No. 636,705. Patented Nov. 7, 1899.

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

LOOM.

(Application filed July 22, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig: 1.

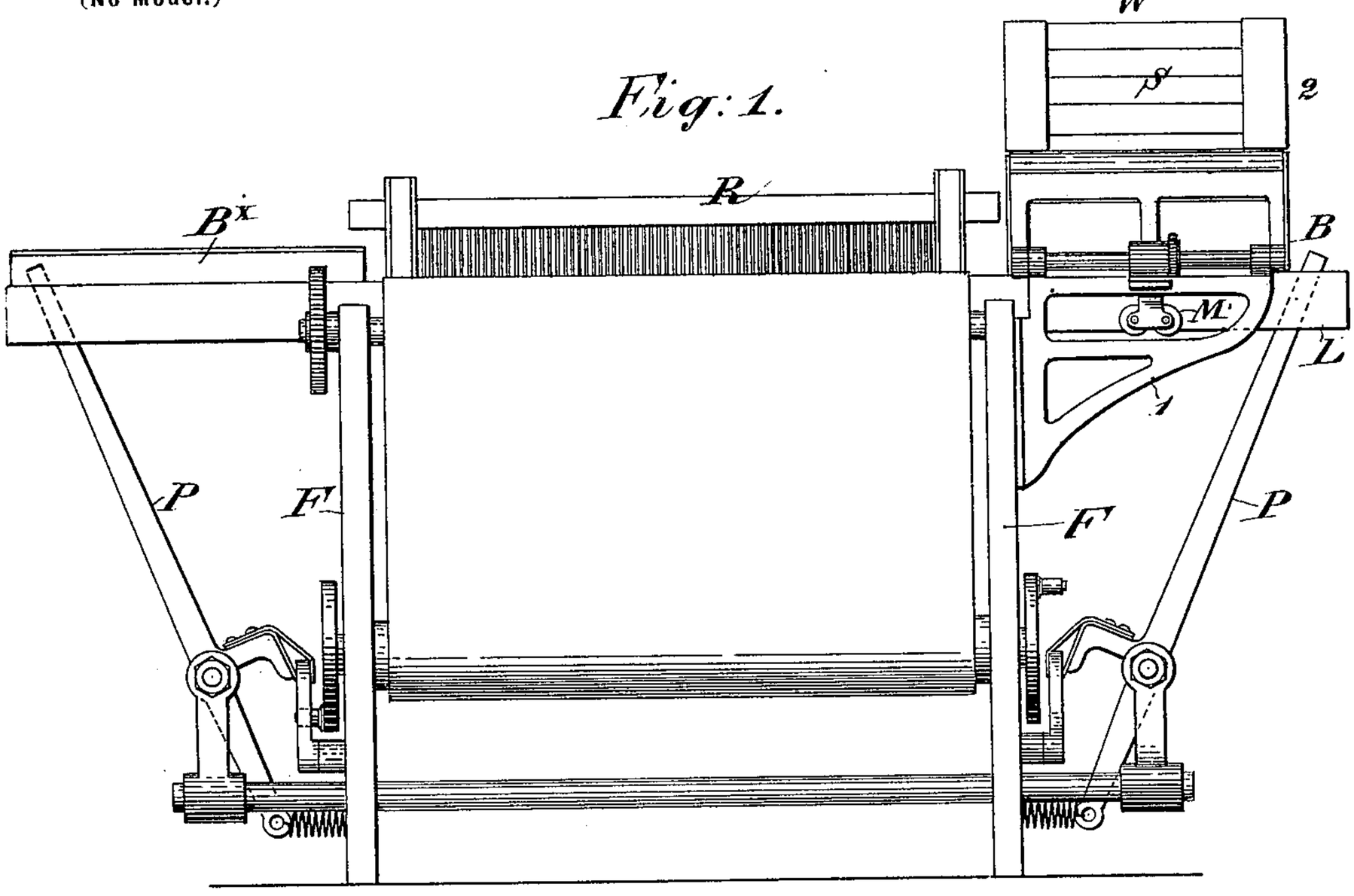


Fig: 5.

