March 24, 1925. 1,531,066

J. F. BRICE

ENGINE CONSTRUCTION

Filed Oct. 11, 1922

Fig. 1.

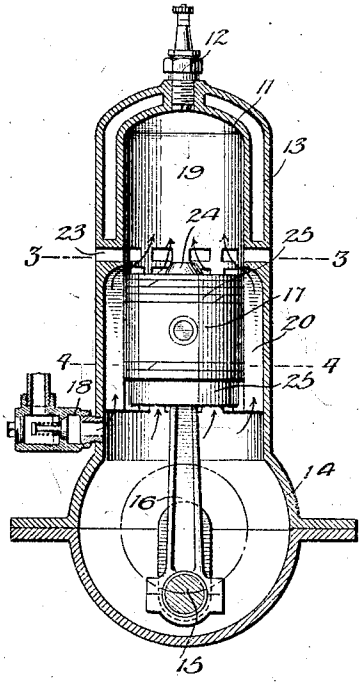


Fig. 2.

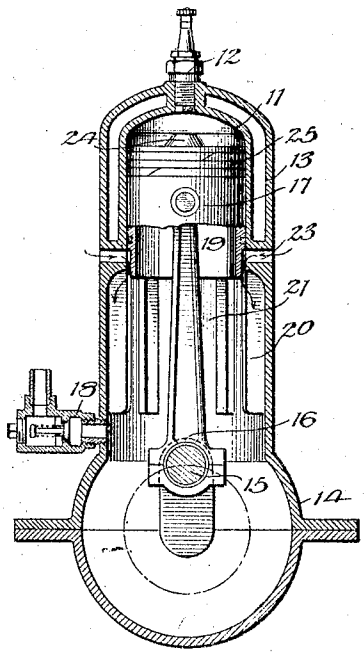


Fig. 3.

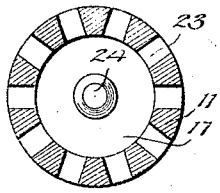
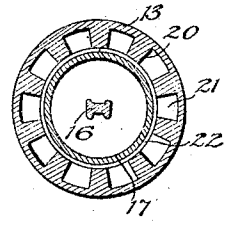


Fig. 4.



WITNESSES

Geo. Murray Co

INVENTOR

John F. Brice

BY Munn & Co

ATTORNEYS

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UNITED STATES PATENT OFFICE.

JOHN FRANCIS BRICE, OF BENSALEM, PENNSYLVANIA.

ENGINE CONSTRUCTION.

Application filed October 11, 1922. Serial No. 593,898.

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 Engine Construction, of which the following is a full, clear, and exact description.

My invention relates to an engine construction and aims to provide certain new and useful improvements in connection with a device of this character, and more particularly in connection with an internal combustion engine.

In the usual internal combustion engine of the two-cycle type, the combustible charge is admitted into the working chamber by ports at one side of the cylinder and the products of combustion are allowed to escape through ports on the opposite side of the cylinder, a baffle plate being provided upon the top of the piston to prevent as far as possible the intermixture of the fresh gas with the spent gas. Such construction limits the total area of cross-section of the ports thereby limiting the rapidity with which the cylinder is charged and exhausted and thus, in turn, limiting the revolution speed of the engine. It will also be seen that the paths traversed by the incoming and outgoing gases are irregular and unsymmetrical to a degree and in ways not ascertainable but evidently not conductive to the best results in operation.

It is an object of my invention to provide, by a new and simple arrangement of ports, very much larger openings for both the admission of the charge and the exhaust of the products of combustion, thus permitting much higher revolution speeds.

It is a further object of my invention to insure by a symmetrical construction that the paths of the incoming and outgoing gases shall be at all phases of operation symmetrical with respect to the axis of the cylinder thereby insuring regularity of operation and greater efficiency.

It is a further object of my invention to separate the fresh from the spent gases by a cushion of inert gases so as to prevent, on the one hand, preignition of the fresh charge and to prevent, on the other hand, wastage of the fresh charge through the exhaust port.

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

Figure 1 is a sectional side view of an engine of the type stated and showing the parts in the position which they assume at the end of the firing stroke.

Figure 2 is a view showing the disposition of the parts at the beginning of the firing stroke.

Figures 3 and 4 are transverse sectional views taken along the lines 3—3 and 4—4 of Figure 1.

In these views the reference numeral 11 indicates the cylinder mounting an igniting device in the nature of a spark plug 12, and being preferably provided with a jacket 13 for cooling purposes. Further, it will be noted in the embodiment illustrated that I have shown a crank case 14 within which a crank shaft 15 is rotatably mounted, the latter having one of the ends of the connecting rod 16 attached to its body, the opposite end of said connecting rod being attached to the piston 17, which is slidably mounted within the cylinder.

I wish it understood that the foregoing features are merely shown for the sake of illustrating my invention, and the same may be varied and rearranged in any manner desired, it being, of course, noted that in view of the fact that the engine is of a two-cycle type that an intake pipe 18 is connected to the crank case, and serves to introduce a fuel mixture thereinto, this fuel mixture in the usual manner being compressed within the crank case and being introduced into the combustion chamber 19 of the cylinder at the completion of the power stroke.

