

(No Model.)

3 Sheets—Sheet 1.

E. E. FURNEY.
CAPSTAN.

No. 290,029.

Patented Dec. 11, 1883.

Fig. 1.

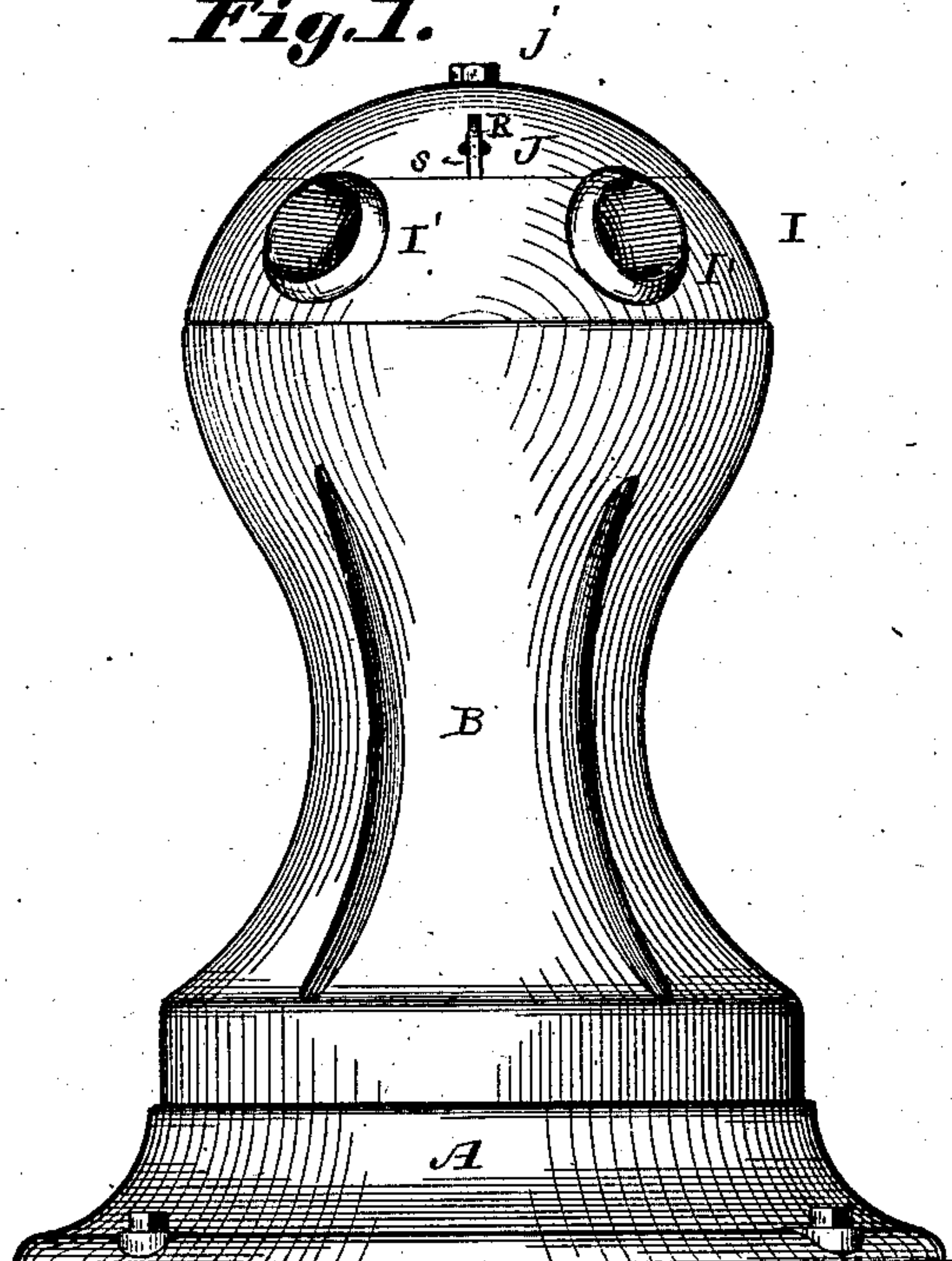


Fig. 2.

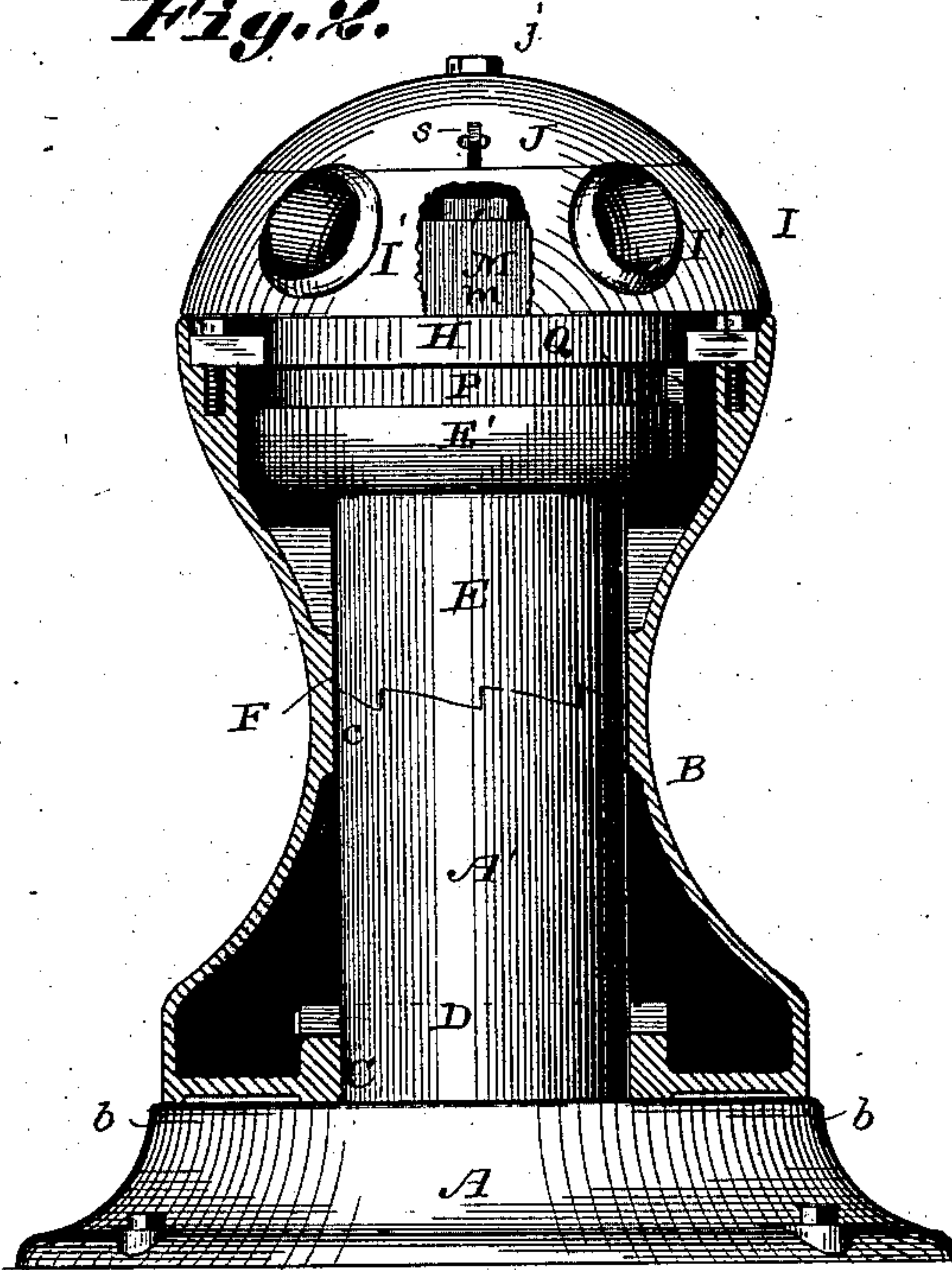


Fig. 3.

