Aug. 25, 1931. C. W. WHITEHEAD 1,820,203

AUTOMATIC CUT-OFF SWITCH

Filed April 20, 1927 2 Sheets-Sheet 1

Fig. 1.

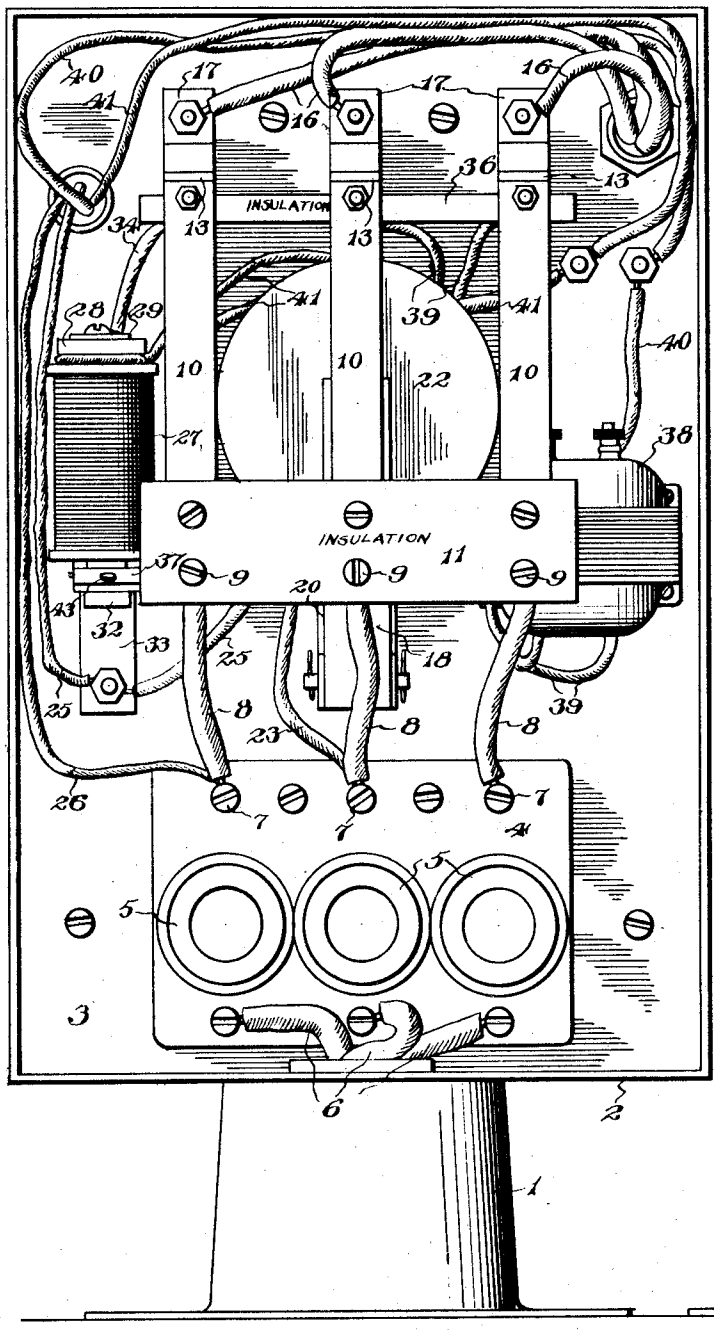
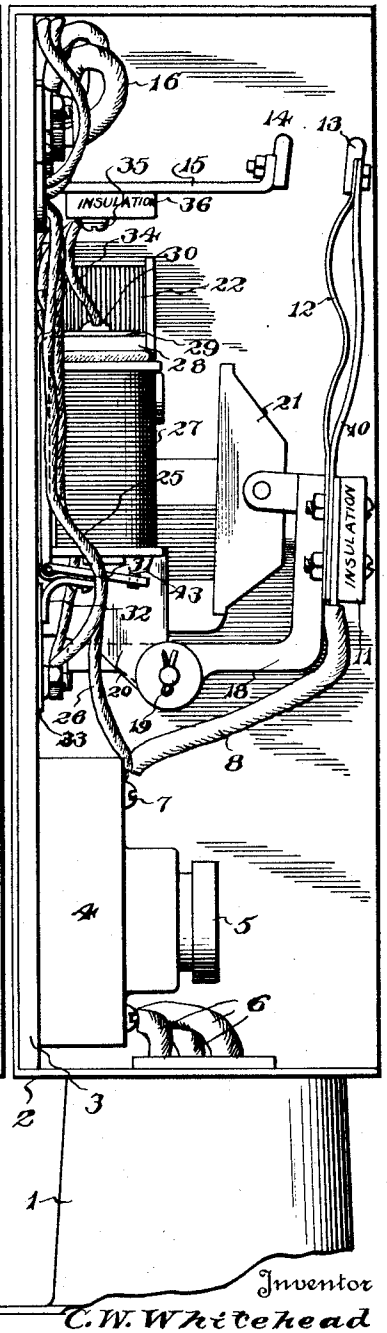


Fig. 2.



