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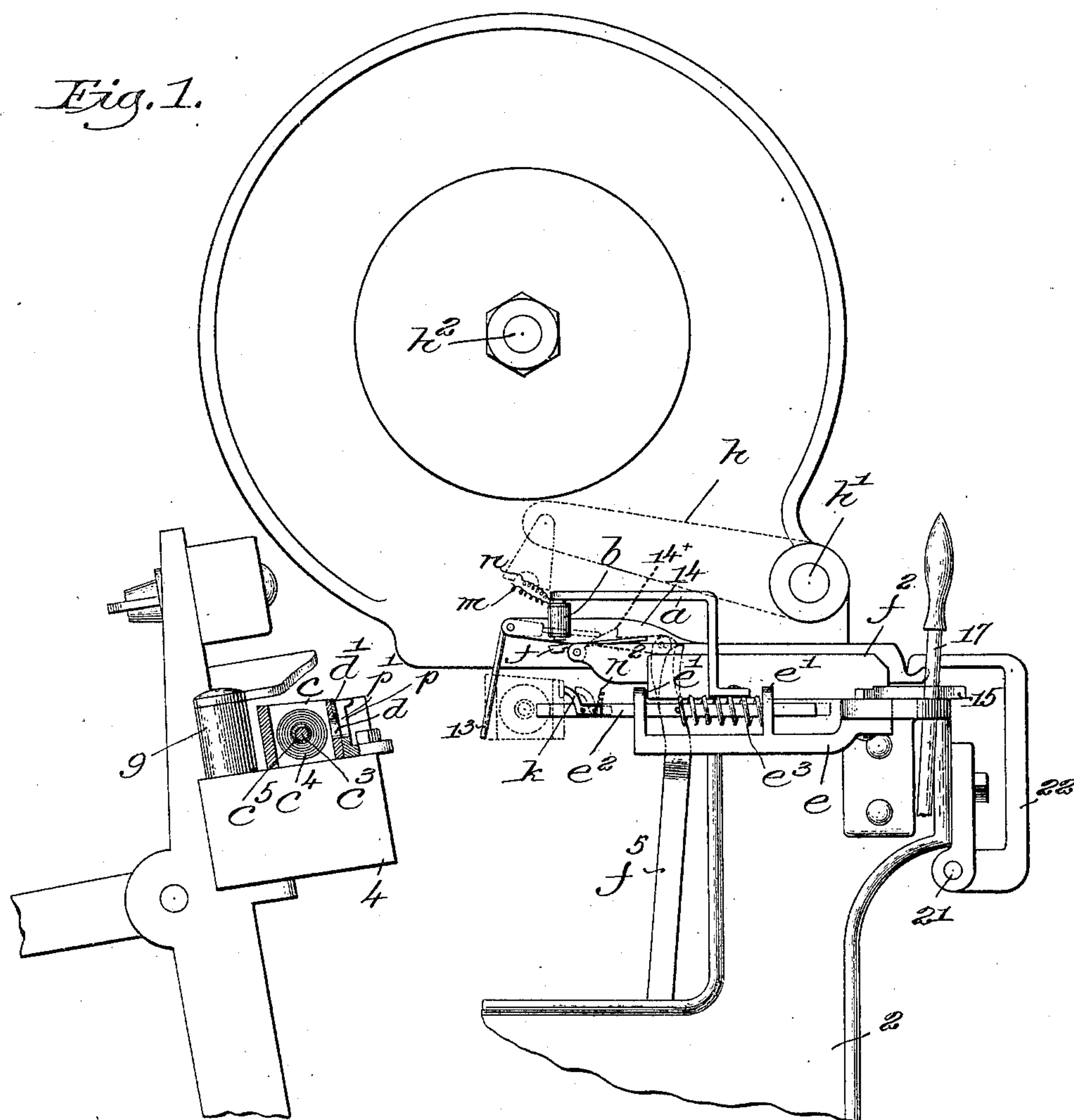
Patented Apr. 15, 1902.

H. W. SMITH.
WEFT REPLENISHING LOOM.

(Application filed Sept. 20, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
Fred S. Grumbaf.
Edward F. Allen

Inventor:
Harry W. Smith,
by Crosby & Gregory
attys.