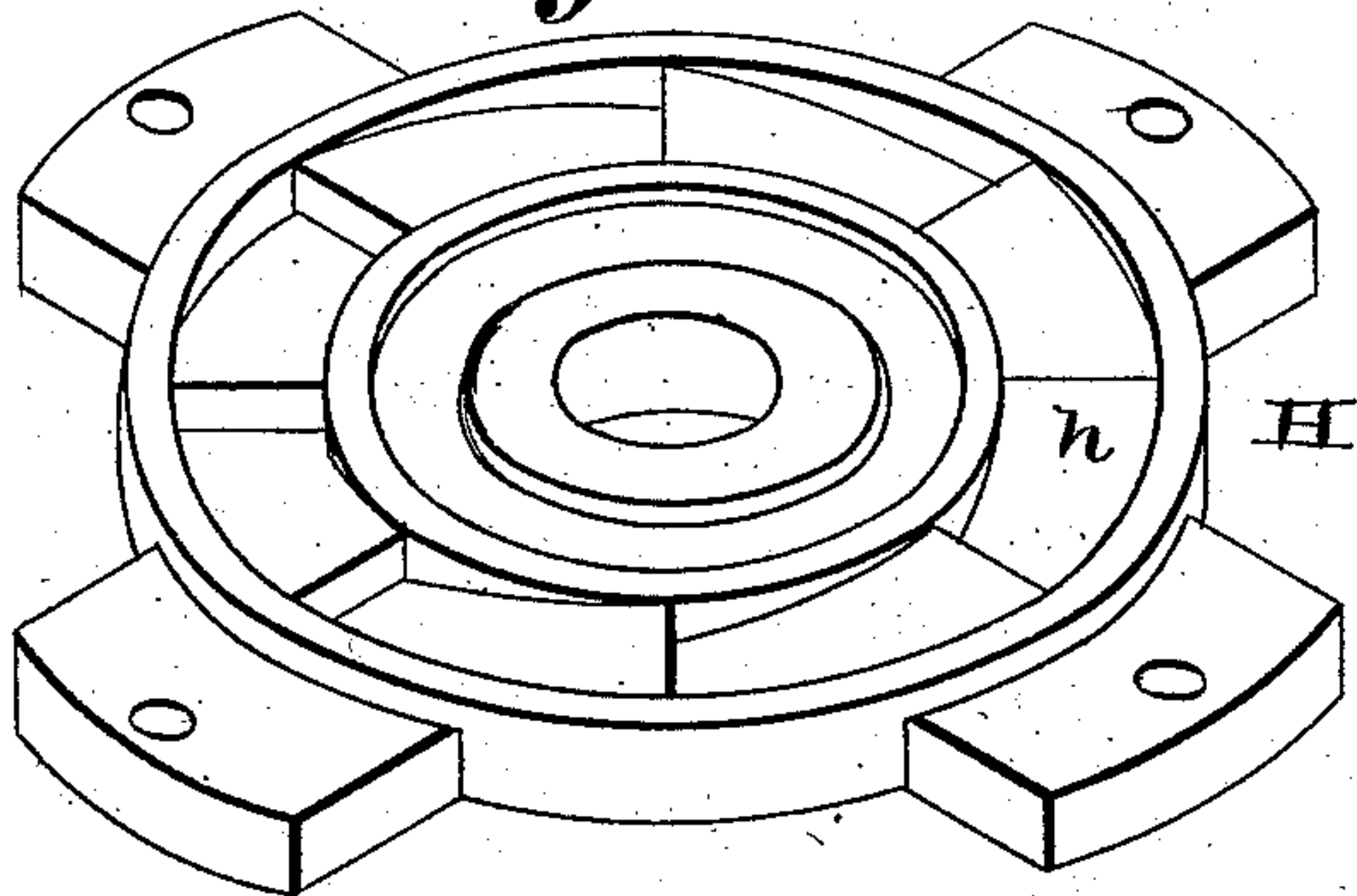
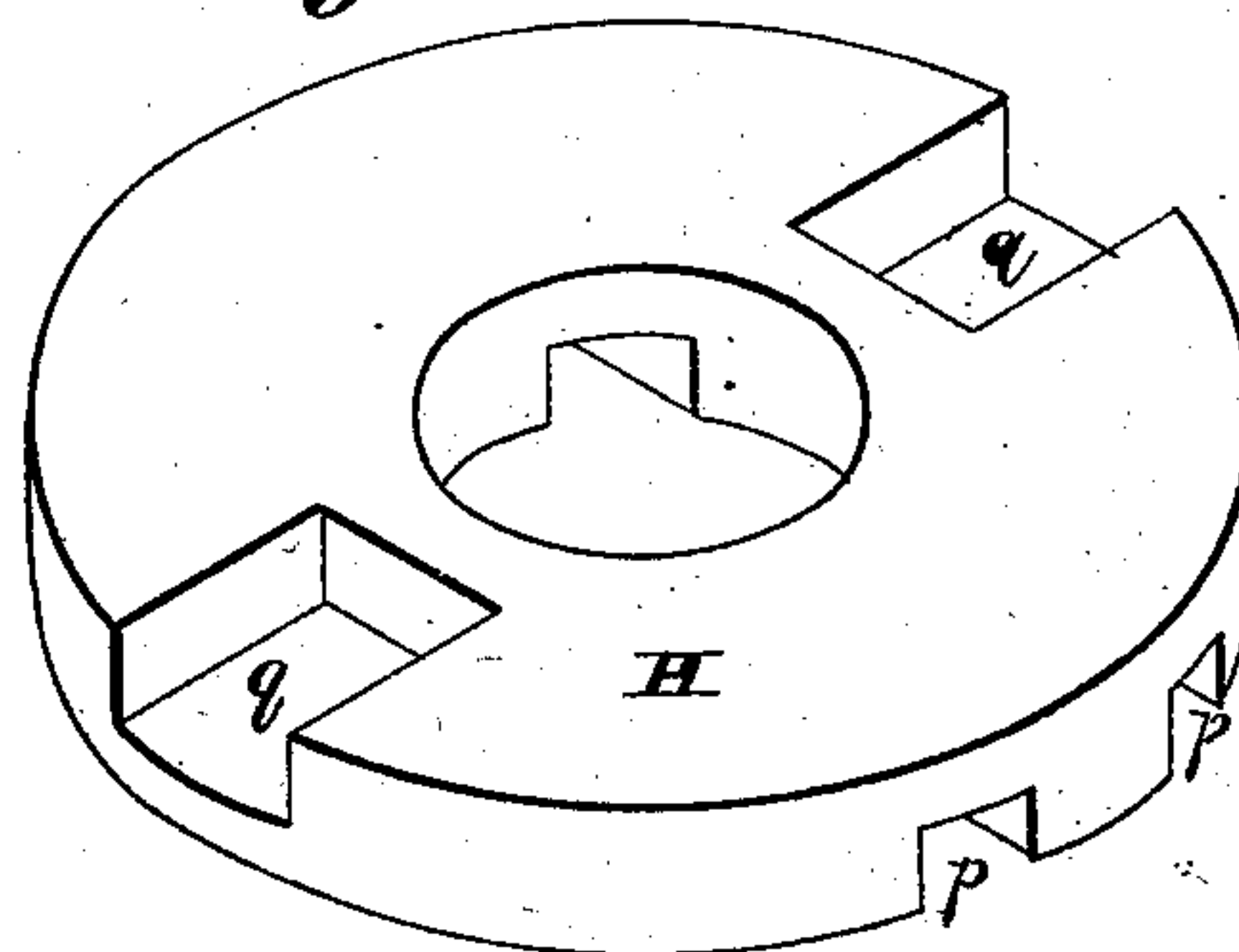


Fig. 4.



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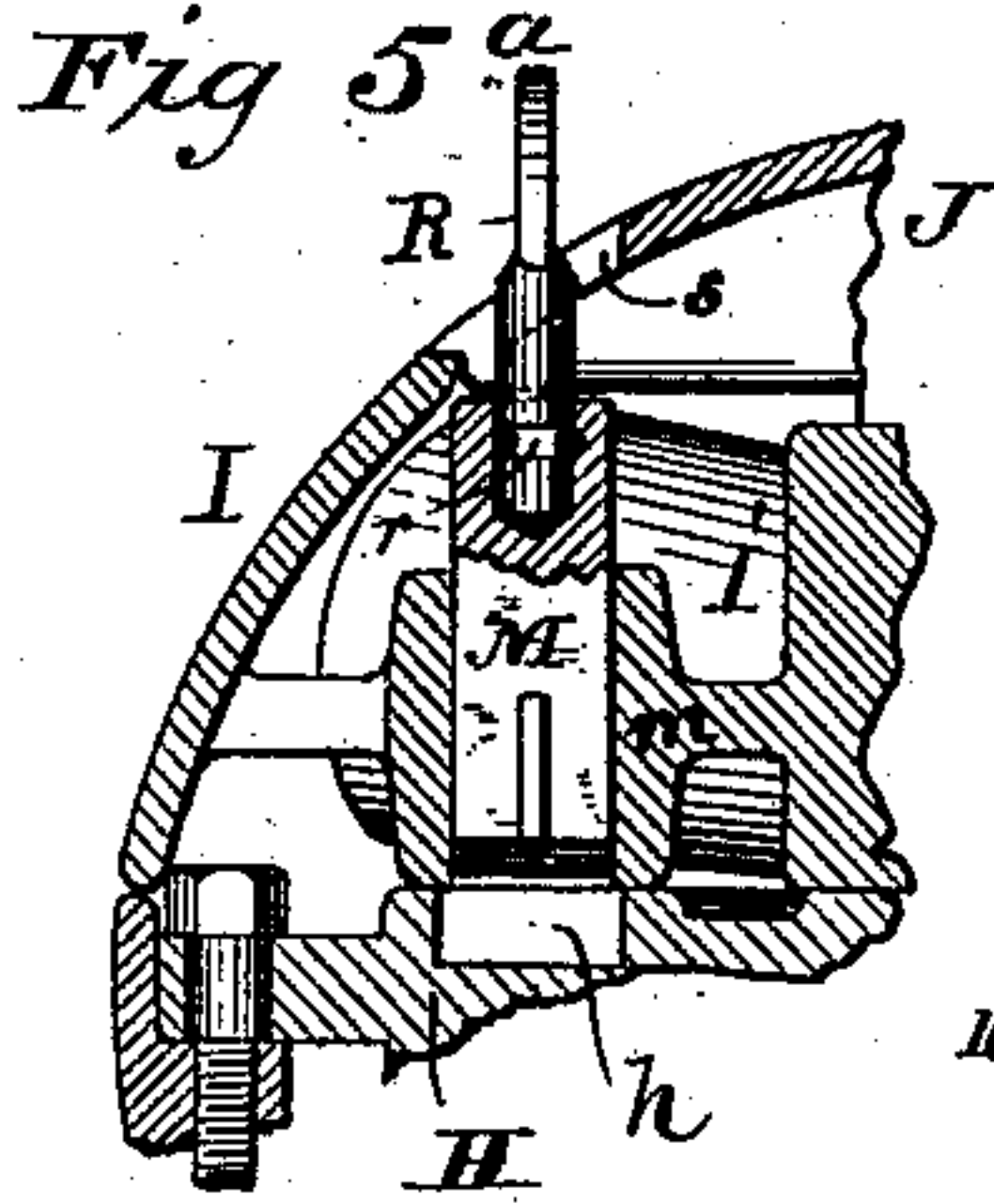


