April 24, 1956 W. P. PATTERSON 2,742,933

STOP RECORDING ATTACHMENT FOR TEXTILE MACHINE

Filed Aug. 28, 1953 4 Sheets-Sheet 1

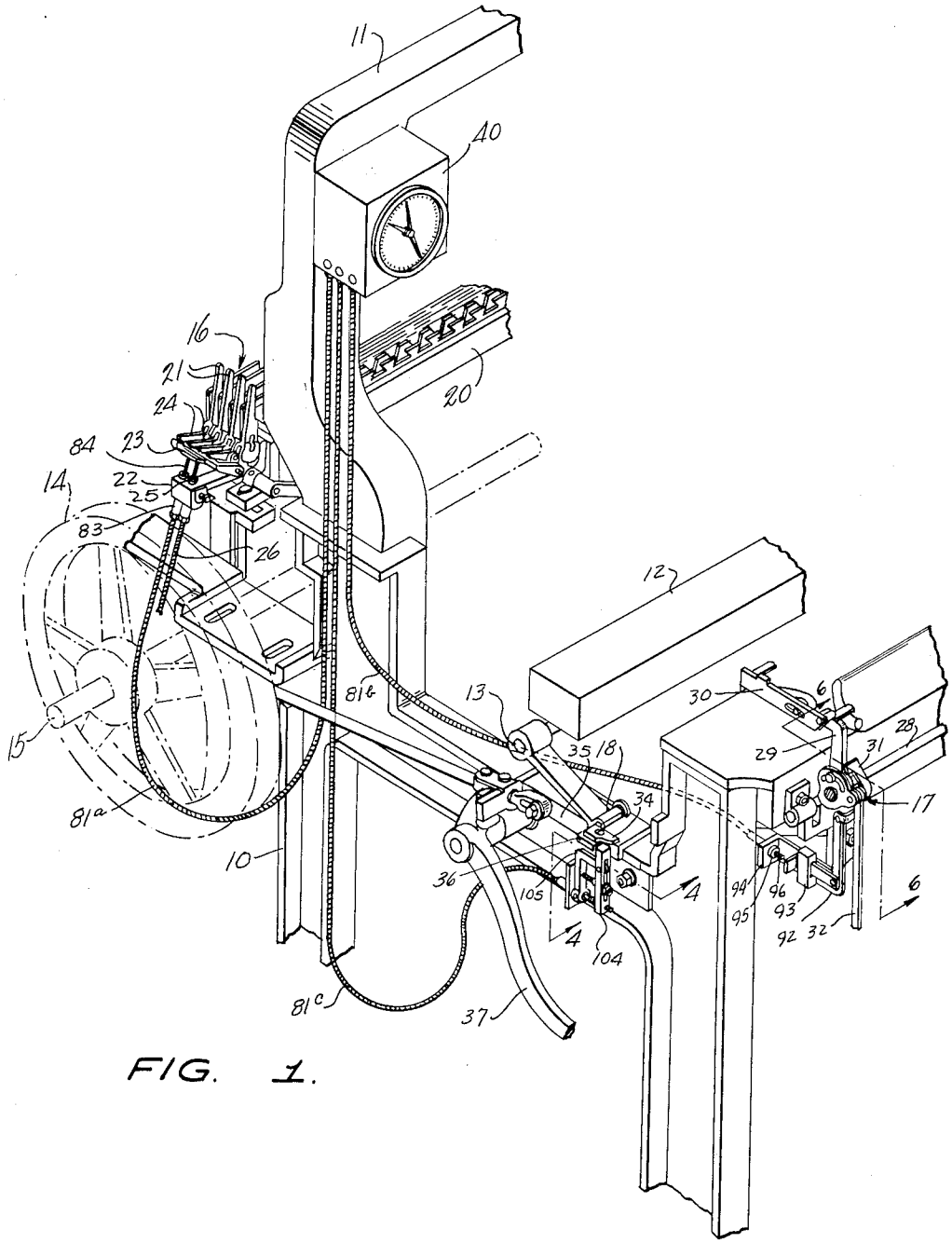


FIG. 1.

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FIG. 2.

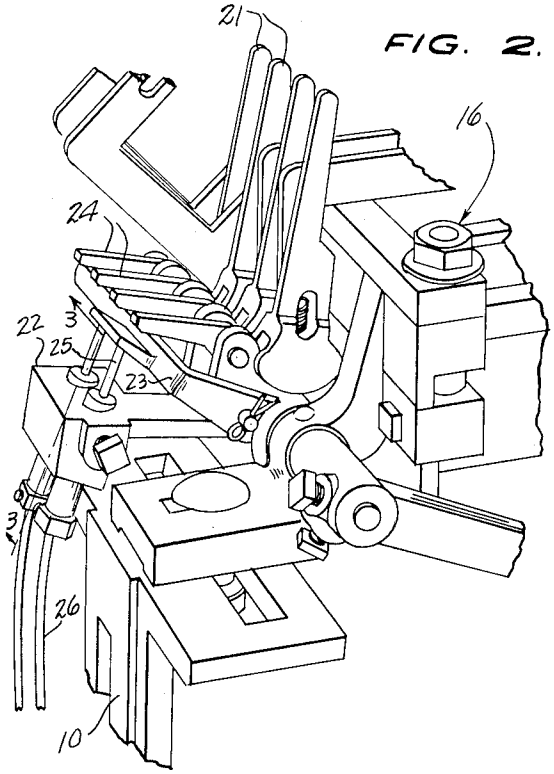


FIG. 3.

