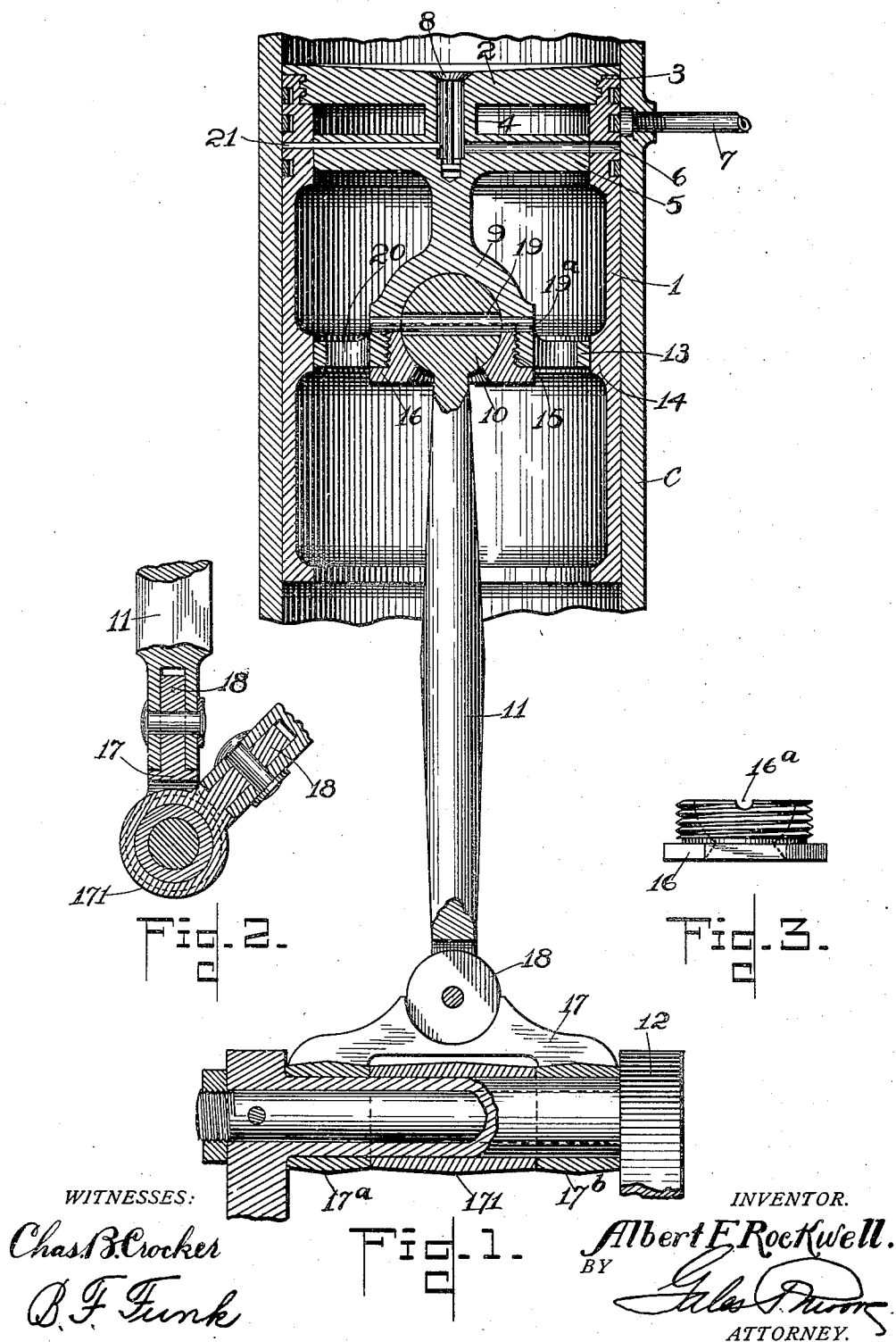


No. 860,767.

