Nov. 18, 1924. 1,515,685

E. T. KERSHAW

INTERNAL COMBUSTION ENGINE

Filed Feb. 7, 1923

Fig. 1

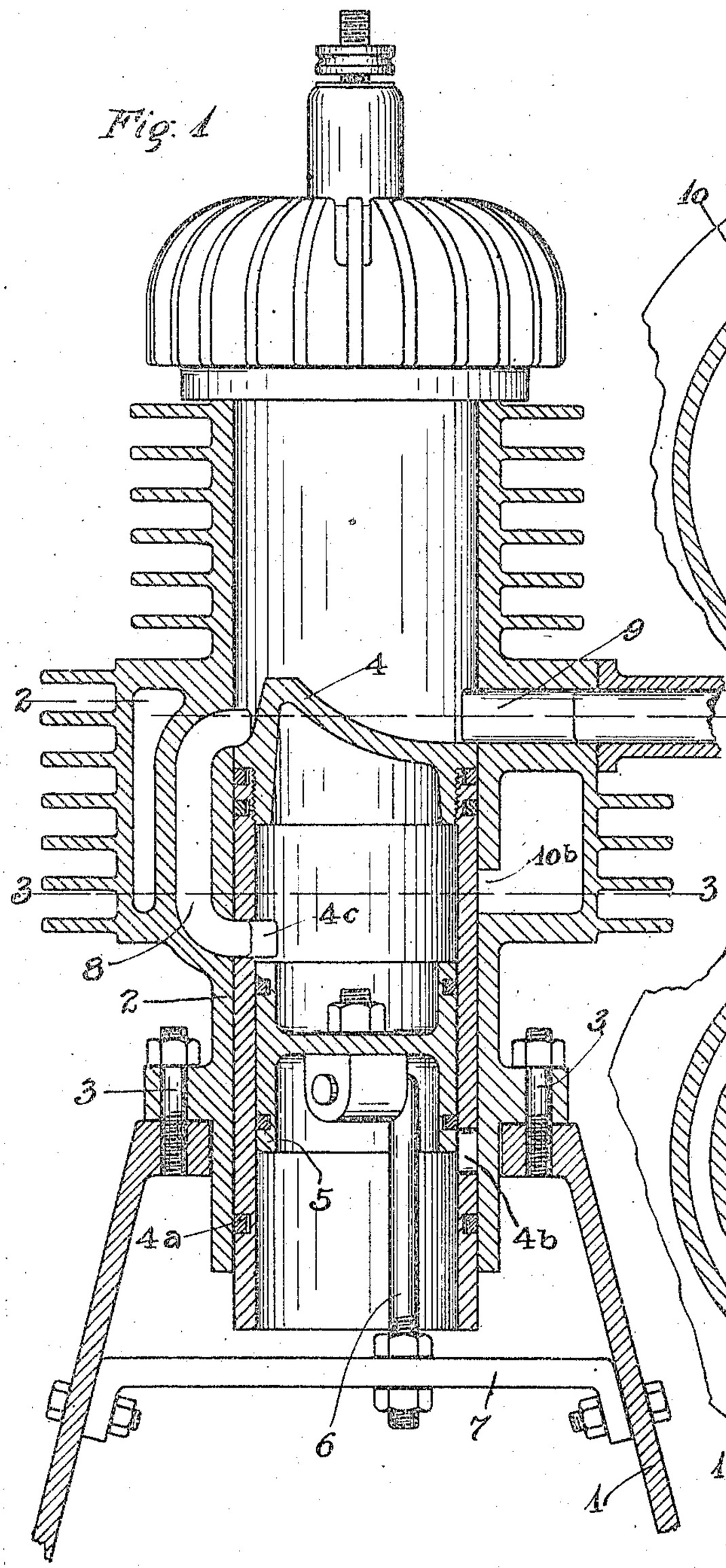


Fig. 2

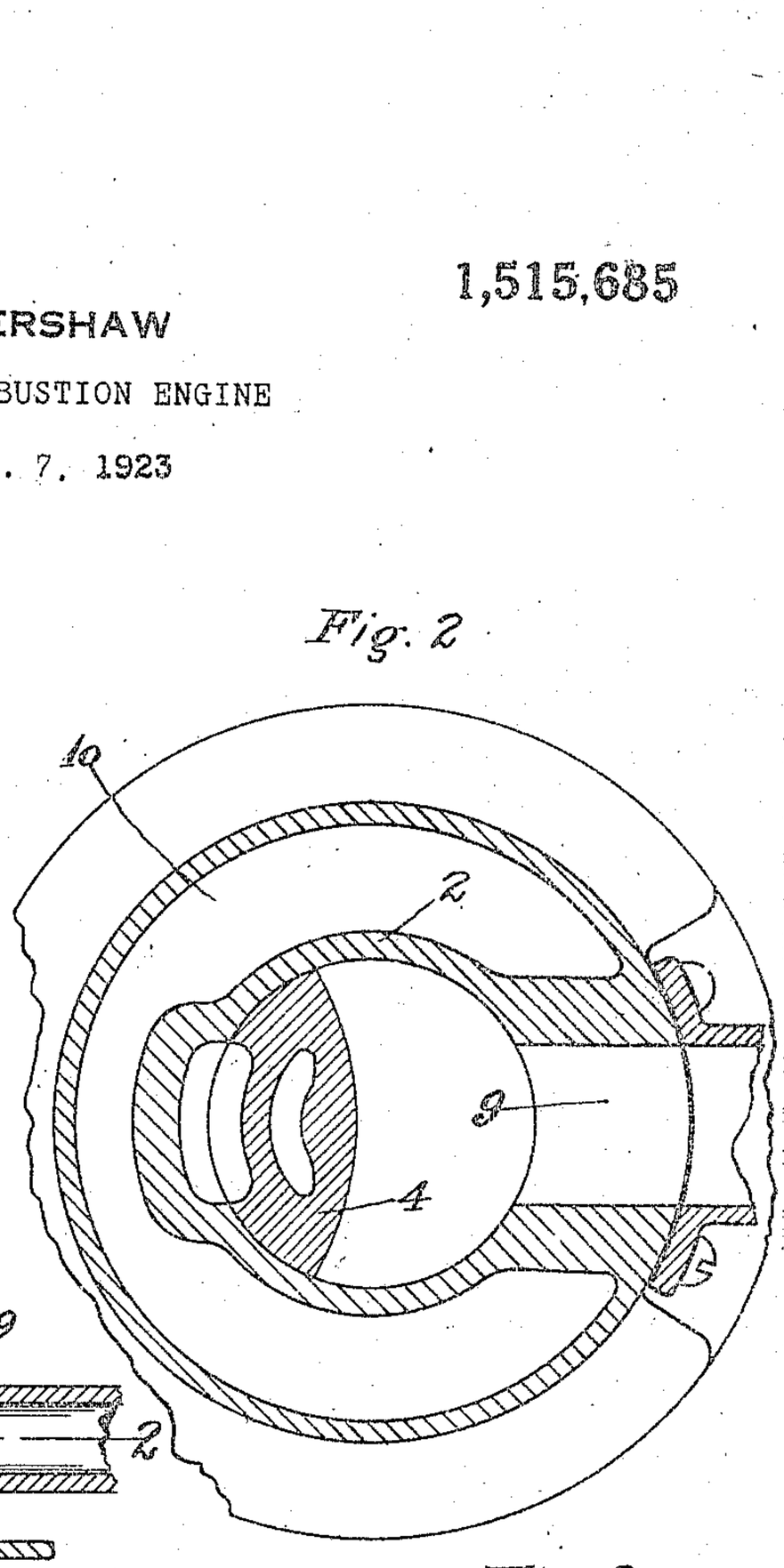
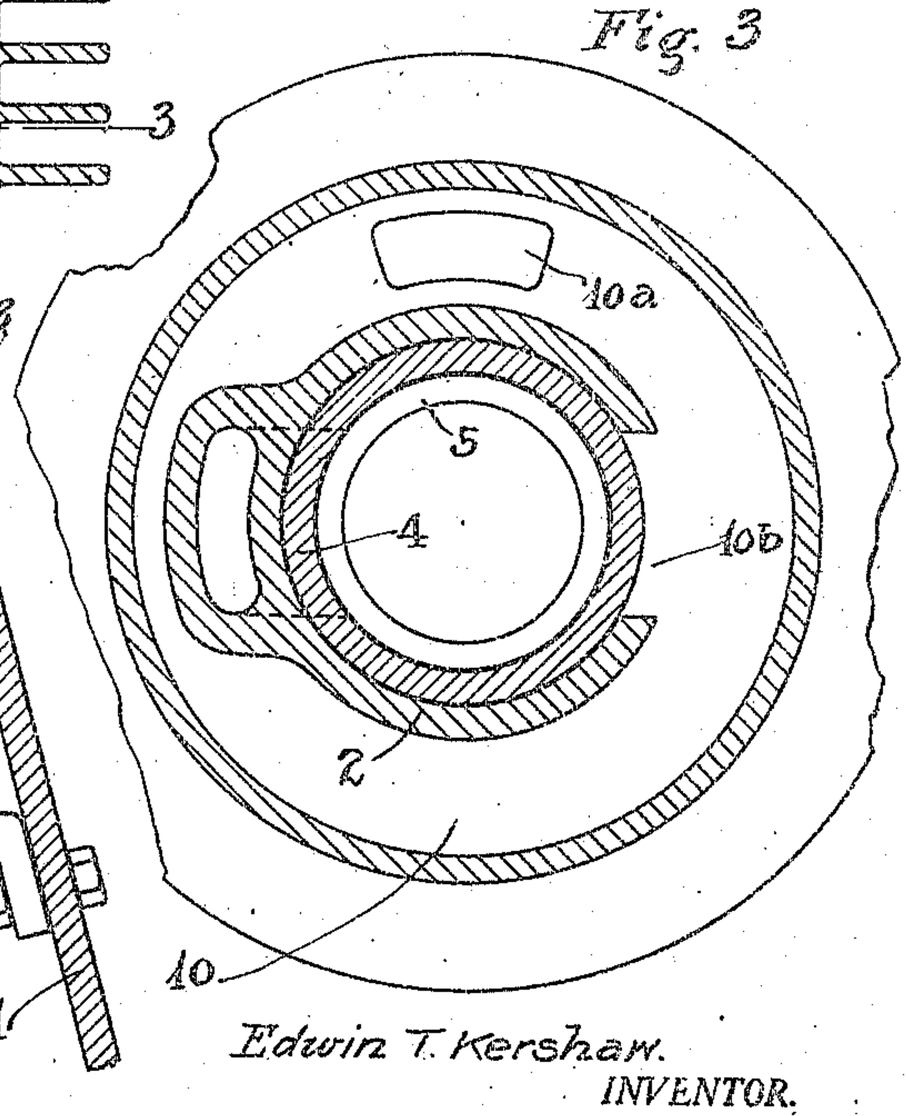


