No. 692,591. Patented Feb. 4, 1902.

W. H. BAKER & F. E. KIP.

DETECTOR MECHANISM FOR WEFT REPLENISHING LOOMS.

(Application filed Mar. 28, 1901.)

(No Model.) 2 Sheets—Sheet 1.

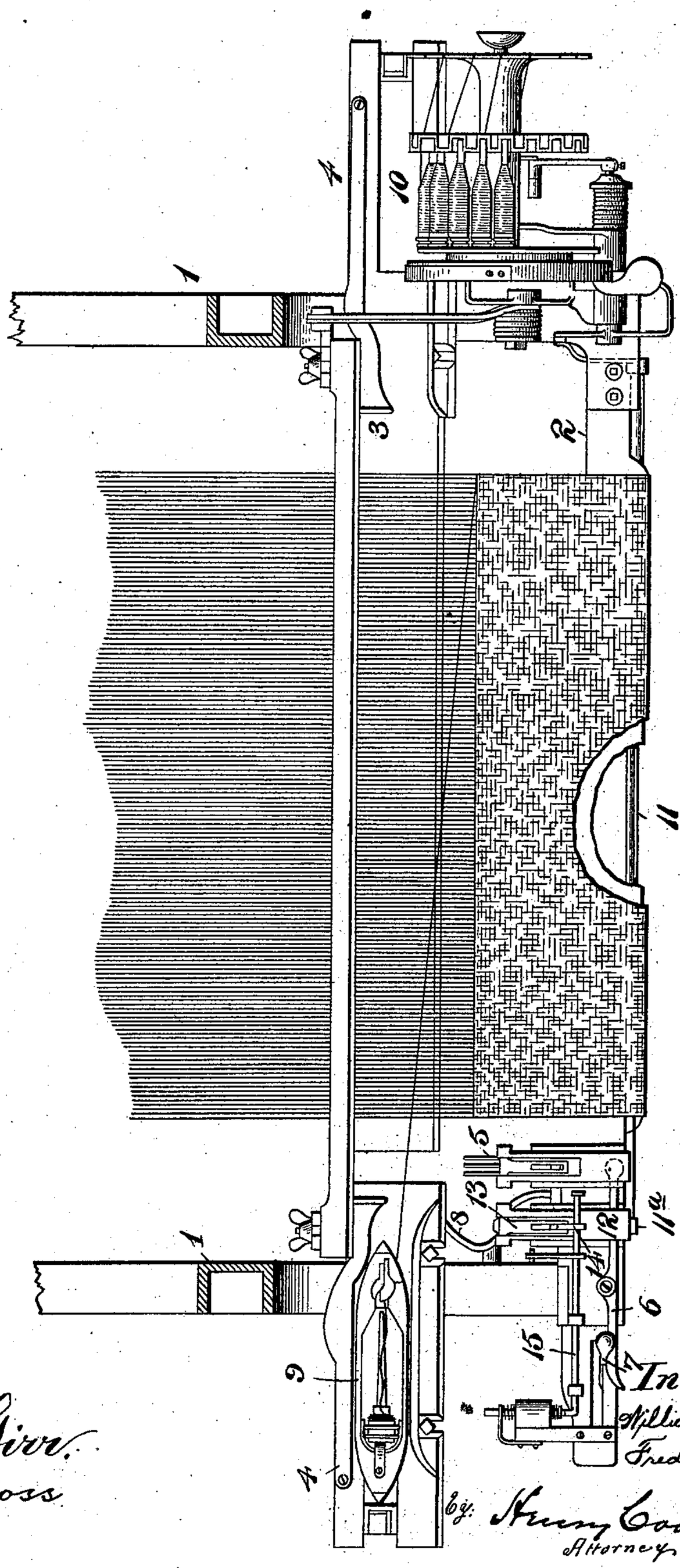

