

No. 695,363.

Patented Mar. 11, 1902.

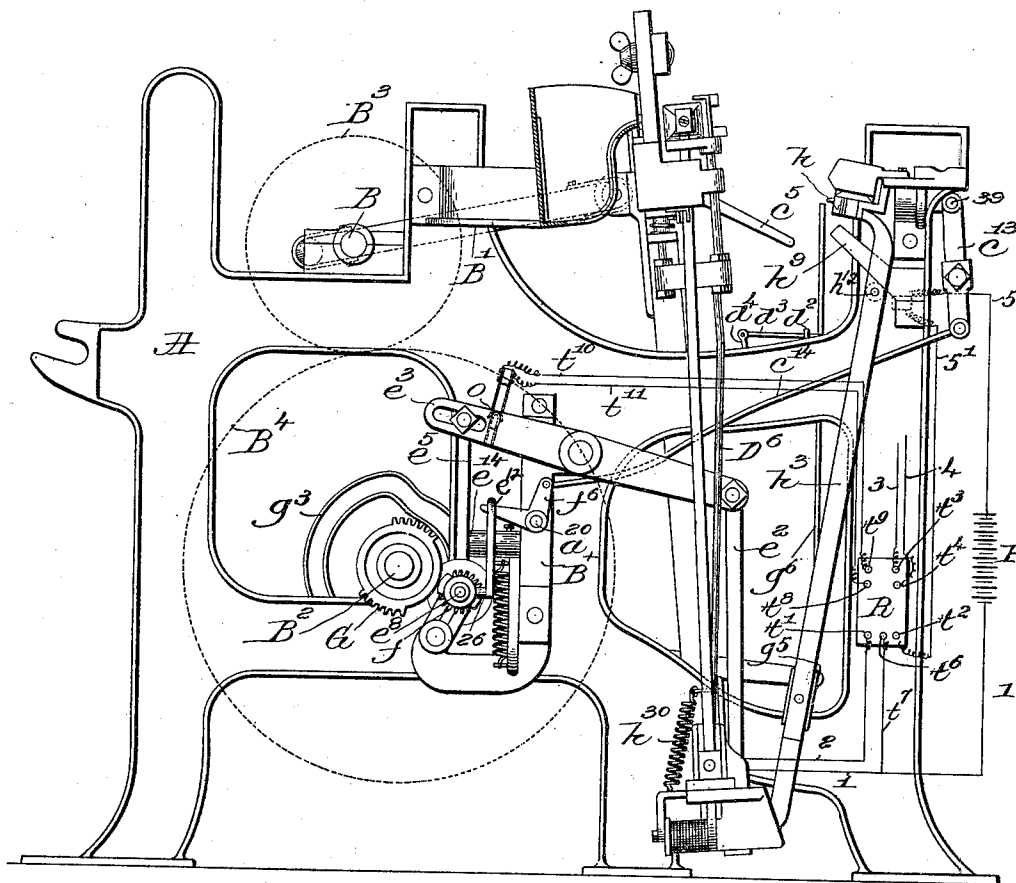
F. M. ARMSTRONG & J. A. CLARK.
ELECTRIC FILLING CHANGING MECHANISM FOR LOOMS.

(Application filed Mar. 26, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



witnesses:

Frank S. Grunkof.
Frank G. Hattie

Inventors.

Frederick M. Armstrong,

John A. Clark.

By Wesley Gregory
Attys.

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Fig. 2.

