C. H. TAYLOR.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED MAY 6, 1918.

1,330,409.

Patented Feb. 10, 1920.

2 SHEETS—SHEET 1.

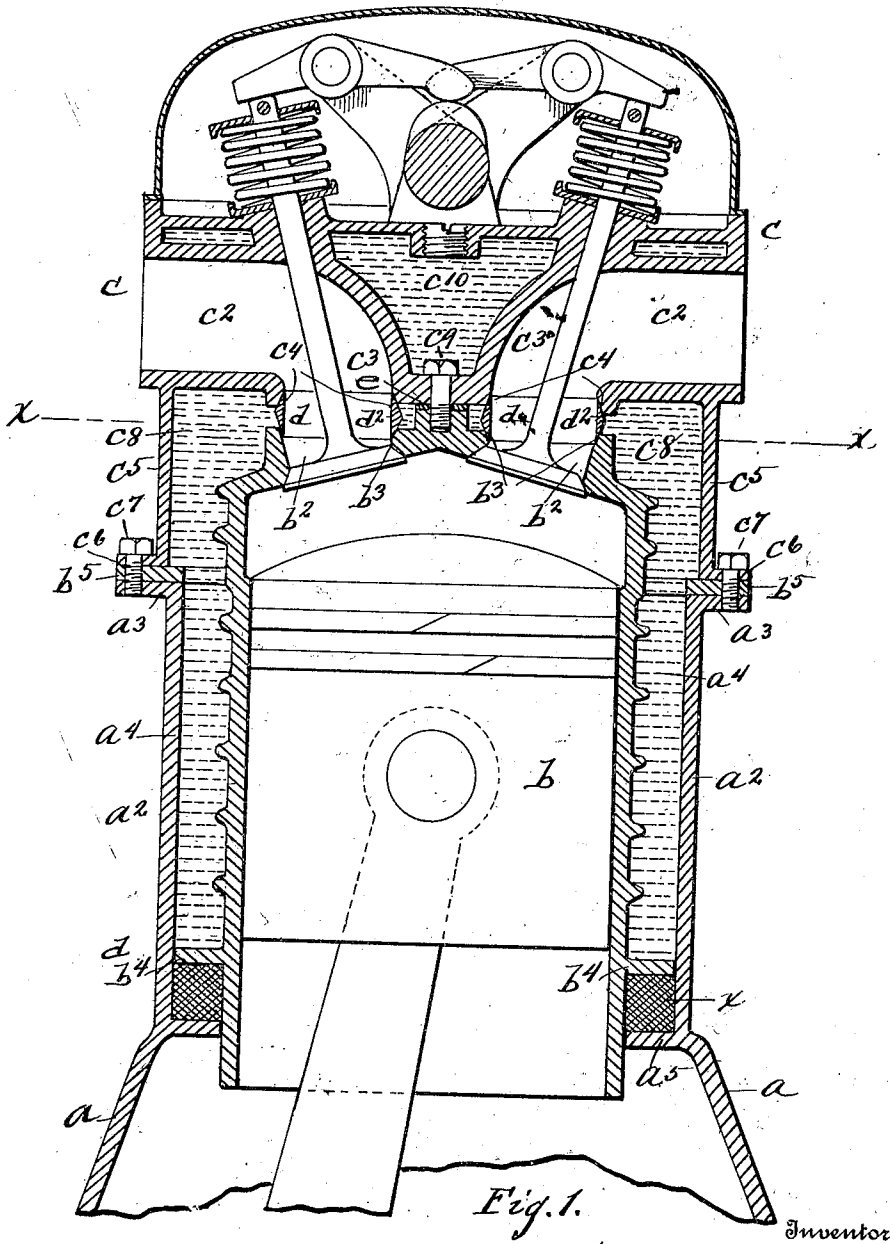

Fig. 1.

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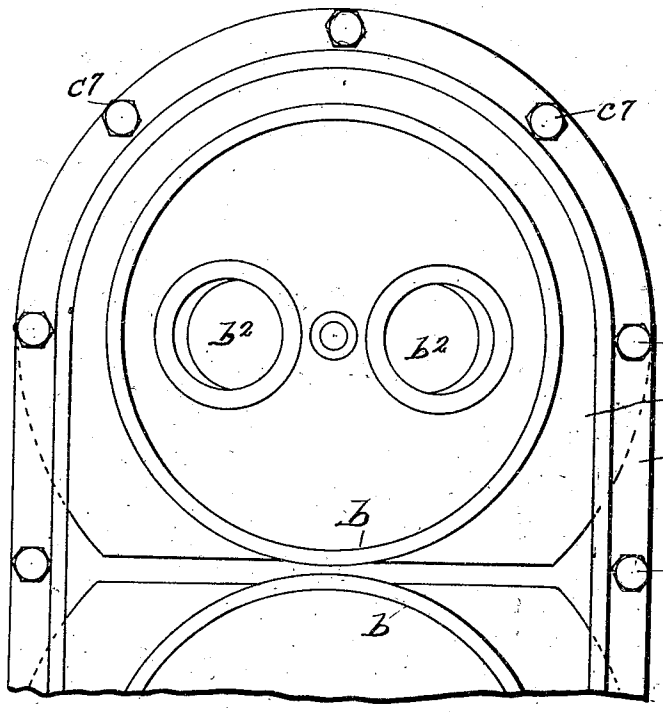

