Aug. 12, 1930. P. R. FORMAN 1,772,773

CONSTANT SPEED DOOR ENGINE

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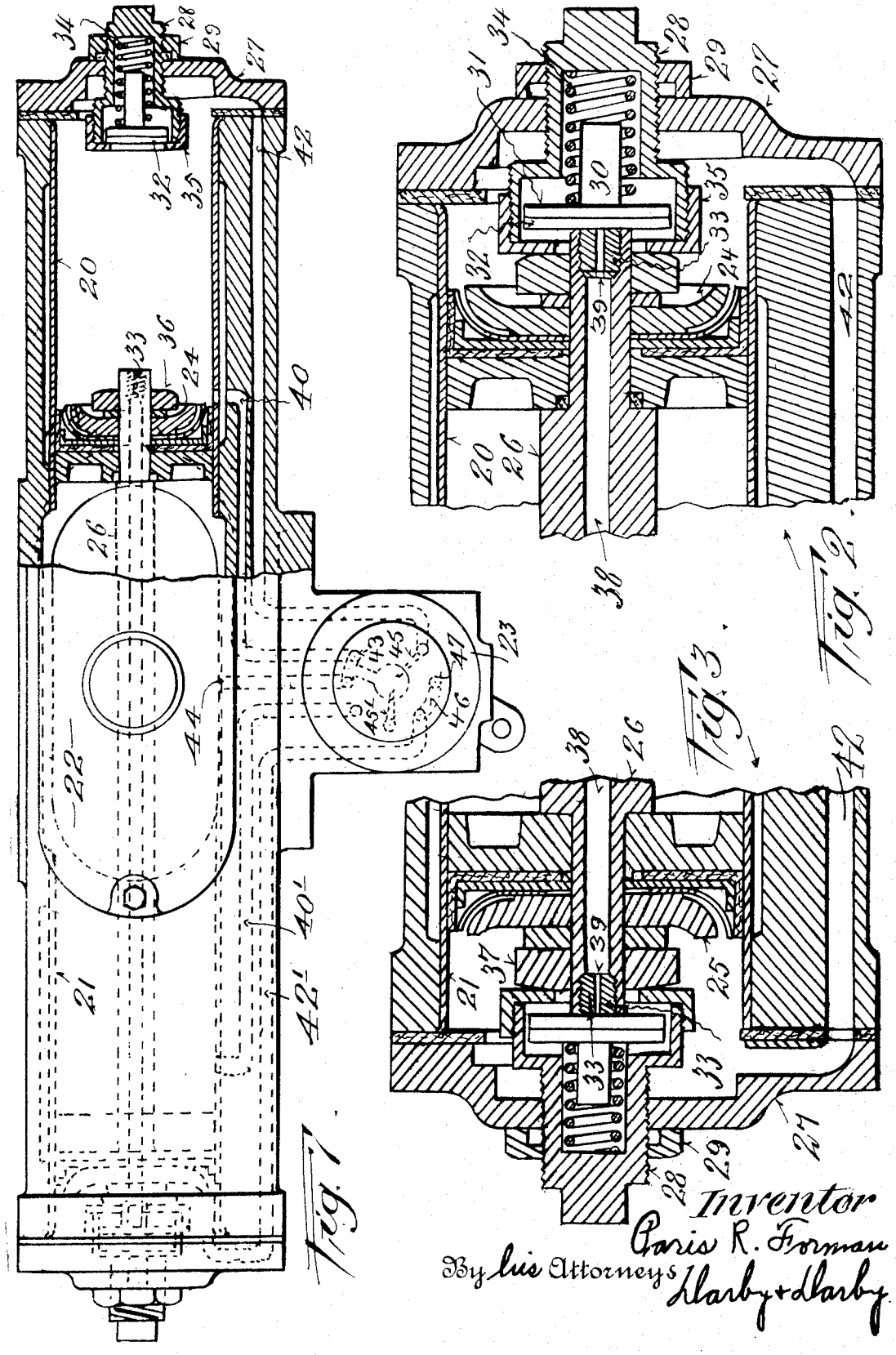


Fig. 1.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE

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CONSTANT-SPEED DOOR ENGINE

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This invention relates to a constant speed type of door operating engine and has for its object the provision of means for affording an even constant speed of travel to a door in closing or opening.

Another object of the invention includes the provision of simple and effective means whereby the door is prevented from slamming and the invention eliminates any possibility of the door striking a blow to a passenger who may be in the doorway as the door closes. By the improved means the door may be held open at any point of its closing travel, for any length of time, or it may even be pushed open further and when released the door will continue to close with the same even speed of travel thus closing quietly and at an even speed of travel.

Other objects will appear hereinafter and I obtain these objects by the construction exemplified in the accompanying drawing in which:

Fig. 1 is a plan view of a door engine made in accordance with the principles of my invention.

Fig. 2 is a sectional view of the right hand end of the engine showing the piston in door closed position, and

Fig. 3 is a similar view of the left hand end.

The same numerals of reference refer to like parts wherever they occur.

