No. 725,129. PATENTED APR. 14, 1903.

C. H. PECK.

REVERSIBLE MOTOR.

APPLICATION FILED AUG. 21, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

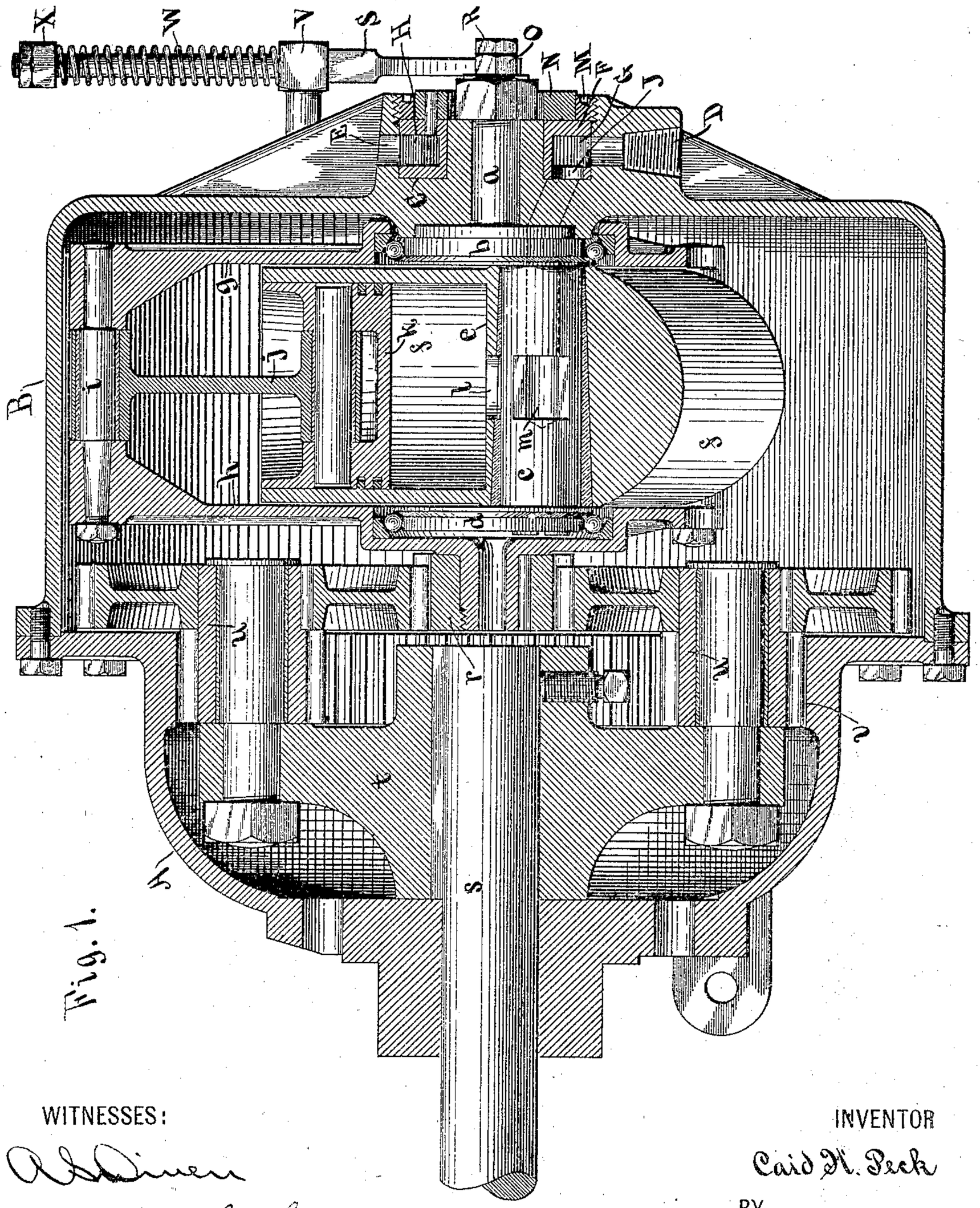

Fig. 1.

