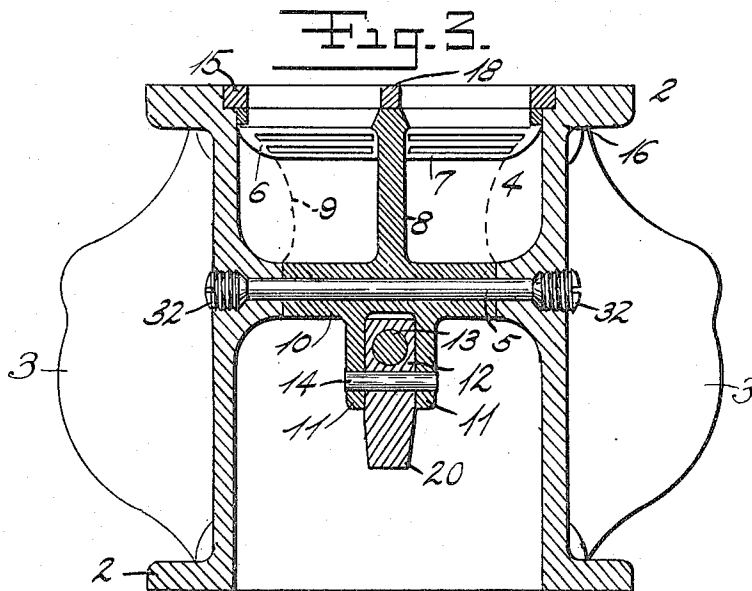
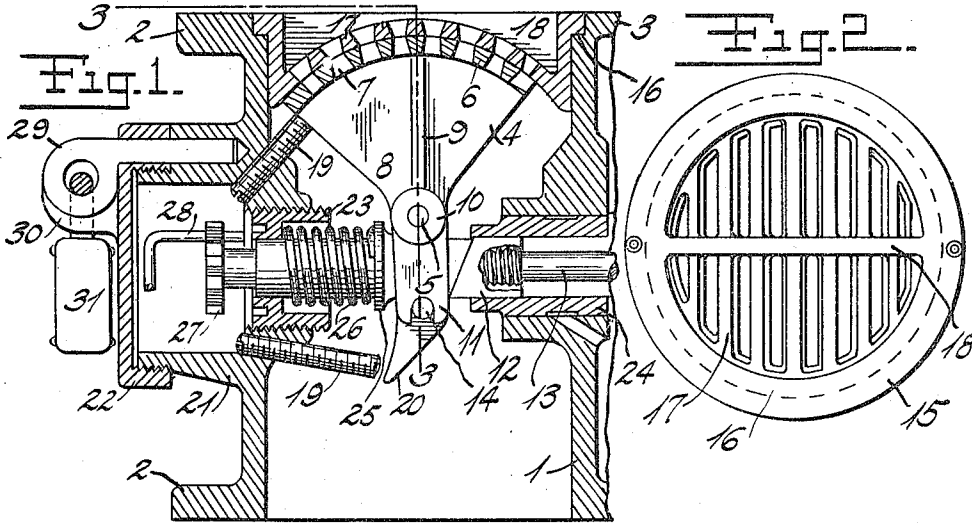


T. DOUGLAS.
VALVE CONSTRUCTION.
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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, THEODORE DOUGLAS, a citizen of the United States, residing at Scarboro, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Valve Construction, of which the following is a specification.

My invention relates to an improved valve construction adapted to be mounted in the intake conduit of an internal combustion engine, and be controlled by a suitable regulating device; to reduce, and, if need be, cut off the fuel supply by which the engine is driven.

Among the objects of my invention are to provide a valve and a seat therefor which are not only of simple and practical design, but also capable of producing a more thorough and uniform intermixture of the air and hydrocarbon flowing through the conduit in which the valve and its seat are placed; and of acting sharply and positively to throttle the combustible fluid as soon as the limiting speed of the engine is attained. I further arrange in operative relation to the valve certain elements to regulate the range of movement of the valve so as to afford the desired result when the regulating device or governor takes effect; these elements being located in such position that the required adjustments can quickly and conveniently be made, without interfering with the relative dispositions of the valve and the governor by reason of which the former can be controlled.

