R. D. LOOSE.

AUXILIARY MIXER FOR INTERNAL COMBUSTION MOTORS.

APPLICATION FILED DEC. 29, 1909.

959,950.

Patented May 31, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

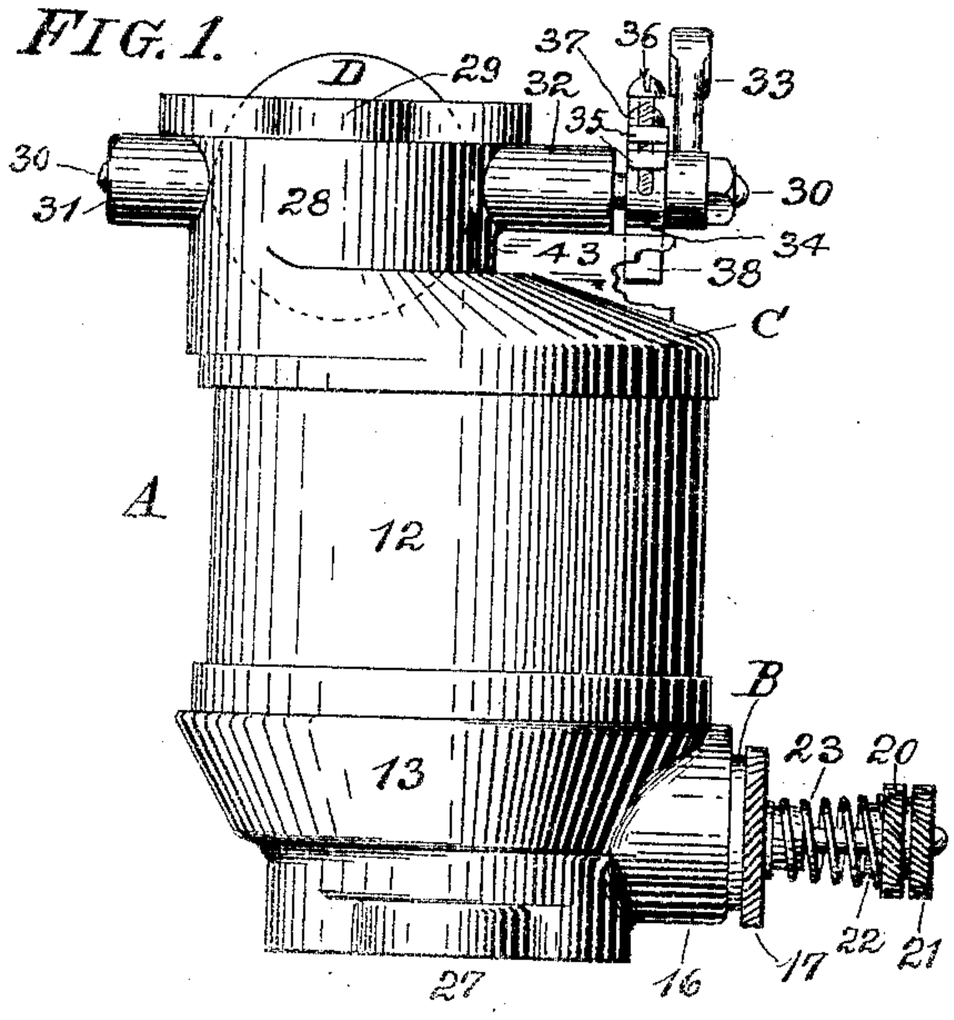

FIG. 2.

