W. W. GORE.

INTERNAL COMBUSTION ENGINE.

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1,411,343. Patented Apr. 4, 1922.

Fig. 2

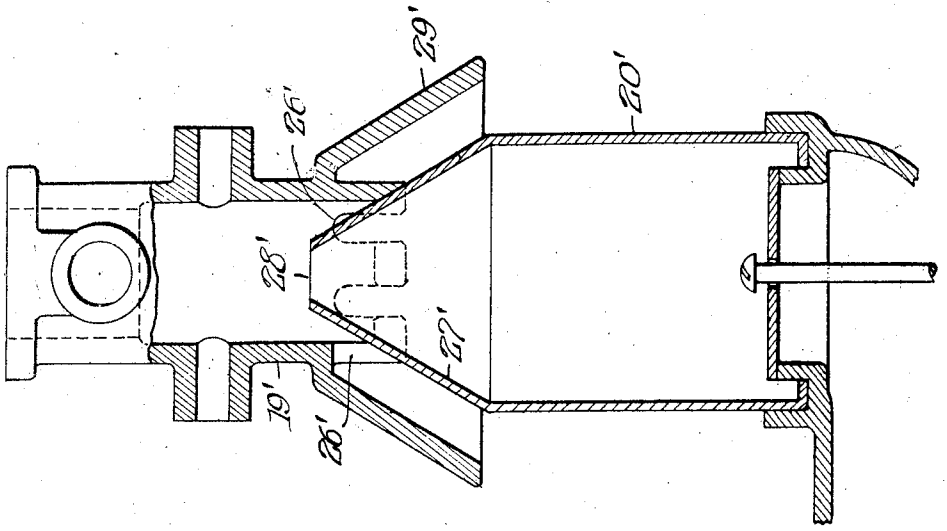
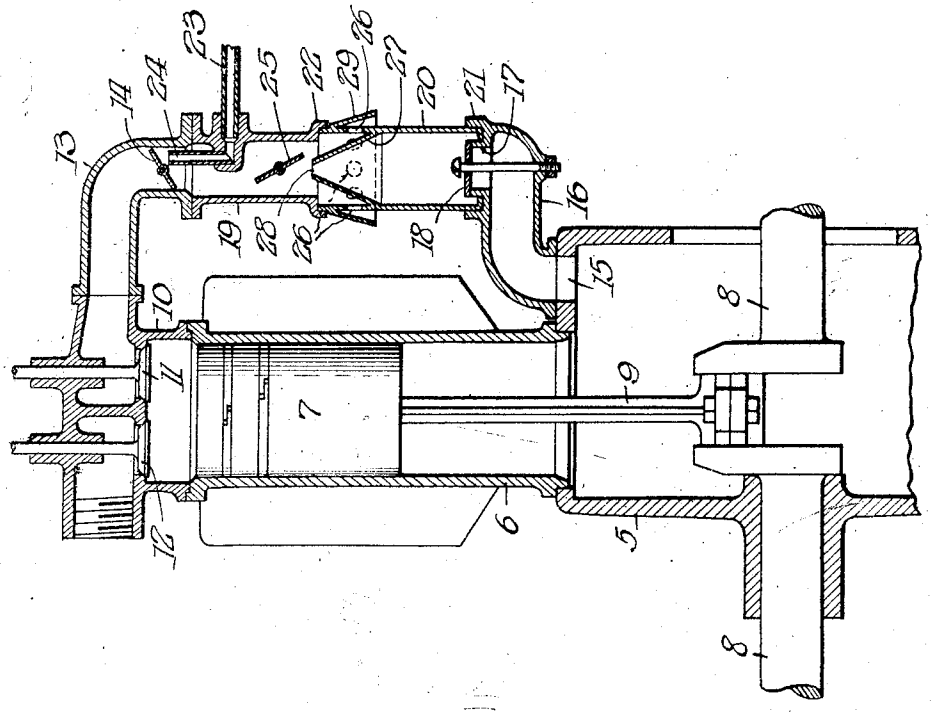


Fig. 1



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,411,343. Specification of Letters Patent. Patented Apr. 4, 1922.

Application filed December 1, 1921. Serial No. 519,098.

To all whom it may concern:

Be it known that I, WARREN W. GORE, a citizen of the United States, residing at Madison, in the county of Dane, State of Wisconsin, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention relates to the art of internal combustion engines, having reference more particularly to engines of the four-cycle type.

As is well known, many internal combustion engines are provided with a closed crank-case, which latter is equipped with a breather to allow the heated air and gases that have passed by the piston to escape from the crank-case and be replaced by cool air drawn in on the up or out strokes of the piston. Where such engines are used indoors, the gases emitted by the breather are noxious and objectionable, and hence, in engines of this type, and especially those designed for indoor use, it is common practice to provide a connection from the crank-case to the intake manifold of the engine through which such noxious gases are conducted to the cylinder instead of being expelled to the atmosphere.

My present invention relates more specifically to an improved device for thus conducting the crank-case gases to the engine cylinder on the suction strokes of the piston; and the purposes served by the specific construction hereinafter described in detail, and the advantages flowing therefrom, will be pointed out after the description of the structure itself, which latter is illustrated in two practical forms or embodiments in the accompanying drawing, wherein—

Fig. 1 is a sectional elevation of those parts of a single cylinder four-cycle engine with which my present improvement directly cooperates; and

Fig. 2 is an enlarged sectional elevation of a modified structure embodying the same principle.