WITNESSES:

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NO MODEL. 3 SHEETS—SHEET 2.

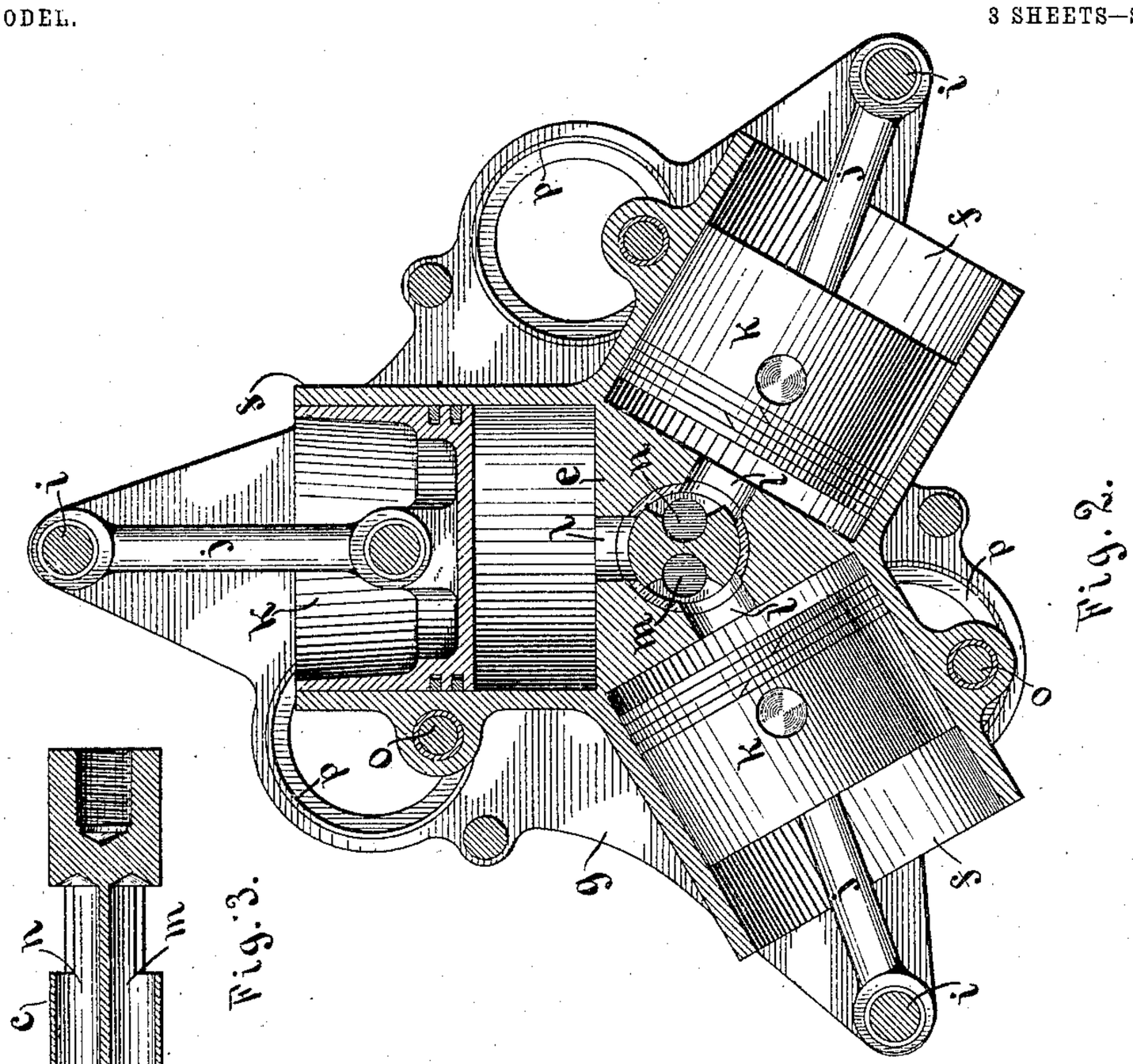

Fig. 2.

