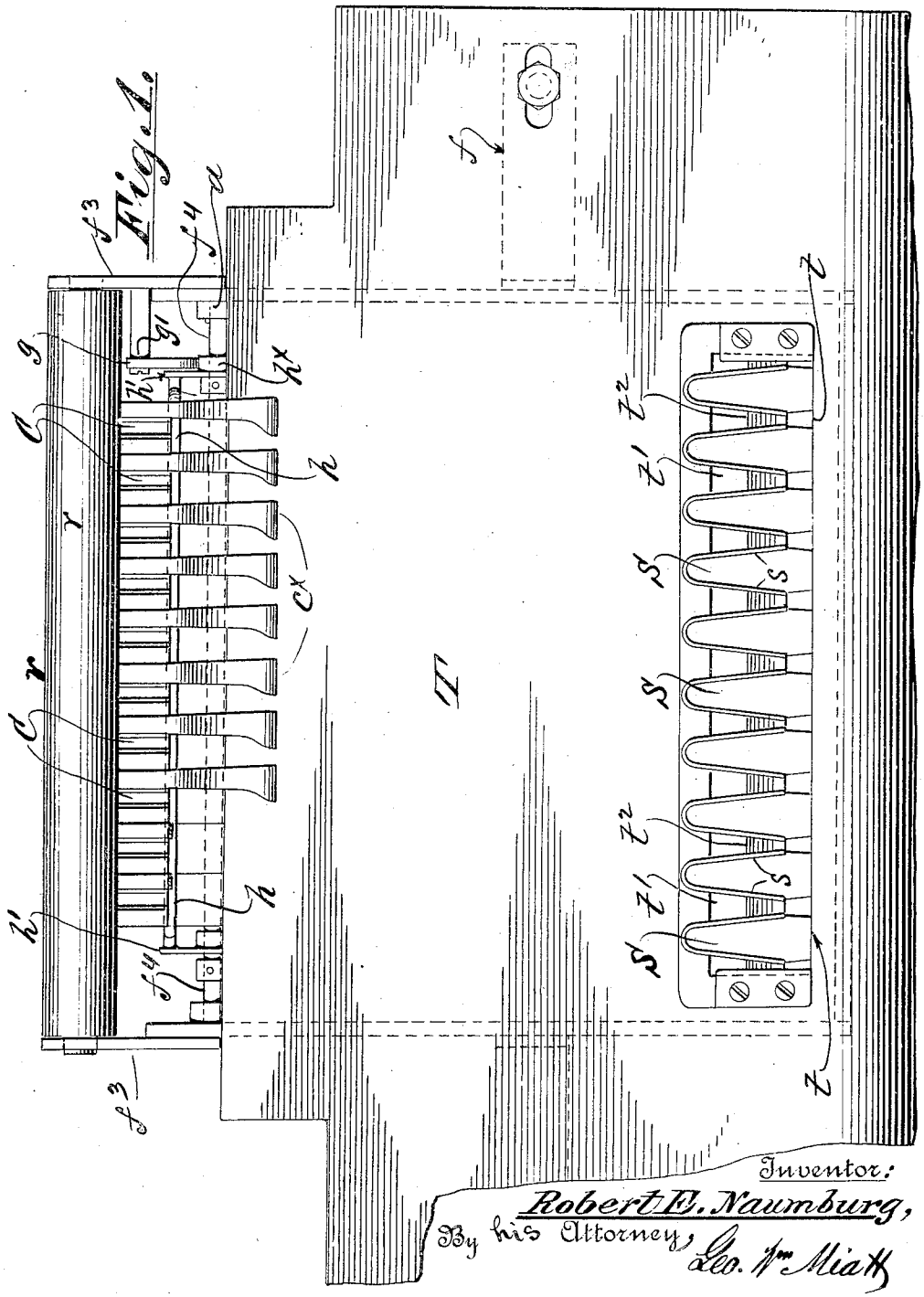
Oct. 6, 1925. 1,556,018

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SLIVER REPLACEMENT MECHANISM FOR TEXTILE MACHINERY

Filed March 10, 1921 6 Sheets-Sheet 1



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SLIVER REPLACEMENT MECHANISM FOR TEXTILE MACHINERY

Filed March 10, 1921 6 Sheets-Sheet 2

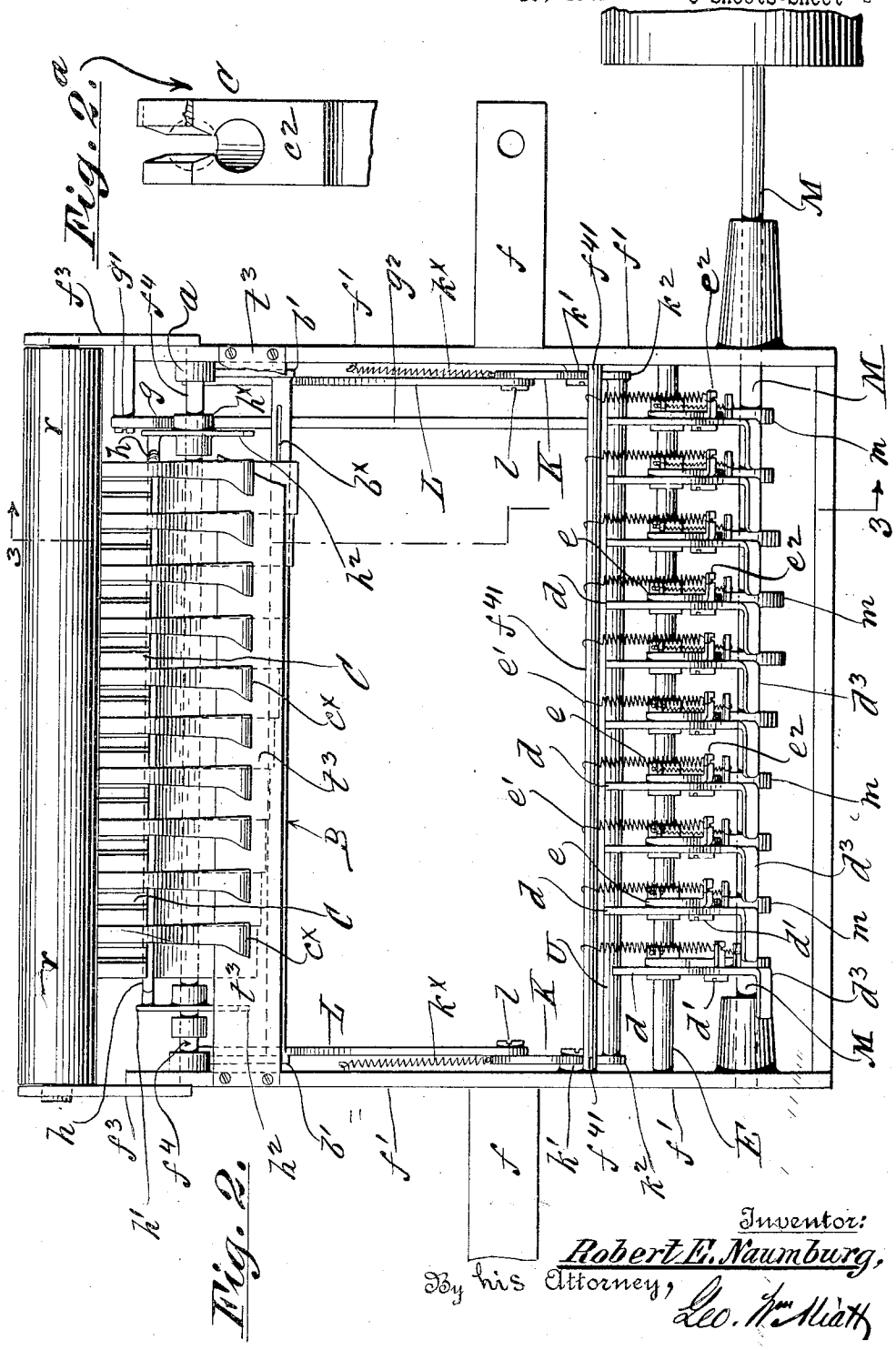


Fig. 2.

