

No. 661,860.

Patented Nov. 13, 1900.

R. A. GALLY.

AIR MOTOR OR PUMP FOR AUTOMATIC MUSICAL INSTRUMENTS, &c.

(Application filed Sept. 15, 1900.)

(No Model.)

Fig. 1.

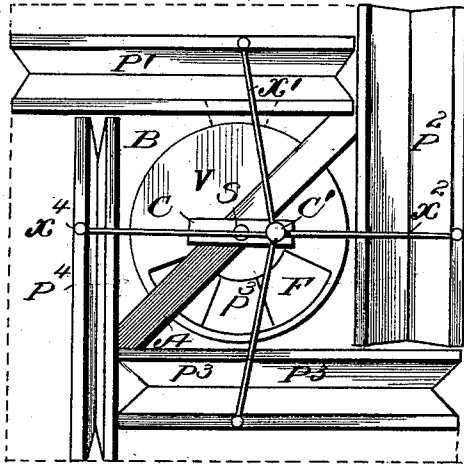


Fig. 3.

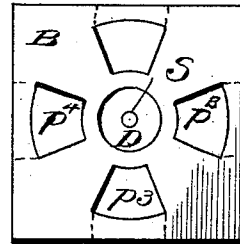


Fig. 2.

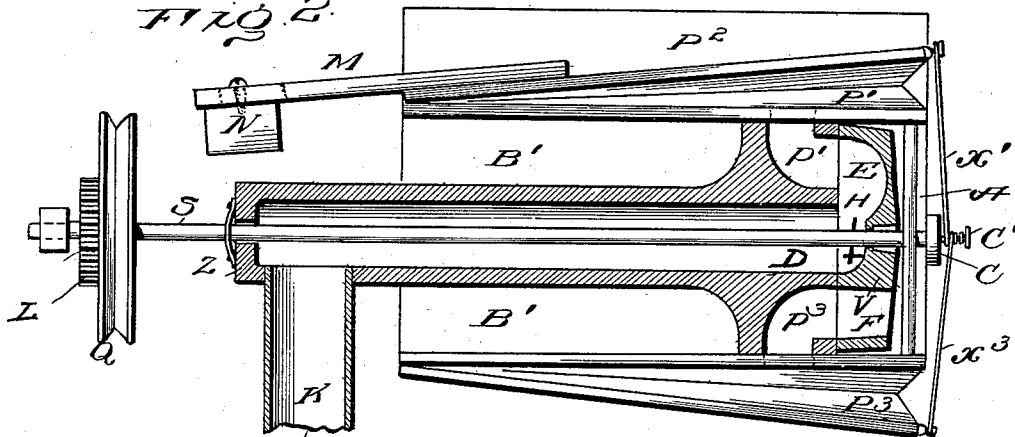


Fig. 4.

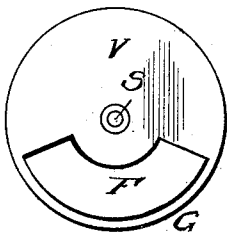


Fig. 5.

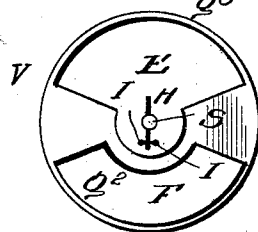


Fig. 6.

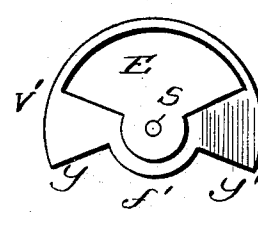


Fig. 7.



Witnesses

Johnnie
Chas. K. Davies.

Inventor

Robert A. Gally
By W. A. Bartlett

Attorney

UNITED STATES PATENT OFFICE.

ROBERT A. GALLY, OF NEW YORK, N. Y.

AIR MOTOR OR PUMP FOR AUTOMATIC MUSICAL INSTRUMENTS, &c.

SPECIFICATION forming part of Letters Patent No. 661,860, dated November 13, 1900.