Fig. 3



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UNITED STATES PATENT OFFICE.

EDWIN T. KERSHAW, OF DENVER, COLORADO.

INTERNAL-COMBUSTION ENGINE.

Application filed February 7, 1923. Serial No. 617,571.

To all whom it may concern:

Be it known that I, EDWIN T. KERSHAW, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to internal combustion engines of the two-stroke-cycle type in which a charge of air and combustible gas or other suitable fuel is preliminarily compressed by the working stroke of each piston and introduced into the combustion space of the cylinder by the expansive force of the precompressed charge.

In order to overcome the deficiencies due to poor preliminiary compression in two-cycle engines it has been proposed to provide preliminary compression chambers within the skirted portion of a cup-shaped piston. To this last mentioned type of engine this invention appertains and its object is to improve the construction of engines of this type by providing means for storing a quantity of suitable fuel immediately adjacent the primary intake port so that when the main piston is at its high point and the intake is open and the fuel is drawn, by the produced suction, immediately into the preliminary compression space in the piston, thus reducing the element of time which would otherwise be necessary for the fuel to pass through a manifold from the carbureters and also aiding in warming the charge by reason of the positioning of the fuel chamber adjacent the cylinder wall and exhaust passage.

In the accompanying drawings in which like reference characters indicate like parts throughout the several views;

Figure 1 is a vertical section through the cylinder and piston of an internal combustion engine embodying my invention:

Fig. 2 is a transverse section taken on the line 2—2 of Fig. 1:

Fig. 3 is a similar section taken on line 3—3 of Fig. 1.

In the drawings numeral 1 indicates an engine crank case of which, for convenience in illustration, only the upper part has been shown and the mechanism contained therein such as the crank shaft and associated mechanism being likewise omitted for convenience of illustration. The engine cylinder is indicated at 2 and is secured to the crank case in any suitable manner as by bolts 3. The cylinder shown is of the air cooled type but the invention is equally applicable to a water cooled cylinder. The piston is shown at 4 and is machined on the inside to receive a stationary piston 5 which is secured to the crank case in any suitable manner as by standard 6 adjustably anchored to a cross part 7 which extends between the sides of the case. The upper end of the piston is provided with the usual piston rings and the lower end thereof is provided with a packing ring 4^a. The piston 4 at its lower end above the packing ring 4^a is provided with a port 4^b and higher up in the opposite wall is provided with the port 4^c the function of these ports presently appearing. The cylinder is provided with a passageway or by-pass 8, the lower end of which registers with the port 4^c when the piston is substantially at the bottom of its stroke, whereby a connecting passage is established between that portion of the cylinder above the piston 4 and the interior of the latter this interior chamber forming a chamber in which the fuel may be preliminarily compressed. The degree of compression desired can be varied by adjusting the stationary piston 5 with respect to its support 7 as will be readily understood. The exhaust port of the cylinder is indicated at 9 and is substantially opposite the upper end of the by-pass 8, it being understood that the head of the piston is provided with a baffle plate for deflecting the charge of fresh fuel upwardly and away from the exhaust port 9. Surrounding the engine cylinder 2 at the region of the by-pass 8 is a chamber 10 having an opening at 10^a to the exterior and having an opening or port 10^b opening into the cylinder and the opening 10^a being adapted for connection to a carburetor. When the piston is at the upper end of the stroke the lower port 4^b thereof registers with the port 10^b and fuel may then enter the chamber within the piston 4. The piston in moving upwardly closes the by-pass and creates a partial vacuum in its interior chamber, and when the port 4^b registers with the port 10^b the fuel charge which is stored within the storage chamber 10, immediately rushes into the piston interior, and on the downward stroke of the piston the charge is com-