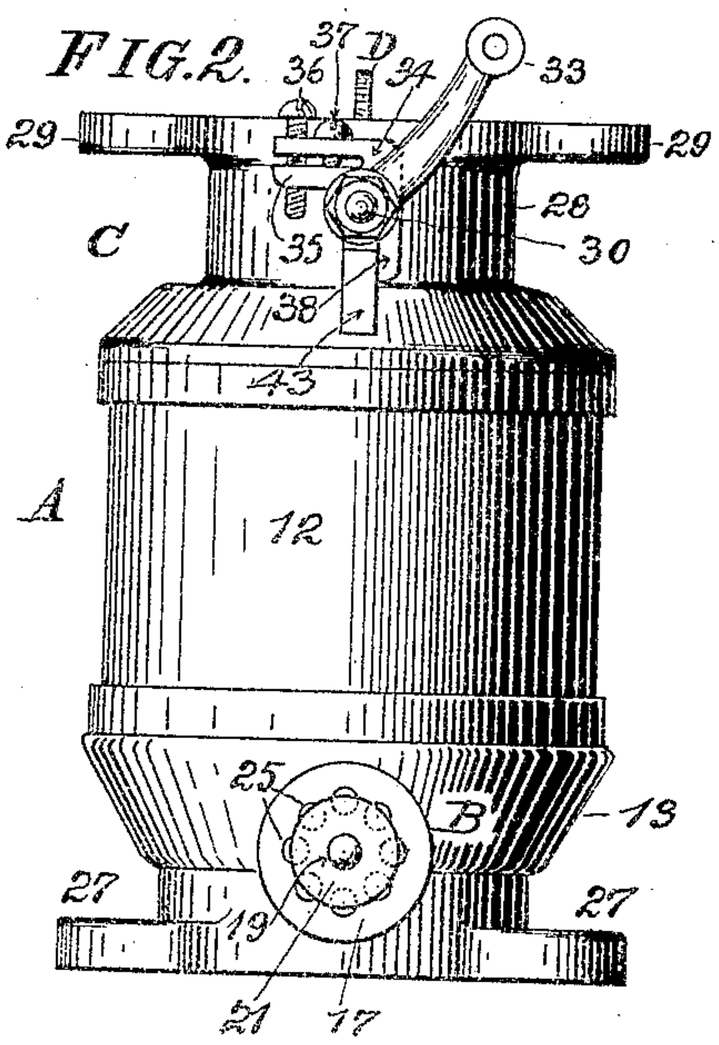

FIG. 3.

