

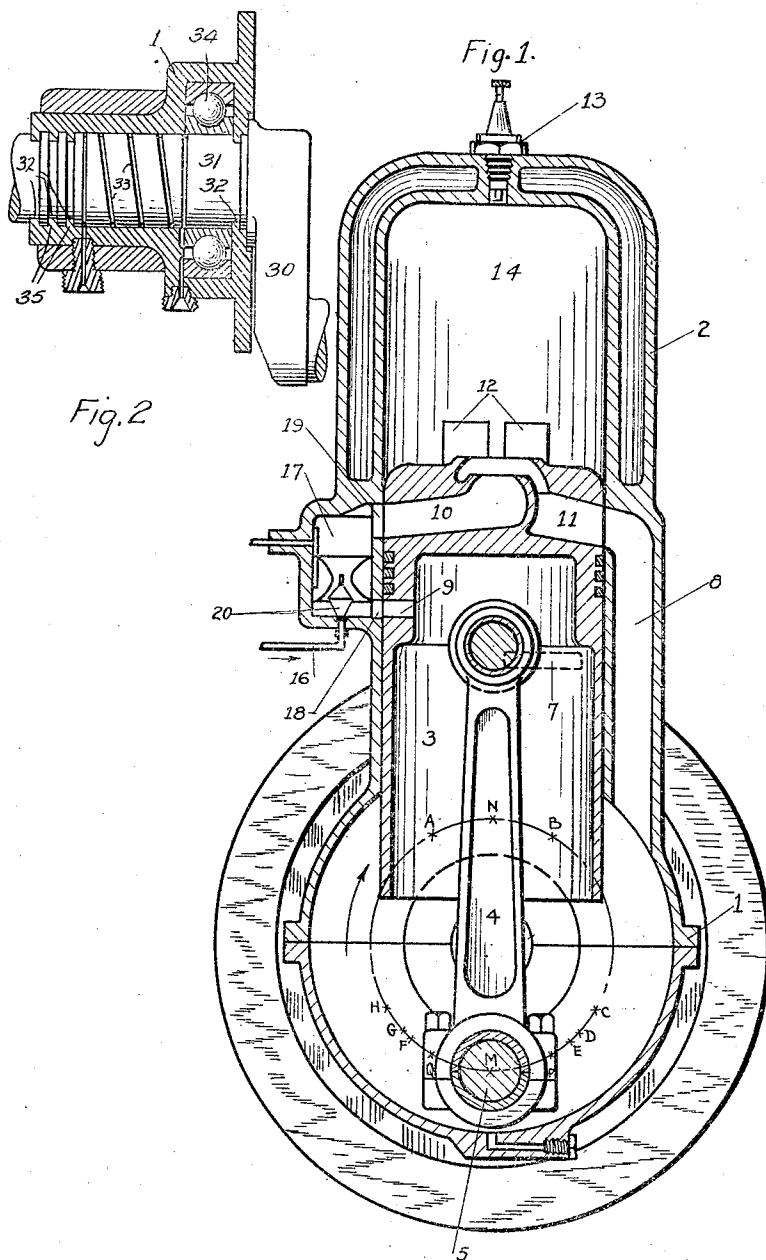
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TWO-CYCLE INTERNAL COMBUSTION ENGINE

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TWO-CYCLE INTERNAL-COMBUSTION ENGINE.

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To all whom it may concern:

Be it known that I, MAURICE BÉZU, a citizen of the Republic of France, residing at New York, in the county of New York and State of New York, have invented a new and useful Two-Cycle Internal-Combustion Engine, of which the following is a specification.

My invention relates to improvements in two-cycle internal combustion engines; and the objects of my improvements are: First, to scavenge the exhaust gases by fresh air passing through the piston head, thus cooling the piston head; second, to close the exhaust ports on fresh air so that no exhaust gases remain in the cylinder when compression begins; third to provide air tight crankshaft bearings.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Fig. 1 is a transverse sectional elevation of my device, and Fig. 2 is a longitudinal sectional elevation of one of the crankshaft bearings.

Similar numerals refer to similar parts throughout the several views.

