J. BUCKLEY.

AIR PUMP.

APPLICATION FILED MAY 14, 1915.

1,185,473.

Patented May 30, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

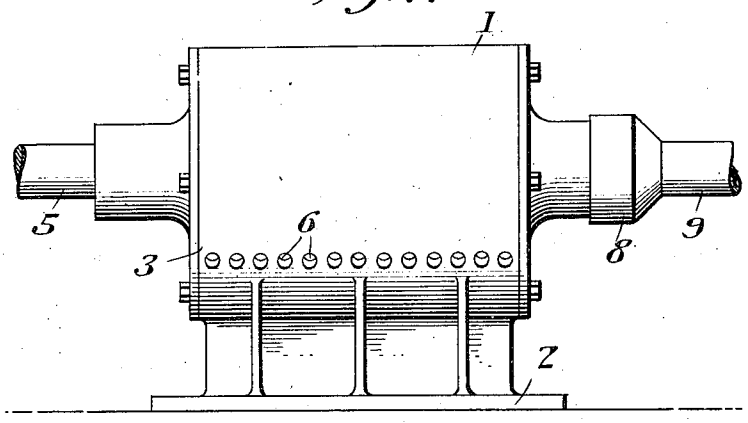
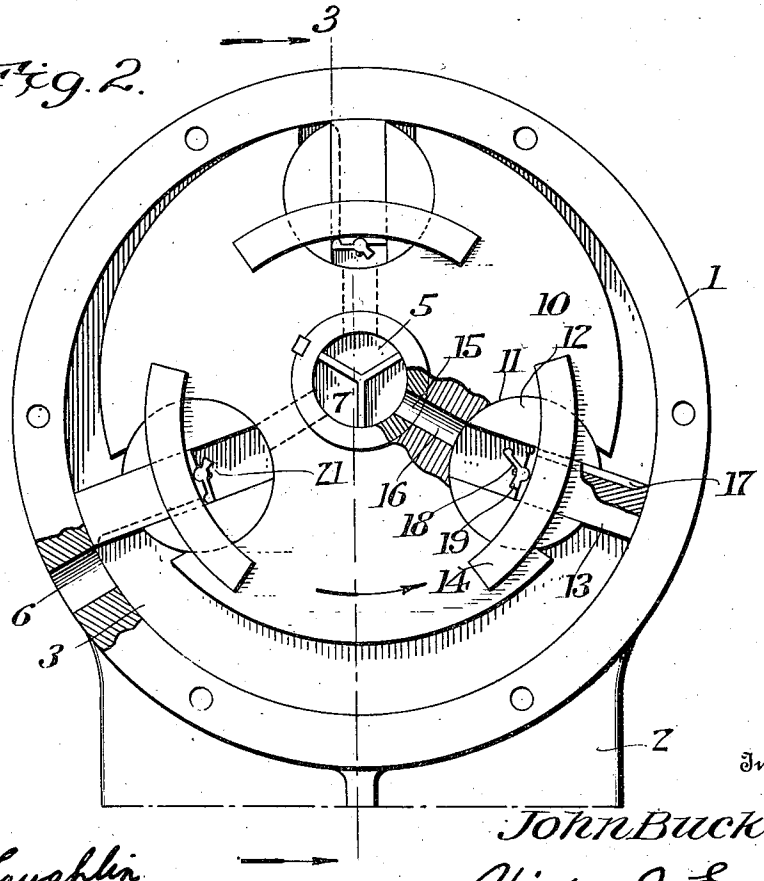


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

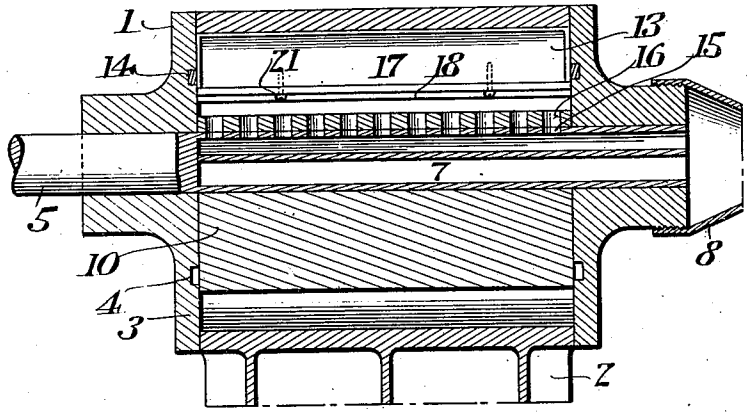


Fig. 4.