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SLIVER REPLACEMENT MECHANISM FOR TEXTILE MACHINERY

Filed March 10, 1921 6 Sheets-Sheet 3

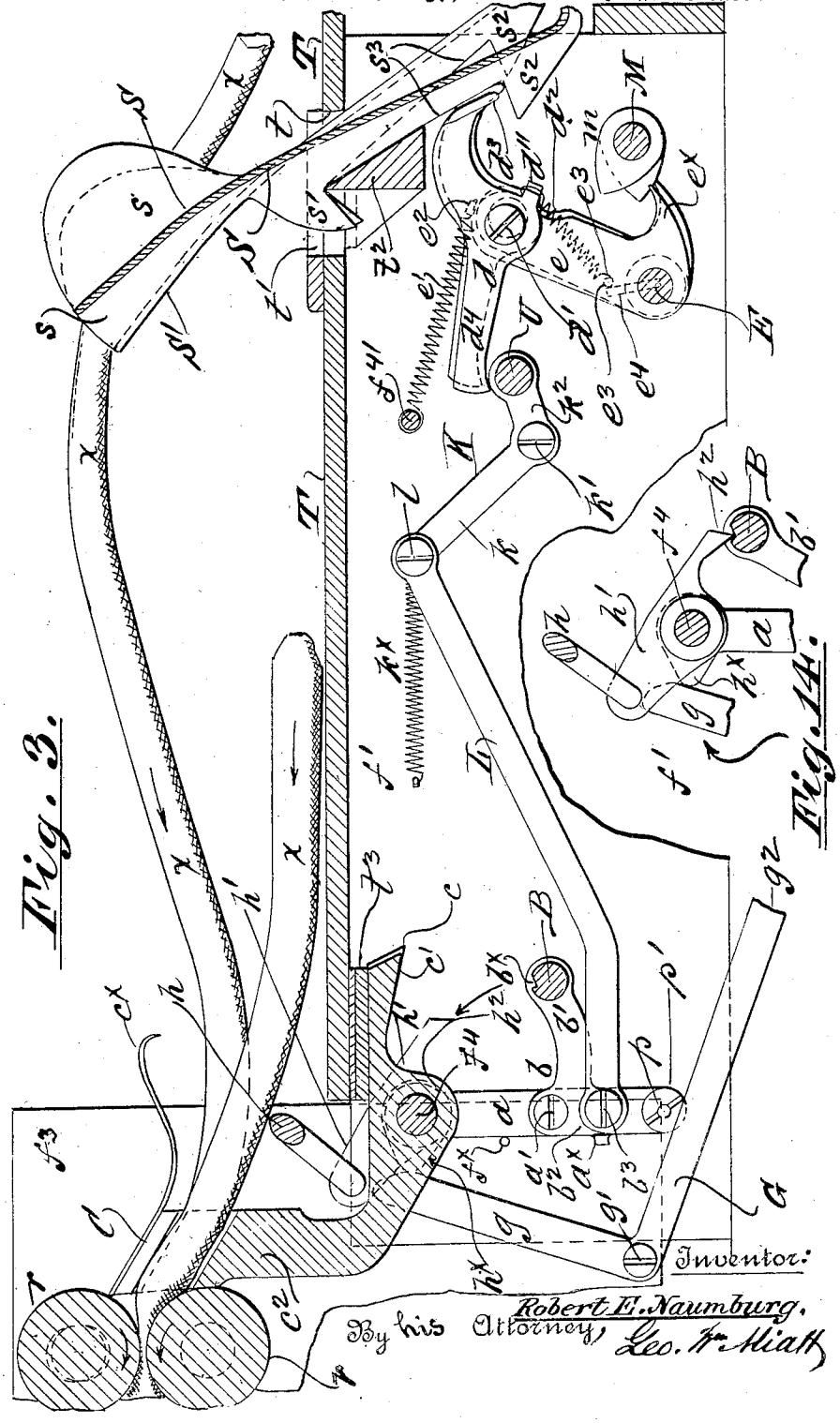


Fig. 3.

Fig. 14.

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SLIVER REPLACEMENT MECHANISM FOR TEXTILE MACHINERY

Filed March 10, 1921 6 Sheets-Sheet 4

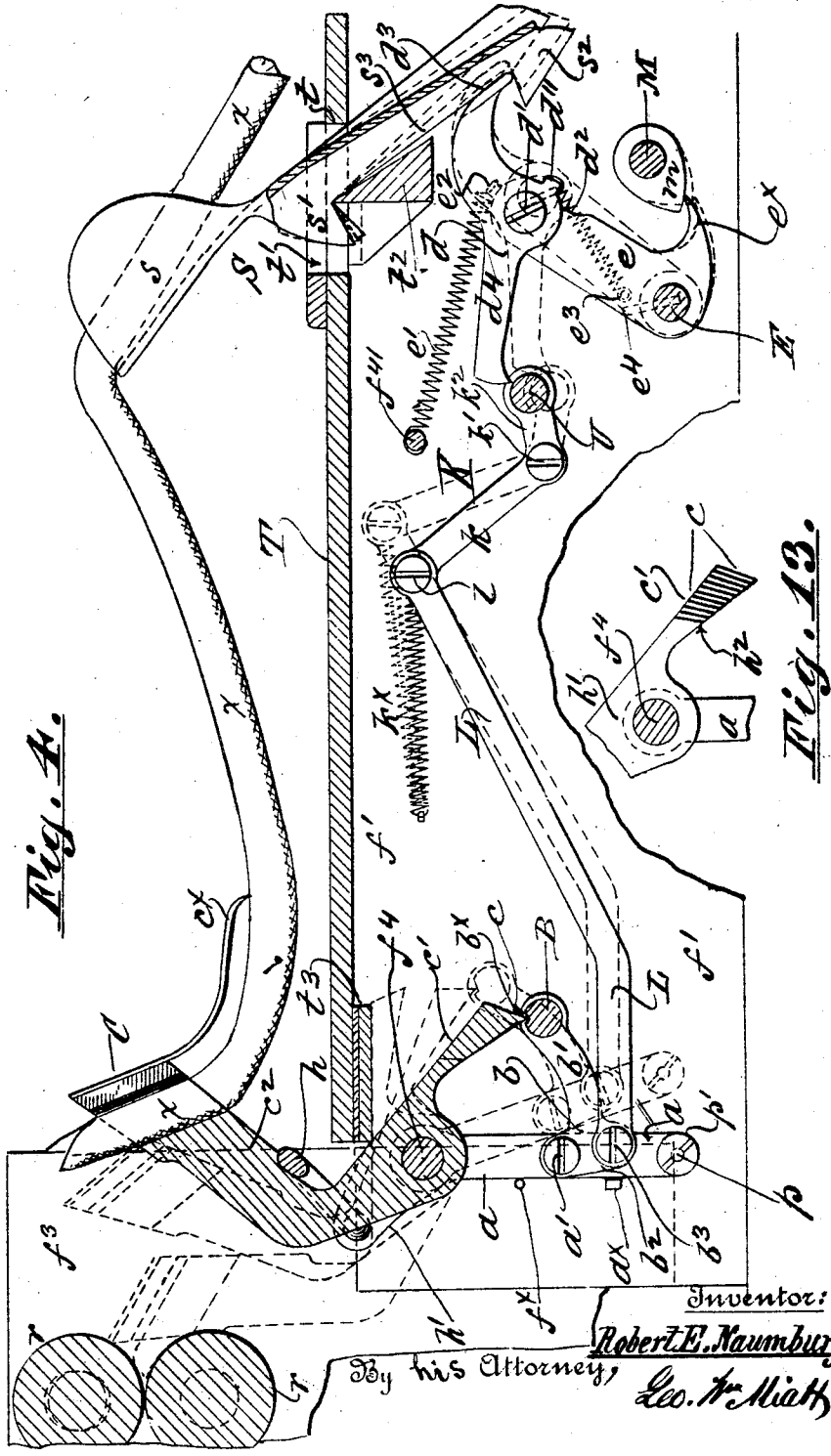


Fig. 13.

Fig. 14.

