No. 659,952. Patented Oct. 16, 1900.

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

LOOM.

(Application filed Feb. 23, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

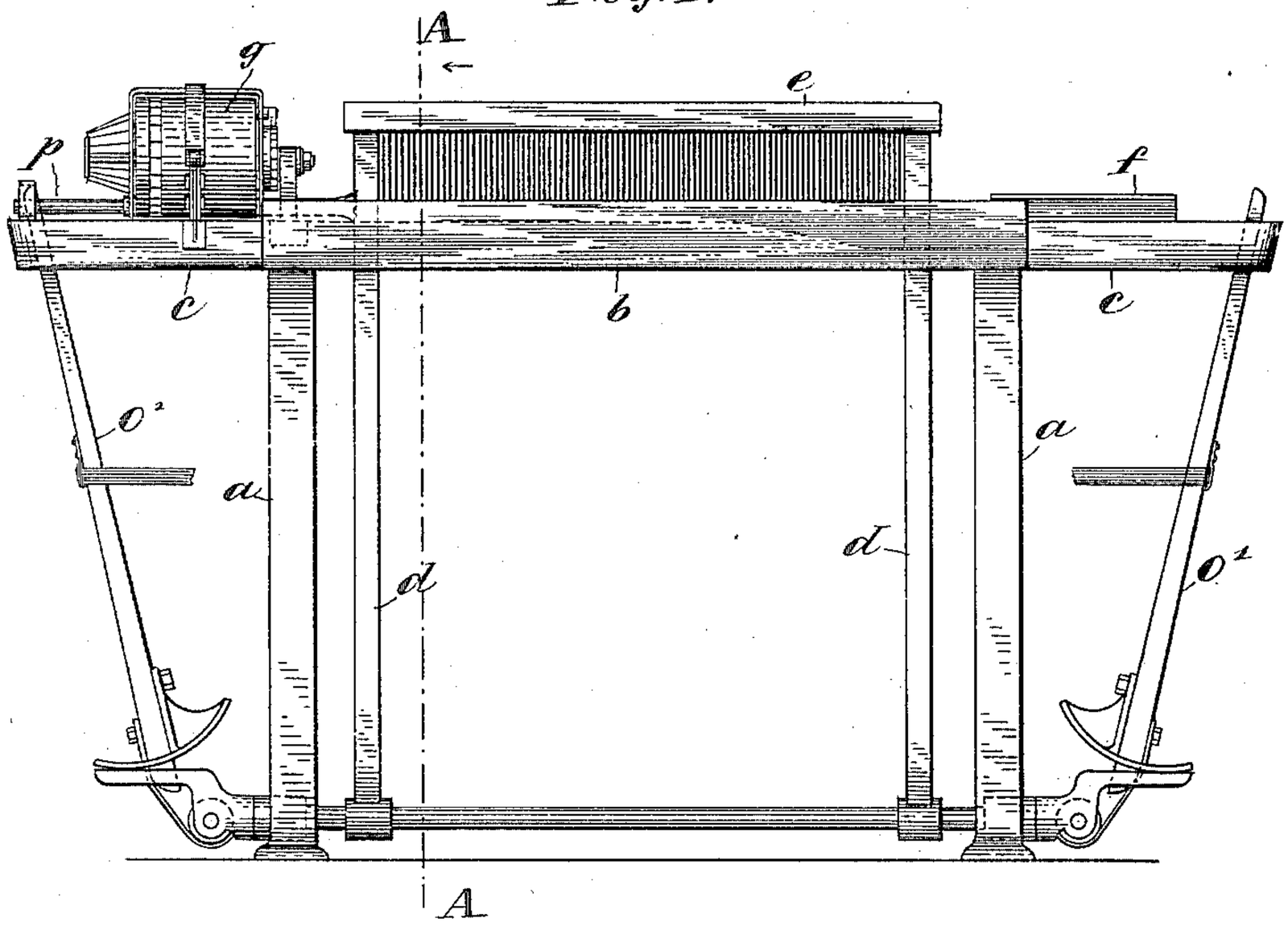


Fig. 2.

