

T. R. BROWN.

PNEUMATIC DOOR OPERATING MECHANISM.

APPLICATION FILED MAR. 15, 1906. RENEWED MAR. 12, 1909.

1,002,027.

Patented Aug. 29, 1911

2 SHEETS-SHEET 1.

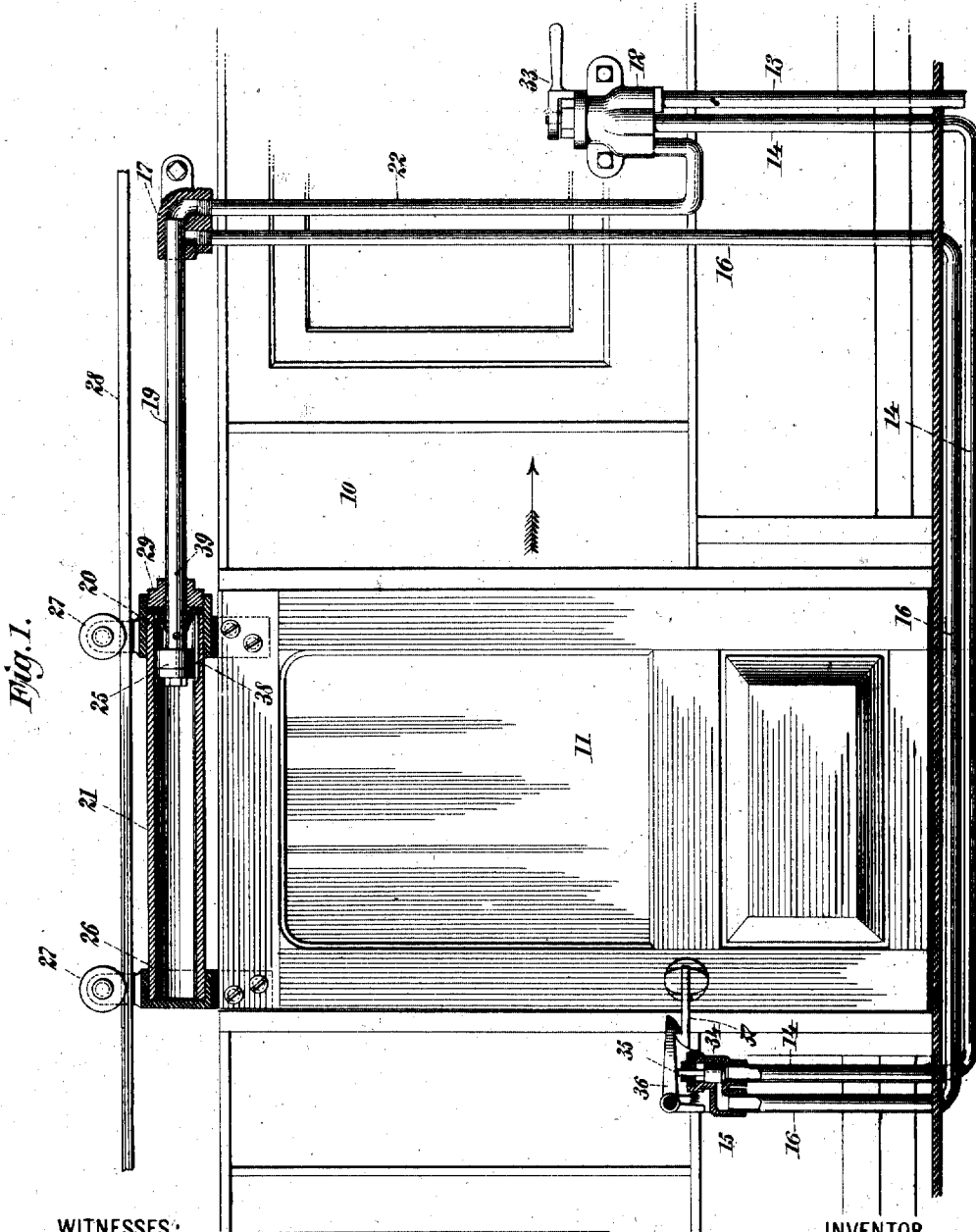


Fig. 1.

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3 SHEETS—SHEET 2.

