

No. 674,156.

Patented May 14, 1901.

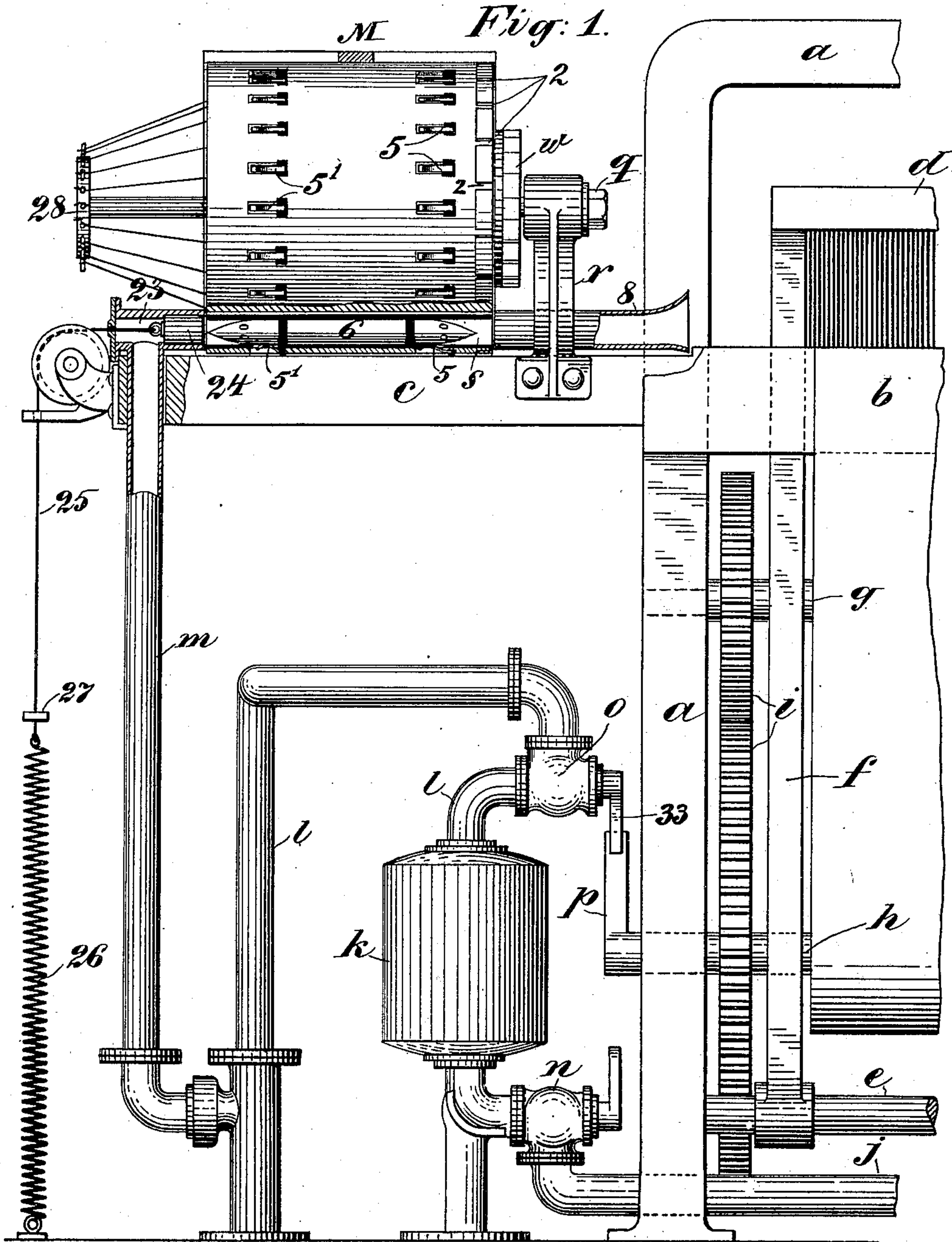
W. H. BAKER & F. E. KIP.