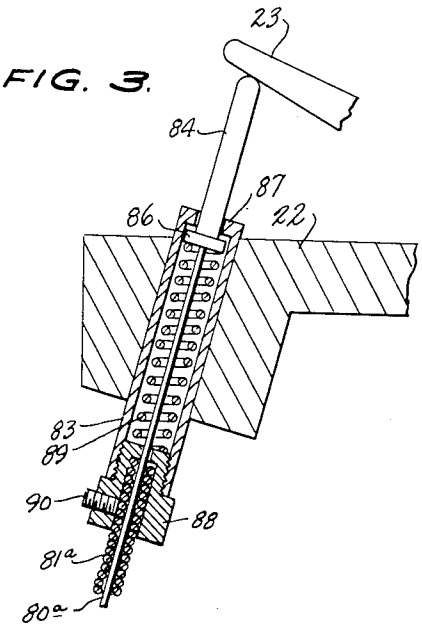


FIG. 4.

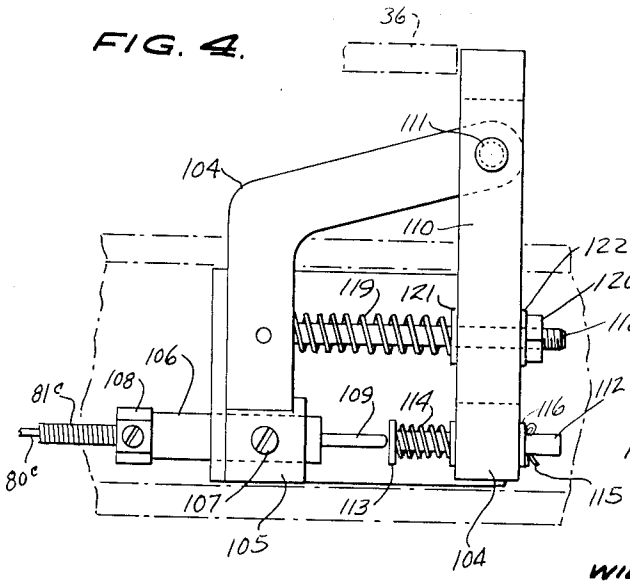
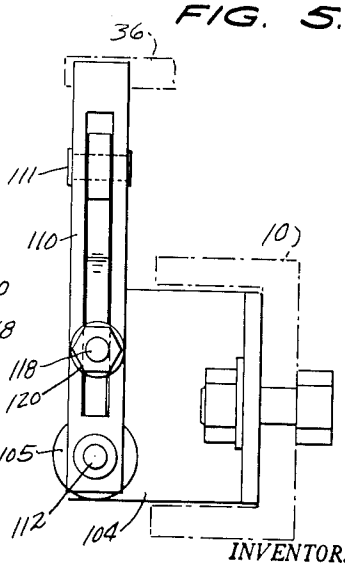


FIG. 5.



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STOP RECORDING ATTACHMENT FOR TEXTILE MACHINE

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FIG. 6.

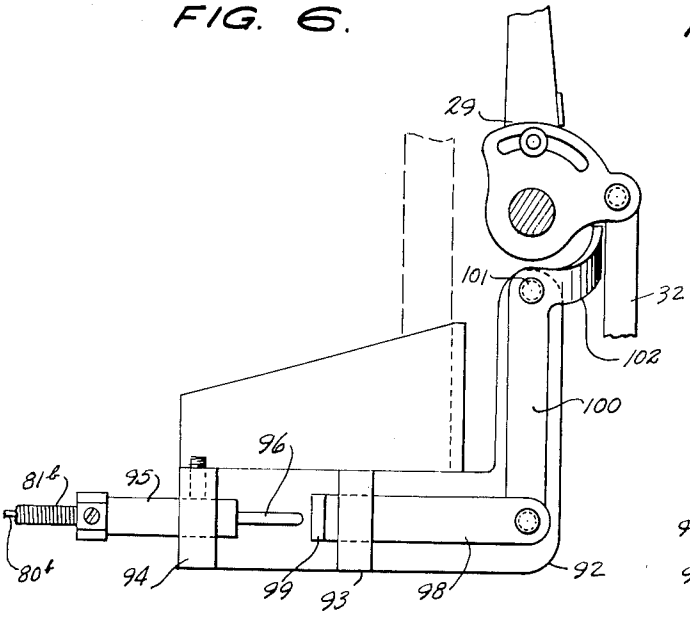
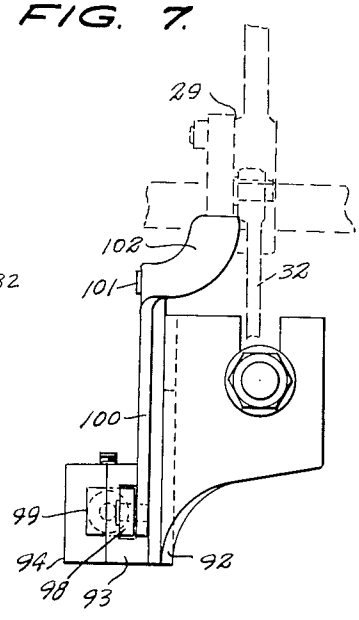


