

April 14, 1942.

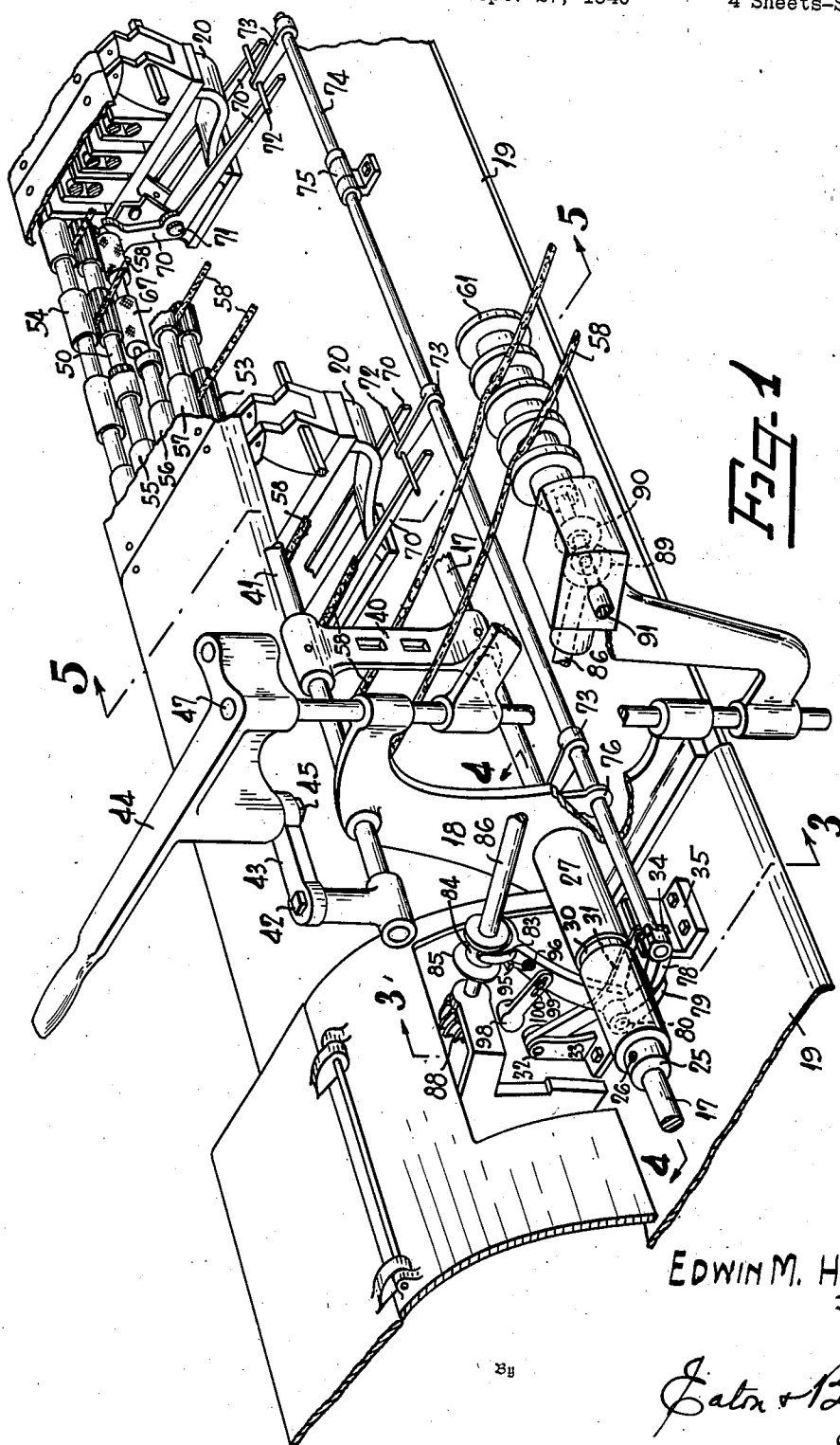
E. M. HOLT

2,279,786

STOP MOTION FOR DRAWING FRAMES

Filed Sept. 27, 1940

4 Sheets-Sheet 1



EDWIN M. HOLT
Inventor

Latex & Brown
Attorney

April 14, 1942.

