(No Model.) 2 Sheets—Sheet 1.

C. E. SHARP.

AUTOMATIC STOP MOTION FOR KNITTING MACHINES.

No. 459,659. Patented Sept. 15, 1891.

Fig. 1.

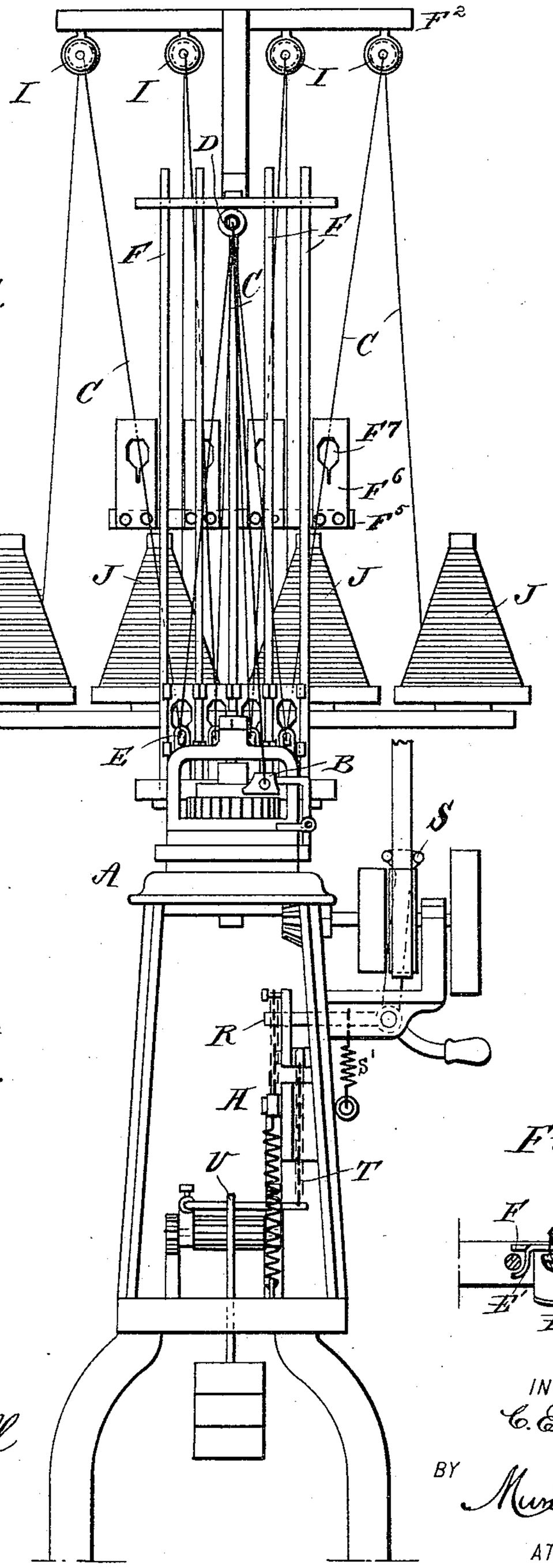


Fig. 5.

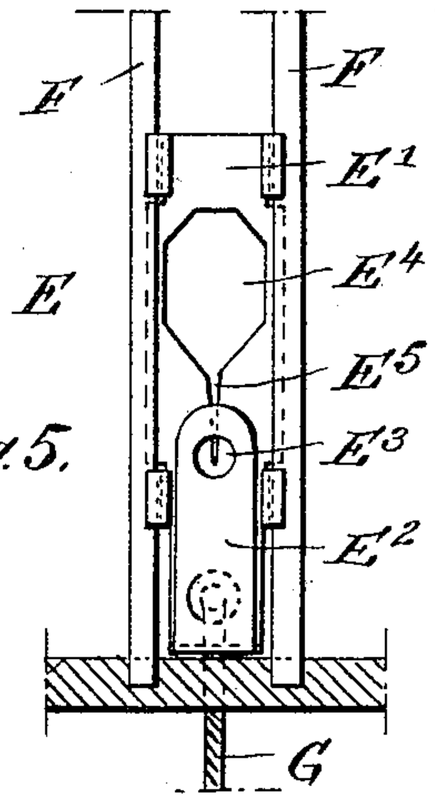
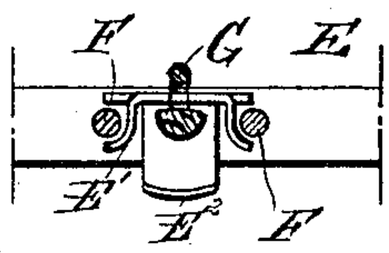


Fig. 6.