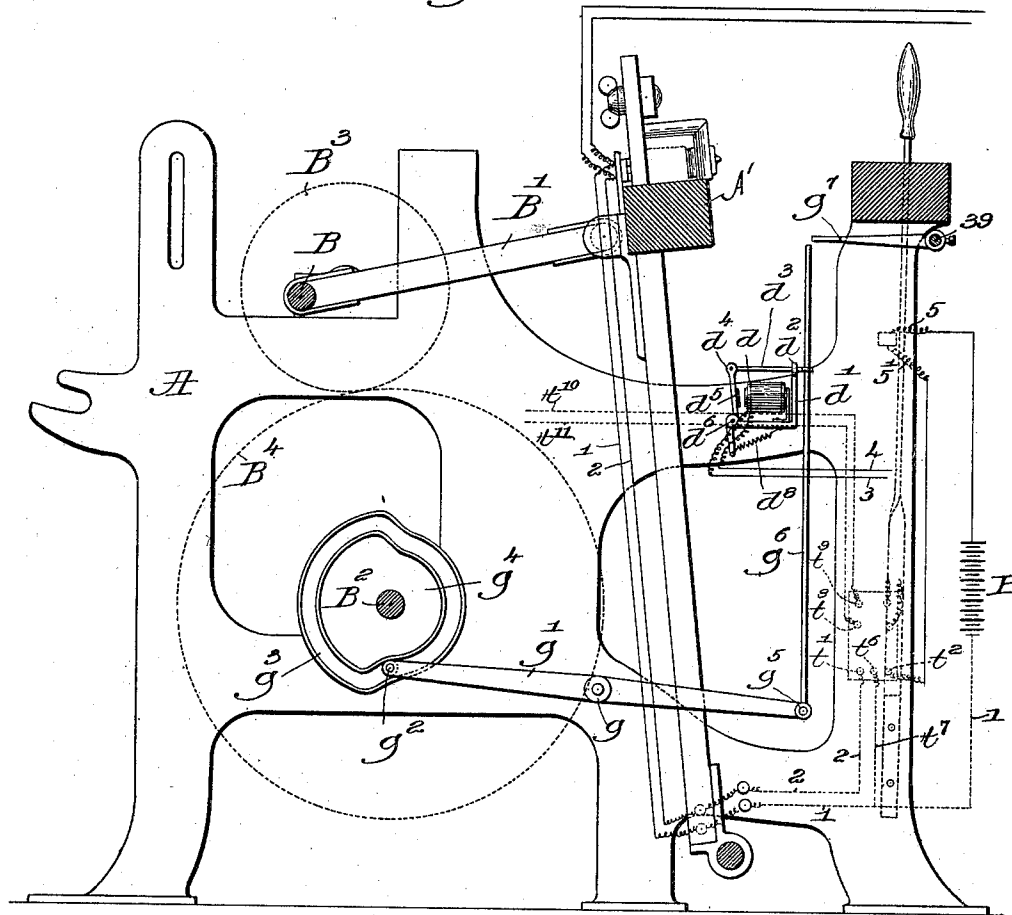
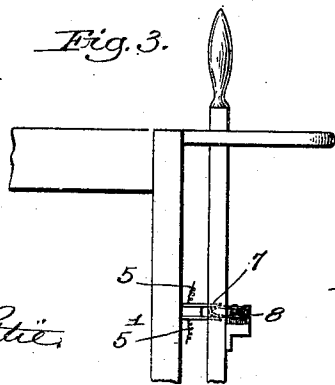


Fig. 3.



Witnesses:

Frederick M. Armstrong
John A. Clark

Inventors.
Frederick M. Armstrong.
John A. Clark.
By Charles Gregory,
attys

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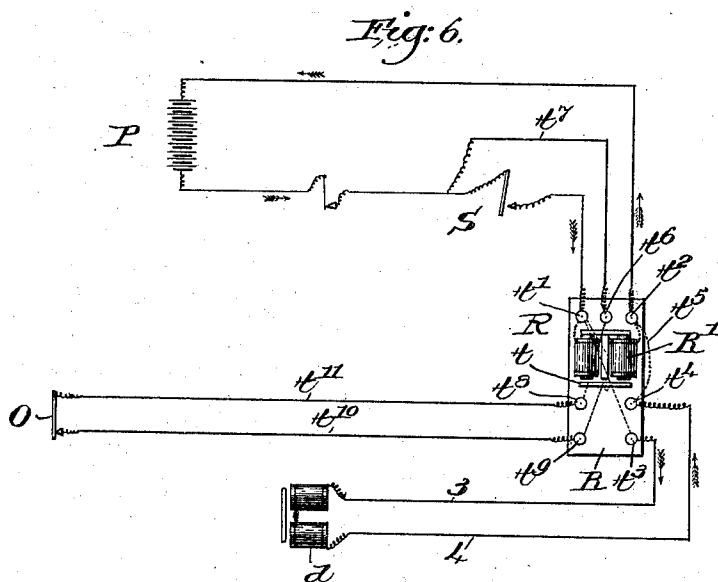
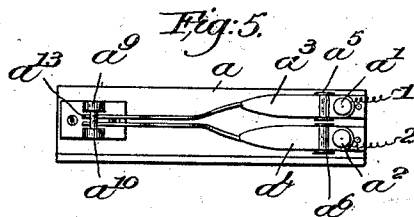
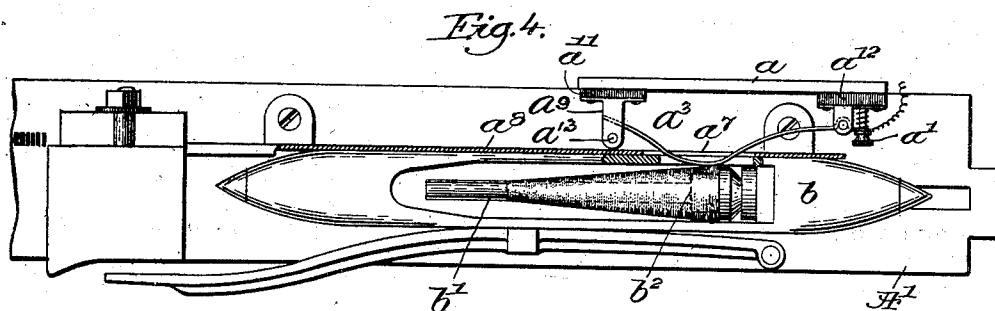
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3 Sheets—Sheet 3.



Witnesses,
Fred A. Grumbel.
Frank G. Kettie.

Inventors,
Frederick M. Armstrong.
John A. Clark.
By Drury Gregory,
attys.

UNITED STATES PATENT OFFICE.

FREDERICK M. ARMSTRONG, OF PAWTUCKET, RHODE ISLAND, AND JOHN A. CLARK, OF WORCESTER, MASSACHUSETTS, ASSIGNORS TO CROMPTON & KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF RHODE ISLAND.

ELECTRIC FILLING-CHANGING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 695,363, dated March 11, 1902.

Application filed March 26, 1900. Serial No. 10,272. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK M. ARMSTRONG, of Pawtucket, county of Providence, State of Rhode Island, and JOHN A. CLARK, of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Electric Filling-Changing Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The invention to be hereinafter described relates to that class of looms wherein provision is made for a change of filling when that in an active shuttle becomes practically exhausted, and more particularly to such type of loom employing an electrically-controlled device for operating the filling-changing mechanism when the filling in an active shuttle is to be changed. In such form of devices the indication of practical exhaustion of the filling in a shuttle is secured through a detector which feels for the filling as the shuttle enters the box and upon a depletion of the filling either entirely or to a predetermined amount such detector forms electrical connection with certain contacts to thereby complete the circuit and cause certain parts of the filling-changing mechanism to be put into position to be operated by the lay or some moving part of the loom. In order to secure ease and certainty of movement, as well as to prevent the shocks and strains incident to the change of filling on the same beat of the lay in which the indication occurs, it is desirable to delay the action of the filling-changing mechanism until the shuttle has made one or more picks; but as the shuttle leaves the indicating-box at once after the beat up the circuit is broken, and in the absence of means for retaining the parts in their operative or filling-changing position, as called for by the indication of the exhausted filling, said parts would at once become inoperative to effect a change of filling. We have therefore devised means whereby upon the interruption of the circuit established through the filling-detector the parts may be retained in their oper-

ative or filling-changing positions, all as will hereinafter more fully appear.

In the present embodiment of our invention we have shown the form of filling-changing mechanism set out in Patent No. 614,369, wherein upon a practical exhaustion of filling in an active shuttle devices are set in operation to change the shuttles; but we desire it to be understood when we use the term "filling-changing" mechanism in this specification and claims we intend to include thereby any suitable form of mechanism that will serve to supply the loom with fresh filling, whether such supply is secured by a change of the shuttle or a change of the bobbin or filling-carrier contained within the shuttle.