Fig. 8.

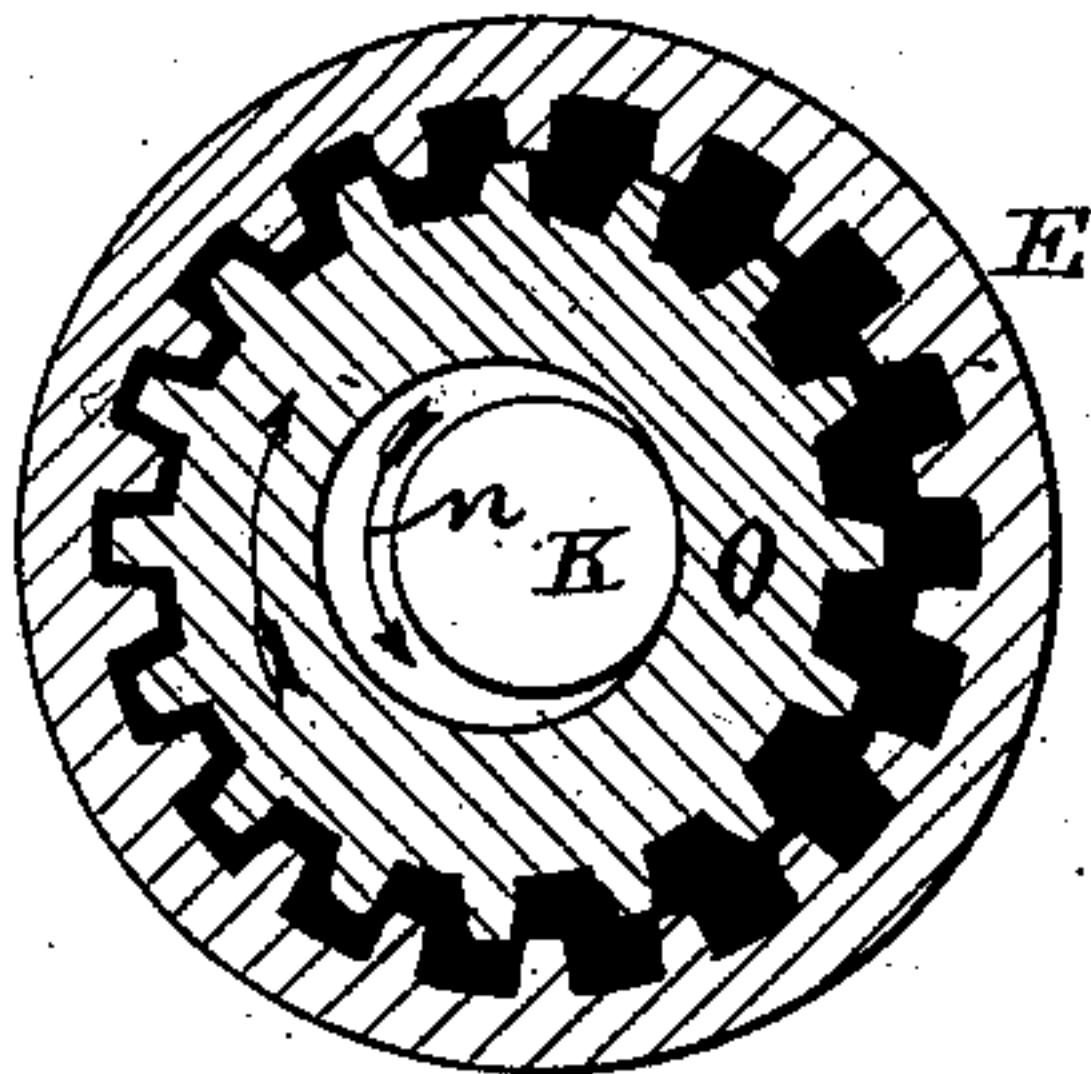


Fig. 5^b

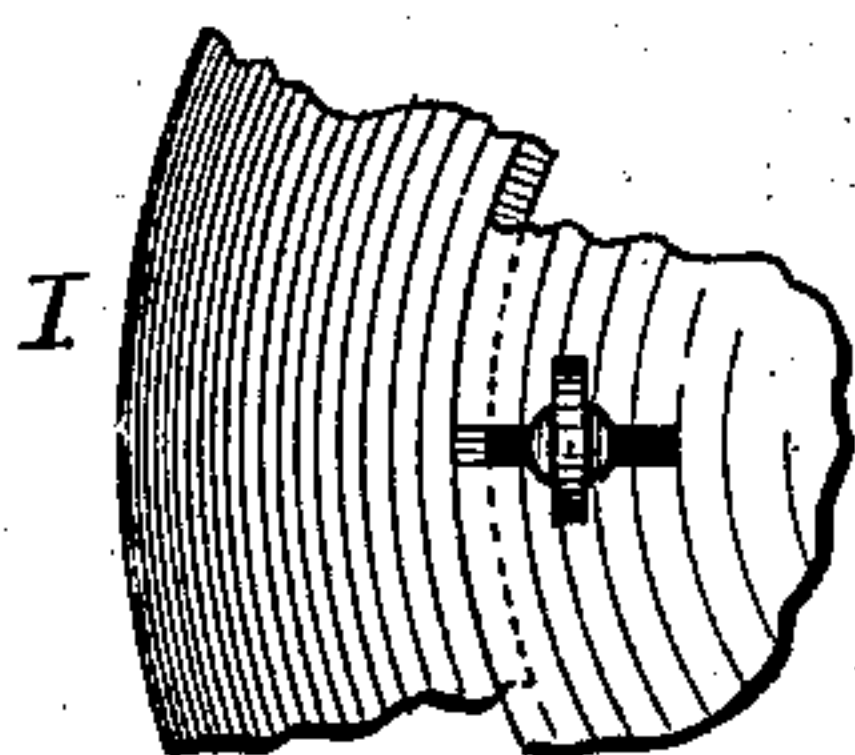
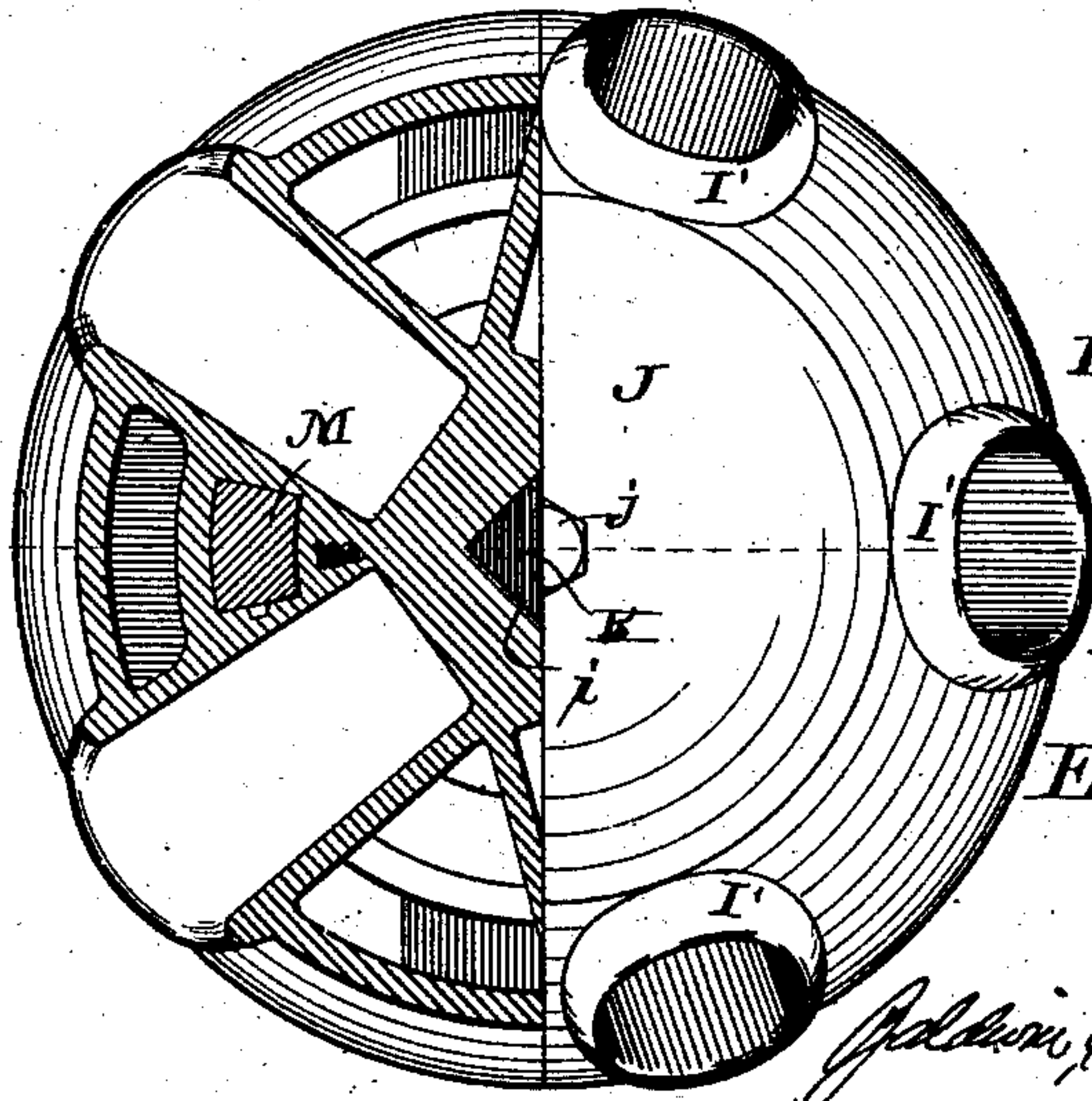


