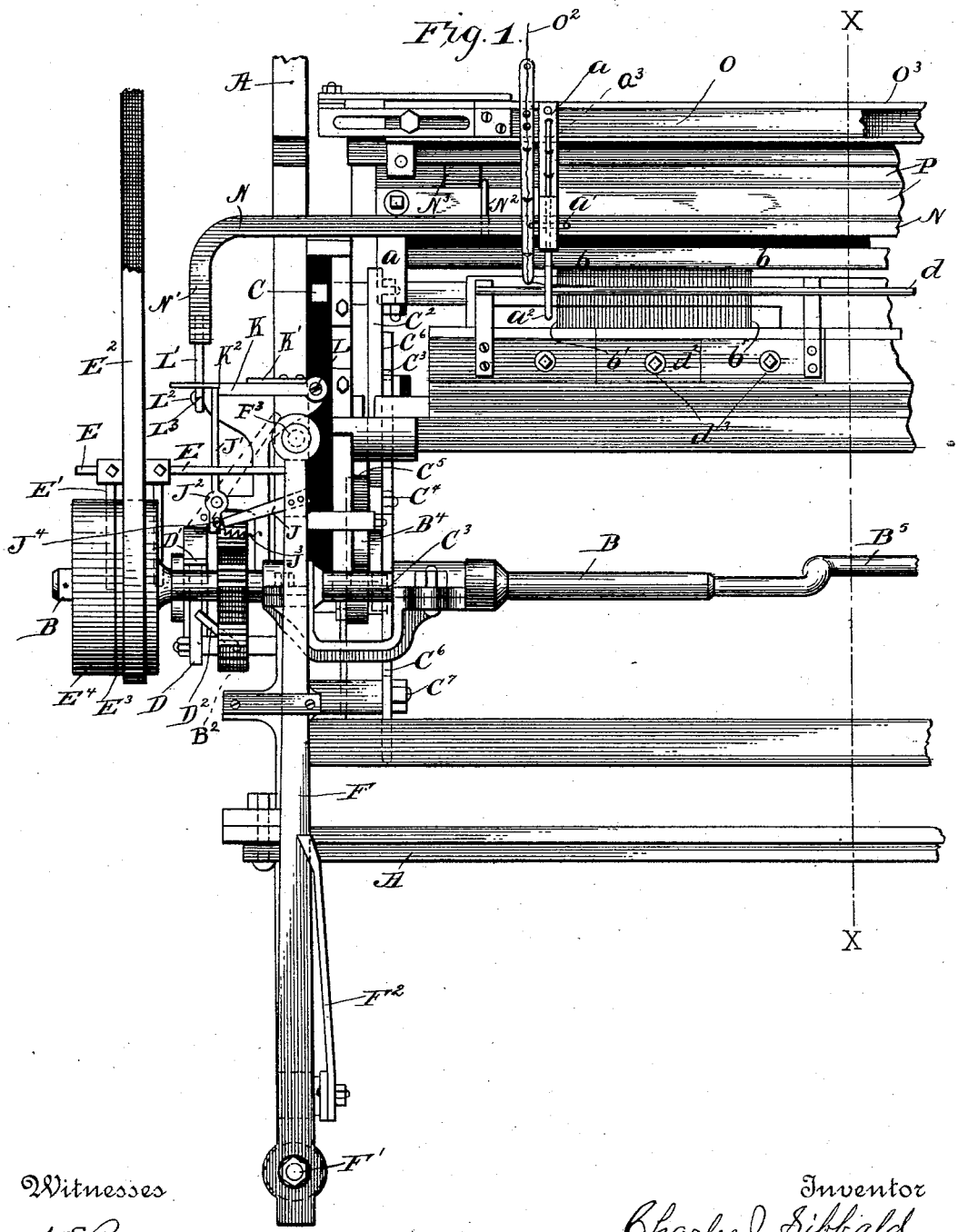
(No Model.) 4 Sheets—Sheet 1.

# C. J. SIBBALD.

## STOP MOTION ATTACHMENT FOR KNITTING MACHINES.

No. 489,420. Patented Jan. 3, 1893.

