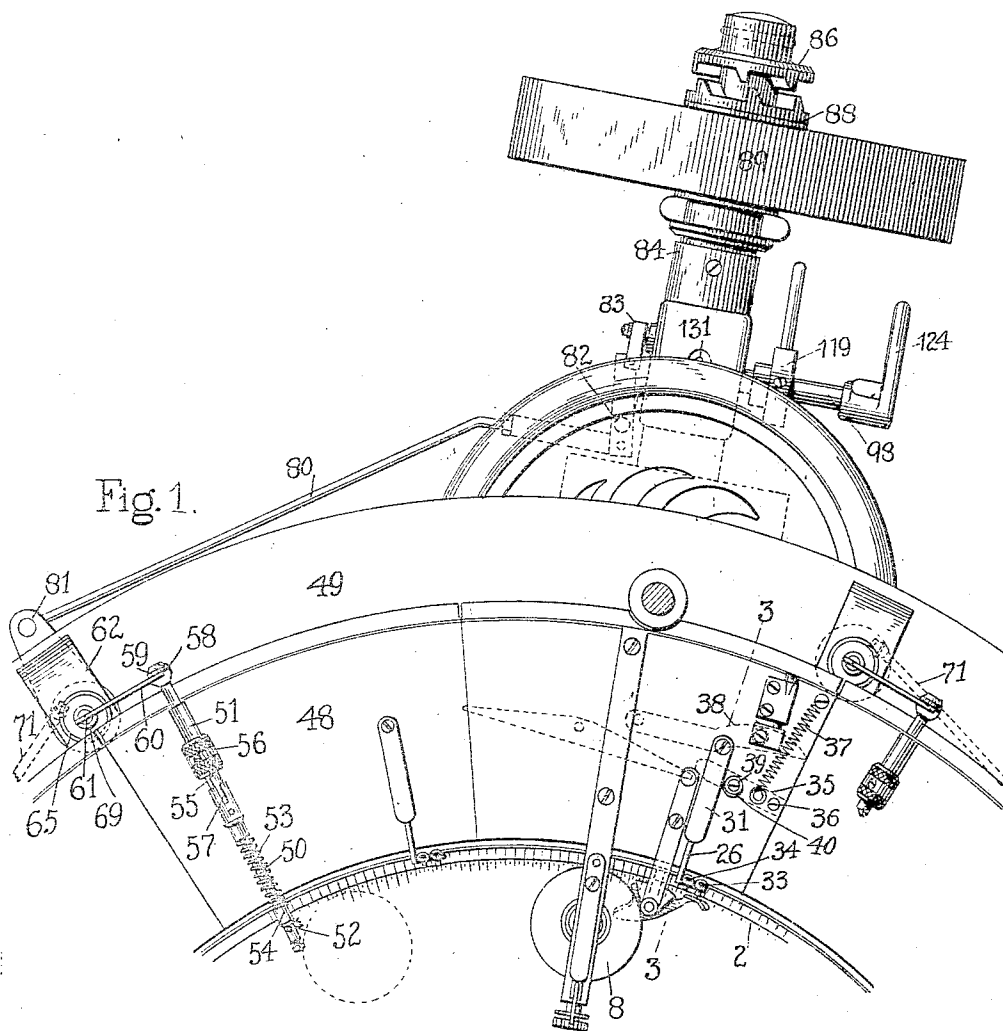


F. WILCOMB.
 NEEDLE PROTECTOR AND LET-OFF FOR KNITTING MACHINES.
 APPLICATION FILED FEB. 16, 1909. RENEWED NOV. 29, 1912.

1,054,479.

Patented Feb. 25, 1913.