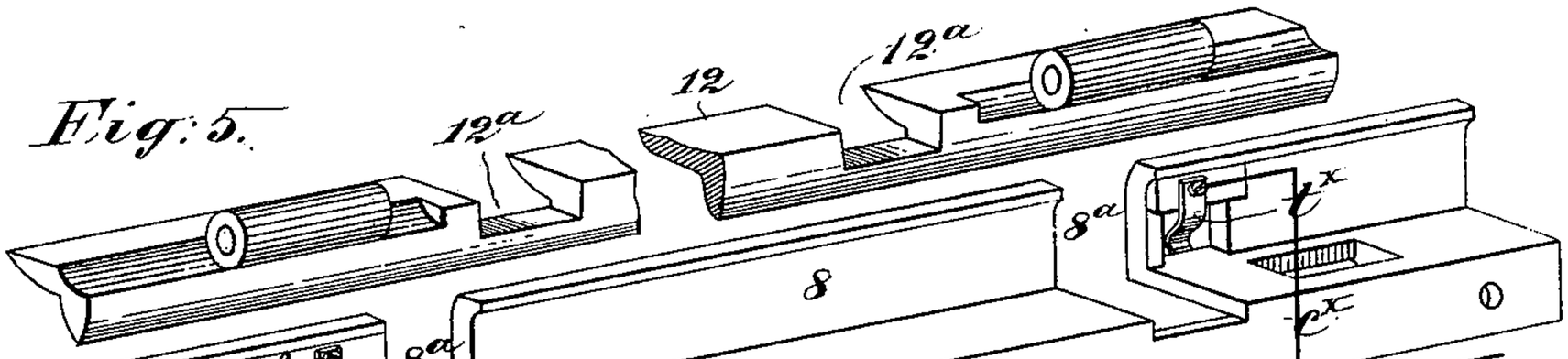


Fig: 6.

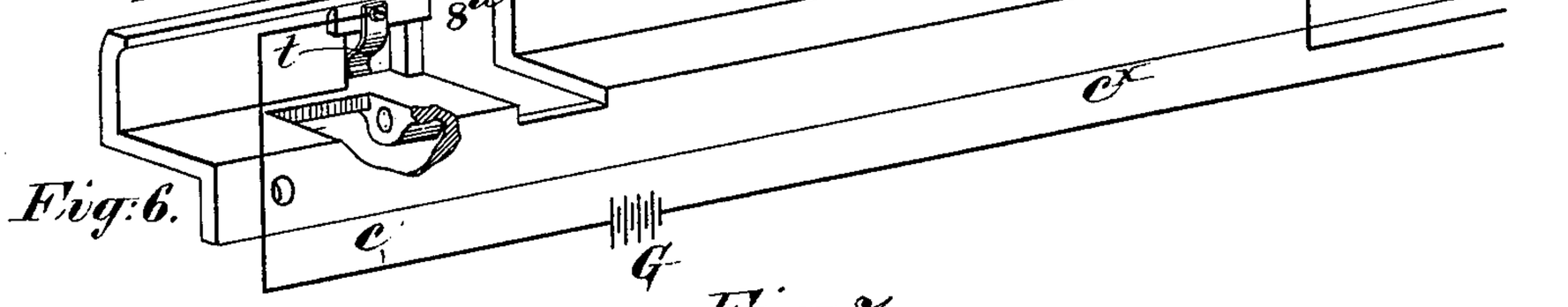
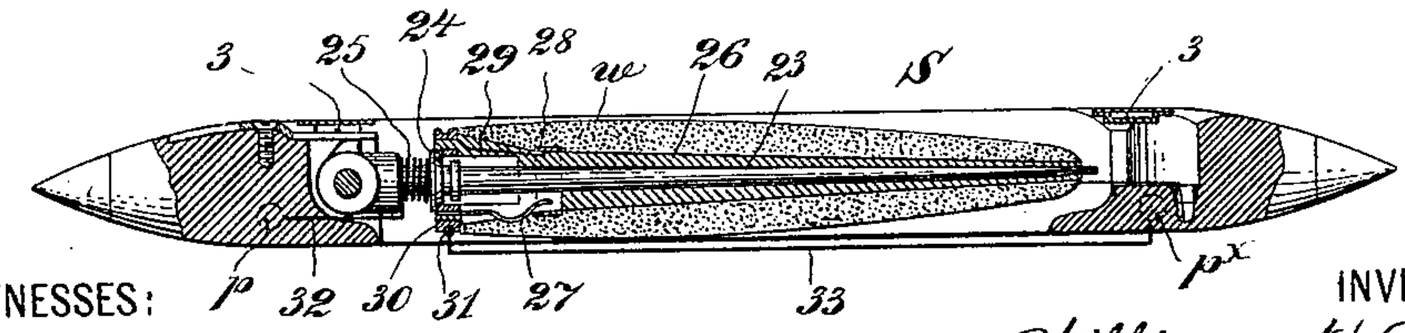


