April 16, 1935. C. D. BROWN 1,998,305

ELECTRICALLY CONTROLLED TEXTILE MACHINE

Filed Oct. 27, 1933 3 Sheets-Sheet 1

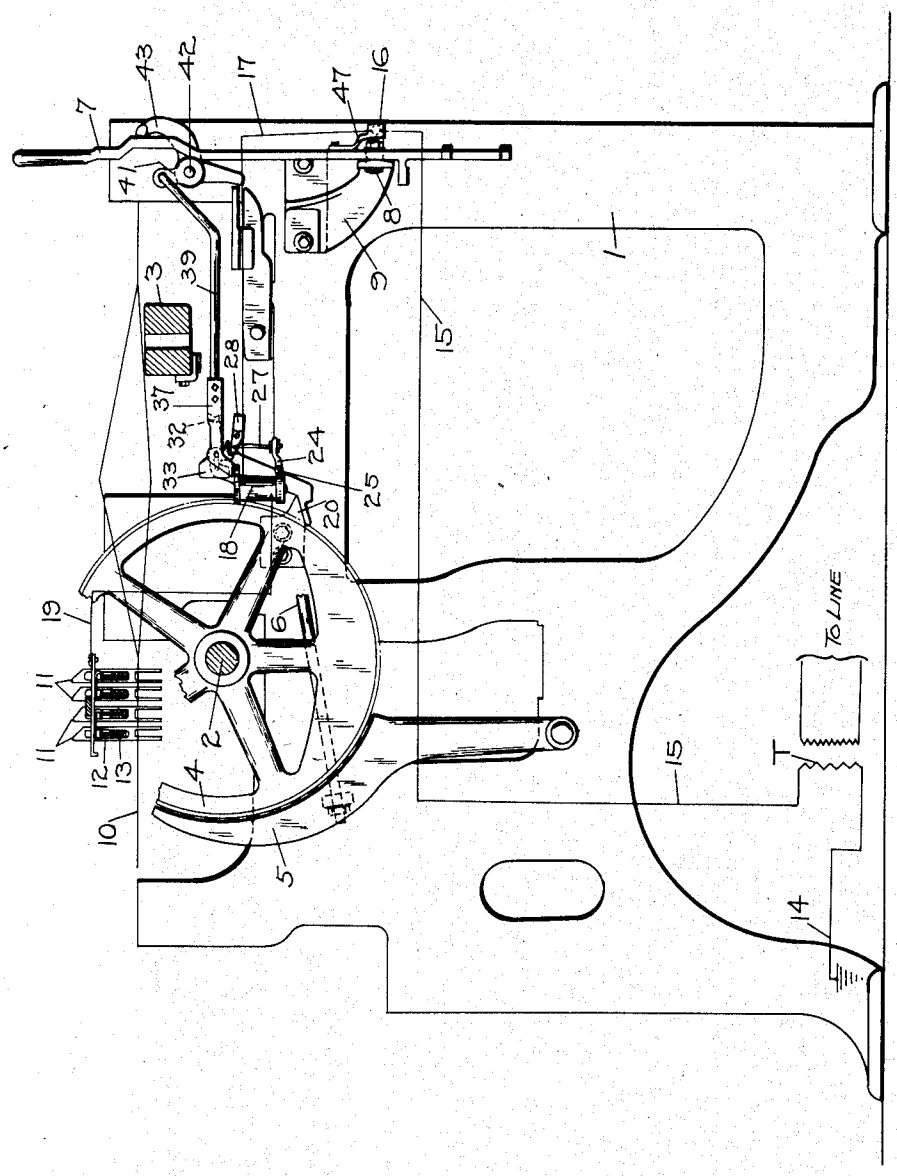


Fig. 1.

WITNESS.
CLINTON S. COBURN.

INVENTOR.
CARL D. BROWN.
BY Claude F. Snider
ATTORNEY.

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Fig. 2.