2 SHEETS—SHEET 1.



Attest
 E. L. Tolson.
 Edward N. Sartan

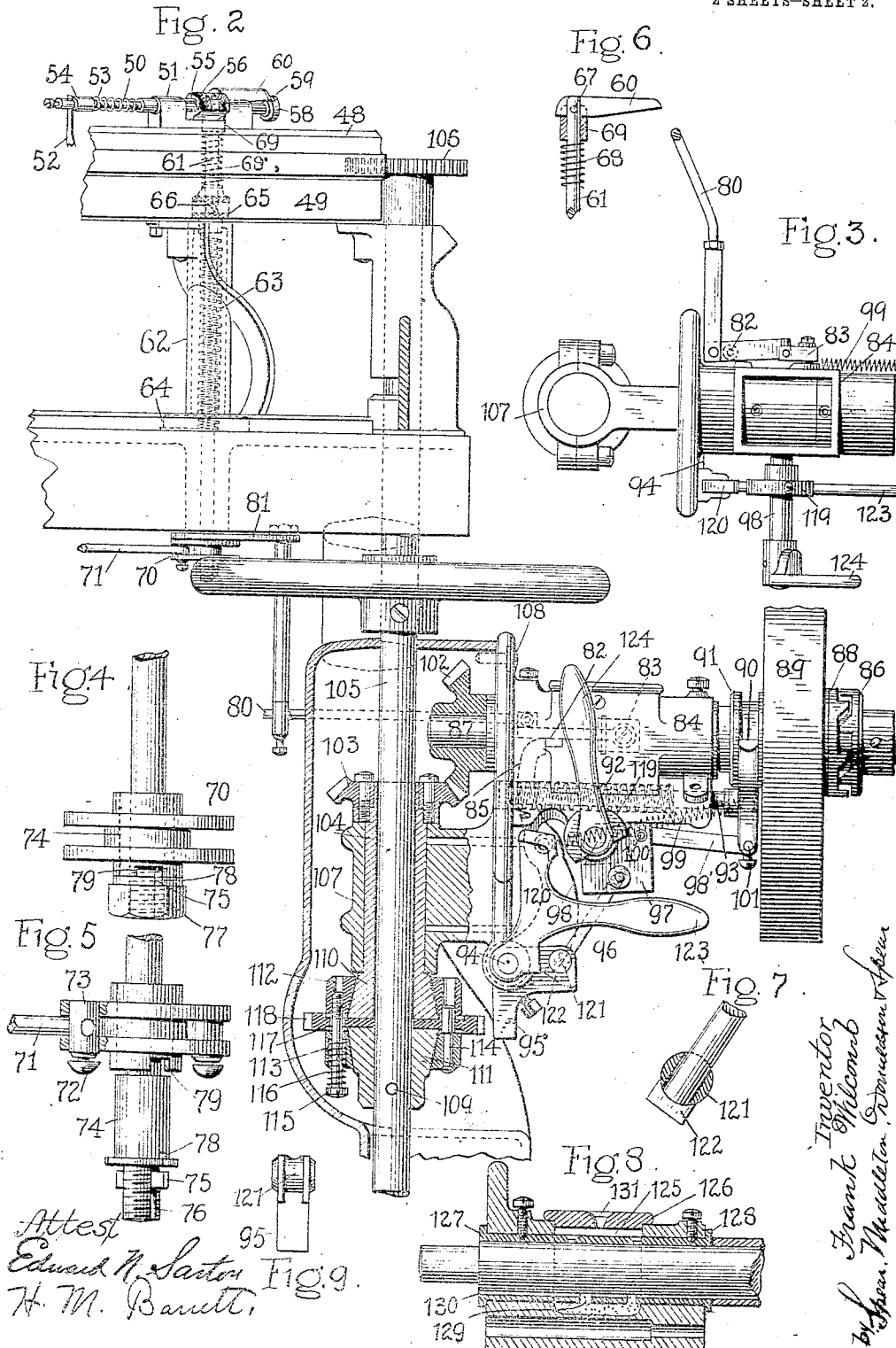
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Attest
 Edward N. Sartor
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Inventor
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 by Spence Macdonald, Attorney at Law

UNITED STATES PATENT OFFICE.

FRANK WILCOMB, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO WILCOMB MACHINE COMPANY, OF NORRISTOWN, PENNSYLVANIA.

NEEDLE-PROTECTOR AND LET-OFF FOR KNITTING-MACHINES.

1,054,479.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed February 18, 1909, Serial No. 478,181. Renewed November 29, 1912. Serial No. 734,195.

To all whom it may concern:

Be it known that I, FRANK WILCOMB, citizen of the United States, residing at Norristown, Pennsylvania, have invented certain new and useful Improvements in Needle-Protectors and Let-Offs for Knitting-Machines, of which the following is a specification.

