F. M. DAVIS.

GAS ENGINE.

APPLICATION FILED NOV. 1, 1915.

1,213,340. Patented Jan. 23, 1917.

FIG. 1

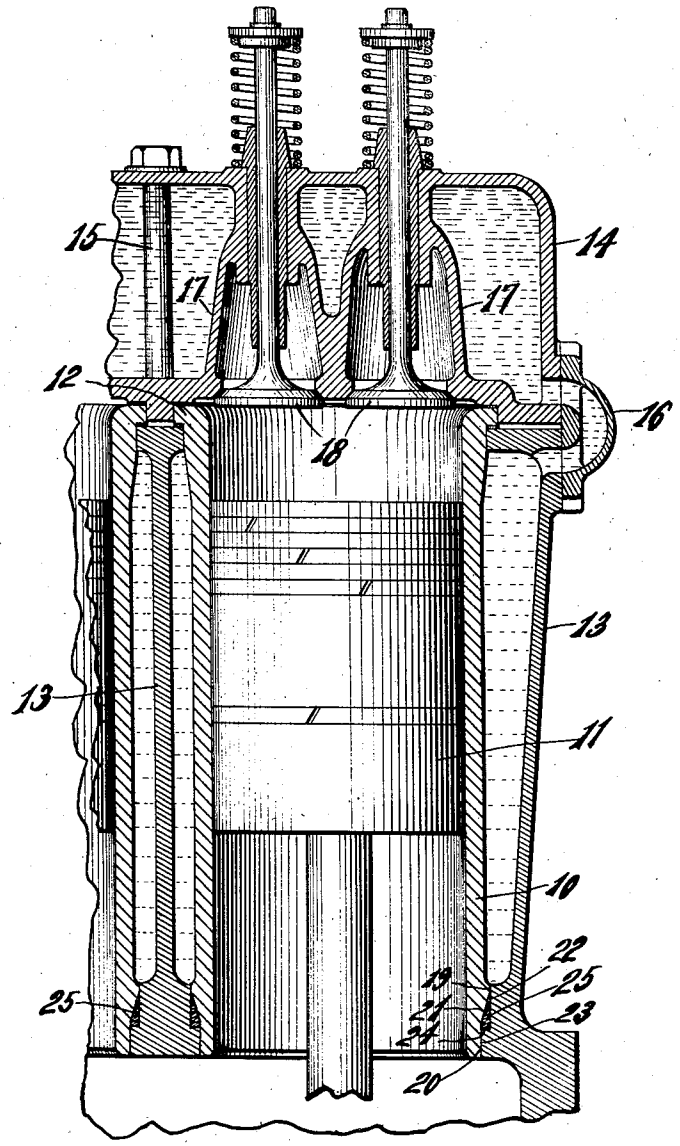


FIG. 2

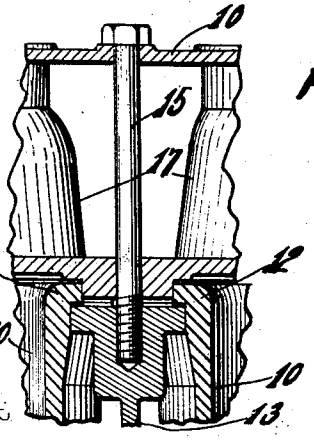
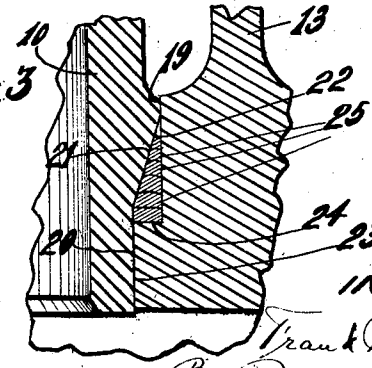


FIG. 3



WITNESSES.

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GAS-ENGINE.

1,213,340. Specification of Letters Patent. Patented Jan. 23, 1917.

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To all whom it may concern:

Be it known that I, FRANK M. DAVIS, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Gas-Engines, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention has for its object to provide for the longitudinal expansion of the cylinder wall of a gas engine without permitting a leakage of the water in the surrounding water jacket.

The invention comprises a cylinder wall made separate from the water jacket casing and the cylinder head and clamped at one end between them while its other end slidably fits in the water jacket casing so as to be capable of longitudinal sliding movement therein with an expansible water tight packing therebetween permitting of such longitudinal movements of the cylinder wall without allowing the water to leak from the water jacket.

With the above and other objects in view the invention consists in the gas engine as herein claimed and all equivalents.

Referring to the accompanying drawing in which like characters of reference indicate the same parts in different views: Figure 1 is a central longitudinal sectional view of one cylinder and a portion of the adjacent cylinder of the gas engine constructed in accordance with this invention: Fig. 2 is a detail view showing one of the clamping bolts for clamping the cylinder head and the cylinder jacket together with the flange of the cylinder wall between them: and, Fig. 3 is an enlarged detail view of the expansion joint between the lower end of the cylinder wall and the cylinder jacket.

In this drawing 10 indicates a cylinder wall having a piston 11 fitting therein, provided with an outwardly extending annular flange 12 around its upper end which rests upon the closed upper end of the cylinder jacket 13. The cylinder jacket forms a casing surrounding the cylinder wall with a space therebetween for containing the cooling water and preferably constitutes an integral part of the upper section of the crank case.

