G. W. BROWN.

MOTOR PRIMING APPARATUS.

APPLICATION FILED APR. 6, 1911.

1,004,359.

Patented Sept. 26, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

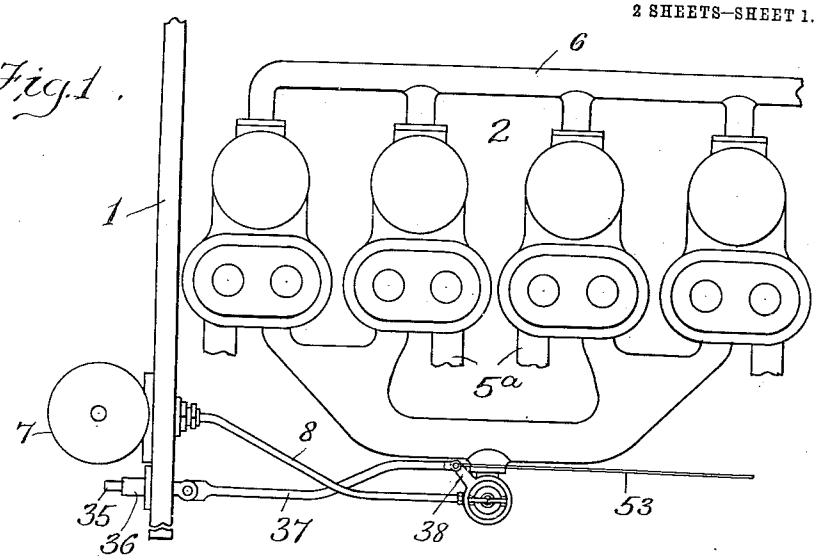


Fig. 2.

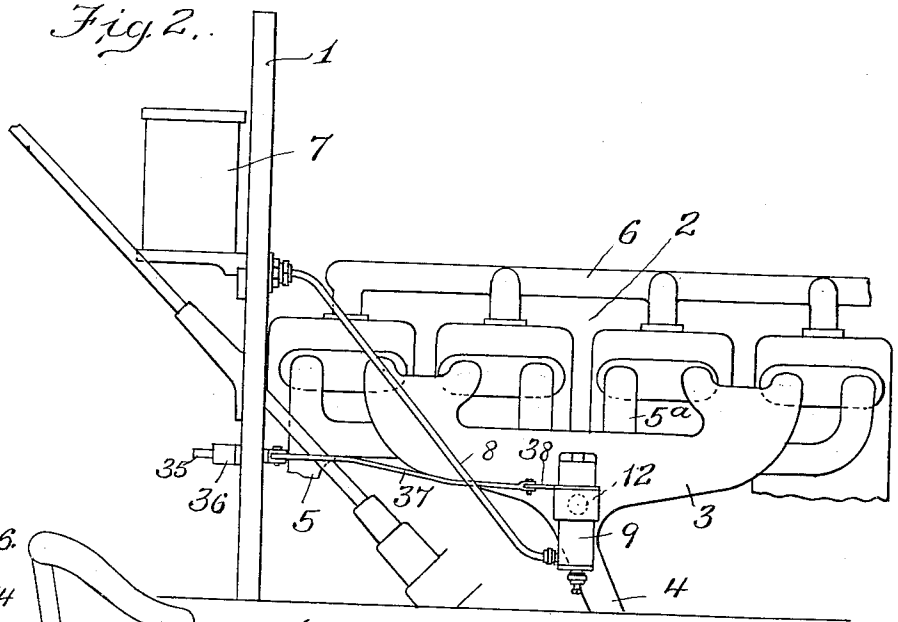


Fig. 16.

