

(No Model.)

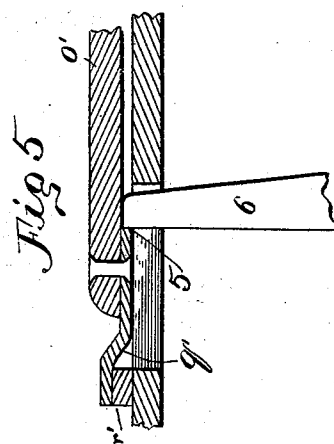
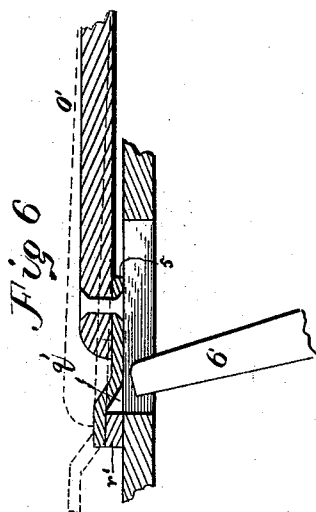
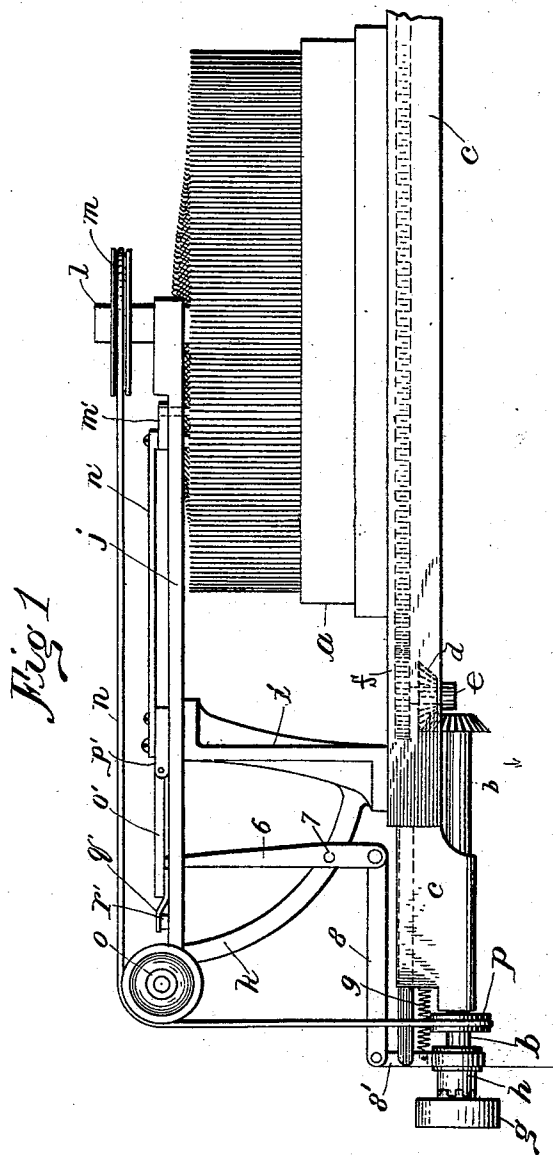
3 Sheets—Sheet 1.

H. S. BECKER.

STOP-MOTION FOR KNITTING MACHINES.

No. 509,283.

Patented Nov. 21, 1893.



Witnesses

C. C. Burdine

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Inventor;
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Atty

(No Model.)

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H. S. BECKER.

