

No. 871,350.

PATENTED NOV. 19, 1907.

B. H. LOCKE.

PERCUSSION DRILL, &c.

APPLICATION FILED NOV. 23, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

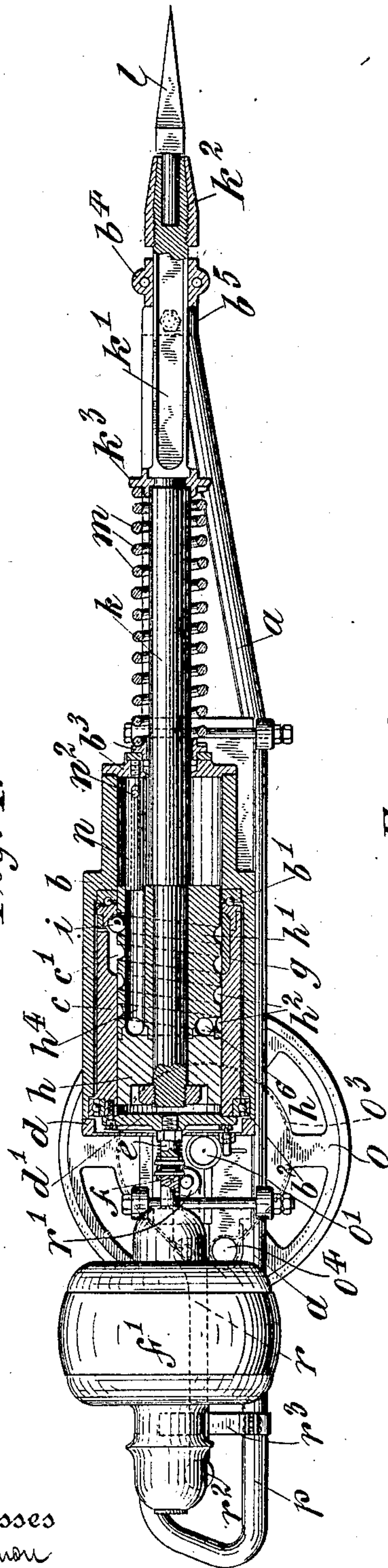
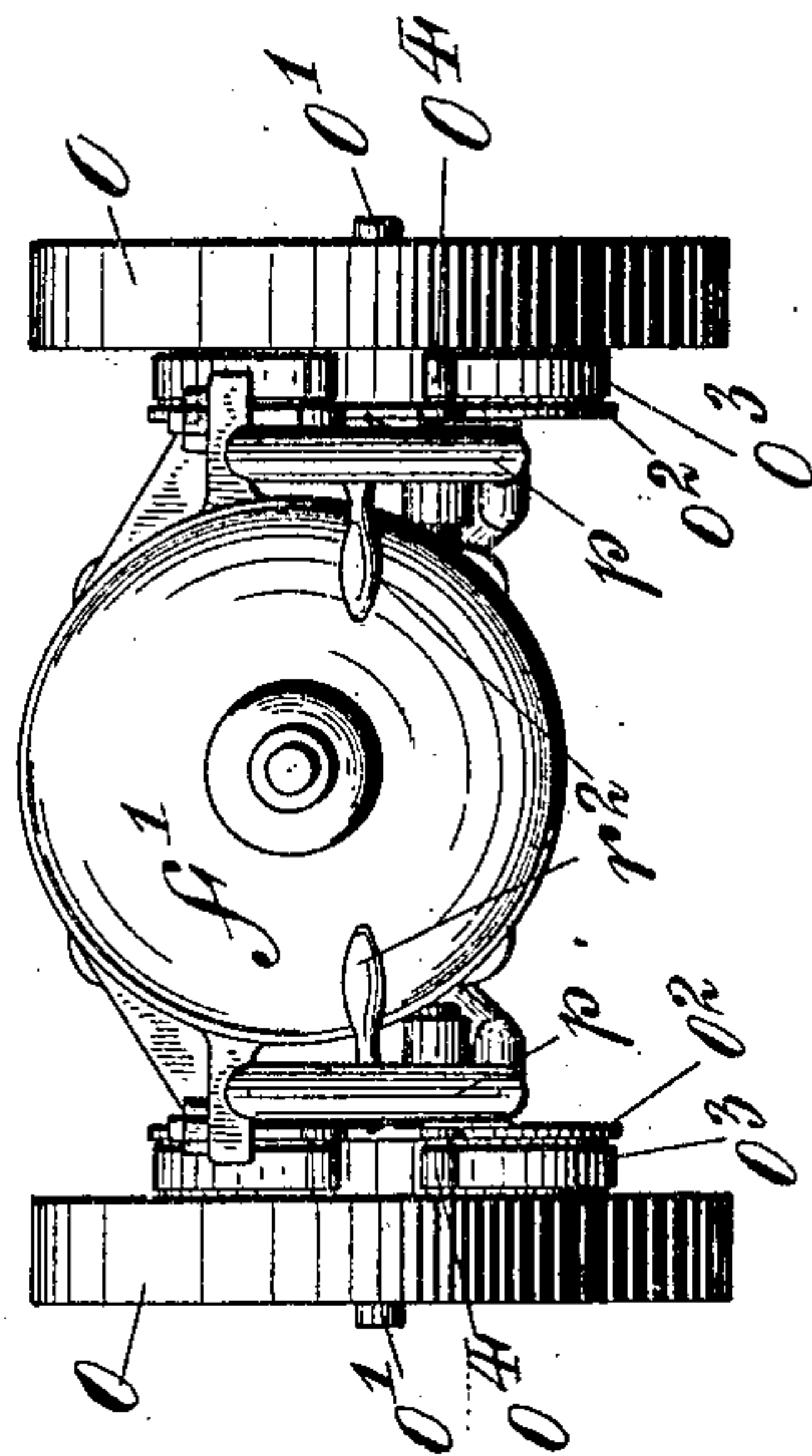