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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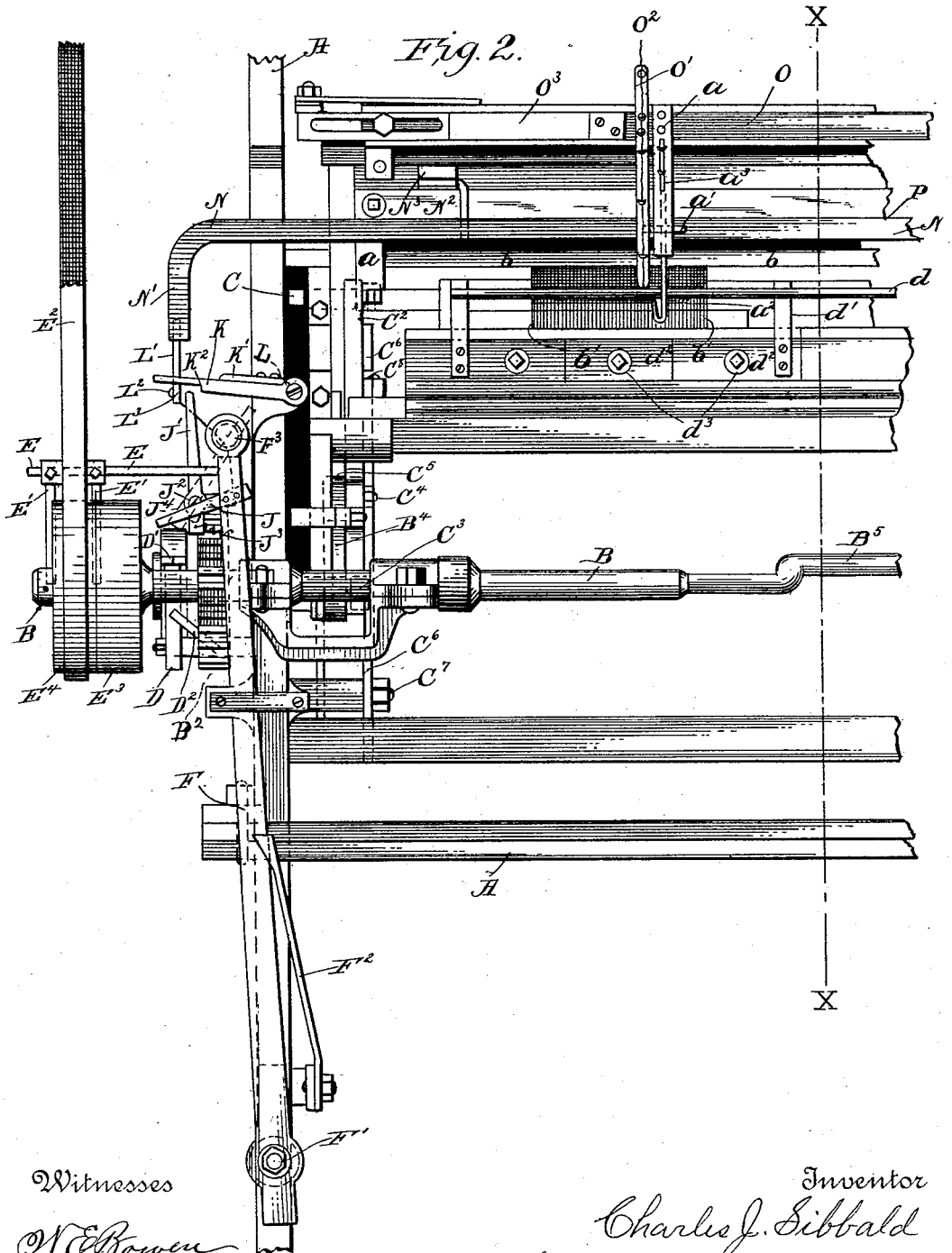
Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

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## STOP MOTION ATTACHMENT FOR KNITTING MACHINES.

