No. 825,387. PATENTED JULY 10, 1906.

A. P. HANSCOM.

ROTARY MOTOR.

APPLICATION FILED JAN. 16, 1906.

Fig. 2.

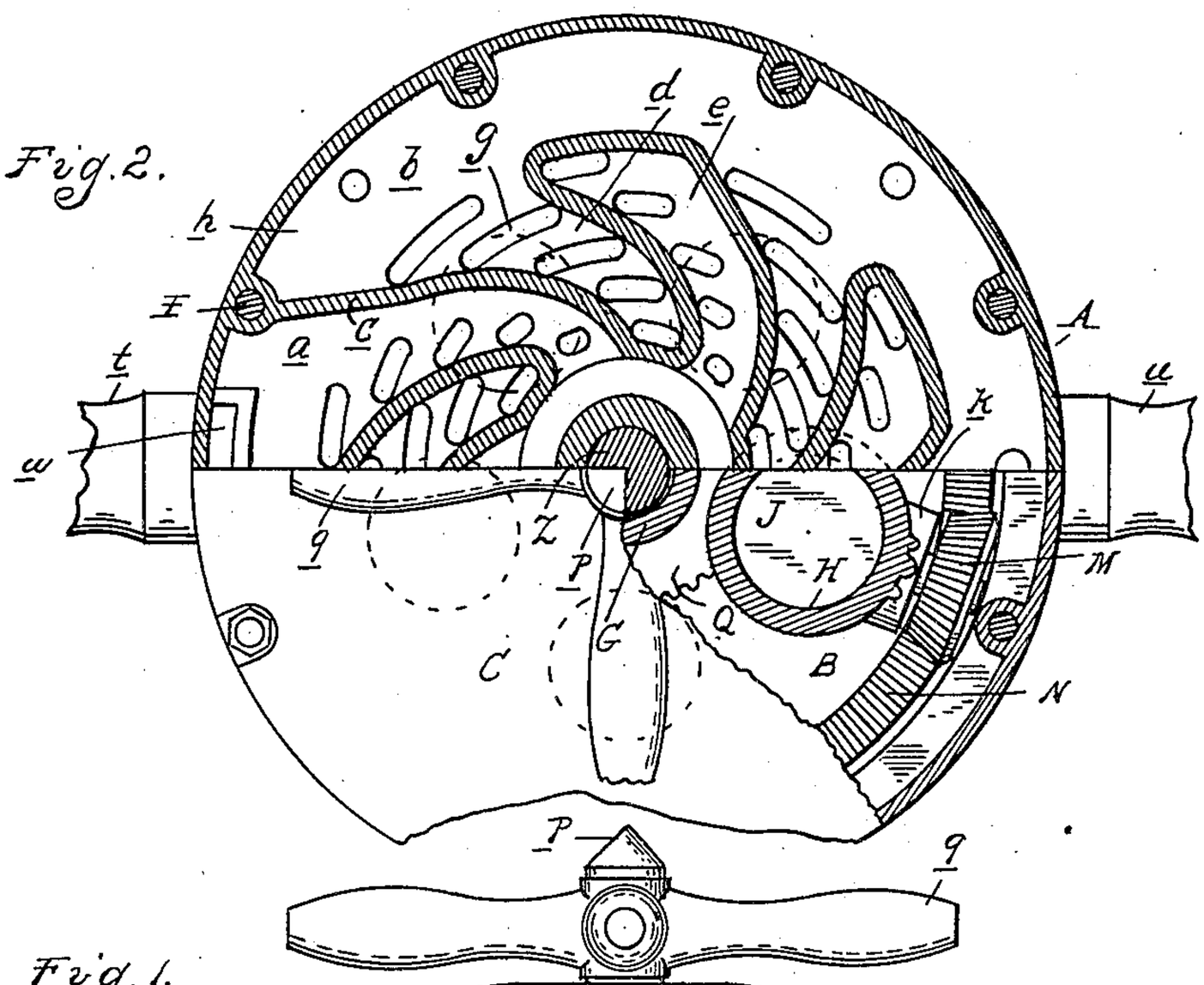
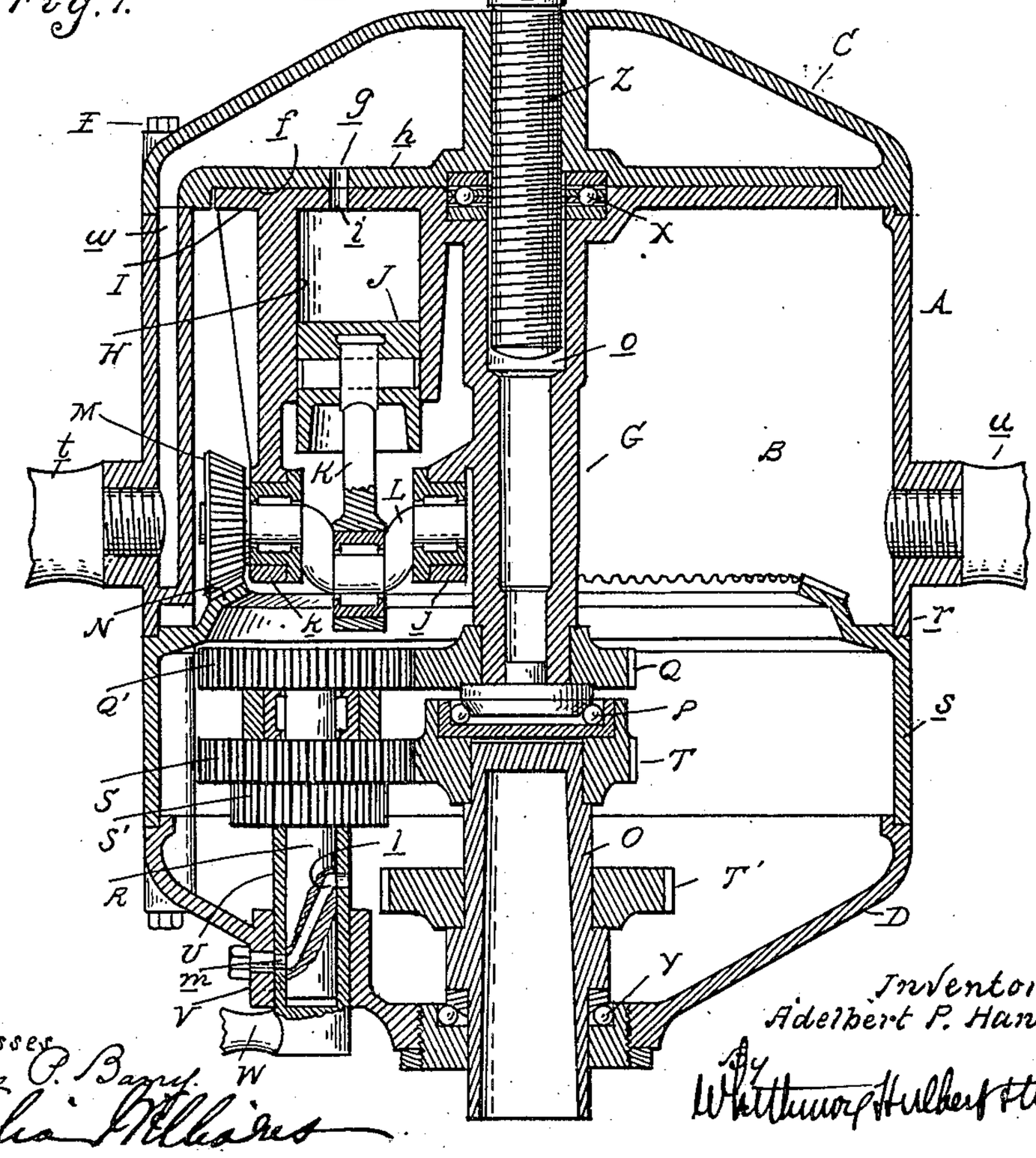