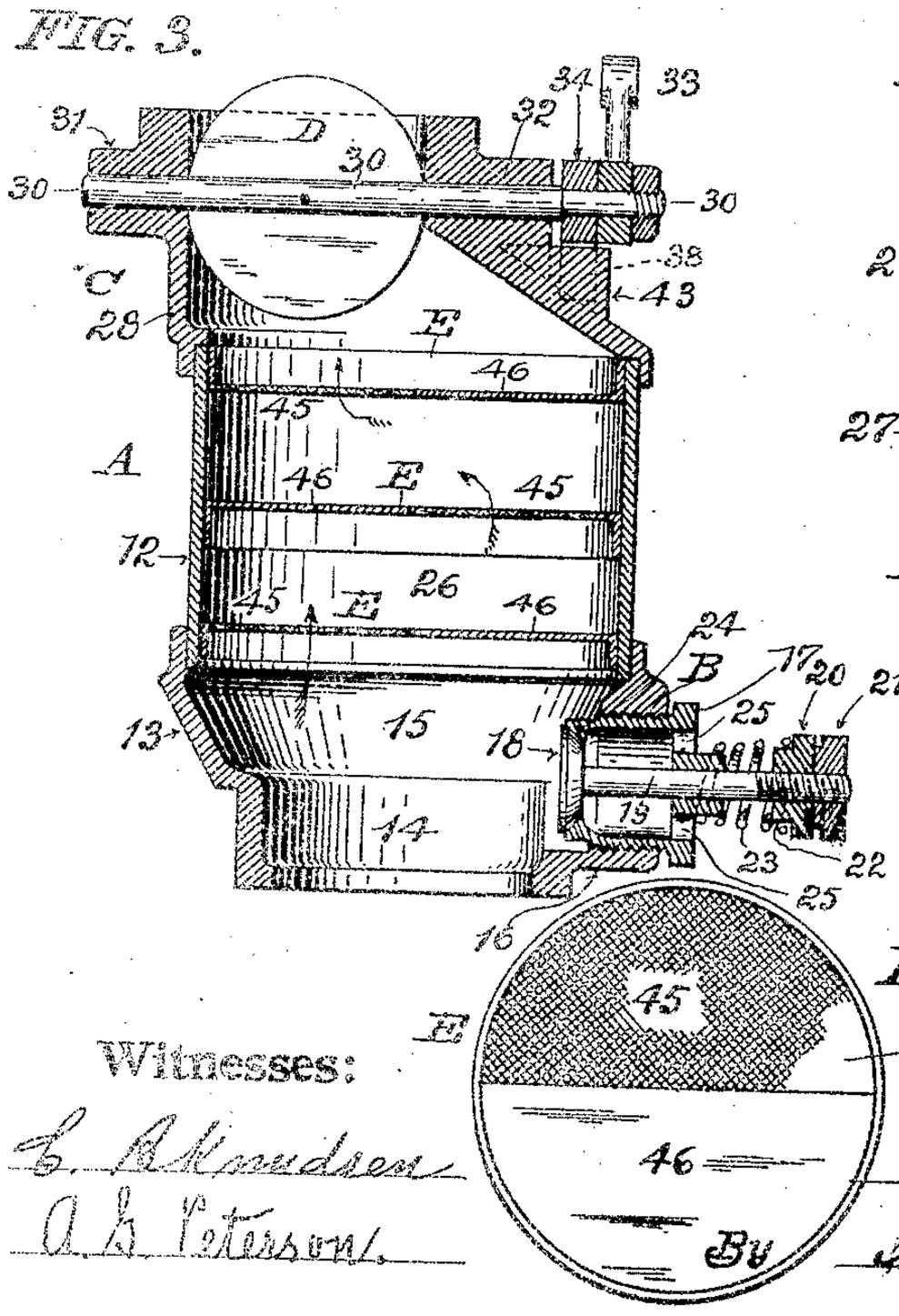

FIG. 4.

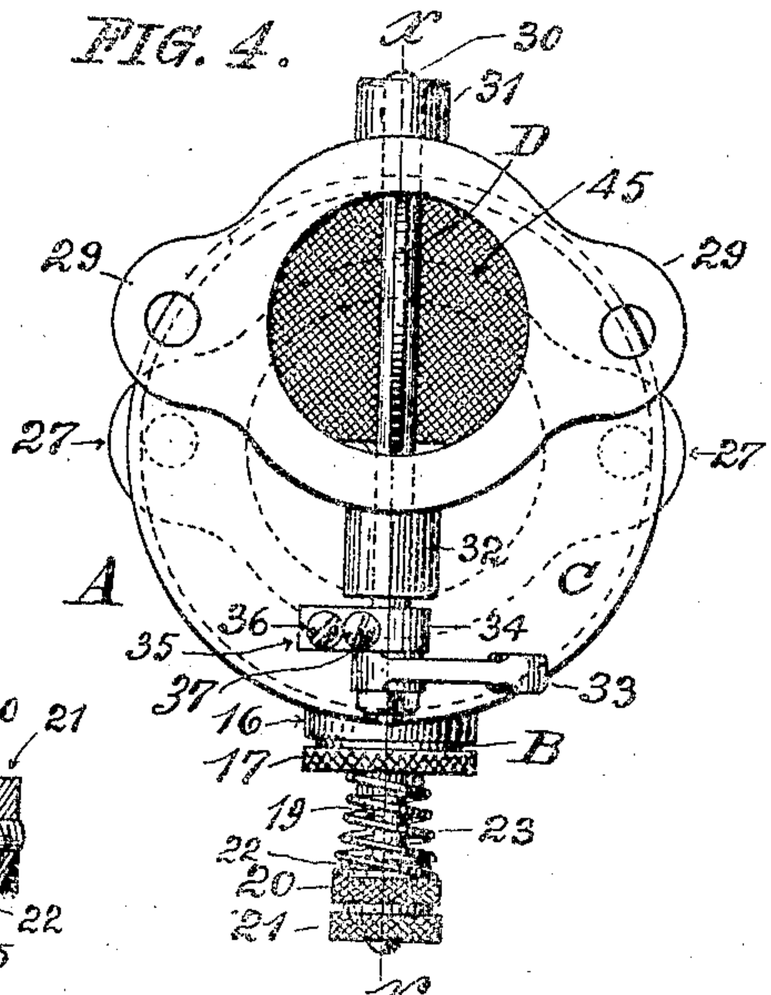

FIG. 5.

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2 SHEETS—SHEET 2.

FIG. 6.

