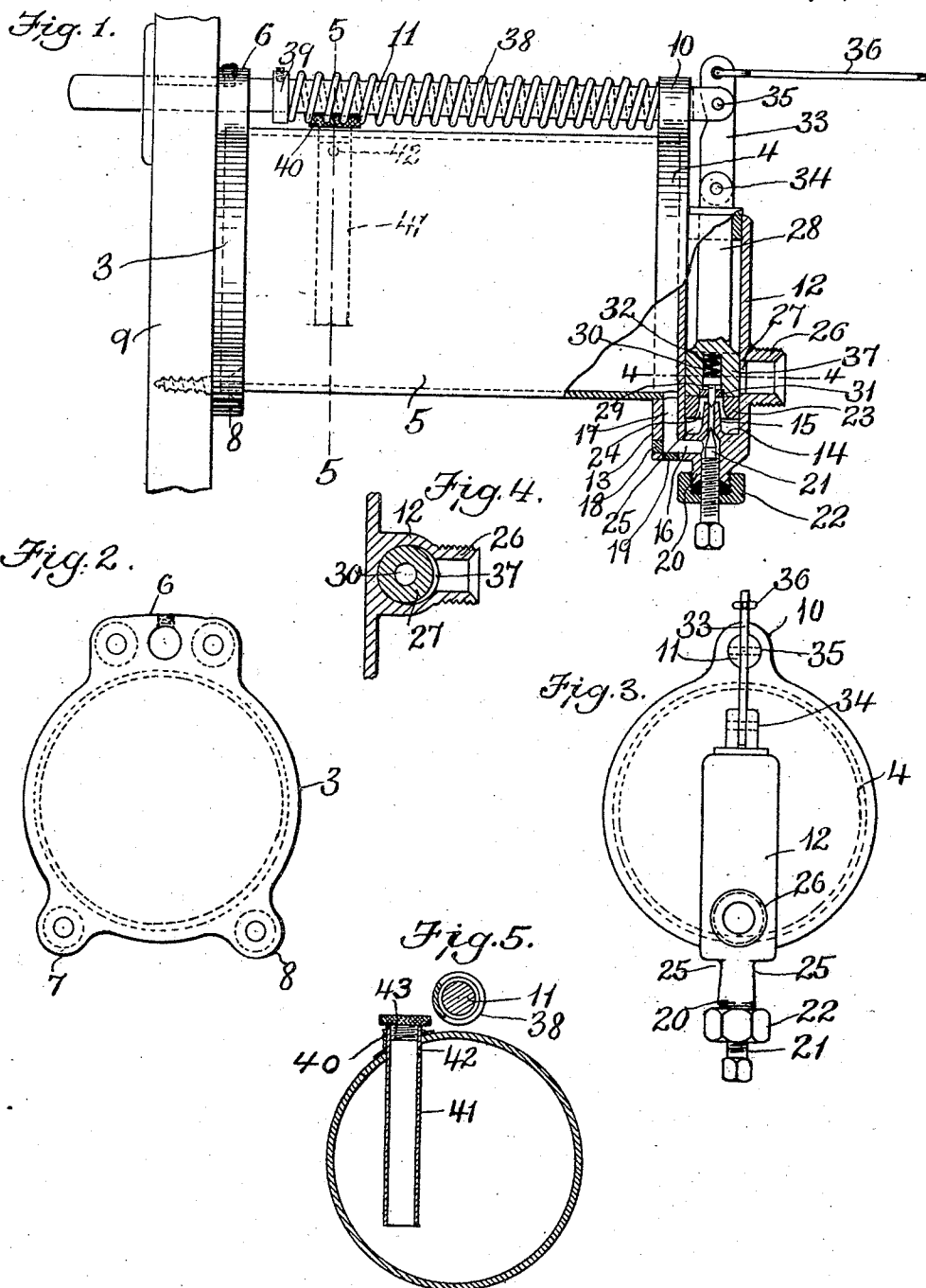


G. W. BROWN.
STARTING PRIMER FOR MOTORS.
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1,066,248.

Patented July 1, 1913.



