw carrying pieces can be adjusted with respect to each other by turning the adjusting screw 13, or the jaws may be simultaneously raised or lowered to the desired position to compensate for variations in the lengths of spools. This last adjustment can, if desired, be done by hand, but an adjusting screw 19 is provided for the purpose, having a circumferential groove 20, which is engaged by a finger 21 extending therein from the jaw carrying piece 8.

When the thread guide is provided with an adjusting screw 19, the jaw carrying pieces 8 and 9 need not be clamped in place by the screw 17, but said screw and its washer 18 may be employed simply to hold the jaw carrying pieces in place, so that the adjusting screw 19 may be manipulated at any time without first loosening the screw 17. (L. T. Houghton, Worcester, Mass.)

PAYNE'S STOP MOTION FOR SPOOLERS.

The object of this motion is to stop the rotation of the respective spool when a thread breaks. The motion is so arranged that upon the breakage of a thread, the fallen drop wire will be automatically returned to its raised position, in which position the eye of the drop wire can be readily threaded for the continued operation of that spool.

This stop motion consists principally in an arrangement for raising the spool slightly when a thread breaks, in order that it may be stopped without hav-



ing to stop the rotation of the spindle carrying it, and also in the arrangement for raising the drop wire to its normal position to be threaded again. The

details of the motion, as well as its method of operation, are best shown by means of the accompanying illustrations, of which Fig. 1 is a side view of the stop motion, showing the parts in the position after a thread is broken, and Fig. 2 is a side view, partly in cross section, of a portion of the arrangement for raising the drop wire into position after a thread breaks.

Referring to the illustrations, 1 indicates the spool upon which the thread is being wound. Situated in front of the spool is a loose sleeve 2, pivoted at 3, and having at its lower end a spring arrangement which tends to move said loose sleeve 2 to the position shown in Fig. 1, in its normal position, being entirely out of contact with the spool.

Situated on top of the loose sleeve 2 is a loose pin 4, which, when a thread breaks, comes under the spool 1 and raises it off of the supporting disk 5 of the spindle 6, and by means of a loose rubber wheel 7 coming in contact with the lower rounded head 8 of the spool, thus stops its rotation. Connected to the lower portion of the loose sleeve 2 is a rod 9, the other end of which is loosely connected to a gravitating catch lever 10, said lever being attached to a shaft 11. In its normal position this lever 10 is held practically horizontal by having its end 12 held by a catch 13 as pivoted at 14. It is through this catch 13 that the loose sleeve 2 is permitted to be acted upon by the spring arrangement, previously mentioned, and thus have the pin 4 to raise the spool.

Connected to the catch 13 is a rod 15, its other end being secured in a lever 16 as pivoted at 17, the drop wire 18 being also pivoted at 17 and movable with the lever 16. The drop wire is held in the position shown in Fig. 2 by a thread passing through its eye,

and when said thread breaks, the end of the drop wire will fall and by its connection with the lever 16, will cause the same to move slightly to the left and through the rod 15, push the catch 13 out of contact with the catch lever 10, thus allowing the latter to act as previously explained.

On the same shaft 11, which the catch lever 10 is attached to, is a wiper arm 19 as seen in Fig. 2, and consequently when the catch lever 10 is released and swings down, it partially rotates the shaft 11 and thus causes the wiper arm 19 to press against the lower end of lever 16 and bring it back to its former position, and at the same time, the drop wire 18, through its connection with said lever, will be brought back to its normal position ready to be threaded again. When the thread which was broken has been properly pieced up, the catch lever 10 is snapped back into the catch 13, which action causes the spool to drop into its regular working position and begin to wind the yarn again. (George W. Payne & Co., Pawtucket, R. I.)

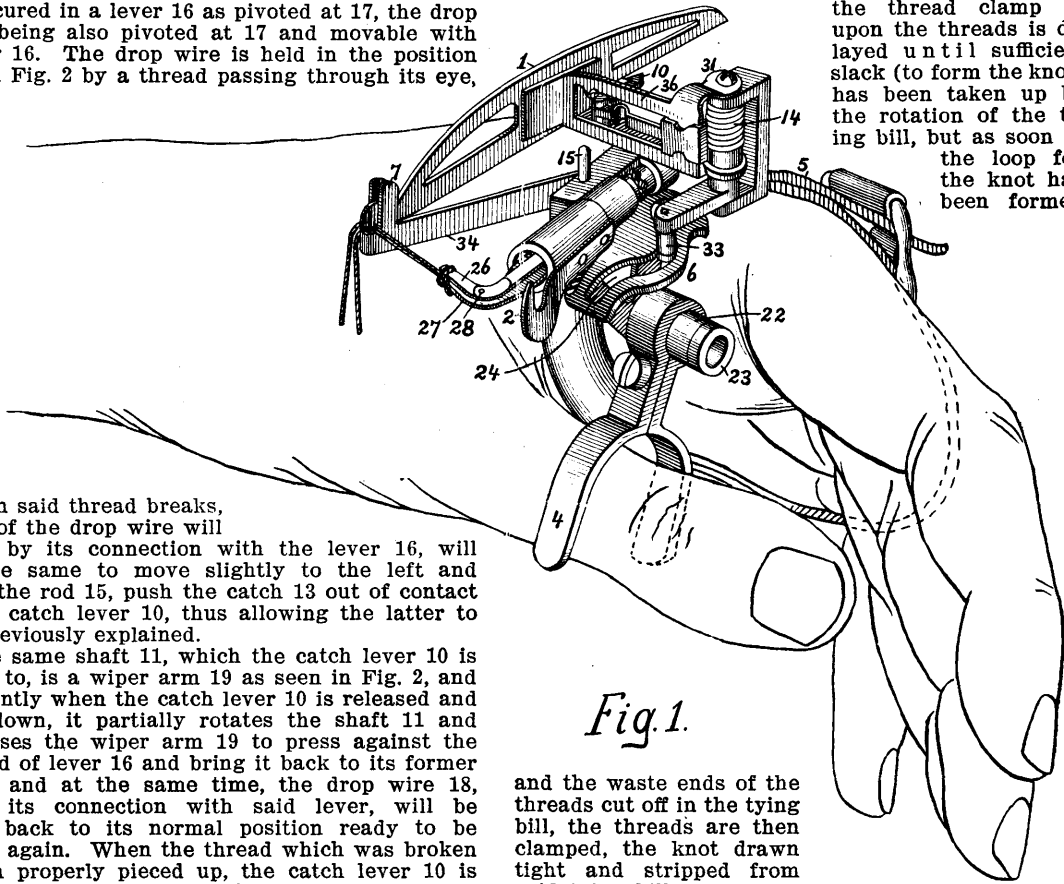
THE BARBER KNOTTER.

This device is designed to tie a spooler's knot more quickly and better than is possible with the use of fingers only, and in its working, comprises three principal operations in order to make the completed knot, viz.: making the loop for the knot, cutting the ends of the two threads to be united, and then making and drawing the knot tight.

A perspective view of the knotter is given in Fig. 1, showing said knotter as adjusted to the hand for operating, the mechanism being in the act of tightening the knot and stripping it from the tying bill. Fig. 2 is a top view, partially in cross section, showing the two threads being operated upon. Fig. 3 is a horizontal cross sectional view through the barrel of the knotter.

In order to tie a knot, two threads are laid by the operator on the side arm 1 and over a thread guide 2, said threads passing intermediately, over the tying bill 3 of the knotter. When the threads are placed in this position, the thumb lever 4 of the implement is depressed by the thumb of the hand upon which said implement is mounted, and this movement is communicated by suitable mechanism to the tying bill 3 to rotate the latter. This tying bill is rotated through about one and one-third revolutions, thus, owing to its shape, winding the threads about said bill, cutting off and clamping them, so that the threads may be tied together with very short ends.

The clamping action of the thread clamp 34 upon the threads is delayed until sufficient slack (to form the knot) has been taken up by the rotation of the tying bill, but as soon as the loop for the knot has been formed



and the waste ends of the threads cut off in the tying bill, the threads are then clamped, the knot drawn tight and stripped from said tying bill.

In the operation of the knotter, the left hand of the operator is slipped within the handle strap 5, the loop having been adjusted to the size of the oper-

ator's hand. The thumb is placed within the thumb fork 4 and the latter thrown to its highest position by an upward movement of the thumb, whereby the parts are placed in the first or initial position for tying the knot. The ends of the threads to be united, grasped side by side, are then placed by an outward movement of the right hand of the operator over the side arm 1 and the thread guide 2, as mentioned. These pieces being inclined downward, the two threads naturally seek the forward ends of the side arm 1 and the thread guide 2, passing across the tying bill 3. A downward pressure upon the thumb piece 4, moves a sector cam gear 6 and thus rotates the tying bill 3. A movement of the thumb piece, sufficient to cause the parts to assume the second position, *i. e.*, to rotate the tying bill through three-quarters of a revolution, causes the clamping fingers 7 to move forward on the side arm 1 and clamp said threads within the hooked forward end of said side arm 1. This clamping of the threads, however, is not done until the tying bill has taken up sufficient slack to form the knot. In this second position, as shown in Fig. 2, the shearing and clamping jaw 8 of

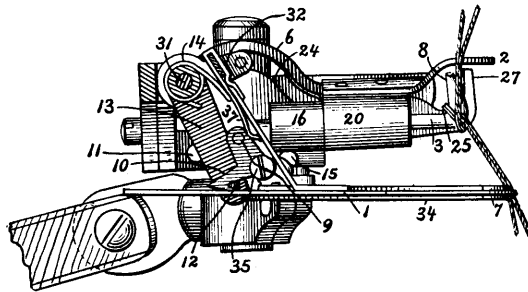


Fig. 2

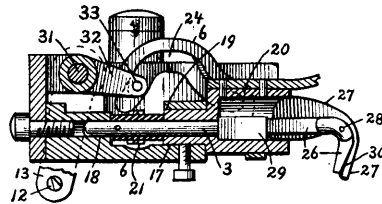


Fig. 3

the tying bill stands open to receive the ends of the threads, as passing over said tying bill to the thread guide 2, which, as the bill passes from the second to the third position, said jaw 8 shears on side nearest the thread guide 2 and clamps on the side toward the side arm 1. A further rotation of about one-quarter or one-third of a revolution of the tying bill places the parts in the fourth and last position assumed by the mechanism, as shown in Fig. 3. During this last movement, the side arm 1, with the threads clamped within the hook at the forward end of said arm by the clamping fingers 7, is swung outward upon its pivotal support, thus taking up the slack in the threads that is made just as the tying bill turns toward the side arm 1, and as the knot is drawn from said bill, the short ends of the threads are pulled from the clamping jaws of the bill. Just after this time, a trigger pin 9 of a catch 10 is brought into contact with a trip pin 11, said catch being rocked upon its pivot against the action of a spring, and thus the engagement between the end of the catch 10 and projection 12 on the bell crank arm 13 is broken. The spring 14 as tending to separate the side arm 1

from the bell crank arm 13 then throws said side arm forward and back to its normal position against the stop pin 15. In order to get all of the parts back into the first position, the thumb of the operator is moved upwardly.

In order to explain the different operations more clearly, a detailed description of the construction of this Knotter will now be given. 16 is a standard, having eccentric openings 17 and 18 passing through it, which together with an eccentrically placed sleeve 19 of the cam barrel 20, fitting into the opening 17, hold the tying bill 3. The tying bill 3 has a spiral pinion 21 secured to it near its rear end, which is rotated by means of the sector cam gear 6 which has teeth similar to those of the spiral pinion. This sector cam gear 6 has a hub 22 to which is secured the thumb piece 4, thus the tying bill 3 is rotated by the movement of the thumb of the operator, the hub 22 being movably placed on a stud having a flanged head 23. The sector cam 6 is also provided with a cam groove 24, which groove is of an outline resembling that of the letter U, with its arms widespread and curved outwardly at their upper ends.

The cam barrel 20, as its name indicates, has its inner surface made somewhat irregular, it being substantially of heart shape in transverse section.

The tying bill 3 is flattened for about one-half of its length by being cut away, and the forward end of this cut away portion is turned back a little more than at right angles to the length of the shaft, at the point 25, to form the clamping jaw 8. Two similarly shaped pieces at the ends 26 and 27 are pivoted on the pin 28 which is secured to the tying bill 3. The bill spring 26 is made of thin spring material, and its rear end is held in place beside the tying bill by means of a sleeve 29, which practically surrounds said tying bill 3. This bill spring 26 is provided with a shear edge 30, the shank of the bill spring being bowed outward slightly near its middle and twisted spirally a very little, in order that the cutting edge of said bill spring shall bear against the cutting edge of the shearing and clamping jaw 27, which lies between the tying bill jaw 8 and the bill spring 26, with a uniform pressure from heel to point. As was mentioned, the jaw 27 is pivoted on the pin 28, one side of said jaw being provided with a shear edge to coincide with the shear edge 30 at the inner edge of the bill spring 26. The rear end of the shearing and clamping jaw 27 is made quite wide, so as to engage opposite sides of the cam barrel 20, and thus be operated by it in either direction with a positive motion.

The shearing and clamping of the threads are accomplished by the action of the cam, during the rotation of the tying bill 3.

The movement of the mechanism for tightening the knot is accomplished by means of the cam groove 24. Pivoted at 31 is a bell crank lever having the arms 32 and 13. A roller 33, secured on arm 32, lies in the cam groove 24, and thus as the cam is moved, the arm 32 is given a lateral movement. The other arm 13 carries the thread clamp 34, having at its forward end the two upwardly extending spring fingers 7. The thread clamp 34 is connected with the outer end of the arm 13 by means of a knife edge pin 12, which in turn allows the connection to be broken at the proper time. The spring latch 10 is pivotally mounted at 35 on the bracket 36 which is loosely mounted on the pivot 31, and carries the side arm 1, and as the outer end of catch 10 is engaged with the pin 12, when the lever 13 is moved backward, the side arm 1 is thrown outwardly, this movement continuing until the catch pin 9 on the catch 10 comes in contact with the trip pin 11, thus stopping said catch pin, and as the arm 13 continues its movement, the catch is moved on its pivot 35 and thus releases its outer end from the knife edge pin 12.

A spring 14, coiled about the pivot 31 is attached at one end to the arm 13 and at the other end to the bracket 36, and by its elasticity tends to hold said arm 13 and bracket 36 apart; thus when the bracket 36 is released, it immediately swings back to its original position, against the stop pin 15. After the catch pin 9 of the catch 10 is out of contact with the stop pin 11, which occurs with the backward swing of the side arm 1, a spring 37 which presses against the catch 10, puts it again in position so that the outer end of said catch may engage the knife edge pin 12 of the arm 13 when it is returned by the action of the cam groove 24. (Barber & Colman, Rockford, Ill.)

spindle, and in this manner stopping the rotation of said spindle. The yarn traverse motion consists of

SIPP'S IMPROVED SILK QUILLER.

The object of this machine is to wind silk yarns into the form of cops for use during weaving. The cops are produced on spindles in the machine which receive constant revolution, said cops being built up by means of a traverse and yarn guiding motion. The size of the cop itself controls the building of the cop by having a wheel in contact with the upper portion of the cop, the friction between the two causing the cop to rotate the wheel, and this latter being on a rod, threaded through a projection of the traverse motion, causes said rod to work itself outwardly and the wheel just out of contact with the cop. The yarn guide is connected to the threaded rod, and by moving outwardly with it, guides the yarn on to successive portions of the spindle, thus producing the desired build of cop. Each cop is controlled individually by its contact wheel, so as to insure of each cop being firm and evenly built up.

The details of the construction and operation of the machine are shown by means of the accompanying illustrations, of which Fig. 1 is an end view of the machine, showing more especially the traverse arrangement, and Fig. 2 is a top plan view of an end portion of the machine, corresponding to the end shown in Fig. 1.

Referring to the illustrations, 1 indicates the driving shaft of the machine, on which are secured friction disks 2, and these in turn drive the spindles 3, separately, through the respective friction cones 4 on the ends of the said spindles 3. The spindles 3 are held by special bearings 5 and 6 respectively, the latter being secured in a pivoted holder which is actuated when a cop is full and swings that end of the spindle so that the other end carrying the friction

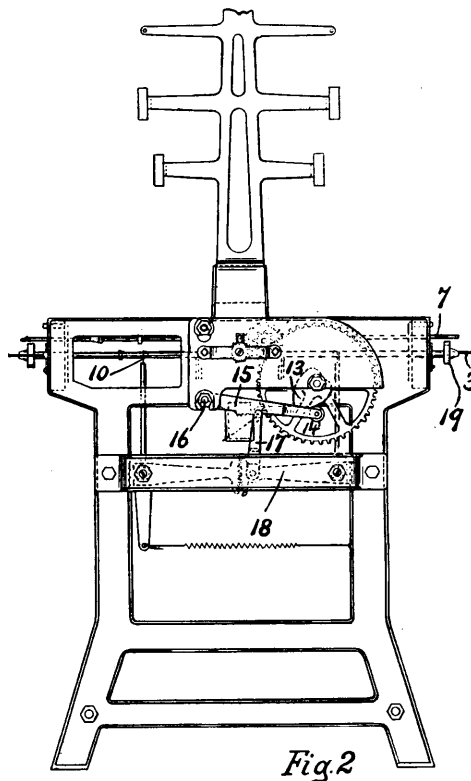


Fig. 2

yarn guides 7, the eyes of which are directly over their respective spindles, and the back ends are connected by forks 8 to threaded rods 9. The threads on these rods work in threaded bearings 10 on the top of their respective rods 11, which are secured to a shaft 12. It is through the partial backward and forward rotation of this shaft 12 which gives the traversing motion to the thread guides, so that they may properly build the cop. The partial rotations of the shaft 12 are obtained from a cam 13 which is positively driven, through the gears shown, from the main shaft 1. The cam 13 presses on a roller 14,

carried by a lever 15 as pivoted at 16, and this lever in turn presses against a lever 17 connected to one of the two arms 18 which are formed with teeth at their point of contact and are connected at their other ends to the shafts 12 respectively, thus imparting motion to them. The length of the stroke or traverse may be varied by placing the end of the lever 17 in different notches on the lever 15.