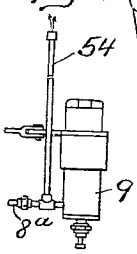
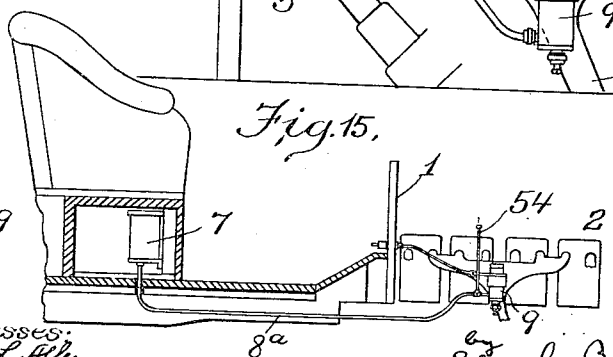


Fig. 15.



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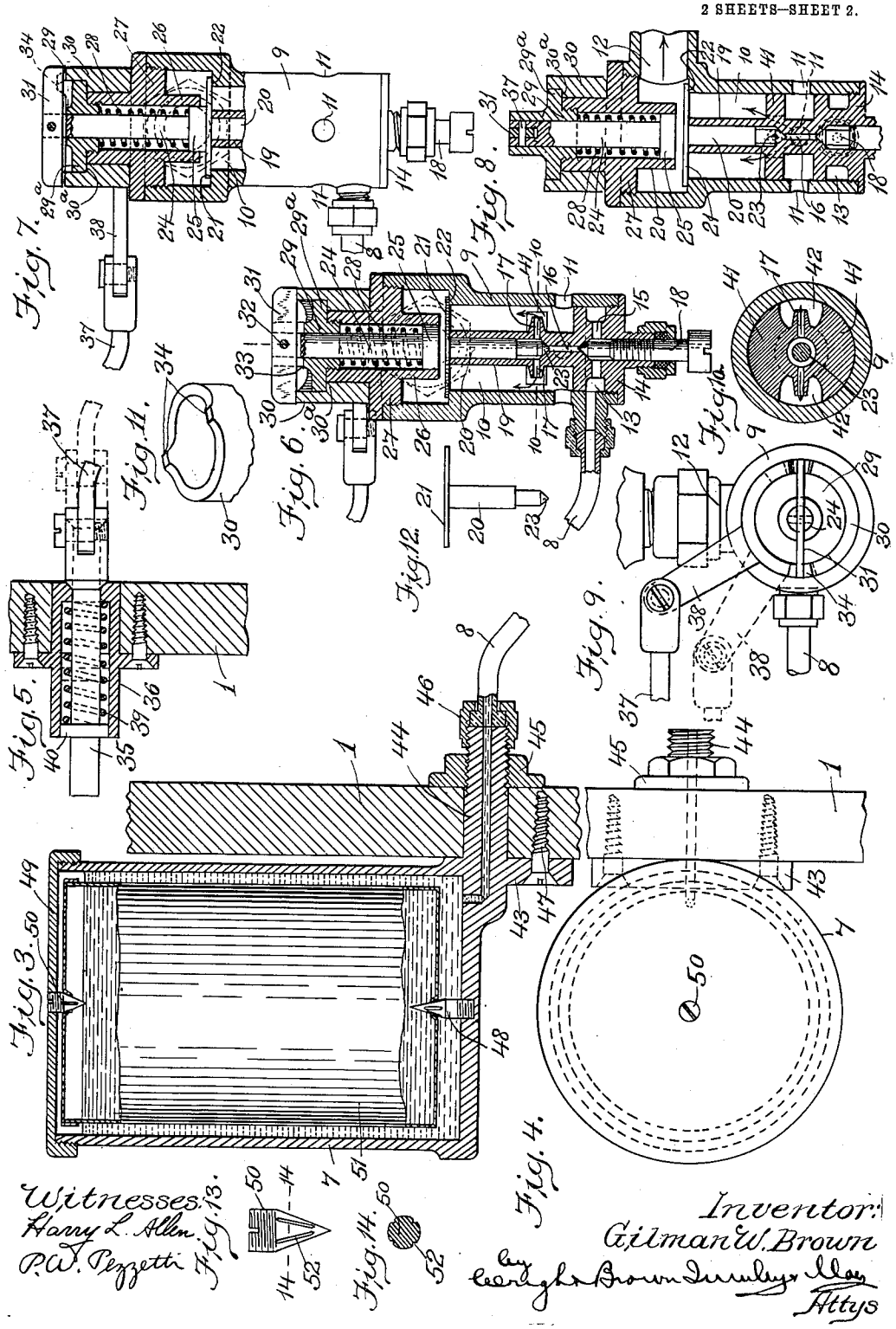
2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GILMAN W. BROWN, OF WEST NEWBURY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HAYDN L. BROWN AND ONE-HALF TO HORACE W. BROWN, OF WEST NEWBURY, MASSACHUSETTS.