Fig: 7.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

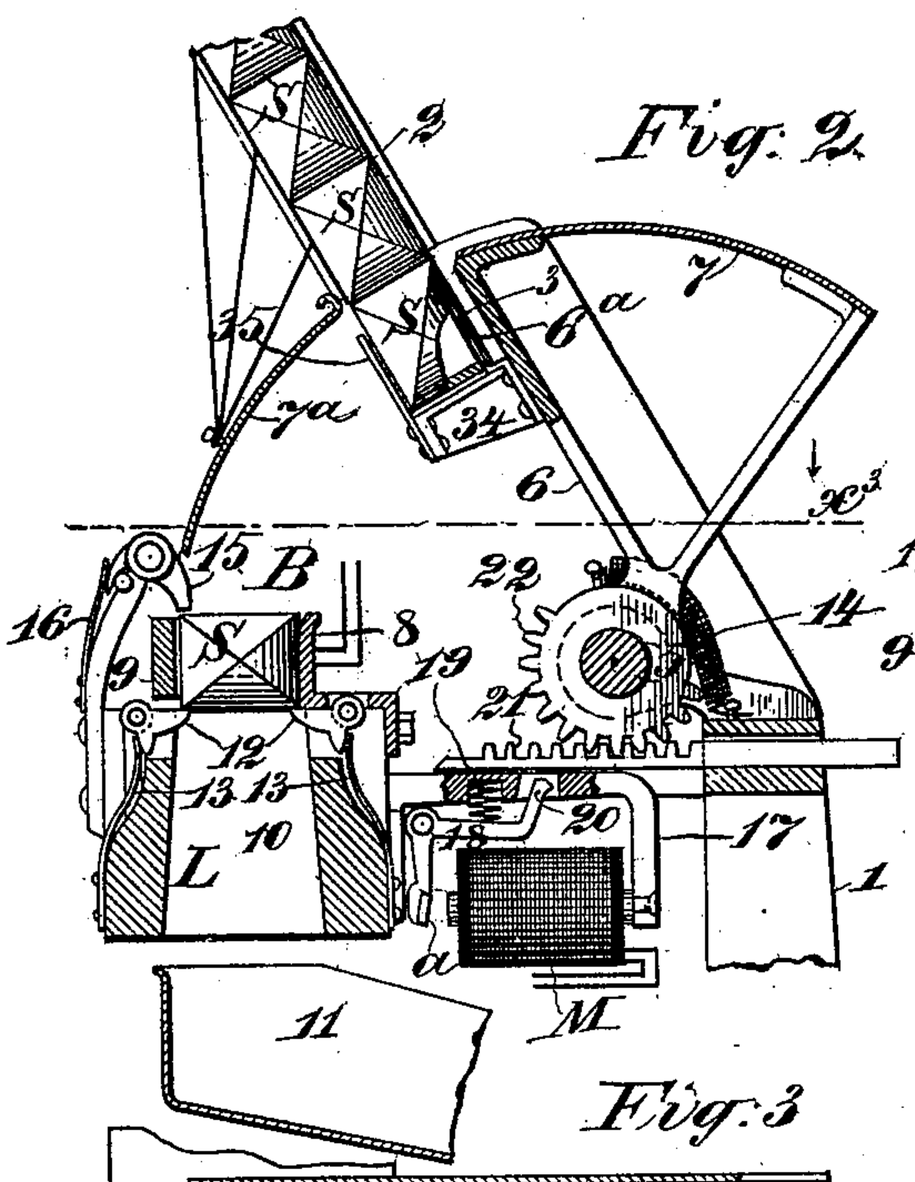


Fig. 2a.