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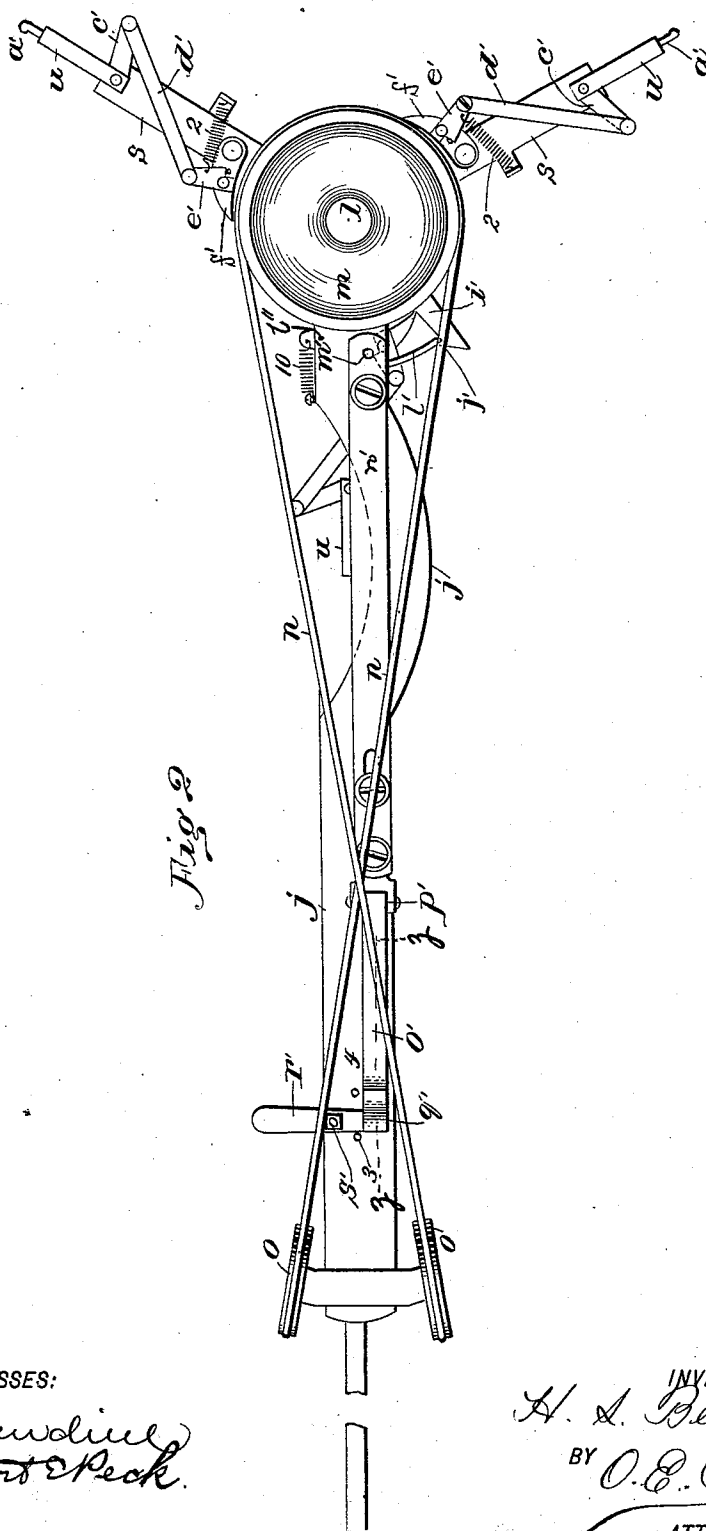


Fig. 2

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(No Model.)