1 is the crank case carrying cylinder 2, which contains piston 3, which carries connecting rod 4 with bearing 5. 7 is the air intake port in cylinder 2; 8 is an air channel leading from crank case 1 to the inside of cylinder 2; 9 is an air channel leading through the side of piston 3; 10 is an explosive mixture channel from the side to the centre of the head of piston 3. It should be noted that for purposes of diagrammatic explanation channels 9 and 10 in Fig. 1 are shown in the same vertical line, but in actual construction and practice, channel 9 is located on a vertical line different from channel 10, in order to prevent any functional interference of channel 9 with the upper opening 19 of channel 17 during the upward and downward motion of piston 3 in cylinder 2; 11 is an air channel, one end of which, at the lower part of the piston stroke, registers with the upper opening of channel 8. The other end of air channel 11 preferably surrounds the central opening of channel 10; 12 are the exhaust ports in cylinder 2; 13 is the spark plug in the head of cylinder 2; 14 is the compression chamber in cylinder 2; 16 is the intake line for gasoline or other explosive liquid or fluid; 17 is an explosive

mixture channel in cylinder 2, with lower opening 18 which registers with channel 9 at the lower part of the piston stroke, and with upper opening 19 which registers with channel 10 at the same time. As previously explained in reference to channels 9 and 10, the openings 18 and 19 are out of vertical alignment. 20 is a spray device, injector, carbureter or other appropriate structure for regulating the feed of the explosive liquid or fluid into channel 17; 30 is the crank, 31 is the crankshaft, with cylindrical recesses 32, to prevent the entry or escape of air into or from crankcase 1, and grooves 33 to transmit lubricants and ball bearings 34 to minimize rotary and longitudinal friction. Cylindrical ribs 35 in crankcase 1, fit into recesses 32 to cooperate in preventing the entry or escape of air into or from crankcase 1.

The operation of my device is as follows:

Assume piston 3 on the upstroke, with crank bearing 5 rotating clockwise as indicated by the arrow. Ports 8, 18 and 19 are closed, thus developing a partial vacuum in crankcase 1. At the same time, compression of the explosive mixture is occurring in chamber 14.

When bearing 5 arrives at point A, the lower edge of piston 3 registers with the lower edge of air intake port 7, and said port 7 opens and fresh air is forced by the outside atmospheric pressure into crankcase 1.

When bearing 5 is somewhere about the upper dead center N, spark plug 13 ignites the gases compressed in chamber 14, and expansion of the gases begins.

When bearing 5 reaches point B, air intake port 7 closes, and the air compression in crankcase 1 begins.

When bearing 5 reaches point C, the upper edge of piston 3 reaches the upper edge of exhaust ports 12, and the burned explosive mixture begins to go out through said exhaust ports 12.

When bearing 5 reaches point D, channel 11 begins to pass channel 8, thereby permitting the compressed air in crankcase 1 to go up through channels 8 and 11 into chamber 14 and up to spark plug 13, thence down the outer periphery of chamber 14, and through exhaust ports 12. This function continues while bearing 5 is passing from points D to G, thereby cooling the head of piston 3,

cleansing spark plug 13, expelling all the burned explosive mixture, and permitting the exhaust ports 12 to close on pure air with no substantial burned mixture remaining in chamber 14.

Meanwhile, when bearing 5 has reached point E, port 10 begins to pass port 19, thereby permitting the explosive mixture in channel 17 to be drawn out through channel 10 by the suction produced by the air coming out through channel 11. This function continues while bearing 5 is passing from point E to point F.

Meanwhile, when bearing 5 has reached point P, port 9 begins to pass port 18, thereby permitting the compressed air in crank case 1 to go through ports 9 and 18, channel 17, port 19 and channel 10, thus accelerating the transmission of the explosive mixture into chamber 14. This function continues while bearing 5 is passing from point P to point Q.

When bearing 5 passes lower dead centre M, piston 3 by its upward motion successively closes port 18 at point Q, 19 at point F, 8 at point G, and 12 at point H, and the cycle starts anew.

It will be understood that the relative time of opening and closing ports 18 and 19 can be changed if desired so that they both open simultaneously, or so that port 19 will open before port 18, such differences being effected by changes in the relative heights and vertical distances of said ports 18 and 19.

If desired, a valve can be placed in channel 8 to regulate the passage of compressed air; and a valve can be placed in channel 17 to regulate the passage of explosive mixture. These valves are not shown, but are well known to all those skilled in the art.

I claim:

1. In a two-cycle internal combustion engine; a crank case; a cylinder; a piston; an explosive mixture channel in the piston head, the outlet of said channel being on the upper surface of said piston head; an air channel in the piston head, the outlet of said channel being adjacent to the outlet of the explosive mixture channel; an air port in the side of the piston; an air channel leading from the crank case and having at its upper end a port which registers with the outer end of the air channel in the piston head, when the piston is at or near lower dead centre; an explosive mixture channel having two ports, one of said ports registering with the explosive mixture channel in the piston head, when the piston is in low position, and the other of said ports registering with the air port in the side of the piston, when the piston is in low position; an exhaust port in the cylinder adapted to be opened by the dropping of the piston head when the piston is at or near lower dead

centre; and an air intake port in the cylinder adapted to be opened by the raising of the piston when the piston is at or near upper dead centre.