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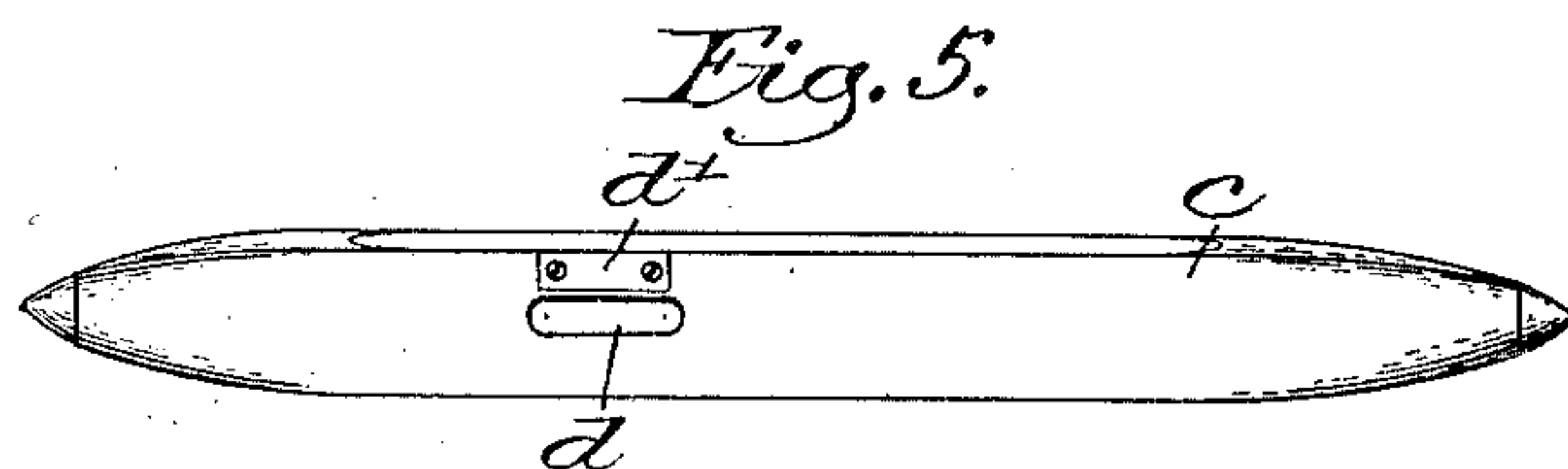
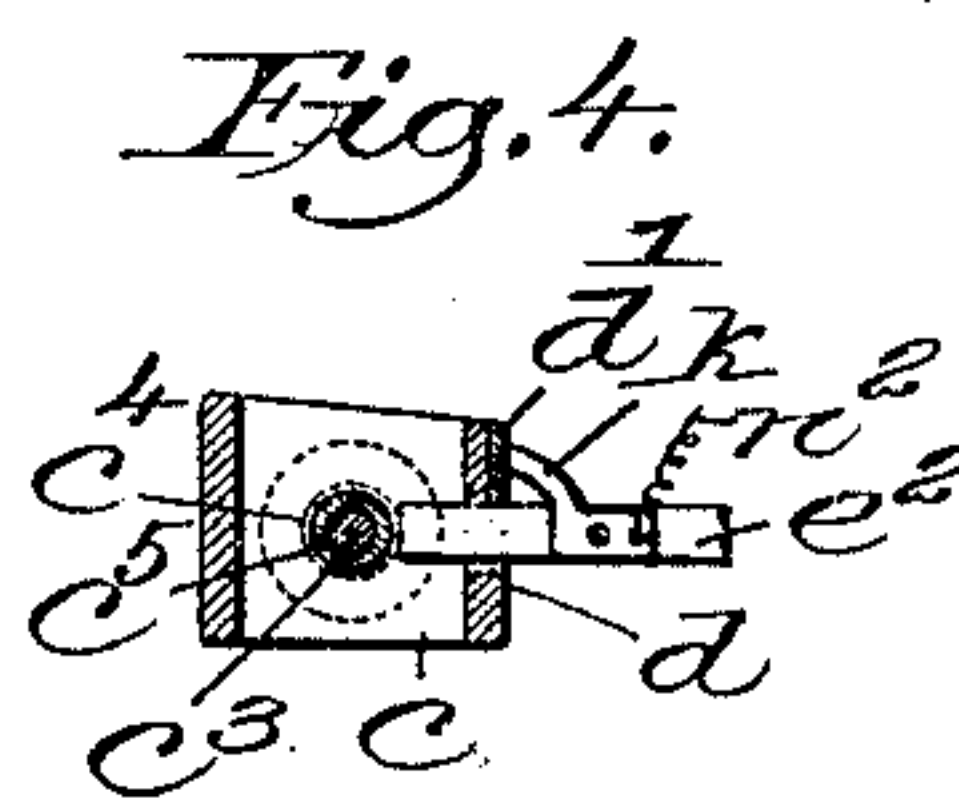