FIG. 7.



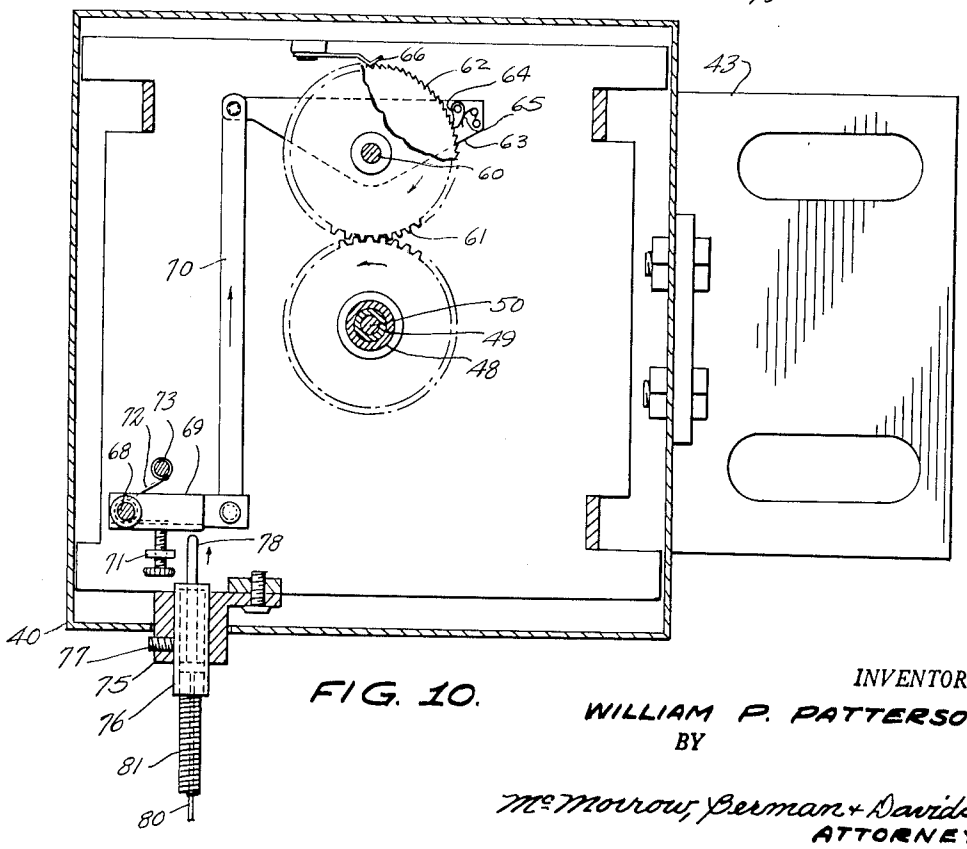


FIG. 10.

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FIG. 8.