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Fig. 3.

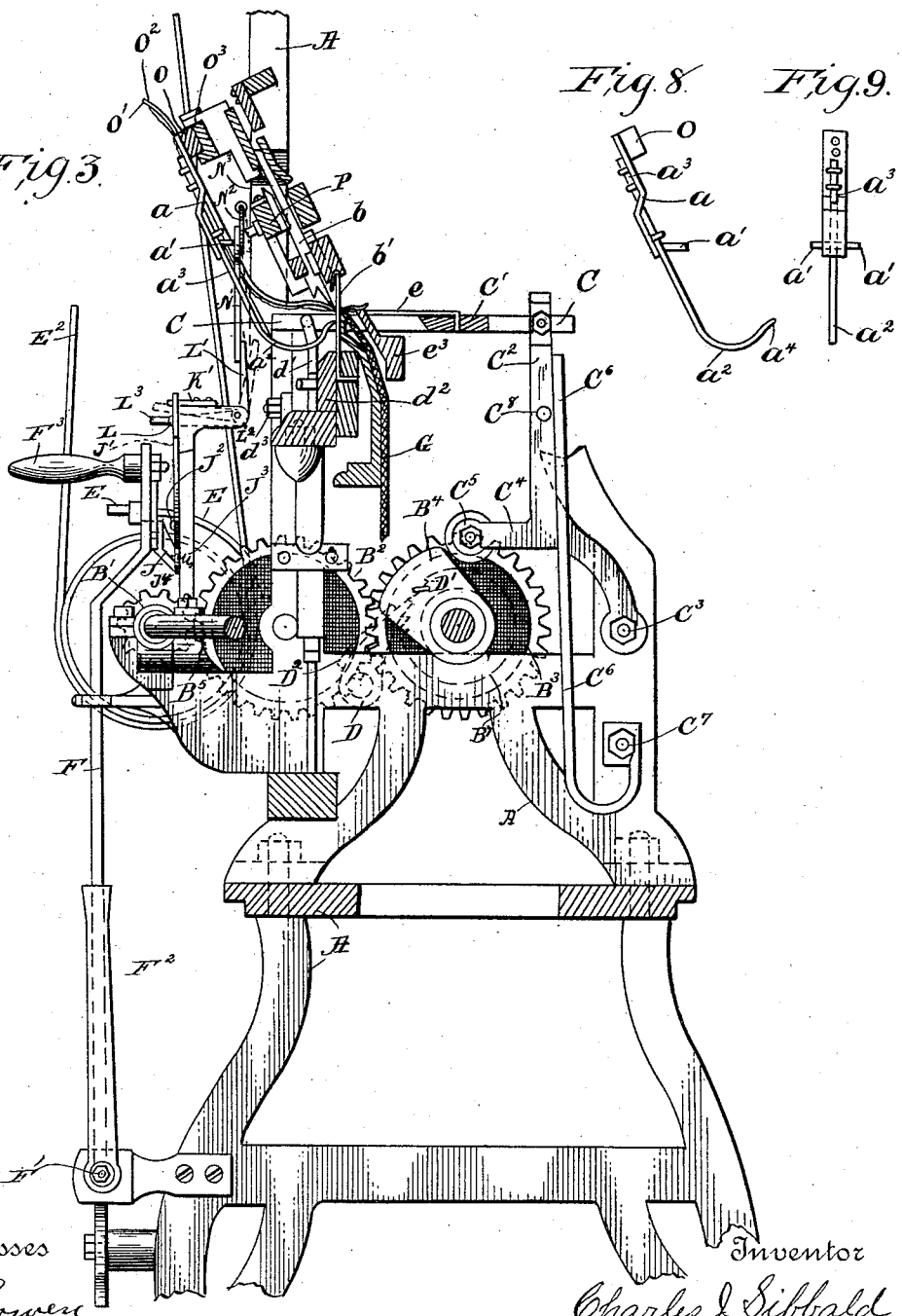

Fig. 8.



Fig. 9.



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(No Model.) 4 Sheets—Sheet 4.

