March 28, 1933. D. F. ASBURY 1,903,159

INTERNAL COMBUSTION ENGINE

Filed Nov. 20, 1931

Fig. 1.

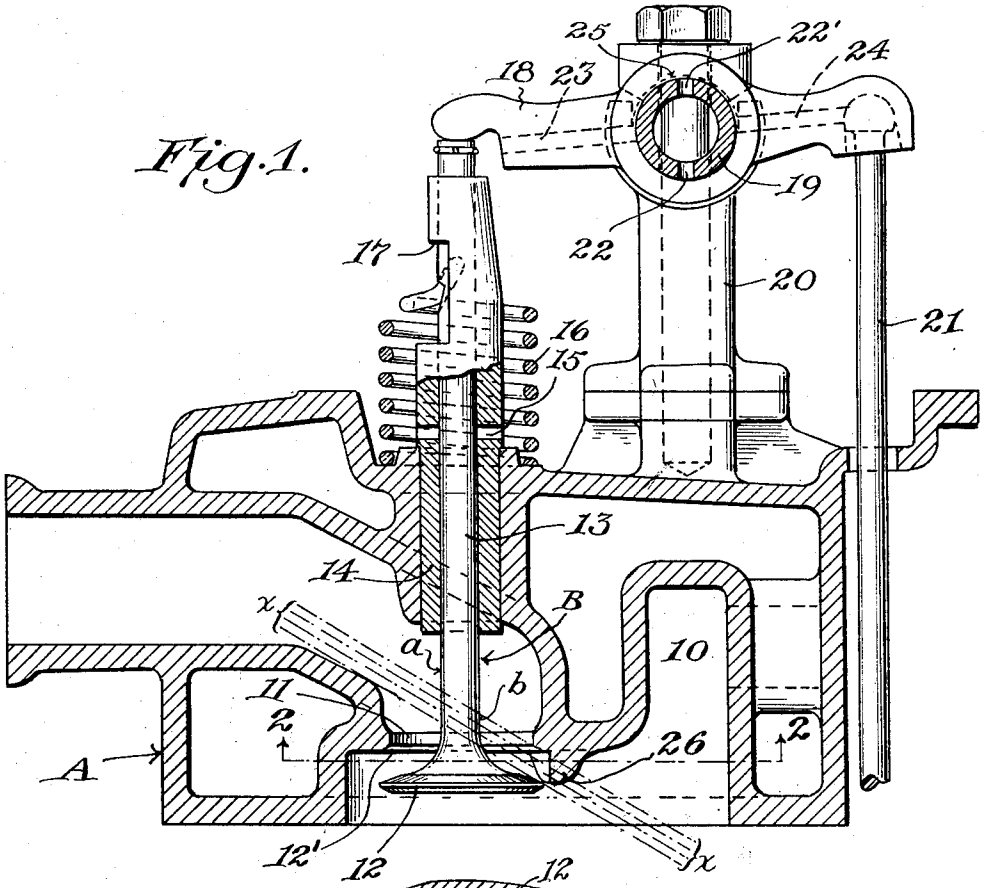
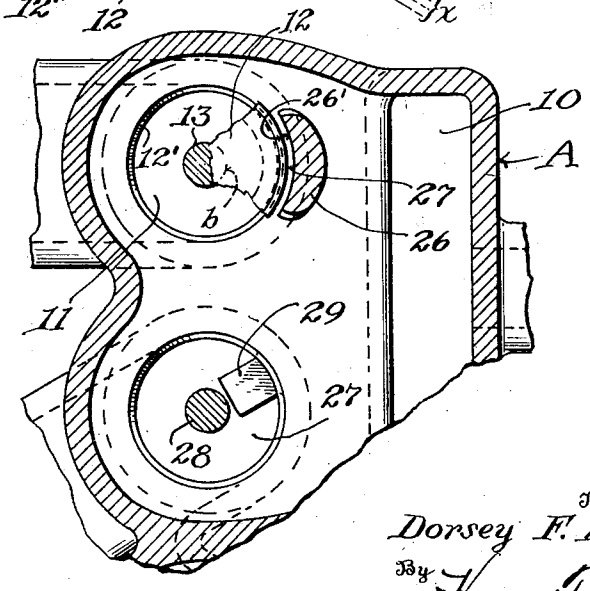


Fig. 2.