On the drawings, which show an embodiment of my invention,

Figure 1 is a vertical section of a preferred form of my valve construction.

Fig. 2 is a top plan of the part constituting the valve seat, and

Fig. 3 is a vertical section of the parts illustrated on Fig. 1, taken on the line 3—3 thereof.

The same characters of reference identify the same parts throughout.

I use the numeral 1 to indicate a casing having a bore through it and provided at its top and bottom with flanges 2. These flanges enable it to be inserted into the intake of an engine and be secured by bolts or other suitable means. The casing may also be shaped to be connected with another casing, indicated at 3, for the governor, not

shown, by which the valve 4 in the casing 1 is moved when the maximum speed of the engine is reached. This valve is mounted upon a pivot bolt 5, and it comprises a plate having curved upper and lower faces and parallel slots 7 providing ports or openings for the passage of combustible fluid by which the engine is driven. This plate is secured to a central web 8, having stiffening ribs 9, extending out from its opposite sides, and carrying a hub or bearing 10, in which the bolt 5 is received. The web is substantially quadrant-shaped, as shown in Fig. 1, with the bearing 10 at its corner.

From the side of the hub 10 extend arms 11 away from the web 8, and on either side of the mid-point of the bearing. These arms straddle an operating member, such as a reciprocable shaft 12, which is moved to close the valve by an element, such as a rod 13, operatively related to the governor above mentioned; and their lower ends are notched to engage a pin 14 extending transversely of the shaft 12 and made fast thereon. Therefore when the shaft 12 moves back and forth, the valve 4 will be oscillated. The web 4, plate 6, ribs 9, hub 10, and arms 11 are preferably made integral with one another, as by casting these parts in one piece. As indicated on the drawings, the rod 13 is inside the shaft 12 and coaxial with same.

I provide a seat for this valve by utilizing a part adapted to be inserted into the upper end of the casing 1, and shaped to fit both the valve 4 and the bore of the casing. This part comprises a ring-shaped element 15, of circular or other configuration having a peripheral flange 16, and encircling a web 17. This web is curved to correspond with the upper face of the valve 4, and when it is put into the top of the casing, the web 17 will engage the valve, and the flange 16 will rest upon an annular shoulder around the inside of the casing 1. A stiffening rib 18 may extend across the web 17 from one side to the other. The part 15 is preferably cast in one piece, and it will have parallel slots similar to the slots 7 in the web. These slots will be on opposite sides of the rib 18, and extend transversely thereto; whereby they will be parallel and constitute separate groups or series. The slots in the valve will be correspondingly arranged, and will coin-

cide with the slots in the seat when the valve is open. Further, the slots in the valve and the slots in the seat will contract toward each other, making passages which are narrowest at the middle and giving a so-called Venturi-tube effect. I have found such a construction of very great utility by reason of the fact that it produces a thorough mixing of the constituents of the combustible mixture passing to the engine; making it uniform and greatly facilitating proper ignition. The mixed particles of air and gasoline, for example, which flow through the casing 1, strike the inclined sides of the slots 7 in the valve and are deflected toward the center of the slots; hence there is a tendency for cross currents to be set up, and the fluid is also retarded by reason of the loss of velocity due directly to impact and the friction which the sides of the slots exert on the particles slipping through them. The gasoline particles are heavier than the air; and are more retarded than the air; and in consequence the air and gasoline flow through the slots at speeds inversely proportional to their relative masses. Moreover, the pressure of the fluid below the valve is greater than above it; and as the mixture is urged through the slots, it does not disintegrate and deposit the hydrocarbon on the valve and seat; but on the contrary, the lighter air particles drag the gasoline particles along with them; atomizing and diffusing them. A much superior mixture is thus obtained.