PATENTED JULY 23, 1907.

A. F. ROCKWELL.  
PISTON ROD CONNECTION.  
APPLICATION FILED FEB. 5, 1906.



WITNESSES:  
Chas. B. Crocker  
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Fig. 1.

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# UNITED STATES PATENT OFFICE.

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## PISTON-ROD CONNECTION.

No. 860,767.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed February 5, 1906. Serial No. 299,613.

*To all whom it may concern:*

Be it known that I, ALBERT F. ROCKWELL, a citizen of the United States, residing at Bristol, county of Hartford, State of Connecticut, have invented a certain new and useful Piston-Rod Connection, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to a piston-rod connection whereby the piston of a motor or any device in which a piston is used may be connected to its complementary part, such for example as the crank-shaft.

One of the objects of the invention is to provide means whereby the pitman will be permitted to have a certain amount of freedom with relation to the piston, so as to obviate the liability of cramping or binding.

Another object of the invention is to provide means for preventing the axial rotation of the piston within its cylinder. This non-axial rotation of the piston being extremely desirable in certain motors in which ports in the cylinder wall are designed to register with complementary ports in the piston shell.

A further object of the invention is to provide a simple connecting means between the actuating and actuated part of the motor which may be readily assembled or removed as occasion requires.

Other objects and advantages as well as the novel details of construction of this invention will be specifically set forth hereinafter, it being understood that changes in form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

Figure 1 is a vertical longitudinal sectional view through a motor cylinder and its piston, having a piston-rod connection constructed in accordance with my invention, the crank-shaft being shown partly in section and partly in elevation; Fig. 2 is a cross sectional view through the crank-shaft connection; and Fig. 3 is an elevational view of a check-nut.

The piston herein shown comprises a tubular shell 1 closed at its inner end by a head-plate 2 which is threaded into the inner end as at 3. The plate 2 is shown as comprising a flange on the constricted neck 4, preferably formed integral therewith and carrying an intermediately located ported flange 5, one port 6, being adapted to register with a gas port 7 in the cylinder C, so that fuel may pass from the port 7 through the port 6 and through the ported neck 4 past the valve 8 into the combustion chamber of the cylinder. A socketed portion 9 is carried by the flange 5, which socketed portion comprises a thrust member having a substantially spherical

recess for receiving the ball-end 10 of a connecting or piston-rod 11, whereby the reciprocatory movement of the piston may be communicated to the crank-shaft or actuated part 12 of the motor. The outer portion of the thrust member is provided with a flange 13 which bears against a shoulder 14 within the shell, said flange having suitable perforations through which air may pass, said perforations also permitting a suitable instrument to be inserted for the purpose of disassembling the head from the piston. The socket is internally threaded as at 15 to receive a check-nut 16, said check-nut having an inner conformation corresponding to the head 10 of the piston-rod 11. Therefore, it is obvious that the ball-end or head of the piston-rod 11 will be efficiently retained within the socket, but in a manner to permit it to radially move therein.