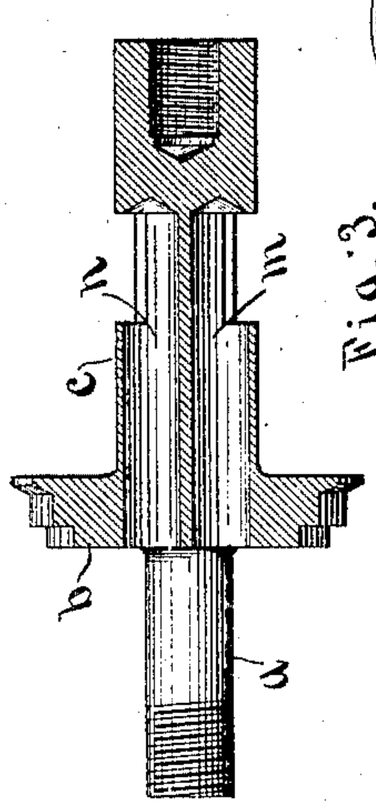

Fig. 3.

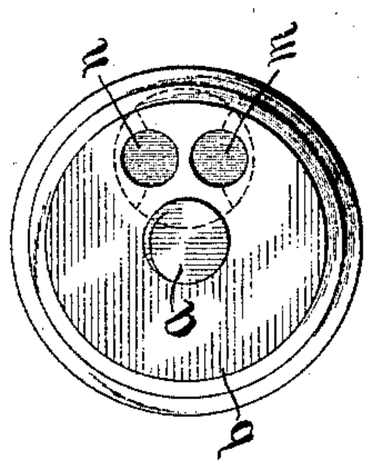

Fig. 4.

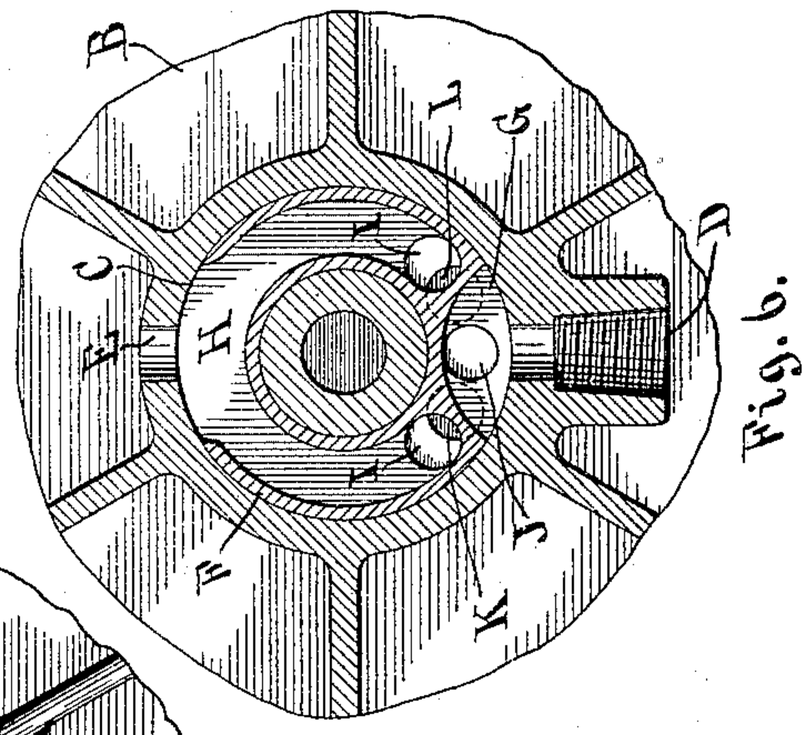

Fig. 6.