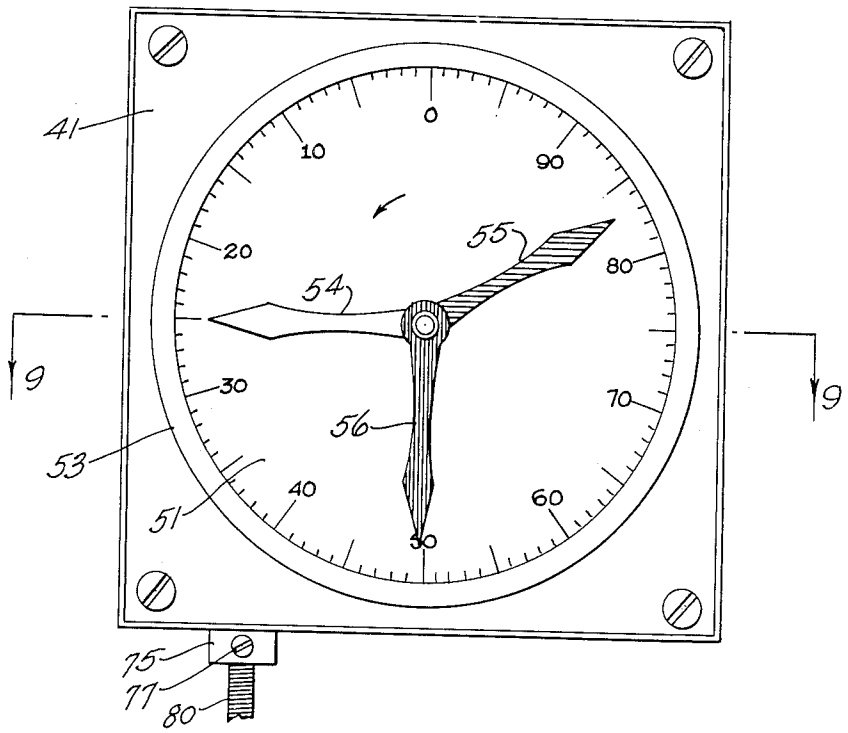
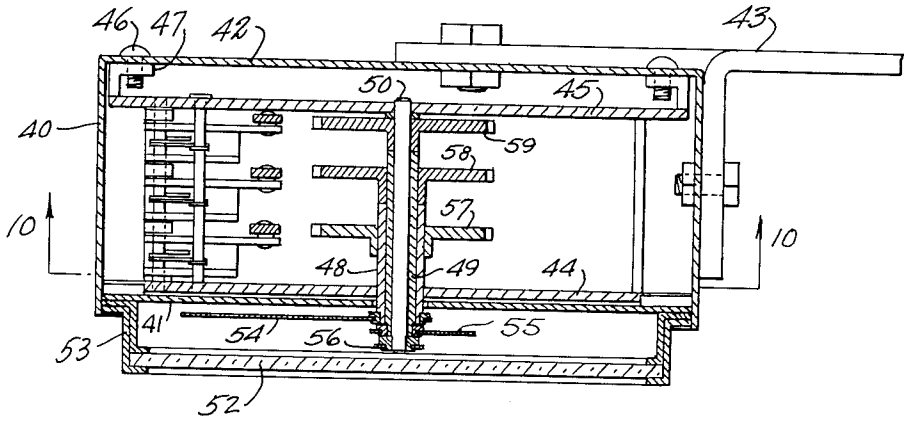


FIG. 9.



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United States Patent Office 2,742,933 Patented Apr. 24, 1956

2,742,933

STOP RECORDING ATTACHMENT FOR TEXTILE MACHINE

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Application August 28, 1953, Serial No. 377,136

3 Claims. (Cl. 139—336)

This invention relates to stop recording attachments for textile machines and more particularly to an attachment which will record the number of stops of the associated machine over a predetermined time interval and maintain separate counts of the number of stops for different causes, so that corrective measures may be taken, if necessary, to reduce the number of stops for any particular cause.

It is among the objects of the invention to provide an improved stop recording attachment which can be mounted upon a textile machine, such as a loom, with no material modification of the machine, and will separately and accurately record the number of times the machine is stopped for different causes during a selected time interval; which is separately responsive to several automatic stop motion devices and to the manual stop mechanism of the machine and maintains separate records of stops for the several automatic stop motions and the manual stops; which can be reset to zero whenever desired and has sufficient capacity for an extended work period, such as a work week, without being reset; which can be easily read at any time by an operator, foreman, superintendent or other persons; which does not interfere in any way with the normal operation of the machine on which it is installed; and which is mechanically actuated in a positive manner to provide accurate counts of the machine stops for the different causes for which the associated machine may be stopped.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings wherein:

Figure 1 is a fragmentary perspective view of an end portion of a textile loom showing the application of a machine stop recorder illustrative of the invention to the loom;

Figure 2 is a perspective view of the automatic stop motion mechanism of the loom responsive to breakage of the loom warp threads and of the associated portion of the loom stop recorder;

Figure 3 is a fragmentary cross sectional view on an enlarged scale on the line 3—3 of Figure 2;

Figure 4 is an elevational view of the portion of the loom stop recorder operated by the manually operated stop mechanism of the loom;

Figure 5 is an elevational view of the mechanism illustrated in Figure 4 looking at the right-hand side of the mechanism as illustrated in Figure 4;

Figure 6 is an elevational view of the portion of the stop recorder mechanism operated by the automatic stop mechanism of the loom responsive to breakage of the filler thread;

Figure 7 is an elevational view of the mechanism illustrated in Figure 6 looking at the right-hand side of the mechanism as illustrated in Figure 6;

Figure 8 is a front elevational view of the stop recording portion of the stop recording mechanism;

Figure 9 is a cross sectional view on the line 9—9 of Figure 8; and

Figure 10 is a cross sectional view on the line 10—10 of Figure 9.