Fig. 2.



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3 SHEETS—SHEET 2.

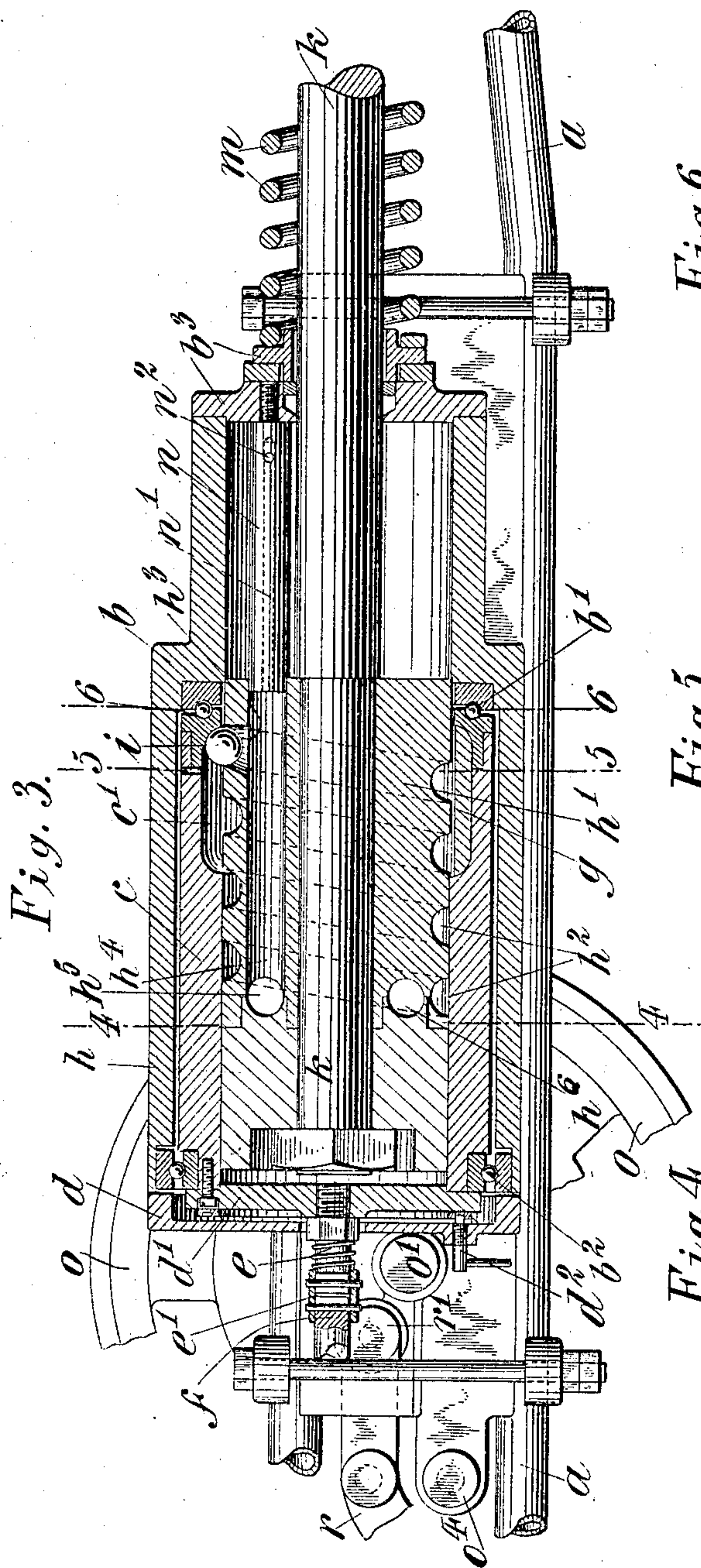


Fig. 6.

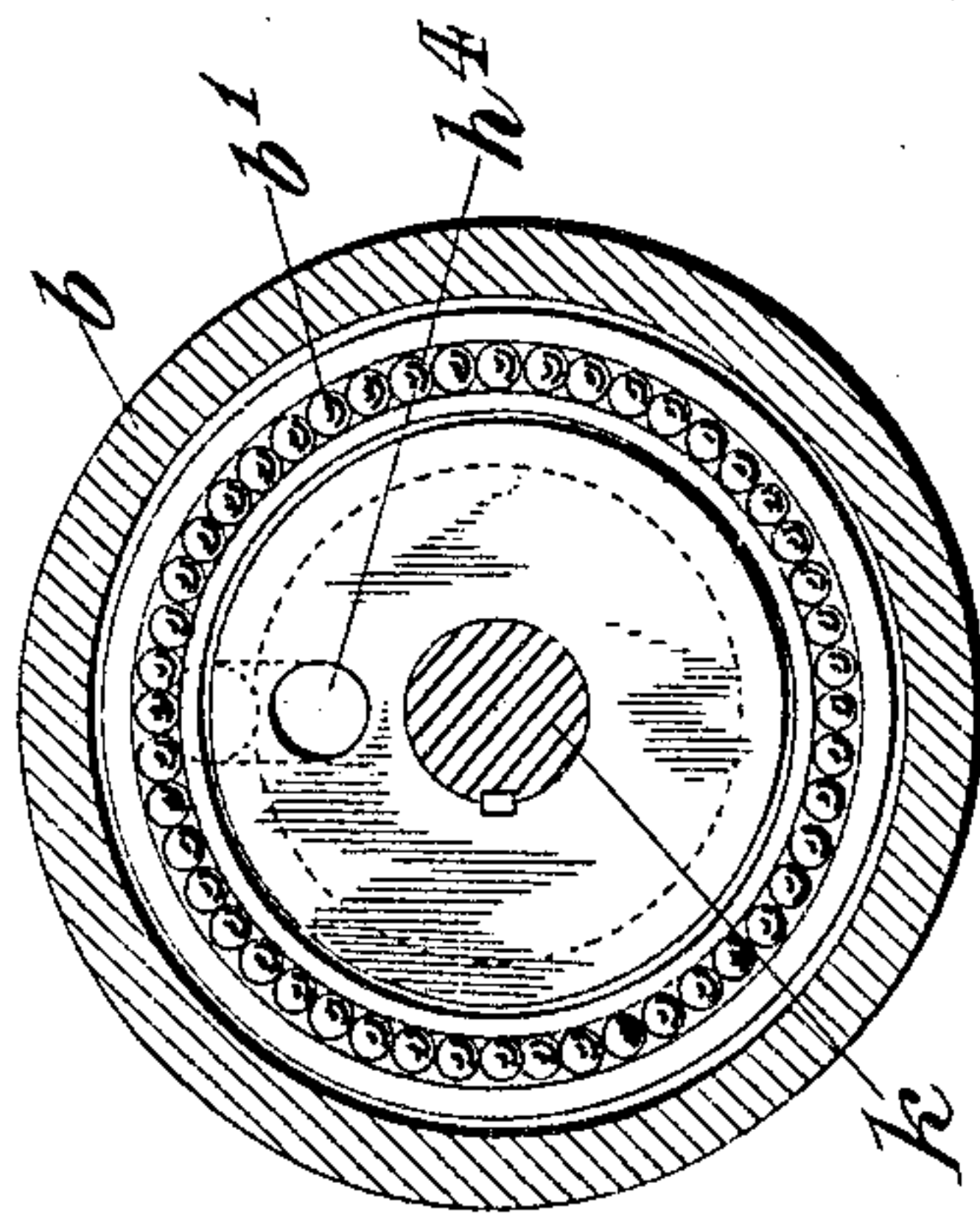


Fig. 5.