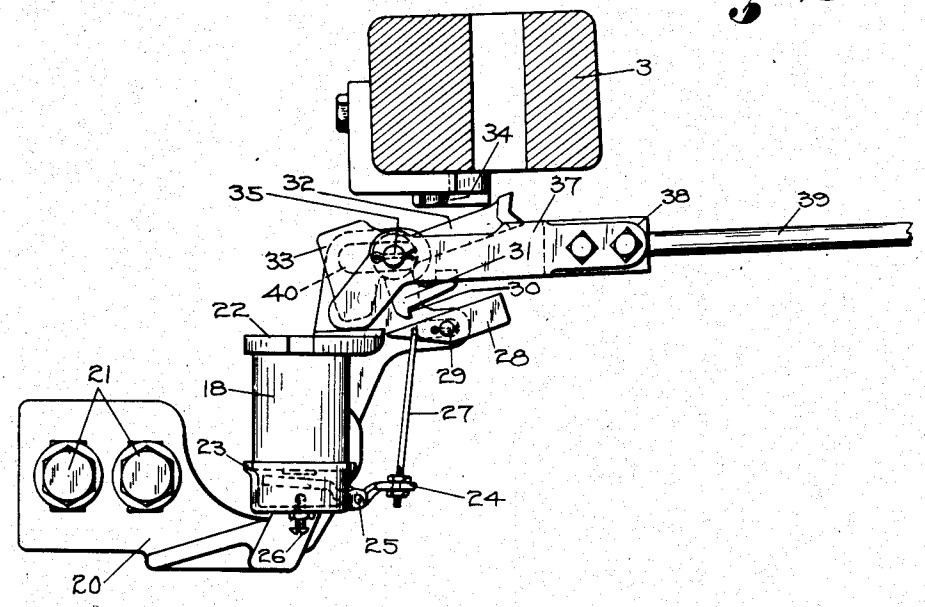
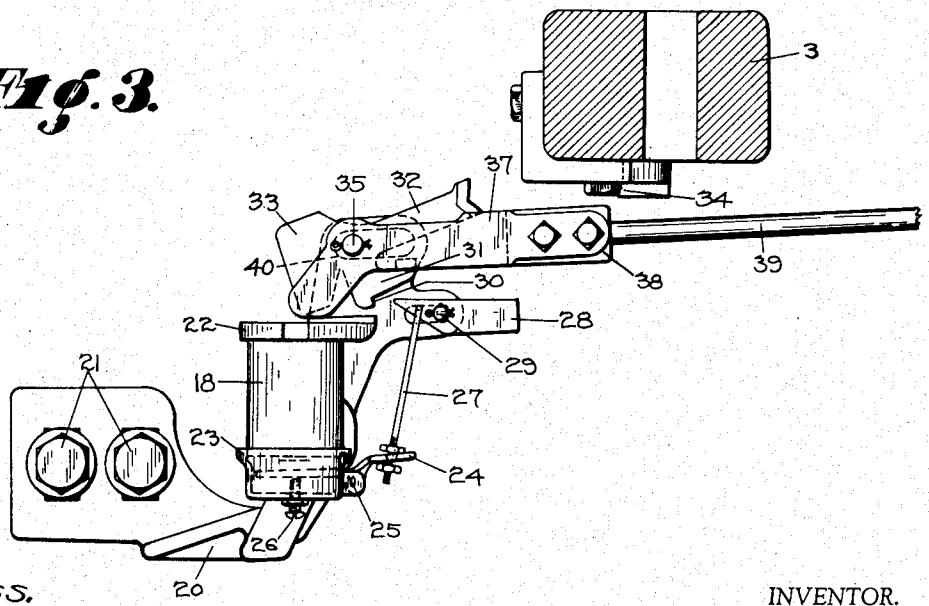


Fig. 3.