E. M. HOLT

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4 Sheets-Sheet 2

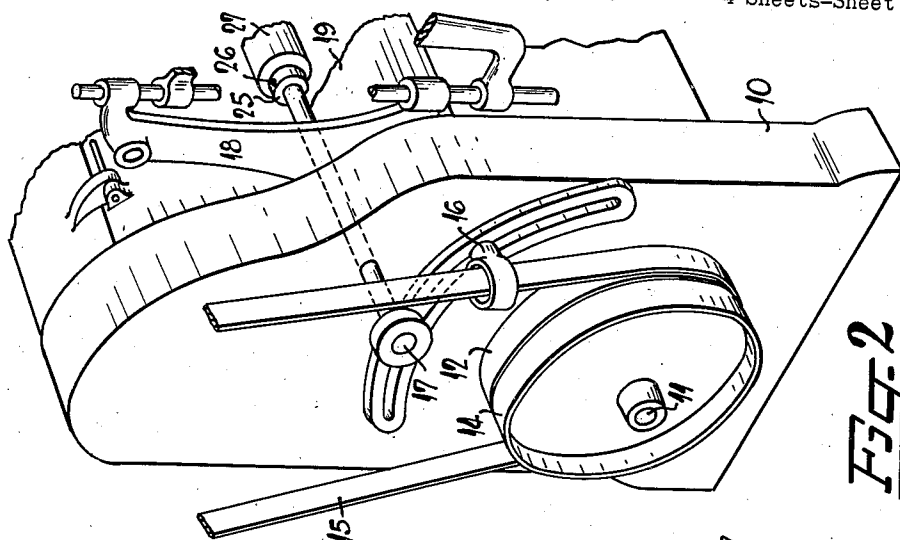


Fig. 2

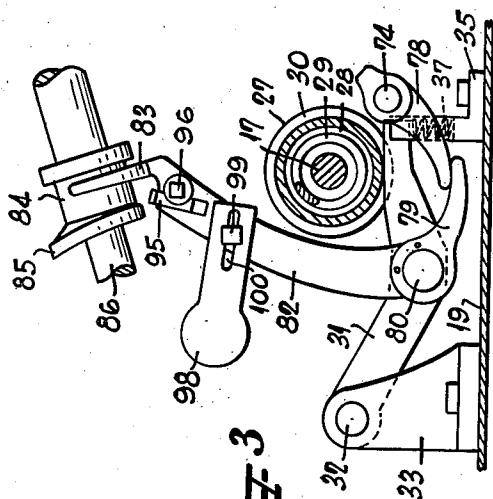


Fig. 3

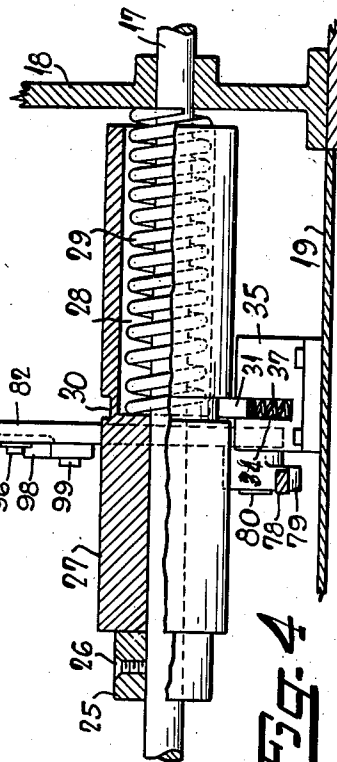


Fig. 4

Inventor:
EDWIN M. HOLT
Eaton & Brown
Attorney

April 14, 1942.