The method of building the cop is to gradually change the position of the yarn guide eye as the cop becomes larger, and is done by the use of a contact wheel 19 on the end of each rod 9. This wheel is so placed that as yarn is wound on the spindle, the wheel will come in contact with the yarn, and owing to the rotation of the spindle will also be rotated. This rotation will cause the threads on the rod 9 to work themselves through the threaded

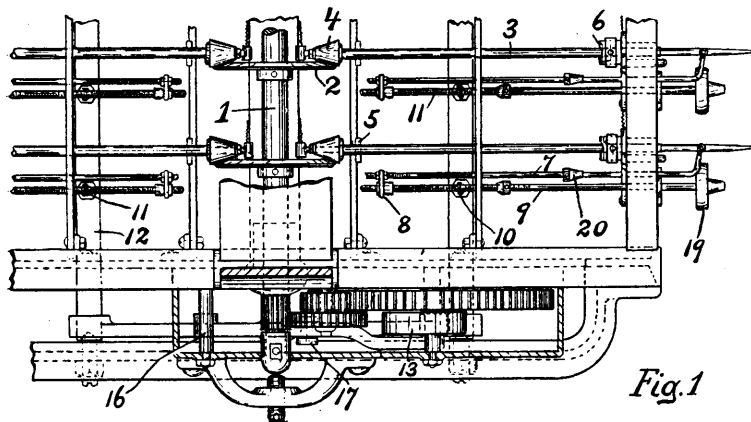


Fig. 1

cone 4 will be thrown out of contact with the friction disk 2, the bearing 5 being used as a pivot for the

also be rotated. This rotation will cause the threads on the rod 9 to work themselves through the threaded

bearing 10 and thus cause the rod to move outwardly. When the rod 9 is moved, through the connection at 8, the yarn guide rod 7 is also moved outwardly and thus guides the yarn on to successive portions of the spindle. The motion of the rods outwardly is very gradual, and the cops are thus made firm and smooth. A dog 20 is provided on each traverse guide rod 7 to regulate the length of the cop built, by coming in contact with the bearing arrangement at 6 when the cop is of the proper length, and releasing a catch which frees the holder of the bearing, causing the latter to swing around so that the friction cone 4 will go out of contact with friction disk 2 and thus stop the winding on of the yarn. The spindle is easily set again by simply snapping it back into place when the dog 20 is out of the way. The yarn guide rod 7 and the rod 9 are re-set by simply lifting the threaded part of the latter rod out of contact with its threaded bearing and pushing them backwardly, then allowing the threaded rod to enter again into the threaded bearing. (Sipp Electric and Machine Co., Paterson, N. J.)

GOODWIN'S IMPROVED WOOL AND WORSTED SPOOLER.

These spoolers are used to wind wool or worsted yarns from the bobbins on to a spool, said spools of yarn being afterwards used in the creel of a dresser or warper in making the warp for the loom.

Several improvements have been added to this spooler, among which are, to use a plain surfaced compression roller which is sustained in end journals and may be easily moved out of and into con-

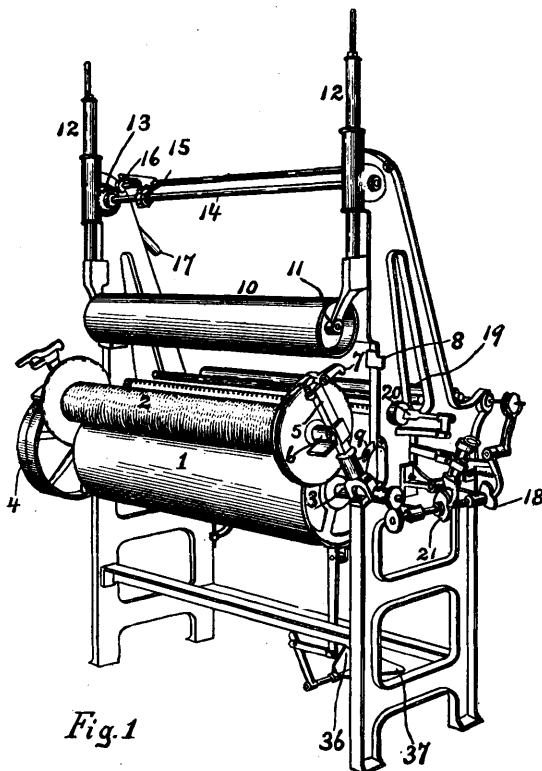


Fig. 1

tact with the spool on which the yarn is wound, besides this, said roller is retained in a stationary posi-

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tion while changing spools. The bearings for the journals of the spools are made movable and serve to sustain the spool not only during the winding

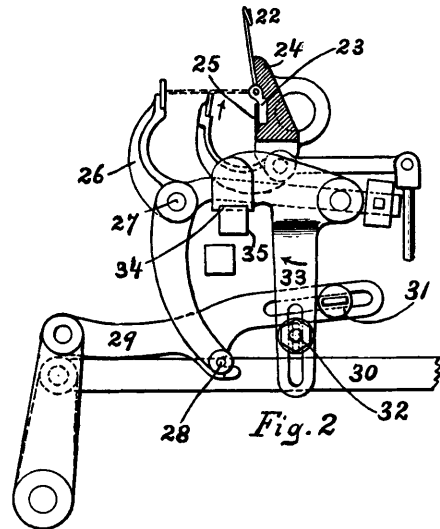


Fig. 2

operation, but also while the operator severs the thread from the full spool, preparatory to removing it from the machine and thus saves the operator the trouble of sustaining the full spool with his knee while he severs the threads. An arrangement for varying the stroke of the traverse guide is also provided to suit different conditions of winding, and besides this, the relative direction of reciprocation of the front guide and the yarn guides that lead the threads into the machine can be changed.

The construction of the machine is best explained by means of the accompanying illustrations, of which Fig. 1 is a perspective view of the machine, showing the parts in the position they occupy when a full spool is being taken out. Fig. 2 is a detail view of the principal parts of the stop motion. Referring to the illustrations, 1 indicates the driving drum of the machine which rotates the spool 2 by means of frictional contact, said drum being covered with cloth or leather to aid in rotating the spool by increasing the friction. The shaft 3 of the drum is supported in bearings in the frame of the machine and has the driving pulley 4 secured to it at the left hand end. Loosely mounted near each end of this shaft 3 are upright arms 5 carrying the bearings 6 for the journals of the spool 2. The top of each arm 5 has a latch 7 which catches on projections 8 on the frame of the machine and hold the bearings in a vertical line while winding, and which are loosened when desired to put the spool in the position for doffing (as shown in illustration), said bearings being prevented from swinging too far, by means of a piece 9. The bearings 6, of course, are movable on the arms 5 and are gradually raised as the spool becomes full. From the special shape of the bearings, and having the arms on which they slide made movable, it will readily be seen that doffing full spools is made very much easier for the operative who formerly had to support partly by one knee while the threads were severed.

The compression roller 10 is held in bearings 11 which are placed within the end rims of the roller, thus allowing said compression roller to go between the ends of the spool without hindrance. These bearings are secured to the lower ends of upright racks 12 which carry the required weights (not shown) for the roll on top of said racks. These racks

are in mesh with gears 13, secured on shaft 14, which also carries another gear 15, having a pawl 16 in contact with it to keep the compression roller 10 in a raised position while doffing a full spool, said roller being raised by moving the lever 17, as attached to the shaft 14, downwardly.

The traverse and guiding arrangement for the threads to the spool consists of a thread guide which is given a reciprocating movement from a cam 18 through the levers shown, said guide being mounted in bearings on each side of the machine. From the thread guide, the threads pass over a roll 19, then separately through wires connected to the stop motion, and from there to another reciprocating guide rod 20, which receives its motion from a cam 21 through the levers shown. The levers are arranged to vary the traverse of the guide rod both as to distance as well as position in relation to the spool, as may be required by said spool. From this guide rod, the threads are wound on to the spool.

The stop motion controlling the passage of the threads is shown in Fig. 2, where each drop wire 22 is pivoted on a foot 23, said feet being inserted in a guideway of a bar 24, the feet being retained in said guideway by a plate 25, secured to said bar. The feet 23 are inserted loosely in the guideway of the bar, so that they may move laterally, as necessity requires, to adapt themselves to the line of the threads. When a thread breaks, the wire 22 drops to the position shown in dotted lines, that is, it comes in the path of a vibrating lever 26, as pivoted at 27 and having its lower end carrying a pin 28 which fits into an open slot in a lever 29, the latter being vibrated from an eccentric on the machine through lever 30 and the connections shown. When the vibration of lever 26 is stopped, the pin 28 slides out of its slot in the lever 29, causing the latter to fall so that as it moves to the left, a stud 31 comes against a stud 32 on a lever 33 and moves it in the direction of the arrow. This movement raises the end 34 out of contact with the belt shifter piece 35 and allows a spring to move it, thus shifting the belt to the loose pulley and stopping the machine. Through lever connections, the machine may be stopped by a lever 36 of the treadle arrangement, and re-started by the lever 37 independent of the stop motion after being once set. (Davis & Furber Machine Co., North Andover, Mass.)

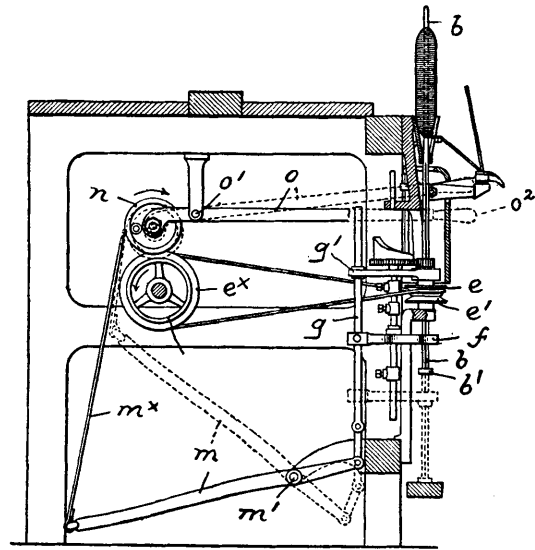
STINSON'S COP WINDER.

The same is of the vertical cop winder type, having means provided for automatically withdrawing the spindle from the cop when the same is filled.

The accompanying illustration is a sectional side elevation of this cop winder, clearly showing the mechanism for removing the spindle from the cop. On the frame of the machine is fulcrumed at o^1 a lever o , provided at one end near the front of the machine with a handle o^2 and at its other end with a wheel n arranged over the driving pulley ex . On this wheel n is fast a strap m^x connected to one end of a lever m as pivoted at m^1 . The other end of this lever m is connected to a rod g , sliding in bracket g^1 as secured to the frame of the machine. Said rod also carries a forked arm f surrounding the spindle b , which in turn carries a collar b^1 on its lower portion and also the fast and loose pulleys e and e^1 .

When the cop is full and ready to be taken off, the operator moves the handle o^2 into its raised position, causing the wheel n to come into contact with the driving pulley ex , thus winding the strap m^x onto wheel n , in turn moving the lever m into its dotted line position, bringing the forked arm f on rod g into

engagement with the collar b^1 , thus forcing the spindle out of the cop.



After the operator has removed the cop, the handle o^2 is pushed down, thus returning the parts to their normal working position. (Lindsay, Hyde & Co., Philadelphia, Pa.)

ELECTRIC STOP MOTION FOR DENN WARP-ERS.

The object of this motion, as its name indicates, is to stop the machine by electrical connections when a thread breaks in its passage from its spool in the creel, at the back of the machine, to the beam, in front of the machine, on which the threads are being wound. The construction of the stop motion is based on the completion of an electric circuit by a detector wire dropping, when its warp thread breaks. The circuit wires, carrying a current of electricity and having an electromagnet on it, energizes the latter and causes it to attract a lever to itself which will in turn allow a spring to shift the belt shipper and put the belt on to the loose pulley.

The detector wires through which the threads pass separately are loosely pivoted on an upright piece which forms one terminal of the circuit, the detector wires being arranged on the upright piece so as not to interfere with any movement of each other. Situated just behind this upright piece is a contact strip which forms the other terminal for the electric circuit, so that when a detector wire swings down on its pivot, it forms a contact with the strip and thus completes the circuit with the consequent shifting of the belt from the fast to the loose pulley.

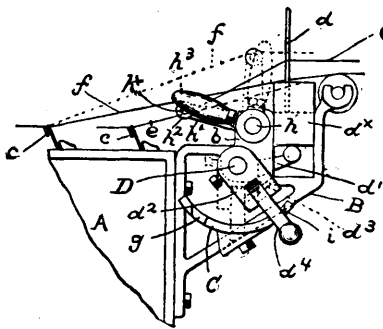
The thread, after passing through the eye of the detector wire, is passed through a hook on the same upright piece which holds the detector wires, and thus offers more support for the latter and at the same time, provided the thread becomes slack, prevents the stop motion to operate.

Owing to the special shape of the detector wires and the space between their pivots and the contact strip, when a detector wire falls on the breakage of a thread, the wire does not make a solid impact with the contact strip, but instead it has a slight rebound which causes it to strike two or three times before becoming stationary, which action tends to prevent the surface of the contact strip from becoming oxidized and making an unsatisfactory electric contact. (Globe Machine Works, Frankford, Pa.)

LEASE FORMING MECHANISM FOR DRAPER WARPERS.

The illustration is a side elevation of such a portion of a warping machine required to be shown, with the mechanism applied thereto.

A rock shaft *h* is mounted in bearings *b* of brackets *B*, secured to the frame *A* of the warping machine and having secured thereto the hubs of rocker arms *h*¹, the free ends of which have positively connected therewith a warp-separating rod *h*^x, the ends of the rod being tightly inserted in eyes *h*² of the arms *h*¹. The warp threads are divided into two series, one series *e*, after passing through the drop wires *c*, extend under the warp-separating rod *h*^x and then



through the notches of the dents *d*, while the threads *f* of the other series pass above the rod *h*^x and between the dents.

In the illustration the dents *d* are shown raised, elevating the threads *e* well above the threads *f* into

full line position *e*¹, forming a shed for the passage of the lease thread between the warp threads *e* and *f*, while the threads *e* are uppermost. After the lease thread is inserted the dents are lowered, the threads *e* being thereby lowered to dotted line position, and the handle *h*³ is turned into dotted line position, raising the rod *h*^x, and thereby elevating the threads *f* into dotted position *f*¹, making a second shed, with the threads *f* uppermost, and the lease thread is passed therethrough. The handle *h*³ is swung past dead centre when the rod *h*^x is elevated, so that the latter will be maintained elevated until the lease has been effected.

To elevate the dents when it is desired to elevate the threads *e*, a rock shaft *D* is provided, having rounded rocker arms *d*¹, which extend at their free ends beneath the dent box *dx*. The projecting end of the rock shaft *D* has fast thereon an arm *d*², to which is pivoted at *d*³ a handle *d*⁴ adapted to enter one of the notches *g*, *i*, in a locking plate *C*, secured to the adjacent bracket *B*. When said handle is swung to the right, the dents *d* will be raised, the handle being placed in the locking notch *i* to maintain said dents elevated.

After the lease has been formed, with the threads *e* uppermost, the handle is unlocked, swung to the left, rocking the shaft *D* to lower the dents, and said handle is placed in the locking notch *g* and there held until the dents are to be again operated. (Draper Co., Hopedale, Mass.)

MEASURING MECHANISM FOR DRAPER WARPERS.

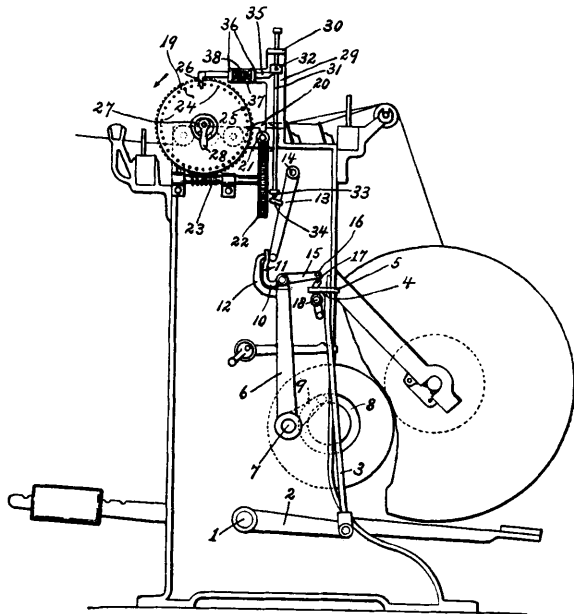
The object of the mechanism is to provide a simple and efficient measuring motion, which may be set to measure a certain number of yards of warp, and which will automatically stop the warper when the required amount has been wound on to the warp beam. The mechanism acts in connection with the regular thread stop motion, and its connection on

the machine is shown in the accompanying illustration, which is an end view of a warper with its parts shown in their relation to each other.