My invention relates to needle protectors and let-off mechanism for knitting machines, and it consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings: Figure 1 is a plan of a part of a knitting head of the circular type with my needle protector and let-off mechanism applied thereto, the main driving clutch being in released position; Fig. 2 is a side view of part of the knitting head with my invention applied thereto, and the main clutch set in driving position; Fig. 3 is a detail plan view of the let-off supporting bracket; Figs. 4 and 5 are detail views of an operating connection between the needle protector and the let-off; Fig. 6 is a detail view; Fig. 7 is a detail view of a slip connection between the let-off and brake mechanism; Fig. 8 is a detail view of an oil box in the let-off supporting bracket; Fig. 9 is a detail view of one of the connecting arms.

The needle protector is arranged on the cam plate 48 of the knitting head shown conventionally at 49, and it comprises a horizontal rod 50 slidably and rotatably mounted in a bracket 51 secured to said plate, and having a finger 52 held by a screw at its inner end and depending close to the fabric, to be engaged by lumps, snarls, or foreign substances on the fabric.

The rod is pressed inwardly when released by a spring 53 bearing, at one end, on a collar loose on the rod, but held against the bracket 51, and at its other end upon a collar 54 which engages with the shank of the protector extending up through the rod. This bracket is preferably formed in one piece with an outer and an inner standard portion separated from each other by a space.

The rod is normally held outwardly to properly position the detector finger in relation to the needles and fabric by a pin

55 carried by a finger piece or handle 56 screwed onto the rod, the said pin bearing upon the inner standard of the bracket, but, when the rod is rotated by the detector finger being struck by an obstruction, the pin is brought opposite a slot or groove 57 in the bracket, and the rod is then free to move inwardly allowing the detector to move away from the needles and clear of the obstruction. The rotation of the rod due to engagement of the obstruction operates or releases connections extending to the let-off. For this purpose the rod is provided with a head 58 having a cam shaped face formed by cutting away part of its cylindrical side forming a flat portion, and leaving an upwardly projecting lip 59 forming a catch for a finger 60, which is connected to a vertical rock shaft 61 supported in a standard 62 fixed to the stationary part of the knitting head. The rock shaft is under tension of a spring 63, one end of which is fixed at 64 to the bracket, the upper end being fixed to a collar 65 which may be turned on the rock shaft for adjusting the tension of the spring, and then set by a screw 66. When, now, the detector is operated and the cam head 58 turned, its cam shaped face will lift the finger 60 (which is pivoted to the rock shaft at 67 and under tension of a spring 68 through a collar 69) and it will be released from the catch lip 59, and the spring 63 will then turn the vertical rock shaft 61 and, through the connections now to be described, the let off will be operated.

The lower end of the rock shaft carries a disk or wheel 70 made up of upper and lower parts, with a space between them to admit a rod 71 which is held by a screw 72 to a pin 73 journaled in the said upper and lower parts of the disk, the pin serving to attach the rod to the disk pivotally and the rod, in turn, serving to hold the pin in its bearings.

The disk or wheel is loosely mounted on a sleeve 74 which is held to the rock shaft 61 by a key 75 seated in a slot 76 in the end of the rock shaft, where it is held by a nut 77, the said key engaging a notch 78 in the sleeve.

The key projects sufficiently to afford engagement with the hub of the disk which is notched at 79 to allow the disk to have a

certain amount of free movement. The parts are shown assembled in Fig. 4 and displaced in Fig. 5.

