No. 636,706. Patented Nov. 7, 1899.

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

LOOM.

(Application filed July 27, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

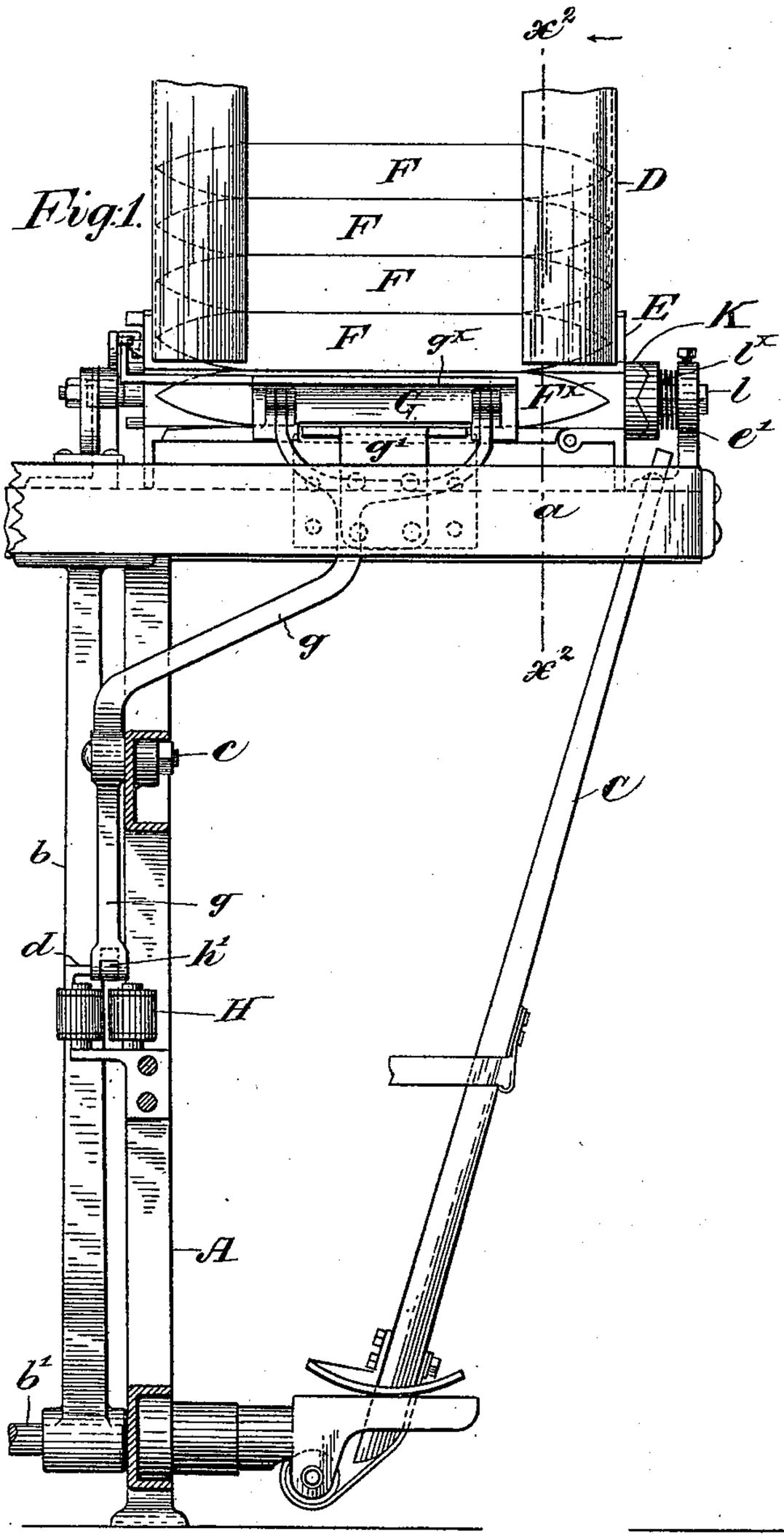


Fig. 2.