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Filed April 20, 1927 2 Sheets-Sheet 2

Fig. 3.

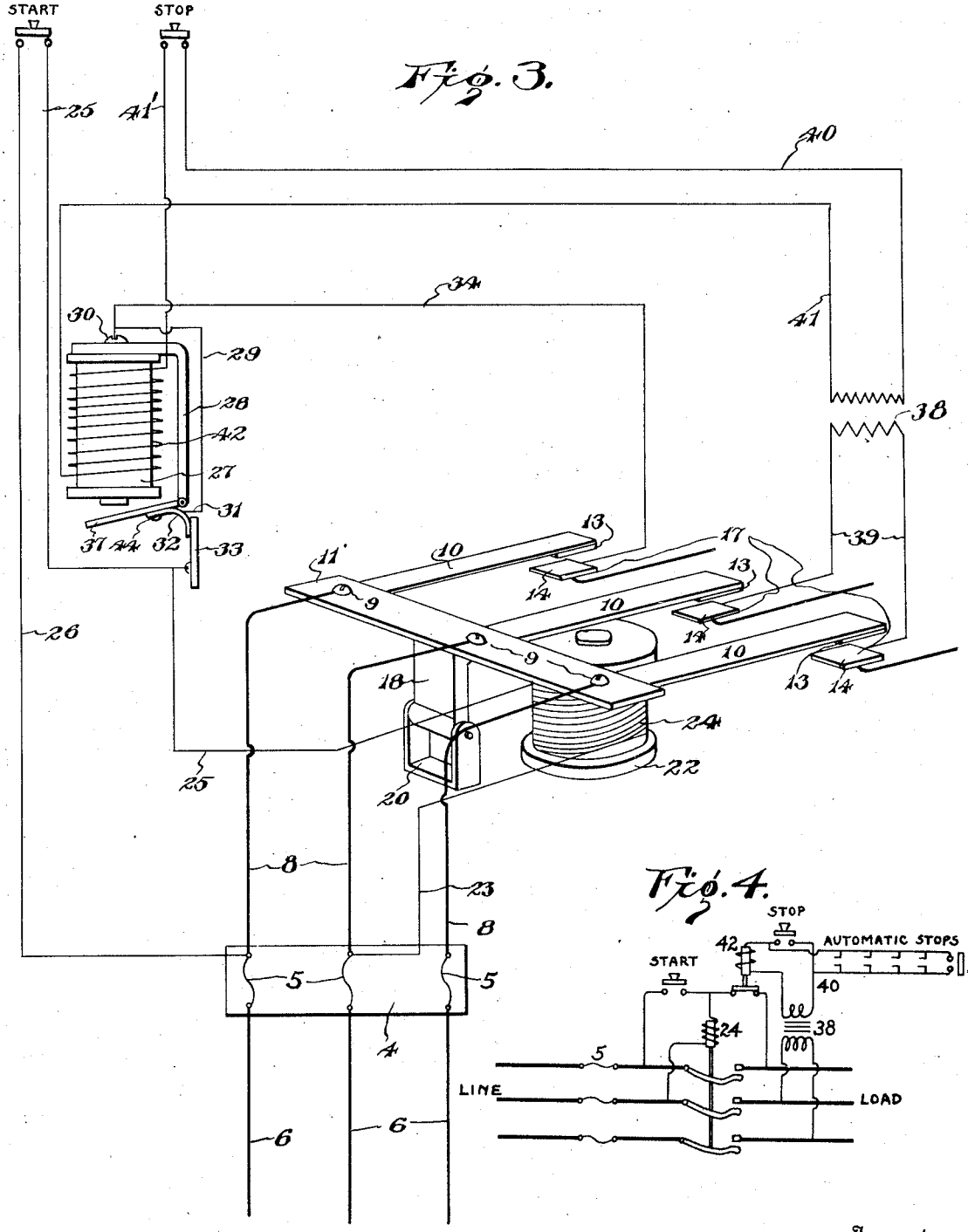


Fig. 4.

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UNITED STATES PATENT OFFICE

CONNIE W. WHITEHEAD, OF CHATTANOOGA, TENNESSEE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW ERA ELECTRO DEVICES, OF CHATTANOOGA, TENNESSEE, A CORPORATION OF TENNESSEE

AUTOMATIC CUT-OFF SWITCH

Application filed April 20, 1927. Serial No. 185,314.