Fig. 1.



Witnesses
James P. Barry.
Amelia Williams

Inventor
Adelbert P. Hanscom
By Whittemore Hulbert & Whittemore
Attys.

UNITED STATES PATENT OFFICE.

ADELBERT P. HANSCOM, OF MEDFORD, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JAMES H. HERRON, OF DETROIT, MICHIGAN.

ROTARY MOTOR.

No. 825,387. Specification of Letters Patent. Patented July 10, 1906.

Application filed January 16, 1906. Serial No. 296,393.

To all whom it may concern:

Be it known that I, ADELBERT P. HANSCOM, a citizen of the United States of America, residing at Medford, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Rotary Motors, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to rotary motors which are operated by an expansible fluid, such as compressed air, and is more particularly designed for use in the construction of portable rotary drills.

The invention consists in certain novel features of construction, as hereinafter set forth.

In the drawings, Figure 1 is a longitudinal central section through the motor. Fig. 2 is a cross-section thereof, broken away into different planes to show various portions of the construction.

A is a suitable casing for inclosing the operating mechanism and preferably comprising a central cylindrical portion B and the caps C D at opposite ends thereof secured together, as by the bolts E. The head C is hollow and is constructed to form therein two chambers *a b*, separated from each other by a division-wall *c*. This wall is so shaped as to form substantially radially extending portions *d e*, respectively, of the two chambers *a b* and which alternate with each other, as illustrated in Fig. 2. Furthermore, the direction of the wall is such as to obliquely cross the exact radial lines, so that relative to a rotating body one end of each of said sections is in advance of the other.

G is a revoluble member arranged within the cylindrical portion B of the casing and concentric with the axis thereof. H represents a series of cylinders carried by and preferably formed integral with the revoluble member G, said cylinders being arranged with their axes parallel to the axis of the revoluble member and case. I is a head or disk preferably formed integral with the cylinders H and member G and fitting against the lower face *f* of the head C. This disk forms, in effect, a valve for controlling a series of ports *g*, formed in the lower wall *h* of the head C and communicating with the chambers *a b*. All said ports are arranged in arcs concentric with the axis of the casing and revoluble member and are adapted to register with corresponding ports *i* through the disk member I and which communicate with the respective cylinders H. Thus in the rotation of the member G the cylinders H are alternately placed in communication with the chambers *a b*.

Within each of the cylinders H is a piston J, which is connected by a pitman K to a crank L, the latter being journaled in bearings *j k*, secured to the revoluble member G.

M is a beveled pinion mounted upon each of the crank-shafts L, and N is an annular beveled rack secured to the casing and engaging with said pinions, the arrangement being such that the rotation of the pinions, due to the reciprocation of the piston, will cause them to travel about the annular rack, thereby revolving the member G and the cylinders carried thereby.

The revoluble member G may be used for directly actuating the rotary driven member; but where it is desired to change the speed of the latter a suitable variable-speed transmission may be employed. As illustrated, the driven spindle O is arranged in axial alinement with the revoluble member G in the lower portion of the case A, and the two are connected to each other at their adjacent ends through the medium of a ball-bearing coupling P.

Q Q′ are intermeshing gears respectively upon the member G and the counter-shaft R, and S S′ are slidable gears on the countershaft for meshing, respectively, with the gears T T′ on the driven spindle O. To permit of shifting the gears S S′, the shaft R is journaled in a sleeve U, which passes through a hub V, formed on the case, and is provided with cam-slot *l*, engaging a pin or stud *m* on the case, so that the rotation of said sleeve will also cause its longitudinal movement.

W is an actuating-handle connected to the sleeve without the casing.

The revoluble member G and the spindle O preferably engage ball-thrust bearings X Y at opposite ends of the case, and the bearing P is so constructed as to also constitute a thrust-bearing. Z is a threaded shank engaging a correspondingly-threaded socket formed in the cap C and preferably extending into a recess *o* in the revoluble member G. The upper end of this shank is provided with a center *p* for engaging a suitable supporting-frame, and a feed-wheel *q* is secured to the shank, by means of which the casing A may

be fed downward during the operation of drilling.

The cylindrical portion B of the casing is preferably formed in two sections *r s*, the latter having the annular rack N formed integral therewith. The section *r* has attached thereto, preferably at diametrically opposite points, handles *t u*, which also constitute admission and exhaust connections for the motive fluid and which are connected by channels *w* with the chambers *a b*.

The construction being as described, in operation the compressed air or other motive fluid is fed through the handle *t* and channel *w* into the chamber *a* and thence into the inward extension *d* of said chamber. The arrangement of the ports *g i* is such as to successively admit the air from the chamber *a* into the cylinders H to cause the downward movement of the pistons, while during the upward movement the ports *i* are in communication with the exhaust-chamber *b*. Thus continuous rotary motion is transmitted to the revoluble member G through the medium of the pitmen K, cranks L, and pinions M and rack N.

What I claim as my invention is—

1. A rotary motor comprising a revoluble member, a cylinder carried thereby, a reciprocatory piston in said cylinder, a connecting-rod for said piston, a crank-shaft operatively connected to said rod and extending radially of said revoluble member and means for translating the movement of said crank-shaft into a rotary drive of said revoluble member.

