March 12, 1935. C. E. BERSTLER 1,994,167

VALVE STRUCTURE FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

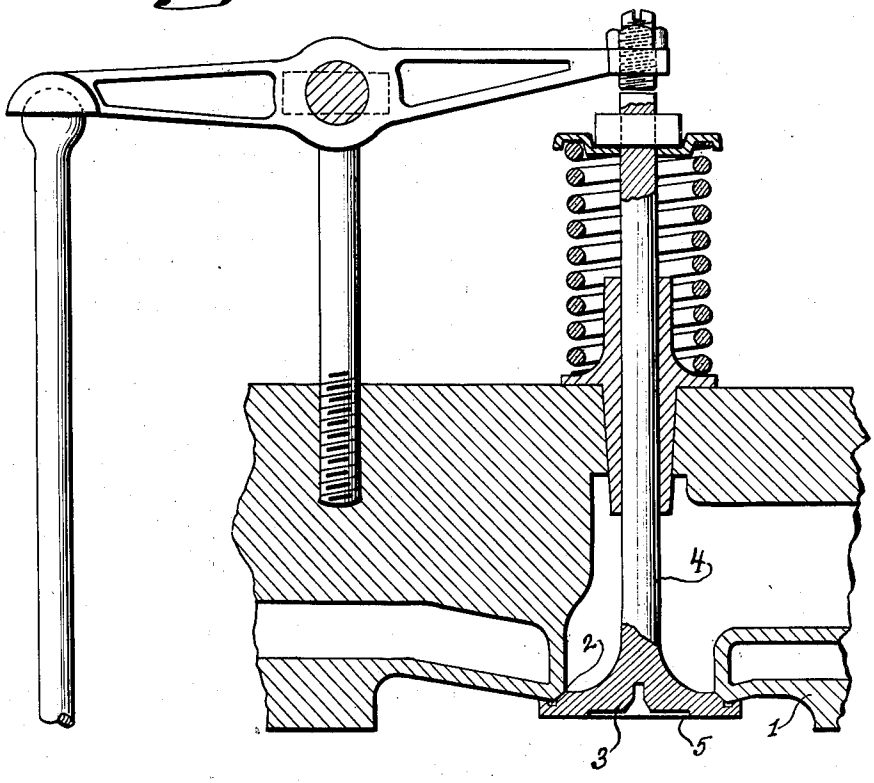


Fig. 2.

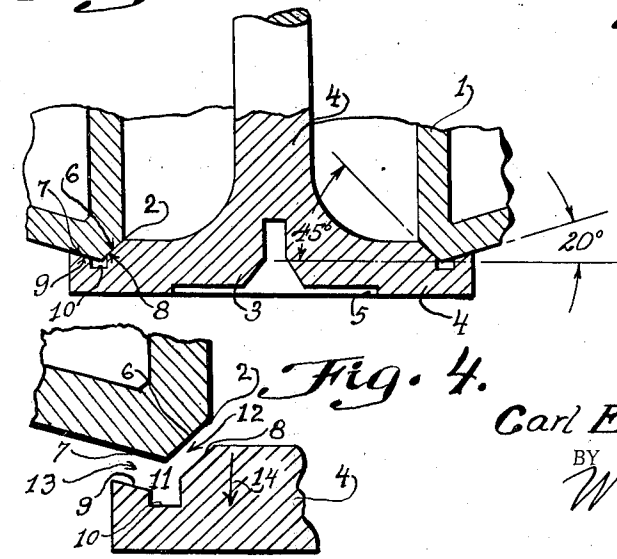


Fig. 3.

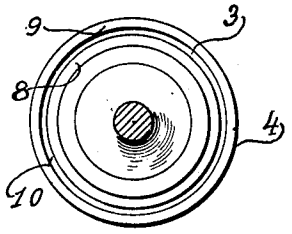


Fig. 4.




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## VALVE STRUCTURE FOR INTERNAL COMBUSTION ENGINES

Carl E. Berstler, Reading, Pa., assignor of thirty-three per cent to William R. Wetherhold, five per cent to Raymond T. Scull, five per cent to John T. Bair, five per cent to George S. Weinerth, all of Reading, Pa., and five per cent to Albert L. Golden, Wyomissing, Pa.

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4 Claims. (Cl. 123—188)

This invention relates to a valve structure for internal combustion engine and its primary object resides in the novel manner of forming, inclining and positioning the valve surface or faces so that duplex valve seats will be provided in a unique arrangement for assuring perfect seating and a more efficient design of gas passage for increasing the efficiency of the engine.

An object of the invention resides in the particular relative inclination of the valve faces and valve surfaces for providing a gas passage of varying width to facilitate the passage of gases and to minimize back pressure.

A feature of the invention resides in the relative position of a 45 degree valve surface and a 20 degree valve surface, and providing an annular channel at the point of juncture of the surfaces so that warpage will be eliminated and a better seating action created between the valve head and the valve seat of the engine casing.

Another feature of my invention resides in the location of the 20 degree valve face at the outer annular surface of the valve head so that in the action of the valve head the outer portion of the gas passage will be of larger capacity than the inner portion for facilitating the passage of gases.