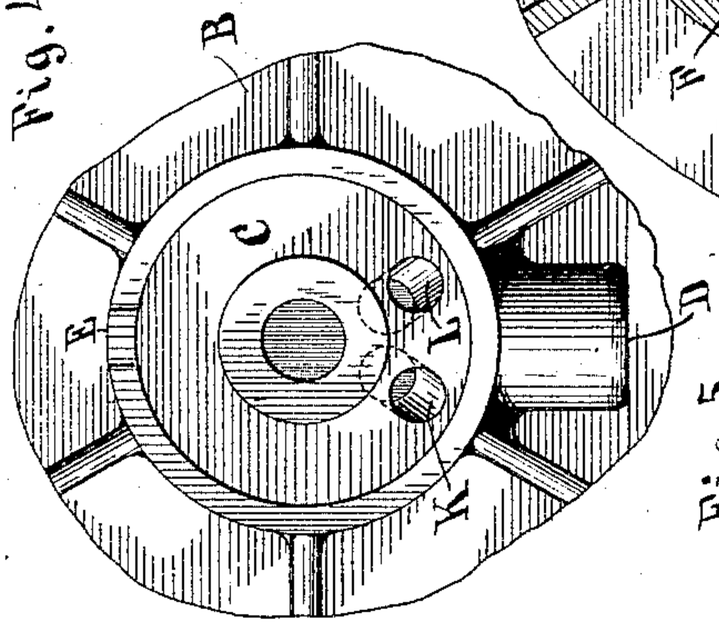

Fig. 5.

WITNESSES:

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No. 725,129. PATENTED APR. 14, 1903.

C. H. PECK.

REVERSIBLE MOTOR.