WEFT REPLENISHING MECHANISM FOR LOOMS,

(Application filed Apr. 10, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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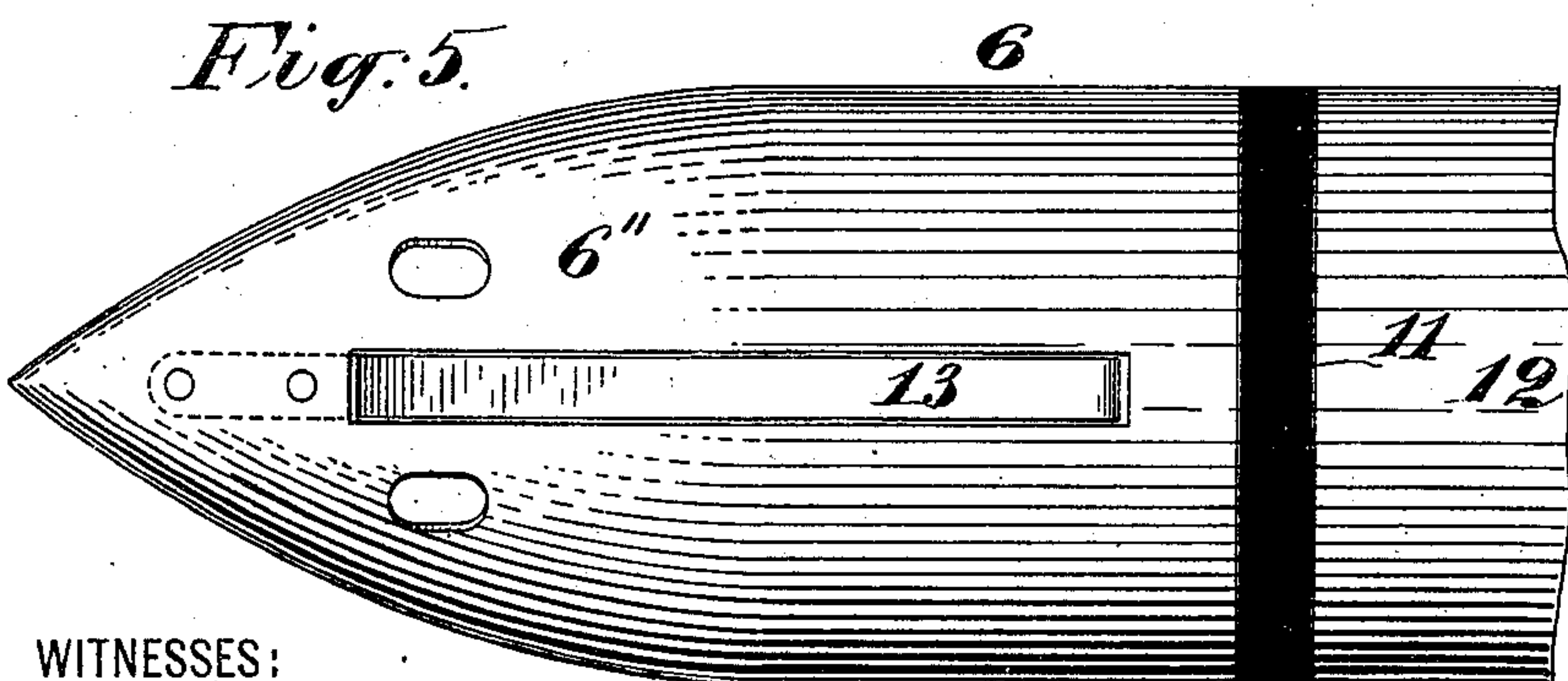
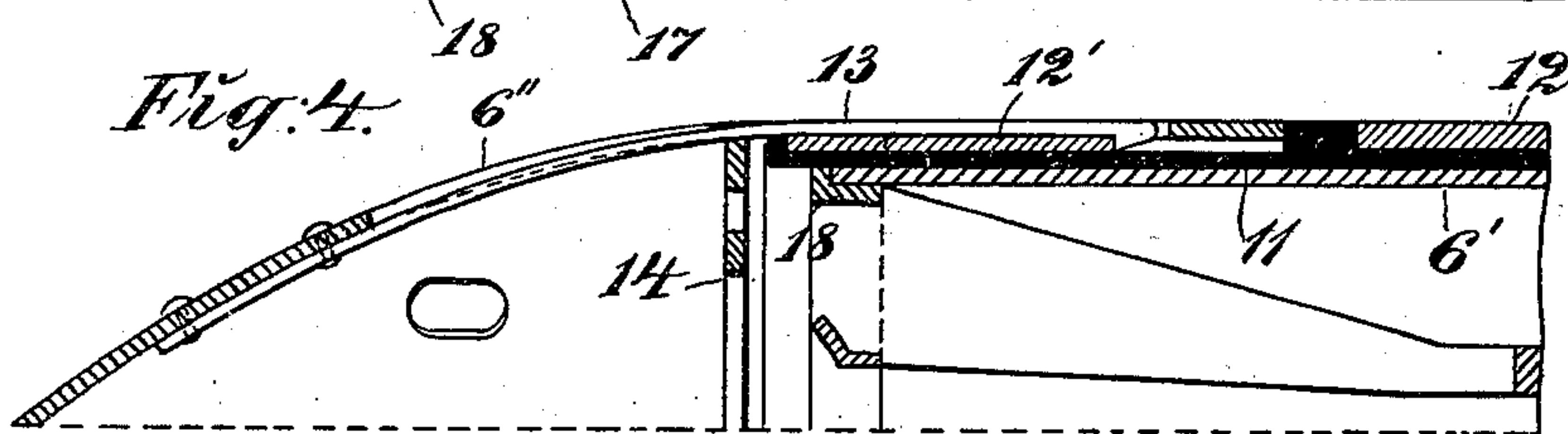
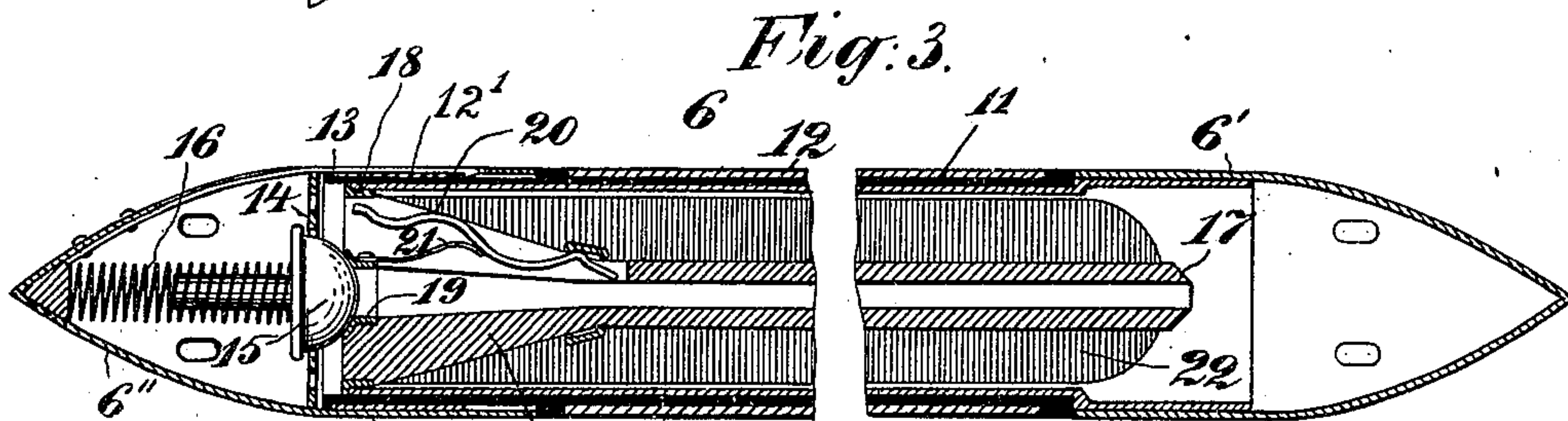
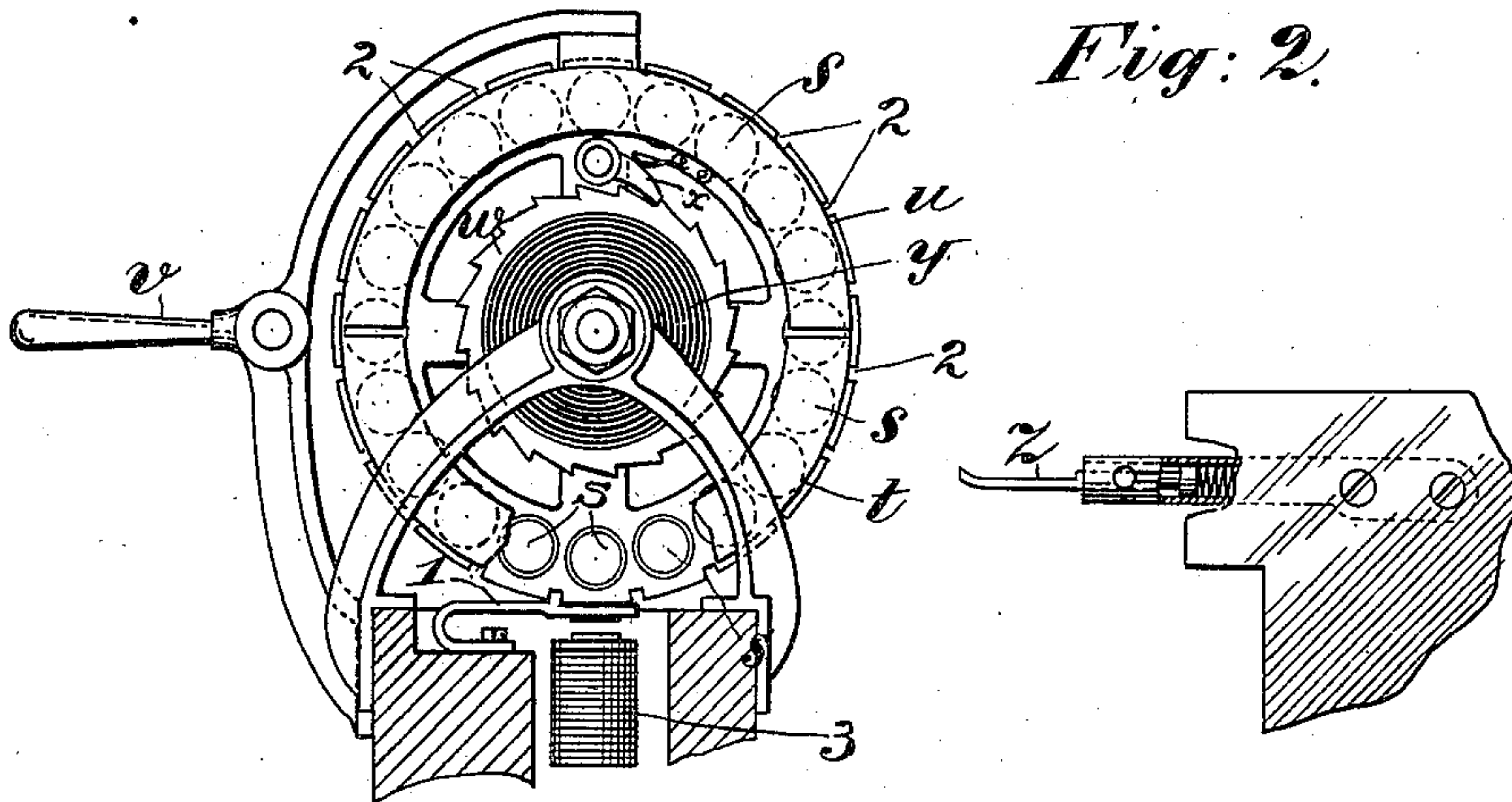