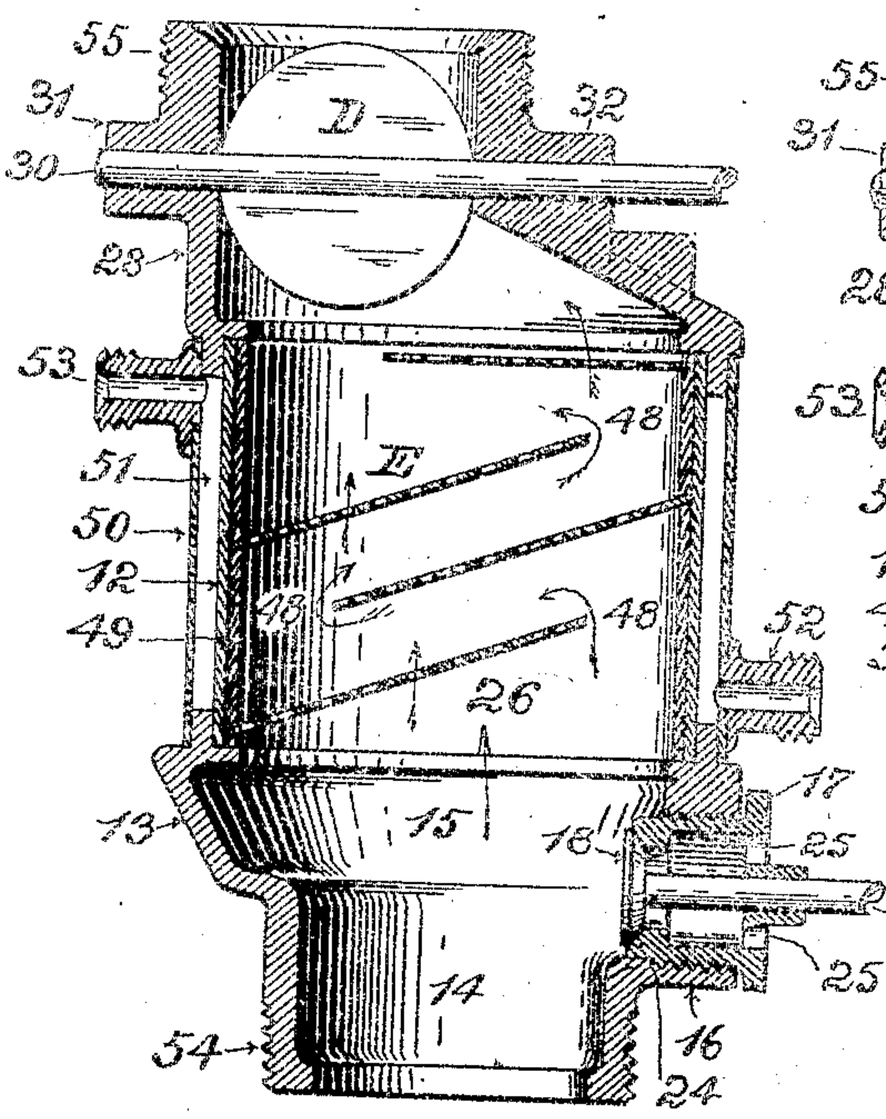


FIG. 7.

