

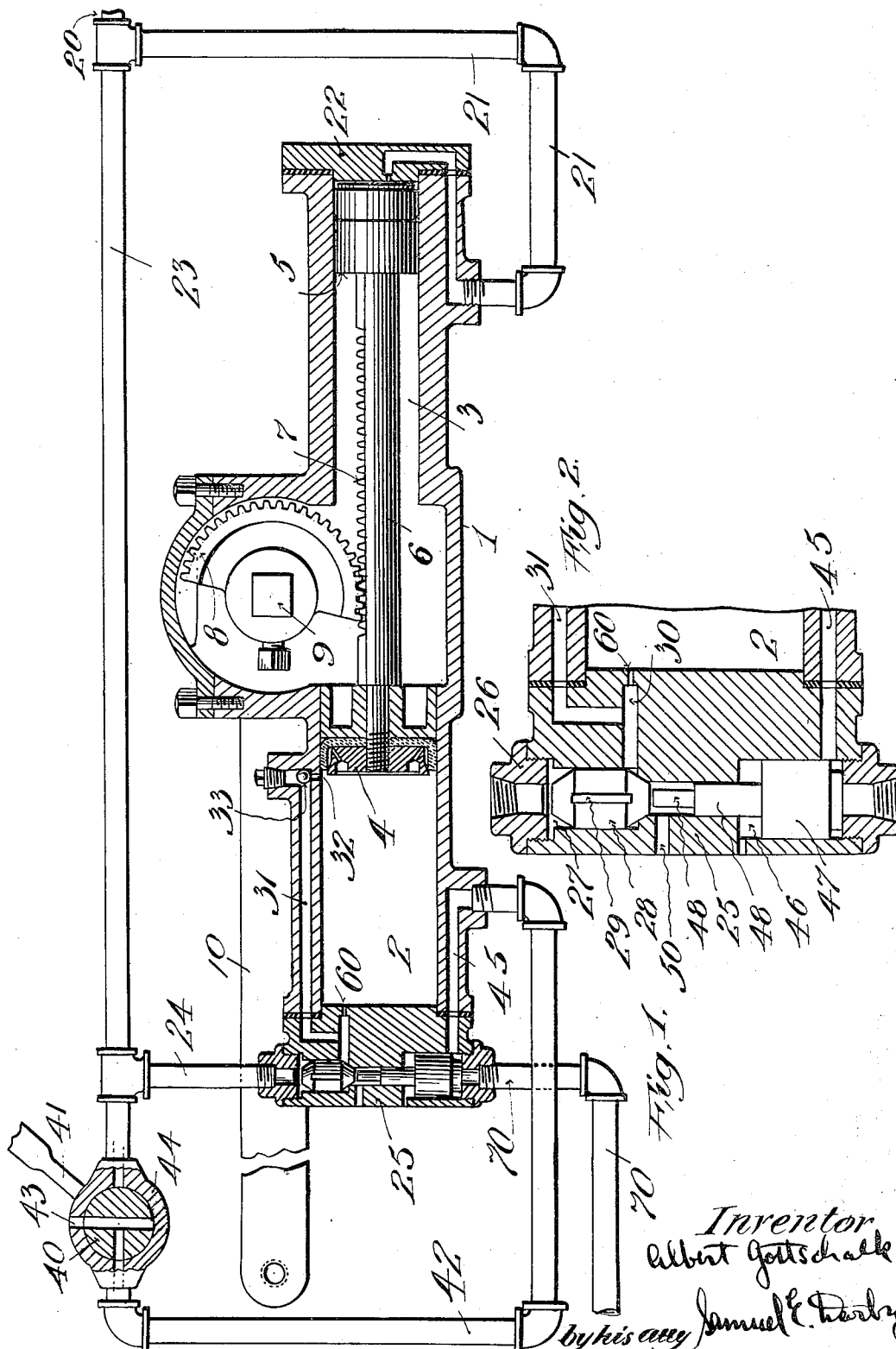
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A. GOTTSCHALK

PNEUMATIC MOTOR

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UNITED STATES PATENT OFFICE.

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PNEUMATIC MOTOR.

Application filed August 6, 1918. Serial No. 248,652.