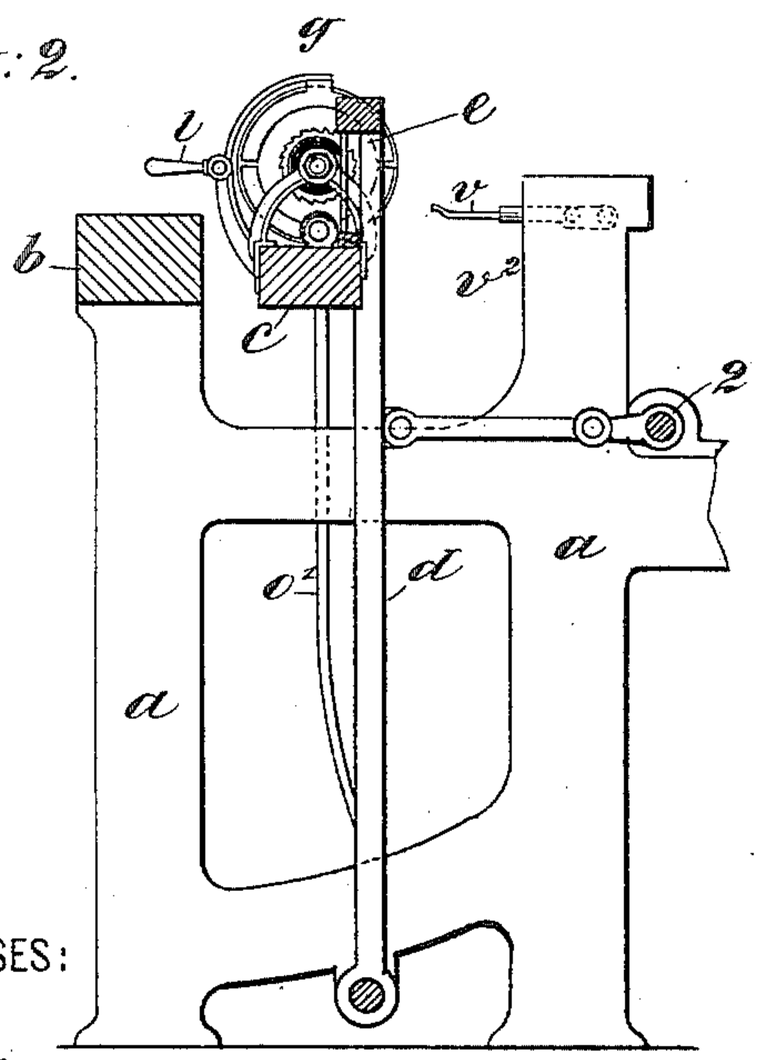
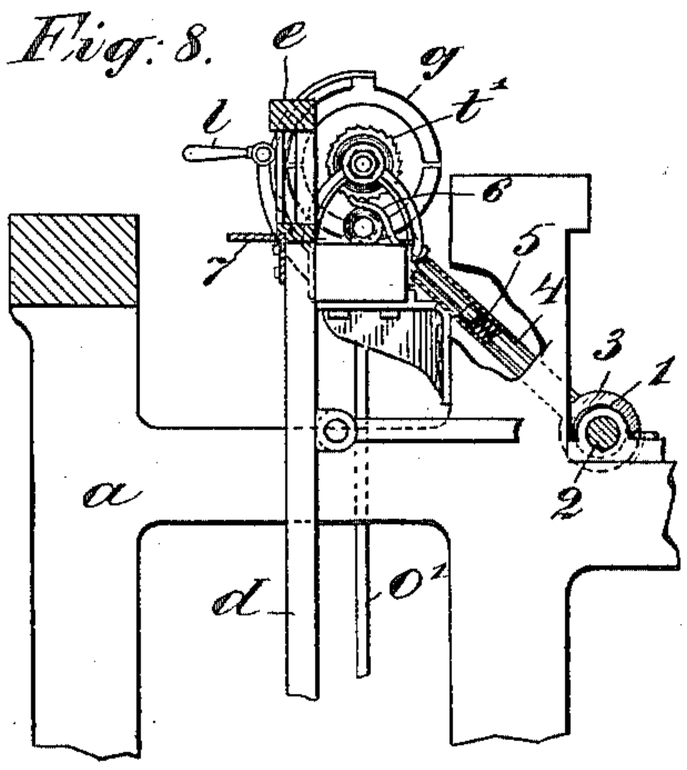