Referring first to Fig. 1, 5 designates the closed crank-case, 6 the cylinder, 7 the piston, 8 the crank shaft, 9 the connecting rod, 10 the cylinder head, 11 the intake valve and 12 the exhaust valve of a single cylinder four-cycle engine. Connected to the intake side of the cylinder head is an elbow-shaped supply pipe or manifold 13 containing a butterfly governor valve 14. In the top of the crank-case 5 is a breather hole 15, over which is secured a laterally extending breather pipe section 16 formed on its upper side with a valve seat 17 on which is mounted an ordinary check or breather valve 18.

Connected in between the manifold 13 and the breather pipe 16 is a tubular connection comprising, in the instance shown, a vaporized casting 19 attached to the lower end of the manifold 13, and a breather tube 20, the lower end of which is mounted in a seat 21 on the breather pipe 16 and surrounding the breather valve 18, and the upper end of which is similarly fitted to a seat 22 formed on the lower end of the vaporizer 19. Into the vaporizer 19 is led a fuel supply pipe 23 which delivers the oil to an upstanding jet nozzle 24 projecting into the lower end of the manifold 13. In the vaporizer 19 is also mounted a butterfly choke valve 25 for throttling the air when starting up the engine.

The breather tube section 20 of this tubular connection between the crank-case and the intake manifold is formed near its upper end with an annular row of holes 26 constituting air ports for the intake of atmospheric air for the fuel mixture. Attached at its wide end to the inner surface of the breather tube 20 slightly below the air holes 26 is a conical baffle ring 27 that lies opposite the air holes 26 and at its upper end has a comparatively small opening 28, through which the crank-case gases flowing through the breather tube are deflected upwardly and inwardly past the air holes 26 and directed into the vaporizer 19, whence they flow through the latter and the manifold 13 to the cylinder on each suction stroke of the piston.

On the upper end of the breather tube 20 is preferably applied a short depending conical flange 29 which lies opposite and encircles the annular row of air ports 26.

In the construction described, the two inner and outer conical members 27 and 29 perform important functions. The internal conical member 27 possesses two main functions, one of which is to prevent the crank-case gases from shooting out through the air ports 26, while the other is to prevent any excess fuel that collects or condenses on the sides of the vaporizer or manifold from

dropping down onto the breather valve, from which position it might work down into the crank-case. Any fuel that collects in this way drips down into the annular space at the base of the conical ring 27, from which it is picked up on the succeeding suction strokes of the engine. The hollow conical flange 29 serves to reduce the sharp hissing noise of the inrushing air, thus acting as a silencer.

Fig. 2 shows a modification embodying the same principle. In this form the vaporizer 19′ has an annular row of air inlet ports 26′ formed in its lower end and the breather tube 20′ is formed with a conical upper end 27′ that is fitted into the lower end of the vaporizer, its narrow top opening 28′ lying slightly above the air ports 26′. The outer conical flange 29′ is formed on the vaporizer 19′, extending downwardly around the air ports 26′. It will be manifest that this modification has the same mode of action, functions, and advantages as the form of the invention shown in Fig. 1, differing from the latter only in a transfer of certain of the elements from the breather tube to the lower end of the vaporizer.

I claim:

1. In an internal combustion engine, the combination with a cylinder, crank-case, and intake manifold, of a tubular connection between said crank-case and manifold formed with lateral air ports, a breather valve in the lower portion of said tubular connection, and a conical baffle ring within said tubular connection and disposed opposite said air ports, said baffle ring serving to deflect the crank-case gases flowing through said tubular connection upwardly past said air ports and into said intake manifold.

2. In an internal combustion engine, the combination with a cylinder, crank-case, and intake manifold, of a tubular connection between said crank-case and manifold formed with lateral air ports, a breather valve in the lower portion of said tubular connection, a conical baffle ring within said tubular connection and disposed opposite said air ports, said baffle ring serving to deflect the crank-case gases flowing through said tubular connection upwardly past said air ports and into said intake manifold, and a depending external flange on said tubular connection surrounding said air ports.

3. In an internal combustion engine, the combination with a cylinder, crank-case, and intake manifold, of a vaporizer connected to the lower end of said intake manifold, a breather tube connected between the lower end of said vaporizer and said crank case and formed with lateral air ports near its upper end, a breather valve in the lower portion of said breather tube, and a conical baffle ring secured at its lower wide end to the inner surface of said breather tube below said air ports and disposed opposite the latter, said baffle ring serving to deflect the crank-case gases flowing through said breather tube upwardly past said air ports and into said vaporizer and also to retain excess fuel collecting within the vaporizer.

4. In an internal combustion engine, the combination with a cylinder, crank-case, and intake manifold, of a vaporizer connected to the lower end of said manifold, a breather tube connected between said vaporizer and said crank-case and formed with lateral air ports near its upper end, a breather valve in the lower portion of said breather tube, a conical baffle ring secured at its lower wide end to the inner surface of said breather tube below said air ports and lying opposite the latter, and an external depending conical flange on the upper end of said breather tube surrounding said air ports.

WARREN W. GORE.