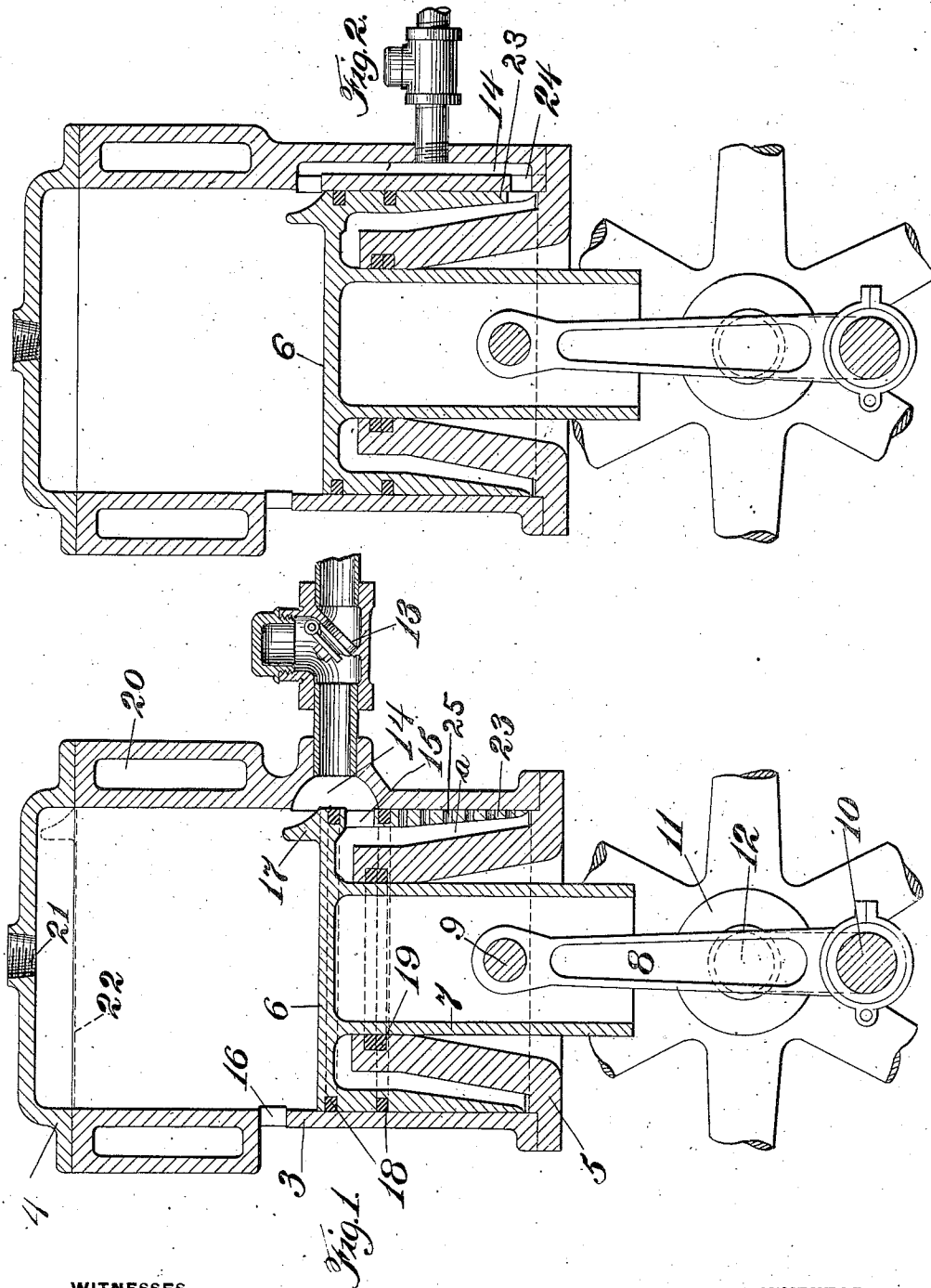


B. G. HARLEY.
EXPLOSION ENGINE.
APPLICATION FILED AUG. 27, 1906.

928,968.

Patented July 27, 1909.



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EXPLOSION-ENGINE.

No. 928,968.

Specification of Letters Patent.

Patented July 27, 1909.

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To all whom it may concern:

Be it known that I, BERTRON G. HARLEY, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Explosion-Engines, of which the following is a specification.

This invention has reference particularly to engines of what is known as the two-cycle type, (that is, in which there is an impulse or explosion at every outgoing stroke of the piston) and has for its objects; the provision of a construction of this character which will have but a minimum number of parts; which will be reliable and efficient in its action; which will retain for a longer period of time a better degree of preliminary compression; which will require but a small amount of repair and attention, and which can be made at a minimum of cost, all as will more particularly hereinafter appear.