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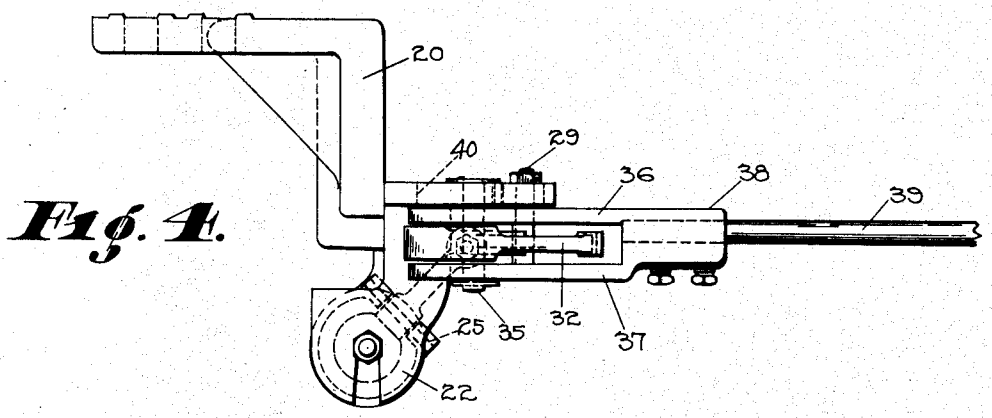


Fig. 4.

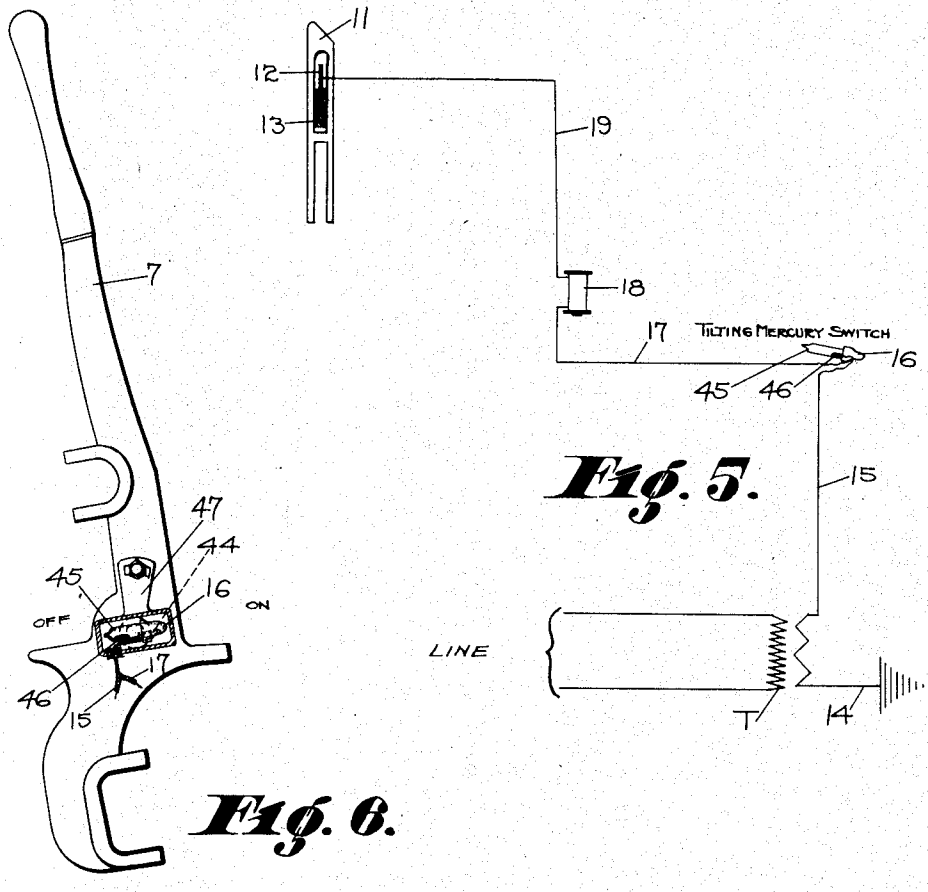


Fig. 5.

Fig. 6.

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CLINTON S. COBURN.

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CARL D. BROWN.
BY Claude F. Snider
ATTORNEY.

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UNITED STATES PATENT OFFICE

1,998,305

ELECTRICALLY CONTROLLED TEXTILE MACHINE

Carl D. Brown, Hopedale, Mass., assignor to Draper Corporation, Hopedale, Mass., a corporation of Maine

Application October 27, 1933, Serial No. 695,514

9 Claims. (Cl. 139—336)

The present invention in its broader aspects relates to electric control circuits for textile machines of the class adapted to operate on a plurality of threads. Certain specific features of the invention are, however, limited to electric warp stop motions as employed, for example, on looms.