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C. Sedgwick

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2

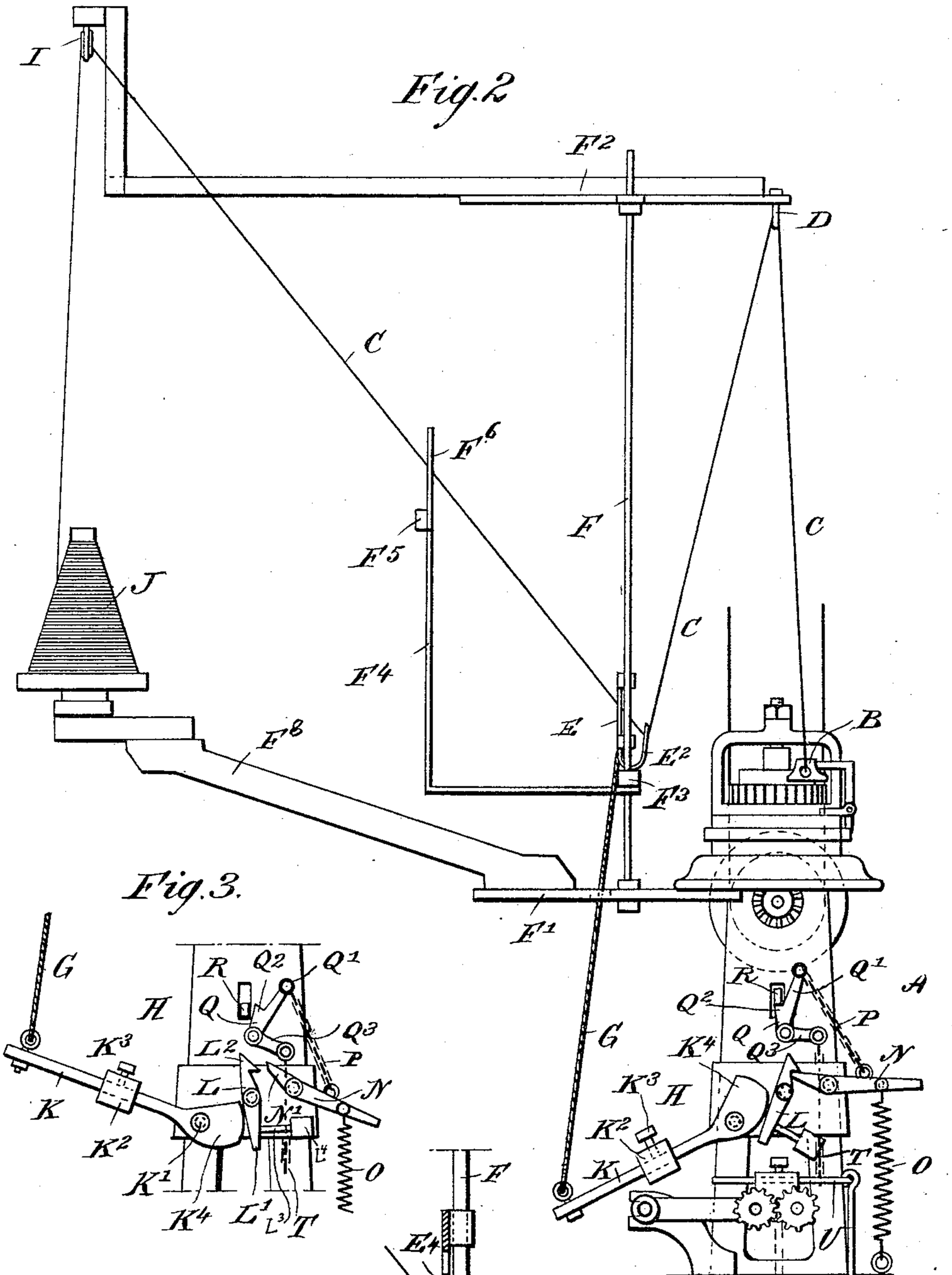

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

CLARK E. SHARP, OF LOWELL, KANSAS.

AUTOMATIC STOP-MOTION FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 459,659, dated September 15, 1891.