2. In a rotary motor, a revoluble member, a cylinder carried thereby and having its axis parallel to the axis of rotation, a reciprocatory piston in said cylinder, a connecting-rod therefor, a crank-shaft operated by said rod and means for translating the movement of said crank-shaft into a rotary drive of said revoluble member.

3. In a rotary motor the combination with a revoluble member, of a cylinder carried thereby and having its axis parallel with the axis of rotation, a reciprocatory piston in said cylinder, a crank actuated by said piston and journaled in said revoluble member, a pinion driven by said crank and a stationary annular rack, whereby the movement of the piston is translated into rotary movement of the revoluble member.

4. A rotary motor comprising a casing, a revoluble member journaled therein, a cylinder carried by said revoluble member having its axis arranged parallel thereto, a reciprocatory piston in said cylinder, a revoluble pinion, an annular rack on said casing engaging said pinion and drive connections between said piston and pinion.

5. A rotary motor comprising a casing, a revoluble member journaled therein, a cylinder parallel with the axis of and carried by said revoluble member having an air-port in the wall thereof, pressure and exhaust chambers in said casing with which said port is alternately registered in the rotation of said revoluble member, a reciprocatory piston in said cylinder, an annular rack on said casing, a pinion meshing therewith journaled in said revoluble member, and connections between said piston and pinion for translating the reciprocatory movement of the one into the rotary movement of the other.

6. In a rotary motor, a revoluble series of cylinders having parallel axes and a series of alternately-arranged pressure and exhaust connections with which said cylinders are successively registered during their rotation.

7. In a rotary motor, a revoluble series of cylinders having their axes parallel to the axis of rotation and a series of alternately-arranged pressure and exhaust connections with which said cylinders successively communicate during their rotation, said connections being arranged to vary the time of admission and exhaust to and from the several cylinders of the series.

8. A rotary motor comprising a revoluble series of cylinders, a series of alternately-arranged pressure and exhaust connections and ports for establishing communication between said cylinders and pressure and exhaust connections during the rotation of the series of cylinders, the ports for the respective cylinders being arranged in different paths.

9. In a rotary motor the combination with a revoluble member and a cylinder carried thereby, of a chambered head arranged parallel to the plane of rotation of said cylinder and in contact therewith and a zigzag wall within said head separating the same into alternately-arranged pressure and exhaust chambers which are crossed by said cylinder during its rotation, said head and cylinder being provided with registering ports for alternate communication with said pressure and exhaust chambers during their rotation.

10. A rotary motor comprising a casing, a revoluble member journaled concentrically within said casing, a chambered head at one end of said casing provided with alternately-arranged pressure and exhaust chambers and having ports in its face communicating with said chambers, cylinders carried by said revoluble member ported to respectively register with the corresponding ports in said chambered head, reciprocatory pistons in said cylinders, an annular rack in said casing, pinions meshing therewith and connections between all of said pistons and their respective pinions for translating the reciprocatory movement of the former into the rotation of the latter, whereby said revoluble member is caused to rotate.

11. In a rotary motor, a revoluble member

comprising an integral series of cylinders having heads and walls formed integral, and a plurality of alternately-arranged pressure and exhaust connections at the heads of said cylinders with which said cylinders are successively registered during their rotation.

12. In a rotary motor, a stationary member carrying inlet and exhaust connections, a cylinder arranged for rotation about an axis parallel with its own axis and arranged to register with said connections, a reciprocatory piston in said cylinder, a connecting-rod for said piston, a crank-shaft radially arranged in relation to the axis of rotation of said cylinder, and means whereby the rotation of said crank-shaft will rotate said cylinder.

13. In a rotary motor, a cylinder, a reciprocatory piston therein, a connecting-rod for said piston, a crank-shaft operatively connected to said rod, and means whereby the rotation of said crank-shaft will cause the rotation of said cylinder about an axis parallel with the axis of the cylinder.

14. A rotary motor comprising a casing, a revoluble driven member therein and a drive mechanism comprising a coöperating annular rack and pinion, and a cylinder and piston for rotating the pinion arranged within and parallel with the axis of the casing.

15. A rotary motor comprising a casing, a rotary driven member therein and a drive mechanism comprising an annular beveled rack, a coöperating beveled pinion, a cylinder and piston arranged longitudinally within the casing, and a connection between the piston and pinion whereby the latter is rotated by the reciprocation of the former.

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

ADELBERT P. HANSCOM.

Witnesses:

CLARENCE H. WALKER,

W. T. PAGE.