M. F. FIELD.

TEXTILE MACHINE.

APPLICATION FILED APR. 27, 1914.

1,364,092.

Patented Jan. 4, 1921.

8 SHEETS—SHEET 1.

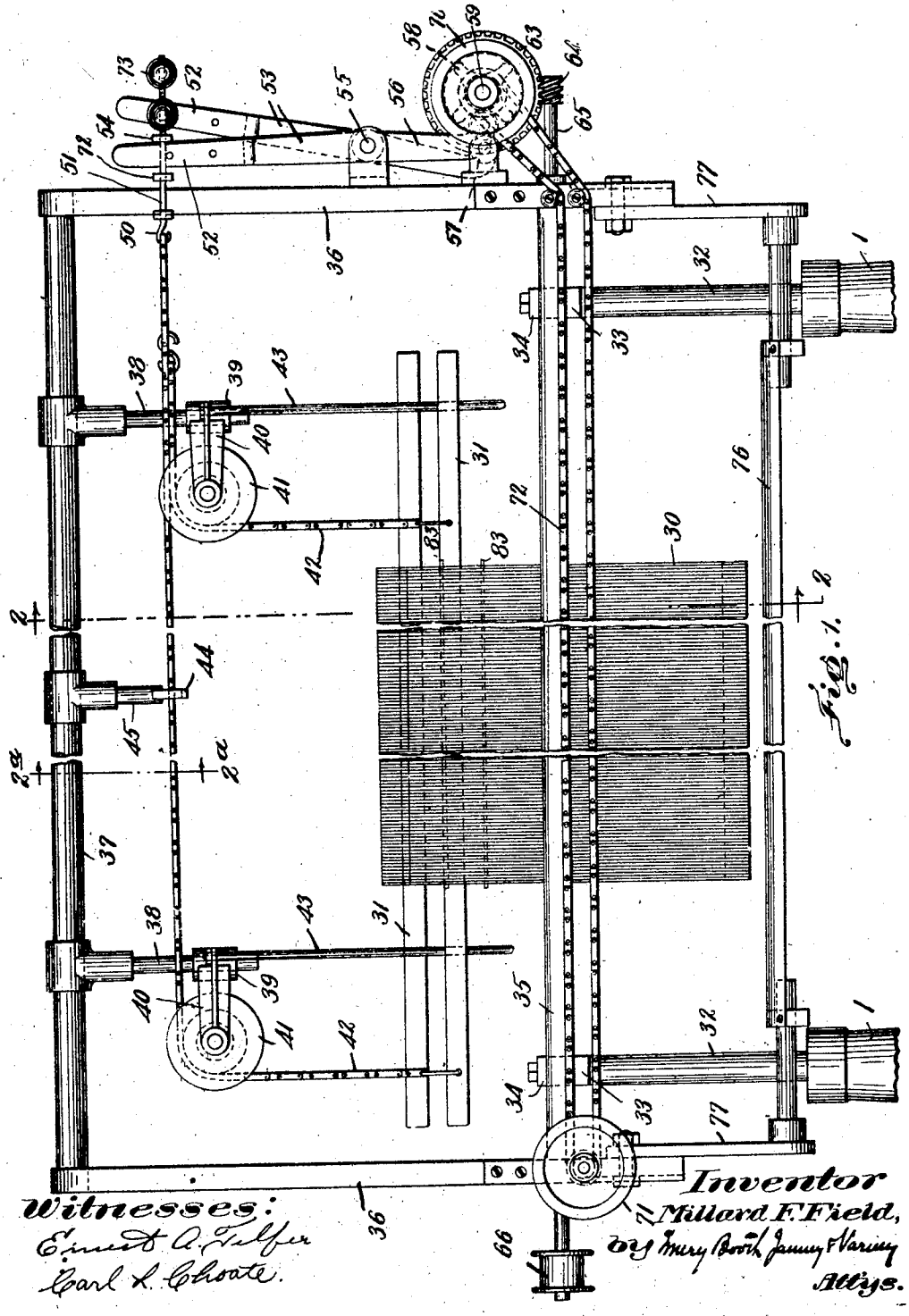


Fig. 1.

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8 SHEETS—SHEET 2.

Fig. 2.

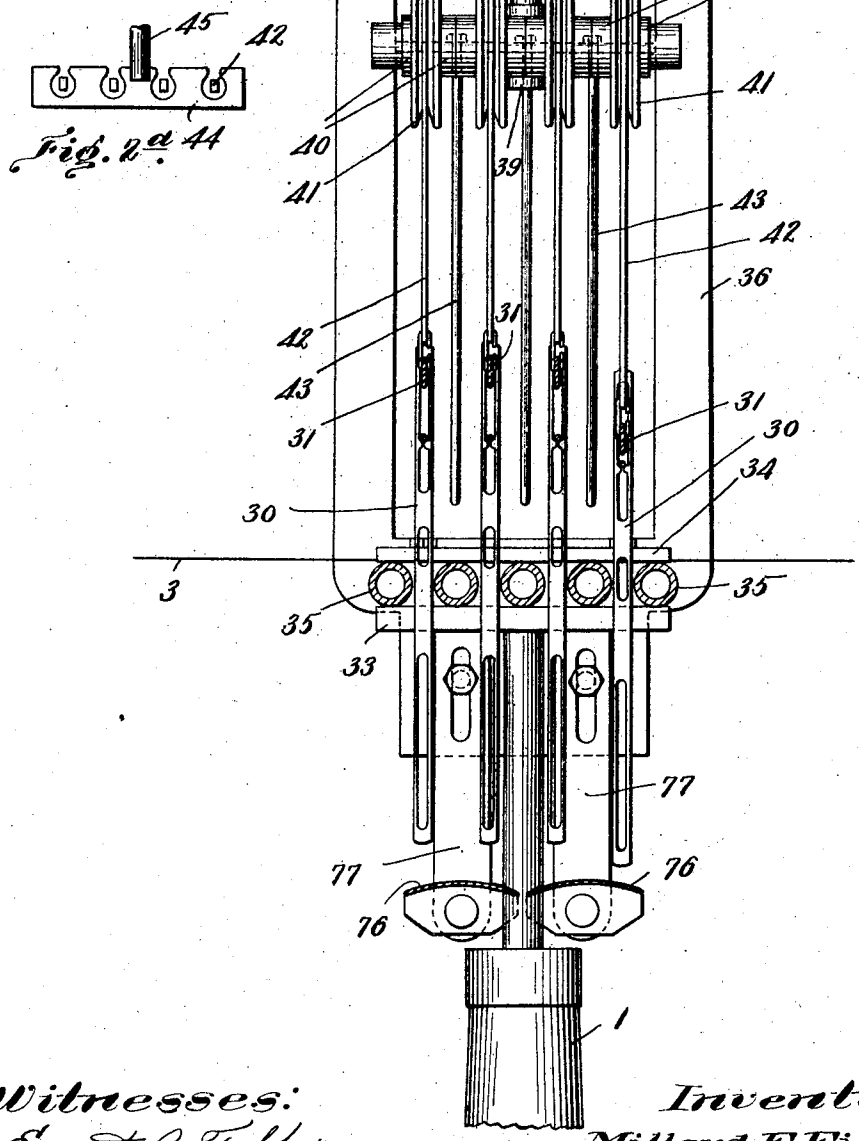


Fig. 2a.

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8 SHEETS—SHEET 3.

Fig. 3.