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

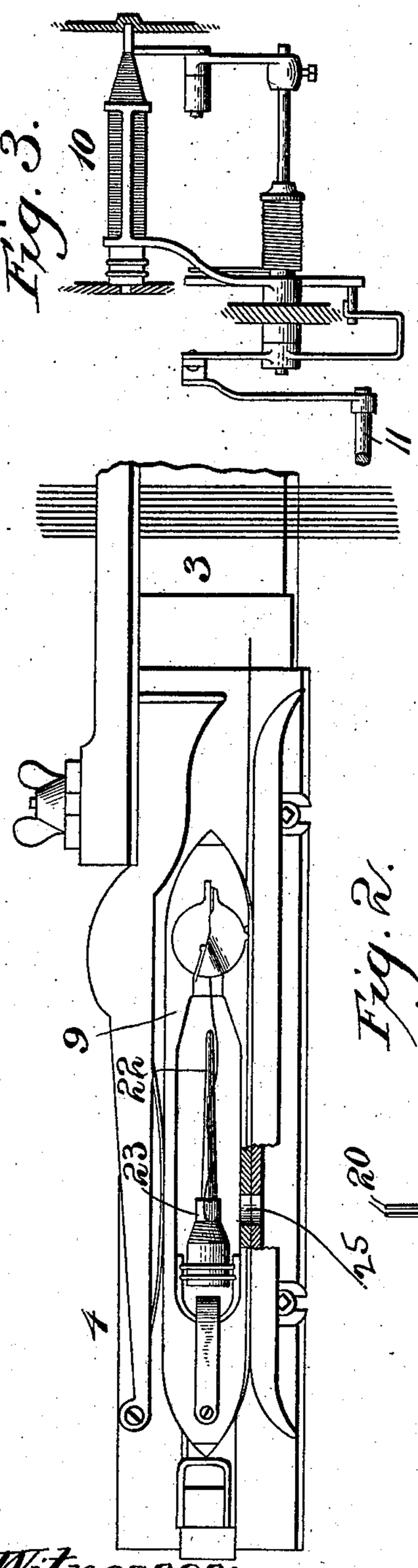


Fig. 4.

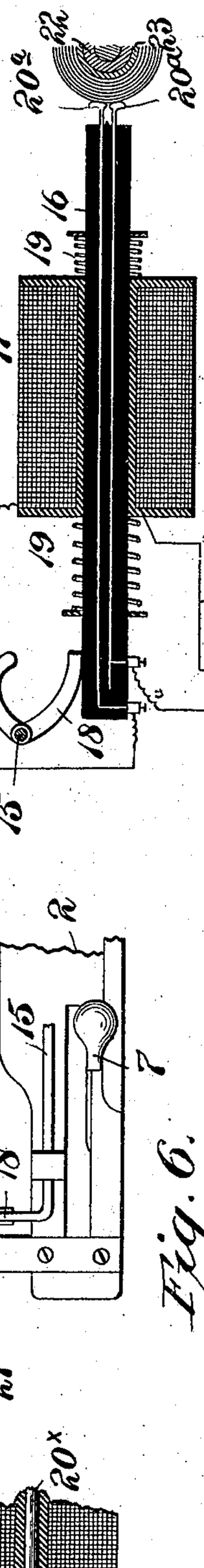


Fig. 5.

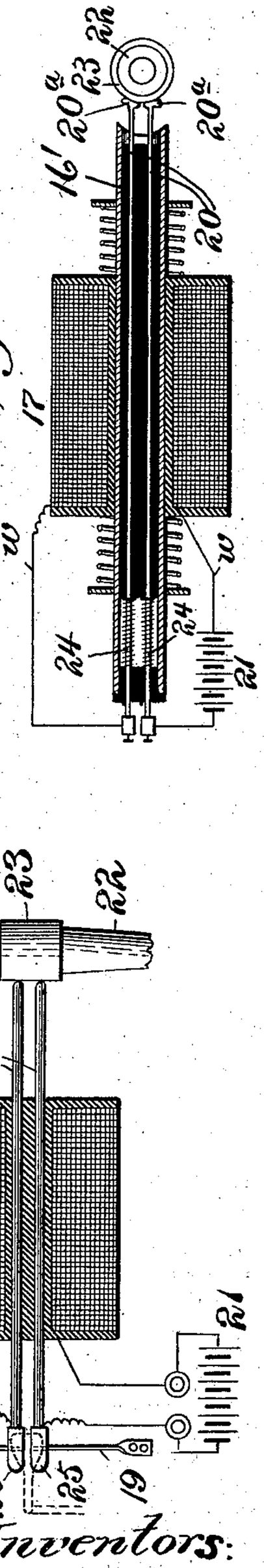


Fig. 2.