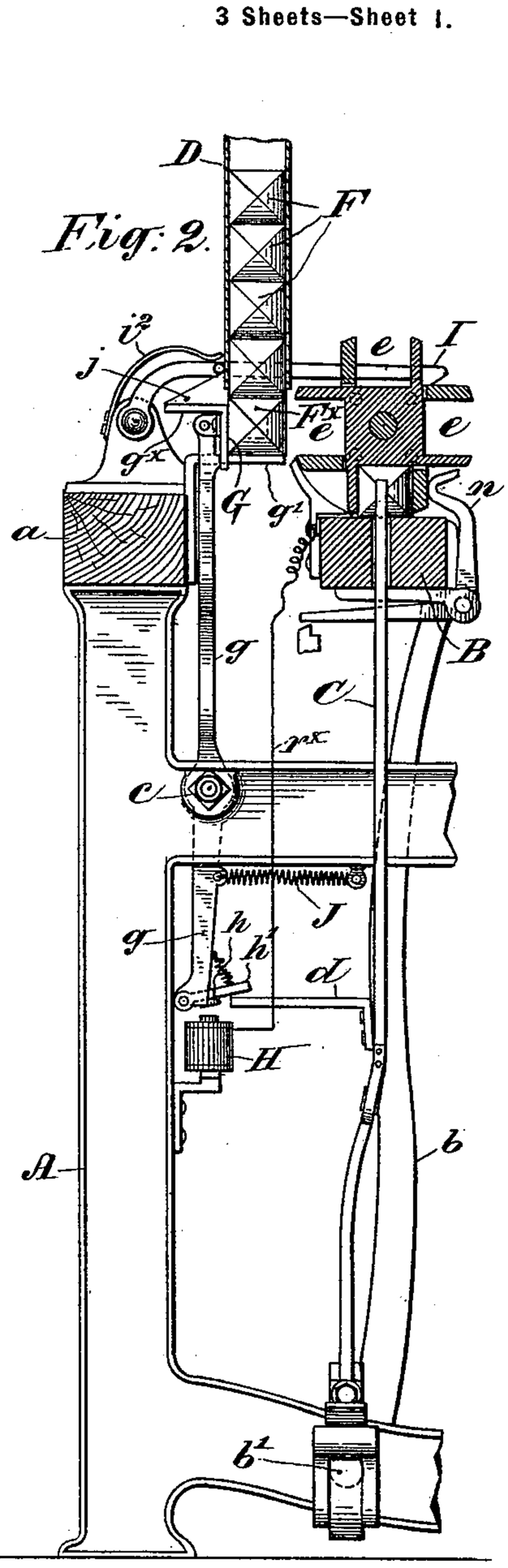
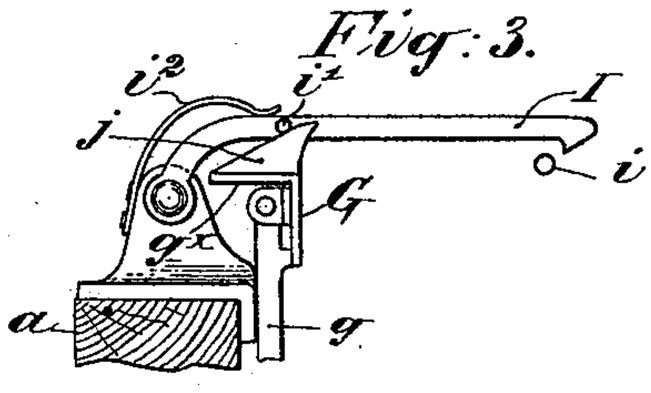


Fig. 3.



WITNESSES:

F. H. Hinman

Peter N. Ross.

INVENTORS

William N. Baker

Frederic E. Kip

BY

Munn Connett

ATTORNEY

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(No Model.) 3 Sheets—Sheet 2.

Fig: 4.

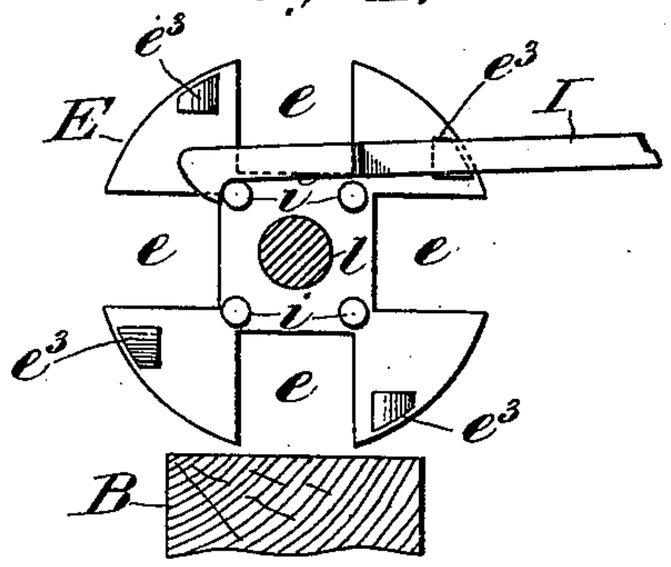


Fig: 5.