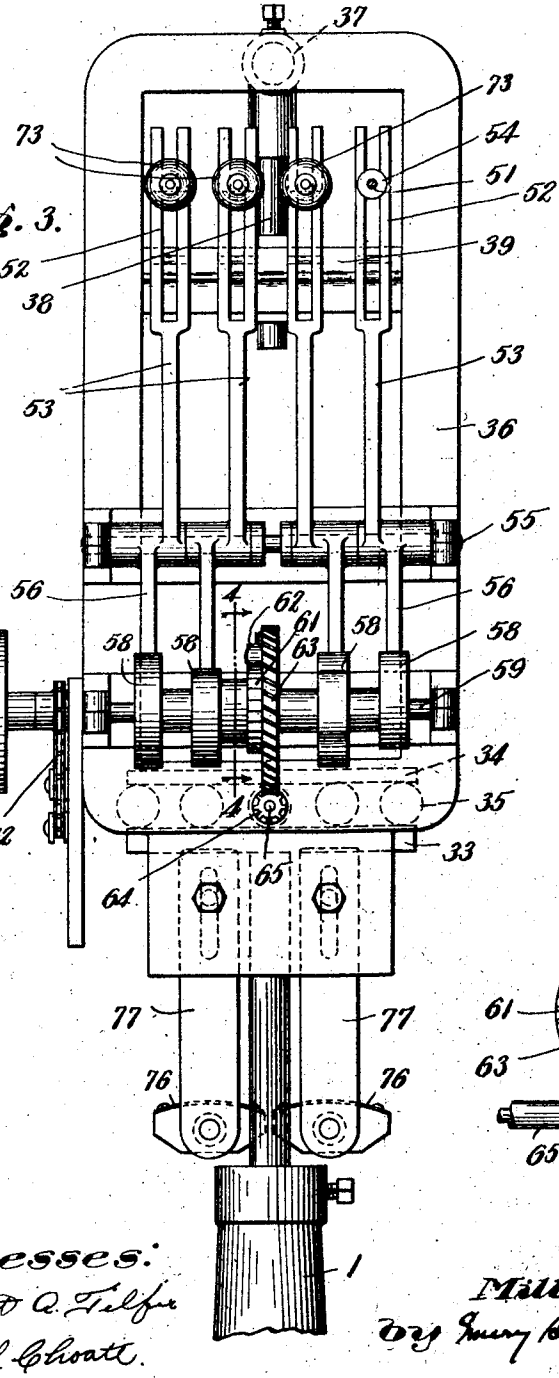


Fig. 3a.

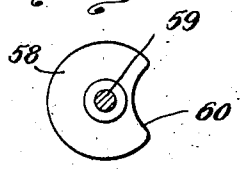
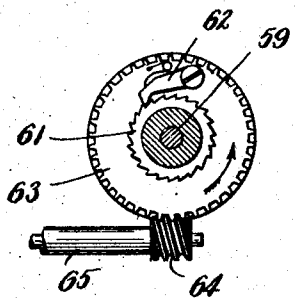


Fig. 4.



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8 SHEETS—SHEET 4.

Fig. 7.

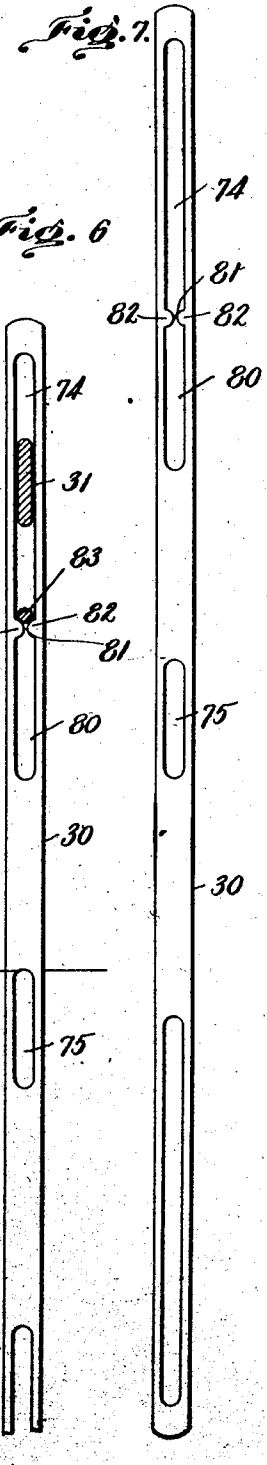


Fig. 5.

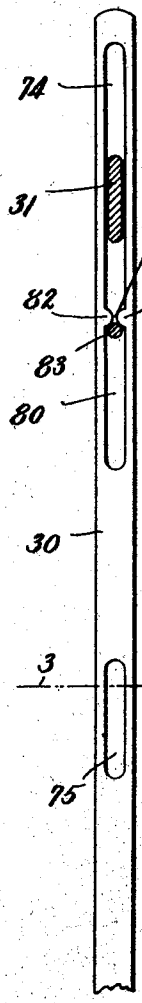


Fig. 6.

Fig. 8.

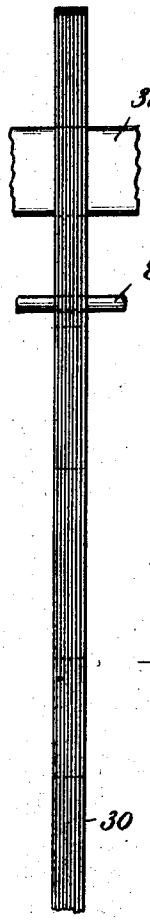


Fig. 9.

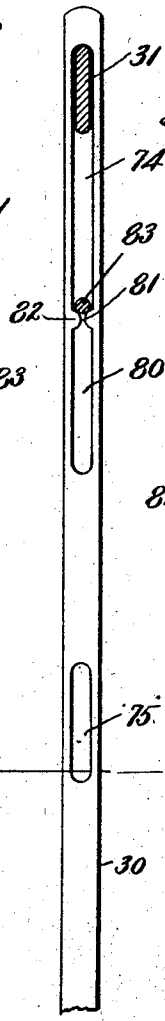
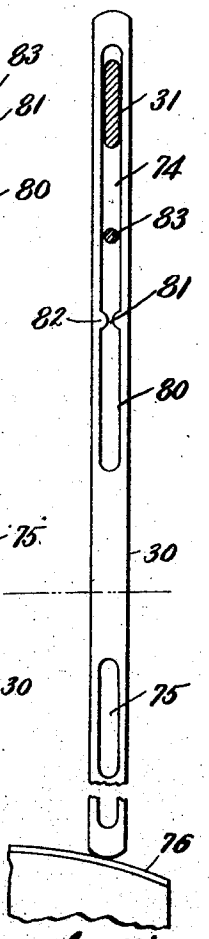


Fig. 10.



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8 SHEETS—SHEET 5.