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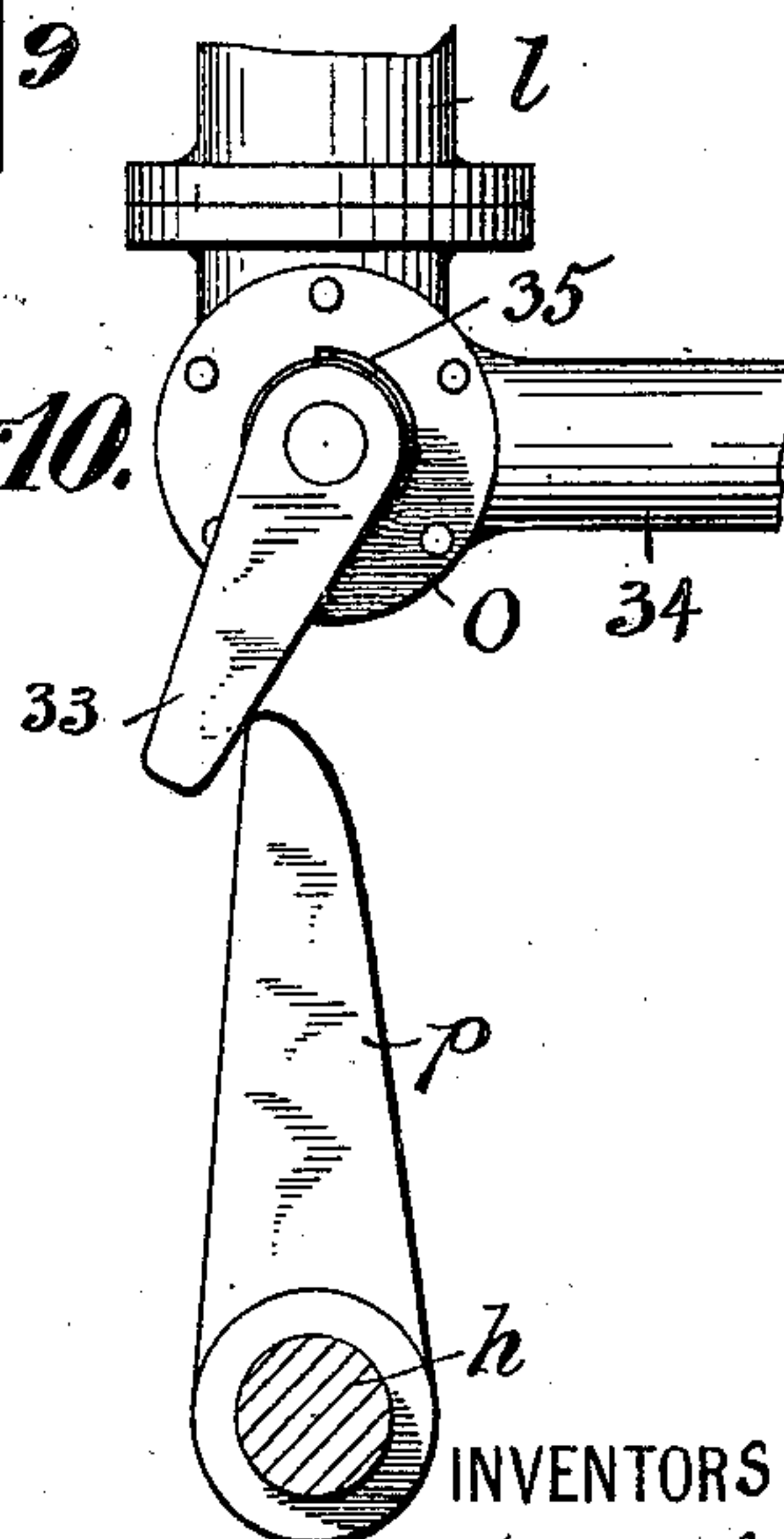
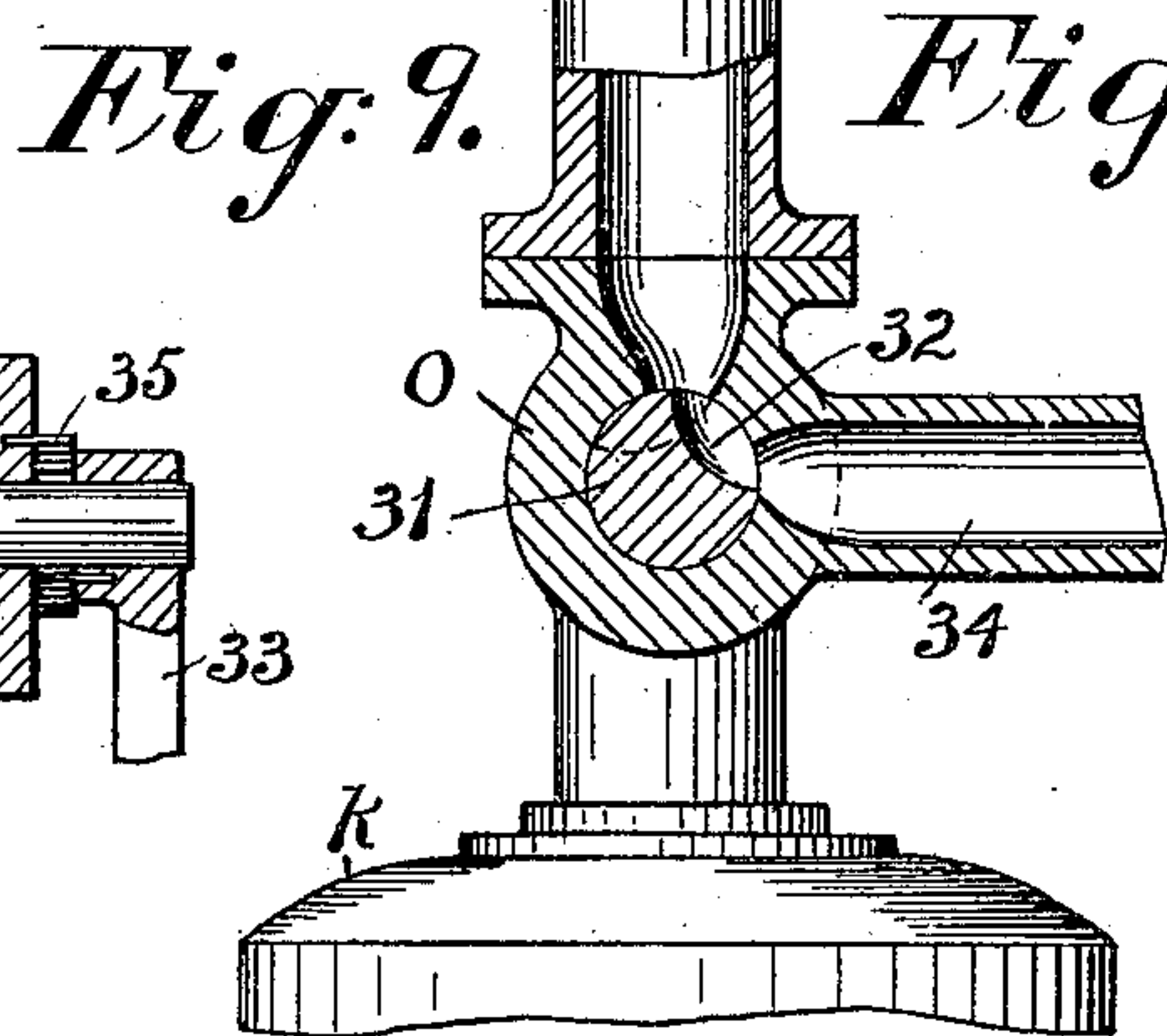
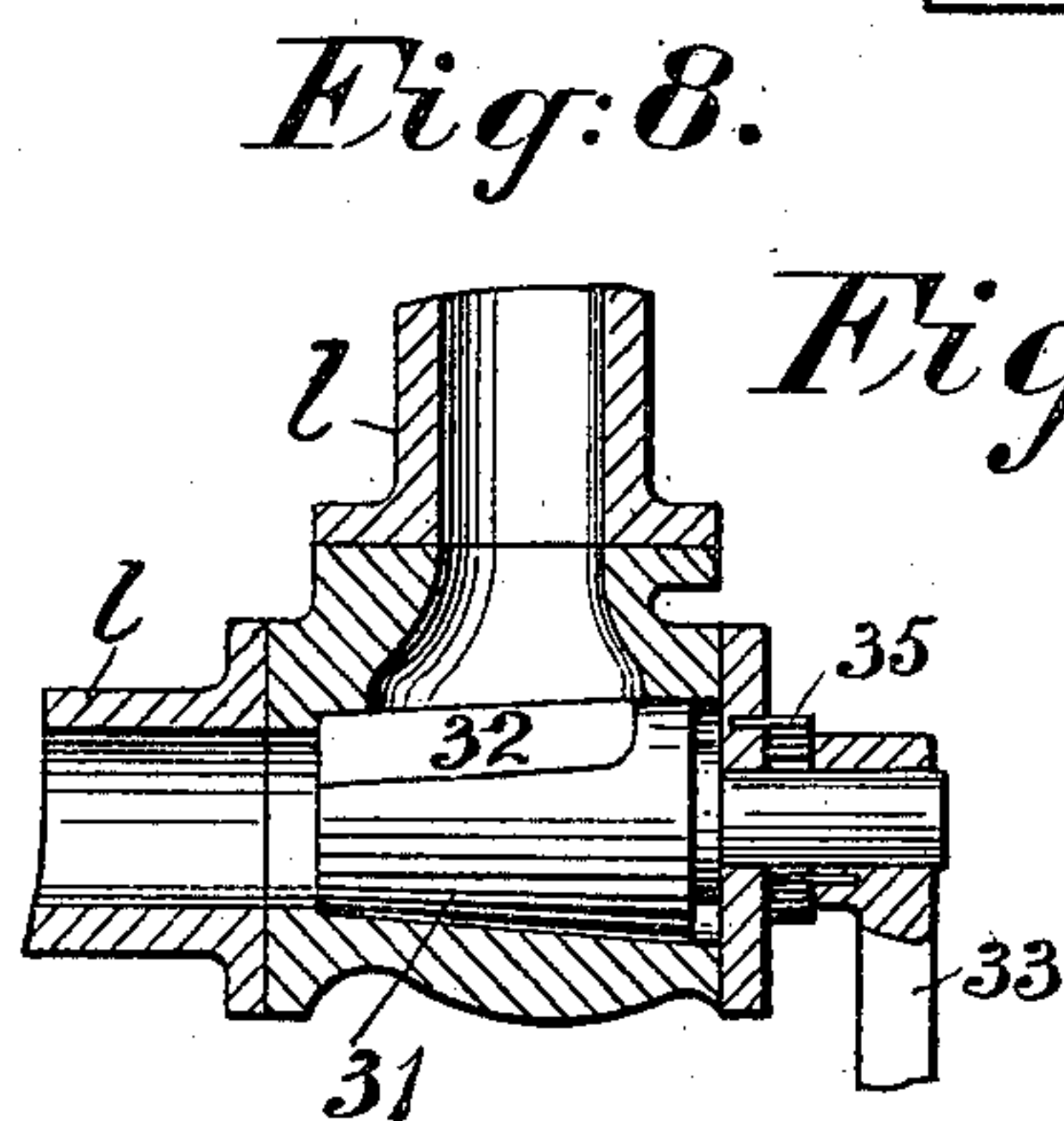