APPLICATION FILED AUG. 21, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

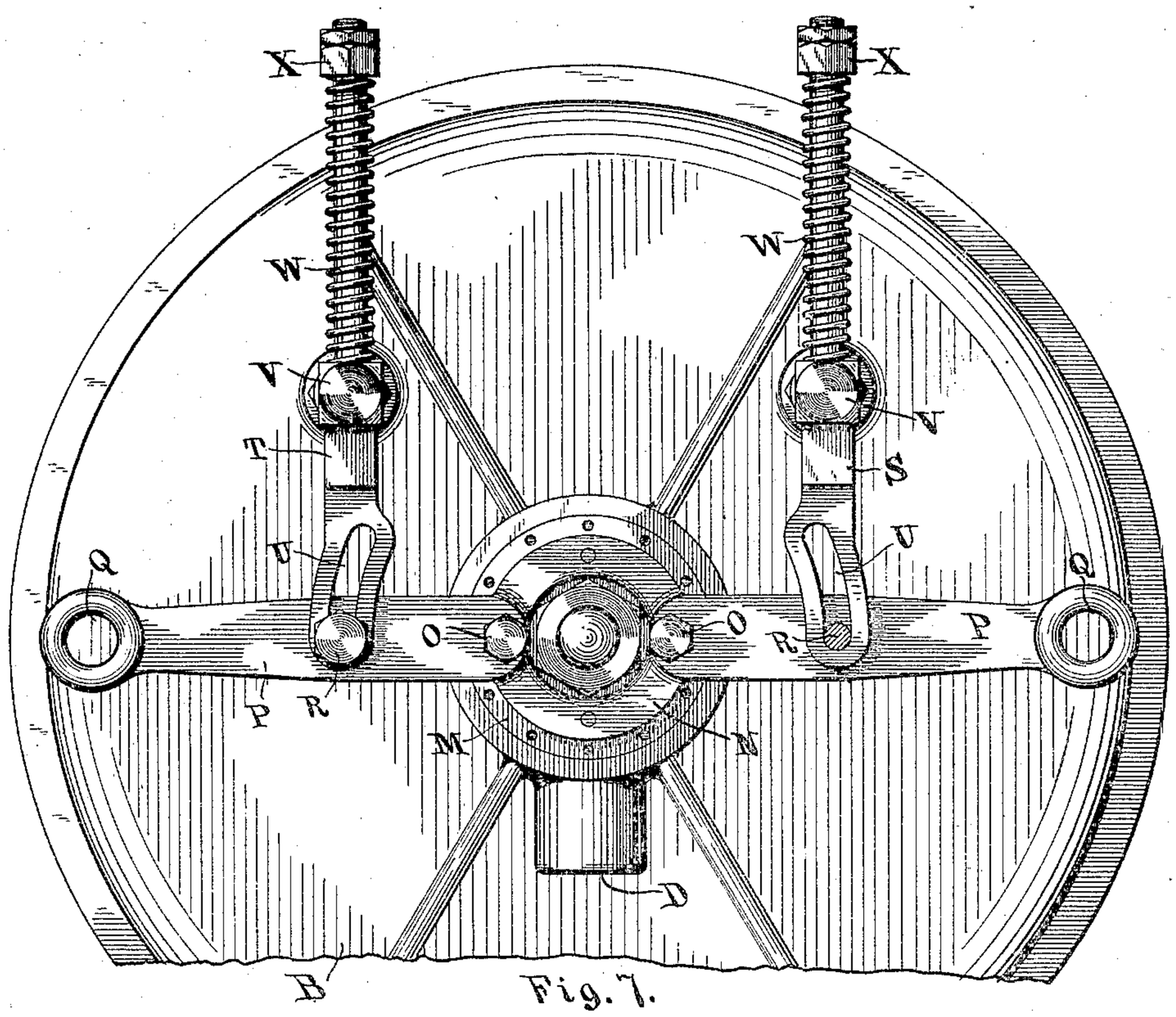

Fig. 7.