Fig. 6.



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Fig. 9.

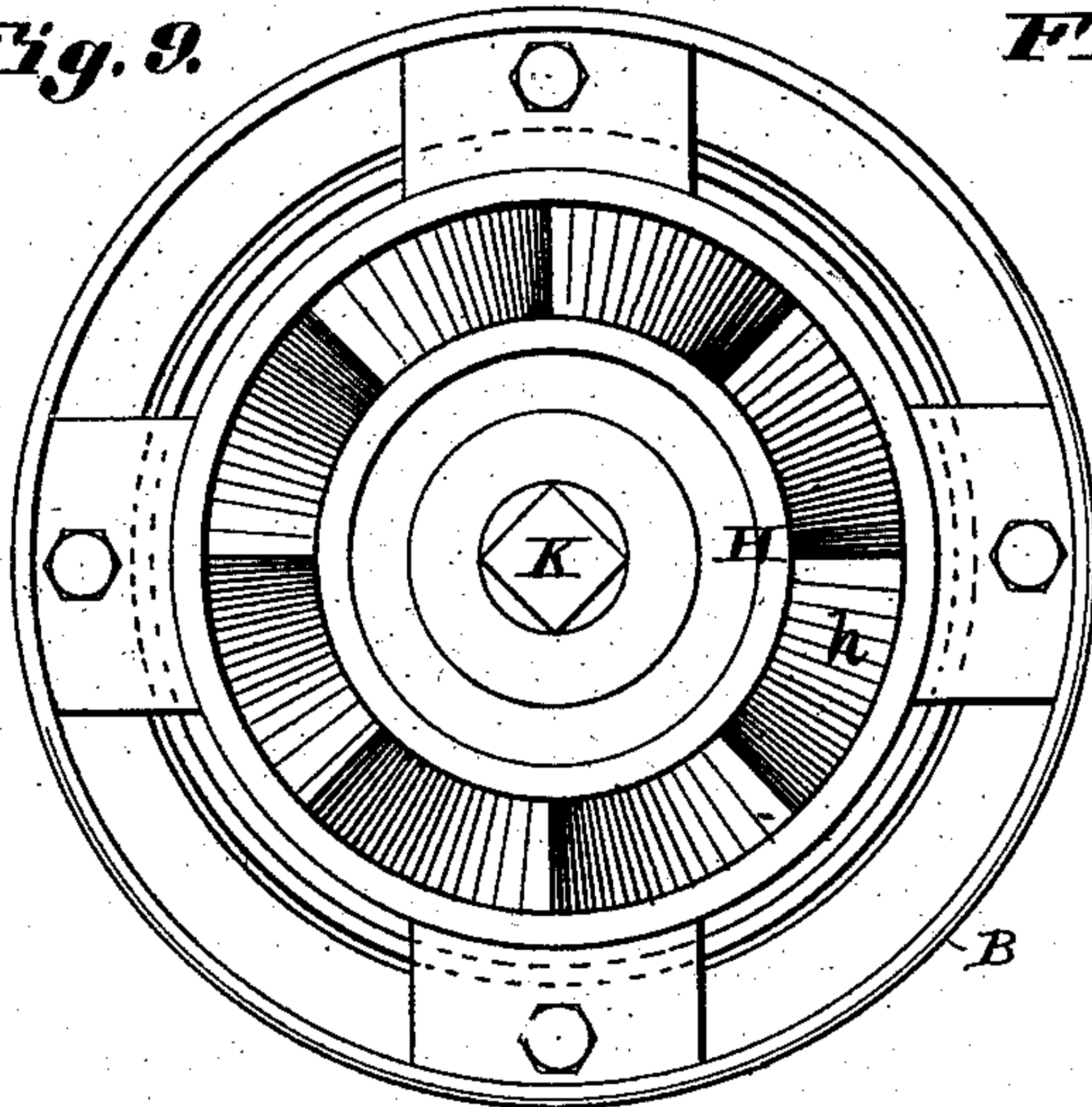


Fig. 10.

