W. H. RICHMAN.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED AUG. 25, 1908.

1,042,970.

Patented Oct. 29, 1912.

Fig. 2.

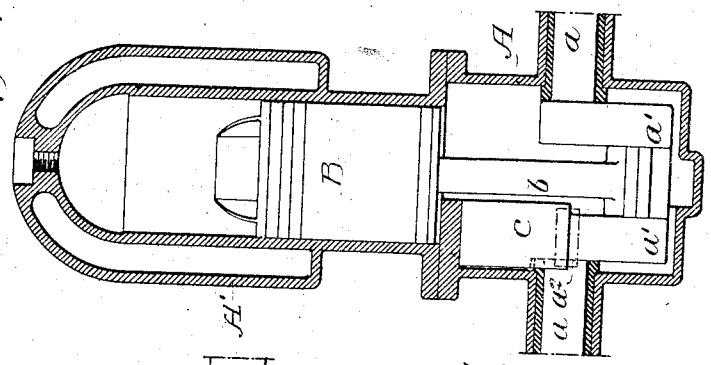


Fig. 1.

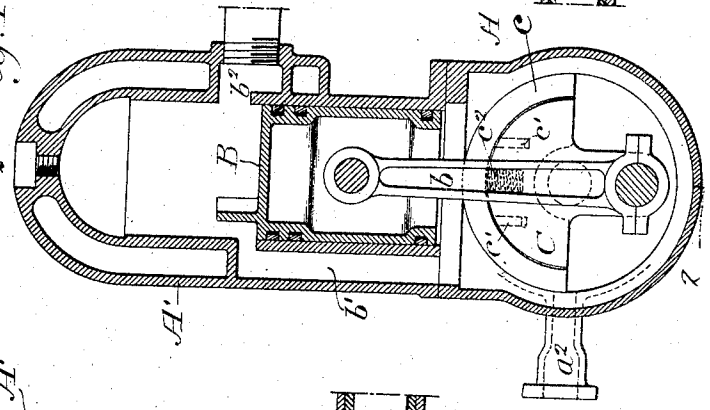


Fig. 4.

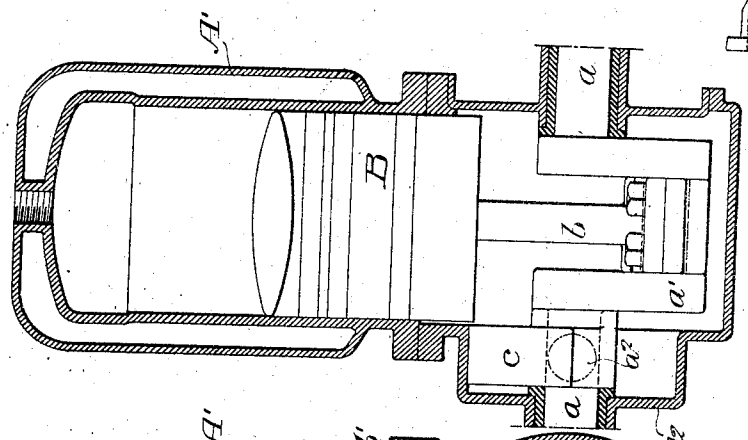
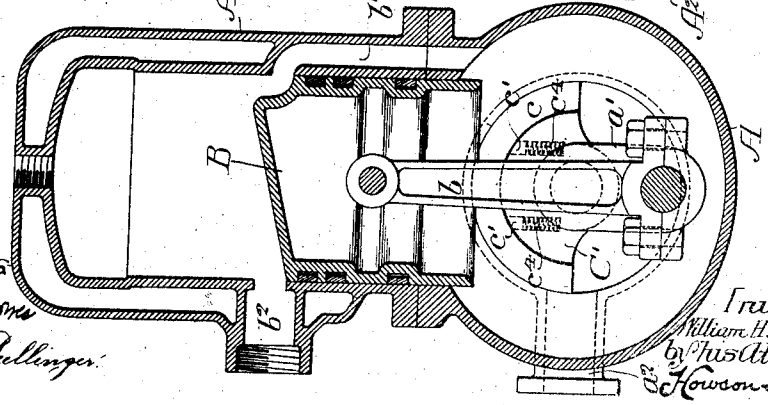


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM H. RICHMAN, OF PHILADELPHIA, PENNSYLVANIA.

INTERNAL-COMBUSTION ENGINE.

1,042,970. Specification of Letters Patent. Patented Oct. 29, 1912.

Application filed August 25, 1908. Serial No. 450,131.

To all whom it may concern:

Be it known that I, WILLIAM H. RICHMAN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Internal-Combustion Engines, of which the following is a specification.

One object of my invention is to provide an improved device for controlling the admission of explosive charges to the cylinder of an internal combustion engine which device shall be of such a nature and construction as to allow an abundance of time for the inflow of such charges without involving many or complicated parts, or interference with the proper and efficient operation of the engine.

Another object of the invention is to provide an inlet valve for internal combustion engines which shall not be liable to leakage nor be likely to get out of order or require attention even after prolonged use.