Application filed September 15, 1900. Serial No. 30,134. (No model.)

To all whom it may concern:

Be it known that I, ROBERT A. GALLY, residing at New York, (Brooklyn,) in the county of Kings and State of New York, have invented certain new and useful Improvements in Air Motors or Pumps for Automatic Musical Instruments, &c., of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to pneumatic motors or pumps, the machine being reversible and capable of use as an air-pump, but primarily intended for use as a motor.

The object of the invention is to construct 15 a compact, quickly-acting, and noiseless motor for light-running machines, more particularly for automatic or self-playing musical instruments, but capable of other uses.

Figure 1 is an end elevation of the machine. 20 Fig. 2 is a longitudinal central section thereof. Fig. 3 is an end view of the central block or base. Figs. 4 and 5 are elevations of the rotary valve. Fig. 6 is a face view of a modification of valve, and Fig. 7 a section thereof.

25 The letter B indicates the base or rectangular block, containing the air-passages from the various pneumatics. This block is preferably square in cross-section for a purpose hereinafter stated; but other polygonal forms 30 may be used subject to suitable valve modifications. The block may be substantially solid at its outer faces or may be grooved out, as at B', so as to be a mere skeleton, but will form a base to which all the pneumatic bellows (known in the art as "pneumatics") will 35 be firmly attached. The block B has a central longitudinal conduit or passage D open at one end and closed at the other, but having a side opening K, from which the air is constantly exhausted when the device works as 40 a motor.

A shaft S passes centrally through the block, having its bearing at one end in a suitable 45 brace or support and its other bearing outside the other end of the block, the shaft passing loosely through an opening in the end of the block, where an air seal is formed by a disk of flexible material Z, tight on the shaft, but flexibly free to suck tight to the block.

50 The pneumatics P' P² P³ P⁴ are small bellows of usual construction attached to the base-block B, so that each pneumatic over-

laps the edge of the block, and consequently overlaps the edge of one of the adjacent pneumatics, being itself overlapped by a pneumatic at the other side. This overlapping arrangement of the pneumatics around a single 55 block is very important, as it gives great compactness, enables short pitmen to be used, and has many other advantages. At each 60 side of the block B, under the pneumatic, there is an air-passage, elbow-shaped, opening outwardly at the end of the block and inwardly to one of the pneumatics. These passages or ducts p' p² p³ p⁴ correspond to the 65 pneumatics, and there is free communication between the pneumatics and the corresponding ducts.

A single rotary valve V is carried on the shaft S. As shown, the valve has two pins I I 70 in its cupped inner face, and a pin H, passing through the shaft, lies between these pins I, thus compelling the shaft and valve to revolve together, but permitting a slight movement of the valve lengthwise of the 75 shaft. The valve V has a cup E in the face toward the block B, which cup is wide enough to overlap two of the end passages p' p² and central passage D when in position to do so. The valve also has a freeway or cut-away portion F, which also overlaps two of the pas- 80 sages p' p². The valve for strength and equalization of weight may have an edge bar G, as in Figs. 4 and 5, or this may be omitted, as in valve V, Figs. 6 and 7. The valve 85 should be as light as possible, and I have found a thin disk of aluminium, cupped to shape and balancing on the shaft, to answer with good results. The cup-valve lies closely 90 against the end of the block in which the passages are placed and is drawn against the end of the block by the exhaust through passage D.

The shaft S has a crank C firmly attached. From the crank-pin C' of this crank pitmen 95 x' x² x³ x⁴ extend to the outer board of the pneumatics or to pins or projections from said boards. These pitmen are so arranged that for the two opposite pneumatics one is open and the other closed when the pitmen 100 thus come to the common center, and at intermediate positions the pitmen will be "off center," as shown in Fig. 1.

The shaft S is provided with a suitable

driving-pulley Q or pinion L, or both, by which to transmit power when the device is run as a motor.