pressed to the desired degree and when the port 4c registers with the lower end of the by-pass 8 the charge will immediately pass into the cylinder above the piston 4 as will now be readily understood. The storage chamber 10 is of sufficient capacity to hold the necessary engine charge, and by reason of the charge being stored in close proximity to the port of entry into the preliminary compression chamber within the piston 4, not only does the charge quickly enter the preliminary compression chamber within the piston 4, but the same is also heated which is a very desirable desideratum, especially when heavy fuels are used.

By my invention a full charge of fuel to the engine is ensured in the very short interval of time that the piston is at the top of its stroke and the speed of the engine and the power thereof are therefore maintained at a maximum, a condition which is not always obtained in the ordinary type of engine because of inability of the engine to obtain the necessary fuel charge in the short interval of time allowed for that purpose.

The efficiency of the present construction lies in the fact that an ample supply of fuel for the pre-compression chamber is always on storage immediately adjacent the pre-compression chamber, and ready to furnish a full supply or full charge to the pre-compression chamber whenever the port thereto is open. All loss by way of friction, and so forth, which is incident to the passage of the charge through a long or narrow passage, is taken care of between the strokes of the piston when the charge is sucked from the carburetor into the storage chamber immediately outside of the cylinder so that when the pre-compression chamber is ready for its charge the full charge is immediately at hand and ready to be supplied without friction or loss of any kind, and a full charge is thus guaranteed at every stroke.

It will be obvious that the sucking of the charge into the preliminary compression chamber will create a partial vacuum in chamber 10 which in turn will draw a new charge into the latter chamber.

The invention has been described with considerable particularity of detail, but it is to be understood that no limitations are intended except as may be imposed by appended claims.

What I claim is:

1. In combination, a cylinder, a skirted piston, a stationary abutment telescoped by the latter, the space between the piston and abutment forming a separate initial compression space, a bypass in communication with said space and the cylinder at a point above the piston when the latter is at the lower portion of its stroke, and a fuel storage chamber having a port opening directly into the said space when the piston is at the upper portion of its stroke.

2. The combination in an internal combustion engine having a separate initial compression space between its piston and an abutment telescoped by the latter, of a fuel storage chamber immediately adjacent the engine cylinder whereby the requisite charge of fuel may pass directly into the said compression space upon the same being opened for the reception of fuel.

3. The combination in an internal combustion engine having a separate initial compression space between its piston and an abutment telescoped by the latter, of a fuel storage chamber surrounding the engine cylinder and having a port which opens into the said compression space whereby the requisite charge of fuel may pass directly into the said space upon the said port being opened for the reception of fuel, the piston controlling the opening of said port.

4. In combination, a cylinder, a skirted piston movable therein, an abutment over which the piston is telescoped, a fuel storage chamber contiguous the cylinder, a port in the cylinder wall leading to said chamber, an opening in the piston skirt adapted to register with the said port when the piston is at the upper limit of its stroke whereby fuel may enter the piston above said abutment.

5. In combination, a cylinder, a fuel storage chamber adjacent the same and having a port entering the cylinder wall, a skirted piston having in its skirt an opening adapted to register with the said chamber port when the piston is at the upper limit of its stroke, said chamber adapted to discharge gaseous fuel into said piston when the said ports are in register, an abutment telescoped by said piston, the latter on its downward stroke compressing the gases received therein from the fuel chamber, a second port through the skirt of the piston, a pair of ports in the cylinder wall connected by a bypass, one of the said pair of ports being in communication with the last-named piston port when the piston is at the downward limit of its stroke whereby the interior of the piston is in communication with the cylinder above the piston to permit the compressed fuel within the piston to be discharged into the cylinder, and a cylinder port through which the exhaust gases may pass.

In testimony whereof he affixes his signature.

EDWIN T. KERSHAW.