Fig. 3.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

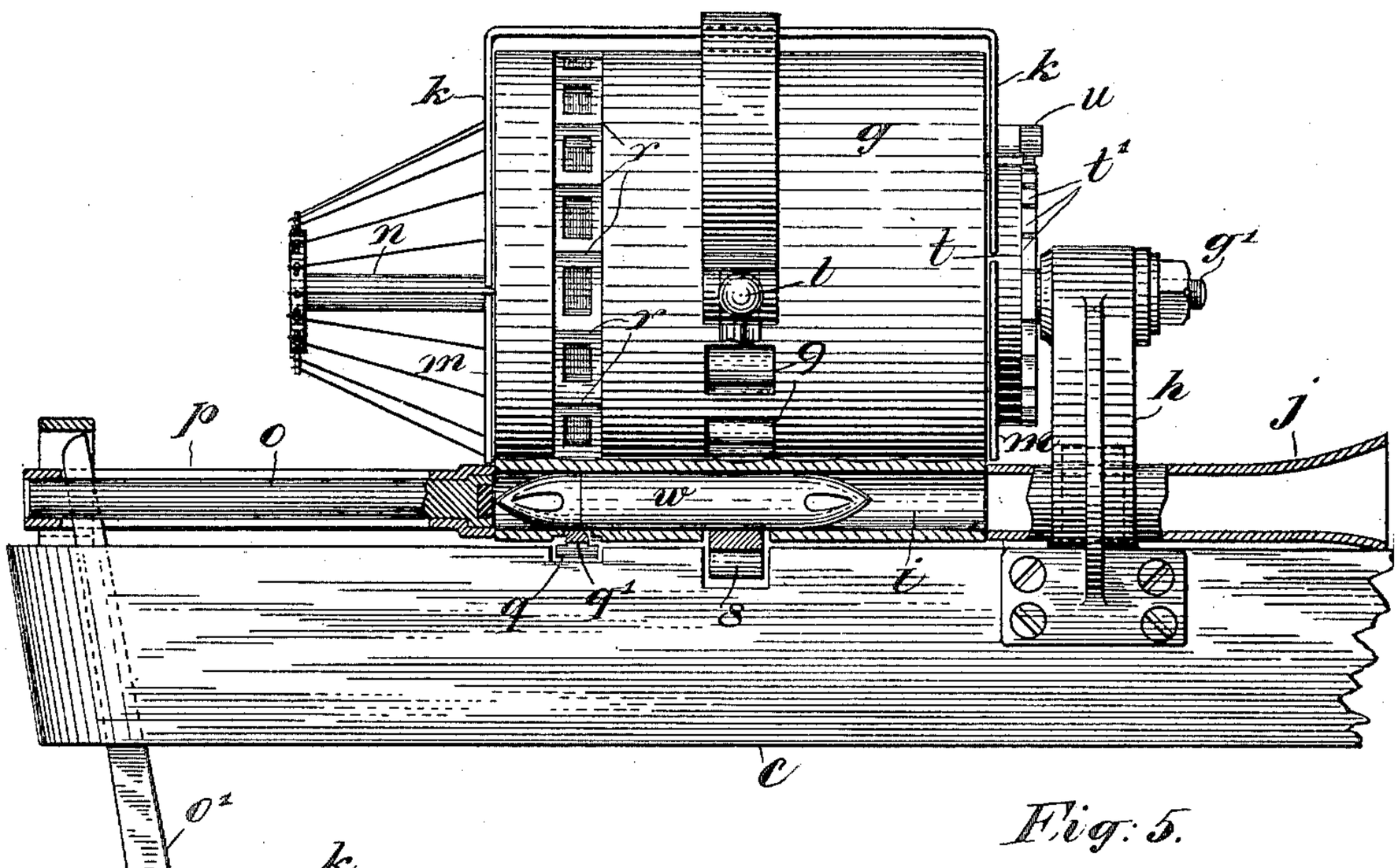

Fig. 4.

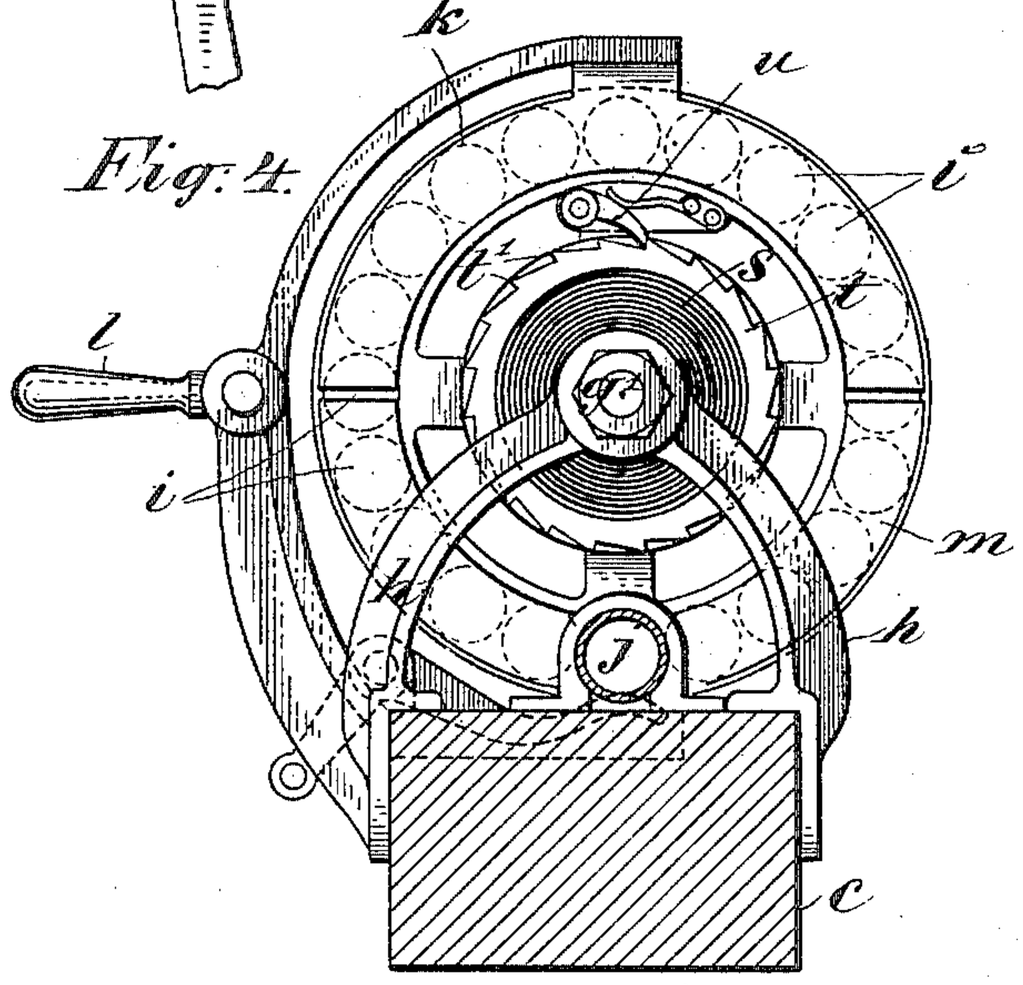

Fig. 5.

