Oct. 11, 1932. J. J. McELHINNEY 1,882,513

INTERNAL COMBUSTION ENGINE

Filed June 9, 1930

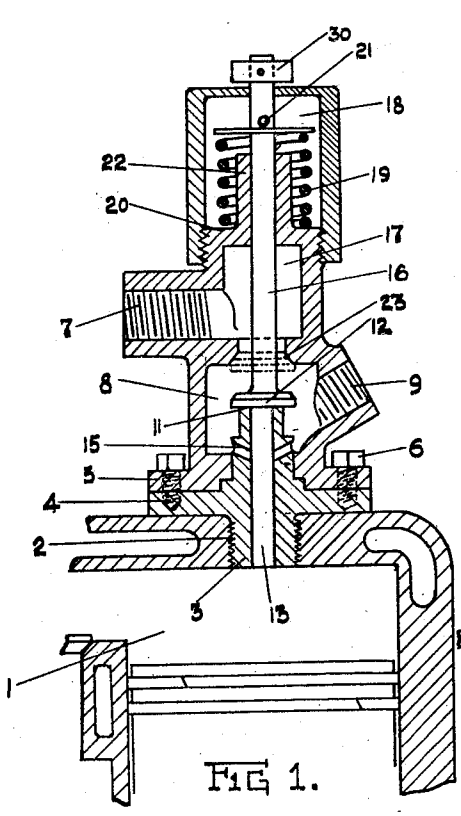


FIG 1.

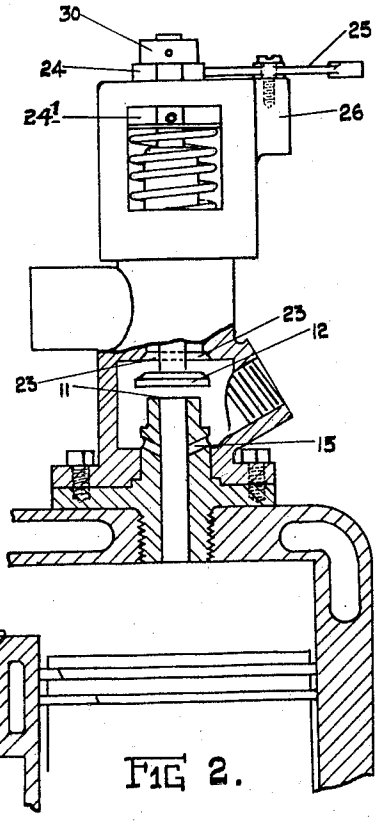


FIG 2.

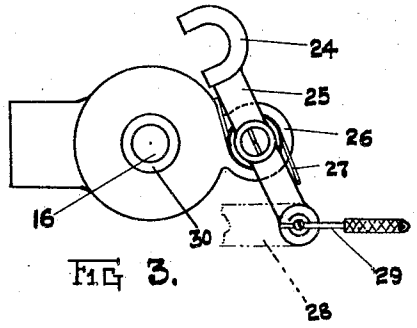


FIG 3.

INVENTOR

James Johnstone McElhinney

By Dowell and Dowell

ATTORNEYS

Patented Oct. 11, 1932 1,882,513

UNITED STATES PATENT OFFICE

JAMES JOHNSTONE McELHINNEY, OF SURREY HILLS, VICTORIA, AUSTRALIA

INTERNAL COMBUSTION ENGINE

Application filed June 9, 1930, Serial No. 460,060, and in Australia June 11, 1929.

My invention relates to improvements in internal combustion engines in which a heavy oil mixture is used in the cylinder and an auxiliary ignition charge of petrol or like volatile spirit (referred to hereinafter as petrol mixture) is provided in the vicinity of the spark plug; and the objects of my invention are, first, to use the petrol mixture more efficiently and to maintain it in the neighbourhood of the spark plug so as to prevent waste; second, to provide means for scavenging out the burnt petrol gases into the cylinder; and, third, to provide means to allow a petrol mixture only to be fed to the cylinder for starting up and idling. I attain these objects by the mechanism illustrated in the accompanying drawing in which:—

Figure 1 is a vertical section through the head of a cylinder showing in position an attachment constructed according to this invention.

Figure 2 is a similar view showing the position of the valve of the attachment during starting-up and idling, and

Figure 3 is a plan view of the top of the attachment showing the means for holding the valve of the attachment open during starting-up and idling.

Similar numerals refer to similar parts throughout the several views.

The cylinder 1 is supplied with a crude oil mixture from a vapourizer and carburettor (not shown), as is well known especially in relation to tractors, but instead of inserting the spark plug into the threaded socket 2 in the cylinder the attachment forming the subject of the present invention is secured therein. The attachment is secured in position by a threaded pipe 3 which is adapted to be screwed into the threaded socket 2 and is provided with an integral flange 4 to which a flange 5 of an upper member is secured by bolts 6. This upper member is provided with an inlet pipe 7 connected to a petrol carburettor and having an ignition chamber 8 for the petrol mixture. The chamber 8 has an offset threaded socket arm 9 adapted to receive the spark plug. The pipe 3 has a passageway 13 and is extended upwardly into the petrol chamber to form a valve seat 11 upon which a valve 12 is adapted to rest during the suction stroke of the engine so as to close the passageway 13 in the pipe 3. This passageway connects the ignition chamber 8 to the cylinder except during the induction stroke of the engine. A relatively small by-pass passage from the ignition chamber to the passageway 13 is provided at all times by small ports 15 of any desired number so that during the induction stroke burnt gases are drawn from the ignition chamber through the by-pass and then downwardly into the cylinder and at the same time are replaced by fresh petrol mixture. The valve is provided with a stem 16 extending upwardly through a chamber 17 which forms a reservoir for petrol mixture between the petrol carburettor and the ignition chamber and through a top chamber 18 which houses a spring 19 bearing at one end upon the base 20 of the upper chamber and at the other end against a cross pin 21 on the valve stem.