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UNITED STATES PATENT OFFICE.

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STARTING-PRIMER FOR MOTORS.

1,066,248.

Specification of Letters Patent.

Patented July 1, 1913.

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To all whom it may concern:

Be it known that I, GILMAN W. BROWN, a citizen of the United States, and resident of West Newbury, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Starting-Primers for Motors, of which the following is a specification.

The subject of the present invention is a device for enabling internal combustion motors, and particularly those provided in motor vehicles, to be started under all weather conditions and at all temperatures, even when the motor, the fuel, and the surrounding atmosphere are extremely cold.

In general objects and in the manner of its use this device is similar to the one disclosed in my pending application filed September 18, 1912, Serial Number 720,964, entitled Primer for internal combustion motors. This device is also capable of being located and used in any position, whether near to or remote from the motor, and above or below the intake thereof with equal efficiency.

The particular objects of this improved form of starting primer are to provide improvements in the construction and arrangement of the parts thereof, particularly in the construction of the supply reservoir, the relation thereto of the carbureter or mixing attachment, and the means for making the same operative when desired, as hereinafter more fully appears.

In the accompanying drawings, Figure 1 is a side elevation partly in section of the improved starting primer. Fig. 2 is an end elevation as seen from the left of Fig. 1. Fig. 3 is an elevation as seen from the right of Fig. 1 and Fig. 4 is a detail sectional view on line 4—4 of Fig. 1. Fig. 5 is a section on line 5—5 of Fig. 1.

The same reference characters indicate the same parts in all the figures.

In construction the device comprises two oppositely arranged heads 3 and 4, respectively, having cylindrical flanges on the faces which are directed toward one another, and a cylindrical shell 5 of which the ends fit tightly and are secured within the side flanges of the heads, the shell and heads together thus forming a supply tank or reservoir for an inflammable volatile liquid. The head 3 has lugs 6, 7 and 8, perforated

to admit bolts or other fastenings whereby it may be attached to the frame of the motor or of the vehicle. Preferably it is attached at the forward side of the dash 9 of the vehicle, as shown in Fig. 1. The lug 6 has an additional perforation, and the head 4 has a perforated lug 10 alined with such perforation, these perforations serving as guides for an operating rod 11 which passes through the dash to the rear side thereof and is accessible by the hand or foot of the vehicle driver. The head 4 is provided also with a device for mixing the combustible liquid with air. This device which also may be called a "priming carbureter" consists of a cylindrical casing or cylinder 12 preferably formed as an integral part of the head 4, and inclosing a chamber which is both a mixing chamber and a valve chamber. Said cylinder 12 extends with a portion 13 of the head 4 below the lower side of the tank and has a cross member 14 from which rises a nozzle 15 located approximately in the axis of the chamber and inclosed within the cylinder 12. The cross member 14 joins the depending extension 13 of the head and is bored out from such extension as far as to the passage in the nozzle, to form a channel 16. The extension 13 is also bored out to form a passage 17 in back of the forward wall of the head and leading from the channel 16 to the reservoir shell into the interior of the reservoir. Preferably the channel 16 is formed by drilling from the rear side of the extension 13, and the passage 17 is formed by drilling upward from the lower end of this extension, the external openings of these drill holes being then closed by plugs 18 and 19, respectively. In this way a continuous passage is provided from the supply tank or reservoir to the nozzle. By extending the bottom of the carbureter below the tank as described, it is possible to locate the nozzle so that its orifice is below the bottom of the tank as shown clearly in Fig. 1, and thus all the liquid in the tank is enabled to flow by gravity through the nozzle. From the bottom of the carbureter extends a nipple which is bored out in line with the nozzle passage and is threaded to receive a needle valve 21 arranged to control the effective size of such passage. Said nipple is also externally threaded and receives a packing

gland 22. In the chamber 12 near the bottom thereof is a ring 23 surrounding the nozzle and restricting the chamber at this point to a narrow annular passage 24 immediately surrounding the nozzle orifice. The sides of the chamber casing 12 are cut away below the ring 23 and beside the cross member 14, as indicated at 25 in Fig. 3 and so as to provide ample inlet openings through which air may flow to make the combustible mixture. Above the ring 24 is a tubular nipple 26 constituting the outlet for combustible mixture from the carbureter and adapted to be connected with a pipe for leading the mixture to the motor.

