

COTTON MACHINERY SKETCHES

TELEGRAMS—
"DOBSONS, BOLTON."

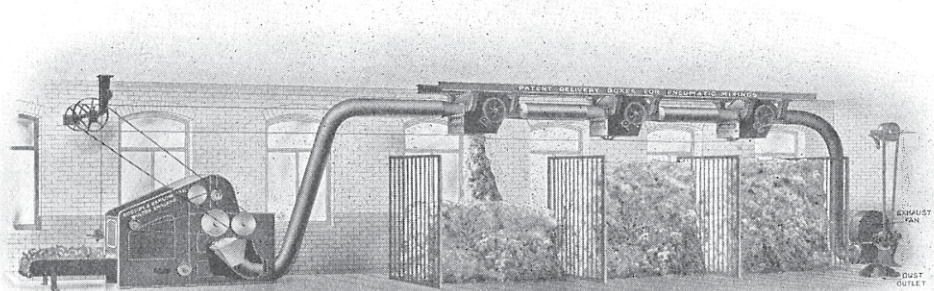
NATIONAL TELEPHONE—
No. 601.

A.B.C., WESTERN,
BENTLEY, AND LIEBER CODES.

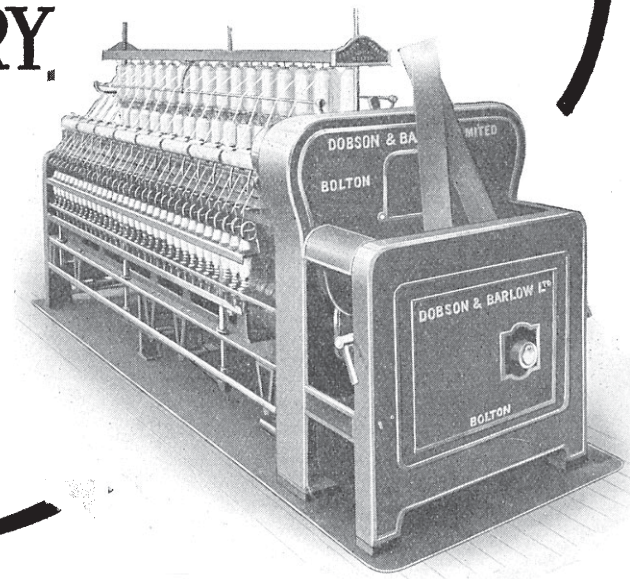
DOBSON & BARLOW LTD.,

BOLTON, ENGLAND.

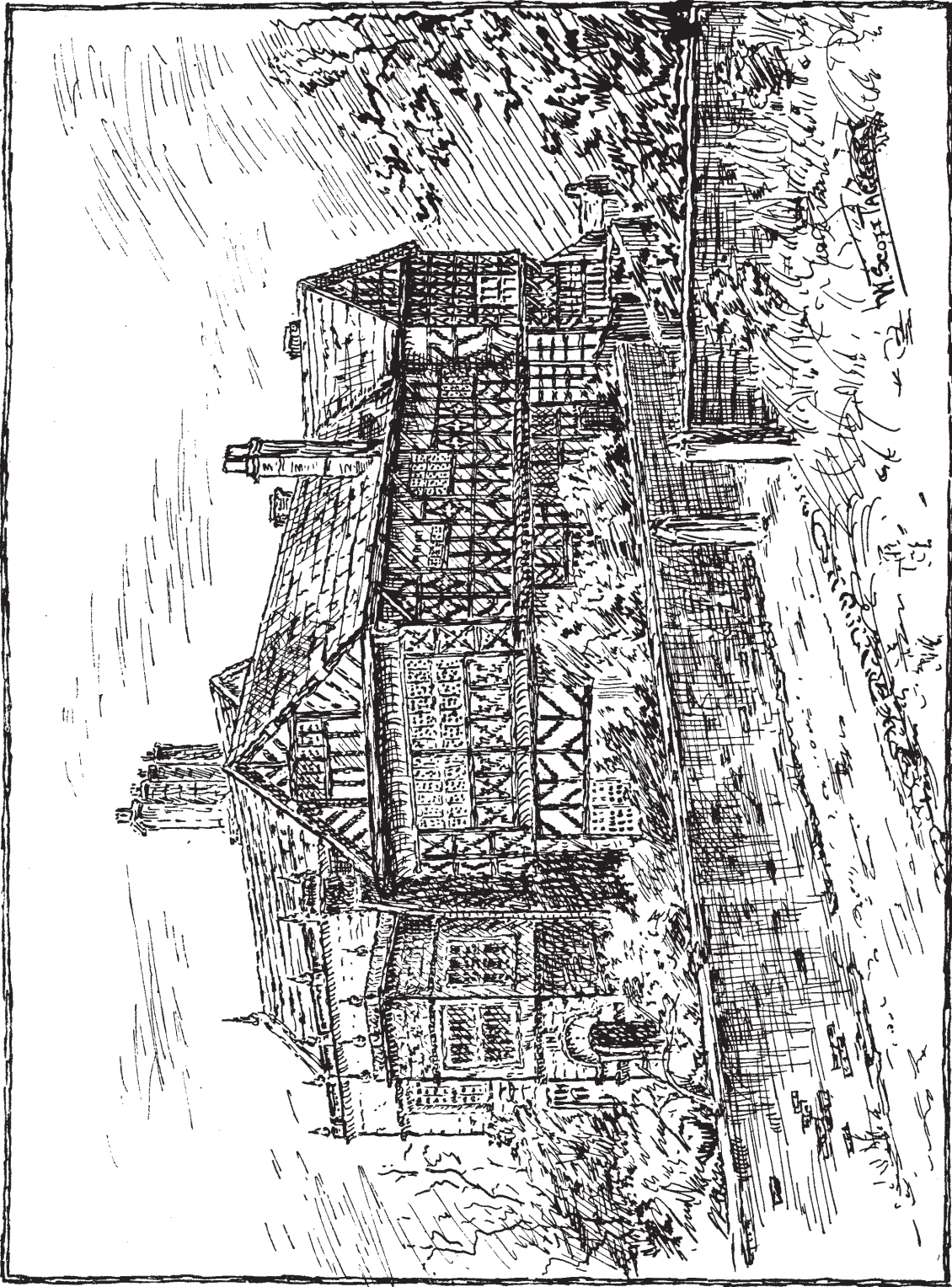
ESTABLISHED 1790.



Patent Pneumatic Delivery Arrangement.
**COTTON SPINNING
MACHINERY,**
for all processes.
**FROM
BALE TO
FINISHED YARN**
of all counts.



Ring Spinning Frame,
(with Birkenhead Creel).



HALL-ITH-WOOD, BOLTON,
Where Crompton made his spinning mule.



MACMILLAN AND CO., LIMITED
LONDON · BOMBAY · CALCUTTA · MADRAS
MELBOURNE

THE MACMILLAN COMPANY
NEW YORK · BOSTON · CHICAGO
DALLAS · SAN FRANCISCO

THE MACMILLAN CO. OF CANADA, LTD.
TORONTO

COTTON MACHINERY SKETCHES

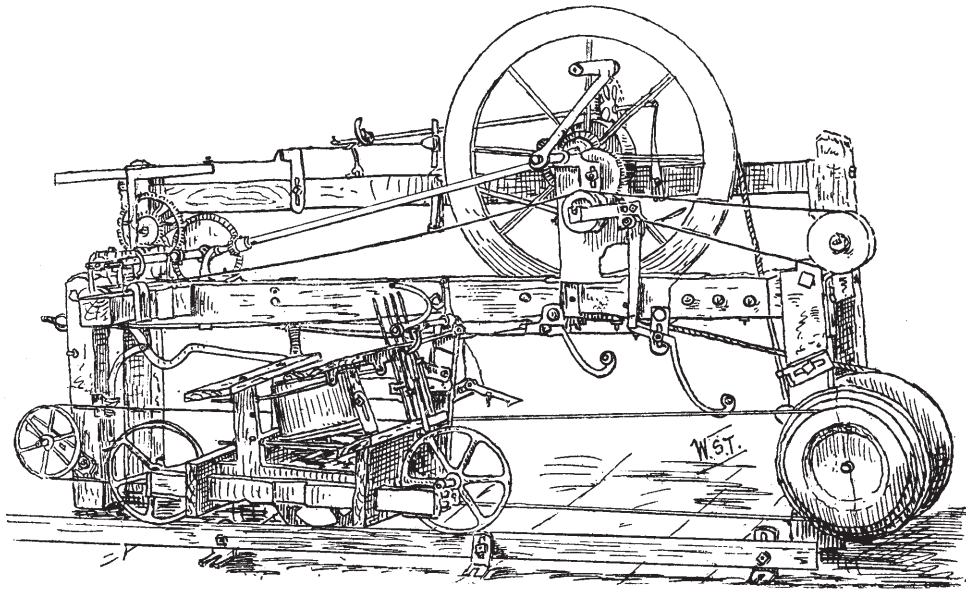
A BOOK OF ILLUSTRATIONS OF ALL TYPES OF
COTTON MACHINERY AND TO ACCOMPANY THE
AUTHOR'S BOOK ON "MILL MANAGEMENT"

BY

WILLIAM SCOTT TAGGART

M.I.MECH.E.

LATE EXAMINER TO THE CITY AND GUILDS OF LONDON INSTITUTE
ASSESSOR FOR COTTON SPINNING AND WEAVING TO THE WEST RIDING OF YORKSHIRE
AUTHOR OF
"COTTON SPINNING," VOLS. I, II, AND III; "COTTON SPINNING CALCULATIONS,"
"TEXTILE MECHANICS," "COTTON MILL MANAGEMENT," ETC.



MACMILLAN AND CO., LIMITED
ST. MARTIN'S STREET, LONDON

1923

COPYRIGHT

First Edition 1903.
Second Edition 1911.
Third Edition 1923.

PRINTED IN GREAT BRITAIN

PREFACE

THESE drawings are taken from the three volumes of the Author's book on *Cotton Spinning*; full explanations of them will be found in these books for those wishing to become thoroughly acquainted with the subject.

It is well known that teachers very seldom teach or lecture direct from text-books; they use drawings, and give explanations from them adapted to the degree of knowledge the students may possess on the subject; such explanation may be, therefore, general or detailed, and for this purpose text-books are not adapted. With a book containing nothing but drawings, a teacher can take any given sketch and lecture from it independent of the Author's own description. The book will prove useful in this direction.

Students can use the book as practice in sketching and for the purpose of developing their own descriptive powers in explaining a machine without being influenced by the description associated with such a drawing in a text-book.

In both cases, of teacher and student, their individuality will be developed.

Suggestions for improvement and additions will be greatly valued by Publishers and Author.

WM. SCOTT TAGGART.

1903.

NOTE TO SECOND EDITION

A NUMBER of new illustrations have been added to this edition, and as they include many details of two well-known S.A. Mules not hitherto illustrated in the text-books, they will prove interesting to the reader. A new Comber for short fibres is also illustrated that will add to the value of the book.

WM. SCOTT TAGGART.

1911.

NOTE TO THIRD EDITION

THE whole of the book is still modern, so that there has been no necessity to eliminate any of the illustrations. On the other hand, rearrangements and improvements of cotton machinery have occurred which are duly noted and included in this edition. The book has also been enhanced in value by the inclusion of a large number of examples of various makers' machines to illustrate details of construction. Diagrams to illustrate the action of carding, drafting, etc., have also been included.

Fancy yarns and their production have received attention by the inclusion of a number of drawings of the mechanical methods employed in producing them.

Winding, Doubling, Gassing, and the Preparation of Yarns are important items that have been given fully.

WM. SCOTT TAGGART.

BOLTON.

LIST OF ILLUSTRATIONS

VOLUME I

Full Explanations will be found in Vol. I. *Cotton Spinning.*

FIG.	PAGE	FIG.	PAGE
1. Map of the Cotton-growing Countries of the World	1	35. Another method for the same purpose	11
2. Enlarged Diagram of Cotton Fibre, showing Ripe, Unripe, Over-ripe, and irregularly Twisted Fibres, together with Transverse Sections	1	36. Section through the Feed part of Scutcher, showing the Cotton struck from the Pedal Nose	12
3. Diagram showing the Degree of Irregularity in the Direction of Twist in the Cotton Fibre	2	37. Section through the Feed part of Scutcher, showing the Cotton struck from Feed Rollers	12
4. Section and Plan of the "Knife Roller" Gin, Double Action	2	38. } Diagram of Scutcher Beaters, Two and Three Bladed	12
5. Diagram showing the effect of the Knives in Double Action	2	39. }	
6. Enlarged Section showing the Relative Positions of the Knife Roller, Leather Roller, Doctor Knife, and Dish Rail in the Knife Roller Gin	2	40. Section through a Combing Beater	12
7. Section through a Single "Macarthy" Gin	3	41. Lap End of Scutcher with Cages, etc.	13
8. Relative Positions of the Acting parts of Gin	3	42. Diagram of two Wheels in Gear	13
9. Section through a Double "Macarthy" Gin	3	43. Diagram—a Train of Wheels	13
10. " " the "Saw" Gin	3	44. Elevation of Gearing of Scutcher	14
11. Bars of "Saw" Gin	3	45. Plan of Gearing of Scutcher	14
12. Section through Bale Breaker with Four Lines of Rollers	4	46. Section through Roller and Clearer Card	15
13. Section through Pedal Bale Breaker	4	47. Enlarged view of Roller and Clearer	15
14. " " Porcupine Bale Breaker	4	48. Section through the Revolving Flat Card	15
15. Mixing Room, showing Lattice Arrangement and Bale Breaker	4	49. Feed Roller Arrangement	16
16. Automatic Hopper Feeder	5	50. Dish Feed Arrangement	16
17. Diagram showing Plans and Relative Positions of Hopper Feed, Opener, and Scutcher	5	51. Diagram of Cotton after the passage through the Teeth of the Taker-in	16
18. Section through a Vertical Beater Opener	6	52. Dish Feeds, showing variations for different classes of Cotton	16
19. " " Small Porcupine Opener	6	53. Section through the Dish Feed, Mote Knives, Taker-in, and Undercasing	17
20. " " Horizontal Beater Opener	7	54. }	
21. " " Single Opener	7	55. } Diagrams of Taker-in Teeth	17
22. " " Double Opener	7	56. }	
23. " " the Feed Rollers, etc., of Opener	8	57. Diagrams of Card Setting Gauges	17
24. " " Single Opener	8	58. Section through Taker-in and Cylinder	17
25. " " Horizontal Exhaust Opener	9	59. Enlarged Section of Taker-in and Cylinder	17
26. " " Single Scutcher Doubling from Lap, with Lap part	9	60. Section through the Card Wire	18
27. Diagram showing the arrangement of Doubling from Laps	9	61. Arrangement of Card Wire—Open Set	18
28. Longitudinal Section through Pedal Roller and Pedals	9	62. " " Twill Set	18
29. Diagram explanatory of the Curves in Cone Drums	10	63. " " Rib Set	18
30. Diagram showing method of forming Cone Drums	10	64. Diagrams of the Position and Form of Teeth	18
31. } Section, End View, and Plan of Feed Regulating		65. Section showing the Flats entering upon the Cylinder	18
32. } Motion of Opener and Scutcher	10	66. Section showing the Relative Positions of the Flats and Cylinder	18
33. }		67. Diagram explanatory of the effect of Grinding	18
34. Arrangement of Bowls and Bowl Rail for reducing Friction	11	68. Card Flexible	18
		69. " "	19
		70. Diagram explanatory of Fig. 69	19
		71. }	
		72. } Card Flexible	19
		73. }	
		74. Card Bend covered with removable Steel Bands instead of Flexible	20

COTTON MACHINERY SKETCHES

FIG.		PAGE	FIG.		PAGE	
75.	Card Flexible	20	95.	Flat Grinding Arrangement	23	
76.	Diagram explanatory of Fig. 75	20	96.	Horsefall Grinding Roller	23	
77.	} Card Flexible	21	97.	Elevation of the Gearing of Card	23	
78.			98.	Plan View of the Gearing of Card	24	
79.	} Card Centre Setting Arrangement	21	99.	Improved Hopper Bale Breaker	24	
80.			100.	Patent Regulator for Hopper Feeder	25	
81.			101.	Section through Hopper, showing Patent Automatic Feed Arrangement	25	
82.	" " " " " " "	22	102.	Section through the Hopper Feeder	25	
83.	Section through the Doffer and Cylinder, showing Covers, etc.	22	103.	" " " " " " "	26	
84.	} Section through Coiler, with Details	22	104.	} Adjustable Beater Bars in the Scutcher	26	
85.			105.			107.
86.			106.	108.	Section through the Card Comb Box	27
87.			107.	109.	Patent Flat Grinding Arrangement	27
88.			110.	Diagram relating to Fig. 109	28	
89.	Section of Card Wire	22	111.	Arrangement of Doffer-driving	28	
90.	} Sections and Details of Flat Grinding Arrangement	22	112.	Arrangement for Weighting Feed Roller of Card	28	
91.			113.	} Comparison of old and new Methods of arranging Flats, Bends, and Cylinder	28	
92.			114.			
93.						
94.						

See Appendix for further illustrations.

VOLUME II

Full Explanations will be found in Vol. II. Cotton Spinning.

FIG.		PAGE	FIG.		PAGE
1.	Section of Draw-Frame	29	33.	} Diagrams explaining the Combing Action	36
2.	} Weighting of Roller in Draw-Frame	29	34.		
3.			35.		
4.	Solid and Loose Boss Rollers	30	36.		
5.	} Diameters and Spaces of Draw-Frame Rollers for various Classes of Cotton	30	37.	Gearing and Driving Plan of Comber	36
6.			38.	Section through a Fly-Frame	37
7.			39.	Plan of Spindle Rail	37
8.	Front and Back Stop Motions in Draw-Frame	30	40.	Section through Rollers and Stand	37
9.	Details of Stop Motion in Draw-Frame	30	41.	Cap Bar	37
10.	Front and Back Stop Motion	31	42.	Rollers and Stand in Fly-Frame	37
11.	Section through Draw-Frame, showing Electric Stop Motions	31	43.	Diameters and Spaces of Rollers in Fly-Frame	38
12.	Patent Revolving Top Clearer	31	44.	} Flyer and Bobbin with Driving	38
13.	Ermen's Top Clearer	31	45.		
14.	Colling's Top Clearer	31	46.	Patent Spindle Footstep Bearing	38
15.	Full Can Stop Motion	31	47.	} Diagrams of the Action of the Flyer	38
16.	Gearing of Draw-Frame	31	48.		
17.	} Driving of Rollers in Draw-Frame	31	49.	Flyers with Straight and Curved Slots	39
18.			50.	Driving for Bobbin and Spindles	39
19.			51.	Diagrams explaining Winding in the Fly-Frame	39
20.	Section through Comber (Duplex)	32	52.	Diagram explaining "Flyer Leading"	40
21.	Star Wheel	32	53.	" " " " " " " "	40
22.	Section through Comber and Nipper Cam	32	54.	} Diagrams explaining the Effect of Winding in the Fly-Frame	40
23.	} Two arrangements of Nipper	32	55.		
24.			56.	Gearing of Fly-Frame	40
25.	Quadrant Cam and Quadrant Feed in Comber	33	57.	} Diagrams explaining the Curves of the Cone Drums	41
26.	Roller or Quadrant Cam, showing Cycle of Actions	33	58.		
27.	Side View, Quadrant, Quadrant Cam, and Clutch Cam	33	59.	Diagrams explaining the Construction of the Cone Drums	41
28.	} Notch Wheel Feed Motion in Comber	34	60.	} Drums	41
29.			61.		
30.	Detaching Roller Mechanism	35			
31.	Section of Single Nip Comber	35	62.	} " " " " " " " "	42
32.	" " " " " " " "	35	63.		
			64.	} " " " " " " " "	42
			65.		
			66.	Differential Motion	42

COTTON MACHINERY SKETCHES

xi

FIG.		PAGE	FIG.		PAGE
67.	Section through Patent Differential Motion . . .	42	77.	Building or Traverse Motion	44
68.	" " " "	43	78.	Improved Methods of Driving of Bobbins . . .	45
69.	" " " "	43	79.	Ordinary Method of Driving of Bobbins . . .	45
70.	" " " "	43	80.	Gearing of Fly-Frame	45
71.	Diagram of Fly-Frame Bobbin	43	81.	" " " "	46
72.	Gearing of Fly-Frame	43	82.	Side View of Fly-Frame Gearing	46
73.	Building or Traverse Motion in Fly-Frames . . .	44	83.	End View of Fly-Frame Gearing	47
74.	Details of Traverse Motion in Fly-Frames . . .	44	84.	Diagram of Fly-Frame Gearing	47
75.	Diagrams explaining Traverse Motion in Fly-Frames	44	85.	Bobbins and Skewers	48
76.	Building or Traverse Motion	44	86.	" " " "	48

See Appendix for further illustrations.

VOLUME III

Full Explanations will be found in Vol. III. Cotton Spinning.

FIG.		PAGE	FIG.		PAGE
1.	Diagram illustrating the Cause of Twists going to the Thinnest Parts of Yarn during Spinning . . .	49	41.	Operating the Front Roller and Back Shaft . . .	58
2.	Diagram illustrating the Arrangement of the Fibres in Yarn	49	42.	Mechanism for Operating Back Shaft and Drawing up Cone Clutch in Cam Shaft Mule	59
3.	Cross Section of Yarn showing Position of the Fibres	49	43.	Holding out Catch	59
4.	Diagram of the Twisting Action in the Mule	49	44.	Backing-off and Drawing-up Mechanism	60
5.	Diagram of the Twisting Action in the Mule and the Effect of an Inclined Spindle	50	45.	Strap-relieving Motion	60
6.	Diagram of the Twisting Action in the Mule and the Effect of an Inclined Spindle	50	46.	Details of same	60
7.	Diagrams showing Difference between a Vertical and an Inclined Spindle	50	47.	Position of Faller Wires for Different Stages of the Cop	60
8.	Plan of a Pair of Mules	50	48.	Position of Sickles and Wires for the Inward and Outward Run of Carriage	61
9.	Section of a Mule	51	49.	Mechanism of Backing-off Chain-tightening Motion	61
10.	Plan View of the Gearing of a Mule	51	50.	View of Spindle and Cop	61
11.	Various Arrangements of Mule Creels	52	51.	Diagram of Cop showing Layers and Crossing	61
12.	View of the Back of Headstock	53	52.	Diagram showing Curves of Variation of the Speed of Spindle for Winding the Cop Bottom	61
13.	Driving of the Mule, End and Side View	53	53.	Diagram of Cop	62
14.	Gearing showing Driving of Front Roller and Back Shaft	53	54.	Gearing Plan of Mule-gearing	62
15.	Plan View showing all the Mule Scrolls	54	55.	Diagrams illustrating Action of the Quadrant	62
16.	Back Shaft drawing the Carriage out	54	56.	Diagrams illustrating Explanation of Quadrant	63
17.	Out End Back Shaft Scroll moving Carriage	54	57.	Variation of Initial Speed of Spindle	64
18.	Drawing-up Scroll	54	58.	Diagram of Rate of Movement of Nut up the Quadrant	64
19.	Check Scroll	54	59.	General View of Quadrant and its Connections	64
20.	Squaring Band under the Carriage	54	60.	Winding Drum and its Connection to the Tin Roller	65
21.	Method of Constructing a Scroll	55	61.	Long Shaper and its Connections	65
22.	Section of Mule showing Driving of Spindles, etc.	55	62.	Diagram illustrating the Shaper	65
23.	Back View of Headstock showing Driving	55	63.	" " " "	66
24.	Spindle or Tin Drum Driving	55	64.	Front, Middle, and Back Plates of Shaper	66
25.	New Method of Driving Spindles and Front Rollers simultaneously	55	65.	Diagram of Long Shaper explaining Curvature of Long Rail	67
26.	Section of Rim Shaft and Pulleys	56	66.	Diagram of Long Shaper Inclined Guide Bracket	67
27.	Duplex Driving and Drawing-up Arrangement	56	67.	Diagrams of Defective Cops	67
28.	Drawing-up by Strap for Fine Spinning	57			
29.	General View of Mechanism of Cam Shaft Mule	57			
30.	End View showing Cam Shaft driven from Rim Shaft	57			
31.	Cam Shaft when placed below the Long Lever	58			
32.	Cam for Moving the Strap Fork	58			
33.	Twist Latch Lever, Backing-off and Strap Fork Arrangement in Cam Shaft Mule	58			
34.	Operating the Cone Clutch on the Cam Shaft	58			
35.					
36.					
37.					
38.					
39.					
40.					

FIG.	PAGE	FIG.	PAGE
82.	68	131.	81
83.	68	132.	81
84.	68	133.	82
85.	68	134.	82
86.	68	135.	82
87.	68	136.	83
88.	68	137.	83
89.	69	138.	83
90.	69	139.	83
91.	69	140.	83
92.	69	141.	83
93.	70	142.	84
94.	70	143.	84
95.	70	144.	85
96.	70	145.	85
97.	70	146.	85
98.	71	147.	85
99.	71	148.	85
100.	71	149.	86
101.	71	150.	86
102.	71	151.	86
103.	72	152.	86
104.	72	153.	86
105.	72	154.	87
106.	73	155.	87
107.	73	156.	87
108.	73	157.	87
109.	74	158.	87
110.	74	159.	87
111.	75	160.	87
112.	75	161.	87
113.	75	162.	87
114.	76	163.	87
115.	76	164.	87
116.	77	165.	88
117.	77	166.	88
118.	78	167.	88
119.	78	168.	88
120.	78	169.	88
121.	78	170.	89
122.	78	171.	89
123.	78	172.	89
124.	79	173.	89
125.	79	174.	89
126.	79	175.	90
127.	79	176.	90
128.	79	177.	90
129.	80	178.	90
130.	80	179.	90
		180.	91
		181.	91
		182.	91
		183.	92
		184.	92
		185.	92
		186.	92
		187.	93
		188.	93
		189.	94

COTTON MACHINERY SKETCHES

xiii

FIG.		PAGE	FIG.		PAGE
190.	} Creel and Troughs of Doubler Frame	94	206.	Old Form of Doffing Motion	98
191.			207.	Coleby's Reel	98
192.	Trough of English System of Doubler	95	208.	} Sections and Gearing of same	99
193.	" Scotch "	95	209.		
194.	Section of Doubler Spindle	95	210.		
195.	Knee Brake for Doubler Spindle	95	211.	Bundling Press	99
196.	Roller Stop Motion for Doubler	96	212.	Plan of a Card Room for a Mill of 80,648 Spindles	100
197.	Roller and Spindle Stop Motion for Doubler	96	213.	Plan of 4th Spinning Room " " "	100
198.	Ring and Traveller of Doubling Frame	96	214.	Plan of Card Room Machinery	101
199.	} Diagram of Twist in Doubling Two or more Ends	96	215.	Plan of Preparing Machinery for Combed Yarn	101
200.			into One	216.	Plan of Card Room of an Indian Mill
201.	} Rope Driving in Ring Spinning and Doubling	97	217.	Plan of a Spinning and Weaving Mill	102
202.			Frames	218.	Hygrophant
203.	Section of Reel showing Doffing Motion	98	219.	Improvements in Long Lever Mule	104
204.	Side View of Reel	98	220.	Short Shaper	104

See Appendix for further illustrations.

APPENDIX

FIG.		PAGE	FIG.		PAGE
1.	Example of Gearing	105	40.	Details of Comber, Nasmith	118
2.	Diagrams of Levers	105	41.	} " " "	119
3.	Belt Driving	105	42.		
3.	Weighting of Lap Rollers	105	43.		
4.	" "	105	44.	} " " "	120
5.	" "	105	45.		
6.	} Stop Motion on Lap End	106	46.	} " " "	121
7.					
8.	Doffer Driving	106	47.	} Setting of " "	121
9.	Flat Driving	106	48.		
10.	Coiler Driving	106	49.	Diagram of various Fibres	121
11.	Gearing Plan of Scutcher	106	50.	Double Roller Macarthy Gin (Platts)	122
12.	Draw-frame Roller Driving	106	51.	Saw Gin Action	122
13.	Fly-frame Building Motion	107	52.	} Saw Gin	123
14.	S.A. Mule Gearing	107	53.		
15.	} " "	108	54.	Bale Breaker (Hetherington)	124
16.					
17.	} " "	109	55.	Hopper Bale Breaker (Platts)	124
18.					
19.	" "	110	56.	" " (Brooks and Doxey)	124
20.	Copping Motion Short Shaper	110	57.	" " (Howard and Bullough)	124
21.	Backing-off Motion	111	58.	" " (Dobson and Barlow)	125
22.	Setting-on and Drawing-up Motion	111	59.	" " (Platts)	125
23.	Backing-off Motion	112	60.	" " (Platts)	125
24.	Twist Motion	112	61.	Pneumatic Mixing (Dobson and Barlow)	126
25.	Rim Shaft Section	112	62.	} Detail of Pneumatic Mixing (Dobson and Barlow)	126
26.	Roller Delivery Motion	112	63.		
27.	Brake Motion	112	64.	} Mixing Room, Pneumatic	127
28.	Click Wheel on Roller Motion	112	65.		
29.	Setting-on and Drawing-up Motion	113	66.	Small Porcupine Opener (Platts)	127
30.	Details of " "	113	67.	Beater and Fan of Exhaust Opener	127
31.	Drawing-out and Changing Motions	114	68.	Hopper Feeder (Dobson and Barlow)	128
32.	Winding Motion	114	69.	Hopper Feeder (Brooks and Doxey)	128
33.	S.A. Mule Gearing	115	70.	Buckley Opener (Taylor Lang)	128
34.	Jacking Motion	115	71.	" " " "	129
35.	Strap-relieving Motion	116	72.	" " (Howard and Bullough)	129
36.	Twist Motion from Tin Drum	116	73.	Youltens Opener (Youltens Ltd.)	129
37.	Backing-off Motion	117	74.	Vertical Opener (Dobson and Barlow)	130
38.	Section of Comber, Nasmith	117	75.	Combined Vertical Beater Opener (Dobson and Barlow)	130
39.	Plan of " "	118	76.	Horizontal Exhaust Opener (Dobson and Barlow)	130
			77.	Single Opener (Dobson and Barlow)	131
			78.	Double " " " "	131

FIG.		PAGE	
79.	Double Cylinder Opener (Dobson and Barlow)	131	
80.	Conical Beater Footstep	131	
81.	" " " "	132	
82.	Double Vertical Opener	132	
83.	Vertical Opener with Lap Part	132	
84.	Dust Trunks (Platts)	132	
85.	Single Scutcher (Dobson and Barlow)	133	
86.	Scutcher Beater and Lap Part (Howard and Bullough)	133	
87.	Travelling Grid Bars (Howard and Bullough)	133	
88.	Vacuum Gauge	133	
89.	Cage Rollers and Calendar Rollers	134	
90.	Pedal Nose Movements	134	
91.	Scutcher Cone Drums	134	
92.	" " " "	135	
93.	Diagram of Irregularities in Lap	135	
94.			
95.	Safety Beater Covers (Dobson and Barlow)	135	
96.	" " " "	136	
97.	Roving Waste Opener (Brooks and Doxey)	136	
98.	Taker-in and Mote Knives (Platts)	137	
99.	Dish Feed and Mote Knives	137	
100.	Card Feed Rollers	137	
101.	Flat Grinding	138	
102.	Doffer Slowing Motion (Howard and Bullough)	138	
103.	Mixed Card (Dobson and Barlow)	139	
104.	Locking device for Cards (Dobson and Barlow)	139	
105.	" " " "	140	
106.	Diagram of Carding Action	140	
107.			
108.			
109.			
110.	" " " "	141	
111.			
112.			
113.			
114.	Doffer Comb Action	141	
115.			
116.			
117.			
118.	Diagram of Bending Effect on Card Wire	141	
119.			
120.			
121.			
122.	" " " "	142	
123.			
124.			
125.			
126.	" " " "	143	
127.			
128.			
129.			
127.	Diagram of Irregularities in Card Sliver	144	
128.			
129.	Card Web	144	
130.	Draw-Frame Roller Weighting (Brooks and Doxey)	144	
131.	Draw-Frame (Dobson and Barlow)	145	
132.	" (Platts)	145	
133.	Ermen's Clearer (Dobson and Barlow)	145	
134.	Roller Clearers (Brooks and Doxey)	146	
135.	Diagram of Hand-pulled Fibres	146	
136.	Diagram of Length of Fibres	146	
137.			
138.	" Equal Fibre Lengths	147	
139.	Action of Drawing Rollers	147	
140.			

FIG.		PAGE	
141.	Position of Fibres in Rollers	147	
142.			
143.	Diagram of Roller Drafts	147, 148	
144.	Swing Motion in Fly Frames (Brooks and Doxey)	149	
145.	Comber Waste Collector (D. and B.)	149	
146.	" " " "	150	
147.	Irregularities in Comber Lap	150	
148.	Ring Frame. Setting Cam for Building on Bobbins (Brooks and Doxey)	151	
149.	Ring Frame. Setting Cam for Building on Paper Tubes (Brooks and Doxey)	151	
150.	Yarn before Gassing	152	
151.	Gassing Frame (Arundel)	152	
152.	Gassing Frame, Upright (Arundel)	153	
153.	Hill and Brown Winding Frame (Brooks and Doxey)	153	
154.	Upright Spindle Winding Frame (Arundel)	154	
155.	Quick Traverse Winding Frame (Arundel)	154	
156.	Gearing of Quick Traverse Winding Frame (Arundel)	154	
157.	Ball Drag or Clearer	155	
158.	Reel	155	
159.	Thread Extractor (Brooks and Doxey)	155	
160.	Roller Weighting, Diagrams of	156	
161.			
162.			
163.			
164.			
165.			
166.			
167.			
168.			
169.			
170.			
171.			
172.	Quick Traverse Gassing Frame (Stubbs)	157	
173.	Gassing Frame (Stubbs)	158	
174.	Rabbeth Spindle Winder (Stubbs)	159	
175.	" " (Stubbs)	160	
176.	Patent Doubler Winder (Stubbs)	161	
177.	Patent Quick Traverse Winding Frame (Stubbs)	162	
178.	Patent Doubler Winder (Stubbs)	163	
179.	Patent Camless Cone Winder Arrangement of Creel Drag and Porcelain Guide (Stubbs)	164	
180.	Patent Camless Cone Winder (Stubbs)	165	
181.	Patent Quick Traverse Doubler Winder (Stubbs)	166	
182.	Pirn Winder (Stubbs)	167	
183.	Yarn Preparing Machine (Stubbs)	168	
184.	Hank Polishing Machine (Stubbs)	169	
185.	Hopper Bale Breaker (Platt Bros.)	170	
186.	Hopper Feeder. Fed by Lattice (Platt Bros.)	170	
187.	Double Hopper Feeder (Platt Bros.)	171	
188.	Hopper Bale Breaker and Double Hopper Feeder (Platt Bros.)	171	
189.	Small Porcupine Opener or Lattice Feeder (Platt Bros.)	172	
190.	Small Porcupine Opener and Conical Vertical Opener (Platt Bros.)	172	
191.	Single Scutcher (Platt Bros.)	173	
192.	Roving Frame (Platt Bros.)	173	
193.	Ring Spinning Frame (Platt Bros.)	174	
194.	Patent Ring Frame for Wool and Waste (Platt Bros.)	175	
195.	S.A. Mule. Details (Platt Bros.)	175	
196.	" " " "	176	
197.	" " " "	176	

COTTON MACHINERY SKETCHES

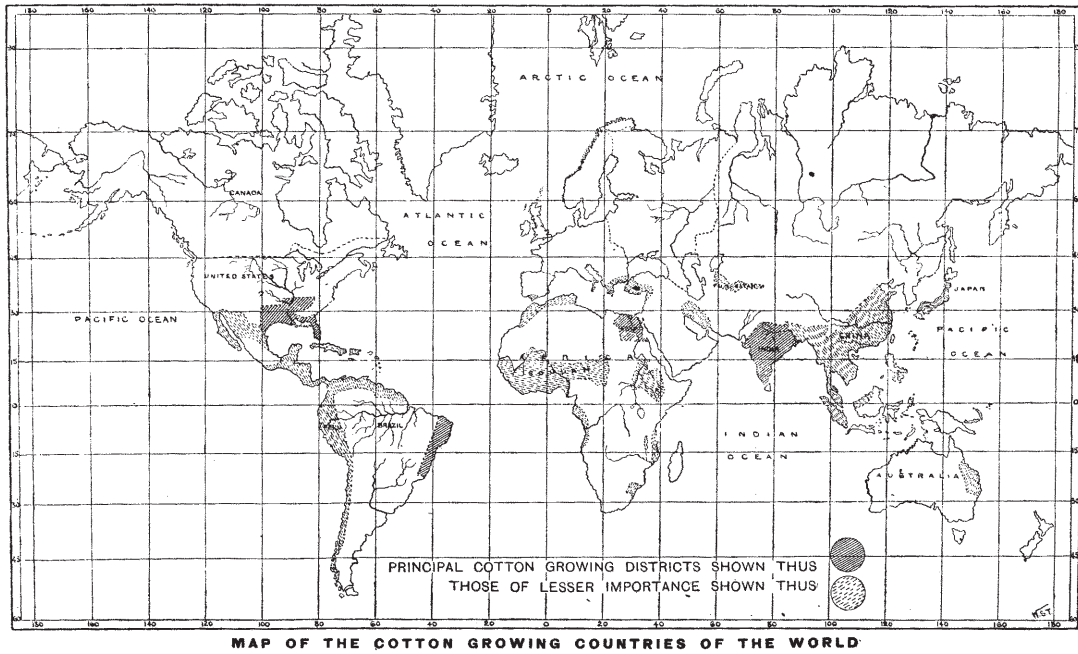
xv

FIG.		PAGE	FIG.		PAGE		
198.	S.A. Mule. Details (Platt Bros.)	177	227.	Shed Mills, Section of (Dobson and Barlow)	187		
199.	} Details of Hopper Feeder	177	228.	Storey Mills, Section of (Dobson and Barlow)	188		
200.				229.	Mill Plan, Card Room (Dobson and Barlow)	188	
201.				230.	Patent Exhaust Opener (Dobson and Barlow)	189	
202.				231.	Nasmith's Comber, Improved (Dobson and Barlow)	189	
203.				232.	Twiner Doubler, Quadrant	190	
204.				233.	„ „ Travelling Creel	190	
205.				234.	Gauges for Setting, S.A. Mule	190	
206.	} New Opening System (Scott Taggart)	178, 179	235.	} „ „ „ „	191		
207.						236.	
208.				237.	Reel. Details of Gearing and Traverse	191	
209.				238.	} „ „ „ „	192	
210.				239.			
211.				240.			
212.	Hopper Feeder and Small Patent Porcupine (Dobson and Barlow)	180	241.	Rigid Single Row Ball Journal Bearing (Hoffmann)	193		
213.	Mixed Card (Dobson and Barlow)	180	242.	„ „ „ „ Roller „ „ „ „	193		
214.	Doffer Slowering Motion (Dobson and Barlow)	181	243.	Single Ball Thrust Bearing (Hoffman)	193		
215.	Card Grinding Roller Motion (Dobson and Barlow)	181	244.	Double „ „ „ „	193		
216.	Draw-Frame Section (Dobson and Barlow)	182	245.	Self-aligning Single Row Ball Bearing (Hoffmann)	193		
217.	Link Regulating Motion Scutchers (Dobson and Barlow)	182	246.	„ „ „ „ Roller „ „ „ „	194		
218.	Comber Section (Dobson and Barlow)	183	247.	Ball Bearing Footstep of Crighton Opener „ „ „ „	194		
219.	Drawing-up by Strap, S.A. Mule (Dobson and Barlow)	183	248.	„ „ „ „ Pedestal of Card Cylinder „ „ „ „	195		
220.	Winding Motion, S.A. Mule (Dobson and Barlow)	184	249.	„ „ „ „ for Gallows Pulley (Hoffmann)	196		
221.	Separator, Ring Frame (Dobson and Barlow)	184	250.	„ „ „ „ for Rimshaft, S.A. Mule (Hoffmann)	196		
222.	Balloon Plates, Ring Frame (Dobson and Barlow)	185	251.	„ „ „ „ for Mule Carriage Bowl (Hoffmann)	197		
223.	Fancy Yarn, Slub Motion (Dobson and Barlow)	185	252.	Mechanism for the making of Fancy Yarns	197		
224.	Upright Spindle Winding Frame (Dobson and Barlow)	186	253.	} „ „ „ „ „ „	198		
225.	Quick Traverse Winding Frame (Dobson and Barlow)	186	254.				
226.	Building Motion for Bottle-shaped Bobbins (Dobson and Barlow)	187	255.	} „ „ „ „ „ „	199		
			256.				
			257.	} „ „ „ „ „ „	200		
			258.				
			259.	} „ „ „ „ „ „	201		
			260.				
			261.				

Very complete descriptions, explanations, and full calculations of above illustrations are or will be given in the Author's three-volume book on *Cotton Spinning* and *Cotton Spinning Calculations*.

COTTON MACHINERY SKETCHES

VOLUME I



MAP OF THE COTTON GROWING COUNTRIES OF THE WORLD

FIG. 1.

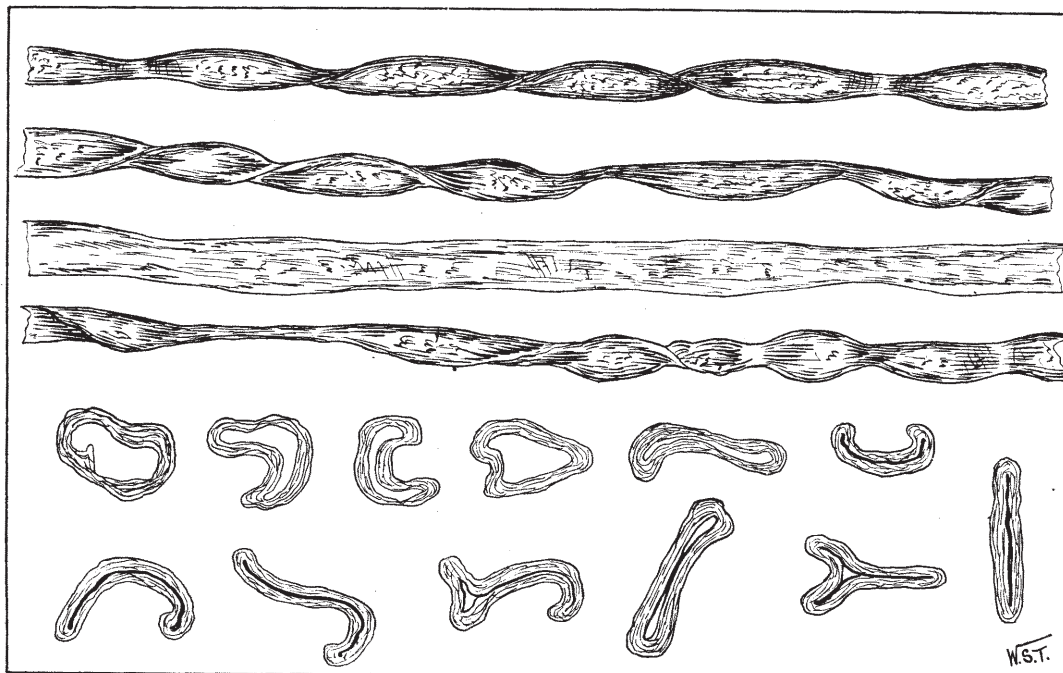


FIG. 2.

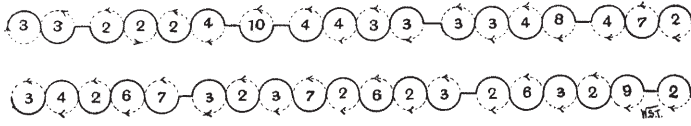


Fig. 3.

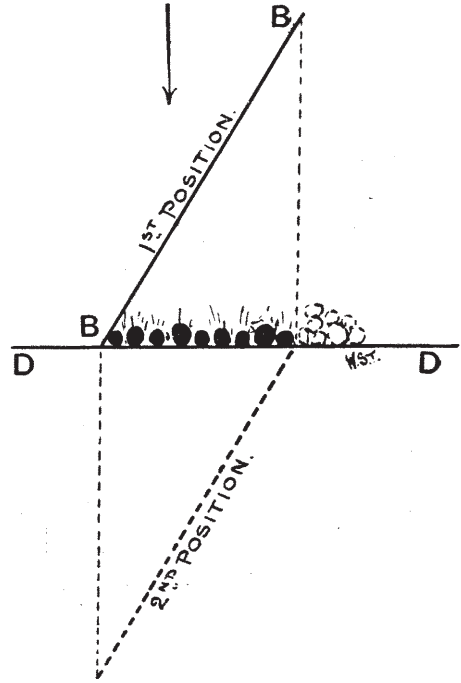


Fig. 5.

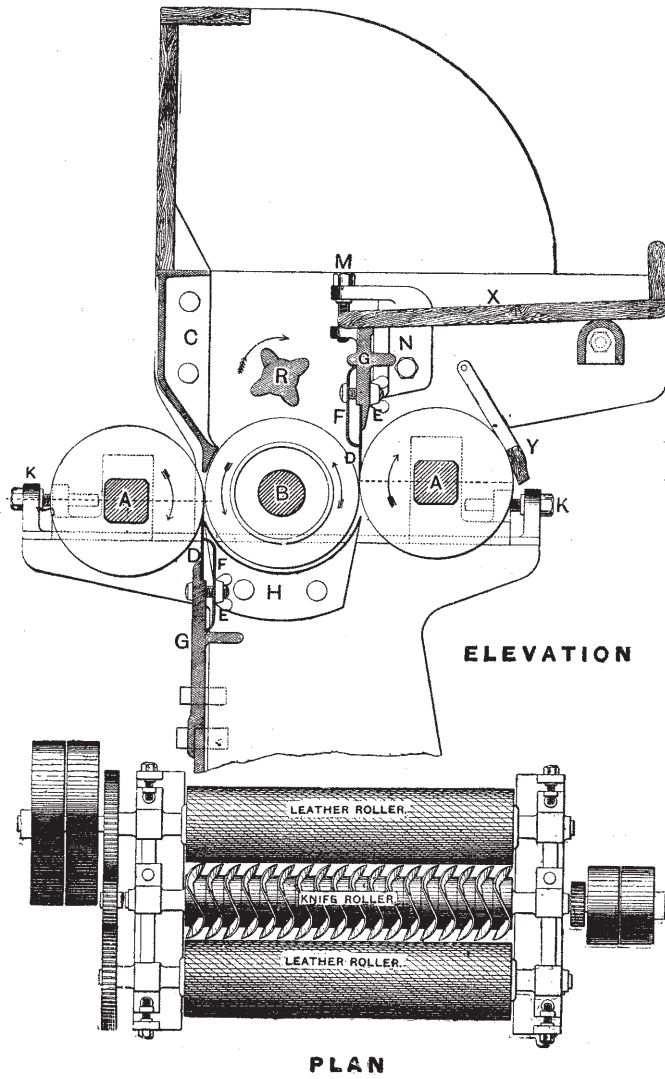


FIG. 4.--KNIFE ROLLER GIN. Plan and Section.