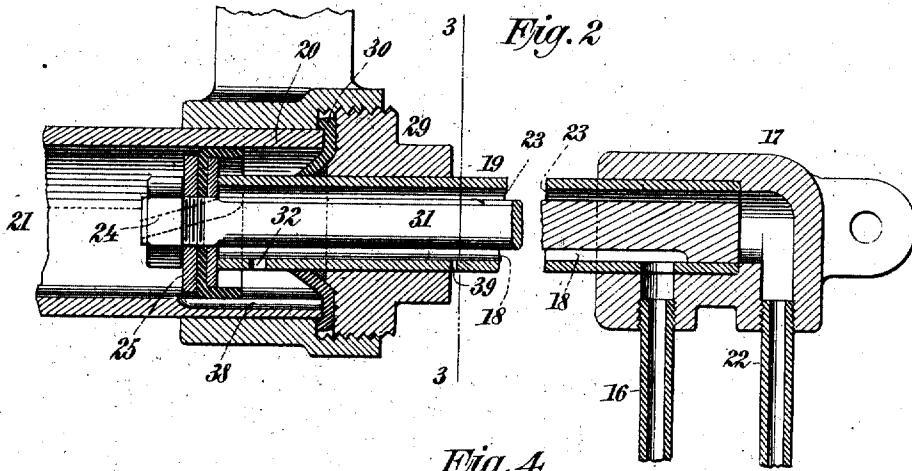


Fig. 2.

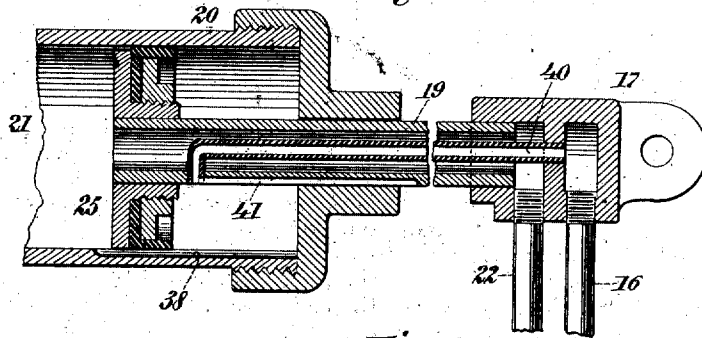


Fig. 4.

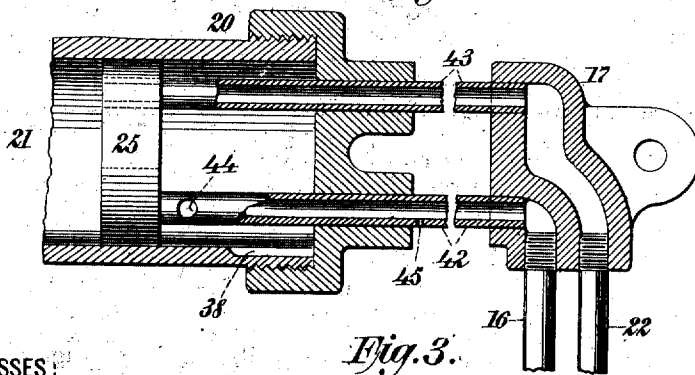
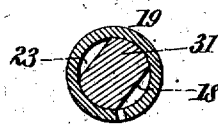


Fig. 5.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC DOOR-OPERATING MECHANISM.

1,002,027.

Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed March 15, 1906, Serial No. 306,128. Renewed March 12, 1909. Serial No. 483,059.

To all whom it may concern:

Be it known that I, THOMAS R. BROWN, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Pneumatic Door-Operating Mechanisms, of which the following is a specification.

The invention relates to improvements in pneumatic door-operating mechanisms, and it consists in the novel features, arrangements and combinations of parts hereinafter described, and particularly pointed out in the claims.

I present my invention herein as applied to a car for opening and closing the door thereof, and in its preferred embodiment my invention comprises means whereby upon the movement of a control-handle to one position, compressed air will be caused to effect the unlatching and opening of the door and upon the movement of said handle to another position, the same air, then acting against a surface of larger area, will be caused to effect the closing of the door, the latter becoming latched upon reaching its closed position. I thus utilize the air by which the door is opened for closing the same and avoid the waste of air which would result if one supply of air from the reservoir were employed in opening the door and another supply thereof for closing the door.

I have illustrated, in this application, the cylinder within which the air acts to both open and close the door as arranged at the upper edge of the latter, but said cylinder may be disposed at the lower edge of the door, if so desired.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation, partly broken away and partly in section, of a car equipped with door operating mechanism constructed in accordance with and embodying my invention; Fig. 2 is an enlarged central vertical longitudinal section, partly broken away, through one end of the operating cylinder and connected parts, this end of the cylinder being that within which the air acts to open the door and which may therefore, for convenience, be termed the opening-end of the cylinder; Fig. 3 is a ver-

tical transverse section, on the dotted line 3—3 of Fig. 2, of a divided pipe upon which the operating cylinder performs its movements and through which the air, by means of independent passages, is conducted to the respective ends of the cylinder; Fig. 4 is a view corresponding with Fig. 2 but illustrating a modified form of a part of the invention, and Fig. 5 is a like view illustrating a further modified form of a part of the invention.