2. In a two-cycle internal combustion engine; a crank case; a cylinder; a piston; an explosive mixture channel in the piston head, the outlet of said channel being on the upper surface of said piston head; an air channel in the piston head, the outlet of said channel being adjacent to and surrounding the outlet of the explosive mixture channel; an air port in the side of the piston; an air channel leading from the crank case and having at its upper end a port which registers with the outer end of the air channel in the piston head, when the piston is in low position; an explosive mixture channel having two ports, one of said ports registering with the explosive mixture channel in the piston head, when the piston is in low position and the other of said ports registering with the air port in the side of the piston, when the piston is at or near lower dead centre; an exhaust port in the cylinder adapted to be opened by the dropping of the piston head when the piston is at or near lower dead centre; and an air intake port in the cylinder adapted to be opened by the raising of the piston when the piston is at or near upper dead centre.

3. In a two-cycle internal combustion engine; a piston; an explosive mixture channel in the piston head, the outlet of said channel being on the upper surface of the piston head; an air channel in the piston head, the outlet of said air channel surrounding the outlet of the explosive mixture channel.

4. In a two cycle internal combustion engine; a crank case; a cylinder; a piston; a first air channel on one side of the piston, the lower end of said air channel opening into the crank case when the piston is in low position, and the upper end of said air channel at the same time opening into an air channel in the side of the cylinder, said air channel in the side of the cylinder at the same time opening into an air channel in the top of the piston head, all of the said openings being closed as soon as the piston has moved upward for a small distance; and a second air channel on one side of the piston, the lower end of said air channel opening into the crank case when the piston is in low position, and the upper end of said air channel at the same time opening into a gasoline mixture channel in the side of the cylinder, said gasoline mixture channel in the side of the cylinder at the same time opening into a gasoline mixture channel in the top of the piston head, all of the said openings being closed as soon as the piston has moved upward for a small distance.

5. In a two cycle internal combustion engine; a crank case; a cylinder, a piston; a first air channel on one side of the piston, the lower end of said air channel opening into the crank case when the piston is in low position, and the upper end of said air channel at the same time opening into an air channel in the side of the cylinder, said air channel in the side of the cylinder at same time opening into an air channel in the top of the piston head, all of the said openings being closed as soon as the piston has moved upward for a small distance; a second air channel on one side of the piston, the lower end of said air channel opening into the crank case when the piston is in low position, and the upper end of said air channel at the same time opening into a gasoline mixture channel in the side of the cylinder, said gasoline mixture channel in the side of the cylinder at the same time opening into a gasoline mixture channel in the top of the piston head, all of the said openings being closed as soon as the piston has moved upward for a small distance and an air intake port in the cylinder adapted to be opened by the raising of the lower edge of the piston past said intake port when the piston is in high position.
6. In a two cycle internal combustion engine; a crank case; a cylinder; a piston; a first air channel on one side of the piston, the lower end of said air channel opening into the crank case when the piston is in low position, and the upper end of said air channel at the same time opening into an air channel in the side of the cylinder, said air channel in the side of the cylinder at the same time opening into an air channel in the top of the piston head, all of the said openings being closed as soon as the piston has moved upward for a small distance; a second air channel on one side of the piston, the lower end of said air channel opening into the crank case when the piston is in low position, and the upper end of said air channel at the same time opening into a gasoline mixture channel in the side of the cylinder, said gasoline mixture channel in the side of the cylinder at the same time opening into a gasoline mixture channel in the top of the piston head, all of the said openings being closed as soon as the piston has moved upward for a small distance; an air intake port in the cylinder adapted to be opened by the raising of the lower edge of the piston past said intake port when the piston is in high position; and an exhaust port in the cylinder adapted to be opened by the dropping of the piston head past said exhaust port when the piston is in low position.
7. In a two-cycle internal combustion engine; a piston; an explosive mixture channel in the piston head, the outlet of said channel being on the upper surface of the piston head; and an air channel in the piston head, the outlet of said channel being on the upper surface of the piston head.
8. In a two-cycle internal combustion engine a piston having an explosive mixture channel in the piston head, and having also an air channel in the piston head.

MAURICE BÉZU.

Witnesses:

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WARREN CLEVELAND.