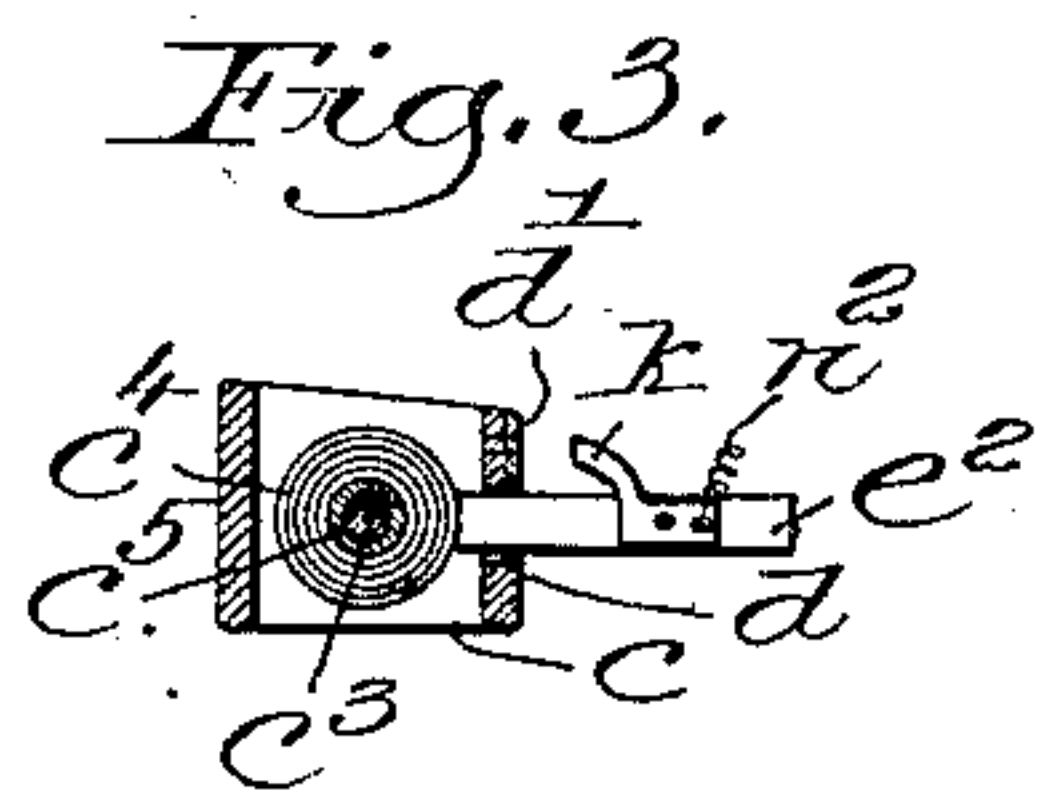
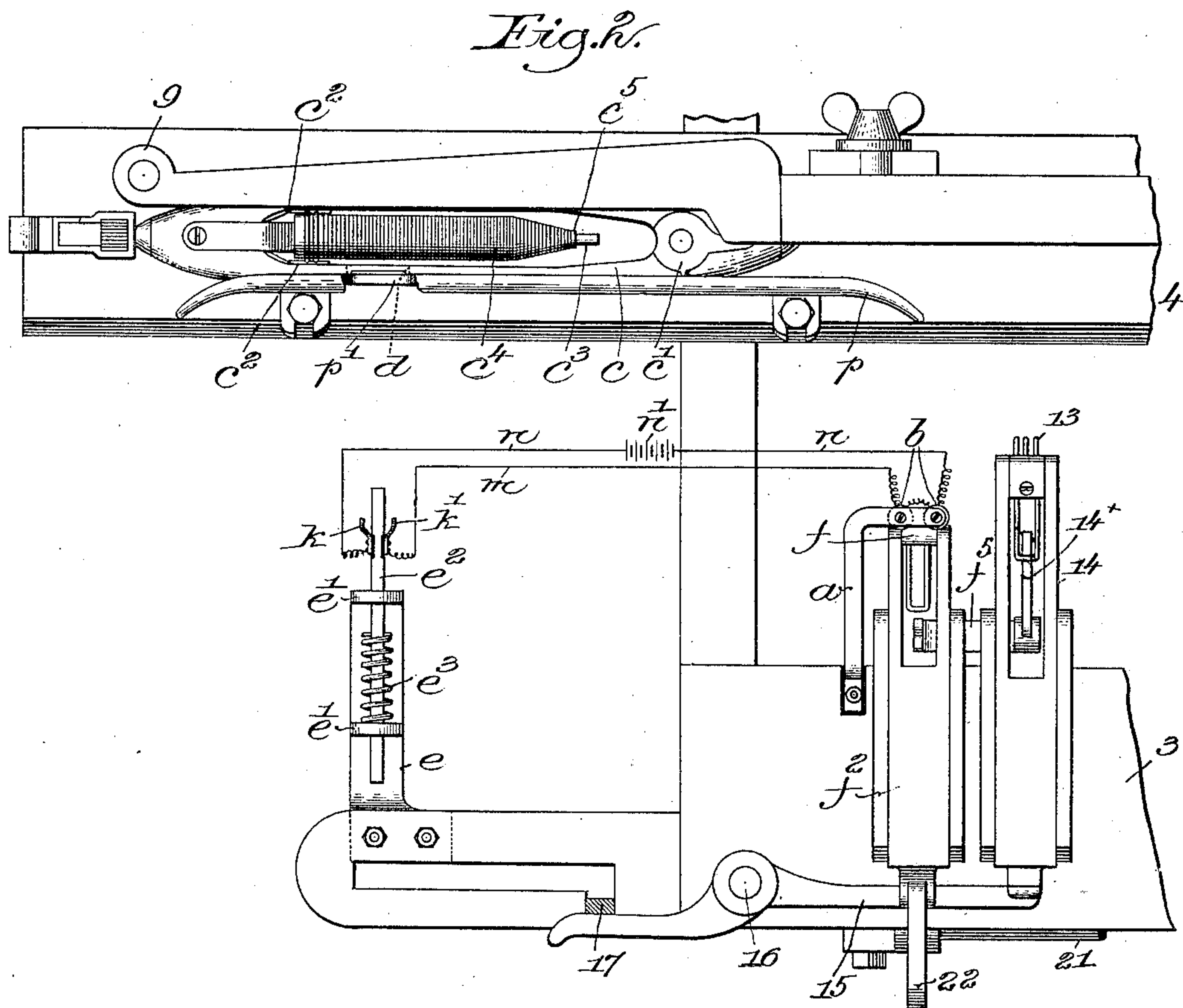
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2 Sheets—Sheet 2.