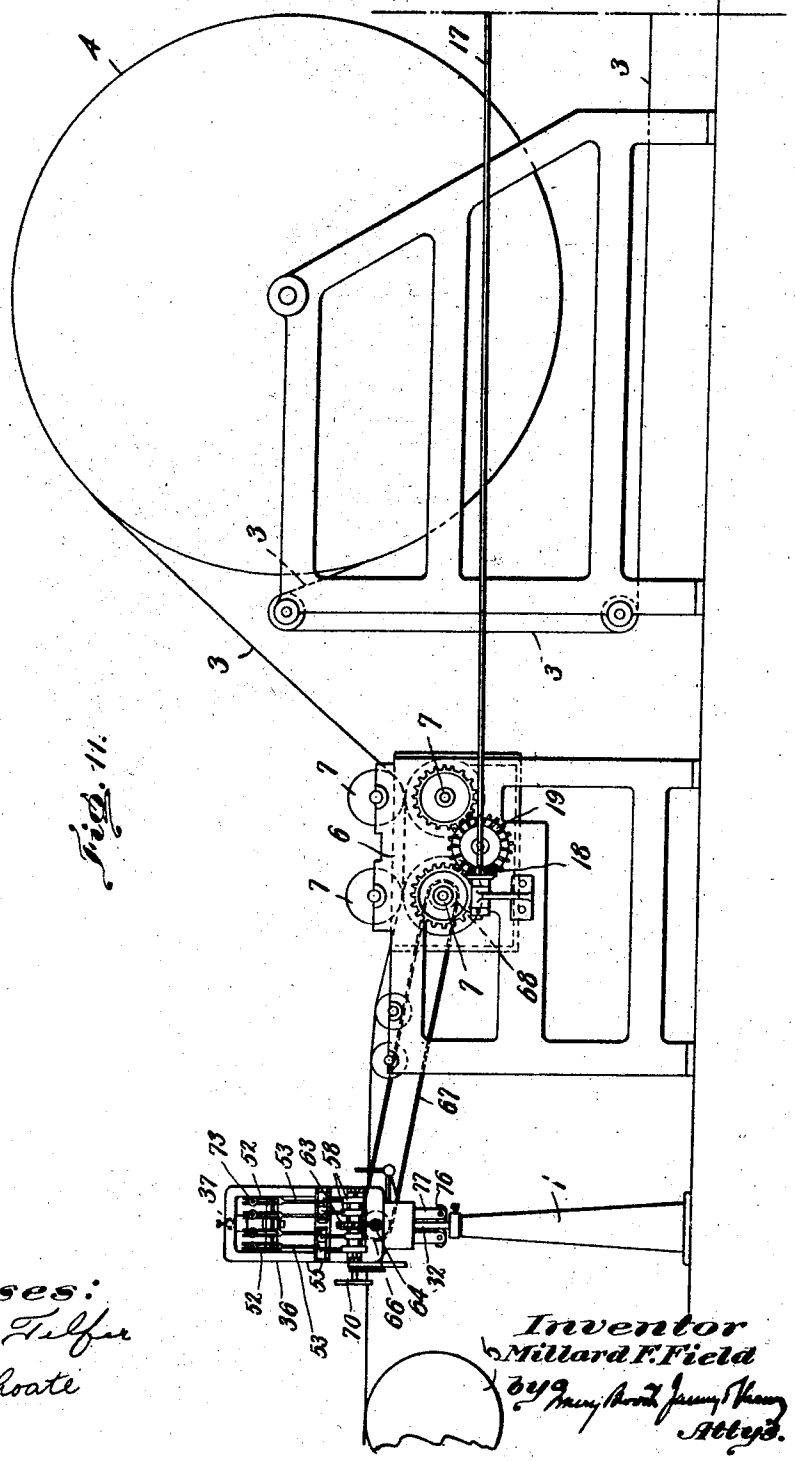


Fig. 11.

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8 SHEETS—SHEET 6.

Fig. 13.

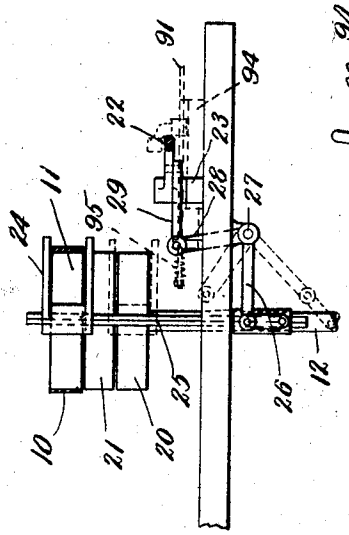
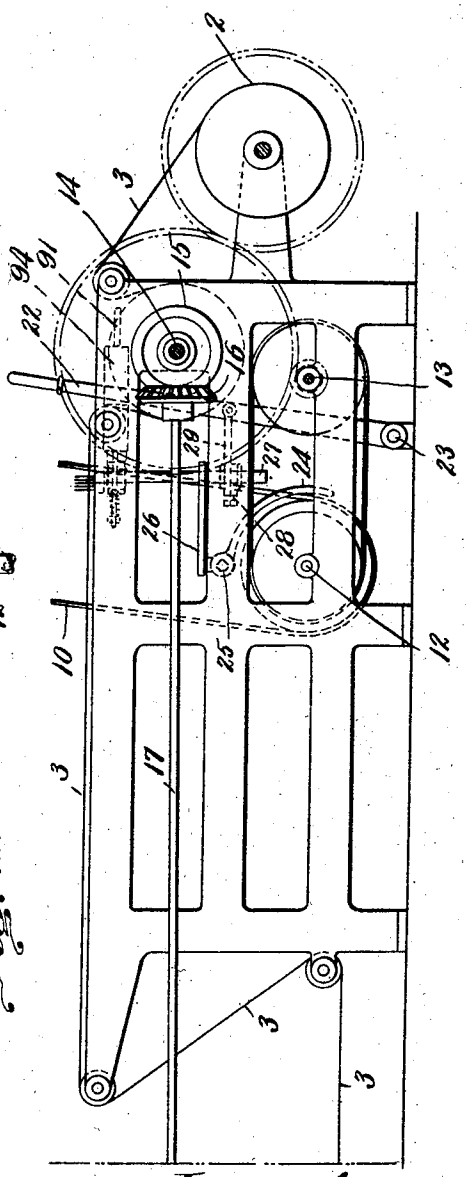


Fig. 12.



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1,364,092.

Patented Jan. 4, 1921.

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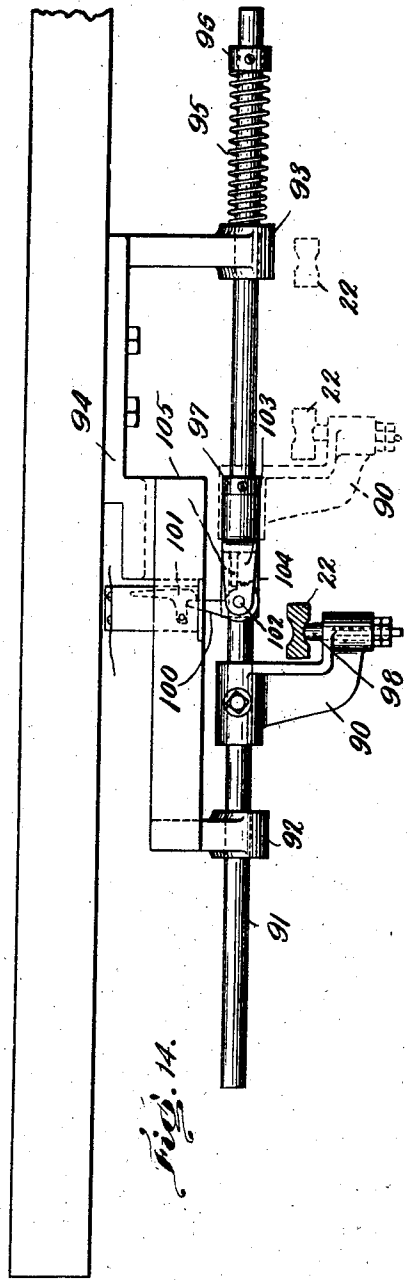


Fig. 14.