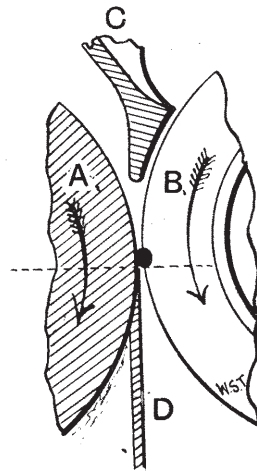


Fig. 6

COTTON MACHINERY SKETCHES

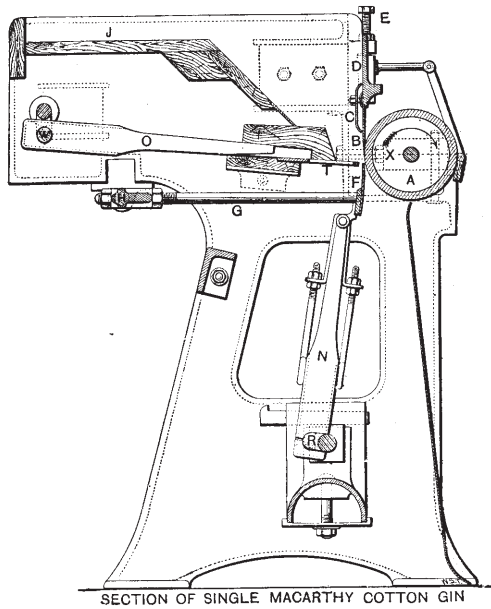


FIG. 7.

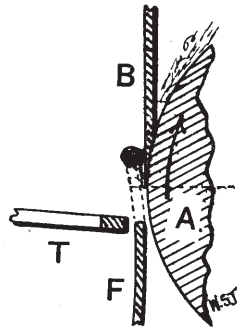


FIG. 8.

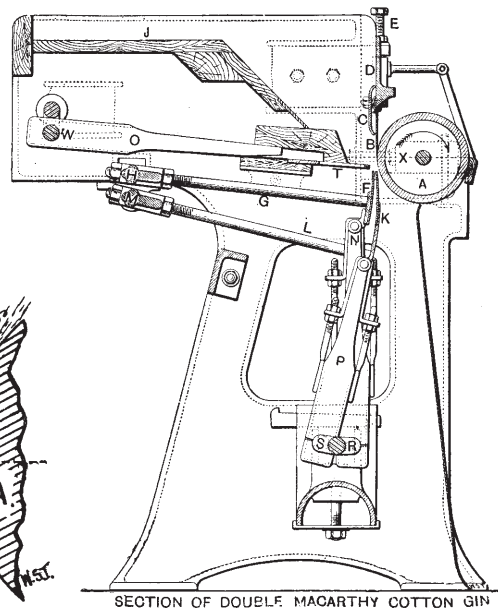


FIG. 9.

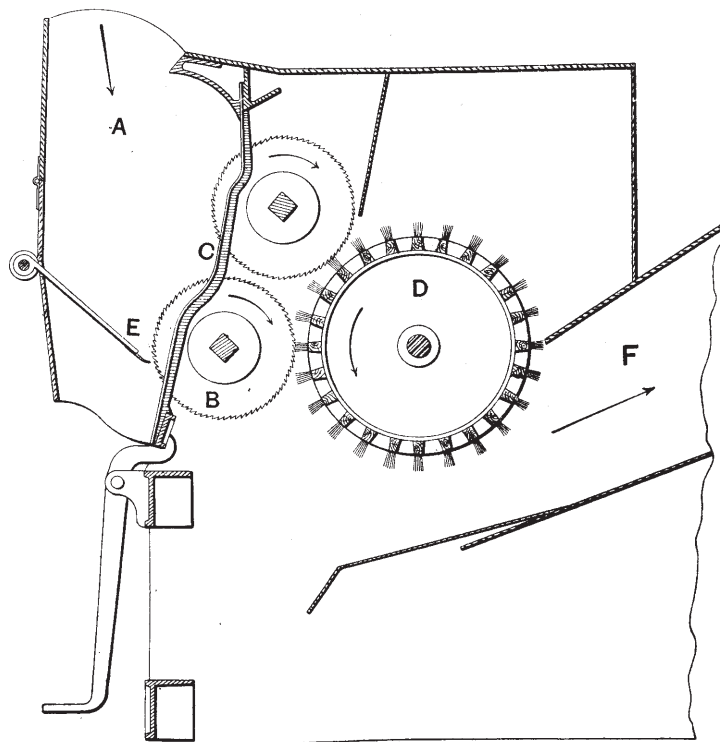


FIG. 10.

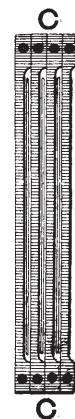


FIG. 11.

COTTON MACHINERY SKETCHES

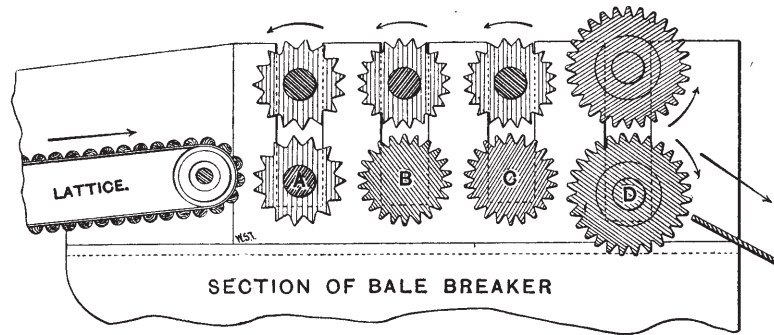


FIG. 12.

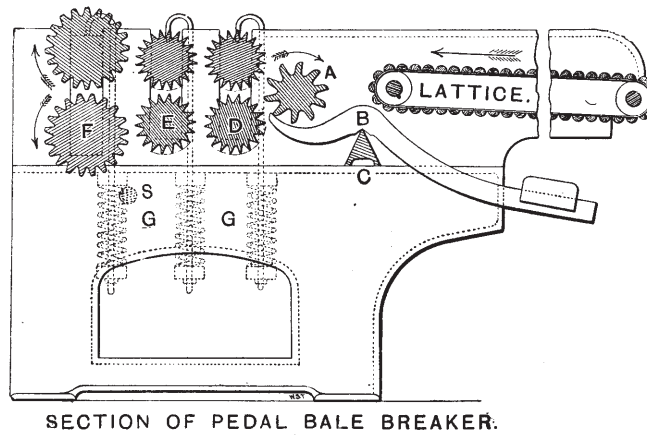


FIG. 13.

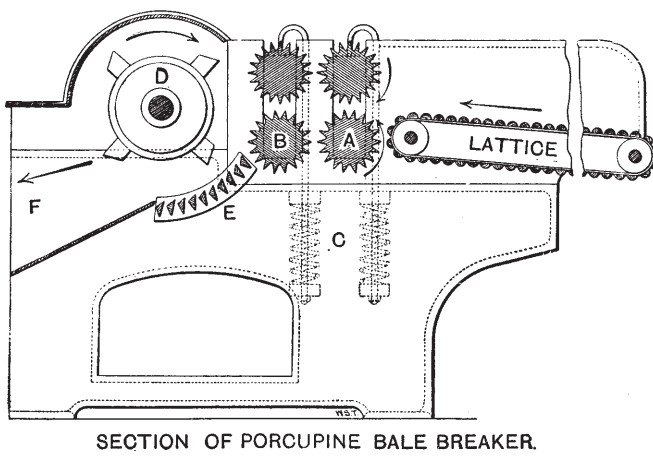
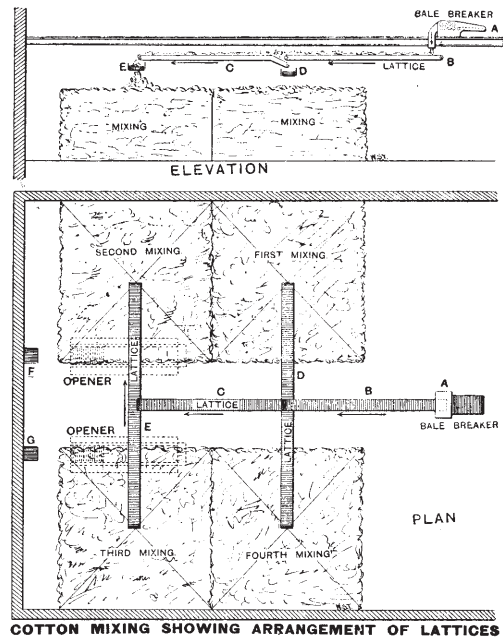


FIG 14.



COTTON MIXING SHOWING ARRANGEMENT OF LATTICES

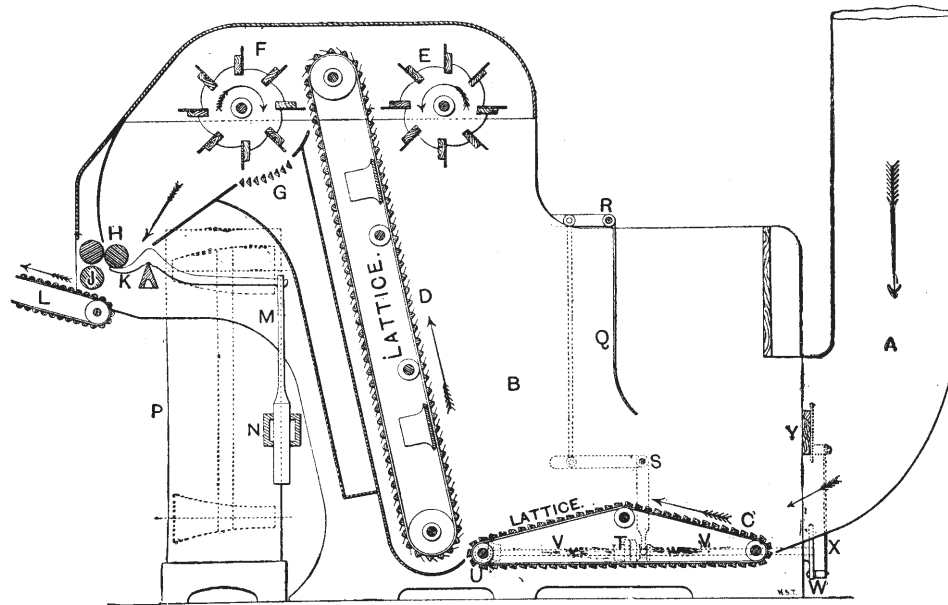


FIG. 16.

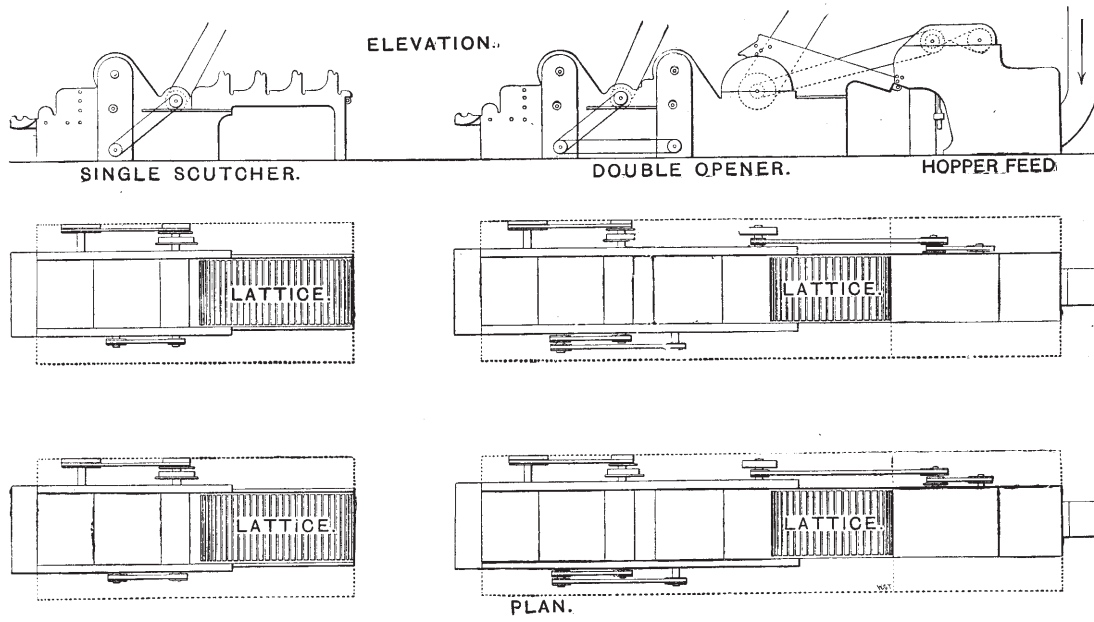


FIG. 17.

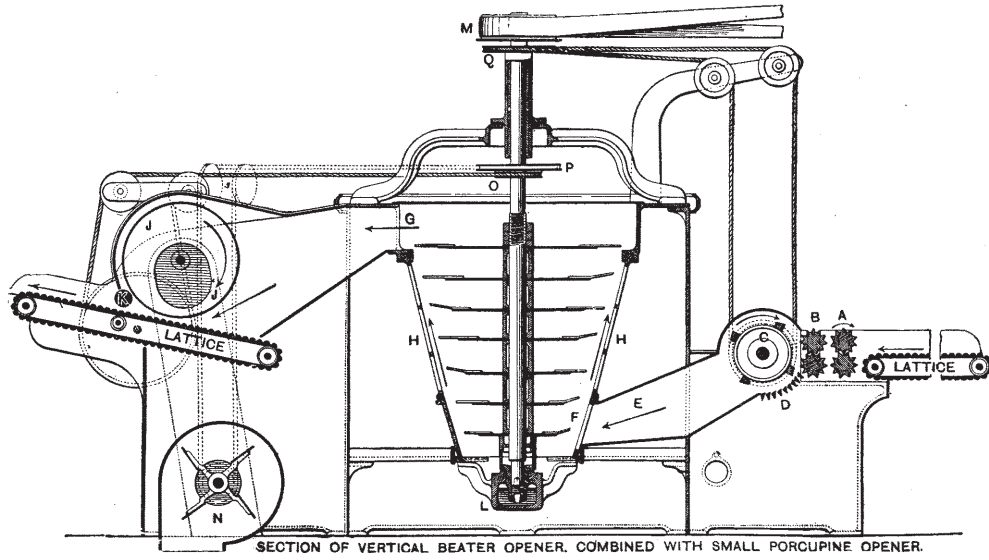


FIG. 18.

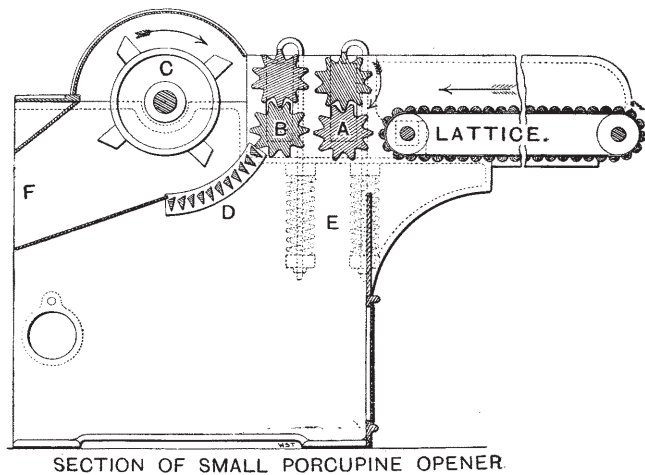


FIG. 19.

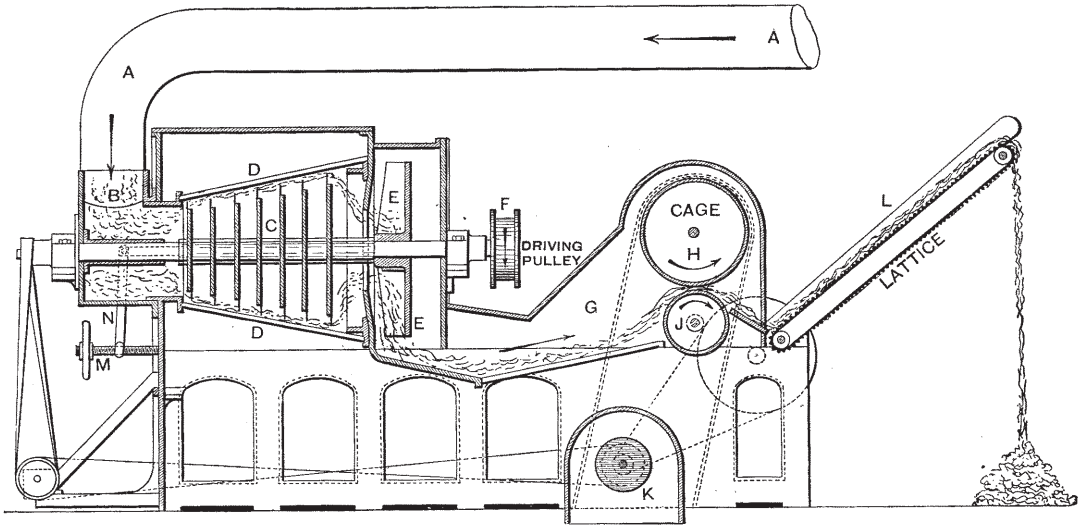


FIG. 20.

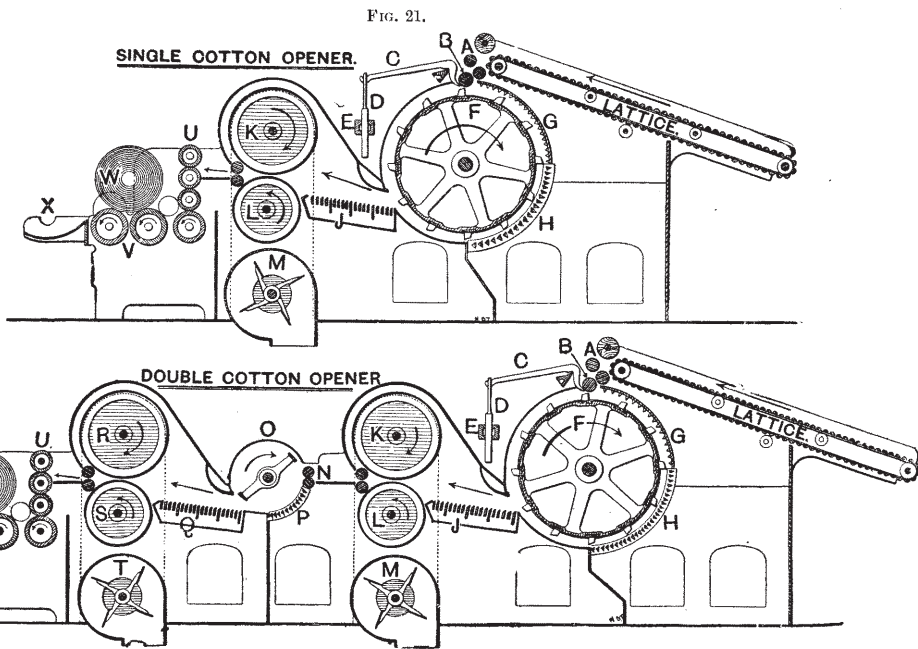


FIG. 22.

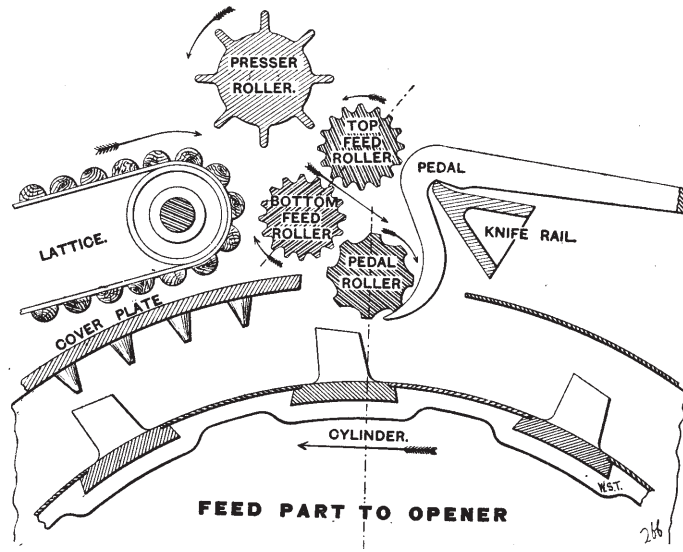


FIG. 23.

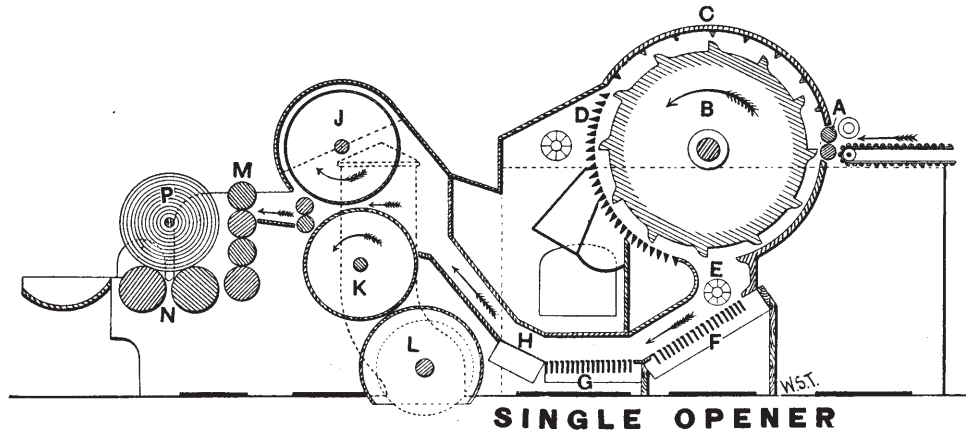


FIG. 24.

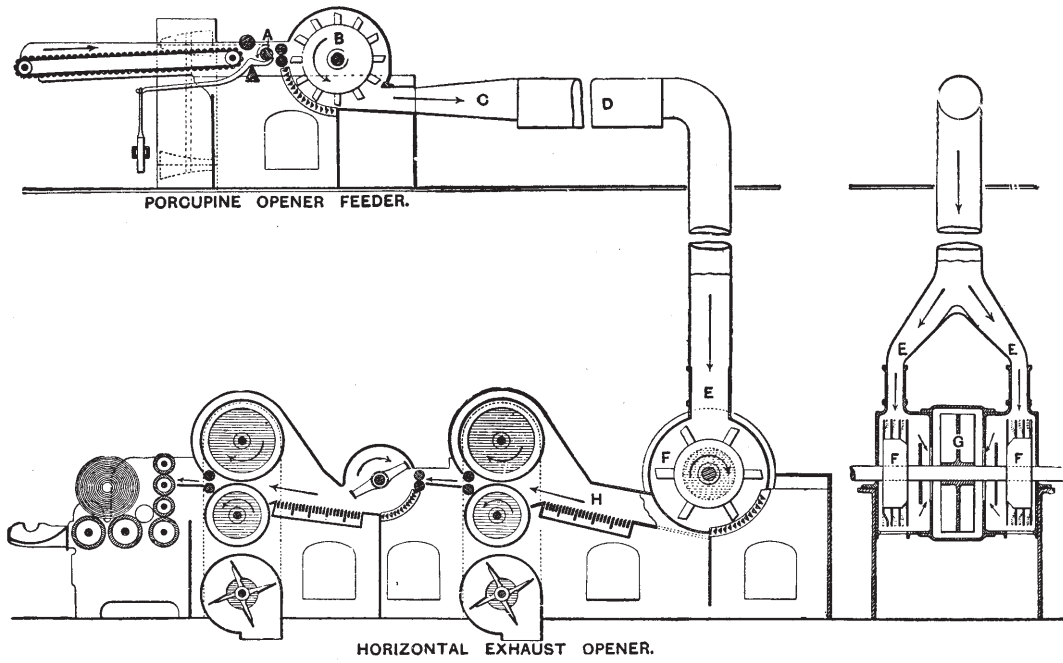


FIG. 25.

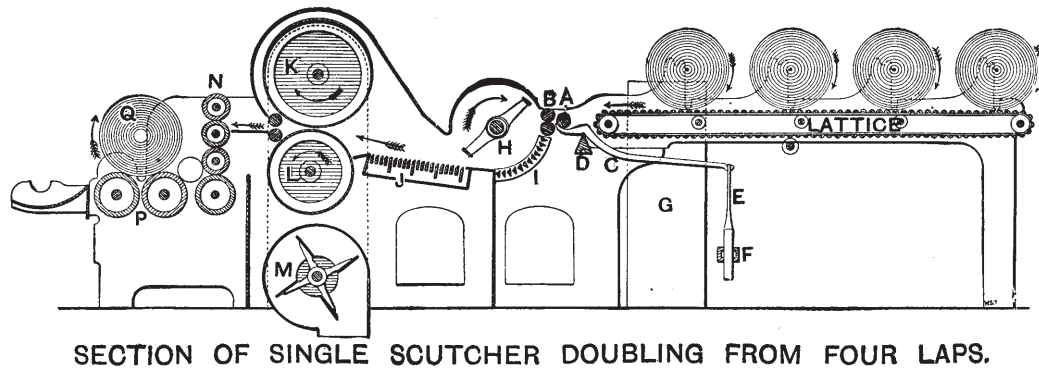
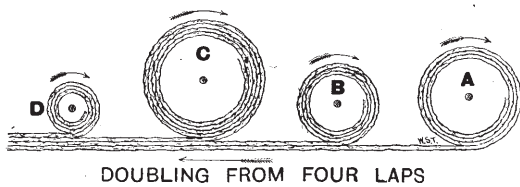


FIG. 26.



DOUBLING FROM FOUR LAPS

FIG. 27.



FIG. 28.

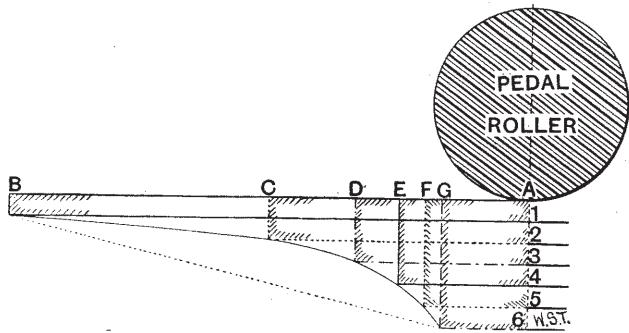


DIAGRAM OF REGULATOR CONE DRUMS.

FIG. 29.

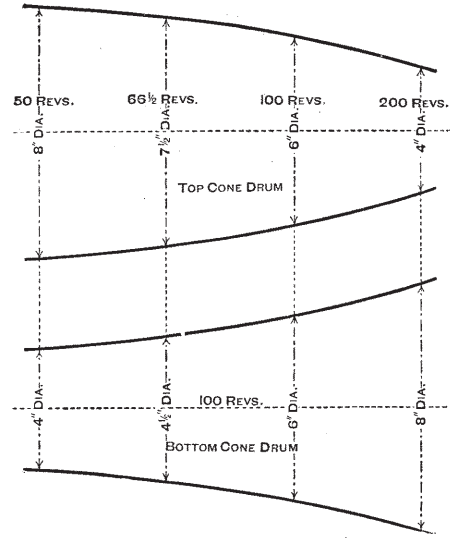


DIAGRAM OF REGULATOR CONE DRUMS.

FIG. 30.

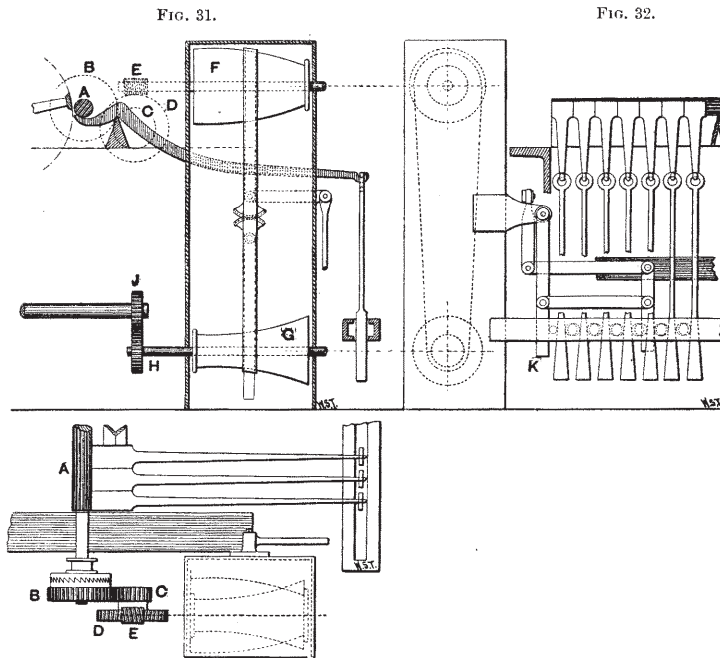


FIG. 33.

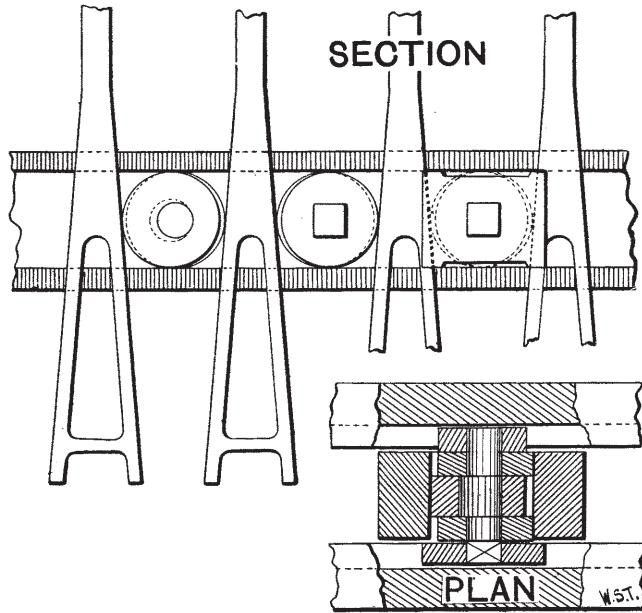


FIG. 34.

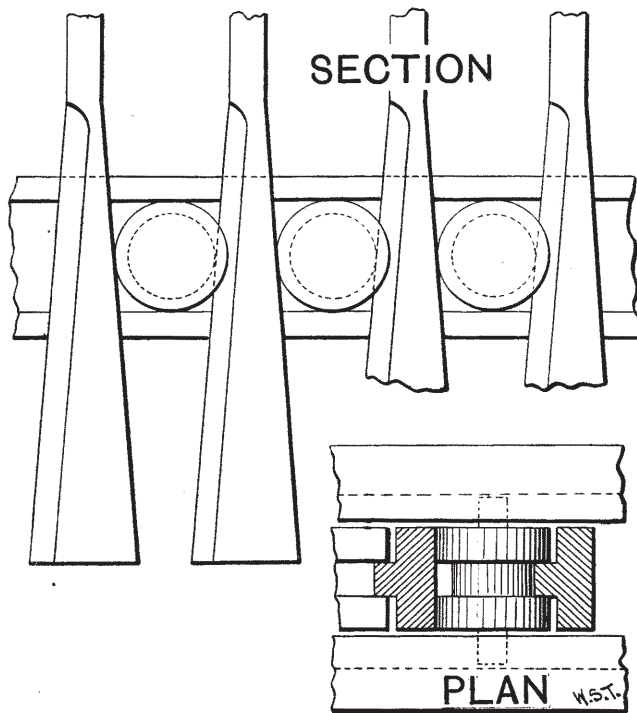


FIG. 35.

COTTON MACHINERY SKETCHES

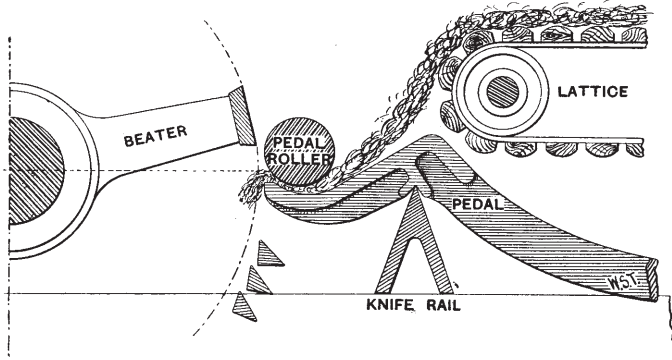


FIG. 36.

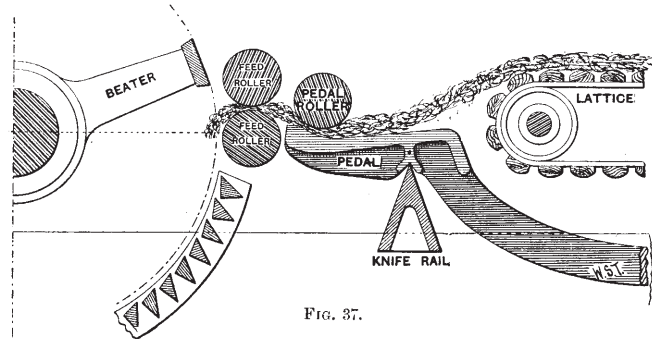


FIG. 37.

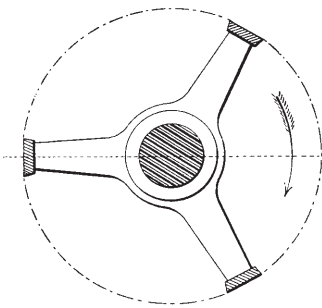


FIG. 38.

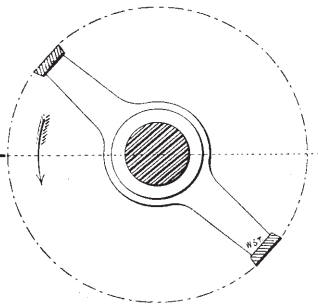


FIG. 39.

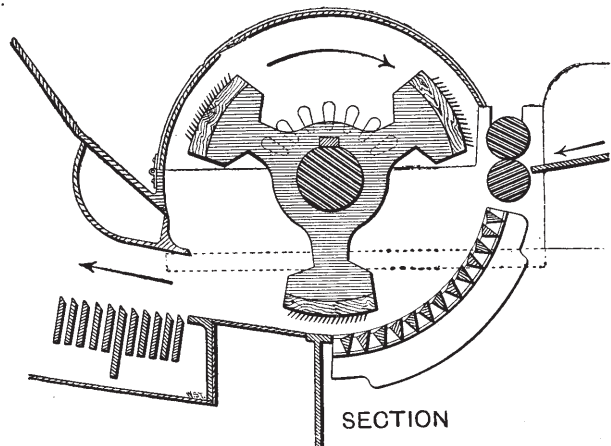


FIG. 40.

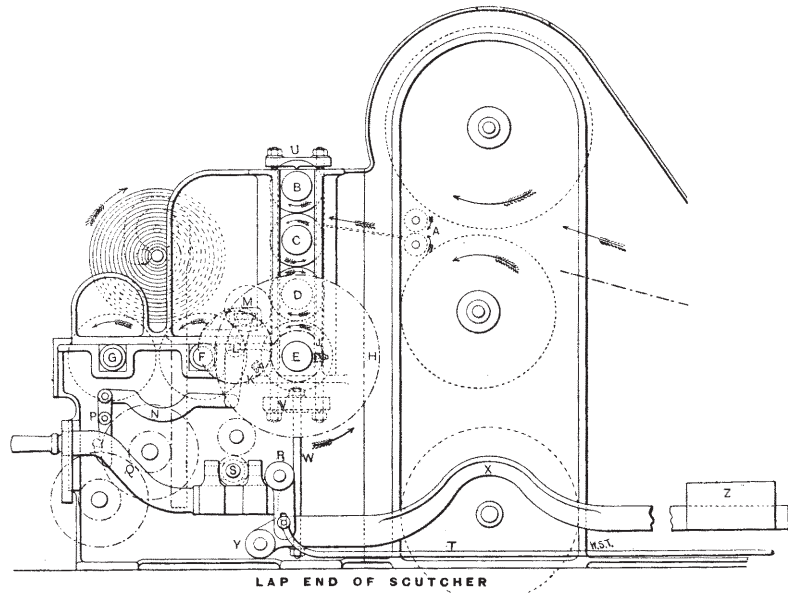


FIG. 41.

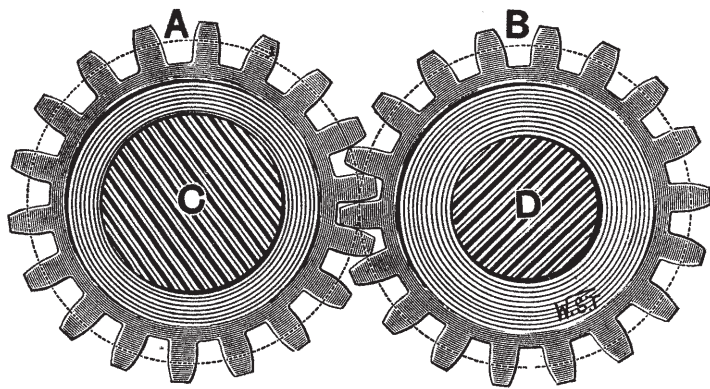


FIG. 42.

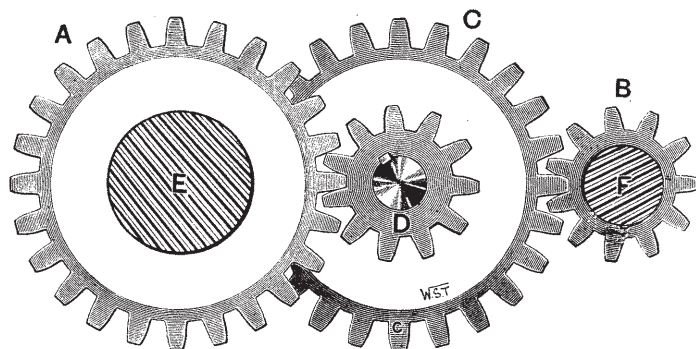
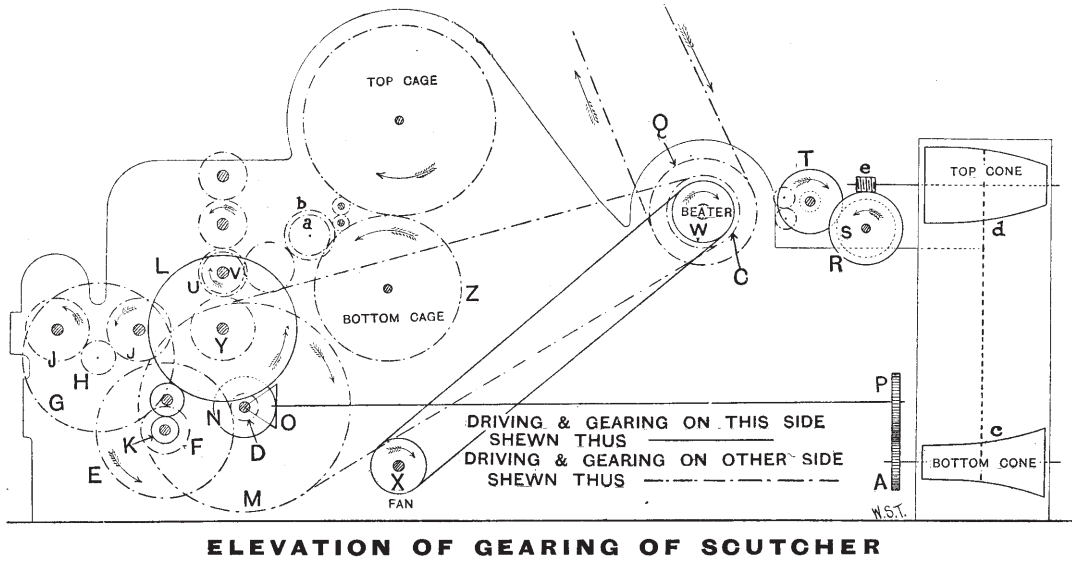
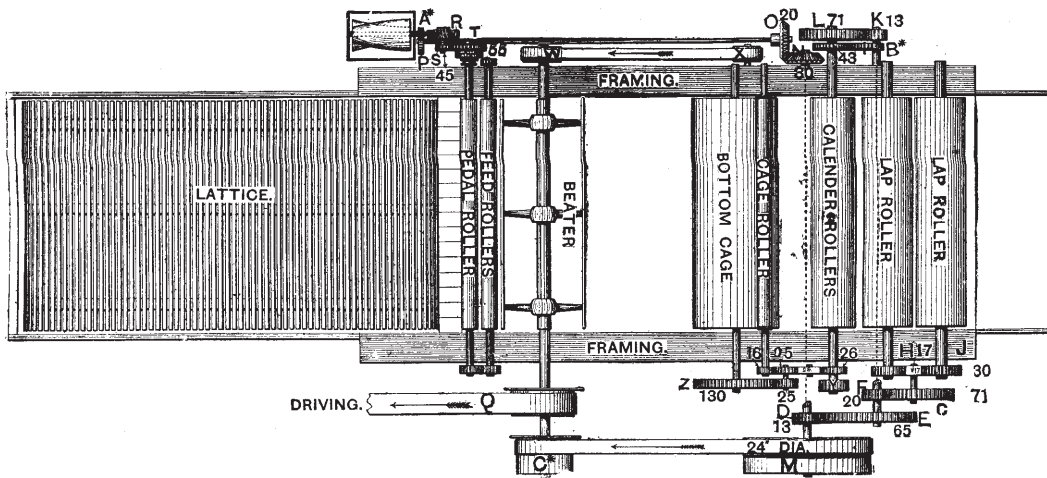


FIG. 43.



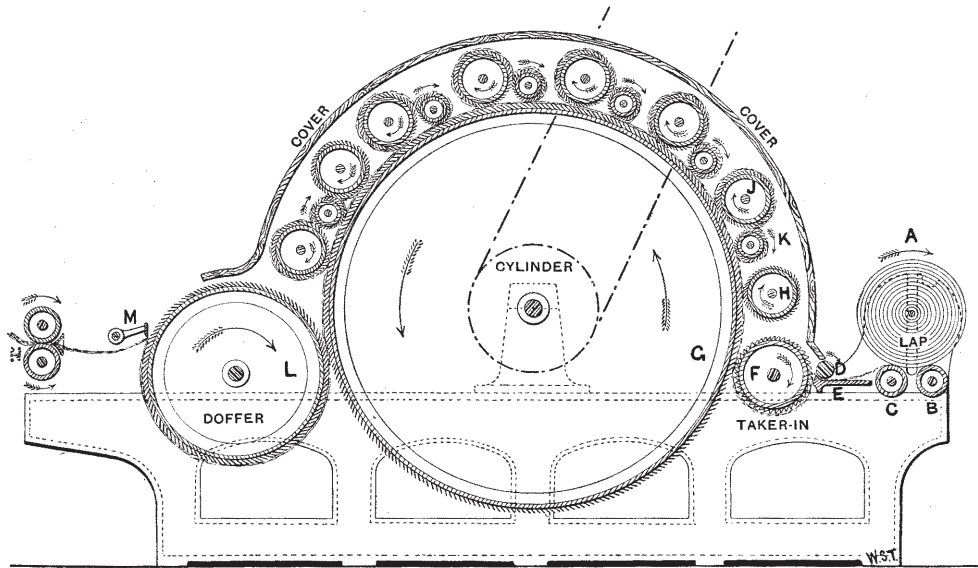
ELEVATION OF GEARING OF SCUTCHER

FIG. 44.



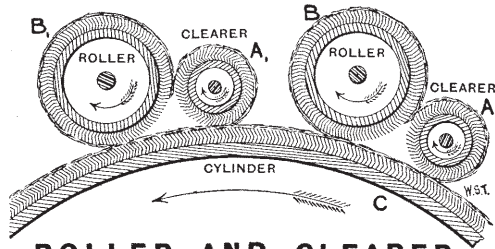
PLAN OF GEARING OF SINGLE SCUTCHER.

FIG. 45.



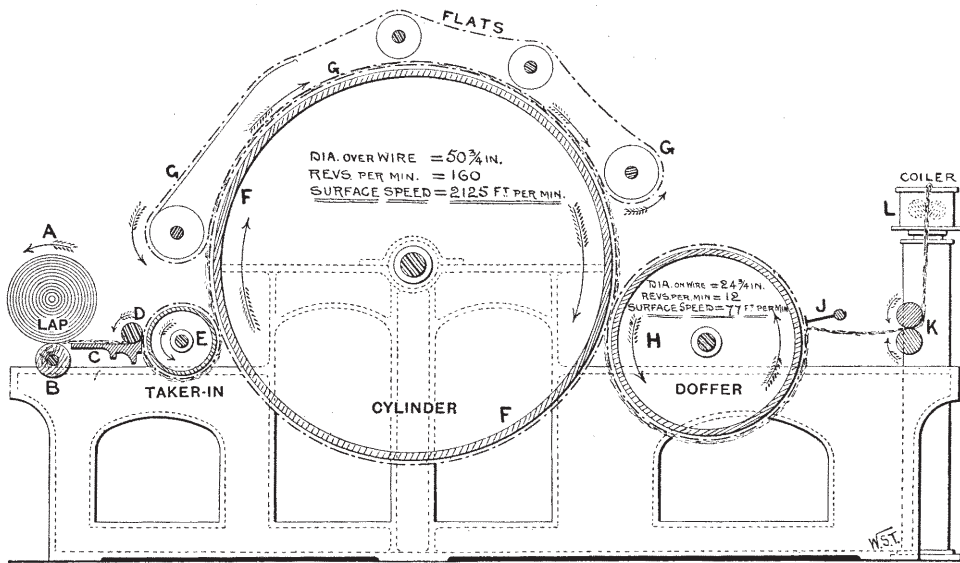
ROLLER AND CLEARER CARD

FIG. 46.