Witnesses:
Fred S. Grunkef.
Edward F. Allen.

Inverdon
Harry W. Smith,
by Leroy & Gregory
Mills.

UNITED STATES PATENT OFFICE.

HARRY W. SMITH, OF NORTH GRAFTON, MASSACHUSETTS.

WEFT-REPLENISHING LOOM.

SPECIFICATION forming part of Letters Patent No. 697,684, dated April 15, 1902.

Application filed September 20, 1901. Serial No. 75,810. (No model.)

To all whom it may concern:

Be it known that I, HARRY W. SMITH, a citizen of the United States, residing at North Grafton, in the county of Worcester and State of Massachusetts, have invented an Improvement in Weft-Replenishing 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 looms, and more particularly to that class of looms wherein upon a near approach to exhaustion of the filling in the shuttle means are put into operation to furnish a new supply of filling. In such type of looms it has heretofore been proposed to provide the filling-carrier or bobbin contained within the shuttle with a circuit-closer in the form of a metallic band or the like, which while a sufficient or working supply of filling remained upon the carrier was covered by the filling; but when the said filling had become nearly exhausted the said circuit-closer on the filling-carrier or bobbin became uncovered by the filling, thereby completing an electric circuit, which through other instrumentalities caused the actuation of filling-replenishing mechanism. In such type of loom, however, it has been necessary that the filling-carrier or bobbin be especially provided with some form of circuit-changing means, as the metallic band referred to, and as the number of such filling-carriers or bobbins used in any one loom is very great the equipment of a loom with this type of mechanism necessitated the placing of such circuit-changer upon a very large number of filling-carriers or bobbins. Moreover, it is desirable in many instances that filling-carriers or bobbins of the ordinary construction and unprovided with a circuit-changer be employed in this class of loom, and in those cases where the filling is wound in cop form upon paper or other tubes it becomes impracticable to provide the filling-carrier or bobbin with a circuit-closer of the character above indicated, as the paper or other tube would cover such circuit-closer and the latter would fail to be exposed to complete the circuit when the filling had become nearly exhausted.