Inventor
Dorsey F. Asbury
By Henry T. Bright
Attorney

Patented Mar. 28, 1933 1,903,159

UNITED STATES PATENT OFFICE

DORSEY F. ASBURY, OF BROOMES ISLAND, MARYLAND

INTERNAL COMBUSTION ENGINE

Application filed November 20, 1931. Serial No. 576,388.

My invention relates to internal combustion engines and has for its objects to provide a shield inside the combustion chamber of the engine which obstructs the nearest straight and therefore highest velocity path of exhaust products discharging from the combustion chamber, so that any two opposite sides of the stem of the valve controlling the discharge of exhaust products from the combustion chamber will be heated to substantially the same temperature and expand the same amount, so that the valve's head is caused to seat central and level at all times; to reduce the amount of heat imparted to the valve's head during exhaust; to cause the valve's head to seat level and thereby give up heat uniformly all around its seat to the water cooled casting of the engine; and to maintain the valve stem from warping and thus permit the use of a 20° valve seat, so that the diameter of the valve port and the lift of the valve may be decreased perceptibly and still have more opening affording communication between the valve port and combustion chamber when the valve is lifted after deducting the amount of the opening obstructed by the shield.

In the drawing chosen to illustrated my invention, the scope whereof is set forth in the appended claims.

Figure 1 is a vertical section of a cylinder head casting showing my invention incorporated; and

Figure 2, a section on the line 2—2 of Figure 1 with a fragment of the exhaust valve head shown in elevation.

Referring to the drawing A indicates the cylinder head casting of a water cooled internal combustion engine, said casting being shaped to provide the combustion chamber 10 of an engine cylinder and to also provide an exhaust port 11 into and through which exhaust products are discharged from the chamber 10. The mouth of the port 11 is controlled by an exhaust poppet valve B which includes a head 12 and stem 13, said stem being slidable in a bearing 14 mounted in the casting A and having a portion between the bearing and valve head exposed to exhaust products in the port 11. This bearing 14 is prolonged on the outside of the casting A almost to the outer end of the stem 13 and is ported laterally at a point close to the outer face of the casting A, as at 15, for the purpose of relieving the outer half of the stem bearing from exhaust pressure, so that said half of the bearing may be maintained properly lubricated while the engine is running. A coil valve spring 16 surrounds the outer half of the bearing 14 and reacts from the outer face of the casting A against the valve stem 13 to normally maintain the valve head 12 engaged upon its seat 12'. The outer or movable end of the spring 16 is engaged in a pocket formed in the valve stem in the manner described and claimed in my prior Patent 1,789,209, such engagement of the spring with the valve stem being effected through an opening 17 in the bearing and located some distance from the outer end thereof, so as to provide a fixed bearing for the valve stem on both sides of the point where it is engaged by the movable end of the spring which reduces the leverage of any transverse force delivered to the stem by the spring or other valve operating parts. This construction of providing fixed bearing for the valve stem on opposite sides of the point where the stem is engaged by the movable end of the valve spring is claimed in my prior application Serial Number 528,941, filed Apr. 9, 1931. The valve B is adapted to be lifted to open position against the spring 16, as shown in Figure 1, by the action of the oscillating rocker arm 18 which latter is journaled on a hollow bearing member 19 supported by a standard 20 rising from the casting A. One end of the rocker arm 18 engages the outer end of the valve stem 13 while the other end thereof is engaged by a tappet rod 21 from which latter force is transmitted to operate the rocker arm against the influence of the spring 16 to lift the valve B. The interior of the member 19 is adapted to be connected with the oil system of the engine and is provided with ports 22 and 22' through the latter of which oil is supplied to passages 23 and 24 in the rocker arm 18 through a groove 25 also in the rocker arm. Oil supplied to the passage 24 is delivered to the upper end of the tappet 21, while oil delivered to the passage 23 is intermittently

thrown against the outer end of the valve stem 13 as the arm 18 rocks.