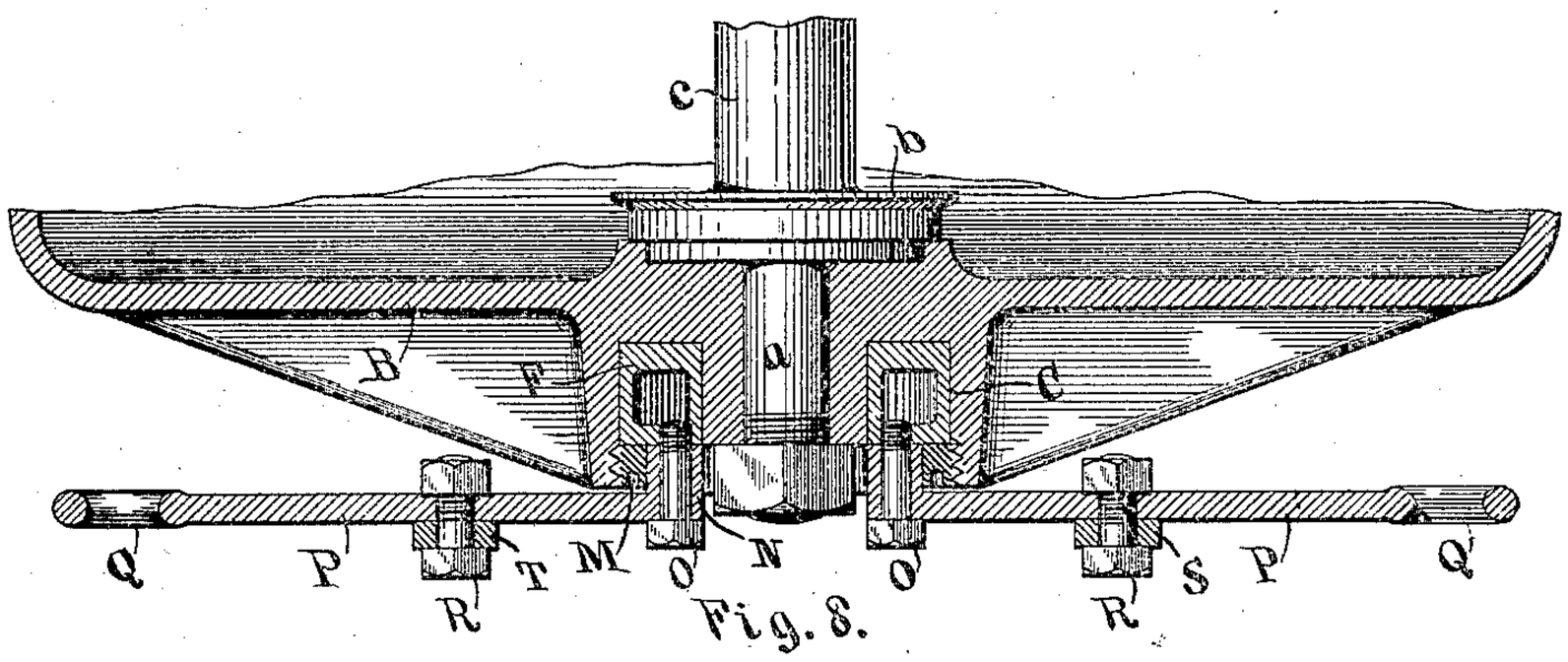

Fig. 8.

WITNESSES:

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INVENTOR

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UNITED STATES PATENT OFFICE.

CAID H. PECK, OF ELMIRA, NEW YORK, ASSIGNOR TO IMPERIAL PNEUMATIC TOOL COMPANY, OF ATHENS, PENNSYLVANIA.

REVERSIBLE MOTOR.

SPECIFICATION forming part of Letters Patent No. 725,129, dated April 14, 1903.

Application filed August 21, 1902. Serial No. 120,574. (No model.)

To all whom it may concern:

Be it known that I, CAID H. PECK, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented a new and Improved Reversible Motor and Reversing-Valve Therefor, of which the following is a specification.

This invention relates to improvements in that class of motors in which a rotary frame journaled upon fixed bearings is propelled by a plurality of cylinders rotating about a fixed shaft set eccentric to the axis of said bearings, the cylinders and their pistons being so connected to the frame that they will coact therewith to produce rotation when compressed air or other motive fluid under pressure is admitted to and exhausted from the cylinders by way of suitable passages and ports in the eccentric shaft, such a motor having already been described by me in my United States Letters Patent No. 641,034, dated January 9, 1900.

The object of my present invention is to make certain changes in said motor whereby it may be rendered reversible and to provide a simple valve and operating mechanism whereby my improved motor may be readily started, stopped, or reversed; and an especial object is to so arrange the valve-operating mechanism that it may be readily operated and controlled when the motor is located at an elevation beyond the reach of the operator, as when my motor is applied to a hoist or other like apparatus.

I attain the above objects by means of the construction and arrangement of parts as illustrated in the accompanying drawings, in which—

Figure 1 represents a transverse vertical section through my improved motor and its case or housing; Fig. 2, a transverse section of the motor-cylinders, showing the arrangement of admission and exhaust ports and passages; Figs. 3 and 4, details showing the eccentric shaft and the ports and passages therein; Figs. 5 and 6, details showing the reversing-valve and its chamber; Fig. 7, an end elevation of the motor-case, showing the reversing-valve mechanism as applied thereto; and Fig. 8, a horizontal section of the same.

Like letters of reference designate like parts throughout the several views.

Referring first to Figs. 1 and 2, A and B represent the two parts of the case or housing within which the motor is mounted and which may be attached to the frame of a hoist or to any other appliance or machine which is to be driven by said motor, motion being imparted to the driving-shaft *s* from the pinion *r* on the motor through the differential gears *u*, carried upon the gear-head *t*, which is keyed to said shaft, the pinions on the differential gears *u* meshing with the internal gear *v*, formed on the inner wall of the section A of the case.

Secured to the center of the head of section B of the case by means of the stud *a* are a pair of disks *b d*, between which is an eccentric shaft *c*, these parts being held stationary within the case. Radiating from the hub *e*, which is journaled upon the shaft *c*, are the three cylinders *f f f*, and running upon ball-bearings on the disks *b d* are the triangular frame-plates *g h*, fastened together by bolts *i i i*, to which are coupled the connecting-rods *j*, leading from the pistons *k*. The motive fluid is admitted to and exhausted from the cylinders by way of the ports *l*, which are placed in alternate communication with the admission and exhaust passages *m n* in shaft *c* as the cylinders rotate about said shaft. As motion is imparted to these cylinders by the motive fluid acting upon the pistons therein, rotary motion is likewise transmitted to the frame-plates *g h* by reason of rollers projecting from the ends of small arbors *o*, journaled in the sides of the cylinders and set to engage the annular guideways *p*, which are suitably located in the frame-plates with reference to said cylinders. The frame-plates and cylinders by reason of this system of connections coact upon one another to produce rotation of the cylinders about the eccentric shaft *c* and a like rotation of the frame-plates upon the disks *d* and *b*, and the plate *h* has secured to it the pinion *r*, from which motion is transmitted to the shaft *s*, as already described.