A core 22 holds the spring in position. A second valve seat 23 is provided and when the induction ceases the spring raises the valve against this upper valve seat and thus cuts off the ignition chamber from the carburettor and connects it to the cylinder. The spark ignites the petrol mixture and the flame penetrates into the crude oil mixture and ignites it. On the exhaust stroke of the engine the burnt gases are not scavenged from the ignition chamber and passageway 13 but on the induction stroke the valve is drawn down against its lower seat and the burnt gases in the ignition chamber are drawn out through the by-pass and from the main passageway into the cylinder and their place is taken by a fresh charge of petrol mixture. The capacity of the ignition chamber and passageway 13 is so small in relation to that of the cylinder that the presence of this small quantity of burnt petrol gases in the crude oil mixture in the cylinder does not substantially affect the efficient combustion of the latter. The size of the by-pass is so designed that on the completion of the induction stroke the petrol charge will be drawn down to the base of the passageway

13 but will not be drawn into the cylinder to any substantial extent, if at all, and the passageway 13 and the ignition chamber 8 are so proportional that on the compression stroke the petrol charge is compressed in the ignition chamber but the crude oil mixture does not pass beyond the top of the passageway to any substantial extent, if at all. Consequently, a rich petrol charge is ignited in the ignition chamber while it is in close contact with the crude oil mixture, and at the same time, waste of petrol by drawing an unnecessary amount into the cylinder is avoided.

To prevent overheating of the spring, openings 24^1 are provided in opposite walls of the top chamber so as to allow a current of air to pass through. The charge in the ignition chamber is too small to effect the running of the engine by itself and simply serves as an auxiliary ignition charge, so that, in order to allow the petrol charge to be used for starting-up and idling, means is provided to hold the valve open and thus the petrol mixture charge is drawn into the cylinder through the top of the passageway 13 with the result that a much greater quantity is drawn in than when the suction is through the by-pass ports 15 alone.

This means comprises a half collar 24 carried by an arm 25 pivoted to a bracket 26 on the top of the attachment. A spring 27 tends to hold the half collar away from the stem 16 of the valve but the half collar can be drawn in by means of a Bowden wire 29 so as to engage the valve stem. The valve stem is provided with a collar 30 at the top which prevents the valve falling when the valve stem is engaged by the half collar. The valve is then held in the position shown in Figure 2 so that the petrol mixture may be drawn in for starting-up and idling. When starting-up the engine, as soon as it has warmed up sufficiently the Bowden wire is released allowing the half collar to fly out away from the valve stem under the action of its spring 27 and the valve 12 is then free to close upon the lower seat 11 on the induction stroke of the engine. As soon as the valve is thus free to operate, the crude oil mixture is supplied to the engine cylinder.

When it is desired to allow the engine to idle as, for example, when a block occurs in the traffic, the foot is removed from the accelerator so as to cut off the supply of crude oil mixture and the Bowden wire is operated to force the half collar inwards. If the valve stem is not in its raised position when the half collar is forced inwards it will of course almost instantly rise owing to the rapidity of the engine cycle and the half collar will then slip into place to hold the valve open as shown in Figure 2. The arms 25 of the various cylinders of the engine are linked together by adjustable rods 28.

I claim:

1. In a four-stroke cycle internal combustion engine, the combination of an engine cylinder for the combustion of heavy oil mixture, a petrol mixture ignition chamber connected to said cylinder, a pipe forming a passageway between said ignition chamber and said cylinder, a valve adapted to close the main opening of said passageway into said ignition chamber, a by-pass between said ignition chamber and said passageway and of smaller cross section than said passageway, a socket in the wall of said ignition chamber to accommodate a spark plug, and means adapted to cut off the supply of petrol mixture from said ignition chamber except during the induction stroke of the engine.

2. An internal combustion engine as claimed in claim 1 in which the said valve and the said means adapted to cut off the supply of petrol mixture from the ignition chamber are constructed integrally with each other as a double valve member of unitary structure adapted to close alternately on a first valve seat and a second valve seat.

3. In a four-stroke cycle internal combustion engine, the combination of an engine cylinder for the combustion of heavy oil mixture, an ignition chamber, means connecting said ignition chamber to said cylinder for spark plug ignition, a first valve seat on said connecting means, a double valve member adapted to engage said first valve seat on the induction stroke of the engine, a second valve seat normally engaged by said valve member and cutting off the supply of petrol mixture except during the induction stroke of the engine, a valve stem connected to said valve member, a spring associated with said valve stem and adapted to hold said valve member against said second valve seat, by-pass means connecting said ignition chamber to said cylinder even when said valve member is closed against said first valve seat on the induction stroke of the engine, and means adapted to engage said valve stem and prevent said valve member from closing on said first valve seat during starting-up and idling.

In testimony whereof I affix my signature.

JAMES JOHNSTONE McELHINNEY.