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SLIVER REPLACEMENT MECHANISM FOR TEXTILE MACHINERY

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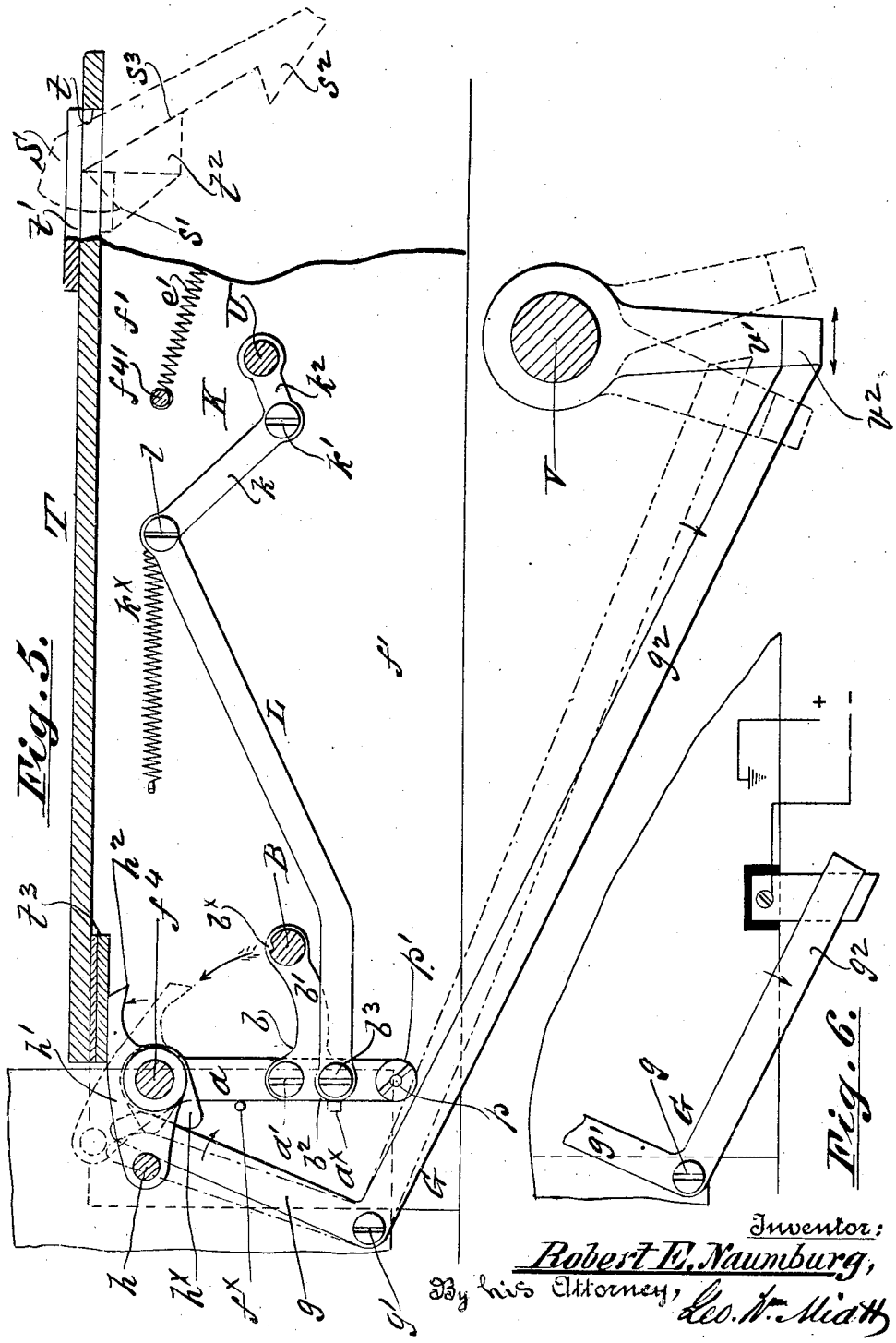


Fig. 5.

Fig. 6.

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SLIVER REPLACEMENT MECHANISM FOR TEXTILE MACHINERY

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Fig. 7.

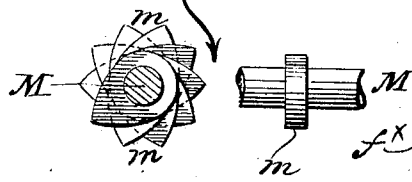


Fig. 8.

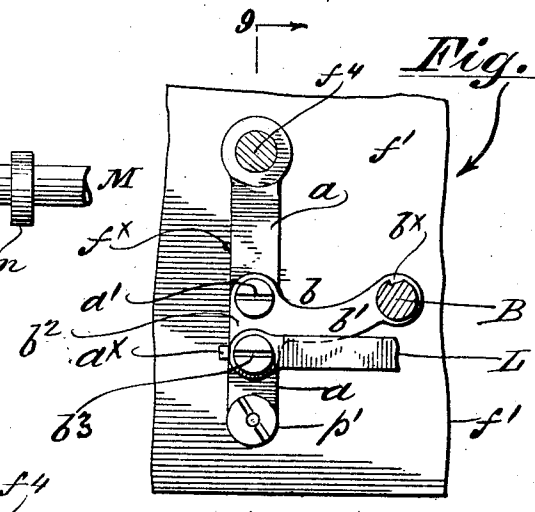


Fig. 9.

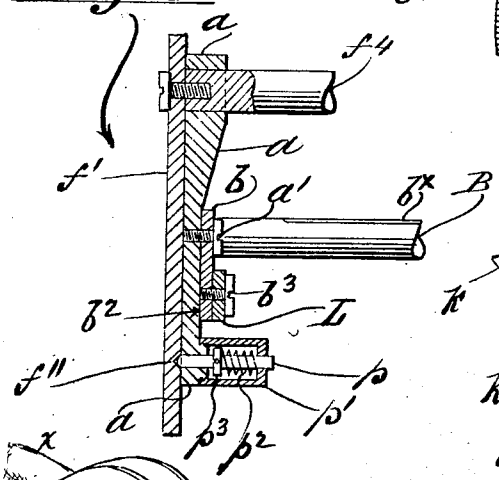


Fig. 12.

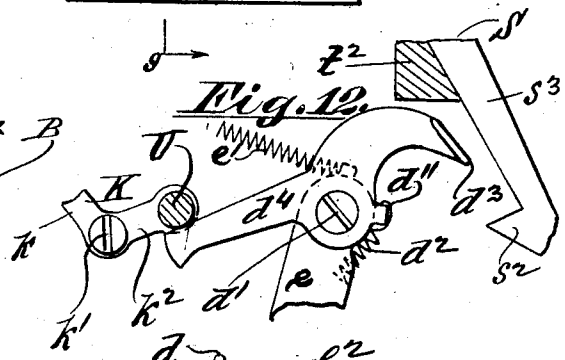


Fig. 10.

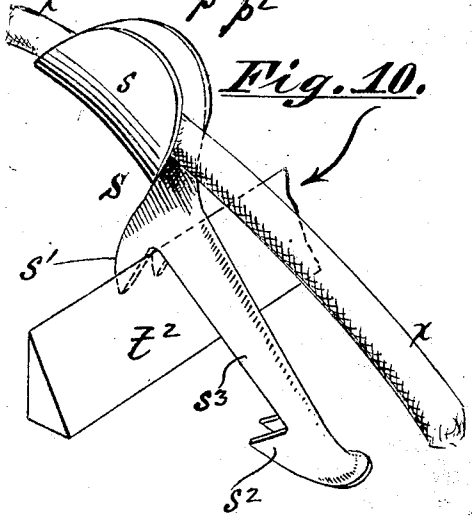
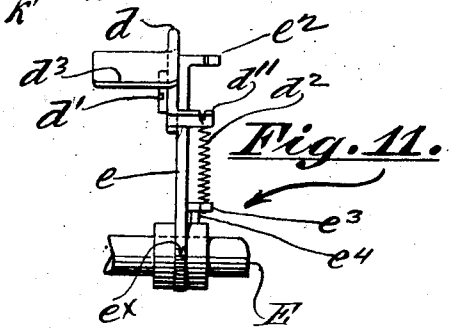


Fig. 11.



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UNITED STATES PATENT OFFICE.

ROBERT E. NAUMBURG, OF NEW YORK, N. Y.

SLIVER-REPLACEMENT MECHANISM FOR TEXTILE MACHINERY.

Application filed March 10, 1921. Serial No. 451,383.

To all whom it may concern:

Be it known that I, ROBERT E. NAUMBURG, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Sliver-Replacement Mechanism for Textile Machinery, of which the following is a specification.

My improvements relate to means for feeding a plurality of slivers to the primary or entry rollers of a drawing frame, such as used in textile machinery for the purpose of attenuating such slivers and uniting them into a single sliver of prescribed character for use in subsequent processes incidental to the manufacture of textile fabrics, in a manner well known in the art.

Heretofore the failure or breakage of one or more of the series of slivers thus simultaneously fed to the drawing frame has resulted in the automatic stoppage of the machine, which remained in enforced idleness until the defect was remedied manually.

It is the main object of my invention to obviate this temporary inoperativeness of the machine, and the consequent loss of time, labor and production involved in lack of continuity of plural sliver feed, by providing for the automatic replacement of slivers in the carriers that feed them to the rolls, as required; and this I accomplish without interferring with the operation of the apparatus as long as replacement slivers are available,—the invention consisting in the combination and arrangement of parts and devices described and claimed whereby this effect is attained, and a feature of the preferred embodiment of the invention being the utilization of such gravity tension spoons as are released by lack of continuity of sliver feed to set in operation my relief mechanism, whereby the substitution and replacement of slivers is accomplished, all as hereinafter fully set forth.

