

G. P. WISDOM.

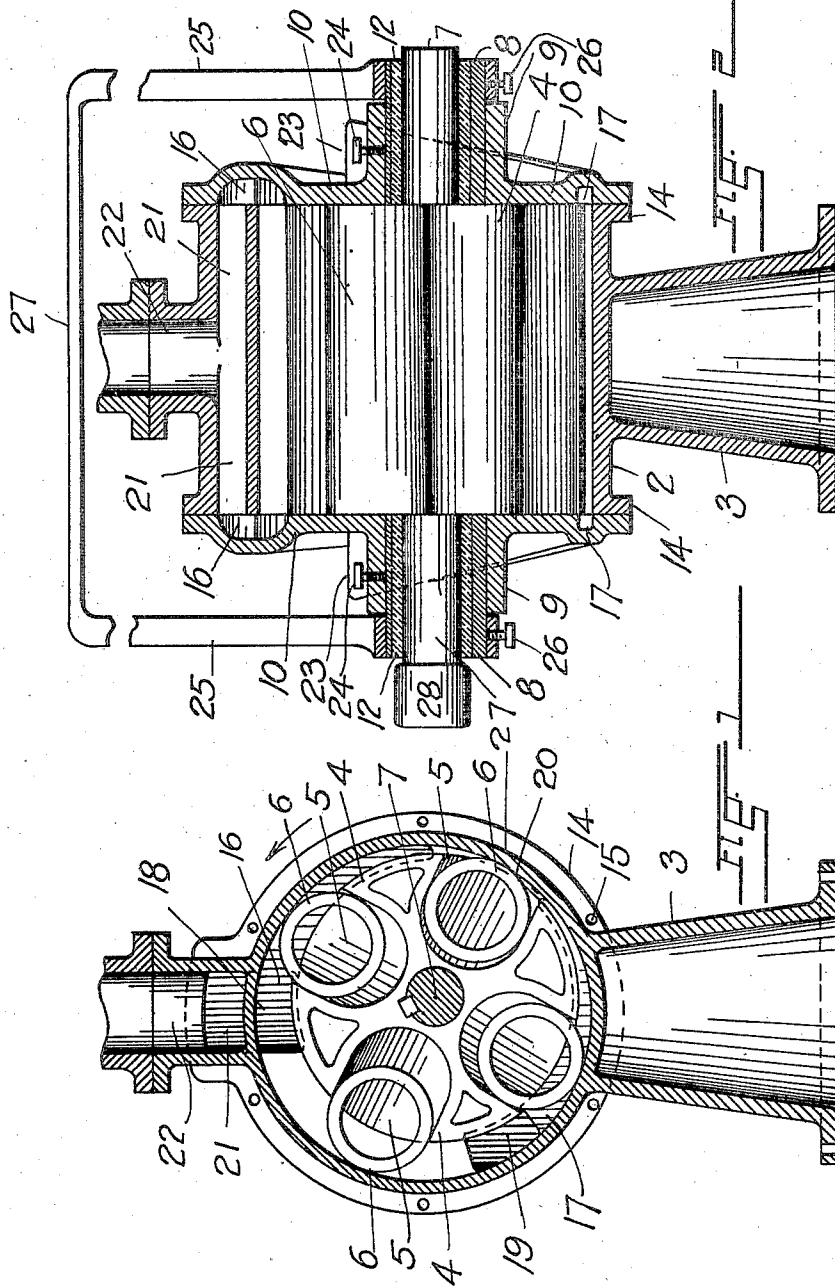
AIR PUMP.

APPLICATION FILED APR. 5, 1910.

Patented Jan. 21, 1913.

1,051,360.

2 SHEETS-SHEET 1.



WITNESSES:

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INVENTOR.