In the illustration, 1 indicates the shaft which operates the belt shifter (not shown). On this shaft 1 is connected a lever arm 2, the other end of which is jointed to a vertical rod 3. Near the top end, this vertical rod 3 is provided with a shoulder 4, which when the warper is running, remains pressed against the under side of the plate 5. A vibrating arm 6, centered at 7, and which gets its motion from the cam 8 through the lever 9, carries a bell crank lever 10, one lever of which 11, extends upward between the bent piece 12 of the vibrating arm 6, and the end of the vibrating lever 13 centered at 14. The other end, 15, of the ball crank lever 10 extends out horizontally and carries a pin 16, which when the arm 11 is held firmly, just goes over the lever 17, centered at 18, the other end of which presses against the vertical rod 3. If the lever 13 is prevented from vibrating, the arm 11 is freed and the other arm 15 falls, because of its weight, and the pin 16 comes behind the lever 17 and pulls it forward, thus causing the other end to press the vertical rod 3 back, which frees it, and through connection mentioned, stops the machine.

The principal parts of the measuring motion consist of a disk 19 which is driven from the measuring roll 20 through the worm 21, the gear 22 and the worm 23 through connections shown. It is provided with holes 24 to receive a peg 25, which in turn will come against a projection 26 during the revolution of disk 19, and pull it forward.

The disk 19 is centered on an eccentric 27 which has a handle 28, and can thus be raised out of contact with the worm 23 and set in any desired position by hand. A bracket 29 on the frame has a guide 30 for an upright headed slide-rod 31 provided with a collar 32, and having its lower end guided by a fixed collar 33 on the main frame, the lower end of the slide-rod 31 being normally held out of the path of a lug 34 on the vibrating arm 13 by



an arm 35, which is slidably mounted in guides 36 on the arm 37 of the bracket 29 and a spring 38 inserted between the guides 36 on the arm 35 to keep

one end under the collar 32. The opposite end of arm 35 is bent downward at 26 and, as mentioned before, is in the path of movement of the pin 25, so that when the rotation of the disk 19 brings the pin 25 into engagement with the part 26 the arm 35 will be drawn out from beneath the collar 32, thus causing the slide rod 31 to descend into the path of the lug 34 and stop the vibration of the arm 13, which in turn, through the mechanism before described, stops the machine.

By having the proper numbers of teeth in the gears 22 and 19 and the worms 23 and 21 correct, one revolution of the disk gear 19 will represent a certain number of yards wound on the warp beam, the space between the holes 24 in turn each representing a certain number of yards. Thus by selecting a zero point on the disk and setting the peg 25 in the correct hole, when the correct number of yards have been wound on the beam, the peg will come against the projection 26, and as explained before, the machine be stopped. (Draper Co., Hopedale, Mass.).

EASTWOOD'S WARPER.

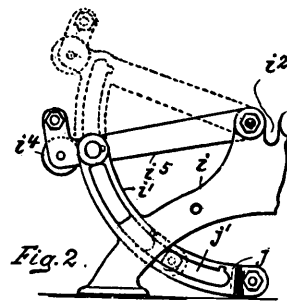
In this warper means are provided whereby the constantly increasing tension on the yarn, as the diameter of the warp on the beam increases is compensated for, in turn effecting a uniform tension to the warp threads throughout the entire operation.

Fig. 1 is a top plan view of this warping machine. Fig. 2 is a side view of part of the tension mechanism, and Fig. 3 is a sectional view of the indicating mechanism.

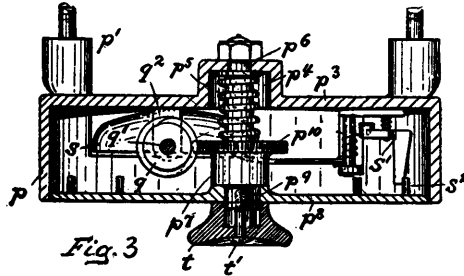
The frame of the warper is surmounted by two bed plates *a*¹, *a*², the one, *a*¹ being larger than the other and provided at one corner with a projection. *b* is the main drive shaft, journaled beneath the bed plate *a*¹, and being slightly movable longitudinally in its bearings. The shaft *b* carries at one end a friction disk *b*¹ and at its other end a pulley *c*. A bracket *c*¹ projects outwardly from the frame and carries a set screw *c*², around which is coiled a spring which tends to force the shaft in toward the frame.

Connecting the two side frames of the machine are two rods *d*, provided with brackets *d*¹, one of

gear *e*⁴ mounted on shaft *e*² as journaled in brackets *e*³ on the frame of the warper. The brackets *e*³ also form supports for a movable rack bar *f*,



the teeth *g*³ of which mesh with a pinion *g*², which meshes with a train of gearing *g*¹ as mounted on the projection of the bed plate *a*¹. The shaft *e*² carries a friction wheel *e*⁶ which bears on the large friction disk *b*¹; thus by rotating the crank *h* on

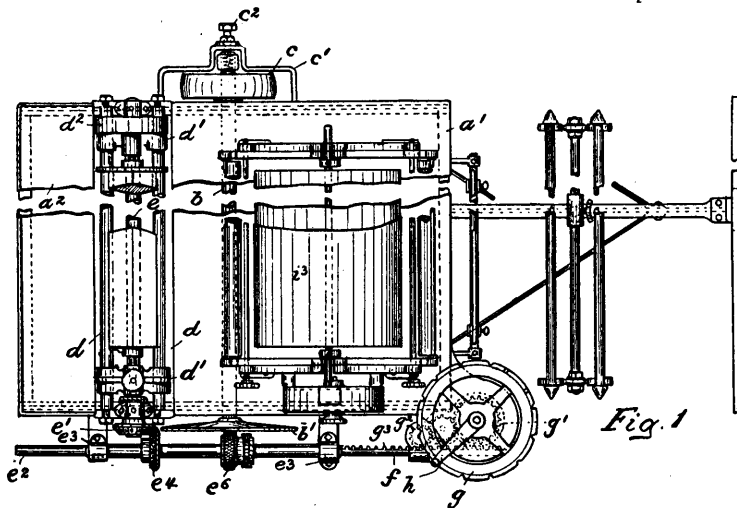


the disk *g* as connected to the train of gears *g*¹, the rack bar *f* will be moved longitudinally, and the position of the friction wheel *e*⁶, relative to the centre of the friction disk *b*¹, will be altered, in turn regulating the speed at which said friction disk *b*¹ and consequently the warp beam travels.

Upon the bed plate *a*¹ are mounted two standards *i* each having a pair of integral arms *i*¹, each having a recess *i*², which affords for a seat for the warp roller *i*³. In these standards are fulcrumed two pairs of levers *i*⁴, extending downward from each of which is an integral arc-shaped guide *j*, provided with slots *j*¹. In each pair of levers *i*⁴ is journaled a roller *i*⁴, thus by moving the rollers *i*⁴ up or down in the slots *j*¹ the tension on the warp yarn is increased or diminished.

p is a circular case having its front wall removed and provided on its rear face with projections *p*¹, for securing the casing in position to the standard of the warper. In the rear wall *p*³ of this case is formed a recess *p*⁴, in which is disposed a spiral spring *p*⁵, that is coiled about a shaft *p*⁶. Near its outer end and within the casing, this shaft carries a collar *p*⁷, and also a disk *p*⁸, which takes the place of the front wall of the casing and is kept from rotating relatively to said collar by means of a pin *p*⁹, that projects from the collar and penetrates said disk. The collar has an integral worm wheel *p*¹⁰ formed with it, whose teeth engage the threads of a worm *q*, that is mounted upon a shaft *q*¹, journaled in arms *q*², projecting from the rear wall of the case, said shaft *q*¹ also carrying another worm wheel that engages a worm mounted upon the end of the adjoining trunnion of the beam *i*³.

t is a knob that is loosely secured to the shaft *p*⁶, outside of the disk *p*⁸, by means of a screw *t*¹, penetrating it and extending into the shaft, being



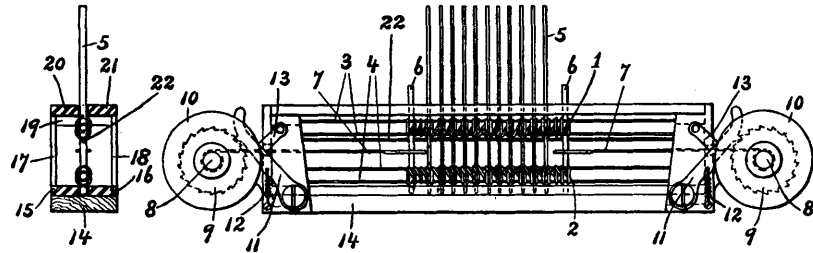
which is formed with a gear casing *d*² in which is journaled a train of gears. On the end of shaft *e* is mounted a bevel gear *e*¹ meshing with a bevel

prevented from rotating relatively to the disk by the pin p^9 , which projects into it. The outer face of the disk p^8 is marked off in graduations, which constitute a scale which is read by means of a pointer.

When the beam i^3 rotates, its trunnion imparts through the worms on shaft q^1 , as previously mentioned, and the worm wheel p^{10} , a rotary movement to the disk p^8 . As often as one of the pins s^2 is brought into engagement with the pawl s^1 , the hammer will be actuated and the gong s sounded. The amount of material that has been passed over the beam i^3 is determined at any time by reference to that mark upon the disk to which the pointer refers.

If at any time it is desirable or necessary to manually operate the indicator, so as to set it back, for instance, it is only necessary to press the knob against the action of the spring p^5 until engagement between the worm wheel p^{10} and worm q^1 is broken, whereupon the disk may be turned without reference to the means which automatically rotates it.

Referring to the mechanism whereby power is transmitted to the warp beam from the main drive shaft, it will follow that by virtue of the arrangement and construction of parts described, with reference especially to the friction disk b^1 , the beam can be thrown into operation very gradually, and so the undue and sudden strain that would otherwise be exerted on the threads obviated. (Benjamin Eastwood Co., Paterson, N. J.)



engage with the teeth of the ratchets 9 and held in contact with them by means of springs 12 and latches 13, which press them against their respective ratchets.

The frame of the comb is made so that it may be easily cleaned out when necessary, and consists of a wooden bottom piece 14, having bottom strips 15 and 16 on top of it, said strips being placed to act as a bottom support for the wires 5 of the comb. Side pieces 17 and 18 are used at each end to form the frame, and short pieces 19 are placed between them at the top of each end, to act as supports for the top metallic strips 20 and 21 which enclose the top and act as top supports for the wires 5. These strips are screwed down to the piece 19 and hence are easily removed when it is desired to clean out the framing.

A stop rod 22 is placed in the frame under and in contact with the upper pair of springs 1, and passing through holes in the wires 5. This prevents the sagging of the pair of springs 1 and keeps them about as far from the pulling points of the straps 7 as the lower pair of springs 2 is, the latter pair being supported upon the bottom strips 15 and 16; this arrangement having a tendency to keep the wires 5 parallel with each other. (T. C. Entwistle Co., Lowell, Mass.)

EXPANSION COMB FOR BEAMERS.

The object is to provide an expansible comb for above mentioned machinery, which may be easily cleaned out, thus preventing the comb from becoming clogged by the accumulation of dirt, a feature which heretofore has required, that the frame containing the comb had to be taken out of the machine in order to unclog the comb. Another object is to make the setting of the comb to the desired width more positive than in previous makes.

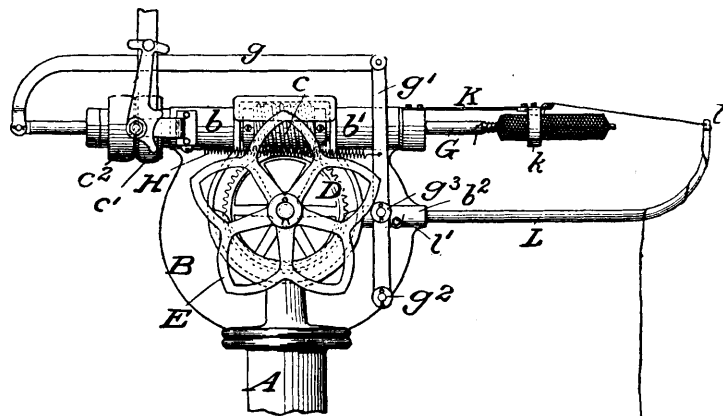
The accompanying illustrations will give a clear idea of the construction of the comb and also the method of expanding or contracting it to the width desired; Fig. 1 being a front elevation of the comb arrangement, and Fig. 2 a cross section through the comb and its frame.

Referring to the illustrations, the comb is made up of two pairs of springs 1 and 2, the coils of each spring engaging the coils of the other spring of the same pair, the pair of springs 1 being held near the top of and parallel to the frame by means of a pair of guide wires 3 placed within the spring on opposite sides of its axis, while the pair of springs 2 is similarly held near the bottom of the framing by means of wires 4. These springs are used to hold the wires 5, which compose the comb, in an upright position and equally spaced apart from each other, and also to make the comb expansible, by having attached to rods 6 at each end of the comb, straps 7 which are in turn

ROYLE'S COP WINDER

For Winding the Cops as used for Card-lacing Machines.

By means of this cop winder a spiral wind of the cord is produced, the coils being a considerable distance apart and alternately reversed as they extend



back and forth from end to end of the cop, resulting in a cop which freely unwinds during card lacing.

The illustration is a view of the machine in side elevation, the base of the support being omitted.

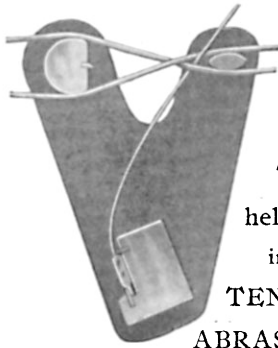
A indicates the support for the machine, made in the form of a hollow pillar, on which is fixed a hollow casting B, developed at its top into bearings b, b^1 , for the spindle operating sleeve, which is provided with a loose and fast pulley c^1, c^2 , for driving the spindle. The spindle support is provided with a worm c , which meshes with a wheel D, to which is secured a five-pointed cam E, which engages with roller g^3 on a lever g^1 , as pivoted at g^2 to the casting B. The other end of this lever g^1 is attached to an arm g , which is connected to the

spindle G, this arrangement sliding the spindle in its bearings five times for every revolution of the cam E, spring H giving the retracting movement to the spindle.

An arm K is attached to the spindle support, being provided with a ring k , which serves to stop the machine by frictional contact when the cop has reached its desired size.

An arm L is mounted in a socket b^2 , and is provided with a guide eye l , the arm being held in its socket by a dowel pin l^1 extending into a groove in said arm, thus permitting it to rock in its bearings. (John Royle & Sons, Paterson, N. J.)

Absolute Efficiency from Bed-Rock Simplicity

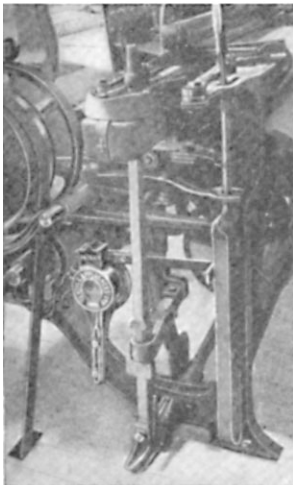


Our WARP-STOP controls
TWO threads by ONE spring WIRE,
held in a COMB, engaging the warp
in such a way that the
TENSION is UNDER CONTROL, and
ABRASION of the yarn is AVOIDED.

The COMBS are RAPIDLY INSERTED

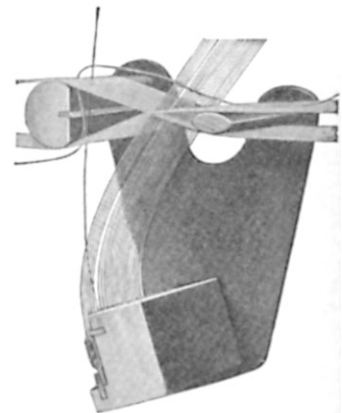
BEFORE or AFTER the warp is in the loom,

and they are carried in a
bar suspended from the LEASE-RODS which ARE NOT FIXED
to the loom side, but FREE to take their proper movement,
so that the COVER of the cloth is UNAFFECTED.



The WIRE SPRINGS OUT
from the comb, when a thread breaks,
thus giving
a CLEAR SIGNAL of the place
of the BROKEN END,
and, by striking
a CONTACT-SLIP upon which
LINT CANNOT COLLECT,
closes the circuit through

a PERFECT KNOCK-OFF, actuated by a SPARKLESS current.



TEXTILE APPLIANCES, Limited, Providence, R. I.

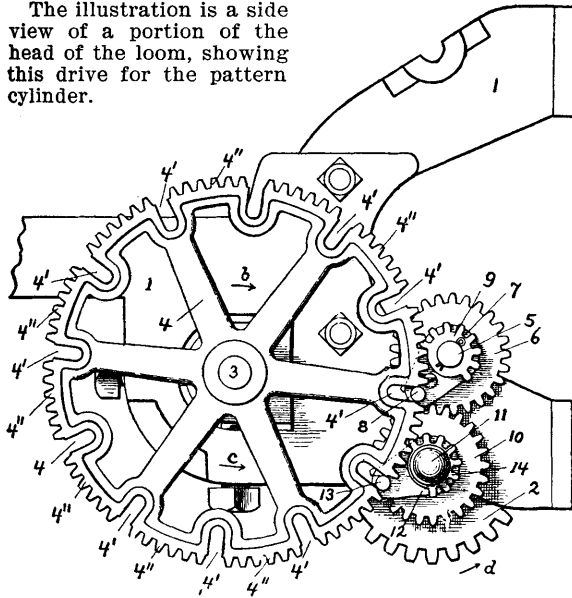
WEAVING MACHINERY AND SUPPLIES.