This invention relates to electric switches and circuit closers and has for its object the provision of an efficient mechanism whereby the operation of a machine may be automatically arrested in the case of emergency or may be easily stopped when the operation of the machine is no longer desired. The invention provides a mechanism whereby an electric motor may be set in motion by closing a shunt circuit momentarily and may be stopped by the operation of another circuit which may be completed either automatically or by the action of an attendant. The invention also provides means whereby when the motor is started a secondary circuit will be formed to maintain the main circuit in a closed condition as long as the operation of the motor is desired or is desirable. A means whereby these stated objects, and other objects which will hereinafter incidentally appear, are accomplished is illustrated in the accompanying drawings and will be hereinafter fully described, the novel features being particularly pointed out in the appended claim.

In the drawings:

Figure 1 is a front elevation, with parts in section and parts removed, of an apparatus embodying the invention;

Fig. 2 is a similar view showing the mechanism in side elevation;

Fig. 3 is a detail in the nature of a diagram.

Fig. 4 is a diagram of the circuit.

The invention is designed primarily for use in connection with the stop motion of looms and similar machines driven by an electric motor and through which a plurality of stock units pass simultaneously, but it is capable of use wherever it is desirable to provide means for automatically stopping a motor in an emergency. The loom and the stop motion devices thereon may be of any existing or approved form and, in themselves, form no part of my present invention which is directed particularly to means for stopping the motor, and consequently the machine driven by the motor, when one or more of the stock units passing through the machine is broken or displaced.

In the drawings, the reference numeral 1 indicates a pedestal supporting a casing 2 within which the operating parts of my improved switch are housed. The casing may be of any approved form and is equipped with a door (not shown) so that the parts may be all enclosed and the liability of passers-by being injured through contact with any of the parts will be thereby avoided. At the back of the casing is secured a base 3 which may be of any insulating material and of substantial construction. At the lower end of this base 3 is secured a fuse block 4 which is likewise of insulation and carries a plurality of fuses 5 which are connected with the feed wires 6 leading upwardly through the pedestal 1. At the upper end of the fuse block are a plurality of binding posts 7 from which the main conductors 8 extend to binding posts 9 whereby they are connected to contact members 10. The posts 9 extend through a bar 11 of fiber or other suitable insulating material and the contact members 10 are spring steel strips having copper strips 12 on their under sides, the free ends of the corresponding strips being fixed to copper blocks 13 which form circuit closing contacts. The contacts 13 are adapted to cooperate with mating contacts 14 carried by the upper ends of posts 15 which are formed of suitable conducting material and are rigidly mounted on the base 3 near the upper end of the same, the main line conductors 16 being secured to the feet 17 of the said posts and extending therefrom to the motor which may be located at any convenient point and suitably geared to the machine to be driven. The bar 11 is carried by a holder 18 which is a right angular bar pivotally mounted at one end, as at 19, upon a bracket 20 which is secured rigidly upon the base 3 above the fuse block 4, and at the upper end of the said holder is carried a block 21 of iron which constitutes the armature of an electro-magnet 22 which is secured upon the base 3 above the bracket 20 and controls the action of the circuit closers 10 and 13. It will be noted that the pivotal point 19 is between the free end of the holder 18 and the base 3 or eccentric to the holder so that the weight of the holder and the parts carried by it will

tend to hold it in the open position shown in Fig. 2. Upon energization of the magnet 22, however, the armature 21 will be attracted and the device swung about its pivot so that the contacts 13 will be caused to impact with the contacts 14 and thereby close the motor circuit, and the motor circuit will be kept closed as long as the magnet 22 is energized. To effect energization of the main magnet 22, a conductor 23 is secured to one of the binding posts 7 and extends into the winding 24 of the magnet, as will be understood upon reference to Fig. 3. From the winding 24, a conductor 25 leads out through the casing to a starting switch mounted in any convenient position upon the machine in connection with which the mechanism is used. The return wire 26 from the starting switch leads to another binding post 7 so that, when the starting switch, which may be a push button, is actuated, a circuit will be closed through the winding 24 and the magnet 22 thereby energized, and the contacts 13 and 14 thereby immediately brought into engagement so that the motor circuit will be completed and the motor started. A secondary electro-magnet 27 is mounted upon the base 3 at one side of the main magnet 22 and is carried by a bracket 28 which is rigidly secured to the said base 3, the said bracket being inverted L-shape so that its upper shorter arm projects forwardly from the base and has the magnet firmly secured thereto. A copper strip 29 is disposed between the bracket 28 and the base 3 and has its upper end secured upon the upper end of the bracket by the same screw 30 which secures the electro-magnet to the bracket, the lower end of the said copper strip passing across the lower end of the bracket end projecting forwardly therefrom, as indicated at 31, where it is attached to a leaf spring 32 bearing normally upon a conducting strip 33 which is secured upon the base 3 below the magnet and has the wire 25 tapped to it. From the conductor 29, a wire 34 extends to one of the posts 15, being connected therewith by a binding screw, as 35, which extends through a bar 36 of fiber or other suitable insulation which serves to prevent short circuits through the said conducting posts and also serves as a brace to maintain them in the proper operative position at all times. The contacting member 32 is carried by an armature lever 37 which is pivotally attached to the lower end of the bracket 28 and extends forwardly therefrom below the electro-magnet 27 so that it may at times be attracted by said magnet. Normally, however, the weight of this lever holds it in the position shown in the drawings so that the contact 32 bears upon the conducting strip 33. Therefore, when the contacts 13 and 14 are in engagement and the motor circuit is closed, a shunt circuit will be formed from one of the contacts 14 through the wire 34, the strip 29 and members 32 and 33 to the wire 25 so that the magnet 22 will remain energized, although the circuit through the wires 25 and 26 are only momentarily closed. The motor, therefore, will continue to operate until some agency acts to break the circuit through the members 32 and 33.

