

I. L. GRINNELL.
AIR MOTOR.
APPLICATION FILED MAY 6, 1911.

1,019,459.

Patented Mar. 5, 1912.

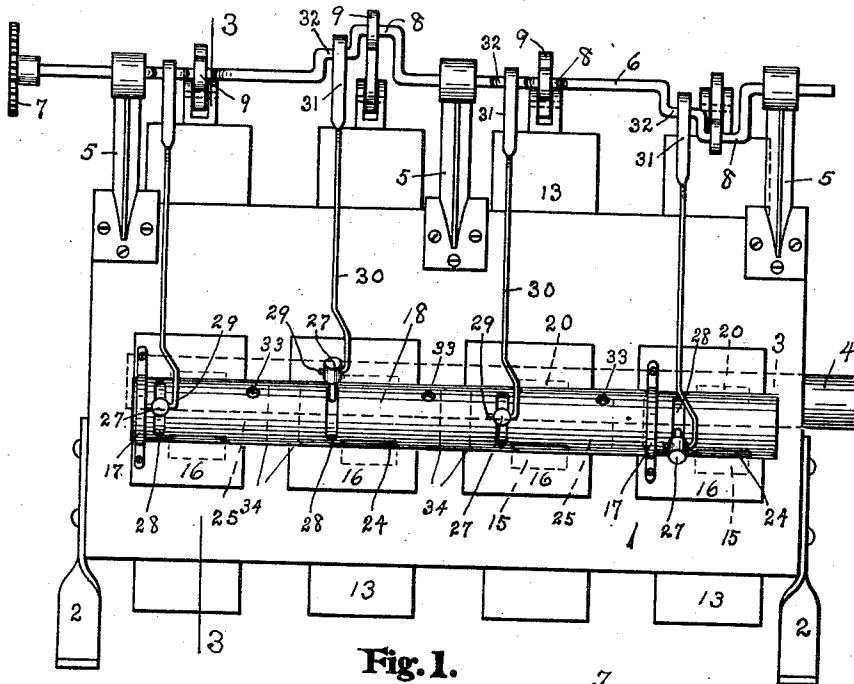


Fig. 1.

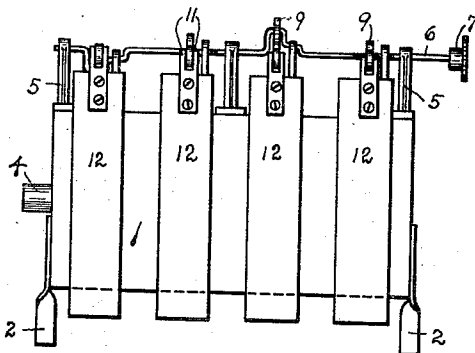


Fig. 2.

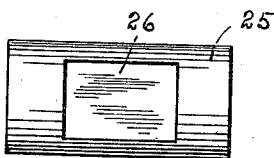


Fig. 4.

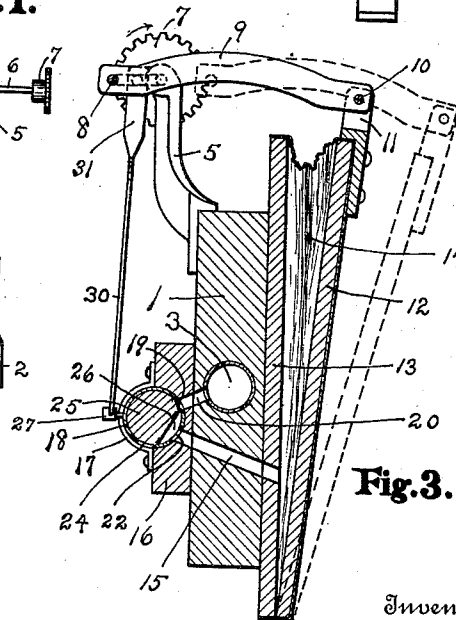


Fig. 3.

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IRA L. GRINNELL, OF DETROIT, MICHIGAN.

AIR-MOTOR.

1,019,459.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed May 6, 1911. Serial No. 625,516.

To all whom it may concern.

Be it known that I, IRA L. GRINNELL, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Air-Motor, of which the following is a specification.

This invention relates to motors adapted to be driven by the movement of air or other gases caused by a difference in the pressure within and that without certain portions of the motor, and its object is to provide a pneumatic motor especially adapted for winding and rewinding note sheets or rolls of automatic musical instruments such as "self-player" pianos and organs.

This invention consists in combination with a shaft and a series of pneumatics or bellows-motors, of a tubular valve casing, a series of valves rotatably mounted therein, one valve for each motor, and connections between the shaft and the valves, said valve casing being provided with proper ports.