In carrying out my invention I employ a type of construction which I have illustrated in preferred form in the accompanying drawing, wherein—

Figure 1 is a sectional view showing an engine cylinder with the piston therein and pitman connected to the piston, and

Figure 2 is a sectional view of a similar construction, with a slightly different arrangement of port openings, but designed to operate on the same general principles.

Referring now more particularly to Figure 1, it will be seen that I have therein shown an engine cylinder 3 having an upper cylinder head 4 and a lower head 5, and within the cylinder a piston 6 provided with a downwardly extending projection 7 to which is secured a pitman 8 by means of a wrist pin 9 which may be inserted in any usual manner, the pitman 8 being connected to the crank pin 10, arranged so as to drive the wheel 11 and the shaft 12 upon which the latter is mounted.

It will be observed that at the right of the cylinder I have arranged an inwardly opening check valve 13, the connection whereof on the cylinder extends into the port or passage marked 14 which registers in the position shown, with the cylinder above the piston, and also with the chamber below the piston by means of the port opening 15 made

in the side walls of the trunk of the piston, indicated at 23.

An exhaust port for the escape of the products of combustion is provided at 16; and an upwardly extending baffle plate or wall 17 is arranged on the upper face of the piston in order to direct the force of the mixture upward to sweep out the waste gases more effectively when the charge is being transferred from the lower side of the piston to the upper one. In order to provide a tight packing for the piston I use the rings 18 constructed in the ordinary manner, and in order to make a tight fit around the trunk like extension 7 of the piston I provide the rings 19 arranged within the lower head 5 in such a manner as to have a bearing on the outer face of the trunk 7, and prevent the escape of the confined mixture which is in the cylinder below the piston.

The side of the piston is provided with a series of holes 25 below the port 15 as clearly shown in Figure 1, the purpose of such holes being to retain communication between the front side of the piston and the port 14 while the piston is moving backward, whereby rarefaction on the front side of the piston is prevented after the port 15 has passed the port 14.

As a means for cooling the cylinder I may employ an ordinary arrangement of water jacket as indicated at 20, or I may provide the cylinder with projecting pins or other devices for the circulation of air whereby the temperature may be kept down by the air cooling process. The injectors are inserted through the opening 21, and may be of any preferred construction, wherefore they are not shown here in detail.

The operation of the device is as follows:

Assuming the piston to be in the position shown, the mixture of gas and air will enter past the check valve 13 and through the chamber or passage 14 into the upper as well as the lower end of the cylinder on the initial movement of the parts, and when the piston advances to its uppermost position as indicated at 22, the mixture with which the cylinder has been charged will become compressed, and after the ignition the usual explosion will occur and drive the piston downward, compressing the mixture which has been admitted through the port marked 15,

into the lower portion of the cylinder, between the lower wall of the cylinder 3 and the wall of the trunk projection 7; accumulating below the piston during the downward stroke of the same, a pressure of say twenty pounds, or more, if desired—the amount of the pressure depending of course upon the clearance allowed and also the stroke of the piston. When the piston begins to uncover the exhaust port 16, the waste gases will begin to escape, and on further downward travel of the piston the passage 14 is uncovered, and the compressed charge below the piston, in the chamber *a* will sweep through the opening 15 and the passage 14, and be deflected upward by the projection 17, against the upper end of the cylinder 3 to drive out the remaining waste gases, filling the upper end of the cylinder with a new charge which in turn will be compressed ready for explosion on the upward travel of the piston, in the usual manner. The check valve 13 acts of course to close the inlet passage against the backflow of the mixture on the beginning of the downward travel of the piston 6, in a manner which will be clear without further explanation.

In Figure 2 I have shown a similar arrangement, except with respect to the matter of the opening 15 which is omitted in the structure shown in Figure 2, and in place thereof another opening 24 communicating with the passage 14 is employed, allowing the compressed mixture to flow around the lower end of the trunk like extension 23 of the piston 6. The port 15 has the advantage in its location of making a shorter distance for the mixture to travel in passing from the lower end of the cylinder to the upper one, which must take place very rapidly in engines of this class if

running at a high rate of speed, as it is necessary to sweep out the unburned products of combustion at each stroke of the piston.

Both forms of construction, it is to be observed, have the same peculiar arrangement of the piston 6 provided with the downward trunk-like extension 7 within which operates the pitman 8, and have the same means for packing the trunk-like extension 7,—namely, the rings 19 housed within the lower cylinder head 5, whereby the employment of a stuffing box and cross-head such as has been heretofore used in two-cycle engines of this class is avoided, and whereby also the necessity of compressing the mixture below the piston within a cavity open to the crank case is also avoided, which is a form of construction heretofore used in devices of this character, employed in marine service.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following:

In combination, a cylinder having an extended admission port intermediate its ends and an exhaust port, and a forwardly extending cup shaped piston with a series of holes extending through the side thereof and arranged longitudinally of the piston whereby a continuous connection is maintained between the front side of the piston and the admission port.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

BERTRON G. HARLEY.

Witnesses:

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