

Oct. 28, 1924.

1,513,692

J. F. BRICE

VALVE ACTION

Filed Oct. 11, 1922

Fig. 1.

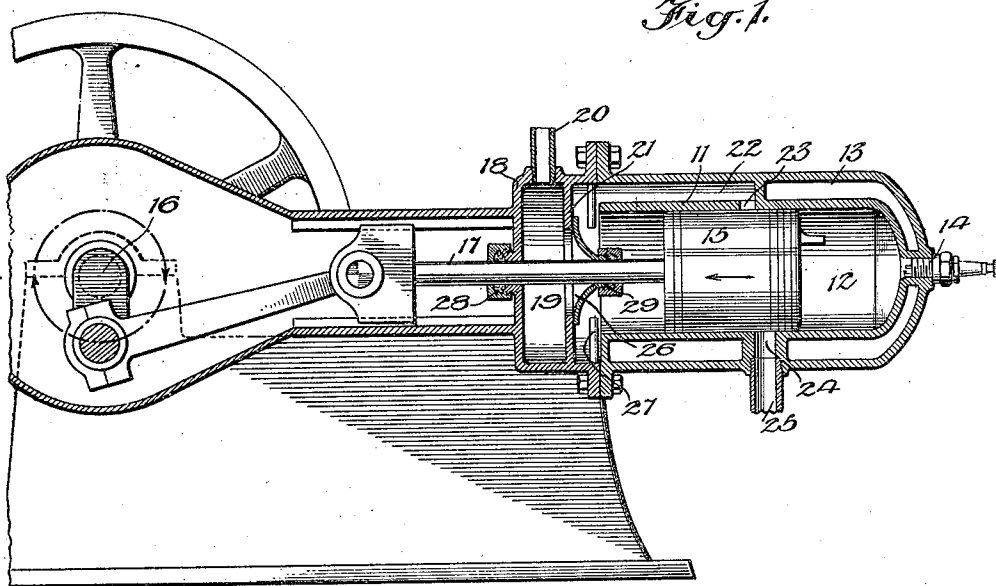


Fig. 2.

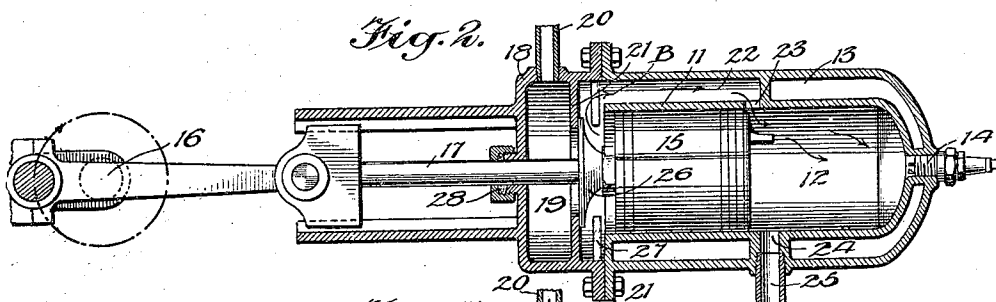
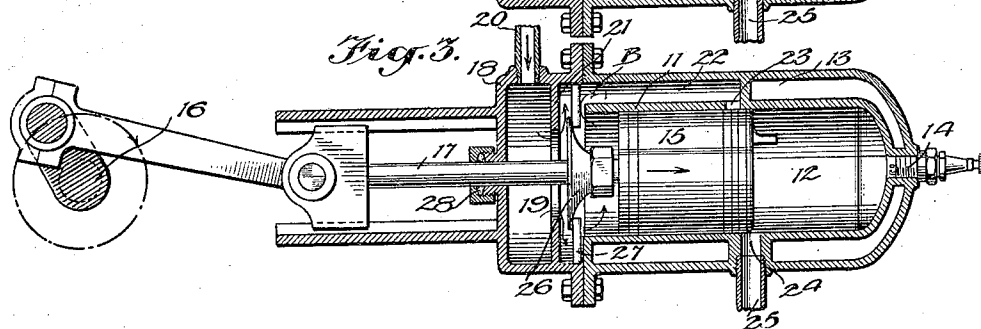


Fig. 3.