3 Sheets—Sheet 3.

H. S. BECKER.

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Fig 3

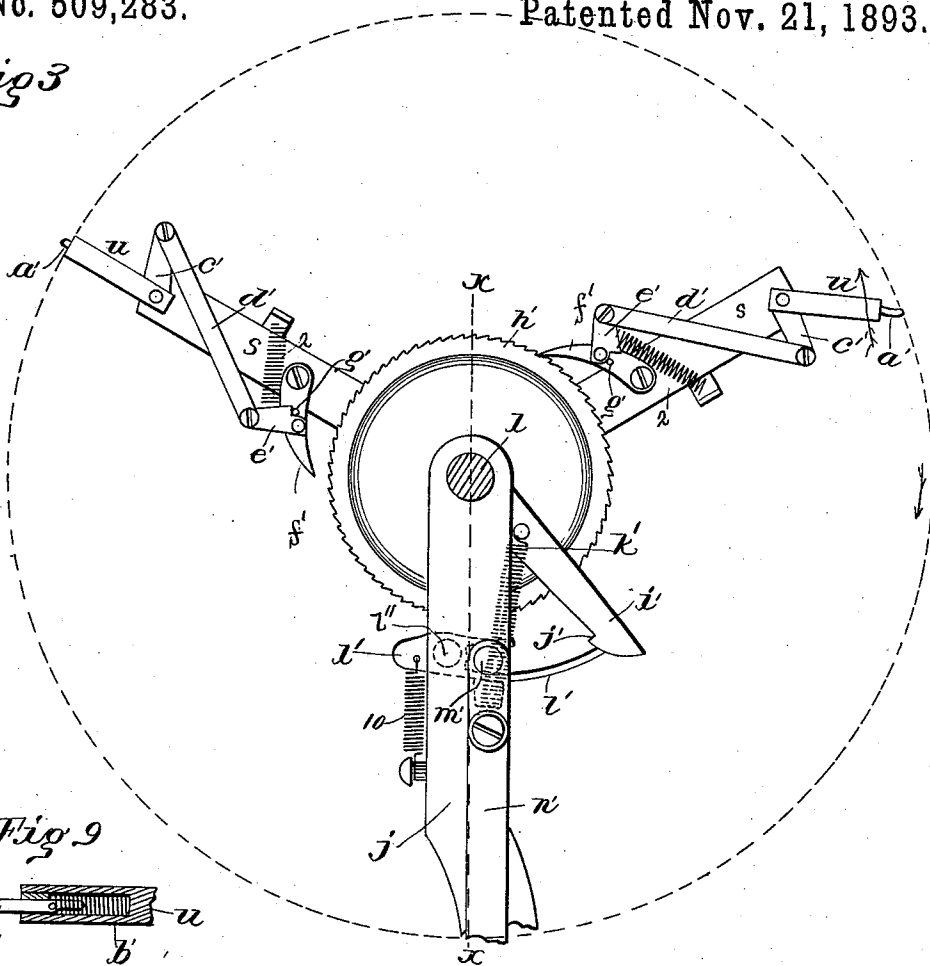


Fig 9

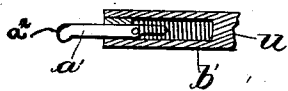


Fig 4

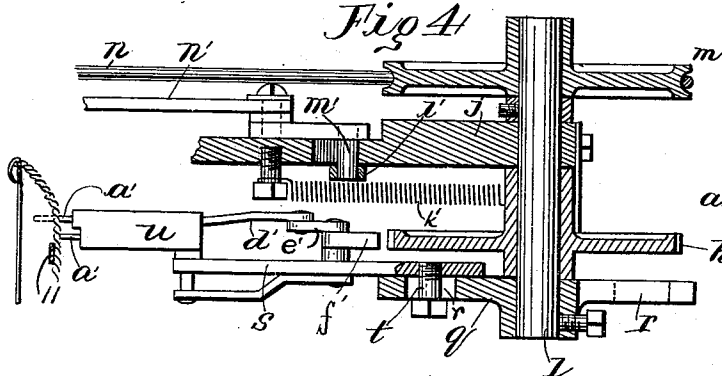


Fig 8

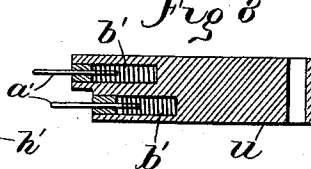
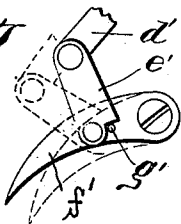


Fig 7



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY SMITH BECKER, OF CHARLOTTESVILLE, VIRGINIA, ASSIGNOR OF TWO-THIRDS TO JAMES A. ARMSTRONG AND IDA A. SALTSMAN, OF SAME PLACE.

STOP-MOTION FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 509,283, dated November 21, 1893.

Application filed August 13, 1892. Serial No. 443,009. (No model.)

To all whom it may concern:

Be it known that I, HENRY SMITH BECKER, of Charlottesville, in the county of Albemarle and State of Virginia, have invented certain new and useful Improvements in Stop-Motions for Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

This invention relates to stop motions for knitting machines. Heretofore in operating certain constructions of knitting machines, one operator could not manage more than one machine, and even then with one operator for each machine a thread would frequently break and a whole quarter of cloth would run off from the needles before it would be discovered by the operator and the machine stopped. The result was great loss of time, waste of material and breakage of needles. Much delay and waste of material and time were also caused by certain other disadvantages.

It is the object of my invention to overcome these disadvantages in the operation of circular knitting machines by providing an improved stop motion and quarter saver very simple in construction and yet accurate and effective in operation and strong, durable, and convenient in build, whereby a thread breaking or dropped stitch in the fabric or a break in the fabric caused by a broken needle will immediately actuate improved mechanism to almost instantaneously stop the knitting machine, and thereby prevent further knitting of fabric after the break in the fabric.