In the chamber above the ring is a valve 27 having a close sliding fit within the cylinder 12 and provided with a stem 28 passing through the upper end of the shell. This valve is adapted to travel across the outlet passage so as either to close or open the same according to its position. It performs the function of permitting or preventing the flow of air in the carbureter and of the combustible mixture therefrom on which account it may be called the "air valve" of the carbureter. It may also be called the "main valve" in distinction from the fuel valve which I will now describe. Such fuel valve, indicated at 29 is contained in a socket 30 in the end of the main valve and projects therefrom toward a complemental seat in the end of the fuel nozzle surrounding the passage therethrough. Said fuel valve passes through a cover plate 31 closing the end of the socket 30 and is prevented from falling out of the socket by an enlargement back of said cover plate. A spring 32 in the socket presses the fuel valve outward and holds it yieldingly against the seat in the nozzle when the main valve is closed.

A link 33 is pivoted at 34 to the end of valve stem 20 protruding on the shell 12. It is also pivoted at 35 to the forward end of the operating rod 11. Said operating rod lies at right angles to the valve stem 28 and to the direction in which the latter is compelled to move. When the rod is in normal position the link 33 extends in line with the valve stem and is also perpendicular to rod 11. Hence when rod 11 is pushed forward it inclines the link 33 and lifts the valve because the latter is so guided that it can only move endwise and cannot change its direction. When the valve has been lifted far enough to uncover the outlet, the plate 31 engages the enlargement of the fuel valve and lifts the latter from its seat. Thereby fuel is permitted to issue from the nozzle and at the same time air is permitted to flow past the nozzle, drawn by the suction of the motor. Thereby sufficient fuel is always supplied to produce a combustible mixture even in starting the motor by hand, when its pistons are moved so slowly that

the movement of air is relatively sluggish. At the same time there is no possibility of flooding the carbureter or the pipe leading from the same in case the fuel valve should be opened any considerable time before the motor is turned over. Even though there is a gravity induced outflow of fuel as soon as the valve is opened, yet this fuel passes through the air inlets 25 beside and below the nozzle, preventing accumulation of any such quantity of fuel as would make the mixture upon the first suction stroke of the motor too rich to be ignited. Thus, as will be seen, sufficient fuel, and not too much, is supplied to the first flow of air to the motor to make a mixture which is properly proportioned to ignite. As the motor speeds up and its suction increases, the partial vacuum has its effect on the fuel as well as on the air, causing an increased amount to pass through the nozzle. It is only necessary in first regulating the device for operation to set the needle valve so that there is a slow outflow of fuel when the valve 29 is opened. After that preliminary regulation, the apparatus takes care of itself and supplies a proper mixture at all speeds of the motor. It is to be understood, however, that this primer is not intended to run the motor for any extended periods of time, but only to get it started until it is running sufficiently fast and is hot enough to run on the ordinary fuel supplied by the main or service carbureter. Link 33 is extended above the operating rod 40 and has provisions for connection with a cord 36 running to the point where the driver takes his stand when starting the motor by hand, so that upon pulling this cord the valves of the carbureter may be opened.

Within the carbureter chamber at the zone of the outlet openings there is a crescent shaped groove 37 partially surrounding valve 27 to permit flow of the mixture past the valve at points at either side of the valve. Reverting to the operating means consisting of the rod 11 and link 33 for opening the shut-off valve of the carbureter, it is pointed out that the alinement of the valve stem and link, and the position of the link pivot 35 approximately in the line of motion of the valve, constitutes a positive lock preventing the shut-off valves from being lifted from their seats. In the running of an automobile engine, there is a great deal of vibration and jolting which tends to throw the valve 27 from the closed position. To counteract this tendency by a spring acting directly on the valve, would require an exceedingly stiff spring, one so stiff that it would be very difficult to open the valve, particularly by the cord 36.