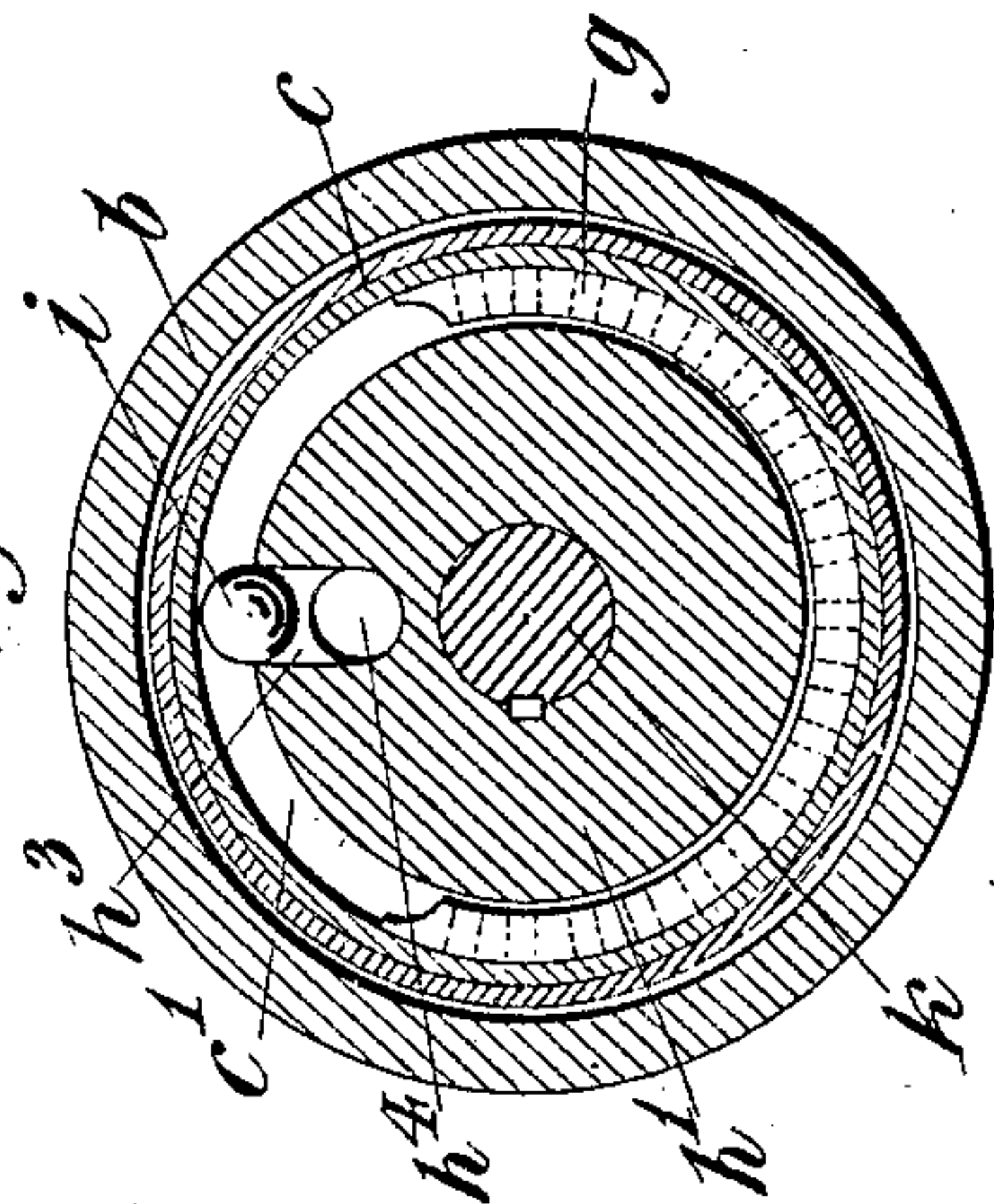