The invention consists in certain novel features of construction and in combinations of parts more fully described hereinafter and particularly pointed out in the claims.

Referring to the accompanying drawings:—
Figure 1 is a side elevation showing the present invention applied to a circular knitting machine. Fig. 2 is a top plan view of the stop motion. Fig. 3 is a detail top plan enlarged of a portion of the stop motion. Fig. 4 is a detail sectional view taken in the plane of the

line $x-x$ Fig. 3. Figs. 5 and 6 are detail views taken in the plane of the line $z-z$ Fig. 2 showing different positions of the parts. Fig. 7, is a detail plan view of one of the pawls that engage the ratchet wheel, dotted lines showing the different positions of the pawl. Fig. 8, is a detail sectional view of one of the swinging blocks carrying the contact or indicating fingers. Fig. 9, is a detail sectional view showing one of said fingers enlarged.

In the drawings the reference letter a , indicates a circular knitting machine of any suitable or desirable construction. The cloth is formed by the needles of the machine in circular or tubular form and depends within the frame and needles forming an endless web. The frame carrying the needles, &c., is rotated by suitable driving mechanism from the drive shaft b , mounted in the supporting frame c , of the machine. This drive shaft through the medium of bevel gearing d , drives the short vertical shaft e , which rotates the needle frame or cylinder by the gearing f . A drive pulley g , is located on the drive shaft b . This pulley g , is loose on the shaft b , and a suitable clutch member h , is splined on said shaft so as to be capable of movement into or out of engagement with said pulley to lock the same to or disengage the same from said drive shaft as clearly shown in Fig. 1, wherein the clutch member h , is shown in engagement with the notches or projections of the pulley g , thereby locking said pulley to the shaft b . However I wish it understood that I do not limit myself to any particular arrangement for detachably connecting the drive shaft b , with the driving power.

A suitable bracket or stand i , is rigidly secured to the main supporting frame c , of the machine. This bracket has an arm j , extending horizontally over the center of the needle cylinder and also has a rearward extension k . The front end of the arm j , is provided with a vertical bearing or journal box in which a short vertical shaft l , is journaled. A horizontal pulley m , is rigidly secured on the upper end of this shaft above said bearing. A belt n , passes around said pulley m , and rotates said shaft l , and passes horizontally rearwardly over the two pulleys o , mounted at

the upper rear end of the extension k , and then downwardly around the pulley p , on the drive shaft b .

A spider frame or otherwise suitably shaped support q , is rigidly secured on the lower end of the shaft l , so as to be located within the needle cylinder. This support q , is provided with a suitable number of radial slots r , (preferably three slots are employed.) An arm s , is adjustably secured at its inner end in each slot by a bolt or other means. These arms extend radially from the shaft l , and are adjustable longitudinally by means of said slots and bolts so that their outer ends travel near the inner surface of the cloth a short distance below the needles. The belt n , is crossed or otherwise connected so that the shaft l , and the arms s , are rotated in an opposite direction to that of the needle cylinder and at a higher rate of speed, usually about twelve times as fast as the cylinder although the rate of speed, &c., is optional. Each arm s , is provided with a block u , at its inner end suitably pivoted to the outer end of the arm so as to form an outward extension thereof and so as to rock in a horizontal plane. Each block is provided with feelers or fingers a' , extending outwardly from its outer end. The end of each block u , is recessed for each feeler and a spring b' , for each feeler is inserted therein around the inner end of the feeler or finger which is provided with stops so that the spring constantly tends to push the finger out its full length. Each block is usually provided with two of these fingers or feelers. At its inner end each block is provided with a rigid lateral arm c' connected by a link d' with a short link e' pivoted on a pawl f' , fulcrumed on the radial arm. A coiled spring 2, suitably secured is at one end fastened to said short link and constantly tends to force said link against a stop g' and to hold the pawl out of engagement with a ratchet wheel h' , and to hold the block u projecting outwardly as shown in Fig. 2. The ratchet wheel is loose on the shaft l , and is provided with a radially projecting latch i' rigid therewith and having one side of its end beveled inwardly to an inwardly facing shoulder j' . A retractive spring k' is secured to the supporting arm and to said ratchet wheel in such a manner as to constantly tend to rotate said wheel so as to hold said latch against the outer end of a lever l' fulcrumed at l'' at one end to the arm j . A rod n' extends longitudinally of the arm j and is confined thereon so as to permit reciprocation by a slot and bolt as shown. The inner end of this rod n' is provided with a pin m' extending down through a longitudinal slot in the arm j into a slot in the lever l' ; hence the rod n' is reciprocated by swinging the lever l' . A vertically movable latch o' forms a continuation of said reciprocating rod n' and is pivoted thereto at p' , so that its free end can swing upwardly from the upper face of said reciprocating rod. The outer end of this latch is provided with an upwardly