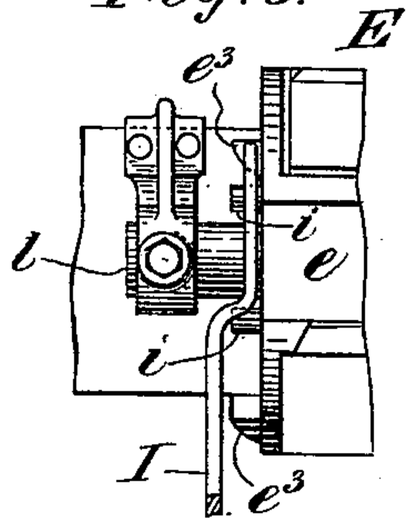


Fig 5ª

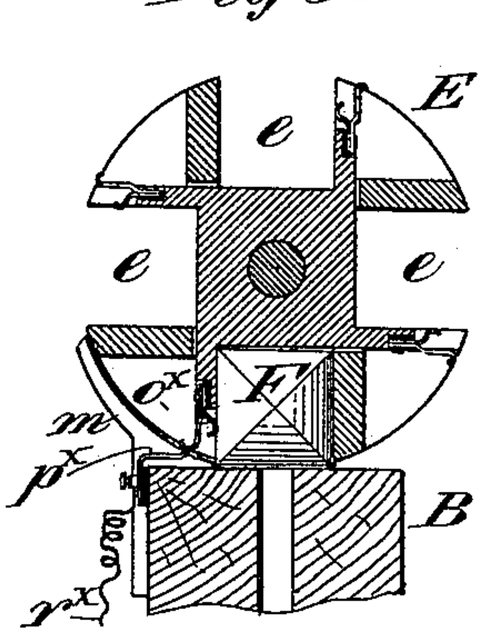


Fig: 6.

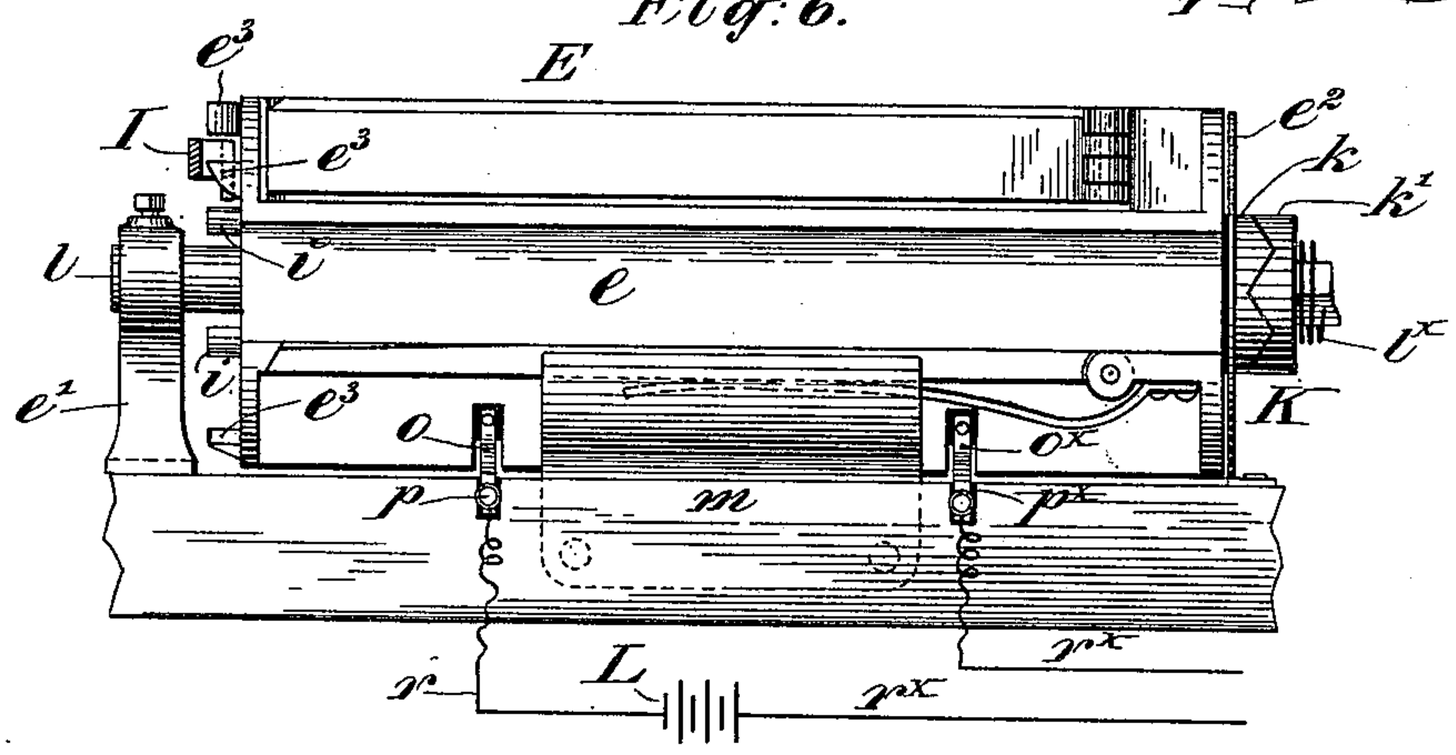


Fig: 7.