Referring now to the drawing, the door operating engine of Fig. 1 includes the usual control valve 23 and the two end cylinders 20 and 21 which are separated by the rack bar chamber 22. Pistons 24 and 25 respectively in the cylinders 20 and 21 are united by the rack bar 26 to be moved back and forth by pneumatic pressure which is controlled by valve 23 in the manner well known to the art and as is more fully stated below.

The cap 27 on the ends of the cylinder carries a cup shaped nut 28 which is screw threaded for adjustment in cap 27 and is fastened by a lock nut 29. A plunger 30 having a disk 31 covered with a cushioning material 32, as leather, is provided for receiving and sealing the end of the rack bar. A spring 34 in the cup nut 28 resiliently holds the sealing disk 32 and a cap 35 holds the spring and disks assembled.

Pistons 24 and 25 are similar in construction and are secured on the respective ends of the rack bar 26 in any suitable manner and locked by lock nuts 36 and 37. Rack bar 26 is also provided with an air passage 38 and in each end of the rack bar air passage there is secured a plug 33. This plug is provided with a restricted air passage 39 of proper size for admitting a suitable volume of air and will be known herein as the speed plug.

It will be noted that the cylinder 20 is provided with a free predetermined exhaust port 40 which opens into the cylinder just in front of the piston 24 when the same is in door open position. This port is connected by the valve passage 43 and port 44 to the atmosphere through the rack bar chamber 22 and the usual bleed port (not shown). A second port 42 leads from the extreme end of the cylinder and then to the atmosphere through a restricted port 45 in the engine valve 23. This construction provides for a rapid drop of pressure in this end of the cylinder until the piston 24 passes and closes the free exhaust port. The remaining air must then pass through port 42 and the restricted port 45 in the control or engine valve and to the atmosphere. The restricted port 45′ in valve 23 releases pressure from the opposite end of the cylinder through port 42′.

The control or engine valve 23 is also provided with a port 46 for connecting the feed pipe 47 with either port 42′, as shown in Fig. 1, for closing the door, or with port 42 for opening the door. The predetermined free exhaust port 40′ in the left hand end of the cylinder wall connects with the air outlet through the valve passage 43, when the valve is turned, as is well known to the art.

The construction herein disclosed provides for constant speed of engine and for meeting obstructions in the following manner:

Figure 1 of the drawing shows the position of the door engine pistons and the valve at the moment the valve has been moved to admit air pressure to enter the left hand end of the door engine, thereby causing the piston to move in a right hand direction. Si-

multaneously the air that was under pressure in the right hand end of the door engine is opened to exhaust through ports 40 and 42. The rapid drop of pressure mentioned above now takes place in cylinder 20 and the moment that piston 24 cuts off the free exhaust port the remaining air to be exhausted must find its way to the atmosphere through the end port and the restricted passage in the control valve which governs the speed of the door engine and maintains an even speed of door travel.

When the door is obstructed in its closing movement, air pressure in the right hand cylinder will continue to exhaust through the valve and in order to supply the cylinder end with sufficient pressure for the regulation of speed, after the door is released, air is supplied from the left hand cylinder to the right hand cylinder through the passage in the rack connecting the pistons. The speed lugs with definite size holes drilled therethrough are placed in the ends of this rack to govern the flow of pressure to the exhausting cylinder. By this construction sufficient pressure is maintained in the exhausting cylinder so that when the door is released an even speed of travel will result and the door will not slam in closing. The door may be held open or even pushed open and when released it will again resume its uniform rate of travel.

As the exhausting piston completes its stroke the end of the rack is sealed against the leather seat, thus closing off the supply of air from the left hand cylinder. The spring 34 is placed behind the leather seat and serves as resistance as the rack seals against the leather seat.

Having now described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. In a constant speed engine construction the combination comprising a pair of pistons united together, cylinders for said pistons, said united pistons having a passage therethrough, means in the passage for regulating the flow of pressure medium through it and means at the end of each cylinder for resiliently engaging the pistons at the point where the passage emerges to seal it at the end of the stroke of the pistons in either direction.

2. In a constant speed engine construction the combination comprising a pair of pistons united together, cylinders for said pistons, said united pistons having a passage therethrough, means in the passage for regulating the flow of pressure medium through it and a spring pressed sealing member slidably supported at the end of each cylinder for engaging and sealing the end of the passage.

3. In a constant speed engine construction the combination comprising a pair of pistons united together, cylinders for said pistons, said united pistons having a passage therethrough, means in the passage for regulating the flow of pressure medium through it and a hollow plug adjustably supported in the end of each cylinder and a spring controlled plunger slidably supported in each plug for sealing the passage at the end of the stroke of the pistons in either direction.

4. A door engine having cylinders, pistons in said cylinders, means for uniting the pistons having a passage therethrough, a valve formed on said cylinders connected by ducts with the cylinders, said ducts including free and restricted paths and means on each cylinder for sealing the passage through the means for uniting the pistons at either end of their stroke, said passage and ducts cooperating to prevent too rapid movement of the pistons by restricting the escape of exhaust fluid pressure during a portion of the piston stroke and by admitting pressure medium into the exhausting cylinder.

In testimony whereof I have hereunto set my hand on this 14th day of July, A. D. 1927.

PARIS R. FORMAN.