The passages *m n* in the shaft *c* lead to corresponding passages K L in the head of section B, which latter passages open into the

annular valve-chamber C, formed in said head concentric with the stud *a*. To this valve-chamber motive fluid is admitted by way of the inlet D, which is threaded to receive the supply-hose or other conduit, and exhaust takes place from said chamber by way of passage E. (See Figs. 5 and 6.) Within the valve-chamber is located a two-chambered valve adapted to be oscillated therein, the chamber G of the valve being in communication with the inlet D and chamber H with the exhaust E. In chamber G is a port J, corresponding in area with the passages K and L, leading into valve-chamber C, and at the two ends of chamber H are two similar ports I I, the distance between each port I and the port J corresponding to the distance between the openings K and L in valve-chamber C. By an inspection of Fig. 6 it will be seen that when the port J is placed in register with one of the passages K or L the other of said passages will be in register with one of the ports I and that the direction of rotation of the motor will be governed accordingly. In the position of the valve shown in Fig. 6 the port J lies between passages K and L, and admission of the motive fluid is cut off from the motor, which will therefore remain stationary in this position of the valve.

The valve F is held within the valve-chamber C by means of the ring N, which is screw-threaded into the outer end of said chamber, and the valve is operated by means of a two-armed lever P, the arms of which project from the ring N, secured to the valve by means of the screws O. The ends of the arms of lever P are provided with eyes Q, to which may be attached operating-cords. To each arm of the lever and connected to it by a pin-and-slot connection R and U, I attach what I term "right" and "left" spring-stops S and T. These stops are provided with shoulders abutting against the guide-studs V, which project out from the head of the motor-case and pass up through and are adapted to reciprocate in said guides. Coiled springs W are located between said guides and the outer ends of the stops, said springs being held in place by means of jam-nuts X, secured to the outer ends of said stops.

As already stated, as the valve is set in Fig. 6 the admission-port in the valve lies between the passages leading to the cylinders, and the valve will be held in this central or closed position by reason of the springs W, which draw the stops S and T up against the guides V, the lower ends of the slots U in each stop engaging the pins R on lever P and holding said lever in this central position. To start the motor, the right-hand cord attached to lever P will be pulled, thereby drawing down stop S and causing pin R on the left-hand arm of the lever to engage the upper end of the slot in stop T when the ports are fully open. Releasing the operating-cord will permit the spring W on stop S to return the stop to its normal position, thereby closing the valve and shutting down the motor. To reverse the motor, the left-hand cord will be pulled, thereby changing the direction of flow through the valve-chamber to and from the cylinders. In so reversing the valve the stop T will be drawn out, and the slot in stop S will limit the throw of the valve, and the valve will be returned to its closed position as soon as the left-hand cord is released by reason of the pressure of the spring W on stop T. The motor may be run at less than full speed in either direction by pulling down to a greater or less extent upon the operating-cords upon either side. Where the motor is within the reach of the operator, the cords may be dispensed with and the lever at either end grasped by the hand of the operator.

In my said former Letters Patent the motor-cylinders are set tangentially upon the eccentric shaft, whereby increased power is attained in the one direction of rotation. To obtain equal power in either direction, the cylinders must be set radially on said shaft, as shown in Fig. 2. It may be desirable, however, to use the tangential arrangement of the cylinders in my reversible motor, as when it is applied to a hoist or other appliance, where more power is required in one direction of rotation than in another, and I do not, therefore, confine myself to the radial set of the cylinders as herein shown.