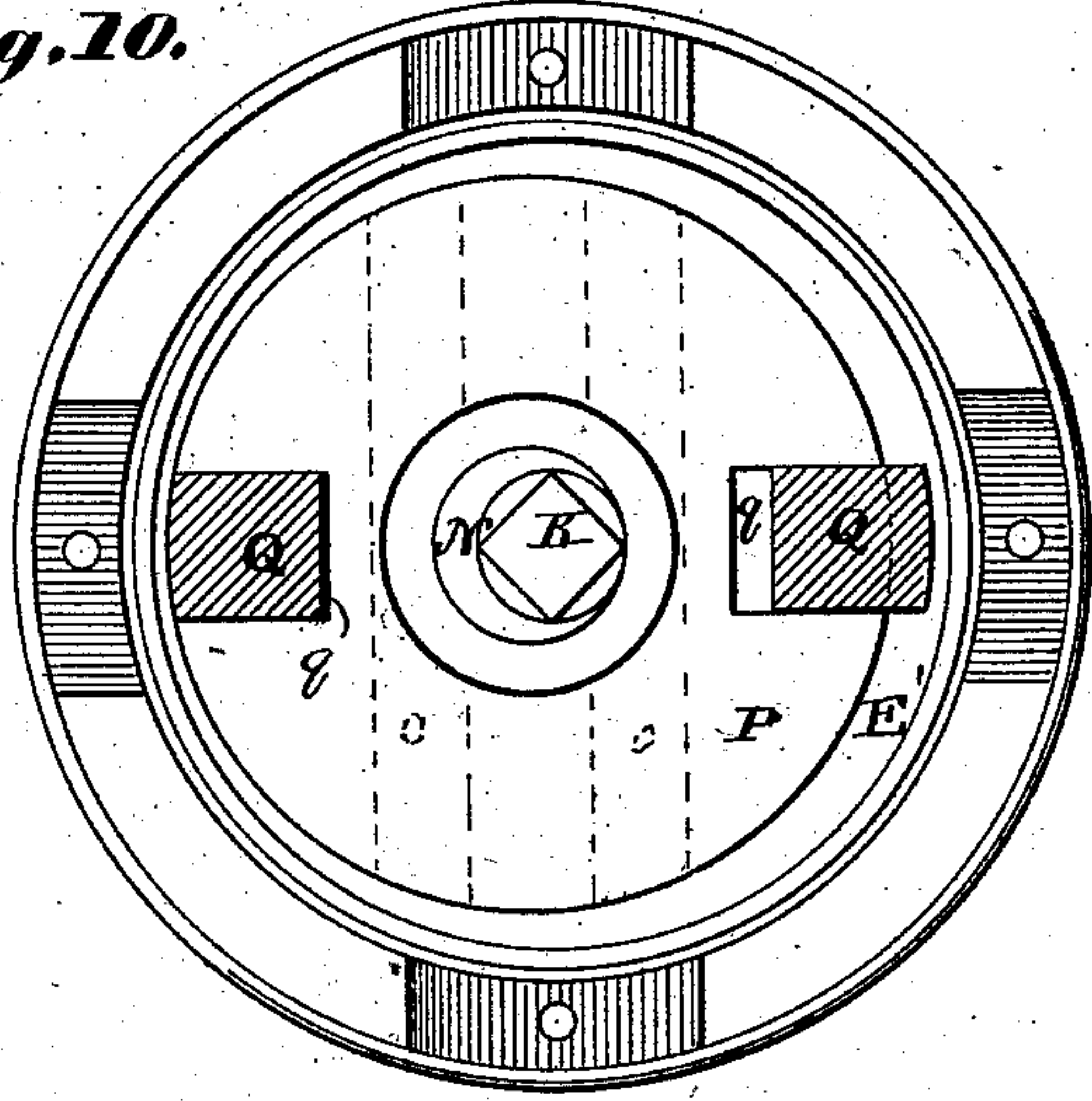


Fig. 12.

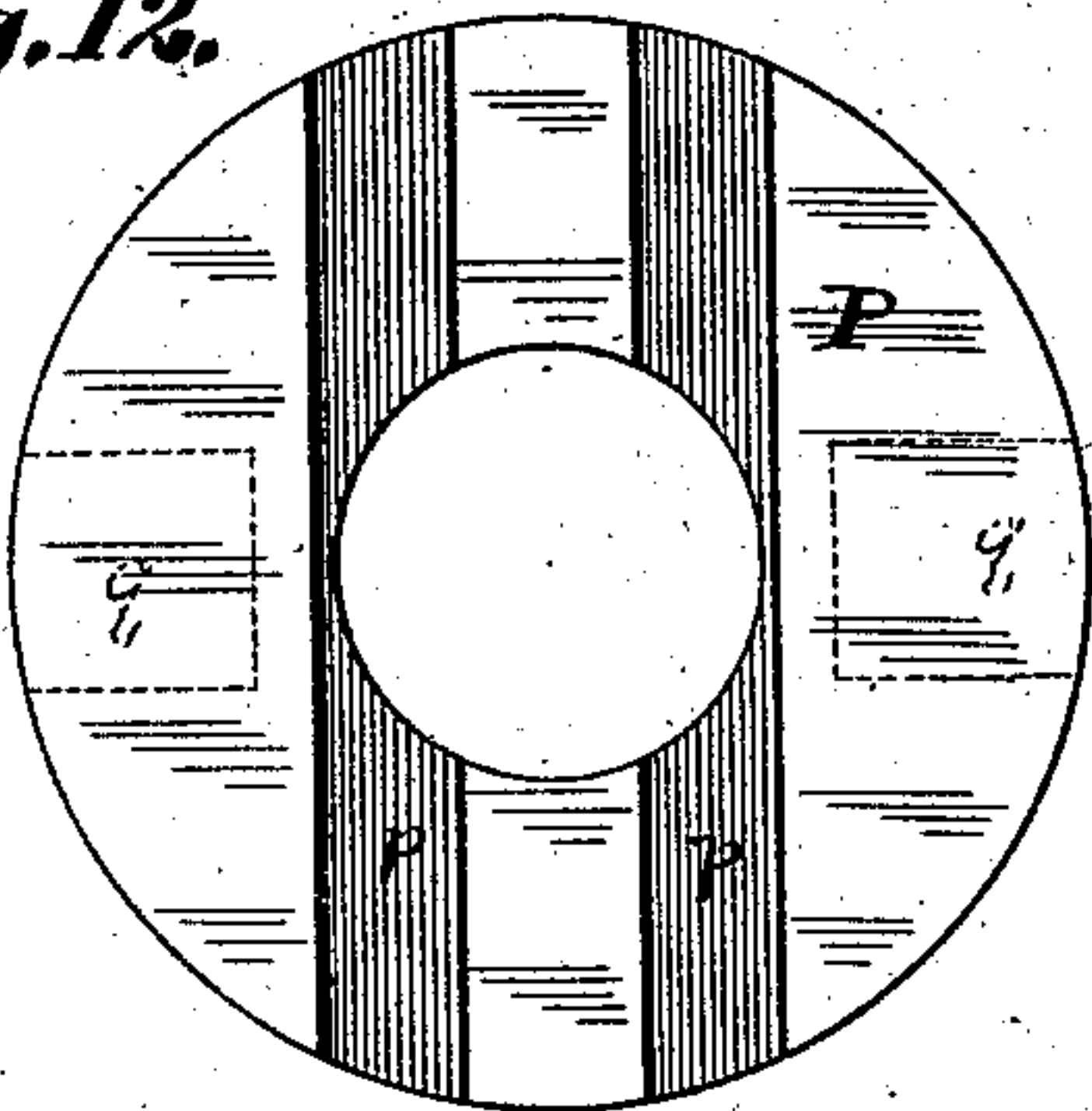


Fig. 13.

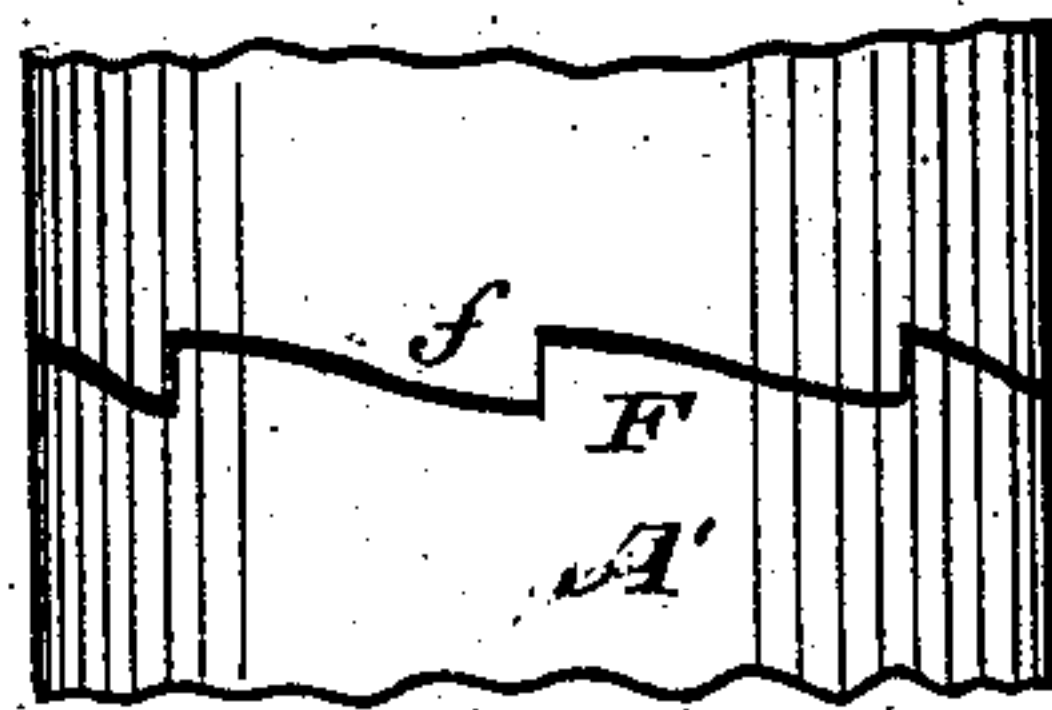


Fig. 14.