In the accompanying drawings, Figure 1 is an end view of a loom, showing the filling-changing mechanism, and corresponding to Fig. 2 in Patent No. 614,369, above referred to, with some of the parts omitted and showing our improvements applied thereto. Fig. 2 is a sectional elevation through the loom. Fig. 3 is a detail showing the shipper-handle and switch, to be described. Fig. 4 is a detail in plan of one end of the lay, showing the indicating-box and a shuttle contained therein. Fig. 5 shows in detail side elevation the filling-detectors, and Fig. 6 is a diagrammatical view showing the relay and connected circuits.

The loom-frame A, crank-shaft B, pitman B', the under or cam shaft B², gears B³ and B⁴, the mutilated gear G, shaft e³, link e⁵, lever e³, link e², shuttle-box rod D⁶, mutilated gear f, shaft 39, arm c¹³, link c¹⁴, joined to the elbow-lever f⁶, pivoted at a²⁰ on a stand B^x, the elbow-lever e¹², mounted on a stud e¹⁴ and having a stud or roll 26, the shuttle-feeder h, mounted on lever or bar h³, pivoted on a stud h⁴, spring h³⁰, inclined guides h⁹ and c⁵, roller h¹² are and may be all as set forth in said Letters Patent No. 614,369 and need not be further described.

In the present form of our invention we have preferably placed the filling-changing mechanism at one end of the lay and the indicating-box at the opposite end, so that af-

ter an indication of practical exhaustion of the filling in an active shuttle the latter will make one, three, or more picks to bring it into position to have the filling changed, and we
 5 so dispose the filling upon the bobbin or carrier to provide sufficient filling for this purpose after practical exhaustion has been indicated.

Mounted upon the indicating-box end of the lay A' is a stand or bracket a , which carries two binding-posts a' a^2 , suitably insulated therefrom, as at a^{12} , to which are connected wires 1 and 2 of an electric circuit, and extending from said posts a' a^2 are the filling-detectors a^3 a^4 , mounted on suitably-insulated stands a^5 a^6 , and spring-pressed to have their curved bodies project through a slot a^7 in the wall a^8 of the shuttle-box. The free ends of the detectors extend between and are guided
 10 by the posts a^9 a^{10} , which are mounted upon the stand or track a and suitably insulated therefrom by the insulation a^{11} . To limit the inward throw of the detectors a pin a^{13} connects the guiding-posts a^9 and a^{10} , between
 15 which and the base of the posts the free ends of the detectors project.

The shuttle may be of any usual construction and carries a bobbin or filling-carrier b' , upon which is mounted a conductor b^2 , preferably in the form of a metallic ring which
 30 when the bobbin or carrier contains a practical working supply of filling is covered by said filling, but when said filling has become practically exhausted the conductor or ring b^2 is uncovered, in which event as the shuttle reaches the indicating-box the two detectors
 35 contact with said conductor or ring and are thus electrically connected to complete the circuit through the binding-posts a' a^2 and wires 1 2, as will hereinafter appear.

While we have shown and described the above form of detectors, binding-posts, and conductor or ring as the preferred construction, in this particular instance it is to be understood that any form of electrical contacts
 45 whereby as the filling nears complete exhaustion a circuit will be established is within the scope of our invention.

Mounted on the loom-frame, preferably adjacent the indicating-box, is an electromagnet d , supported on a bracket d' , having a guiding-arm d^2 for the support and guidance
 50 of the free end of a controller d^3 , pivotally connected at d^4 to the armature d^5 , itself pivoted at d^6 to the bracket d' , and having its lower end extended and engaged by a spring d^8 , which normally tends to hold the armature away from the magnet.

Pivoted to the loom-frame at g is an actuating-lever g' , having at one end a pin or roller g^2 , which travels in the groove g^3 of a cam g^4 , secured to the under or cam shaft B², and connected to the other end of the actuating-lever, preferably by the pivot g^5 , is the
 60 actuator g^6 , which midway of its length is embraced and guided by the end of the controller d^3 .