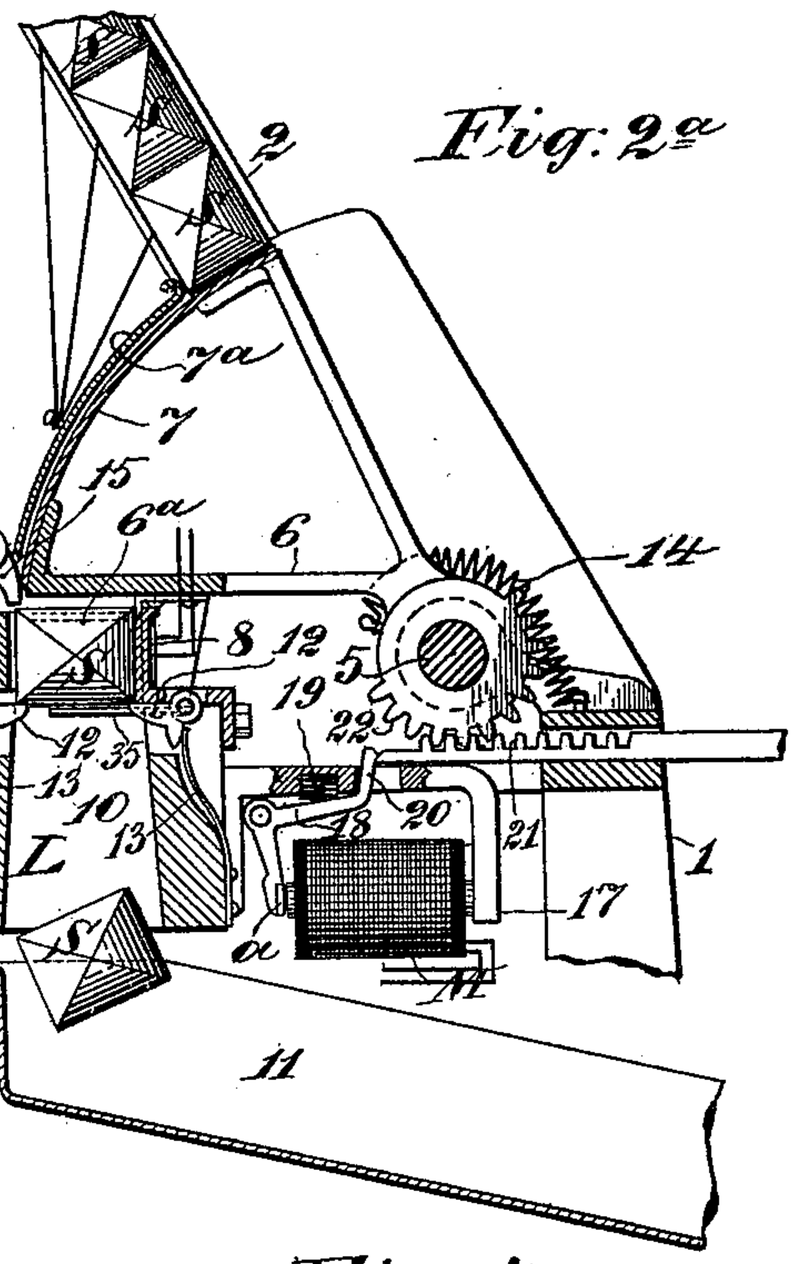


Fig. 3

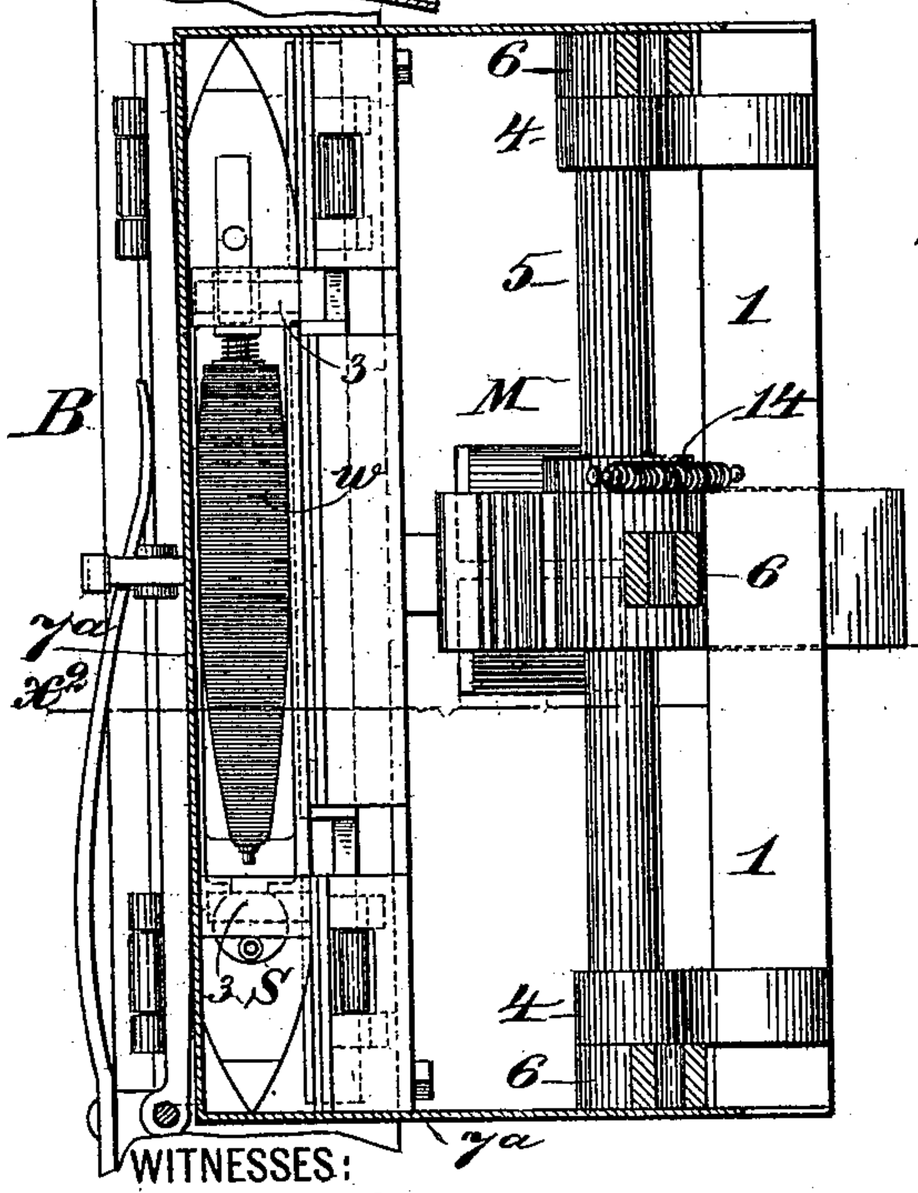
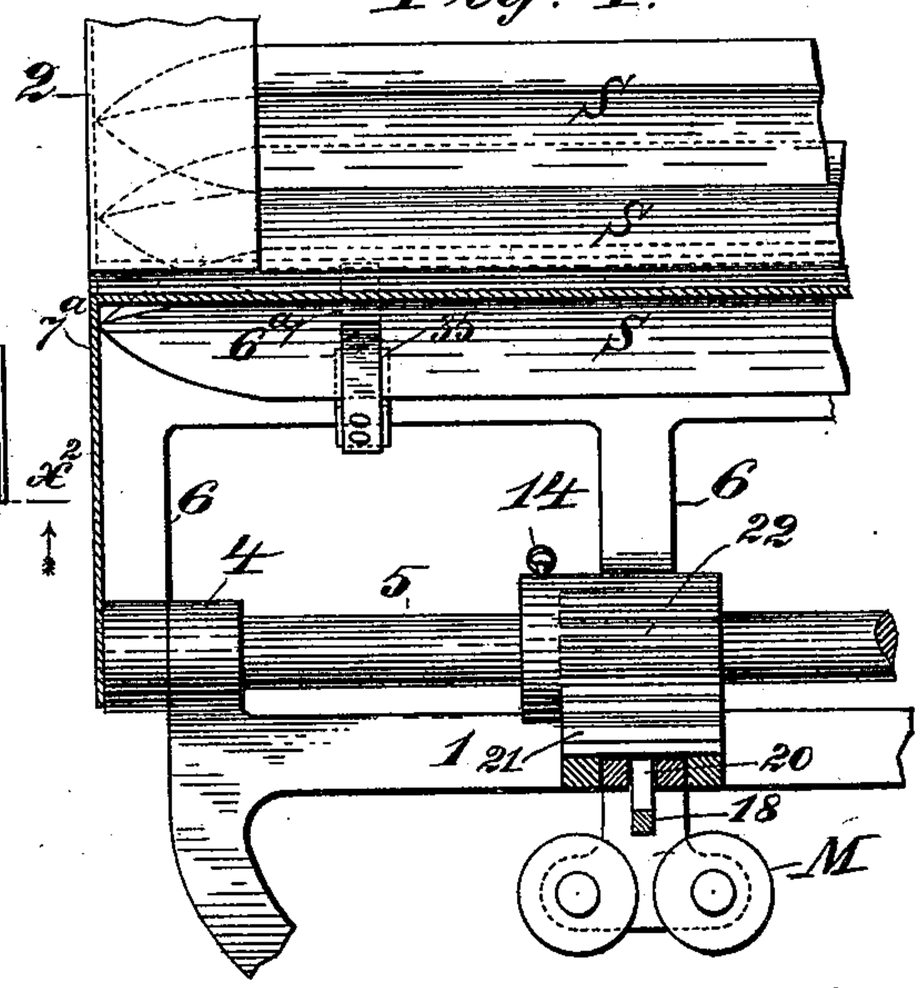


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM H. BAKER, OF CENTRAL FALLS, RHODE ISLAND, AND FREDERIC E. KIP, OF MONTCLAIR, NEW JERSEY.