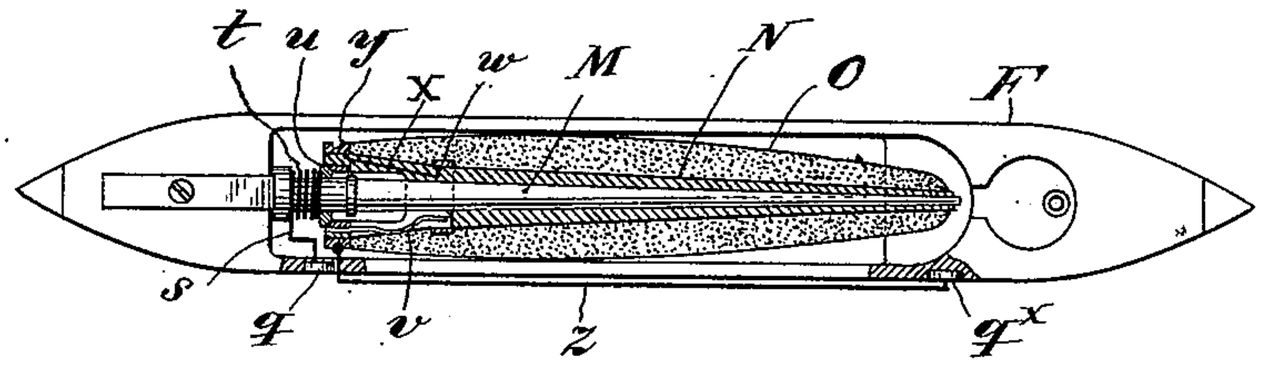
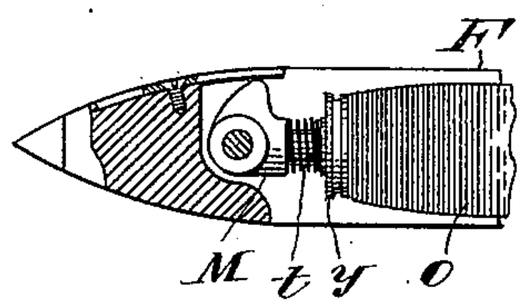


Fig: 8.



WITNESSES:

F. W. Hinman

Peter A. Ross

INVENTORS

William H. Baker

Frederic E. Kip

BY

Henry Connett

ATTORNEY

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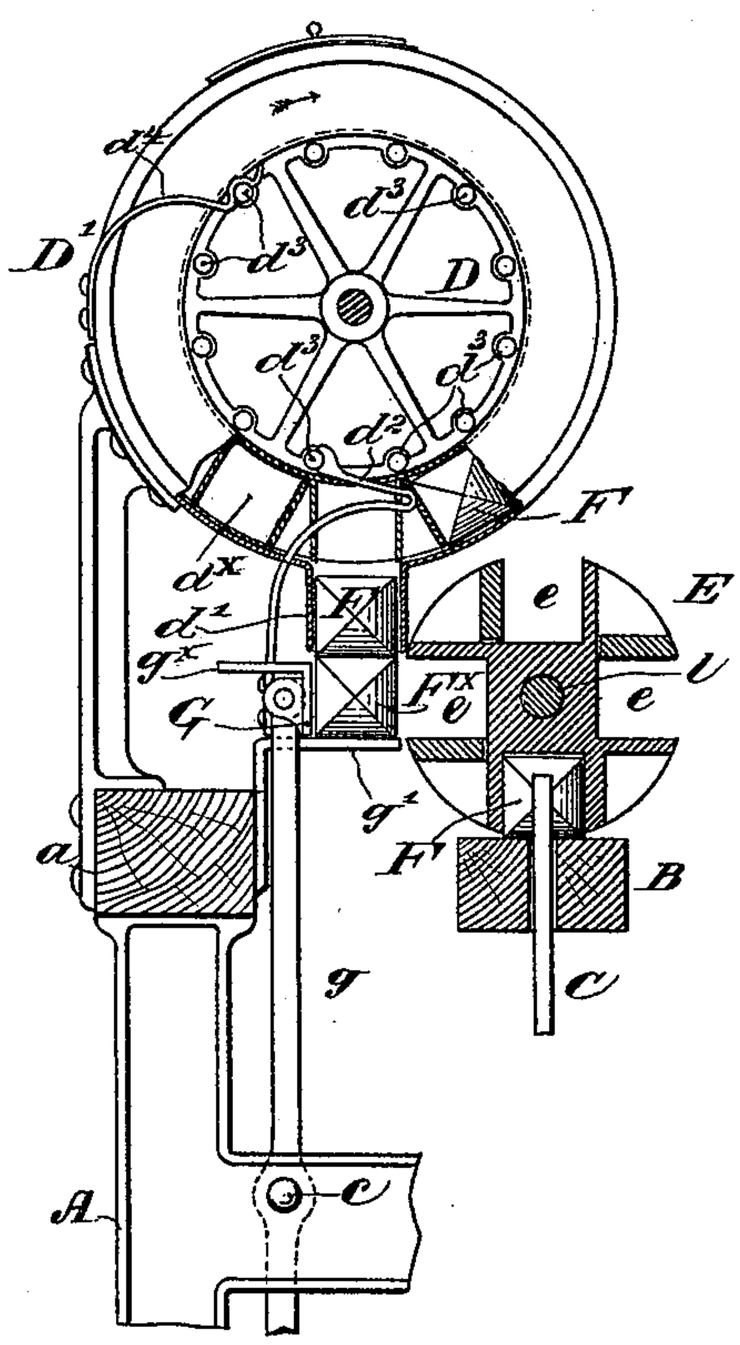
(No Model.) 3 Sheets—Sheet 3.

