Jan. 16, 1923. 1,442,257.

G. P. DORRIS.

INTERNAL COMBUSTION ENGINE.

FILED APR. 9, 1921. 2 SHEETS—SHEET 1.

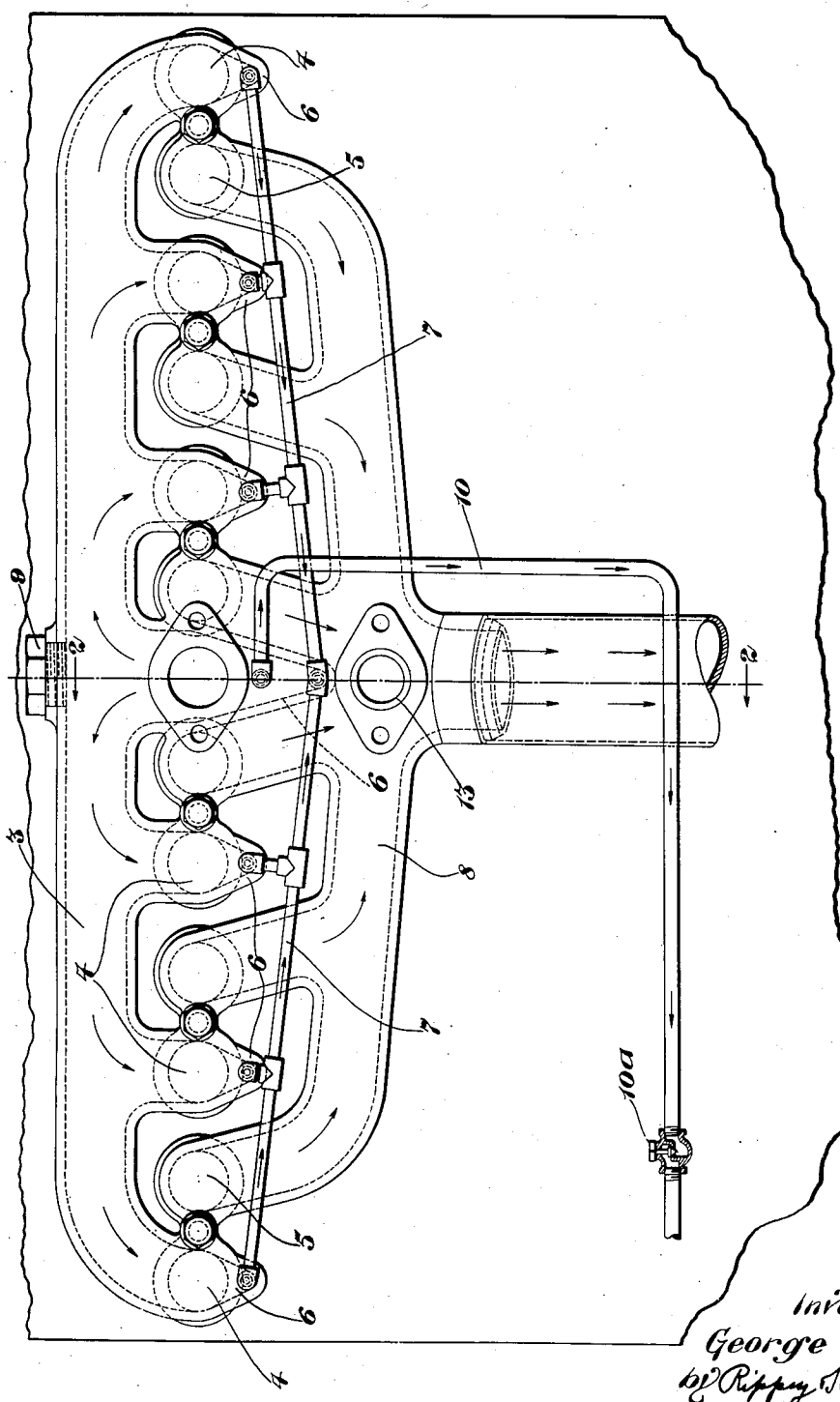

Fig. 1.