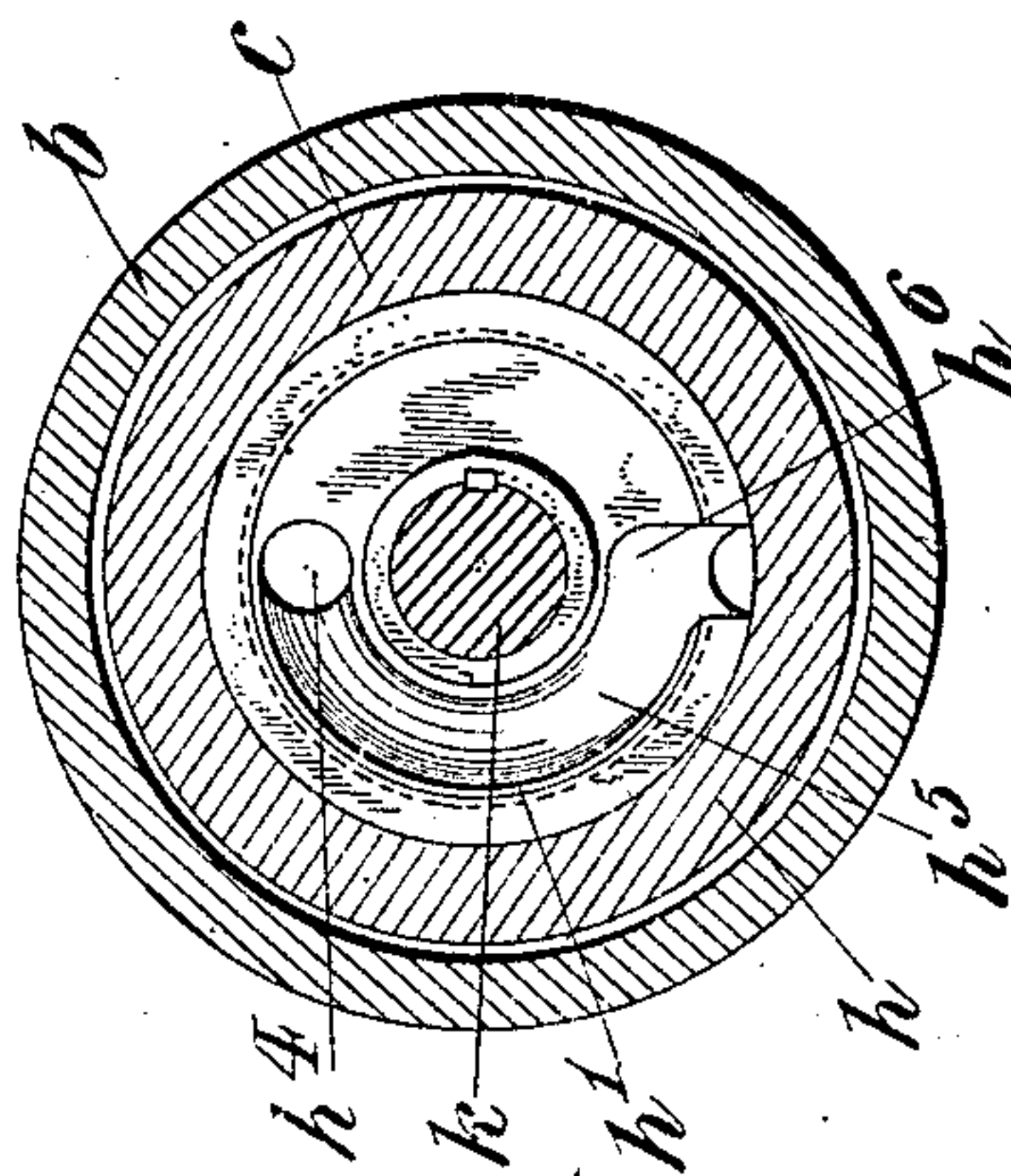