As shown in Fig. 1, in a multiple feed machine I employ a number of these needle protectors, only one of which is shown complete, distributed about the needle circle and their disks just described are connected together through the rods 71 which extend from disk to disk about the knitting head, and by reason of the loose mounting of the disks by means of the notch 79 and key 75, any one of the detectors, when operated, will cause the actuation of the connections leading to the let-off independently of the other detectors, though they each transmit their motion, when operated, through a common connector. This connector common to all the detectors consists of the rod 80 connected with an arm 81 fixed to one of the disks, and extending to a detent 82 which is pivoted to an arm or block 83 in turn pivoted to the bracket 84 of the let-off mechanism. This detent restrains an arm or lever 85 (dotted lines, Fig. 2), and this lever controls the let-off clutch. This clutch comprises a clutch member 86 fixed on the driving shaft 87, and a clutch member 88 fixed to the drive pulley 89 slidably mounted on the shaft; the clutch fork 90 engages a grooved collar 91 fixed to the pulley, and this clutch fork is under tension of a spring 92 pocketed in the bracket 84 and exerting its force through a rod 93 to slide the pulley along the shaft, and withdraw its clutch member from the fixed clutch member. The controlling lever or arm 85 is fixed on a rock shaft 94 journaled in the bracket 84, and said rock shaft is connected with the clutch fork 90 through an arm or brake detent 95 fixed to the said rock shaft and connected by a link 96 with a plate or arm 97 on a rock shaft 98 journaled in the bracket 84, said arm being in turn connected with the clutch fork by a link 98'. The controlling arm is under tension of a spring 99. When the needle protector is operated and the detent 82 is thereby withdrawn from the controlling arm, the spring 99 will turn the controlling arm 85 and the rock shaft 94, and through the link 96 the arm 97 will be turned by this spring pressure sufficiently to throw the pivot 100 of the link 98' below the center line of the rock shaft 98 and the clutch fork pivot 101 (said pivot being above said line when the parts are clutched to drive the machine) and this will permit the main spring 92 to come into action to move the pulley along the shaft and release the clutch, thus stopping the machine.

The relation of the pivots 100 and 101 and the center of the rock shaft 98 is such that, when the parts are clutched, the pivot 100 will be above the center line of the

points 98 and 101, and the force of the spring 92 will act to hold the parts securely, but when the pivot 100 is thrown below the said center line, and not till then, will the spring 92 be called into action.

Power is communicated to the working parts of the knitting head from the drive shaft 87 through the bevel gear 102 fixed thereon, and a bevel gear 103 through a friction clutch now to be described. The gear 103 is secured to a loose sleeve 104 on an upright shaft 105 which, at its upper end, has gears for driving the rotary parts or the machine, one of such gears being shown at 106. The sleeve and upright shaft turn in a bearing 107 formed integrally with the bracket 84, and extending into a cavity of the machine standard, the bracket being secured, as at 108, to the said standard. The loose sleeve, at its lower end, has a conical enlargement 110, and below this end, fixed to the shaft by a pin 109, is a cone 111. Friction clutch rings 112 and 113 engage these cones, respectively, and these rings or shoes are connected by pins 114 and 115, the former of which is fixed to the lower cone and has sliding connection with the upper cone, and the other is screwed into the upper cone and is pressed upon by a spring 116 pocketed in the lower cone, which spring draws the friction shoes or clutch members upon the upper and lower cones with a yielding pressure, so that the motion of the sleeve and upper cone is transmitted to the lower cone. This driving clutch is also employed by me as a brake, and for this purpose I have associated therewith a brake disk or member 117 which lies between the cones, surrounds the upright shaft and is carried around by the pins 114 and 115. The periphery of this brake disk is toothed as at 118 to be engaged by the brake lever or arm 95 before mentioned, this being fixed to the rock shaft 94 so that after the main driving clutch is released by sliding the drive pulley along its shaft, the brake arm is thrown to engage the tooth of the brake disk to hold the same against rotation, and the friction drive clutch will be immediately converted into a brake by the friction clutch members now held stationary acting upon the cones. In order to prevent the brake from being thrown into action before the main clutch is released, I provide on the rock shaft 98 a locking member or brake controller consisting of a segmental disk 119 having a circular periphery and a flat side, and I also provide a restraining arm or lever 120 fixed to the rock shaft 94.

Now, when the detector is operated and the spring pressed controlling arm 85, with its rock shaft 94, is released, the brake restraining-arm 120 will be moved also, but it will be arrested as soon as the main spring

92 is brought into action to release the main clutch, this arresting action being due to the restraining arm striking against the periphery of the controller segment or member 119, and the brake arm 95, which moves in unison with the restraining arm 120, will be prevented from engaging the toothed brake disk 117, and this control of the brake arm will be continued until the main clutch has been fully released and the rock shaft 98 and controller 119 have been turned to bring the latter's flat side to the restraining arm 120 and thus allowing the end of the brake restraining arm to fall off of the periphery of the controller and have the necessary amount of movement under the action of the spring 99 to throw the brake arm into engagement with the toothed brake disk to hold the same against movement, and thus apply the brake.