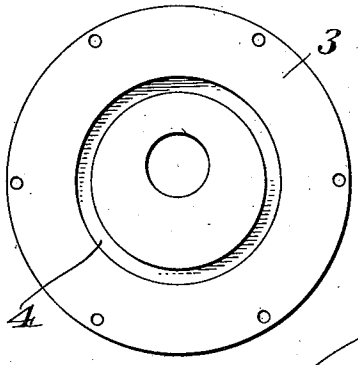


Fig. 5.

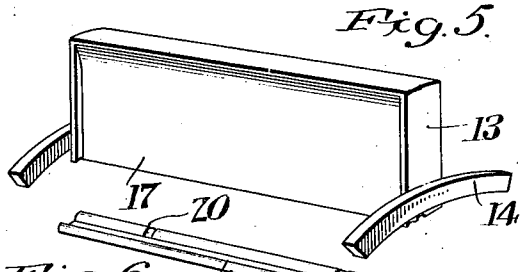
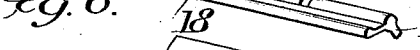


Fig. 6.



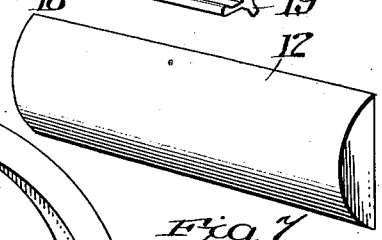
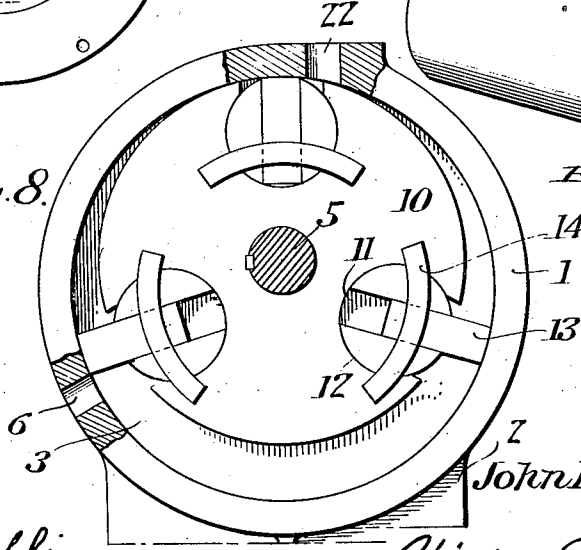


Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN BUCKLEY, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO WILLIAM H. BOURNE.

AIR-PUMP.

1,185,473. Specification of Letters Patent. Patented May 30, 1916.

Application filed May 14, 1915. Serial No. 28,171.

To all whom it may concern:

Be it known that I, JOHN BUCKLEY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Air-Pumps, of which the following is a specification.

This invention relates to an air pump which may be used in the capacity of a force pump or suction pump as desired, and it consists in the novel features hereinafter described and claimed.

An object of the invention is to provide a pump of simple and durable structural arrangement adapted to be used in either of the capacities mentioned, the pump primarily including a cylindrical stator, having means for admitting the passage of air therein and the exit of air therefrom. A rotor is journaled in the stator and rotates about an axis eccentrically positioned with relation to the stator. Abutments are movably mounted in the rotor and carry guide strips which are located in annular grooves provided at the heads of the stator. The said grooves are concentrically arranged with relation to the stator, consequently during the rotation of the rotor, the abutments are moved radially therein and the outer edges of the abutments are at all times maintained in contact with the inner surface of the stator.

In one form of the invention the parts are so arranged that the air is discharged through the shaft which carries the rotor and the abutments are provided with side recesses adapted to be closed at intervals by valves mounted upon the said abutments. The said valves are moved or operated by the pressure of the air at the opposite sides therof, and as the pressure at the opposite sides vary the valves are thereby, and at predetermined intervals, moved from open to closed positions and vice versa.

In another form of the invention the features are so arranged that the air exits through the side of the stator and in this form the abutments are devoid of the valves and recesses referred to in conjunction with the brief statement of the features of the first mentioned form of the invention.