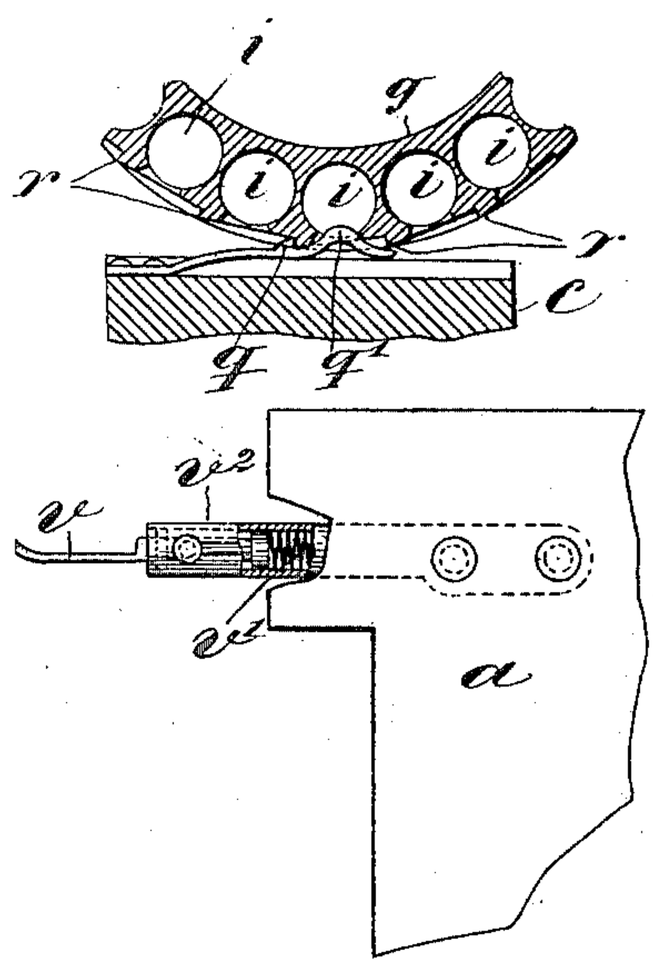

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Fig: 6.