ROLLER AND CLEARER

FIG. 47.



REVOLVING FLAT CARD

FIG. 48.

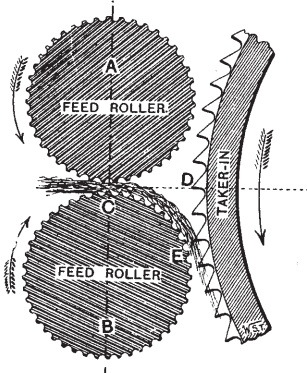


FIG. 49.

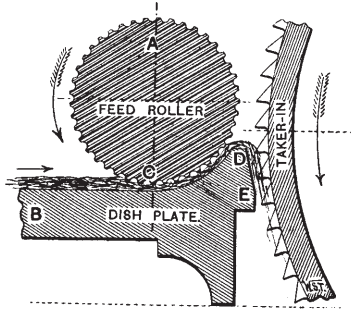


FIG. 50.

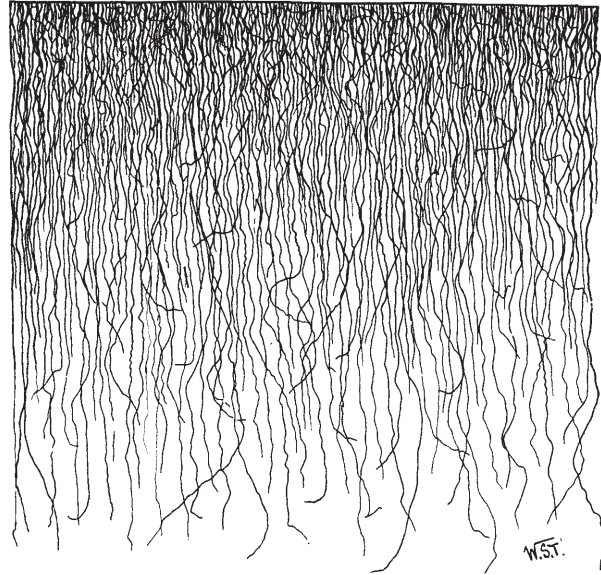
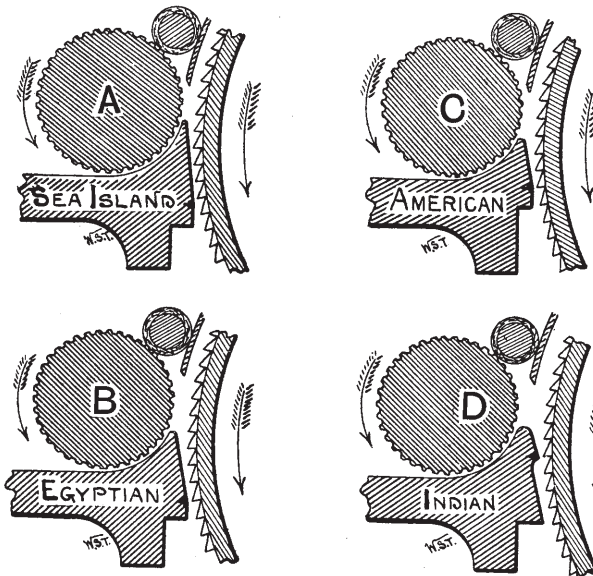


FIG. 51.



DISH FEED

FIG. 52.

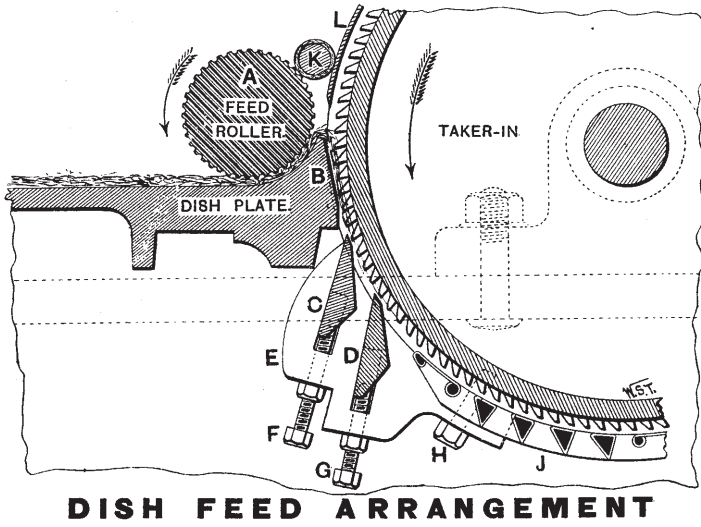


FIG. 53.

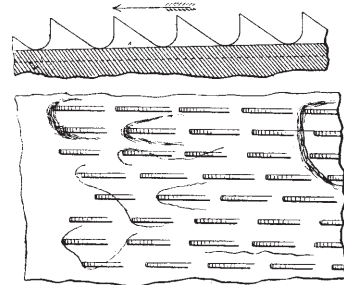


FIG. 54.

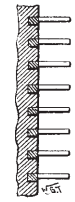


FIG. 55.

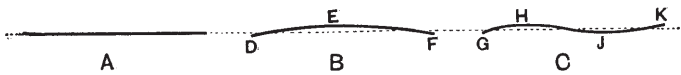


FIG. 57.

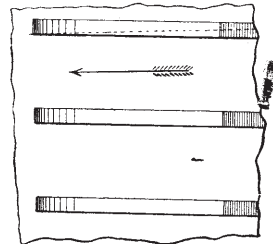


FIG. 56.

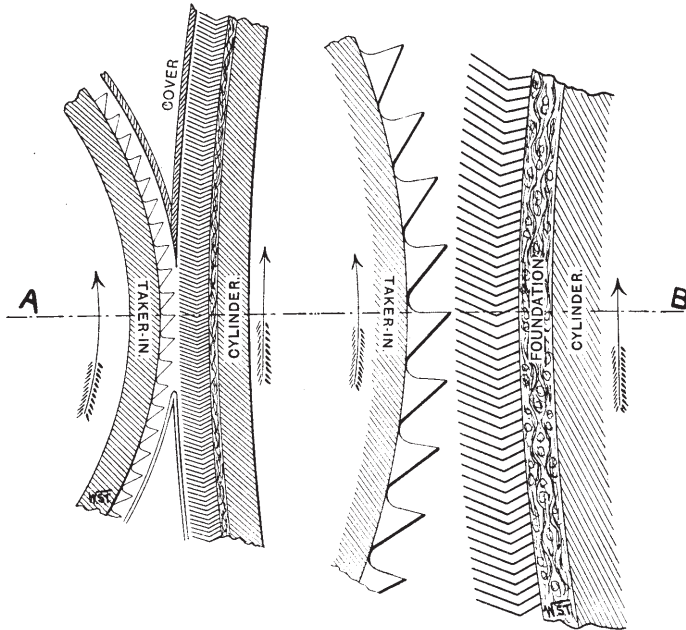


FIG. 58.

FIG. 59.

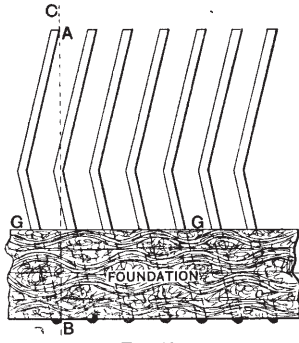
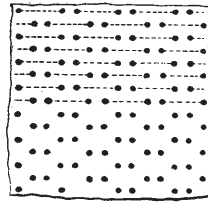
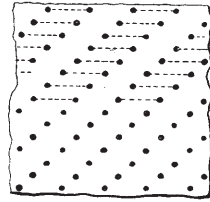


FIG. 60.



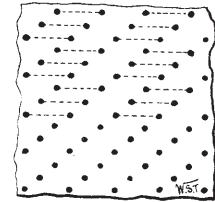
OPEN SET

FIG. 61.



TWILL SET

FIG. 62.



RIB SET.

FIG. 63.

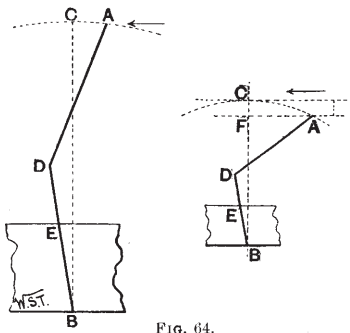


FIG. 64.

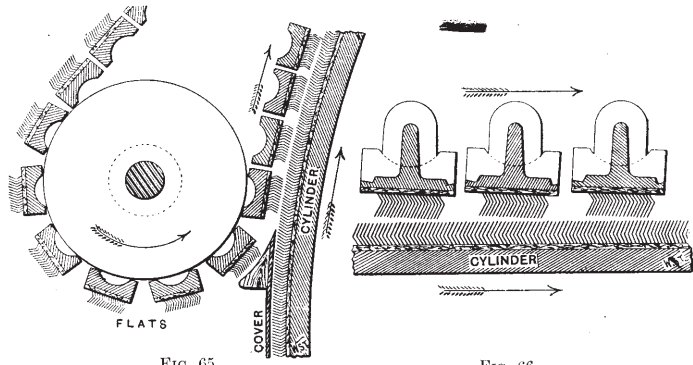


FIG. 65.

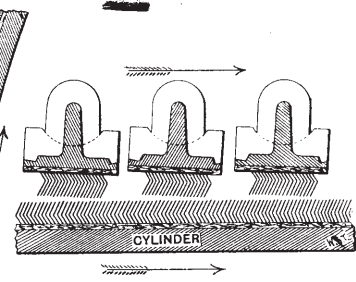


FIG. 66.

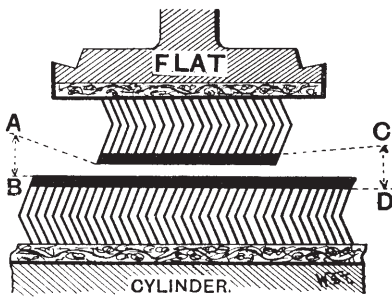


FIG. 67.

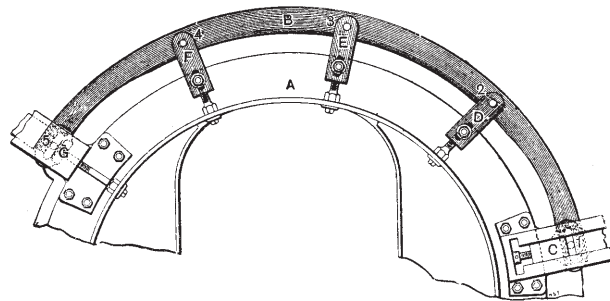


FIG. 68.

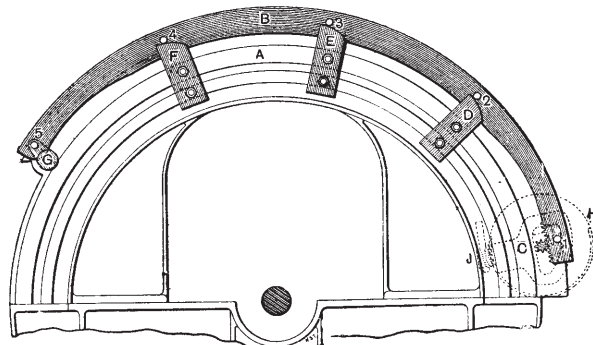


FIG. 69.

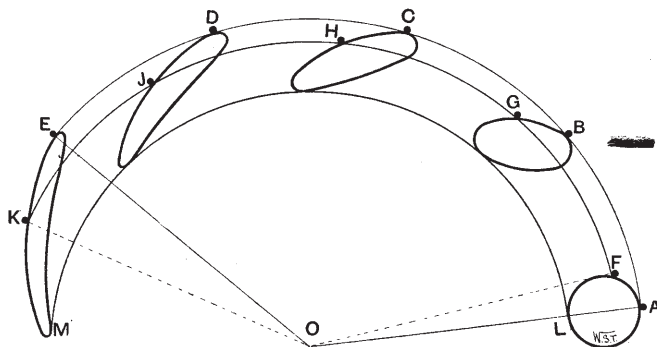


FIG. 70.

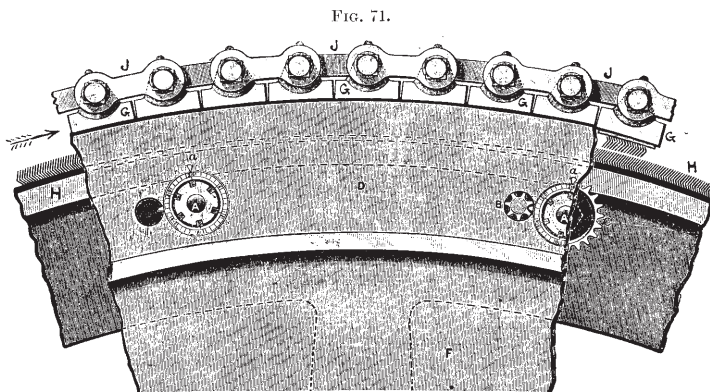


FIG. 71.

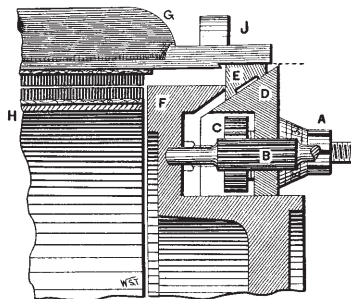


FIG. 72.

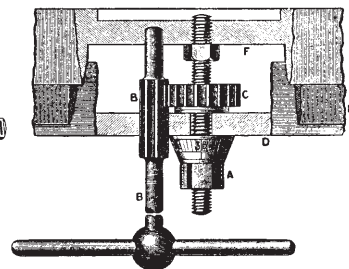


FIG. 73.

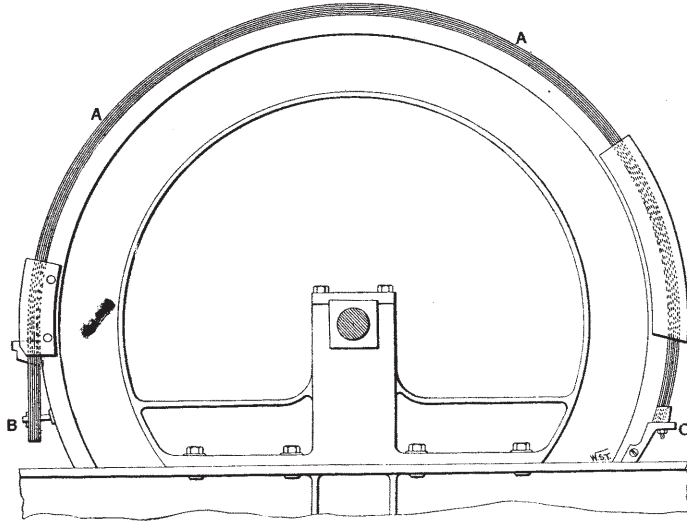


FIG. 74.

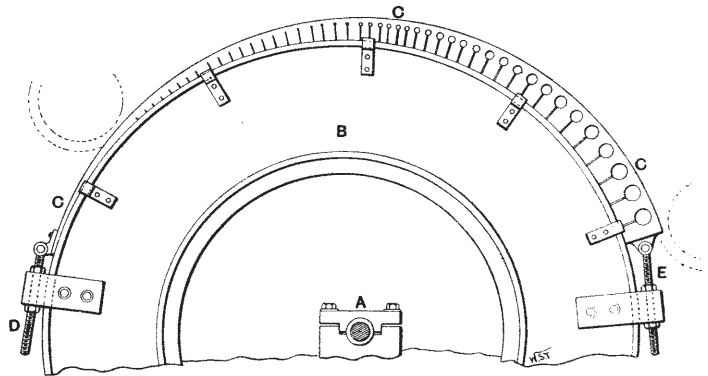


FIG. 75.

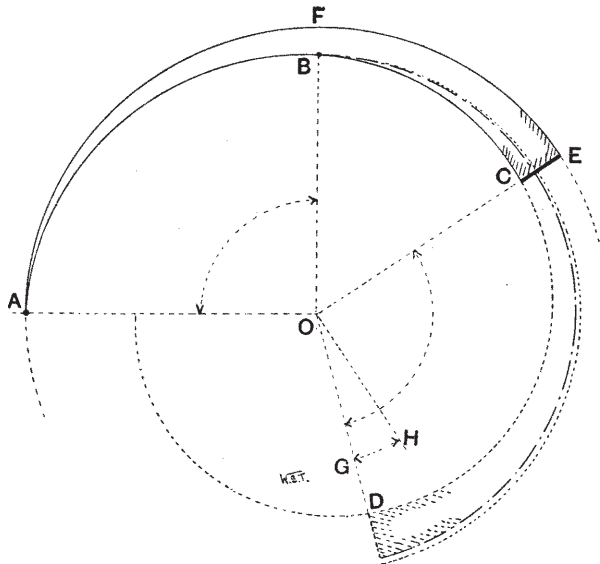


FIG. 76.

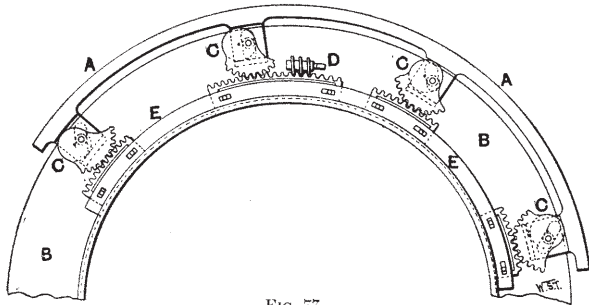
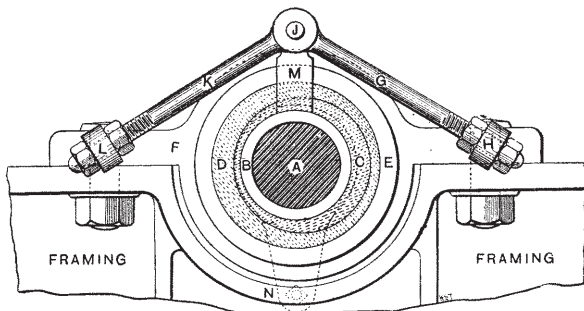


FIG. 77.



PATENT ADJUSTABLE CYLINDER PEDESTAL.

FIG. 79.

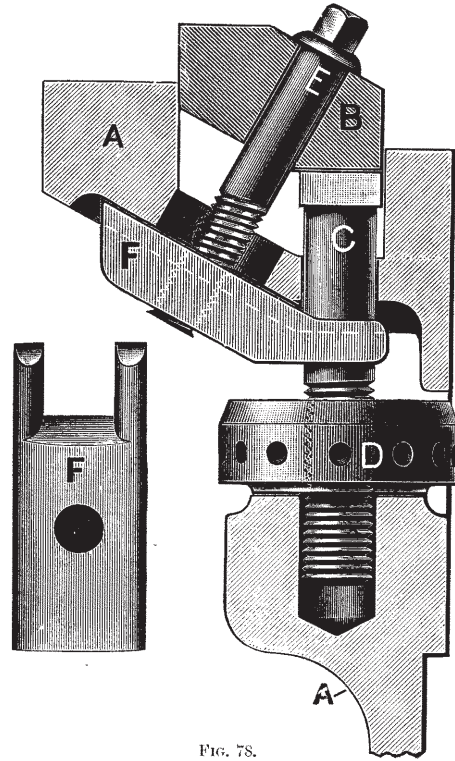


FIG. 78.

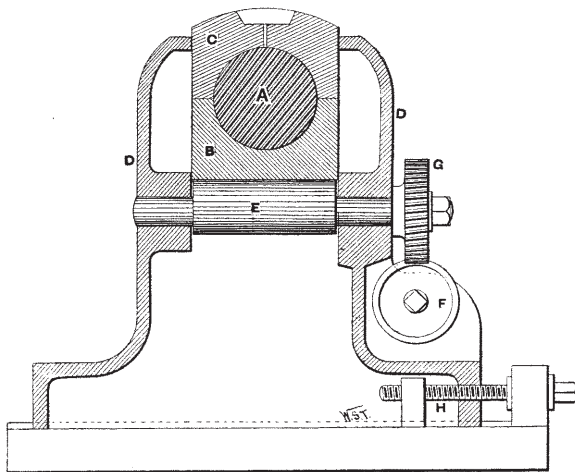


FIG. 80.

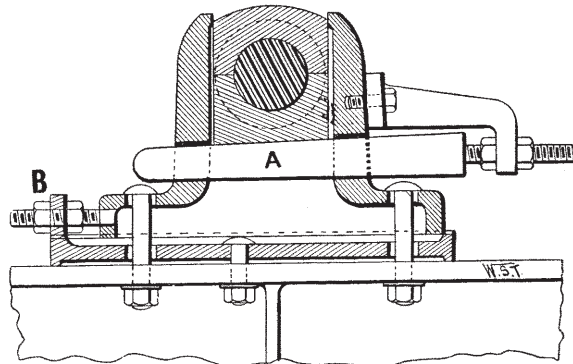


FIG. 81.

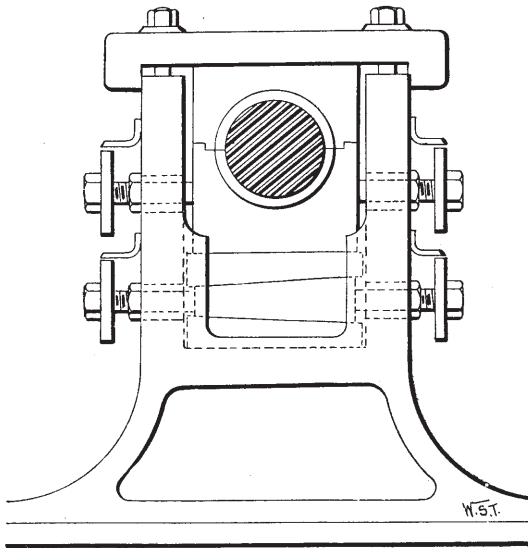


FIG. 82.

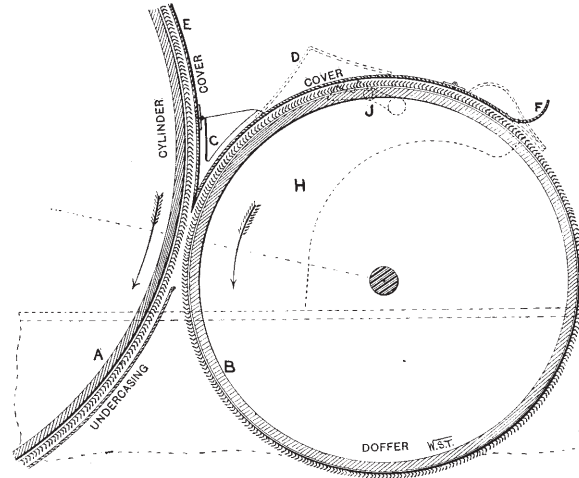


FIG. 83.

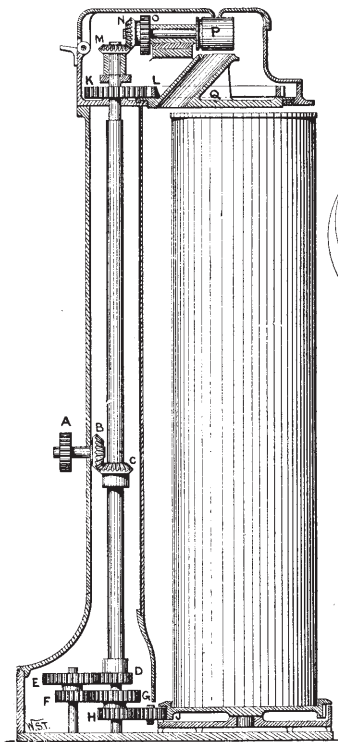


FIG. 84.

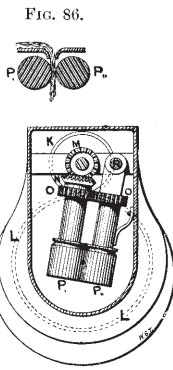


FIG. 86.

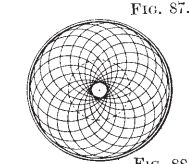


FIG. 87.

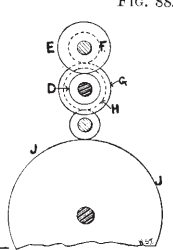


FIG. 88.

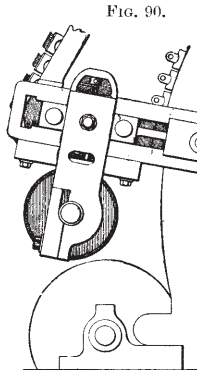


FIG. 90.

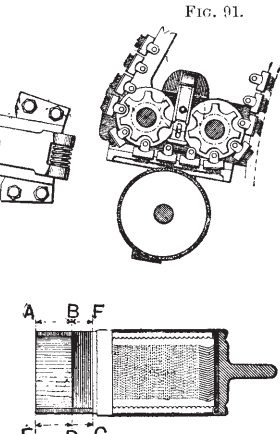


FIG. 91.

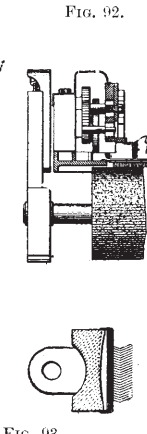


FIG. 92.

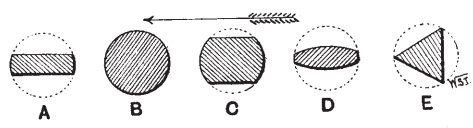


FIG. 89.

A. B. C. D. SLIDING SURFACE WHEN GRINDING.
 A. B. C. E. SLIDING SURFACE WHEN CARDING.
 B. F. CLEARANCE FOR RAISED SURFACE ON SLIDE WHEN GRINDING.

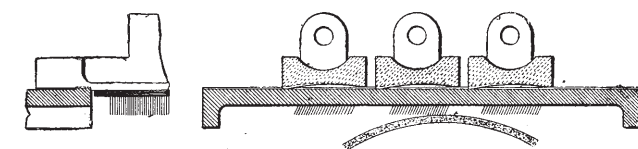


FIG. 94.

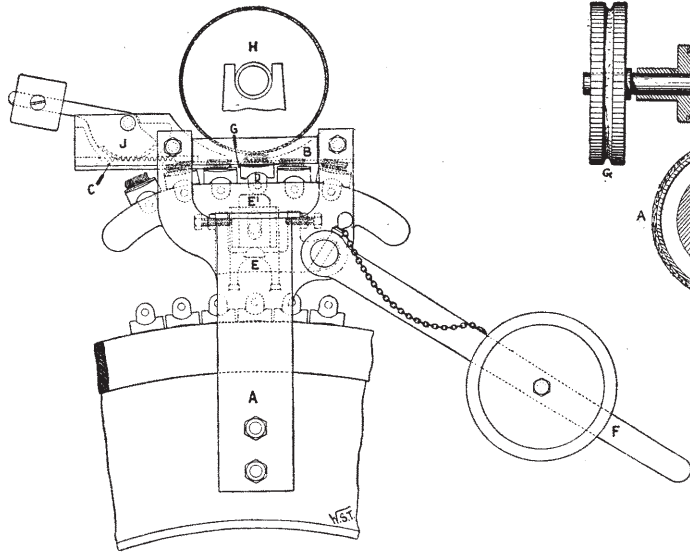


FIG. 95.

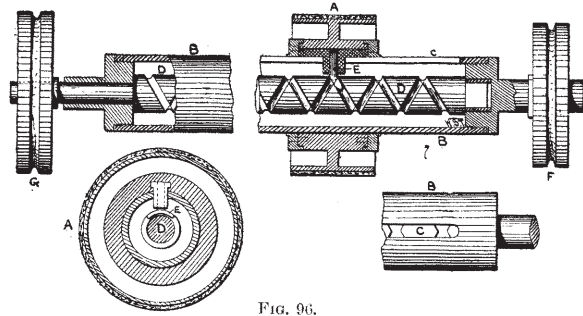


FIG. 96.

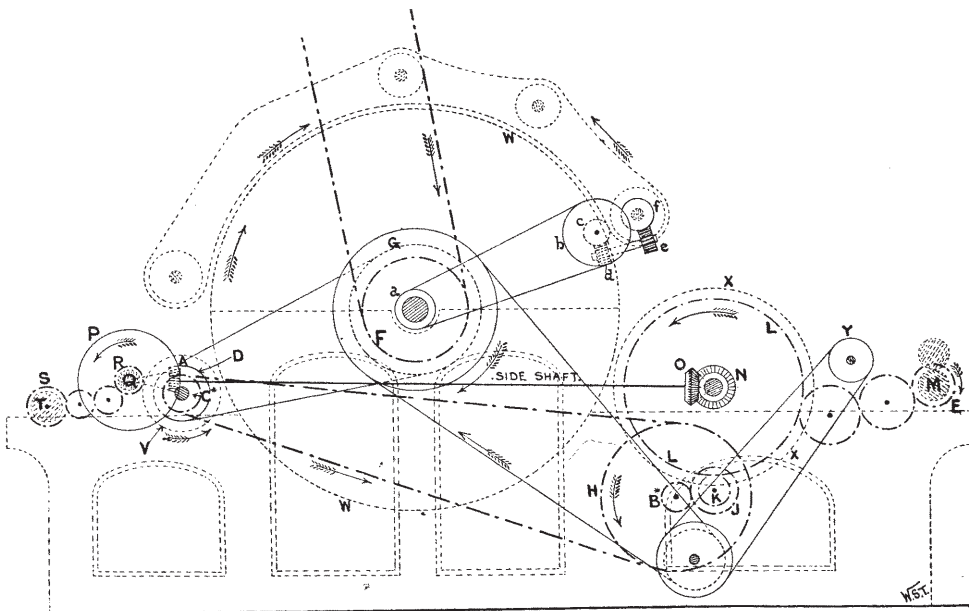


FIG. 97.

COTTON MACHINERY SKETCHES

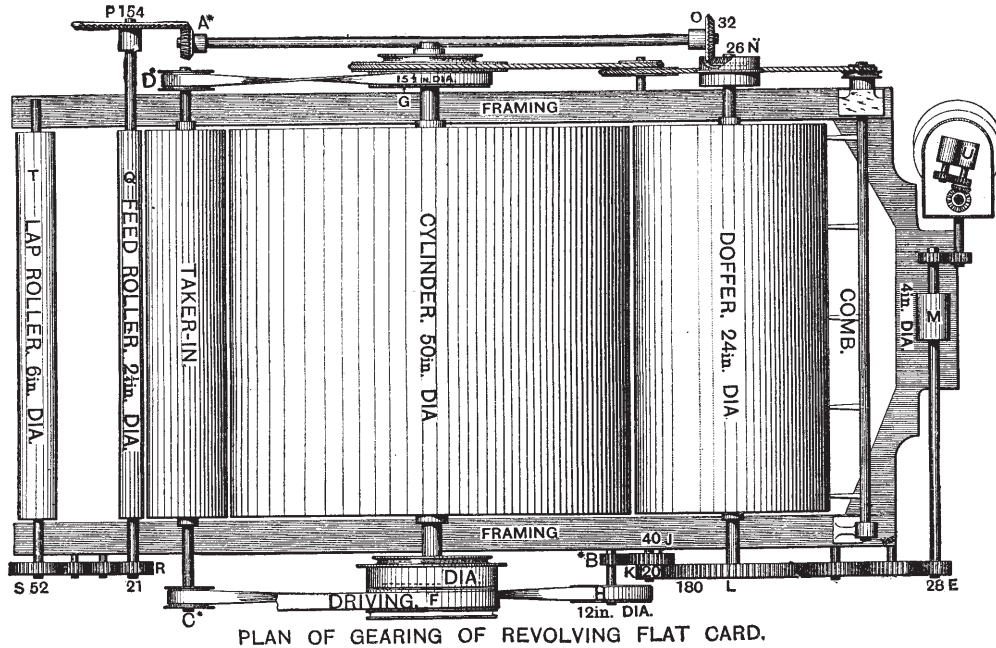


FIG. 98.

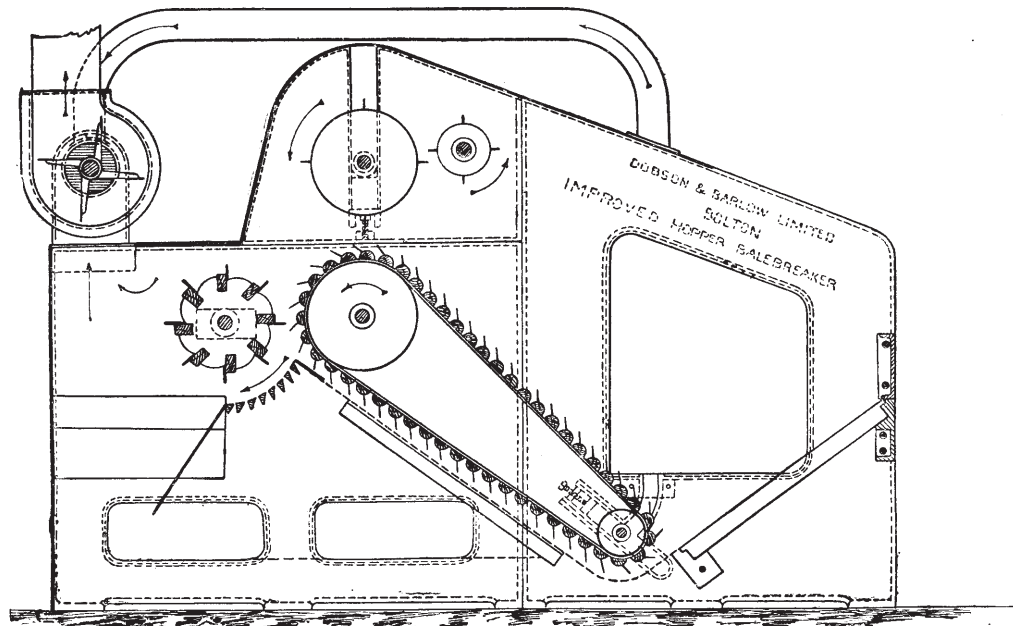


FIG. 99

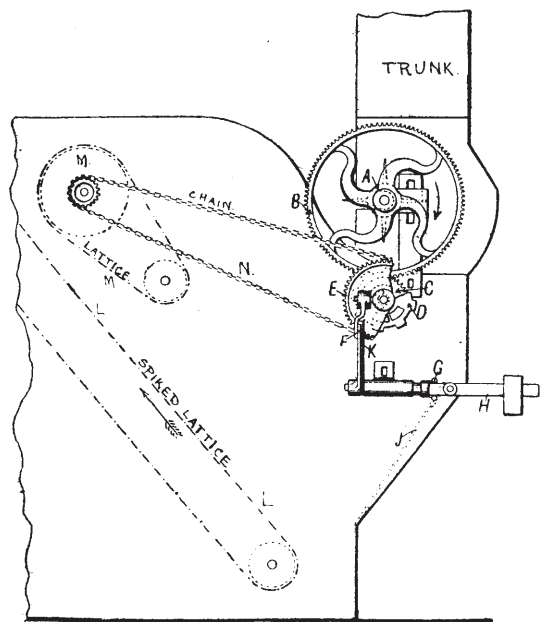


FIG. 100.

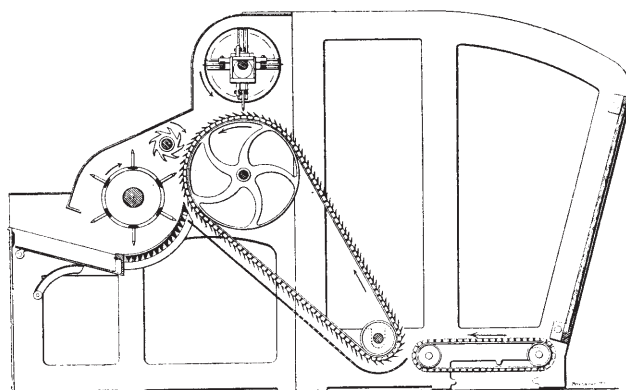


FIG. 102.

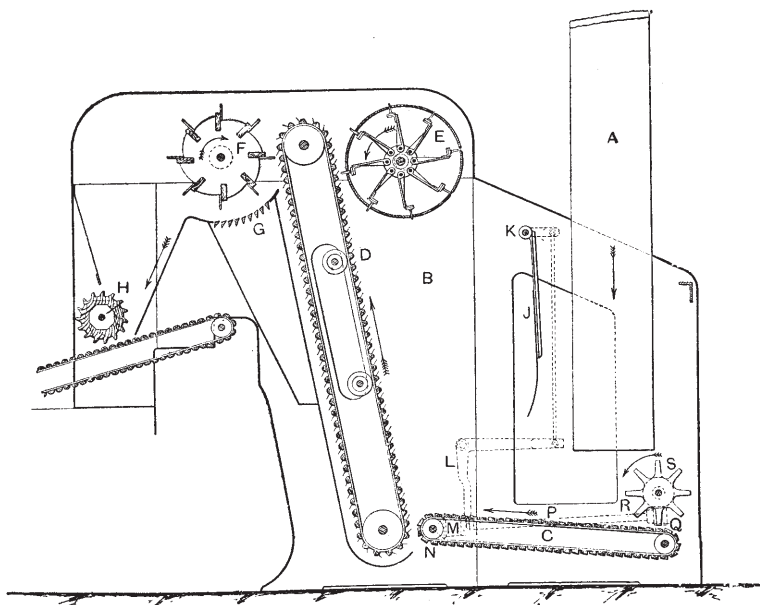


FIG. 101.

COTTON MACHINERY SKETCHES

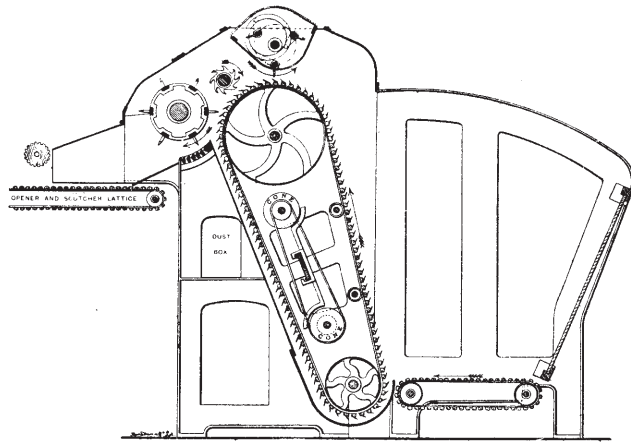


FIG. 103.

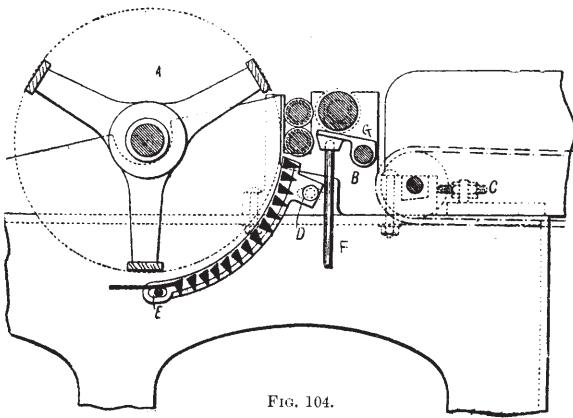


FIG. 104.

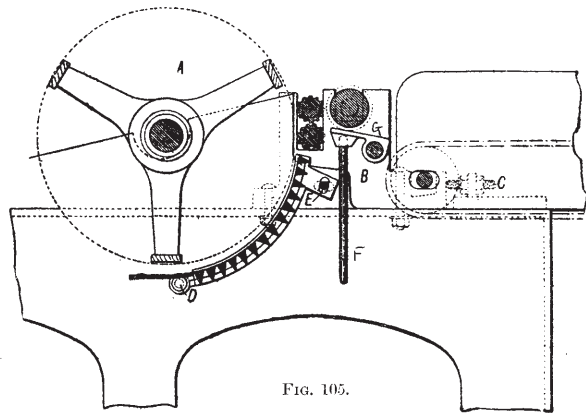


FIG. 105.

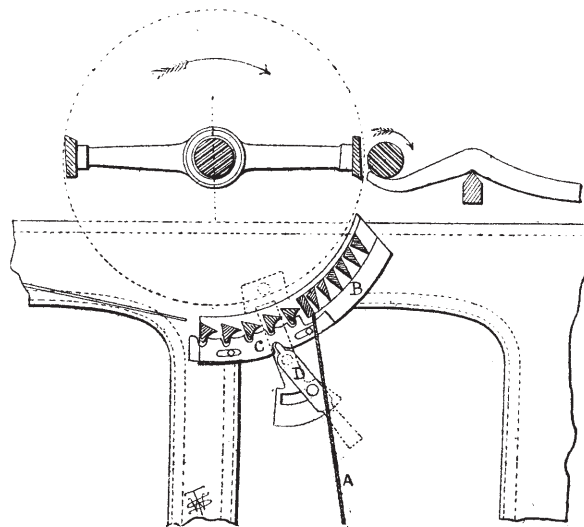


FIG. 106.

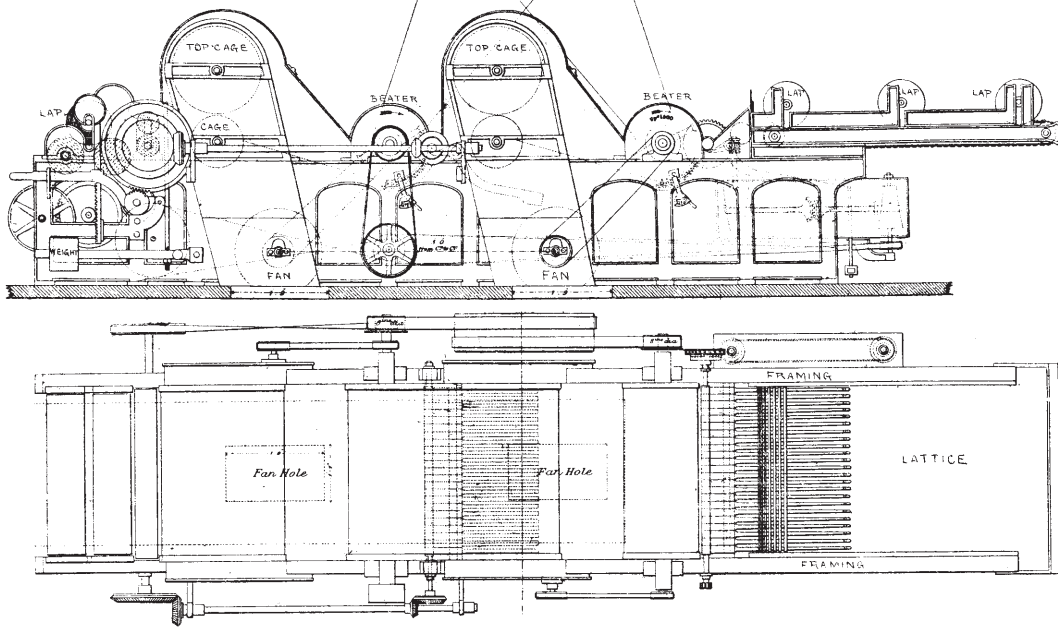


FIG. 107.

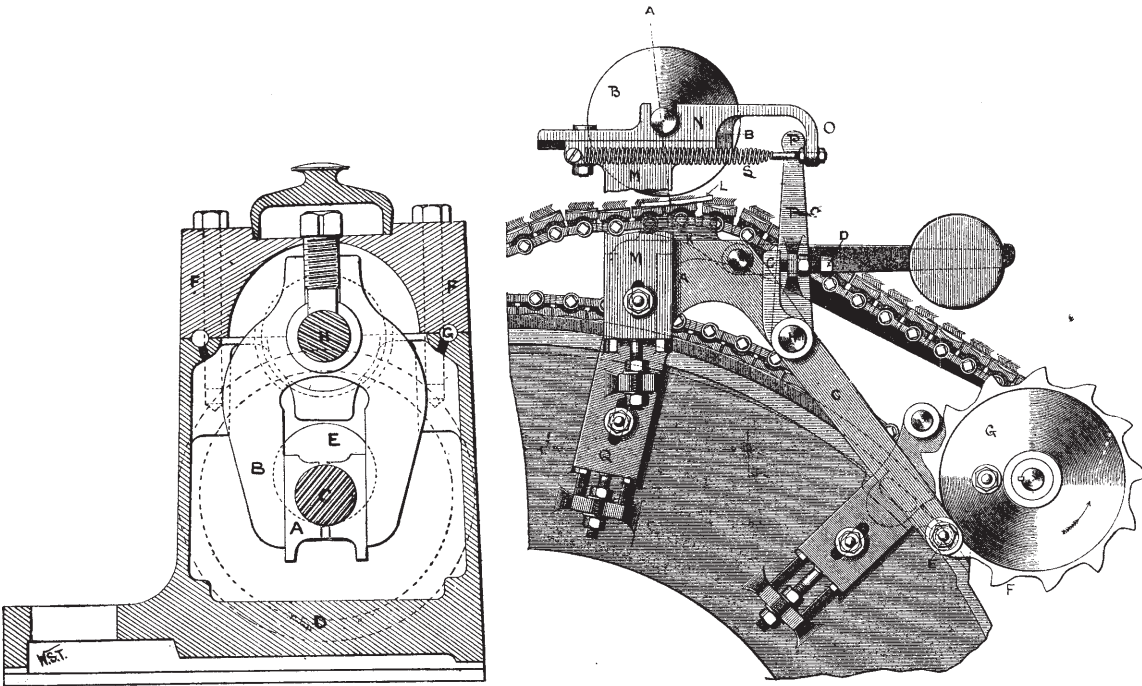


FIG. 108.

