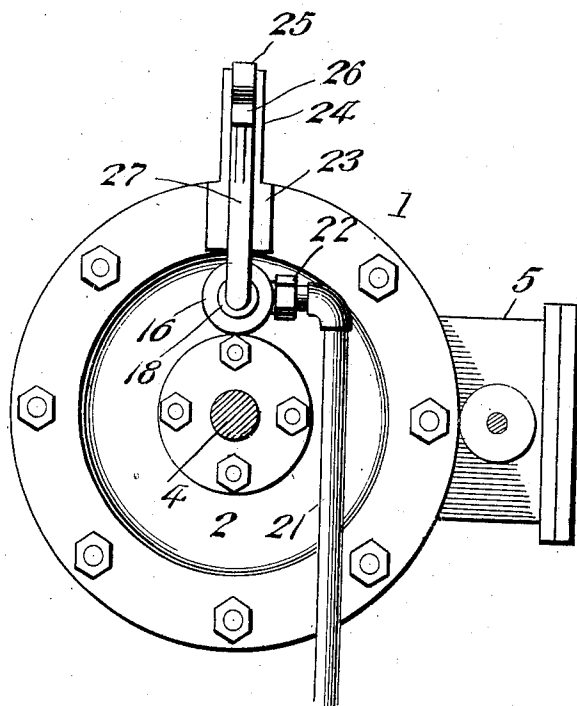
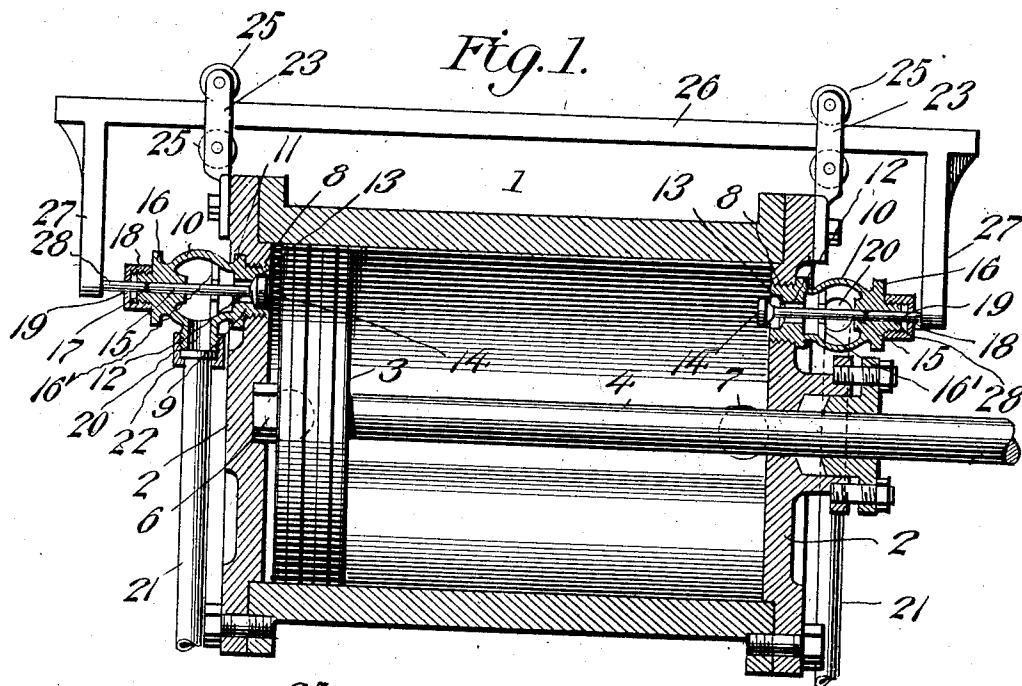


No. 833,090.

PATENTED OCT. 9, 1906.

W. SHEPHERD.  
STEAM ENGINE.  
APPLICATION FILED OCT. 7, 1905.



Witnesses  
*Geo. Ackerman*  
*W. Allen*

Inventor  
*Willis Shepherd,*  
*Victor J. Evans*  
Attorney

# UNITED STATES PATENT OFFICE.

WILLIS SHEPHERD, OF WEST LEBANON, INDIANA.

## STEAM-ENGINE.

No. 833,090.

Specification of Letters Patent.

Patented Oct. 9, 1908.

Application filed October 7, 1905. Serial No. 281,794.

*To all whom it may concern:*

Be it known that I, WILLIS SHEPHERD, a citizen of the United States of America, residing at West Lebanon, in the county of Warren and State of Indiana, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

The invention relates to an improvement in steam-engines, comprehending specifically means for providing an auxiliary port at each end of the cylinder for service as an additional exhaust-port in relieving the piston from the usual retarding pressure.

The main object of the present invention is the provision of means which shall be automatically controlled by the pressure of the motive fluid to open a port in the end of the cylinder open to the exhaust, whereby to provide an additional outlet for the exhaust and relieve the piston of the retarding pressure incident to the ordinary exhaust through the valve-chest.

The preferred details of construction of the invention will be described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view, partly in elevation, illustrating the application of my improved automatic valve mechanism to a steam-cylinder. Fig. 2 is an end elevation of the same.