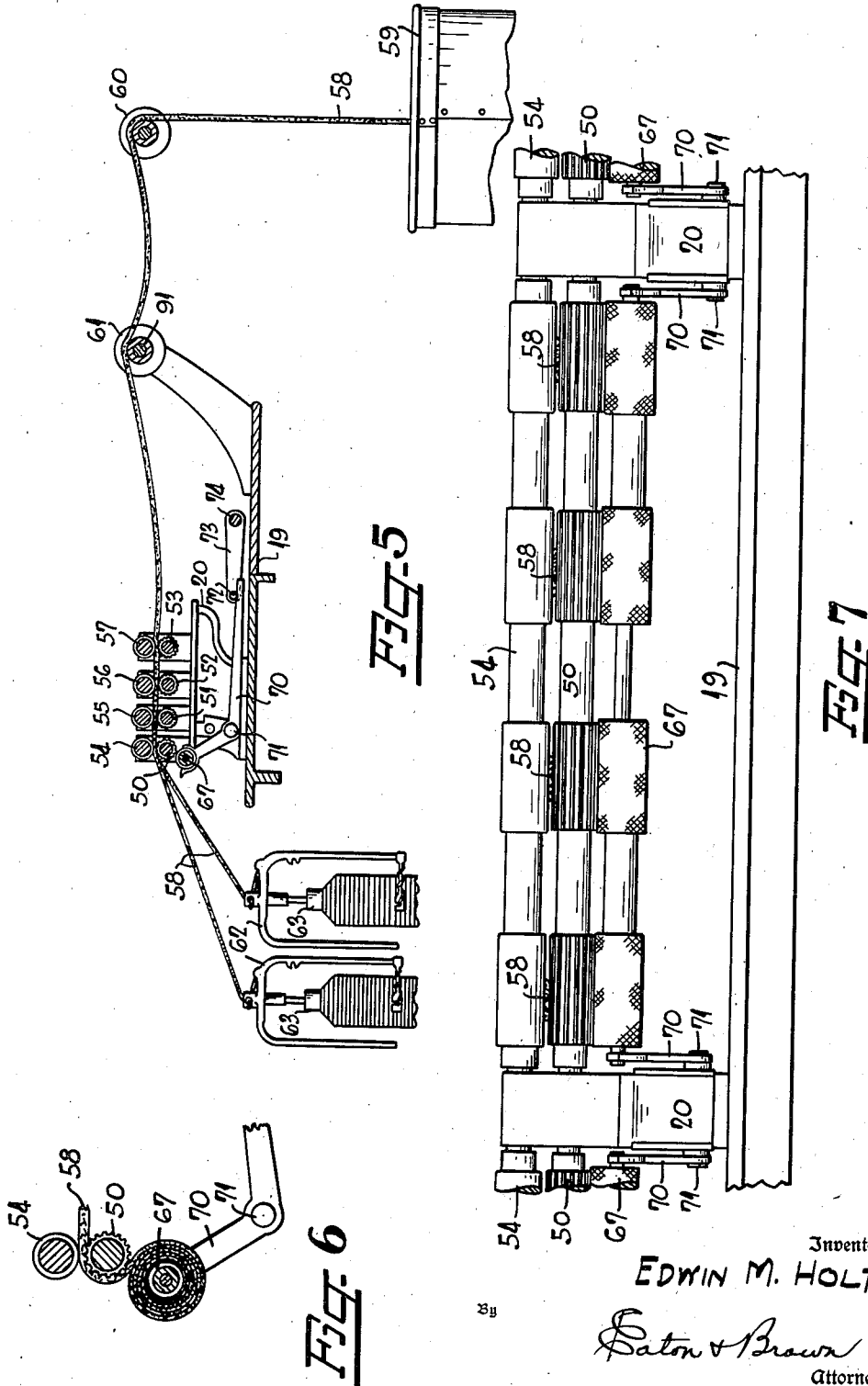
E. M. HOLT

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4 Sheets-Sheet 3



Inventor:

EDWIN M. HOLT

Saton & Brown

Attorneys

April 14, 1942.