It will be understood of course, that the combined area of the openings in the valve and seat, even when the valve is in full open position, will be less than the cross-sectional area of the conduit in the casing 1.

I limit the throw of the valve so that it cannot move beyond the points where the slots register, or are out of registry, by a screw bolt 19 which engages the web 8, above the hub 10; and a similar screw bolt which engages a projection or lug 20 on the bottom of the shaft 12, below the hub 10. These bolts are mounted in threaded holes extending through the casing, making both bolts accessible from the outside thereof. The outer ends of these bolt holes are encircled by an annular boss 21, on the exterior of the casing and threaded to receive a cap 22. When the cap is removed both bolts 19 can be reached by a screw driver and turned at will; as their outer ends have kerfs therein for this purpose. The bolts 19 enable both ends of the range of movement of the valve to be adjusted at will.

Coaxial with the boss 21 is a threaded opening which receives a threaded sleeve 23, providing a bearing for one end of the shaft 12. This sleeve will be in line with a bearing 24, in the opposite side of the casing, for the other end of the shaft 12. The shaft 12

is thus slidably supported and has a collar 25 engaged by a spring 26, seating at its other end on a shoulder in the sleeve 23. This sleeve is adjustable to vary the force of the spring; when the valve is open, resting against the upper bolt 19, the speed at which the governor will move the rod 13 to close the valve can thus be controlled. The rod 13 passes through the shaft 12 into the boss 21, and carries therein an adjusting wheel 27, by which the rod can be turned, and the point at which the governor will actuate the rod 13 to move it regulated. The wheel 27 has peripheral notches, and can be held in position by a U-shaped element 28 engaging the notches and fitted at its ends into holes in the outside of the casing in side the boss 21. Of course, the wheel 27 will not obstruct the holes for the bolts 19, and the element 28 will not prevent axial movement of the wheel with the rod 13.

The cap 22 and the boss have registering openings to receive a locking pin 29. This pin has a hole therethrough and the cap has a perforated lug 30, so that by means of a pad lock 31, the cap can be secured on the boss till the lock is opened by some one authorized to do so.

From the above it will be seen that when the valve construction is assembled the necessary adjustments to limit the throw of the valve and set the spring 26 and the rod 13 can all be made from the outside of the casing; without interfering even temporarily with the governor for actuating the rod 13; and the bolts 19, sleeve 23 and wheel 27 all being at one place, the testing and adjusting are rendered very convenient and easy. After the adjustments are made, the cap 22 and lock 31 make derangement and tampering with the valve impossible.

It will further be perceived that the width of the slots 7 is quite small and only a slight movement of the shaft 12 is needed to restrict the capacity of the slots. Hence after the predetermined speed of the engine is about reached a very little increase will be sufficient to close the valve and shut off the fuel supply completely, if necessary. Otherwise the fuel is only reduced.

In case access to the parts is necessary for inspection and repair, the part 15, which is held by screws, can easily be detached and lifted out, and the valve 4 can be removed after the part 15 by taking out the bolt 5. This bolt is loosely inserted through aligned holes in the side of the casing and retained by nuts 32. Also, after disengaging the element 28, the rod 13 can be unscrewed from the shaft 12, and taken out through the boss 21; and by unscrewing and taking through the boss 21 the sleeve 23, which has recesses to receive a tool to enable it to be turned as desired, the shaft 12 can be withdrawn from the casing 1.

The construction and manner of mounting the valve renders it unlikely to be disturbed by vibrations of the engine or the support for the latter. This feature is of the greatest importance when one considers the slight distance the valve must travel in order to close the intake conduit altogether. Also the Venturi-tube effect above explained, besides giving a better mixture, wire-draws the fluid, keeping up its velocity, and insuring the quick admission of the charge to the fuel chamber when the suction stroke commences.