Secured to the shaft 39 of the filling-changing mechanism and by which said mechanism is made operative is the operating-arm g^7 , adapted to be contacted and moved by the actuator g^6 when during the reciprocation of the latter it is moved under the arm g^7 , consequent upon the energization of the magnet d and movement of its armature, due to the
 75 completion of the circuit by the practical exhaustion of the filling from the active shuttle. The magnet d is in circuit with the detectors a^3 and a^4 through the wires 1 and 2, 3 and 4, the electric energy being derived from any
 80 suitable source, as the battery P. From this construction it will be evident that upon a completion of the circuit through the detectors the electromagnet d will be energized and at once attract the armature d^5 and move the
 85 actuator beneath the arm g^7 ; but immediately after having indicated a practical exhaustion of the filling and prior to the operation of the filling-changing mechanism the shuttle is driven from the indicating-box and
 90 the circuit is again broken, at which time the armature under the stress of spring d^8 would assume its original position and withdraw the actuator from beneath the arm g^7 , to obviate which and to retain the magnet d energized
 95 until the shuttle has reached the changing end of the lay and the filling has been changed. We have provided in the circuit just described what we term a "retarding-relay" R, which consists of an electromagnet
 100 R', placed in the circuit of the detectors and having an armature t , Fig. 6, which on establishment of the circuit through the detectors is moved to complete an auxiliary circuit through electromagnet d after the detecting-circuit has been interrupted by the
 105 shuttle leaving the box. The construction and operation of the relay and the course of the currents will be best understood by reference to Fig. 6, in which R represents the
 110 relay, P the battery or source of electric energy, S a switch corresponding to the filling-detectors, d the electromagnet for moving the actuator, and O the switch to be hereinafter described and operated by the
 115 movement of the filling-changing mechanism. On completion of the circuit by closing the switches S and O the current is caused to flow from the battery through the post t' , part thereof passing to the frame of and around
 120 the electromagnet R' and part to the magnet R', energizing it, and back to the battery through the post t^2 , and part passing through the post t^3 to energize the magnet d through wires 3 and 4, thence back to post t^4 and by
 125 the conductor t^5 to post t^2 to battery. Thus the armature d^5 is moved to place the actuator beneath the arm g^7 . To retain it in this position when the switch S is opened or the connection between the detectors interrupted by
 130 the shuttle leaving the box, we have connected to the post t^6 the auxiliary circuit t^7 , and this with the post t^8 and its connected circuit t^{11} t^{10} , to the other post t^9 of which is connected

the armature *t*. From this it will be evident that when the circuit has been established through the detector-circuit the armature *t* is by the energy of the electromagnet *R'* moved to complete the auxiliary circuit, which when the switch *S* or detectors are opened causes the circuit to flow from battery *P* to circuit *t'*, to post *t⁶*, to *t³*, to *O*, to *t⁹*, to armature *t*, to magnet-frame, to *t³*, part passing through electromagnet *R'* to *d*, to *t⁴*, to *t²*, to battery, and to thus continue until the circuit is interrupted by movement of the filling-changing mechanism which opens the switch *O*, releasing the armature *t* and interrupting the circuit through the electromagnet *d*, as will be evident. In order that the auxiliary current may be broken as soon as the filling-changing mechanism has changed the filling, we secure one member of the switch to the lever *e³* and the other adjacent thereto on the frame of the machine, as shown in Fig. 1, the connecting-wires *t¹⁰* and *t¹¹* of which lead to the relay and form part of the auxiliary circuit, from which it will be clear that as soon as the filling-changing mechanism has operated the auxiliary circuit will be broken and the electromagnet *R'* will release its armature *t*, thus cutting out the auxiliary circuit also at the relay, so that as the filling-changing mechanism closes the switch *O* after having supplied fresh filling the auxiliary circuit will not be completed until by the completion of the circuit through the filling-detectors on exhaustion of filling the armature *t* is again moved into completing position.

It is desirable to cut the current from the loom when the shipper has moved the belt onto the loose pulley, and we therefore provide a switch 7, connected to the wires 5 and 5', leading to battery through the switch member 8, carried by the shipper when the same is in position, as shown in Fig. 3, with the belt on the fixed pulley, but which switch when the shipper has moved to place the belt onto the loose pulley is opened, as will be obvious from Fig. 3.

From the construction described it will be evident that on completion of the circuit by the practical exhaustion of the filling in an active shuttle the electromagnet *d* will be energized and will place the actuator in position to operate the arm *g⁷* on its upward movement. By the same current thus established the electromagnet *R'* will be energized, as above explained, and through its armature will establish an auxiliary circuit through the wire *t'*. On the interruption or breaking of the circuit through the filling-detectors as the shuttle leaves the box the current which before passed through the detector-circuit will now pass through the auxiliary circuit and retain the magnet *d* energized to hold the actuator in position beneath the arm *g⁷* until said actuator has moved said arm and caused a change of filling, at which time the switch *O* is opened, thus interrupting the auxiliary

circuit, as will be apparent, and the parts assume their original position.