MOTOR-PRIMING APPARATUS.

1,004,359. Specification of Letters Patent. **Patented Sept. 26, 1911.**

Application filed April 6, 1911. Serial No. 619,348.

To all whom it may concern:

Be it known that I, GILMAN W. BROWN, of West Newbury, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Motor-Priming Apparatus, of which the following is a specification.

The present invention relates to a mode of enabling internal combustion motors using liquid hydrocarbon as fuel to be started readily in cold weather. It is applicable to all kinds of such motors, however used, whether stationary or in motor boats or vehicles, and for the purpose of illustration is shown as applied to an automobile. With the grade of fuel usually supplied for internal combustion motors, great difficulty is experienced in securing proper carburation at low temperatures.

It is my object to provide a supplemental tank containing a quantity of liquid fuel of much more volatile character and better grade then that ordinarily used, and to provide, in connection with the same, conducting means and an auxiliary carbureting device by which the fuel from this auxiliary container may be supplied to the motor in a combustible mixture with air whenever desired, and only at the times desired. By filling the combustion chamber or chambers of the motor with the mixture of highly volatile fuel and air, ignition can be secured almost instantly even at the very lowest temperatures, because the fuel which may be used is so volatile that it will vaporize at temperatures far below the zero of the Fahrenheit scale, and when vaporized will retain that condition even at extremely low temperatures.

The invention consists of an improved apparatus for securing the above-named object, the essential principles of which apparatus and a practical mode of construction in which such principles may be embodied are explained in detail in the following specification.

In the drawings, Figure 1 is a plan view of an automobile motor and the apparatus constituting my invention applied thereto. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical sectional view of the fuel container showing one mode of applying the same to an automobile. Fig. 4 is a plan view of the same. Fig. 5 is a detail elevation of a control device by which the driver of the automobile may cause the priming apparatus to become operative or inoperative at will. Fig. 6 is a longitudinal sectional view of a carbureter having novel principles and features of construction which constitutes a part of the present invention. Fig. 7 is a view partly in section of the carbureter showing the valve closer thereof in its operative position. Fig. 8 is a cross-section of the carbureter on a plan at right angles to that of Fig. 6. Fig. 9 is a plan view of the carbureter. Fig. 10 is a cross-section on line 10—10 of Fig. 6. Fig. 11 is a perspective view of a control member by which the valve closer of the carbureter is made inoperative at will. Fig. 12 is an elevation of the compound valve of the carbureter. Fig. 13 is an elevation of the puncturing device used in connection with the auxiliary fuel container. Fig. 14 is a cross-section of such device on line 14—14 of Fig. 13. Fig. 15 is a sectional elevation of part of an automobile showing an alternative mode of applying the auxiliary fuel container. Fig. 16 is a detail on a larger scale of a portion of this alternative arrangement.

For the purposes of illustration it may be considered that in Figs. 1, 2 and 3 the part 1 represents the dash of any sort of an automobile or motor vehicle, and that 2 represents generally the motor thereof, the same being an internal combustion motor using a mixture of vaporized liquid fuel with air as the explosive. For illustration the motor is shown as consisting of four cylinders and may, of course, have any number from one up to the maximum practicable. 3 represents the intake which is provided with enough branches to make separate connection with all of the cylinders of the motor for conducting the combustible mixture thereto. It is to be understood that this intake leads from a carbureter which is not shown, in which the liquid fuel from the main supply tank is vaporized, and mixed with air, and from which it passes to the intake 3 by way of the pipe 4. This mixture is distributed in the usual manner by the intake of the combustion chambers of all the cylinders at the proper times to fill these chambers. 5 represents the exhaust pipe which is connected by branches 5^a with all of the cylinders, and 6 represents one of the pipes of the usual water-cooling system.