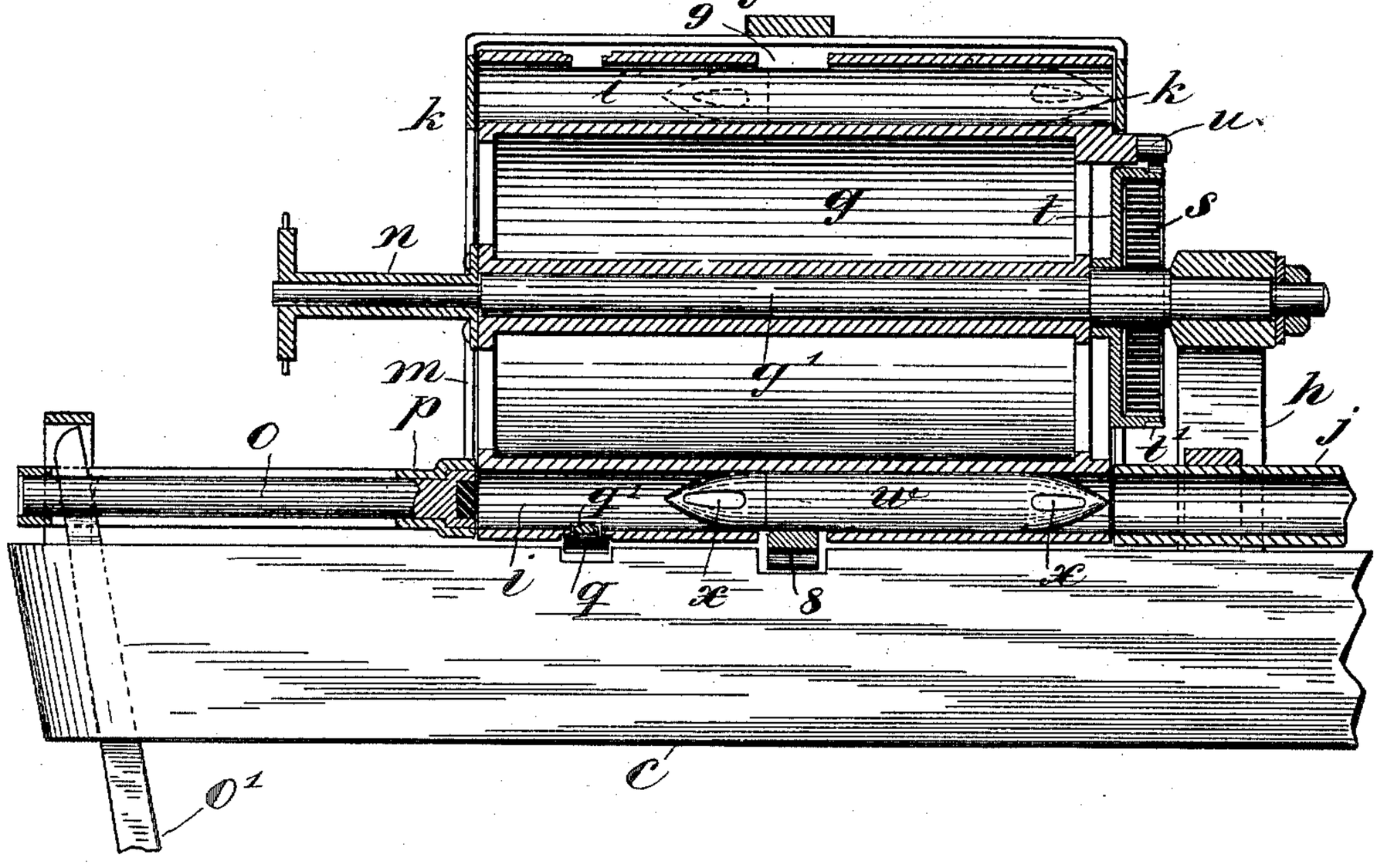
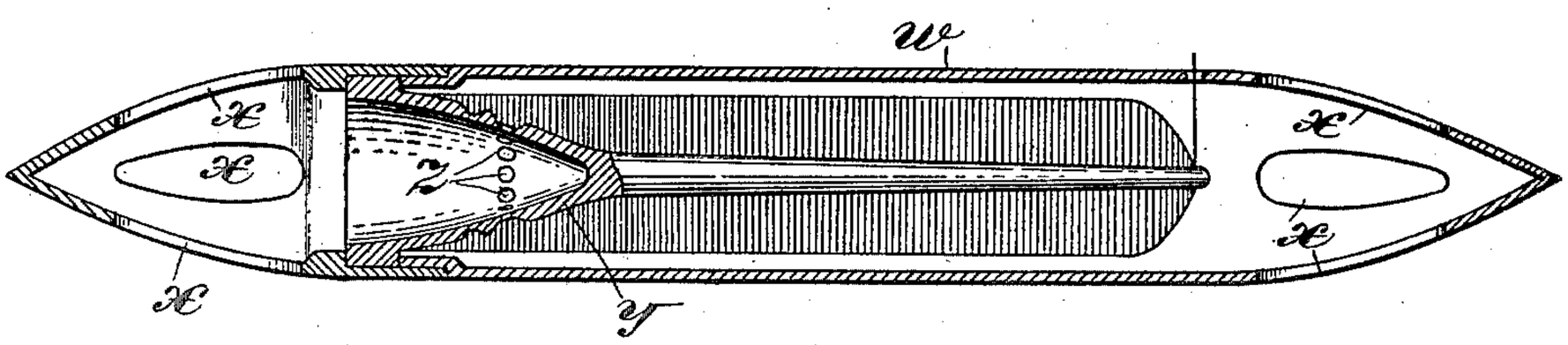


Fig: 7.



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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. 659,952, dated October 16, 1900.

Application filed February 23, 1900. Serial No. 6,143. (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 automatic weft or filling supplying mechanisms for looms, and particularly to that class of such mechanisms wherein the shuttle-boxes are in the form of cells concentrically arranged in a rotatively-mounted magazine, which latter rotates step by step to bring cells containing fresh shuttles, one by one, as required, to the picking position, and to such as employ a cushion of air incarcerated in the shuttle-box in front of the incoming shuttle to cause the full shuttle to come to rest in the box at one point while the exhausted shuttle comes to rest therein at another point, the presence or absence of the weft in the active shuttle or shuttle for the time in play thus being made to control the times of operation of the supplying mechanism.

The object of the present invention is in part to provide means for shifting the magazine so as to bring a fresh shuttle into play without the aid of the lay or other going part of the loom, thus adapting the supplying mechanism to supply full shuttles in a rapidly-operating loom, and in part to provide means for picking the shuttle through the medium of a picker and picker-stick, while employing the air-cushion controlling device, which has heretofore been employed, as we believe, only in looms where the shuttle is picked with a compressed aeriform fluid.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a front elevation of the loom, only such parts being shown as are necessary to a full understanding of the present invention; and Fig. 2 is a vertical section taken in the plane indicated by line A A in Fig. 1. These are general views on a relatively-small scale. Fig. 3 is a side elevation of the magazine as seen from the front of the loom, the lower portion thereof being in section. Fig. 4 is an end view of the magazine, that end which is at the right in Fig. 3 being shown. This view also shows the means for winding up the rotating spring of the magazine. Fig. 5 is a fragmentary detail view illustrating the detent device and means for releasing it. Fig. 6 is a vertical longitudinal section of the magazine, showing the shuttle in its normal position in its cell. This view also shows the magazine adapted for longer shuttles than that shown in Fig. 3. Fig. 7 is a longitudinal sectional view of the shuttle. Fig. 8 is a view similar to Fig. 2, but illustrating a construction wherein the magazine and the picker-stick at that side do not vibrate with the reed or lay.