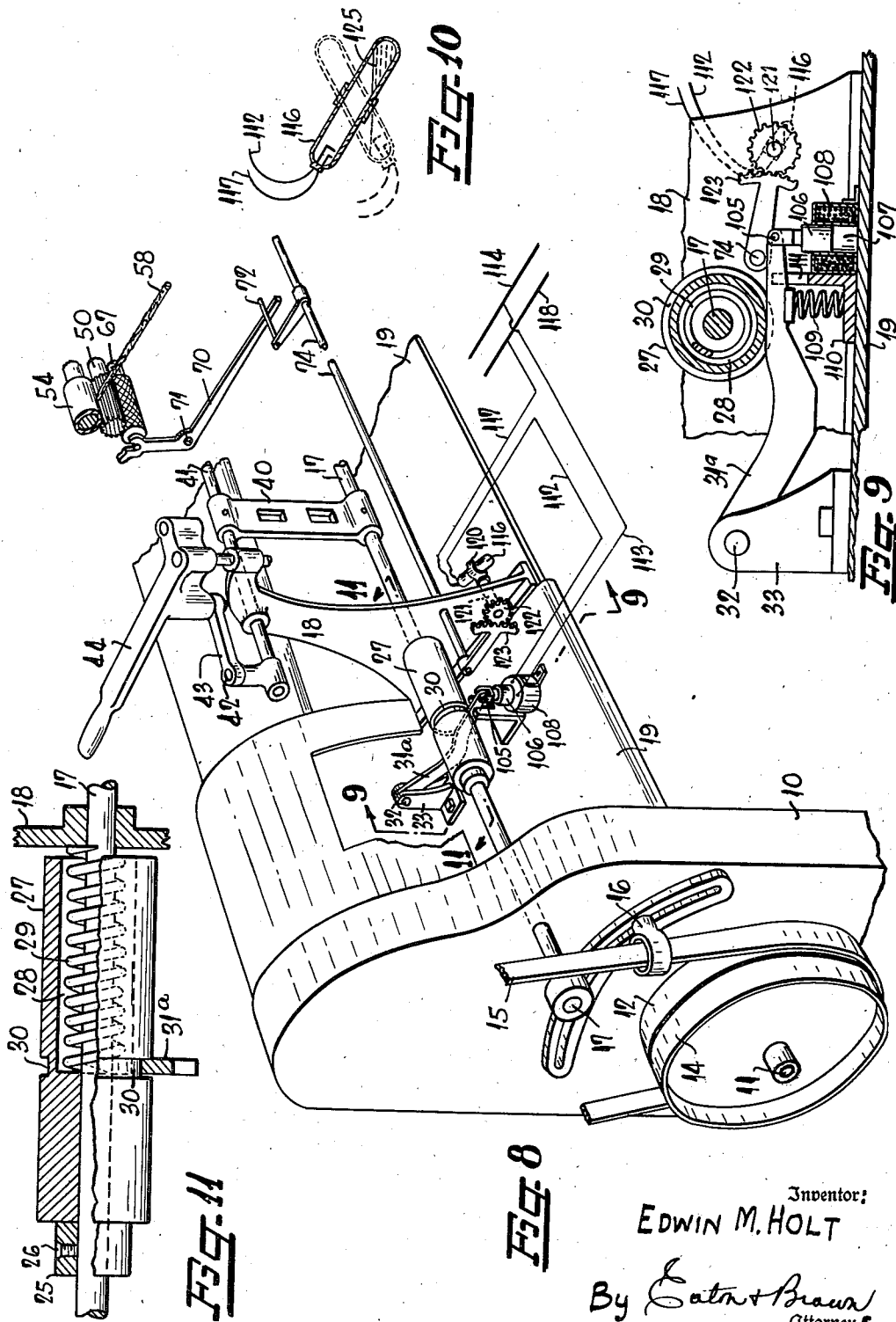
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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,279,786

STOP MOTION FOR DRAWING FRAMES

Edwin M. Holt, Cooleemee, N. C., assignor to
Whitin Machine Works, Whitinsville, Mass., a
corporation of Massachusetts

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1 Claim. (Cl. 19—167)

This invention relates to textile apparatus and more especially to a fly frame stop motion which will automatically stop the frame when a strand or roving becomes broken.