In the drawings, 10 designates a portion of an ordinary car, 11 the door thereof, 12 the control-valve casing, 13 the supply pipe leading thereto from a reservoir, not shown, for compressed air, 14 the pipe leading from said casing to the casing 15 for the door latching devices and extending thence by means of a branch pipe 16 to a header 17 and thence by means of a passage or pipe 18 (Fig. 2) formed within the tube 19 to the opening end 20 of the cylinder 21, and 22 a pipe leading from the control-valve casing 12 to said header 17 and thence by means of a passage or pipe 23 (Fig. 2) formed within said tube 19 and a port 24 extending through the piston-head 25, to the closing end 26 of said cylinder 21. The cylinder 21 is connected with and disposed above the upper edge of the door 11, and said door and cylinder are suspended by rollers 27 from a rail 28, upon which said rollers may travel during the opening and closing of the door. The piston 25 is secured upon one end of the tube 19, which is stationary and whose other end is secured in the header 17, and said tube 19 passes through the cylinder-head 29 and is in line with the longitudinal center of the cylinder, whereby during the opening and closing of the door said cylinder may travel upon said tube. A packing 30 is provided within the cylinder 21 to engage the surface of the tube 19, and the piston 25 is preferably of the cup type. The tube 19 contains the bar 31, which strengthens the tube and facilitates the securing of the same to the piston 25 and in addition, by its flat sides (Fig. 3), forms within said tube the air passages or pipes 18, 23, the former of which (Fig. 2) starts directly above and is in communication with the pipe 16, while the passage 23 extends out to the end of the tube 19 and is in communication with the pipe 22. The passage 18 communicates with the opening-end 20 of the cylinder 11

der 21 through a port 32 formed in the tube 19 near the piston 25, and the passage 23 is continued through the piston by means of a port 24 so that it may communicate with the closing end 26 of said cylinder.

The control valve within the casing 12 is operable by means of a handle 33, and this valve is a two-way valve of any suitable character adapted when the handle 33 is turned to one position to place the supply pipe 13 in communication with the pipe 14 and when placed in another or closing position to cut off the pipe 13 and place the pipes 14, 22 in communication with each other, so that the air in the pipe 14 may expand into the pipe 22.

I do not limit my invention to any special form of two-way valve within the casing 12, but one example of such valve is illustrated in detail in my application Serial No. 483,058 of even date herewith for Letters Patent for improvements in door operating mechanisms.

Within the casing 15 for the door latching devices is provided a vertical plunger-valve 34 from which projects a vertical stem 35 directly below a pivoted latch 36 adapted to engage a catch arm 37 secured to the door 11. When the valve 34 is in its lower position the stem 35 permits the latch 36 to remain in engagement with the catch arm 37, and said valve 34 when in its lower position cuts off communication from the pipe 14 to the pipe 16. When air is admitted to the pipe 14 for opening the door it will elevate the valve 34 and disengage the latch 36 from the catch arm 37 and also open the port to the pipes 16, into which the air will pass on its way to the opening end of the cylinder 21. The latch 36 will remain in its elevated position so long as the air pressure remains in the pipe 14, but after the door 21 has been opened and then closed the air in the pipe system is permitted to exhaust and at such time the valve 34 will descend and the latch 36 will automatically reengage the catch arm 37.

In the operation of my invention, the door being in its closed position, the control handle 33 will be moved to place the supply pipe 13 in communication with the door opening pipe 14 and thereupon the compressed air will flow through the pipe 14 to the casing 15, unlatching the door, and then through the branch pipe 16 to the header 17 and thence through the branch 18 and port 32 into the opening end 20 of the cylinder 21, wherein the air acting against the piston 25 and cylinder-head 29, will force the cylinder along the tube 19 and thereby effect the movement of the door 11 to its open position, the closing end 26 of said cylinder reaching a position adjacent to the piston 25 when the door attains its open position. The door will be held open so long as the air