It will be observed that both the brake controller 119 and the arm 97, to which the links or rods 96-98 are attached, are fixed to the rock shaft 98, and after the detent 82 releases the controlling arm 85 and the brake restraining arm 120 is set against the periphery of the controller segment 119, the said arm 97, together with the controller 119 which are attached to the same shaft, must continue their movement while the full release of the main clutch is being accomplished, and for this and other purposes hereinafter described I have provided a slip joint connection between the brake restrainer 120 and the link or rod 96, this consisting of a pin 121 extending between the walls of the arm 95 and having an opening through which the link 96 slips to permit the link and clutch controlling connections to have movement after the restraining arm and controller are in engagement, and the restraining arm comes to rest. The link is provided with a head 122 to engage the pin to be drawn down by the movement thereof.

After the clutch has been fully released, and the brake set, the upper end of the brake restraining arm or lever 120 lies below and in contact with the flat face of the controller 119, and to the left of the vertical center of the rock shaft 98 and in this position, in which the main clutch is released, the brake restraining arm acts as a clutch lock to hold the same released, and because of the fact that this restraining arm is rigidly attached to the same rock shaft which carries the main controlling arm 85, it can be released and held from its locking position in respect to the clutch connections only by resetting the detector connections ready to operate, that is, by throwing said restraining arm and controlling lever back and setting the detent 82 into engagement with the latter.

The brake restraining and clutch locking

arm 120 is provided with a handle 123. After the locking arm 120 has been withdrawn from the clutch connections and held by the lever 85 and detent 82, the main clutch can be thrown into action by operating the handle 124 attached to the rock shaft, the link 96 slipping, during this action, through the pin 121, and by operating this handle the clutch can be disengaged.

All the let-off parts including the connections from the detent 82 to the clutch fork 75 are carried by the bracket 84 which also supports the drive shaft and has the inwardly extending bearing 107 for the upright shaft and sleeve. This bracket, together with the let-off connections described, the drive shaft, clutch, brake controlling means and bearing for the vertical shaft, can be removed or replaced as one body. This bracket also carries an oil pocket 125 closed by a cap 126. The drive shaft is bushed at 127 and 128, these bushings having openings 129 on their under sides by which the oil may reach the shaft, grooves 130 being formed in the bushing for the passage of the oil from end to end of the bushing. These bushings are held in place by screws, and they have oil holes in their upper sides. Oil is fed into the pocket through the opening 131.

I have shown my invention in connection with my type of machine having an inner presser.

Reverting to the detector finger and the devices directly associated therewith. In operation the detector finger 52 engages with a bunch, snarl, or knot in the fabric, and the rod 50 is rotated, disengaging the latch 60 from the lock 59, allowing the shaft 61 to be operated by the spring 63 to stop the machine. The shaft 50 is then free to be forced toward the center of the machine, the pin 55 entering the slot 57 through pressure of spring 58, and the result aimed at by this movement is to allow the detector finger 52 to disengage the obstruction without being caught by the noses of the web holders which are shown as retracted directly under the rod 50, but which advance toward the center of the machine again after they have been retracted. This movement of the rod 50 does not have any effect on the stopping of the machine, but is simply for the purpose of allowing the finger 52 to clear itself from the obstruction.

The pin 55 and associated parts may be said to constitute setting means, or the pin the setting member for the shaft, though I do not limit myself in this respect, and are representative of any means for holding the shaft retracted until turned.

I claim:—

1. A needle protector for knitting machines comprising a contact finger, a rotary

and longitudinally movable shaft therefor, setting means for the shaft to hold the shaft normally against longitudinal movement until turned, and let-off connections

5 controlled by the shaft.

2. A needle protector for knitting machines comprising a contact finger, a spring pressed shaft adapted to rotate and slide, a setting member to hold the shaft normally

10 against longitudinal movement until turned, a bearing therefor to hold the shaft retracted until the shaft is turned by the contact finger, and let-off connections controlled by the said shaft.