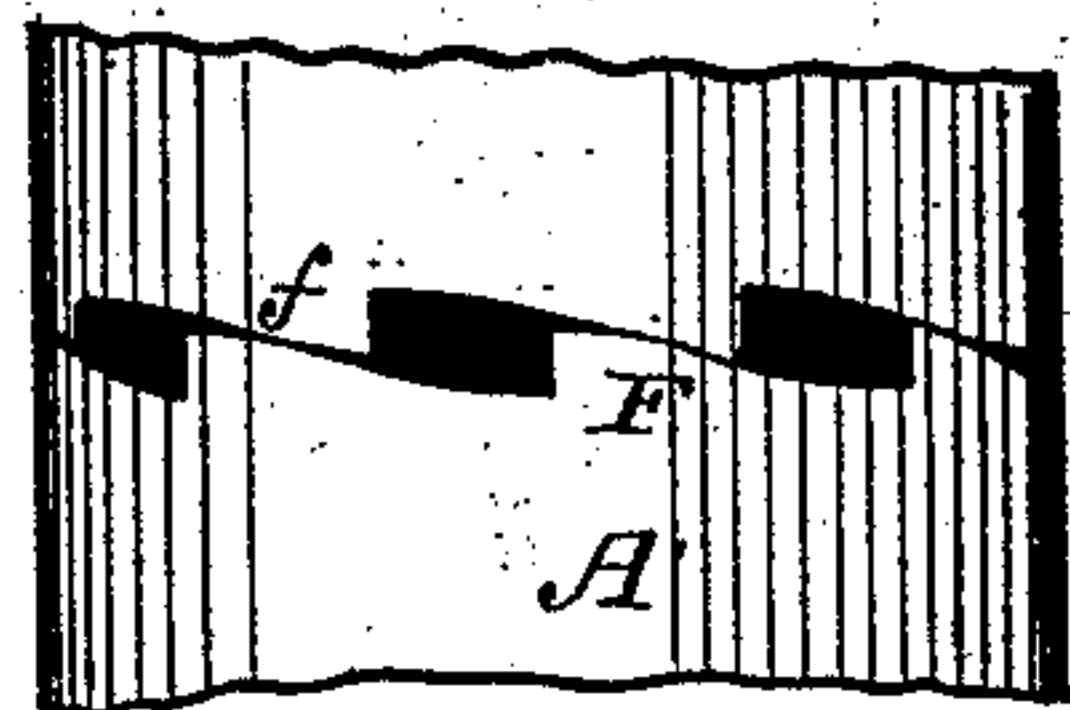


Fig. 11.

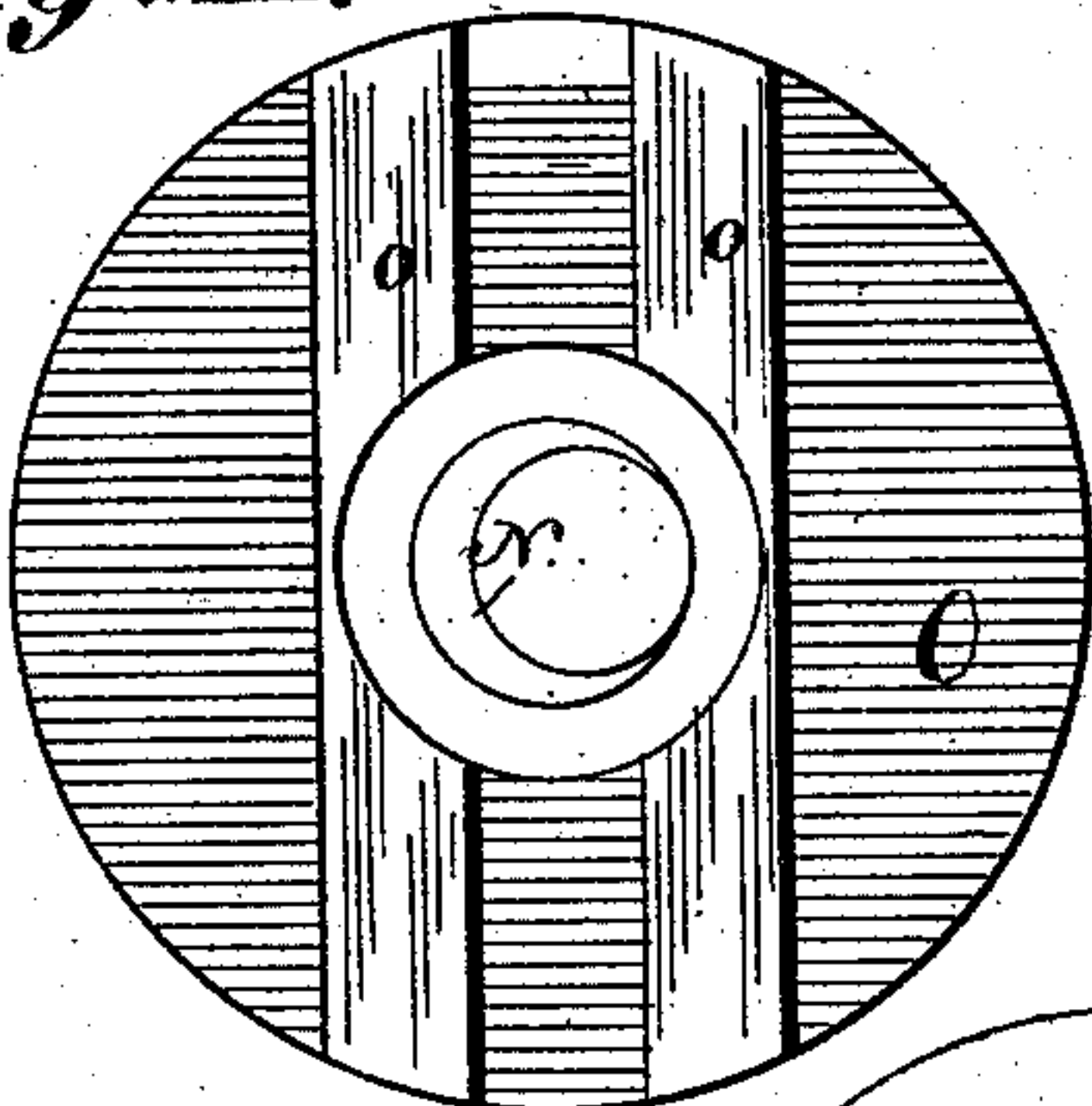


Fig. 15.