SHEDDING MOTIONS.

OPERATING THE PATTERN CYLINDER IN KNOWLES LOOMS.

The object is to simplify the system of gears used for rotating the pattern cylinder in either direction, in connection with the fast and slow motion of the latter.

The illustration is a side view of a portion of the head of the loom, showing this drive for the pattern cylinder.



On the frame 1 is mounted the lower cylinder gear 2, which is the main drive for the pattern cylinder as mounted on the shaft 3. The pattern cylinder gear 4 has in its periphery a series of open end slots 4', between each of which are formed teeth 4". On a stud 5, fast to the frame 1, is loosely mounted a gear 6, and rigidly secured to said stud 5 is a plate 7 provided with a stud 8 and a mutilated pinion 9, the teeth of said pinion meshing with the teeth 4" of gear 4 and in turn impart a slow movement to the pattern cylinder. The stud 8 enters the recess 4' and imparts a fast movement to the pattern cylinder for the remainder of the rotation of the gear 6. Meshing with this gear 6 is a corresponding gear 10, which is loosely mounted on the extended journal of the lower cylinder gear 2 and connected therewith to rotate with said lower cylinder gear by the sliding key 11. Also loosely mounted on the extended journal of the lower cylinder gear 2 is a plate 12 having a driving pin 13 thereon and a mutilated pinion 14 secured thereto or made integral therewith, the teeth of which mesh with the teeth 4" on the gear 4 to communicate a slow motion to said gear while the driving pin 13 on the plate 12 enters the recesses 4' on the gear 4 to communicate a fast motion to said gear 4.

The operation of the mechanism is as follows: In the operation of the loom until now, the revolution of the cylinder gear 2 in the direction of

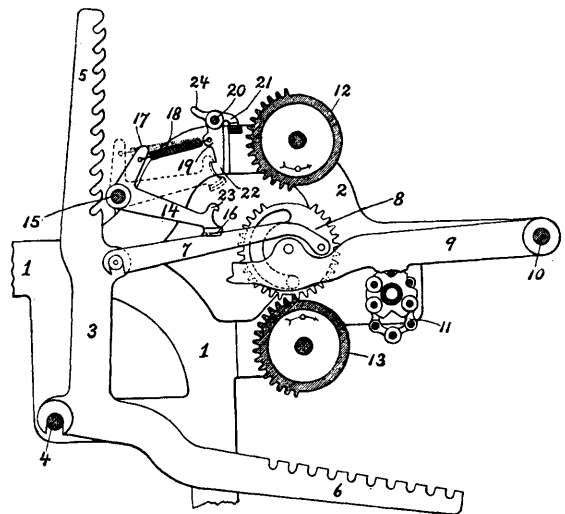
arrow *d* will, through the sliding key 11, cause the plate 12, carrying the driving pin 13 and the mutilated pinion 14, to rotate with said gear 2 and through pin 13 and pinion 14 communicate a continuous fast-and-slow motion to the pattern-cylinder gear 4 in a forward direction, or in the direction of arrow *b*. The engagement of the teeth 4" on the gear 4 with the teeth on the mutilated pinion 9 will rotate said pinion and also the gear 6, loosely mounted on the stud 5, and the gear 10, loose on the journal of the cylinder gear 2.

In case it is desired to reverse the movement of the pattern cylinder gear 4, or move it in the opposite direction, as indicated by arrow *c*, the sliding key 11 is pushed in to disconnect the plate 12 and the mutilated pinion 14 from the journal of the cylinder gear 2, and leave them loose on said journal and connect the gear 10 with said journal to cause it to rotate with the cylinder gear 2. The revolution of the gear 10 will rotate the upper gear 6, with which it meshes, and with it the plate 7 and pinion 9, and cause the pattern-cylinder gear 4 to rotate in the reverse direction, or in the direction of arrow *c*. (Crompton & Knowles Loom Works, Worcester, Mass.)

MAKING THE ACTION OF THE KNOWLES' HEAD MOTION POSITIVE.

The accompanying illustration is a side view, partly in cross section, of a portion of this shedding mechanism, having the improvements combined therewith.

Referring to the illustration, 1 indicates a portion of the arch of a loom to which is attached the head stand 2. 3 indicates one of the harness jacks, as



pivoted on a rod 4, said rod extending across the width of the shedding mechanism, and being also used as a pivot for the other harness jacks which

are placed side by side in the mechanism. The two sets of straps which connect to the harnesses in the loom are attached to the harness jacks 3, at 5 and 6 respectively, and thus produce a shed during weaving. Each harness jack 3 has a connector 7 pivotally attached to it, the other end of said connector being connected to a vibrator gear 8. Each gear 8 is carried by a vibrator lever 9 as pivoted at 10, said levers 9 resting on the pattern chain 11, which is made up of rolls and tubes according to how it is desired to operate the harnesses. The vibrator gear 8 is actuated by coming into the path of either of the two cylinder gears 12 and 13, which revolve constantly in the direction of the arrows. The gear 8 is revolved in one direction for one-half of a revolution by the upper cylinder gear, when a roll on the pattern chain 11 comes under the lever 9 and raises it, and in the opposite direction for half a revolution by the lower cylinder gear when the roll passes from under the lever 9. These movements of vibrator gear 8 are converted from circular into linear motion by means of the connector 7, and the harness jack 3 is thus moved back and forth on its pivot 4 to raise and lower the harness.

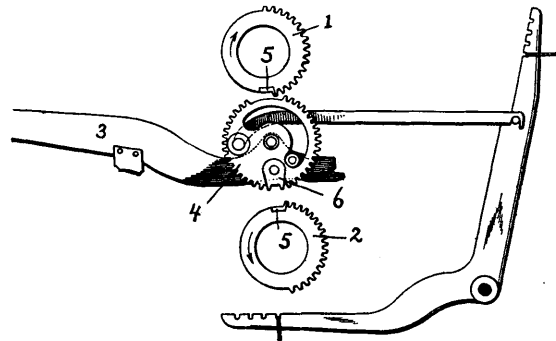
In order to make the action of the vibrator gear 8 as positive as possible, so as to get perfect shedding, a bell crank lever 14 as pivoted at 15 is provided, having one end made grooved at 16 so as to fit on the top side of connector 7. The upper portion 17 of the bell crank lever has one end of a spring 18 connected to it, the other end of said spring being attached to a catch 19 as pivoted at 20.

This catch is provided with a projection 21 which limits the movement of the catch. The action of the spring 18 keeps the lever 14 pressed firmly against the connector 7 and thus makes its movement positive. The lower end of the catch is shaped in the form of a projection 22, which will hold the lever 14 up when its projection 23 is in catch with it.

When it is not desired to use the full number of the harnesses, the levers 14 are raised off of the connector 7 of the unused harness and held out of contact with them by means of the catches 22 and 23, until they are to be used again, when they are released by simply pressing on a thumb piece 24. (Crompton & Knowles Loom Works, Worcester, Mass.)

REPAIRABLE GEARING FOR THE KNOWLES HEAD MOTION.

The novelty consists in providing removable initial teeth to the driving and pitman gears of the shedding mechanism, which initial teeth permit ready replacement by others when worn out.



The illustration is a side view of parts of the shedding mechanism gearing, showing the construction of the new teeth.

Between the driving drums 1 and 2 are the free ends of the harness actuating levers 3, the drums 1 and 2 acting to move said lever 3 by engagement with the pitman gear 4; *i. e.*, one toothed section co-operates with a drum turning in one direction and the other toothed section co-operates with the drum turning in the other direction.

The teeth which have to stand the most strain during the running of the loom are the initial teeth, *i. e.*, the teeth which go first into mesh, and for which reason the drums 1 and 2 are each provided with a removable tooth 5, and the pitman gear 4 with a removable toothed plate 6, thus providing in turn easy repairing when the initial teeth of either gear become worn.

SHEDDING MOTION FOR C. & K. DOBBIES.

In former constructions of this shedding mechanism the connections, *i. e.*, the hooked jacks for raising and lowering the harness levers, were pivoted upon said levers; whereas, in the new construction, a series of harness lever actuating cams are provided, the same being moved by the hooked jacks, thus making the connections entirely separate from the harness levers.

Fig. 1, in side elevation, shows one of the harness levers, its operating cam and the actuator for the latter.

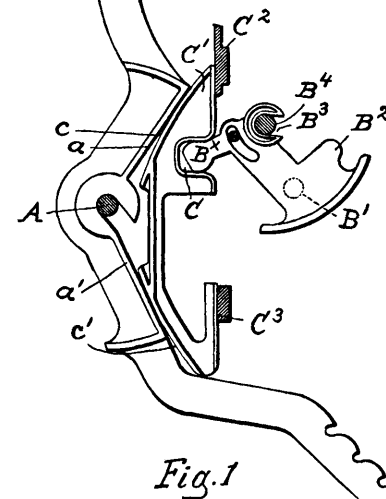


Fig. 2 shows the connection for moving this operating cam, *i. e.*, the lifting and depressing jacks.

Examining this latter illustration, we find that these connections B (one for each harness frame), instead of being pivotally mounted on the harness levers or an extension therefrom, as in former constructions, are mounted on studs B1 of actuators B2, said actuators having

their hubs slotted at B3 to fit over and be sustained by a rod B4. Each of said actuators has an arm or projection Bx, adapted to engage a harness-lever-moving cam C1, said arm entering a notch C in said cam, the cam being depressed whenever a harness lever is to be acted upon to effect the lifting of its attached harness frame, and the cam being lifted whenever a harness lever is to be moved to depress its co-operating harness frame. The cam C1 is sustained and guided by guides C2, C3, which insure a positive movement of the cams in straight lines. Each cam C1 has two acting faces or inclines *c, c1*, which co-operate with the inclines *a, a1*, of the harness levers, the incline *a* being located at one side of the supporting rod A for the harness levers, while the inclines *a1* are located at the opposite side thereof. These cams C1

while they act to turn the harness levers about the fulcrum A, also act when in their extreme positions to lock the harness levers in their extreme positions to thereby maintain the warp threads in the proper plane of the shed; said cams also acting while turning the harness levers about their fulcrum to prevent said levers from moving at a faster speed than that determined by the movement of the shed-forming knives.

Each connection B (see Fig. 2) has operatively joined to it at its upper end a hooked lifting jack *b*, and at its lower end a like hooked lifting jack *b*¹. Each connection B has at its upper end a depressing jack *b*², and at its lower end a like depressing jack *b*³. These depressing jacks are pivoted directly upon the ends of the lever B, and have pivots *b*^x sustaining the hooked lifting jacks *b*, *b*¹, previously referred to.

The movement of the harness levers in one direction is effected by the engagement of the hooked jack *b* with the usual knife. When the harness has been raised, the means for effecting the return movement of the same consist in providing the depressing jacks *b*² *b*³ with a shoulder *d*, which engages the respective shed-forming knife on its return movement, and thus puts the harness frame connected with said depressing jack into the opposite shed.

Another method of operating the harness levers is shown in Fig. 3, in which the harness levers are provided with two cam horns *e* and *f*, which in turn are engaged by toes *g* and *h* on a cam slide or actuator *i* when the same is moved, thus raising

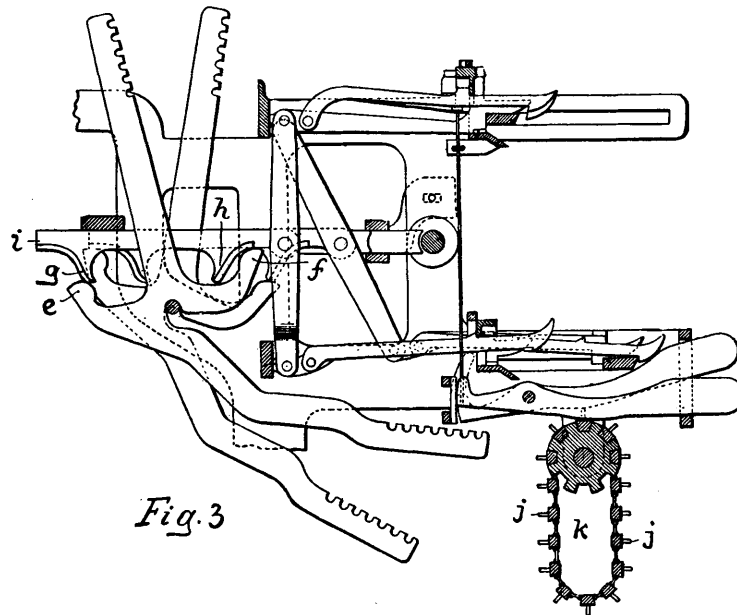


Fig. 3

or lowering the harnesses connected with the levers as required by indications *j* on the pattern chain *k*. (Crompton & Knowles Loom Works, Worcester, Mass.)

CLUTCH MECHANISM FOR C. & K. DOUBLE ACTING DOBBIES.

The object is to provide to double acting dobbies, as provided with a double index pattern chain, a mechanism for automatically unclutching one portion of the clutch mechanism from the other, and then clutching them again at predetermined intervals, and whereby the rotation of the chain can be stopped while the weaving continues with a double index.

The accompanying illustration is an elevation of a driver shaft and connections to a pattern-chain cylinder for operating the same, with the clutch mechanism applied thereto.

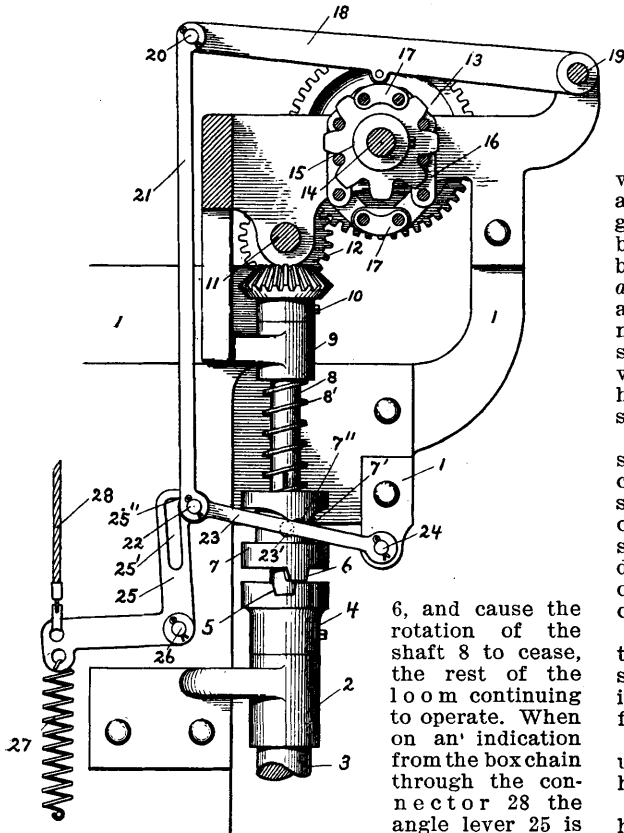
Examining this illustration, we find numeral 1 to indicate a portion of the loom frame, having a bearing 2 for a vertical shaft 3, which has a bevel gear (not shown) fast on its lower end, meshing with and being driven by a bevel gear on the driving shaft of the loom. On the upper end of said vertical shaft is fast the lower member 4 of the clutch, having in this instance a recess 5 to receive the projection 6 on the upper member 7 of the clutch, which is splined on a vertical shaft 8, having a bearing 9 on the framework 1. A spiral spring 8' encircles the shaft 8 and acts to force down the clutch member 7. On the upper end of the shaft 8 is fast a bevel gear 10 which meshes with and drives a bevel gear (not shown) fast on one end of the horizontal shaft 11, the opposite end of said shaft having fast a pinion 12, which meshes with and drives a gear 13 fast on the shaft 14, carrying the pattern cylinder 15, which has thereon a pattern chain 16, carrying a series of indications 17.

Extending over the pattern cylinder 15 is an indicator lever 18, pivotally mounted at one end on a rod 19 and pivotally attached at its other end by a pin 20 to the upper end of a connector 21. The lower end of this connector is pivotally attached by a pin 22 to one end of a lever 23, the opposite end being pivotally mounted on a pin 24, secured to the framework 1. The lever 23 is provided with a pin 23' (shown by broken lines), adapted to extend into an annular groove 7' in the upper clutch member 7 and to engage and travel on the cam surface 7'' on the upper clutch member 7. The pin 22, which connects the link 21 to the lever 23, extends in a vertical slot 25' in an angle lever 25, pivoted on a pin 26, secured to the framework 1. A side slot 25'' leads out from the vertical slot 25'. The opposite end of the angle lever 25 has attached thereto the upper end of a spring 27, the lower end of which is attached to a stationary part on the loom frame. The lower end of a connector 28 is also attached to the end of the angle lever 25, said connector 28 being operated by the box chain.

In the operation of the mechanism, when one of the indicators 17 in the rotation of the pattern cylinder comes under the roll 18' on the lever 18, said lever is raised, and through link 21 the lever 23 is raised, so that the pin 23' will extend into the upper part of the annular recess 7' in the clutch member 7, and the projecting end of the pin 22 at the end of the lever 23 will extend in the upper part of the vertical slot 25' and allow the spring 27 to act to move the angle lever 25 and cause the side slot 25'' to receive the pin 22, and thus lock the lever

end of the lever 23 will extend in the upper part of the vertical slot 25' and allow the spring 27 to act to move the angle lever 25 and cause the side slot 25'' to receive the pin 22, and thus lock the lever

23 in its raised position. The continued revolution of the clutch member 7, through its engagement with the clutch member 6, will cause the cam portion 7'' to ride up on the pin 23', and thus disconnect the member 7 of the clutch from the member



6, and cause the rotation of the shaft 8 to cease, the rest of the loom continuing to operate. When on an indication from the box chain through the connector 28 the angle lever 25 is moved on its pivot

point 26 to move the pin 22 out of the side slot 25' and into the upright slot 25', and the pattern indicator on the pattern cylinder, having passed from under the roll 18' on the lever 13, the spring 8', encircling the shaft 8, will act to force down the upper clutch member 7, so that in the continued revolution of the lower clutch member 4 the parts will be clutched and the shaft 8 and the parts driven thereby again put into operation. (Crompton & Knowles Loom Works, Worcester, Mass.)