3. A needle protector for knitting machines comprising a contact finger, a rotary and slidable shaft, bearings for the shaft, a handle on the shaft between the bearings, a pin on the handle, a recess in one of the

20 bearings, and let-off connections controlled by the said shaft, substantially as described.

4. A needle protector for knitting machines comprising a frame, a cam plate and a needle protector consisting of a shaft rotatably and slidably mounted on the cam plate, and extending horizontally, having a depending contact finger at one end and let-off means connected with the shaft.

5. In a knitting machine a needle protector consisting of a depending contact finger, a horizontal shaft carrying the same, a vertically extending shaft, a catch between the two shafts to be released by the turning of the horizontal shaft, and let-off connections

35 controlled by the rotation of the vertical shaft, said catch including a cam shaped piece on the horizontal rock shaft and an arm on the vertical shaft engaging the same.

6. In a knitting machine a needle protector consisting of a depending contact finger, a horizontal shaft carrying the same, a vertically extending shaft, a catch between the two shafts to be released by the turning of the horizontal shaft, let-off connections controlled by the rotation of the vertical shaft, said catch including a cam shaped piece on the horizontal rock shaft and an arm on the vertical shaft engaging the same, said arm

50 being pivotally mounted on the vertical shaft, and a spring for holding it in normal position, substantially as described.

7. In combination in a knitting machine having a plurality of needle protectors, a let-off, a connection thereto common to all the protectors, said connections having a lost motion joint permitting independent operation of the detectors, substantially as described.

8. In combination in a knitting machine, a plurality of needle protectors, a shaft for each protector, a power transmitting device for each protector, having a pin and lost motion notch to permit independent opera-

tion of the needle protectors, substantially as described.

9. In combination with detector means, a let-off, a lock to hold the let-off inactive, and a connection between the lock and the detector means to hold the lock withdrawn when the detector means is reset, substantially as described.

10. In combination with detector means, a let-off, a brake, a restraining member connected with the brake, a releasing device for the restraining member connected with the detector, and a controller connected with the let-off for holding the restraining means until after the let-off has been released, substantially as described.

11. In combination with detector means, a let-off, a brake, and a member, for locking the let-off inactive and for setting the brake, connected with the detector to be released thereby, and a controller connected with the let off for restraining said member until the let-off is released, said member then locking the let-off until the detector means is reset, substantially as described.

12. In combination the let-off clutch, a rock shaft connected therewith, a handle for operating the rock shaft, a locking arm for the rock shaft, detector means, a detent for the locking arm to hold it in unlocked position, said detent being connected with the detector to be set in position for holding the locking arm inactive when the detector is set, and means controlled by the detent and acting when the locking arm is released for turning the rock shaft and throwing the clutch out, substantially as described.

13. In combination the let-off clutch, a brake, a rock shaft connected with the clutch, a handle for operating the rock shaft, a locking arm for the rock shaft, a detent for the locking arm, a detector with connections therefrom to the detent to set the same in position for holding the locking arm inactive when the detector is set ready for action, means controlled by the detent and acting when the locking arm is released for turning the rock shaft and throwing the clutch out, a connection between the locking arm and the brake to set the latter when the full movement of the arm takes place, and a controller for the locking arm and moving as the clutch is released, said controller arresting the locking arm and delaying setting the brake until the clutch is fully released, substantially as described.

14. In combination a let-off clutch, a main spring for throwing out said clutch, a detector, a detector controlled detent, a connection between the detector and the detent, a locking arm restrained thereby, a rock shaft, a connection between the rock shaft and the clutch, a connection between said locking arm and rock shaft, a supplemental

spring for operating the arm when released to bring the main spring into play, and to set the locking arm in position to hold the let-off clutch out of operation, substantially as described.

15. In combination a let-off clutch, a main spring for throwing out said clutch, a detector, a detector controlled detent, a connection between the detector and detent, a locking arm restrained by the detent, a rock shaft, a connection between the same and the clutch, a lost motion connection between said arm and rock shaft, a supplemental spring for operating the arm when released, to bring the main spring into play and to set the locking arm in position to hold the let-off clutch out of operation, substantially as described.