In the accompanying drawings, I have exemplified a practical embodiment of my invention in conjunction with well known operative parts of drawing frame mechanism of apparatus of the character designated, in which provision is made for ten slivers, two or more of which may presumably be held in reserve to be utilized as replacements for broken or exhausted slivers, although the relative number of active slivers and reserve slivers may be varied at will, and without special arrangement or adjustment of parts,—the ends of the initially active slivers being inserted by hand between the entry rollers of the customary series of drawing or attenuating rollers in the usual manner, and the ends of other or reserve slivers being so inserted in their respective carriers, ready for automatic substitution on emergency in a manner to be hereinafter described. It is to be understood of course in this connection that I do not limit myself to any plural number of slivers thus to be provided for in the apparatus, the essential features of construction and operation being the same irrespective of the number of slivers used in such co-relation, and the control mechanism being practically duplicated for each sliver accommodated.

Furthermore while I herein describe the invention as used in connection with, and adapted to the requirements of a cotton-drawing frame of well known construction, I do not limit myself thereto, since the essential features of my invention may be utilized in other forms of apparatus and processes incidental to the manufacture of textile products, from either cotton or other fibrous material in which continuity of feed of a plurality of slivers or other strands is important.

With this understanding, Fig. 1, represents a plan of the portions of a cotton sliver drawing frame to which my improvements have been applied, the top plate being broken away in part;

Fig. 2, is a similar view with the top plate and spoon knife edge fulcrum bar removed, showing the operative parts positioned thereunder;

Fig. 2ª, is a detail view of one of the sliver carrier heads;

Fig. 3, is a sectional elevation upon a larger scale, taken upon plane of lines 3—3, Fig. 2;

Fig. 4, is a view like unto Fig. 3, illustrating the operation of the sliver replacement mechanism;

Fig. 5, is a sectional elevation showing means for automatically dogging the vibrator which controls the stop motion device of the machine;

Fig. 6, is a detail illustrating the application of the machine stop when electrically controlled;

Fig. 7, is a view showing details of the trip cam shaft;

Fig. 8, is a sectional elevation showing one of the rockable suspender arms on and between which the carrier selector bar is mounted;

Fig. 9, is a sectional elevation taken upon plane of line 9—9, Fig. 8;

Fig. 10, is a perspective view of one of the controlling sliver spoons;

Fig. 11, is a rear elevation of one of the spoon-feeler triggers and mounts;

Fig. 12, is a sectional elevation, similar to Figs. 3 and 4 in part, illustrating in connection therewith the operation of one of the feeler triggers as related to the universal replacement bar;

Fig. 13, is a sectional detail illustrating the difference in rear projection of the carrier lever arms as related to the selector bar.

Fig. 14, is a sectional detail showing means for controlling and actuating the gravity dog lever by which the machine stop mechanism is automatically utilized in connection with my sliver replacement apparatus.

T, is the ordinary rear top plate of a cotton drawing frame detachably secured to brackets f, f, on the exterior of the side wall plates f', f', of the supporting frame. The usual knife edge fulcrum bar t^2, on which the gravity tension-feed spoons S, are mounted, is rigidly attached to the under side of said top plate T. The said feed spoons S, are of customary construction, being formed with the sliver guide flanges s, s, saddle shoulders, s', and tripping shoulders s^2, it being understood of course that the spoons S, as heretofore are delicately balanced on the knife edge fulcrum bar t^2, and that their gravity centers tend constantly to hold them with their shanks s^3, against the inclined surface of the fulcrum rail t^2, as in the case of the spoon S, shown in section in Fig. 3, from which position they are tilted by the weight of the sliver x, when present as above stated, into the feed position indicated by spoon S', as shown in said Fig. 3, with their aforesaid shanks s^3, resting against a stationary part, as for instance, the rear edge t, of the transverse slot t', formed in the top plate T, to admit of the protrusion of the upper portions of the spoons S, above said top plate in the usual manner, to bring their guide flanges s, s, into operative relationship with the sliver drawing mechanism.

r, r, represent the rear or sliver receiving rollers of the usual series of attenuating rollers provided in drawing frames of this type, said rollers r, r, being mounted on and between the side members f^3, f^3, of the frame work, and being actuated and functioning as heretofore.

f^4, is a fixed fulcrum rod on which the carriers C, C, which feed the slivers x, x, directly to the rear drawing rollers r, r, are loosely fulcrumed. This fulcrum rod or shaft f^4, is rigidly supported by and between the side plates f', f', of the frame, and affords pivotal support not only for the carriers C, C, but also for the two suspender arms a, a, positioned respectively on said fulcrum rod f^4, at opposite ends thereof.

Each suspender arm a, has pivotally mounted upon it, (as at a') a stirrup rock lever b, to the stirrup arms b', b', to which rock levers b, b, the selector bar B, is rigidly attached, and between which it extends for approximately the whole distance between the side plates f', f', of the frame, as shown particularly in Fig. 2.

The upper side of said selector bar B, is formed with a longitudinal groove b^x, for engagement with the bevelled ends c, of the carrier lever arms c'. These latter are of different lengths, as indicated particularly in Fig. 13, in which the difference is shown as of progressive sequence, although this is not essential, as any promiscuous arrangement in this respect will answer the same purpose. Thus when the carriers C, C, are in the position indicated by that in solid lines in Fig. 4, the said pointed ends c, of their lever arms c', are located to engage successively with the groove b^x, in the selector bar B, when the latter is raised by the rocking of the stirrup lever b, b, the longest lever arm c', of those in such depressed or retracted position being of course selected first, and so on consecutively, according to circumstances and conditions prevalent at the time. It is to be understood in this connection that the upper portions or heads c^2, of the carriers C, are heavier than their selective lever arms c', and that they are so shaped as related to the fulcrum rod f^4, on which they are supported that their centers of gravity may be positioned on either side of the latter, as will be understood by a comparison of the carriers shown in solid lines in Figs. 3 and 4 respectively. They are supported in the position shown in Fig. 3, by the contact of their selective lever arms c', with a buffer strip t^3, on the under side of the rear top plate T, whereas in the position shown in solid lines in Fig. 4, they rest

against a rest rod h, rigidly affixed to and between rockers h', h', fulcrumed on the rod f^4, as and for the purpose hereinafter stated.

The short arm b^2, of each stirrup rock lever b, is pivotally connected (as at b^3) with the forward end of one of two links L, the rear extremities of which are pivotally connected (as at l) with the long arms k, of one of the two bell-cranks K. The latter are fulcrumed (as at k') each to a side plate f', of the frame work, and their short arm k^2, carry rigidly mounted upon and between them the universal bar U, so called because it extends in operative relation to all of the feeler triggers d, which latter are individually and pivotally mounted each on its own trip lever e, a series of which are loosely mounted on a fixed rod or shaft E, extending between and rigidly secured to the aforesaid side members f', f', of the frame work.

Retractile springs k^x, k^x, attached to the bell cranks K, K, and to the side members f', f', of the frame, or other stationary part, acting through the links L, L, tend constantly to thrust the short arms b^2, b^2, of the stirrup rock levers b, b, against stops a^x, a^x, on the suspender arms a, a, and thus indirectly to hold the latter normally against the stops f^x, f^x, affixed to the side members f', f', or other stationary parts of the frame. This normal positioning of the suspender arms a, a, and their connections is shown more particularly in Figs. 3, 5 and 8, of the drawings, by reference to which it will be seen that the functions of the retractile springs k^x, k^x, are duplex, and of importance in that they not only control the normal positions and relationship of the suspender arms a, a, stirrup levers b, b, and selector bar B, as above stated, but also act in like manner to tend constantly to maintain the bell cranks K, and universal bar U, in normal positions,—the said retractile springs k^x, k^x, acting in conjunction with the stops f^x, f^x, in this respect, since the latter limit the forward thrust of the connecting links L, L, as shown clearly, for instance, in Figs. 3 and 5.