REVERSING MOTION FOR C. & K. DOBBIES.

In this mechanism means are provided whereby the pattern surfaces of the shedding and the box motions as well as the multiplying mechanism may be turned backward or forward, in unison, at one operation; operating said mechanisms through one shaft having two worms.

Fig. 1 is an end elevation of the mechanism, Fig. 2 a detail in plan, showing the worm of the box motion and the worm toothed gears, actuated thereby, and the sliding collars which form parts of the clutches.

The frame work A is provided with a bearing A¹, through which extends a shaft A² having a beveled toothed gear A³ which meshes with another bevel-tooth gear A⁴ on the end of shaft A⁵ which constitutes a part of the driving mechanism. The upper end of the shaft A⁵ has fast on it the hub of a disk B⁴, provided with a notch to receive a tongue a (see

dotted lines) extended downwardly from a latch B³, pivoted on shaft B², said shaft being surrounded by a stiff spring B¹ which normally acts to keep the tongue a in engagement with its notch in the disk B⁴. This arrangement moves the two shafts A⁵ and B², although in two parts, in unison.

The part B² is provided with two worms a¹, a², the one a¹ engaging with the gear a³ on the shaft B as carries the pattern chain of the shedding motion and which it rotates continually. The other worm a² (see Fig. 2) rotates the gear a⁴ and its sleeve a¹⁰ intermittingly about the stud a⁵.

The sleeve a¹⁰ has fixed to its end opposite the worm-toothed gear, a plate a⁶, having a notch a⁷, and also has mounted upon it a collar a⁸, having an annular groove a¹¹ and a finger a¹², said collar being free to be slid on said sleeve and cause said finger to move back and forth in the notch of said plate. The worm a² also engages a second like worm-toothed gear a¹³, as fast on sleeve a⁹, having at its front end a connected disk a¹⁴, having a notch a¹⁵, and the said sleeve a⁹ has mounted upon it loosely, between said worm-toothed gear a¹³ and said disk, a collar a¹⁷, having a finger a¹⁸ which enters the notch a¹⁵ in said disk, said collar having an annular groove a¹⁹.

Both collars a⁸ and a¹⁷ are free to be slid on the sleeves a¹⁰, a⁹, collars and sleeves forming part of a clutch. The stud a²⁰ of gear a¹³ receives upon it a sleeve a¹⁶, having connected with it a chain carrying cylinder a¹⁰, on which is hung the box chain b. The sleeve a¹⁶ also has connected with its inner end a disk having a series of spaces, which may be entered, one or the other, by the finger a¹⁸ at the end of the collar a¹⁷.

The stud a⁵ receives upon it a sleeve d, having detachably secured to one end thereof a hand wheel d², said sleeve having at its opposite end a disk d³, having a series of spaces in which may be entered the finger a¹² of the collar a⁸ at desired times.

The sleeve d also has as part of it a cylinder d¹, upon which is hung the multiplying pattern chain, having at suitable intervals high links or indicators.

The disks or plates b³ and d³ constitute each one-half of a clutch, the other halves being the collars a⁸ and a¹⁷, said collars having the fingers a¹² and a¹⁸, and either one of the said sleeves d or a¹⁶ may be rotated at any desired time by simply putting the clutches into operation, and they may be left at rest for any desired time by putting the clutches out of operation.

In a bracket c³ of the framework is mounted a stud c², which receives a lever, bent, to present a depending extremity c¹, which enters the annular groove a¹⁹ in the collar a¹⁷. This lever has an upwardly extended ear and at the side of said ear the said stud c² receives on it loosely an adjustable continuation c⁸ of said lever, said continuation having an upwardly extended short arm c⁷, provided with a slot c⁶, through which is extended a screw c⁵, by which the particular angles occupied by the end c¹ of the lever, and the end of the continuation c⁸, may be varied to insure just the proper movement for the collar a¹⁷. The continuation c⁸ of the lever c has a stud c¹⁰, on which is pivoted a shoe c¹², said shoe resting immediately above the chain of the multiplying mechanism in position to be struck by an indicator when it is desired to effect the clutching of the finger a¹⁸ of the collar a¹⁷ with the plate or disk b³ to start the sleeve a¹⁶ and chain b in motion.

The stud c² also has mounted loosely upon it, but at its opposite end, a second lever having a depending end which enters the groove a¹¹ of the collar a⁸, and the end of the stud c², has an adjustable continuation f, the same as the one c⁸. The continuation f of this second lever has a pivot or stud f¹, upon

which is mounted a shoe f^2 , which stands above and in position to be acted upon by the indicator b^1 of the box chain b , and when a special indicator b^1 acts on the shoe f^2 this second lever is turned to cause the finger

revolution, causing the multiplying and pattern-chain mechanisms to be turned back one pick, the tongue a slipping out of its notch in disk B^4 , thus permitting only the upper part of shaft B^2 to turn.

Thus when the loom is again started the pattern chain having been turned back, it will not make a miss-pick but start on the same pick it left off with. The mechanism thus described can also be turned back for more than one pick, as required, with the same result. (Crompton & Knowles Loom Works, Worcester, Mass.)

HARNESSEVENER FOR C. & K. DOBBIES.

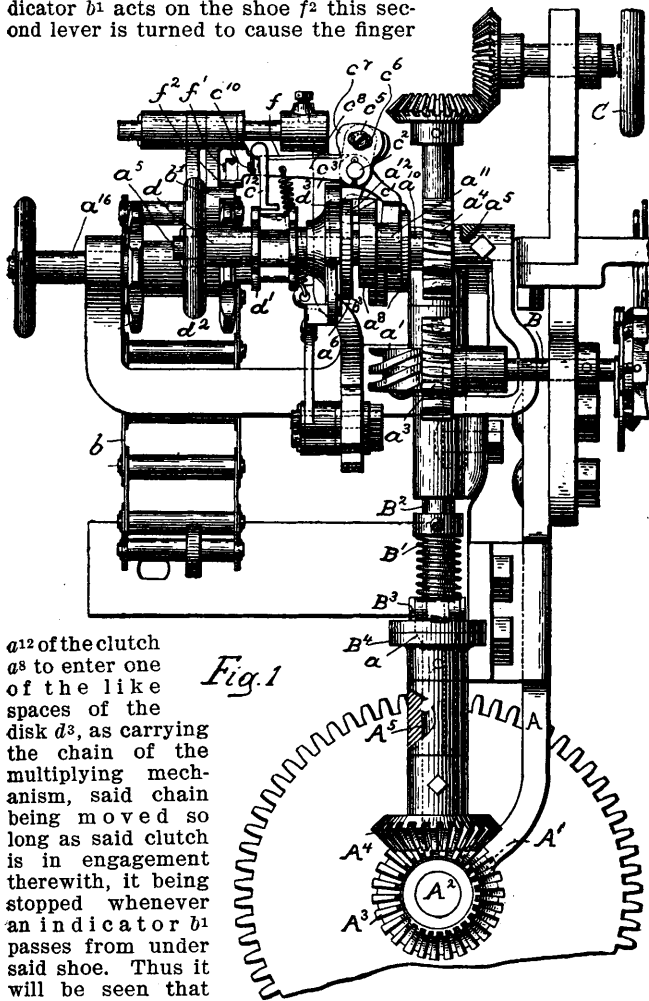
The construction and operation of this mechanism is best explained by reference to the illustration, which is a sectional side elevation of a portion of a dobby, showing one harness jack in its raised and the other in its lowered position.

The harness jacks 1 are moved as always through their hooked fingers 2 and 3, engaging with the lifter bars 4 and 5, respectively. The upper lifter bar 4 is made in two parts 6 and 7, the lower part 6 having rigidly secured thereto at each end upon its under side by a bolt 8, the lower end of a stand 9, the upper end of which has a bearing 10 for a transverse rocking shaft 11. On the outer end of the shaft 11 is fast an operating handle 12 and a crank arm 13 having a side projection 14, which acts as a stop to engage the front edge of the stand 9 on the forward movement of the crank 13.

To the outer end of the crank 13 is pivoted on a stud 15 one end of a link 16. The other end of this link 16 is pivoted on a stud 17 in the upper end of a lug 18 on the end of the upper bar 7. At the lower front part of this lug 18 is a pin 19, which extends into and travels in the slot 20.

The upper bar 7 has a downwardly extending projection 21 on its rear edge, which extends over the rear upper edge of the lower bar 6 and holds the two bars together, causing them to move back and forth as a single lifter bar in the normal operation of the loom. The front edge of the lower bar 6 has in a lug extending out therefrom a rod 22 on which are mounted small rolls 23, which the downwardly extending lip 21 on the upper bar 7 will engage and travel on when the bar 7 is moved forward to extend over the bar 6.

When it is desired to even the harnesses or to lower those that are in their raised position, the handle 12 is moved in the direction of the arrow, which rotates the shaft 11 and through crank 13, link 16, lug 18 and pin 19, extending in the slot 20, raises the rear edge of the upper bar 7, the pin 19 acting as a pivot to disengage the lip 21 thereon from the lower bar 6 and move the bar 7 to its extreme inward position, allowing the upper hooked jack 2 to move with it, the jack and harness connected therewith being moved into its lowered position. When the loom is started, the moving outwardly of the lower lifter bar 5 will move inwardly the lower section 6 of the upper lifter bar 4, and cause it to pass under the upper section 7, the rolls 23 engaging the lip or projection 21 on the section 7. The movement of the handle 12 in the opposite direction will return



a^{12} of the clutch a^8 to enter one of the like spaces of the disk d^3 , as carrying the chain of the multiplying mechanism, said chain being moved so long as said clutch is in engagement therewith, it being stopped whenever an indicator b^1 passes from under said shoe. Thus it will be seen that the operation of the multiplying mechanism is governed by the indications on the multiplier chain, the same moving the collars a^{17} or a^8 to determine which shall operate.

Fig. 1

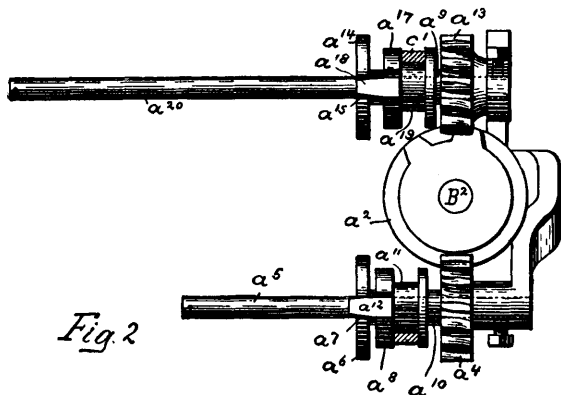
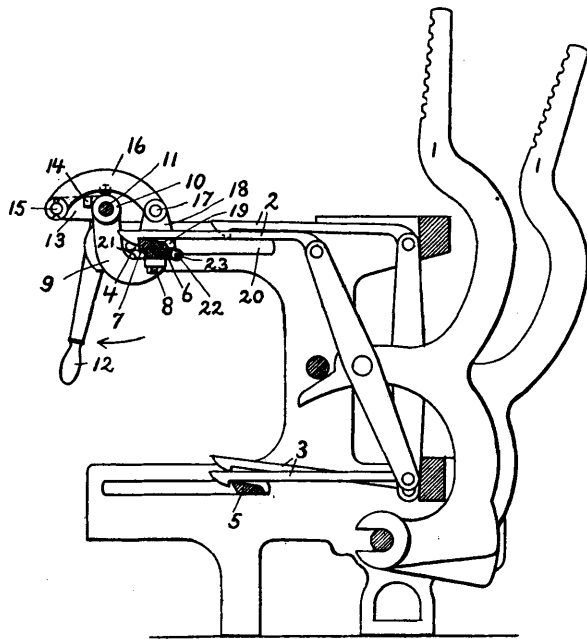


Fig. 2

When the loom stops on account of the filling having run out, the hand wheel C is turned backward one

the bar 7 to its position on the bar 6, in case the loom is not started up, and raise the harness jacks 1.

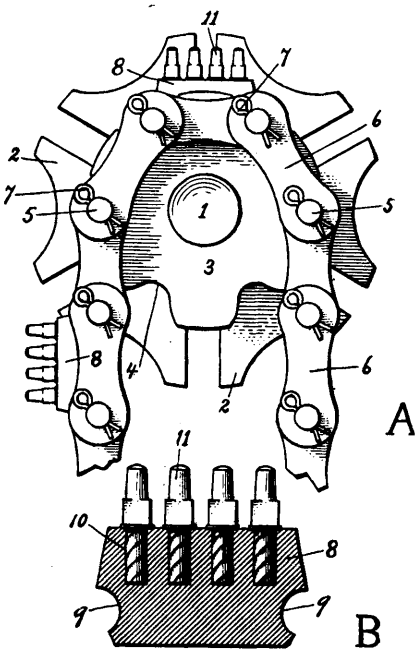


(Crompton & Knowles Loom Works, Worcester, Mass.)

CONNECTION FOR BARS IN THE PATTERN CHAIN OF C. & K. DOBBIES.

This connection of the bars is somewhat similar to that employed on their ball and chain dobbies, the manner in which it is adapted to the wooden bars

being best explained by referring to the accompanying illustration, of which diagram A is an end view of the pattern chain barrel as carrying the pattern chain, the bars of which are shown with the improved connection, and diagram B a vertical section through a bar with pattern pegs (in side elevation) shown inserted into said bar.



1 indicates the pattern chain barrel or cylinder, which is

loosely mounted on the shaft (not shown), and is rigidly connected to and rotated with the star wheel

2, said star wheel receiving its motion from a revolving pin (not shown).

The pattern chain barrel 1 has at each end a head 3, having grooves 4, to receive the ends of the iron rods 5, of the pattern chain. Two of these rods 5, are connected on either side of the chain by means of a metal link 6, having a hole near each end to receive the ends of the rods 5, said link being kept in place by having split pins 7, placed in holes placed near the ends in the rods 5. Every pair of rods 5, carries one of the wooden bars 8, of the pattern chain, the shape of said bar being shown in its section in Fig. B. The length of the bars is a little less than the length of the iron rods 5, and of a width a little greater than the distance between two of these iron bars 5.

On each side of the wooden bar 8, near its lower surface, is provided a concave recess or groove 9, sufficiently large to readily receive the iron rod 5, previously referred to. By means of the rods 5, extending in the grooves 9, of the bars 8, said bars are supported and maintained in position on the pattern chain.

To prevent any endwise movement of the bars 8 on the iron rods 5, tubes are placed on the iron rods 5 at each end, to extend between the ends of the bars 8 and the metal links 6. The wooden bars 8, are provided with a series of holes 10, to receive the pattern pegs 11, which are made with a reduced shank to extend into the holes 10, in the bars 8, having an enlarged upper portion to engage the upper surface of the bars 8. The holes 10 in the wooden bars 8 extend about half way through the bar, which is a sufficient depth to receive and properly hold the reduced ends of the pegs 11. In assembling the parts of the chain, the bars 8 are connected with the iron rods 5 by removing a connecting link 6, which connects two ends of the rods 5 from one side of the chain, and inserting the wooden bars 8 between a pair of iron rods 5, by fitting the rods into the grooves 9, prepared for them, and then replacing the metal link 6, and the split pins 7. The wooden bars 8 may be provided with one or more series of holes (four being shown in the illustration) therein (according to scope of dobbie) to receive the pattern pins 11. (Crompton & Knowles Loom Works, Worcester, Mass.)

FOUR WEAVE C. & K. DOBBY.

The object is to combine with an ordinary dobbie mechanism a supplemental mechanism to produce four different weaves in the fabric.

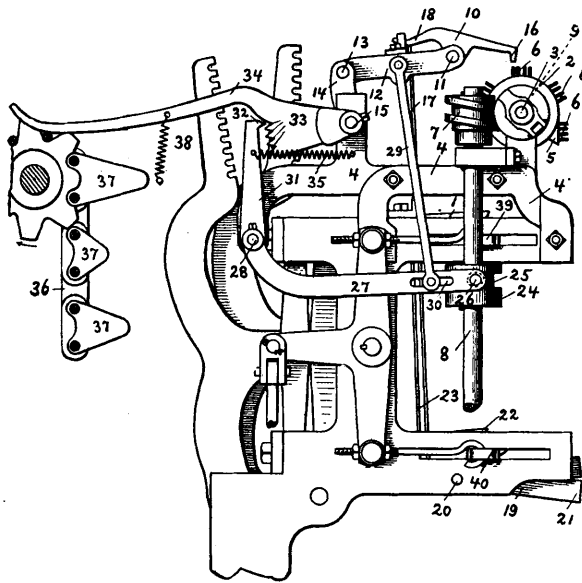
The accompanying illustration is a side elevation of a portion of a dobbie head, having this mechanism applied thereto.

Examining the illustration we find arranged above the upper hook jacks 1, the pattern cylinder 2, fast on a shaft 3, mounted in bearings on the frame 4. On the pattern cylinder 2 is supported the pattern chain 5, having four sets of pegs 6 arranged on each bar, for the four different weaves to be produced in the fabric. Rotary motion is communicated to the pattern cylinder 2 by means of a worm 7, fast on the upper end of an upright driven shaft 8, meshing with a worm gear 9, fast on the end of the shaft 3.