In the manufacture of cotton yarns, the cotton which is delivered to the mill from the gin in bales is thoroughly cleared of foreign matter and immature fiber. It is then run through pickers and is formed into rolls, called laps, after which it is carded and condensed into a strand known as sliver from whence it may be passed directly to draw frames for parallelization of the fibers. It is delivered from the drawing frames as drawing sliver. From the final drawing process, it is run through a machine known as a fly frame which has as its object the reduction of the thickness of the sliver, the evening of the product, the twisting of the strand, now known as roving, and the winding of the strand or roving onto a bobbin.

Until the advent of the so-called long draft roving, the roving processes usually consisted of three systems in the steps as slubbers, intermediates and fine frame, but with the development of the long draft for fly frames, the roving processes have been reduced to two processes and in some cases to one, depending on yarn counts desired.

The stock passing through the roving or fly frame process is drawn from cans, or bobbins if not the first roving process, through drafting rolls and through flyers where proper twist is inserted and finally wound on to bobbins. In passing from the drafting rolls to the flyers, it often occurs that the strand will be broken either because of small weak places in the strand, the flyer becoming clogged, or various other causes. When this occurs unless the frame is stopped and the break repaired the broken end will fly into other strands and cause them to break also. An attendant usually tends several of the fly frames, each of which runs a multiplicity of spindles and strands. The alertness with which he watches such breaks affect both the quantity and quality of the roving produced. The old type of conventional fly frame occupied a comparatively small floor space and an attendant could see and stop the frame quickly when the strand broke, but with the advent of the long draft frame, occupying a greater floor space, it becomes increasingly difficult for the frame tender to see and correct such breaks.

Therefore, it is an object of the present invention to render the fly frame inoperative automatically when the strand breaks and thus pre-

vent the occurrence of the character just described.

More specifically, it is an object of this invention to provide a fly frame having sets of drafting rolls between which a strand or roving is adapted to pass, in combination with a cloth covered roll for contacting one of the above-named rolls and a mechanism controlled by the accumulated roving on the roll for automatically stopping the fly frame. When a strand or roving breaks, the loose end will be engaged and wound around the roll. As more material is wound upon the roll, the diameter will be increased, thus forcing the roll away from the drafting roll. This movement of the roll is utilized to stop the fly frame so that the broken end can be mended.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is an isometric view of the central portion of a roving frame and embodying some features of the present invention;

Figure 2 is an isometric view of the end portion of the roving frame shown in Figure 1;

Figure 3 is a transverse vertical sectional view taken along the line 3—3 in Figure 1;

Figure 4 is a longitudinal sectional view taken along line 4—4 in Figure 1;

Figure 5 is a transverse vertical sectional view taken along line 5—5 in Figure 1;

Figure 6 is an enlarged sectional view of the central portion of Figure 5 showing the manner in which the end of a broken strand or roving is wound around the stop motion;

Figure 7 is an elevation of the front set of drafting rolls and the associated stop motion rolls;

Figure 8 is an isometric view showing a modified form of the invention employing an electromagnet for effecting the stopping of the fly frame;

Figure 9 is a transverse vertical sectional view taken along line 9—9 in Figure 8;

Figure 10 is a detail view showing the positions of the mercury switch;

Figure 11 is a longitudinal sectional view taken along line 11—11 in Figure 8.

Referring more specifically to the drawings (Figure 2), the numeral 10 denotes the head on the driving end of a roving frame of a common type. This head has rotatably mounted therein a longitudinally disposed drive shaft 11 upon which a fixed pulley 12 and a loose pulley 14 are mount-

ed. A suitable driving belt 15 is shown mounted upon the fixed pulley 12, but since both pulleys are of the same diameter, the belt may be shifted from one pulley to the other. The belt 15 is encircled by a belt shifter 16, said shifter 16 being secured upon the end of a shaft 17 which, in turn, is slidably mounted in the frame 10. Shaft 17 is also mounted in suitable brackets or uprights 18 and these brackets are in turn supported by table member 19 which supports other parts of the fly frame such as roll stand brackets 20.