Fig. 2.

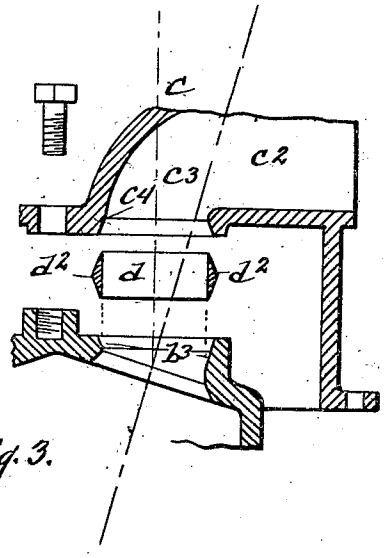

Fig. 3.

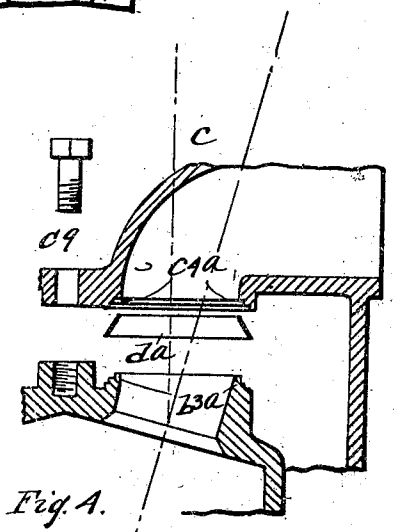

Fig. 4.

Witness

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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,330,409. Specification of Letters Patent. Patented Feb. 10, 1920.

Application filed May 6, 1918. Serial No. 232761.

To all whom it may concern:

Be it known that I, CECIL HAMELIN TAYLOR, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Internal-Combustion Engines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to internal combustion engines and an object of my improvement is to provide for a construction that shall facilitate assembly of the parts and obviate danger of leakage.

I secure this object in the device illustrated in the accompanying drawing in which:

Figure 1 is a sectional elevation of the upper part of an engine embodying my invention.

Fig. 2 is a partial plan view of the same.

Fig. 3 is a detail sectional elevation, the parts being separated.

Fig. 4 is a view similar to Fig. 3 showing a modified construction.

a is the crank case which is extended upward in a cylindrical part a^2 which forms the inclosing wall of the lower part of the water jacket. a^5 is an inwardly extending annular flange at the top of the water jacket.

b is the cylinder which I make of a single piece of steel having its upper end closed except for the valve ports b^2. The walls of the cylinder are quite thin.

b^4 is an annular outwardly extending flange integral with the cylinder b. x is a washer, or ring, of packing material compressed between the flanges a^5 and b^4 to form a tight joint.

There is a space a^4 between the walls of the cylinder b and the cylindrical extension a^2 from the crank case a forming the lower part of the water jacket.

a^3 is an annular outwardly extending annular flange at the upper part of the cylindrical portion a^2 which extends from the crank case a. The upper surface of the flange a^3 is machined to coact in forming a tight joint.

b^2 b^2 are valve ports through the upper end of the cylinder b, the axes of which diverge outwardly. There is a conical seat b^3 formed around the outer end of each of the valve ports b^2.

c is an aluminum casting containing the valve-passages c^2 c^2 which extend horizontally inward and then bend downward at c^3 toward a vertical direction. There are passages c^{10} formed in the casting c to constitute a water jacket around the walls of the valve-passages c^2 c^3. c^5 is a downwardly extending cylindrical portion of the casting c terminating at its lower end in an outwardly extending annular flange c^3 which is machined on its under surface.

b^5 is an annular flange extending outward from the upper portion of the cylinder b, integral therewith, and having its upper and lower faces machined.

The flange b^5 rests upon the flange a^3 and the flange c^6 rests upon the flange b^5 and the three flanges are secured together by bolts c^7 to form a tight joint and to unite the cylinder b, crank case a^2 and casting c together.