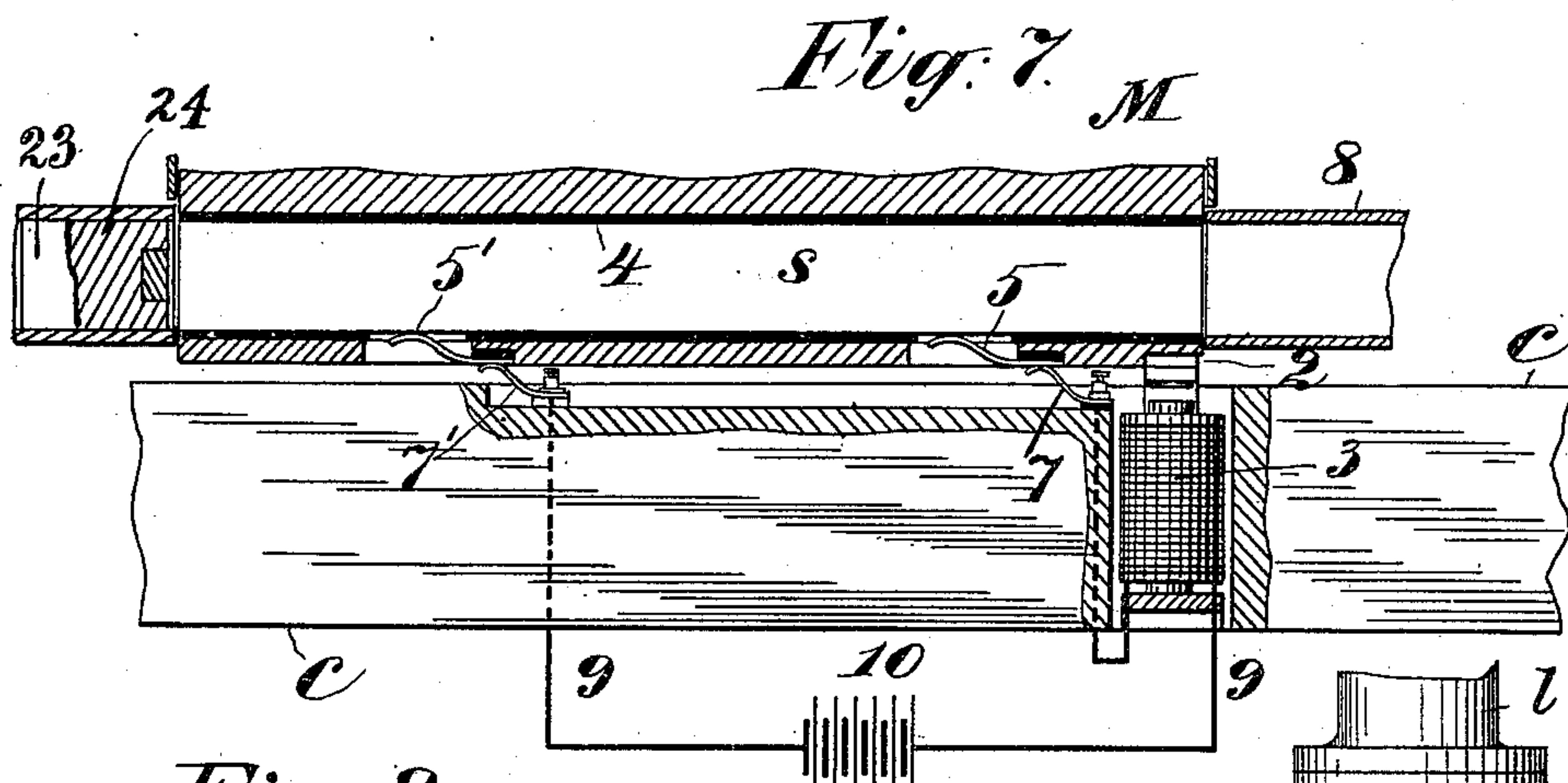
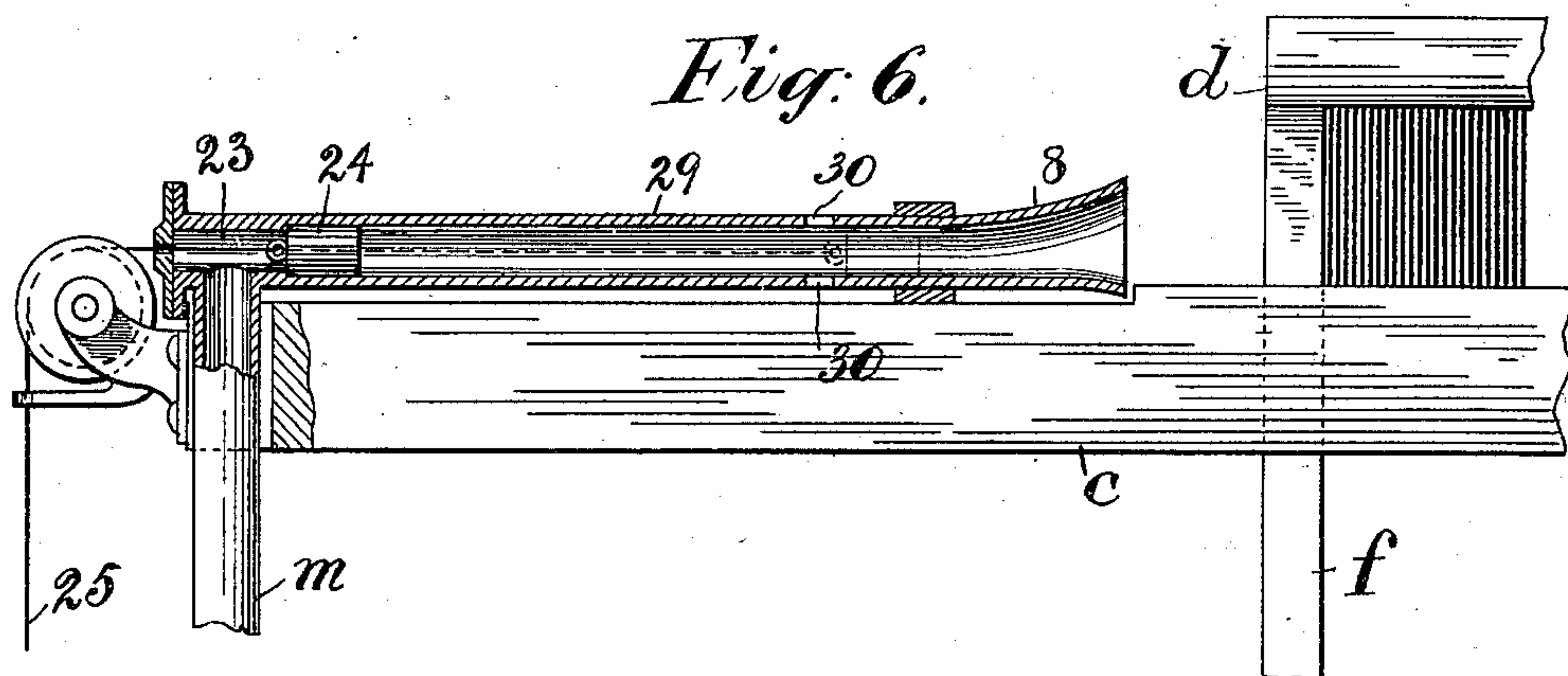
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# UNITED STATES PATENT OFFICE.