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## STOP MOTION ATTACHMENT FOR KNITTING MACHINES.

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Fig. 4.

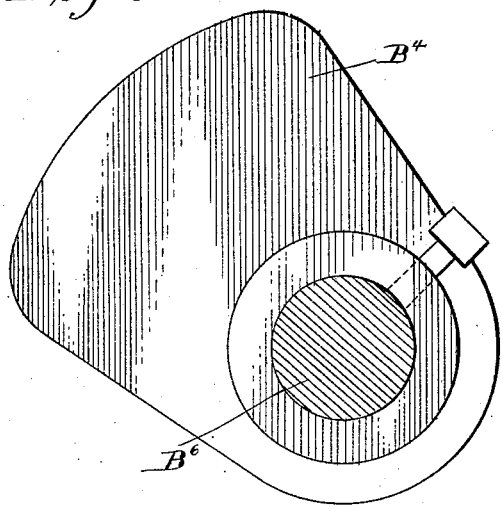



Fig. 5.

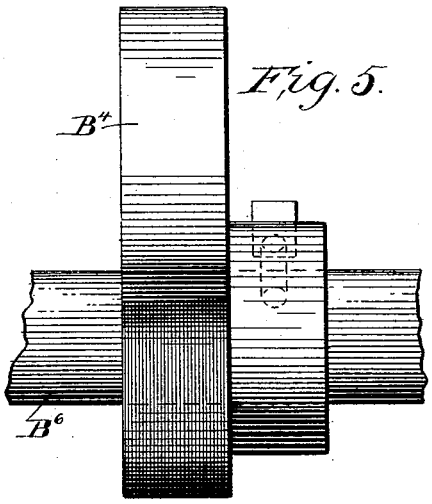



Fig. 6.

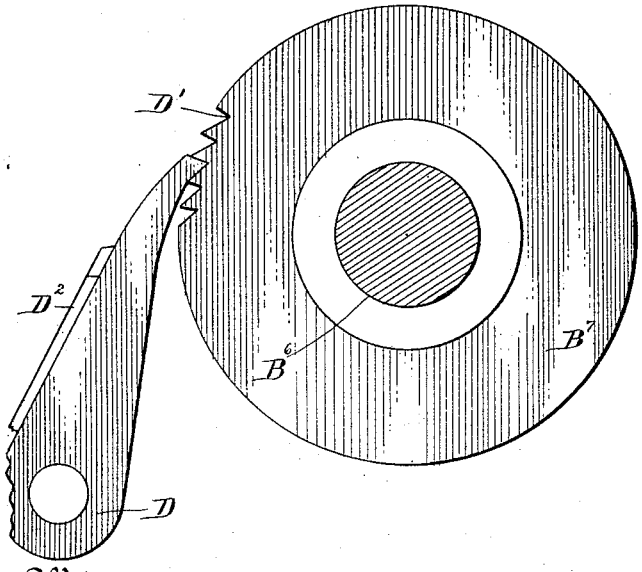
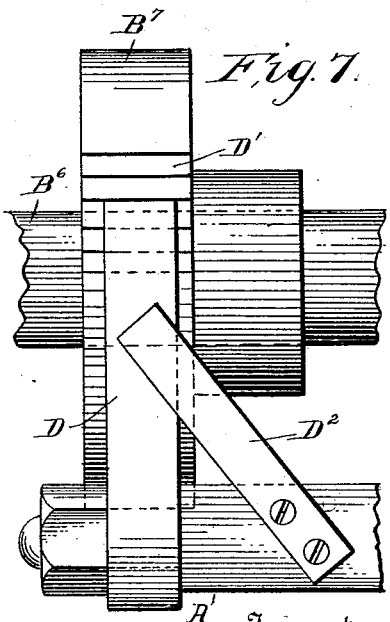



Fig. 7.

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# UNITED STATES PATENT OFFICE.

CHARLES J. SIBBALD, OF COHOES, NEW YORK, ASSIGNOR TO CHARLES COOPER, OF BENNINGTON, VERMONT.