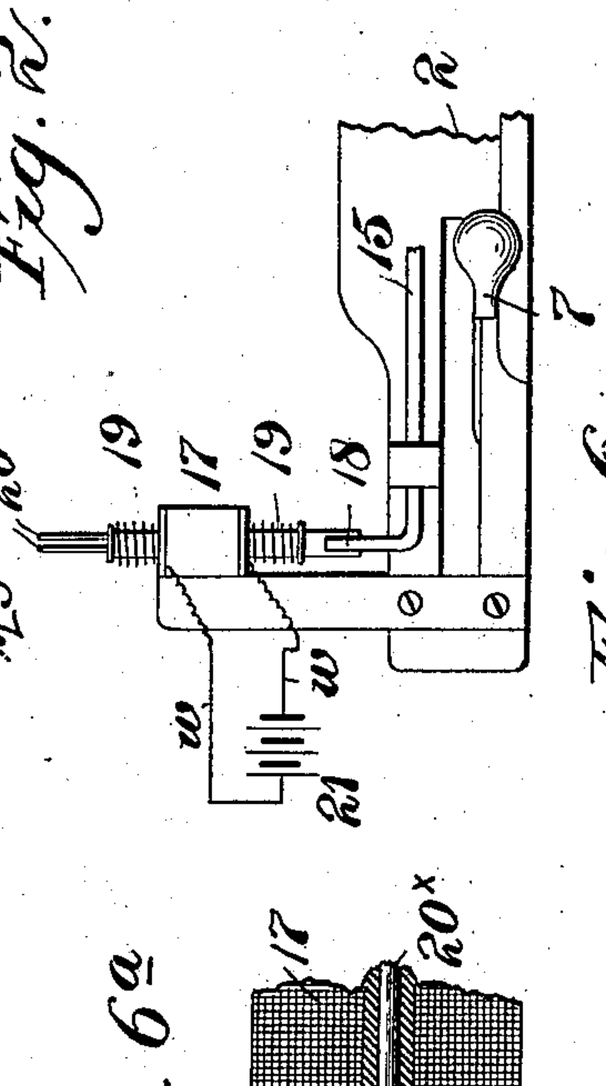
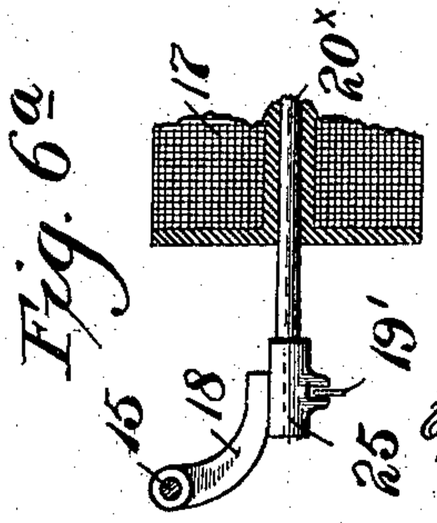


Fig. 6.

Fig. 6a.



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UNITED STATES PATENT OFFICE.

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DETECTOR MECHANISM FOR WEFT-REPLENISHING LOOMS.

SPECIFICATION forming part of Letters Patent No. 692,591, dated February 4, 1902.

Application filed March 28, 1901. Serial No. 53,254. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. BAKER, residing at Central Falls, Providence county, Rhode Island, and FREDERIC E. KIP, residing at Montclair, Essex county, New Jersey, citizens of the United States, have jointly invented certain new and useful Improvements in Detector Mechanism for Looms, of which the following is a specification.

This invention is adapted to the class of looms which employ weft or filling changing or replenishing mechanisms and to that class of such replenishing mechanisms wherein a magnetic feeler is employed to detect the condition of the weft or filling on the bobbin and to set the replenishing mechanism for operation in case the bobbon is found to be exhausted or denuded of weft to a sufficient extent to require renewal.