In the accompanying drawings:—Figure 1 is a side elevation of one form of the pump. Fig. 2 is an end elevation of the form of pump shown in Fig. 1, with one of the heads removed and showing parts in section. Fig. 3 is a vertical transverse sectional view of the pump cut on the line 3—3 of Fig. 2. Fig. 4 is a plan view showing the inner face of one of the heads of the stator. Fig. 5 is a perspective view of one of the abutments as used in the form of invention shown in Figs. 1 to 3 inclusive. Fig. 6 is a perspective view of a valve used in conjunction with the abutments shown in Fig. 5. Fig. 7 is a perspective view of a guide block for the abutment and Fig. 8 is an end elevation of a modified form of the pump with one of the heads of the stator removed and showing parts in section.

As illustrated in the accompanying drawing the pump comprises a stator 1 of cylindrical configuration and mounted upon a suitable base 2. Heads 3 close the ends of the stator 1 and are provided at their inner surfaces with annular grooves 4 arranged concentrically with relation to the cylindrical stator 1. A shaft 5 is journaled for rotation in the heads 3 and the said shaft traverses the length of the cylindrical stator 1. The axis of the shaft 5 is eccentrically positioned with relation to the stator 1, and therefore, the said shaft is also eccentrically positioned with relation to the annular grooves 4 of the heads 3.

In the form of the invention as shown in Figs. 1, 2 and 3, the stator 1 is provided with a series of air inlet ports 6 and the shaft 5 is provided with a series of longitudinally disposed channels 7, which serve as air exit passage ways for the pump in the manner hereinafter described. The channels 7 traverse the length of the stator 1 and continue to one end of the shaft 5 as best shown in Fig. 3 of the drawing. At that end of the shaft one of the heads 3 is provided with a fitting 8 by means of which an air pipe 9 is connected with the said head 3 of the pump.

In both forms of the invention, a rotor 10 is mounted upon the shaft 5 and the periphery of the rotor is tangent with the inner surface of the stator 1. The rotor 10 is less in diameter than the internal diameter of the stator and inasmuch as the shaft 5 is eccentrically positioned in the stator, the entire periphery of the rotor, except the said point of tangency, is spaced from the inner surface of the stator. The rotor 10 is pro-

vided with a series of pockets 11, preferably three in number, and the said pockets are arcuate in transverse section. The pockets 11 traverse the length of the rotor 10 and the said pockets at their outer ends open at the periphery of the rotor. Blocks 12 are turnably mounted in the pockets 11, the said blocks having arcuate outer sides which fit snugly against the walls of the pockets, and being provided at their inner sides with plane surfaces, the plane surfaces of the blocks in the same pockets being spaced from each other. Abutments 13 are movably mounted in the pockets 11 between the inner plane surfaces of the blocks 12 turnably mounted therein. Arcuate guide strips 14 are fixed to the ends of the abutments 13 and are received in the annular grooves 4 provided at the inner sides of the heads 3.

In the form of the invention as shown in Figs. 1 to 3 inclusive, the shaft 5 is provided with radially disposed ports 15 which communicate at their inner ends with the channels 7. The outer ends of the ports 15 communicate with ports 16 provided in the rotor 10. The outer ends of the ports 16 communicate with the pockets 11 at the points thereof located nearest the axis of the rotor 10. The abutments 13 are provided at one side with recesses 17, the outer ends of which terminate short of the outer ends of the said abutments, but the inner ends of which extend to the extreme inner edges of the abutments. A valve 18 is pivotally mounted at the inner ends of each of the abutments 13 and at times is adapted to close the inner end of the recesses 17 in the said abutment. The valve 18 is provided with a shank 19 which is adapted to engage the inner end of the abutment, whereby the swinging movement of the said valve is limited. Each valve 18 is provided with a series of openings 20, through which studs 21 pass whereby the valves are secured in position upon the abutments 13, it being understood that the openings 20 are sufficiently large to permit the valve to have a proper amount of swinging or pivoted movement.