FIG. 109.

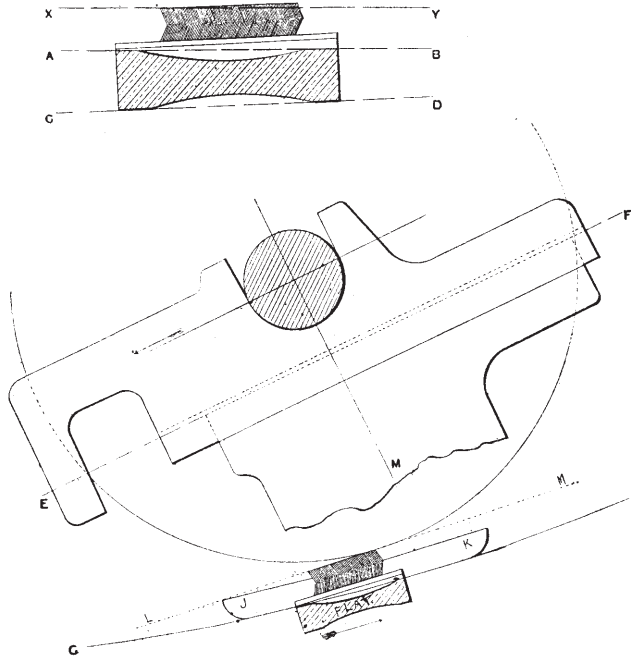


Fig. 110.

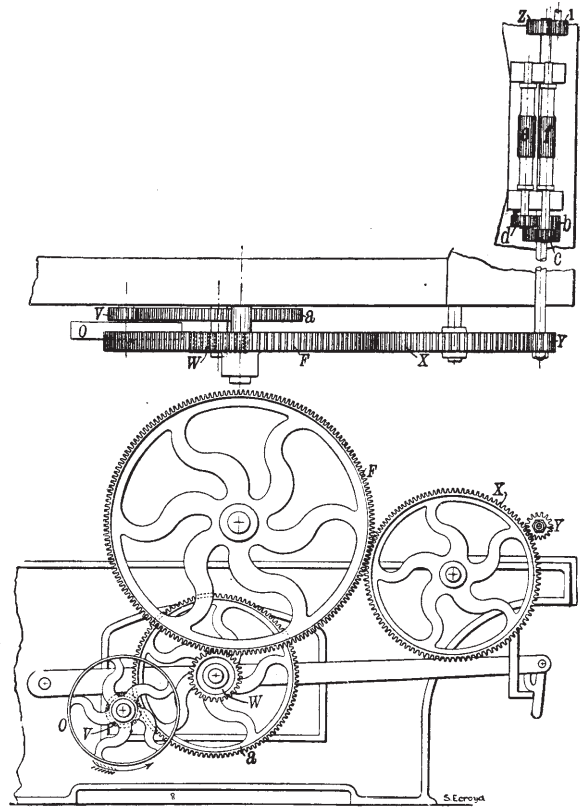


Fig. 111.

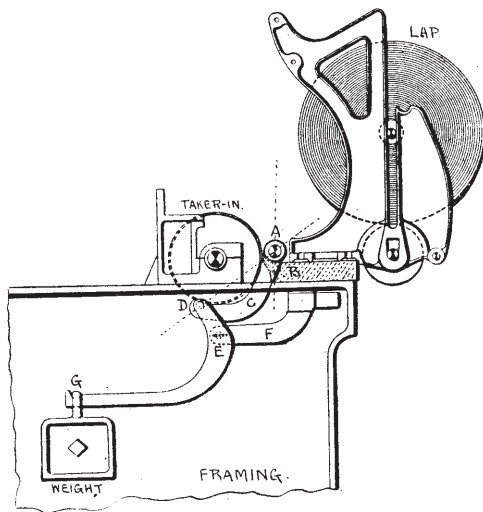


Fig. 112.

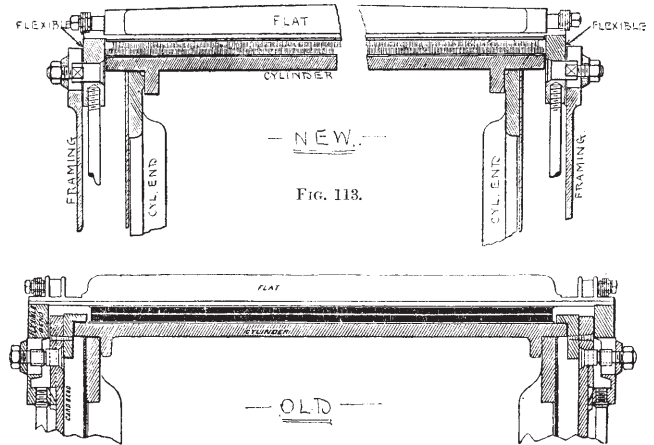


Fig. 113.

Fig. 114.

See Appendix for further illustrations.

VOLUME II

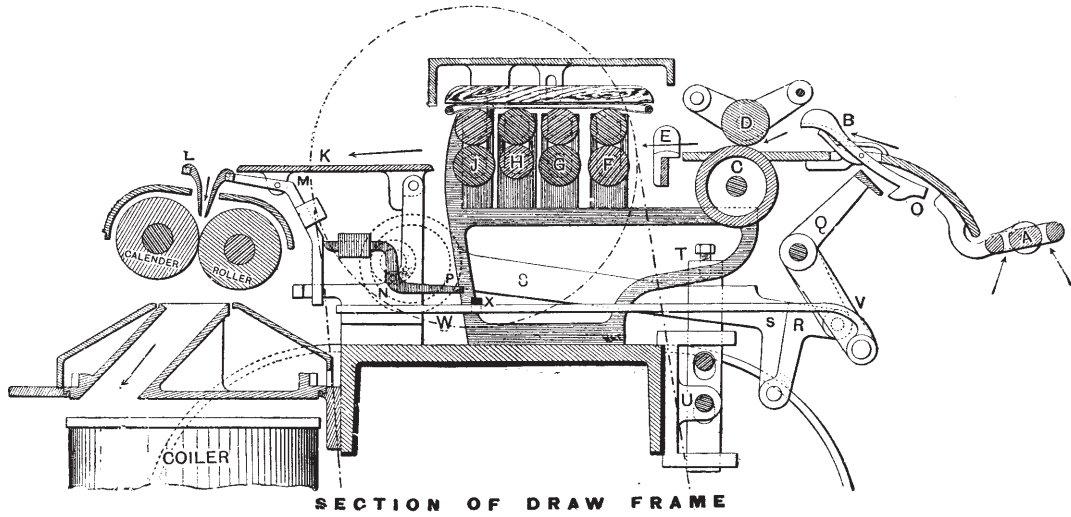


FIG. 1.

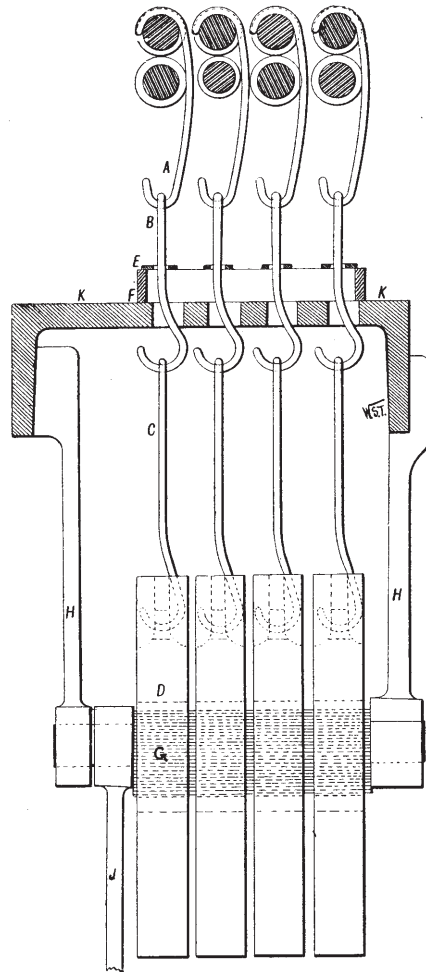


FIG. 2.

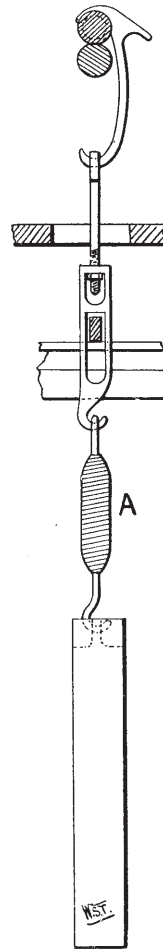


FIG. 3.

COTTON MACHINERY SKETCHES

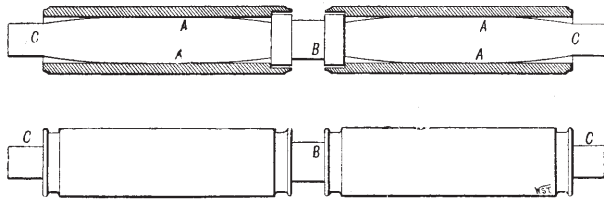


FIG. 4.

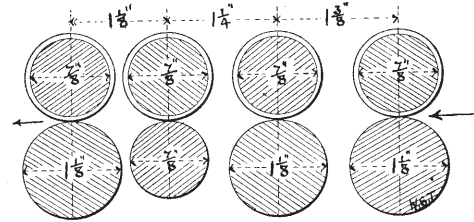


FIG. 5.

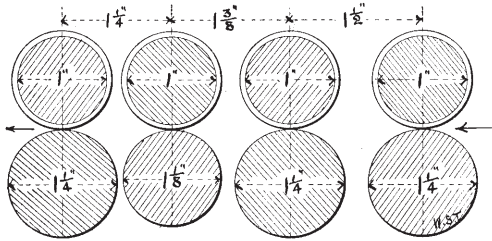


FIG. 6.

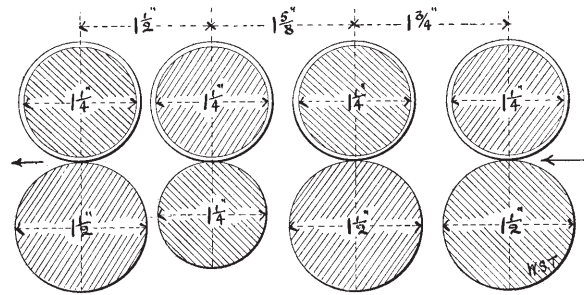


FIG. 7.

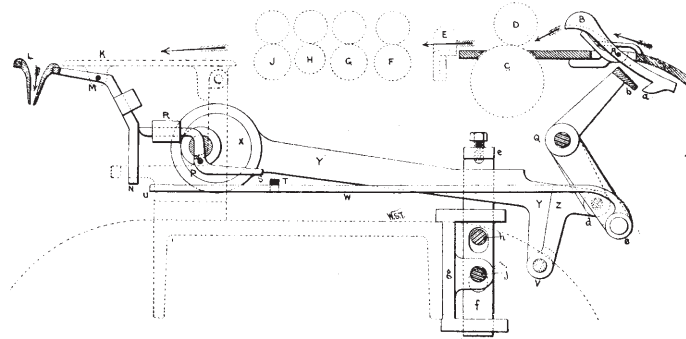


FIG. 8.

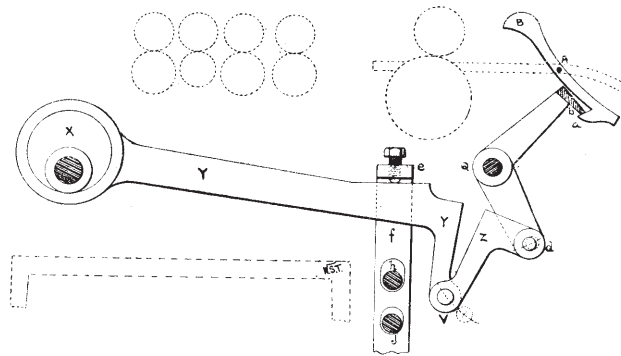


FIG. 9.

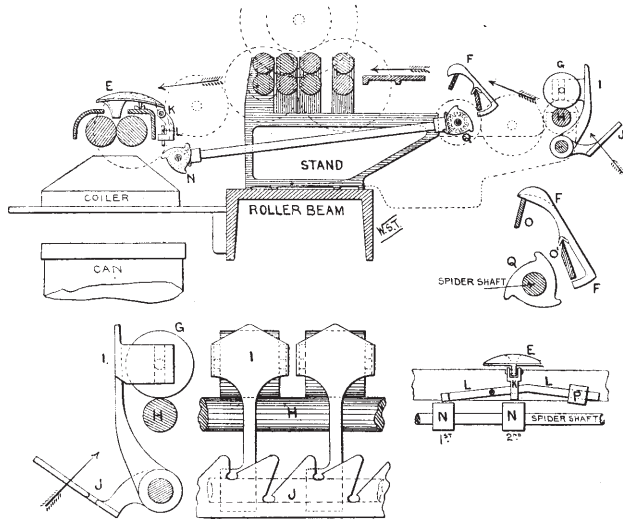


FIG. 10.

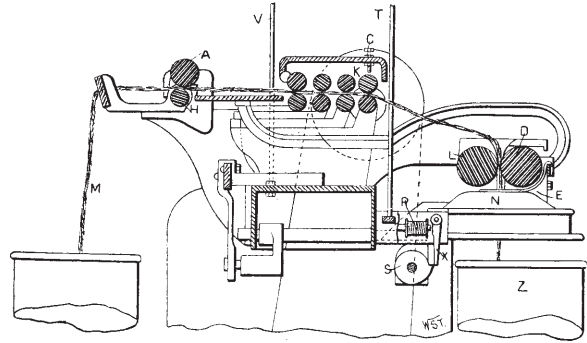


FIG. 11.

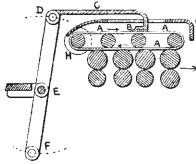


FIG. 13.

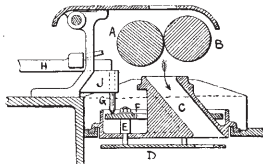


FIG. 15.

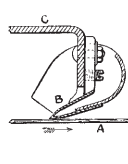
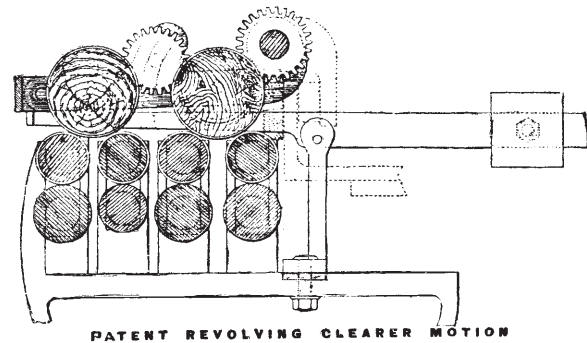
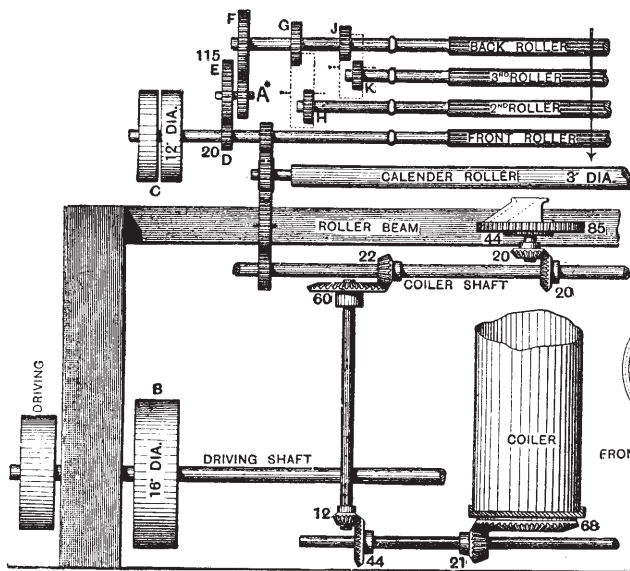


FIG. 14.



PATENT REVOLVING CLEARER MOTION

FIG. 12.



GEARING OF DRAW FRAME

FIG. 16.

FIG. 17.

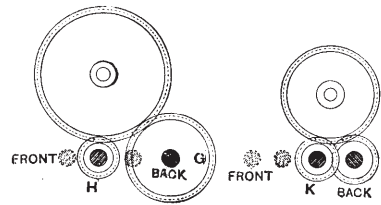
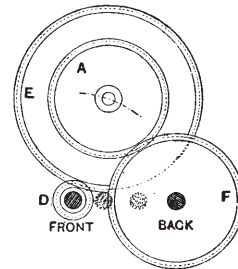


FIG. 18.

FIG. 19.

COTTON MACHINERY SKETCHES

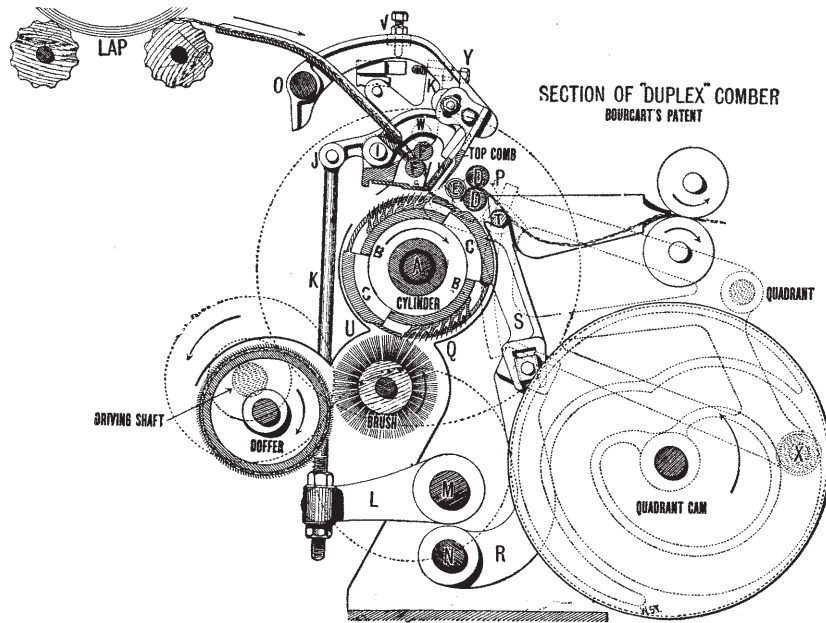


FIG. 20.

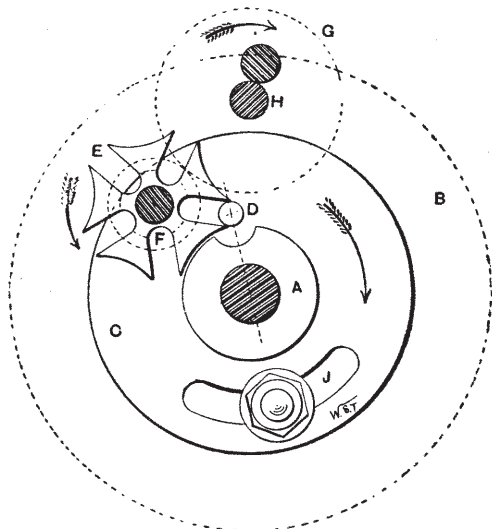


FIG. 21.

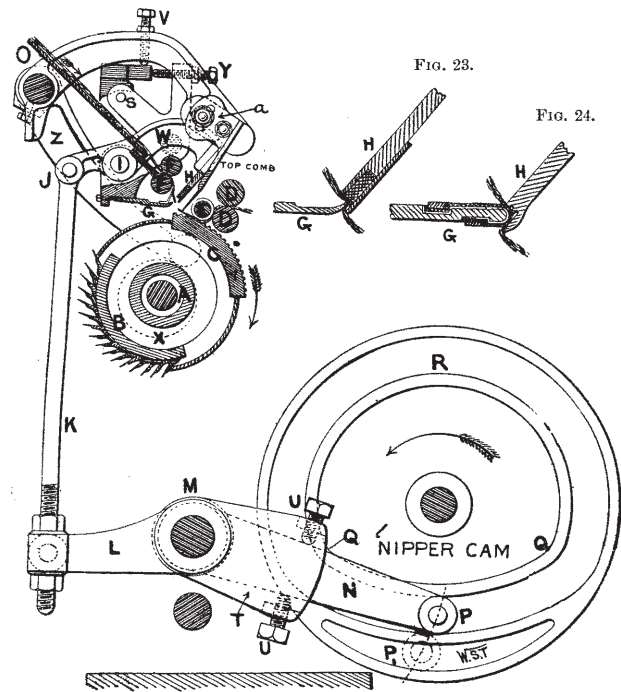


FIG. 22.

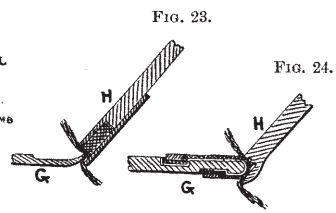


FIG. 23.

FIG. 24.

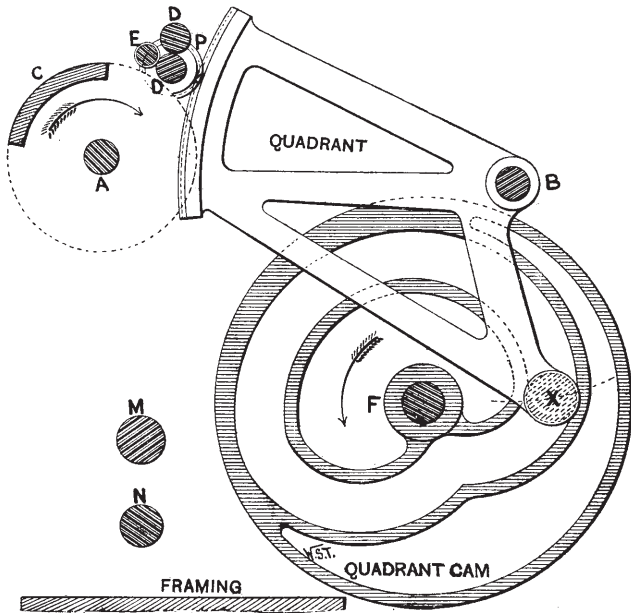


FIG. 25.

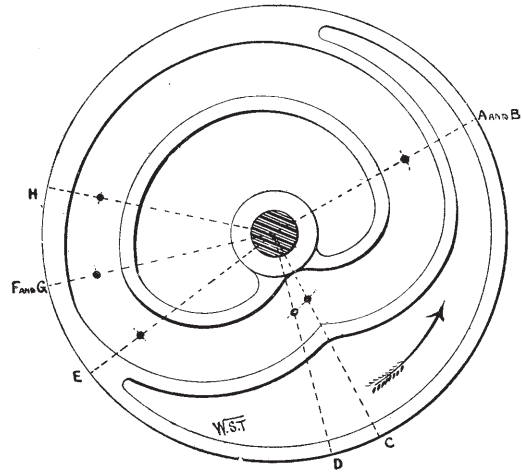


FIG. 26.

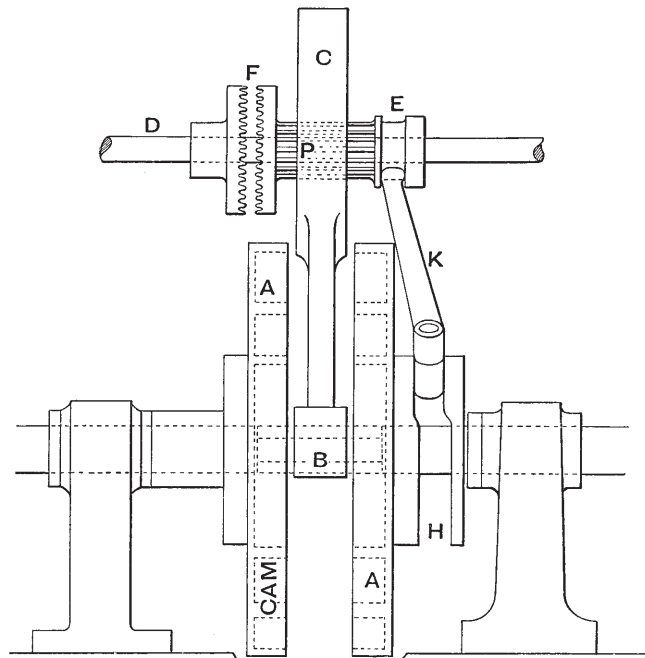


FIG. 27.

COTTON MACHINERY SKETCHES

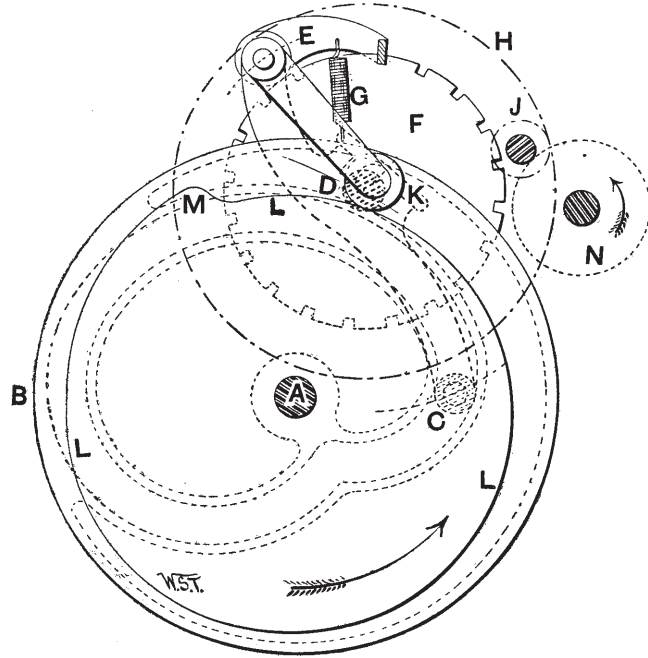


FIG. 28.

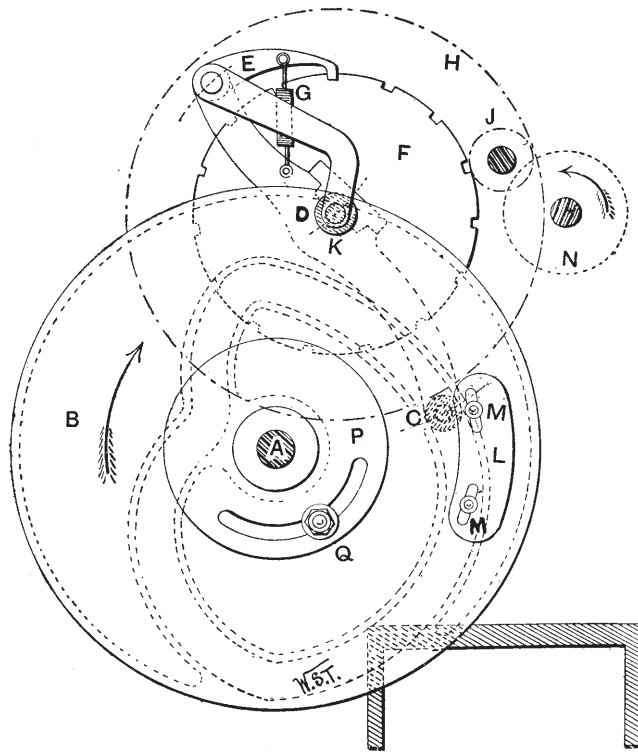


FIG. 29.

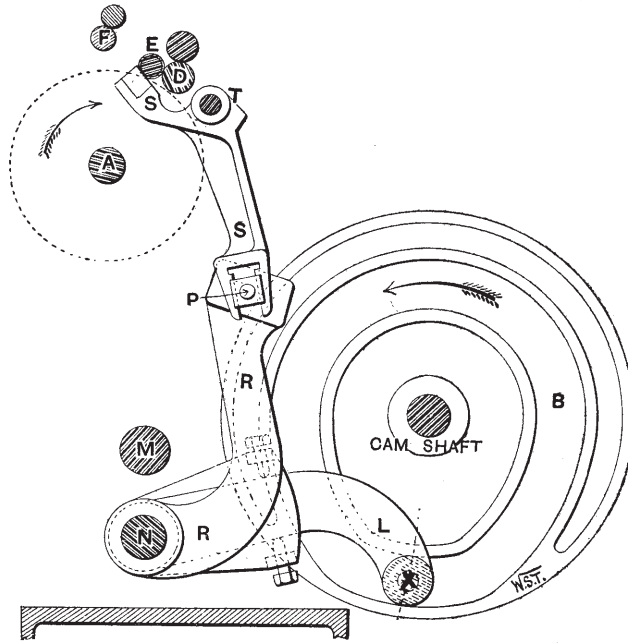


FIG. 30.

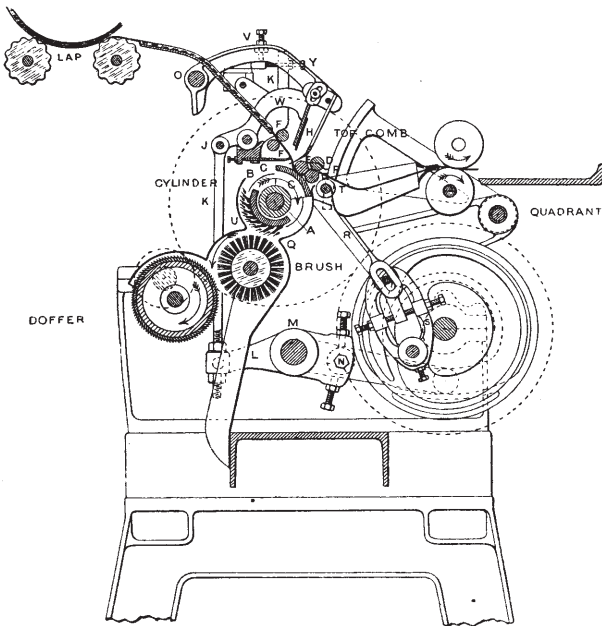


FIG. 31.

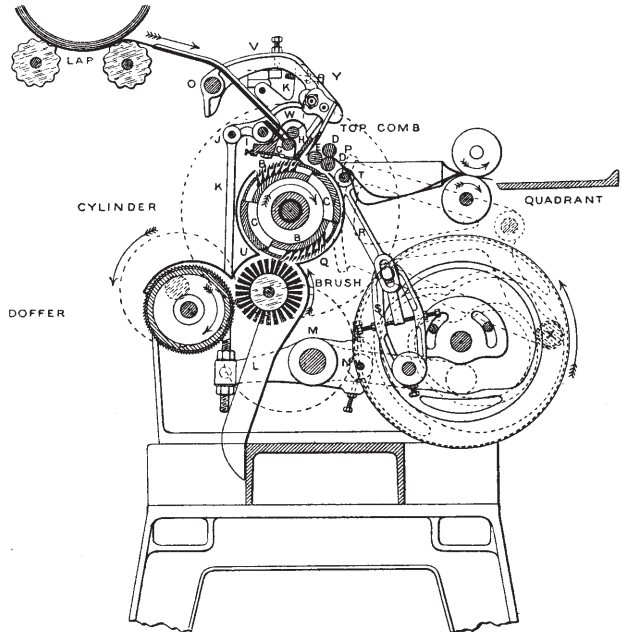


FIG. 32.

COTTON MACHINERY SKETCHES

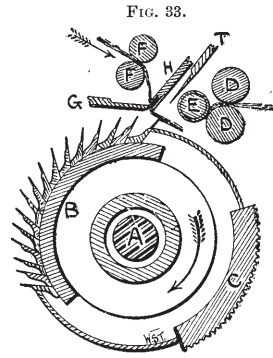


FIG. 33.

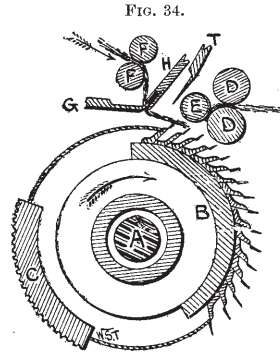


FIG. 34.

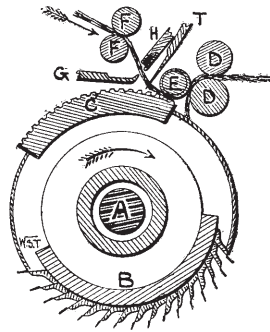


FIG. 35.

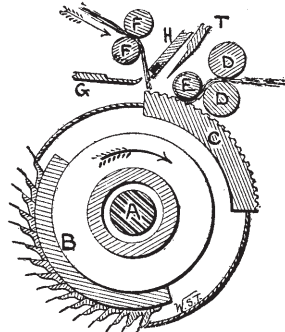
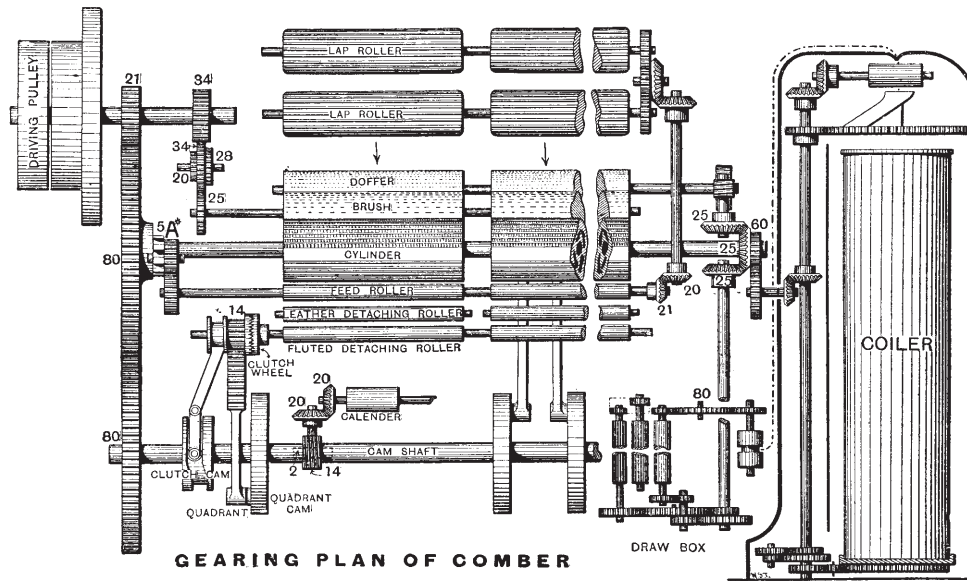


FIG. 36.



GEARING PLAN OF COMBER

FIG. 37.

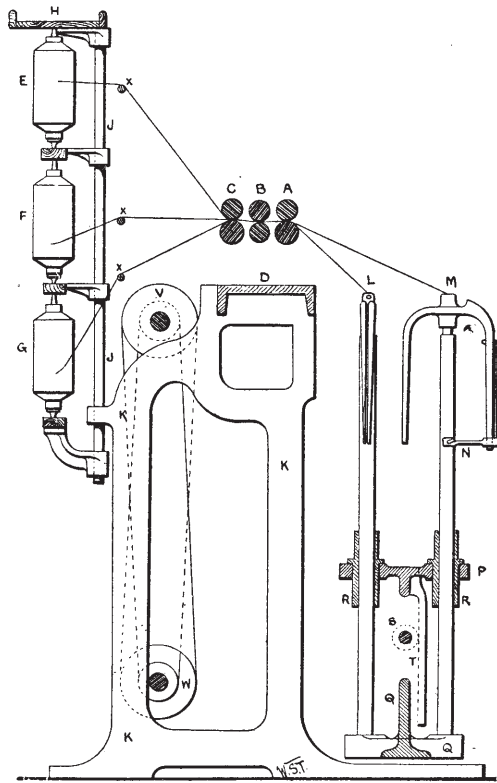


FIG. 38.

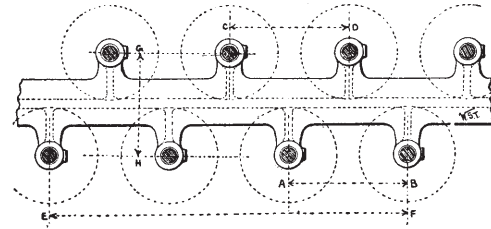


FIG. 39.

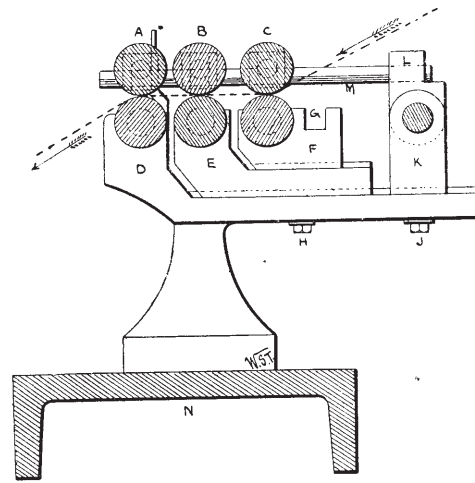


FIG. 40.

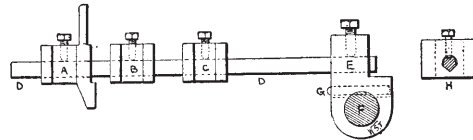


FIG. 41.

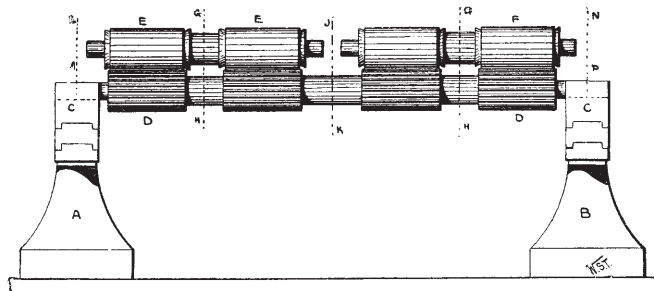


FIG. 42.

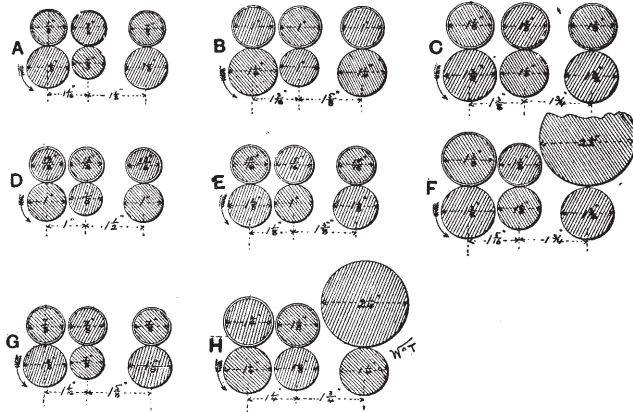


FIG. 43.

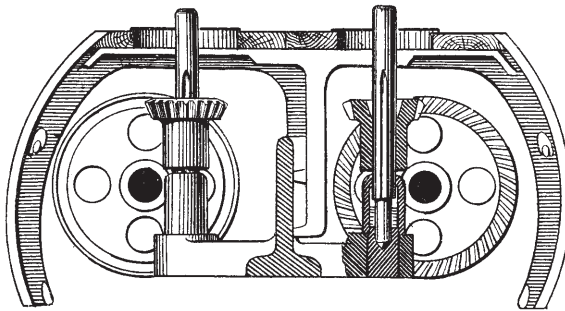


FIG. 46.

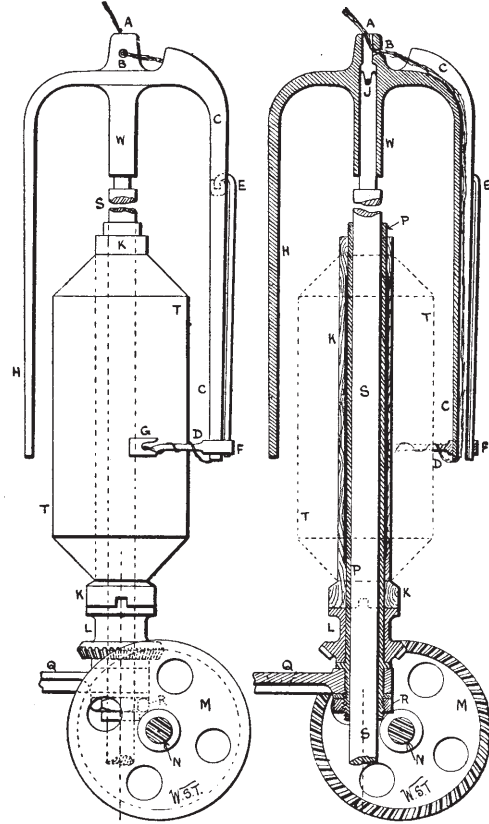


FIG. 44.

FIG. 45.

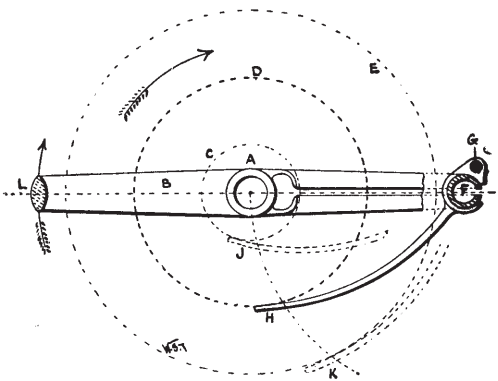


FIG. 47.

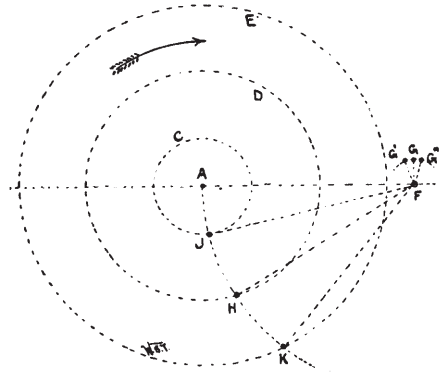


FIG. 48.

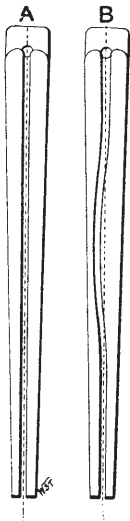


FIG. 49.

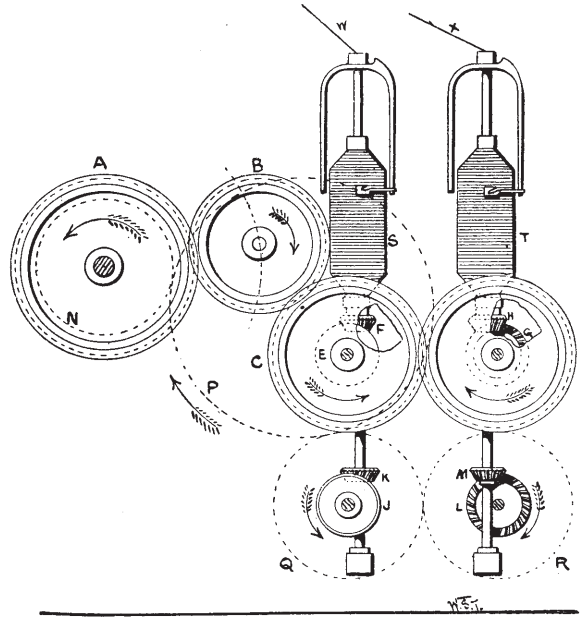


FIG. 50.

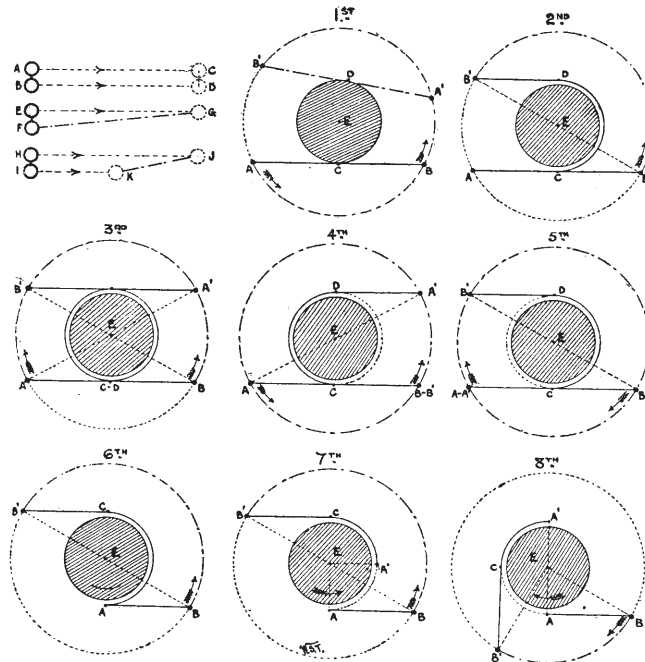


FIG. 51.

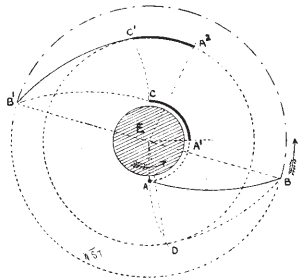


FIG. 52.

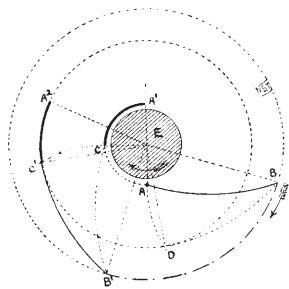


FIG. 53.

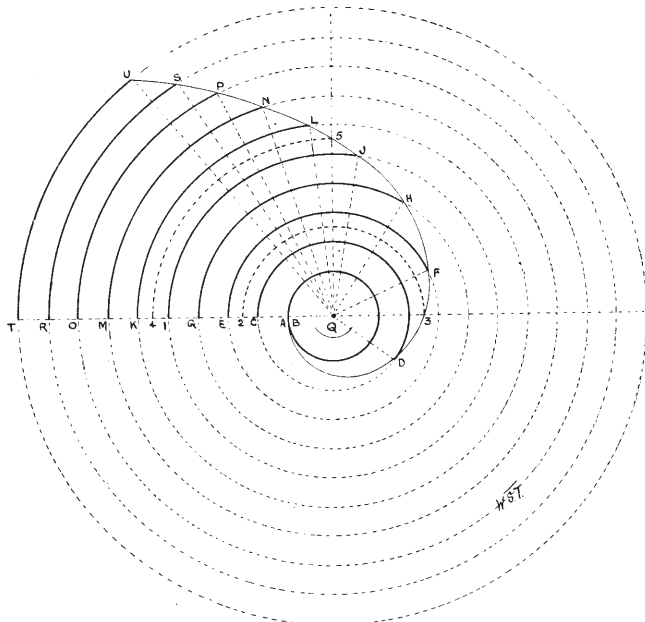


FIG. 54.