The object of the invention is to improve the construction of the device described and claimed in the patent to Wyman, No. 665,559, dated January 8, 1901. In this patent there is on the bobbin a piece or ring of iron which is normally covered by the filling or weft, and the feeler is a magnet, either the core of a solenoid held in a normally-balanced position by a constant current through the coil of the solenoid or a permanent magnet held in a normally-balanced position by springs. When the bobbin is denuded of filling to an extent sufficient to expose the iron ring thereon and the feeler enters and contacts with said ring, on the return movement of the lay the magnet clings to the ring and is drawn out to an abnormal extent, thus providing more play or movement of the feeler at the moment when this movement is required for setting the weft-replenishing mechanism than can be obtained through the use of the ordinary mechanical feeler. It is found, however, that where the sliding core of a solenoid magnetized by a constant current of electricity is employed as a magnetic feeler the magnet, if made strong enough to adhere firmly to the iron ring on the bobbin, is liable to act irregularly, being in substance a permanent magnet, and to be attracted and drawn to an abnormal position before the filling on the bobbin is sufficiently exhausted or woven off, and where a permanent or steel magnet is employed the difficulty arises that it loses its magnetism to a greater or less extent and becomes very uncertain in its action. Obviously if in such a feeler mechanism the magnetic feeler could be made to operate at the proper time, which is at that point in the play of the running shuttle when the iron ring on the bobbin is first denuded or exposed, and at no other time and the feeler be uniformly and powerfully magnetized at this time the mechanism could be relied on to operate perfectly at all times.

To effect these ends is the object of our present invention, which consists, essentially, in a a feeler or body of soft iron within a coil which forms part of a normally open electric circuit, terminals of said circuit being adapted to contact with the metal ring or piece on the bobbin as soon as and only when said ring or piece becomes exposed by the denudation of the bobbin, thereby closing the circuit through the coil about the feeler and magnetizing it at the proper moment only and always to a uniform extent. The magnetic feeler itself may be of two insulated parts and form the terminals of the circuit, or these latter may be separate from the magnetic feeler, but closely adjacent thereto, so that it may be in contact, or nearly so, with the iron on the bobbin when the circuit shall be closed. The magnet-feeler may be movable endwise through its coil, or it may be fixed in the coil and all be movable together. Our invention is not specifically limited in this respect, the only essential being that the feeler shall only be powerfully magnetized at the moment when the magnetic body on the weft-carrier shall be uncovered by the exhaustion of the filling.

In the accompanying drawings, which serve to illustrate an embodiment of the invention, Figure 1 is a plan view, on a small scale, of the front part of a loom provided with our invention. Fig. 2 is a plan view of the shuttle-box, a shuttle therein, and our improved feeler device on a larger scale than Fig. 1. Fig. 3 is a view of a part of the magazine for containing the full bobbins. Fig. 4 is an enlarged sectional view of the magnet. Figs.

5, 6, and 6ª are views similar to Fig. 4, illustrating slightly-modified constructions of the magnet.

The present invention being limited to the magnetic feeler devices, it will only be necessary to briefly describe the weft or filling changing or supplying mechanism, (shown in Figs. 1 and 3,) as this mechanism is known and will be found fully illustrated and described in the before-mentioned patent of Wyman.

1 is the loom-frame. 2 is the breast-beam forming a part thereof. 3 is the lay. 4 represents the shuttle-boxes thereon. 5 is the ordinary weft-fork; 6, the knock-off lever; 7, the shipper-lever; 8, the weft-hammer; 9, a shuttle in the box 4 at the left in Fig. 1, and 10 the magazine at the right adapted at proper times to supply bobbins to the running shuttle in the box at that side of the loom.

It will suffice to say that 11 is a rock-shaft which extends across the front of the loom and which when rocked sets the mechanism connected with the magazine 10 so that when the lay next beats up it will actuate the supplying mechanism and drive a full bobbin from the magazine down into the shuttle, the full bobbin displacing the exhausted bobbin and expelling it from the shuttle. The shaft 11 is rocked by a slide 12, which acts on an upright arm 11ª on said rock-shaft when the weft-hammer 8 is permitted to engage a hook 13, pivoted on the slide. Normally this hook is elevated out of the path of the vibrating weft-hammer, but will be depressed into its path by a weighted arm 14, Figs. 1 and 4, on a rock-shaft 15 when permitted to do so. The arm 14 is, however, normally upheld by the core 16 of a magnet 17, Fig. 4, which takes under another arm 18 on the rock-shaft 15. The core is slidably mounted in the spool of the magnet, and when moved forward or toward the lay to an abnormal extent it will be drawn from under the arm 18, and the shaft 15 is thus permitted to rock or rotate. The core 16 is held in a normally-balanced position in the coil or spool of the magnet by two springs 19, which permit said core to move to a limited extent in either direction, but which bring it back to its normal position when the pressure is relieved.

So far as above described the construction is in general substantially the same as or very similar to that described in the Wyman patent before mentioned. The distinctive features of difference between this device and that of the said patent will now be described.