It is the object of my present invention to

meet the conditions above indicated and to provide means for replenishing the filling when that in the shuttle has become nearly exhausted and in which any of the usual or ordinary forms of filling-carriers or bobbins may be employed; and, generally stated, the invention consists of an electric circuit the terminals of which may be acted upon by a circuit-changer carried by the shuttle exterior to the filling in the shuttle, so as to cause the actuation of the filling-replenishing mechanism when the filling is to be changed, and in the combinations and parts which will be hereinafter more fully described.

Figure 1 is a detail showing a sufficient portion of a well-known loom for supplying filling to the shuttle with my improvements added to enable my invention to be understood, the figure showing the shuttle, the filling-carrier and yarn-load, and the front wall of the shuttle-box in section. Fig. 2 is a plan view of the left-hand end of the loom partially shown in Fig. 1. Fig. 3 is a sectional view showing the shuttle, filling-carrier, and filling in section, the filling acting upon the inner end of the feeler. Fig. 4 is a like sectional detail showing the filling as substantially exhausted and the circuit closed upon the electrode of the shuttle, and Fig. 5 is a side view of the shuttle.

The loom-frame 2, the breast-beam 3, the lay 4, the device f^5 , adapted at its upper forked end to be connected with either the inner end of the usual weft-fork 13, pivotally mounted in a slide 14, which is moved forwardly when the weft-fork is not tilted by the presence of filling in the shed, the inner end of the weft-fork at such time being engaged by a hook 14^x , carried by the lever f^5 , the lever 15, pivoted at 16 and acted upon at its inner or right-hand end, as shown by the slide 14, which turns said lever to release the shipper-handle 17 from its usual holding-notch to stop the loom when the filling is absent, the rock-shaft 21, instrumental through suitable devices to actuate a pusher h , (shown by dotted lines,) movable about a stud h' and adapted when actuated to meet a filling-carrier having filling and suitably sustained in a hopper rotatable about a suitable pivot, as h^2 , the binder 9, the arm 22, fast on the rock-shaft 21, the slide-bar f^2 , having an overbal-

anced lever f pivoted on said slide at one end, said slide deriving its movement after depressing the inner end of the overbalanced lever that it may engage a suitable prong of the actuating device f^5 , are and may be substantially the same as devices fully described in Patent No. 665,559, the pusher and the hopper containing the battery of filling-carriers and the means between the rock-shaft 21 and said pusher to actuate it being more fully described in United States Patent No. 624,371, dated May 2, 1899.

The loom herein shown is provided with a suitable stand a , (represented as connected with the breast-beam and insulated therefrom,) said stand supporting a suitable magnet or magnets b . The poles of the magnet b are located near the overbalanced inner end of the lever f , and whenever the magnets are excited they attract the inner end of the overbalanced lever f , causing its opposite forked end to be engaged by the lever or device f^5 , which is moved forwardly at every other pick of the loom. The overbalanced lever and the magnet for moving it are common to United States Patent No. 633,976, dated September 26, 1899.

In the present embodiment of my invention selected for illustration the shuttle c is shown as provided with any usual self-threading device, as c' , of any suitable construction, and spring-jaws c^2 , which receive between them and hold frictionally the head of the filling-carrier c^3 , which may be of any usual type, provided with filling c^4 , represented in the present illustration as wound on any suitable paper or other tube c^5 , (shown in section in Figs. 3 and 4,) although it will be evident that any form of filling-carrier may be employed and may be held in the shuttle in any desired manner. In one side of the shuttle is provided a passage-way or hole d for a purpose that will hereinafter appear, and the wall of said shuttle is provided with a circuit-changer d' , shown as a metallic plate, preferably located adjacent to the hole d , although this is not essential.