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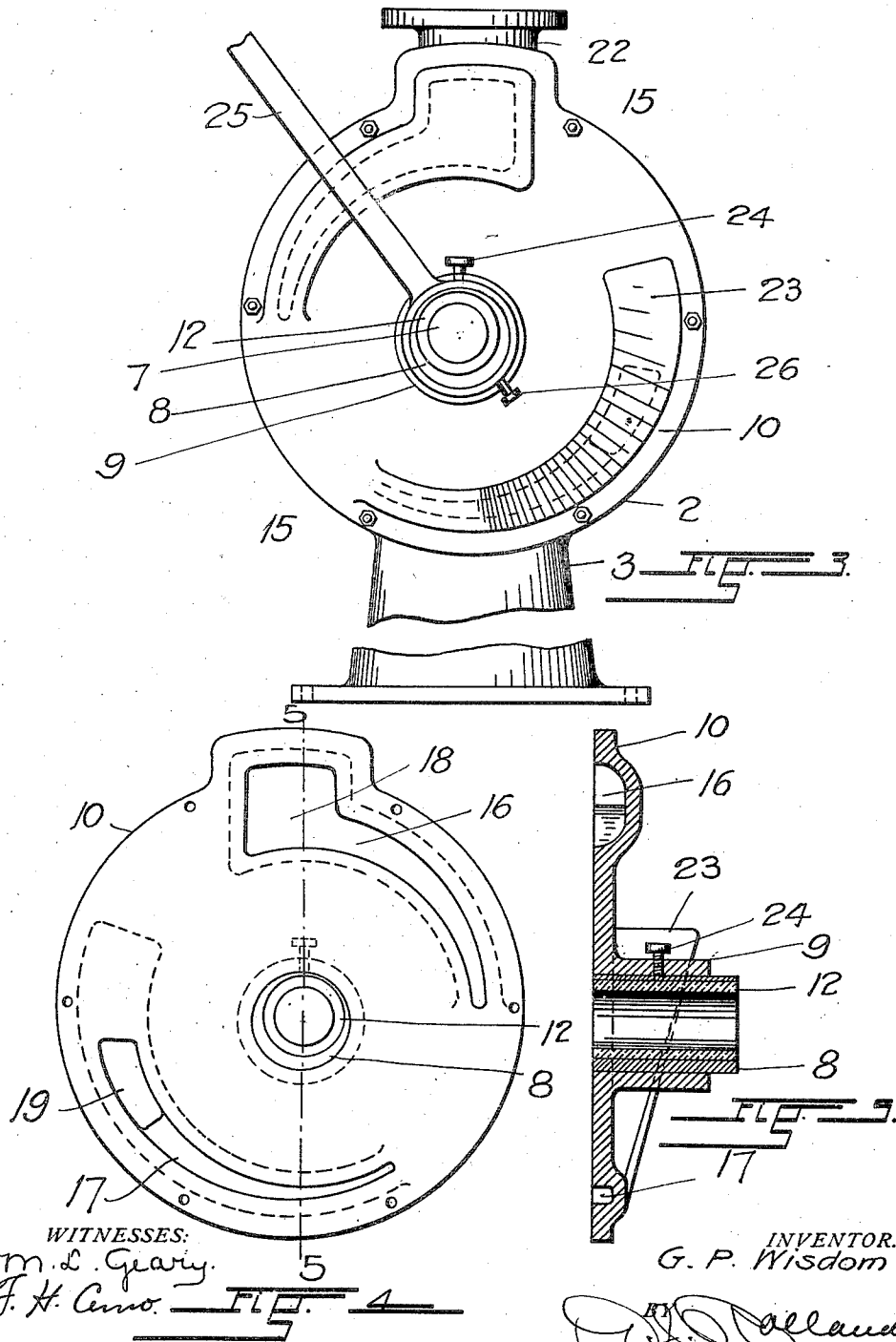
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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

GEORGE P. WISDOM, OF DENVER, COLORADO, ASSIGNOR OF ONE-THIRD TO WILLIAM H. PERRY AND ONE-THIRD TO JOHN C. ANDERSON, BOTH OF DENVER, COLORADO.

AIR-PUMP.

1,051,360.

Specification of Letters Patent.

Patented Jan. 21, 1913.

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To all whom it may concern:

Be it known that I, GEORGE P. WISDOM, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Air-Pumps, of which the following is a specification.

This invention relates to air pumps of the type characterized by a cylinder in which a rotatory element is eccentrically mounted and provided with pistons which, during the movement of the said element, are centrifugally brought in contact with the inner surface of the cylinder.