Fig. 4.



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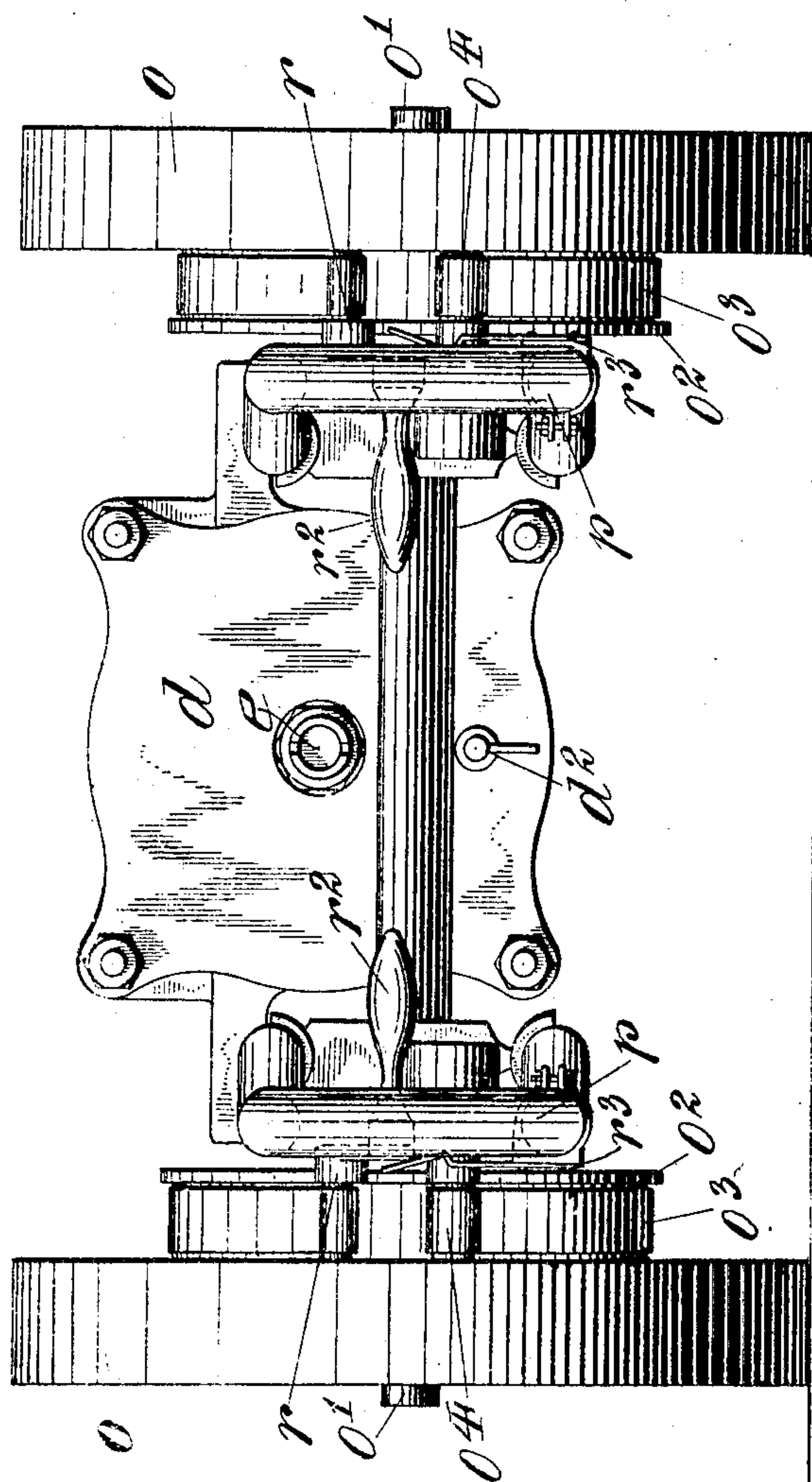
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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PERCUSSION-DRILL, &c.

No. 871,350.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed November 23, 1906. Serial No. 344,734.

To all whom it may concern:

Be it known that I, BRADFORD H. LOCKE, a citizen of the United States, residing in the borough of Manhattan of the city of New York, State of New York, have invented certain new and useful Improvements in Percussion Drills, &c., of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to machines of the general character of that shown in Letters Patent of the United States No. 676,045, granted June 11, 1901, and it has for its object to produce a machine of such character which shall be specially adapted for use as a coal pick or coal puncher. The invention is particularly concerned with the devices for producing the reciprocating motion of the pick, the amplitude of such motion being considerably greater than the amplitude of motion of a rock drill. In the present machine, as in that described in said Letters Patent, the working stroke of the reciprocating part which carries the pick is effected by a spring, while the return stroke and the compression of the spring are effected by the coöperation of a coupler with two parts, one of which is spirally grooved and one of which rotates with respect to the other, and by the present invention provision is made for the certain return of the coupler, at the end of each forward stroke, to the position required for the beginning of the next return stroke.