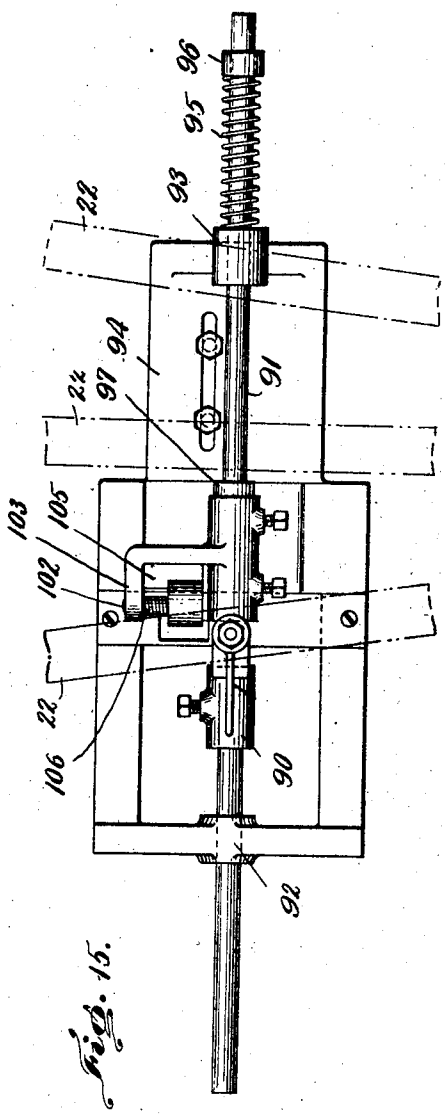


Fig. 15.

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APPLICATION FILED APR. 27, 1914.

1,364,092. Patented Jan. 4, 1921.

8 SHEETS—SHEET 8.

Fig. 16.

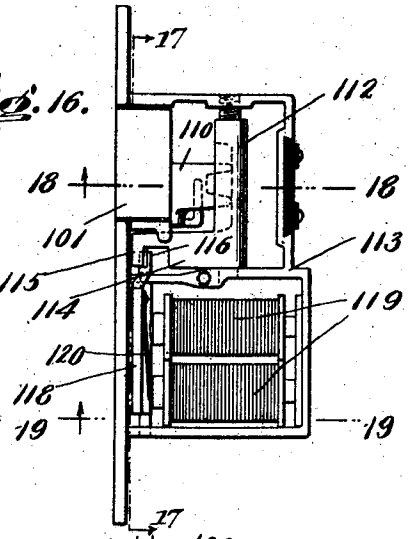


Fig. 17.

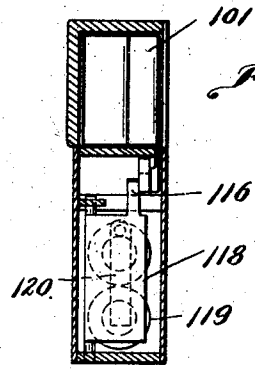


Fig. 18

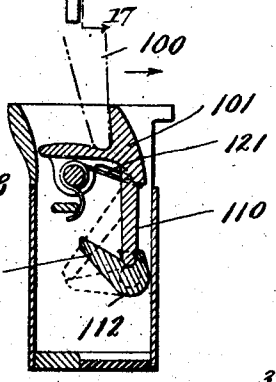


Fig. 19.

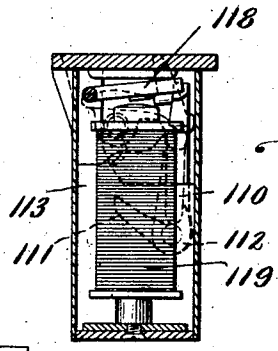
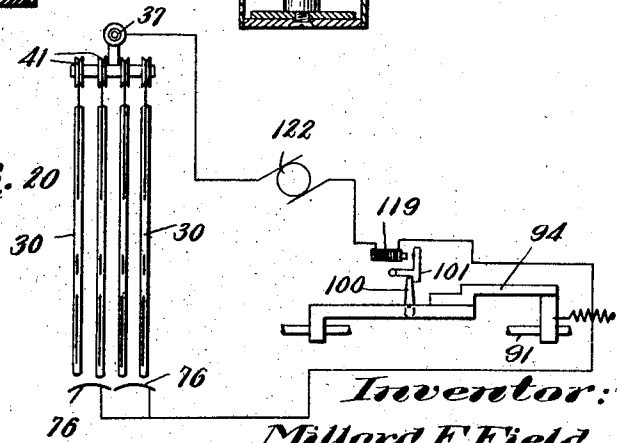


Fig. 20



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UNITED STATES PATENT OFFICE.

MILLARD F. FIELD, OF WINTHROP, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BARBER-COLMAN COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

TEXTILE-MACHINE.

1,364,092. Specification of Letters Patent. Patented Jan. 4, 1921.

Application filed April 27, 1914. Serial No. 834,607.

To all whom it may concern

Be it known that I, MILLARD F. FIELD, a citizen of the United States, and a resident of Winthrop, county of Suffolk, State of Massachusetts, (whose post-office address is 195 Freeport street, Dorchester, Massachusetts,) have invented Improvements in Textile-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to textile machines, the specific embodiment by which the same is herein illustrated consisting of an attachment or mechanism embodied in or combined with a slasher and serving in its relation thereto both a thread-fault detecting function and a warp leasing function.

While the invention has marked advantage as applied to a slasher, the improvements herein described have features of novelty and utility both with reference to the leasing function and the thread-fault detecting function which are of broad and general application to other uses and other relations than the specific ones herein disclosed.

Having reference first to the leasing function of the disclosed apparatus, the yarns or threads when passed through the slasher are taken from a number of different thread sources, as, for example, a number of section beams or rolls, and, after being sized and dried, are wound in the required order upon the warp beam. From the same set of section beams a succession of loom beams is prepared. This involves cutting off the yarns as each loom beam is filled.

To avoid the trouble and loss of time heretofore consequent on the striking of a lease, this invention contemplates the provision of leasing means which so engage the individual threads leading to the loom beam that the latter are under a positive leasing control at all times. Preferably the threads are controlled in sets, each set by a leasing member, whereby the relative movement of the leasing members may be caused at any time to strike a lease. This permits the same leasing control to be maintained over the thread coming from the thread sources so that leases can be successively struck, leasing cords or other devices inserted and a lease left at the end of each warp on the loom beam after the threads have been cut, while the leasing means are still maintained in leasing control over the balance of the warp supply and the lease may be obtained for the next beam. Such leasing control is particularly applicable to a slasher but it may be usefully employed in other connections, as for example where a series of consecutive warp beams or rolls are required to be wound from the same thread sources and a lease struck or preserved for each successive roll or beam.

In the illustrated form of the invention the devices which are employed to preserve the leased arrangement of the thread supply are in the form of drop heddles arranged in separate banks or harnesses and capable of relative movement to form the lease. The same devices are also employed as thread fault detectors to detect a broken or faulty thread coming from the thread sources. Since it is undesirable completely to stop a slasher for any length of time, herein the detection of a faulty thread is accompanied by a slowing down of the operation of the machine to a sufficiently slow rate to permit the operative to correct the thread fault, but devices similar to those disclosed may be employed in stop motions.

The apparatus, either with or without its capacity to strike a lease, has novelty and utility as a thread-fault-detecting mechanism, not only in connection with a slasher but in connection with other textile machinery and particularly where it is required to operate upon unsized threads or threads moving at relatively high rates of speed. In the loom the travel of the warp rarely exceeds a few inches per minute, but in a slasher the travel is ordinarily at the rate of many yards per minute. Furthermore the warp threads in the loom are sized and thereby protected against abrasion, whereas the yarn as it leaves the section beams is unsized. Threads which are run at high rates of speed as compared with the travel of the threads in a loom and threads which are unsized are susceptible to impairment through friction-caused abrasion when controlled by the ordinary warp stop motion detectors which hang suspended in permanent supported engagement upon the threads. In the present thread-fault-detecting mechanism feeling means is provided which is caused intermittently to feel for the

threads, the said feeling means being preferably, as herein shown, in the form of individual thread detectors having each an intermittent thread-fault feeling movement against its thread and caused to initiate the operation of certain detecting mechanism on occurrence of a thread fault.

