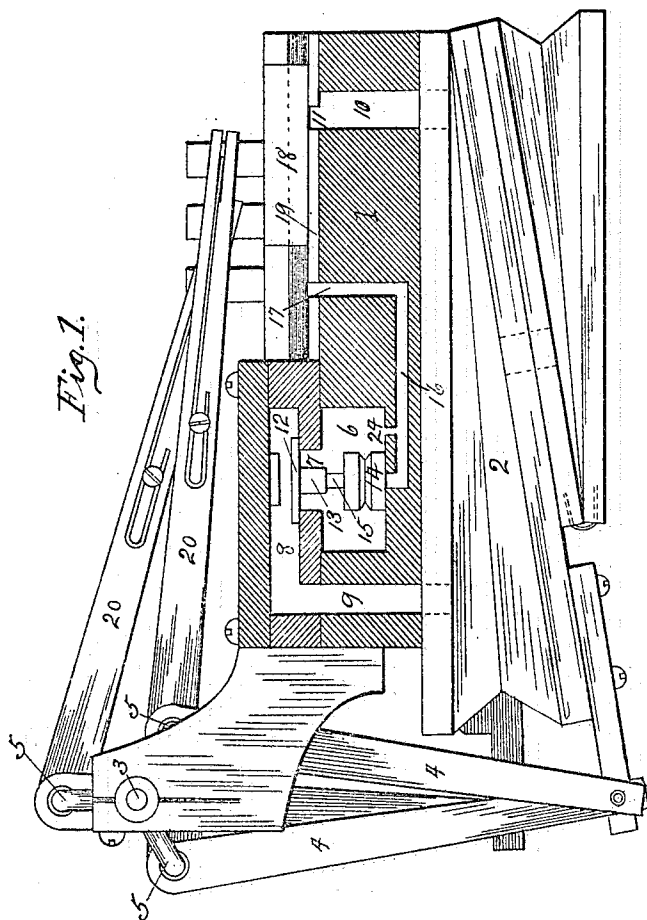


No. 809,919.

PATENTED JAN. 9, 1906.

L. U. JOBES.  
PNEUMATIC MOTOR.  
APPLICATION FILED DEC. 5, 1904.

3 SHEETS-SHEET 1.



WITNESSES:

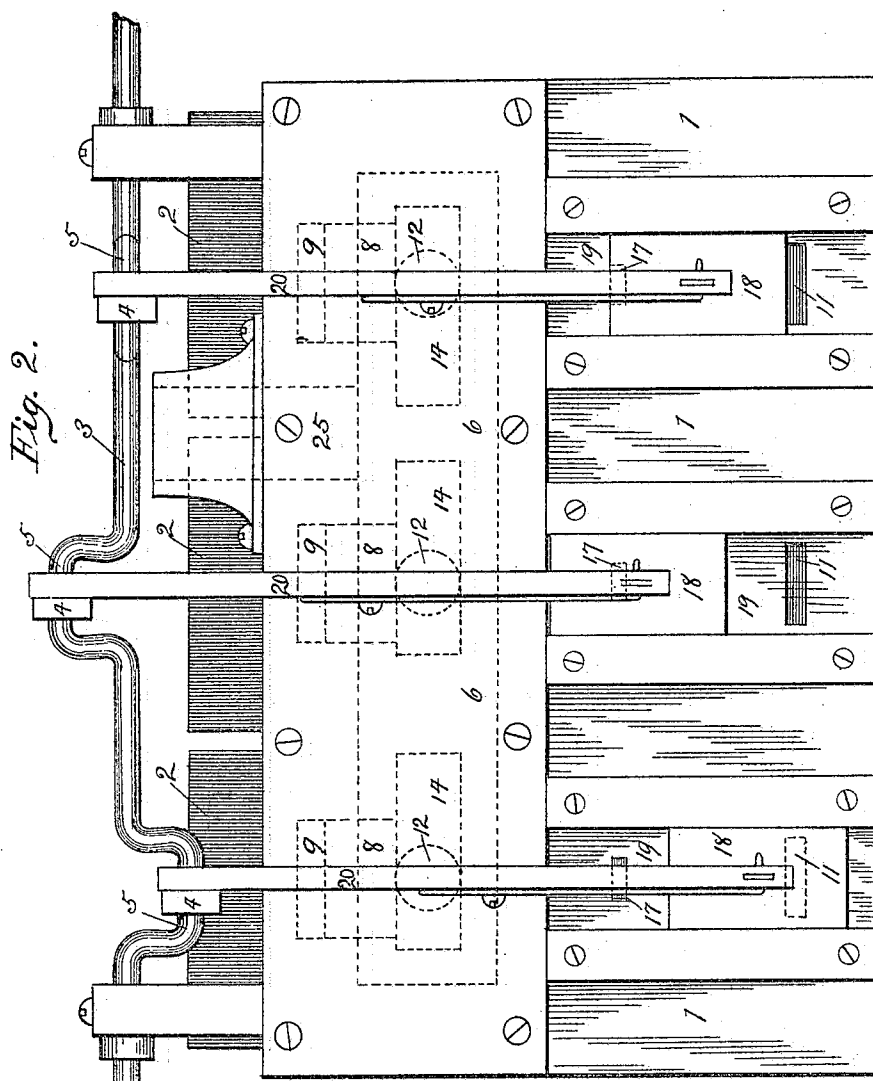
*J. W. Macy.*  
*J. H. Reim.*

INVENTOR.