It may be here noted that each suspender arm a, is provided at its lower extremity with a spring detent, one of which is shown in sectional detail in Fig. 9, although I do not restrict myself to this identical construction of detent, the function of which is to retard the yielding of the said suspender arms a, a, to the initial strain exerted by the links L, L, at the inception of the operation of effecting the automatic replacement of a sliver, as hereinafter set forth. In the form of detent thus shown by way of exemplification, the inner end of a plunger p is mounted in a bearing bored for the purpose in the lower extremity of the suspender arm a, the outer end of the said plunger extending through a bearing in the otherwise closed end of a cylindrical casing or screw cap p', attached to said lower end of said suspender arm a, and a compression spring p^2, being interposed between the end of said cylindrical casing p', and a shoulder p^3, on the plunger p, the inner end or nose of which is peak-shaped to adapt it to protrude into a depression f'', formed for the purpose in the opposed inner surface of the adjacent side member f', of the frame, as shown only in said Fig. 9, of the drawings.

As before stated each feeler-trigger d, is pivotally mounted (as at d') on one of a series of trip levers e,—independently and rockably mounted on a fixed shaft E. Retractile springs e', one for each trip lever e, are attached thereto and to a common cross rod f^4, extending between the side members f', f', of the frame, as shown more particularly in Fig. 2,—the trip levers e, being formed each with a hook lug e^2, for such spring e'. These springs e', tend constantly to rock the trip levers e in such a manner as to hold shoulders e^3, on said trip levers e, in contact with stop pins e^4, on the fixed shaft E, as shown in Fig. 11, and indicated by dotted lines in Figs. 3 and 4. Each trip lever e, is formed with a toe e^x, which protrudes into the orbital plane of rotation of one of the radial cams m, rigidly mounted on the rotatable cam shaft M,—the number of said cams being equal to the number of trip levers e, feeler-triggers d, and spoons S, installed in the machine, during the operation of which said cam shaft M, is rotated continuously.

Each feeler-trigger d, is formed with a shoulder d'', which normally is held in contact with the rear edge of the trip lever e, (on which said feeler-trigger d, is mounted) by means of a spring d^2, attached to and interposed between said shoulder d'', and the shoulder e^3, on the trip lever e. Hence, while the latter is free to be rocked by its particular cam m, on the rotating shaft M, against the resistance of the spring e', each feeler-trigger d', is held normally with its lateral feeler-flange d^3, in lowest position, and with its forward or depressor-arm d^4, elevated above the universal bar U, as shown particularly in Fig. 3. Thus, while a feed-spoon is held by a sliver x, in the tilted position in which the spoon S', is shown in Fig. 3, with its tripping shoulders s^2, out of the path of the feeler-flange d^3, of its particular trigger d, the oscillation of the latter and its supporting trip-lever e, caused by the contact of the cam m, with the toe e^x, of the latter, will be inoperative in so far as the other parts are concerned.

When, however, a sliver x, breaks or is exhausted, releasing a spoon and allowing it to assume the position of the spoon S, shown in section in said Fig. 3, with its

shank s^3, resting against the inclined rear face of the knife fulcrum bar t^2, thereby protruding its tripping shoulders s^2, s^2, into the path of the lateral feeler flange d^3, of the trigger d, the latter will be rocked on its pivot d', against the resistance of the spring d^2, as the cam m, depresses the toe e^x, of the trip lever e. As a result, the forward end of the depressor arm d^4, contacts with the universal bar U, thereby rocking the bell crank levers K, K, on their pivotal supports k', k', (positioned on the side members f', f', of the frame, as heretofore stated) against the resistance of the retractile springs k^x, k^x, and causing the links L, L, to rock the stirrup levers b, b, on their pivotal supports a', a', on the suspender arms a, a,—the latter being held stationary temporarily during the inception of the retractile movement of said links L, L, and rock levers K, K, by the plungers p, p, until the strain exerted by the cam m, and intermediate parts specified above is sufficient to overcome the resistance of the springs p^2, p^2, which normally hold the peaked inner ends of said plungers p, p, in engagement with the sockets f'', f'', in the side members f', f', of the frame as hereinbefore described in connection with Fig. 9 of the drawings. This retardation of the response of the suspender arms a, a, to the pull exerted by the links L, L, is for the purpose of enabling the groove b^x, in the upper side of the selector bar B, to engage with and take up the bevelled edge c, of the longest carrier lever arm c', in depressed or retracted position (as shown in Fig. 4) preparatory to the rearward swing of said suspender arms a, a, thereby insuring the clearance of said selector bar B, by and beyond the bevelled edges c, of the other retracted carriers C, so that there can be no interference therewith. The necessary preliminary movement of the stirrup levers b, b, and the selector bar B, thus provided for and attained, is rendered practically positive by the spring detents p, p, and their sockets f'', f'', in such manner that only the particular retracted reserve carrier C, having the most protuberant lever arm c', will or can be affected by the operation of intermediate parts brought into action by a spoon released by discontinuance of active sliver feed, as above set forth.

The completion of the downward thrust of the cam m, acting on the toe e^x, of the trip lever e, in conjunction with the resistance afforded by the contact of the feeler flange d^3, of the triggers d, with the tripping shoulders s^2, of the spoon S, not only completes the depression of universal bar U, to the extent requisite to effect the raising of the carrier C, until its center of gravity is forward of the fulcrum shaft f^4, so as to enable it to assume the position shown in Fig. 3, with the end of its sliver x, thrust between the receiving rollers r, r, of the drawing frame, but also carries the forward end of the depressor arm d^4, below the said universal bar U, as will be understood by a comparative reference to Figs. 4 and 12, thereby releasing the rock levers K, K, and links L, L, so that the retractile springs k^x, k^x, are free to return the said parts, and the stirrup levers b, b, and suspender arms a, a, to normal positions, as in Fig. 3. During this return of parts to normal relationship the detent plungers p, p, are however again utilized, but in this instance the purpose is to retard the retractile movement of the suspender arms a, a, until the short arms b^2, b^2, of the stirrup levers b, b, again contact with the stops a^x, a^x, on said suspender arms a, a, so that the selector bar B, is again lowered out of range of the ends c, of any reserve carrier levers c', that may still be in depressed or retracted position, this being accomplished prior to the forward swing of said suspender arms a, a. This the said spring plungers p, p, do by frictional contact with the inner surfaces of the side members f', f', of the frame, thus insuring the engagement of the short arms b^2, b^2, of the stirrup levers b, b, with the stops a^x, a^x, until said spring plungers p, p, again coincide with and enter their mortices f'', f'', when the suspender arms a, a, reach and rest against the fixed shoulders f^x, f^x, on the side members f', f', of the frame, thereby again setting the mechanism in prescribed normal relationship for the repetition of the sliver replacement operation above described in case of further lack of continuity of sliver feed, provided of course that there are still reserve carriers in retracted position, with their upper portions reclining against the rest rod h, when the latter is in normal retracted position, as in Fig. 4.

When a fresh sliver x, is passed manually over a spoon S, on its way to a carrier C, the act of course tilts such spoon forward on the fulcrum bar t^2, so that the tripping shoulders s^2, of said spoon are held out of the path of the contact flange d^3, on the feeler-trigger d, opposed to and in alignment with said spoon S, thus allowing the spring d^2, to assist the trigger d, to again assume its normal position with its depressor arm d^4, above the universal bar U, and permitting the trip lever e, and its feeler-trigger d, to oscillate freely during the contact of the cam m, with the trip lever toe e^x, until such time as the spoon S, is again relieved of sliver tension, and hence again rocks back into the position shown in section in Fig. 3, with its shank s^3, resting against the fulcrum bar t^2.

The rocker arms h', upon and between which the rest rod h, is rigidly mounted, are loosely fulcrumed on the fixed shaft f^4, near the opposite extremities thereof, and

beyond the series of carriers C, C. The bevelled rear ends h^2, of these rocker arms h', are nearer the center of the shaft f^4, than any of the correspondingly bevelled ends of the lever arms c', of the carriers C, so that they are the last to engage with the selector bar B, and then only after all the carriers C, C, have been tilted forward into the position shown in Fig. 3. That is to say, if there are no carriers C, C, in reserve, all such having been utilized for replacement of slivers as above set forth, the subsequent release of a spoon S, by the breaking or exhaustion of the sliver feed, will result in the engagement of the selector bar B, with the ends h^2, h^2, of the rocker arms h', h', thereby tilting the latter into the position shown in Fig. 5, with their ends h^2, h^2, resting against the buffer t^3.