A novel form of detector is herein provided having among other features of novelty provision such that any detector at will may be quickly moved or placed in inoperative relation to the detecting mechanism, this being herein accomplished by lifting the particular detector in question so that it is supported by the remaining detectors of the bank or series and is moved therewith. In this relation it is no longer operative to actuate the detector-responsive mechanism of the machine in case of a thread fault.

In the present embodiment of the invention, furthermore, a novel detector-actuated control motion for the machine is employed which may be usefully applied to loom stop motions or other control devices operated by thread-fault finding means. In the control motion herein illustrated the machine is slowed down from a high rate of speed to a relatively slow rate by devices which work instantly upon the detection of a thread fault and without being dependent, as in the ordinary stop motion of a loom, upon the subsequent movement of some other regularly movable part of the machine. This provides for the instant control of the machine responsive to a thread fault, whereas stop motions of the prior art have depended upon bringing into the path of some moving part of the machine a detector actuated member. This causes the lapse of an interval between the dropping of the detector and stoppage or control of the machine during which the machine may move through a large part of its operative cycle.

It will be observed that many of the features which I have herein shown in combination are novel and patentable in and of themselves as well as in other relations than those herein disclosed; also that the apparatus herein disclosed is capable of wide and general application apart from the peculiar advantage which accompanies its use herein.

The invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a vertical, front elevation of a combined leasing and thread-fault-detecting mechanism embodying one form of my invention;

Fig. 2 is an end elevation taken in section on the line 2—2 in Fig. 1, showing the position of the detectors in said mechanism;

Fig. 2[a] is a detail in elevation showing the slotted chain guide;

Fig. 3 shows in end elevation the mechanism of Fig. 1;

Fig. 3[a] is a detail in side elevation showing the shape of the detector actuating cams;

Fig. 4 is a detail in side elevation showing the driving gearing for the feeling devices;

Fig. 5 shows a detector in its raised, inoperative position where it is supported upon the catch bar;

Fig. 6 shows a detector in operative position and in its depressed or feeling relation to a thread;

Fig. 7 shows the full length of the detector in front elevation;

Fig. 8 shows a series of the detectors in side elevation in the same relation to the thread shown in Fig. 6;

Fig. 9 shows a detector in operative position but raised by its stringer bar out of feeling relation to the thread;

Fig. 10 shows a detector which has been dropped through the absence of a thread upon an underlying contact device;

Fig. 11 shows in side elevation one end of a slasher with the detector and leasing mechanism operatively related thereto;

Fig. 12 shows in elevation the opposite end of the slasher being in effect an extension or continuation of the view shown in Fig. 11;

Fig. 13 is a detail in plan showing the belt shifter mechanism;

Fig. 14 is an enlarged detail in plan showing the automatic release mechanism for the belt-shifting lever;

Fig. 15 is a side elevation of the mechanism shown in Fig. 14;

Fig. 16 is an elevation in detail and partial section showing the electrically controlled release for the belt shifter illustrated in Fig. 14;

Fig. 17 is a sectional front elevation on the line 17—17 in Fig. 16;

Fig. 18 is a transverse section in plan taken on the line 18—18 in Fig. 16;

Fig. 19 is a transverse section in plan taken on the line 19—19 in Fig. 16; and

Fig. 20 is a diagrammatic view showing the connections controlled by the detectors.

Referring to the embodiment of the invention which is submitted for illustrative purposes, and first to Figs. 11 and 12, the leasing and detector devices are supported upon the pedestals 1 (Fig. 11), being shown combined with the usual elements of a slasher. The latter is conventionally represented as to its principal parts in Figs. 11 and 12. These consist of the usual supports on one end of the machine for the loom beam 2 (Fig. 12) to which the warp threads 3 pass after being sized and dried. The warp threads pass from the steam-heated drying cylinder 4 (Fig. 11) to the part of the

slasher shown in Fig. 12 over various guide rollers and other thread-engaging devices, which are conventionally represented in Fig. 12. From the section beams 5 (only one of which is shown) the threads pass through sizing apparatus, including the size pot 6 and rollers 7, and thence to and about the drying cylinder 4. The usual driving mechanism for the various parts is provided, the parts necessary for an understanding of the present invention only being shown.

The machine is driven from any suitable source of power, herein by the main drive belt 10 (Fig. 12) which passes over the driving pulley 11 mounted on the drive shaft 12. The latter is belted to drive the shaft 13, the latter in turn being geared to drive the shaft 14 through which the loom beam is turned by appropriate gearing. The shaft 14 carries a beveled gear 15 meshing with a second gear 16, the latter mounted upon the longitudinal transmission shaft 17 at the opposite end of which is the beveled pinion 18 meshing with the gear 19 and adapted to drive the lower size rollers 7 through appropriate gearing.

Owing to the size pots through which the threads pass and the undesirability of completely stopping the machine on the occurrence of a thread fault, means are provided whereby the speed of the machine may be reduced under such circumstances and the yarns drawn very slowly through the machine, giving the operative opportunity to repair the thread fault if possible while at the same time preventing the gumming of the yarns, which might follow the complete stoppage of the machine. Any appropriate means to stop or slow down the speed of the machine may be employed, but herein the belt 10 is capable of being shifted to the loose pulley 20 to stop the machine, or to an intermediate pulley 21, the latter being connected to the drive shaft 12 by any suitable speed reduction means to give a relatively slow speed to the machine upon the occurrence of a thread fault.

The belt shifter may be moved to shift the belt to either one of the three pulleys referred to by means of the hand lever 22, pivoted at 23, automatically controlled shifting mechanism being also provided, as will be later described. To control the belt through the lever 22 the belt is engaged by the forked belt shipper 24 carried by the slide rod 25, the latter adapted to be moved by the lever arm 26. The lever arm 26 is connected to the upright rock shaft 27, the latter having the rock arm 28 provided with the jointed connection 29 to the hand lever 22.

While the thread-fault detecting and leasing mechanism might be located in other relations to the slasher, as for example, between the steam-heated cylinder and the loom beam, herein it is interposed between the sizing apparatus and the section rolls, as is represented in Fig. 11, the several warp sections passing directly from the section rolls to and through the heddles of the leasing and detecting apparatus.

Referring more particularly to Figs. 1, 2 and 3, the heddles 30 are arranged in harness formation in a plurality of series or banks, herein four, each bank being suspended upon its stringer bar 31 which lies transversely the direction of travel of the warp threads. Any suitable supporting structure may be provided, but herein the supporting pedestals 1 carry at their tops the upright tubular supports 32, 32, the latter supporting the lower cross plates 33, 33, between which and corresponding upper cross plates 34, 34, are clamped the transverse tubular members 35 (herein five in number.) The latter not only serve as transverse supports for the overhead supporting frame, but also act as underlying guide supports for the warp threads 3, as represented in Fig. 2, the tubular members being separated sufficiently to allow the several respective sets of heddles or feelers 30 to have a working movement between adjacent tubes, as shown in Fig. 2. The members 35 also serve to guide or hold the heddles 30 against being dragged laterally out of their proper positions when in contact with the swiftly moving threads.

At their opposite ends where they overhang the cross piece 33, the tubular members 35 are secured to and support the end frame members 36, the latter connected by the overhead, longitudinal supporting tubular member 37. The latter has secured thereto a pair of depending hanger rods 38, carrying hanger brackets 39, the latter provided with forked arms 40 in the ends of which are journaled the four guiding sheaves 41—41, etc., over which pass supporting chains 42, a pair of sprocket chains and guide sheaves being provided for each stringer bar 31 and the chains being connected to opposite ends of their respective bars. The hanger brackets 39 also carry fixed, depending separating members 43 which are located between the stringer bars 31 to prevent lateral displacement of the bars and heddles in their vertical, reciprocatory movements. The sprocket chains 42 are caused to pass through a slotted guiding plate 44 (Fig. 2[a]) secured to a depending hanger rod 45 attached to the mid portion of the overhead frame member 37.