Mounted upon the base 3 is a transformer 38, the high side of which is connected by conductors 39 to two of the contacts 14. From the low voltage side of the transformer, one conductor 40 leads out through the casing of the device to a stopping circuit-closer which may be a push button mounted upon the machine. This conductor 40 is also connected in parallel with the various automatic stop motion devices mounted upon the machine. Another conductor 41 leads from the low side of the transformer into the winding 42 of the electro-magnet 27 and a conductor 41′ leads from the winding out to the stopping switch and the stop motion devices in the same manner that the conductor 40 leads thereto, the stopping circuit being normally open. Whether the machine is to be stopped by the action of the operator or through the automatic action of any of the stop motion devices, the circuit is completed through the wires 40 and 41′ and the magnet 27 is thereby energized so that the armature lever 37 will be attracted and will swing up to the core of the said magnet. This action will swing the contact 32 away from the conductor strip 33 and will, consequently, break the circuit through the conductors 34 and 25 so that the magnet 22 will be de-energized and the weight of the holder 18 and the parts carried thereby will cause the same to swing to the position illustrated in Fig. 2, the contacts 13 and 14 being thereby separated and the motor circuit broken so that the operation of the motor and the machine driven by it will stop. In the end of the armature lever 37 is fixed a copper pin 43 so that the armature cannot become permanently magnetized through the action of the magnet 27.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have provided a very simple, compact and direct acting mechanism whereby a motor may be easily started and quickly stopped when stoppage is desired. The contact member 32 is secured to the armature lever 37 by a set screw 44 inserted through a slot or notch in the contact member so that it may be easily adjusted for wear and also set to maintain the desired operative relation to the conductor strip 33. The transformer reduces the voltage at the stop motion devices which are distributed over the machine, thereby practically eliminating the fire hazard and the danger of serious injury to operatives who

may be working near the machine. All the working parts, except the starting and stopping switches, are enclosed in the casing 2 so that injury to persons by contact with live line wires is guarded against and if it should be necessary to open the box pulling of the fuses will eliminate the risk. While the starting switch is used to start the motor, it is closed only momentarily and the holding circuit is established by and through the main contacts, thereby eliminating auxiliary devices for maintaining the holding circuit. If any stop motion device or the stopping switch be closed the holding circuit and the main circuit are instantly broken and no current flows, the starting and holding circuits being entirely independent of the stopping circuit. The mechanism of this invention has very few moving parts and can be installed quickly without requiring the services of a large number of workmen, and a broken or worn part may be removed without requiring the entire mechanism to be disassembled.

Having thus described the invention, I claim:

Means for the purpose set forth comprising a working circuit including main line conductors, fixed contacts, and rocking contacts pivoted eccentrically whereby to set normally away from the fixed contacts, an armature connected to and movable with said rocking contacts, a magnet arranged to cooperate with said armature, a starting circuit extending from two main line conductors and through the magnet whereby when the starting circuit is closed the magnet will be energized and the rocking contacts caused to engage the fixed contacts and close the working circuit, a holding circuit extending from a fixed contact and over a part of the starting circuit through the magnet whereby the holding circuit will be closed simultaneously with the working circuit and the energization of the magnet will be maintained, said holding circuit including relatively movable parts located between the fixed contact and the starting circuit, a step-down transformer having its high side connected to two fixed contacts, and a stopping circuit including the low side of the transformer and controlling the relatively movable parts in the holding circuit whereby when the stopping circuit is closed said parts will be separated and the holding and working circuits will be broken.

In testimony whereof I affix my signature.

CONNIE W. WHITEHEAD. [L. S.].