Suitably supported on a stand e , secured to the loom-frame, is a feeler e^2 , adapted to pass through the passage-way or hole d in the shuttle on the forward beat of the lay and feel for the filling on the filling-carrier contained within the shuttle. This feeler may be of any desired character or construction which will pass into the passage-way or hole d , as described, and is preferably mounted to slide in ears e' , carried by the stand e , a spring e^3 normally acting to maintain the feeler in position, so that as the lay beats up and the shuttle and filling-carrier contained therein move toward the fell the filling will strike the end of the feeler and push the same in the direction of movement of the lay.

Operatively connected to the feeler e^2 , so as to be movable therewith, are the terminals k k' of an electric circuit, the said terminals being insulated from the feeler and suitably

connected to the magnet b by the conductors m and n , respectively, a suitable source of electric energy, as a battery or generator n' , being interposed between the terminals and magnet, as represented in Fig. 2.

So long as there is a working supply of filling on the carrier to insure the proper operation of the loom to prevent a mispick the filling will contact with the feeler as the lay moves forward or toward the fell and move the said feeler and through it the terminals of the circuit in the direction of movement of lay and prevent the circuit-changer carried by the shuttle from changing the circuit through the terminals k k' , and in the form of construction shown the circuit will not be closed and the magnet b will not be energized to cause the actuation of the replenishing mechanism through the slide f^2 , rock-shaft 21, and operatively-connected instrumentalities. When, however, the filling becomes nearly exhausted or exhausted to a predetermined extent, the feeler will penetrate farther into the shuttle before it is caused to move in the direction of movement of the lay, and the circuit-changer or plate d' will engage the terminals k k' and close the circuit, thereby enabling the device f^5 to engage the inner end of the overbalanced lever and move the slide f^2 to turn the rock-shaft 21 and cause the operation of the filling-replenishing mechanism to supply fresh filling to the shuttle when the latter arrives at the opposite end of the loom at which substantial absence of filling was indicated.

It is obvious, of course, that the terminals k k' may be located more or less distant from the inner end of the feeler, that depending upon the size of the shuttle, the diameter of the filling mass, and the quantity of filling it is desired to leave upon the filling-carrier when the latter is to be changed by the replenishing mechanism.

That the end of the feeler may enter the passage-way or hole d in the shuttle, the front wall p of the shuttle-box, which may be of any usual or desired construction, is cut away, as at p' .

While in the present embodiment of my invention I have selected for illustration a construction wherein the filling-carrier is changed in the shuttle upon near approach to exhaustion of the filling, it is to be understood that my invention is not limited in this respect, as the same may be applied to the well-known type of loom wherein the shuttle is changed, and while I have shown the shuttle in the present instance as provided with a circuit-changer in the form of a plate d' , by which the terminals k k' are electrically joined on the exhaustion of the filling to a predetermined extent to thereby complete the circuit, it is equally obvious to the ordinary electrician and one skilled in this art that the circuit-changer might be caused to break the circuit, although the construction illustrated is deemed the preferred type; neither is it

necessary that the terminals be directly carried by the feeler, as I desire it to be understood that I regard myself as being the first to provide a shuttle with a circuit-changer exterior to the filling in the shuttle which upon near exhaustion of the filling in the shuttle will change the condition of the circuit through terminals of an electric circuit, irrespective to the details of construction thereof or their disposition with relation to the feeler, although I regard the described and shown construction as of the preferred form.

It will be noted from the construction described that the terminals k k' of the electric circuit are yielding and that on the forward beat-up of the lay that they yield and move to some extent in the direction of movement of the lay, and it will also be noted that the part e^2 , which I have denominated a "feeler," serves to render the circuit-changing means d' , carried by the shuttle, inoperative to change or close the circuit when sufficient filling is upon the filling-carrier, and yet permits its operation to change or close the circuit when the filling has become exhausted to a predetermined extent, and any means which will do this in connection with an exposed circuit-changer carried by the shuttle exterior to the filling contained therein I regard as within the scope of my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a loom, filling-replenishing mechanism, an electric circuit having terminals, a shuttle provided with circuit-changing means exterior to the filling in the shuttle to change the circuit through the terminals and cause the said replenishing mechanism to be actuated when the filling is to be changed.

2. In a loom, filling-replenishing mechanism, an electric circuit having terminals, a shuttle provided with circuit-changing means exterior to the filling in the shuttle, and means controlled by the filling for rendering the circuit-changing means operative to change the circuit and cause the replenishing mechanism to be actuated when the filling is nearly exhausted.

