

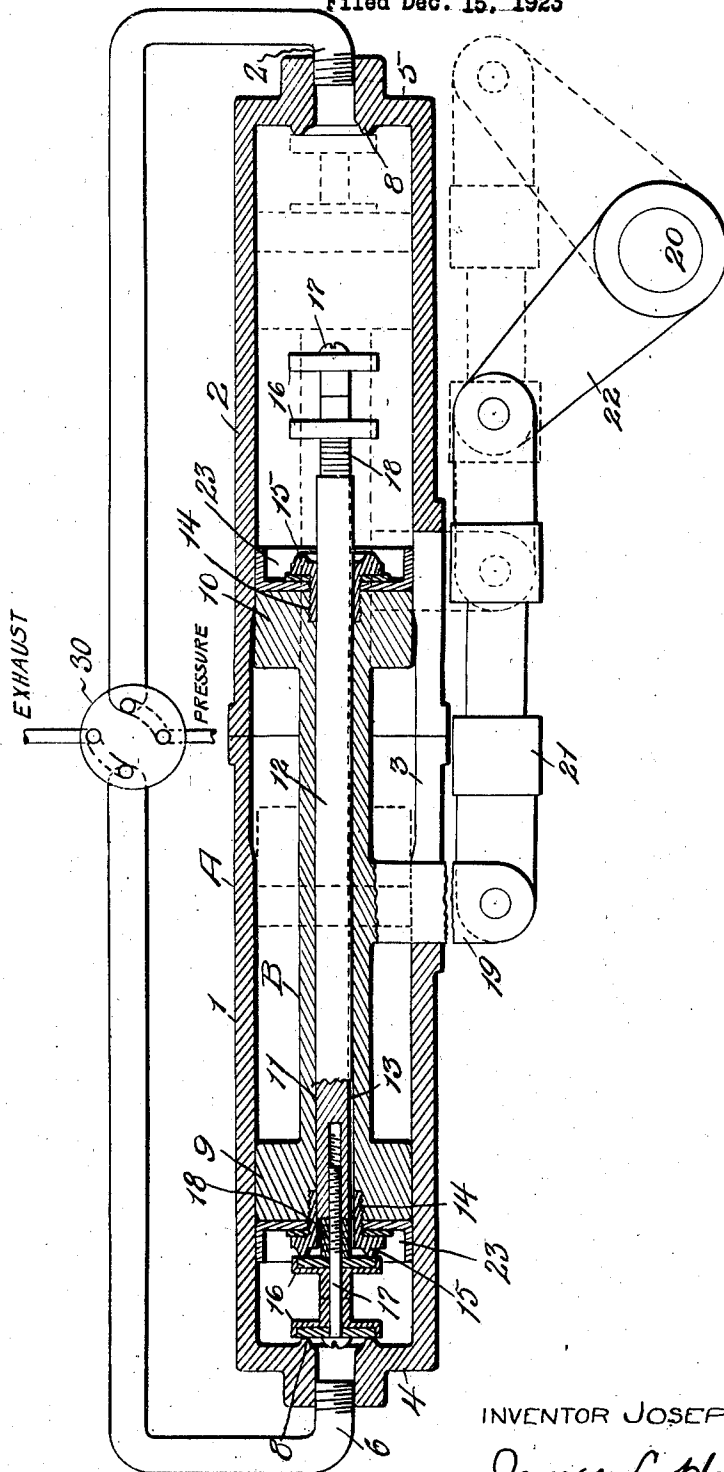
Jan. 21, 1930.

J. M. DAPRON

1,744,069

DOOR ENGINE

Filed Dec. 15, 1923



INVENTOR JOSEPH M. DAPRON,

by *James L. Hopkins* ATTORNEY.

# UNITED STATES PATENT OFFICE

JOSEPH M. DAPRON, OF ST. LOUIS, MISSOURI, ASSIGNOR TO NATIONAL PNEUMATIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF WEST VIRGINIA

## DOOR ENGINE

Application filed December 15, 1923. Serial No. 681,023.

My invention relates to improvements in door engines and has for its object to provide a pneumatic engine consisting of a cylinder having a median longitudinal slot, a double headed piston mounted in said cylinder and having a central arm extending through said slot; and a single slidable rod member axially mounted through said piston. Said slidable rod member may also have the capacity of adjustability as to its length.

### Drawings

The drawing is a longitudinal mid-sectional view of an engine embodying my invention.

### Description

The cylinder A is formed of the halves 1 and 2 and has the median slot 3, and heads 4 and 5 in which air-pipes 6 and 7 are centrally mounted, each head having an inwardly extending valve seat 8. The pipes 6 and 7 are so valve-controlled that when one is being used as an inlet the other is exhausted freely to atmosphere.