LOOM.

SPECIFICATION forming part of Letters Patent No. 636,705, dated November 7, 1899.

Application filed July 22, 1899. Serial No. 724,745. (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 invented certain new and useful Improvements in Looms, of which the following is a specification.

This invention relates to that class of looms which are provided with automatic weft-supplying mechanisms, and particularly to those wherein the supply is controlled by electromagnetic means.

The object of this invention is to provide a simple mechanism operated by a going part of the loom and preferably by the lay or batten which when the weft in a shuttle is nearly or quite exhausted will take a full shuttle from a shuttle-magazine and place it in the shuttle-box, the exhausted shuttle being at the same time displaced. The exhaustion of the weft of the shuttle in play is detected and the weft-supplying operation controlled by electrical means. In our pending application, Serial No. 707,772, filed March 4, 1899, we show a means for supplying to a shuttle in the shuttle-box a bobbin-box containing a full bobbin, and in the present case we employ mechanism in many respects similar to that in said application; but in the present case a construction is provided at the shuttle-box for permitting the incoming full shuttle to displace and expel the shuttle in play that has been more or less exhausted or deprived of weft.

In the accompanying drawings, Figure 1 is a general front view of a loom provided with our improvements, the weft-supply mechanism being seen at the right. This view is on a relatively small scale. Fig. 2 is a vertical section of the weft-supply mechanism, taken at line x^2 in Fig. 3; and Fig. 2^a is a sectional view in the same plane as Fig. 2, but showing the parts in a different position. Fig. 3 is a horizontal section taken at line x^3 in Fig. 2. Fig. 4 is a fragmentary face view of the carrier, showing one of the fingers thereon. Fig. 5 is a detail perspective view of one of the hinged flaps of the shuttle-box for supporting the shuttle; and Fig. 6 is a similar view of the side of the shuttle-box, showing the electrical connections. Fig. 7 is a longitudinal section of the shuttle, showing the electrical devices therein for closing the circuit when the weft is nearly or wholly exhausted.

Fig. 1 is merely an illustrative view designed to show the position of the weft-supplying devices on the loom. F is the loom-frame, L the batten or lay, and B the shuttle-box, as a whole, at the side of the loom where the supply devices are situated. $B^\times$ is the shuttle-box at the opposite side of the loom—at the left in Fig. 1. P are the picker-sticks. S is the shuttle. R is the reed, and W, in Fig. 1, is the weft-supplying mechanism as a whole. Respecting this last-named mechanism, which is best illustrated in the detail views Figs. 2, 2^a, 3, and 4, 1 is a strong bracket mounted on the loom-frame, and 2 is a shuttle-magazine supported on said bracket. The magazine discharges at its bottom, and the shuttles S are superposed therein. They are taken one by one as required and transferred by a rocking carrier to the shuttle-box B, when the lay L moves up to the beating-up point, the descending full shuttle on the fingers of the carrier displacing the shuttle already in the box, as will be hereinafter explained. Mounted in bearings in the bracket 1 at 4 is a shaft 5, on which is fixed the carrier 6. This carrier is in the form of a frame and stands, normally, in the receiving position under the magazine, as seen in Fig. 2. It carries a curved plate or guard 7, which when the carrier moves down to the position seen in Fig. 2^a takes under and closes the delivery-outlet of the magazine 2 and prevents the shuttles from falling out therefrom. In moving down the upper end of the carrier and the shuttle carried thereby play close under a fixed curved shield 7^a, which prevents the shuttle from flying off from the carrier. The shield or guard 7^a may be connected with and form a part of the magazine, and the latter, as well as said shield, need only house or take over the ends of the shuttles.

The shuttle S has in it two mortises or sockets 3, Figs. 2 and 7, to engage upright fingers 6^a on the carrier 6, and when the latter is brought to the position seen in Fig. 2 the bot-

tom shuttle is impaled on these fingers, being then wholly below the bottom of the magazine and ready to be transferred to the shuttle-box.

Before minutely describing the mechanism which at the proper time rocks the carrier and brings the full shuttle down to the shuttle-box B we will describe the construction of this box.