WITNESSES

John Taylor
A. J. Smith

INVENTOR

John F. Brice

BY

M. W. Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN FRANCIS BRICE, OF BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA.

VALVE ACTION.

Application filed October 11, 1922. Serial No. 593,897.

To all whom it may concern:

Be it known that I, JOHN FRANCIS BRICE, a citizen of the United States, and a resident of the township of Bensalem, in the county of Bucks and State of Pennsylvania, have invented a new and Improved Valve Action, of which the following is a full, clear, and exact description.

My invention relates to a valve action, and aims to provide a structure of this character, particularly adapted for use in connection with an explosive motor of the two-cycle type.

In two-cycle engine practice it has been common to compress the unexploded fuel charge within a case or compartment at the lower end of the cylinder, and usually the crank case. In combination with this construction it has been usual to admit the combustible charge to the base by means of a port in the cylinder wall uncovered by the skirt of the piston at one end of its stroke. This entails periodic variations above and below atmospheric pressure in the crank case, giving rise to irregularities of operation due to leakage around the bearings and the joints of the crank case, also a rather low limit is placed on the revolution speed because of the very short interval during which the fuel port remains open. With a view to correcting the latter fault, another construction has been used in which the so-called third port for admitting the mixture to the base is replaced by some form of check valve automatically opened by the suction beneath the rising piston and closed at the return of the piston by excess pressure over atmospheric, usually with the addition of a light spring to hasten the closing. The structural considerations limit the size of such a valve and the inertia of the mass of the valve limits the speed of its action very materially.

With these and further difficulties in mind the present invention has reference to a valve structure by means of which primarily no loss of compression will be experienced.

A further object of my invention is that of providing a device of the character stated by means of which a high compression will be provided.

A still further object of my invention is that of providing a device of the nature stated in which an unprecedentedly large opening is provided for the admission of the combustible charge by means of a valve actuated both automatically and positively

without the use of springs or any added part other than the piston rod itself.

Another object of the invention is that of providing a device of the type stated which will employ an extremely simple construction of parts, and arrangement of the same, and by means of which the efficiency of the motor will be generally improved, aside from the fact that mechanical difficulties will be reduced to a minimum.

With these and further objects in mind my invention contemplates the combination of a motor embracing a cylinder and a piston movable within said cylinder, together with a combustion chamber beyond the piston, and a compression chamber below the same, as well as a valve mechanism actuated by the motor operations, and serving to control the flow of unexploded fuel into the combustion chamber.

Reference is had to the attached sheet of drawings as illustrating one practical embodiment of my invention and it will be seen in these views that—

Figure 1 is a sectional side view of a motor generally embracing a conventional construction with which there is associated, however, my improved type of valve action and showing the parts in one position;

Figure 2 is a somewhat diagrammatic view on the order of Figure 1, and showing the position which the parts assume when the motor is in a different stage of its cycle; and

Figure 3 is a view similar to Figure 2 and showing the motor parts in the position which they assume during still another step of the operating cycle.

It will be seen in these views that the reference numeral 11 indicates a cylinder providing the usual combustion chamber 12, said cylinder, if desired, being provided with a jacket 13, and also mounting, in the usual manner, a fuel igniting device 14. Moreover, in accordance with conventional construction, a piston 15 is mounted for reciprocation within the cylinder, and this piston is operatively attached to a crank shaft 16 by a connecting rod 17 all of which is in accordance with the usual construction.

However, contrary to the conventional construction, it will be noted that a cylinder 11 has a base 18 attached to its inner end, and this base provides a space 19 into which a fuel charge is introduced through a pipe 20, it being noted, however, that an inwardly ex-

tending flange portion 21 is provided adjacent the inner end of the cylinder and acts as a valve seat in a manner hereinafter specified.

5 Normally the motor operates as follows:

The compressed fuel charge flows as in customary two-cycle engines through a by-pass 22 and is introduced into the combustion chamber 12, through an opening 23 upon the 10 piston 15 moving inwardly beyond said opening. This fuel charge is then compressed into the chamber 12 and subsequently ignited to force the piston 15 inwardly, and upon the said latter member reaching a point in line 15 with the opening 24 the products of combustion flow from within the cylinder through the exhaust manifold 25.