*Lawrence U. Jobes.*

L. U. JOBES.  
PNEUMATIC MOTOR.  
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3 SHEETS—SHEET 2.



WITNESSES:

J. W. Macy.  
A. K. Blinn.

INVENTOR:

Lawrence U. Jobes.

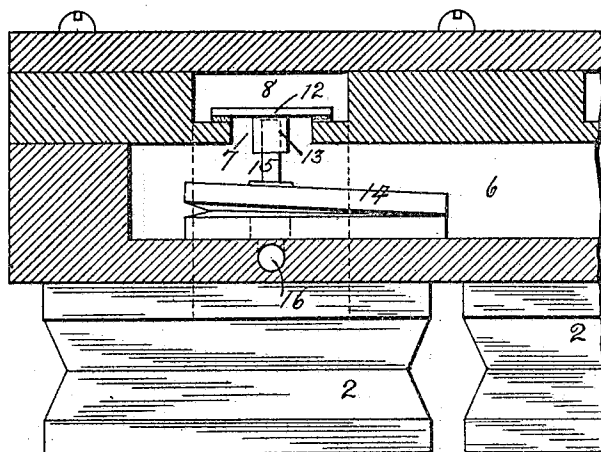
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3 SHEETS—SHEET 3.

*Fig. 3.*



WITNESSES:

*A. K. Blinn*  
*J. W. Macy*

INVENTOR.

*Lawrence U. Jobes*

# UNITED STATES PATENT OFFICE.

LAWRENCE U. JOBES, OF CINCINNATI, OHIO.

## PNEUMATIC MOTOR.

No. 809,919.

Specification of Letters Patent.

Patented Jan. 9, 1906.

Application filed December 5, 1904. Serial No. 235,545.

*To all whom it may concern:*

Be it known that I, LAWRENCE U. JOBES, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Pneumatic Motors, of which the following is a full description, reference being had to the drawings which form a part of this specification.

My invention relates to motors adapted for use in self-playing musical instruments operated by a suction or exhaust current of air.

The principal object of the invention is to provide a simple and efficient motor of the kind specified.

Referring to the accompanying drawings, Figure 1 is a side elevation of a pneumatic motor embodying my invention. Fig. 2 is a front elevation of the channel-board, showing the pneumatic mechanism. Fig. 3 is a sectional view through the channel-board, showing a valve and its operating-pneumatic.

Similar numerals of reference indicate corresponding parts.

To the rear of the channel-board 1 are placed the bellows 2, three or more in number, which drive the motor. In the drawings I show a motor having three bellows and three sets of passages and valves, with a motor-shaft having three corresponding cranks. The action of the bellows 2 is imparted to the shaft 3 by means of the link 4, the crank portions 5 being placed at an angle of one hundred and twenty degrees apart. By this arrangement the bellows 2 when they collapse will in turn act upon the motor-shaft through the medium of the links 4 and cranks 5, resulting in a continuous propulsion of the shaft.

Each of the bellows 2 is provided with a pneumatic and valve mechanism by which the air can be alternately admitted to and exhausted from its interior, as shown in Fig. 1. The exhaust-passage 6 consists of a channel extending transversely across the channel-board 1, the same being closed at the ends and having an opening 25 in the side thereof adapted to communicate with any suitable exhaust mechanism for maintaining suction or a partial vacuum therein. In the upper wall of said exhaust-passage a series of ports open into a series of valve-passages 8, in which are placed the valves which control the ports 7. A series of bellows-passages 9 connect the bellows 2 with the valve-passages 8, and by means of said passages and said ports communication is established between the bellows

2 and the interior of the exhaust-passage 6. While I preferably use a single exhaust-passage in combination with a series of bellows-passages and valve-passages, it is apparent that a series of exhaust-passages would not effect the efficiency of the motor. An air-passage 10 also communicates with the interior of the bellows 2 and is provided with an air-port 11, which communicates with the outside air. The exhaust-port 7 is controlled by a valve 12 of any suitable form. The valve shown consists of a disk having a socket 13 on the under side. The valve 12 is operated by a small pneumatic 14, placed under the same in the exhaust-passage 6, said pneumatic being connected with the valve 12 by the post 15.

The pneumatic-passage 16 communicates with the interior of the pneumatic 14 and leads to the outside air through the pneumatic-port 17, situated at the end of the pneumatic-passage. A small vent 24 extends from the pneumatic-passage into the exhaust-passage for the purpose of relieving the pneumatic 14, thus causing it to collapse quickly when the pneumatic-port is closed.