8 is the fixed side of the box, and 9 the swell at the opposite side thereof. Under the box the lay L is cut away or mortised at 10 to open a way for a shuttle to fall down through into any suitable receptacle or chute 11. The shuttle in the box is sustained, however, by two hinged flaps 12, (detached in Fig. 5,) one at each side of the mortise 10 in the lay. These flaps may be about as long as the shuttle, and they will take, normally, under the bottom of the shuttle in the box to a limited extent and be backed by suitable springs 13. Supported in this manner on yielding supports, it will be obvious that when the carrier 6 brings a full shuttle down, as in Fig. 2ª, into the box B said shuttle will drive down the exhausted shuttle in the box, the flaps 12 yielding and allowing the latter shuttle to drop down into the receptacle or chute 11. The falling shuttle is indicated in Fig. 2ª. The side S of the box B will be notched, as seen at 8ª, Fig. 5, to allow the fingers 6ª of the carrier 6 to enter, and as the lay recedes toward the picking-point the full shuttle just deposited in the shuttle-box will be drawn off from the fingers 6ª, and the carrier will then be free to return to its upright receiving position. This return is effected by a spring or springs—for example, the spring 14. In order to hold the shuttle down in the box while the lay is receding and before the fingers 6ª are disengaged therefrom, a hinged finger or latch-guard 15 is mounted on the lay and backed by a spring 16. When the shuttle enters the box, it wipes past this latch-guard, and the latter springs in over it. The electromagnetic devices, together with the mechanical devices they control, will now be described. On the lay is mounted a stout bracket 17, which supports an electromagnet M and an elbow-shaped armature-lever 18, carrying the armature *a* of said magnet. The lever 18 is backed by a spring 19 and has an upwardly-turned toe 20, which when the magnet is excited and attracts its armature is protruded upward through an aperture in the horizontal arm of the bracket 17. The bracket, magnet, &c., being mounted on the lay will of course move to and fro with the latter.

Mounted to slide in a guideway in the bracket 1 is a rack 21, which plays directly over the bracket 17, and in gear with this rack is a circular rack or toothed wheel 22, fixed on the carrier 6 concentric with the shaft 5. Now if the rack 21 be pushed to the right, as the parts are represented in Figs. 2 and 2ª, the carrier will be rocked by the intermeshing racks from the upright position seen in Fig. 2 to the position seen in Fig. 2ª, and to effect this automatically means are provided, to be hereinafter described, whereby when an exhausted shuttle enters the box B (while the the lay is at the picking-point) an electric circuit will be closed through the magnet M, the magnet will be excited and attracts its armature, thus rocking the armature-lever 18 and causing its toe 20 to protrude upwardly through the slot or aperture in the bracket 17. As the lay advances in beating up the protruding toe 20 will impinge upon the end of the rack 21 and drive it back, thus operating the carrier 6.

Figs. 6 and 7 illustrate the electrical construction at the shuttle-box B and in the shuttle. The construction within the shuttle may be, so far as its specific character is concerned, like those in any one of our several pending applications—namely, Serial No. 711,026, filed March 29, 1899; Serial No. 721,802, filed June 26, 1899, and Serial No. 723,128, filed July 8, 1899. As herein shown, 23 is the spindle, hinged in the shuttle, and on it is a loose metallic washer 24, backed by a spring 25. The bobbin 26, carrying the weft *w*, is slipped onto the spindle, and a metallic spring contact-terminal 27, mounted in a slot in the bobbin, is thus put into metallic contact with said washer 24. The terminal 27 has a bow or arch, and the weft on the bobbin bears on this arch, and thus presses the terminal inward, so that its free end is out of contact with the inner surface of a metal band or ring 28 on the bobbin where said ring crosses said slot. The ring 28 is connected electrically by a conductor 29 with a grooved metal ring or part 30 on the bobbin, and when the bobbin is in place the grooved ring 30 makes electrical contact with a metal pin 31 in the shuttle. The spring 25 is electrically connected by a suitable conductor 32 with a contact-plate *p* on the side of the shuttle, and the pin 31 is connected in a similar manner by a conductor 33 with a similar plate $p^{\times}$ on the shuttle.

On the side of the shuttle-box B, Fig. 6, are spring-terminals *t* and $t^{\times}$, which contact, respectively, with the plates *p* and $p^{\times}$ on any shuttle which may enter the shuttle-box. The springs *t* and $t^{\times}$ are terminals of the operating electric circuit, which consists of conductors *c* and $c^{\times}$ and includes the electromagnet M and a generator G.

When the weft *w* is nearly exhausted from the bobbin 26, the resiliency of the spring-terminal 27 causes the latter to close the break in the circuit in the bobbin, so that when the shuttle next enters the box B the magnet M will be excited and a fresh or full shuttle supplied.