Fig: 9.



WITNESSES:

L. M. Hinman

Peter A. Ross

INVENTORS

William H. Baker

Frederic E. Kip

BY

Munn & Connell

ATTORNEY

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. 636,706, dated November 7, 1899.

Application filed July 27, 1899. Serial No. 725,219. (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 mechanism connected with a loom for supplying weft thereto automatically when needed; and the characteristic features of the invention are a stationary shuttle-magazine on the loom-frame, a rotatively-mounted shuttle-box on the lay having in it a plurality of concentric shuttle-cells, a shuttle-placer which vibrates between the delivery-outlet of the magazine and the said box and supplies a filled shuttle to the latter as needed, means for imparting intermittent rotary impulses to the shuttle-box to bring the filled cell down to the raceway and to discharge simultaneously the exhausted shuttle, and electromagnetic means for controlling the movements of the shuttle-placer.

In the accompanying drawings, Figure 1 is a front elevation of a part of a loom, showing our invention. Fig. 2 is a sectional side elevation taken substantially at line x^2 in Fig. 1. Fig. 3 is a detached view, on the same scale as Figs. 1 and 2, showing the latch-hook lifter. Fig. 4 is an end view, on a larger scale, of the rotary shuttle-box, showing the devices for rotating it. Fig. 5 is a fragmentary side view of the same, and Fig. 5^a is a cross-section of the same. Fig. 6 is a front view of the shuttle-box, enlarged, showing the electrical connections. Fig. 7 is a plan view of the shuttle, showing the bobbin in section and the electrical features within it; and Fig. 8 is a vertical section of one end of the shuttle. Fig. 9 represents a rotary form of magazine, which is preferred.

A represents the loom-frame, and *a* the breast-beam thereof. B is the lay, and *b* one of the lay-swords. *b'* is the swing-rail, and C is one of the picker-sticks. All of these parts may be of substantially the usual construction.

On the loom-frame is mounted a shuttle-magazine D to contain the shuttles F. This magazine has its delivery-outlet at its bottom, and on the lay is mounted a rotative shuttle-box E. This box has a plurality of concentrically-arranged cells *e* for the shuttles—four, as herein shown—and turns on a shaft or rod mounted in brackets *e'* on the lay. The cell *e* that is for the time below and adjacent to the raceway of the lay receives the shuttle in play, and the others are closed at their outer ends by a stationary ring-plate e^2, mounted on the lay.

G is a vibrating shuttle-placer, which is mounted on the upper arm of a lever *g*, fulcrumed *c* on the loom-frame. Below the delivery of the shuttle-magazine is situated a receiving-shelf *g'* for the shuttle which is to be delivered to the shuttle-box. This shelf is secured to the breast-beam *a* conveniently and is in the form of a bracket. It is situated below the outlet of the magazine D a distance sufficient to allow the lower shuttle to drop out clear of the magazine. By a vibrating movement of the lever *g* the placer G is caused to push the delivered shuttle ($F^\times$ in Fig. 2) into the empty cell of the shuttle-box E, which stands opposite to it, a plate $g^\times$ on the placer moving under the magazine-outlet and preventing the shuttles therein from falling down until the placer returns to its normal position under the magazine.

