To all whom it may concern:

Be it known that I, FREDRIK HARROLD, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented a new and useful Mixing-Valve for Explosive-Engines, of which the following is a specification.

The present invention appertains to mixing valves for explosive or internal combustion engines, and aims to provide a novel and improved device of that character for admixing water and air so that the mixture may be drawn into the cylinders with the carbureted gas.

It is the object of the present invention to provide a valve of the nature indicated, which shall be of such construction and operation as to normally preclude the passage of water and air therethrough, but permitting the water and air to be drawn or sucked inwardly and then admixed so as to be supplied to the cylinder or cylinders.

Another object of the present invention is to provide novel and improved means for simultaneously shutting off and establishing the flow of air and water through the valve.

It is also within the scope of the invention to improve generally the construction and utility of devices of that character to which the present invention relates, in order that the device may be simple, compact, durable and inexpensive, as well as serviceable, convenient and efficient in its use.

With the foregoing general objects outlined and with other objects in view, which will be apparent as the description proceeds, the present invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention has been illustrated in its preferred embodiment in the accompanying drawing, wherein:

Figure 1 is a longitudinal central section of the valve. Fig. 2 is a side elevation. Fig. 3 is a sectional view taken on the line of 3-3 of Fig. 2.

In carrying out the invention, reference being had in detail to the drawing, there is provided a mixing chamber 1 having the depending nipple or nozzle 2, which is adapted to be attached either directly or indirectly to the engine cylinder, intake manifold, or other suitable part of the engine, in order that the mixture of water and air may be drawn into the cylinder or cylinders. The mixing chamber 1 is also provided with an upper opening provided by the socket 3.

An annular member 4 is seated on the rim of the socket 3 and is provided with a reduced extension or nipple 5 threaded into the socket 3. The annulus 4 is also provided with an upstanding yoke or arbor 6 providing a supporting frame for certain of the parts as will hereinafter appear. The intermediate portion or crest of the yoke 6 is formed with an upstanding lug or boss 7 having a lateral extension 8 over one arm of the yoke.

A tube 9 has its upper end threaded into the intermediate portion or head of the yoke 6 so as to depend within the yoke and within the annulus 4 and its extension or nipple 5, the lower end of the tube being provided with a constricted duct or opening 10. A channel or duct 11 extends from the extension 8 into the boss 7 so as to communicate with the upper end of the tube 9, the extension 8 being provided with a socket or tap 12 for the reception of the end of a water supply pipe. This water supply pipe may be of any suitable character and may communicate with any convenient source of water or similar fluid.

A needle valve 13 is threaded through the boss 7 and extends axially within the tube 9, the lower end or tip of the needle valve 13 cooperating with the duct or passage 10, and the upper end being projected above the boss 7 and so formed as to be conveniently turned or rotated by hand.

A sleeve 14 is slidably snugly upon the tube 9 and passes through the extension or nipple 5 of the annulus 4, the lower end of the sleeve 14 being provided with an annular exterior flange 15 projecting below the rim or edge of the extension or nipple 5. The flange 15 preferably carries a gasket or packing ring 16, although, this is not necessary, inasmuch as the flange 15 may seat directly against the extension or nipple 5, al-
though in this case, the gasket 16 seats against the said extension or nipple. The sleeve 14 is of a diameter somewhat smaller than that of the opening through the extension or nipple 5, so as to provide an air passage leading from the atmosphere to the mixing chamber 1.

A plug 17 is threaded into the lower end of the sleeve 14 and is provided with an upstanding conical tip or extension 18 forming the valve adapted to seat within the lower end of the duct or passage 10, the plug 17 being provided with an annular series of passages or ducts 19, and with a depending rounded lug 20 between the ducts 19.

The sleeve 14 is spring pressed so as to ordinarily raise the sleeve to seat on the valves 15 and 16 and to this end, the spiral spring 21 surrounds the sleeve 14 within the yoke 6 and is disposed compressibly between the annulus 4 and the upper end of the sleeve 14. The lower convolution of the spring 21 is seated on the annulus 4, the annulus being provided with an upstanding marginal flange 22 surrounding the lower convolution of the spring, and a nut 23 is threaded upon the upper end of the sleeve, the upper convolution of the spring 21 being seated against the nut 23 and the nut being provided with an annular flange or lip 24 engaging within the upper convolution of the spring. By adjusting the nut 23, the tension of the spring may be increased or decreased, as desired to most effectively seat the valves 15 and 16.