In the drawings—Figure 1 is a view partly in side elevation and partly in longitudinal section of a coal puncher or coal pick to which the invention is applied. Fig. 2 is a rear end elevation of the same. Fig. 3 is a partial view similar to Fig. 1 but on a larger scale to show more clearly the details of construction. Figs. 4, 5 and 6 are views in transverse section on the planes indicated by the lines 4—4, 5—5 and 6—6 of Fig. 3. Fig. 7 is a view similar to Fig. 2 but on a larger scale and with the motor, handles and brake levers removed.

In the embodiment of the invention illustrated in the drawings, the mechanism is supported by a suitable frame *a* which includes a shell or casing *b* of cylindrical form. Within the shell or casing *b* is mounted a rotatable cylinder *c*, a combined end thrust and lateral ball bearing *b'* being provided at the forward end of the cylinder and a lateral ball bearing *b²* near the rear end thereof.

The cylinder is open at its forward end but at its rear end may be closed by a head *d*, secured to the cylinder by screws or otherwise. A bearing ring *d'* is supported by adjusting screws, one of which is shown at *d²*, threaded in the head end of the casing *b*, for the purpose of preventing excessive movement of the cylinder away from its forward bearing. A short shaft *e* secured to the head *d* of the cylinder is connected by an ordinary slip coupling *e'* with the armature shaft *f* of an electric motor *f'* which is supported on the frame of the machine. Near its forward end the cylinder or sleeve *c* is provided internally with an annular groove *c'*, in which is loosely placed a floating ring *g*, as described in Letters Patent of the United States No. 704,810 granted July 15, 1902.

Within the cylinder *c* and fitting freely therein is a piston, formed conveniently in two parts, *h* and *h'*. The piston is provided on its surface with a spiral groove *h²* for coöperation with the ball coupler *i*, which, in operation, lies partly in the groove *h²* of the piston and partly in the groove *c'* of the cylinder, between the ends of the floating ring *g*. At its forward end the spiral groove *h²* communicates, through a port *h³*, with a return channel *h⁴* which is preferably formed parallel with the axis and terminates at its rear end with a circular channel *h⁵*. The latter communicates through a port *h⁶* with the other end of the spiral groove *h²* and when such port is in registration with the groove *c'* in the cylinder *c* the ball coupler *i*, which has entered the channel *h⁴* through the port *h³*, is permitted to leave the channel *h⁵* and to seat itself partly in the groove *h²* and partly in the groove *c'*. The piston rod *k* is secured to the piston *h* and is extended forwardly through the forward cap *b³*, being supported at its forward end by a suitable bearing *b⁴* carried by an arm *b⁵* of the frame. The shaft or rod *k* is made polygonal in cross section, as at *k'*, where it reciprocates within the bearing, which also has a similar form, so that the rod or shaft and piston are held from rotation. The extreme forward end of the rod or shaft is provided with a suitable means *k²* for securing thereto the pick *l* which is of usual form. At a suitable point the rod or shaft *k* is provided with a collar *k³* which forms an abutment for the stiff spiral spring *m* which bears against it and at its rear end bears against the end *b³* of the shell or casing *b*, the spring acting to throw the rod or shaft and its con-

nected parts forward when the piston is released by the passage of the ball coupler i into the channel h^4 . For the purpose of insuring the passage of the ball coupler i through the channels h^4 and h^5 the channel h^4 is made to communicate with the space between the forward end of the piston and the forward cap b^3 of the shell or casing, so that the air compressed in such chamber during the rapid forward movement of the piston shall drive the ball coupler backward through the channels. Preferably there is secured to the cap b^3 a plunger n which fits freely in the channel h^4 and is bored centrally, as at n' , and provided near its forward end with a port n^2 which opens into the chamber above mentioned. Not only may such plunger drive the ball backward through the channel h^4 by positive action if the ball should stick, but a blast of air is forced backward through the power of the plunger with great velocity so that under all ordinary conditions the ball coupler is driven backward through the channel h^4 and outward through the channel h^5 by the blast of air without actual contact with the end of the plunger n . In this manner the return of the ball coupler and its reengagement with the sleeve or cylinder and with the piston is insured and there can be no failure of operation of the machine through failure of the coupler to engage the piston and sleeve or cylinder.