16. In combination a let-off clutch, a main spring for throwing said clutch, a detector, a detector controlled detent, a connection between the detent and detectors, an arm restrained by said detent, a rocking member having a lost motion link connection with the said arm, a link connection between said rocking member and the clutch having its pivot normally to one side of the line of strain when the clutch is set, a main spring to throw the clutch but acting normally to hold the link with its pivot in normal position with the clutch set, and a supplemental spring connected to the arm to throw the link to the other side of the line of strain and bring the main spring into play, and to throw the arm into position to lock the let-off released when the clutch is fully released, substantially as described.

17. In combination a let-off clutch, a main spring for throwing said clutch, a detector, a detector controlled detent, a connection between the detector and the detent, an arm restrained by said detent, a rocking member having a lost motion link connection with the said arm, a link connection between said rocking member and the clutch having its pivot normally to one side of the line of strain with the clutch set, a main spring to throw the clutch but acting normally to hold the link with its pivot in normal position when the clutch is set, and a supplemental spring connected to the arm to throw the link to the other side of the line of strain and bring the main spring into play, and to throw the arm into position to lock the let-off released when the clutch is fully released, substantially as described.

18. In combination a let-off clutch, a main spring for throwing said clutch, a detector, a detector controlled detent, a connection between the detector and the detent, an arm restrained by said detent, a rocking member having a lost motion link connection with the said arm, a link connection between said rocking member and the clutch having

its pivot normally to one side of the line of strain with the clutch set, a main spring to throw the clutch but acting normally to hold the link with its pivot in normal position with the clutch set, a supplemental spring connected to the arm to throw the link to the other side of the line of strain and bring the main spring into play, and to throw the arm into position to lock the let-off released when the clutch is fully released, and a brake controlled by the arm, said arm being controlled by the rocking member to hold the brake off until the clutch is released, substantially as described.

19. In combination in a knitting machine let-off, a detector, a detector-controlled detent, a connection between the detector and the detent, a rocking member consisting of a segmental disk, a clutch member connected thereto, a main spring for operating the clutch member, a locking arm connected to the rocking member for operating the same, the said detent controlling the locking arm, and a supplemental spring for applying tension to the locking arm, said locking arm engaging first the periphery of the segmental member and then its flat side, substantially as described.

20. In combination in a knitting machine, a detector, a let-off clutch, a rocking member, a link connection between said parts having its pivot normally above the line of strain, a brake, a brake arm having a sliding link connection with the rocking member and under tension, means including a detent for restraining the brake arm, a connection between the detector and the detent, said rocking member restraining the brake arm when released from its detent until the clutch is released and acting therewith as a lock until the detent is reset to restrain the same, and a main spring for releasing the clutch when the link pivot is thrown down below the line of strain, substantially as described.

21. In combination with a knitting machine, a detector, a clutch, a friction drive comprising the driving and driven member, contact shoes transmitting movement from one to the other, means for holding said contact shoes stationary to act as brake shoes, and connections between the detector and clutch and friction drive, said shoes maintaining their relation to the driving and driven parts while acting as drive or as brake shoes, substantially as described.

22. In combination with a knitting machine, a detector, a clutch, a friction drive comprising the driving and driven members, friction shoes, one for each member, and each encircling one member and connected together to act as a power transmission member, and means for holding the said friction shoes stationary to act as brake

means, and connections between the detector and said holding means and the clutch, substantially as described.

23. In a knitting machine, a detector, a
5 clutch, a combined drive and brake, comprising a friction drive cone, a friction driven cone, an encircling shoe for each cone, spring means for drawing the shoes toward each other, a plate or ring connected
10 with the shoes having teeth holding means for arresting the cone and thus converting the drive into a brake, and connections between said detector and said holding means and the clutch, substantially as described.

15 24. A needle protector for knitting ma-

chines, comprising a frame, a needle protector consisting of a shaft rotatably and slidably mounted on the frame, having a contact finger at one end and let off means controlled by the said shaft, the sliding
20 movement carrying the contact finger away from the needles and clear of obstructions, substantially as described.

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

FRANK WILCOMB.

Witnesses:

NINA S. RITTER,

HERBERT W. BOYER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."