There is a conical bearing c^4 formed around the open lower end of each of the parts c^3 of the valve-passages c^2 c^3. The walls surrounding the opening from each of the parts c^3 of the valve passages is axially in line with the wall of the opening at the upper end of the adjacent valve passage b^2.

c^8 is a water jacket inclosed between the cylindrical portion c^5 of the casting c and the upper end of the cylinder b.

d is a ring of soft metal having conical exterior walls d^2 adapted to fit against the conical walls around the opening from the passage c^3 and the conical wall around the adjacent opening from the port b^2.

In assembling the thin steel cylinder b is placed within the cylindrical portion a^2 of the crank case a with the flange b^4 resting upon the packing material x which is between it and the flange a^5 extending inwardly from the crank case. The rings d are then placed upon the conical surface of the walls around the outer ends of the ports b^2. The casting c is then adjusted to place with the conical wall c^4 resting upon the upper conical portions of the outer walls of the rings d. This brings the flange c^6 in position to be secured to the flange a^3. The bolts c^7 are inserted and screwed to place clamping the flanges a^3, b^5 and c^6 firmly together and drawing the casting c downward thus compressing the rings d d and forming a tight joint between the walls

of said rings and the conical seats with which they engage.

A securing bolt c^9 is used extending through a bolt hole at the center of the casting c and engaging a screw-threaded opening in the upper end of the cylinder b. The casting c is formed at its center and lower face to constitute an engaging surface that may be machined and the upper end of the cylinder b is provided with a corresponding engaging surface and there is a shim e placed between said surfaces.

Instead of the smooth conical seats b^3 and b^4 stepped, or annularly indented sheets may be used as shown in Fig. 4 at b^{3a} and c^{4a}. In this case a conical ring of thin metal d^a would be used which would be interposed between the stepped portion c^{4a} and b^{3a} and when the casting c is screwed to place the ridges of the surfaces b^{3a} and c^{4a} are forced against the ring d^a indenting said ring in annular corrugations and forming a tight joint in this way.

The joint secured by the bolt c^9 being in approximately the plane of the rings the engaging position of the parts will be fixed and not variable due to the extension and contraction of the material.

It will be observed that the engaging conical walls around the opening from the passage c^3 and around the adjacent opening from the port b^2 are in horizontal planes, that is, in planes at right angles to the relative motion of the cylinder b and the casting c when these parts are being drawn to their engaged position.

The conical form of the engaging ring allows a considerable margin for the motion of the parts so that the joint formed by the ring and its engaging surfaces will be tight without an over refinement as to the engaging position of the other surfaces which determine the relative position of these engaging parts.

What I claim is:

1. In an internal combustion engine, the combination of a cylinder having its end closed, a valve port extending through said end with its axis diverging outward from the axis of the cylinder, said port being provided with an engaging surface around its outer end in a plane at right angles to the axis of the cylinder, a separate piece having a valve passage therein adapted to form an extension of said port and having an engaging surface around its inner end parallel to said engaging surface of the port, a compressible ring between the walls at the ends of said passage and port, and means for securing said separate piece to said cylinder that shall cause the relative engaging movement of said piece and said cylinder to be parallel to the axis of said cylinder.

2. In an internal combustion engine, the combination of a cylinder having its end closed, a valve port extending through said end with its axis diverging outward from the axis of the cylinder, said port being provided with a conical engaging surface around its outer end in a plane at right angles to the axis of the cylinder, a separate piece having a valve passage therein adapted to form an extension of said port and having a conical engaging surface around its inner end parallel to said engaging surface of the port, a compressible ring having conical surfaces adapted to engage against the conical engaging surfaces of said port and passage, and means for securing said separate piece to said cylinder that shall cause the relative engaging movement of said piece and said cylinder to be parallel to the axis of said cylinder and shall limit the extent of said movement.

3. In an internal combustion engine, the combination of a cylinder having its end closed, a valve port extending through said end with its axis diverging outward from the axis of the cylinder, said port being provided with an engaging surface around its outer end in a plane at right angles to the axis of the cylinder, a separate piece having a valve passage therein adapted to form an extension of said port and having an engaging surface around its inner end parallel to said engaging surface of the port, a compressible ring between the walls at the ends of said passage and port, and means for securing said separate piece to said cylinder that shall cause the relative engaging movement of said piece and said cylinder to be parallel to the axis of said cylinder and shall limit the extent of said movement, said engaging surfaces being annularly corrugated.

In testimony whereof I sign this specification.

CECIL HAMELIN TAYLOR.