By observing Figures 1 and 4, it will be seen that the shaft 17 has fixedly secured thereon a collar 25 by any suitable means such as a screw 26. Rotatably and slidably mounted around the shaft 17, and between the collar 25 and one of the upright brackets 18, is a cylindrical member 27, said cylindrical member having a bore 28 therein for the accommodation of a suitable compression spring 29. This compression spring normally tends to force the cylindrical member 27, the collar 25, and the shaft 17 to the left in Figures 1, 2 and 4. In order to latch member 27 in position against the pressure of spring 29, a suitable peripheral groove 30 is provided in the cylindrical member, said groove being adapted to accommodate the upper edge of the free end of a lever 31. One end of the lever 31 is pivoted as at 32 to bracket 33; whereas the free end of the lever is slidably mounted in a slot 34, which is cut in the upstanding leg of bracket 35. In order to normally hold the upper edge of the lever 31 in engagement with the groove 30, a suitable spring 37 is employed (see Figure 4). It is quite evident that when the upper edge of the free end of the lever 31 is disposed within the peripheral groove 30, the cylindrical member 27 will not be permitted to move to the left and consequently, the shaft 17 will remain in the position shown. But when one end or roving breaks, certain mechanism to be hereinafter described will release the free end of lever 31 from the peripheral groove 30 to thereby allow the spring 29 to move member 27 and shaft 17 to the left which, in turn, will move the belt shifter 16, causing belt 15 to move from the fixed pulley 12 to the loose or idler pulley 14.

Referring again to Figure 1, it is seen that the shaft 17 has the lower end of bracket 40 secured thereto, the upper end of the said bracket being secured to a longitudinally disposed shaft 41 which is mounted for longitudinal sliding movement in bracket 18. The end of shaft 41 has pivotally secured thereto as at 42 a link 43 which link is also pivoted to the intermediate portion of lever 44 as at 45. The lever 44 is pivoted to a vertically disposed shaft 47. When the belt 15 is disposed upon the loose pulley 14 and it is desired to place the machine in operation, it is necessary to again shift the belt back to the fixed pulley 12. To do this, the lever 44 must be rotated in a clockwise manner about shaft 47 thereby causing the shaft 41 to move longitudinally away from the observer in Figure 1; carrying with it the bracket 40 and the shaft 17. Of course, when the shaft 17 moves away from the observer in Figure 1, the belt shifter 16 (Figure 2) will be moved away from the observer, thereby shifting the belt 15 from loose pulley 14 to fixed pulley 12. When the shaft 17 has been moved far enough away from the observer to cause the peripheral groove 30 to coincide with the top edge of the free end of lever 31, the spring 37 will force the upper edge of this lever into the groove 30 to

latch the cylindrical member in position. If it is desired to manually stop the machine when the lever 31 is engaging the groove 30, it is only necessary to rotate lever 44 in a counter-clockwise manner in Figure 1. This rotation will cause members 17, 25, 41, 16 and 15 to move toward the observer while the cylinder 27 remains stationary.

Referring now to Figures 1 and 5, it will be noted that the fly frame is equipped with fluted bottom rolls 50, 51, 52, and 53, said rolls having top rolls 54, 55, 56 and 57, respectively mounted thereon. Between the sets of top and bottom rolls, suitable strands or rovings 58 are adapted to pass from the drafting and parallelization process. Usually the strands 58 are drawn from suitable cans 59 upwardly over lifting rolls 60, thence to second set of lifting rolls 61, from whence they pass between the drafting rolls just described. From the drafting rolls the strands pass to suitable flyers 62 and are deposited on bobbins 63.

As heretofore stated, it frequently happens that a strand or roving 58 breaks at a point between the front rolls 50 and 54 and the flyers 62, thereby causing the loose end to engage the adjacent unbroken strands and to break them also. The present invention contemplates the construction of a stop motion roll 67 which will engage the broken loose end and wind it therearound. The roll 67 is driven by peripheral contact with the drafting roller 50. As the roving on the roll 67 builds up in diameter, the roll moves away from the drafting roll. This stop motion roll, as it moves away from the drafting roll 50, will actuate the lever 31, previously described, and cause it to move out of the peripheral groove 30 thereby releasing the cylindrical member 27 so that the spring 29 can move the shaft 17 and belt 16 longitudinally of the frame and shift the belt 15 from the fixed pulley to the loose pulley.