However, it will be seen that contrary to conventional construction I provide a bypass through which the compressed fuel charge is introduced into the cylinder by mounting a series of vanes 20 extending radially inward within the enlarged lower end of the cylinder, and thus spaces 21 are provided between the piston in its lowermost position and the inner wall of the chamber, and it is through these spaces that

the compressed fuel charge flows, the same being introduced at a series of different points in the circumference of the cylinder, as has been shown in Figure 1.

Also, aside from the foregoing, the vanes 20 serve another purpose in that they confine the body of the piston 17 and, consequently, the rings 22 carried thereby are prevented from springing clear of the grooves with which they are associated when the piston is in its lowermost position.

Moreover, contrary to conventional construction, it will be noted that a series of radial ports 23 are provided above the upper ends of the spaces 21, and these ports serve as discharge openings for the products of combustion, and it is obvious that, due to the fact that the same are arranged radially substantially around the entire circumference of the cylinder, these products of combustion will be discharged in the quickest possible time so that the incoming charge of unexploded fuel will not be mixed with a relatively large proportion of the same.

Thus in operation, assuming that the parts are in the position shown in Figure 1 in which the crank shaft 15 is rotating in a clockwise direction, and in which compressed fuel mixture is in the crank case 14, it will be obvious that, due to the fact that the upper edge of the piston 17 is uncovering the upper ends of the spaces 21, this compressed fuel mixture will flow in the manner indicated by the arrows in Figure 1, in other words, into the combustion chamber 19, it being noted that I deflect this fuel mixture centrally upward, preferably, by utilizing a baffle in the nature of a circular tapered boss 24, carried upon the upper end of the piston and centrally positioned with respect thereto.

Upon the piston moving upward and outward the fuel mixture will be further compressed, and, upon the parts reaching the position shown in Figure 2, the plug 12 will ignite this charge and serve to throw the piston downwardly and inwardly, and, due to the pressure exerted by the products of combustion, it will be obvious that, upon the upper edge of the piston clearing the upper edge of the port openings 23, these products of combustion will be forced through these ports incident to the deflecting action exerted by the boss 24.

Further, it is to be noted that the lower end of the piston 17 is in the nature of a skirt 25, reduced in diameter to furnish a clearance which is of sufficient width so that when the piston is in its outermost or upper position shown in Figure 2 it will permit of air flowing through the exhaust ports 23 around this lower end of the piston and so into the spaces 21, where it will form a cushion, separating the fuel charge in the base from the spent gases of the exhaust when the return of the piston to its lowermost position uncovers the upper ends of the spaces 21, as in Figure 1.

Thus the fuel charge is sucked through the pipe 18 during the upward or compression stroke of the piston, and, upon the crank case having been nearly filled with this mixture, inert gas is subsequently introduced into the upper ends of the spaces 21 where it will form a protective cushion so positioned as to enter the working cylinder ahead of the fuel mixture when the latter is subsequently transferred, compressed and introduced directly into the combustion chamber in the manner aforementioned.

I would state in conclusion that while the illustrated example constitutes a practical embodiment of my invention I do not limit 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. An engine construction including in combination a cylinder formed with exhaust ports and intake passages, the latter being arranged below the former, a piston movable within said cylinder and adapted to cover said openings, a reduced skirt portion adjacent the lower end of said piston whereby to permit communication between said openings, and a flow of fluid from the first into the second upon said piston being in its upper position.

2. In an internal combustion engine of two-cycle type, a construction including in combination a cylinder formed with transfer ports symmetrically disposed around the entire wall of the cylinder adjacent to the end of the working chamber nearest to the crank shaft, exhaust ports symmetrically disposed around the entire circumference of the cylinder wall adjacent to said transfer ports, a piston movable within said cylinder and adapted to uncover the exhaust ports and subsequently the transfer ports near the end of its stroke nearest to the crank shaft and to cover said ports in reverse order upon its return, a skirt portion of reduced diameter adjacent to the lower end of said piston adapted to permit communication between the exhaust ports and transfer ports and a flow of fluid from the first into the second at the time when said piston is near the end of its stroke furthest from the crank shaft.

3. A cylinder having a base portion of enlarged diameter, inwardly extended radial ribs within said enlarged base portion, the inner edges of said ribs being in line with the cylinder wall, a piston movable within said cylinder adapted to override the upper ends of the spaces between said ribs, and a skirt portion of reduced diameter adjacent

to the lower end of said piston adapted to permit communication between the exhaust ports and transfer ports and a flow of fluid from the first into the second at the time when said piston is near the end of its stroke furthest from the crank shaft.

4. In engine construction including a cylinder having exhaust ports and intake ports each arranged in a circumferential row therein, means for directing communication between the ports, including a piston formed with a skirt, said piston skirt having an annular depression formed therein at its base.

JOHN FRANCIS BRICE.