The detecting members are given an intermittent feeling movement each toward its controlled thread and for this purpose the several respective banks are raised and lowered in successive order by raising and lowering their respective stringer bars. To this end each set of sprocket chains 42

is connected to a hook 50, the shank 51 of which passes between the two arms 52 of a bifurcated actuating lever 53, and is held in fixed relation thereto under the weight of the heddles by a stop collar 54 which has threaded adjustment on the shank 51 of the hook. The levers 53 are pivoted at 55 on the frame member 36, being given each an oscillatory movement between the two extreme positions shown in Fig. 1 by suitable driving mechanism.

For this purpose each lever 53 has a depending arm 56 which carries a roll 57 held pressed by the weight of the detectors against the face of a cam 58. The four cams are fixed upon the cam shaft 59 and have each the shape indicated in Fig. 3ª, such that, at each revolution of the cam shaft, the depression 60 on the face of the cam allows the inward movement of the roller and causes an oscillatory movement of the corresponding actuating lever 53. The cams are preferably adjusted upon the cam shaft so that the depressions 60 occur ninety degrees apart. The result is that the feelers are normally held in elevated position as indicated by the three banks or sets at the left in Fig. 2, with their detectors out of supported engagement with the threads, but at each quarter revolution of the cam shaft one bank is momentarily lowered to cause each detector thereof to feel for its thread, the entire series being immediately thereafter raised and there held suspended until the cam shaft has completed another revolution.

The mechanism for raising and lowering the detectors is preferably driven from or with the driving mechanism for the slasher. Herein, also for the purpose of striking the lease, means are provided whereby, and apart from the slasher driving mechanism, the several sets of detectors may be moved to the same level and from that position may each be independently moved to strike the lease.

For this purpose driving movement is imparted to the cam shaft by means of the ratchet 61 (Fig. 4) which is turned through the spring-pressed pawl 62 carried on the face of the worm gear 63, the latter being rotatable independent of the cam shaft (Figs. 1, 3 and 4). The worm gear is turned in the direction of the arrow shown in Fig. 4 by means of the worm 64 carried on the end of the driving shaft 65, the latter extending across the machine and at the opposite end thereof having the driving pulley 66 to which driving movement is imparted by means of the driving belt 67 (see Fig. 11) driven from a pulley 68 on the shaft for the size-roll 7. This causes a steady rotation of the cam shaft proportional to the speed of the slasher. By properly proportioning the driving pulleys the actual speed of the cam shaft may be varied to suit the character of the yarn or other conditions, but for ordinary purposes the intermittent feeling movement imparted to the detectors may be comparatively slow and infrequent.

In order to strike the lease, the cam shaft may be turned independently of the pawl to raise the several sets of detectors to the same level and from this level each detector set, constituting as it does a leasing member, may be independently moved to strike the lease. For this purpose the cam shaft has fixed at its end the hand wheel 70 and it may also be operated from the other end of the machine by the hand wheel 71 connected to turn the cam shaft by the intermediate sprocket chain 72. If one of the sets of detectors is left depressed as indicated in Fig. 1, the hand wheel 70 or 71 may be turned until that set of detectors is raised.

Any one or more of the sets of detectors may be independently and further raised with relation to the remaining sets by temporarily shortening the connection of the supporting chains 42 to their respective actuating levers 53. For this purpose each shank 51 is provided with a second stop collar 72 (Fig. 1) at a point between the hook 50 and the outer stop collar 55. When desired, the shank may be manually lifted out from between the bifurcated arms 52, pulled back, and again slipped down between the arms and caused to support the detectors through the stop collar 72, thus leaving that particular set of detectors at a higher level. To facilitate this manipulation of the detectors the projecting end of each shank 51 is provided with a device such as the ball 73 threaded thereon, which may be readily grasped by the hand of the operator.

Referring now more particularly to Figs. 5 to 10, while detector or feeling members of various other forms might be employed, herein they are in the form of flat, thin, sheet-steel members resembling in their general construction the ordinary drop heddles or drop wires of warp stop motions. Each heddle is provided at its upper end with an elongated supporting slot 74 through which the stringer bar 31 passes, the slot being of sufficient length to permit the necessary relative movement between the stringer bar and the heddle. At a suitable point in its length, each detector is also provided with a thread engaging and controlling formation, the same being herein in the form of an elongated slot or perforation 75. This slot is preferably of such length that when the heddles are lifted to their normal position by the stringer bar 31, as is represented in Fig. 9, the threads are relieved each of the

weight and frictional engagement with its respective detector and has a free running draft through the perforation 75. In this elevated position of the heddles as is shown in Fig. 2, the threads run freely over the guide and supporting tubes 35 and are not required to sustain any of the weight or resultant frictional engagement of the heddles. Although unnecessary to the thread-fault detecting function of the apparatus, but for the purpose of assisting in forming the lease, the elongated thread-receiving slot 75 terminates just below the position which the thread occupies therein when the heddle is elevated to its normal position, as represented in Fig. 9, so that any further elevation of the heddle will raise the thread with it.

The normal up position of the heddles is shown in Fig. 9 and the normal depressed position in Fig. 6. In executing its movement the stringer bar moves from the position shown in Fig. 9 to the position shown in Fig. 6 so as to feel for the thread 3 and momentarily leave the detector sustained on the thread. Should the thread be broken or absent, the detector will drop to the position shown in Fig. 10 and engage with suitable detection devices which herein slow down the driving mechanism for the slasher. When the stringer bar 31 is lowered, it moves quickly to the position shown in Fig. 6, leaving sufficient clearance to allow for the drop of the detector in case of a thread-fault. The feeling movement having been performed, the bar is again quickly lifted, immediately relieving the threads each from the weight and friction of its heddle.

It will be observed that the heddles work in close proximity to the guide tubes 35 so that even the momentary contact with a high speed unsized yarn is under the conditions which tend to the least impairment of the yarn. By separating them in several banks, supporting them at their upper ends and leaving them relatively unconfined at their lower ends, the heddles hang loose and free, so that they yield to the yarn and the latter can travel through the heddles at relatively high rates of speed without restriction or danger from abrasion or other impairment.

For responding to a thread fault, any suitable responsive devices may be employed, but herein there are provided electrical controlling devices controlled by the engagement between a dropped detector and underlying contact members, herein in the form of the two contact plates 76 (Figs. 1, 2 and 3). These lie immediately below the several banks of detectors and are carried upon the depending hanger brackets 77 secured to the bottoms of the frame members 36. The circuit connections are preferably established by insulating the contact member 76 from the machine frame and connecting the latter to one terminal of the controlling circuit while the contact plates 76 are connected to the remaining terminal as is shown in Fig. 20 and will be later explained.

A novel feature of the described form of detector is the provision of means whereby, should occasion arise, any given detector may be temporarily withdrawn from operative relation to the contact plate 76 or to such other detection responsive devices as may be employed. In the present case this is secured by the provision of a special supporting formation in the heddle whereby it may be lifted from its normal position and temporarily supported upon a catch bar or other device, which herein is carried by the remaining heddles of the series, so that the withdrawn heddle continues to move up and down with the main series but supported at a fixed position on the series, so that it is no longer capable of dropping into contact with the underlying plate 76.