Mounted upon the dash 1, or any other

convenient location, is an auxiliary fuel container 7 from which a conducting pipe 8 leads to an auxiliary carbureter 9 which is arranged to discharge into the intake 3 when it is allowed to become operative. It is to be understood that the container 7 is not the main fuel tank, nor is the carbureter 9 the main carbureter through which the mixture for the ordinary running of the motor is supplied. On the contrary these parts are merely auxiliary, the main tank and main carbureter being of any of the known kinds and arranged in any of the common ways. Being common and well-known they are not illustrated here. The auxiliary apparatus is used only for priming the motor when the atmospheric temperature is so low that difficulty in carbureting the ordinary low grade fuel would be experienced. In such circumstances the motor is primed with a more volatile and richer mixture before being stopped when it is anticipated that it will remain stopped long enough to get cold, and usually also when starting. At all other times the priming apparatus is so shut off that none of the fuel can pass therefrom into the motor.

The preferred construction of the carbureter is illustrated in Figs. 6 to 12. It consists of a shell having an internal mixing chamber 10, with air inlets 11 at the lower end and an outlet 12 which connects with the motor intake 3. The pipe 8 from the container 7 opens into an external groove 13 in a plug 14, which is screwed into the lower end of the carbureter shell and has radial passages 15 opening into a passage 16 from which lead outlets or nozzles 17 which discharge into the mixing chamber. In the plug 14 is screwed an adjustable needle valve 18 which is adapted to close the admission end of the passage 16 and to regulate the opening of such passage so as to govern the richness of the mixture. The passage 16 is preferably formed in a tubular stem 19 forming a part of the plug 14 and containing the shank or stem 20 of a compound valve. One part of the valve is a disk or plate 21 which overlies a shoulder 22 between the mixing chamber 10 and mixture outlet 12, and thus shuts off the flow of the mixture from the carbureter. The other part of the valve is a cone 23 which enters the passage 16 before the latter opens into the nozzle 17. The valve stem is of such length that both of the valve members may be closed tightly at the same time, whereby not only the flow of the mixture to the motor is prevented, but also admission of the liquid to the carbureter is prevented.

Normally the valve is held closed by a closing device or valve closer 24, which is conveniently a plunger having a head 25 arranged to travel in a guide 26 in the cover 27 of the carbureter, and actuated by a spring 28 contained between the shank and guide and passing the head 25, the reaction of the spring being taken by an abutment 29 screwed in the upper end of the guide and rigidly held therein. The abutment 29 has also a flange 29^a between which and the cover plug 27 is confined a sleeve 30 which has a shoulder 30^a underlying the flange 29^a. The sleeve, however, extends beyond the abutment 29 and upon its edge rests a crossbar 31 which is secured by a pin 32 in a slot in the end of the plunger 24, and is guided in a groove or slot 33 in a tubular extension of the abutment 29. On the sleeve 30 are cam extensions 34 shown in Fig. 11, which are adapted to be brought under the ends of the crossbar 31 to raise the latter and thereby the valve-closing plunger.

The sleeve 30 is rotated to secure the effect last-mentioned by means preferably of a push rod 35 shown in Fig. 5, which passes through a thimble 36 set into the dash 1 and is pivoted to a link 37 which extends to and is pivoted to an arm 38 on the sleeve 30, as shown in Figs. 1, 6 and 9. A spring 39 is contained in the thimble 36 and bears against a shoulder 40 on the push rod tending to move the same toward the left as viewed in Fig. 5, and thus to swing the arm 38 and sleeve 30 so that the cam projections 34 are displaced from under the crossbar 31. The plunger 24 is then free to press against the carbureter valve under the influence of spring 28, as shown in Fig. 7, thus shutting off the carbureter, preventing fuel from flowing thereto, and the mixture from issuing therefrom.