Inventor:
George P. Dorris,
by Rippey, Smigeland,
His Attorneys.

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Fig. 2.

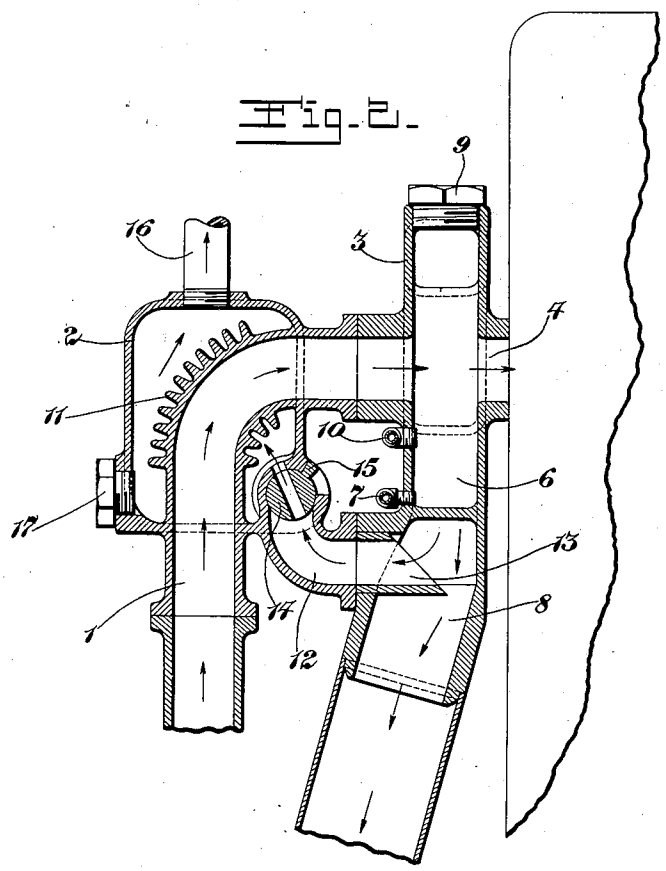
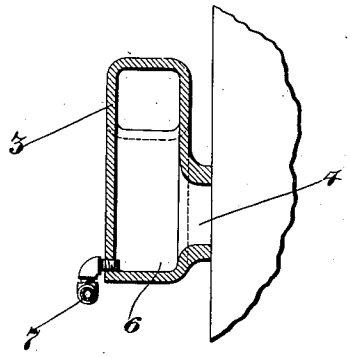


Fig. 3.



Inventor:
George P. Dorris,
by Rippey & Kingsland,
His Attorneys.

Patented Jan. 16, 1923. 1,442,257

UNITED STATES PATENT OFFICE.

GEORGE P. DORRIS, OF ST. LOUIS, MISSOURI, ASSIGNOR TO DORRIS MOTOR CAR COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

INTERNAL-COMBUSTION ENGINE.

Application filed April 9, 1921. Serial No. 459,915.

To all whom it may concern:

Be it known that I, GEORGE P. DORRIS, a citizen of the United States, residing at St. Louis, Missouri, have invented a new and useful Internal-Combustion Engine, of which the following is a specification.

This invention relates to an internal combustion engine.

An object of the invention is to provide improved means for trapping or delaying the passage of the heavy ends of gasoline toward the cylinders, so as to prevent these heavy ends of the gasoline from entering the cylinders, in combination with the means for causing re-vaporization of all or a part of the trapped or heavy ends of the gasoline that accumulate between the carburetor and the engine cylinders, and means for withdrawing any surplus accumulation of such heavy ends of the gasoline to prevent same from entering the cylinders in unvaporized form.

Another object of the invention is to provide an equipment for internal combustion engines for trapping the heavy ends of gasoline that pass the carbureter to prevent the same from entering the engine cylinders, and means for removing the heavy ends of the gasoline to prevent the same from entering the engine cylinders, said removing means comprising a pipe or passage for returning the heavy ends of the gasoline to the gasoline tank or other point of disposition.