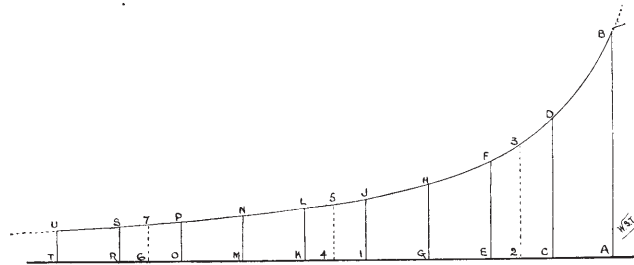
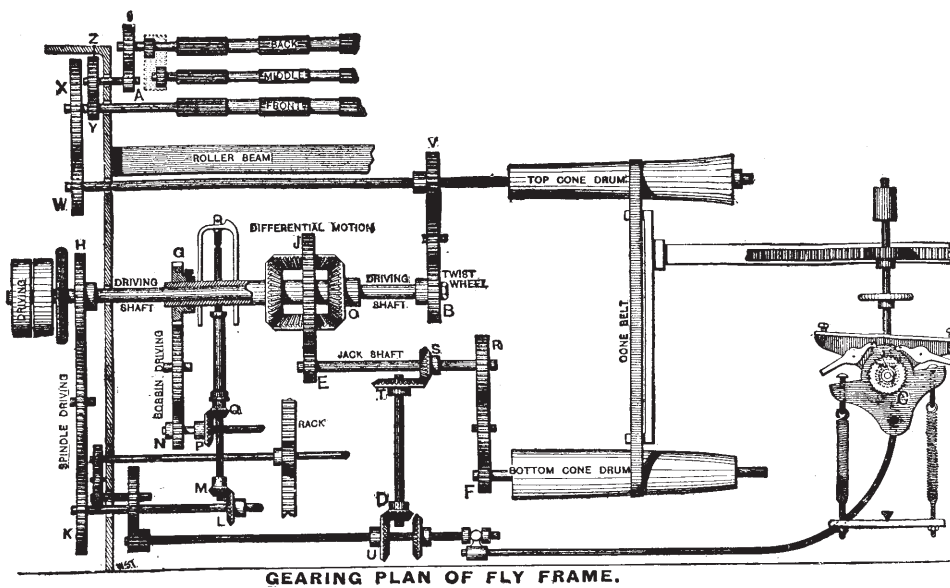


FIG. 55.



GEARING PLAN OF FLY FRAME.

FIG. 56.

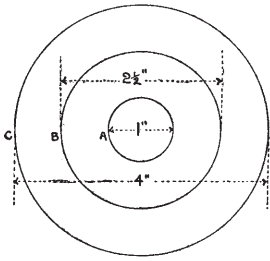


FIG. 57.

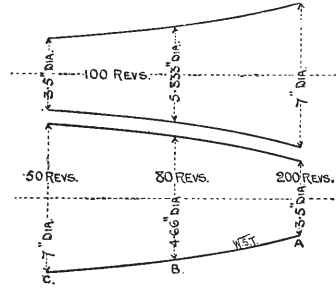


FIG. 58.



FIG. 59.

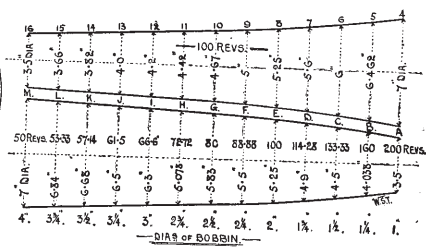


FIG. 60.

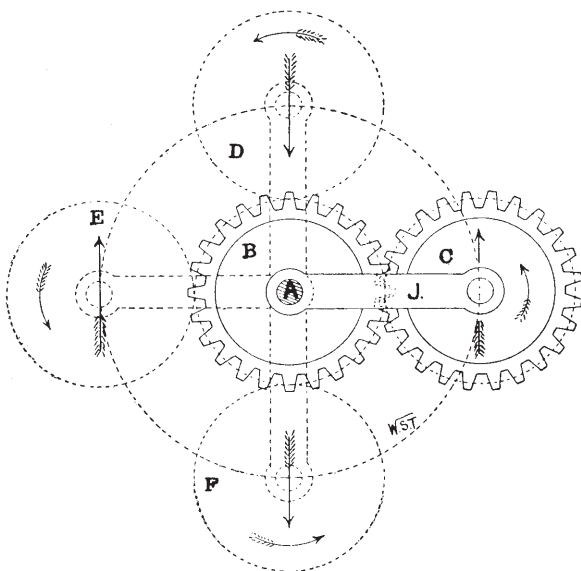


FIG. 61.

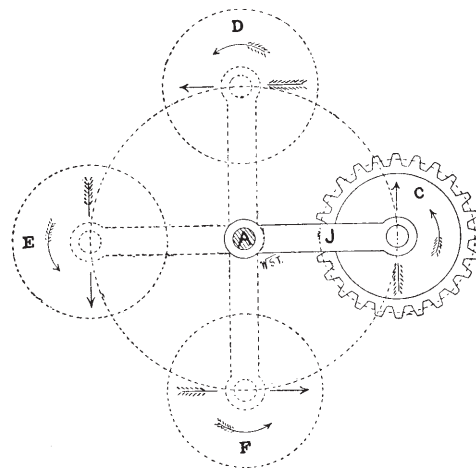


FIG. 62.

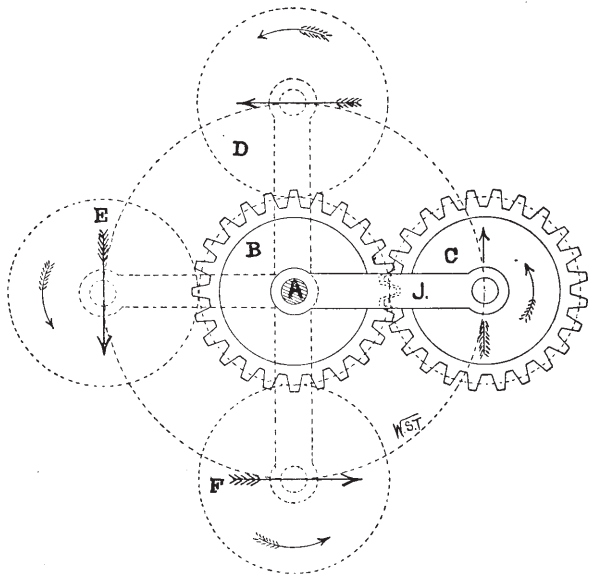


FIG. 63.

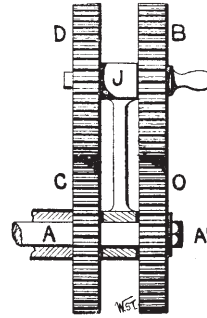


FIG. 64.

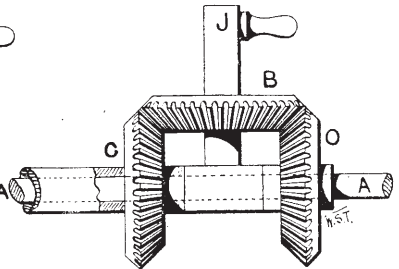


FIG. 65.

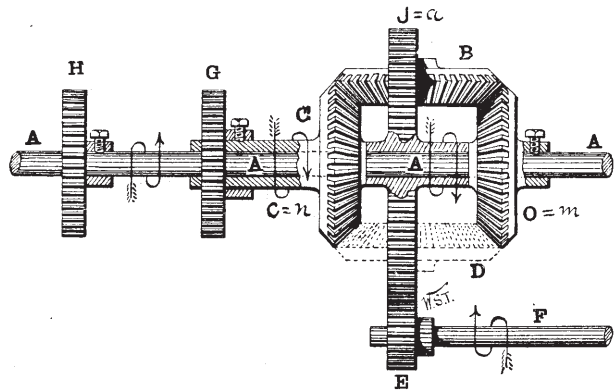


FIG. 66.

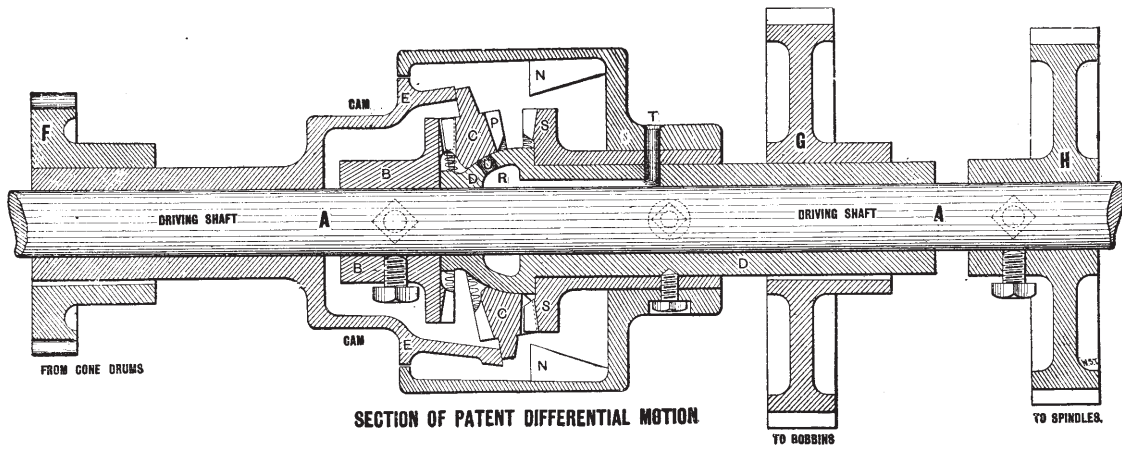


FIG. 67.

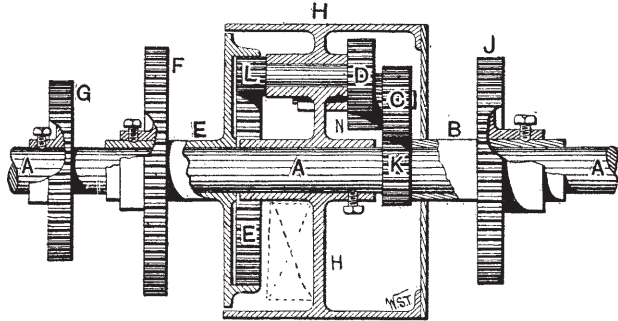


FIG. 68.

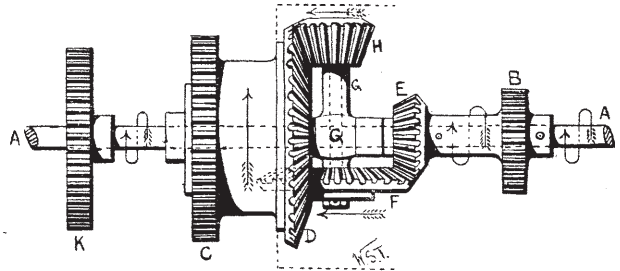


FIG. 69.

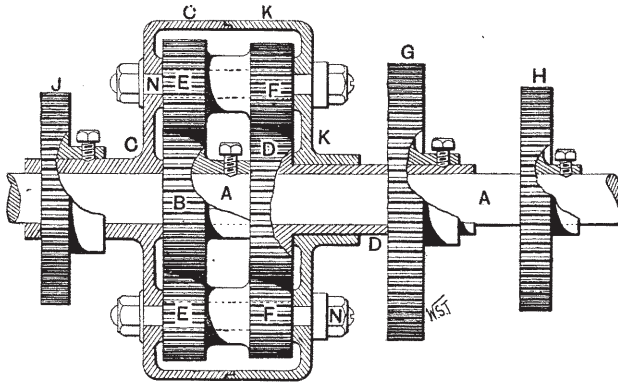


FIG. 70.

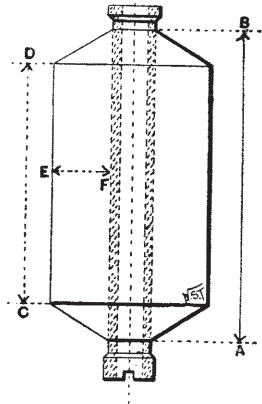
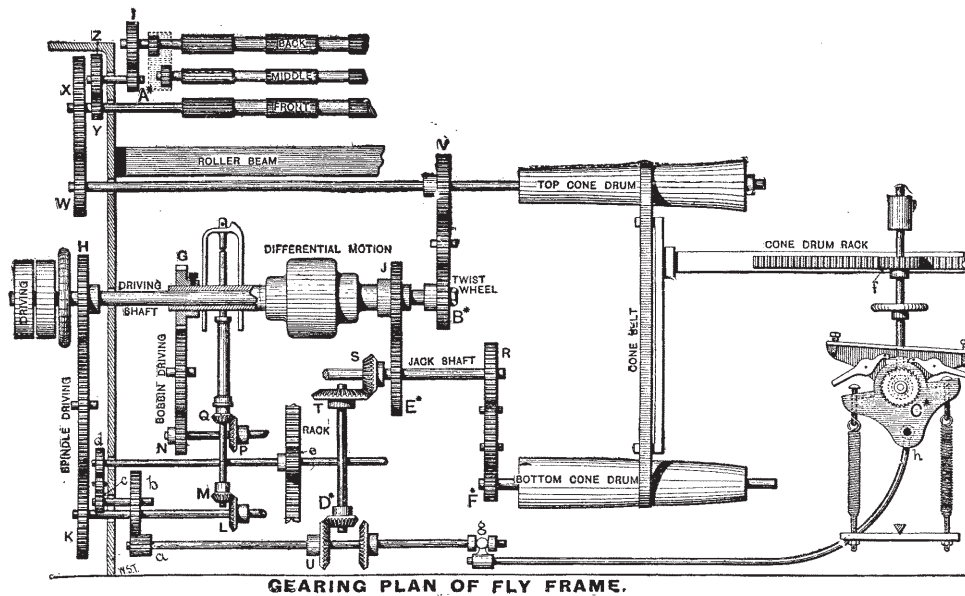


FIG. 71.



GEARING PLAN OF FLY FRAME.

FIG. 72.

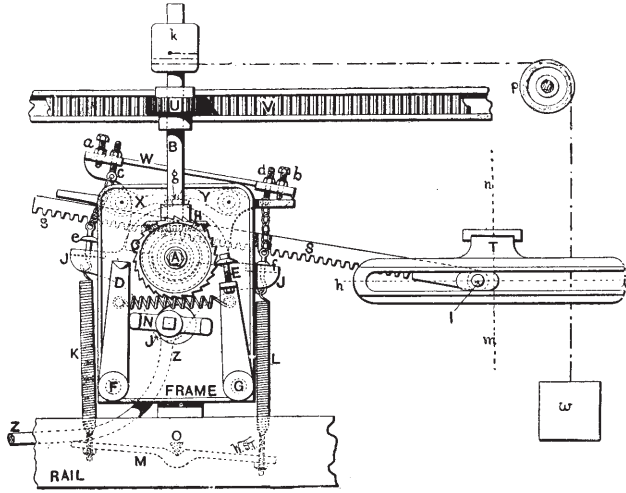


FIG. 73.

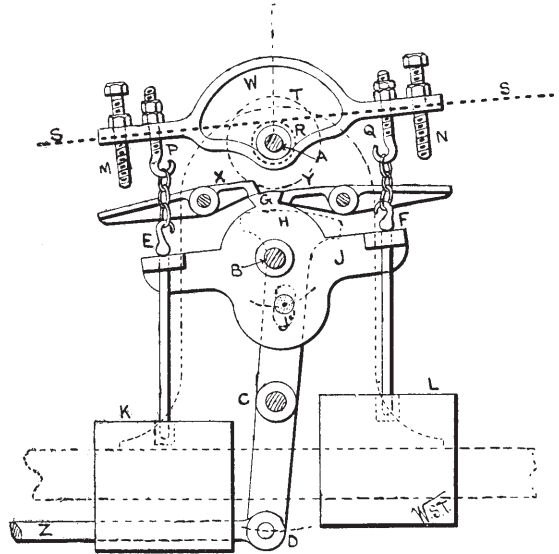


FIG. 76.

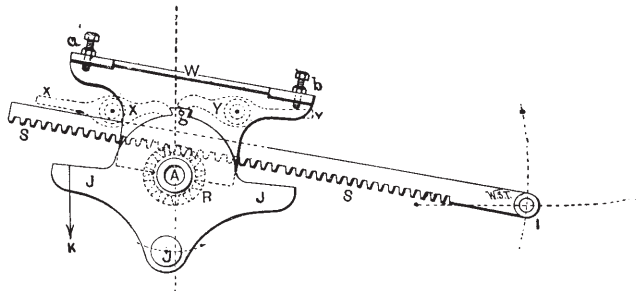


FIG. 74.

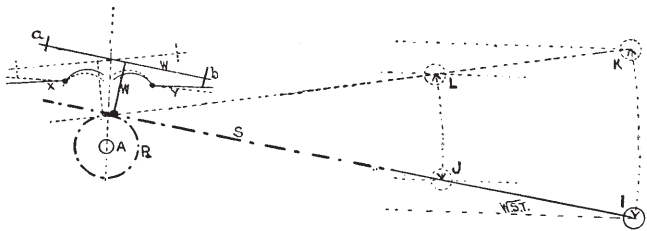


FIG. 75.

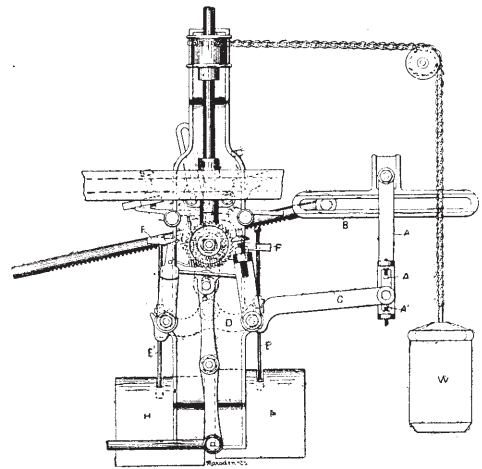


FIG. 77.

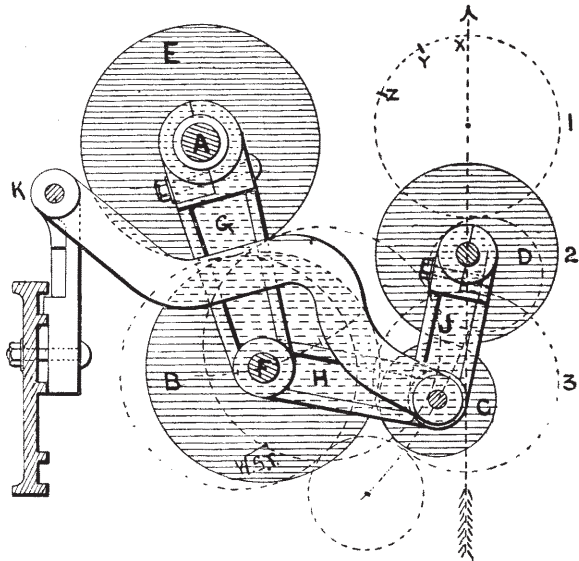


FIG. 78.

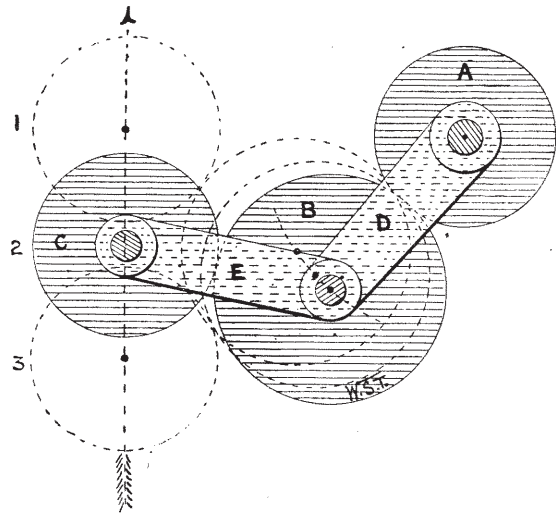
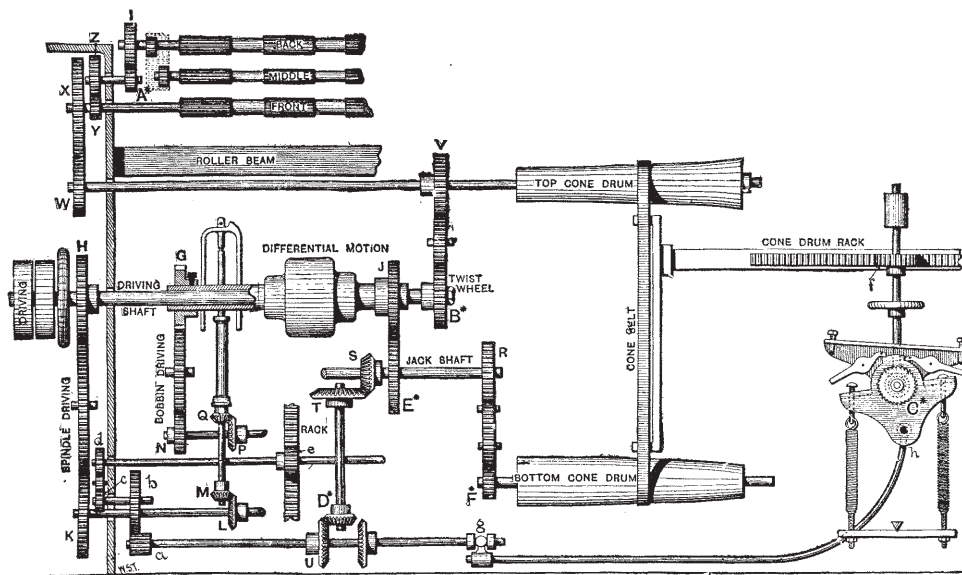


FIG. 79.



GEARING PLAN OF FLY FRAME.

FIG. 80.

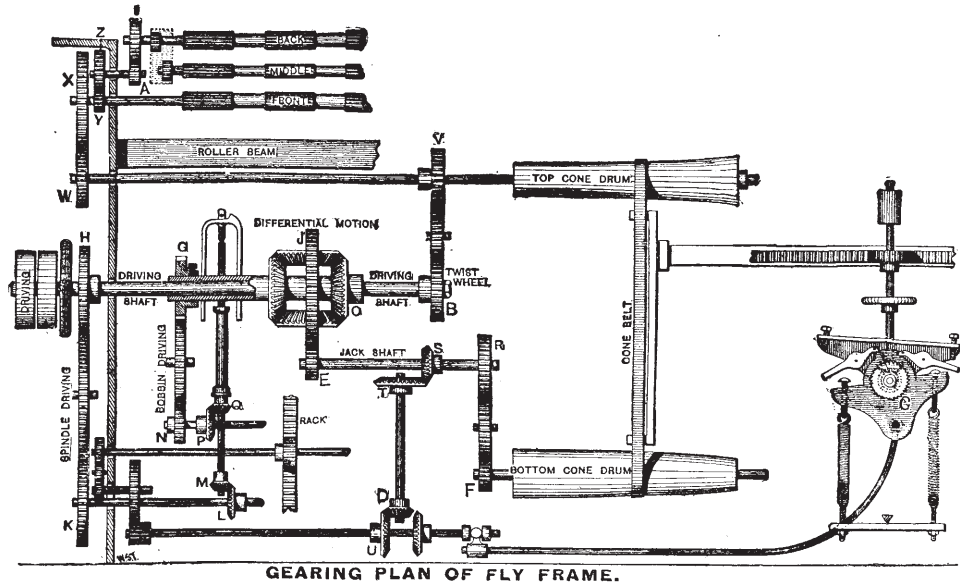


FIG. 81.

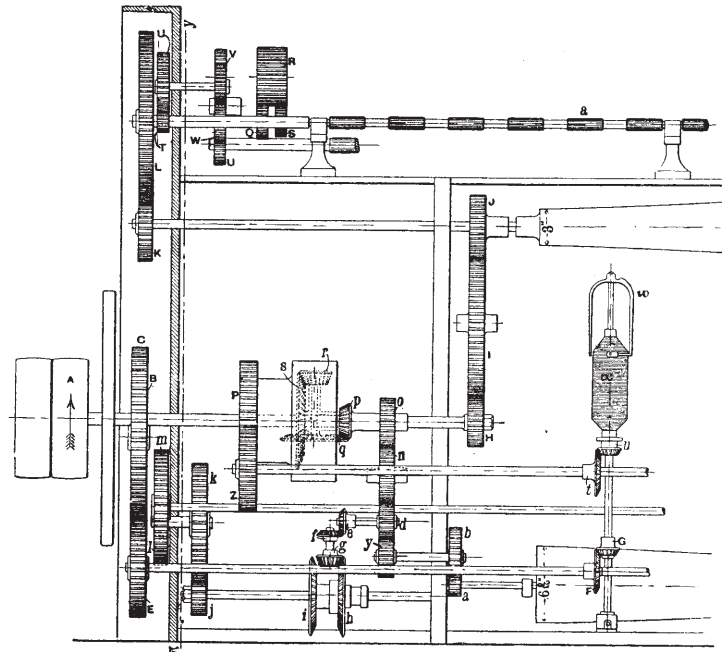


FIG. 82.

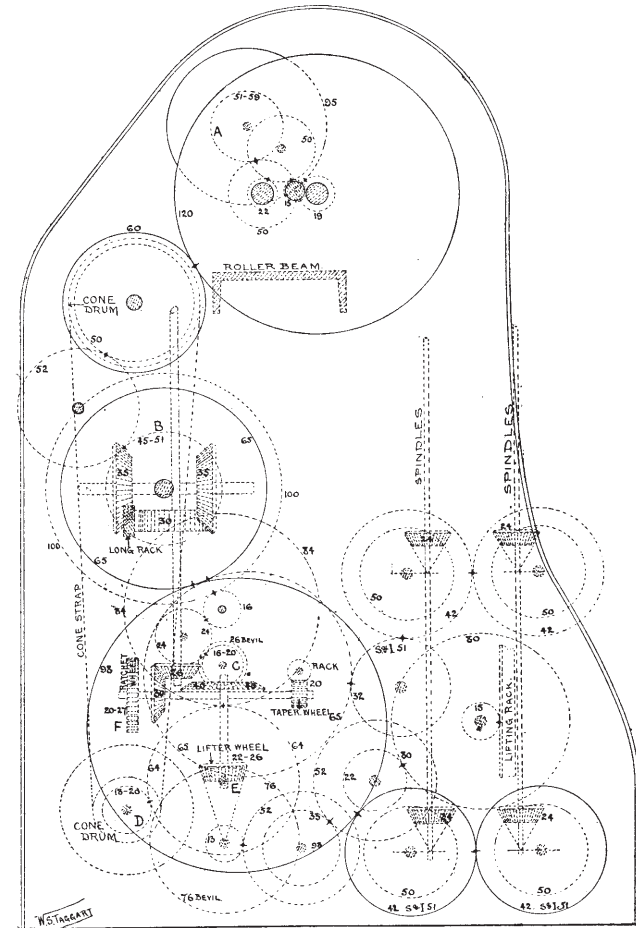


FIG. 83.

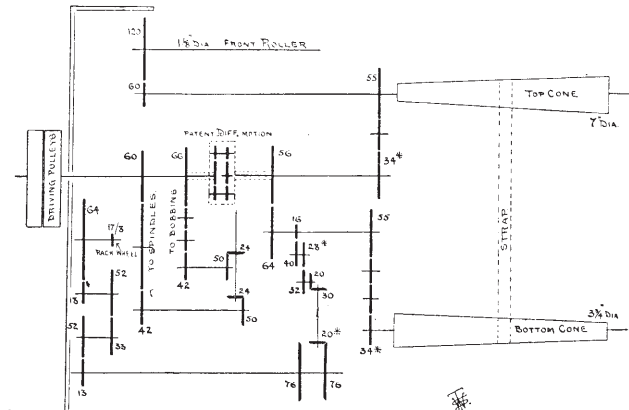


FIG. 84.

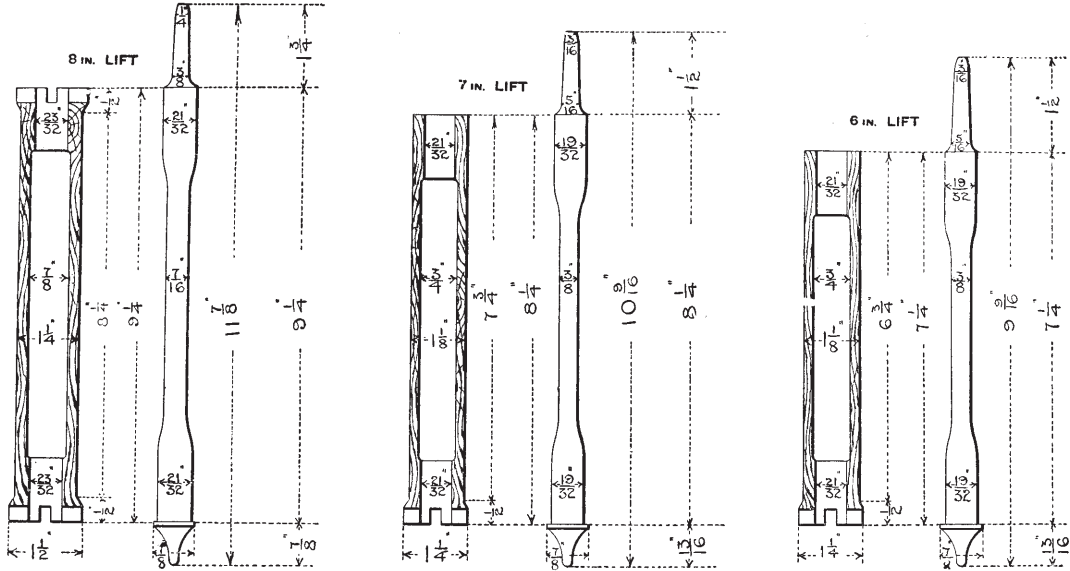


FIG. 85.

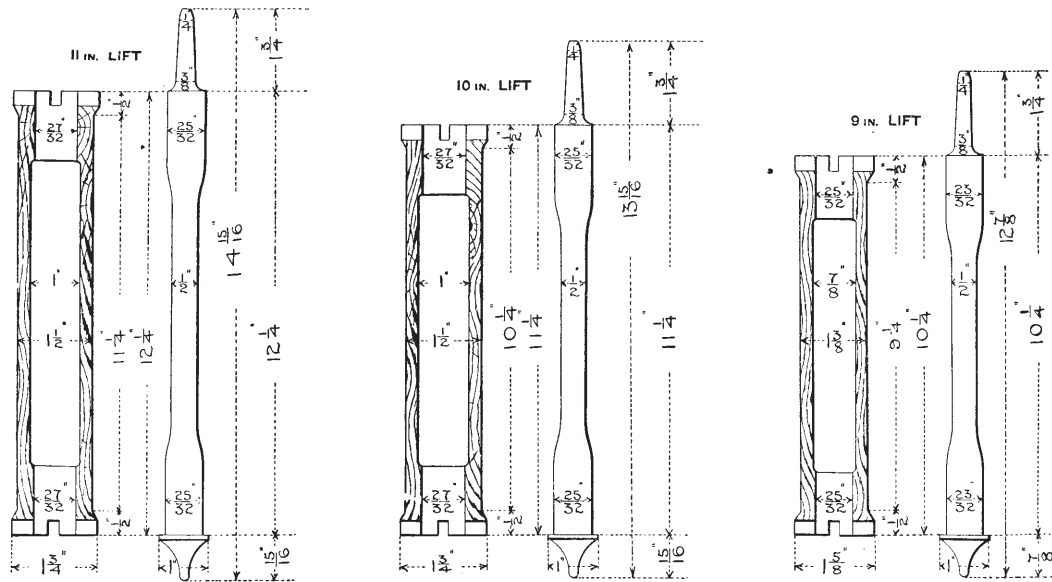


FIG. 86.

See Appendix for further illustrations.

VOLUME III

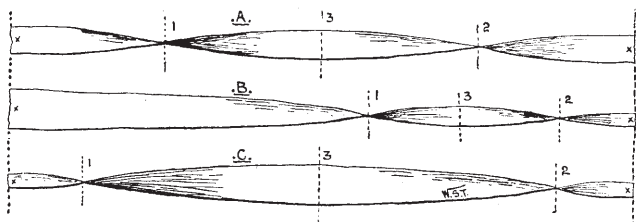


FIG. 1.



FIG. 3.

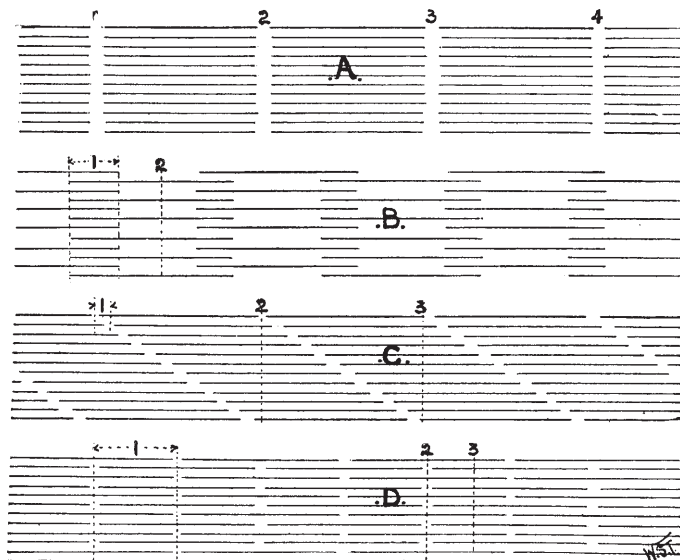


FIG. 2.

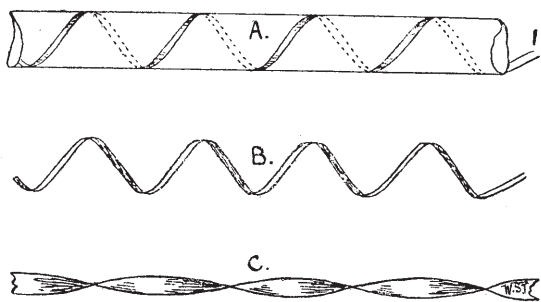


FIG. 4.

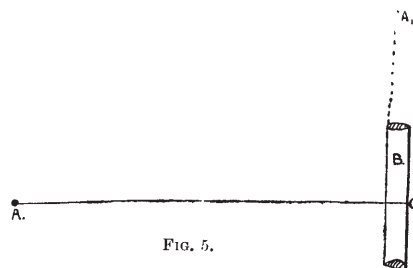


FIG. 5.

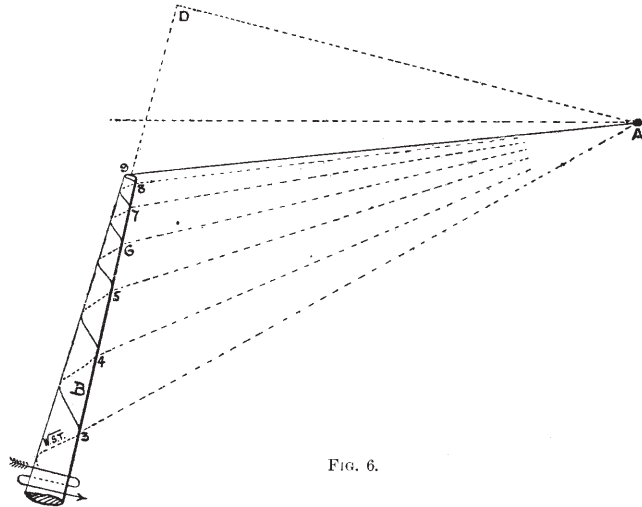


FIG. 6.

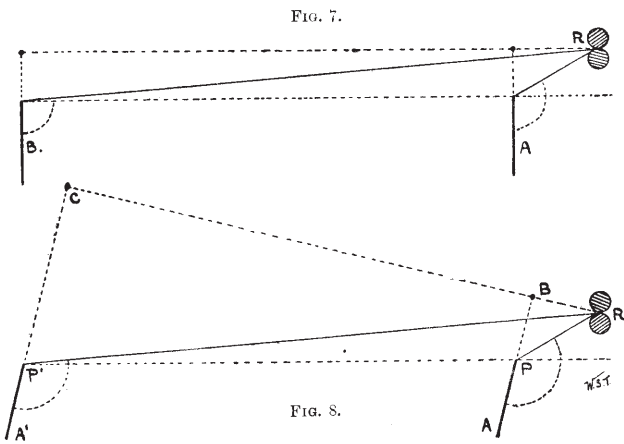


FIG. 7.

FIG. 8.

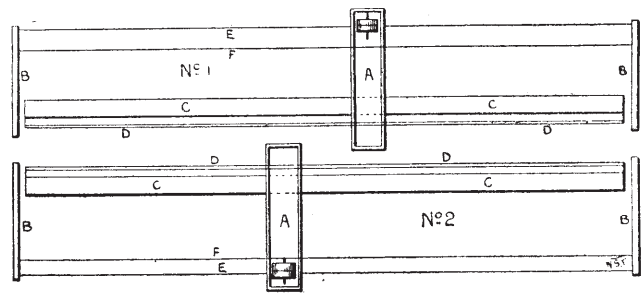


FIG. 9.

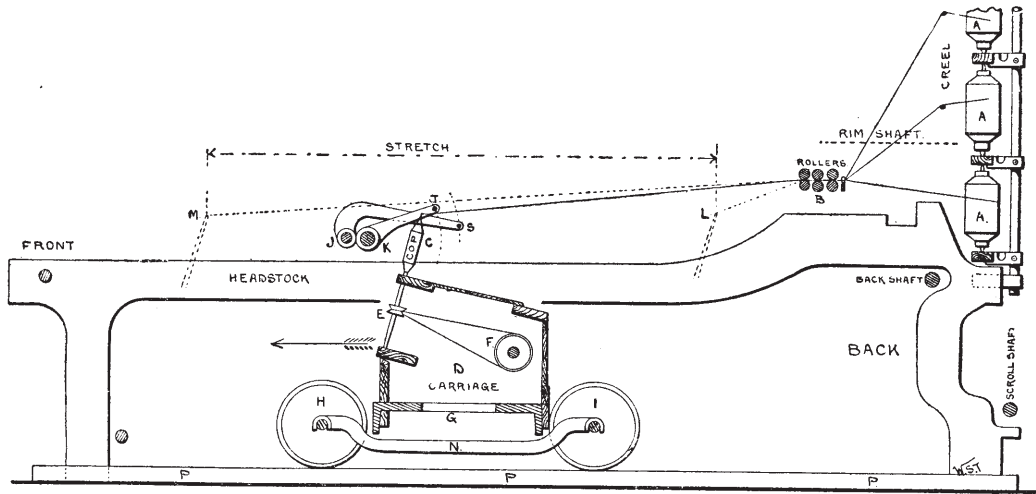


FIG. 10.

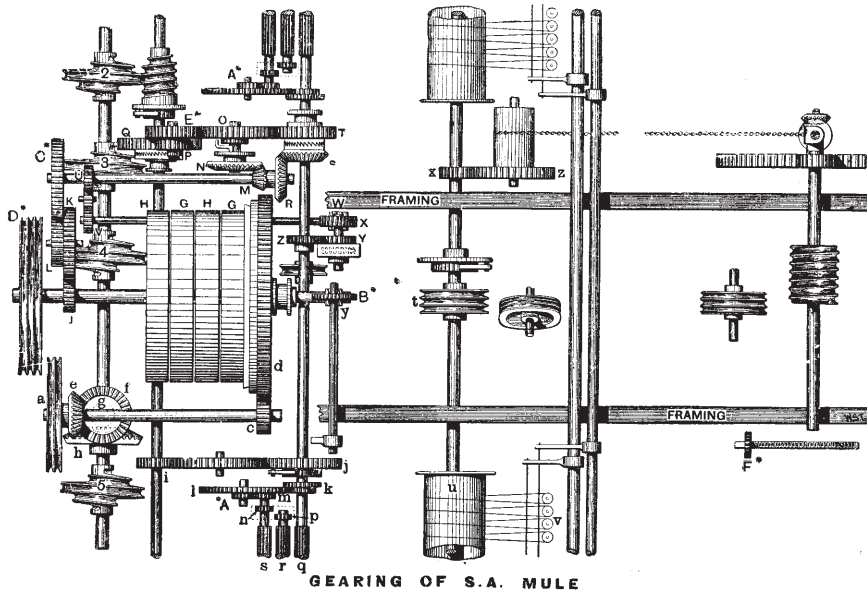


FIG. 11.

COTTON MACHINERY SKETCHES

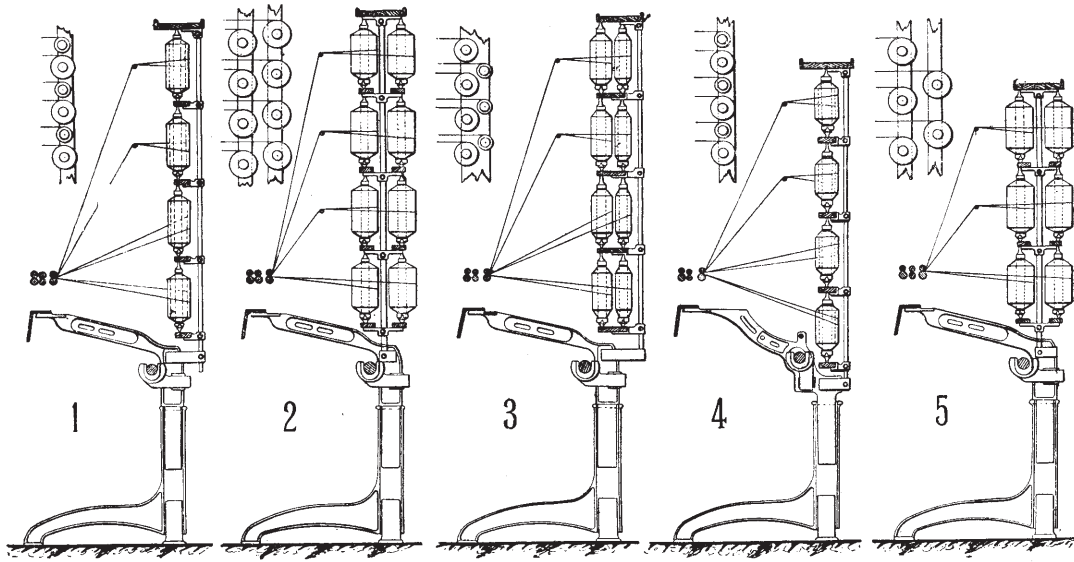


FIG. 12.

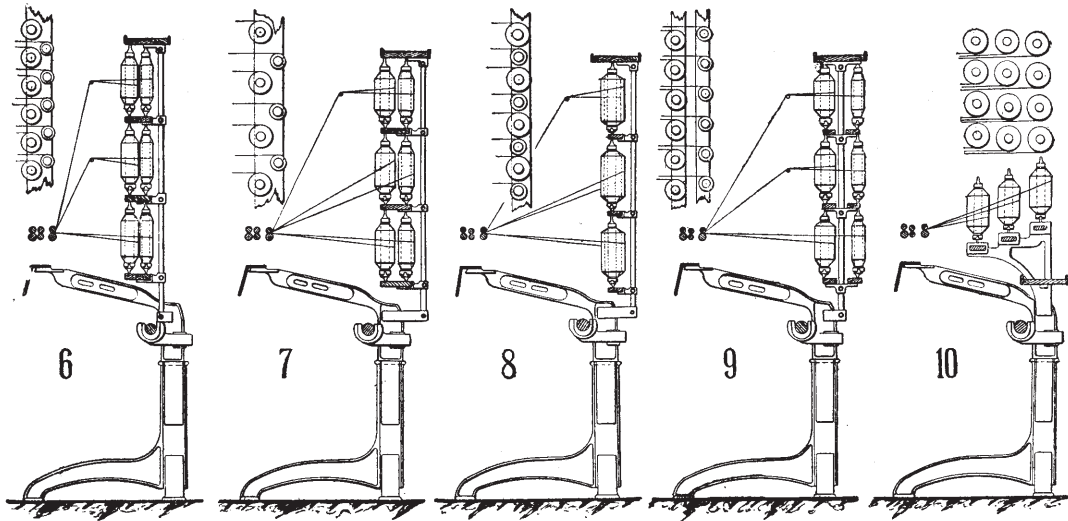


FIG. 13.

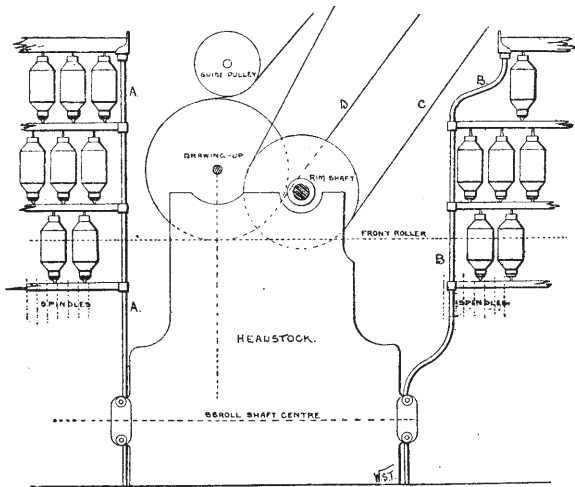


FIG. 14.

