Oct. 10, 1933. E. J. HALL 1,929,637

INTERNAL COMBUSTION ENGINE

Filed Oct. 27, 1928

Fig. 1.

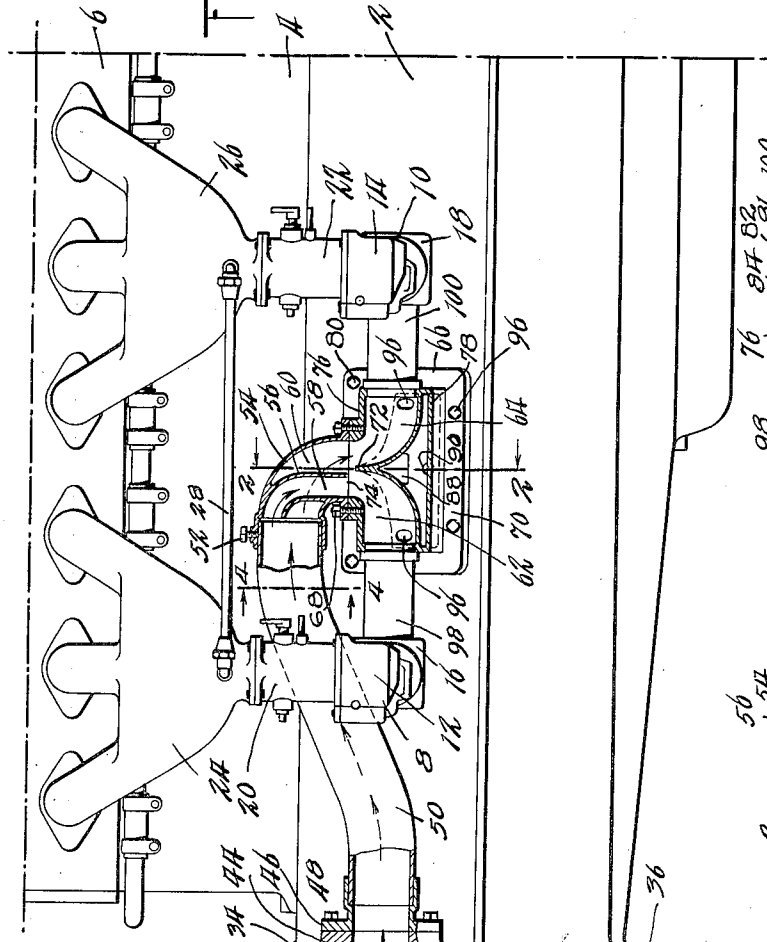


Fig. 3.

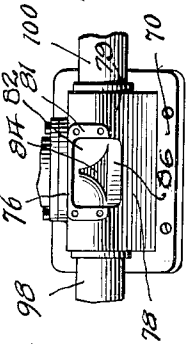


Fig. 4.

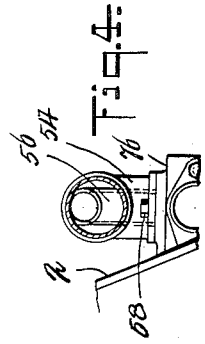


Fig. 2.

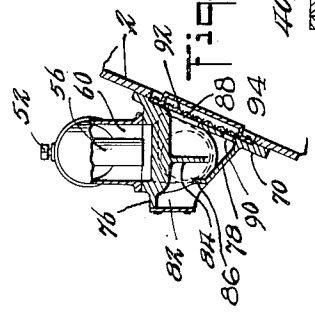
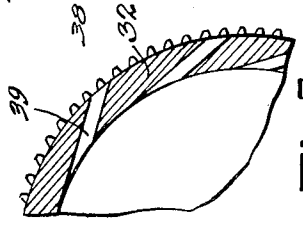


Fig. 5.



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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

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Application October 27, 1928. Serial No. 315,520

6 Claims. (Cl. 123—52)

This invention relates to internal combustion engines and has particular reference to means for increasing the speed and power thereof.

One object of the invention is the provision of means operative in accordance with the speed of the engine for feeding air to the mixing chamber of a carburetor at a pressure above atmospheric.

Another object of the invention is the provision of means for directing substantially equal amounts of air to the mixing chambers of a plurality of carburetors at a pressure above atmospheric. A further object of this invention is the provision of means for dissipating backfire from the engine.

A still further object of the invention is the provision of means for directing a fuel charge to the cylinders of an internal combustion engine at a pressure above atmospheric whereby to increase the speed and power of the engine.

Other objects and advantages of this invention will be apparent from the following description, taken with the accompanying drawing, in which A indicates more or less diagrammatically an internal combustion engine of the marine type, having a plurality of cylinders; in the instance shown, the engine is a six cylinder one.