When the shuttle in play becomes exhausted of weft, or nearly so, an electric circuit is closed by the entry of the exhausted shuttle into the lower cell of the shuttle-box E at the picking-point and a magnet H on the loom-frame is excited. This magnet, which is situated adjacent to the lower arm of the lever *g*, Fig. 2, attracts its armature *h*, which is carried by an armature-lever *h'*, pivotally mounted on the lower arm of the lever *g*, thus drawing said armature-lever down to a substantially horizontal position. The lay B in beating up causes a tappet *d* on the lay-sword to impinge upon the end of the armature-lever and through it to drive back the lower arm of the placer-lever *g*, thus causing the placer G to move up to and place the shuttle $F^\times$ in the cell opposite to it in the shuttle-box E. The electrical devices connected with the shuttle and shuttle-box will be hereinafter

described. Now when the lay recedes after beating up a partial rotation of the shuttle-box E is effected for the purpose of bringing the cell thereof, which will then contain the full shuttle F×, down to the raceway on the lay, and also to expel or throw out the exhausted shuttle, and the mechanism for effecting this shifting of the shuttle-box will be next described.

In one end of the shuttle-box E are set four short studs *i*, one for each cell *e* therein, and on the loom-frame, and preferably on the breast-beam *a*, is hinged a hook I, the hooked end of which is adapted under certain conditions to take over and engage one of said studs *i*. However, normally or when the loom is running with a full shuttle this hook I is held up out of engagement with the studs *i* by a device best illustrated in Fig. 3. This lifting device consists of an inclined cam-piece *j* on the placer G, which when the placer is drawn back to its normal position by the strong retracting-spring J, Fig. 2, wipes under a stud or part *i'* on the hook I and slightly elevates it, holding it thus elevated until the placer moves inward toward the shuttle-box, when the hook is depressed by a light spring i^2 into engagement with a stud *i*. As the lay moves back the hook I turns the shuttle-box nearly to the proper extent, when a spring device K (seen in Fig. 1) continues the movement. This device comprises, as herein shown, a member *k*, fixed to the magazine and having four radially-arranged V-shaped teeth and a like matching member *k'*, splined on the fixed shaft *l*, about which the shuttle-box rotates, and backed by a spring $l^\times$. This spring device is not in itself new, and any equivalent device for the purpose may be employed. When the movement of the lay shall have rotated the shuttle-box E to the proper extent, or nearly so, the hook I will be cammed off from the stud *i* laterally, it being made sufficiently thin and spring-like for this purpose. The cams e^3, which effect this, are on the end of the shuttle-box and so placed as to bear on the face of the hook, which is next the shuttle-box. As soon as the lay recedes the placer will return to its normal position. As the shuttle-box is rotated to the left, as seen in Fig. 2, the cell therein containing the full shuttle passes down behind a suitable curved guard *m* on the lay, which serves to prevent said shuttle from falling out of the cell, and the cell containing the exhausted shuttle is turned up and the said shuttle thrown out therefrom. It may be caught in a tray or other receptacle suitably placed to receive it. We have not deemed it necessary to illustrate this receptacle, as it is not essential to the invention.

In Fig. 2 we have shown what is known on looms as the "protecting-finger," a common device for effecting the stoppage of the loom where the shuttle fails to enter the shuttle-box when it should do so. This finger *n* may be used in connection with our rotary shuttle-box and will be merely pressed back out of the way when the box rotates in shifting.

The electrical appliances are best illustrated in Figs. 2, 6, 7, and 8. On the side of each cell of the shuttle-box E are secured two spring-contact terminals *o* and $o^\times$, and on the lay B are secured two contact-pieces *p* and $p^\times$, which contact with the terminals on the box side, as seen in Figs. 2 and 5^a. The contact-pieces *p* and $p^\times$ are terminals of an outer operating-circuit formed by conductors *r* and $r^\times$ and including the electromagnet H and any generator L. The shuttle F has on its outer side, Fig. 7, two contact-plates *q* and $q^\times$, which when it is in play and enters the cell of the shuttle-box at the raceway come into contact, respectively, with the spring-terminals *o* and $o^\times$ on the side of the box. The plate *q* is connected electrically by a conductor *s* with a spring *t* on the spindle M and behind a loose metal ring *u* on the spindle. The bobbin N slips on the spindle and carries in a slot therein a curved spring-contact *v*, which when the bobbin is in place is put into electrical contact with the loose ring or washer *u*. When the bobbin is in place, the weft O thereon presses in the spring-contact *v* and holds its free end out of contact with a metal ring or piece *w* on the bobbin and bridging the slot therein; but when the weft is nearly quite exhausted the contact *v* springs outward by its own resiliency and comes in contact with the ring *w*. This ring is connected by a conductor *x* with a grooved metal ring or piece *y* on the bobbin, and this ring is electrically connected through a conductor *z* with the plate $q^\times$ on the shuttle. Thus when the break is closed in the shuttle by the exhaustion of the weft the circuit will be completed through the operating-circuit when the shuttle in play enters the box E.