The air-port 11, leading to the air-passage 10, and the pneumatic-port 17, leading to the pneumatic-passage 16, are controlled by a single slide-valve 18, which works upon a suitable valve-seat 19. The slide-valve 18 is suitably connected with the shaft-crank 5 by the pitman 20 and is so arranged that it alternately opens and closes the ports 11 and 17 when the motor is in operation.

It will be seen that when the exhaust-passage 6 is under suction from the exhaust apparatus the motor will start, since one of the three pneumatic-ports 17 is always open to the air and its corresponding air-port 11, leading to the bellows 2, is closed. Under these conditions the suction in the exhaust-passage 6 causes the pneumatic 14 to expand with air entering through the passage 16, the valve 12 is raised from its seat, and the bellows 2 is caused to collapse, the air passing through the bellows-passage 9, the valve-passage 8, and the exhaust-port 7 into the exhaust-passage 6. Motion is communicated to the shaft 3 through the link 4 and the crank 5, which causes the same to revolve. As the shaft moves the slide-valve 18, actuated by the pitman 20, closes the pneumatic-port 17 and opens the air-port 11. This allows the suction in the exhaust-passage 6 to close the exhaust-port 7, and the bellows 2 expands with air entering through the air-port 11. As the three

bellows successively act upon the shaft 3 there results a continuous, even, and powerful rotation of the shaft.

What I claim as my invention is—

- 5 1. In a pneumatic motor the combination with a bellows, of a bellows-passage communicating therewith, a valve-passage leading from the bellows-passage to the exhaust-passage; an exhaust-passage communicating with  
10 the valve-passage by way of a port; a valve controlling said port; a pneumatic placed in said exhaust-passage operating said valve; a pneumatic-passage leading from said pneumatic in the exhaust-passage to the outer air  
15 with a pneumatic-port at the outer end thereof; an air-passage communicating with said bellows, having an air-port at the outer end thereof, the pneumatic-port and air-port being controlled by a single slide-valve, substantially as described.  
20
2. In a pneumatic motor the combination with a bellows, of a bellows-passage communicating therewith; a valve-passage leading from the bellows-passage to the exhaust-passage; an exhaust-passage communicating with  
25 the valve-passage by way of a port; a valve controlling said port; a pneumatic placed in said exhaust-passage operating said valve; a pneumatic-passage leading from said pneumatic in the exhaust-passage to the outer air  
30 with a pneumatic-port at the outer end thereof; an air-passage communicating with said bellows, having an air-port at the outer end thereof, the pneumatic-port and air-port being controlled by a single slide-valve, which  
35 alternately opens and closes said ports; and means for operating said slide-valve by the collapse of the bellows, substantially as described.
- 40 3. In a pneumatic motor the combination with a bellows, of a driving-shaft having bellows and valve-cranks; links connecting the bellows with said cranks; a bellows-passage and valve-passage leading from the bellows to the exhaust-passage, through a port in said  
45 exhaust-passage; a valve controlling said port; a pneumatic operating said valve; a pneumatic-passage leading from said pneumatic in

said exhaust-passage to the outer air, having a pneumatic-port at the outer end thereof; an  
50 air-passage leading from the bellows to the outer air, having an air-port at the outer end thereof, the pneumatic-port and air-port being controlled by a single slide-valve which alternately opens and closes said ports; and  
55 means for operating said slide-valve by the collapse of the bellows, substantially as described.

4. In a pneumatic motor the combination with a bellows 2 of a driving-shaft 3, having  
60 bellows and valve-cranks 5; links 4 connecting the bellows 2 with said cranks; a bellows-passage 9 and valve-passage 8 leading from the bellows 2 to the exhaust-passage 6, through a port 7 in said exhaust-passage; a valve 12  
65 controlling said port; a pneumatic 14 operating said valve; a pneumatic-passage 16 leading from said pneumatic in said exhaust-passage to the outer air, having a pneumatic-port 17 at the outer end thereof; an air-passage 10  
70 leading from the bellows 2 to the outer air, having an air-port 11 at the outer end thereof, the pneumatic-port 17 and air-port 11 being controlled by a single slide-valve 18 which alternately opens and closes said ports; and  
75 the pitman 20 connecting the valve 18 with the driving-shaft 3, by means of which the valve 18 is operated by the collapse of the bellows 2, substantially as described.

5. In a pneumatic apparatus, a structure  
80 providing an exhaust-passage 6, a valve-passage 8 communicating with said exhaust-passage by the port 7 and a valve 12 controlling said port; a bellows-passage 9 communicating with said valve-passage; a pneumatic-passage  
85 16 adapted to control a pneumatic in said exhaust-passage, said pneumatic-passage terminating in a pneumatic-port 17; an air-passage 10 having an air-port 11 and a single slide-valve controlling the ports 17 and 11, and  
90 means for operating said slide-valve, substantially as described.

LAWRENCE U. JOBES.

Witnesses:

J. W. MACY,  
H. K. BLINN.