Textile machines of the class involved are commonly provided with certain electrically operated devices, such as stop motions or loom filling feelers, the current for which is derived from some independent, outside source. It is necessary that such current be turned "on" during such time as the machine is in operation, but the current should be turned "off" whenever the machine is even temporarily stopped. An object of my invention is to provide a novel and improved means for effecting this result.

The specific embodiment of my invention herein disclosed is selected as best illustrating the utility of the invention. Such embodiment includes a loom having the usual manually operable shipper handle, and an electric warp stop motion. The source of electrical energy for the warp stop motion is connected to the latter through a tilting, conductive-fluid switch of the mercury switch variety. This switch is mounted directly on the shipper handle in such position that it is "on" when the shipper handle is in loom running position but tilts to "off" position as the shipper moves to off position, thereby opening the circuit to the warp stop motion simultaneously with the stopping of the loom.

I have also devised, and herein disclose, a novel form of electro-magnetically controlled knock-off device for the electric warp stop motion mentioned. This knock-off is constructed to require of the electro-magnet a very small amount of work. A very little, low-voltage current is required to operate the magnet under these circumstances and, when such current is shut off simultaneously with the stopping of the loom, objectionable sparking at the detector bars of the warp stop motion is eliminated.

The above mentioned embodiment of my invention is illustrated on the accompanying drawings, of which:

Fig. 1 is a side elevation of a loom embodying my invention, but with certain of the loom mechanisms omitted;

Fig. 2 is a detail, to a larger scale, of the knock-off device;

Fig. 3 is a view similar to Fig. 2 but with the parts in the position as they occupy after the loom has stopped;

Fig. 4 is a plan view of the device of Figs. 2 and 3, with the parts in loom running position;

Fig. 5 is a wiring diagram; and

Fig. 6 is a detail of the shipper handle and mercury switch, the housing for the switch being broken away.

The loom shown on the drawings is largely of conventional design, the same including a frame indicated generally at 1, a main shaft 2 for reciprocating the lay 3 and for operating various other mechanisms, a brake wheel 4 and brake 5 for stopping the loom, and connections including a brake rod 6 for controlling the brake from the shipper handle 7. The shipper handle is pivoted at 8 to a suitable bracket 9 on the loom frame, and may be released to swing on the pivot to loom stopping position by being pushed rearwardly (toward the left in Fig. 1) out of the usual holding notch, not shown.

Other loom mechanisms, such as the let-off, take-up, and shedding mechanism, are not illustrated as they may be of any usual construction and form no part of the present invention even insofar as the latter pertains specifically to looms.

The threads constituting the warp of the fabric are formed into a warp sheet 10 from whence they proceed through the drop wires 11, 11 of the warp stop motion and forwardly toward the lay. Each of the threads supports an individual drop wire 11 above and out of contact with an electrode 12 which is carried by but insulated from a second electrode 13.

Electrical current for the warp stop motion may be derived from a step-down transformer T, the secondary of which has one side grounded as at 14 and the other side connected by a conductor 15 to a conductive-fluid switch 16, to be more fully described. A conductor 17 connects the switch with an electro-magnetic device herein constituted by a magnet 18. The magnet is, in turn, connected by a conductor 19 to the live electrode 12. The normally dead electrode 13 may be grounded to the loom frame as by being in direct contact therewith.

When one of the warp threads breaks the corresponding drop wire 11 will fall and, being of conductive material, will complete the circuit from the live electrode 12 to the grounded electrod 13. This establishes a complete electrical circuit and allows current to flow through the electro-magnet 18. Energization of the magnet is utilized to effect a predetermined change in the operation of the loom, i. e., the stopping

thereof, through the intermediary of devices constituting a part of the present invention.

Such devices include a stand **20** fixed to the loom frame as by bolts or screws **21**, **21**. The magnet is supported between two brackets or caps **22**, **23** carried by the stand **20**. The armature **24** of the magnet is pivoted intermediate its ends on a pin **25** carried by the lower cap **23**, the rearward end of the armature being attracted upwardly when the magnet is energized. An adjustable stop screw **26** may be provided for limiting movement of the armature away from the magnet.