An important feature of the carbureter is illustrated in Fig. 10. On the stem 19 previously referred to are located wings 41 in the zone of the nozzle 17. These wings fit the interior of the carbureter shell between the air inlets 11 and the mixture outlet, thereby closing the mixing chamber entirely except for restricted spaces 42 into which the nozzles project. As the air is drawn into the mixing chamber by the suction of the motor, it passes around the nozzles and crosses their outlets with relatively high velocity and atomizes the fuel most efficiently.

Conveniently the auxiliary container is mounted upon the dashboard, as indicated in Figs. 3 and 4, where it is shown as having a flat lug 43 adapted to lie against the dash, and a nozzle 44 passing through the dash. A nut 45 may be screwed upon the protruding end of the nozzle, to which also is screwed a coupling 46 joining the pipe 8 thereto, while screws 47 may secure the lugs 43 to the dash. The highly volatile liquid fuel may be stored in sealed cans of such a size as to enable them to enter the tank 7 readily. In the bottom of the tank is a pointed spur 48 and in the removable cover

49 is a similar spur 50. When the sealed can 51 is placed into the container, its bottom rests on the spur 48 and when the cover is screwed down, the spur 50 bears on the upper end of the can, pressing upon the latter and forcing the lower end against the spur 48. Thus the heads of the can are punctured, as shown in Fig. 3. The sides of the spurs where they pass through the heads of the can are grooved at 52 to allow the liquid to run out of the punctured bottom and the air to enter the punctured top of the can.

Having described the construction of my apparatus fully, I will now briefly describe its mode of operation. Ordinarily the plunger 24 is pressed by a spring against the compound carbureter valve so firmly as to prevent the latter from being opened by the suction of the motor. The spring is stronger than the force tending to open the valve in response to the partial vacuum in the motor. When the driver is ready to stop the motor for a period long enough to allow it to get cold, he closes his operating throttle and presses upon the push rod 35. This causes the valve closer 24 to be raised through the connections described, and allows the suction of the motor to raise the compound valve 21, 23. This allows fuel to enter the mixing chamber 10 and the combustible mixture to pass to the cylinders. The last few turns of the motor under its own momentum cause the combustion chambers to become filled with this mixture, which, owing to the highly volatile nature of the liquid fuel, will not lose its explosive character even in the coldest temperatures ordinarily met with under natural conditions. When the push rod is released, the spring 39 restores the latter and sleeve 30 to their normal condition, allowing the valve closer to become operative. In order that the operator when standing in front of the motor to crank it may prime the motor with the rich mixture, I may provide an additional connection such as a cord 53 leading from the arm 38 to the forward end near the crank.

In Figs. 15 and 16 I have illustrated a modification in the mode of mounting the auxiliary tank where the conditions are such that it cannot be mounted on the dash. Here the tank 7 is located beneath the seat and the pipe 8^a leads under the floor of the car to the carbureter. As the pipe is lower than the carbureter I provide a vent 54 to allow bubbles of the liquid volatilized in the pipe, or of air, to escape. This vent is connected to the pipe near the end which is connected to the carbureter to a height as great as the top of the tank 7 and is open at the top.

I claim:

1. A means for filling the combustion chamber of an internal combustion motor with a highly volatile combustible mixture, comprising a carbureter having a mixing chamber, an air inlet, and an outlet leading into the combustion chamber, a container for highly volatile liquid fuel, a connection from said container opening into the mixing chamber of the carbureter, valve members for closing both the carbureter outlet and the fuel inlet, and operator-controlled means for permitting said valve members to open, whereby a mixture of fuel and air may be drawn into the motor by the suction of the moving piston thereof.

2. A means for filling the combustion chamber of an internal combustion motor with a highly volatile combustible mixture, comprising a carbureter having a mixing chamber, an air inlet, and an outlet leading into the combustion chamber, a container for highly volatile liquid fuel, a connection from said container opening into the mixing chamber of the carbureter, a compound valve having means for closing both the carbureter outlet and the fuel inlet, adapted to be opened by the suction of the motor, a device for retaining said valve in closed position, and means controlled by the operator for making said valve-closing device inoperative and allowing the valve to open.