3. In a loom, filling-replenishing mechanism, an electric circuit containing an electromagnet and having a plurality of terminals exterior to the shuttle, a shuttle provided with circuit-changing means exterior to the filling in the shuttle, and a device to render said means inoperative by the presence and operative by the substantial absence of filling in the active shuttle to thereby control the actuation of the said replenishing mechanism.

4. In a loom, filling-replenishing mechanism, an electric circuit controlling said mechanism and having its terminals sustained exterior to the shuttle, and a shuttle having mounted thereon circuit-changing means exterior to the filling in the shuttle, and adapted to close said circuit through said terminals

upon the exhaustion of the filling in the shuttle to a predetermined extent.

5. In a loom, a filling-replenishing mechanism and means for controlling the time of its operation, and means comprising an electric circuit, a shuttle and means exterior to the filling in the shuttle for completing the circuit through the shuttle when the filling in the shuttle has become nearly exhausted.

6. In a loom, an electric circuit containing an electromagnet and having a plurality of terminals exterior to the shuttle, and a shuttle provided with circuit-closing means exterior to the filling in the shuttle, and adapted to engage said terminals and complete the circuit when the filling has become nearly exhausted.

7. In a loom, a shuttle adapted to carry a supply of filling and provided with circuit-closing means situated exterior to the filling in the shuttle, an electric circuit including an electromagnet and having yielding terminals situated exterior to the shuttle to engage said circuit-closing means and complete the circuit when the filling has become nearly exhausted.

8. In a loom, filling-replenishing mechanism, and means to control the time of operation of said mechanism, said means comprising an electric circuit, a shuttle adapted to contain a supply of filling and having an exposed circuit-closer, filling-induced movement of the terminals of said circuit preventing change of circuit through the circuit-closer until the filling has become exhausted to a predetermined extent, whereupon the circuit-closer carried by the shuttle acts upon the terminals to change the circuit and induce operation of the replenishing mechanism.

9. In a loom, filling-replenishing mechanism, an electric circuit containing an electromagnet and having terminals exterior to the shuttle, a shuttle provided with circuit-closing means exterior to the filling in the shuttle, a feeler to feel for the filling in the shuttle, said terminals being movable with said feeler to prevent closing the circuit when a sufficient or working supply of filling is present in the shuttle, and to close said circuit when the filling has become exhausted to a predetermined extent.

10. In a loom, filling-replenishing mechanism, an electric circuit having terminals exterior of the shuttle, a shuttle provided with an exposed metallic plate, a feeler arranged to be struck by the filling on the filling-carrier and controlling said terminals of the electric circuit to prevent contact of said terminals with the metallic plate until the filling has been exhausted to a predetermined point, after which to permit the terminals to meet said plate and complete the circuit, and means set in motion by closing said circuit to actuate said filling-replenishing mechanism to supply fresh filling.

11. A feeler, and an electric circuit having

terminals, a lay having a shuttle-box provided with a shuttle having a hole in one side and with a metallic plate, and a filling-carrier in said shuttle, the end of said feeler being free to be struck and moved by the filling
5 until the latter has become exhausted to a predetermined point when said terminals meet said metallic plate and close the circuit, filling-changing means, and devices in said
10 circuit and actuated after closing said circuit to move said filling-changing means and supply fresh filling.

12. A slidable feeler having connected with it near its inner end the terminals of an electric circuit, a lay having a shuttle-box provided with a shuttle having a hole in one side and with a metallic plate, and a filling-carrier in said shuttle, the end of said feeler being free to be struck and moved by the filling
15 until the latter has been exhausted to a predetermined point when said terminals meet said metallic plate and close the circuit, filling-changing means, and devices in said circuit and actuated after closing said circuit to

move said filling-changing means and supply 25 fresh filling.

13. A lay having a shuttle-box, a shuttle having a connected metallic body and containing a filling-carrier, a movable feeler, means to sustain said feeler that it may be
30 moved forwardly with the lay while the filling-carrier contains filling of the minimum quantity desired, an electric circuit the terminals of which are controlled by said feeler, said terminals contacting with the metallic
35 body of the shuttle after the filling has been exhausted from the filling-carrier to a predetermined point, filling-changing means, and means set in motion by closing said circuit to actuate said filling-changing means. 40

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY W. SMITH.

Witnesses:

GEORGE S. TAFT,
JAS. B. R. HARDEN.