## STOP-MOTION ATTACHMENT FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 489,420, dated January 3, 1893.

Application filed January 21, 1891. Serial No. 378,566. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES J. SIBBALD, a citizen of the United States, residing at Cohoes, in the county of Albany and State of New York, have invented certain new and useful Improvements in Stop-Motion Attachments for Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in stop motion attachments for knitting machines, and has for its principal object to provide attachments to detect imperfect work produced by the knitting machine, automatically stop the machine and prevent the sudden forward movement of the needles after the machine is stopped, when such forward movement would be injurious, and it consists of the novel construction and combination of parts hereinafter described and more particularly pointed out in the claims.

Referring to the drawings it will be seen that I have shown a portion of a rib machine, omitting many of the parts not necessary to a full understanding of the operation of my improved attachments, in which;

Figure 1 represents a front elevation of one end of a knitting machine (the other end being broken away), and showing a driving belt upon a driving pulley. Fig. 2, is a similar view showing the belt shipped upon the loose pulley. Fig. 3, is a vertical cross section taken on the broken line $x$—$x$ in Figs 1, and 2. Fig. 4, is a side view of a cam, for actuating the horizontal needles. Fig. 5, is an edge view of the same. Fig. 6, is a side view of a segmental ratchet or stop wheel, and pawl pivoted to engage therewith. Fig 7, is an edge view of the same. Figs. 8, 9, are front and side elevations of the detector.

My improved attachments are more especially applicable to that class of knitting machines in which the yarn carrier travels reciprocally to and fro along a row of needles as in a straight rib machine, rather than to that class of machines in which the carrier remains stationary, as in a cylinder machine. As an ordinary rib machine knits or "runs" thirty or more courses a minute, it requires only a fraction of a minute's time to tangle up the needles and probably break some of them if a stitch is dropped in knitting any one course. The yarn and work then bunch up and do not feed down between the needles properly, and often before the operator detects the difficulty and stops the machine, a snarl or "smash" will occur which may require ten or twenty minutes to repair, while the machine stands idle.

The function and construction of the several parts will be readily understood from the following description.

I have shown in the drawings parts of a well known rib machine, such as a portion of the general supporting frame A, driving shaft B, having a fixed pulley $E^3$, and a loose pulley $E^4$, and a hand crank $B^5$,—slide bar O, movable longitudinally in the fixed slideway $O^3$, which bar O, may be called a carrier bar, as it supports the thread carrier $O^2$, which carries the yarn to and fro along the row of needles $b'$, transverse needle supporting rods $d$, and needle retaining plates $d^2$, secured by bolts $d^3$, to the needle bar which carries the vertically reciprocating needles, as well as other parts which it is unnecessary to describe to enable persons skilled in the art, to arrive at a perfect understanding of my improvements.

Among my improved attachments, is the bar N, hinged at $N^2$, and $N^3$, to oscillate freely, and depending from the cross bar P, which forms a part of the frame, supporting the sinkers $b$, which slide almost vertically in the frame to and from the needles. The bar N, is provided with the arm N′, projecting at almost a right angle from it and adapted when oscillated to strike the arm L′, of a lever L, pivoted at $L^2$, upon a fixed support projecting from the frame. The other arm $L^3$, of the same lever projects beneath the free end of the stop latch K, pivoted at its other end upon a fixed support at L. This latch K, is provided with a spring K′, and the stop $K^2$, which engages with the long arm of lever J′, pivoted at $J^2$, the short arm being connected with the frame, or a fixed support, by a spring $J^3$, and provided with a stop $J^4$,