3. A priming apparatus comprising a container for liquid fuel, a carbureter, means for conducting fuel from the container to the carbureter, means for conducting a mixture of the vaporized fuel and air to the motor, valves adapted to interrupt the flow of the fuel and mixture respectively, a closing device, and means operable by the motor operator for controlling said closing device.

4. A priming apparatus comprising a container for liquid fuel, a carbureter having a fuel inlet, an air inlet, a mixing chamber, and an outlet from said chamber, a valve means for conducting fuel from the container to the fuel inlet of the carbureter, a spring operated closing device arranged to bear on said valve and hold the same closed, and a member operable by the operator to retract said device against the pressure of its spring to leave the valve free to open.

5. A priming apparatus comprising a carbureter having a fuel inlet, an air inlet, a mixing chamber and an outlet, a valve arranged to close the outlet of the mixing chamber and having a stem, a valve member connected to said stem, arranged to close the fuel inlet at the same time that the first-named valve is closed, a plunger arranged to bear on the valve, a spring tending to hold said plunger against the valve, and a cam operable to retract the plunger against the force of the spring.

6. In an apparatus of the character described, a carbureter comprising a shell, a plug closing one end of the shell, said plug having an inlet, and a stem having a pas-

sage communicating with the inlet and having outlets opening into the interior of the shell, a valve operable to vary the opening to the passage, an air inlet to the carbureter adjacent to such fuel outlet, an outlet from the carbureter, a valve arranged across such outlet and having a stem contained in the first-named stem, and a valve member upon said stem adapted to close the above-named fuel passage, said stem being of such length as to cause both valve members to close simultaneously.

7. In a priming device, a carbureter having a mixing chamber, an air inlet thereto, a fuel inlet thereto, and an outlet therefrom, connecting valve members constructed and arranged in such form and proportion as to close the fuel inlet and carbureter outlet simultaneously, a plunger mounted in the carbureter and guided to move toward and from said compound valve, a spring acting on said plunger and tending to hold the compound valve in closed position with a force greater than that produced by the suction of the motor, tending to open the same, and a cam engageable with said plunger and movable to withdraw the stem from the valve and to permit its approach to the valve.

8. In a priming apparatus, the combination with a carbureter having fuel and air inlets, a mixing chamber and an outlet from the carbureter, a valve in said carbureter adapted to close said outlet and the fuel inlet, a plunger guided in the carbureter to engage the valve, a spring acting on the plunger to hold the same in valve-closing position, a sleeve cam rotatably mounted upon the carbureter and surrounding the stem of the plunger, said cam having an axially offset projection, and a cross-bar secured to the plunger and engaging the cam, whereby the plunger may be retracted by rotation of the cam.

9. A priming apparatus comprising a container for liquid fuel, a carbureter having a connection with the intake of a motor, and having also a connection with the container, means automatically operable to close both of said connections, and means including an endwise movable push-rod, and a revoluble cam connected to said push-rod for rendering the connection closing means inoperative.

10. In a priming apparatus, a carbureter having a mixing chamber, an air inlet, and an outlet for the combustible mixture, a nozzle for injecting liquid fuel into the mixing chamber between the inlet and outlet thereof, and a partition extending across the mixing chamber at the zone of the nozzle and having a restricted opening adjacent to the nozzle.

11. In an apparatus of the character described, a carbureter comprising a cylindrical mixing chamber having an inlet near one end, and an outlet at the other, a tube for conducting fuel to the carbureter entering the mixing chamber and having a nozzle at its side between the inlet and outlet, a partition plate on said stem in the zone of the nozzle fitting the interior of the mixing chamber and closing the same except for a relatively narrow opening adjacent to the nozzle.

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

GILMAN W. BROWN.

Witnesses:
C. F. Brown,
Arthur H. Brown.