It will be noted that the port 11 extends away from the side *a* of the valve stem and on the opposite side of the mouth of the port from said stem side *a* I provide a shield 26 located inside the combustion chamber. In the present instance I show the shield as an integral part of the casting A and formed with an arcuate surface 26′ concentric with and spaced from the periphery of the valve head 12 and having its elements substantially parallel to the direction of movement of the valve B. In the absence of the shield 26 the highest velocity path of exhaust products in passing from the combustion chamber into the port 11 would be along the dotted lines *x*—*x* and as the rate of imparting heat to a surface by hot combustion products varies as the velocity of products by the surface and does not vary with the size of the opening through which the products of combustion travel and as the stem is located in the middle of such path of high velocity direct impingement of the exhaust products against the valve stem will occur with the result that the side *b* of the valve stem would be heated to a higher temperature than the side *a* with a resulting greater amount of expansion on the side *b* than on the side *a* and warping of the stem and erroneous positioning of the valve head with respect to its seat. My shield 26 eliminates this straight path of high velocity and deflects the exhaust products in such manner that their velocity is equalized around the valve stem 13 and an even temperature maintained throughout said stem, so that the stem will expand straight longitudinally and maintain the valve head in proper relation to its seat. Furthermore, the shield 26 is effective to maintain the temperature of that portion of the valve head 12 opposed to the shield at the same temperature as the corresponding opposite portion of the head by controlling the velocity of products of combustion in their passage by the valve head within the extent of the shield. It will further be noted, in the functioning of the shield 26, that an eddy of exhaust products is maintained on the side *b* of the valve stem which products would, in the absence of the shield, impinge against the stem at their highest velocity. The presence of this eddy of exhaust products is due to the fact that the exhaust products entering the port between the valve head and shield and those products which enter the port at each side of the shield collide in the port with a resulting eddy and diminution in the velocity of the exhaust products before contact with the valve stem.

At extra high engine speed, when slow burning high test gasoline is used, the pressure of the left over products of combustion in the combustion chamber is higher than the pressure in the intake manifold when the intake valve starts to open. This difference in pressure at that time causes the left over hot products of combustion to rush out into the intake manifold and impinge against only one side of the intake valve stem and heat that side, the opposite of the stem is cooled by the cold intake mixture impinging thereagainst during the intake stroke. This above double action of heating one side of the stem and cooling the opposite side is liable to warp the stem enough to prohibit the valve head from seating properly. The stem shield takes care of the heat imparted to the valve stem in the same manner as described in my prior application Serial Number 535,525, filed May 6, 1931. This precaution is taken because the 20° angle of seat on the valve is not steep enough to provide a self-centering feature. The standard 45° angle of seat has the self centering feature and it needs it more than any other angle of seat possible for its conical surface is just about perpendicular to the direction of the shift of the position of the valve head due to a warp or incline of the valve stem.

In Figure 2 there is disclosed an intake port 27, intake valve stem 28, and an intake valve stem shield 29 in the port 28. This shield 29 forms the claimed subject matter of my prior application 535,525.

I claim:

1. In a gas engine structure, a cylinder including a gas port having entrance and discharge ends, a poppet valve controlling the entrance end of the port, said valve including a head and a stem with the latter having a length thereof exposed to gas current in the port, and means inside the combustion chamber shielding from the gas current only that side of the exposed length of the stem which is remote from the discharge end of the port.

2. In a gas engine structure, a cylinder including a gas port having entrance and discharge ends, a poppet valve controlling the entrance end of the port, said valve including a head and a stem with the latter having a length thereof exposed to gas current in the port, and a formation on the cylinder inside the combustion chamber at the side of the port entrance end which is remote from the port discharge end shielding the side of the valve stem adjacent thereto from the gas current.

3. A structure for internal combustion engines comprising a poppet valve controlling the mouth of an exhaust port and having its stem exposed to exhaust products in the port, said port extending in a direction from one side of the valve stem, and a shield inside the combustion chamber of the engine located adjacent to the side of the mouth of the port which is remote from said side of the valve stem and spaced from the periphery

of the valve head, said shield being formed so that it is ineffective to reduce the area of valve opening per lift until the lift of the valve is equal to the space between the valve head's periphery and the shield.

In testimony whereof I hereunto affix my signature.

DORSEY F. ASBURY.