Application filed July 17, 1890. Serial No. 359,047. (No model.)

To all whom it may concern:

Be it known that I, CLARK E. SHARP, of Lowell, in the county of Cherokee and State of Kansas, have invented a new and Improved Automatic Stop-Motion for Knitting-Machines, of which the following is a full, clear, and exact description.

The invention relates to knitting-machines, and its object is to provide a new and improved stop-motion which is simple and durable in construction, very effective and automatic in operation, and specially designed to prevent large knots, imperfectly-twisted yarn, and bunches of loose material on the bobbin from passing into the knitting-machine, thus overloading or choking up the needles, causing breakage of the latter and other injury.

The invention consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front view of the improvement as applied to a knitting-machine. Fig. 2 is a side elevation of the same with parts of the knitting-machine removed and parts in section. Fig. 3 is a side elevation of the tripping device in a different position from the one shown in Fig. 2. Fig. 4 is an enlarged sectional side elevation of the thread-guide. Fig. 5 is a front view of the same, and Fig. 6 is a sectional plan view of the same.

The improved automatic stop-motion is applied to a knitting-machine A, of any approved construction, provided with the usual eye B, adapted to guide the twisted threads C into the machine A in the usual manner. These threads C pass through an eye D, located above the machine, as is plainly shown in Figs. 1 and 2, and then the threads diverge from this eye D downward, each to pass through a thread-guide E, fitted to slide vertically on suitable guideways F, secured on a cross-bar F^3, supported on a bracket F', fastened to the frame of the knitting-machine A, as is plainly shown in Fig. 2.

Each thread-guide E is connected by a downwardly-extending rope or cord G with a tripping mechanism H of special construction and hereinafter more fully described. Each thread passes to the thread-guide E from an eye I, supported on a bracket F^2, fastened to the upper ends of the guideways F, which also supports the eye D, previously mentioned. The threads pass to the eyes I from the usual bobbins J, held on a suitable bracket F^8, fastened to the rear end of the bracket F', as shown in the drawings. Each thread-guide E (see Figs. 4, 5, and 6) is provided with a back plate E', arranged vertically and having suitable flanges fitting on the guideways F, so that the thread-guide can conveniently slide vertically on the said guideways. From the lower end of each back plate E' extends forward and upward an arm E^2, provided with a circular opening E^3, somewhat greater in diameter than the opening in the eye B previously mentioned. Each thread C, before passing through the opening E^3, passes through a large opening E^4, formed in the back plate E', the said opening E^4 continuing at its bottom into a slit E^5, adapted to catch the end of a thread when the latter breaks or its respective bobbin J is empty. From the cross-bar F^3 extends rearwardly and upwardly an arm F^4, supporting a cross-bar F^5, carrying a number of plates F^6, each having a large opening F^7 with a slit in the bottom thereof, similar to the back plate E'. Each thread C passes through an opening F^7 in one of the plates F^6 before passing to the thread-guide E. The back plate E' is also connected in any suitable manner with the upper end of the string G, the lower end of which is fastened to one end of a releasing or actuating lever K of the tripping mechanism H, and fulcrumed at K' on the main frame of the knitting-machine A. (See Figs. 2 and 3.) On the releasing or actuating lever K is held to slide a weight K^2, adapted to be secured in place by a set-screw K^3, and serving to adjust the sensitiveness of the tripping mechanism H, according to the coarseness or fineness of the yarn used in the knitting-machine. The inner end K^4 of the lever K is in the form of a cam, and is adapted to engage one end L' of a lever L, also fulcrumed on the main frame of the knitting-machine A and provided at its upper end with a catch L^2, adapted to en-

gage the end N′ of a lever N, fulcrumed on the main frame of the knitting-machine A and adapted to extend about horizontally when the said catch L^2 engages the end N′ of the said lever, as is plainly shown in Fig. 2. The lever L has on its lower arm a wire L^3, carrying a small weight L^4, adapted to swing the catch L^2 always forward, so that when the long arm of lever N is raised the catch L^2 instantly and automatically catches the end of lever N at N′. The outer end of the lever N is connected with one end of a spring O, secured by its other end to the knitting-machine frame and adapted to pull the outer end of the lever downward when the catch L^2 is released from the end N′, as hereinafter more fully described. The outer end of the lever N is also connected by a short chain P with one arm Q′ of a bell-crank lever Q, fulcrumed on the main frame A and provided on this arm Q′ with a shoulder Q^2, adapted to support the inner end of an arm R, connected with the spring-actuated shifting-lever S, adapted to shift the driving-belt of the knitting-machine A from a fixed to a loose pulley, and vice versa. The other arm Q^3 of the bell-crank lever Q is connected by a chain T with a hold-down mechanism U of the usual construction.