While the machine stop recording mechanism may be applied to various kinds of textile machines, such as spinning frames, winding machines, warp filling machines and looms, it has been illustrated as applied to a loom in order to provide an exemplary showing of the construction and operation of the device.

The loom fragmentarily illustrated in the accompanying drawings may be of a well known form and includes a frame **10**, an arch **11**, a lay **12**, a protector rod **13** extending longitudinally of the under side of the lay and projecting at its ends beyond the ends of the lay, and a brake wheel **14** mounted on the crankshaft **15** of the loom and engaged by brake mechanism, not illustrated, to stop the loom when the loom clutch is tripped by any one of one or more automatic stop motion devices or by the manual stop mechanism of the loom.

The loom, as illustrated, has an automatic stop motion mechanism, generally indicated at **16**, responsive to breakage of the warp thread passing through the loom, an automatic stop motion mechanism, generally indicated at **17**, responsive to breakage of the filler thread, and a manually operated stop mechanism, generally indicated at **18**, controlled by the manually actuated knock-off lever with which the loom is provided.

The automatic stop motion **16** includes the sliding feeler bars **20** which extend transversely of the loom and are provided with a series of notches in their upper edges. These bars are arranged in pairs and one bar of each pair is given continuous reciprocating movement transversely of the loom by an eccentric cam, and drop wires are supported by the warp threads above the notched upper edges of the feeler bars. If a warp thread breaks, the associated drop wire falls onto the top edges of one of the pair of sliding feeler bars and engages in the notches in the top edges of this pair of bars, causing the two bars of the pair to move together. Feeler bar fingers **21** are pivotally mounted on the loom at one end of the group of sliding feeler bars and are connected to the feeler bars in a manner such that when the two feeler bars of one pair move together the corresponding feeler bar finger is turned about its pivotal mounting on the loom. A feeler bar finger base **22** extends outwardly from the feeler bar fingers substantially in longitudinal alignment with the sliding feeler bars **20** and a plunger finger **23** of U-shaped construction is pivotally mounted at its ends on the base **22** and has its intermediate portion disposed between the base and the finger bars. Feeler bar finger trips **24** project outwardly, one from each feeler bar finger and bear on the upper surface of the intermediate portion of the plunger finger **23**, so that the intermediate portion of the plunger finger is forced downwardly toward the outer end of the base **22** when any one of the feeler bar fingers is moved about its pivotal mounting on the loom by the corresponding pair of sliding feeler bars, as described above.

A feeler bar finger plunger **25** extends through and is mounted in the base **22** near the outer end of this base, and has its upper end disposed against the under side of the intermediate portion of the feeler bar finger trip **24**. This plunger is connected through a flexible motion transmitting device **26** to the shipper handle of the loom and is effective to move the shipper handle and stop the loom whenever a warp thread breaks.

A starting rod **28** extends longitudinally of the front side of the loom frame and is given an oscillatory movement by suitable mechanism, not illustrated but, well known to the art. The automatic stop motion **17** in-

cludes a filling motion finger 29 extending upwardly from the rod 28 and connected to the usual filling fork in a manner to move the filling fork toward and away from the usual fork grate to continuously feel the filling thread. If the pick is broken, the filling fork will pass through or into the filling grate and catch the filling dog hook. This will pull the filling slide back against the let-off arm which is connected to the filling motion finger 29 and give a downward motion to the finger and to the link 32 connected to the filling motion finger. This downward motion of the link knocks the shipper handle off, stopping the loom. When the loom is restarted, the filling motion finger 29 is restored to its original position and releasably latched in position by the straddle bug 30.

If the loom stops for mechanical reasons the dagger, not illustrated, comes into contact with the live frogs 34 which pushes against the frog piece 35 and moves the frog lip 36. The frog lip is connected to the knock-off lever, not illustrated, which releases the brake lever 37 and enables the brake lever spring to apply the brake to the brake wheel 14. The loom may stop automatically for mechanical reasons by failure of the protector rod 13 to accomplish its normal movement, or may be stopped by manually releasing the knock-off lever of the loom, as is well known to the art. While the loom has been illustrated only sufficiently to show the application of the stop count indicator attachment thereto, it is believed that the operation of the loom and its various stop motion devices, as briefly described above, will be readily understood by those skilled in the art.

The stop count recording attachement of the present invention comprises a hollow housing 40 mounted in some convenient position on the associated machine where it will be readily visible to the machine operator or others requiring the information disclosed thereby, and where it will not interfere in any way with the normal operation of the machine. In the installation illustrated the housing is shown mounted on the arch 11 of the loom at one end of the arch.