Another object of the invention is to provide a construction for trapping or delaying the heavy ends of the gasoline that pass the carburetor and for causing re-vaporization thereof between the carburetor and the engine cylinders, before the gasoline enters the engine cylinders, in combination with a pipe or passage for withdrawing surplus accumulations of gasoline from the trap in which the gasoline accumulates.

Another object of the invention is to provide a construction for trapping the heavy ends of gasoline between the carburetor and the engine cylinders, and for withdrawing such heavy ends of gasoline to prevent the same from entering the engine cylinders.

Other objects and advantages will become apparent from the following description, reference being made to the accompanying drawings, in which,

Fig. 1 is an elevation showing parts of one embodiment of the invention, the heater shown in Fig. 2 being omitted.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view showing one of the traps and the outlet therefrom by which the heavy ends of the gasoline are trapped and removed.

In the construction shown, the intake pipe 1 passes through a heater 2 and opens into the manifold 3. From the manifold 3 the vaporized gasoline is delivered into the respective cylinders through inlet ports 4, and the products of combustion are discharged from the cylinders through exhaust or outlet ports 5.

My present invention comprises means for trapping or delaying the passage of the heavy ends or unvaporized portions of the gasoline that pass the carburetor, in order to prevent such unvaporized portions of the gasoline from entering the engine cylinders. In using the term "heavy ends" in this and in my companion applications Serial Nos. 458,299 and 459,916, I have reference to the unvaporized gasoline. Preferably, the trapped, unvaporized portions of the gasoline are subjected to heat to cause re-vaporization thereof between the carburetor and the engine cylinders; in combination with means for withdrawing unvaporized portions of the gasoline in order to assure that such portions will not enter the engine cylinders.

In the embodiment shown, I have provided, in connection with the manifold, adjacent to each inlet port, a depending well or receptacle 6 which receives or traps the heavy ends of unvaporized portions of the gasoline to prevent the same from entering

the cylinders, while leaving vaporized gasoline free to enter the cylinders. The well or receptacle 6 at the middle of the series is preferably of relatively greater depth and size than the other well or receptacle 6, so that the trapped heavy ends from the other wells or receptacles may be received in the central one, and there subjected to heat of the exhaust and re-vaporized. For the purpose of delivering the trapped heavy ends of the gasoline from the smaller ones of the wells or receptacles 6 to the large ones, pipes 7 are provided. The pipes 7 are in communication with the several relatively shallow wells or receptacles 6, and have their lower adjacent ends opening into the deeper or larger central well or receptacle 6, so that the trapped heavy ends of the gasoline will flow by gravity into the central well or receptacle.

In the embodiment shown, the exhaust ports 5 open and discharge into the leads of an exhaust manifold 8. The adjacent side walls of the two centrally disposed exhaust leads constitute the side walls of the central, relatively deeper well or receptacle 6, into which the heavy ends of the gasoline are delivered from the remaining wells or receptacles 6, in which the heavy ends of the gasoline are trapped at the inlet ports to the respective cylinders. Thus, the relatively large and deep centrally arranged well or receptacle 6 is heated by the exhaust, with the result that all or a part of the heavy ends of the gasoline delivered into said centrally disposed well or receptacle are vaporized and return in vaporized form to the manifold 3, through which the vaporized gasoline passes to the cylinders for combustion.

Since the heavy ends or unvaporized portions of the gasoline are delivered into the centrally disposed, relatively large well or receptacle 6, it may be desirable to obtain access to said well or receptacle for the purpose of removing the carbon or other deposits that may accumulate therein, or for other purposes. For all such purposes, a removable plug 9 may be set in one of the walls of the central well or receptacle. When the plug 9 is removed access is afforded to the interior of the well or receptacle for all purposes for which access may be desired thereto.