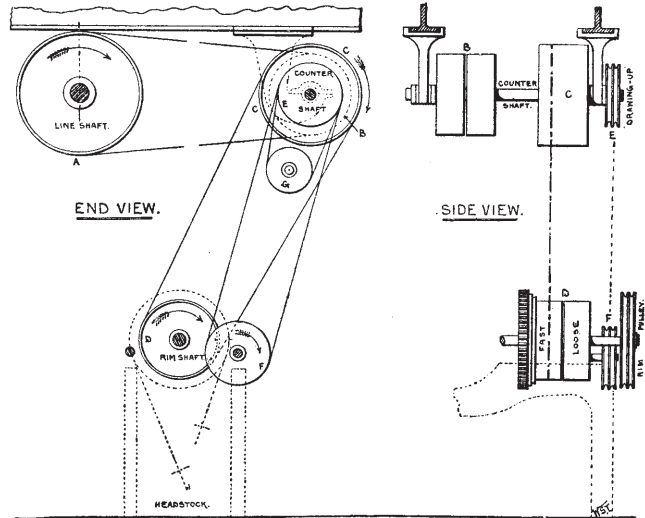


FIG. 15.

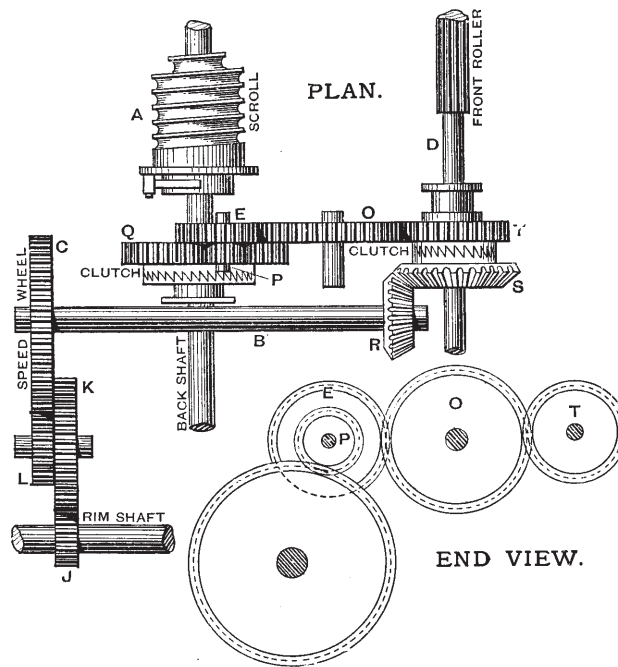


FIG. 16.

COTTON MACHINERY SKETCHES

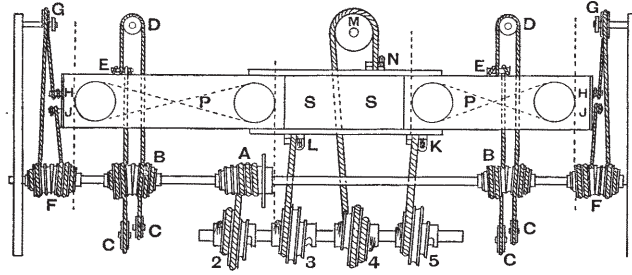


FIG. 17.

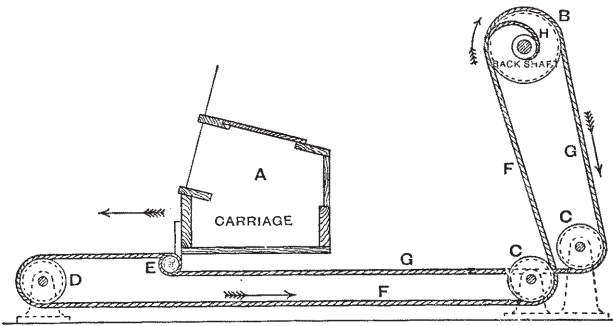


FIG. 18.

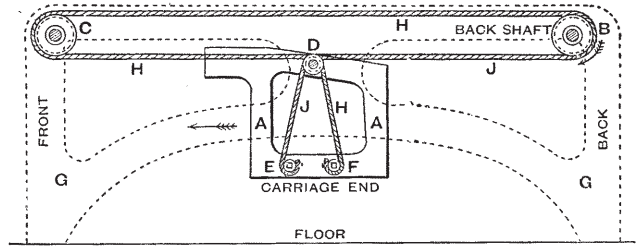


FIG. 19.

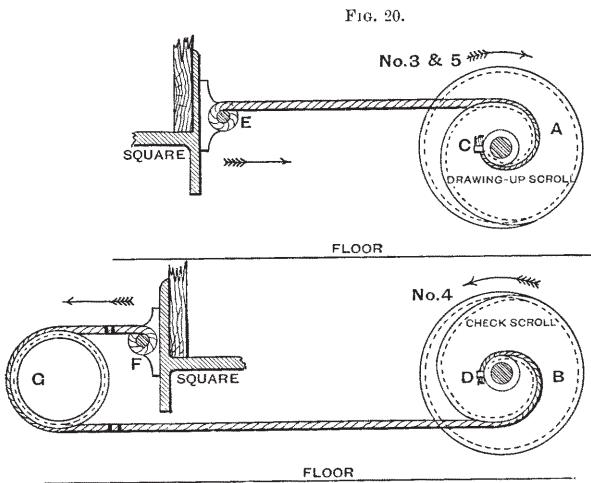


FIG. 21.

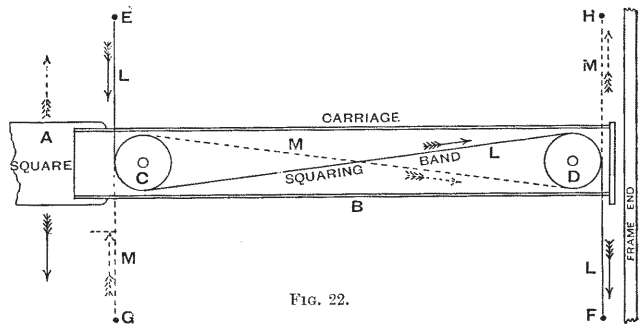


FIG. 22.

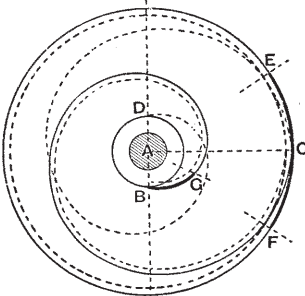


FIG. 23.



FIG. 24.

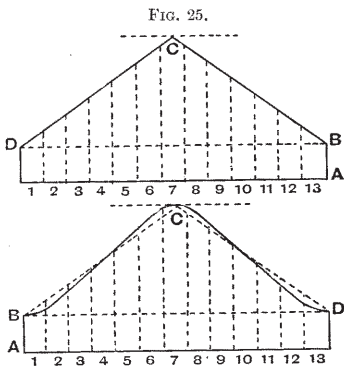


FIG. 25.

FIG. 26.

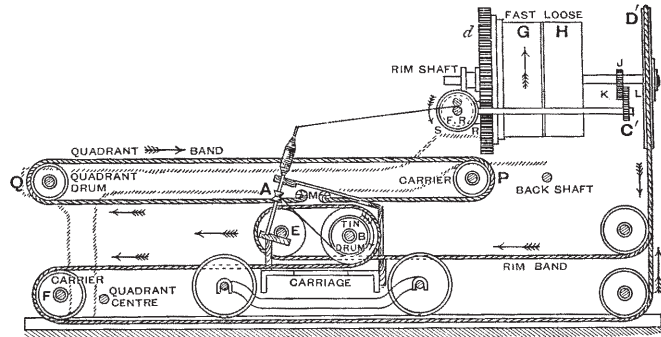


FIG. 27.

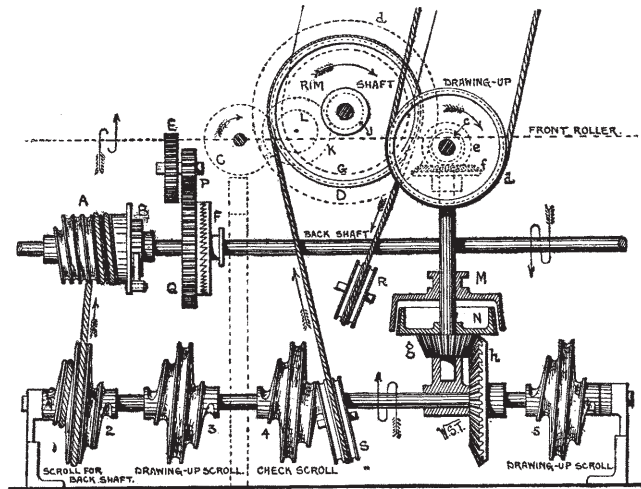


FIG. 28.

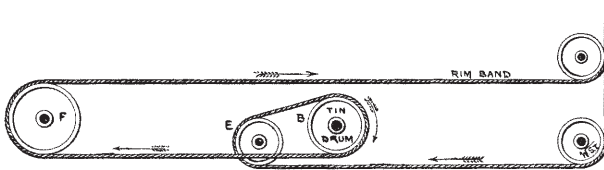


FIG. 29.

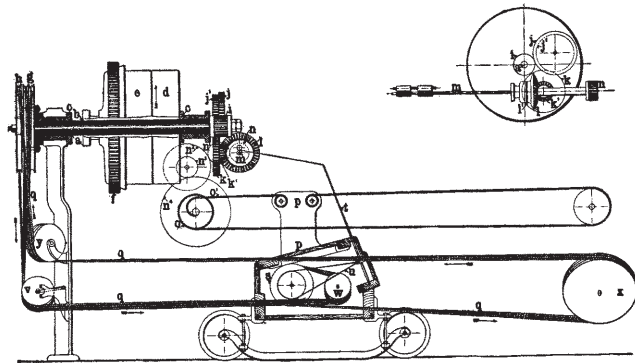
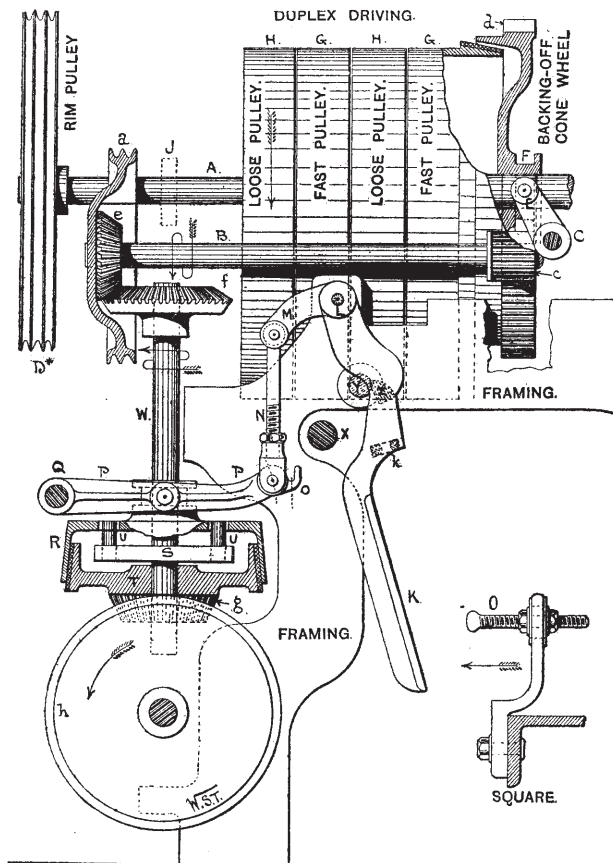
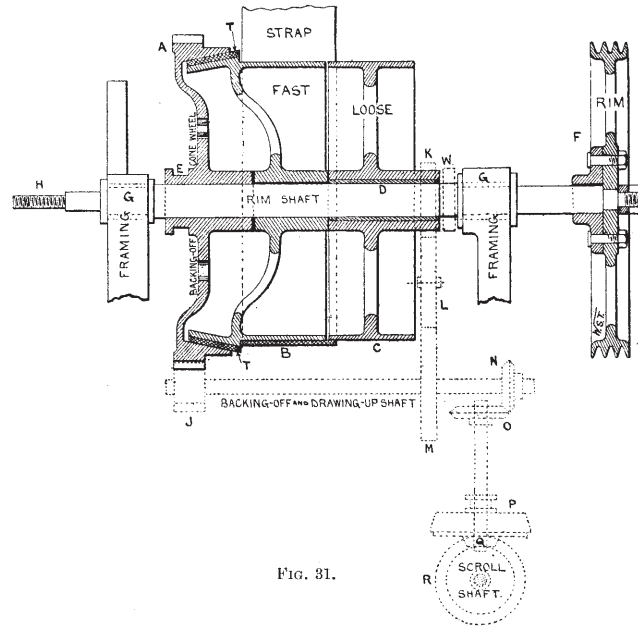


FIG. 30.

COTTON MACHINERY SKETCHES



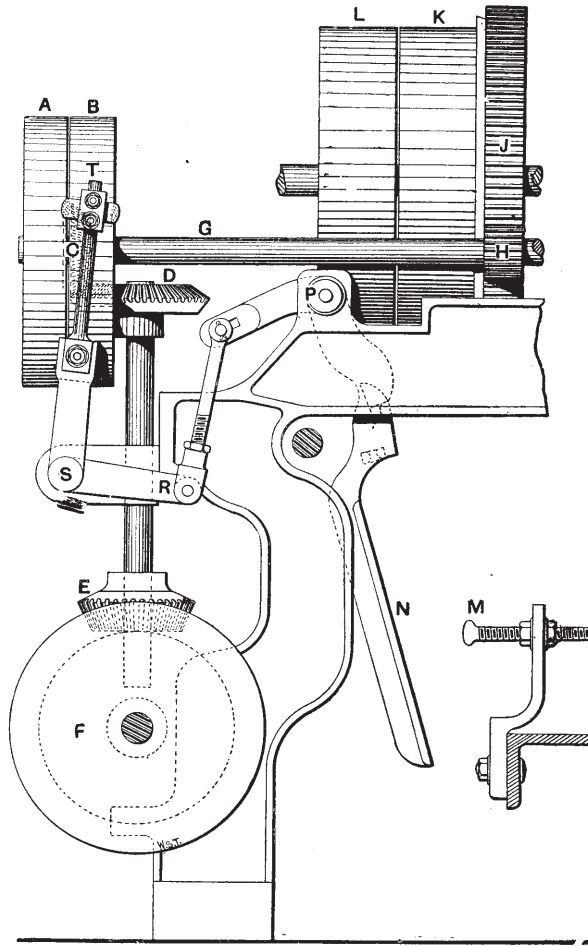


FIG. 33.

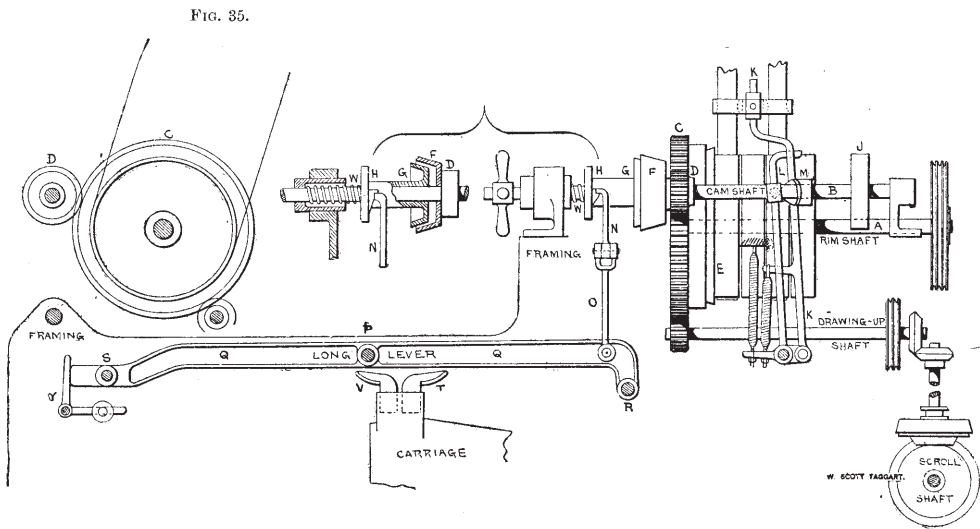


FIG. 34.

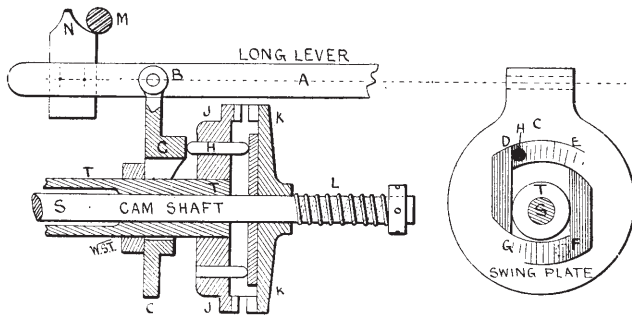


Fig. 36.

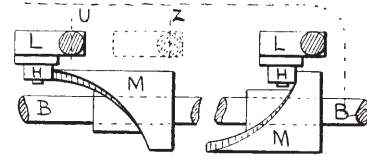


Fig. 37.

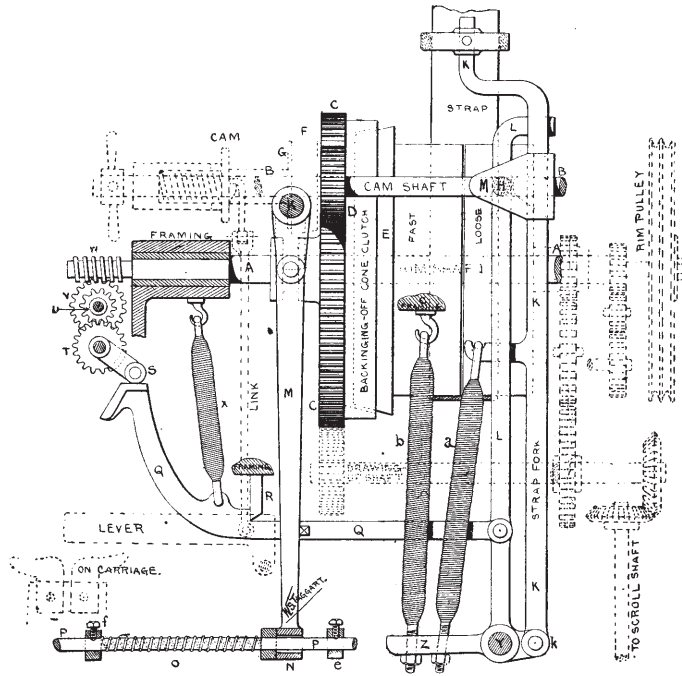


Fig. 38.

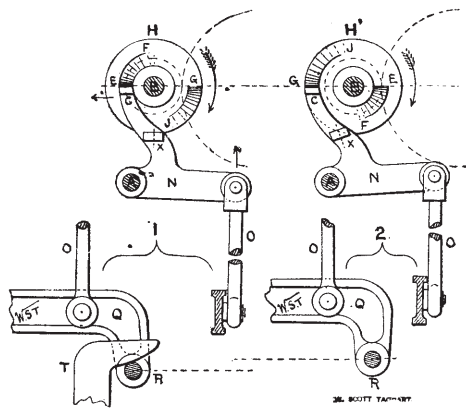


Fig. 39.

Fig. 40.

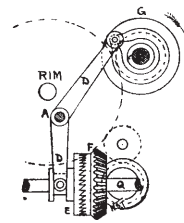


Fig. 41.

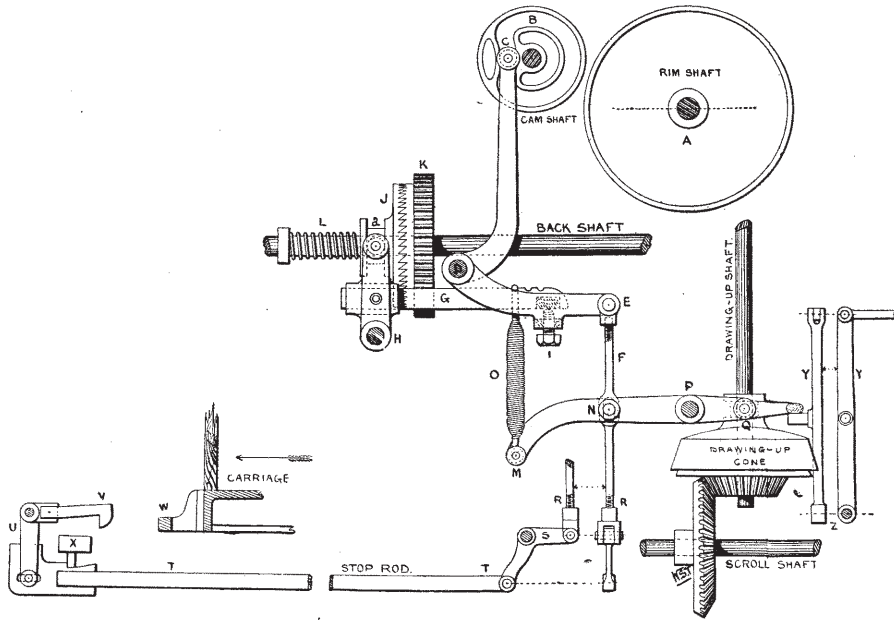


FIG. 42.

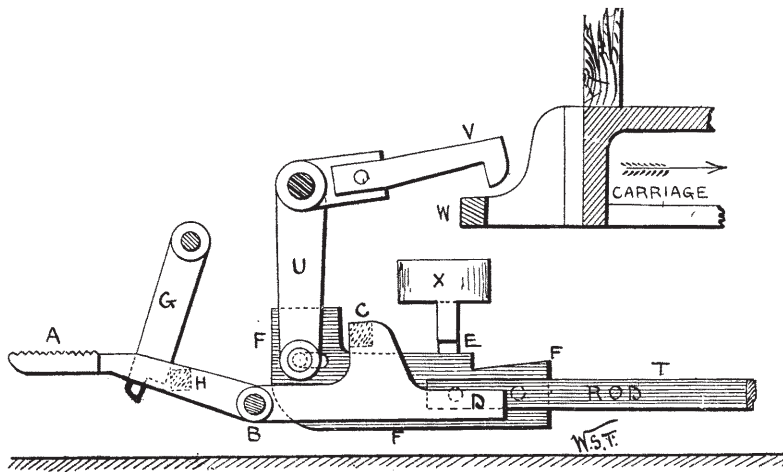


FIG. 43.

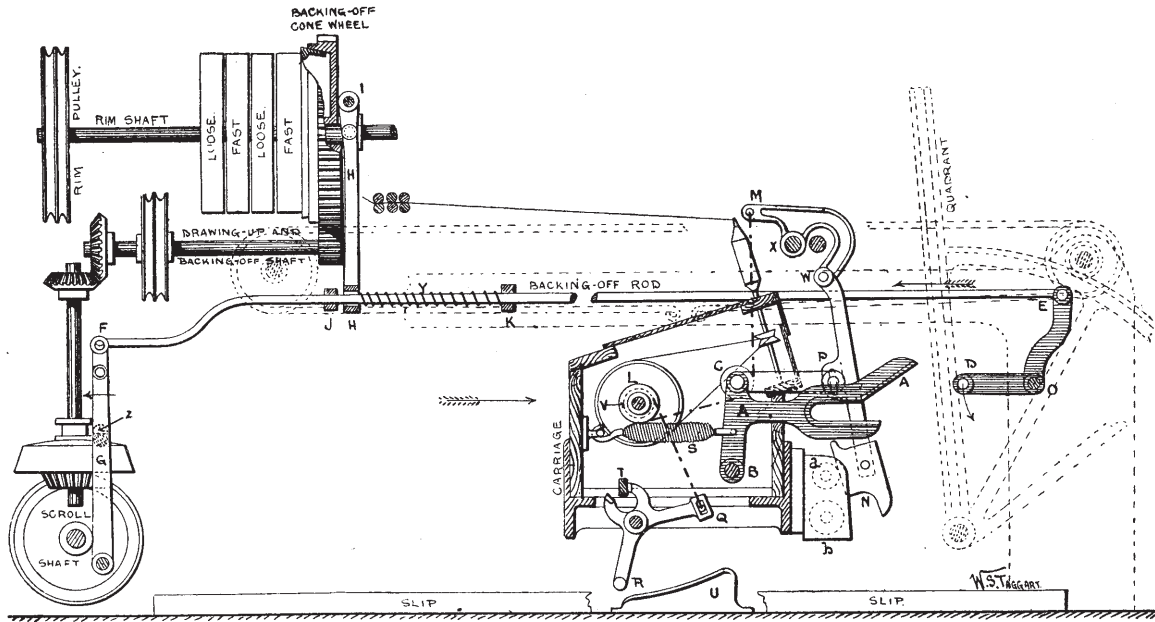


Fig. 44.

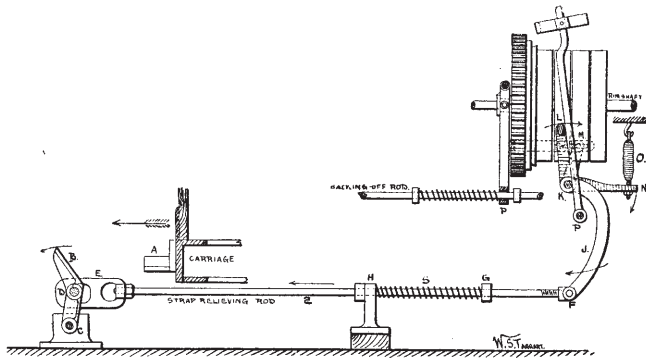


Fig. 45.

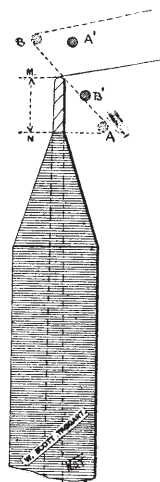


Fig. 48.

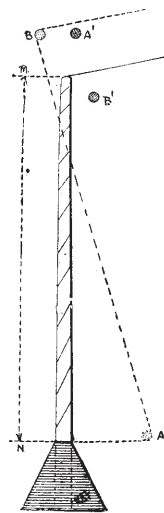


Fig. 49.

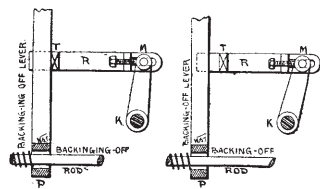


Fig. 46.

Fig. 47.

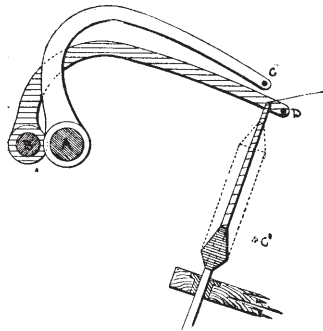


FIG. 50.

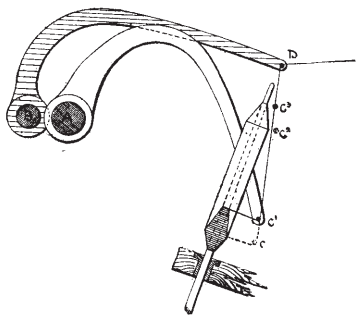


FIG. 51.

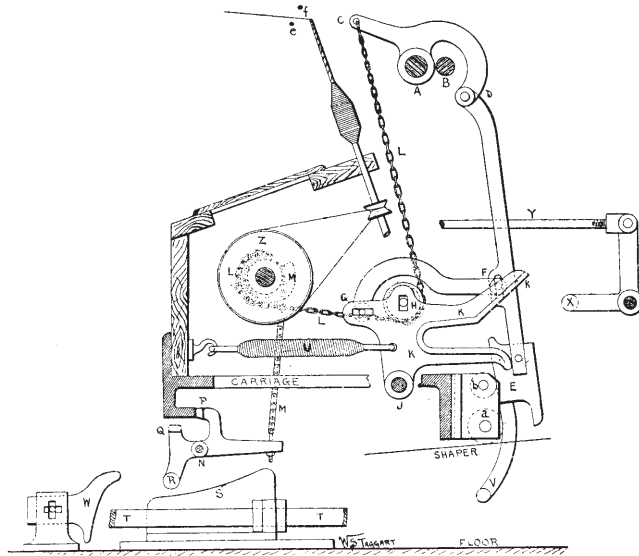


FIG. 52.

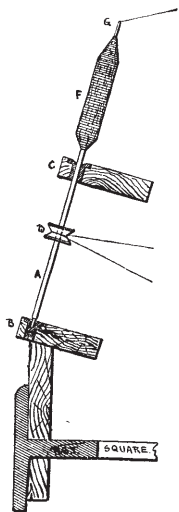


FIG. 53.

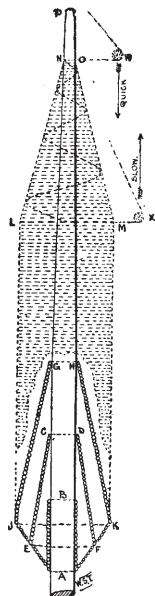


FIG. 54.

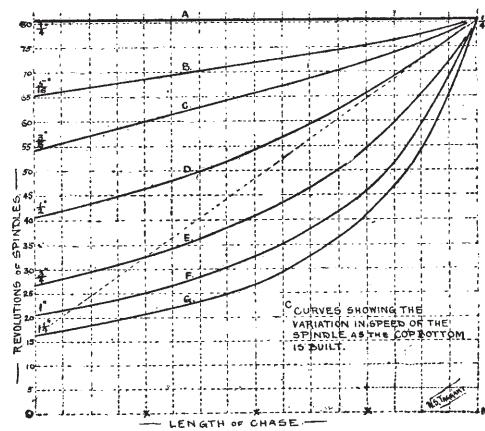


FIG. 55.

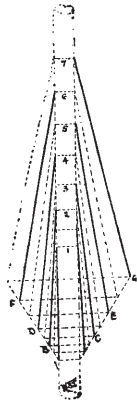


FIG. 56.

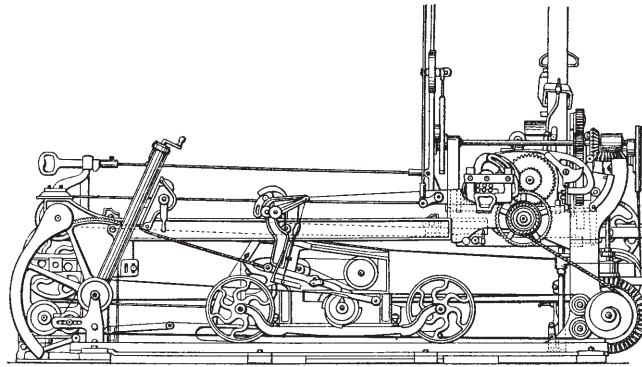
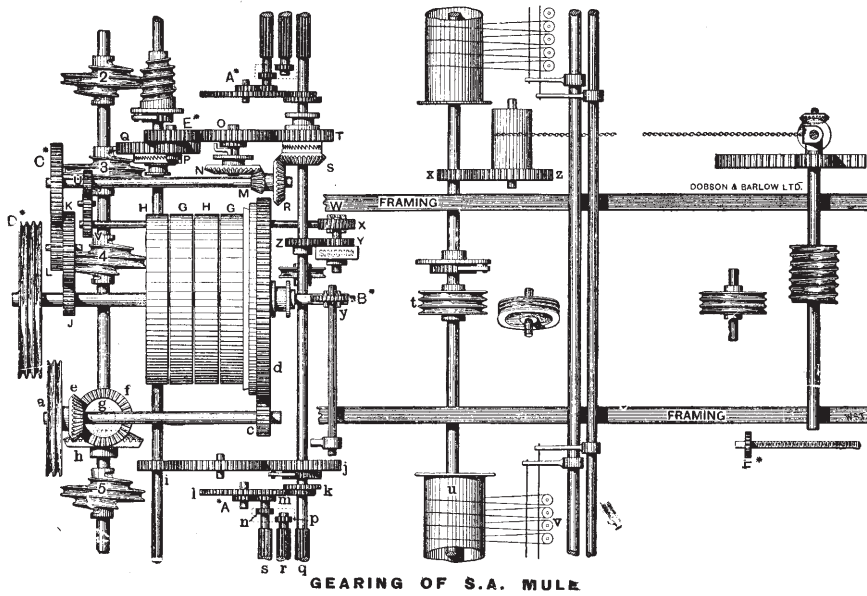


FIG. 58.



GEARING OF S.A. MULE

FIG. 57.

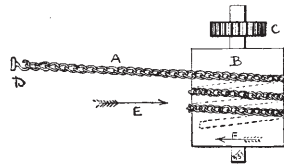


FIG. 59.

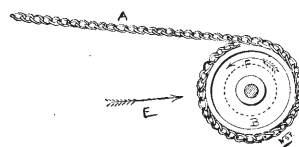
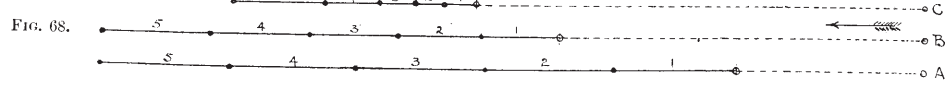
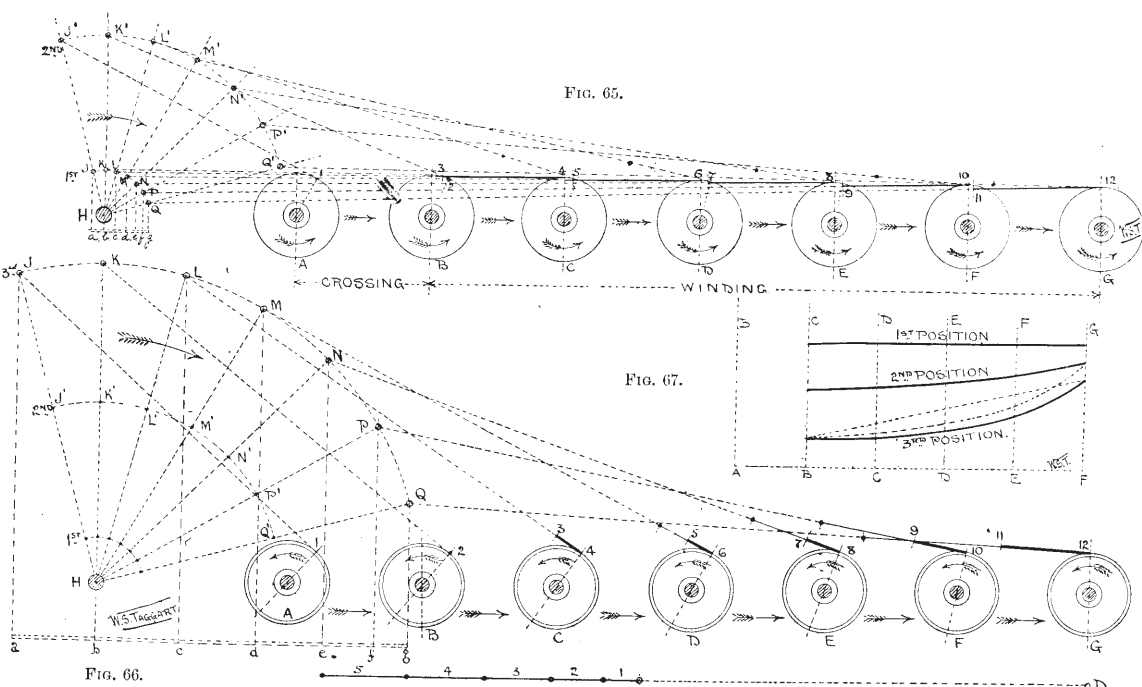
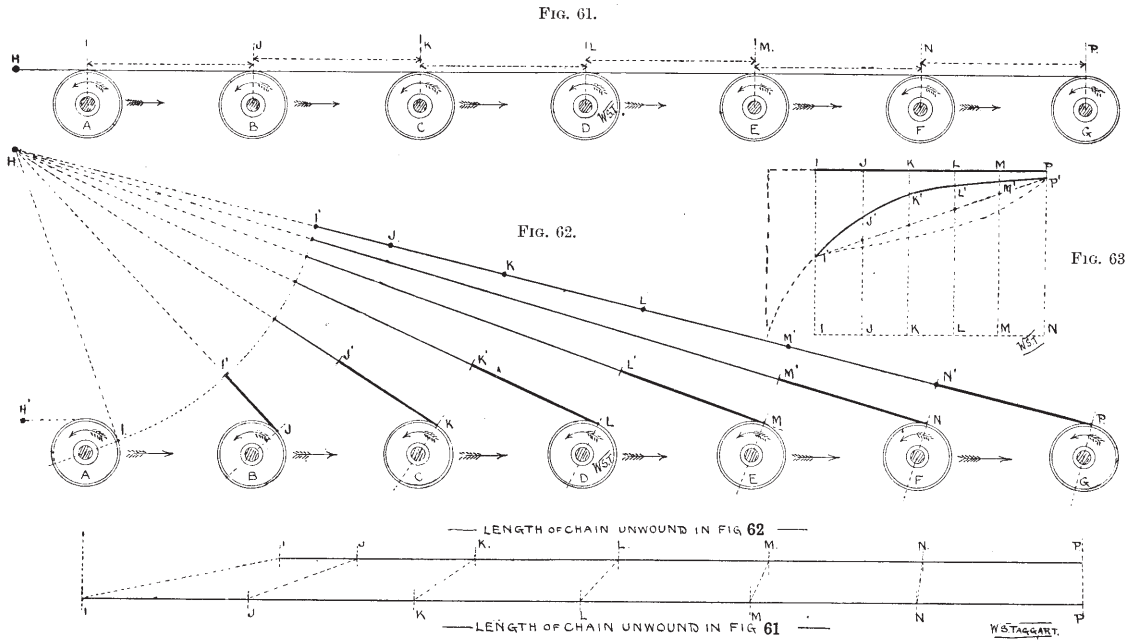


FIG. 60.



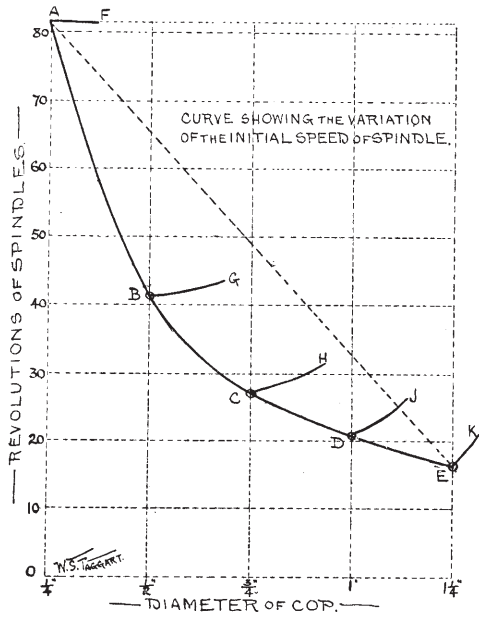


FIG. 69.

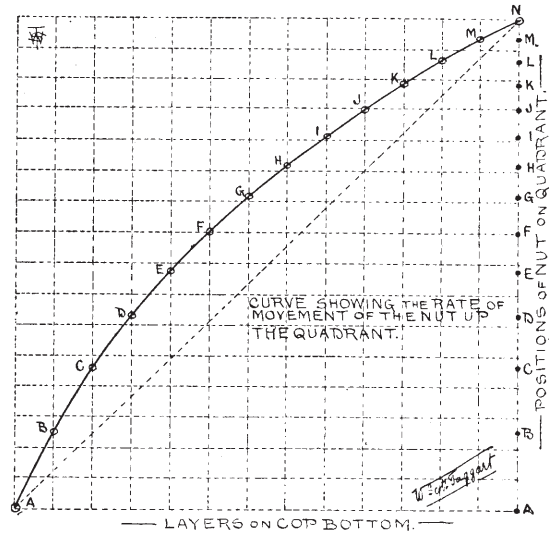


FIG. 70.

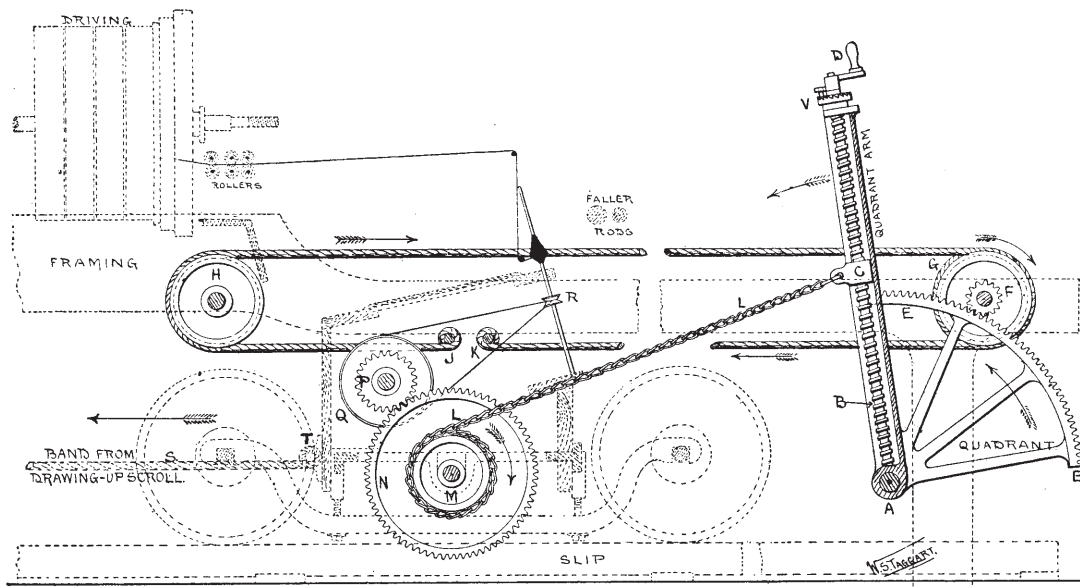


FIG. 71.

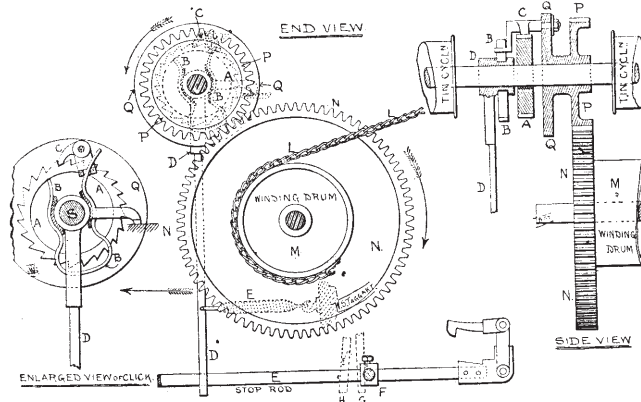


FIG. 72.

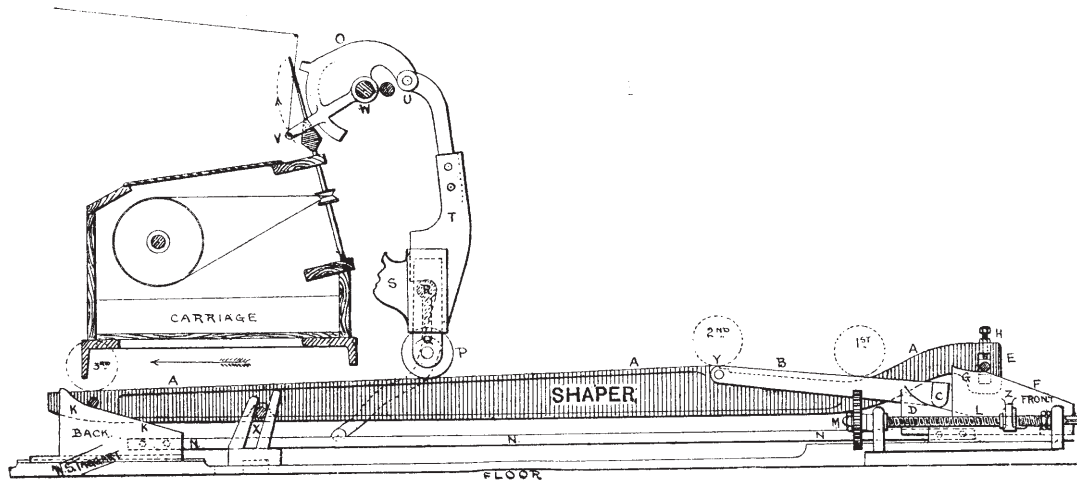


FIG. 73.

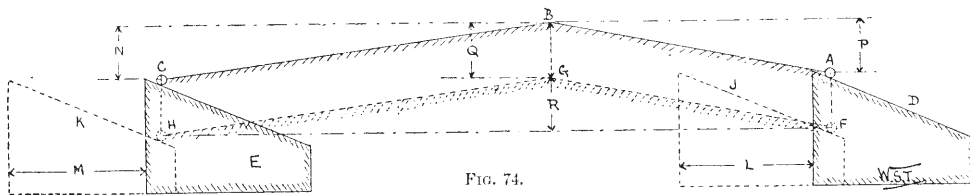


FIG. 74.

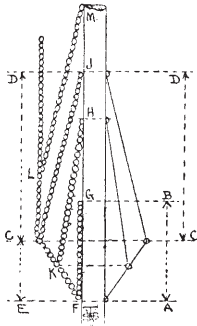


FIG. 75.

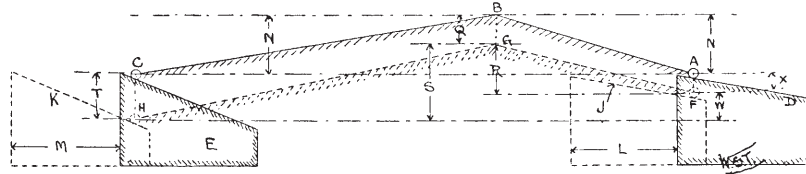


FIG. 76.

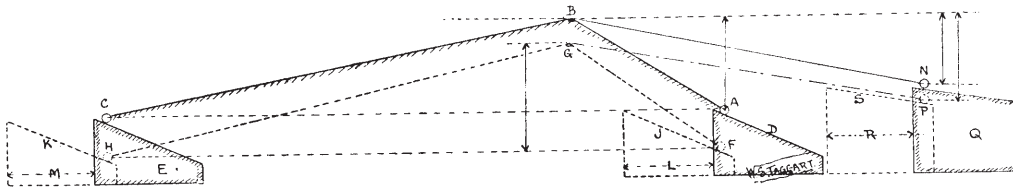


FIG. 77.