It is further desired to provide an inlet valve having the above characteristics which in addition may be readily adjusted to permit the engine to be reversed.

These and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanying drawings, in which:

Figure 1, is a vertical section of an explosion engine constructed according to my invention; Fig. 2, is a vertical section taken on the line 2—2 Fig. 1; and Figs. 3 and 4 are vertical sections, taken at right angles to each other, illustrating a modified form of my invention.

Referring to Figs. 1 and 2 of the above drawings, A is the base or crank case of an internal combustion engine having a main shaft a and a crank a'. The engine cylinder A′ is mounted on the base in the customary manner and within it is a piston B operatively attached to the crank by a connecting rod b. An inlet port a^2 enters the crank case and is connected to any suitable source of fuel for the engine. A passage b' extends from the upper portion of the crank case toward the upper end of the engine cylinder, in the manner customary in two-cycle engines of a well known form, and in addition there is provided in the side of said cylinder an exhaust port or passage b^2 for the escape of the products of combustion.

Mounted upon one side of the crank so that it may if desired, act as a counter-balance for the same and for the connecting rod, etc., is a substantially semi-circular valve structure C having upon it a semi-annular shoe c held in position by pins c' shown in dotted lines in Fig. 1 and normally pressed out from the structure C by a spring c^2. One end of the crank case forms a flat cylindrical chamber for this valve structure C and its shoe, and it will be understood that when the crank is turned, said shoe is forced out by centrifugal force, as well as by the spring c^2, so as to closely fit the wall of said chamber. The inlet port a^2 enters the crank case through the aforesaid valve chamber in which the structure C and the shoe revolve, so that it is periodically closed by said shoe for substantially one half a revolution of the shaft a.

Under operating conditions the inlet port is open during the entire up stroke of the piston and as this latter cuts off the opening of the passage b' into the cylinder, gaseous fuel is drawn into the crank case, since the shoe c uncovers the port a^2. At the beginning of the down stroke of the piston, said shoe closes or cuts off this inlet port, so that the fuel is compressed in the crank case and is finally allowed to pass into the cylinder when the piston uncovers the opening into the passage b'. Just after this admission of fuel to the cylinder, the shoe again opens the inlet port a^2 so that the upward movement of the piston sucks a new charge into the crank case and at the same time compresses that previously admitted until it is exploded in any suitable manner to cause operation of the engine.

Instead of placing the projection or counterweight structure C directly on the crank, I may in those cases in which it may be desirable to make the engine reversible, arrange the parts as shown in Figs. 3 and 4, where I provide a segmental projection C′ upon the crank or main shaft a and extend the crank case to form a cylindrical chamber A^2 at one side thereof. As before I mount a semi-annular shoe on the segmental structure, though in this case I place springs c^4 to act directly on the pins c' so as to cause the shoe to make a tight joint with the interior surface of the chamber in which it moves. The operation of the valve formed by the part C′ and its shoe is the same as described in connection with the form of the invention illustrated in Figs. 1 and 2, and when it is desired to reverse the direction of op-

eration of the engine, said valve may be shifted on the shaft through an angle of 180° relatively to the crank.

It is obvious that the positions of the ports and the proportions of the various parts of the valve and the chamber in which it works, may be materially changed without departing from my invention, which provides a most simple and efficient means for controlling the admission of fuel to an internal combustion engine.

I claim as my invention:

1. The combination in an internal combustion engine of a crank case having a cylindrical interior provided with a port opening into its cylindrical surface; a cylinder; a piston therein; a shaft having a crank in said crank case; means for connecting the crank and the piston; a valve structure carried by the shaft so as to extend in a line substantially 180 degrees distant from the line of the crank; with a substantially semi-annular shoe mounted on and structurally independent of said structure in position to movably coöperate with the cylindrical surface of the crank case to control the flow of fluid through the port; there being a conduit for conducting fluid from the crank case to the engine cylinder; with springs between the valve structure and said shoe.

2. The combination in an internal combustion engine, of a crank case having a substantially cylindrical surface provided with a port; a cylinder; a piston in said cylinder; a shaft having a crank in the crank case; a rod connecting the crank with the piston; a valve structure on the shaft; and a circularly curved strip forming a shoe movably mounted on the valve structure in position to coöperate with the port in the cylindrical surface of the crank case to control the flow of fluid therethrough; there being means for conducting fluid from the crank case to the engine cylinder.

3. The combination in an internal combustion engine of a crank case having a cylindrical portion provided with a port; a crank shaft passing through said case; a crank on said shaft; a semi-cylindrical structure mounted adjacent to the crank and extended from the shaft in a line substantially 180° from the line of said crank; a substantially semi-annular shoe movably mounted on said structure in position to cooperate with the crank case port to control the flow of fluid therethrough; an engine cylinder; a piston therein; and a rod connecting the piston with the crank.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM H. RICHMAN.

Witnesses:
WILLIAM E. BRADLEY,
WM. A. BARR.