As the movements of the carrier 6 will be rapid and the impact of the incoming shuttle will be considerable, it is best to provide the carrier with means for interposing a cushion or cushions of some relatively soft material, such as leather, between the shuttles at the moment of the shifting or changing. In the

present construction two such cushion devices are employed, placed opposite to the respective fingers 6^a. Each comprises a supporting-bracket 34 on the carrier, provided with a cushion 35, of leather or the like. As the cushions 35 must at the time of supplying the shuttle to the box pass down below the bearing-surfaces of the flaps 12, these latter are recessed, as seen at 12^a in Fig. 5, at the proper points, and the recesses 8^a in the side 8 of the box B, Fig. 6, are also deepened and widened for the same reason.

Having thus described our invention, we claim—

1. In a loom, the combination with the lay and the shuttle-box thereon, of a yielding support for the shuttle on the lay within said box, said support taking under the bottom of the shuttle at its side, a magazine, and a vibrating carrier which takes the shuttle from the magazine and transfers it to the shuttle-box by driving the shuttle already in the box down past the yielding support in the latter.

2. In a loom, the combination with the vibrating lay and the shuttle-box thereon, said box having a yielding support for the shuttle, of the shuttle, having mortises 3, the shuttle-magazine, having a bottom delivery, and a vibrating carrier for the shuttle which plays between the magazine and the shuttle-box and has fingers 6^a, to engage the mortises in the shuttle.

3. In a loom, the combination with the vibrating lay, and the shuttle-box thereon, said box having a yielding support for the shuttle and a spring latch-guard 15, to take over the inserted shuttle, of the magazine, and the vibrating shuttle-carrier between the magazine and shuttle-box, said carrier having fingers which engage the shuttle to be carried.

4. The combination with the lay, the fixed magazine, and the shuttle-box on the lay, having a yielding support for the shuttle, of the vibrating shuttle-carrier which plays between the magazine and shuttle-box, said carrier having a cushion which interposes between the shuttle in the carrier and that in the box.

5. The combination with the lay, having an opening in it below the shuttle-box, and the said shuttle-box, of the hinged, spring-flaps, 12, forming a yielding bottom for the shuttle-box to support the shuttle, whereby the shuttle may be displaced from the box by a downward blow or pressure on the shuttle.

6. The combination with the vibrating lay, the magazine, the shuttle-box on the lay having downwardly-yielding supports for the shuttle, and a vibrating shuttle-carrier which plays between the magazine and shuttle-box, of the brackets 34, on the carrier, and the cushions 35, carried by said brackets.

7. In a loom, the combination with the lay, the shuttle-box thereon having in it a yielding support for the shuttle, the magazine, and a vibrating shuttle-carrier which plays between the delivery of the magazine and the shuttle, whereby the shuttle in the carrier is made to displace downward that in the shuttle-box, of electromagnetic means controlling the vibrations of said carrier, substantially as set forth.

8. In a loom, the combination with the vibrating lay, the shuttle-box thereon having in it a yielding support for the shuttle, the magazine, and a vibrating shuttle-carrier which plays between the delivery of the magazine and the shuttle-box, whereby the shuttle in the carrier is made to displace downward the shuttle in the shuttle-box, of electromagnetic means controlling the vibrations of said carrier, and a shuttle having in it a partial electric circuit forming part of the operative circuit when the shuttle is in the shuttle-box, and said partial circuit having in it a self-closing break held open normally by the overwrapped weft in the shuttle, substantially as set forth.

9. The combination with the vibrating lay, the fixed magazine, and the shuttle-box on the lay, open at its top to receive a shuttle and having in it hinged yielding supports for the shuttle, of the vibrating shuttle-carrier which plays between the magazine and the shuttle-box and is adapted to deposit the shuttle in the box at its open top and displace the shuttle therein, substantially as set forth.

10. In a loom, the combination with a vibrating lay, of a weft-supplying mechanism comprising a fixed magazine, a shuttle-box on the lay and having in it yielding supports for the shuttles, a vibrating shuttle-carrier which plays between the magazine and the said shuttle-box, and is adapted to deposit the shuttle in the box and displace the shuttle therein, and an operating electric circuit including an electromagnet, said circuit being opened or closed by the presence or absence, or partial absence, of weft or thread in the shuttle.

In witness whereof we have hereunto signed our names, this 14th day of June, 1899, in the presence of two subscribing witnesses.

WILLIAM H. BAKER.
FREDERIC E. KIP.

Witnesses:
WILLIAM B. PHELPS,
DAVID L. BOWERS.