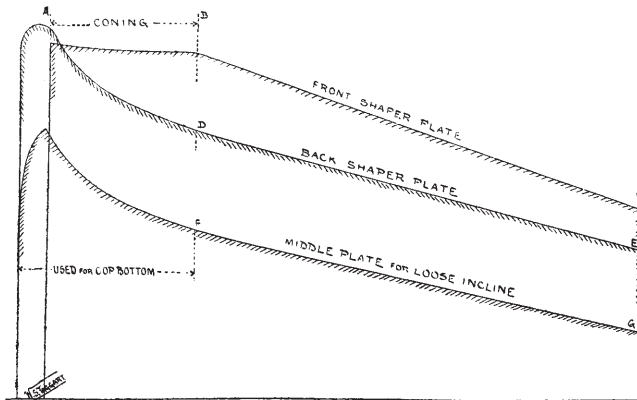


FIG. 78.

FIG. 79.

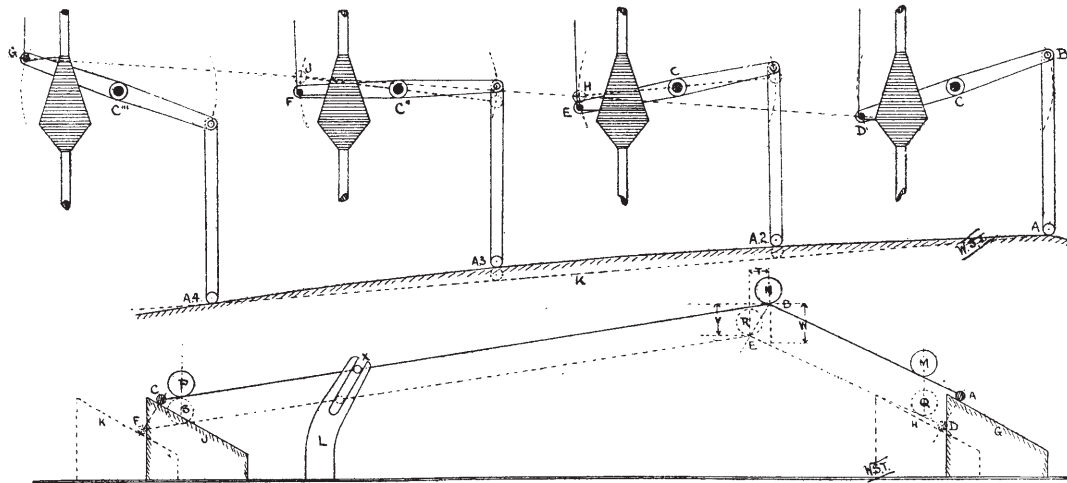


FIG. 80.

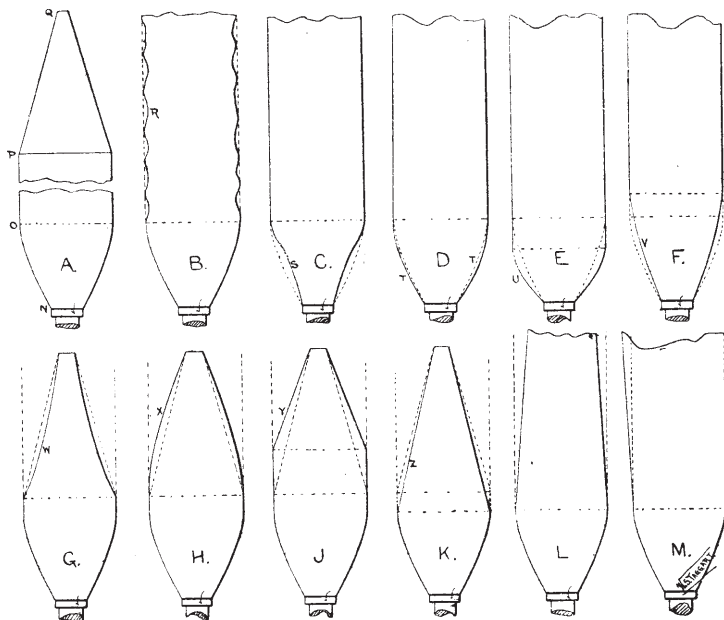


FIG. 81.

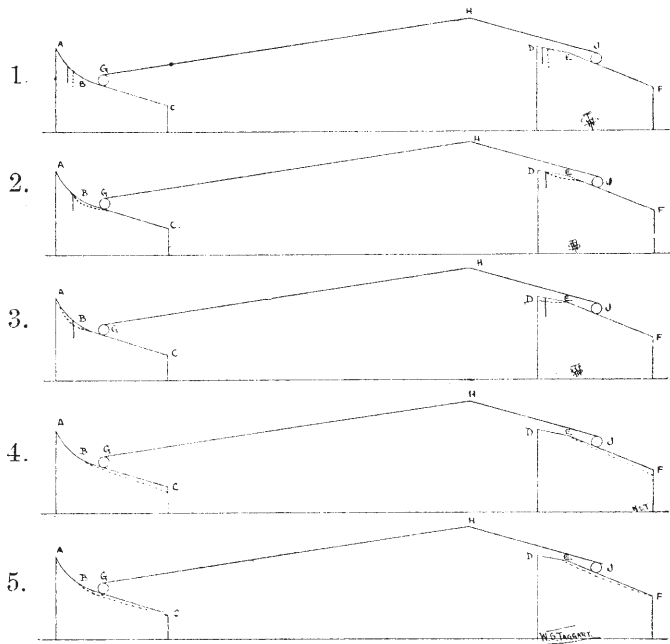


FIG. 82.

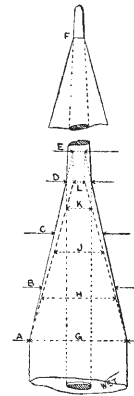


FIG. 86.

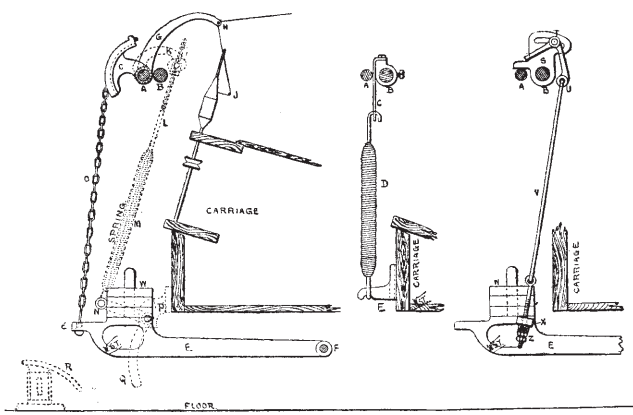


FIG. 83.

FIG. 84.

FIG. 85.

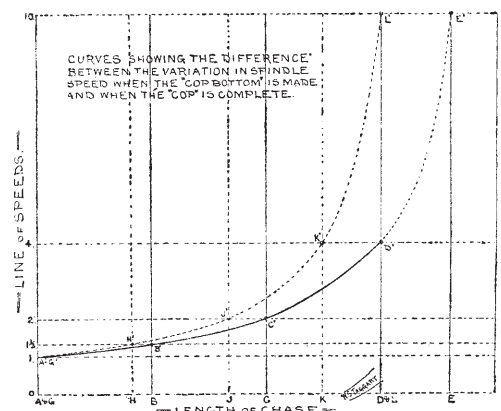


FIG. 87.

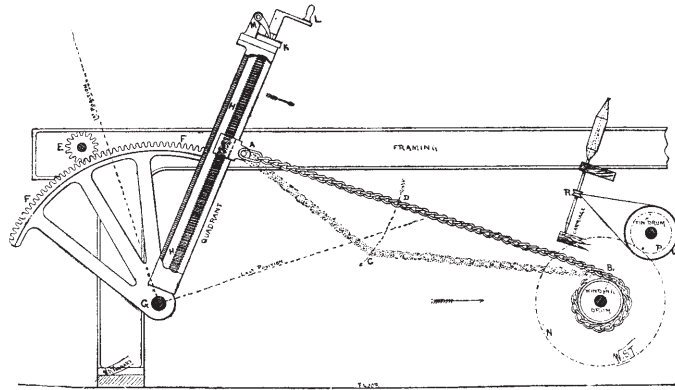


FIG. 88.

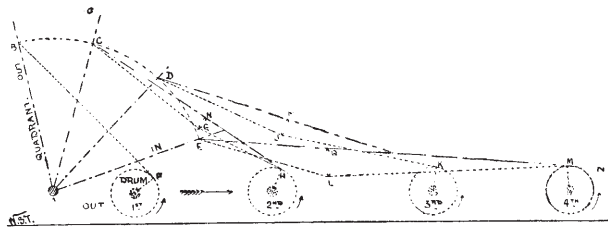


FIG. 89.

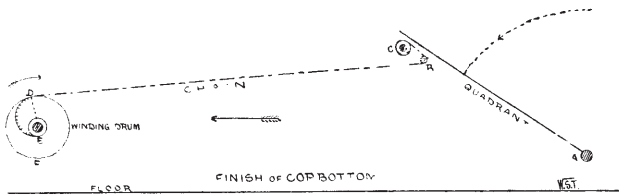


FIG. 90.

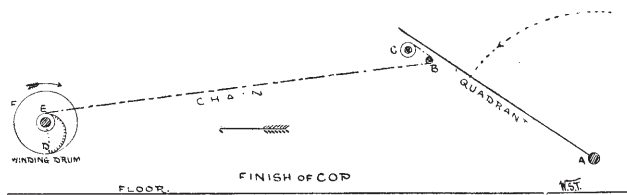


FIG. 91.

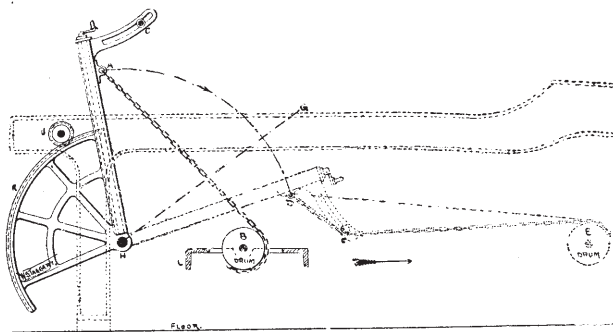


FIG. 92.

COTTON MACHINERY SKETCHES

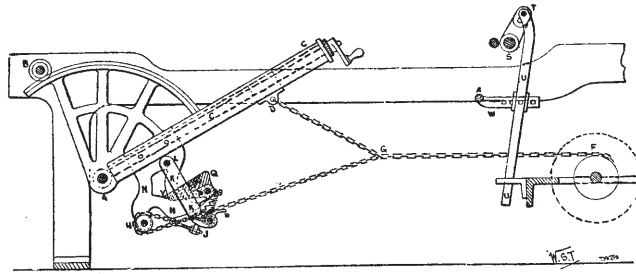


FIG. 93.

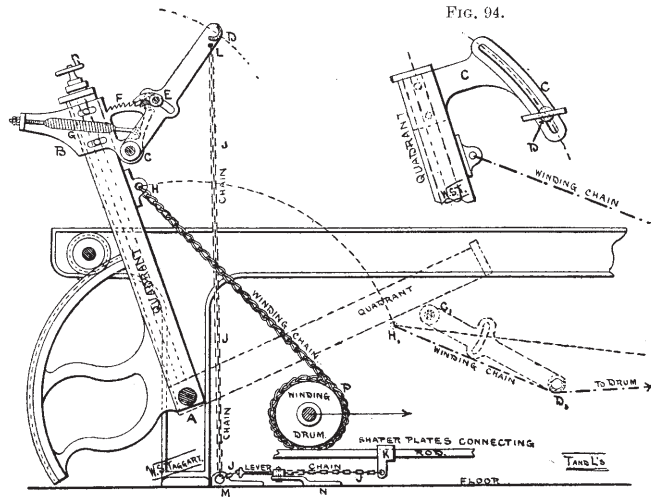


FIG. 95.

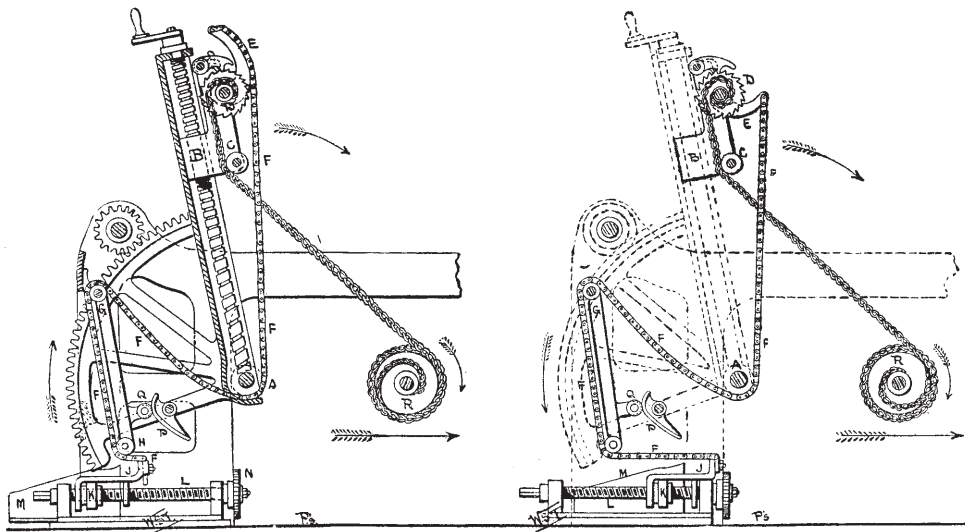


FIG. 96.

FIG. 97.

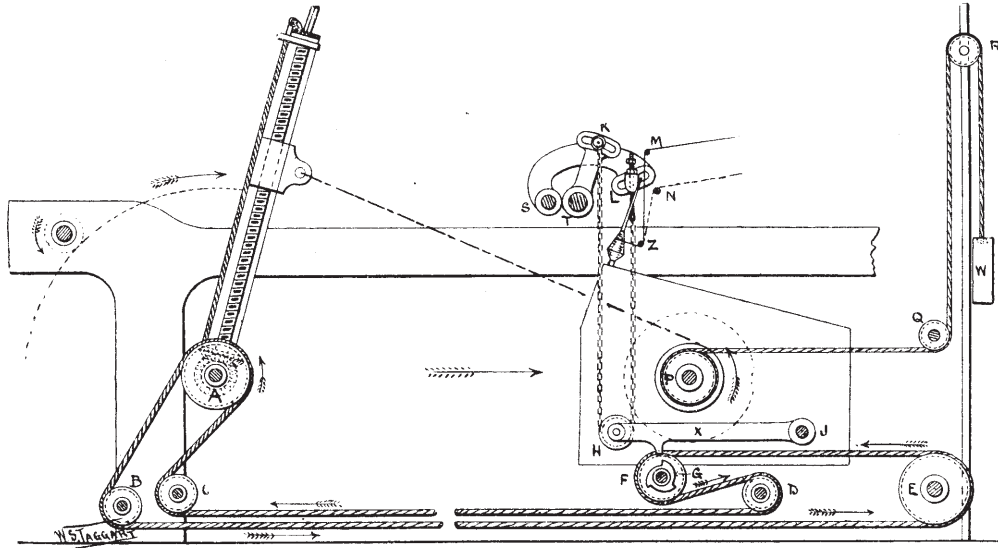


FIG. 98.

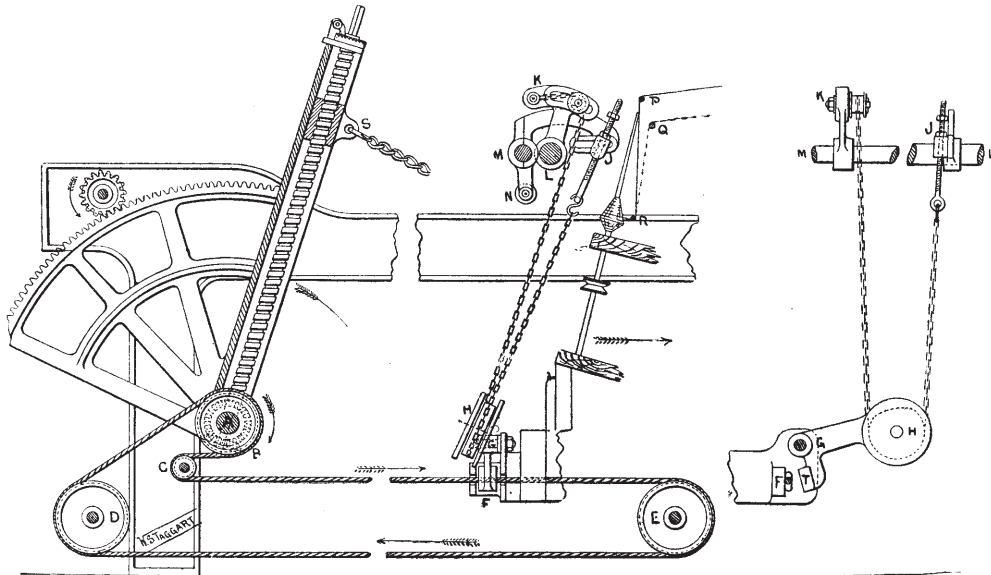


FIG. 99.

FIG. 100.

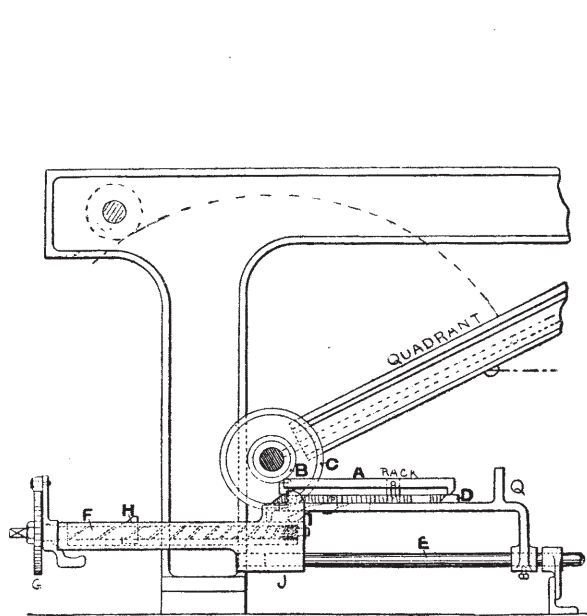


FIG. 101.

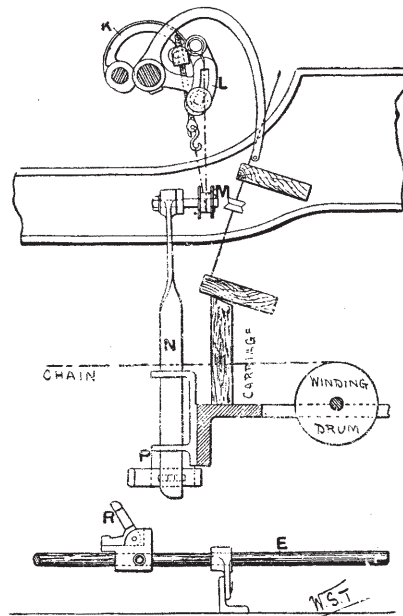


FIG. 102.

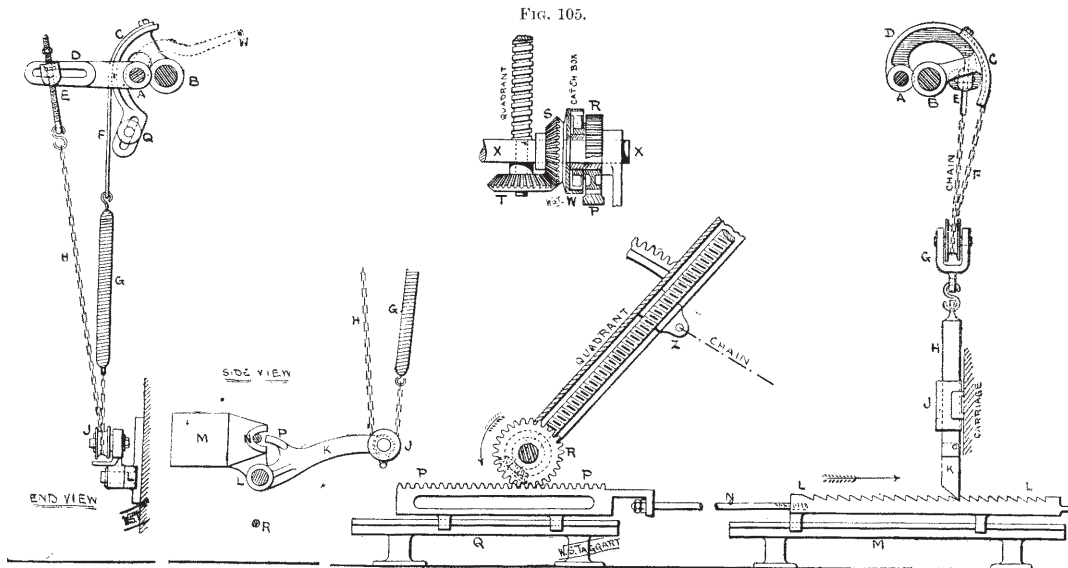


FIG. 103.

FIG. 104.

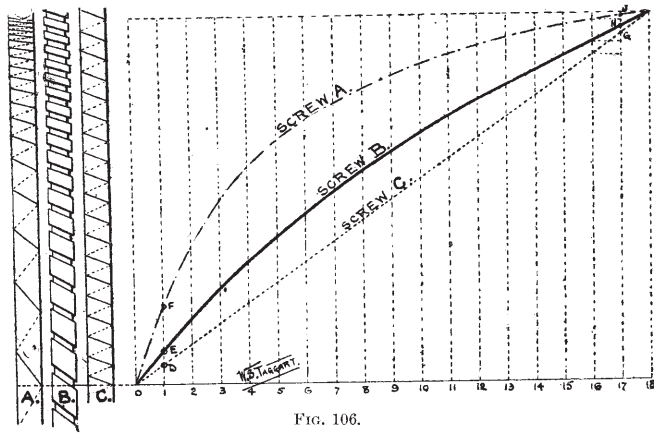


FIG. 106.

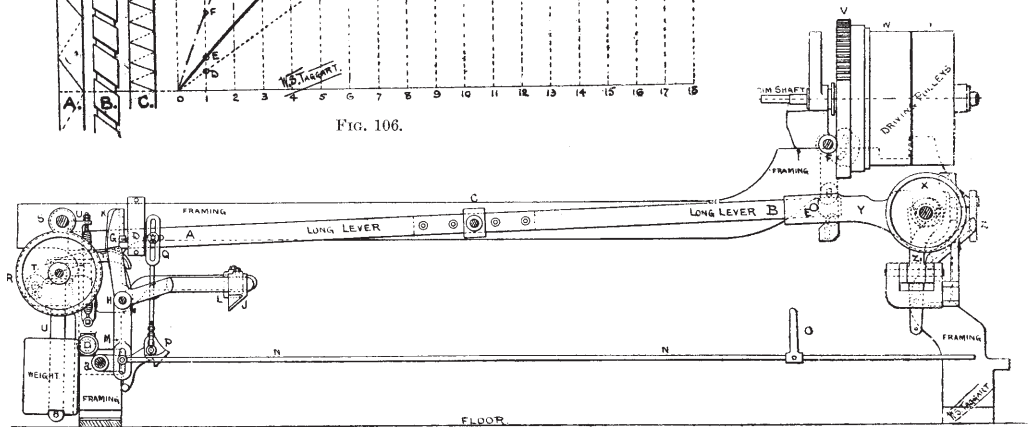


FIG. 107.

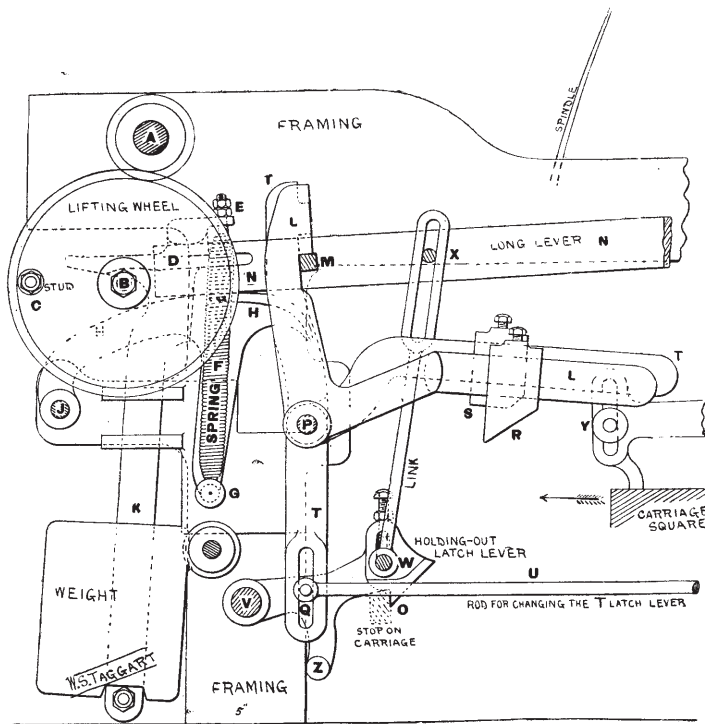


FIG. 108

COTTON MACHINERY SKETCHES

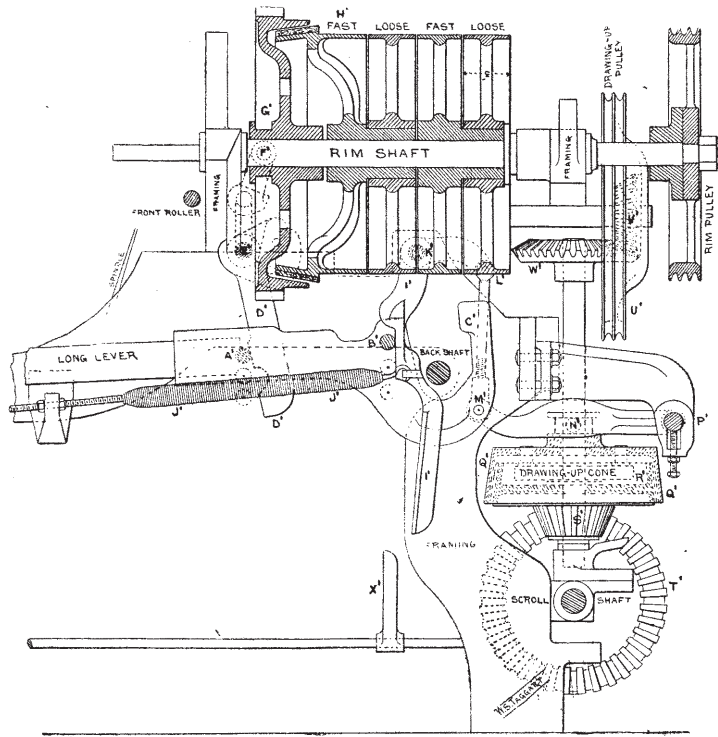


Fig. 109.

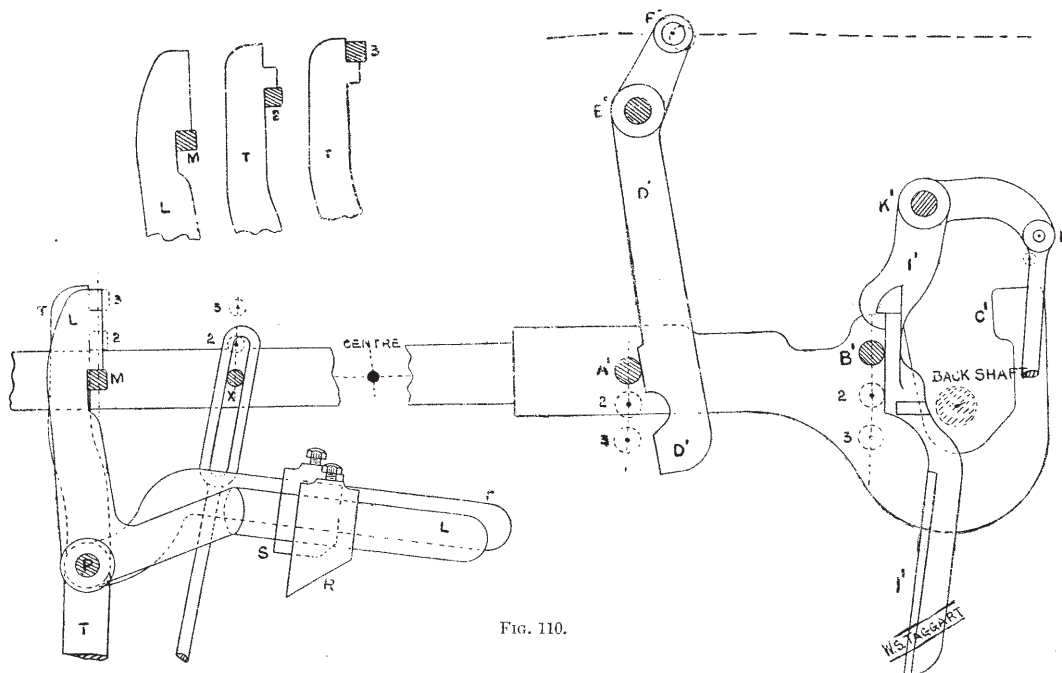


Fig. 110.

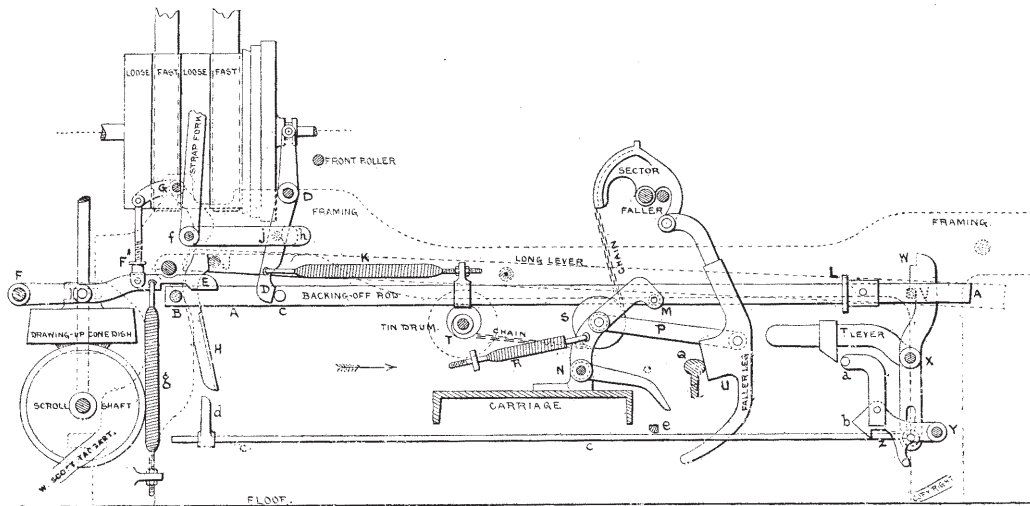


FIG. 114.

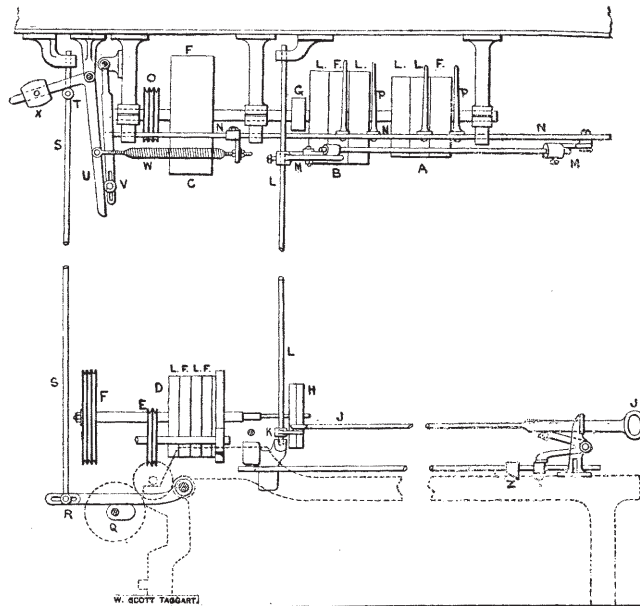


FIG. 115.

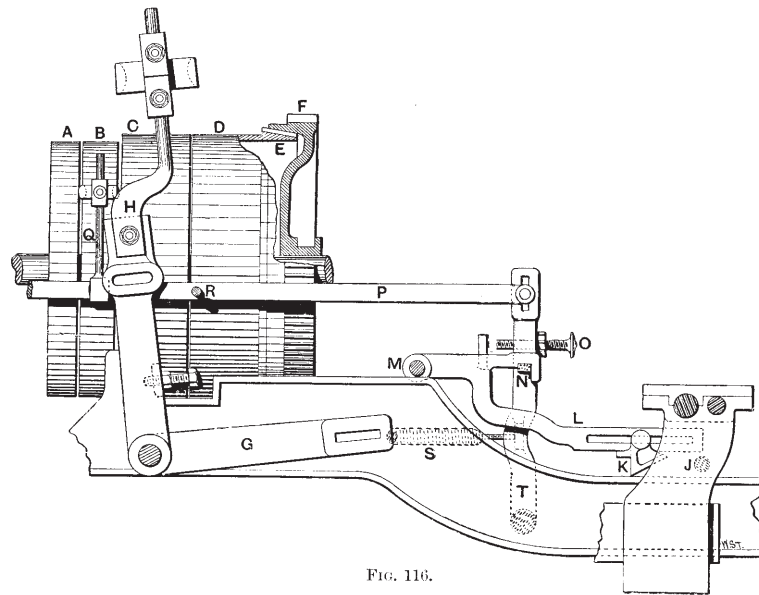
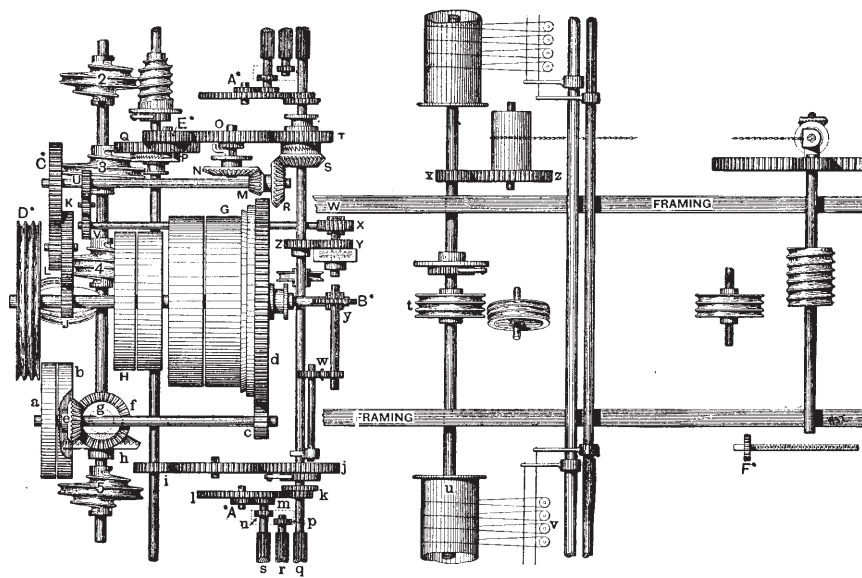


FIG. 116.



GEARING OF S.A. MULE FOR FINE NUMBERS

FIG. 117.

COTTON MACHINERY SKETCHES

FIG. 119.

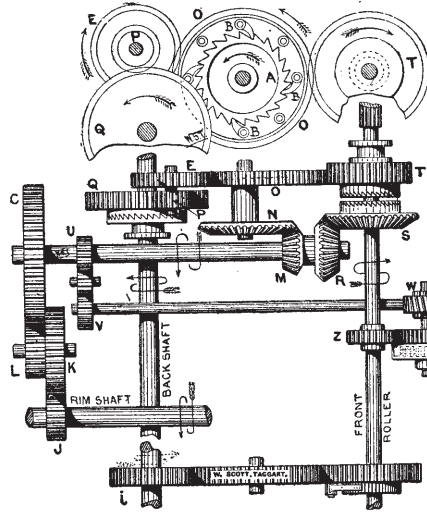


FIG. 120.

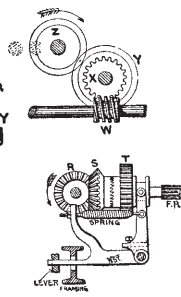


FIG. 118.

FIG. 121.

FIG. 122.

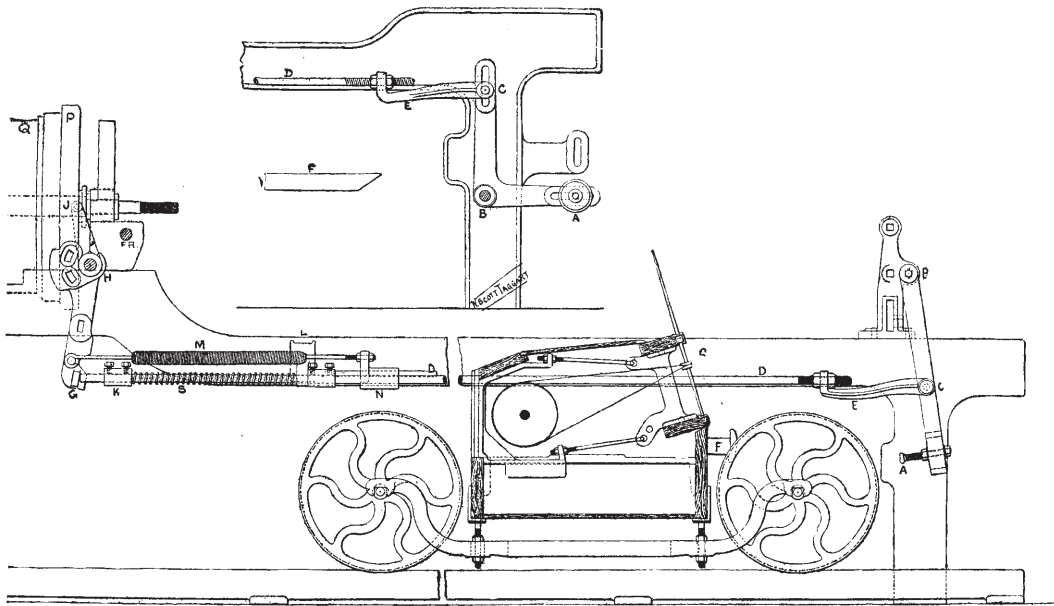


FIG. 123.

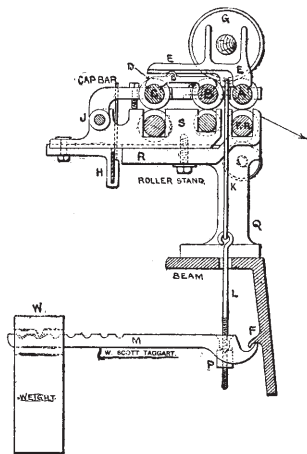


FIG. 124.

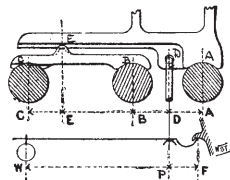


FIG. 125.

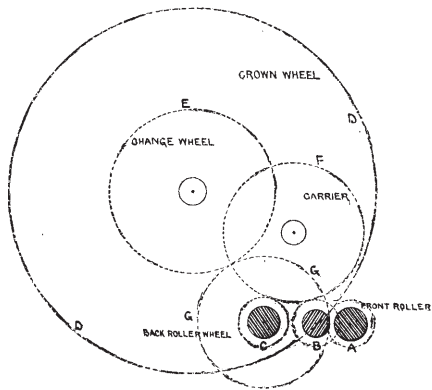


FIG. 126.

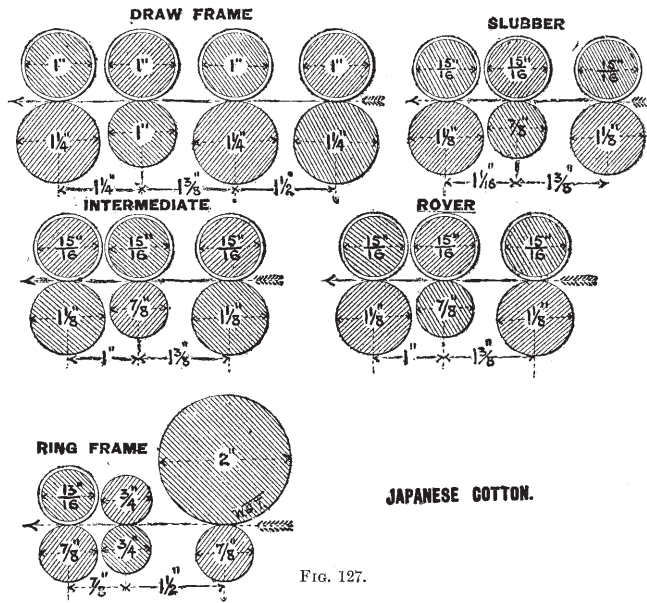


FIG. 127.

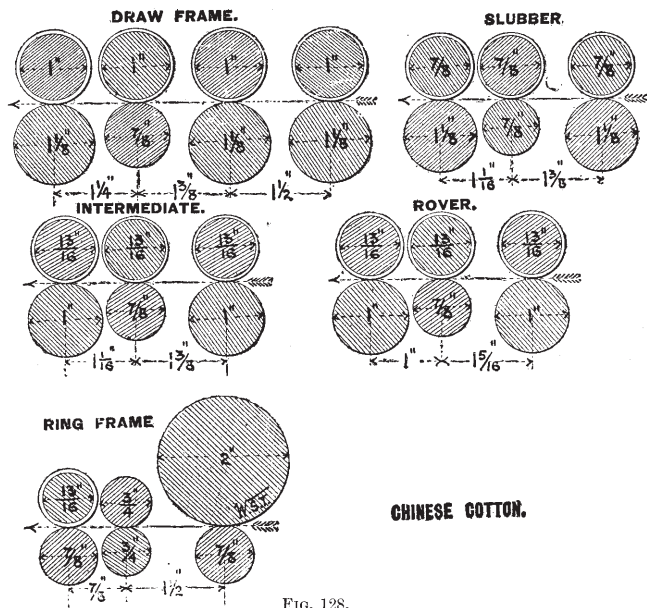


FIG. 128.

COTTON MACHINERY SKETCHES

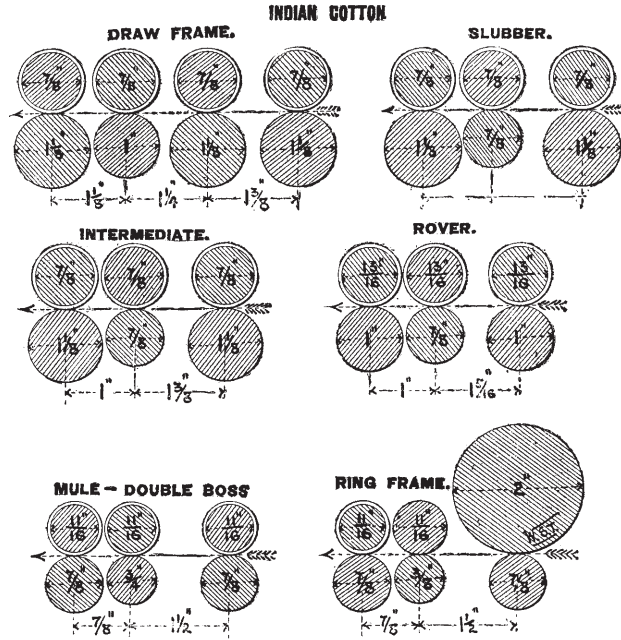


FIG. 129.

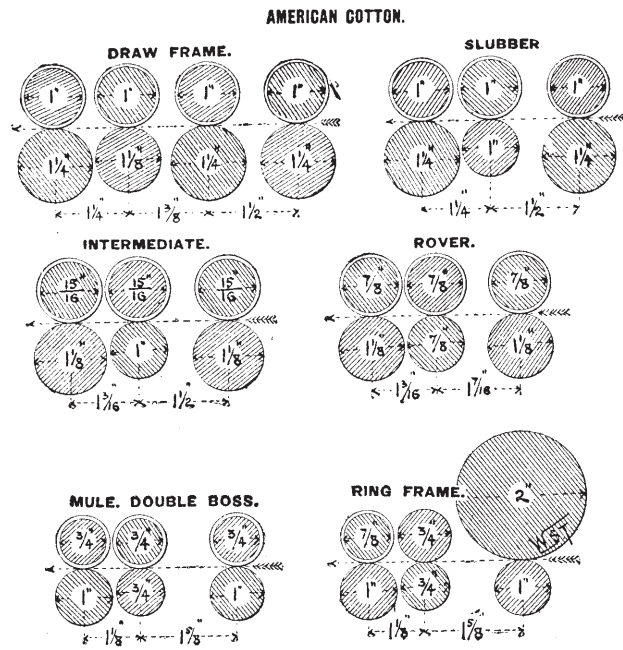


FIG. 130.

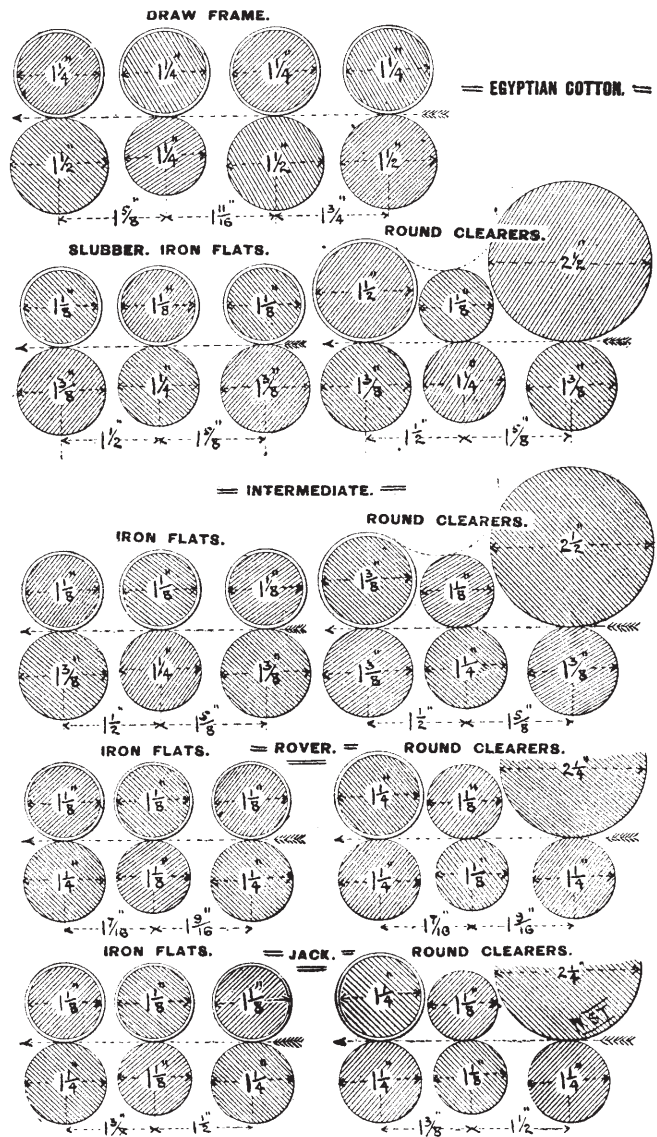


FIG. 131.