Having thus described my improvements and without restricting myself to the precise details of construction and arrangement of the parts as illustrated, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In a motor, the combination of a rotary frame journaled upon fixed bearings, a plurality of cylinders rotating with said frame and imparting motion thereto, a support for the motor, a stud by which the bearings are attached to said support, an annular chamber in the support surrounding said stud, an inlet and outlet for the motive fluid opening into said chamber, passages leading therefrom to the motor-cylinders, an annular-chambered valve in said chamber provided with ports to register with the passages to the cylinders, and means for rotating said valve in either direction to reverse the flow through said passages.

2. In a motor, the combination of a rotary frame, bearings for said frame, a shaft between said bearings eccentric to the axis of rotation of said frame, a plurality of cylinders rotating upon said shaft, connections between the frame and cylinders whereby rotary motion is imparted from one to the other, a support to which one of said bearings is attached, ports and passages leading from the motor-cylinders through the eccentric shaft and said bearing to a valve-chamber in said support, and a valve in said chamber where-

by the flow of the motive fluid to and from the cylinders may be started, closed off, or reversed.

3. In a motor, the combination of a rotary frame, bearings for said frame, a shaft between said bearings eccentric to the axis of rotation of said frame, a plurality of cylinders rotating upon said shaft, connections between the frame and cylinders whereby rotary motion is imparted from one to the other, a support for the motor, a stud projecting from one of the bearings by which the motor is attached to said support, an annular chamber in the support surrounding said stud, admission and exhaust passages in the support leading into said chamber, corresponding passages leading from said chamber through the bearing and eccentric shaft to the motor-cylinders, an annular-chambered valve in said chamber provided with ports to register with the passages to the cylinders, and means for rotating said valve in either direction to reverse the flow through said passages.

4. With a motor, the combination of an annular valve-chamber, an inlet and outlet for the motive fluid opening thereinto, admission and exhaust passages leading from said chamber to the motor-cylinders, an annular-chambered and ported valve in said chamber whereby the flow of the motive fluid to and from the cylinders may be started, closed off or reversed, an operating-lever attached to the valve, and means for automatically returning said valve to closed position when the lever is released.

5. With a motor, the combination of an annular valve-chamber, an inlet and outlet for the motive fluid opening thereinto, admission and exhaust passages leading from said chamber to the motor-cylinders, an annular-chambered and ported valve in said chamber whereby the flow of the motive fluid to and from the cylinders may be started, closed off and reversed, an operating-lever attached to the valve, and spring-stops coupled to said lever whereby the throw of the valve in either direction is limited and the valve returned to closed position when the lever is released.

6. With a motor, the combination of a casing-head, a stud projecting through said head, by which the motor-bearings are secured to the head, an annular valve-chamber in the head surrounding said stud, an inlet and outlet for the motive fluid opening into said chamber, admission and exhaust passages leading therefrom to the motor-cylinders, and an annular-chambered and ported valve in said chamber whereby the flow of the motive fluid to and from the cylinders may be started, closed off or reversed.

7. In a motor, a reversing-valve comprising an annular chamber, admission and exhaust openings in the peripheral walls of said chamber, corresponding openings at one end of the chamber leading to the motor-cylinders, a valve occupying said chamber provided with two chambers or passages communicating respectively with the admission and exhaust openings in the peripheral walls of said chamber, a port in the admission-chamber of the valve and a port at each side thereof in the exhaust-chamber of the valve, whereby the passages to the cylinders may be placed simultaneously in communication with the admission and exhaust when the valve is shifted in one direction or the other.

8. In a motor, a reversing-valve comprising an annular chamber, admission and exhaust openings leading into said chamber through the peripheral walls thereof, passages K L leading from one end of said chamber to the motor-cylinders, a valve occupying said chamber and provided with chambers G and H communicating respectively with said admission and exhaust openings, and the ports J I I spaced apart so as to place chamber H in communication with passage K when chamber G is opened to passage L, and vice versa, when the valve is shifted in one direction or the other.

In testimony whereof I have affixed my signature in presence of two witnesses.

CAID H. PECK.

Witnesses:
M. E. VERBECK,
A. S. DIVEN.