Referring to Figs. 5 and 6, each heddle is provided with an elongated slot 80 terminating in a narrow throat 81 so as to form on either side of the throat catch or supporting projections 82. Just above the projections the throat opens into a space consisting herein of an extension of the slot 74 but the said space might be separate from the slot 74 if desired. In the space above the projections 82, a small rod or bar 83 is inserted and during the normal operation of the apparatus this bar, resting upon the projections 82, moves up and down with the bank. If a thread is permanently missing, or missing for some time, or if, for any other reason, it is desired to throw out of operation any particular feeler, either temporarily or otherwise, that particular feeler may be lifted from the position shown in Fig. 6 where it is unsupported by the catch bar, to the position shown in Fig. 5 where it is supported by the catch bar 83 hanging thereon by its supporting projections 82. By virtue of the connecting throat 81, the heddle can be readily slipped from the position where the catch bar is above the throat, to the position where it is below the throat. In the latter position the heddle is supported through the catch bar by the remaining heddles of the series and cannot at any time fall below the position indicated in Fig. 5.

As previously stated, the responsive devices for the thread-fault detecting mechanism effect an instantaneous slowing down of the driving mechanism for the slasher to a speed permitting the correction of the thread-fault. As also previously stated, these devices work immediately and without the necessity of awaiting the subsequent

movement of some part of the mechanism, so that the control is exercised before the detector is lifted from the contact plate by the upward movement of the stringer bar which immediately follows.

The preferred means for accomplishing the control of the driving mechanism is through the movement of a speed controlling member,—herein the shipper handle 22, positively enforced by the closing of the circuit at the detector. In the specific construction herein shown, this is secured by causing the electrically actuated release of the previously latched shifting lever so that it is automatically and instantly thrown to a position to shift the belt over to the slow speed pulley 21.

Referring more particularly to Figs. 12 to 15, inclusive, the belt shifting lever 22 when moved to the position for applying the belt to the tight pulley 11, is pressed against an actuator arm 90 (Fig. 14) the latter secured to the slide rod 91 slidably mounted in guide arms 92, 93, carried by the bracket 94 attached to the side of the slasher frame adjacent the hand lever 22. The slide rod is normally moved to the right as viewed in Fig. 14 by means of a coiled spring 95 interposed between a collar 96 in the end of the rod and the bracket 93, the spring being of sufficient strength to draw the actuator 90 to the dotted line position shown in Fig. 14 and move the belt shifter to a position where it applies the belt to the slow speed pulley 21. In that position the actuator arm 90 is brought to rest by engagement between a collar 97 fixed on the slide rod 91 and the guide arm 93, the belt shifting lever being capable of being moved still farther to the right to throw the belt on the loose pulley and stop the machine. The lever 22 is yieldably fixed with reference to the actuator 90 by means of a spring pressed pin 98 carried by the actuator arm and engaging a groove or depression in the side of the lever.

When the actuator arm is moved to the full line position shown in Fig. 14, it is there held by means of the latch finger 100 engaging the pivoted catch 101. The latch finger is pivotally mounted on a pin 102 carried by the bracket 103 fixed upon the slide rod 91. Its rotative movement left-handedly, as viewed in Fig. 14, is limited by the shoulder 104 on the latch finger which engages a stop lug 105 on the bracket. A spring 106 on the pin 103 tends normally to turn the latch finger to the position shown in Fig. 14 against the stop lug. This provides a construction whereby the latch finger is permitted readily to snap past and seat against the catch when the slide rod is moved to the left (as viewed in Fig. 14) but prevents opposite movement of the slide rod or actuator until the catch is withdrawn whereupon the spring moves the actuator and throws the belt shifting lever as described.

The catch 101 is caused to be positively withdrawn to release the latch and actuator immediately on the dropping of a detector by electro-magnetic means which are energized through the circuit completed thereby. Any suitable form of electro-magnetic release for the catch may be provided, but herein I have shown in Figs. 16 to 19, inclusive, an efficient form of electro-magnet catch release similar to that shown in Patent No. 538,124, dated April 23, 1895. In this form of releasing mechanism the catch 101 has a tail piece 110 which is prevented from movement in a direction to release the latch 100 by the stop projection 111 carried by the rock lever 112. The rock lever 112 is pivoted in the casing 113 and has at one end a stop arm 114 provided at its end with a stop projection 115. The latter is normally prevented from movement in a direction to release the catch by the end 116 of an armature lever 118, the latter being located in operative relation to the magnets 119.

The armature lever 118 is normally thrown outward by a spring 120 to the position shown in Figs. 16, 17 and 19 where it prevents backward movement of the stop lever 114. On energization of the magnet windings, however, it is drawn down so as to register with the notch 116 in the stop lever, thereby releasing the latter for backward movement. The stop 111 yields against the pressure of the tail piece 110 and the latter against the pressure of the latch 100, and the catch swings back out of the way of the latch, releasing the latter and permitting movement of the belt shifting lever. A relatively light spring 121 is provided to normally hold the catch and rock levers in the full line position shown.

As indicated in the diagrammatic view shown in Fig. 20, the magnet windings 119 are in series with a circuit passing through a source of electro-motive force 122, the machine frame, detectors and contacts 76, the circuit as described being normally broken between the contacts and the detectors. Since the detector exercises direct electro-magnetic control over the speed change mechanism, the belt shifter is thrown directly upon the dropping of the detector upon the contact plate 76.

To strike the lease after the warp has been wound on the loom beam, the machine is stopped momentarily and the cam shaft turned through the hand wheel 70 or 71 to bring the several sets of heddles to the same level. The two sets of heddles which control alternate threads of the warp are then raised by manipulating the connections of the stringer bars to the actuating levers 52

as heretofore described, which gives the required decussation of the threads to permit a leasing tape to be passed between the two sheds thus formed. The pair of elevated heddle supports are then lowered and the remaining pair raised and another tape inserted. This operation need occupy but a few seconds of time. The machine is then started up, the leasing tapes being passed through the comb, reeds or other interfering parts of the machine by expedients similar to those heretofore adopted and well known in the art.

It is convenient to draw the warp threads through the harnesses in one, three, two, four order, that is to say, the first thread of the warp through a heddle of the first set, the next adjacent warp thread through a heddle of the third set, the next through a heddle of the second set, and the fourth through a heddle of the fourth set. By this expedient the first and second set of heddles or the third and fourth set may be raised together to obtain the decussative arrangement of the yarns. Obviously any other suitable arrangement of thread drawing may be had.

It will be observed that by employing several pairs of detector sets not only are the threads given a very free draft between the detectors, due to the freedom of the latter to separate, but the detector supports may be manipulated at will to form a single thread or a double thread lease *i. e.* one where two adjacent and successive threads fall upon the same side of the leasing tape or other leasing member.

While I have herein shown and described for purposes of illustration one specific embodiment of the invention and one specific application thereof, it is to be understood that the same is limited neither to the details of construction nor relative arrangement nor position of parts herein shown, nor to the application herein made of the several features of improvement herein disclosed, but that extensive deviations may be made from the described embodiment without departing from the spirit of the invention.

Claims.

1. The combination with a slasher of thread-fault-detecting members operatively associated respectively with the individual threads thereof, and means controlled by the same on the occurrence of a thread fault for slowing down the slasher without stopping the action thereof.

2. The combination with a slasher of thread-fault-detecting means associated therewith, and means controlled by the same for slowing down the slasher.

3. In a textile machine, the combination with means for passing threads therethrough in a non-united condition, driving mechanism, thread-fault-detecting means, and means controlled thereby for slowing down the machine.

4. The combination with a slasher having its section beam supports, sizing rolls, drying cylinder and loom beam support, and means for driving the same to cause the passage of threads from the section beams over the sizing rolls and drying-cylinder to the loom beam, of thread-fault detecting means associated with the threads during their passage and normally out of supported contact with the threads, and detector-controlled mechanism responsive to the occurrence of a thread fault.