Roll 67 is covered with felt or cloth, or is otherwise provided with a surface to which the roving will cling to cause the broken roving to be attached to the roll 67. The roll 67 has its ends rotatably mounted in the forked ends of suitable levers 70. These levers 70 are pivoted intermediate their ends as at 71 to the roll stands 20. Figure 7 illustrates the apparatus employed in supporting the ends of these stop motion rolls and in holding the same in close proximity to the bottom of the front drafting rolls 50.

The other ends of the levers 70 are disposed beneath pins 72, which, in turn, are fixed in the free ends of lever 73. Levers 73 are fixedly secured around shaft 74, said shaft extending longitudinally of the fly frame and being rotatably mounted in brackets 75 and 76.

The end of the shaft 74 nearest the observer in Figure 1 (also see Figure 3), has fixedly secured thereon a short lever 78, and the free end of this lever is adapted to rest upon the upper free end of another lever 79, said lever 79 being rotatably secured as at 80 to the central portion of lever 31, previously described. Also secured to the lever 79 as at 80 is an upstanding arm 82 which has a forked portion 83 on the upper end thereof for encircling a collar 84, said arm being rotatably mounted with respect to lever 31.

Collar 84 has integral therewith, a cam 85, both the collar and the cam being fixedly secured on shaft 86. The shaft 86 has a spiraled gear 88 on one end thereof (see Figure 1), and the other end has a beveled gear 89, said beveled gear meshing with another beveled gear 90 on longi-

itudinally disposed lifting roll shaft 91. The shaft 91 is adapted to carry the lifting rolls 61 previously described. The spiraled gear 88 is driven by a suitable mechanism, not shown, but in timed relation to the movement of the other parts of the machine so that shaft 91 and the lifting rolls 61 will be moved at the proper speed to deliver the roving 58 to the drafting rolls.

It will be noted by referring to Figure 3 that the upper portion of the arm 82 has a T-shaped bar 95 adjustably secured thereto by any suitable means such as a bolt 96. When the parts are in the positions shown in Figures 1 and 3, the upper end of the bar 95 will not be engaged by the periphery of cam 85 as it rotates. However, when the arm 82 is allowed to pivot in a counter-clockwise manner, about pivot point 80, the upper end of this bar will be contacted by the periphery of cam 85 to thereby force the arm 82 as well as the free end of lever 31 downwardly. Of course, upon the forcing of the lever 31 downwardly, the upper edge of this lever will be moved out of the peripheral groove 30 to thereby effect a release of the cylindrical member 27 to cause the belt 15 to be shifted from the fixed pulley 12 to the loose pulley 14. A suitable counterweight 98 is provided so that the members 79 and 82 will normally rotate in a counter-clockwise manner about point 80 when released. The counterweight is secured to the upper portion of the arm 82 by means of a suitable bolt 99. This bolt penetrates a slot 100 in the counterweight 98 and has its end threadably embedded in the arm 82. The slot permits the adjustment of the counterweight to suit various operating conditions.

Let us suppose that a strand or roving 58 breaks between the front rolls 50 and 54 and the flyers 62. The loose end will be engaged by the roll 67 and wound therearound in the manner shown in Figure 6. As the diameter of the fibers on the roll is built up, the lever arm 70 will be rotated in a counter-clockwise manner in Figures 1 and 5 thereby causing the members 72 and 73, as well as the shaft 74 to rotate in a clockwise manner. This clockwise manner rotation of shaft 74 will cause the lever 78 to rotate in a clockwise manner in Figure 3, thereby allowing the counterweight 98 to rotate the lever 79 and arm 82 in a counter-clockwise manner in Figure 3 to a point where the upper end of T-bar 95 will be disposed in the path of the periphery of cam 85. Upon the rotation of the cam 85 with the T-bar in this position, the arm 82, as well as the free end of lever 31 will be pushed downwardly until the upper edge of lever 31 is disengaged from the peripheral groove 30. Of course, upon this disengagement, as heretofore stated, the shaft 17 will be shifted longitudinally to effect the stopping of the machine. At this time, the broken end can be mended, after which the lever 44 will be rotated about shaft 47 until the spring 29 (Figure 4) is compressed sufficiently to allow the groove 30 to again accommodate the free end of lever 31 in the position shown in the drawings. It is desirable that the roll 67 be covered with a suitable material such as felt or the like which will easily catch strands of roving.