The devices described and illustrated in Figs. 7 and 8 are the same in substance as those illustrated in our pending application, Serial No. 724,385, filed July 19, 1899, and are not specifically claimed herein. Indeed any one of the various devices shown in our several applications—namely, Serial No. 707,772, filed March 4, 1899; Serial No. 711,026, filed March 29, 1899; Serial No. 723,128, filed July 8, 1899, and Serial No. 721,802, filed June 26, 1899—for closing a normally-open break in an electric circuit within a shuttle may be used in lieu of that herein described.

The preferred form of magazine (illustrated in Fig. 9) is rotary in form and will need only a brief description. This magazine $D^\times$ is rotatively mounted within a stationary casing D'. The box is in the form of a drum and has a series of concentrically-arranged shuttle-cells $d^\times$ about its periphery. The lower cell discharges its shuttle down through a chute *d'*, from which it falls to the platform or shelf *g'*, and the placer G takes it as in the construction already described. At each movement of the placer back to its normal position a spring-latch d^2 thereon rotates the

magazine to the extent of one cell, said latch engaging one of a series of pins d^3 on the end of the drum. A spring-detent d^4 steadies the drum and holds it when set, the detent wiping over and engaging one of said pins d^3.

Preferably the placer G will be hinged on the lever g, so as to allow a little rocking of the placer thereon. This is desirable, as the placer moves in a slightly-curved path.

The spring i^2, which depresses the hook I, is only a precautionary device. Gravity may be relied on to depress the hook. The length of the hook I will be such that it may wipe over and engage the proper stud i on the magazine when the lay is in the beating-up position.

In the drawings the fixed tappet d is on the lay and the lever h' is on the placer-lever g, the magnet H being on the loom-frame; but it will be obvious that the particular positions of these parts are not important so long as they perform the functions required of them.

Having thus described our invention, we claim—

1. In a loom, the combination with the vibrating lay, a shuttle-magazine, and a vibrating placer for transferring a shuttle from the magazine to the rotatable shuttle-box on the lay, of the said shuttle-box, provided with a plurality of shuttle-cells, automatic means for rotating the shuttle-box at the proper time, and electromagnetic means controlling the operation of the placer and the rotation of the shuttle-box.

2. In a loom, the combination with the vibrating lay, a shuttle-magazine, and a vibrating placer for transferring a shuttle from the magazine to the rotatable shuttle-box on the lay, of the said shuttle-box, provided with a plurality of shuttle-cells, automatic means for rotating the shuttle-box at the proper time, and electromagnetic means controlling the operation of the placer and the rotation of the shuttle-box, said means comprising an outer electric circuit including a generator and the operating electromagnet, and having terminals in the shuttle-box cell, and a partial circuit in the shuttle closed with the outer circuit when the shuttle is in the box, said circuit in the shuttle having in it a break held open normally by the weft, substantially as set forth.

3. In a loom, the combination with the vibrating lay, a rotatable shuttle-magazine, and a vibrating placer for transferring a shuttle from the magazine-outlet to the rotatable shuttle-box on the lay, of the said shuttle-box, provided with a plurality of shuttle-cells, automatic means for rotating said shuttle-box after a full shuttle has been placed in a cell therein, and automatic means for rotating the magazine after the delivery of a shuttle therefrom to the shuttle-box.

4. In a loom, the combination with the vibrating lay, the shuttle-box thereon, and the magazine having a delivery-outlet, of the shelf to receive the shuttle from the magazine, the placer G, the lever g, carrying the placer, the spring for retracting the placer, mechanism, whereby the lay, in beating up, may actuate the placer, and electromagnetic means controlling said mechanism for actuating the placer.

5. In a weft-supplying mechanism for looms, the combination with a shuttle-magazine, and a vibrating placer for transferring a shuttle therefrom to the shuttle-box, of the rotary shuttle-box E, on the lay and provided with cells e, a spring device K, to steady and hold said box against accidental rotation, a hook I, on the loom-frame and adapted to engage a stud on the shuttle-box, whereby the latter is rotated when the lay recedes, and means substantially as described for holding said hook, normally, out of engagement with the stud on the box.

6. The combination with the rotary, multiple-celled shuttle-box on the lay, provided with studs i and cams e^3 on its end, of the laterally-movable hook I, hinged on the loom-frame and adapted to engage, when depressed, one of the studs i on the box, and means, substantially as described, for elevating said hook and holding it elevated, normally, substantially as set forth.

7. The combination with the rotary, multiple-celled shuttle-box on the vibrating lay, said box being provided with studs i on its end, of the hook I, hinged on the loom-frame and adapted to engage, when depressed, one of the studs i on the shuttle-box when the lay has beaten up, the vibrating placer, and a cam on the placer which takes under some part of the hook I and holds it elevated while the placer is in its normal position, substantially as set forth.