As is usual in machines of the character shown in the drawings, the frame is mounted upon wheels o for convenience in the use of the machine, the frame being provided with studs or short axles o' for this purpose. Each of the wheels o is provided with a brake drum o^2 which is encircled by a brake band o^3 . One end of the latter is secured to a fixed point, as o^4 , and the other is connected to a brake lever r which is fulcrumed at r' while its forward end is provided with a suitable handle r^2 . A latch r^3 , for coöperation with the brake lever, is secured to any convenient part of the machine, as to the corresponding handle p , so that the brake may be held on without requiring an effort on the part of the operator and may be released readily when it is desired to move the machine. It will be understood that independent brakes are provided for the respective wheels, which are likewise independent, so that either brake may be released to permit the whole machine to be swung to one side or the other about the point of rest of the other wheel, as the exigencies of the work may require, while both brakes may be released to permit the machine to be moved bodily from or toward the work.

In operation the sleeve or cylinder c is made to rotate rapidly, being held from forward movement in response to the action of the spring with the coupler i , by the forward bearing b' . The coupler i while it rests

partly in the groove c' , is caused to rotate with the cylinder through the action of the loose or floating ring g which has more or less frictional engagement with the cylinder. As the ball rotates and travels in the spiral groove h^2 of the piston h , the latter is moved rearwardly, compressing the spring m , until the forward end of the spiral groove h^2 comes into registration with the groove c' of the cylinder when the coupler passes through the port h^3 into the channel h^4 , thus releasing the piston and permitting it to be thrown forward forcibly by the spring m . During the forward movement of the piston, the coupler i is driven backward through the channel h^4 and through the channel h^5 so that by the time the piston has reached or nearly reached the forward limit of its stroke with the rear portion of the spiral groove h^2 in registration with the annular groove c' of the cylinder, the coupler is discharged through the port h^6 and again engages both the annular groove c' and the spiral groove h^2 , when the operation is repeated. During the action of the piston, the machine is steadied and guided by the hands of the operator on the handles p , the brakes on the wheels o being applied or released as conditions may require. The action of the armature of the motor rotating rapidly upon the longitudinal axis of the machine, is of material advantage to the operator in holding the machine to its work and its independence of the devices for producing the reciprocating motion and its location in line therewith and to the rear thereof permit the piston and its associated parts to be placed entirely in front of the axis of the wheels while the proper balance of the machine is maintained.

It will be understood that various changes in details of construction and arrangement can be made without departing from the spirit of the invention.

I claim as my invention:

1. In a machine of the character described, the combination of a shell or casing, an internally grooved cylinder mounted to rotate therein, an end thrust ball bearing at the forward end of said cylinder, a lateral ball bearing at the rear end of said cylinder, an adjustable bearing at the rear end of said cylinder to prevent excessive movement from the forward thrust bearing, a spirally grooved piston within the cylinder, a ball coupler engaging the piston and the cylinder, a piston shaft and a spring to drive the piston shaft in one direction.

2. In a machine of the character described, the combination of an internally grooved rotating cylinder, an externally, spirally grooved piston mounted to reciprocate in said cylinder, a ball coupler adapted to engage the cylinder and the piston and a shell or casing inclosing the cylinder and piston, said piston having a return channel for the

ball coupler communicating at its forward end with the chamber forward of the piston, whereby the air compressed in the chamber in front of the piston drives the ball coupler backward through said channel.

3. In a machine of the character described, the combination of an internally grooved rotating cylinder, an externally, spirally grooved piston, a ball coupler engaging the cylinder and piston, said piston having a longitudinal return channel for the ball coupler, a shell or casing inclosing the cylinder and piston and a plunger carried by the head of the shell or casing and entering the return channel in the piston to drive the coupler rearwardly through said channel.

4. In a machine of the character described, the combination of an internally grooved rotating cylinder, an externally, spirally

grooved piston, a ball coupler engaging the piston and the cylinder, said piston having a longitudinal return channel for the coupler, a shell or casing inclosing the cylinder and piston and a plunger carried by the head end of the shell or casing and entering said return channel, said plunger having a longitudinal bore communicating with the chamber in front of the piston, whereby a blast of air is driven through the bore of the plunger into the return channel to drive the coupler rearwardly through the same.

This specification signed and witnessed this 17th day of November, A. D., 1906.

BRADFORD H. LOCKE.

In the presence of—

AMBROSE L. O'SHEA,
W. B. GREELEY.