In the drawing:

Figure 1 is a side elevation of a portion of an internal combustion engine of the marine type, showing the invention applied thereto, certain parts being broken away and other parts being shown in section;

Fig. 2 is a sectional view of the distributor, taken on the line 2—2, Fig. 1;

Fig. 3 is a front elevation of the distributor;

Fig. 4 is a sectional view, taken on the line 4—4, Fig. 1; and

Fig. 5 is a fragmentary sectional view of a modified form of fly-wheel.

The crank case is shown at 2, the cylinder block at 4, and the cylinder head at 6.

The engine shown for purposes of illustration is of the duplex carburetor type, having carburetors 8 and 10 provided with float chambers 12 and 14, mixing chambers 16 and 18, and discharge passages 20 and 22 respectively; the latter each having a throttle valve controlled by an actuating lever. Intake manifolds 24 and 26 are connected to the discharge passages 20 and 22 respectively and lead to the cylinder head 6. For providing uniform or equal pressures in the manifolds, a balance tube 28 is connected therebetween and the two carburetors are connected to a common source of fuel supply, not shown.

Secured to the crank shaft and rotated thereby is a fly-wheel 30 comprising a rim 32 and a web 34 and the rim is provided with gear teeth 36 to be engaged by a starter or the like for an obvious purpose.

The fly-wheel is designed to act as a blower, and to that end the rim thereof is provided with openings 38 which, upon rotation of the fly-wheel, serve to draw air from the atmosphere into the fly-wheel housing indicated at 40 through suitable apertures or slots formed in the housing cover 42. In Fig. 1 the apertures 38 are shown as substantially radially arranged, but this is merely by way of example, as, obviously, to meet desired or required conditions the openings may be otherwise arranged; for example, they may be tangentially arranged as shown at 39 in Fig. 5. The particular design of the apertures in the housing cover is optional and may be of the types shown in my co-pending application Serial Number 315,519, filed Oct. 27, 1928.

The housing is provided with an opening in the rear wall thereof defined by a boss 44, and a coupling 46 is secured to said boss by suitable means, such as screw bolts 48 or the like. The coupling supports a conduit 50 and connects the same to receive air blown from the fly-wheel housing, and said coupling inclines rearwardly upward and its opposite end is secured by means of a set screw 52 in the upper end of a separator indicated generally at 54.

The separator 54 is preferably of the form shown and is provided with an internally arranged pipe 56 which divides the separator into two passages 58 and 60 which lead respectively to the oppositely extending arms or passages 62 and 64 formed in a distributor designated generally at 66 and which is secured to the lower end of the separator by screw bolts 68 or the like.

In view of the upward inclination of the conduit 50, it is obvious that the greater portion of air in the conduit will naturally be forced against the upper wall of the conduit and unless some means are provided for separating this air it will be apparent that the major portion thereof will be delivered to the arm 64. To accomplish a substantially equal separation of the air, the pipe 56 has been provided and it has been found that if the inlet end of the pipe is so arranged and proportioned that it occupies approximately one-half of the upper half of the inlet end of the separator 54, the air will be substantially equally separated and hence substantially equal amounts will be delivered to the arms 62 and 64 respectively.

The distributor is of particular construction and comprises a casting having an attaching base

70 for securing the casting to the crank case 2 by bolts 80, and the passages 62 and 64 are cast with said base and are oppositely extended, as shown, and joined in a central rib 72 arranged substantially midway of an opening 74 formed in the upper wall 76 of the distributor. The passages are defined by the upper wall 76 and the lower wall 78 which is joined with said upper wall at a curved portion 79; a portion of the upper wall and curved portion being extended to form an attaching flange 81 for supporting a fuel filter (not shown) or the like.

The front surface of the casting is open in the area defined by the attaching flange 81, as shown at 82, providing an open passage entirely through the casting, the attaching base 70 being provided with upper and lower openings 88 and 90 respectively which are normally covered by a screen 92 and a splash plate 94 spaced therefrom. The arrangement of the splash plate is such as to permit the entrance of crank case vapors into the interior of the casting from opposite ends of the plate, the ends, of course, being spaced from the attaching base 70. The bottom walls of the discharge passages 62 and 64 are connected by a depending web 84, the lower end of which is arranged in a horizontal plane lower than the upper edge 86 of the open front of the casting; the web 84 forming a baffle for a purpose to be hereafter described. Each discharge passage is provided with an opening 96 which communicates through the space in the rear of the discharge passages with the openings 88 and 90 in the base 70 and with the opening formed in the front of the casing. Extending from the discharge passages are oppositely arranged conduits 98 and 100 respectively which connect the distributor to the mixing chambers of the respective carburetors.

It is believed that the operation of the device will be fully apparent to those skilled in the art, but a brief résumé is given herewith.