Forming part of, or integral with, one of the rocker arms h', is a cam h^x, against which rests the upper arm g, of a gravity-dog lever G, pivotally supported at g',—the lower and longer arm g^2, of said gravity dog lever being used to stop the machine when a break of sliver feed occurs after all the reserve or replacement carriers C, C, have been raised as and for the purpose hereinafter set forth. This cam is so timed with relation to its rocker arm h', (and hence also with regard to duplicate rocker arm h', on the other extremity of the fixed shaft f^4) that when the rocker arm is tilted back with its feeler end h^2, depressed as in solid lines in Figs. 3 and 14, the protuberant eccentric portion of said cam h^x, will extend in substantially horizontal alignment, as shown in dotted lines in both Figs. 3 and 5, and in solid lines in Fig. 14, thereby sustaining said gravity dog lever G, with its arms in raised position, as indicated in solid lines in Fig. 3, and in dotted lines in Fig. 5,—the longer lower arm g^2, of the gravity dog lever G, acting as a counterweight which maintains contactual engagement between the upper extremity of the short arm g, of said lever and the operative eccentric portion of the controlling and actuating cam h^x, as will be readily perceived by a comparative reference to said Figs. 3 and 5, of the drawings. As a consequence of this cam control of the gravity dog lever G, when the rocker arms h', h',—are raised by the selector bar B, as above stated, the eccentric portion of the cam h^x, will be depressed as shown in solid lines in Fig. 5, thereby allowing the gravity dog lever G, to assume the position indicated in solid lines in Figs. 5 and 6, with its lower arm g^2, in position to dog and stop the operation of the whole machine through the medium of the usual stop mechanism provided in connection therewith. Thus, in Fig. 5, the end of the lower arm g^2, of the gravity dog lever G, is shown as protruding into the path of oscillation of the arm v', rigidly attached to the vibratory shaft V, incidental to one form of machine stop mechanism, while in Fig. 6, the said lower arm g^2, of the gravity dog lever G, is shown as closing an electrical circuit in which machine stop mechanism is interposed in a manner well known in the art.

In either case it is the tripping forward of the rocker arms h', h', by the selector bar B, after all the reserve carriers C, C, have been utilized for sliver replacement, that effects the stoppage of the whole machine upon the next succeeding failure of sliver feed, until fresh slivers are substituted for those lacking, and the apparatus is re-set for automatic control, which latter may be accomplished by the simple expedient of rocking back the cam h^x, and levers h', h', by means of the rest bar h, as a handle, or by any expedient that will return said rest bar h, rock levers h', and cam h^x, to normal retracted position, (as by turning back one of the carriers C) in which they will be sustained by the counterweight arm g^2, of the gravity dog lever G, by reason of the contactual engagement of the upper arm g, thereof with the cam h^x, as in Figs. 3 and 14.

It is to be understood as related to the foregoing description that the preponderance of weight of the rest bar h, rocker arms h', h', and cam h^x, being (as indicated in Fig. 14) in advance of the center of the stationary shaft f^4, on which they are articularly supported, it is only necessary for the selector bar B, to tilt the rocker arms h', h', sufficiently to effect the tripping downward of the cam h^x, in order to allow the gravity lever G, to assume the machine-dogging position, and to maintain it so until the apparatus is reset, and said gravity lever G, returned to normal position by the turning of the cam h^x, again into horizontal alignment, as indicated particularly in Figs. 3 and 14, thereby releasing the machine stop mechanism.

Obviously, if a reserve of auxiliary or replacement slivers is maintained by threading fresh slivers over the spoons and into empty carriers from time to time as occasion or opportunity affords, the apparatus may be run for a long time without intermission,—the amount of attention required, and the frequency of inspection involved, being governed largely by the number of sliver carriers and connections installed, and the proportion thereof held in reserve. In other words, with ordinary care and attention, the apparatus may be successfully operated continuously for an indefinite period, thereby effecting practical and substantial economy in resultant cost of product.

While I herein show and describe the embodiment of the essential features of my

invention in practical form as related to a drawing frame of well known type, I do not limit myself to minor details of construction and arrangement of parts, nor to the combination thereof with cotton sliver drawing mechanism, since various modifications may be resorted to in applying and adapting my improvements to apparatus for treating slivers of other textile material without departing from the spirit and intent of my invention in this respect.

In this connection it is to be understood that the principle involved in my invention may be adapted and employed wherever one or more ends, slivers, strands, threads, or cords (which are liable to break or become exhausted) are to be transferred or fed in or to, not only drawing frames, but also lap winders, sliver lap machines or other mechanisms for treating fibrous material in the art of textile manufacture.

By the term "active carriers" as employed in the claims for convenience of description, I mean to designate those carriers which are positioned in active feed relation to the sliver receiving rolls of the apparatus, as hereinbefore set forth.

In order to simplify and shorten the claims I therein use the term "universal bar" to designate a depression or rock bar performing the functions of the bar U shown in the drawings. In like manner the specification is relied upon to define the function of the spring detents positioned on the suspender arms *a*, *a*. Furthermore, the construction, operation, and functions of the sliver feed gravity spoons S, being well known in the art, special reference thereto in the claims is omitted.

The word sliver as used in the appended claims is intended to include not only slivers properly so-called, but any strands, threads, cords or ropes capable of being operated upon in machines of the character described.

What I claim as my invention and desire to secure by Letters Patent is,

1. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding another sliver in reserve, and means for automatically engaging said reserve sliver between the rolls upon breakage or exhaustion of one of the other slivers.

2. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding another sliver in reserve with its end in proximity to the rolls, and means for automatically engaging the end of said reserve sliver between the rolls upon breakage or exhaustion of one of the other slivers.

3. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding a plurality of slivers in reserve, and means for automatically engaging said reserve slivers one by one in the rolls upon breakage or exhaustion of other slivers successively.

4. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding a plurality of slivers in reserve with their ends in proximity to the rolls, and means for automatically engaging the ends of said reserve slivers one by one in the rolls upon successive breakage or exhaustion of other slivers.

5. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding another sliver in reserve, and automatic mechanism for feeding said reserve sliver into said rolls, said mechanism being controlled by a member which normally engages a moving sliver and is displaced upon the breakage or exhaustion of said sliver.

6. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding a plurality of slivers in reserve, and automatic mechanism for feeding said reserve slivers successively into said rolls, said mechanism being controlled by members which normally engage moving slivers and are displaced by the breakage or exhaustion thereof.

7. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding another sliver in reserve, and automatic mechanism for feeding said reserve sliver into said rolls, said mechanism being controlled by a member placed in operative relation to the path of travel of a moving sliver and actuated upon breakage or exhaustion of such sliver.

8. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of drawing rolls, means for holding a plurality of slivers in reserve, and automatic mechanism for feeding said reserve slivers successively into said rolls, said mechanism being controlled by members in operative relation to the path of travel of moving slivers and actuated upon breakage or exhaustion of such slivers.

9. In apparatus of the character described, a plurality of devices for feeding individual slivers to drawing rolls, some of said feed devices being in active position and at least one other being positioned in reserve, and means for automatically throwing a reserve

feed device into active position upon a discontinuation of feed in an actively positioned feed device.

10. In apparatus of the character described, a plurality of devices for feeding individual slivers to drawing rolls, some of said feed devices being in active position and others being positioned in reserve, and means for automatically throwing said reserve feed devices into active position one at a time in sequence upon discontinuation of feed occurring in actively positioned feed devices.

11. In apparatus of the character described, drawing rolls, means for feeding a plurality of slivers thereto, means for holding a plurality of reserve slivers with their ends in proximity to the drawing rolls, and means automatically operable upon discontinuation of feed of any sliver to engage the end of one of said reserve slivers in said rolls.

12. In apparatus of the character described, means for feeding slivers to drawing rolls, a plurality of reserve sliver feed devices having projecting arms of different lengths, and a member operable automatically upon discontinuance of the feed of a sliver to engage that feed device in reserve position which has the longest projecting arm, whereby said reserve sliver feed devices are thrown into active position one at a time upon discontinuance of successive sliver feeds.

13. In textile machinery, means for guiding a plurality of traveling strands, means for holding another strand in reserve, and means operative upon the breakage or exhaustion of any one of said traveling strands for automatically substituting said reserve strand therefor.

14. In textile machinery, means for simultaneously passing a plurality of strands through a set of rolls, means for holding another strand in reserve, and means for automatically engaging said reserve strand between the rolls upon breakage or exhaustion of any one of the other strands.

15. In textile machinery, means for simultaneously passing a plurality of traveling strands through a set of rolls, a magazine for holding another strand in reserve, a stop motion, and means operative upon breakage or exhaustion of one of said traveling strands for automatically engaging a reserve strand between the rolls if said magazine is loaded with a reserve strand, and for operating said stop motion if said magazine is empty.

16. In textile machinery, a plurality of traveling strands, a detector for each strand, a reserve strand, a universal bar, and means whereby upon breakage or exhaustion of one of said traveling strands the detector therefor will cause said bar to effect the substitution of said reserve strand for the broken or exhausted one.