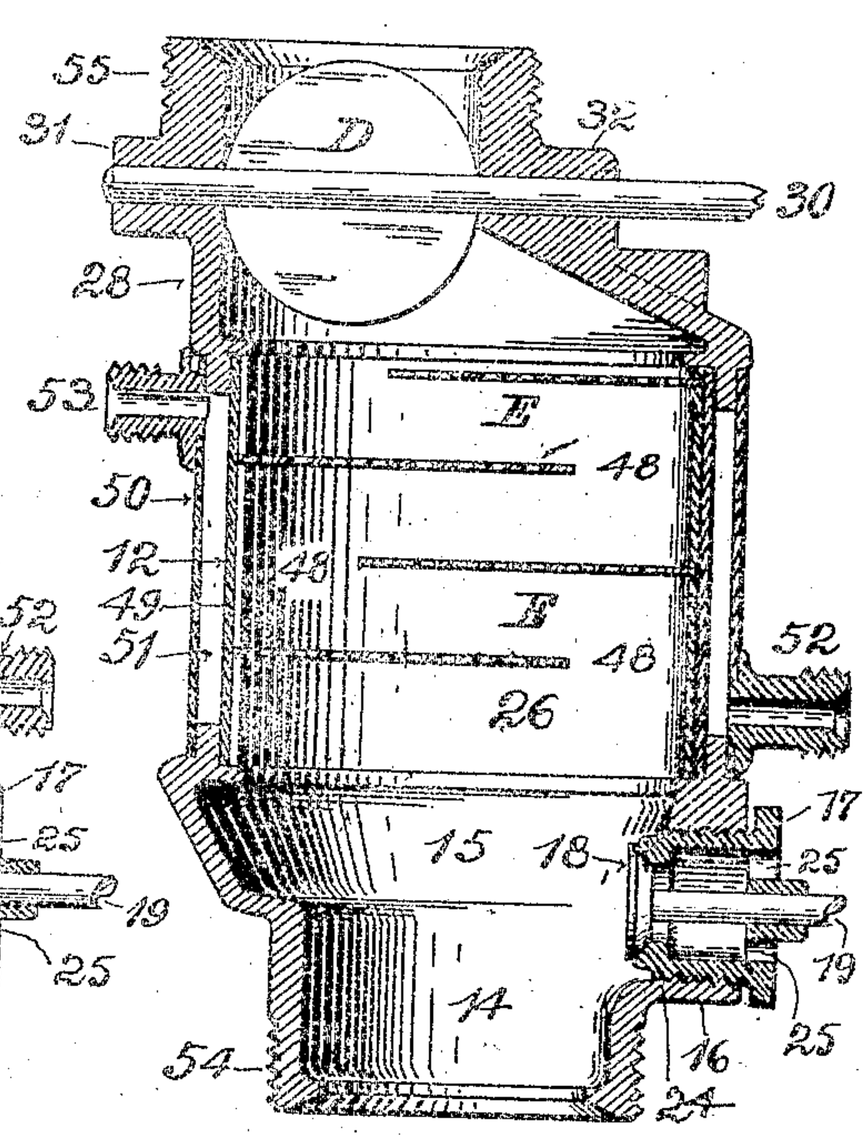
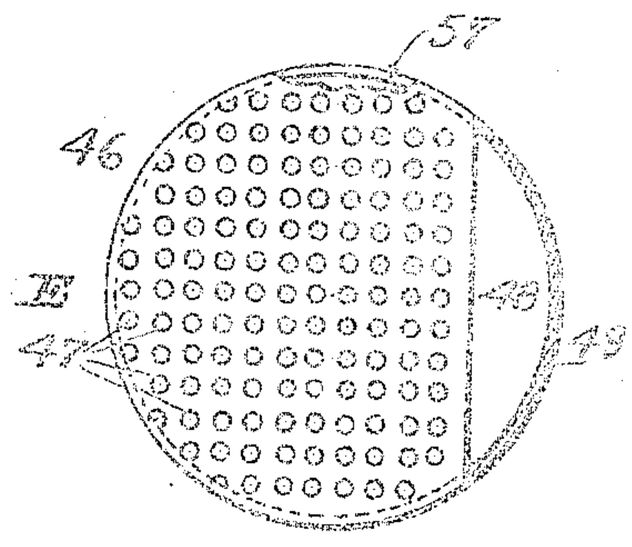


FIG. 8.



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UNITED STATES PATENT OFFICE.

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AUXILIARY MIXER FOR INTERNAL-COMBUSTION MOTORS.

959,950. Specification of Letters Patent. Patented May 31, 1910.

Application filed December 29, 1909. Serial No. 535,467.

To all whom it may concern:

Be it known that I, ROBERT D. LOOSE, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Auxiliary Mixers for Internal-Combustion Motors; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheets of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has general reference to improvements in auxiliary mixers for internal combustion motors; and it consists, essentially, in the novel and peculiar combination of parts and details of construction, as hereinafter first fully set forth and described, and then pointed out in the claims.

In the drawings, Figure 1 is a side-elevation of this auxiliary mixer. Fig. 2 is a front-elevation of the same. Fig. 3 is a sectional elevation on line *x x* of Fig. 4. Fig. 4 is a plan, and Fig. 5 is a plan of one of the baffle-plates. Figs. 6 and 7 are sectional elevations of the mixer, and Fig. 8 is a plan, partly in section of one of the baffle-plates of modified construction.

Like parts are indicated by corresponding characters and symbols of reference in all the various figures.