A hollow casting 14 is clamped to the cylinder jacket 13 by means of suitable clamping bolts or screws 15 and fits upon the flange 12 of the cylinder wall, there being pressure tight gaskets, preferably of the copper asbestos type between the flange 12 of the cylinder wall and the upper face of the cylinder jacket 13 and the lower face of the hollow casing 14 respectively, so that the upper end of the cylinder wall is rigidly clamped in place by the tightening of the clamping screws 15. The hollow casing 14 forms a cylinder head and the space between its walls constitutes a water jacket communicating with the water jacket surrounding the cylinder by means of a by-pass formed by an elbow connection 16 bolted to the cylinder jacket 13 and the casing 14 respectively. The cylinder head 14 also contains the valve pockets 17 in which the valves 18 are seated.

The lower end of the cylinder wall 10 is free to expand or contract longitudinally without hindrance and the novelty of the present invention relates particularly to the means for maintaining a water tight closure for the water jacket around the cylinder wall at this longitudinally movable lower end of the cylinder wall. The outer surface of the lower end of the cylinder wall is accurately turned to produce concentric cylindrical bearing surfaces 19 and 20, one a short distance above the other and of somewhat larger diameter with an inclined or tapering wall 21 therebetween while the cylinder jacket is bored cylindrically to form two concentric bearing faces 22 and 23 respectively of different diameters, the former to have a tight working fit with the bearing surface 19 of the cylinder wall and the latter to have a tight working fit with the bearing surface 20 of the cylinder wall.

The surface 24 joining the bearing surfaces 22 and 23 is preferably at a plane at right angles to the axis of the cylinder so that the annular space around the cylinder wall is approximately triangular in cross section, though the short wall formed by the surface 20 is parallel with the wall formed by the bearing surface 22 and the longitudinal expansion and contraction of the cylinder wall incident to the varying temperature thereof shortens or lengthens these walls of the annular space. Within this annular space are rubber rings or gaskets 25 which occupy all but the apex of the space in the normal position of the end of the cylinder wall, but which are crowded together and forced upwardly to fill the apex of the space

as the end of the cylinder wall moves downwardly under expansion of higher temperatures, such crowding of the rubber gaskets being effected by the cam action of the inclined or tapering surface 21 tending to force the rubber more tightly against the surfaces 22 and 24 with the reduction in size of the annular space. As the cylinder wall contracts on cooling the resiliency of the rubber gaskets causes them to maintain their water tight packing between the cylinder wall and the cylinder jacket so that the water is prevented from leaking from the water jacket at all times. By only partially filling the annular space with the rubber gaskets sufficient vacant space is left in the upper part thereof in which the rubber may expand and contract to maintain a water tight connection in either the expanded or contracted condition of the cylinder wall.

What I claim as new and desire to secure by Letters Patent is:

1. In a gas engine, a cylinder jacket, a cylinder wall slidably fitted therein with an annular space therebetween having an inclined wall, such annular space varying in sectional area with the expansion and contraction of the cylinder wall incident to the temperature variations thereof, and a resilient gasket fitting in the annular space and adapted to be crowded by the inclined wall of the annular space against the opposite wall thereof by the longitudinal movements of the cylinder wall.

2. In a gas engine, a cylinder jacket having a pair of concentric bearing surfaces of different diameters, a cylinder wall having corresponding concentric bearing surfaces slidably fitting against the bearing surfaces of the cylinder jacket, there being a tapering surface between one pair of bearing surfaces forming a wall of an annular space between the cylinder wall and the cylinder jacket and a resilient gasket contained in the annular space.

3. In a gas engine, a cylinder jacket, a cylinder wall within the cylinder jacket having a flange at one end thereof seated upon the cylinder jacket, a cylinder head seated upon the flange of the cylinder wall, clamping means connecting the cylinder head with the cylinder jacket to clamp the flange of the cylinder wall therebetween, there being concentric bearing surfaces of different diameters at the other end of the cylinder wall with a tapering cam surface therebetween and corresponding concentric bearing surfaces in the cylinder jacket within which the bearing surfaces of the cylinder wall slidably fit, said tapering cam surface of the cylinder wall forming one wall of an annular space between the bearing surfaces of the cylinder wall and the cylinder jacket, and a rubber gasket partially occupying the annular space and adapted to be compressed by the cam surface to more completely occupy the annular space by the longitudinal movement of the end of the cylinder wall incident to the expansion thereof.

4. In a gas engine, a cylinder jacket, a cylinder wall therein with an annular flange at one end seated on the end of the cylinder jacket with a space between the cylinder wall and the cylinder jacket to contain water, a hollow cylinder head fitting on the flange of the cylinder wall and containing valve pockets, the space within the cylinder head around the valve pockets being adapted to contain water, clamping means connecting the cylinder head with the cylinder jacket to clamp the flange of the cylinder wall therebetween, a by-pass connecting the water space of the cylinder jacket with the water space of the cylinder head, there being concentric bearing surfaces of different diameters at the other end of the cylinder wall with a tapering cam surface therebetween and corresponding concentric bearing surfaces in the cylinder jacket within which the bearing surfaces of the cylinder wall slidably fit, said tapering cam surface of the cylinder wall forming one wall of an annular space between the bearing surfaces of the cylinder wall and the cylinder jacket, and a rubber gasket partially occupying the annular space and adapted to be compressed by the cam surface to more completely occupy the annular space by the longitudinal movement of the end of the cylinder wall incident to the expansion thereof.

In testimony whereof, I affix my signature, in presence of two witnesses.

FRANK M. DAVIS.

Witnesses:
WM. NELSON,
FRANKLIN ZELLHOEFER.