Extending over the pattern cylinder 2 are a series of pattern indicator levers 10 (one indicator for each harness), and which are centrally pivoted on a transverse rod 11, supported on the outer end of the hinged frame 12, which is pivotally mounted on a traverse rod 13, in the upper ends of the arms 14, which are secured at their lower ends on a rock shaft 15. Each pattern indicator lever 10 has a downwardly extending projection 16 on its end, which is adapted to engage the pegs 6 of the pattern chain,

there being a slight recess or depression in the end of said projection 16, into which extends the projecting end of a peg 6 when engaged by the said projection during the revolution of the pattern chain. A vertical wire 17 extends under and engages the end 18 of each indicator lever 10, and at its lower end extends into a recess in the lever 19, pivoted at 20. The opposite end 21 of said lever is weighted and causes the hook projection on its other end to engage the lower edge of the lower hook jack 22 to raise said jack. A vertical wire 23 is supported at its lower end in the recess in the lever 19, and engages at its upper end the upper hook jack 1.

Fast on the upright driven shaft 8 is a cam 24, which has a cam groove 25 therein, into which extends and travels a roll on a pin 26, on a lever 27, fast on a rock shaft 28. A link 29 is secured at its lower end in a slot 30 in the lever 27, and is pivotally attached at its upper end to the hinged frame 12, carrying the pattern indicator levers 10.



Fast on the rock shaft 28 is the lower end of an arm 31, which has a projection 32 at its upper end, adapted to engage recesses 33 in the lever 34, fast on the rock shaft 15. A spring 35, attached to the lever 31 and to the frame, holds said lever 31 in engagement with the recesses in the lever 34. As the lever 27 is raised and lowered by the cam 24, the arm 31 moves with it, and away from and into engagement with the recesses 33 in the lever 34, to leave said lever free to be moved by an auxiliary pattern chain 36, having pattern surfaces 37 thereon of different elevations, to move the lever 34 into four different positions, the projecting end of said lever being held in engagement with the pattern surfaces by a spring 38.

The operation is as follows: The revolution of the upright shaft 8 will, through the cam groove 25 in the cam 24, and the roll on the pin 26 on the lever 27, move said lever 27 and through link 29 raise and lower the hinged frame 12, carrying the pattern indicator levers 10 at regular intervals and at the same time move the arm 31 out of and into engagement with the lever 34. In case there is no peg 6 extending under the end 16 of one of the pattern indicator levers 10, the downward movement of the hinged frame 12, carrying the pattern indicator levers 10 through the link 29 and lever 27, operated by the

cam 24, will move down the pattern indicator levers 10 and carry the end 16 down, and allow the weighted lever 19 to rock on its pivot support 20 and raise the lower jack 22, and through the wire 23, the jack 1 out of the path of the lifter bars 39 and 40. When a peg 6 comes under the end 16 of the pattern indicator lever 10, it will hold up said end, and the downward movement of the hinged frame 12 carrying the pattern indicator lever 10, will, through wire 17, rock the lever 19 and allow the jacks 1 and 22 to move down into position to be engaged by the lifter bars 39 and 40.

When the pattern surfaces 37 on the pattern chain 36 operate the lever 34, they cause said lever to rotate the rock shaft 15, and move it in one direction or the other to change the upright position of the arms 14, carrying the rod 13, on which the frame 12 is hinged, so as to move the frame 12 forward or back to cause the indicator levers at their engaging ends to be in a position to engage any one of the four rows of pegs 19 to produce any one of the four weaves, while the arm 31 acts to hold the lever 34 in its adjusted position. (Crompton & Knowles Loom Works, Worcester, Mass.)

MULTIPLIER MECHANISM FOR PATTERN CHAINS FOR C. & K. LOOMS.

This multiplier mechanism is intended for looms for weaving blankets and other fabrics containing borders, and has for its objects the reduction in the length of the pattern chain, by means of a reversing motion for said chain, so that after the chain has made nearly a complete revolution in one direction, it is made to automatically reverse its direction of motion, and thus provide means for repeating a certain portion of said pattern chain and multiplying a certain pick.

In order to give a detailed description of the mechanism, the accompanying illustrations are given, of which Diagram A is a plan view of the pattern chain mechanism, shown in the correct position required for weaving the body of the blanket, etc.; Diagram B is a side view of the parts shown in Diagram A; and Diagram C is a diagrammatic view, showing parts of a loom which are used to call the pattern chain into action, the parts being shown in position for operating the auxiliary chain as required for the multiplication of picks.

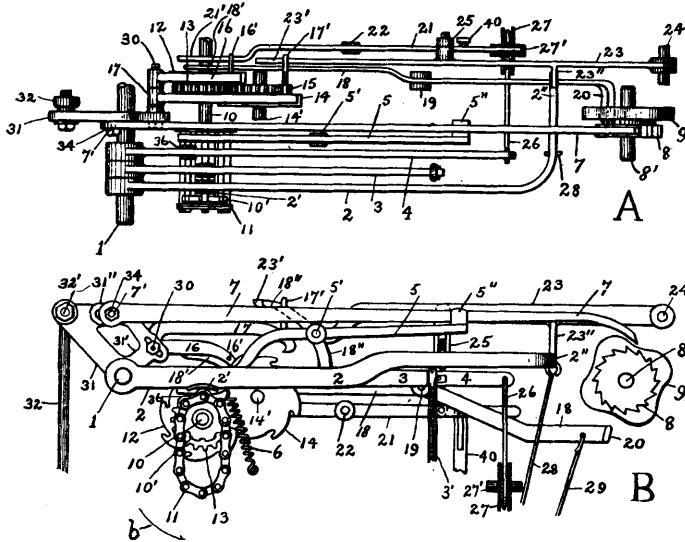
Numerals of reference indicate the parts as follows: A shaft 1 has loosely mounted on it one end of the levers 2, 3, and 4 which extend over the bars of the pattern main chain 11 and rest on the tubes or rolls on said bars. The lever 3, through the connector 3' operates the movable shuttle boxes in the usual way. The lever 5, centrally pivoted at 5', has one end extending over and resting on the tubes or rolls of the pattern chain and is held in contact with the tubes or rolls by a spring 6. The opposite end of the lever 5 has a slotted side extension 5", which extends under and holds the free end of the pawl 7 out of engagement with the ratchet wheel 8, as attached to the multiplier cam 9 on a stud 8' until it is desired to operate said multiplier cam. The chain shaft 10 carries the pattern barrel 10' which supports the pattern chain 11, made up of bars which carry rolls and tubes in the usual manner.

Fast on the chain shaft 10 is the ratchet 12, having integral with it the gear 13. An auxiliary ratchet 14, mounted on a stud 14', has the gear 15 integral with it, which meshes with the gear 13. The pull pawl 16 is made to engage with its free end, the ratchet 12 to turn said ratchet and the gear 13. The pull pawl 17 is made to engage, with its free end, the auxiliary ratchet 14 in order to turn said ratchet and the gear 15.

A lever 18 is centrally pivoted at 19 and has the upwardly curved extensions 18' and 18". The extension 18' extends under a pin 16' on the pawl 16, and the extension 18" extends under the bent end of the pin 17' on the pawl 17. The opposite end of the lever 18 has a side extension 20 to engage with the multiplier cam 9 when required.

pivoted at 7' on a stud 34, fast in the extension 31" on the crank 31. A regular oscillating movement is communicated to the crank 31 and to the three pawls 16, 17, and 7 through the rod 32, pivoted at 32' to the crank 31 and connected at its lower end to a driven part of the loom.

When the parts are in the position shown in Diagrams A and B, the body of the blanket is being woven, and to put the parts in these positions with the pawls 16, 17, and 7 out of engagement with their respective ratchets, a roll 2' on the pattern chain 11, is brought under the lever 2 to raise said lever, and through extension 23" on the lever 23, resting on said lever 2, to raise the lever 23, which, engaging the bent end of the pin 17' on the pawl 17, lifts said pawl out of engagement with the ratchet 14. The raising of the lever 2 causes a downward pull on the lever 18 through connector 28, lever 50, pin 50', latch 48, flexible connector 52, and connector 29, attached to said lever 18. The downward pull on the lever 18 through the extensions 18' and 18", which extend under and engage the pins 16' and 17' on the pawls 16 and 17, raises said pawls and holds them out of engagement with their respective ratchets 12 and 14. The pawl 17 is held up by both levers 23 and 18, while the pawl 16 is held up by the lever 18 alone. At this time there is no roll on the chain under the lever 5, and therefore the spring 6 acts to raise the



The lever 21, centrally pivoted at 22, has one end 21' bent to extend under the pin 16' on the pawl 16. The lever 23, pivoted at one end on a stud 24, has at its other end a curved extension 23', which extends under the bent end of the pin 17' on the pawl 17. The levers 21 and 23 are connected by an adjustable connector 25. To one end of the lever 21 is connected the end of a flexible connector 26, which passes under a roll 27 on a stud 27'. The other end of the chain 26 is attached to the free end of the lever 4.

other end 5" of said lever 5, and hold the pawl 7 out of engagement with the ratchet wheel 8, so that both chain driving pawls 16 and 17 and the multiplier pawl 7 are out of engagement with their respective ratchets.

The downward extension 23" on the lever 23 rests on the bent free end 2" of the lever 2. The free end 2" of the lever 2 is connected by a connector 28 to the free end of the lever 50, pivoted at 51 and having a pin 50' on said lever. The end of the lever 18 is connected by a connector 29 to a flexible connector 52, which passes under the pulley 53, pivoted at 54. The opposite end of the flexible connector 52 is secured to the lower end of a latch 48, pivotally mounted on a screw 49, extending through an elongated slot 48' in the latch 48. The latch 48 has a notch 48" to engage the pin 50' on the lever 50, and at its upper end an inclined surface 48"', which is engaged by the end 46' of the rod 46. A spring 55, secured to the latch 48, acts to hold the latch in engagement with the pin 50'.

The operation of the mechanism for giving a forward movement to the pattern chain when, for example, the body of the blanket is completed and the pattern chain is called for, will now be described. The parts shown in Diagram C are in the position they occupy when the pattern chain is inoperative. The auxiliary pattern chain cylinder 41 is revolving all the time in the direction of the arrow *y*, and in the revolution of said pattern chain cylinder, the pattern ball 42 on the pattern chain is brought under one arm of the bell crank lever 43, which is then moved in the direction of the arrow *z*, and through rod 46, connected to the other arm of said bell crank lever 43, the latch 48 is moved on its pivotal support 49 until it is disengaged from the pin 50' on the lever 50. Said latch will drop until the upper end of the slot 48' strikes the screw 49. The dropping of the latch 48 causes a slack in the flexible connector 52, which slack is taken up by the turning movement of the lever 18 on its pivotal support 19, which is induced by gravity. The movement of the lever 18 allows the pawl 16 to drop into engagement and operate its ratchet 12 and start the chain 11 in the direction of arrow *b*, Diagram B, because the raising of the lever 23, through connector 25, moves lever 21 on its axis 22 and drops the end 21' out of contact with the pin 16' on the pawl 16. The revolution of the ratchet 12 through pawl 16, movement being communicated to said pawl through crank 31 and the rod 32, will revolve the chain 11 in a forward direction and remove the roll 2', from under the lever 2, allowing said lever to drop, and through connector 28 allowing the lever 50 to drop with the pin 50', (stop 56 limits the downward movement of said lever,) and said pin 50' will again be engaged by the latch 48, the pattern ball 42 having passed out from under the arm of the angle lever 43 to allow the spring 47 to move the rod 46

A bell crank lever 43 is pivoted on a stud 44 in a stand 45, and one end of the bell crank lever 43 is connected at 43' to the rod 46, the opposite end 46' of which engages the inclined edges 48"' on the latch 48, as stated before. The opposite arm of the angle lever 43 extends over the auxiliary pattern chain 41. A spiral spring 47, loosely coiled around the rod 46, and bearing at one end against an arm 47' on the stand 47", and at its other end against a collar 46", adjustable on the rod 46, acts to keep the arm of the angle lever 43 in engagement with the auxiliary pattern chain 41.

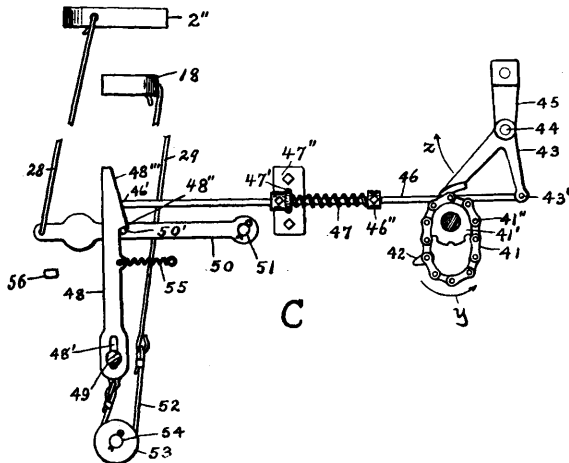
Referring again to pawls 16, 17, and 7, the pawl 16 is pivoted on a pin 30 on an arm 31' of the crank 31 mounted on the shaft 1, and the pawl 17 is also pivoted at 30 on arm 31' of the crank 31. The pawl 7 is

and the spring 55 to move the latch 48 into position to be engaged by said pin 50'. The pattern chain 11 will now advance a bar at a time for each movement of the ratchet 12 caused by the pawl 16.

To multiply a given pick, for this purpose a roll on the pattern chain is brought under the lever 5 to raise its end and at the same time lower the other end 5" and allow the pawl 7 to turn the ratchet 8 and the multiplier cam 9 attached to it. The rotation of the cam 9 brings one of its projections into contact with the extension 20 on the lever 18 and causes said lever to move on its pivotal support 19 to raise the pawl 16 and the pawl 17 out of engagement with their respective ratchet wheels. A depression in the periphery of the cam 9 allows the lever 18 to move and take its opposite position and allow the pawls 16 and 17 to engage with their respective ratchet wheels and again operate the pattern chain and stop the multiplication of picks.

In the operation of the forward movement of the chain 11, the chain having completed one revolution, except one bar, it may be desired to reverse the movement of the chain. It will be noticed that there is a roll 36 on the chain 11 (see Diagram A), one bar in advance of the roll 2'. The roll 36 is under the lever 4, and when the chain 11 has completed one revolution in a forward direction the roll 36 comes under the lever 4 and raises said lever, and through flexible connector 26, passing around the pulley 27, draws down the lever 21, pivoted at 22, and raises the opposite end 21' of said lever 21, which extends under the pin 16' on the pawl 16 and raises the pawl 16 out of engagement with the ratchet 12. At the same time, through the connector 25 the lever 23 is drawn down with the lever 21, allowing the pawl 17, held up by the end 23' of the lever 23, to engage with the ratchet wheel 14, and through pinion 15, fast to said ratchet wheel and meshing with pinion 13, fast to the ratchet wheel 12, turn the pattern barrel 10' and the pattern chain 11 in the opposite or reverse direction.

It will be seen that the pattern chain 11 in reversing will perform all of the operations described in connection with the forward movement of the pattern chain, including the multiplication of certain picks, if desired, but exactly in the reverse direction. The pattern chain 11 will continue to move in the reverse direction until the roll 2' is again brought under the lever 2 and the chain is stopped.

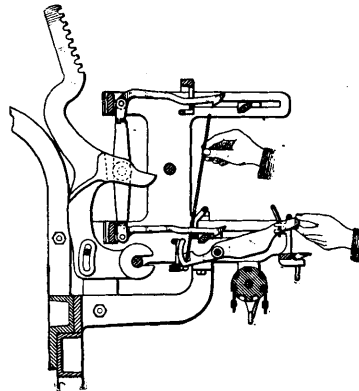


A spring latch 40 holds up the lever 21 when the support of the lever 23, having the extension 23" resting on lever 2, is withdrawn by the roll 2' passing from under the lever 2. (Crompton & Knowles Loom Works, Worcester, Mass.)

METHOD OF TAKING OUT THE CONNECTING WIRES IN CROMPTON-THAYER DOBBIES.

The accompanying illustration is a side elevation, in section, of the new Crompton-Thayer Dobby, showing the method of taking out the wires connecting the hooked jacks in said doobby.

The piece in a doobby that generally goes across the top of the grate in which the indicating fingers lie,



is in the new doobby made so that the same can be easily removed by simply taking out a cotter pin, which then allows the indicating fingers to be raised abnormally high (see left hand in illustration), thereby depressing its end, which then allows the top of its mate upright wire to go abnormally low, and from which position the latter then can be easily removed by bringing it a little forward, and then lifting it out of the doobby.

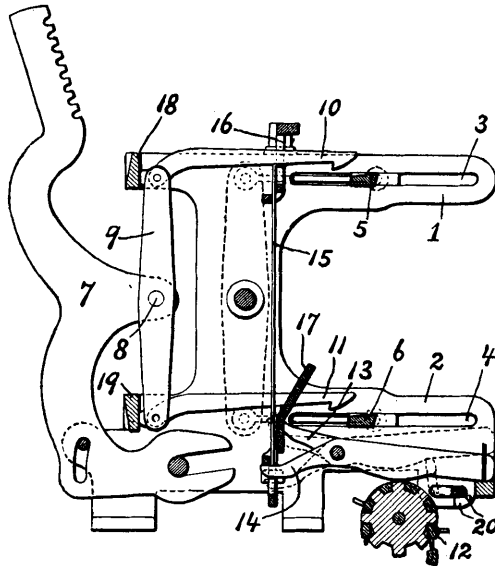
This certainly is a distinctive advantage over those doobbies where said upright wire has to be bent, in order to take it out. (Crompton-Thayer Loom Co., Worcester, Mass.)