Let *a* represent the loom-frame; *b*, the breast-beam, forming a part thereof; *c*, the lay; *d*, the lay-swords; *e*, the reed, and *f* the shuttle-box, Fig. 1, on the lay at the side of the loom opposite to the magazine. These are features found in most or all ordinary looms and will need no further description.

Referring to the principal views, *g* is a magazine rotatively mounted on a spindle *g'*, fixed in a bracket *h* on the lay. This magazine contains a series of concentrically-arranged cells *i*, which may be brought successively to a position in line with the shuttle-race to form shuttle-boxes. On the lay, alined with the shuttle-race, is a shuttle guide and receiver *j*, which does not rotate with the magazine. Full shuttles are placed preliminarily and as needed thereafter in the cells *i*, access being afforded to the upper cells by lifting-screens *k*, connected with and operated by a suitable handle or lever *l*. The lower cells are closed by fixed screens *m*. The weft-threads from the shuttles are led out and secured to a central stem *n* on the magazine. The shuttle is picked by a picker *o* in the nature of a plunger, which is alined with the raceway and is slidably mounted in a suitable guide *p*, which is slotted to receive the upper end of the picker-stick *o'*.

The magazine is held against rotation by a spring-detent *q*, Fig. 5, which is mounted on the lay and has a shoulder or part adapted to engage one of a series of teeth or shoulders *r* on the magazine, there being one shoulder

for each cell *i*. The detent also has a rounded part *q'*, which projects up into the cell through an opening in the wall of the same.

The magazine is rotated by means of a spring *s*, Fig. 4, which is coiled about the spindle *g'*, being fixed at one end thereto and at the other end to a spring-barrel *t*, having on it ratchet-teeth *t'*, which are engaged by a spring-pawl *u* on the magazine. The spring *s* is wound up by means of a pawl device *v*, mounted on the loom-frame. When the lay moves back to the picking-point, the pawl *v* impinges on a lower tooth of the ratchet *t'* and rotates the spring-barrel *t*, thus winding up the spring *s*, which becomes gradually wound up tight. When it cannot be wound up farther or the resistance to winding becomes too great, the pawl *v* yields at each impact, it being backed by a spring *v'* in the barrel or guide v^2, Fig. 4, in which the pawl *v* plays. The magazine being thus under the rotative influence of the spring *s*, on the instant the detent *q* is released the magazine will be rotated, but only to an extent sufficient to bring the next tooth or shoulder *r* into engagement with the detent, thus bringing the next cell in succession into line with the raceway. The manner in which the detent is thus released will now be explained.

Normally when the shuttle *w* enters the cell *i* then at the raceway it meets the cushion of air incarcerated in the cell, and the resistance offered by this cushion will counteract the momentum of the shuttle and arrest it at a predetermined point in the cell or box, as seen in Fig. 6. This is what we call the normal position or point of rest in the cell or box. Now if means be provided for relieving the tension of the air-cushion in the cell as the shuttle enters the latter, obviously the momentum of the shuttle will cause it to enter the cell to a greater extent, as seen in Fig. 3, and in that case the incline formed by the conical nose of the shuttle will wipe over the inwardly-projecting part *q'* of the detent *v*, and thus press the latter downward or outward until it is disengaged from the tooth *r* on the magazine, thus releasing the latter, the spring of which instantly rotates it. As the exhausted shuttle, which presses on the detent *q*, is instantly shifted laterally off from said detent by the rotation of the magazine, the detent will engage the next tooth or shoulder *r* and arrest the further rotation of the magazine.

The manner in which the tension of the air-cushion in the cell is reduced by the substantial exhaustion of the weft or filling in the shuttle is illustrated in Fig. 7, which shows the shuttle *w* in longitudinal section. This shuttle is the same as that illustrated in our application, Serial No. 735,647, filed November 3, 1899, and need only be described briefly herein. It is a hollow cylindrical pointed shell with apertures *x* in its ends, one of said ends being removable to permit a bobbin or weft holder *y* to be introduced. This bobbin is hollow at its butt or enlarged end, and this enlarged end closes the shuttle, so that air can pass through the shuttle only by way of apertures *z* in the bobbin, which are normally closed by the weft thereon; but when the weft is substantially exhausted these holes are opened, and the air incarcerated in the cell or box may then pass through the shuttle.