and outwardly curved cam edge or surface q' resting on a small lever r' extending transversely of the reciprocating rod and fulcrumed on bar q between its ends at s' , so that one end of the lever r' forms a handle so that the opposite end of the lever can be swung thereby between the two stops 3 4. The lever normally rests against the stop 3 in which position the latch rests on the upper face of the bar j . The latch is provided with a shoulder 5 in its under face facing toward the pivoted end of the latch. A vertical lever 6, is fulcrumed at 7 between its ends to the portion k , of the supporting bracket and its upper end extends up through a longitudinal slot in the bracket k so as to engage and be held by the shoulder of said latch. The lower end of said lever 6, is connected to the clutch member h , by means of link 8 and an arm 8'. The clutch member h , has a peripheral groove, and the arm 8' has a collar on its end in said groove to permit the member to rotate in the collar but so as to control the longitudinal movement of said clutch member on the drive shaft. However I do not limit myself to any such specific arrangement. A spring 9, is connected to the clutch member and has a constant tendency to throw the same from the driving pulley and thereby disengage the drive shaft and its driving means. This spring hence has a constant tendency to throw the upper end of the lever 6 toward the outer end of the slot in the bracket k . The shoulder 5 in said latch o' , is located near the inner end of said slot and at such a position that when the end of the lever is caught and held thereby the clutch member will be forced into engagement with the driving pulley and will thereby lock the same to the drive shaft. If the said latch be raised either by swinging forward the lever r' against the cam edge q' , or by moving said latch outwardly by the rod n' so as to engage and be raised by said lever r' , the lever 6 will be freed from the shoulder 5 thereby permitting the spring 9 to act and throw the parts out of gear and disconnect the machine from its driving power. This function is accomplished automatically by the instrumentalities hereinbefore described.

A spring 10, is attached to the lever l' , so as to yieldingly hold the outer free end of said lever in the path of latch i' to be engaged and held by the shoulder j' thereof, and also to return the rod n' and latch o' to their normal positions after the lever 6, has been released and to be in readiness to receive and hold said lever when pushed forward.

A ring 11, is secured to the inner side of the needle cylinder just below the needles to hold the cloth out away from the cylinder and needles as it passes down. The arms s rotated as before described carry the feelers rapidly around over all parts of the inner surface of the cloth. The feelers a' , are held yieldingly pressed in by the cloth so that their springs are compressed. If there is a tear caused by

a thread breaking, a hole or a dropped stitch in the cloth or a broken needle causing a "run down," a feeler will immediately catch in the same by reason of its spring tension, and the continued rotation of the arm carrying the same will cause the particular block *u* to swing back on its pivot, thereby moving the link *d'* and short link *e'* in a direction to throw a pawl *f'*, into engagement with the ratchet wheel against the tension of the pawl spring 2. The continued rotation of the arm *s* causes the pawl *f'*, to engage a tooth of the ratchet wheel and rotate said wheel against the tension of its spring *k'*. A very slight movement of the ratchet wheel moves the latch *i'* sufficiently to release the lever *l'*, thereby freeing the rod *n'* and latch *o'*, and permitting the spring 9 to throw the clutch out of gear. The knitting machine is thus quickly thrown out of gear with its driving power and the fingers *s* almost instantly stop rotating also as they are driven from the shaft *b*. The spring 10 immediately returns the latch *o'* and lever *l'* to their normal positions in readiness to receive the lever 6 and the latch *i'*, automatically. The spring *k'* swings the ratchet wheel around to its normal position and in so doing automatically locks the lever *l'* by the latch *i'*. When it is desired to start the machine again the operator has merely to push back the upper end of the lever 6 and it will throw the machine into gear with its driving power and will raise the latch *o'*, until it drops down with its shoulder 5, behind the end of lever 6, thereby locking said lever. By this peculiar mechanism the machine is almost instantly stopped when the feeler strikes the defect in the cloth; hence there is a minimum waste of time and material in overcoming the defect and starting the machine again to work. The machine can also be quickly stopped by hand by merely swinging the lever *r'*. As circular knitting machines are now usually operated particularly when running in rooms artificially lighted, the operators do not always discover a broken needle, dropped stitch, &c., until considerable fabric has been knit or damage done to the machine. Where a hole from any reason appears in the cloth time cannot be taken to unravel the yarn to the hole but when the cloth is cut up to form into garments the portion having the hole is cut out and wasted.