Figures 8 to 11 inclusive show a slightly modified form of the invention in which an electromagnet is employed for effecting the tripping operation of cylindrical member 27. Fundamentally, the principle employed is the same as in the preceding form and therefore like reference characters will be given to like parts and a de-

scription of the parts which differ will be given. In this form of the invention, it will be noted that the free end of lever 31a has pivoted thereto as at 105, the upper end of a core 106, said core being slidably mounted in a cylinder 107 of magnetic coil 108. A spring 109 is disposed beneath the free end of the lever 31 which normally forces the upper edge thereof into engagement with the peripheral groove 30, and thereby holds the parts in latched position during the normal operation of the machine.

A suitable bracket 110 is secured to the table portion 19 and the upstanding leg of this bracket has a slot 111 therein for the accommodation of the free end of the lever 31a. The purpose of this slot is to provide the necessary lateral reinforcement or support at the free end of the lever so that the force of the spring 29 within cylindrical member 27 will not move the free end of the lever out of place. Leading from the coil 108 are suitable wires 112 and 113, the wire 113 having its other end attached to main current supply line 114, and the wire 112 having its other end connected to one end of a mercury tube switch 116. Also leading from the same end of the tube 116 is another wire 117 which leads to main current supply line 118. The tube 116 is supported by a clamp 120 on the end of a shaft 121, said shaft being rotatably mounted in bracket 18 and also having a pinion 122 fixedly secured to the other end thereof. This pinion meshes with a rack 123 which, in turn, is fixedly secured on the end of shaft 74 previously described.

During the normal operation of the machine the tube 116 is in the bold line position shown in Figures 8 and 10 at which time the mercury 125 therein has settled to the end removed from the wires 112 and 117 thereof. Upon the breaking of a strand 58, the roll 67 will wind the loose end therearound thereby causing the lever 70 to rotate in a counterclockwise manner (Figure 8) which at the same time will effect a clockwise rotation of shaft 74, and rack 123. This rotation of rack 123 will cause the shaft 121 and the tube 116 to rotate in a counterclockwise manner, that is the tube 116 will be rotated from bold line position (Figure 10) to dotted line position, allowing the mercury 125 to settle into the other end of the tube 116, to close the circuit between wires 112 and 117. Upon the closing of the circuit the coil 108 will be energized to cause core 106 to be pulled downwardly. At the same time the free end of lever 31a will be pulled downwardly out of the peripheral notch 30 so that the cylindrical member 27 will be released to allow the spring 29 to move the cylindrical member 27 and its associated shaft 17 longitudinally in a manner previously described. Of course, upon the movement of the shaft 17, the belt shifter 16 and the belt 15 will be moved from the fixed pulley 12 to the idler pulley 14.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being set forth in the appended claim.

I claim:

In a drawing frame having a main driving shaft provided with tight and loose pulleys and a driving belt and having a longitudinally movable rod to shift said belt, in combination, a cylindrical member mounted on said rod, a coiled

compression spring enclosed within said cylindrical member and encircling said rod, a fixed abutment engaged by one end of said spring and the other end of said spring abutting said cylindrical member, said spring normally forcing said rod to shift said belt, in combination, a cylinder-pulley, and said cylindrical member having a peripheral groove therein, a lever adapted to swing in a plane transverse to the path of movement of said rod and to be engaged in said groove to latch said cylindrical member and rod in a position to hold the belt on the tight pulley, a rotary member onto which a broken sliver passing through the drawing frame is adapted to fall

and to become wrapped therearound, and means controlled by radial displacement of said rotary member by the formation of a mass of fiber thereon and effective to remove the lever from the peripheral groove and to thereby allow the compression spring to move the rod longitudinally and to thereby shift the belt from the tight pulley to the loose pulley to stop the drawing frame, and said latter means including an electro-magnet, a connection from said magnet to said lever, and a switch device bodily responsive to the radial displacement of said rotary member.

EDWIN M. HOLT.