To all whom it may concern:

Be it known that I, ALBERT GOTTSCHALK, a citizen of the United States, residing at New York, county and State of New York, have made a certain new and useful Invention in Pneumatic Motors, of which the following is a specification.

This invention relates to pneumatic motors, and particularly to motors of this type utilized principally for the operation of doors on cars, street cars, or the like.

The object of the invention is to provide a pneumatic motor which is simple in construction, efficient in operation, and economical of manufacture, and which requires little or no care or attention in upkeep.

A further object of the invention is to provide a motor of the character described utilizing the control thereof for securing proper cushioning of the motor at the limit of its working strokes.

Further objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown by the accompanying drawing, and finally pointed out in the appended claims.

Referring to the drawing:—

Fig. 1 is a view in section of a motor embodying my invention showing diagrammatically the piping layout used in connection therewith.

Fig. 2 is an enlarged sectional view of one head used with the motor of my invention.

The same part is designated by the same reference character wherever it occurs throughout the several views.

1 designates generally a pneumatic motor of the usual construction, comprising cylinders 2 and 3, within which operate pistons 4 and 5, the cylinder and piston 2 and 4 respectively being of different size than the cylinder and piston 3 and 5, thus constituting a differential type of motor. The respective pistons are connected by means of the piston rod 6 provided with the teeth 7 which mesh with and engage the segment gear 8 which is mounted on a shaft 9 and to which is secured the arm 10 for actuation of the door or the part to be moved. This is the usual construction of differential piston

type of pneumatic motors. Fluid pressure 55 is admitted through the pipe line 20 and through the line 21 to the casing 1 and through head 22 to a small port in front of the piston 5. It will be seen therefore that piston 5 is at all times in communication 60 with the source of fluid pressure. A joint line 23 communicates at all times with line 24, which communicates with the head 25 of the larger cylinder through a plug 26 to the chamber 27, which is controlled by a 65 valve 28, the sides of which valve are grooved as indicated at 29 to, in the position shown, established communication between the chamber 27 and a passage 30. The passage 30 communicates through a 70 small port 60 with the end of the cylinder 2, and through passage 31 and port 32 with the opposite end of the cylinder 2, port 32 being controlled in any suitable manner, for example, by means of a ball and check as 75 indicated at 33. The continuation of the line 23 is controlled by a valve 40, which valve may be controlled in any suitable manner, for instance, manually, by means of the handle 41, so that when the valve is in one position communication is established between 80 the line 23 and the line 42, and when the handle is turned in the other direction, for example, as shown, the line 42 is opened to exhaust through port 43 in the valve case 85 44. The line 42 leads to the casting 1 and through passage 45 to one end of the chamber 46 behind a piston 47 located within said chamber. The piston 47 is provided with plungers 48 adapted to bear against 90 one end of the valve 28 to move the same in the chamber 27, it being understood that when the valve 28 is in the position as shown in Fig. 2 communication between the passage 30 and line 24 is established, and communication between the passage 30 and the exhaust port 50 located in the head 25 communicating with the atmosphere is shut off. 95 Likewise when the valve 28 is in its opposed position communication between the line 24 and the passage 30 is shut off and communication between passage 30 and the exhaust port 50 is established. With the parts as shown and the valve 40 in the position indicated, it will be seen that any pressure that might be 100 located behind the piston 47 is exhausted through passage 45, line 42, through the valve 40, exhaust port 43 of the valve casing 44, 105