pressure is permitted to exert its force through the pipe 14 and against the cylinder head 29. When it is desired to close the door 11 the control handle 33 will be moved to its closed position and thereby cut off the supply pipe 13 and place the pipes 14, 22 in communication with each other, whereupon the air within the pipe system 14 and within the cylinder 21 at the opening side of the piston, will expand into the pipe 22 and pass thence through the header 17, passage 23 and port 24 to the opening end 26 of the cylinder 21, wherein said air will act to move the cylinder and door back to their initial position, closing the door. Upon the door reaching its closed position a by-pass groove 38 in the wall of the cylinder, at the opening end thereof, becomes partly uncovered and permits the air within the cylinder 21 and connected pipe systems to exhaust around the piston and through the port 32 into the passage 18 from which it escapes by means of a small vent 39 (Fig. 2), whereupon the air pressure being relieved the valve 34 in the latch casing 15 will descend to its initial position and permit the latch 36 to pass into reengagement with the catch arm 37, locking the door in its closed position. The areas of by-pass groove 38 and of exhaust vent 39 should be so relatively proportioned and restricted with reference to port opening 32 that when the pressure medium is initially admitted through pipe 18 to the opening end of the cylinder a movement of the cylinder will be inaugurated to an extent sufficient to cause by-pass grooves 38 and exhaust vent 39 to be closed before any material exhaust of pressure medium will take place.

In Fig. 4 I illustrate a modified construction embodying my invention in that I omit from the tube 19 of Fig. 4 the bar 31 and connect the pipe 16 with the opening-end of the cylinder 21 by means of a tube or interior pipe 40 and extend the tube 19 directly through the piston 25 so as to form the passage for the air to the closing-end of the cylinder. The tube 40 of Fig. 4 corresponds with the passage 18 of Fig. 2 and the chamber through the tube 19 corresponds with the passage 23 of Fig. 2. Fig. 4 differs from Fig. 2 merely in detail and not in operation or in any essential particular. The exhaust passage 38 in Fig. 4 coöperates with a similar passage 41 formed in the exterior wall of the tube 19, for permitting the air to exhaust from the cylinder when the door is in its closed position.

In Fig. 5 the modification consists in the omission of the tube 19 containing the passages leading to the respective ends of the cylinder and in substituting therefor two separate pipes 42, 43 upon which the cylinder will travel and which correspond to the passages 18, 23 of Fig. 2. The pipe 42 leads

from the pipe 16 to the opening end of the cylinder and communicates therewith through a port 44. The pipe 42 is also provided with the exhaust aperture 45 corresponding with the exhaust aperture 39 or Fig. 2. The pipe 43 is in communication with the pipe 22 through the header 17 and leads through the piston 25 so as to communicate at the proper time with the closing end of the cylinder 21. The modification shown in Fig. 5 differs only in detail of construction from what is illustrated in Fig. 2, without varying the function or operation of the apparatus.

What I claim as my invention and desire to secure by Letters-Patent, is:—

1. In combination, in a mechanism for moving doors or other devices, an element to be moved, a cylinder connected to the movable element to move therewith and presenting at its ends opposing faces of unequal effective area to be acted upon, respectively, by compressed air, a stationary piston within said cylinder, a manually operable control valve connected with a source of supply of the compressed air, pipes leading therefrom to the respective sides of said piston, said valve being adapted, when moved to one position, to admit the air to one of said pipes and thence to the cylinder to which it is connected, to move the movable element in one direction, and when moved to another position to cut off the air supply and place said pipes in communication with each other, whereby the air used at one end of the cylinder to move the movable element in one direction is permitted to expand into the other end of the cylinder and utilized to move said element in the opposite direction to its initial position, substantially as set forth.

2. In combination, in a mechanism for moving doors or other devices, an element to be moved, a cylinder connected thereto to move therewith, a piston arranged in said cylinder, a piping connected to the piston and extending out through the cylinder head and forming air passages, one member of the piping passing through the piston and delivering to one side thereof and another terminating adjacent the piston and delivering to the opposite side of the piston, means connected with a source of supply of compressed air and leading to one member of said piping to move the movable element in one direction, and means for cutting off the air supply and placing the members of said piping in communication with each other for permitting the air to expand into the other end of the cylinder to move said element in the opposite direction, substantially as set forth.

3. In combination, in a mechanism for moving doors or other devices, an element to be moved, a cylinder connected thereto to move therewith, said cylinder having opposing end faces of unequal effective area, a stationary piston arranged within said cylinder, pressure delivery connections to said cylinder on the respective sides of said piston, a valve for controlling the supply of pressure medium to one of said connections, said valve also operating, when actuated, to place said connections in communication with each other.

Signed at New York city, in the county of New York, and State of New York, this 13th day of March A. D. 1906.

THOMAS R. BROWN.

Witnesses:

ARTHUR MARION,
CHAS. C. GILL.