From the foregoing the merit and utility of my invention, especially its simplicity of structure, convenience in handling, sharp and certain throttling, and capacity for ready assembling and taking apart, will be fully apparent to those skilled in this art. I of course do not wish to be limited herein to the exact details of construction shown, but reserve the right to make changes in the shape, size, and arrangement of parts within the scope and spirit of my invention, as the claims define the same.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. The combination of a casing having a conduit therethrough, a seat extending across said conduit and having a plurality of openings, a valve having a plurality of openings, the openings of the valve and the openings of the seat contracting toward each other so as to afford a Venturi-tube effect, the combined area of openings being less than that of the cross-sectional area of the conduit, whereby a fluid mixture passing through the valve and seat will have its ingredients retarded to an extent inversely proportionate to their relative masses, thus producing a uniform distribution of the ingredients of the mixture, and means for causing relative movement of the valve and seat to put the openings of the valve and seat into and out of registry, whereby the valve may also act as a regulating valve.

2. A member constituting a valve seat, comprising a ring-shaped element provided with a supporting flange, and a curved web inclosed by said element having a plurality of openings therein.

3. A member constituting a valve seat, comprising a ring-shaped element provided with a supporting flange, and a curved web inclosed by said element, said web having a plurality of openings therein, and a central stiffening rib extending across the web.

4. A valve comprising a plate having a curved face with a plurality of openings therein, a web projecting from the plate, a bearing carried by the web, means projecting from the bearing for enabling the valve to be actuated, and means adjacent the web

and the projecting means to permit the range of movement of the valve to be adjusted.

5. A valve comprising a plate having a curved face with a plurality of openings therein, a web projecting from said plate, a bearing supported by the web, a pair of arms extending from the bearing away from the web, and an operating member engaged by the outer ends of said arms, and having a lug projecting beyond the ends of said arms.

6. A valve comprising a plate having a curved face with a plurality of openings therein, a web projecting from the plate, a bearing supported by the web, a casing having means for pivotally engaging the bearing, arms on the bearing extending away from the web, an operating member between the arms and engaged thereby, a lug on the operating member, and devices accessible from the outside of the casing adjacent the web and the lug to limit the range of movement of the valve.

7. A member constituting a valve seat, comprising a ring-shaped element provided with a supporting flange, and a curved web inclosed by said element, said web having a plurality of openings therein, and a central stiffening web having a straight outer edge extending across the web.

8. A valve comprising a plate having a curved face with a plurality of openings therein, a web projecting from the plate, a bearing carried by the web, means projecting from the bearing for enabling the valve to be actuated, and means adjacent the web and the projecting means to permit both ends of the range of movement of the valve to be adjusted, said means being accessible from without the casing.

9. A member constituting a valve seat, comprising a ring-shaped element provided with a supporting flange, and a curved web inclosed by said element having a plurality of openings therein, said openings being larger on one side of said web than on the other.

10. A valve comprising a plate having a plurality of openings therethrough, a web secured to the plate, and stiffening ribs on each side of the web.

11. A valve comprising a plate having a plurality of openings therethrough, a web secured to the plate, and stiffening ribs on each side of the web, said openings being larger on one side of the plate than on the other.

12. The combination of means providing a seat, a valve engaging the seat, an operating member engaged by the valve, and an element adjustably mounted in said member and coaxial therewith to actuate said member and said valve.

13. The combination of means providing

a seat, a valve engaging the seat, an operating member for the valve, a casing containing said means, the valve and the member, and an element connected to said member to actuate said member and the valve, said element being mounted to be adjustable with respect to said member from without the casing.

14. A valve comprising a plate, a web secured to the plate, a pivot bearing carried by the web, a pair of arms projecting from

the web, and an operating member received between said arms.

15. A valve comprising a bearing, a pivot engaged by said bearing, and a pair of adjustable screws mounted at one side of the valve to limit both ends of the range of movement of the valve about said pivot.

In testimony whereof I have signed my name to this specification this 10th day of April, 1916.

THEODORE DOUGLAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."