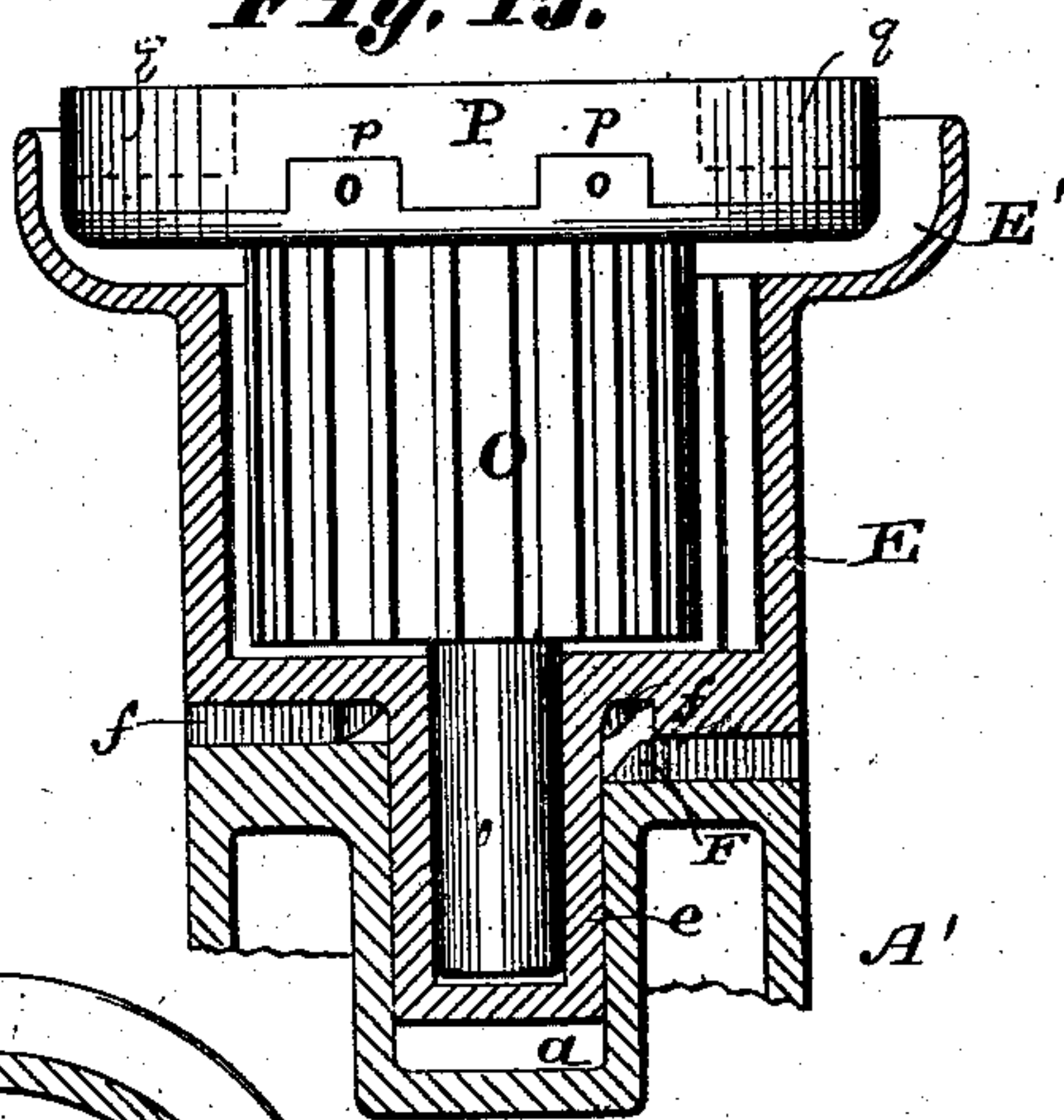
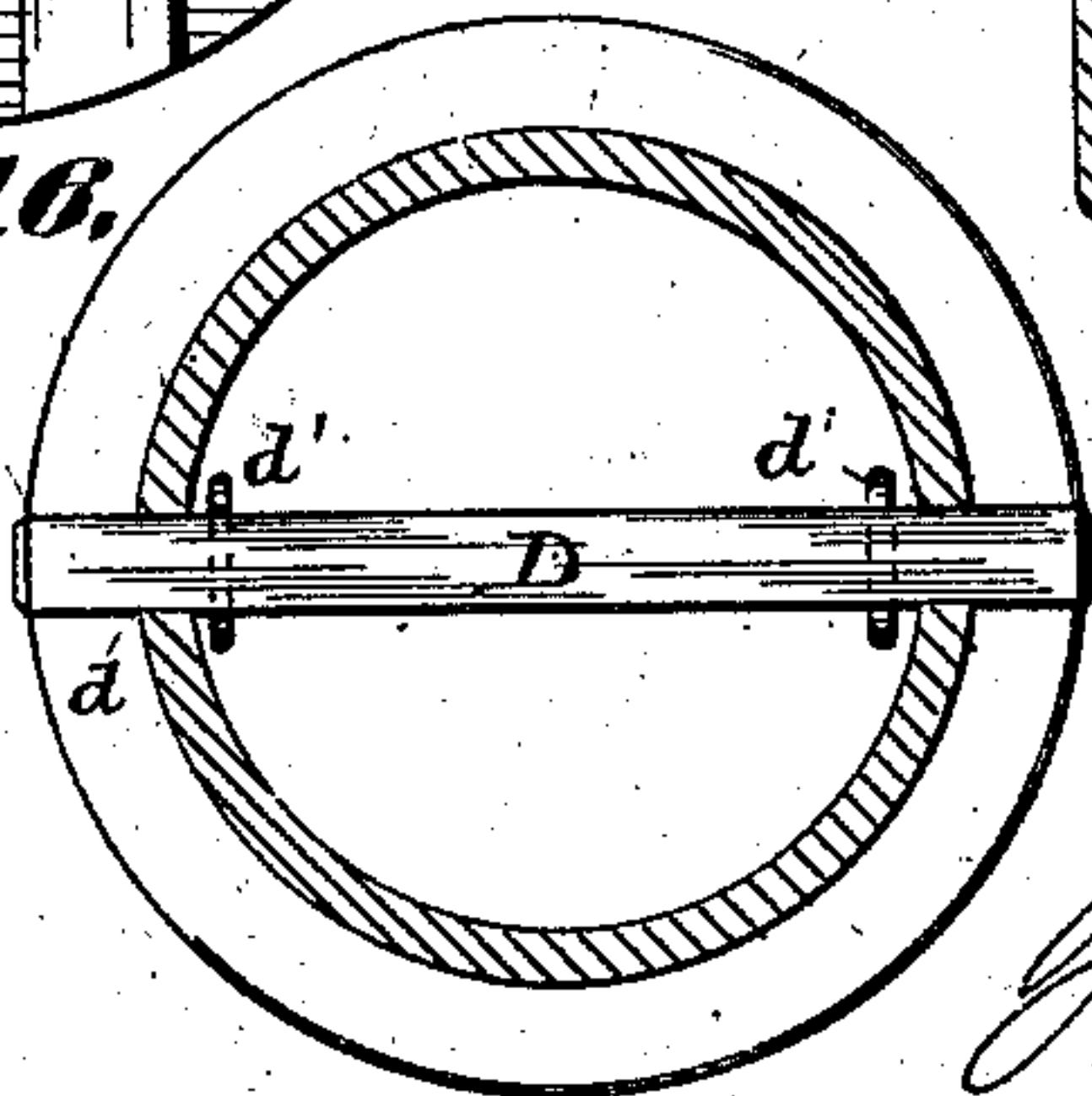


Fig. 16.



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UNITED STATES PATENT OFFICE.

ELLIOTT E. FURNEY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO GERARD B. ALLEN, OF SAME PLACE.

CAPSTAN.

SPECIFICATION forming part of Letters Patent No. 290,029, dated December 11, 1883.

Application filed October 22, 1883. (No model.)

To all whom it may concern:

Be it known that I, ELLIOTT E. FURNEY, of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Capstans, of which the following is a specification.

My invention relates to improvements in capstans of the class in which by the rotation of the head of the capstan in one direction the barrel or body of the capstan may be caused to rotate with and at the same rate of speed as the head, while by reversing the direction of rotation of the head the body, though rotated in the same direction as before, or so as to wind up a rope or chain, turns at a slower rate of speed than the head, with a proportionate increase of power.

The objects of my invention are to provide a strong, durable, and simply-constructed capstan of the class above named, and to provide for rotating the body in either direction at its slower rate of speed.

My improvements consist in the novel organization of parts and combinations of devices, hereinafter claimed, after being first fully described by reference to the accompanying drawings, in which—

Figure 1 is a view in elevation of the capstan. Fig. 2 is a view partly in elevation, showing the capstan-body in vertical section. Fig. 3 is a view in perspective, on an enlarged scale, of a pawl-plate secured to the capstan-body and forming part of the mechanism for connecting the capstan head and body; Fig. 4, a similar view of a key-plate or locking-disk, forming part of the connecting mechanism between the head and body of the capstan. Fig. 5 is a vertical central section of the capstan, as indicated by the line 5 5 of Fig. 6. Figs. 5^a and 5^b are respectively a view partly in elevation and partly in section and a partial plan view designed to show details of means employed for lifting and holding up the pawl which serves to connect the capstan-head and the pawl-plate secured to the capstan-body. Fig. 6 is a view partly in plan and partly in horizontal section, as indicated by the line 6 6 of Fig. 5. Figs. 7 and 8 are sectional views, as indicated by the line 7 8 of Fig. 5, showing the gearing, the pinion and its actuating-eccentric being represented in two positions.

Fig. 9 is a plan view, showing the pawl-plate secured in place upon the capstan-body, the capstan-head being removed. Fig. 10 is a view partly in plan, with the capstan-head removed, and partly in horizontal section in the plane of the line 10 10 of Fig. 5. Fig. 11 is a plan view of the pinion, showing its ribbed head or disk for engaging the key-plate. Fig. 12 is a bottom view of the key-plate. Figs. 13 and 14 are views in elevation, showing the clutch-connection between the base-post of the capstan and the internally-toothed gear, the parts being represented in two positions. Fig. 15 is a view partly in elevation and partly in vertical central section, showing the gearing and adjacent parts. Fig. 16 is a view in horizontal section on the line 16 16 of Fig. 5.

In some respects the mechanism shown by the drawings, and now in detail to be described, is similar to or substantially the same as mechanism shown in United States Letters Patent No. 90,254, granted to me May 18, 1869.

A hollow base, A, adapted to be bolted in place upon the deck of a vessel or elsewhere, is provided with a strong rigid post, A', also hollow, which is by preference cast with the base. Centrally in the post, and at its upper end, there is provided an annular recess or bearing, a, closed at its bottom, for a purpose soon to be explained.

The capstan barrel or body B is supported at its lower end upon the bearing-surfaces *b b* of the base A, and fits about the post at C *c*, so as to rotate freely when in operation. The capstan-body is held down to the base by means of the cross-bar D. This securing-bar is inserted in place by pushing it at one end through one of the openings *d* in the post until its opposite end may be brought within the post and in line with the other opening therein, when, by a sliding movement of the bar, it is moved into proper position, and is secured against displacement by cross-pins *d' d'*, passed through the bar and bent to hold them in place. The bottom walls of the openings are inclined, as shown in Fig. 5, to enable the securing-bar to be fixed in position, as above explained, and as will readily be understood. (See dotted lines, Fig. 5.)