My arrangement of operating device above noted avoids the necessity of such a stiff spring, by providing a positive lock in the

nature of a toggle joint, which positively prevents any jumping of the valve from closed position. Only the lightest of springs is necessary to bring the operating device into and retain it in this locking position. Such a spring is preferably arranged to act on the rod 11, being in the form of a helix surrounding the rod, indicated at 38 and abutting at one end on the lug 10 and at the other end on a collar 39 on the rod. The construction of the tank having two heads, each with a lug forming a guide for the operating rod provides the most effective and inexpensive mounting possible for the operating rod. The lugs 6 and 10 may be easily formed upon the head and accurately alined with the greatest ease, and they provide a sufficiently solid support and guide for the rod without necessitating much additional metal in the heads, and therefore constituting the most effective and inexpensive support possible. The rod also is not in the way, as it lies close to the shell of the tank, and it constitutes a convenient holder for the spring 38, by which the latter is supported out of the way.

An important feature of the invention is the means which I employ for venting the fuel tank to maintain the pressure therein uniform without allowing the very volatile liquid fuel to escape. It is necessary to provide a vent to allow inflow of air to take the place of what fuel flows out, and it is a fact that liquid of the sort which I use for fuel is so very fluid that it will pass in objectionably large quantities through even the smallest of vents when thrown violently from one part of the tank to the other by sudden starting or stopping of the vehicle, unless the vent is properly located. When the vehicle is suddenly started, the liquid in the tank will be thrown against the rear head of the tank with considerable force, and in suddenly checking speed a similar wave of the liquid will be projected against the forward head. If the vent is located near either of these heads, some of the fuel will escape when such an action occurs. My mode of overcoming this difficulty is to provide a tube 41 leading from the filling opening or nozzle 40 to a point near the bottom of the tank, and in making in the side of this tube a small vent 42 in the highest point of the tank. The tube or nozzle is closed by a cap 43 which either has a vent made in it or fits loosely enough to permit leakage of air past it. If any wave of fuel brings up against the tube 41 and the vent 42, such quantity of the fuel as flows through the vent can only fall back into the body of the fuel, since it could not escape through the vent in the cap, unless it should be sufficient in volume to fill the nozzle 40, and should flow through the vent faster than it could flow down the tube and back into the tank,

which is obviously impossible. I also place the filling tube near the longitudinal middle of the tank where there is the least disturbance due to sudden starts and stoppages of the vehicle, and therefore the least tendency of the fuel to flow through the vent.

With this device it is possible to produce a combustible mixture of fuel vapor and air at all temperatures, even in the severest winter weather and without the necessity of previously heating the fuel or the air. The mixture is made at the supply tank and thence conducted in the form of gas through the motor. In this form it will flow upward or downward with equal velocity when impelled by the suction of the motor, hence it is immaterial to the functioning of the device whether it is located at a higher or lower level at a point where the connection is made with the motor intake, or whether it is near or remote from the motor.

In this device the parts are few in number, simple in construction and the machine work of manufacture is reduced to the minimum. It has the advantage of efficiency and low cost of production.

I claim:

1. A starting primer for internal combustion motors comprising a supply tank, including as part of its construction, a head at one end, a cylinder formed as a part of said head, a nozzle in said cylinder, a passage leading from the tank to the nozzle, a mixture outlet from the cylinder above the nozzle, and a valve for alternately opening and closing the nozzle.

2. A starting primer comprising a horizontally arranged tank having heads at opposite ends, said heads having alined guides, an endwise movable operating rod sliding in said guides, a carbureter comprising a cylinder made as a part of one of said heads, and having an outlet in its side, a valve arranged to move across said outlet so as to open and close the same in a direction approximately perpendicular to that of the operating rod, means connecting the rod with the valve and arranged to operate the valve in consequence of endwise movement of the rod, a nozzle in the lower part of said carbureter, and a channel leading from the interior of the tank to said nozzle.