It may be said there that while we have illustrated a cylindrical shuttle such as is shown in our said application Serial No. 735,647, the shuttle may as well be rectangular and have the air-vents in the bobbin controlled by springs, as illustrated in our application, Serial No. 735,648, filed November 3, 1899, or like that illustrated in our pending application, Serial No. 739,874, filed December 11, 1899. Indeed, we do not herein claim this weft-exhaustion-indicating device specifically, nor do we limit ourselves herein to any specific form of shuttle or any specific means in the shuttle whereby the weft controls the flow of air through the shuttle. Of course if the shuttle is made rectangular in cross-section the cells in the magazine will have the same form.

The general form of magazine is the same as those shown in our pending applications, and it is not specifically claimed herein. The novel features of and connected with the magazine reside in the means for rotating it and arresting it and for picking the shuttle from it.

When the magazine is not carried by the lay, but is mounted on the loom-frame at the picking-point, other means than the pawl *v* are required for winding up the spring *s*. Such a construction is shown in Fig. 8, wherein 1 is an eccentric on a rotating shaft 2 of of the loom, and 3 is a yoke thereon. This yoke has a tubular stem or guide 4, provided with a spring 5 and a pawl 6, adapted to engage the ratchet-teeth *t'*. This pawl performs the same functions as the pawl *v*, the only difference being that the pawl *v* is stationary and the magazine moves up to it, while the pawl 6 reciprocates and the magazine does not vibrate. Obviously any means may be employed for rotating the spring-barrel with a pawl. The point of novelty lies in the cushion-spring behind the pawl.

In Fig. 8, 7 is the shuttle-raceway, which vibrates with the reed *e*.

The picker-sticks may be operated by the usual mechanism for this purpose and not herein shown.

We have shown the magazine as situated at the right-hand side of the loom; but it will be obvious that this is not important to our invention, nor is it important to our invention whether there is a magazine at only one or at both sides of the loom.

There will be or may be a swell 8, adapted to bear on the shuttle through an aperture 9 in the wall of the shuttle-cell in the magazine. This swell performs the same function as the ordinary swell found in most looms.

The guide *p* for the picker will fit up quite closely to the end of the magazine, so as to obviate leakage of air at the joint to any material extent, and the picker *o* will also fit closely in its guide for the same reason.

Fig. 6 being designed mainly to show the construction of the magazine, the position of a full shuttle thereon is merely indicated by dotted lines. The magazine-cells will, however, always be filled with shuttles.

Having thus described our invention, we claim—

1. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled magazine, the practically air-tight cells of which form shuttle-boxes, means tending constantly to shift said magazine so as to bring a fresh shuttle into line with the raceway, and a detent which normally holds the magazine from rotating, of means for picking the shuttle, and a shuttle having in it an air-passage controlled by the weft or filling, the substantially-exhausted shuttle being adapted, on entering its cell, to release the magazine from its detent and permit it to shift.

2. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled magazine, the practically air-tight cells of which form shuttle-boxes, a spring tending to rotate said magazine, means for winding said spring by increments until it reaches a predetermined tension, and a detent which normally prevents rotation of the magazine, of means for picking the shuttle, and the said shuttle having an air-passage through it that is controlled by the weft or filling, the substantially-exhausted shuttle being adapted, when it enters its cell, to release the magazine from its detent and permit it to shift.

3. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatively-mounted magazine having in it concentrically-arranged cells forming shuttle-boxes, having also teeth or shoulders *r*, one for each cell, and having in the respective cell-walls apertures for the entry of a detent, of the said detent *q*, situated so as to engage the teeth *r* and so as to project into the cell for the active shuttle, means for rotating the magazine when it is freed from said detent, and means within the shuttle for controlling its entry into the cell to an extent sufficient to free the magazine from said detent.

4. In a weft or filling changing or supplying mechanism for looms, the combination with the rotatively-mounted magazine having concentrically-arranged cells forming shuttle-boxes, of the spring-barrel *t*, having ratchet-teeth, the pawl *u* on the magazine engaging said teeth, the spring *s*, a yielding device to impinge on the teeth of said band for intermittently rotating the spring-barrel for winding up said spring, and a detent which resists the rotation of the magazine.

5. In a weft or filling changing or supplying mechanism for looms, the combination with the rotatively-mounted magazine having concentrically-arranged cells forming shuttle-boxes, of a spring for driving said magazine, a ratchet device connected with said spring, and a cushioned pawl for operating said mechanism, whereby said pawl is permitted to yield when the resistance to winding is too great.

6. In a weft or filling changing or supplying mechanism for looms, the combination with the rotatively-mounted magazine having concentrically-arranged cells forming shuttle-boxes, of the spring for driving the magazine, a ratchet-winding device connected with said spring, the pawl, mounted in a guide on the loom-frame and adapted to operate said winding device, the guide for said pawl, and a spring behind said pawl, substantially as and for the purposes set forth.

7. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled magazine, the practically air-tight cells of which form shuttle-boxes, means tending constantly to shift said magazine so as to bring a fresh shuttle into line with the raceway, and a detent which normally holds the magazine from rotating, of mechanical means for picking the shuttle, and a shuttle having in it an air-passage controlled by the weft or filling, the substantially-exhausted shuttle being adapted, on entering its cell, to release the magazine from its detent and permit it to shift.

8. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled magazine, the practically air-tight cells of which form shuttle-boxes, a spring tending to rotate said magazine, means for winding said spring by increments until it reaches a predetermined tension, and a detent which normally prevents rotation of the magazine, of mechanical means for picking the shuttle, and the said shuttle having an air-passage through it that is controlled by the weft or filling, the substantially-exhausted shuttle being adapted, when it enters its cell, to release the magazine from its detent and permit it to shift.

9. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled, magazine shuttle-box, means tending constantly to rotate said magazine so as to bring the shuttles or weft-carriers therein one by one, as required, to the raceway, means for picking said shuttle through the warp-shed, and means within said shuttle, controlled by the weft or filling therein, for determining the extent to which the shuttle shall enter its box, of means adapted to be actuated by the shuttle when it enters the box to the maximum extent for setting in motion the magazine.

10. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled magazine, the cells

of which form shuttle-boxes, means tending constantly to rotate said magazine so as to bring the shuttles therein successively into position to be picked, a detent which restrains the rotation of said magazine, means for picking the shuttle or weft-carrier, and pneumatic mechanical means for operating said detent, made inoperative and operative, respectively, by the presence or absence of weft or filling in the shuttle in play.

11. In a weft or filling changing or supplying mechanism for looms, the combination with a rotatable, celled magazine, the cells of which form shuttle-boxes, means tending constantly to rotate said magazine so as to bring the shuttles therein successively into position to be picked, means for picking the shuttle or weft-carrier, and a movable mechanism which arrests the rotation of the magazine and extends into the path of the body of the incoming, substantially-exhausted shuttle for releasing the magazine through the direct impact of the shuttle-body thereon.

12. In a loom, the combination with the rotary, multiple-celled, magazine shuttle-box, having a weft-end holder which rotates therewith, means tending constantly to rotate said magazine, and a detent mechanism which prevents said magazine from rotating during predetermined periods, and means which automatically restrains said detent mechanism while the magazine is carrying to the operative position a cell containing a full weft-carrier to replace that exhausted, substantially as set forth.

13. In a loom, the combination with the rotary, multiple-celled, magazine shuttle-box, having a weft-end holder which rotates therewith, means tending constantly to rotate said magazine, and a detent mechanism which prevents said magazine from rotating during predetermined periods, of means which automatically restrains said detent mechanism while a cell containing a full weft-carrier is being moved into position for picking the latter, substantially as set forth.

14. In a loom, the combination with a rotatively-mounted magazine having in it concentrically-arranged shuttle boxes or cells, means tending constantly to rotate said magazine, and restraining mechanism which normally prevents the rotation of said magazine, and which is rendered inoperative when another cell of the magazine is required to be brought into line with the raceway, of pneumatic mechanical means controlled by the weft or filling of the shuttle in play for rendering said restraining means inoperative.

15. In a loom, the combination with a rotatively-mounted magazine having in it cells to receive weft-carriers, and a weft-end holder, which rotates therewith, means tending constantly to rotate said magazine, and a detent device which prevents said magazine from rotating at predetermined periods, of pneumatic mechanical means controlled by the weft or filling in the weft-carrier in play for setting in operation said magazine-rotating mechanism, and said weft-carriers, adapted to fit snugly into the said cells.

16. In a loom, the combination with a rotatively-mounted magazine having in it concentrically-arranged, cellular shuttle-boxes, each provided with an aperture in its side for the entry of a protection finger or device, and the said device adapted to enter the cell when the latter is in position to receive the shuttle in play, means tending to constantly rotate said magazine, a restraining device which prevents the magazine from rotating periodically, said restraining device being operative normally and made inoperative when one of the shuttle-cells is required to be shifted in line with the raceway, and pneumatic mechanical means controlled by the weft or filling in the shuttle or weft-carrier in play for setting in operation said mechanism.

17. In a loom, the combination with a rotatively-mounted magazine having in it a plurality of shuttle-cells, each provided with an aperture in its side adapted to receive a protection device, and said protection device, adapted to enter said aperture when the cell is in position to receive the shuttle in play, means tending constantly to rotate said magazine, a restraining device which prevents said rotation of the magazine at predetermined periods, and pneumatic mechanical means controlled by the weft or filling in the weft-carrier in play, for setting in motion said rotating means.

18. In a loom, the combination with a rotatably-mounted magazine having a weft-end holder and in it a plurality of shuttle-cells, each provided with an aperture in its side adapted to receive a protection device, and said protection device, adapted to enter said aperture when the cell is in position to receive the shuttle in play, of a shuttle-director situated in alinement with the working shuttle box or cell of the magazine, means tending constantly to rotate said magazine, a restraining device which prevents the magazine periodically from rotating, said restraining device made operative normally and inoperative when one of the shuttle boxes or cells is to be shifted in line with the raceway, and pneumatic mechanical means for setting in operation said mechanism.

In witness whereof we have hereunto signed our names, this 29th day of January, 1900, in the presence of two subscribing witnesses.

WILLIAM H. BAKER.
FREDERIC E. KIP.

Witnesses:
HENRY CONNETT,
PETER A. ROSS.