The ring 11, holds the cloth away from the needle cylinder and the feelers bear against and travel over the fabric usually between the needles and this ring. Two feelers are preferably carried by each block one above the other. The upper feeler of each pair or the one nearest the needles is preferably shouldered at the outer end so as to form the forwardly projecting shoulder *a*², see Fig. 9, to catch in the hole in the fabric when a thread breaks thereby stopping the machine and preventing the cloth running off the needles. This feeler is more particularly the quarter saver. The lower feeler is more particularly for

dropped stitches, &c., as very often a dropped stitch will not open until it has passed below the upper feeler. Sometimes there are weak or fine places in the yarn or thread that will hold together until the weak point has passed below the upper feeler.

It is evident that various changes might be made in the forms, constructions, and arrangements of the parts described without departing from the spirit and scope of my invention. Hence I do not limit myself to the peculiar constructions herein set forth, but consider myself entitled to all such variations as fall within the spirit and scope of my invention.

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

1. A stop motion comprising a constantly rotatable carrier independent of and arranged concentric with the cylinder and provided with spring actuated feelers arranged to travel along the inner surface of the fabric in the cylinder, and mechanism substantially as described for constantly rotating said carrier substantially as described.

2. A knitting machine stop motion having a rotatable carrier suspended within and independent of the cylinder, mechanism for constantly rotating said carrier, and a laterally movable feeler carried by said carrier and yieldingly held against the inner surface of the fabric within the cylinder, substantially as described.

3. In a knitting machine stop motion, the combination of a support, the cylinder, a rotatable carrier suspended within the cylinder independent thereof, mechanism, substantially as described, for constantly rotating said carrier, and a series of movable supports carried by said carrier and provided with spring actuated feelers traveling along the inner surface of the fabric in the cylinder, substantially as described.

4. A knitting machine stop motion having a constantly rotating carrier in the cylinder provided with pivoted yieldingly held blocks having spring actuated feelers traveling along the inner surface of the fabric in the cylinder, as and for the purposes substantially as set forth.

5. A knitting machine stop motion provided with a rotary carrier moving in an opposite direction to the direction of rotation of the needle cylinder and provided with a feeler traveling along the surface of the cloth, as and for the purposes set forth.

6. The knitting machine provided with the ring inside of the needle cylinder over which the fabric travels and by which it is held in from the cylinder, in combination with the traveling feelers moving over the surface of the fabric near said ring, substantially as described.

7. In combination, the driving mechanism, a clutch in the driving mechanism, a support extending above the needle cylinder, a verti-

cal shaft mounted in said support and extending down into the cylinder, a rotary frame carried by said shaft carrying feelers traveling on the inner surface of the fabric, means for rotating said shaft, mechanism controlling said clutch, a latch for holding said mechanism, and mechanism, substantially as described, controlled by said feelers to disengage said latch.

8. In combination, in a knitting machine, a support, a vertical shaft carried thereby concentric with the needle cylinder, a carrier moving with the shaft, movable feelers carried by said carrier within the cylinder yieldingly bearing against the inner surface of the fabric, a wheel loose on the shaft, pawls arranged to engage and lock said wheel to the shaft, connections between said feelers and said pawls controlling the same, and mechanism, substantially as described, for constantly rotating the carrier, substantially as described.

9. A knitting machine cylinder and its driving gear, and mechanism for throwing the driving gear into and out of gear, in combination with mechanism substantially as described to hold the driving gear in gear, a support, a shaft carried thereby and extending into the needle cylinder, a ratchet wheel on said shaft controlling said mechanism, the rotary frame rigid with said shaft, the pivoted blocks on said frame having the feelers, pawls normally held out of engagement with said ratchet wheel, and connections between said blocks and said pawls to throw the pawls into engagement with the ratchet wheel, as and for the purpose described.