The hollow housing 40 has spaced apart and substantially parallel front and back walls 41 and 42, top, bottom and side walls, and is mounted on the arch 11 of the loom by a suitable angle bracket 43 secured to the back wall and one of the side walls of the housing. Mechanism is mounted in the housing and includes spaced apart and substantially parallel frame plates 44 and 45 disposed adjacent the front and back walls respectively of the housing and secured in position in the housing by suitable means, such as the screws 46 extending through apertures in the back wall 42 of the housing and threaded into tapped holes in lugs 47 formed on the back plate 45 of the mechanism frame.

Concentric shafts 48, 49 and 50 extend transversely of the space between the frame plates 44 and 45 and are journaled in these frame plates. These shafts extend through an aperture in the front wall 41 of the housing substantially centrally of the housing front wall and are surrounded by a dial 51 mounted or provided on the outer surface of the housing front wall 41. The dial is covered by a transparent window pane 52 supported in spaced and substantially parallel relationship to the dial by an angular frame or bezel 53 mounted on the front wall of the housing and marginally engaging the pane 52. Hands or pointers 54, 55 and 56 are mounted on the shafts 48, 49 and 50 respectively, and are movable around the dial 41 when the corresponding shafts are rotated.

Spur gears 57, 58 and 59 are mounted on the coaxial shafts 48, 49 and 50 respectively, and are disposed between the frame plates 44 and 45 in spaced apart relationship to each other. A shaft 60 extends transversely of the space between the frame plates 44 and 45 in spaced and parallel relationship to the shaft 50 and is journaled at its opposite ends in the frame plates. Spur

gears, as indicated at 61 in Figure 10, are journaled on the shaft 60 and mesh respectively with the gears 57, 58 and 59, and ratchet wheels, as indicated at 62 in Figure 10, are disposed one against each of the gears 61 concentrically thereof and are drivingly connected to the corresponding gears 61. Levers, as indicated at 63 in Figure 10, are rockably mounted on the shaft 60, one adjacent each ratchet wheel 62, and each lever extends at its ends beyond the correspondingly opposite sides of the associated ratchet wheel. Pawls, as indicated at 64, are carried one by each of the levers 63 near corresponding ends of these levers and are resiliently urged by springs, as indicated at 65, into engagement with the teeth of the corresponding ratchet wheel 62, so that the ratchet wheels and associated gears 61 will be rotated through a predetermined angular interval when the corresponding levers 63 are rocked in one direction, but will not be moved when the levers are rocked in the opposite direction. Detent or brake springs, as indicated at 66, are mounted on the mechanism frame and respectively engage the teeth of the ratchet wheel 62 to maintain the ratchet wheels and associated gears 61 against reverse rotation.

With this arrangement, the pointers 54, 55 and 56 will be progressively moved in a step by step manner around the dial 51 when the corresponding levers 63 are rocked.

A third shaft 68 extends transversely across the space between the frame plates 44 and 45 and is secured at its ends in these frame plates, and levers, as indicated at 69, are pivotally mounted at corresponding ends on the shaft 68 and extend from this shaft inwardly of the housing. Links, as indicated at 70, connect each of the levers 69 at the ends of these levers remote from the shaft 68 to the corresponding levers 63 at the ends of the levers 63 remote from the associated pawls 64. Adjustable stops 71 are provided, one for each of the levers 69 at the under sides of these levers and springs 72 connected between the levers 69 and a fourth shaft 73 resiliently urge the levers 69 against the corresponding adjustable stops 71. The stops 71 can be adjusted to regulate the angular extent of rotation of the ratchet wheels 62 and associated gears 61 for each rocking movement of the corresponding levers 63.

Three tubular bosses, as indicated at 75 in Figure 10, extend downwardly from the mechanism frame and through corresponding apertures in the bottom wall of the housing 40 and are disposed one below each of the levers 69. Sleeves, as indicated at 76, extend slidably, one through each of the bosses 75 and are releasably secured in adjusted longitudinal position relative to the associated bosses by suitable means, such as set screws 77 threaded through tapped holes in the bosses and engaging the corresponding sleeves. Plungers, as indicated at 78, are slidably mounted, one in each of the sleeves 76, and extend upwardly from the upper ends of the corresponding sleeves for engagement at their upper ends with the under surfaces of the corresponding levers 69 to impart rocking movement to the levers 69 and corresponding levers 63. Core wires, as indicated at 80, are connected individually to the lower ends of the plungers 78 and extend downwardly from the plungers, and flexible sheaths 81 respectively receive the core wires 80 and are secured at corresponding ends in the lower end portions of the corresponding sleeves 76.