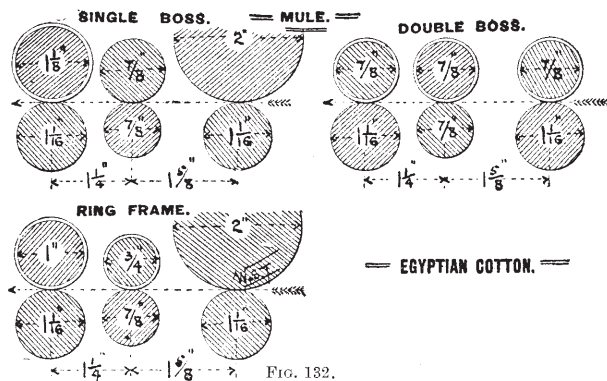


FIG. 132.

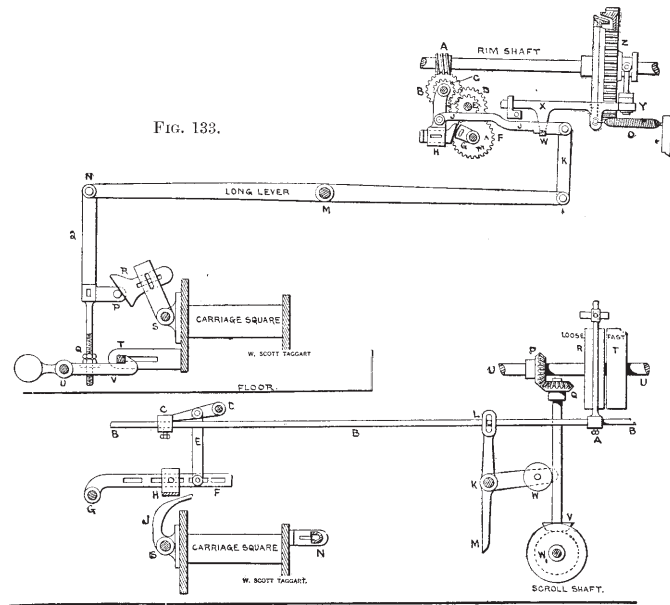


FIG. 134.

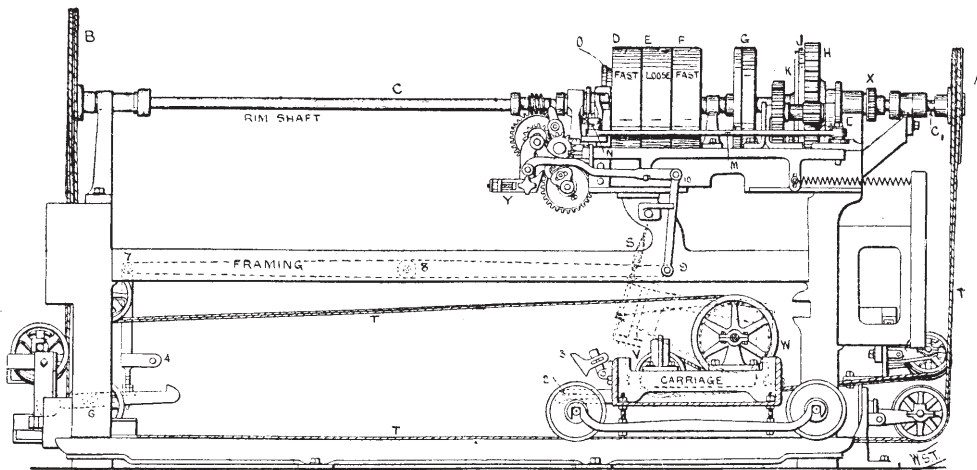


FIG. 135.

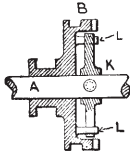


Fig. 136.

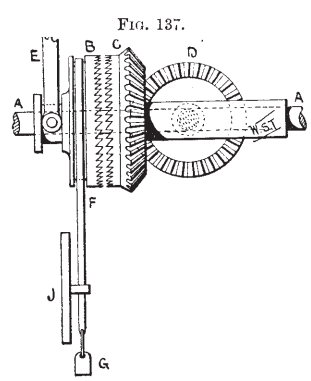


Fig. 137.

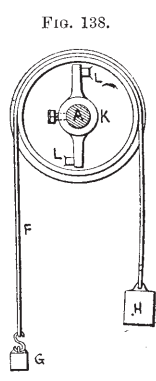


Fig. 138.

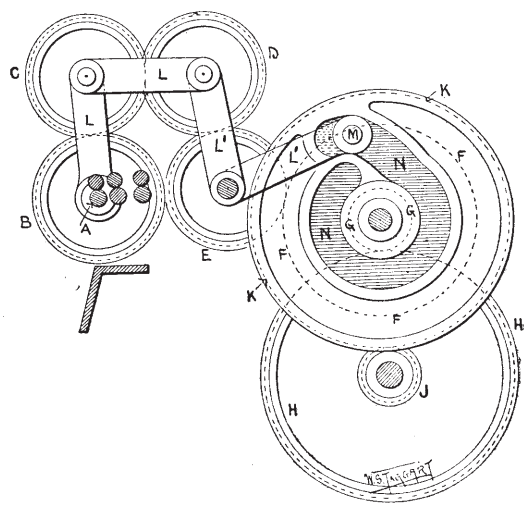


Fig. 139.

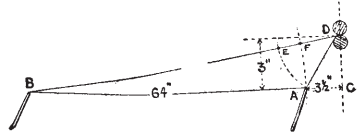


Fig. 140.

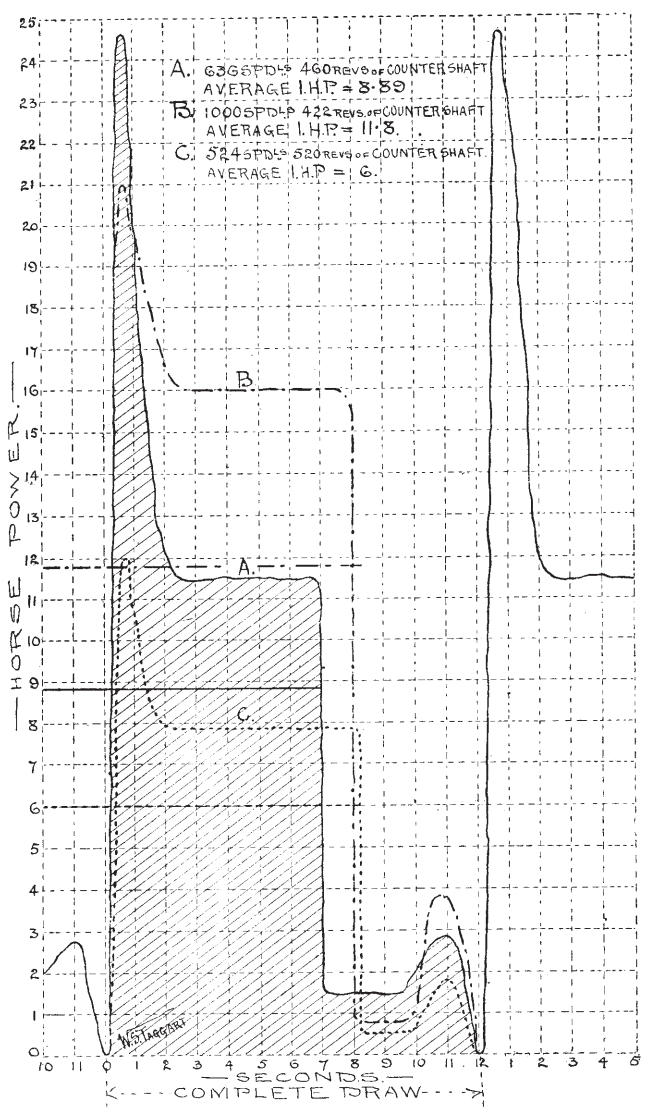


Fig. 141.

COTTON MACHINERY SKETCHES

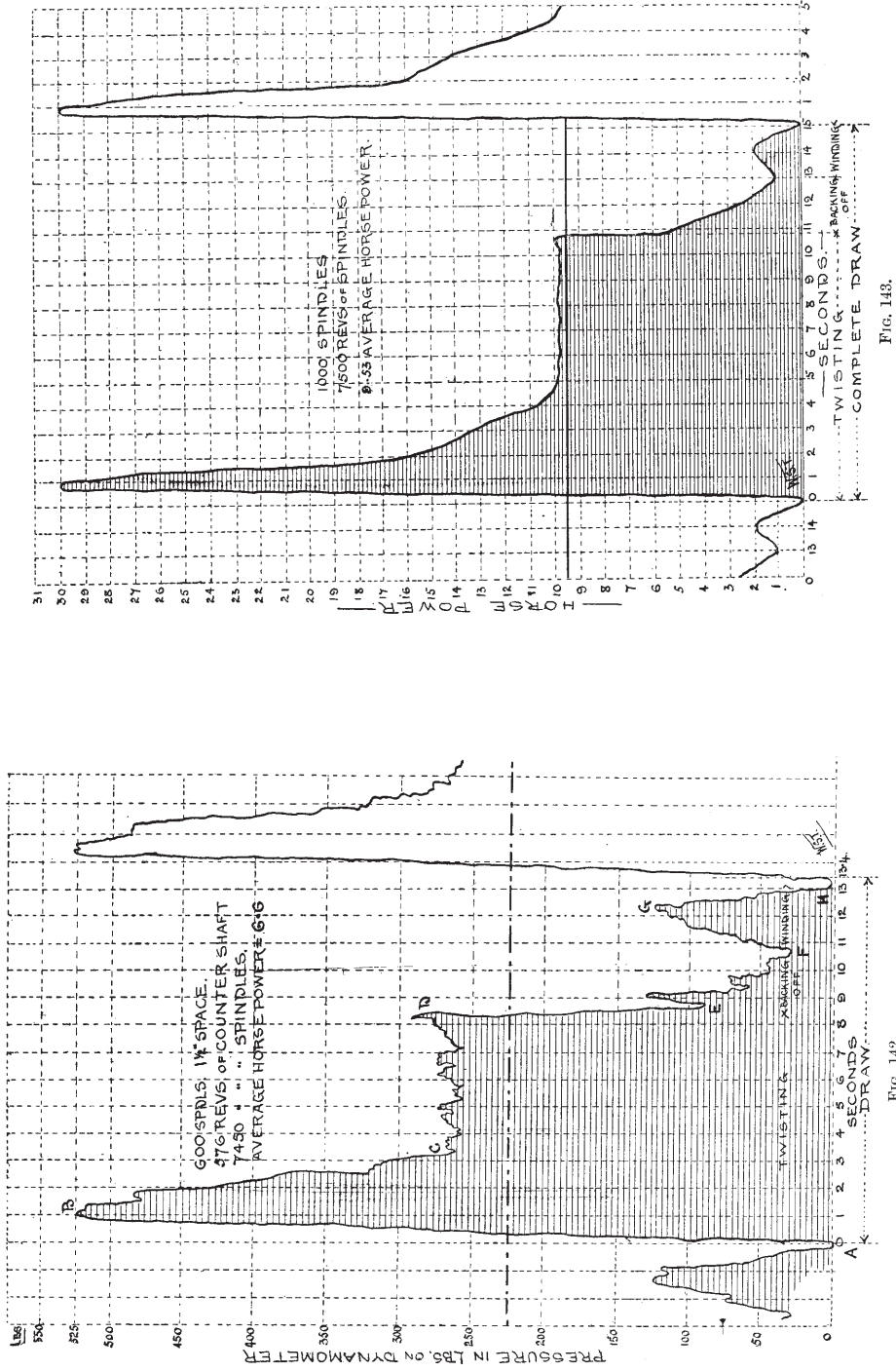


FIG. 142.

FIG. 143.

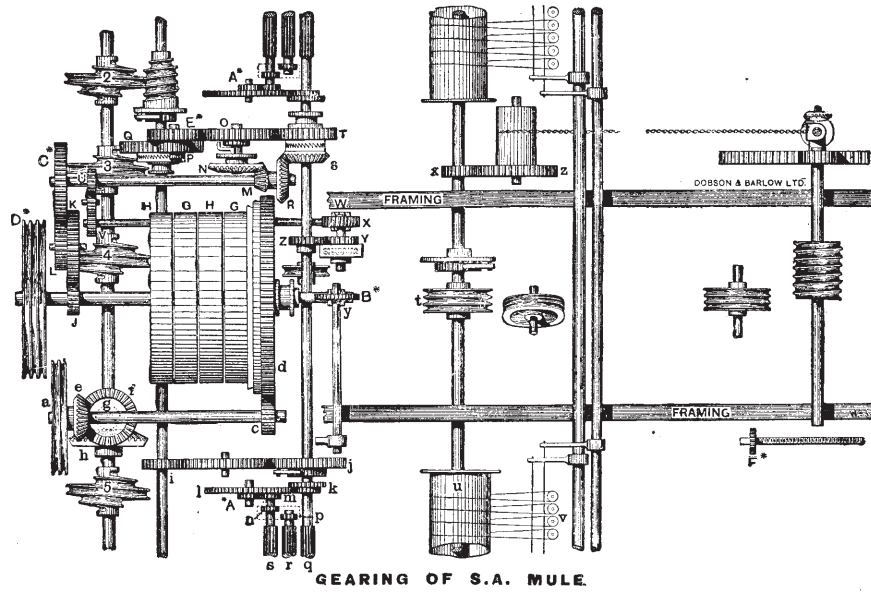


FIG. 144.

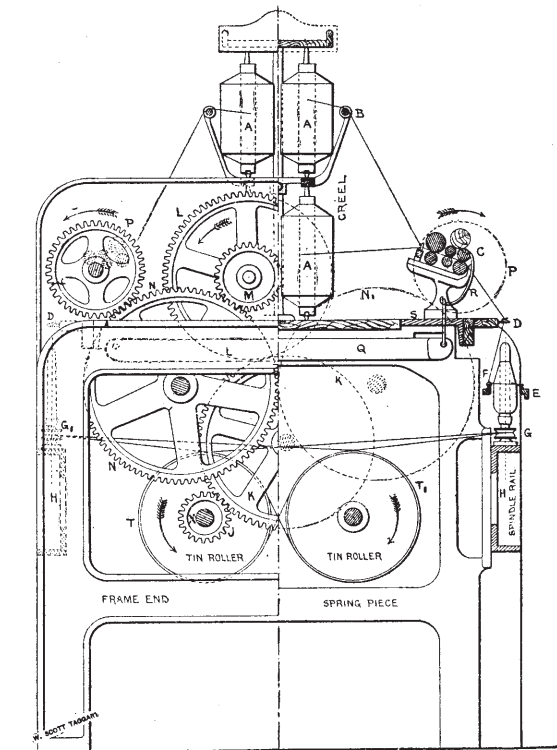


FIG. 145.

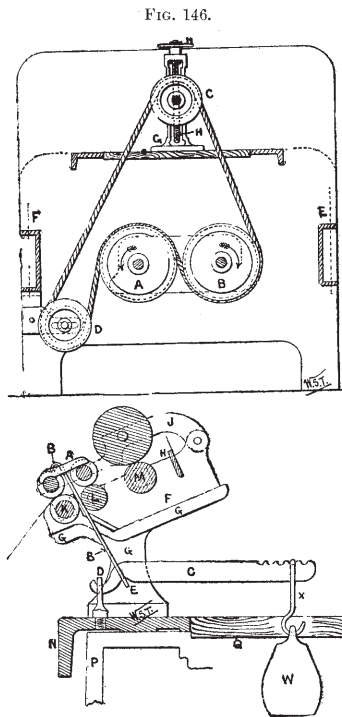


FIG. 146.

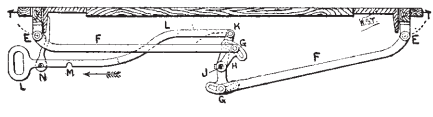
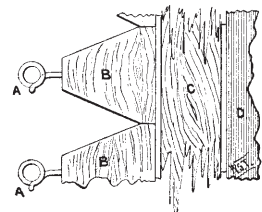
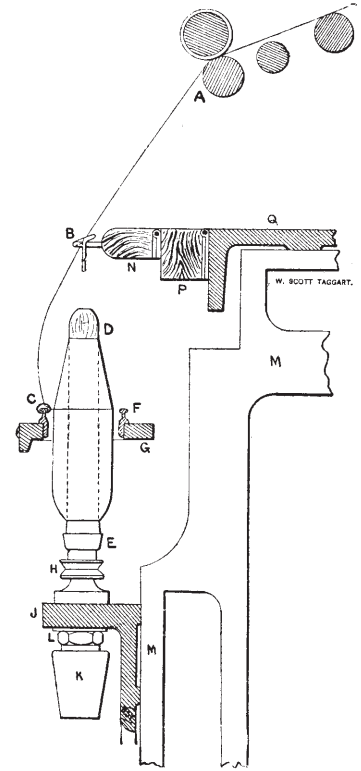
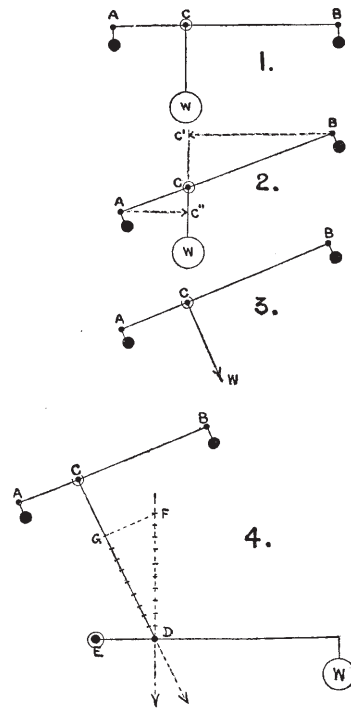
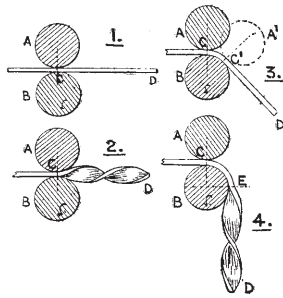
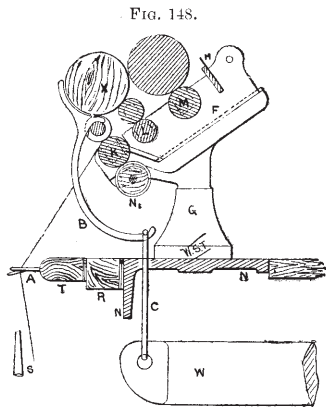


FIG. 154.

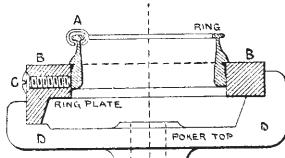


FIG. 155.

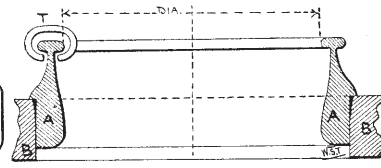


FIG. 156.

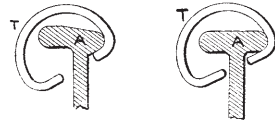
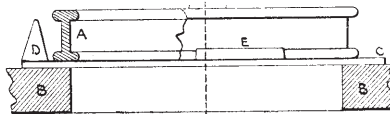


FIG. 157.

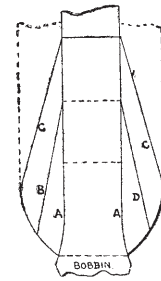
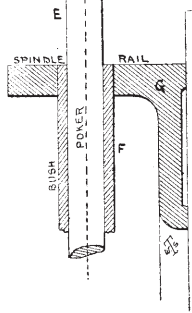


FIG. 159.

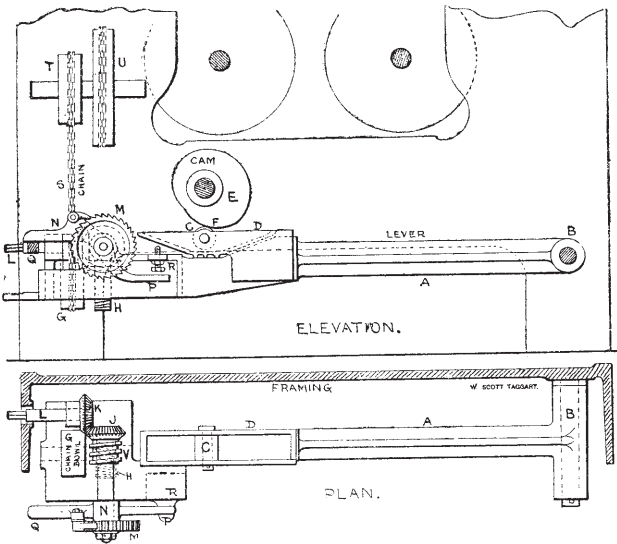


FIG. 158.

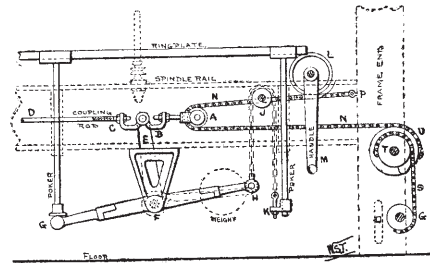


FIG. 160.

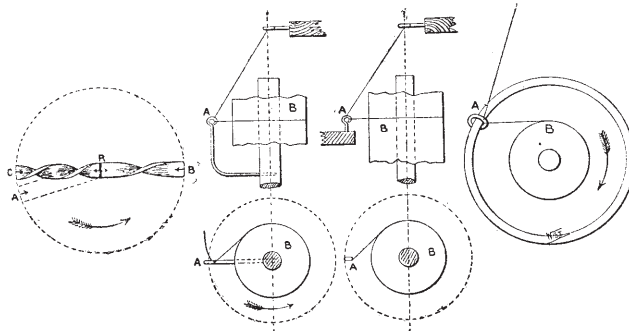


FIG. 161.

FIG. 162.

FIG. 163.

FIG. 164.

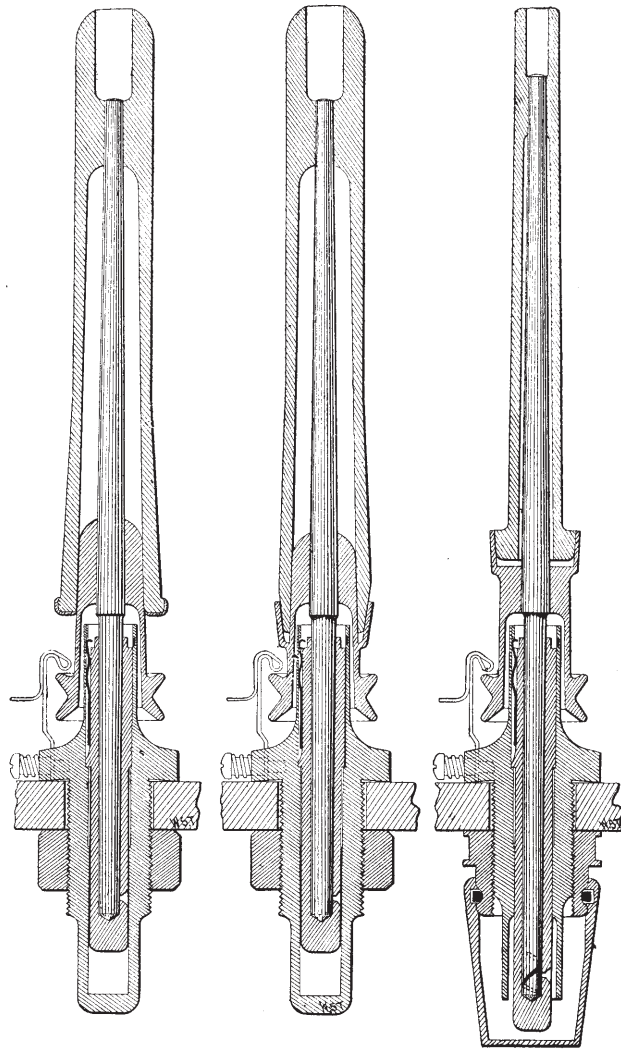
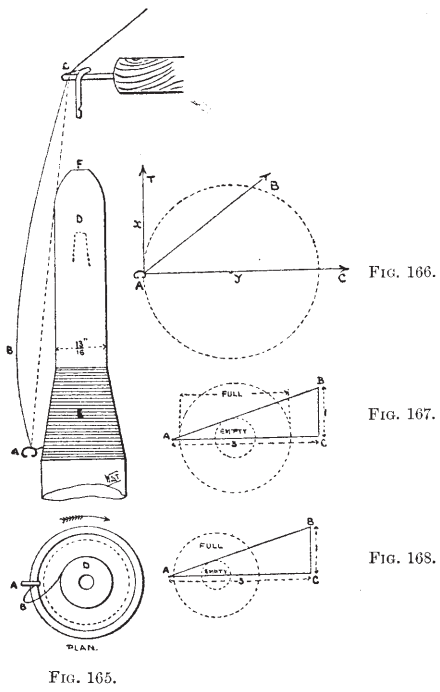
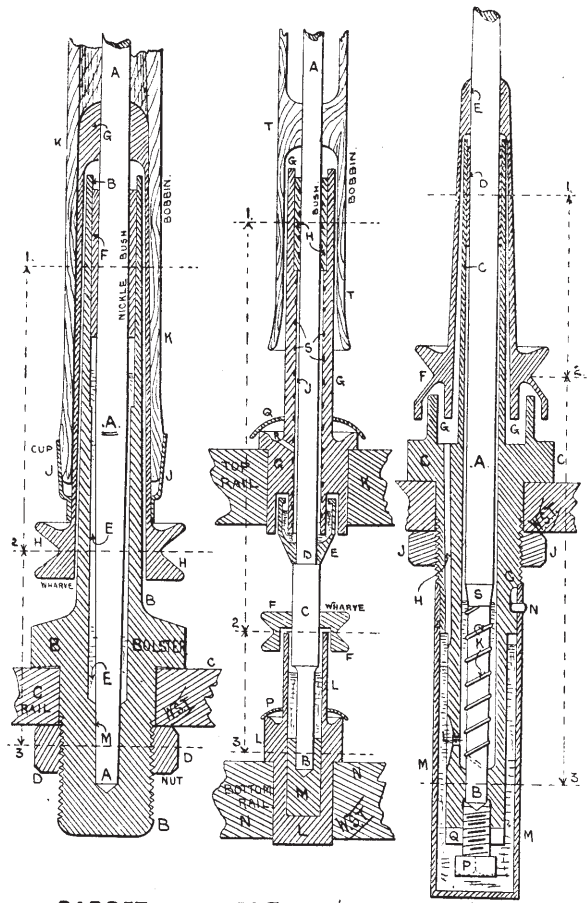


FIG. 169



RABBETH.

BOOTH-SAWYER.

DOBSON-MARSH.

FIG. 170.

FIG. 171.

FIG. 172.

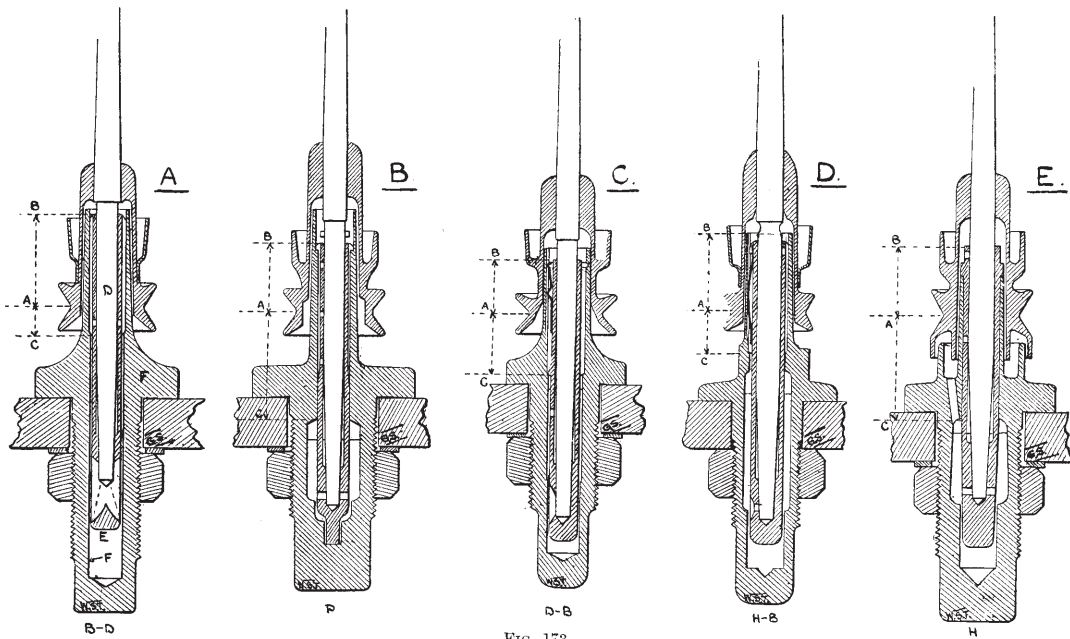


FIG. 173.

COTTON MACHINERY SKETCHES

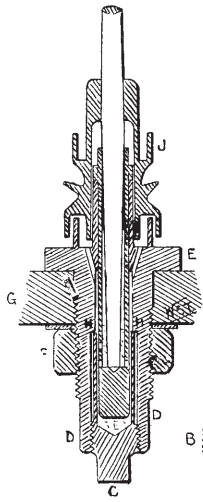


FIG. 174.

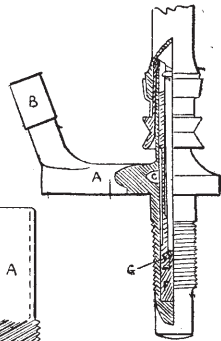


FIG. 175.

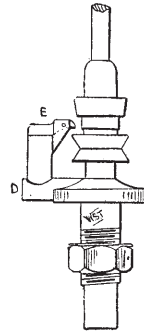


FIG. 176.

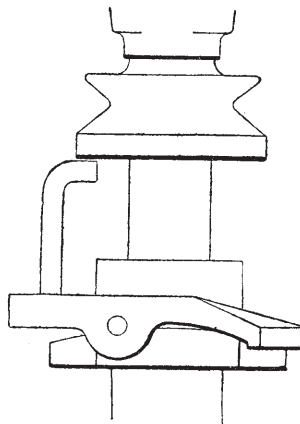


FIG. 177.

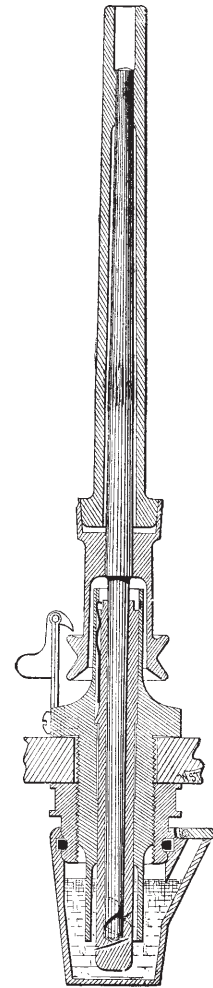


FIG. 178.

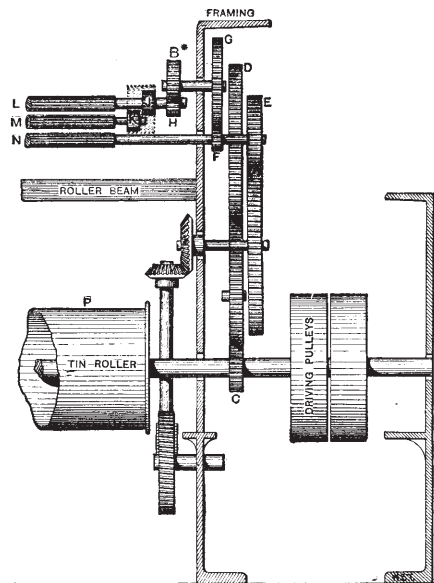
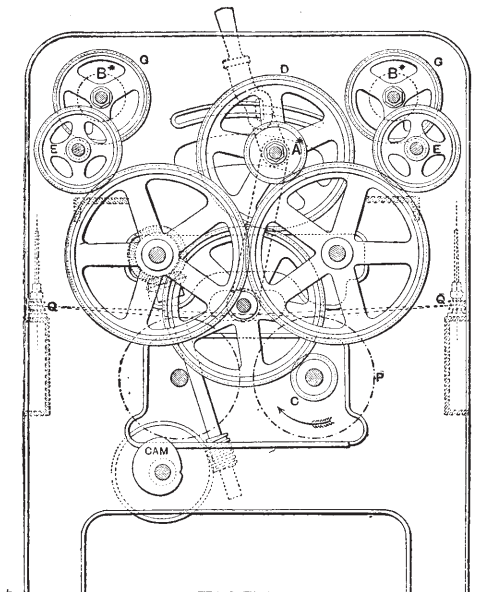


FIG. 179.

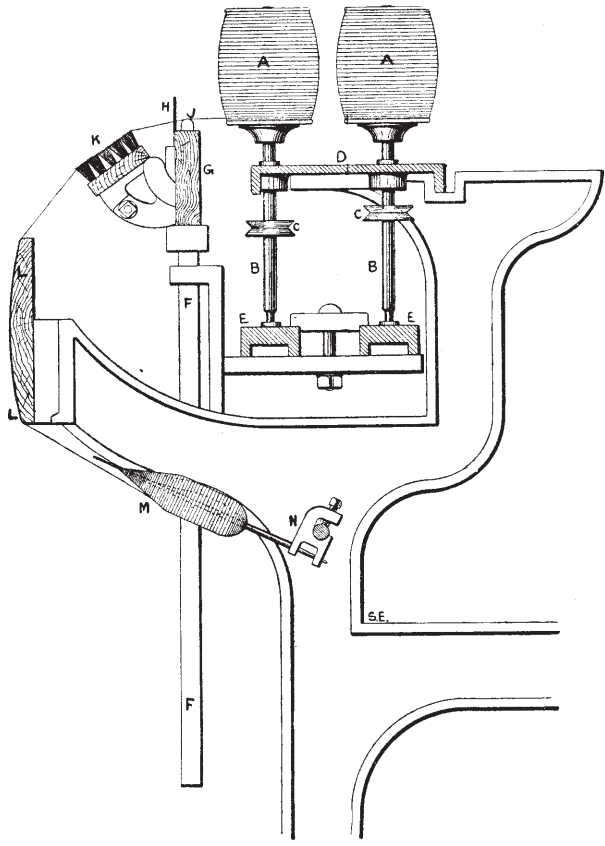


FIG. 180.

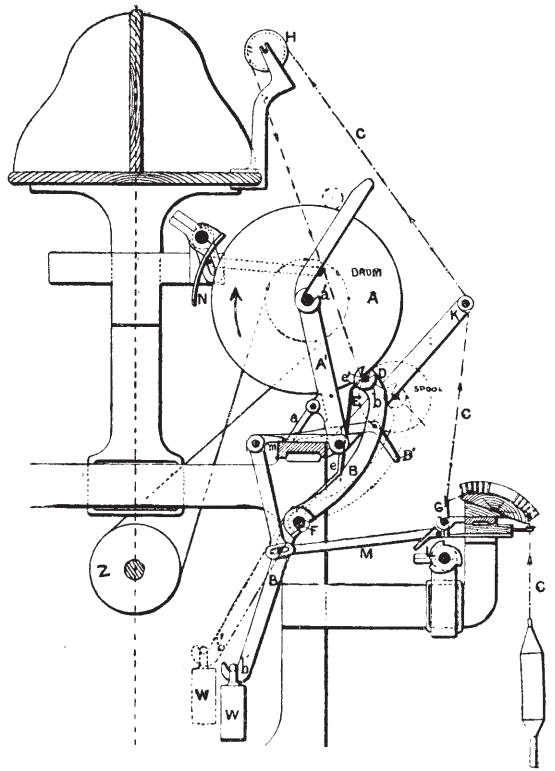


FIG. 182.

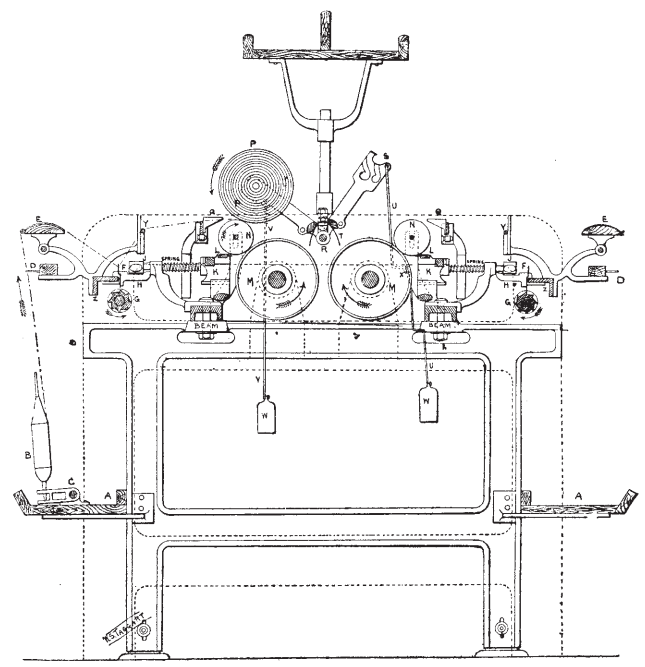


FIG. 181.

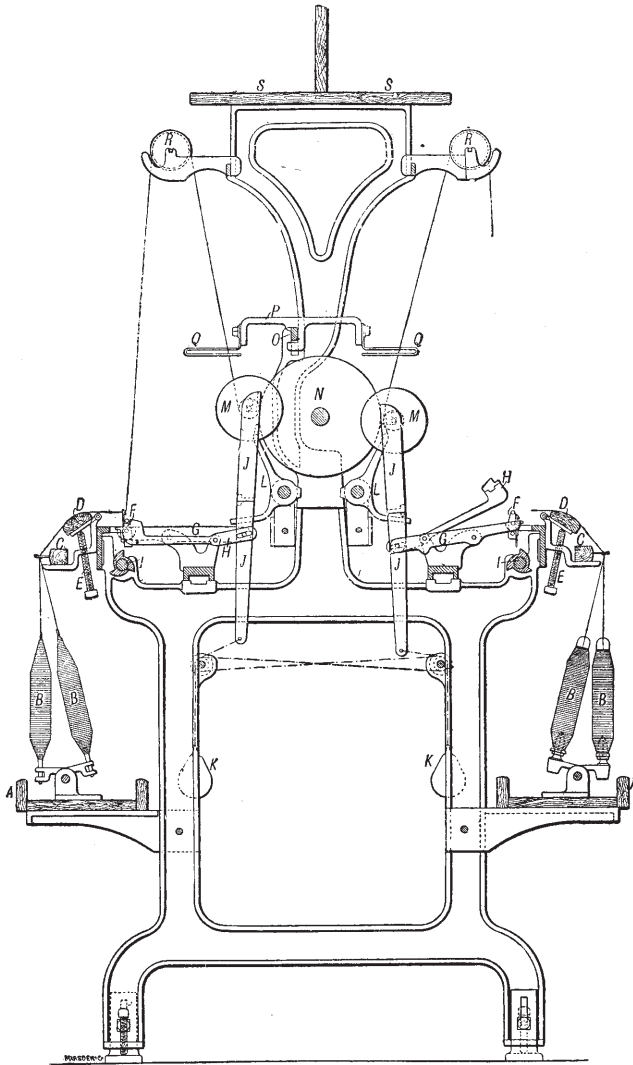


FIG. 183.

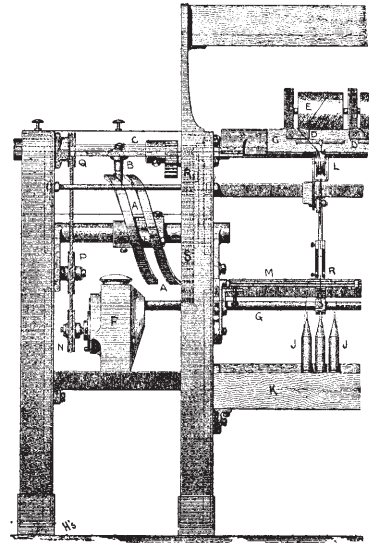


FIG. 185.

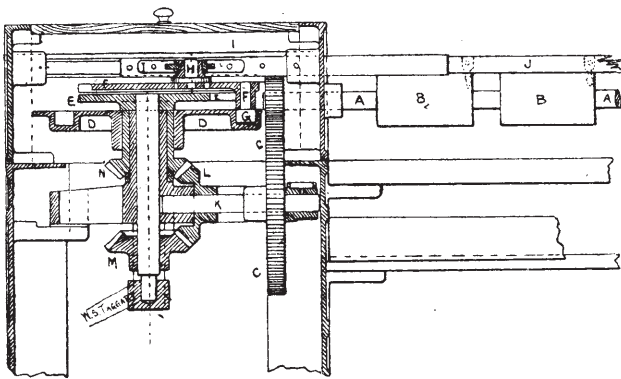


FIG. 184.

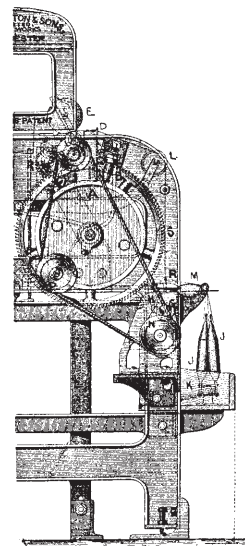


FIG. 186.

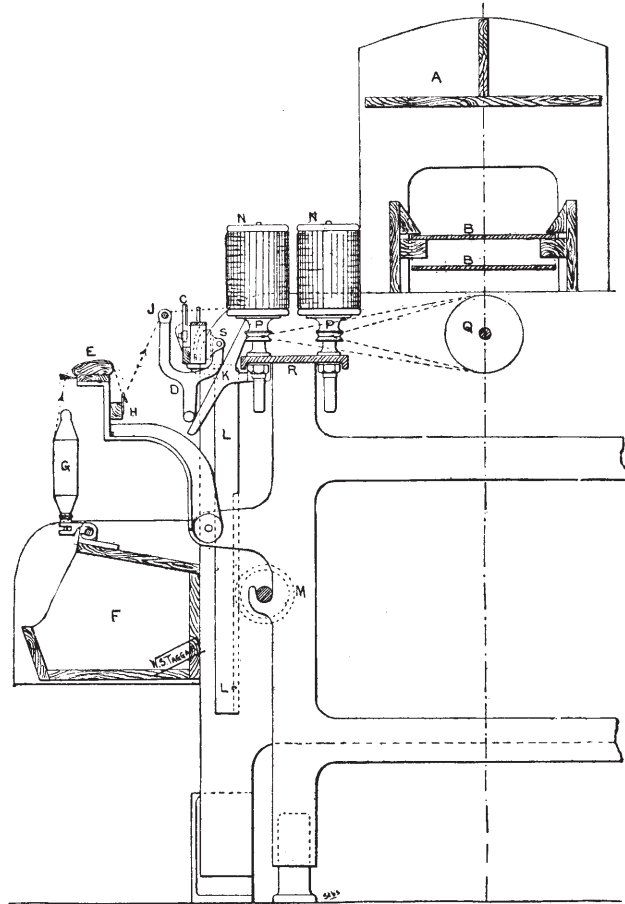


FIG. 187.

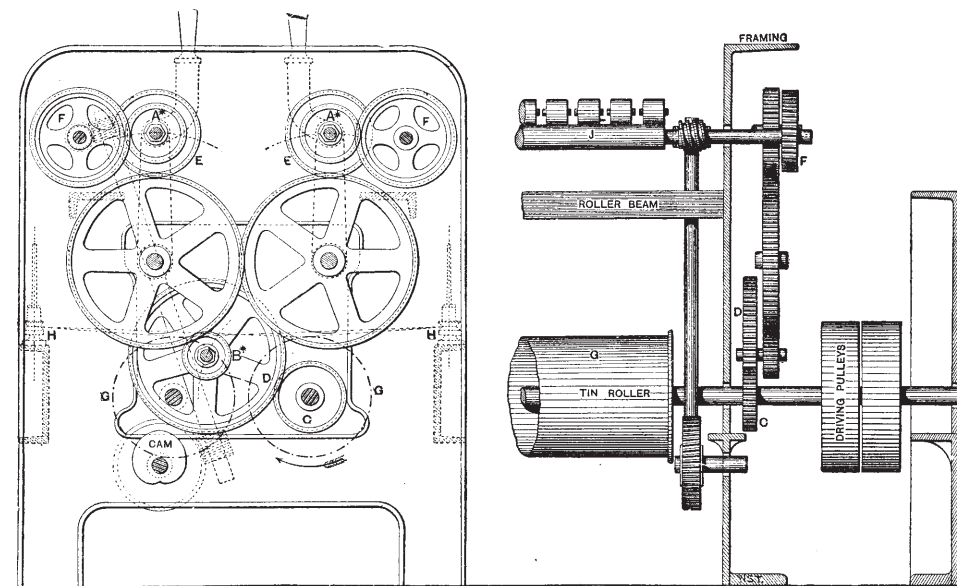


FIG. 188.