Referring to the drawings, 1 represents a cylinder having the usual head 2, in which cylinder is mounted for reciprocation the usual piston 3, fixed on the end of the piston-rod 4. The specific details of these parts are immaterial so far as the present invention is concerned, as I contemplate the use of the valve mechanism described with any usual or preferred type of cylinder.

The valve-chest 5 is secured to the cylinder in the usual manner and communicates with the interior thereof in ports 6 and 7, serving alternately as inlet and exhaust ports.

The valve mechanism of the present invention comprises duplicate valves, one mounted in each cylinder-head and arranged in alinement longitudinally of the cylinder. As these valves are identical in construction, a detailed description of one will suffice for both.

The cylinder-head is provided with an opening 8, in which is fixed, preferably by threaded engagement, a projecting nipple 9 of a

valve-casing 10, the junction of the casing proper with the nipple being provided with a circumferential laterally-extending flange 11, seating in a recess formed in the outer surface of the head and so limiting the inward movement of the nipple that its inner edge is in a plane with the inner surface of the head. The casing proper is in communication with the interior of the cylinder through a bore 12, extending through the nipple and enlarged near its inner end to provide a valve-seat 13. A valve 14 is mounted for coöperation with said seat, being secured on the inner end of a stem 15, slidably mounted in the valve-casing and guided at its outer end in the thickened end wall 16 of said casing, and intermediate its ends in a guide-strip 16', secured transversely of the casing. A threaded boss 17 projects outwardly from the end wall 16 of the casing and is adapted to support a guide-block 18, arranged for threaded connection therewith and having its end wall 19 centrally perforated in longitudinal alinement with the bore in the casing-wall 16 and boss 17, arranged for the reception of the stem 15 of the valve.

The casing 10 is formed with a depending nipple 20, to the lower end of which is secured a pipe-section 21 through the medium of an ordinary coupling 22. The pipe-section from the respective valve-casing may be led to the usual exhaust-pipe (not shown) or to any suitable point of discharge.

Standards 23 are secured to the respective edge to project above the plane of the cylinder, said standards above the cylinder including spaced parallel arms 24, between which are revolvably supported duplicate rollers 25, disposed in vertical alinement and spaced apart. A slide-bar 26 of greater length than the cylinder is mounted for reciprocation longitudinally of the cylinder, being supported in the respective standards 23 and guided between the rollers 25 of said standard, whereby to provide for the effective movement of said bar under a comparatively light power. An arm 27 depends from each end of the bar, terminating in alinement with the valve-casing and being provided with a laterally-projecting pin 28 of a length and so positioned as to adapt it for reciprocation within the opening 19 in the guide-block and the longitudinal bore in the valve-casing end wall and boss. The pins 28 are of such length and the arms

27 so positioned relative to the valve-casings that the free ends of the pins are in contact at all times with the free ends of the valve-stems 15 of the respective valves.

- 5 In operation, assuming the parts constructed and arranged as described and the piston within the cylinder in the position shown in Fig. 1, the admission of steam through the port 6 will operate to drive the piston toward  
10 the opposite end of the cylinder, the pressure of the steam also forcing the valve 14 to its seat. This movement of the valve 14 at the then inlet end of the cylinder will force its stem 15 into contact with the pin 28 and  
15 move the slide-bar 26 longitudinally of the cylinder opposite the direction of movement of the piston. The movement of the rod 26 in this direction will, through the medium of its pin 28 at the then exhaust end of the cyl-  
20 nder, force the adjacent valve 14 from its seat and open the auxiliary port 12 to the exhaust-steam, thereby providing a port for the escape of the exhaust in addition to the normal exhaust-port 7. By this construction  
25 means are provided by which the exhaust end of the cylinder is automatically provided with a port for assisting in the escape of the exhaust-steam, whereby back pressure upon the piston is wholly obviated.
- 30 It is to be understood, of course, that the valves at the respective ends of the cylinder are alternately opened to provide exhaust-ports in accordance with the movement of the piston. The guide-block 18 may be  
35 moved longitudinally with relation to the boss to provide for guiding the stem or pin 28 to the extent desired, whereby the movement of said stem may be maintained true and accurate for effecting the piston-stem.
- 40 The slide-bar 26 being movably supported in

roller-bearings is adapted for free and ready movement with a minimum of power, so that sticking of the bar is prevented.

Having thus described the invention, what is claimed as new is—

1. The combination with a cylinder, of a valve mounted in each end thereof and provided with stems, said valve-stems projecting in opposite directions from the cylinder, a slide-bar of greater length than the cylinder and mounted above said cylinder for longitudinal movement with relation thereto, and means projecting from said bar and adapted for contact but wholly free from connection with the valve-stems.

2. The combination with a steam-cylinder, of valve-casings secured in the head thereof and in open communication with pipe-sections, each of the casings being in communication with the cylinder through a port, a valve mounted in the casing and adapted to close the port, each of said valves having a stem guided at its free end in its valve-casing, the stems of the respective valves projecting in opposite directions, roller-bearings secured to the cylinder, a slide-rod of greater length than the cylinder and mounted for longitudinal movement in said bearings, arms depending from the opposite ends of said bar, and pins projecting in opposite directions from said arms and projecting through the wall of the valve-casing for contact with the valve-stems.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS SHEPHERD.

Witnesses:

ALEX HANNA,  
C. B. BRINKER.