However, it will be noted that an initial compression of the unexploded fuel charge 20 is obtained incident to the fact that a suitable valve 26 is slidably mounted upon the rod 17, and the movement of this valve on the one hand is limited incident to contact with the valve seat provided by the flange 21, while 25 on the other hand any suitable stop means such as inwardly extending pins 27 may be provided for limiting the outward movement thereof.

Thus in operation, reference being had to 30 Figure 3, it will be noted that the piston 15 is upon its outward stroke, and due to the frictional contact existing between the valve 26 and the rod 17, the said valve will be in its completely unseated position or, in other 35 words, in contact with the pins 27. Due to the outward movement of the piston, a fuel charge will be sucked in through the pipe 20 as has been indicated in arrows in the figure referred to, and this fuel charge will enter 40 first the space 19 and flow past the valve 26, and so into the space existing between the valve and the piston. This operation will be continued until the piston reaches the outermost point of the stroke and upon the same 45 again traveling inwardly as in Figure 1, incident to the explosion of the fuel charge within the combustion chamber 12, it will be obvious that the valve 26 will be carried with the rod 17, and seat upon the flange 21 thus 50 sealing the space aforementioned.

A fuel charge will now be trapped within this space, and, due to the continued inward movement of the piston, will be compressed, and, upon the piston clearing the opening 55 24, the products of combustion will be discharged from within the combustion chamber, and, upon the piston further advancing as in Figure 2, the compressed unexploded fuel charge aforementioned will flow through 60 the opening or port 23 into the combustion chamber, and this entire cycle will be repeated again and again as the engine is operated.

It is to be noted in this connection that 65 any suitable packing means such as a stuffing

box 28 may be associated with the base 18, and encircle the rod 17, so that an escape of fluid from within the space 19 is prevented, it being further noted that a similar packing 29 is preferably associated with the valve 26 70 for the purpose of preventing a flow of fluid also past this point.

An alternative construction may be employed in which the space 19 is not separated from the main body of the crank case which 75 must, of course, be a completely closed chamber in this instance, attention being called to the fact that this space is never subjected to any compression above atmospheric and that the periodic suction below atmospheric 80 is so slight as to be almost negligible.

I would state in conclusion that while the illustrated example constitutes a practical embodiment of my invention I do not limit 85 myself strictly to the exact details herein illustrated since manifestly the same can be considerably varied without departing from the spirit of the invention as defined in the appended claims.

Claims:

1. In an internal combustion engine including a cylinder, a charge receiving chamber formed on one end of the cylinder and communicating with the latter through an opening formed in the end of the cylinder, 95 and a piston rod extending through the chamber and opening into the cylinder, means for controlling the flow of the charge between the charge receiving chamber and the cylinder, comprising means slidably 100 mounted on the piston rod for closing said opening, and means mounted in the cylinder for limiting the movement of said means for closing the opening with the piston rod.

2. A device of the class described, comprising a cylinder having a plurality of inlet and outlet port openings extending through its wall and open at one end, a jacket surrounding said cylinder and spaced therefrom forming a channel for directing a charge through the inlet openings in the cylinder wall, a charge-receiving chamber 110 formed on the lower end of the jacket and separated from the jacket and cylinder by an annular plate, a piston having a piston rod 115 connected thereto slidably mounted in the cylinder, means mounted on the piston for directing the charge entering through the inlet ports in a desired direction, a valve for closing the opening in the annular plate slidably mounted on the piston rod, and means 120 carried by the jacket for limiting the movement of said valve.

3. In an internal combustion engine including a cylinder, a charge receiving chamber formed on the end of the cylinder and communicating with it, and a piston rod extending through the chamber into the cylinder, means for controlling the flow of the charge between the charge receiving cham- 125 130

ber and the cylinder, comprising a valve slidably mounted on the piston rod, and means mounted in the cylinder for limiting the movement of the valve with the piston
5 rod.

4. In an internal combustion engine, a cylinder, a casing formed on one end of the cylinder providing a charge receiving chamber, said casing having an opening formed in one
10 wall establishing communication with the

cylinder, a piston rod extending through the charge receiving chamber and said opening, a valve, adapted for seating over the opening in the casing wall to close the same, slidably mounted on the piston rod, said valve 15 frictionally engaging the piston rod, and a plurality of radial projections mounted in the cylinder for limiting the movement of the valve with the piston rod.

JOHN FRANCIS BRICE.