The central well or receptacle 6 opens into a pipe or passage 10 which leads to any appropriate place of discharge, as, for instance, to the gasoline tank. Preferably the opening from the central well 6 into the pipe or passage 10 is at a point between the bottom of said well and the plane of the lower walls of the inlet ports 4. Thus, the gasoline is prevented from rising to a sufficient height to flow or pass into the engine cylinders; for, before the gasoline rises to such a height, it overflows into and is withdrawn through the pipe or passage 10, thus removing surplus accumulations of the gasoline and retaining only such quantities as will be readily vaporized by the heat resulting from the operation of the engine. A check valve 10^a is provided in the pipe 10. This valve is arranged and designed to prevent the suction of the engine from drawing gasoline from the gasoline tank to the engine; but when the engine is stopped the valve will open under pressure of the gasoline and other pressure between said valve and the engine to permit the gasoline contained in said pipe to pass the valve and to discharge from the pipe 10 into the gasoline tank, or other place of discharge.

I have mentioned the heater 2 as being in connection with the intake and the manifold. This heater, in use, may be of any desired construction and formation. In the embodiment shown, the heater is in the form of a casing, inclosing a portion of the intake. Within the heater casing, the intake is provided with a number of heater fins 11 in order to obtain better results in utilizing the heat. A passage 12 from the heater casing 2 opens into the outlet from the exhaust manifold 8, and is provided with a baffle 13, extending into the outlet from the exhaust manifold, and serving to deflect a part of the heated exhaust through the passage 12 into the heater casing 2. The passage 12 is equipped with a valve 14 controlling the admission of the heated exhaust into the heater casing. The valve 14 is capable of being turned from open position, as shown in Fig. 2, to closed position, turning movement of said valve being limited to a lug 15 contacting with the ends of a slot in the valve case into which said lug extends. When it is desired to utilize the heat of the exhaust to heat the intake, the valve 14 is opened, permitting a part of the heated exhaust to enter the heater 2 which opens to atmosphere through a pipe 16. Access to the intake of the heater 2 may be obtained by removing a closure plug 17 through an opening in the wall of the heater in which said plug is removably located.

It is apparent that the invention may be embodied in various forms without departing from the nature and principle thereof. By preventing the heavy ends and unvaporized portions of gasoline from entering the engine cylinders, the life of the engine is greatly prolonged and the engine is maintained in a better working condition. Imperfect combustion due to flooding the engine with unvaporized gasoline is prevented. The formation and accumulation of carbon within the cylinders or on the spark plugs of the cylinders and on other parts of the engine are reduced to a minimum, with a result that there is a relatively

large saving in the amount of gasoline required. The withdrawal of the surplus accumulation of the heavy ends of the gasoline assures against such heavy ends entering the cylinders. The invention is therefore of an important and valuable nature and is clearly not to be restricted to the specific construction and arrangement shown.

I am aware that the invention may be widely varied as to its construction and arrangement without departing from the scope and principle thereof. The heavy ends of the gasoline may be trapped or delayed otherwise than in the specific manner shown and may be withdrawn and prevented from entering the engine cylinders in different ways. The pipe 10 may be trapped into the well or receptacle 6 at any selected point.

It is apparent that the invention satisfactorily serves all of its intended purposes in a highly efficient manner.

What I claim and desire to secure by Letters Patent is:—

1. The combination with an internal combustion engine, an intake manifold opening into the respective cylinders of the engine, and the intake pipe opening into the manifold, of a number of receptacles in the manifold extending downwardly from the manifold relatively a considerable distance below the openings into the cylinders and out of direct communication with the intake pipe for trapping the heavy ends of gasoline before the heavy ends enter the cylinders, and a pipe for withdrawing the trapped heavy ends of the gasoline from the manifold to a point of discharge away from the engine.

2. The combination with an internal combustion engine, an intake manifold therefor opening into the respective cylinders of the engine, and an intake opening into the manifold, of a number of receptacles in the manifold below the openings into the respective cylinders of the engine for trapping the heavy ends of gasoline before the heavy ends enter the cylinders, an additional receptacle within the manifold for receiving the gasoline from the first-named receptacles, a pipe for conducting the trapped gasoline from the first-named receptacles to the additional receptacle, and a pipe for conducting the gasoline from said additional receptacle to a place of discharge.