3. A starting primer comprising a tank having a head at one end and said head being formed with a depending extension below the tank, a cylinder connected with the exterior of said head having a cross member joined to the depending extension, a nozzle rising from said cross member, the extension, cross member, and nozzle having connecting passages communicating with the interior of the tank, the cylinder being open to the atmosphere at the bottom on each side of said cross member and nozzle, an outlet opening from the side of the cylinder above

the nozzle, a valve fitting in the shell and movable across the outlet toward and from the nozzle, and a fuel valve carried by said valve and yieldingly impelled toward the nozzle.

5 4. A starting primer comprising a fuel tank having heads upon its ends, said heads having alined guideways, a carbureter formed integrally with one of said heads
10 having an internal mixing chamber, a nozzle in said chamber, a ring forming a stricture in the carbureter surrounding the nozzle, an outlet above the nozzle and an air inlet below the nozzle, the head being provided with a passage leading from the interior of the tank to the nozzle, a valve in
15 said carbureter movable across the outlet and carrying means for stopping the nozzle, an operating rod contained in said guideways, and a toggle link joining said rod and valve, arranged to form a positive lock to prevent opening of the valve when the latter is closed.

5. A starting primer comprising a carbureter having a mixing chamber, a fuel inlet, an air inlet, and a mixture outlet, a container for liquid fuel in communication with said fuel inlet, a valve for controlling the flow of combustible from the carbureter
30 and guided to move in a definite path, a link hingedly connected to said valve, a guiding member having a pivot connection with said link and movable only in a direction which is transverse to the path in which the valve
35 may move, and yielding means normally holding said guiding member in such a position that the points of connection between said member and the link and between the link and valve are approximately in the path
40 of movement of that portion of the valve to which the link is connected, whereby the valve is locked against accidental displacement.

6. A priming device comprising a carbureter having a mixing chamber, fuel and air inlets to said chamber, and an outlet for combustible from said chamber, a valve adapted to control the flow of combustible from such outlet, an operating link hinged
50 to said valve, said valve at the point of connection with said link being constrained to move in a predetermined path, and means for restricting said link at a point distant from its connection with the valve to a
55 movement in one path only, which is transverse to the path of its connection with the valve, whereby movement of that part of the link is enabled to operate the valve.

7. A priming device comprising a carbureter having a mixing chamber, fuel and air inlets to said chamber, and an outlet for combustible from said chamber, a valve adapted to control the flow of combustible from such outlet, an operating link hinged
65 to said valve, said valve at the point of

connection with said link being constrained to move in a predetermined path, and means for restricting said link at a point distant from its connection with the valve to a movement in one path only, which is transverse to the path of its connection with the valve, and intersecting such last named path, whereby when said point is at the point of intersection of said paths, the valve is locked against accidental movement, and movement of the link away from such point is operative to open the valve.

8. A priming device comprising a carbureter having a mixing chamber, fuel and air inlets to said chamber, and an outlet for combustible from said chamber, a valve adapted to control the flow of combustible from such outlet, an operating link hinged to said valve, said valve at the point of connection with said link being constrained to move in a predetermined path, and a guide member with which said link is engaged at a point distant from its hinged connection with the valve, arranged to compel such point of the link to travel only in a path transverse to and intersecting the prolongation of the first named path, whereby movement of the link in the predetermined path operates the valve, and the link is enabled to lock the valve against movement by force otherwise applied when in one position.

9. A priming device comprising a carbureter having a mixing chamber, fuel and air inlets to said chamber, and an outlet for combustible from said chamber, a valve adapted to control the flow of combustible from such outlet, an operating link hinged to said valve, said valve at the point of connection with said link being constrained to move in a predetermined path, a rod pivoted to said link at a point removed from the hinged connection of the link with the valve, and a guide by which said rod is held so as to extend in a direction transverse to said path and with respect to which the rod is movable endwise.