which engages with the arm J, fixed upon the lever F. The lever F, is pivoted at the lower end at F′, upon the frame, and provided at its upper end with a handle $F^3$, and also with an arm E, fixed thereon, and carrying a belt shipper consisting of the arms E′. The spring $F^2$, is secured at its lower end to the frame in such a manner that the upper end bears against lever F, and tends to force it to the left, or from the position shown in Fig. 1 to that shown in Fig. 2. It is therefore apparent that a very slight blow from the arm N′, upon the lever arm L′, will tip it to the position shown by dotted lines in Fig. 3 and lift the latch K, releasing the lever J′, which is immediately forced by the spring $F^2$, to the position shown by dotted lines in Fig. 2 whereupon the arm J, slips off the stop $J^4$, permitting the lever F, to yield to the force of spring $F^2$ and ship the belt $E^2$ from the tight pulley $E^3$ to the loose pulley $E^4$ whereupon, the power being removed, the machine stops. The machine is easily started again by grasping the handle $F^3$ and forcing the lever F back against its actuating spring until the arm J engages with the stop $J^4$ which has been brought back into proper position by the spring $J^3$, which restores all the parts to the position shown in Fig. 1 and the machine is maintained in operation by the belt.

The attachment which oscillates the bar N is what I term the stop-detector, which is made up of a vertical arm or frame *a* fixed upon the carrier bar O to travel with it, and provided with a detector rod or stem $a^3$, to rotate in said arm. The detector-rod $a^3$, is bent at the lower part to form an arm $a^2$, and is provided directly opposite the bar N with two or more arms $a'$, projecting on each side thereof to said bar, or so near thereto that any rotary movement of the rod $a^3$ in either direction will cause one of the projecting arms $a'$ to press against the bar N with sufficient force to oscillate the arm N′ and operate the lever L′ $L^3$, to lift latch K and release the shipping lever F. It will be observed that the point $a^4$ of the detector rod reaches inward and travels to and fro along and just in front of the row of vertically reciprocating needles $b'$, so long as the operation of knitting progresses smoothly, and no stiches are dropped, the knitted fabric G passes down back of the vertical needles, as shown in Fig. 3. If however a stitch be dropped or the yarn becomes tangled, an ill formed mass speedily collects in front of the needles, as shown in Fig. 2. which will soon bend or break the needles, unless removed, and require the repair of the machine. The point $a^4$ of the detector, in passing rapidly to and fro, in front of the needles, is instantly caught by any protruding yarn or any portion of knitted fabric, which arrests or retards its progress sufficiently to give a quick rotary movement to the detector rod $a^3$ which causes one of the projecting arms $a'$ to strike the bar N with sufficient force to oscillate the arm N′ and release the shipping lever F as before explained, whereupon the machine stops before damage is done to the machine, and before any defect has entered into the fabric which cannot be easily and quickly remedied.

Persons skilled in the manufacture or use of knitting machines will readily understand that it would not be safe to automatically ship the driving belt from the tight to a loose pulley at all stages in the movements of the machine, for the reason that the powerful springs employed to co-operate with actuating cams might in certain positions of the parts, act upon the cams to drive the needle frames forward and thus drop the stitches, or entangle and break the needles. This is the case when the parts are in the position shown in Fig. 3. A cam $B^4$ is fixed upon a common shaft with the gear wheel $B^3$ connected through gear wheels $B^2$ and B′ with the driving shaft B and is shown in the act of lifting the friction roller $C^5$ located upon the end of the arm $C^4$ of the lever $C^2$. The lower end of the lever $C^2$ is pivoted at $C^3$ upon the frame A and the other end to the needle bar frame C which reciprocates to and fro horizontally, carrying the needle bar C′ and the row of needles *e*, set therein. The needles *e* travel back and forth past the vertically reciprocating needles $b'$ while the machine is at work. They are impelled in the backward direction, as we have seen, by the cam $B^4$ and in the opposite or forward direction by the spring $C^6$ secured at its lower end at $C^7$ to the frame, the upper end bearing against stop $C^8$ and tending to force the friction roller $C^5$ against the cam. If therefore the belt were shipped from the tight to the loose pulley while the parts are in the position shown in Fig. 3 the force of the spring $C^6$ would be sufficient to drive the cam $B^4$ in a direction reverse to that in which it was traveling and also give the horizontal needles a sudden forward movement against the vertically reciprocating needles which would be most likely attended with disastrous effects. To provide against such a contingency I make use of a wheel $B^7$ fixed upon the same axle with the cam, and provided with a few notches D′ on a portion of its periphery. For convenience of description I term this wheel a segmental ratchet wheel. A pawl D is pivoted upon the frame A in such position as to engage with said notches D′, the pawl being forced therein by the spring $D^2$.