10. A knitting machine stop motion having the rotary frame provided with the pivoted blocks, and two spring actuated feelers carried by each block, substantially as described.

11. In combination, the clutch, a spring tending to throw it out of gear, a vertical swinging lever controlling said clutch, a reciprocating rod having a latch to hold said lever, a swinging lever holding said rod, a support, a shaft depending in the needle cylinder and provided with rotating means, a ratchet wheel on said shaft having a latch to hold said last mentioned lever, and a rotating frame carried by said shaft provided with swinging feelers, and pawls controlled by said feelers to actuate said ratchet wheel.

12. A knitting machine stop motion having means to hold the fabric away from the needle cylinder, and a traveling feeler moving over the surface of the fabric just below the needles and where held away from the cylinder, substantially as described.

13. The knitting machine stop motion having its feelers arranged in pairs, one feeler above the other, and a traveling support for each pair, substantially as described.

14. In a knitting machine stop motion, the combination of a support, a vertical shaft carried by said support, and provided with a carrier, movable feelers carried by said car-

rier yieldingly held against the fabric, a ratchet wheel loose on said shaft, pawls connected with and controlled by said feelers and normally held out of engagement with said wheel, and mechanism, substantially as described, controlling the mechanism throwing the machine in and out of gear, said ratchet wheel provided with a latch normally holding said mechanism in gear, the ratchet wheel and latch being yieldingly held in their normal positions, substantially as described.

15. A knitting machine stop motion having traveling feelers arranged in pairs, the upper feeler of each pair being shouldered at the outer end for the purpose set forth.

16. A knitting machine stop motion having a rotary carrier, and a yieldingly held laterally movable support on said carrier provided with a spring actuated feeler arranged to swing said support laterally when a feeler catches in a hole, &c., in the fabric.

17. In a knitting machine stop motion, the combination with a support, of the vertical lever controlling the mechanism that throws the machine in and out of gear, a spring yieldingly holding said lever in one direction, the movable rod having a vertically swinging latch provided with a shoulder to hold said lever against the tension of said spring, the outer end of said latch being beveled, the hand lever arranged to engage said beveled end of the latch and raise the same to release said spring actuated lever, and mechanism substantially as described for normally holding said movable rod stationary, as set forth.

18. In combination, a support, a knitting machine cylinder, a spring actuated mechanism for throwing the machine in and out of gear, a movable rod controlling the same, said support provided with a rotary shaft in the cylinder provided with feelers and devices operated by said feelers, a wheel loose on said shaft and actuated from said feelers, substantially as described, said wheel provided with a latch, a lever arranged to hold said movable rod, said latch normally projecting into the path of said lever and holding the same so that when the wheel is turned the latch will release the lever and movable rod, substantially as described.

19. In combination, a knitting machine cylinder, a horizontally arranged support extending over the cylinder, spring actuated mechanism to throw the cylinder in and out of gear with its driving mechanism, a lever controlling the same and extending above said support, a movable rod on said support provided with a vertically swinging latch to engage and hold said lever, means, substantially as described, to release said latch from the lever when the rod moves in one direction, a locking and releasing mechanism for said rod, and feelers controlling said mechanism, substantially as described.

20. In combination, a knitting machine cylinder and its support, a drive shaft for said

cylinder, mechanism to throw said shaft into and out of gear with its driving mechanism, a bracket extending up from said support and over the needle cylinder of said machine, a
5 vertical shaft carried by said bracket in said cylinder and provided with means carrying feelers, said bracket provided with guide pulleys, a belt passing over said pulleys and driving said vertical shaft from said drive shaft,
10 and intermediate holding and releasing mechanism between said feelers and said mechanism connecting the drive shaft with its power, substantially as described.

21. A knitting machine stop motion having
15 the rotary shaft supported in the needle cylinder and provided with a carrier, a pivoted block mounted on said carrier and provided

with a feeler, a pawl mounted on said carrier, a short lever pivoted on the pawl and provided with a stop to permit a limited inde- 20 pendent play, said lever having its outer end connected to said block so that the block and lever will swing together, the ratchet wheel loose on said shaft, and a spring acting on
25 said pawl and block to yieldingly hold the pawl from the ratchet wheel, and the feeler to the fabric, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HENRY SMITH BECKER.

Witnesses:

HERBT. WINGFIELD,
ROBT. S. J. STERLING.