10. A priming device comprising a carbureter having a mixing chamber, fuel and air inlets to said chamber, and an outlet for combustible from said chamber, a valve adapted to control the flow of combustible from such outlet, an operating link hinged to said valve, said valve at the point of connection with said link being constrained to move in a predetermined path, a rod pivoted to said link at a point removed from the hinged connection of the link with the valve, a guide by which said rod is held so as to extend in a direction transverse to said path and with respect to which the rod is movable endwise, and a spring acting on said rod and tending to hold the same in such position that the line through its point of engagement with the link and the connection between the link and valve are in the

same line with the path in which such connection is constrained to move.

11. In a primer the combination of a tank and a carbureter united structurally with said tank, having a fuel inlet connected with the tank, an air inlet and a mixture outlet, a valve movable so as to open and close said outlet, a link pivoted to said valve, an operating line connected to said link and arranged to move the part wherewith it is connected in a direction transverse to that in which the valve is constrained to move, and a rod connected with the link and guided to have its only movement in a path approximately parallel to that in which said operating line is arranged to act, said rod being also constructed to serve as an actuator for the link.

12. A starting primer comprising a fuel tank and a carbureter structurally united with said tank and having a fuel inlet in communication with the tank, an air inlet and a mixture outlet, a valve in said carbureter movable across said outlet, an operating rod movably supported by said tank, and a toggle link joining said rod and valve and arranged to form a positive lock to prevent opening of the valve when the latter is closed.

13. A starting primer comprising a horizontally arranged tank having a vertical head at one end, said head having as an integral part thereof a carbureter casing extending vertically along the outer face of the tank, and said carbureter casing including a nozzle connected with the interior of the tank by a passage leading through the head, and having also openings below the nozzle for admission of air and an outlet above the nozzle for outflow of the combustible mixture, and a stricture within the casing surrounding the nozzle.

14. A starting primer comprising a supply tank, a carbureter formed as a part of said tank and having a connection therewith through which a gravity flow of liquid fuel may pass, said carbureter having a nozzle through which the fuel issues and an outlet for combustible mixture, and having means for preventing flooding by the liquid fuel issuing from the nozzle when there is no flow of air through the carbureter.

15. A starting primer comprising a supply tank, a carbureter formed as a part of

said tank and having a connection therewith through which a gravity flow of liquid fuel may pass, said carbureter having a nozzle through which the liquid fuel issues, having an outlet for combustible mixture at a height above the nozzle orifice, and having an externally open air inlet at a height lower than the nozzle orifice, through which fuel flowing through the nozzle when there is no flow of air through the carbureter may escape to prevent flooding of the carbureter.

16. A starting primer comprising a supply tank, a carbureter formed as a part of said tank and comprising an inclosed mixing chamber, an upstanding nozzle in said mixing chamber removed from the walls thereof and in communication with the interior of the tank, said carbureter having an outlet for the combustible mixture of which the lowest point is higher than the discharge orifice of the nozzle, and having also an external opening below the nozzle orifice and so arranged that an excess of liquid issuing from the nozzle may escape therethrough.

17. A starting primer for internal combustion motors comprising a supply tank, a carbureter constructed as a part of said tank at one of the ends thereof, and including an inclosed mixing chamber having a lateral outlet for the combustible mixture, an upstanding nozzle having communication with the interior of the tank and located below the said outlet, and an air inlet below the nozzle orifice, and a valve arranged to alternately open and close said outlet.

18. A starting primer comprising a tank having an upright wall, a carbureter comprising an inclosed mixing chamber made as a part of such wall and having a lateral outlet for combustible mixture, a nozzle in the lower part of said carbureter, a channel leading from the interior of the tank to said nozzle, a valve arranged to move toward and from the nozzle to close and open the same, and an operating rod engaged with said valve.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GILMAN W. BROWN.

Witnesses:

C. F. BROWN,

E. BATCHELDER.