and fluid pressure passing from supply line 20, line 21, is constantly behind the piston 5, and at the same time through line 23 and 24, chamber 27, groove 29 of the valve 28, passage 30, port 60. Pressure is likewise admitted behind piston 4, and the piston 4 being of larger diameter than piston 5, the pressure on the ends thereof is unequal and consequently the parts assume the position shown, that is, for example, with the door closed. The minute, however, the valve 40 is shifted to establish communication between the lines 23 and 42 the following operation takes place—fluid pressure passes from the line 23 through valve 40, line 42, passage 45, behind the piston 47 causing the same to move upwardly in its chamber 46 and the plungers 48 thereof closing the passage leading from line 24 to chamber 27 and establishing communication between passage 30 and exhaust port 50 of the head 25. There will be instantly a comparatively large exhaust through port 32 raising the check valve 33 and therefrom through passages 31 and 30 to exhaust 50 allowing the pressure behind the piston 5 to cause the piston to move to the left in their cylinders. As soon, however, as the piston 4 passes by the port 32 the only egress for the pressure contained in the cylinder 2 is through restricted port 60 of passage 30 and thus the closing movement of the motor will be effectively cushioned and will prevent the slamming of the door, etc. So long as the valve 40 remains in the position indicated the motor will be maintained in its position thus secured. As soon, however, as the valve 40 is shifted to again establish communication between lines 23 and 42 fluid pressure will again be admitted behind the piston 4, and as the diameter thereof is larger than the diameter of the piston 5 the motor will be moved in the opposite direction, the cushioning effect of this structure of the motor being secured by the face of the piston 5 being constantly exposed to the fluid pressure through the line 21 as hereinbefore described. It will be seen that I have thus secured a very simple pneumatic motor and control thereof requiring but few parts and meeting the requirements of effectively cushioning at the limits of its strokes. It may be advisable and necessary to secure a reversal of the motor under certain circumstances, for example, when utilized in connection with door operation if an obstruction is met in the closing of the door. Consequently I have shown the under surface of the piston 47 in the motor head 25 as being in connection through the line 70 with a suitable source of pressure (not shown), which may be controlled in any desired or well known manner for effecting a reversal of the motor either during its operation or effecting an actuation of the mo-

tor if the same is at rest when fluid pressure is supplied through the line 70 independently of the manually controlled valve 40.

Many changes and modifications will readily occur to those skilled in the art without departing from the spirit and scope of my invention as defined in the claims, therefore what I claim as new and useful, and of my own invention, and desire to secure by Letters Patent, is,—

1. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a valve for controlling the supply of fluid pressure to, and the exhaust of the same from the cylinder of larger diameter for initiating the operation of said motor, and fluid pressure actuated means for shifting said valve.

2. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a valve for controlling the supply of fluid pressure to, and the exhaust of the same from the cylinder of larger diameter for initiating the operation of said motor, and manually controlled fluid pressure actuated means for shifting said valve.

3. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a cylinder head for the cylinder of larger diameter and provided with passages communicating with the exhaust and through a restricted port with the cylinder, a valve located in said head for controlling said passages to shut off the pressure supply to the cylinder and simultaneously open said cylinder to exhaust, and a free exhaust passage communicating with said passages and with said cylinder at a point intermediate its ends.

4. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a cylinder head for the cylinder of larger diameter and provided with passages communicating with the exhaust and through a restricted port with the cylinder, a valve located in said head for controlling said passages to shut off the pressure supply to the cylinder and simultaneously open said cylinder to exhaust, and a free exhaust passage communicating with said passages and with said cylinder at a point intermediate its ends, and means for controlling said valve.

5 5. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a cylinder head for the cylinder of larger diameter, and provided with passages communicating with the exhaust and through a restricted port, with the cylinder, 10 a valve located in said head for controlling said passages to shut off the pressure supply to the cylinder and simultaneously open said cylinder to exhaust, and a free exhaust passage communicating with said passages 15 and with said cylinder at a point intermediate its ends, and fluid pressure actuated means for controlling said valve.

20 6. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a cylinder head for the cylinder of larger diameter and provided with passages communicating with the exhaust 25 and through a restricted port with the cylinder, a valve located in said head for controlling said passages to shut off the pres-

sure supply to the cylinder and simultaneously open said cylinder to exhaust, and 30 a free exhaust passage communicating with said passages and with said cylinder at a point intermediate its ends, and manually controlled fluid pressure actuated means for controlling said valve. 35

7. A pneumatic motor comprising differential cylinders, a piston for each of said cylinders, a piston rod connecting said pistons, means for normally maintaining a supply of fluid pressure to both of said cylinders, a cylinder head for the cylinder of larger diameter and provided with passages communicating with the exhaust and through a restricted port with the cylinder, 40 a valve located in said head for controlling said passages to shut off the pressure supply to the cylinder and simultaneously open said cylinder to exhaust, and a free exhaust passage communicating with said passages 45 and with said cylinder at a point intermediate its ends, and a check valve for said auxiliary passage. 50

In testimony whereof I have hereunto set my hand on this 23rd day of July A. D., 1918.

ALBERT GOTTSCHALK.