Referring to Fig. 4, the core 16 is represented as some solid insulating material, such as hard rubber, in which are fixed two terminals 20 of soft iron or metal capable of being temporarily magnetized. The coil of the magnet and a battery or generator 21 are in a metallic circuit consisting of wires *w* and the two terminals 20. Now if this circuit, which is normally open, be closed by connecting the two extremities 20ª of the terminals by a conductor a current will flow through the coil of the magnet and convert the said terminals into magnets. The shuttle-box and shuttle have apertures or ways formed in their respective sides for the entry of the said terminals, and these apertures register when the shuttle is in the box, as seen at 25 in Fig. 2, where the respective sides of the shuttle and inclosing box are broken away, so as to show the apertures. On the bobbin 22 in the shuttle is an iron plate or piece 23, preferably in the form of a band or ring, and this band is so placed that when the lay beats up the terminals 20, which form a magnetic feeler, enter the shuttle through the way or aperture therein and contact with said band if it should be uncovered by the exhaustion of the weft. The current through the magnet-coil will then be instantly established and the terminals become magnets, which on the withdrawal of the lay cling to the band on the bobbin as to an armature and are drawn out to an abnormal extent, thus carrying the core 16 out from under the arm 18 and permitting the shaft 15 to rock, as before explained. If, however, there is any weft or filling on the bobbin over the band 23, as represented in Fig. 4, there will be no closure of the circuit, and consequently no excitation of the magnet. Thus the feeler only becomes a magnet when metallic contact is established between the two ends of said feeler and the naked band 23 on the bobbin.

Obviously there are many ways of carrying this invention into practice.

Fig. 4 shows the terminals 20 fixed in the core, and only the said terminals are magnetized. In this construction no other part of the core need be of iron; but in Fig. 5 the terminals are slidable longitudinally in the core to a limited extent through insulating material in a tubular iron core 16′. In this construction when the lay advances and the iron band 23 on the bobbin contacts with the ends of the terminals 20 the circuit is closed and the terminals are at the same time pressed back, compressing their springs 24. The iron core 16′ becomes a magnet, and its end is brought into contact with the band 23, to which it clings when the lay withdraws.

Figs. 6 and 6ª show a construction wherein the terminals 20× form in themselves the entire core upon which rests the arm 18. (Indicated in dotted lines in the figure.) These terminals are of soft iron and have insulating-blocks 25 at their ends where they engage the springs 19′, which hold them yieldingly in their normal balanced position. These modified constructions will suffice to illustrate several of the various constructions that may be employed; but others will suggest themselves to those skilled in the art.

We have shown our invention as applied to a "bobbin-changing" weft-supplying mech-

anism of a known kind for controlling its operations; but it will be obvious that it may be employed as well for controlling the operation of a "shuttle-changing" supplying mechanism, of which many forms are known.

Being the first, as we believe, to employ an electromagnetic feeler device or detector mechanism for looms wherein the circuit through the energizing-magnet of the feeler is closed by the contact of the circuit-terminals with metal uncovered by the weft on the weft-holder in the shuttle, we do not limit ourselves to any specific means for accomplishing this result.

By the words "shuttle" and "filling-carrier" as herein used is meant any device for carrying filling or weft through the web of the cloth, and by "filling-holder" is meant any known device for holding weft or filling, of which a bobbin-cop, butt-cop, and all-cop are examples. By "filling-changing" means as herein used we mean any known variety or kind of weft-replenishing mechanism.

Having thus described our invention, we claim—

1. In a loom, a filling or weft holder having a magnetic body, a feeler sustained yieldingly in a normal position, a normally open electric circuit, including a coil and generator, for magnetizing said feeler, means for closing the magnetizing-circuit when the magnetic body on the weft-holder is uncovered by exhaustion of the weft, and filling changing or supplying means operated by the movement of said feeler into abnormal position due to the coöperation of said feeler with said filling or weft holder.

2. In a loom, a filling or weft holder having a magnetic body, a feeler of magnetic metal sustained yieldingly in a normal position, a normally open electric circuit, including a coil and a generator, for magnetizing said feeler, the coil being stationary and the feeler slidable therein, springs which hold said feeler in its normal position, means for closing the feeler-magnetizing circuit when the magnetic body on the weft-holder is uncovered by exhaustion of the weft, and filling changing or supplying means operated by the movement of said feeler into abnormal position due to the coöperation of said feeler with said filling or weft holder.