The feeler bar finger base 22 is extended laterally and provided with an aperture spaced from and substantially parallel to the aperture in which the machine stop plunger 25 is mounted. A sleeve 83 extends through and is secured in this second aperture in the base 22, and the end of one of the sheaths 81, designated in Figure 1 as the sheath 81*a*, remote from the housing 40, is secured in the lower end portion of the sleeve 83. A plunger 84 is slidably mounted in the sleeve 83 and projects upwardly from the top end of the sleeve into engagement

with the under surface of the feeler bar plunger finger **23**. Movement of the plunger **84** outwardly of the sleeve **83** is limited by an annular flange or collar **86** on the lower end of the plunger disposed within the sleeve **83** and an internal shoulder formation **87** in the upper end of the sleeve. A plug **88** is threaded into the lower end of the sleeve and a compression spring **89** disposed within the sleeve between the inner end of the plug **88** and the inner end of the plunger **84** resiliently urges the plunger to its limiting position outwardly of the sleeve **83**. The plug **88** has a bore receiving the sheath **81***a* in which the sheath is secured by a set screw **90** and the core wire **80***a* extending through the sheath **81***a* extends through the spring **89** and is secured to the inner or lower end of the plunger **84** to transmit movements of the plunger **84** to the associated plunger **78** in the housing **40**.

With this arrangement, each time the feeler bar plunger finger **23** is actuated in the manner described above to move the plunger **25** and stop the machine, it also moves the plunger **84** and causes the corresponding pointer **54**, **55** or **56** to advance one step.

A bracket **92** of right angular shape is mounted on the loom frame below and adjacent to the filling motion finger **29** and has one leg substantially vertically disposed and depending from the frame immediately below the starter rod **28** and its other leg substantially horizontally disposed and directed inwardly of the frame from the front side of the frame. A guideway **93** is mounted on the horizontal arm of the bracket **92** intermediate the length of this arm, and an apertured ear or lug formation **94** is provided on the distal end of the horizontal leg and disposed substantially perpendicular to this leg. A sleeve **95** extends through and is secured in an aperture in the lug **94** and a plunger **96** is slidably mounted in the sleeve **95** and projects from the end of the sleeve nearest the guideway **93**. A flexible sheath **81***b* is secured at its end remote from the housing **40** in the end portion of the sleeve **95** remote from the plunger **96**, a spring corresponding to the spring **89** preferably being provided in the sleeve **95** to resiliently urge the plunger **96** to its limiting position outwardly of this sleeve, and the core wire **80***b* extending through the sheath **81***b* is secured at its end remote from the housing **40** to the inner end of the plunger **96** to transmit movements of the plunger **96** to the corresponding plunger **78** in the housing **40**.

A bolt **98** extends slidably through the guide **93** and has on its end adjacent the plunger **96** an abutment **99** engageable with the adjacent end of the plunger to force the plunger inwardly of the sleeve **95** when the bolt is moved toward this sleeve. A bell crank lever **100** is pivotally mounted at its bend on the vertical arm of the bracket **92**, as indicated at **101**, and has its lower end pivotally connected to the end of the bolt **98** remote from the plunger **96**. The second leg **102** of the lever **100** extends under the filling motion finger **29**, so that the lever **100** will be swung about its pivotal connection **101** in a direction to force the plunger **96** inwardly of the sleeve **95** whenever the filling motion finger **29** is swung forwardly to stop the loom in the manner described above. When the plunger **96** is moved by the filling motion finger **29** moving to stop the loom, the corresponding plunger **78** will be moved, thereby advancing the associated pointer one step around the dial **51**.

An angularly shaped bracket **104** is mounted on the end of the machine frame and has its upper end disposed below the front edge of the frog lip **36** of the machine and its lower end provided with an apertured sleeve or boss formation **105**. A sleeve **106** extends slidably through the boss formation **105** and is secured in adjusted position therein by a set screw **107** and the flexible sheath **81***c* is secured at its end remote from the housing **40** to one end of the sleeve **106** by a screw plug **108**. A plunger **109** is slidably mounted in the sleeve **106** and projects from the end of the sleeve remote from the plug **108**, a compression spring corresponding to the spring **89**, as

illustrated in Figure 3, being preferably disposed in the sleeve **106** between the plunger **109** and the plug **108** to resiliently urge the plunger to its limiting position outwardly of the sleeve. The core wire **80***c* extending through the sheath **81***c* is secured at its end remote from the housing **40** to the inner end of the plunger **109** and transmits movements of the plunger **109** to the corresponding plunger **78** in the housing **40**.

A lever **110** is pivotally mounted intermediate its length on the upper end of the bracket **104** by a pivotal connection **111** and has its upper end disposed in opposition to the front edge of the frog lip **36**. Near its lower end the lever **110** is provided with a transverse aperture and an abutment pin **112** is slidably mounted in this aperture and has on one end a head **113** disposed in opposition to the outer end of the plunger **109**. A compression spring **114** surrounds the pin **112** between the head **113** and the adjacent side of the lever **110** to resiliently urge the head end of the pin toward the plunger **109** and movement of the pin by the spring **114** is limited by a cotter key **115** extending through an aperture in the pin at the opposite side of the lver **110** and bearing against a thrust washer **116**. A guide pin **118** is pivotally connected at one end to the bracket **104** above the bracket boss formation **105** and extends slidably through an aperture in the lever **110** above the pin **112**. A compression spring **119** surrounds the pin **118** between the bracket **104** and lever **110** and a nut **120** is threaded onto the pin **118** at the side of the lever **110** remote from the bracket **104**. Abutment washers **121** and **122** surround the pin **118** at respectively opposite sides of the lever **110** and are disposed between the lever and the spring **119** and nut **120** respectively.