My invention is particularly adapted to be used in connection with a vacuum cleaning system and its principal object resides in the provision of a rotary pump of simple, though highly efficient construction, in which the friction between the moving and stationary parts is reduced to a minimum and which in consequence may be operated at a high rate of velocity and driven in direct connection with the shaft of a motor.

Other objects of my invention reside in providing a means whereby the resistant influence of the displaced air upon the rotatory and reciprocatory parts of the pump is substantially eliminated; in the provision of a mechanism which will displace the maximum amount of air admitted through the inlet port of the pump in the minimum of time, and in providing an adjustment through the instrumentality of which the capacity of the pump may be varied and the flow of air between its inlet and exhaust ports may be reversed without changing the direction of rotation of its rotatory element.

I attain the above objects, as well as others of minor importance, by the mechanism illustrated in the accompanying drawings in the various views of which like parts are similarly designated and in which—

Figures 1 and 2 represent, central, vertical sections through the apparatus respectively along planes at right angles to each other, the movable parts having been shown in elevation, Fig. 3, a side elevation of the device, Fig. 4, an inside view of one of the cylinder heads and Fig. 5, a section taken along the line 5—5, Fig. 4.

Referring to the drawings by numerals, 2 designates the hollow cylindrical housing which is supported upon a therewith inte-

gral pedestal 3, and in which a rotatory drum 4 is eccentrically mounted. The drum 4 is provided with a plurality of equidistant, radial slots 5 in which pistons 6 have a reciprocatory movement. During the rotary movement of the drum 4, these pistons are, centrifugally, projected against the inner surface of the drum, and to reduce the consequent friction, they are composed of hollow, open-ended cylinders which have a rolling contact with the cylinder wall and which are constantly cooled by the air circulating through their interiors.

The drum 4 is rigidly mounted upon a shaft 7 the ends of which project through eccentric bores in bearing-sleeves 8 which are adjustably mounted in hollow bosses 9 extending outwardly from the cylinder-heads 10, and which are lined with bushings 12 of Babbitt or other suitable material for the usual purpose. A coupling 28 attached at one end of the shaft 7 serves to operatively connect it with the shaft of a motor.

The cylinder-heads 10 which are secured to external flanges 14 on the housing, by means of bolts 15, are formed in their inner surfaces with depressions 16 and 17 which from points 18 and 19, at opposite sides of the point of nearest approach 20 of the drum 4 to the inner surface of the cylinder 2, taper in opposite directions toward the said point of approach, and terminate in close proximity thereto. The depressions 16 register at their widest portions with a laterally extending duct 21 in the upper portion of the housing, which communicates with the centrally disposed air-inlet 22, and the depressions 17 through which, in practice, the air is exhausted from the cylinder, connect at their widest extremities with the orifices of outwardly flaring exhaust conduits 23 formed integral with the heads 10.

The eccentric sleeves 8 which are held against rotation by means of set-screws 24, project beyond the ends of the bosses 9, and their exterior portions are fitted in correspondingly bored extremities of levers 25 to which they are secured by the use of set screws 26. The levers 25 are connected by means of a cross-bar 27 for the purpose of insuring a simultaneous and corresponding movement of the bearing-sleeves 8 in the bosses 9, when it is desired to adjust the position of the element 4 relative to the cylinder in which it is mounted.

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In the operation of my improved air-pump; during the process of cleaning by vacuum, the inlet 22 is connected with the end of a preferably flexible conduit, which at its free extremity, carries a nozzle which is held in contact with a surface to be cleaned. The rapid rotatory movement of the element 4 and the therewith associated pistons 6, which are centrifugally projected against the inner surface of the cylinder 2, creates a vacuum by which the air together with the dirt and dust, is drawn through the nozzle and the flexible conduit, into the cylinder and between each two consecutive pistons which convey it to the exhaust passages 17 and the therewith communicating ducts 23, through which it is discharged into the open. The tapering passages 16, which communicate with the inlet 22, convey a part of the indrawn air to a point in close proximity to the point of nearest approach 20 of the drum 4 with the surface of the cylinder, and the air occupying the said passage is in gradually increasing quantities displaced by a piston moving in the direction of the arrow in Fig. 1, upwardly from said point of approach, until it has passed the widest extremity of the depressions 16, whence the body of air confined between the said piston and the preceding one is conveyed to the exhaust ports.