An internally-toothed gear, E, is provided at its lower end with a tubular journal, *e*,

closed at its end, and fitting in the bearing *a* of the base-post. This internally-toothed gear has clutch-connection at its base with the upper end of the base-post. Ratchet-teeth or inclines *f* upon the gear and inclines *F* on the post serve to clutch or lock the gear against rotation in one direction, (to the left,) while leaving it free to unclutch to rotate in the opposite direction, or to the right. In addition to the supporting-journal *e* of the gear, it is further supported by being mounted at its lower end in the central bearing portion, *F'*, of the body *B*. A plate, *H*, is removably and strongly secured to the upper end of the capstan-body just beneath the capstan-head *I*, and serves, as soon to be described, to connect the body and head, so that by rotating the head in one direction a corresponding rotation will be imparted to the body, while rotation of the head in the opposite direction imparts revolution to the body by means of gearing and at reduced speed. The head *I* is provided with sockets *I'* for the usual capstan-bars by which to rotate it, and has a cap-piece, *J*, which is secured in place by means of a screw, *j*, passing through it and into the driving shaft or spindle *K* of the capstan. The driving-shaft is squared at its upper end and passes through a correspondingly-shaped central opening, *i*, in the head. The shaft and head are thus caused to turn together, and the head is supported so as to turn readily by the plate *H* and the body *B*. A cross-pin, *k*, above, and resting upon the hub of the head, serves as a suspending-support for the shaft, which has journals *L L'*, fitted to rotate in a bearing, *l*, in the plate *H*, and in the tubular journal *e* of the gear *E*, which is in turn supported so as to rotate in the post *A'*, as before explained. The plate *H* is provided with an annular ratchet formed by the series of inclines or ratchet-teeth *h*, and the capstan-head carries a pawl, *M*, for engaging the teeth of the plate. As shown, a gravitating pawl is employed. It is fitted to move endwise in its socket or guide *m* in the head, and is provided with controlling devices, by which it may be lifted and locked in its elevated position, so as to be inoperative, as further on to be described. When the pawl is left free to work automatically, it will be seen that the head, when rotated to the right, is locked with the pawl-plate *H*, and thus imparts motion to the body, while the gear *E* is out of clutch with the base-post, and that rotation of the head to the left causes the pawl to ride over the teeth of the pawl-plate while the gear is locked against turning by engagement with the post. When the gear is thus clutched with the post, the capstan-body is rotated slowly as compared with the speed of rotation of the head by the means now to be described.

The shaft *K* is formed with an eccentric, *N*, between its journals *L L'*, and with a collar, *n*, at the lower end of the eccentric. A pinion, *O*, within the gear *E*, is fitted about the eccentric and the collar, and is held against

downward movement by this collar. (See Fig. 5.) The pinion is formed with a ribbed head or disk at its upper end. In this instance two ribs, *o*, are formed on the pinion-head. These ribs engage with grooves *p* in the under surface of a locking-disk or key-plate, *P*. This key-plate rests upon the pinion-head, is provided with a central opening surrounding the driving-shaft, and connects with the pawl-plate *H*, so that the rotary movement of the pinion may be imparted to the capstan-body. The connection between the key-plate and pawl-plate, as shown, is by means of radial grooves *q* in the upper surface of the key-plate and extending at right angles with its cross-grooves *p* and lugs *Q* on the pawl-plate. These lugs project into the grooves *q*.

In order to provide for lubricating working parts to which access is difficult, the gear *E* is made with a flaring or cup-shaped upper end, *E'*, which extends around the ribbed disk of the pinion *O* and the key-plate *P*. The cup and body or barrel of the gear are filled with oil, so as not only to lubricate the teeth of the gear and pinion, the eccentric *N*, and the lower shaft-journal, *L'*, but also to supply oil to the working-surfaces of the pinion-disk and the key-plate, the excess of oil, flowing over the cup-edges and dripping down, being utilized to oil the bearing *F'*, the ratchet-teeth *f F*, and the bearing *a* in the base-post for the gear-journal. The up and down movements of the cupped gear *E*, as the ratchets on its lower end ride over those on the base-post, cause a thorough application of oil to the key-plate bearing-surfaces and to the ribbed disk of the pinion, such oil as may be splashed or jolted out over the edges of the cup being utilized as above explained, while the oil dripping from the pinion-disk and key-plate returns to the gear-cup.

From the above description the operation of the mechanism as a power-capstan, when the pawl *M* is allowed to act automatically, will be seen to be as follows: The pinion by the rotation of the shaft to the left and the actuation of the eccentric is caused to rotate to the right. The internally-toothed or outer gear being clutched with the post, is locked against turning, and the capstan-body rotates to the right. The pinion in this instance having sixteen teeth and the gear eighteen teeth, there is one revolution imparted to the capstan-body (by way of the key-plate and pawl-plate) for every eight revolutions of the capstan head and shaft. As the pinion is actuated by the thrust of the eccentric, its ribs slide in the grooves in the key-plate, and this, together with the sliding connection of the key-plate with the pawl-plate by means of the grooves and lugs, provides for all needed play.

It will readily be understood from what has already been said that when the head is rotated to the right, with the pawl at liberty to engage the pawl-plate, the action of the eccentric and the pinion is simply to turn the gear to the right, the body being turned with the

head by the engagement of the pawl with the pawl-plate.

In order that the capstan-body may be rotated in both directions by the gearing, or so that the capstan may be operated as a power-capstan and its body rotated to the left by the rotation of the head to the right, the pawl M is controlled by means admitting of its being lifted and secured out of its position for working automatically. The following devices are shown as employed for this purpose: A lifter-catch or cross-head bolt, R, has turning-connection at its lower end with the pawl by means of an annular groove, *r*, formed in that end of the bolt which fits in a bearing-recess in the pawl, and a cross-pin secured to the pawl and engaging the groove, as will readily be understood from the drawings. The cross-head or catch end of the bolt, when the bolt is lifted and given a quarter-turn, crosses an elongated slot, *s*, in the capstan-head, and the bolt, resting by its head on the capstan-head at the sides of the slot, holds up the pawl. When the pawl is to be restored to its working position, the bolt is turned to bring its head in position to drop down into the slot of the head. When the pawl is held up, it will readily be seen that the rotation of the head to the right will actuate the gearing in such manner as to cause a slow rotation of the body to the left instead of turning it to the right, as it would be turned at a quick speed were the pawl engaged with the pawl-plate. By thus providing for rotating the body in either direction, the coils of rope or chain may be readily cleared in event of fouling and without liability of accident, as will readily be understood. Obviously the relative number of teeth of the gear and pinion may be greatly varied and the throw of the eccentric altered, so as to adapt the machine to act quickly and with little power or slowly with increased power.

Details of the mechanism may be further modified in various ways. For instance, a suitable body or cylinder rotating about a horizontal axis may be substituted for the upright body, and spring-actuated pawl-and-ratchet clutch mechanism be used, instead of the before particularly described devices for connecting the head with the barrel and the gear with the post.

I claim as of my own invention—

1. The combination of the base provided with the post, the rotating body, the rotating head, the pawl-plate secured to the body, and the pawl carried by the head and acting on the pawl-plate, substantially as and for the purpose hereinbefore set forth.

2. The combination, substantially as hereinbefore set forth, of the rotating body, the rotating head, the internally-toothed gear, means by which said gear is locked against rotation in one direction, the pinion within said gear, and having the ribbed disk, the shaft actuated by the head, the eccentric acting on the pinion, the key-plate with which

the ribbed disk of the pinion engages, and the plate H, engaging with the key-plate and secured to the body, for the purpose described.

3. The combination, substantially as hereinbefore set forth, of the base, its post, the rotating body, the internally-toothed gear having clutch-connection with the post, the pinion within the gear, the key-plate with which the pinion engages, the pawl-plate engaging with the key-plate, the driving-shaft, its eccentric actuating the pinion, the rotating head with which the driving-shaft turns, and the pawl carried by the head, for the purpose described.

4. The combination, substantially as hereinbefore set forth, of the rotating body, the rotating head, the internally-toothed gear, means by which said gear is locked against rotation in one direction, the pinion within the gear, the key-plate with which the pinion engages, the pawl-plate secured to the body and engaging with the key-plate, the driving-shaft turning with the rotating head, the eccentric acting on the pinion, the pawl carried by the head for engaging the pawl-plate, and means by which the pawl may be held out of its working position, for the purpose described.

5. The combination of the rotating head provided with the slot *s*, the rotating body, the pawl-plate secured to the body, the pawl carried by the head, and the lifter-catch, substantially as and for the purpose hereinbefore set forth.

6. The combination of the hollow base-post having the bearing *a*, closed at its bottom, and provided with the ratchet-teeth, and the internally-toothed gear having the ratchet-teeth to clutch with those of the base-post, as and for the purpose described.

7. The internally-toothed gear having the cup-shaped upper end, the tubular journal *e* at its opposite end, and the ratchet-teeth, as and for the purpose described.

8. The combination of the pinion having the ribbed disk, its actuating shaft and eccentric, the key-plate engaging with the pinion-disk, the pawl-plate engaging with the key-plate and secured to the rotating body, and the internally-toothed gear having the cup-shaped upper end, substantially as and for the purpose hereinbefore set forth.

9. The combination of the hollow base having the hollow post, the body supported upon bearing-surfaces of the base, and having bearing-contact at its central portion with the upper end of said post, and the cross-bar D, by which the body is held down to the base, as and for the purpose described.

In testimony whereof I have hereunto subscribed my name this 17th day of October, A. D. 1883.

ELLIOTT E. FURNEY.

Witnesses:

GEO. L. ALLEN,
H. T. McCUNE.