The spring **119** is a check spring which resists excessive movement of the lever **110** when this lever is subjected through the frog lip **36** to the shock of mechanical stoppages of the machine, and the spring **114** is a cushion spring which limits the force applied by the lever **110** to the plunger **109** and prevents movement of the plunger to an undesirable extent, even though the movement of the lever **110** may be excessive.

Whenever the machine is stopped by the mechanical or manually operated stop mechanism, the plunger **109** will be moved and its movement will be transmitted through the core wire **80***c* to the corresponding plunger **78** in the housing, advancing the corresponding pointer one step around the dial **51**.

Each of the loom stop mechanisms is thus connected to a corresponding pointer and the positions of these pointers around the dial **51** will indicate the number of times the loom has been stopped by the corresponding stop mechanisms, the sum of the numbers indicated by the several pointers being the total number of times that the loom has been stopped for all purposes during the selected work interval.

The dial **51** will have sufficient capacity to record the number of machine stops for a desired work interval, such as a work week, and at the end of the selected interval the several pointers may be returned to a zero reading in order to record the number of machine stops for a subsequent work interval.

The gear wheels **57**, **58** and **59** are frictionally mounted on the shafts **48**, **49** and **50** respectively, so that while the gears will drive the shafts and move the corresponding pointers or hands **54**, **55** and **56** in the manner described above, the shafts can be turned in the hubs of the corresponding gears when the hands or pointers are manually moved. The hands can thus be manually turned back to zero position in the manner of resetting an old fashioned clock.

The hands will be labeled, numbered or differently colored, so that an observer can readily determine which hand is connected to a particular stop motion device and easily discern the number of stops recorded for each of the stop motion devices.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. In combination with a textile machine having an automatic stop motion mechanism including a feeler bar plunger finger responsive to breakage of the warp thread, an automatic stop motion mechanism including a filling motion finger responsive to the breakage of the filler thread, and a manually operated stop mechanism including a frog lip controllable by the manually actuated knock-off lever, a stop count recording attachment including three visible stop count indicating means, one of said stop count indicating means being provided with means engageable with the feeler bar plunger finger of said first named stop mechanism to move one step each time said machine is stopped, another of said stop count indicating means being provided with means engageable with means operatively connected to the filling motion finger of said second named stop mechanism to move one step each time said machine is stopped, a further one of said stop count indicating means being provided with means engageable with means operatively connected to the frog lip of said third named stop mechanism to move one step each time said machine is stopped.

2. In combination with a textile machine having an automatic stop motion mechanism including a feeler bar plunger finger responsive to breakage of the warp thread, an automatic stop motion mechanism including a filling motion finger responsive to the breakage of the filler thread, and a manually operated stop mechanism including a frog lip controllable by the manually actuated knock-off lever, a stop count recording attachment including three visible stop count indicating means, one of said stop count indicating means being provided with a plunger engageable with the filler bar plunger finger of said first named stop mechanism to move one step each time said machine is stopped, another of said stop count indicating means being provided with a plunger engageable with an abutment operatively connected to the filling motion finger of said second named stop mechanism to move one step each time said machine is stopped, a further one of said stop count indicating means being provided with a plunger engageable with an abutment pin operatively connected to the frog lip of said third named stop mechanism to move one step each time said machine is stopped.

3. In combination with a textile machine having an automatic stop motion mechanism including a feeler bar plunger finger responsive to breakage of the warp thread, an automatic stop motion mechanism including a filling motion finger responsive to the breakage of the filler thread, and a manually operated stop mechanism including a frog lip controllable by the manually actuated knock-off lever, a stop count recording attachment including three visible stop count indicating means, one of said stop count indicating means being provided with a plunger engageable with the feeler bar plunger finger of said first named stop mechanism to move one step each time said machine is stopped, spring means operatively connected to said plunger for urging the latter toward engagement with the feeler bar plunger finger of said first named stop mechanism, another of said stop count indicating means being provided with a plunger engageable with an abutment operatively connected to the filling motion finger of said second named stop mechanism to move one step each time said machine is stopped, spring means operatively connected to said second named plunger for urging the latter toward engagement with the abutment operatively connected to the filling motion finger of said second named stop mechanism, a further one of said stop count indicating means being provided with a plunger engageable with an abutment pin operatively connected to the frog lip of said third named stop mechanism to move one step each time said machine is stopped, spring means operatively connected to the third named plunger for urging the latter toward engagement with the abutment pin operatively connected to the frog lip of said third named stop mechanism.

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