Inasmuch as by the above described arrangement, the pistons are at no time brought in sudden contact with the body of air drawn into the cylinder through the inlet 22, the rotatory movement of the element 4, will be equable and uniform. The gradual admission of air between each two consecutive pistons while they approach the point of inlet insures the displacement of the entire body of air drawn in each time a piston passes the port 22, and back pressure of the air against the piston approaching the said port is substantially negated by the air which, entering the space between said piston and the succeeding one from the passages 16, prevents the formation of even a partial vacuum. The tapering passages 17 which extend from the point of exhaust 19 to the point of approach 20, are also an essential factor in the effective operation of the pump. They positively prevent air being carried in between the consecutive pistons past the point 20 and thus insure the discharge of the entire body of displaced air.

To reverse the operation of the pump for the purpose of forcing air into the conduit connected with the inlet 22 instead of exhausting it therefrom, the position of the drum is, by manipulation of the levers 25 and through the instrumentality of the eccentric bearing-sleeves 8, adjusted until its point of nearest approach to the interior surface of the cylinder is diametrically opposite to that shown in the drawings, with

the result that while the direction of rotation of the element 4 remains unchanged, the air will now be drawn in through the exhaust ducts 23 to be discharged through the outlet 22.

By changing the position of the point of nearest approach of the drum, in between the adjacent extremities of the passages 16 and 17 the capacity of the pump, *i. e.* the quantity of air taken in by each piston, may be varied within predetermined limits.

As the rollers move through a comparatively small arc while conveying air from the inlet- to the exhaust ports, heating due to compression of the air as well as its frictional contact with the cylinder wall, is materially reduced, the circulation of air through the hollow pistons, constantly cools them, while the rolling contact of the pistons with the interior surface of the housing produces but little friction between the moving and relatively stationary parts.

The above enumerated features cooperate in permitting the operation of the pump at a high rate of speed so that it may be directly connected with the shaft of a motor.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. An air pump comprising a rotary element formed with a series of radial slots; a hollow cylinder wherein said element is eccentrically mounted provided at one side of the point of nearest approach of the said element to its circumferential surface with an air outlet port, and at the opposite side thereof with an air inlet port; and a series of open-ended hollow pistons disposed in said slots and adapted to move centrifugally when said element is rotated, the end members of the cylinder being formed upon their inner surfaces with pairs of alining arcuate air passages which taper in opposite directions toward the said point and which communicate at their widest portions one with the inlet port and the other with the outlet port, to relieve compression and back pressure, the ends of said pistons registering with the adjacent passages during a portion of their travel with said element to permit a circulation of air through their interiors.

2. An air pump comprising a rotary element formed with a series of radial slots; a hollow cylinder wherein said element is eccentrically mounted provided at one side of the point of nearest approach of the said element to its circumferential surface with an air outlet port, and at the opposite side thereof with an air inlet port; and a series of pistons disposed in said slots and adapted to move centrifugally when said element is rotated, the end members of said cylinder being formed upon their inner surfaces with pairs of alining arcuate air passages which

taper in opposite directions toward the said point and which communicate at their widest portions one with the inlet port, and the other with the outlet port, to relieve
5 compression and back pressure.

3. An air pump comprising a rotary element formed with a series of radial slots; a hollow cylinder wherein said element is eccentrically mounted provided at opposite
10 sides with air inlet and exhaust ports, the end members of said cylinder being formed upon their inner surfaces with pairs of air passages which communicate one with the inlet port and the other with the outlet

port; and a series of open-ended hollow pistons 15 disposed in said slots and adapted to move centrifugally when said element is rotated, the ends of said pistons registering with the adjacent passages during a portion of their travel with said element to permit
20 a circulation of air through their interiors.

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

GEORGE P. WISDOM.

Witnesses:

G. J. ROLLANDET,
J. C. ANDERSON.