DOBBY FOR WHITIN LOOMS.

This doobby is characterized by its compactness of construction and the economical use of parts, especially those for operating and controlling the movement of the hooked jacks and levers. The accompanying illustration is a cross sectional view of this doobby, and in which 1 and 2 indicate its end frames, being provided with slots 3 and 4 in which the lifter bars 5 and 6 slide for operating the hooked jacks. Each harness jack 7 as pivoted at 8, has attached to its centre projection, a connector 9; each end of said connector having attached to it the rear ends of the top and bottom hooked jacks 10 and 11 respectively. These jacks 10 and 11 are moved back and forth by means of the lifter bars 5 and 6 respectively when the hooked ends of the former drop into their paths. The dropping of the jacks is controlled by the pattern chain 12, through the lever 13 for the lower jack 11, and through the lever 14 and vertical rod 15 for the top jack 10. Each top hooked jack 10 is placed in a separate slot of an upper grate 16, which thus act as a guide for the former. The lower end of the grate is curved to an angle of 90°, and has slots in that portion which are used as guides for the top ends of the vertical rods 15, thus not requiring the use of other guides or collars, and consequently reducing the cost of construction of the doobby. The lower jacks 11 are similarly guided in the slots of a lower grate 17, said grate also being provided with slots for guiding the levers 14. The lower ends of the rods 15 are also held in their proper position by holes in the grate 17, these latter coming in between the part of the grate with one set of slots and the other part with the other set of slots.

The working of the doobby is similar to the regular style, the stops 18 and 19, of course, being used alternately as pivots for the connectors 9 when the jacks are actuated. The harnesses may be leveled

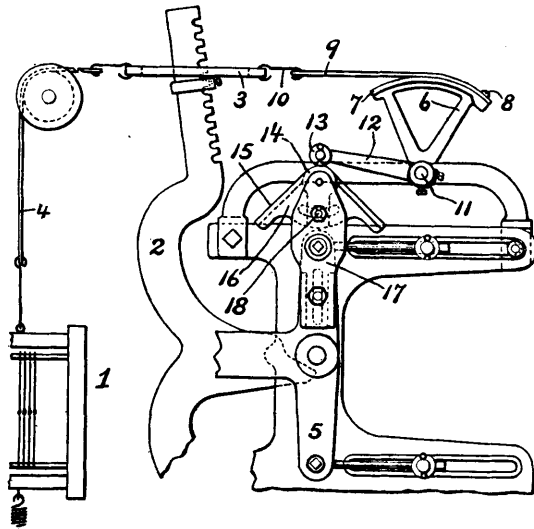
by means of a pivoted piece 20 being pushed under the ends of the series of levers 13 and 14 by means



of a handle at the side of the dobby. (Whitin Machine Works, Whitinsville, Mass.)

LENO MOTION FOR WHITIN DOBBIES.

In leno or gauze weaving it is necessary to cross the whip threads against the standard threads, a feature which puts an extra strain on the whip threads, and, in order to reduce this strain as much as possible, when a thread has to be in the upper part of the shed for two or more picks, the leno *i. e.* the half and return motion is used, which in turn obviates the necessity of the whip threads moving from the upper part of the shed to the closed shed, and then back again to its original position when the next shed is opened.



The half and return motion thus means, that the harness only moves to an intermediate position (half-

way), and then back again to its original position, *i. e.* without descending to the closed shed.

The construction and operation of the Whitin leno motion is best given by means of the accompanying illustration, which is a side view of the principal parts of this dobby and in which 1 indicates a loom harness operated by a harness lever 2, through a slotted link 3, which fits over said harness lever and cord 4, said harness lever 2 in turn being operated through harness jacks (not shown) from the actuating rocker 5 of the dobby.

The leno or half and return motion consists of the segmental arm 6, with a curved rim 7, to which is connected at 8 one end of a strap 9, the other end being connected to the link 3 through a wire 10. The segmental arm 6 is secured to a shaft 11, which shaft also has an arm 12 secured to it. This arm carries at its end, a roller 13, which is kept pressed on the cam 14 by means of a spring coiled around the shaft 11. The cam 14 consists principally of two side faces 15 and a slotted plate 16 by which said cam may be secured in any desired position to the cam support 17 by means of a clamping bolt 18. The cam support 17 is secured to the top end of the actuating rocker 5, and consequently the cam 14 is moved back and forth with said rocker, making a movement in each direction for every pick. Owing to the cam 14 having two slanting faces, the roller 13 in pressing against said faces gives a backward and forward swing to the segmental arm 6, while the rocker 5 makes a movement in one direction or makes what is termed a back and return movement. The effect of this movement on the harness is that as the harness starts downwardly it is held in an intermediate position for a small space of time by having the cam roller 13 resting on the highest part of cam 14, and if said harness is to remain up for the next pick, the raising harness lever 2, actuated by the dobby, at this time will catch the harness, just as the segmental arm is about to begin a return movement.

If the harness is to remain down for the next pick, the segmental arm will make its return movement in time to allow said harness to be in the lower shed at the next pick.

The cam, in being made adjustable, can vary the movements of the segmental arm as desired. (Whitin Machine Works, Whitinsville, Mass.)

HARNES RETRACTOR FOR DRAPER LOOMS.

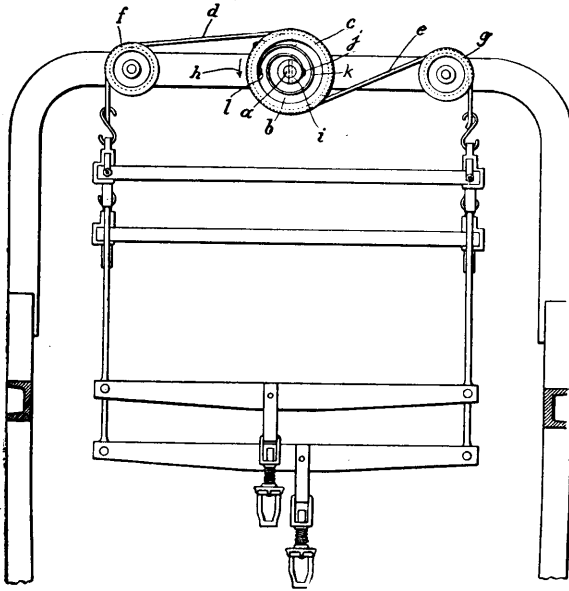
This device refers to that class of looms wherein the harness frames are moved positively in the lower portion of the shed by means of cams, and raised in the upper portion of the shed by means of spring actuated drum winding. Two or more harness frames can be used, as the movement of each is effected independently of the others.

The accompanying illustration shows the gist of the new device—the spring actuated drum winding mechanism, *i. e.*, harness retractor device—in its front elevation, so much of portions of loom being shown in connection with it as are required to get a clear understanding of the working of the new mechanism.

In this class of looms, the harness frames are depressed (pulled down) by means of harness cams (not shown in illustration).

The arch of the loom sustains a horizontal stud, *a*, and projecting forwardly therefrom, and on said stud is mounted a plurality of spring operated rotatable actuators, one for each harness frame. Each actuator is made as a circular disk *b*, having an overhanging annular flange *c*, externally grooved, the disk having a hub to be supported rotatably on the stud *a*, the actuator being substantially an ex-

ternally grooved drum. These drums are mounted upon the stud, one in front of the other, above their



respective harness frames, and flexible straps *d, e*, are wound from opposite directions above the grooved periphery of each drum and secured thereto, their other ends being led over guide rollers *f, g*, and in turn attached to the harness frames.

When the drum is rotated in the direction of arrow *h*, the connection *d, e*, will be unwound, and the harness frame attached thereto lowered, opposite rotation of the drum winding up the connections and lifting the harness frame. A collar *i*, is secured to the stud *a*, within each drum in front of the disk *b*, thereof, and by a suitable set screw *j*, one end of a coiled spring *k*, is fixed to the collar, the spring, of the flat or clock spring type, being coiled about the collar and having its other end secured at *l* to the inner circumference of the flange *c*.

When each harness frame is depressed positively by its cam (not shown), the drum of said frame will be rotated in the direction of arrow *h*, and its spring thus wound, storing up its power. As the cam rotates, and in turn releases the down pull on the harness frame, the spring *k*, of its drum expands, turning the drum oppositely to the arrow *h*, and thereby winding upon its periphery the connections *d, e*, that is, lifting the harness frame. Any stretch of the flexible connections *d, e*, is taken up by the springs, and the opposite winding of each pair of connections effects an even and uniform movement to the harness frame. (Draper Co., Hopedale, Mass.)

STAFFORD'S DOBBY.

The construction of this dobbie is seen by referring to the accompanying illustrations, of which Fig. 1 is a side elevation through the dobbie, and Fig. 2 is a detail its different parts for operating the harnesses.

Referring to the numerals of reference in the illustrations, 1 indicates a rock shaft, which carries a lever having upper and lower arms 2 and 3 respectively,

and which arms vibrate back and forth with the rock shaft 1 as a centre, the motion which said arms receive being obtained from the loom through the lever rod 4, which is connected by a joint to the arm 5, said arm being centred on the rock shaft 1 and having a rigid connection with the levers 2, 3, thus imparting the vibrating motion to them. It will be noticed that there are two levers centred on the rock shaft, i. e., the one on the front side of the dobbie being indicated by 2, 3, and the one on the back side of the dobbie being indicated by 6, 7, each arm of the latter lever being a little longer than the corresponding arms 2, 3, of the front lever.

Connected to the ends of the arms 2, 3, are the rods 8 and 9 respectively, the other ends of which are connected to the front end of the top and bottom lifters 10 and 11 respectively. On the ends of the back arms 6 and 7 are connected rods 12 and 13 respectively, which are longer than the rods 8 and 9. The other end of the rod 12 is connected to the top lifter 10, while the rod 13 is connected to the bottom lifter 11, hence the back ends of the lifters will receive a greater movement than their front ends.

The harness levers 14 are pivoted on the rod 15 at their lower ends, and are connected at their middle projections to the connectors 16 by means of a joint 17, each end of the connectors 16 being jointed respectively to a hooked jack 18. These jacks are operated from the harness chain 19 through the levers 20, one of them resting under a lower hook, while the adjacent lever has a wire resting on it, which has its top end resting under the top hook of the same connector 16 as the bottom hook. From the leverage shown, it will be seen that when a peg or ball of the chain 19 comes under the lever 20, its other end is lowered, and the hook jack 18 falls into the path of the vibrating lifter 10 or 11 according to which hook is operated, and is carried

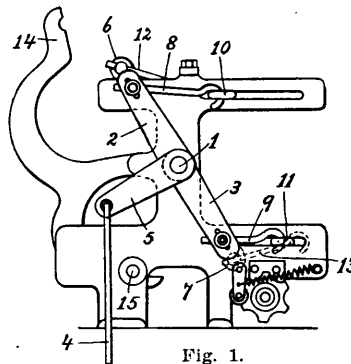


Fig. 1.

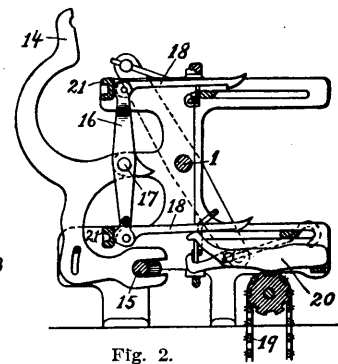


Fig. 2.

outward by it. Through the connection previously referred to, the respective harness lever 14 is thus given a movement, and by its connection with the harness (not shown), said harness is raised. As was stated, the object of the motion is to have all the threads of each section of the shed in one plane, and this object is accomplished for the top shed by having the levers for operating the lifters 10 and 11 of different lengths as described, for the reason that the back end of the lifters, by being connected to the longer levers, will move through a greater distance than the front ends of said lifters, and hence the hooked jacks 18, which are situated toward the back of the dobbie, will get a longer pull, and through their connection with the harness levers 14, will give a correspondingly increased movement to them.

It will be readily understood that each successive

harness lever, as it approaches the front of the dobbie, will receive a slightly less upward movement than the harness lever just back of it. In this manner all of the threads in the top section of the shed are brought into one plane, thus obtaining half of the object of the improvement. The other half, that is getting all of the threads of the bottom section of the shed in one plane, is accomplished by setting the lower pivot 15, at a horizontal angle, thus having the back end of said pivot farther away from the harnesses than the front end. The positions of the stop bars 21, being parallel to the loom side, when the hooked jacks are free, the connectors 16 are vertical, and the pivots 17 are in a straight line. Owing to the horizontal inclination of the pivot 15, the lower end of the last harness lever 14 is farther away from the harnesses than the lower end of the first harness lever, and consequently its top end to which the harness straps are connected is closer to the harnesses and thus the harness itself is lower than the harness which is connected to the first harness lever. The top of each successive harness lever is a little higher than the one just back of it, and in this manner all the warp threads in the bottom section of the shed are brought into one plane. (Geo. W. Stafford, Warwick, R. I.)

SHEDDING MECHANISM FOR WEAVING HOSE.

This shedding mechanism provides for dividing the movement of the harness frame, or making the same intermittent by the alternate action of the jacks, or effecting full movement without a subdivision by simultaneous action of the jacks.

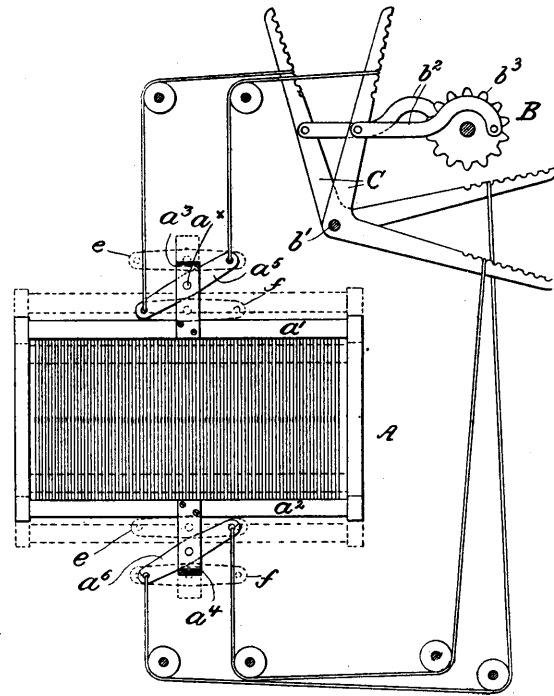
A represents a harness frame, and B pattern controlled jack operating mechanism. Jack levers C are pivotally mounted upon a bar b^1 , and connected by links b^2 , with pinions b^3 , which are operated by devices controlled by the pattern chain (not shown).

To the top cross bar a^1 of the harness frame A is secured a bracket a^3 , to which is pivoted at a^x a lever a^5 , and to the lower cross bar a^2 of the harness frame A is secured a similar bracket a^4 and lever a^6 . Levers a^5 and a^6 are connected by cords to the harness frame.

Two levers C are utilized to operate the harness frame A, one being connected with the corresponding ends of both of the levers a^5 and a^6 by means of a cord c , while the other lever C is connected with the opposite ends of said levers a^5 and a^6 by means of the cord d . The dotted outlines of the levers a^5 and a^6 shown at e indicate the position occupied by said levers when the harness frame A is in its elevated position, and the dotted outlines shown at f indicate the position occupied by said levers when the harness frame A is in its lowermost position, while the full line position shown in the illustration indicates its intermediate position. By causing the levers C to be alternately operated, the harness frame may be raised or lowered from one extreme position to the other extreme, step by step, or when the levers C are simultaneously operated in the same direction, the frame A will be moved directly from one extreme position to the other extreme.

The levers C work on fulcra afforded in their connections with the jacks, and when the latter are working alternately, one end of each lever is held through its connections

with the inactive jack so as to work on a fulcrum at that end when the other jack operates, and so the

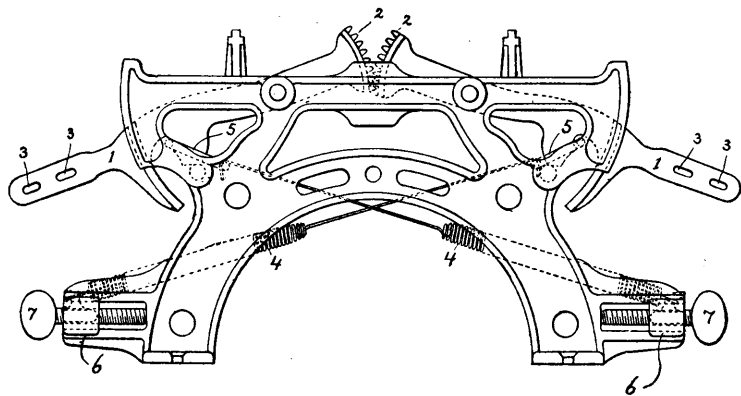


lever works first on a fulcrum at one end and then on a fulcrum at the opposite end to accomplish the before mentioned "step-by-step" movement of the harness frame. (Preston Hose and Tire Co., Marlboro, Mass.)

UNDER MOTION FOR C. & K. DOBBIES.

This device, as used for effecting the return movement of the harness, has for its object the production of means whereby the power of the springs can be conveniently varied, progressively from front to rear, in the series of harness frames employed in the loom.