The operation is as follows: When the machine is running, the arm R of the shifting-lever S rests on the shoulder Q^2 of the bell-crank lever Q, the shifting-lever S then holding the driving-belt on the pulley secured on the main driving-shaft of the knitting-machine A. The lever N is then engaged by its end N′ with the catch L^2 of the lever L, the lever K then being in the position shown in Fig. 2—that is, the cam end K^4 being in an uppermost position to allow the said lever L to engage and hold the lever N. The other end of the lever K is then in a downward position, thus holding the thread-guide E in a lowermost position and preventing the latter from sliding upward as long as the threads are in perfect order. The eye I, which contains a circular opening little less in diameter than the opening in the eye B, is adapted to catch large knots, imperfectly-twisted yarn, tangles from bobbin, loose material, &c. Hence if soft-twisted yarn catches in the eye I and breaks before raising thread-guide E the end is caught in the slit in the opening F^7 and the slit E^5 of the thread-guide E. The pull of the twisted threads from the guide E and the working parts of the knitting-machine A will then cause the respective thread-guide E to rise on its guideways F, so that the cord G will throw the lever K upward, whereby the cam end K^4 swings downward and, in pressing on the lower end of the lever L, disengages the catch L^2 of the latter from the lever N, which now changes position by the downward pull of the spring O. The downward motion of the outer end of the lever N causes a pull on the arm Q′ of the bell-crank lever Q by means of the chain P, so that the shoulder Q^2 of the said bell-crank lever is thrown out from underneath the arm R, and the shifting-lever S is operated by its spring S′ and moves the driving-belt from the fast pulley to the loose pulley on the driving-shaft of the knitting machine A, thus stopping the farther motion of the latter. The mechanism U is an automatic hold-down attachment adapted to hold the work down in the machines by means of weights, which at last are wholly brought on one or two needles, which are greatly injured when the work runs out. At the same time this mechanism drops and the pulling on chain T stops the machine, but after the greatest possible injury is done. My invention prevents work from running out, but does not interfere with mechanism U. It will of course be understood that the entire weight of the hold-down attachment U is borne by the depending web or work, so that the chain T hangs slack without in any way acting on the lever Q, except in case of a "press-off," whereupon the web or work drops and no longer supports the said hold-down attachment, which then acts on lever Q to stop the machine. A similar operation takes place when a thread C breaks between the thread-guide E and the eye I or when one of the bobbins J is empty, so that the end of the thread C falls downward between the eye I and the thread-guide E, the downward-moving end of the thread then passing downward in the opening E^4 to pass into the slit E^5 to be caught and held therein. The pulling movement of the machine then causes a rising of the respective thread-guide E, and the above-described operation is effected. When such an accident has taken place and the machine has been stopped, the operator removes the obstruction and then lifts the outer end of the arm N, so that the latter passes into a horizontal position and is engaged by the catch L^2 of the lever L, the lever K having previously moved into its normal position, as is shown in Fig. 2. The bell-crank lever Q is also moved into its normal position to engage and support the arm R of the shifting-lever S. The machine is then running again, as the driving-belt has by the last operation been moved again onto the fast pulley. Thus it will be seen that when a thread has a knot or is unevenly twisted so as not to pass through the eye I, then the machine is instantly stopped. In a similar manner when the thread breaks between the thread-guide E and the eye I or a bobbin has run empty the end of the thread is caught by the plates F^7 and thread-guide E, and the machine is also stopped in the manner above described. Any knots which will pass through the eye I will pass through openings F^7 E^4 E^3, eye D, and eye B to be safely knit without damage to the knitting-machine A. The slit in the opening F^7 is adapted to catch the end of the yarn first,

and this operation raises the thread-guide E to a level with the slit in the opening F^7 by the momentum of the machine causing the thread-guide E to still rise after the belt has been shifted onto the loose pulley. The advantage of the end catching in the slit in the opening F^7 is to give the yarn C more power to throw the tripping mechanism H. When the end catches in the slit E^5, the yarn has a straight pull to eye D, requiring more power than when the end catches in the slit in the opening F^7 when the yarn has the principle of pulling over a pulley, the aperture E^3 acting as the pulley. The tripping mechanism H is thrown before the thread-guide E has risen to a level with the opening F^7. The eye I and nothing else catches all knots too large to be knit. It will further be seen that the machine cannot be kept in motion until the device is reset, as above described, except by holding the lever S by hand. When the machine is started, it requires no further attention, except to remove the causes of stoppage, as no accident can happen while the machine is at work.