The forward end of the armature **24** is connected, by link **27**, with the rearward arm of a latch **28**. The latch is pivoted intermediate its ends on a pin **29** in the stand **20** and the forward end of the latch is weighted, as shown, to cause the rearward end thereof to engage in a notch **30** formed in an arm **31** of a dog **32**. When the parts are in normal, loom-running position, Fig. 1, the latch **28** is below and substantially parallel to the dog **32**, wherefore the latch may be disengaged from the notch **30** by a very light pull of the magnet.

The dog is provided with a rearwardly extending, weighted arm **33** which tends to bias the dog counterclockwise from the loom-running position of Fig. 1 to the loom-stopping position of Fig. 2 where it is in the path of a bunter **34** on the lay **3**.

The dog **32** is pivoted on a pin **35** which is mounted in a slide constituted by two spaced, parallel arms **36**, **37** carried by a head **38** on the stop rod **39**. The pin **35** is slidable in a slot **40** in the stand **20**, wherefore the entire slide, together with the stop rod, may move forwardly and rearwardly within limits defined by the slot.

The rod **39** is pivotally engaged, at its forward end, with the conventional knock-off lever **41** which is pivoted at **42** to the loom frame and is provided with an arm **43** for moving the shipper handle out of its notch when moved counterclockwise as by the stop rod **39**.

The mechanism as thus far described operates as follows:

When the magnet **18** is energized it operates, through the armature **24** and link **27**, to pull the nose of the latch **28** down out of the notch **30**, thus allowing the dog **32** to swing upwardly into the path of bunter **34**. Should the lay be rearwardly of the dog at such time, as in Fig. 2, the bunter will merely ride over and depress the dog as the lay moves forwardly, and the dog immediately resumes its position in the path of the bunter. Then, as the lay moves rearwardly the bunter engages the dog and pushes the dog, slide and stop rod rearwardly, thereby releasing the shipper handle which immediately swings to loom stopping position. When the loom stops the magnet will be deenergized, by means to be described, thus allowing the latch **28** to return to normal position. Fig. 3 shows the parts in the position they occupy immediately after the loom stops.

When the loom is restarted, by pulling the shipper handle on, rod **39** and the slide thereon will be pulled forwardly, thus-causing the notch **30** of the dog **32** to be engaged by the nose of the latch **28** and the latter then pivots the dog out of the path of the bunter into the loom-running position of Fig. 1.

The knock-off device as thus described is particularly desirable in that it imposes very little load on the magnet, thus reducing the current required and very materially reducing sparking at the electrodes of the warp stop motion.

The automatic resetting of the knock-off parts is dependent upon the magnet being deenergized while the loom is stopped. Furthermore, the opening of the circuit to the magnet and electrodes should be accomplished the instant the shipper handle is moved toward loom stopping position, because the shock and jar attendant upon application of the brake would, otherwise, cause a dancing of the drop wires, accompanied by objectionable arcing between the drop wires and electrodes.

The means which I have provided for deenergizing the magnet upon movement of the shipper handle is comprised of the mercury switch **16**. The switch consists of a base containing spaced electrodes, as **44**, covered by a glass housing **45**. A small body of conductive fluid, as mercury **46** is enclosed within the housing **45**. The switch is conveniently positioned in a carrier **47** which is bolted to a tilting lever, herein constituted by the shipper handle **7**. When the shipper handle is in on position (clockwise from Fig. 6) the mercury runs toward the base of the switch and completes the circuit from conductor **15** to conductor **17**. However, the instant the shipper handle tilts toward off position the mercury runs away from the electrodes **44** and breaks the circuit. It will be evident that breaking the circuit in this manner will deenergize the magnet **18** and will interrupt the current to the warp stop motion in time to prevent the aforementioned arcing.

The mercury switch construction just described is particularly advantageous on textile machines because its operation cannot be affected by accumulations of lint, because it may be mounted, as above indicated, to operate soon enough to prevent arcing at the other electrodes in the controlled circuit, and also because it has no moving parts to wear out or come out of adjustment.

It will be apparent that my invention, in certain of its aspects, is not limited to the particular textile machine herein disclosed but may be utilized with other such machines which embody auxiliary electric circuits for effecting predetermined changes in the operation of the machine. Neither is the invention, as applied to a loom, necessarily limited to use with the warp stop motion thereof, the true scope of the invention being defined in the appended claims.