The illustration is a front elevation of this under motion as fastened to the floor beneath the harnesses,



and consists of a series of rocking levers 1 arranged in pairs (one pair for each harness), being operatively

connected by segment teeth 2 to each other so that said pair of levers move in unison. The outer ends of these levers 1 are provided with holes 3 for the reception of the harness cords, each one of said levers having connected therewith a spring 4 by means of its loop 5. Two cross bars 6 (adjustable by means of set screws 7) are located at opposite ends of the frame, and the springs of each set of levers 1 are connected to their respective bar, on the opposite side of the frame, thus preventing any crowding of springs, as well as the same time providing for a convenient adjustment of the power of the springs.

It will be also noticed that by the arrangement shown the springs exert the greatest power when the harness is down, which power is gradually lessened as the harness is raised. (Crompton & Knowles Loom Works, Worcester, Mass.)

BOX MOTIONS.

BOX CHAIN MULTIPLIER FOR C. & K. LOOMS.

The object is to reduce the length of the drop box pattern chain by providing means for automatically reversing said chain, and means for repeating a certain portion of said chain as well as means for multiplying a given pick. The illustration herewith given is a side view of the mechanism, showing the means for effecting these movements.

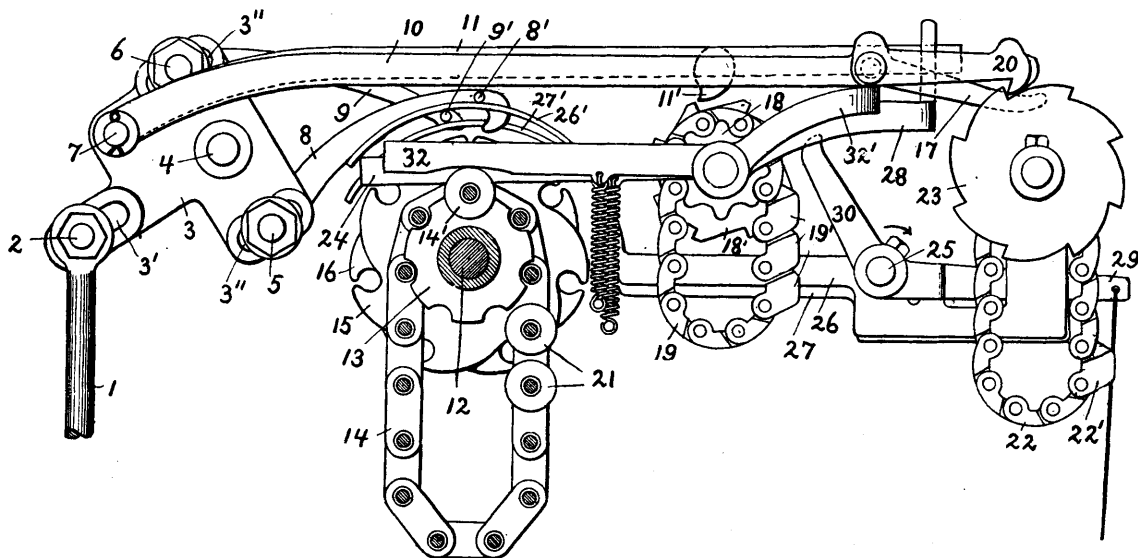
To the upright rod 1 is given a regular up and down motion from a driven part of the loom, the upper end of said rod 1 being adjustably connected by a bolt 2 with a slotted portion 3' of the plate 3, which is mounted to rock on a stud 4. In slots 3" in the plate 3 are adjustably secured studs 5 and 6,

8 and 9 to turn the pattern chain cylinder 13 forward or back, as desired.

In the normal operation of the mechanism the upward stroke of the rod 1 will rock the plate 3, causing the pawl 8 to rotate the ratchet wheel 15 one tooth, the multiplying mechanism being out of operation, since the arm 32 will be resting on the bars of the pattern chain, and thus through its end 32' raise the end 17 of pawl 10 out of engagement with the ratchet wheel 23 of the multiplier chain 22, so that the same cannot operate.

Multiplying for a given number of picks. When a roller 14' on the chain 14 raises the arm 32, and thus operates the ratchet wheel 23, and in turn the multiplier chain 22, composed of high and low links, any portion of the chain 14 can thus be repeated until continued revolution of the multiplier pattern chain 22 will bring a high link 22' on the chain 22 under the end 17 of a forked pawl to raise said end 17, and at the same time raise the pawl end 20 out of engagement with the ratchet wheel 23, leaving said ratchet wheel at rest. The main pattern chain 14 will then continue in the same direction as before, that is, if the pawl 8 is down and operating the pattern-chain cylinder 13 in one direction, it will continue down, and if the pawl 9 is down and operating the pattern chain cylinder 13 in the opposite direction, it will continue down, and therefore a given section of the pattern chain 14 will be repeated instead of the chain being reversed.

When to multiply a given pick, a roller 21 is brought under the end of lever 24 and it will raise said lever and lower the end 28, extending under the pawl 11, to allow the extension 11' on the pawl 11 to engage with the ratchet wheel 18', connected with the auxiliary pattern chain cylinder 18, and turn said ratchet wheel and cylinder and move the chain 19 thereon until a high link 19' is brought under the multiplying arm 30, which raises said arm and ro-



a stud 7 being also secured in said plate 3. On the stud 5 is pivotally mounted the pull pawl 8, and on the stud 6 the push pawl 9, and on the stud 7 pull pawls 10 and 11 as working the multiplier. Fast on shaft 12 is the drop box pattern chain cylinder 13. Two ratchet wheels 15 and 16 are fast on the shaft 12, with their teeth extending in opposite directions, and adapted to be engaged by the pawls

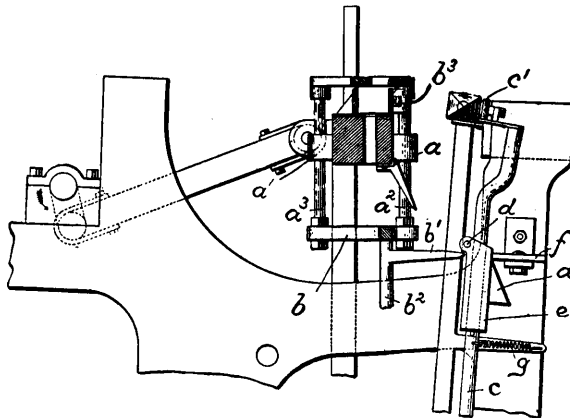
tates the shaft 25 in the direction of the arrow to move the lever 29, and in turn controlling levers 26 and 27 to raise the ends 26' and 27' of said levers and cause them to engage the pins 8' and 9' on the pawls 8 and 9, and raise said pawls out of engagement with their respective ratchet wheels 15 and 16. The multiplication of any one bar will thus continue as long as there is an unbroken suc-

cession of the high links 19' on the chain 19, but as soon as a low link comes under the arm 30, the shaft 25 will be rotated in an opposite direction, and the levers 26 and 27 will be released and allowed to move to allow one of the pawls 8 or 9 to engage with its ratchet wheel, and move the pattern chain proper. (Crompton & Knowles Loom Works, Worcester, Mass.)

IMPROVEMENT TO THE C. & K. SHUTTLE CHANGER.*

The object is to do away with the running shuttle box as used in this class of looms, the front plate of the stationary box being raised, when required, to receive a spare shuttle from the shuttle feeder, the latter forming at that time a temporary box for the shuttle.

The accompanying illustration is a side elevation of part of a loom showing the lay on its forward stroke, the shuttle feeder being ready to operate, to place a fresh shuttle on the lay.



In the new construction, the end of the lay is extended to form the bottom of the shuttle box, said lay being provided with two ears *a*, *a*¹, for receiving slide rods *a*², *a*³, united by a cross bar *b*. This cross bar is formed with a rod *b*², provided with a lifter *b*¹. By means of this rod *b*² the cross bar *b* is lifted, in turn raising the slide rods *a*², *a*³, and the binder *b*³ to thus permit the placing of the spare shuttle on the lay.

The shuttle feeder lever *c*, is provided with a stud on which is pivoted the spare shuttle binder *c*¹. The lever *c* has co-operating with it an actuator *e*, having a cam *d* and a stud *d*¹ adapted to engage with the lifter *b*¹.

When required to change the shuttle, the usual actuator lever which operates to move the lifter rod *b*² is moved, in turn lifting the binder *b*³ with the cross bar *b*. At the same time the lifter *b*¹ engages the stud *d*¹ on the actuator *e*, causing the same to engage a projection *f*, which, through spring *g*, moves the shuttle and its feeder into the space previously occupied by the running shuttle, the same having been discharged at the other end of the lay, and when the binder *c*¹ acts in place of the regular binder *b*³, until the latter, with cross bar *b*, returns to normal (lowered) position after the spare shuttle has been picked from the shuttle feeder, and when the latter is withdrawn from the shuttle box ready for replacing with another shuttle by the weaver. (Crompton & Knowles Loom Works, Worcester, Mass.)

*For a complete description of this mechanism see pages 24, 25, 26 and 27 of Part 2 of this work.

SHUTTLE BOX MOTION FOR MASON LOOMS.

This motion has for its object the production of means whereby a positive locking of the shifting tooth (so that when in mesh it is practically a solid part of the gear) is obtained, in turn producing a strong, durable and self shifting mechanism.

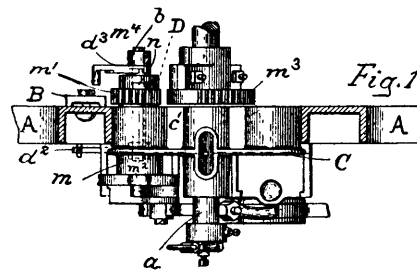


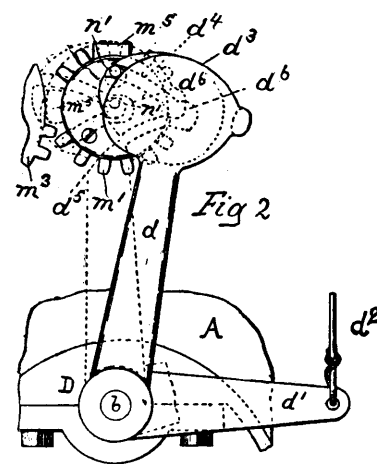
Fig. 1 is a top plan view of the mechanism, and Fig. 2 is an

enlarged inner side elevation of the gear with the shifting tooth and the controlling means for the shifting mechanism, the parts being shown in position to prevent shifting at the first dwell, but ready to start.

Examining the illustrations we find a bracket *C* secured to the loom side *A* having a bearing for the shaft *a*, and a bearing *c* for the hub *m* of the toothed gear *m*¹, to which hub is secured the face plate *m*². A mutilated gear *m*³ is secured to the crank shaft *a* adjacent to the gear *m*¹, the number of teeth being such as to give only one-half a revolution to the gear *m*¹ when in engagement therewith.

On a bracket *B*, secured to the loom frame, and in a bearing *D* is fulcrumed a shaft *b*, to which the controller (shown as practically a bell crank *d*, *d*¹) is secured, the arm *d*¹ being connected by a wire *d*² with the inner end of the box-motion lever, controlled by the pattern chain. At its upper end the arm *d* is enlarged to form a head *d*³, which swings in a path closely adjacent and in front of the cap *m*⁴, the inner face of the head having two cam grooves *d*⁴, *d*⁵ extending from a nearly circular recess *d*⁶ to the edge of the head, the grooves being adapted to receive the stud *n*¹ secured to the shifter.

In Fig. 2, the bell-crank controller is shown in normal position, maintained therein by its own weight, the inner end of the pattern lever resting on the plain portion of the pattern chain, and at such time the stud *n*¹ of the shifter is in its highest position, and it is so maintained because the stud is in the outer end of the cam slot *d*⁴ of the controller, and the



tooth *m*⁵ nearest the mutilated gear *m*³ is retracted, so that said gear will not rotate the gear *m*¹. Now, if it is desired to operate the box motion, a ball on the pattern lever and through wire *d*² swings the controller to the left and into dotted line position, the weight of the shifter *n* causing it to drop, the cam groove *d*⁴ per-

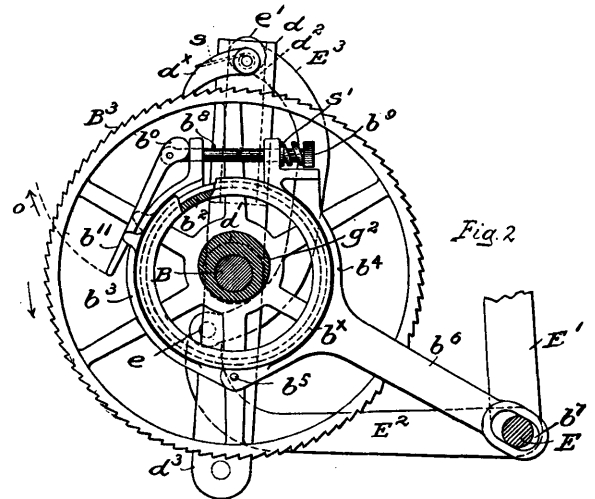
mitting it to descend, the shifter acting to shift the slide bar or carrier to the left to bring the tooth *m*⁵ into operative position, and the driven

gear m^1 will be rotated one-half revolution, causing the stud n^1 to travel in a circular path in the recess d^3 from above the axial centre of the gear m^1 to directly below it, and out of the inner end of the groove d^4 , the gears m^1 and m^3 being out of mesh. If the box motion is to be again operated, the controller is released and will move into normal position, but the stud n^1 will travel from the inner end of the cam groove d^5 to its outer end, the weight of the shifter n causing it to drop.

The shifting of the tooth carrier is not effected by the direct operation of the pattern mechanism, but by the weight of the shifter, and the only strain brought upon said mechanism is that necessary to effect the slight movement of the controller from full to dotted line position, Fig. 2, thus relieving the pattern mechanism of all strain necessary to shift the tooth of the shifting-tooth gear, and by the mode of supporting the tooth carrier in said gear the shifting tooth is practically a solid part of the gear when in operation. (Mason Machine Works, Taunton, Mass.)

with this mechanism applied, and Fig. 2 is an enlarged section of part of the mechanism on line x, x , Fig. 1.

W indicates the whip roll as mounted in arms W^1 , secured to the rocker shaft W^2 . Secured to



LET OFF MECHANISMS.

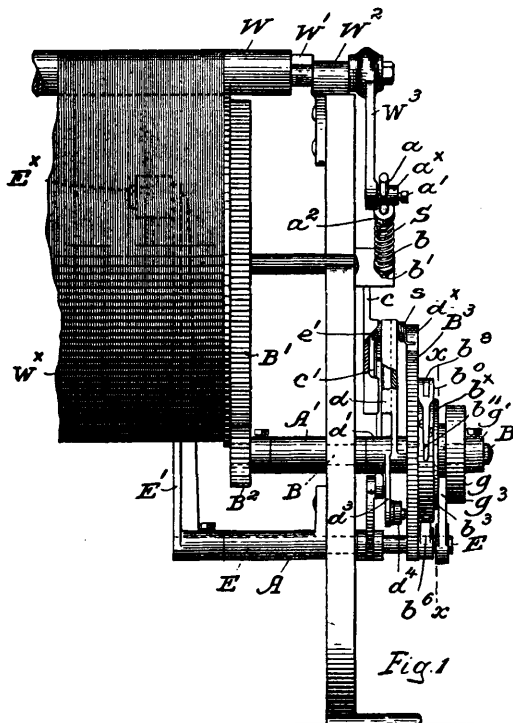
LET OFF MOTIONS FOR DRAPER LOOMS.

This mechanism is used in connection with the well-known "Bartlett" let off motion, and has for its object to provide means whereby the actuating pawl will be gradually set to take up an increasing number of teeth on the ratchets (as the di-

said rocker shaft is the rocker arm W^3 . A rocking stud a^x on the free end of the arm W^3 has extended through it a rod a , secured by a set screw a^1 , said rod having fast upon it a collar a^2 , against which bears one end of the tension spring S , as coiled around the rod, and at its other end bearing against an ear b on a bracket, secured to the loom side, the rod passing loosely through a slot b^1 in the ear. The end of the rod a extended through the ear is pivotally connected with one member c of a compound pawl carrier, said member having a longitudinal guide-way c' in its outer face.

A hub A^1 on the frame forms a bearing for a pinion shaft B , having fast thereon at its inner end a pinion B^2 , in mesh with the beam gear B^1 . The shaft is extended through and beyond the loom side, and has loosely mounted upon it the let off ratchet B^3 , and between the latter and the loom side the hub d^1 of the other member d of the pawl carrier is loosely mounted on the shaft, said member d being upturned alongside of the member c , and having in its face adjacent thereto a longitudinal guide-way d^2 . A let off pawl d^x is mounted on the member d and pressed upon the teeth of the ratchet by a spring s . A short arm d^3 depends from the hub d^1 , and has pivotally connected with it a slide bar d^4 , supported in a bearing on the loom side, said slide bar having adjustably mounted upon it a collar. A link connected to the lay sword is rearwardly extended and upturned to form an eye embracing the slide bar d^4 back of a collar, the forward beat of the lay bringing said eye against said collar and moving the slide bar toward the front of the loom. Such movement of the bar swings the member d of the compound pawl carrier c, d to the left (backwards with reference to Fig. 1), and imparts the feed stroke to the pawl d^x , the termination of such stroke of the pawl being always at the same point.

A sleeve bearing A on the inner side of the loom frame supports a rock shaft E , extended beyond the loom side and having fast upon it at its inner end an upturned arm E^1 , provided at its upper end with a roll E^x (shown in dotted lines),



ameter of the warp on the beam decreases) with the same movement of the whip roll.

Fig. 1 is a rear elevation of a portion of a loom