In the accompanying drawing Figure 1 is a front elevation of this improved motor. Fig. 2 is a rear elevation of the same. Fig. 3 is a section on the line 3—3 of Fig. 1. Fig. 4 shows one of the valves.

Similar reference characters refer to like parts throughout the several views.

The motor shown in the drawing may be operated by either suction or pressure, and the direction of revolution of the shaft will depend upon whether suction or pressure is applied. When used with an automatic player in connection with either piano or organ, the music roll can be moved in either direction according to the direction of the flow of air. The mechanism may be mounted on a board 1, which is preferably provided with feet 2, and has a passage 3 into which extends a pipe 4 which connects to a source of supply of air or other gases under pressure, or is connected to a suction device of any desired type. Mounted on the board 1 are any desired number of brackets 5, in the upper ends of which is revoluble a crank shaft 6, on which shaft may be mounted any desired type of driving wheel 7 for the transmission of power. This crank shaft is provided with as many cranks 8 as there are bellows, and on each crank 8 is mounted a pitman 9 whose other end connects to a pin 10, extending through the lugs 11 at the upper end of a plate 12. This

plate 12 is hinged at its lower end to the plate 13 which is secured against the board 1 in any desired manner. Around the edges of the two plates 12 and 13 the strip of cloth 14 is secured so as to form air-tight sides of a compartment, the size of which will depend upon the distance between the upper ends of the plates 12 and 13. Passages 15 through the board 1, the plate 13 and the blocks 16, which carry the valve casing, permit the entrance and exhaust of the air or other gases.

The blocks 16 are secured to the board 1 and carry a tube 18 which forms the valve casing. This tube may be secured in place by straps 17. This tube is provided with ports 19 which open into passages 20 connected to the passage 3 in the board 1. The tube is further formed with ports 22 connecting with the passages 15 which connect to the pneumatics. It is further formed with ports 24 which open outward. Within the valve casing are a series of valves 25, each cut away at 26, and each supplied with an arm 27 which extends through a slot 28 in the valve casing. The arms 27 have holes in their outer ends through which the hooked ends 29 of the valve rods 30 extend. The upper end of the valve rods screw into the blocks 31 which are bored to receive the cranks 32 formed on the crank shaft. The valve casing is also provided with oil holes 33. The ends of the valves are indicated by dotted lines 34 in Fig. 1 and between the ends of the valves may be placed any desired absorbent material which will serve to keep the valve properly supplied with lubricants.

The operation of the device as a "suction" motor is as follows. The parts being in the position shown in Fig. 3, port 19 being closed, and port 24 not yet opened by the valve 25, the other pneumatic motors turn the shaft 6 in the direction of the arrow and turn the valve to the right, so that immediately the ports 24 and 22 will be in connection. The shaft and connecting rod will move the plate 12 outwardly, so that the bellows fill with air during the next half revolution. At the end of which, the plate 12 will be in the position shown in dotted lines and the valve will be back to the position shown in Fig. 3, but will be turning to the left. Immediately afterward the ports 19 and 22 will be connected, and during practically all that half-revolution

of the shaft, the suction in the passage will pull the plate 12 inward. With four pneumatics, a smooth even movement is obtained. The mechanism operates as a pressure motor in a similar manner but the shaft turns in the opposite direction. The valve-mechanism is unusually light running so that a few ounces of pressure or suction are sufficient to drive it.

10 Having now explained my construction, what I claim as my invention and desire to secure by Letters Patent is:—

1. In a motor comprising a series of pneumatics, the combination of a frame on which the same are mounted provided with a common air passage, a cylindrical tube extending along said frame and provided with three ports for each pneumatic, one connecting with the pneumatic, one connecting to the common passage and an intake port to the outside air, a cylindrical valve mounted in said tube for each pneumatic, means for independently oscillating each valve, and absorbent pads for lubricators separating the ends of the valves.

2. In a motor comprising a series of pneumatics, the combination of a frame on which they are mounted, said frame having a

main passage, a crank shaft mounted on the frame and having a crank for each pneumatic, a pitman extending from each pneumatic to its crank, a cylindrical valve casing extending along the frame and provided with three ports for each pneumatic, a series of cylindrical valves within the casing, one for each pneumatic, an arm extending through a transverse slot in said tube to each valve whereby the valve may be oscillated, and a rod connecting to the crank shaft and to each arm to operate each valve independently, one of said ports for each pneumatic connecting to a passage opening into the pneumatics, another to the main passage and the third opening to the outside air, each of said valves being formed so as to connect the pneumatic to the main passage and to the outside air alternately and lubricating pads separating the adjacent ends of the valves.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

IRA L. GRINNELL.

Witnesses:

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WALTER C. ROBINSON.