The end of the piston-rod distant from the cylinder is articulated on a head-strap or yoke 17 in engagement with the crank-shaft (or crank-pin as the case may be), the articulation 18 being such as to afford a certain amount of freedom in allowing the piston-rod to actuate the crank-shaft without liability of cramping or binding. It will be obvious that the articulation or joint 18 is such as to permit a slight movement of the piston rod at right angles to the movement of the crank-shaft 12. The head or ball-end 10 of the piston-rod is provided with an elongated transverse aperture or slot 19 adapted to receive a pin 19<sup>a</sup>, which may be inserted through the apertures 20 in the thrust member and arranged in substantially axial parallelism with the crank-shaft 12. While the elongation of the aperture 19, therefore permits of a slight oscillation of the ball-end of the pitman-rod in a plane parallel with the crank-pin, the thrust member is locked against rotation relative to the pin on account of the absence of freedom between the pin and the sides of the slot 19, and if desired the inner member of the piston may be additionally held against rotation in the piston-shell, as for example, by a positioning pin 21. The check-nut 16 may be securely locked against movement with respect to the thrust member by the pin 19<sup>a</sup>, which may engage the alining notches 16<sup>a</sup>, which are adapted to align with the apertures 20 in the thrust member before the pin 19<sup>a</sup> is inserted. Therefore, the pin not only serves to hold the head of the piston-rod in position, but also serves the purpose of a nut-lock. By the construction just described, a pair of piston-rods may be conveniently connected to a single pin of the crank-shaft, for example, the construction of the strap 17 may include the bifurcated ends 17<sup>a</sup> and 17<sup>b</sup>, so that a single ended strap 17<sup>i</sup> may be introduced between the bifurcated ends 17<sup>a</sup> and 17<sup>b</sup> to receive a second piston-rod similar to the one 11 together with its appurtenances. From the foregoing it is obvious while there is suffi-

cient play between the piston-rod and its connecting strap and its piston to facilitate an easy operation of the piston within the cylinder and the crank-shaft with relation to the piston-rod, no undue movement, such as lost motion will be permitted. And, furthermore, axial play of the piston will be avoided thereby reducing the wear and tear in the cylinder, and also preventing the ports from getting out of alinement in the event ports are used in the construction of the motor. The 10 ports illustrated are merely illustrative of a construction to show a material advantage resulting from preventing axial play of the piston, but it is to be understood that the particular arrangement of these ports are not essential to the proper application of my invention. 15

What I claim is:

1. The combination with an engine cylinder, of a reciprocatory piston in said cylinder, a crank-shaft, and a piston-rod, having an articulated connection with one of the elements and a ball and socket connection with the other. 20
2. The combination with an engine cylinder, of a piston therein having a recess, a piston-rod having a head provided with a transversely elongated slot, and a pin passing through the recessed portion of the piston and through the 25 slot in the piston-rod.
3. The combination with a motor cylinder, of a reciprocatory piston therein, said piston having a recessed portion, a piston-rod having a head in the recessed portion of said piston, and a set nut having an inner conformation corresponding to the conformation of the head and engaging the recessed portion of the piston to hold the head on the piston-rod into engagement with the recesses portion 30 in the piston.

4. The combination with a cylinder and a piston therein, said piston having a recess, of a headed piston-rod in engagement with the recess, said piston-rod having a transversely elongated slot, a pin passing through the recessed portion of the piston and through the slot in the head, and a notched locking device engaging the recessed portion of the piston to hold the head in place, the notches of the 40 locking device being engaged by the pin.

5. The combination with a cylinder, a piston therein and a crank-shaft, of a piston-rod having a jointed connection with said crank-shaft to permit a slight swing of the piston-rod in a line with the longitudinal axis of the shaft, and a pin and slot connection between the piston-rod and the piston to permit a slight swinging movement of the piston-rod at an angle to the longitudinal axis of the crank-shaft, said connection between the piston-rod and the crank-shaft and the piston being effective in preventing 50 axial rotation of the piston.

6. The combination with an engine cylinder having an inlet port, of a reciprocatory piston therein having a port adapted to intermittently register with the port in the cylinder, an element adapted to be actuated by the piston, and means for connecting the piston and the actuated element so as to prevent axial rotation of the piston. 55

7. The combination with an engine cylinder, of a reciprocatory piston in said cylinder, a crank shaft, a piston rod connected to said piston at one end, an articulated 60 connection between the piston rod and the crank shaft, the axis of the articulated connection being at an angle to the axis of the connection between the piston rod and the piston.

In testimony whereof, I hereunto affix my signature, in 65 the presence of two witnesses.

ALBERT F. ROCKWELL.

Witnesses:

JOSEPH D. BROWN,  
CLARA H. VOORHEES.