The pawl and segmental ratchet wheel are shown by the dotted lines in Fig. 3 and solid lines in Figs. 1, 2, 6, and 7. The notches D′ are so located on the periphery of the segmental wheel as to be engaged by the pawl D while the cam $B^4$ is acting to move lever $C^2$ against the resilient force of the spring $C^6$ thereby preventing the possibility of moving the needles forward when they are in a position to be injured by such a movement.

The segmental ratchet wheel $B^7$ and pawl are of great utility in any machine with or

without automatic stop motion attachments, for the reason that most machines are supplied with a hand crank, as $B^5$ or other means for working the needles back and forth to relieve them of any snarl or tangle which may form thereon. In such cases care is required not to move the needles forward when located about as shown in Fig. 3 but with the use of the ratchet wheel $D^7$ and pawl, no care is required, as the parts cannot be moved forward to their injury. When the pawl engages with the notches D′ and prevents any forward movement, the parts are moved backward until the pawl rides upon the smooth periphery of the wheel, permitting a forward or backward movement as desired.

It is obvious that more than one detector may be used with one bar N and that the bar may be of any desired number of sections.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent of the United States is;

1. The combination with a knitting mechanism, of a belt shipping lever, a spring bearing against said lever, and suitable devices to hold the lever against the force of the spring, a rotatable detector rod adapted to travel to and fro in close proximity to the needles, for the purpose specified, and a vibratory bar adapted to be operated by the detector rod when rotated, to trip the holding devices of the said belt shipping lever, substantially as and for the purpose described.

2. The combination with knitting mechanism, of a belt shipping lever provided with a spring, a reciprocating carrier bar, an arm secured to said carrier bar, a detector rod loosely coupled to said arm and provided with laterally projecting arms, a vibratory bar in position to be actuated by said detector rod, a pivotal elbow lever, a latch and a pivoted lever which is adapted to engage with an arm of the said shipping lever, substantially as and for the purpose described.

3. The combination with a frame carrying the needles and suitable mechanism for operating said frame, of a carrier bar O, an arm secured thereto, a detector rod loosely coupled to said arm and provided with laterally projecting arms and a point which is held in position adjacent to a row of needles, a vibratory bar in position to be actuated by said detector rod, a shipping lever, and devices, substantially as shown, intermediate said vibratory bar and said shipping lever, whereby the shipping lever is released upon the movement of the bar, substantially as and for the purpose described.

4. In a knitting machine, a needle carrying frame, a pivoted lever connected thereto and a spring bearing against the lever to move it in one direction, combined with a cam intermittently engaging said lever to move it in the opposite direction, a wheel having uniform rotation with said cam and provided with ratchet teeth on a portion only of its periphery, and a pawl adapted to engage said teeth, the parts being so arranged that the pawl will engage the teeth when the cam is moving the lever against the force of the spring, substantially as and for the purpose specified.

5. In a knitting machine, a set of vertically reciprocating needles, a set of horizontally reciprocating needles, the running mechanism, a spring actuated belt, shipping lever, and devices to hold the lever against the force of the spring, combined with a rotating detector rod and adapted to travel to and fro in front of the vertically reciprocating needles, suitable devices intermediate of the detector rod and the lever holding devices adapted to trip the latter when the former is rotated to thereby release the belt shipping lever to stop the machine, and a device to prevent the forward movement of the horizontal needles when the machine is stopped, substantially as and for the purpose described.

6. The combination with a knitting mechanism, of a belt shipping device, a detector-rod adapted to travel to and fro in close proximity to the needles for the purpose specified, and suitable mechanism between the detector-rod and the belt shipping device whereby the latter may be operated by the former, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses:

CHARLES J. SIBBALD.

Witnesses:
CHARLES COOPER,
EDWARD J. HALL.