3. In a loom, a filling or weft holder having a magnetic body, a feeler of magnetic metal sustained yieldingly in a normal position, a normally open electric circuit, including a coil and a generator, for magnetizing said feeler, the latter being formed of two insulated terminals of the magnetizing-circuit, springs which hold said feeler in its normal position, and filling changing or supplying means operated by the movement of said feeler into abnormal position due to the coöperation of said feeler with said filling or weft holder, the feeler being composed of two bodies of magnetic metal which also form terminals of the magnetizing-circuit.

4. In a loom, the combination with a bobbin or weft-holder having on it a magnetic body 23, which is normally covered by the weft or filling and exposed by the partial exhaustion thereof, and a shuttle having an aperture or way to admit a feeler to contact with said body when exposed, of a feeler composed of two circuit-terminals made from magnetic metal, a normally open electric circuit including said feeler-terminals, a magnetizing-coil about said feeler-terminals and a generator, springs for holding said feeler-terminals in normal position, and filling changing or supplying means operated by the movement of said feeler into abnormal position due to the coöperation of said feeler-terminals with the exposed magnetic body on said filling or weft holder.

5. In a loom, a filling-carrier, a magnetic body carried thereby, an electric circuit including a magnetizing-coil, a feeler device made periodically a magnetized body by the current of said circuit, and filling-changing means made operative as required by the momentary adhesion of said feeler device to said magnetic body, all combined to operate substantially as set forth.

6. In a loom, a feeler sustained yieldingly in a balanced condition, a normally open electric circuit including a magnetizing-coil for turning said feeler into a magnetized body, a lay, a shuttle-box thereon, a filling-carrier in said box, a filling-holder in said carrier provided with a magnetic body adapted to contact with the feeler and adapted to adhere to and carry said feeler back with it on the back stroke of the lay after the substantial exhaustion of the filling from the filling-holder in said carrier, in combination substantially as set forth.

7. In a loom, a filling-carrier and a feeler yieldingly sustained in a normal position, each provided with a magnetic body, and means for temporarily magnetizing one of said bodies when the feeler is put in contact electrically with the body in the weft-carrier by the exhaustion of filling in the said carrier to a predetermined extent.

8. In a loom, a filling-carrier and a feeler yieldingly sustained in normal position, one having a magnetic and the other a periodically-magnetized body, means for magnetizing the last-named body when the filling in the carrier is exhausted to a predetermined extent, and filling-changing means set in operation by the movement of said feeler into abnormal position due to coöperation of said feeler with said filling-carrier.

9. In a loom, a filling-carrier provided with a filling-holder having a magnetic body normally covered by filling, a periodically-magnetized body or feeler, means for magnetizing the said feeler when the filling on the holder is exhausted to a predetermined extent, and filling-changing means made operative by a change of position of said feeler due to the uncovering or partial uncovering of said mag-

netic body on the filling-holder in the act of weaving.

10. In a loom, a shuttle or filling-carrier provided with a magnetic body, an intermittently-operating feeler device adapted to feel the volume of filling in said carrier, and an electric circuit and coil to periodically magnetize said feeler when the circuit is completed, the completing of the circuit being effected by the contact of the feeler with the magnetic body in the filling-carrier when said body is uncovered by exhaustion of the filling.

11. In a loom, a filling-carrier provided with a magnetic body, a yieldingly-sustained feeler, which through the agency of a normally open electric circuit is periodically made a magnetized body, and the said circuit, including a magnetizing-coil about the feeler, said feeler feeling through an aperture in the carrier and being capable of movement with the latter by magnetic action from its normal into its abnormal position, when the magnetizing-circuit is completed through exhaustion of the filling to a predetermined extent.

12. In a loom, filling-changing means, a shuttle provided with a filling-holder having a magnetic body normally covered by filling, a solenoid-magnet the core of which acts as a feeler to feel for exhaustion of filling, an electric circuit acting to make said feeler periodically a magnetized body, the said feeler being put in its abnormal position whenever the magnetic body carried by the shuttle is sufficiently denuded of filling and effecting the operation of the filling-changing means.

In witness whereof we have hereunto signed our names, this 25th day of March, 1901, in the presence of two subscribing witnesses.

WILLIAM H. BAKER.
FREDERIC E. KIP.

Witnesses:
PETER A. ROSS,
F. W. WIMAN.