5. The combination with a slasher having its section beam supports, sizing rolls, drying cylinder and loom beam support, and means for driving the same to cause the passage of threads from the section beams over the sizing rolls and drying cylinder to the loom beam, of thread-fault detecting means associated with the threads and including a series of vibratory feeler-detective devices adapted to feel for and contact with non-faulty threads.

6. The combination with a slasher with its section beam supports, sizing rolls, drying cylinder and loom beam support, and means for driving the same to cause the passage of threads from the section beams over the sizing rolls and drying cylinder to the loom beam, thread-fault-detecting mechanism associated with the threads during their passage and means controlled by the occurrence of a thread fault for slowing down the movement of the threads without stopping the same.

7. The combination with a slasher having section beam supports, size rolls, a drying cylinder, and a warp beam support, of means for causing the thread to pass from the section beams over the size rolls and drying cylinder to the warp beam at a relatively high rate of speed, thread-fault-detecting means including detecting devices normally out of supported contact with the threads, and means for causing an occasional thread contacting movement of the detecting means to detect the occurrence of a thread fault.

8. The combination with a slasher having section beam supports, sizing devices including size rolls, a drying cylinder, a loom beam support, means for causing the passage of threads from the section beams through the sizing devices over the drying cylinder and to the loom beam, thread-fault-detecting means associated with the threads between the section beams and the sizing devices and including detecting devices normally out of supported contact with the threads and acting on the unsized threads, and means to cause an occasional thread contacting movement of the detecting means to detect the occurrence of a thread fault.

9. The combination with a slasher of

thread-fault-detecting means including detecting devices normally out of either supported or supporting contact with the threads but adapted periodically to contact therewith to detect the occurrence of a thread fault.

10. The combination with a slasher of thread-fault-detecting mtans including detecting devices normally out of supported contact with the threads, thread-guiding means for maintaining a substantially fixed path for the threads where they pass the detecting devices, and means for causing an intermittent thread-contacting movement of the detecting devices.

11. As a new article of manufacture, a detector having a supporting formation whereon it may rest on a supporting member and provided with a throat through which the member may be relatively withdrawn from supporting relation to the detector.

12. A heddle provided with a perforation having in its upper edge a relatively narrow throat opening into a wider member-receiving perforation, said throat presenting on each side abruptly shouldered supporting portions.

13. A flat metallic heddle having a relatively narrow slot terminating both above and below in wider member-receiving openings, in combination with a supporting member of greater width than the slot.

14. A heddle provided with a perforation having in its upper edge a relatively narrow throat opening into a wider perforation, said upper edge presenting at said throat abruptly shouldered supporting portions.

15. The combination of a series of heddles with a supporting bar, said heddles being provided with perforations wherein said bar may be sustained, each heddle perforation being so shaped as to permit it to be lifted individually with relation to the series and sustained by the remaining members of the series through said bar.

16. In a detector mechanism, a series of detectors and means for supporting an individual detector by the other members of the series but at a height above the level of the remaining members of the series.

17. In a detector mechanism, a series of detectors, means for raising and lowering the series, and means for moving an individual detector to support the same in fixed relation to the series as a whole whereby the same is rendered inoperative.

18. In a thread-fault-detecting apparatus a series or bank of detectors, means for giving said detectors an intermittent, thread-fault-detecting movement, and means for temporarily rendering a given detector inoperative.

19. As a new article of manufacture, a detector having a thread slot and an opening enlarged at the ends but having catch projections whereon said detector may be temporarily suspended to render the same inoperative.

20. The combination with a textile machine of a plurality of sets of threads, detectors normally held out of supported relation to the threads, means for giving the same an intermittent thread detection feeling movement, thread-fault detection mechanism controlled thereby, and means for giving said sets relative movement to strike a lease.

21. The combination with a slasher of lease forming means comprising a plurality of sets of detecting members normally held out of supported relation each to its corresponding thread, means for giving them an intermittent feeling movement each against its thread, thread-fault responsive means controlled by said members, and means providing for relative movement of the sets to strike a lease.

22. The combination with apparatus for winding on a succession of warp rolls from the same source of thread supply, of intermediate lease forming means comprising a plurality of sets of detecting members, thread-fault responsive means controlled by said members and means for moving said sets relatively to each thread to strike a lease.

23. The combination of a plurality of series of heddle members, means to vibrate the heddle members, means while the vibrating means is at rest to shift any series of heddle members vertically and there hold the same to strike a lease.

24. The combination of a plurality of series of detector members, means to vibrate the latter, thread-fault responsive means controlled by the detectors, and means while the vibrating means is at rest to shift any series of detectors vertically and there hold the same to strike a lease.

25. The combination with a slasher of lease forming means comprising a plurality of sets of thread-fault-detecting members normally out of supported contact with the threads, means for moving the supports one at a time to bring their detectors into thread-contacting relation with the threads, and means at will to strike a lease by moving a plurality of said supports at a time to lift the threads which are related to the detectors carried by said supports above the plane of the remaining threads.

26. The combination with a slasher of lease-forming means comprising a plurality of sets of thread-fault-detector members normally out of supporting contact with the threads, means for depressing said members at intervals to bring them into fault-detecting contact with the threads, and means at will to raise a set of said detector members into supporting contact with the threads

controlled thereby and thereby raise the threads above the plane of the remaining threads to assist in striking a lease.

27. The combination with a slasher of a plurality of banks of thread-fault-detectors, a holding bar for each bank, automatic power means for vibrating said bars to impart a thread contacting movement to the detectors and devices for disconnecting the automatic power vibrating means from the holding bars whereby the latter may be moved as desired to strike a lease in the threads controlled thereby.

28. The combination with a slasher of a plurality of sets of detector devices normally out of supporting contact with the threads, automatic power means for moving the detectors at intervals into supporting contact with the threads, and means for disconnecting said power means whereby said detectors may be employed to strike a lease.

29. A method of detecting thread fault in a high speed yarn which consists in intermittently feeling for any contacting with the yarn while maintaining the latter in a substantially fixed path.

30. The method of detecting a thread fault in a high speed yarn which consists in intermittently feeling for and contacting with the yarn without deflecting the yarn from its path and causing the feeling movement to control the yarn movement on the occurrence of a thread fault.

31. The combination with a slasher of combined leasing and thread fault detecting means including depending devices having elongated thread openings, and means to move said devices intermittently to contact with non-faulty threads.

32. The combination with a slasher of combined leasing and thread fault detecting means including depending metallic members having elongated thread openings, and means positioned above the threads to move said members periodically into feeling contact with non-faulty threads.

33. A combined lease forming and detecting mechanism for warp threads comprising a plurality of banks of detectors, a support for each bank, an oscillatory actuating member for each support, connections between each support and said oscillatory member, a cam for actuating each oscillatory member to cause intermittent and occasional frictional movement of the corresponding detector bank the said cams being arranged to cause said movements in order of succession, a driving ratchet for said several cams, a driving pawl for moving said ratchet, a constantly driven shaft for actuating said pawl, means for turning said cams independently of the driving shaft to bring the said banks to the same level when the driving shaft is at rest, and means for changing the connection between each actuating member and its support to cause relative movement between the several detector banks to strike a lease.

34. The combination with a textile machine of a combined lease forming and detecting means, and mechanism for moving said means intermittently into feeling engagement with the threads, said thread feeling movement being without sensible deflection of the thread from its normal path.

35. The combination with a slasher having its section beam supports, sizing rolls, drying cylinder and loom beam support, and means for driving the same to cause the passage of threads from the section beams over the sizing rolls and drying cylinder to the loom beam, of combined lease-forming and thread-fault detecting means, and mechanism for intermittently moving said means into contact with the threads during their passage through the slasher.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

MILLARD F. FIELD.

Witnesses:
THOMAS B. BOOTH,
EVERETT S. EMERY.