It is understood that in machines as now constructed when the work runs out of the machine caused by empty bobbins or breaking of threads, then considerable damage is done to the needles, as the weight which is for holding down the work in the machine finally bears on one or two needles, which are seriously injured. When the work runs out of the knitting-machine, the needles fly up and the hubs of the same are liable to be broken by striking the cams.

It is also understood that by the device above described many obstructions preventing the yarn from passing freely to the machine, such as yarn catching on large knots, yarn being wound or drawn under the yarn on the bobbin, or yarn not tied tight, or any other similar condition, causes an instant stopping of the machine. By the use of this device a very large percentage of the needles is saved and the production of perfect work is greatly increased.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In an automatic stop-motion, the combination, with a vertically-sliding thread-guide, of a tripping mechanism below said guide, adapted to throw the machine out of gear, having a releasing-lever, and a connection extending down from the sliding guide to the said lever, substantially as set forth.

2. A stop-motion having a thread-guide fitted to slide and provided with a large opening, the bottom of which terminates in a slit to catch the end of the thread or yarn, substantially as shown and described.

3. In a stop-motion, a thread-guide comprising a back plate fitted to slide and having a large opening, the bottom of which terminates in a slit, and an arm projecting from the said back plate and provided with a small aperture, through which is adapted to pass the thread after passing through the opening in the back plate, substantially as shown and described.

4. In a stop-motion, the combination, with a vertically-rocking spring-actuated lever controlling the driving mechanism of the machine, of a catch-lever adapted to engage the inner end of said spring-actuated lever and hold it depressed against the action of its spring, a cam-lever adapted to actuate the said catch-lever, and a plate-guide above the cam-lever and fitted to slide vertically and connected with the said cam-lever, substantially as shown and described.

5. In a stop-motion, the combination, with a vertically-rocking spring-actuated lever controlling the driving mechanism of the machine, of a catch-lever adapted to engage the inner end of said spring-actuated lever and hold it depressed against the action of its spring, a cam-lever adapted to actuate the said catch-lever, a plate-guide above the cam-lever and fitted to slide vertically and connected with the long arm of said cam-lever, and a weight held adjustably on the said long arm of the cam-lever, substantially as shown and described.

6. In a stop-motion, the combination, with a thread-guide fitted to slide and provided with a back plate having a large aperture the bottom of which terminates in a slit, and a front arm projecting from the said back plate provided with an opening for the passage of the thread only, of a cord connected with the said thread-guide, a cam-lever connected with the said cord, a catch-lever adapted to be actuated by the said cam-lever, and a spring-actuated lever adapted to be locked in place by the said catch-lever and also adapted to control the driving mechanism of the machine, substantially as shown and described.

7. In a stop-motion, the combination, with the eye I of a size to prevent the passage of knotted, untwisted, or tangled thread, of a vertically-sliding thread-guide below the said eye and between it and the knitting mechanism, and a tripping mechanism below and connected with said vertically-sliding guide and adapted to throw the machine out of gear, substantially as set forth.

8. In a stop-motion, the combination, with the vertically-sliding thread-guides, of a series of stationary plates in rear of the said sliding guides and provided each with a large opening terminating at its bottom in a slit to catch the end of the thread or yarn, substantially as set forth.

9. In a stop-motion, the combination, with the eyes I above the bobbin-support, and the eye D above the knitting mechanism, of the vertically-sliding thread-guides below and between the said eyes I D, and the vertical plates below and in front of the eyes I and provided with openings through which the

threads pass from said eyes to the sliding guides, the openings in said plates terminating at their bottoms in slits, a tripping mechanism to stop the machine, and a connection between said mechanism and a series of sliding guides, substantially as set forth.

10. In a stop-motion, a thread-guide consisting in a plate or body having a thread-opening the bottom of which terminates in a thread-grasping slit, substantially as set forth.

CLARK E. SHARP.

Witnesses:
J. R. ROUNSAVELL,
W. E. MORGAN.