When the engine is started, the crank shaft thereof rotates the fly-wheel 30, thereby forcing air from the atmosphere into and through the conduit 50 to the separator 54 where it is divided into substantially equal parts and distributed to the mixing chambers of the respective carburetors through the discharge passages 62 and 64; the air being introduced at high velocity by the blower or fly-wheel 30. The air is mixed with the fuel from the float chambers 12 and 14 and is led into the intake manifolds and then into the engine cylinders in which the velocity is lost and a pressure above atmospheric is built up, thereby increasing the speed and power of the engine itself. As is usual in all engines, vapors develop in the crank case and such vapors are drawn through the screen 92 into the space between the attaching base and the discharge passages where they strike the baffle 84, and oil entrained in said vapors drops to the lower wall 78 and is returned to the crank case through the aperture 90. The vapors remaining pass around the baffle 84 and enter the passages 62 and 64 through the openings 96 formed therein and are conducted by the incoming air into the mixing chambers of the carburetors to be mixed with fuel and led to the engine to be burned. The casting, as before mentioned, is open from the atmosphere to the crank case, thereby furnishing a breather for the engine.

Backfiring of an engine sometimes occurs during normal running thereof, and in the event of such backfiring it is apparent that it will be projected first into a stream of fuel mixture flowing at high velocity in the opposite direction and the reduction of velocity of the fuel stream by the movement of backfire causes the building up of a pressure above atmospheric and the backfire will be dissipated. If, for any reason, the backfire should pass entirely through the carburetors and into the conduit 50 it is apparent that it must first reverse the movement of a column of air traveling at high velocity through conduit 50, after which any remaining flame will be immediately broken up by the fly-wheel due to the rotation of the latter. In view of this, it will be obvious that the fire hazard incident to the normal operation of an internal combustion engine, particularly an engine of the marine type, is reduced to a minimum. It will further be apparent that due to the increased speed at which the fuel mixture is fed to the engine, the speed and power of the engine are greatly increased; the device therefore functioning as a supercharger in this respect.

What is claimed is:

1. In an internal combustion engine, a plurality of carburetors, and means for introducing equal amounts of fuel mixture to the engine cylinders comprising a distributor having oppositely extending discharge passages connected respectively to the carburetors, a blower mounted on the crank shaft to be driven thereby, a conduit receiving air from the blower, a coupling connecting the outlet end of the conduit with the distributor, and a pipe arranged in the coupling leading to one of said discharge passages to substantially equally divide the air from the conduit whereby substantially equal amounts are delivered to the carburetors.

2. In an internal combustion engine, a plurality of carburetors, and means for introducing equal amounts of air at a pressure above atmospheric into the carburetors comprising a distributor connected to said carburetors, said distributor comprising a hollow casting secured to the engine crank case, discharge passages formed with the casting and connected to the carburetors, said casting having openings in the attaching base thereof for receiving crank case vapors, a baffle in the casting for preventing the passage of entrained oil to said discharge passages, said casting having an opening therein communicating with the interior of the casting to provide a crank case breather, a blower actuated by the engine crank shaft, and a conduit leading from the blower to the distributor.

3. In an internal combustion engine, a plurality of carburetors, a distributor having a discharge passage leading to each carburetor, a fly-wheel mounted on the engine crank shaft and provided with apertures whereby to draw in atmospheric air, a housing for said fly-wheel, a conduit leading from the fly-wheel housing, a separator connecting said conduit and distributor for directing substantially equal amounts of air to the respective discharge passages, and means comprising a port in the wall of each distributor discharge passage for admitting crank case vapors to the discharge passages to be mixed with the air therein.

4. In an internal combustion engine, spaced carburetors, a conduit receiving atmospheric air, a distributor connecting said carburetors and receiving atmospheric air from the conduit, said distributor comprising a hollow member having oppositely arranged discharge passages therein for directing atmospheric air to the respective carburetors, said distributor including an at-

taching portion for attachment to the crank case of the engine adjacent an opening in the latter, and said attaching portion having an opening registering with the opening in the crank case, said discharge passages each having an opening therein to the interior of the distributor whereby passage of air through the discharge passages will draw vapors from the crank case to said discharge passages.

5. In an internal combustion engine, spaced carburetors, a conduit receiving atmospheric air, a distributor connecting said carburetors and receiving atmospheric air from the conduit, said distributor comprising a hollow member having oppositely arranged discharge passages therein for directing atmospheric air to the respective carburetors, said distributor including an attaching portion for attachment to the crank case of the engine adjacent an opening in the latter, and said attaching portion having an opening registering with the opening in the crank case, said discharge passages each having an opening therein to the interior of the distributor whereby passage of air through the discharge passages will draw vapors from the crank case to said discharge passages, and a baffle in the distributor for preventing passage of entrained oil in the vapors to the discharge passages.

6. In an internal combustion engine, a plurality of intake manifolds, carburetors connected to said manifolds, a distributor connected to the carburetors, a blower actuated by the engine crank shaft, means for conducting air from said blower to said distributor, said conducting means comprising a longitudinally extending baffle for separating the air and directing it into the distributor in two separate streams and conduit means having separate discharge outlets for discharging atmospheric air into each of said streams.

ELBERT J. HALL.