17. In textile machinery, a plurality of traveling strands, a detector for each strand, an oscillating feeler for each detector, means for holding a strand in reserve, a universal bar, and means whereby upon breakage or exhaustion of one of said traveling strands the detector therefor will cause said bar to effect the substitution of a reserve strand for the broken or exhausted one if there be a reserve strand in place, and if not to stop the machine.

18. In textile machinery of the character designated, means for passing a plurality of slivers through feed rolls, means for holding another sliver in reserve, and means for automatically engaging said reserve sliver between the rolls upon breakage or exhaustion of one of the other slivers.

19. Sliver replacement mechanism of the character designated, comprising means controlled by the sliver gravity-feed spoons for automatically effecting the replacement of broken or exhausted individual slivers as fed to the rolls.

20. Sliver replacement mechanism of the character designated, comprising means controlled by sliver gravity-feed spoons for automatically effecting the replacement of broken or exhausted individual slivers as fed to the drawing rolls, and for automatically stopping the operation of the machine when such sliver feed is not available.

21. The method herein described of utilizing the plural sliver feed to the rollers of a drawing frame of the character designated, consisting in automatically controlling and effecting individual sliver replacement by means of gravity feed spoons, substantially as and for the purpose set forth.

22. The method herein described of utilizing plural sliver feed to the rolls of a drawing frame of the character designated without impeding the operation of the machine as long as slivers are available as set forth, consisting in automatically attaining and controlling sliver replacement and then stopping the machine when such sliver feed is not available, both operations being effected by means of gravity feed spoons, substantially as and for the purpose set forth.

23. The combination with sliver replacement mechanism of the character designated, comprising means controlled by the sliver gravity feed spoons for effecting the automatic replacement of broken or exhausted individual slivers, of a plurality of sliver carriers some of which are employed actively in feeding slivers to drawing rolls, and some of which are held in reserve, for the purpose set forth.

24. The combination with sliver replacement mechanism of the character designated, comprising means controlled by gravity feed spoons for effecting the automatic replacement of broken or exhausted individual slivers, and for automatically stopping the machine when such sliver feed is not available, of a plurality of sliver carriers, some of which are employed actively in feeding slivers to the drawing rolls, and others of which are held in reserve, for the purpose set forth.

25. The method herein described of rendering plural sliver feed to the rolls of the drawing frame practically continuous in apparatus of the character designated, which consists in replacement of individual slivers by automatic means controlled by the gravity feed spoons of the apparatus, substantially as and for the purpose set forth.

26. The method herein described of utilizing the lack of continuity of sliver feed to the rolls of a drawing frame of the character designated, to effect the automatic replacement of slivers by means of mechanism controlled by the gravity feed spoons over which said slivers are fed to the apparatus, substantially as and for the purpose described.

27. The method herein described of attaining continuity of sliver feed to a drawing frame of the character designated, consisting essentially in utilizing the discontinuation of the feed of an individual sliver to effect the automatic substitution of a fresh sliver therefor through the medium of the gravity feed spoons over which said slivers are fed individually to the apparatus, substantially as set forth.

28. The method herein described of attaining the replacement of a sliver to the feed rolls of a drawing frame of the character designated, consisting in utilizing the discontinuation of the feed of one sliver to automatically effect the substitution of another sliver in lieu thereof by means of lack of sliver tension on the gravity spoon affected by such discontinuation, substantially as and for the purpose described.

29. In apparatus of the character designated, a plurality of devices for feeding individual slivers to the rolls of a drawing frame, and means for automatically substituting one of such sliver feed devices in lieu of another by utilizing a lack of continuity of individual sliver feed, substantially as set forth.

30. In apparatus of the character designated, a plurality of devices for feeding individual slivers to the rolls of a drawing frame, some of said sliver feed devices being in active position and others being positioned in reserve, and means for automatically substituting a reserve feed device in lieu of an actively positioned feed device in which a discontinuation of feed has occurred, substantially as set forth.

31. In apparatus of the character designated, a plurality of devices for feeding individual slivers to the rolls of a drawing frame, some of said sliver feed devices being in active position and others being positioned in reserve, means for automatically substituting a reserve feed device in lieu of an actively positioned feed device in which a discontinuation of feed has occurred, and means for automatically stopping the machine when all the reserve feed devices have been utilized, substantially as and for the purposes set forth.

32. In textile machinery, the combination with a drawing frame of the character designated, of a plurality of sliver carriers adapted to feed individual slivers to receiving rolls, gravity guide spoons arranged to feed slivers to said carriers, and intermediate replacement mechanism controlled by said gravity guide spoons and adapted to effect a substitution of sliver carriers upon the failure of sliver feed thereto.

33. In textile machinery, the combination with a drawing frame of the character designated, of a plurality of sliver carriers adapted to feed slivers to receiving rolls, some of which carriers are active and some of which are held in reserve, gravity guide spoons adapted to feed slivers to all of said carriers, and intermediate replacement mechanism controlled by said gravity guide spoons, and adapted to effect replacement of sliver feed upon failure thereof.

34. In sliver replacement mechanism of the character designated, the combination of an active sliver carrier positioned to feed a sliver directly to the receiving rolls of the drawing frame, a reserve sliver carrier, and mechanism arranged to automatically substitute the reserve sliver carrier in lieu of the first named carrier upon the failure of sliver feed thereto, as set forth.

35. In sliver replacement mechanism of the character designated, the combination of a plurality of active sliver carriers positioned each to feed an individual sliver directly to the receiving rolls of the drawing frame, a plurality of reserve sliver carriers, and mechanism arranged to automatically substitute one of the reserve sliver carriers in lieu of an active sliver carrier when the sliver feed to the latter fails, for the purpose set forth.

36. In sliver replacement mechanism of the character designated, the combination of an active sliver carrier positioned to feed a sliver directly to the receiving rolls of the drawing frame, a reserve carrier, gravity sliver guide spoons, one for each of said carriers, arranged to supply slivers thereto, and mechanism controlled by said gravity guide spoons for automatically substituting

the reserve sliver carrier in lieu of the so called active carrier upon the failure of sliver feed tension on its sliver guide spoon.

37. In sliver replacement mechanism of the character designated, the combination of a plurality of active sliver carriers positioned each to feed an individual sliver directly to the receiving rolls of the drawing frame, a plurality of reserve sliver carriers, gravity sliver-guide spoons, one for each of said carriers, arranged to supply slivers thereto, and mechanism controlled by said gravity guide spoons for automatically substituting a reserve sliver carrier in place of a so called active carrier upon the failure of sliver feed tension over its guide spoon, as set forth.

38. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism, comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of others in the series, a reciprocatory selector bar adapted to contact with and raise said selector lever arms separately and successively, according to the length thereof interposed in the path of reciprocation of said selector bar and gravity-spoon-controlled mechanism for automatically actuating said selector bar when a spoon is relieved of sliver feed tension, for the purpose set forth.

39. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism, comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selector lever arms separately and successively according to the length thereof interposed in the path of reciprocation of said selector bar, stirrup levers on and between which the selector bar is rigidly mounted, suspender arms on which said stirrup levers are pivotally supported, bell crank levers links pivotally connecting said stirrup levers with said bell crank levers, a universal bar supported upon and between said bell crank levers, a series of vibratory trip levers, a plurality of rotatable cams for actuating said trip levers, feeler triggers pivotally mounted on said trip levers, and sliver-feed gravity spoons pivotally mounted and formed with tripping shoulders which protrude into the path of said feeler triggers on the trip levers when said spoons are relieved of sliver feed tension, as and for the purpose set forth.

40. In textile machinery of the character designated, the combination with sliver drawing rolls, of silver replacement mechanism, comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selector lever arms separately and successively according to the length thereof interposed in the path of reciprocation of said selector bar, stirrup levers on and between which the selector bar is rigidly mounted, suspender arms on which said stirrup levers are pivotally supported, spring detents on said suspender arms arranged to retard the movement thereof, bell crank levers, links pivotally connecting said stirrup levers with said bell crank levers, a universal bar supported upon and between said bell crank levers, a series of vibratory trip levers, a plurality of rotatable cams for actuating said trip levers, feeler triggers pivotally mounted on said trip levers, and sliver-feed gravity spoons pivotally mounted and formed with tripping shoulders which protrude into the path of said feeler fingers on the trip levers when said spoons are relieved of sliver feed tension, as and for the purpose set forth.

41. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selector lever arms separately and successively according to the length thereof interposed in the path of reciprocation of said selector bar, a cam rocker arm pivotally supported in alignment with the said carriers and formed with a feeler arm shorter than the selector lever arms on said carriers and adapted to be raised by said selector bar after all of the carriers are raised thereby, a cam rigidly related to said rocker arm, a pivotally supported gravity dog lever the upper arm of which contacts with said cam and the lower arm of which is adapted to engage with the machine stopping means, and gravity spoon-controlled mechanism for actuating said selector bar when a spoon is relieved of sliver tension, as and for the purpose set forth.

42. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism, comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocating selector bar adapted to contact with and raise said selector lever arms separately and succes-

sively according to the length thereof interposed in the path of reciprocation of said selector bar, a cam rocker arm pivotally supported in alignment with the said carriers and formed with a feeler arm shorter than the selector lever arms on said carriers and adapted to be raised by said selector bar after all of the carriers are raised thereby, a cam rigidly related to said rocker arm, a pivotally supported gravity dog lever the upper arm of which contacts with said cam and the lower arm of which is adapted to engage with the machine stopping means, stirrup levers on and between which said selector bar is mounted, suspender arms on which said stirrup levers are pivotally supported, links pivotally connecting said stirrup levers with bell crank levers, said bell crank levers, a universal bar supported upon and between said bell crank levers, a series of vibratory trip levers, a plurality of rotatable cams for actuating said trip levers, feeler triggers pivotally mounted on said trip levers, and sliver-feed gravity spoons pivotally mounted and formed with tripping shoulders which protrude into the path of said feeler fingers on the trip levers when said spoons are relieved of sliver feed tension, as and for the purpose set forth.

43. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selective lever arms separately and successively according to sequence in length as interposed in the path of said reciprocatory selector bar, rock levers pivotally supported, one at each end of the series of said carriers, and in alignment therewith, said rock levers being formed with feeler arms shorter than the selective lever arms on any of said carriers so as to be adapted to be raised by said reciprocatory selector bar after it has raised all of the carriers, a carrier rest bar rigidly connecting and extending between said rock levers, and gravity-spoon-controlled mechanism for automatically actuating said reciprocatory selector bar, substantially as and for the purpose described.

44. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selective lever arm separately and successively according to sequence in length as interposed in the path of said reciprocatory selector bar, rock levers pivotally supported, one at each end of the series of said carriers, and in alignment therewith, said rock levers being formed with feeler arms shorter than the selective lever arms on any of said carriers so as to be adapted to be raised by said reciprocatory selector bar after it has raised all of the carriers, a cam rigidly related to one of said rocker levers, a pivotally supported gravity dog lever the upper arm of which contacts with said cam and the lower arm of which is adapted to engage with the machine stopping means, and gravity-spoon controlled mechanism for automatically actuating said selector bar, substantially as and for the purpose described.

45. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selective carrier lever arms separately and successively according to sequence in length as interposed in the path of reciprocation of said selector bar, stirrup levers on and between which said selector bar is rigidly mounted, suspender arms on which said stirrup levers are pivotally supported, stops on said suspender bars for limiting the forward thrust of said stirrup levers, fixed stops limiting the forward thrust of said suspender arms, bell crank levers, links pivotally connecting said stirrup levers with said bell crank levers, a universal bar supported upon and between said bell crank levers, a series of vibratory trip levers, a plurality of rotatable cams for actuating said trip levers, feeler triggers pivotally mounted on said trip levers, and sliver-feed gravity spoons pivotally mounted and formed with tripping shoulders which protrude into the path of said feeler triggers on the trip levers when said spoons are relieved of sliver feed tension, as and for the purpose set forth.

46. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selective carrier lever arms separately and successively according to sequence in length as interposed in the path of reciprocation of said selector bar, stirrup levers on and between which said selector bar is rigidly mounted, suspender arms on which said stirrup levers are pivotally supported, stops on

said suspender bars for limiting the forward thrust of said stirrup levers, spring detents on said suspender arms arranged to retard the movement thereof for the purpose set forth, fixed stops limiting the forward thrust of said suspender arms, bell crank levers, links pivotally connecting said stirrup levers with said bell crank levers, a universal bar supported upon and between said bell crank levers, a series of vibratory trip levers, a plurality of rotatable cams for actuating said trip levers, feeler triggers pivotally mounted on said trip levers, and sliver-feed gravity spoons pivotally mounted and formed with tripping shoulders which protrude into the path of said feeler triggers on the trip levers when said spoons are relieved of sliver feed tension, as and for the purpose set forth.

47. In textile machinery of the character designated, the combination with sliver drawing rolls, of sliver replacement mechanism comprising a plurality of independently and pivotally supported sliver feed carriers each formed with a selective lever arm of a length different from that of the others in the series, a reciprocatory selector bar adapted to contact with and raise said selective carrier lever arms separately and successively according to sequence in length as interposed in the path of reciprocation of said selector bar, stirrup levers on and between which said selector bar is rigidly mounted, suspender arms on which said stirrup levers are pivotally supported, stops on said suspender bars for limiting the forward thrust of said stirrup levers, spring detents on said suspender arms arranged to retard the movement thereof for the purpose set forth, fixed stops limiting the forward thrust of said suspender arms, bell crank levers, links pivotally connecting said stirrup levers with said bell crank levers, retractile springs connected therewith which tend constantly to thrust said stirrup levers and suspender arms into forward positions against the aforesaid stops, a universal bar supported upon and between said bell crank levers, a series of vibratory trip levers, a plurality of rotatable cams arranged to actuate said trip levers, retractile springs which tend constantly to engage said trip levers with said rotatable cams, feeler triggers pivotally mounted on said trip levers and each formed with a depressor arm for contacting with said universal bar, retractile springs which tend constantly to rock said feeler triggers with their depressor arms out of contact with said universal bar, and pivotally supported sliver feed gravity spoons formed with tripping shoulders which protrude into the path of vibration of said feeler triggers on the trip levers when said spoons are relieved of sliver feed tension, as set forth.

48. In textile apparatus of the character designated, the combination with drawing frame rolls, of means for automatically controlling the sliver feed thereto through the medium of pivotally supported gravity guide spoons, comprising mechanism arranged to successively and individually position a plurality of replacement sliver carriers in operative relation to said rolls, and also to stopping the machine when subsequent failure of sliver feed occurs as and for the purposes set forth.

49. In a drawing frame, means for guiding a plurality of active slivers to sliver receiving rolls, means for holding another sliver in reserve, and means operative upon the breakage or exhaustion of any one of said active slivers for automatically substituting said reserve sliver therefor.

50. In textile machinery of the character described, means for simultaneously passing a plurality of slivers through a set of sliver receiving rolls, means for holding another sliver in reserve, and means whereby said reserve sliver is automatically engaged between said rolls following upon breakage or exhaustion of any one of the other slivers in time to preserve the continuity of sliver feed.

51. In a sliver replacement mechanism, a series of gravity spoons, a corresponding series of oscillating feeler triggers, a corresponding series of springs tending to hold said feeler triggers in inoperative position, a corresponding series of stopping means to limit the motion of said feeler triggers, a universal bar adapted to be operated by any of said feeler triggers, and a selecting mechanism operated by said universal bar.

52. In a sliver replacement mechanism, a series of gravity spoons, a corresponding series of oscillating feeler triggers, a corresponding series of springs tending to hold said feeler triggers in inoperative position, a corresponding series of stopping means to limit the motion of said feeler triggers, a universal bar adapted to be operated by any of said feeler triggers, a selecting mechanism operated by said universal bar, and a plurality of reserve sliver carriers adapted to be successively operated by said selecting mechanism.

53. In a sliver replacement mechanism, a series of gravity spoons, a corresponding series of oscillating feeler triggers, a corresponding series of springs tending to hold said feeler triggers in inoperative position, a corresponding series of stopping means to limit the motion of said feeler triggers, a universal bar adapted to be operated by any of said feeler triggers, a selecting mechanism operated by said universal bar, a plurality of reserve sliver carriers adapted to be successively operated by said selecting mechanism, and a stop motion operable upon the breakage or exhaustion of another sliver

after all said reserve sliver carriers have been thrown in.

54. In a sliver replacement mechanism, a series of gravity spoons, a corresponding series of oscillating feeler triggers, a corresponding series of springs tending to hold said feeler triggers in inoperative position, a corresponding series of stopping means to limit the motion of said feeler triggers, a universal bar adapted to be operated by any of said feeler triggers, and a selecting mechanism operated by said universal bar, said selecting mechanism being composed of carriers with levers of different lengths.

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