I claim:

1. In combination with a textile machine operating on a plurality of threads, manually operable means for starting and stopping said machine at will, said means including a shipper handle, an electric stop motion operating to stop said machine upon breakage of one of said threads, and a mercury switch mounted on said shipper handle and electrically connected to interrupt the current to said stop motion upon movement of the shipper handle to stopping position.

2. In combination with a loom, manually operable means including a tilting lever for starting and stopping the loom, electrically operated means controlled by a weaving thread for effecting a predetermined change in the operation of the loom, and a mercury switch mounted on said lever and electrically connected with said thread controlled means for interrupting the current to the latter simultaneously with the tilting of the lever to loom stopping position.

3. In combination with a loom and the shipper

handle thereof, an electric warp stop motion, and a mercury switch electrically connected in series with said warp stop motion, said switch being mounted on the shipper handle to tilt to open position and thereby interrupt the current to the warp stop motion simultaneously with the movement of the shipper handle to loom stopping position.

4. In combination with a loom and the shipper handle thereof, an electric stop motion, a knock-off mechanism including a knock-off slide, a dog pivoted to the slide and an electro-magnetic device for controlling said dog, and a mercury switch mounted on said shipper handle, said stop motion, magnetic device and switch being electrically connected in series and said switch tilting to interrupt the current to the stop motion and magnetic device simultaneously with the movement of the shipper handle to loom stopping position.

5. In combination with a loom and the shipper handle thereof, an electric warp stop motion, a knock-off mechanism including a slide operatively associated with said shipper handle, a dog pivoted on said slide and weighted to tend to swing to knock-off position, a bunter normally reciprocating adjacent said dog, a latch engaging said dog and normally holding the same out of knock-off position, electro-magnetic means controlled by said warp stop motion for releasing said latch, and means including a mercury switch mounted on said shipper handle for deenergizing said magnetic means simultaneously with the stopping of the loom.

6. In a loom, an electric warp stop motion, shipping mechanism including a shipper handle, a reciprocating bunter, a slide operatively associated with said shipper handle, a dog pivotally mounted on said slide and movable therewith, said dog being biased to tend to swing into the path of said bunter, a latch normally holding said dog out of said path, and electro-magnetic means controlled by said stop motion for releasing said latch and freeing said dog, the said latch engaging said dog and pivoting the latter out of the said path upon movement of said slide toward its normal loom-running position.

7. In a loom, a warp stop motion, stopping mechanism including a slide movable in one direction to stop the loom and moving in the opposite direction upon the restarting of the loom, a reciprocating bunter, a dog pivotally mounted on said slide and moving therewith, said dog being biased to tend to swing into the path of said bunter, a latch normally holding said dog out of said path, and means controlled by said warp stop motion for releasing said latch and freeing said dog, the said latch engaging said dog and pivoting the latter out of the said path upon the movement of the said slide occasioned by restarting the loom.

8. In a loom, a warp stop motion, stopping mechanism including a knock-off member movable in one direction to stop the loom and moving in the opposite direction upon the restarting of the loom, a bunter moving in a given path, a dog pivotally mounted on said member and moving therewith, said dog being biased to tend to swing into said path of the bunter, a part normally holding said dog out of said path and means controlled by said warp stop motion for causing said part to release said dog and permit the same to swing into the path of said bunter, the said part engaging said dog and pivoting the latter out of said path upon the movement of said member occasioned by restarting the loom.

9. In a loom, a warp stop motion knock-off mechanism including a knock-off slide movable in one direction to stop the loom and moving in the opposite direction upon the restarting of the loom, a reciprocating bunter, a dog pivotally mounted intermediate its ends upon said slide, said dog having one end thereof weighted to bias the other end thereof upwardly toward the path of said bunter, a latch pivotally mounted below and normally substantially parallel to said dog, said latch normally engaging the dog and holding the latter out of the path of said bunter, and means for releasing said latch and freeing said dog to thereby initiate loom stoppage, said latch engaging said dog and pivoting the same out of the path of said bunter upon the movement of said slide occasioned by restarting the loom.

CARL D. BROWN.