While we have disclosed the above form of relay and connected circuits as the preferred embodiment of our invention, it is to be understood that our invention is not limited thereto, but includes any form of electrical device which will serve to hold the actuator in operative position after the indication shuttle has left the indicating-box.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a loom, the following instrumentalities, viz: a filling-changing mechanism, means for controlling the operation thereof including an electric circuit, the electric condition of which is changed on the exhaustion of the filling to a predetermined amount, and a retarding-relay in said circuit.

2. In a loom the following instrumentalities, viz: a filling-changing mechanism, means for controlling the operation thereof including an electric circuit, the electric condition of which is changed on the exhaustion of the filling in an active shuttle to a predetermined amount, and an auxiliary circuit completed by change in the electric condition of the first-named circuit.

3. In a loom the following instrumentalities, viz: a filling-changing mechanism, means for controlling the operation thereof including an electric circuit completed on the practical exhaustion of the filling in an active shuttle, an auxiliary circuit formed by the completion of the first-named circuit, and a switch to interrupt the auxiliary circuit on the operation of the filling-changing mechanism.

4. In a loom the following instrumentalities, viz: a filling-changing mechanism, an actuator therefor, means including an electric circuit formed by the practical exhaustion of the filling in an active shuttle to place said actuator into operative position, and electric devices for retaining the actuator in operative position after the interruption of the said circuit.

5. In a loom the following instrumentalities, viz: a filling-changing mechanism an actuator therefor, an electric circuit including an electromagnet and completed by the practical exhaustion of the filling in an active shuttle to place said actuator in operative position, electric devices for retaining the actuator in operative position after the interruption of said circuit, and means for rendering said electric devices inoperative on the operation of the filling-changing mechanism.

6. In a loom the following instrumentalities, viz: a filling-changing mechanism, an actuator therefor, an electric circuit including an electromagnet and completed by the practical exhaustion of the filling in an active shuttle to place said actuator in operative position, an auxiliary circuit formed by the completion of the first-named circuit to retain

said actuator in operative position after the interruption of the said first-named circuit.

7. In a loom the following instrumentalities, viz: a filling-changing mechanism, an actuator therefor, an electric circuit including an electromagnet and completed by the practical exhaustion of the filling in an active shuttle to place said actuator in operative position, an auxiliary circuit formed by the completion of the first-named circuit and including said electromagnet to retain said actuator in operative position after the interruption of the said first-named circuit.

8. In a loom the following instrumentalities, viz: a filling-changing mechanism, an actuator therefor, an electric circuit including an electromagnet and completed by the practical exhaustion of the filling in an active shuttle to place said actuator in operative position, an auxiliary circuit formed by the completion of the first-named circuit and including said electromagnet to retain said actuator in operative position after the interruption of the said first-named circuit, and a switch operative on movement of the filling-changing mechanism to interrupt the auxiliary circuit.

9. In a loom the following instrumentalities, viz: a filling-changing mechanism, an actuator therefor, an electric circuit including an electromagnet and filling-detectors, the latter of which feel for and complete the

circuit on the practical exhaustion of the filling in an active shuttle, an auxiliary circuit also including said electromagnet and a retarding-relay to establish the auxiliary circuit on the completion of the first-named circuit and to continue said auxiliary circuit after the first-named circuit has been interrupted.

10. In a loom the following instrumentalities, viz: a filling-changing mechanism, an actuator therefor, an electric circuit including an electromagnet for controlling the position of said actuator, filling-detectors also included in said circuit and through which the same is completed on the exhaustion of the filling to a predetermined amount, an auxiliary circuit also including said electromagnet, a retarding-relay to establish the auxiliary circuit on the completion of the first-named circuit, and continue the same after the interruption of said first-named circuit, and a switch for interrupting the auxiliary circuit on movement of the filling-changing mechanism.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FREDERICK M. ARMSTRONG.

JOHN A. CLARK.

Witnesses:

HENRY F. HARRIS,

J. OTIS SIBLEY.