8. The combination with the rotatively-mounted shuttle-box on the lay, having in it a plurality of concentrically-arranged shuttle-cells, of the pairs of spring-terminals o, $o^\times$, on the sides of the respective cells in the box, the outer electric circuit, having contact-terminals p and $p^\times$, on the lay and in position to make electrical contact with the terminals o, $o^\times$, on the side of that cell of the box which is at the raceway, substantially as set forth.

9. In a loom, the combination with the vibrating lay, of a weft-supply mechanism comprising a magazine, a vibrating shuttle-placer hinged to its operating lever or arm near the point of contact with the shuttle, the said lever or arm, a shifting shuttle-box on the lay, and electrical means for controlling the operation of said placer, said means including an operating-circuit having in it a break held open by the weft in the shuttle, substantially as set forth.

10. In a loom, the combination with the vibrating lay, of a weft-supply mechanism comprising a magazine, a vibrating shuttle-placer hinged to its operating lever or arm near the point of contact with the shuttle, the said lever or arm, a rotating shuttle-box on the lay, having in it a plurality of cells, and electrical means for controlling the operation of said

placer, said means including an operating-circuit having in it a break held open by the weft in the shuttle, substantially as set forth.

11. In a loom, the combination with the vibrating lay, of a weft-supply mechanism comprising a shuttle-magazine, a vibratable shuttle-placer which carries a shuttle from the magazine to the shuttle-box, a rotary, celled shuttle-box on the lay, mechanism for operating the placer and shuttle-box at proper times, and an open, electric circuit, which includes an electromagnet and controls the operation of said mechanism, said circuit having in it a break, the closure of which is controlled by the weft in the shuttle.

12. In a loom, the combination with the rotary, celled shuttle-box, and means for rotating it to bring its cells in succession to the picking-point, each cell thereof being provided with two electric terminals, and an open electric circuit having terminals adjacent to said box and in position to contact with the terminals of that cell of the box which is at the picking-point, of a shuttle having in it a partial electric circuit which latter has terminals that close with those on the box-cell when the shuttle enters said cell, substantially as and for the purposes set forth.

13. A loom having the following instrumentalities, namely: a rotary, celled shuttle-box, each cell thereof being provided with electric terminals, means for rotating said shuttle-box to bring its respective cells to the picking-point, and shuttles having terminals that close with those on the shuttle-box when the shuttle enters the cell thereof, said shuttles also having a circuit maker and breaker the same being held open by the weft-filling carrier by the shuttle and adapted to be closed by the substantial exhaustion thereof.

14. A loom, having the following instrumentalities, namely: a rotary, celled shuttle-box, each cell of which is provided with electric terminals, means for controlling the time of rotating said shuttle-box, said means consisting of a shuttle having terminals thereon that connect with those in said box, and an open electric circuit, including an electromagnet, having in it a break, the closure of which is controlled by the weft in the shuttle.

15. In a loom, the combination of a rotary, celled shuttle-box, each cell of which is provided with electric terminals, means for controlling the time of operation of said shuttle-box, said means consisting of an electric circuit extending from an electromagnet through the shuttle to a circuit-closing device, said circuit-closing device being normally held open by the weft or filling in the shuttle and adapted to be closed by substantial exhaust thereof.

16. In a loom, the combination of a weft-supply mechanism including a shuttle-magazine, a vibrating shuttle-placer, a rotary celled shuttle-box, each cell of which is provided with electric terminals, means for controlling the time of operation of said placer for automatically supplying a shuttle to said shuttle-box, said means consisting of an electric circuit extending from an electromagnet through the shuttle to a circuit-closing device, which is normally held open by the weft or filling in the shuttle and adapted to close by the substantial exhausting of said weft or filling.

17. In a loom, the combination of a weft-supply mechanism including a shuttle-magazine, a vibrating shuttle-placer, a rotary celled shuttle-box, each cell of which is provided with electric terminals, means for controlling the time of operation of said placer for automatically supplying a shuttle to said shuttle-box, said means comprising a magnet connected with said weft-supply mechanism, and an electric circuit extending from said magnet and adapted to be opened or closed by the presence or absence of weft or filling in the shuttle.

18. A loom, having the following instrumentalities, namely: a vibrating shuttle-placer, a rotary celled shuttle-box, each cell of which is provided with electric terminals, means for controlling the time of operation of said placer and shuttle-box, said means consisting of an electric circuit extending from an electromagnet through the shuttle to a circuit-closing device, which is normally held open by the weft or filling in the shuttle and adapted to close by the substantial exhausting of said weft or filling.

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.