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## WEFT-REPLENISHING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 674,156, dated May 14, 1901.

Application filed April 10, 1900. Serial No. 12,317. (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 Weft-Replenishing Mechanism for Looms, of which the following is a specification.

10 This invention relates to the operative features of looms, and has to do in part with that class of looms wherein a compressed aeriform fluid is employed for picking or driving the shuttle. So far as this feature of the invention is concerned, it relates to that class of such looms as have a picking mechanism comprising a piston-like picker driven by a compressed aeriform fluid. Another feature of the invention is the adoption of this means for picking the shuttle to a loom having a weft or filling changing or supplying mechanism. Another feature is the adaptation of electrical controlling means to the weft-supplying mechanism, and another feature of the invention is a new construction of the shuttle. The foregoing will be hereinafter fully described with reference to the accompanying drawings, which illustrate an embodiment of the invention.

30 In the drawings, Figure 1 is a front elevation of a part of the loom provided with a weft-supplying mechanism and the improved shuttle-picking mechanism, and Fig. 2 is a side elevation of the portion of the same part of the loom showing the magazine in end elevation. Fig. 3 is a longitudinal section of the shuttle and the bobbin therein. Fig. 4 is a fragmentary section of the shuttle, illustrating the securing device for the separable end piece of the shuttle; and Fig. 5 is a plan of the same. Fig. 6 is a sectional view of the shuttle-box at the opposite side of the loom from the magazine as seen from the rear and illustrating also the application of this feature of the invention to a loom with plain or simple shuttle-boxes. Fig. 7 is a sectional view of a shuttle-cell, showing the insulating-lining and electrical contacts. Figs. 8, 9, and 10 are detail views of the two-way valve for admitting the charge to and exhausting it from the shuttle-box.

*a* represents the loom-frame; *b*, the breast-beam, forming a part thereof.

*c* is the vibrating lay.

*d* is the reed; *e*, the swing-rail; *f*, the lay-swords; *g*, the crank-shaft; *h*, the cam-shaft, driven from the crank-shaft by gearing *i*. A pipe *j* leads compressed air from any source to a charge-holder *k*, and *l* is a pipe which leads the charge from the holder *k* to a rocking pipe *m*, which conveys it to the shuttle box or cell. In the pipe *j* is a self-closing cock or valve *n*, in the pipe *l* is a self-closing cock or valve *o*, and on the shaft *h* is a cam *p*, which opens the valves *n* and *o* alternately, first admitting a charge to the holder and then allowing it to pass to the shuttle box or cell.

All of the above features are substantially the same as those shown and described in our Patent No. 659,950, dated October 16, 1900, and are employed herein merely for illustration. Other devices for the purpose may be employed for carrying out the present invention. Indeed, so far as the feature of supplying a compressed aeriform fluid for picking the shuttle is concerned any of the many known devices may be employed.