The pipes 6 and 7 are connected by an ordinary two-way valve 30 to a source of fluid pressure through pipe marked "Pressure." This valve also has the exhaust outlet marked "Exhaust."

Within the cylinder A is the double-headed piston B having the heads 9 and 10 and the axial bore 11 through which extends the rod 12 having the longitudinal air-vent or groove 13 formed on its surface.

Each of said heads 9 and 10 has a bushing 14 with an outwardly-extending valve seat 15.

The rod 12 carries at each end a pair of valve disks 16—16 mounted by means of a screw 17 and adjustably spaced from the rod 12 by a series of washers 18 whose number may be increased or diminished to alter the length of the shock-absorbing element.

A piston-arm 19 extends through the slot 3 from the body of the piston B at a point

midway its length, and actuates the operating shaft 20 through the connecting rod 21 and lever-arm 22. Each of the piston-heads 9 and 10 has a cupped washer 23 on its outer face.

### Mode of operation

The drawing shows the piston-arm 19 at the left end of its stroke, with the left-hand outer-disk 16 in contact with and closing the valve seat 8 on the head 4. To move the piston-arm 19 air is admitted through the pipe 6 behind piston 9 by turning valve 30 so as to connect pipe 6 with the pressure source, driving the disk 16 out of contact with said left-hand nipple 8, when the pressure will strike the left-hand cupped washer 23. The rod 12 and piston B will continue to move in unison until the right hand disk 16 strikes and seats against the right-hand valve seat 8, sealing the air space at the right of the piston-head 10 to form an air-cushion (the piston B continuing by force of its momentum and the pressure behind it to move to the right while the rod 12 is stationary). As soon as the disk 16 contacts with the valve seat 8, the cylinder 2 is cut off from exhaust and the pressure in this cylinder builds up due to the continued movement to the right of piston 10 and due to the air pressure which leaks from cylinder 1 through groove 13 into cylinder 2. As the pressure in cylinder 2 builds up, the pistons begin to slow down and when the pressure in cylinders 1 and 2 becomes equalized, the pistons become stationary. This is a gradual process so that the door or device connected to shaft 20 is brought to a gradual stop.

It is of course evident that the relative positions of pistons 9 and 10 may be adjusted so that disks 16 may or may not rest on seats 15 at the end of the stroke. This adjustment is secured by rotating the threaded screw 17 into or out of rod 12 the necessary distance. By this means the pistons can be stopped at any predetermined point in their travel.

As various embodiments may be made in

the invention above set forth and as many changes might be made in the structure hereinafore described, it is to be understood that all matter herein set forth is to be interpreted as illustrative and not in a limiting sense.

5 I claim:—

1. In an engine the combination with a cylinder having a double headed piston mounted at opposite ends of a connecting rod, said pistons and rod having an axial bore extending entirely through them of means in said bore extending from both ends of the connecting rod for effecting the cushioning of the pistons near the end of their stroke in either direction.

15 2. In an engine the combination with a cylinder having a double headed piston mounted at opposite ends of a connecting rod, said pistons and rod having an axial bore of means in said bore extending from both ends of the connecting rod for cushioning the pistons near the end of their stroke in either direction and fluid pressure connections for each end of the cylinder having control means for admitting fluid pressure to either end of the cylinder.

3. In an engine the combination with a cylinder having a double headed piston mounted at opposite ends of a connecting rod, said pistons and rod having an axial bore of slidably mounted means in and throughout the length of said bore and projecting beyond each end of the connecting rod to admit fluid pressure through said bore from the working end of the cylinder to the other end of the cylinder to cushion the piston when said slidably mounted means engages the end of the cylinder towards which the piston is moving.

4. In an engine the combination with a cylinder having a double headed piston mounted at opposite ends of a connecting rod, said pistons and rod having an axial bore of a rod mounted in said bore of a length greater than the piston assembly and means on said rod to admit fluid pressure into the opposite end of the cylinder from the working end to cushion the piston stroke.

5. In an engine the combination with a cylinder having a double headed piston mounted at opposite ends of a connecting rod, said pistons and rod having an axial bore of a grooved rod slidably mounted in said bore having two spaced disks mounted on each end, said rod being longer than the piston assembly and said disks cooperating with said pistons and the ends of the cylinder to admit fluid pressure to the exhausting end of the cylinder to cushion the pistons.

6. In an engine the combination with a cylinder having a double headed piston mounted at opposite ends of a connecting rod, said pistons and rod having an axial bore, of slidable means in said bore to cut off the cylinder exhaust and admit fluid pressure from the working end to the other end of the cylinder to cushion the pistons.

7. In an engine the combination with a cylinder having double headed piston assembly, said assembly having an axial bore of grooved means slidably mounted in said bore to cut off the exhaust port and admit fluid pressure to the exhausting end to cushion the piston assembly.

In testimony whereof I have hereunto affixed my signature.

JOSEPH M. DAPRON.