It is to be noted that the tube 9 provides a water passage leading from the top 12 to the mixing chamber 1, and that the said tube also serves as a bearing for the sleeve 14 carrying the water valve 18 and the air valve 15.

In use, it will be evident that the nozzle or spout 2 of the mixing chamber may be attached either directly or indirectly to the cylinder, the intake manifold or other part of an internal combustion engine, so that as the piston of the respective cylinder moves to draw in a new charge of carbureted gas, the suction will extend to the mixing chamber 1. The suction created within the mixing chamber 1 will draw the sleeve 14 downwardly or inwardly, thereby unseating the valves 15 and 16 simultaneously, so that water and air will be permitted to flow into the mixing chamber. The air will flow through the nipple 5 around the flange or valve 15, while the water will flow through the passage 10 and through the ducts 19 around the lug 20. The flow of water may be regulated by means of the needle valve 13, so that the supply may be proportioned as desired, the water and air being admitted into the mixing chamber 1 as specified serving to admit them thoroughly in order that they may be drawn through the nozzle or nipple to the cylinder. When the suction is relieved, the spring 21 will again seat the valves 15 and 16 simultaneously, so as to shut off the flow of water and air, it being observed that the present device is entirely automatic.

From the foregoing, taken in connection with the drawing, the advantages and capabilities of the present invention will be apparent, the benefits derived from introducing a thorough mixture of water and air into the cylinders of an internal combustion engine being apparent to those versed in the art, and needing no lengthy description.

Having thus described the invention, what is claimed as new is—

1. In a device of the character described, a mixing chamber having an inlet, a fluid supplying tube having a constricted opening, and a sleeve slidably mounted upon the tube carrying valves to normally close the passage and the said opening, and a needle valve projecting into the tube to cooperate with the said opening.

2. In a device of the character described, a mixing chamber having an inlet, a fluid supplying tube having a constricted opening, and a yieldable sleeve slidable on the tube entering the said inlet, the sleeve having a valve within its lower end seatable within the said opening, and having an exterior flange adapted to close the air passage, and a needle valve projecting into the tube to cooperate with the said opening.

3. In a device of the character described, a mixing chamber, an inlet nipple engaged thereto, a fluid supplying tube having a constricted opening, a spring pressed sleeve slidably on the tube and passing through the said nipple, the sleeve having a valve within its respective end seatable against the end of the tube, and having an exterior flange seatable against the nipple, and a needle valve projecting into the tube to cooperate with the said opening.

4. In a device of the character described, a mixing chamber having an inlet, a fluid supplying tube, a spring pressed sleeve slidably on the tube and passing through the said inlet, the sleeve having an exterior flange to normally close the inlet, and a plug engaged within one end of the sleeve and having a valve seatable against the end of the tube and a plurality of ducts therethrough.

5. In a device of the character described, a mixing chamber, a frame having a nipple attached to the mixing chamber, a fluid supplying tube supported by the frame, a sleeve slidable on the tube and passing through the said nipple, the sleeve having a valve within one end seatable against the end of the tube, and having an exterior flange seatable against the nipple, and a spring disposed between the other end of the sleeve and the frame.
6. In a device of the character described, a mixing chamber, an annulus having a nipple attached to the mixing chamber, and embodying a yoke, a fluid supplying tube supported by the yoke, a sleeve slidable on the tube and, passing through the nipple, the sleeve having a valve in one end seatable against the end of the tube and having an exterior flange seatable against the nipple, and a coiled wire spring surrounding the sleeve and seated at its ends against the annulus and the other end of the sleeve.

7. In a device of the character described, a mixing chamber, a member having a nipple attached to the mixing chamber and embodying a yoke, a fluid supplying tube attached at one end to the yoke, the yoke having a passage communicating with the said end of the tube, a needle valve adjustably carried by the yoke and extending axially within the tube to control the constricted passage, a spring pressed sleeve slidable on the tube and passing through the air inlet, the sleeve having an exterior flange to normally close the air inlet, and a plug engaged within one end of the sleeve having a valve to control the constricted passage of the tube and a series of ducts therethrough.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FREDRICK HARROLD.

Witnesses:
Geo. L. SAUER,
LOUIS B. McNEAL.