To secure ease of movement and noiselessness, each pneumatic may have a lever *m* and a counterweight *n* (or a spring equivalent thereto) attached thereto, the weight being movable, as is common.

Now, assuming the motor to be constructed substantially as shown and described and air to be exhausted through passage K D, said exhaust will draw air through cup E from one of the pneumatics if the cup be central with a passage, say *p'*, or from two pneumatics, say *p' p''*, if the cup of the valve be not central. (See Fig. 1.) When the valve-cup is central with the passage to a pneumatic, the pitman of the pneumatic is off center. When the valve-cup laps two of the passages *p' p''*, &c., at least one of the pitmen of the pneumatics with which the passages communicate is off center, so it is impossible that the machine should stop on a dead-center. The action described exhausts the air from within one or two of the pneumatics, and the outer atmospheric pressure collapses such pneumatic or pneumatics and causes the pitmen to start the crank and shaft in rotation. The shaft carries the valve with it and immediately makes connection with the next pneumatic in series, and the action is repeated therein. The opposite pneumatic, which must open as the exhausted one closes, (by reason of pitmen connection,) is in free communication with the outer air through freeway F and its passage, so that there is little or no resistance to the movement of pneumatics save a slight friction. The successive closing of the pneumatics causes a rotation of the shaft and valve, and the device may thus run as a motor as long as the exhaust continues at K. It is obvious that a reverse of movement of shaft would produce a suction through pipe K.

The construction described is the best with which I am now familiar. It is obviously capable of numerous modifications without change of principle.

What I claim is—

1. In a pneumatic motor or pump, the combination with a main block, of a series of pneumatics arranged around said block, each pneumatic overlapping the edge of an adjacent pneumatic, said main block having valve-controlled ports and a supply or exhaust passage in communication with the pneumatics.

2. In a motor or pump, the combination with a main block having ports and a conduit, of a series of pneumatics arranged around and communicating with said block, and a main shaft carrying thereon a cupped recessed valve which bears against a valve-seat on the block, and controls communication between said block and the pneumatics.

3. In a motor or pump, the combination with a main block having a central longitudinal

passage and a series of ports in its outer face, of pneumatics arranged around said main block and communicating with the said ports, and a revoluble valve engaging the outer face of said main block and having its inner face at one side of the center of a cup or recess, to successively connect the central passage with the surrounding ports, and to the opposite side of the center of an open or cut-away portion, to successively free out the several ports of the main block as the valve is revolved.

4. In a motor or pump, the combination with a main block having an exhaust-passage and a series of ports in its outer face, of a series of pneumatics arranged around and communicating with the ports in said main block, and a main shaft carrying thereon a revoluble cupped or recessed valve held in engagement with the outer face of the main block by the power of the exhaust.

5. In a motor or pump, the combination with a main block having a central longitudinal passage and a series of ports in its outer face, of pneumatics arranged around said main block and communicating with said ports, a main shaft extending longitudinally through the center of said main block, a revoluble valve on said main shaft adapted to engage the outer face of said main block and control the ports therein, connections between the pneumatics and the main shaft, and a pulley or equivalent device on the main shaft adapted to convey power from or to the main shaft, according as the device is used as a motor or pump.

6. In a motor or pump, the combination with the main block having valve-controlled ports and a conduit, of a series of pneumatics arranged around said main block and communicating therewith through said ports and conduit, and an adjustable counterweight secured to a pneumatic to balance the movement of the same.

7. In a pneumatic motor, a series of pneumatics arranged around a common center, a shaft at this center, pitmen connected to each pneumatic and to a crank on the shaft, air-ducts leading to all the pneumatics, and a single valve moving with the shaft and controlling all the air-ducts.

8. In a pneumatic motor, the combination with a single block having air-ducts, of a series of pneumatics surrounding the block and communicating with the ducts, and a single valve having a cup of width to connect a plurality of the ducts when in proper position, and means operated by the pneumatics for moving said valve.

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

ROBERT A. GALLY.

Witnesses:

FLINT W. WRIGHT,
EDWARD F. COYLE.