*M* represents as a whole a rotatively-mounted celled shuttle-magazine on the lay. In its general construction and mounting and in the means employed for intermittently rotating the magazine in order to bring the shuttle-cells therein, one by one, into alignment with the raceway this magazine is similar to that shown and described in our Patent No. 659,950, dated October 16, 1900, and is mainly used herein for illustration. The magazine is rotatively mounted on a spindle *q*, fixed in a bracket *r* on the lay, and has in it a concentric series of shuttle-cells *s*, the ends of which are closed below by fixed covers *t* and above by movable covers *u*, operated by a handle *v*. Rotatable on the spindle *q* is a ratchet-wheel *w*, with the teeth of which a spring-pawl *x* on the magazine engages. Within a chamber in the wheel *w* is a spring *y*, fixed at one end to the spindle *q* and at the other end to the wheel *w*. When the lay recedes to the picking-point, a spring-pawl *z* on the loom-frame impinges on the teeth of the wheel *w* and rotates it, thus winding up the spring *y*, and when the tension of this



latter spring becomes too great to wind any farther the pawl  $z$  will yield at each impact. The spring  $y$  tends constantly to drive or rotate the magazine; but on the lay is a spring-detent 1, which engages one of a series of notches 2 on the magazine, one notch for each cell  $s$  therein, and thus holds the magazine against rotation until freed by the withdrawal of said detent.

10 In or on the lay below the detent 1 is an electromagnet 3, which when excited attracts the detent 1 as an armature and sets free the magazine. The magnet 3 will be excited whenever a shuttle in play from which the  
15 weft or filling is substantially exhausted enters its cell in the magazine, and this excitation will free the latter and allow it to rotate far enough to bring the next cell containing a full shuttle into line with the raceway. As soon as the magazine starts to rotate, the circuit through the magnet 3 will be broken, and the detent 1 will be free to again engage the next notch and hold the magazine.

25 The electrical devices which control the shuttle-changing mechanism may now be described with especial reference to Figs. 3, 4, 5, and 7. The shuttle-cells  $s$  are each lined with some suitable insulating material 4, Fig. 30 7, and on the magazine, at each cell, are two spring-contacts 5 and 5', which extend through apertures in said insulation, so that they may bear yieldingly on the body of the shuttle 6 near its respective ends. On the lay are two  
35 spring-contacts 7 and 7', which come into electrical contact with the respective contacts 5 and 5' of the shuttle-cell which is for the time in operative position at the raceway or which is alined with the fixed shuttle-guide 8. The  
40 contacts 5 and 5' thus form terminals of a circuit 9, which includes the magnet 3 and any generator 10.

The shuttle 6 (seen in detail in Figs. 3, 4, and 5) has a special construction, which will  
45 now be described. The shuttle is of metal, preferably of sheet metal and preferably cylindrical, and consists of two insulated parts—namely, the body portion 6' and the cap or removable end piece 6". These parts are in-  
50 sulated from each other by a tube of insulating material 11. Exterior to this insulating material are filling-bands 12 and 12' of metal; but these are mainly to perfect the symmetry of the shuttle-body and take the wear. The  
55 end piece or cap 6" slips over the open end of the body and has a spring-catch 13, which snaps over the band 12' to hold the cap in place. In the cap 6" is a partition 14, with an aperture in its center, and back of this par-  
60 tition, in the hollow of the cap, is a metal contact-stud 15, with a rounded or conical head, which protrudes through the partition. This stud is backed by a spring 16. The bob-  
65 bin or weft-holder 17 is or may be of the usual tubular form, with an enlarged end or butt. On this enlarged end is a flanged metal ring

18, which engages the open end of the shuttle-body 6' (see Fig. 4) when the bobbin is pushed into the latter and forms electrical contact with said body. Within the bobbin 70 is set an inner metal ring or piece 19, upon which presses the head of the metal stud 15 when the cap of the shuttle is put in place. Mounted in a slot in the bobbin is a metal contact-lever 20, backed by a spring 21, which 75 tends to press the lever outward and put it into contact with the ring 18. The spring 21 being rigidly secured to the ring or piece 19 and in electrical contact therewith and also in electrical contact with the lever 20, it fol- 80 lows that the latter is in circuit with the cap 6" of the shuttle, and the ring 18 being in electrical contact with the body 6' of the shuttle it follows that to cause a current to flow 85 from the cap 6" to the body 6' it is only necessary to permit the spring 21 to press the contact-lever 20 into contact with the ring 18; but the lever 20 has an arched portion which is overwrapped by the weft 22, Fig. 3, which 90 holds said lever out of contact normally with the ring 18. Now when the shuttle 6 enters its cell in the magazine its body 6' will come into electrical contact with the contact-spring 5 and its cap or end piece 6" with the contact- 95 spring 5', and if the weft or filling 22 is exhausted to such an extent as to permit the lever 20 to be pressed into contact with the ring 18 the circuit will be completed through the magnet 3, and the magazine will be in- 100 stantly shifted.

In order to prevent the formation of an air-cushion in front of the entering shuttle in the box or cell in case the shuttle fits quite snugly in the cell, the sections of the shuttle may have apertures in them for air to enter and 105 pass out, and the bobbin will have an air-passage through it.

The mechanism for picking the shuttle will now be described with especial reference to Fig. 1. The pipe  $m$  admits the charge of com- 110 pressed air or fluid to a piston-chamber 23 on the lay and alined with the cell  $s$  of the magazine which is at the raceway. In this chamber 23 is a piston 24 of such size as to fit quite snugly in the cell  $s$ . The charge of air en- 115 ters behind this piston and drives it forward through the cell, forcing or driving the shuttle with it. After the shuttle is picked the piston is withdrawn to its normal position with the aid of a connector 25, which passes 120 out through an aperture at the back of the chamber 23 and is connected to a spring 26. The charge of compressed air may be permitted to leak out at openings in the shuttle-cell and about the connector 25; but preferably the charge will be exhausted at the valve 125  $o$ , as will be hereinafter described with reference to Figs. 8, 9, and 10. To limit the extent of the return movement of the piston, there may be a shoulder in the chamber 23, 130 and to limit its forward travel there may be a button 27 on the connector 25. As shown,



the spring 26 is attached to the floor at its lower end; but it is not important just how this retracting-spring is arranged. Obviously it might, for example, be attached at its lower end to the rocking pipe *m*.

The magazine *M* is provided with a suitable weft-end holder 28, similar to that shown in our before-mentioned patent.

The picking-piston 24 may have a center piece of rawhide or the like where it impinges on the point of the shuttle. This is a common feature in pickers and is illustrated in Fig. 7.

Fig. 6 illustrates a simple shuttle-box 29, such as would be employed on a loom unprovided with a weft-supplying or shuttle-changing mechanism and such as may be employed at the opposite side of the loom from the magazine *M*. This shuttle-box will require no specific description. It need only be said that in constructing it the shuttle-director and the chamber for the piston 24 may be integral with the box 29.