3. The combination with an internal combustion engine, an intake manifold communicating with the individual cylinders of the engine, and an intake pipe opening into the intake manifold, of a receptacle in the manifold extending downwardly from the manifold relatively a considerable distance below the openings into the cylinders and out of direct communication with the intake pipe located adjacent to each individual cylinder of the engine for receiving the heavy ends of gasoline and preventing said heavy ends from entering the cylinders, and means for conducting portions of the heavy ends of the gasoline from said receptacles away from the engine.

4. The combination with an internal combustion engine, an intake manifold communicating with the individual cylinders of the engine, and an intake pipe opening into the intake manifold, of a receptacle in the manifold out of direct communication with the intake pipe located adjacent to each individual cylinder of the engine for receiving the heavy ends of gasoline and preventing said heavy ends from entering the cylinders, means for vaporizing a portion of the heavy ends of the gasoline, and means for withdrawing surplus accumulation of the heavy ends of the gasoline to assure that the same will not enter the cylinders.

5. The combination with an internal combustion engine, an intake manifold opening into the individual cylinders of the engine, and an intake pipe communicating with said manifold, of a receptacle in the manifold adjacent to each individual cylinder of the engine and out of direct communication with the intake pipe for receiving the heavy ends of gasoline and preventing such heavy ends from entering the cylinders, and a pipe for conducting a portion of the heavy ends away from the manifold of the engine leaving a portion of the heavy ends in the manifold for re-vaporization.

6. The combination with an internal combustion engine, comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, and an intake pipe opening into the intake manifold, of receptacles in the intake manifold for receiving the heavy ends of the gasoline and preventing such heavy ends from entering the respective cylinders, a receptacle arranged to be heated by the heat of the engine, means for delivering the accumulated heavy ends of the gasoline from the first-named receptacles into the heated receptacle for vaporization, and an outlet from said heated receptacle located below the plane of the openings from the manifold into the engine cylinders.

7. The combination with an internal combustion engine, comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, and receptacles in the intake manifold for receiving the heavy ends of the gasoline before such heavy ends enter the cylinders, of a receptacle arranged to be heated by the heat of the engine, means for delivering the accumulated heavy ends of the gasoline from the first-named receptacles to the heated receptacle for vaporization, and an outlet pas-

sage for withdrawing the gasoline from said heated receptacle.

8. The combination with an internal combustion engine, comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, and an intake pipe opening into the intake manifold, of a receptacle in the intake manifold below and adjacent to the opening into each individual cylinder for receiving the heavy ends of gasoline and preventing such heavy ends from entering the respective cylinders, means for withdrawing the gasoline from said receptacles, a heater case adjacent to the intake manifold, enclosing a part of the intake pipe, and means for admitting heated exhaust from the engine into said heater case.

9. The combination with an internal combustion engine, comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, an intake pipe opening into the intake manifold, a heater case enclosing a part of the intake pipe, and an exhaust manifold arranged to deliver heated exhaust into said case, of a receptacle in the intake manifold below and adjacent to the opening into each individual cylinder for receiving the heavy ends of the gasoline that enter the intake manifold from the intake pipe, means for conducting the heavy ends of the gasoline from said receptacles to a point away from the engine, and means for controlling admission of the heated exhaust from the exhaust manifold into said heater case.

10. The combination with an internal combustion engine, comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, an intake pipe opening into the intake manifold, an exhaust manifold for conducting the heated exhaust away from the engine, of means controlling the admission of the heated exhaust from the exhaust manifold into said heater case, receptacles in the intake manifold for receiving the heavy ends of the gasoline that enter the intake manifold from the intake pipe, and means for withdrawing from said receptacles surplus accumulation of heavy ends of the gasoline while leaving portions of the heavy ends in the intake manifold for re-vaporization.

11. The combination with an internal combustion engine and the intake manifold thereof, of a series of relatively shallow receptacles in the manifold for trapping the heavy ends of gasoline before the heavy ends enter the cylinders, a relatively deep receptacle, pipes for conducting the heavy ends of gasoline from said shallow receptacles to said deep receptacle, a pipe for conducting the trapped heavy ends of the gasoline from the deep receptacle to the gasoline tank, and a valve in said pipe arranged to open under the pressure of the gasoline therein to permit the gasoline to flow to the gasoline tank and to prevent the gasoline from being drawn from the gasoline tank to the engine.