In operation power is applied to the shaft 5 whereby the same together with the rotor 10 are rotated in the direction as indicated by the arrow in Fig. 2 of the drawing. As the abutments 13 successively pass the inlet ports 6, the air is drawn into the stator 1, through the said ports and follows a preceding abutment. When a succeeding abutment crosses the ports 6 the plenum of air which has entered the stator 1 is trapped between two adjacent abutments which extend beyond the periphery of the rotor 10 and have contact with the inner surface of the stator 1. This volume of air is carried around in the stator 1 and as the space between the periphery of the rotor 10 and the inner surface of the said stator gradually diminishes the air is compressed and is forced up through the recess 17 of the succeeding or following abutment and when the air is compressed to a sufficient degree, the valve 18 is forced by the pressure of the said volume of air away from the inner end of the recess and consequently, the air passes through the space between the inner surfaces of the blocks 11 and the ports 16 and 15 and enters one of the channels 7 of the shaft 5. As the abutments 13 approach the inlet ports 6 from the point of tangency between the rotor and the stator, the valves 18 are maintained in closed positions at the inner ends of the recesses 17 by the back pressure of the air which has previously been compressed in the channels 7 and the said valves remain in the said closed position until the pressure of the air at the outer side of the rotor is increased to such a degree as to overcome the pressure of the air in the channels 7 when the valves are moved to the open position indicated at the right in Fig. 2, and the compressed air is permitted to enter the channels 7 of the shaft 5.

As the rotor 10 is turned in the stator 1 the guide strips 14 follow the annular grooves 4 so that the outer ends of the abutments 13 are at all times maintained in contact with the inner periphery of the stator 1. The compressed air which is delivered into the channels 7 of the shaft 5 may pass through the pipe 9 to any suitable receptacle, (not shown) or may be employed for any useful purpose. Therefore the pump has a suction action in drawing the air into the stator and the air is expelled or forced from the pump under pressure.

In the form of the invention as shown in Fig. 8 of the drawing, the stator 1 is provided at its side with outlet ports 22 and in this form of the invention the shaft 5 is made solid throughout. Also the abutments 13 are devoid of valves and there is no communication between the center of the shaft 5 and the pockets 11 as is the case in the form of the invention hereinbefore described. In this form of the invention as the shaft 5 is rotated the air enters the stator 1 through the inlet ports 6 and is compressed in a manner similar to that described in conjunction with the form of the invention shown in Figs. 1 to 3 inclusive. When the volume of compressed air is brought under the outlet ports 22 it passes through the same where it may be employed for any useful purpose.

In both forms of the invention, as the abutments are carried around the stator 1 the guides 14 follow the grooves 4 which are concentric with relation to the stator 1 and eccentric with relation to the axis of the shaft 5. Therefore, the blocks 12 permit the abutments 13 to rock laterally and hence the outer edges of the said abutments are main-

tained in proper contact with the inner surface of the stator during the rotation of the rotor.

Having described the invention what is claimed is:—

1. A pump comprising a stator having an inlet port, a rotor journaled in the stator upon an axis fixed eccentric with relation to the stator, said rotor having peripheral pockets, blocks turnably mounted in the pockets, abutments located between the blocks, means for holding the ends of the abutments in contact with the inner surface of the stator, channels provided at the center of the rotor, ports communicating with the pockets and the said channels, said blocks having recesses and valves pivotally mounted at the inner ends of the blocks and adapted to close said recesses.

2. A pump comprising a stator having an inlet port, a rotor journaled in the stator upon an axis fixed at an eccentric position with relation to the stator, said rotor being provided with centrally located channels, said rotor having peripheral pockets which are arcuate in transverse section, blocks having arcuate surfaces which bear against the surfaces of the pockets, said blocks in the said pockets having their inner surfaces spaced from each other, abutments located in the spaces between the inner surfaces of the blocks and provided at one side with recesses, valves pivotally mounted at the inner ends of the blocks and adapted to close the recesses and ports through the rotor connecting the pockets with the channels.

3. A pump comprising a stator, a rotor journaled in the stator upon an axis fixed at an eccentric position with relation to the stator, said rotor having peripheral pockets and provided at its center with channels and having ports connecting the pockets with the channels, the pockets being arcuate in transverse section, blocks turnably mounted in the pockets and having arcuate outer surfaces and plane inner surfaces, the inner surfaces of the blocks in the same pocket being spaced from each other, abutments movably mounted between the blocks in the same pocket and having at one side recesses which terminate short of the outer ends of the abutments, means for holding the outer ends of the abutments which contact with the inner surface of the stator, and valves mounted for limited movement at the inner ends of the abutments and adapted to close over the inner ends of the recesses.

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

JOHN BUCKLEY.

Witnesses:
WALTER COHAN,
GEORGE BOURNE.