As it is desirable in a loom of this kind to attain a high speed—say two hundred picks per minute—it is necessary to get rid of the charge of air behind the piston 24 as quickly as possible after it shall have done its work in order that the piston may return quickly to its normal position of rest. In Fig. 6 apertures 30 are shown in the box 29 at a point where they will be uncovered by the piston at the end of its outstroke. These will allow of the lateral escape of the charge to an extent sufficient to reduce the pressure materially; but as the return of the piston will at once cut off these outlets and still leave air in the box behind the piston it is preferred to employ either alone or in addition to these the relief device illustrated in Figs. 8, 9, and 10, which show the valve *o* in longitudinal section, transverse section, and end elevation. The plug 31 of this valve has a port 32 formed in it, which when the cam *p* impinges on the crank-arm 33 of the valve first opens the piston-chamber 23 to the charge-holder *k*, and then almost instantly opens said chamber to the atmosphere through the outlet-port 34. It will be understood that the compressed charge will actuate the piston instantly and that as soon as it has done its work the further movement of the valve will at once allow it to escape, so that the piston can be as quickly retracted. The valve will be closed by a suitably-arranged spring, as seen at 35 in Fig. 8.

The piston-chamber 23 is merely a prolongation of the tubular shuttle box or cell and is herein considered as a part of the same, and the piston 24 is a picker actuated by the compressed aeriform fluid admitted behind it. Necessarily it is piston-like in function and form, as it is not desirable that the fluid shall leak past it to any considerable extent. It may be of any suitable form or construction so long as it performs its functions.

By "shuttle" is herein meant any weft-carrier suitable for traversing the shed of the

loom, and by "bobbin" is meant any suitable weft or filling holder adapted to go into a shuttle. By the word "tubular" as applied to the shuttle box or cell is meant an inclosed box through which the picking-piston may be driven. It need not be circular in cross-section nor need the shuttle be of the same cross-section or size as the cell or box, although they are so shown herein.

By absence of weft or filling in the shuttle as herein used is not necessarily meant the entire denudation of the weft-holder, but such degree of denudation thereof as will allow the exhaustion-indicating device to perform its function.

In lieu of the rotating means herein shown for rotating the magazine shuttle-box other means may be employed—for example, the means illustrated in our said Patent No. 659,950.

Having thus described our invention, we claim—

1. In a loom, the combination with a magazine rotatively mounted on the lay and having concentrically-arranged shuttle-cells adapted to be brought in succession to the raceway, of a piston-chamber secured on the lay and alined with the cell of the magazine at the raceway, said cell and chamber being of the same diameter, a piston-like picker in said chamber, and means for admitting an aeriform fluid behind said picker for driving it from the chamber into the magazine-cell.

2. In a loom, the combination with a magazine rotatively mounted on the lay and having concentrically-arranged shuttle-cells adapted to be brought in succession to the raceway, of a piston-chamber secured on the lay and alined with the cell of the magazine at the raceway, said cell and chamber being of the same diameter, a piston-like picker in said chamber, means for admitting an aeriform fluid behind said piston for driving it into the magazine-cell, and means connecting with said picker through the wall of the chamber for retracting the picker.

3. In a loom, the combination with a rotatively-mounted magazine on the lay and provided with concentrically-arranged shuttle-cells adapted to be brought in succession to the raceway, means for rotating said magazine, means for controlling the times of and extent of its rotation, and a piston-chamber mounted on the lay and alined with that cell of the magazine at the raceway, a piston-like picker in said chamber, means for admitting a charge of compressed aeriform fluid behind said piston, and means for retracting the piston after it shall have done its work.

4. In a loom, the combination with a rotatively-mounted magazine on the lay and provided with concentrically-arranged shuttle-cells adapted to be brought in succession to the raceway, means for rotating said magazine, means for controlling the times of and extent of its rotation, and a piston-chamber mounted on the lay and alined with that cell



of the magazine at the raceway, a piston-like picker in said chamber, means for admitting a charge of compressed aeriform fluid behind said picker, means for removing the compressed aeriform fluid after it has done its work, and means for withdrawing the piston from the magazine into said chamber.

5. In a loom, the combination with a piston-chamber mounted on the lay, a piston-like picker in said chamber, means for introducing a charge of compressed aeriform fluid to the chamber behind said picker, and means for retracting the picker, of a movable shuttle-magazine having a series of shuttle-cells adapted to be brought successively into alinement with and in front of said piston-chamber, whereby the picker may enter the cell and drive out the shuttle.

6. In a loom, the combination with a shuttle-guide, mounted on the lay, a piston-chamber, also mounted on the lay and alined with said guide, a piston-like picker in said chamber, means for admitting a charge of compressed aeriform fluid behind said picker, and means for retracting the picker, of a movable magazine situated between said piston-chamber and guide and having a series of shuttle-cells adapted to be put into alinement, successively, with said chamber and guide, and means for operating said magazine at proper times.

7. In a loom, the combination with a magazine mounted movably on the lay and having in it a plurality of shuttle-cells adapted to be brought successively into alinement with the raceway, a single piston-chamber stationary on the lay and alined with the shuttle-cell at the raceway, a picker in said chamber, means

for driving said picker into the magazine-cell for expelling the shuttle, and means for shifting the magazine at proper times.

8. A metal shuttle, comprising the two sections 6' and 6'', adapted to close together telescopically and insulated from each other, the section 6'' being provided with the stud 15 and spring 16, in combination with the bobbin 17, provided with the flanged outer ring 18, in contact with the section 6', the inner ring 19, in contact with the stud 15, the contact-lever 20, and the spring 21, connecting the ring 19 and lever 20, electrically.

9. The combination with a shuttle having insulated metal portions, of a shuttle box or cell having a lining of insulating material, and contact-terminals, situated so as to contact electrically with the respective metal portions of the shuttle when the latter enters the box.

10. In a loom, the combination with the rotatively-mounted, celled magazine, having notches 2, one for each cell, means tending to rotate said magazine, and a spring-detent adapted to engage one of said notches and hold the magazine against rotation, of an electromagnet adapted when excited to withdraw said detent, and electrical means, controlled by the presence or absence of weft in the shuttle in play, for energizing said magnet.

In witness whereof we have hereunto signed our names, this 2d day of April, 1900, in the presence of two subscribing witnesses.

WILLIAM H. BAKER.  
FREDERIC E. KIP.

Witnesses:

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PETER A. ROSS.