12. The combination with an internal combustion engine and the intake manifold thereof, of a series of relatively shallow receptacles in the manifold for trapping the heavy ends of gasoline before the heavy ends enter the cylinders, a relatively deep receptacle, a device for conducting the heavy ends of the gasoline from said shallow receptacles to said deep receptacle, a pipe for conducting the trapped heavy ends of the gasoline from said deep receptacle to a gasoline tank, and means for preventing the gasoline from being drawn from the gasoline tank to the engine through said pipe.

13. The combination with an internal combustion engine, having inlet ports opening into the respective cylinders, of an intake manifold supported above the inlet ports and having downward extensions opening into the inlet ports respectively, a receptacle at the lower end of each of said downward extensions below each of the inlet ports for receiving the heavy ends of gasoline passing from the intake manifold, and pipes for conducting the gasoline from said receptacles.

14. The combination with an internal combustion engine having inlet ports opening into the respective cylinders, of an intake manifold supported above the inlet ports and having downward extensions opening into the inlet ports respectively, a receptacle at the lower end of each of said downward extensions below each of the inlet ports for receiving the heavy ends of gasoline passing from the intake manifold, an additional receptacle, and means for conducting the heavy ends of gasoline from the first-named receptacles to said additional receptacle.

15. The combination with an internal combustion engine having inlet ports opening into the respective cylinders, of an intake manifold supported above the inlet ports and having downward extensions opening into the inlet ports respectively, a receptacle at the lower end of each of said downward extensions below each of the inlet ports for receiving the heavy ends of gasoline passing from the intake manifold, an additional receptacle, means for conducting the heavy ends of gasoline from the first-named receptacles to said additional receptacle, and means for conducting the heavy ends of gasoline from said additional receptacle.

16. The combination with an internal combustion engine, an intake manifold therefor opening into the respective cylinders of the engine, and an intake opening into the manifold, of a number of receptacles in the manifold below the openings into the

respective cylinders of the engine for trapping the heavy ends of gasoline before the heavy ends enter the cylinders, an additional receptacle within the manifold for receiving the gasoline from the first-named receptacles, a pipe for conducting the trapped gasoline from the first-named receptacles to the additional receptacle, a pipe for conducting the gasoline from said additional receptacle to a place of discharge away from the engine and outside the intake pipe, and means in said second pipe preventing the suction of the engine from drawing gasoline through said second pipe from the place of discharge.

17. The combination with an internal combustion engine comprising individual cylinders, and an intake pipe communicating with the individual cylinders of the engine, of receptacles for receiving the heavy ends of the gasoline and preventing such heavy ends from entering the respective cylinders, a heated receptacle, and means for delivering the accumulated heavy ends of the gasoline from the first-named receptacles to the heated receptacle for vaporization.

18. The combination with an internal combustion engine comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, and an admission pipe opening into the intake manifold, of a receptacle adjacent to the place at which the manifold opens into the cylinder to receive the heavy ends of gasoline and prevent such heavy ends from entering the cylinders, and a heated receptacle in communication with the intake manifold and arranged to receive the accumulation of the heavy ends of gasoline from said first-named receptacles to cause such accumulations to be vaporized in the heated receptacle and discharged in vaporized form into the intake manifold.

19. The combination with an internal combustion engine comprising individual cylinders, an intake manifold opening into the individual cylinders of the engine, and an admission pipe opening into the intake manifold, of a receptacle adjacent to the place at which the manifold opens into each cylinder to receive the heavy ends of gasoline and prevent such heavy ends from entering the cylinders, a heated receptacle in communication with the intake manifold and arranged to receive the accumulation of the heavy ends of gasoline from said first-named receptacles to cause such accumulations to be vaporized in the heated receptacle and discharged in vaporized form into the intake manifold, and a removable closure for one side of said heated receptacle arranged to be removed to afford access to the interior of said heated receptacle to permit the removal of deposits therefrom.

GEORGE P. DORRIS.