Besides the above, my invention is distinguished in the corelation of valve faces of different degrees of inclination so that any tendency of one face to warp is counteracted by the warping tendency of the other face, thus not only eliminating the tendency of the valve to warp but assuring positive seating of at least one valve face at all times.

With these and other objects in view, my invention will be better understood from the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a vertical sectional view showing my improved valve in applied positon.

Figure 2 is an enlarged sectional view of the valve head in applied position.

Figure 3 is a horizontal view of the valve.

Figure 4 is a detail sectional view.

Referring to the drawing, the numeral 1 designates a valve casing having a valve seat (2) with which coacts a valve (3) consisting of a stem (4) and a head (5). The stem (4) is reciprocated in the usual manner by the valve operating mechanism. My invention has been developed to utilize the usual 45 degree type of valve seat now in use.

The principal feature of my invention resides in providing the valve seat (2) and the valve head (5) each with duplex seat surfaces, or seat faces, which are relatively positioned and designed to assure proper seating of the valve head and reduction in the warpage thereof.

To accomplish this desired result, the valve seat (2) is designed to provide an inner seat surface (6) and an outer seat surface (7), the former extending at a 45 degree angle in relation to the axis of the stem (4) and the latter extending at a 20 degree inclination in relation to the axis of the stem (4). I wish it to be understood that the degree of inclination of the seat surface (7) may be changed provided there is maintained a difference in the degree of inclination of the two surfaces.

The head (5) is provided with duplex valve faces (8 and 9), the inner face (8) extending at a 45 degree angle to the axis of the stem (4) and the outer face (9) extending at a 20 degree angle in relation to the axis of the stem (4). The face (8) coacts with the seat surface (6) and the face (9) coacts with the seat surface (7). At the point of juncture of the faces (8 and 9) there is arranged a channel (10) that separates the valve faces for assuring proper contacting action between the seat surfaces and the valve faces and, further, provide a certain degree of flexibility between the valve faces of the valve head and the valve surfaces of the casing, to assure proper seating and, further, minimize warping.

Due to the relatively different degrees of inclination of the seat surfaces and valve faces and their relative arrangement, I accomplish in the opening of the valve a gas passage (11) of varying widths, that is to say, this passage (11) is provided with an inner chamber (12) of less width than its outer chamber (13), so that in the movement of the valve head vertically, as indicated by the arrow (14), the valve faces (8 and 9) will be spaced different distances from the seat surfaces (6 and 7), as clearly shown in Figure 4. There is a decided advantage in this construction, as greater freedom to the passage of gases is accomplished and back pressures reduced to a minimum.

I have found from actual tests with my valve structure that warping of the valve head is practically eliminated, and efficient, effective seating of the valve is assured under all operating conditions. I have also found that I can obtain higher compression, a reduction in gasoline consumption, and the elimination of burnt valve surfaces.

Due to the relative arrangement of the seat surfaces and valve faces, the valve is capable of

readjusting its seating action in the accumulation of carbon upon the seat surface and the valve faces. The difference in degrees of inclination of the seat surfaces and valve faces and their relative arrangement neutralizes any tendency of the head to warp and, besides, any slight tendency of the valve to warp is compensated for by the fact that the inner valve face will tend to warp under different conditions than the outer valve face, thereby enabling one valve face to counteract the warping action of the outer valve face under varying conditions.

Having described my invention, what I claim is:—

1. A valve structure comprising a casing having a valve seat and a valve head, said valve head having a valve seat coacting with the seat of said casing, the valve seat of said casing consisting of an inner valve surface extending at a 45 degree angle and an outer valve surface extending at a 20 degree angle, said valve seat of said head consisting of inner valve face extending at a 45 degree angle and coacting with the inner seat surface of said casing valve seat, and an outer valve face extending at a 20 degree angle and coacting with the outer seat surface of said casing valve seat.

2. A valve structure comprising a casing having a valve seat and a valve head, said valve head having a valve seat coacting with the seat of said casing, the valve seat of said casing consisting of an inner valve surface extending at a 45 degree angle and an outer valve surface extending at a 20 degree angle, said valve seat of said head consisting of inner valve face extending at a 45 degree angle and coacting with the inner seat surface of said casing valve seat, and an outer valve face extending at a 20 degree angle and coacting with the outer seat surface of said casing valve seat, said valve head being further provided with an annular channel at the point of juncture of the inner and outer valve faces.

3. A valve comprising a stem and a circularly shaped head having an angular channel formed in the head concentrically of said stem and in close relation to the outer annular surface of the valve head, said head having an annular inner valve face extending at a 45 degree angle to the axis of said stem and an annular outer valve face extending at a 20 degree angle to the axis of said stem and extending from the said channel to the outer annular surface of the valve head.

4. A valve structure comprising in combination a valve seat having angularly related duplex valve surfaces, a valve head having angularly related duplex valve faces complementary to the angularly related duplex surfaces on said valve seat, and a stem projecting upwardly from the valve head, said valve surfaces extending at different angular degrees of inclination in relation to each other and to the axis of said stem and said valve faces extending at different angular degrees of inclination to each other and to the axis of the valve stem.

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