The object of this invention is the production of an efficient, serviceable, and durable means for producing in internal combustion motors a thorough mixture of the gaseous fuel and the oxygen necessary for perfect combustion. This auxiliary mixer is to be located in the intake pipe of the motor, between the carbureter and the motor cylinder or cylinders, preferably as near as possible to the cylinder or cylinders. It is a well-recognized fact that nearly all, if not all carbureters used in this class of engines, while functioning reasonably perfect at certain speeds, fail at other, and especially the higher, speeds, to operate perfectly, owing, principally, to the imperfect intermingling of the charges drawn into the motor cylinders, and frequently to the incorrect proportions of the constituents of the charges. To avoid these drawbacks, I construct this auxiliary mixer substantially as follows:

A in the drawings designates the casing of my auxiliary mixer. It comprises a cylindrical shell 12, of a sufficient diameter to contain approximately three times the area of that of the intake pipe of an internal combustion motor. This shell has at its lower end a bottom-member 13, within which the lower end of said shell is properly secured, said bottom-member 13 having an internal passage 14, flaring outwardly toward the shell, as shown at 15, Figs. 3, 6, and 7, and it has a sidewise-projecting boss 16, which is internally screw-threaded to receive a valve-casing B, comprising an externally screw-threaded shell having on its outer end a flange 17, the outer periphery of which is knurled for convenience in inserting said casing B into the screw-threaded bore of said boss 16. Within this casing B there is a valve 18, the stem 19 of which passes through the outer wall of the casing B, and it has on its outer end a knurled nut 20, and in front of this nut 20 a lock-nut 21, to prevent the nut 20 from unscrewing. The nut 20 has a shoulder 22, to receive one end of a helical spring 23, interposed between the face of the casing B and said nut 20, to cause the valve 18 to be normally seated upon its seat 24 at the inner end of the casing B. Through the front wall of this casing there are provided a series of openings 25, through which air is admitted to the chamber 26, by pushing the valve 18 inwardly by pressing upon the nut-lock 21 which in this case also serves as a button or knob.

The lower end of the bottom-member 13 has lugs or flanges 27, by means of which the auxiliary mixer is adapted to be secured to corresponding flanges on the carbureter or the intake pipe, or this end of the device may be screw-threaded as shown in Figs. 6 and 7 at 54, to receive a union-nut (not shown) should the carbureter be provided with a union connection instead of flanges, as is frequently the case.

C designates the upper member of the casing 12. It is suitably fastened to the upper end of the shell 12, and it has an upwardly-projecting, sidewise-located, branch 28, provided with lugs or flanges 29, or it is externally screw-threaded at 55, by means of which it is connected to the intake pipe of an internal combustion motor. This branch 28 is internally bored to receive a butterfly valve D, secured to a spindle 30, having its bearings in oppositely-located bosses 31, 32, on said branch 28. At one of the ends of this spindle 30 there is affixed

an arm 33, by means of which the valve D may be manipulated. And in order to limit the rotative movement of the valve D, there is placed upon the spindle 30 a bell-crank lever 34, one member, 35, of which is slotted and adapted to receive an adjusting-screw 36, and a clamping-screw 37, while the other, downwardly-pending member 38, of said bell-crank lever is adapted to strike an abutment 43, located upon the upper member C, on one of its sides, while the inner end of the adjusting-screw is adapted to strike the opposite side of said abutment, the extent of the movement of the butterfly-valve D being regulated by manipulating said adjusting-screw, in an obvious manner. The member 35 of said bell-crank lever is slotted so that by tightening the screw 37, the adjusting-screw 36 will be securely locked and prevented from turning.

E designates a series of baffle-plates, each of which comprises a cup-shaped body, the bottom of which has approximately one-half of its surface punched out to afford a semi-circular opening 44, said opening 44 being partly closed by wire-cloth or screening 45, thereby leaving in said bottom a semi-circular blank. These baffle-plates are secured in the shell 12 and spaced apart in such manner that the blank 46 of the baffle-plates is opposite the wire-screen 45 of the adjacent baffle-plates, whereby a tortuous passage is afforded in the shell 12 wherein the gas and air entering the chamber 26 and escaping from the branch 28 are thoroughly and intimately mixed.

It is well known that the mixture of gas and air forming the explosive gas that enters the motor cylinder or cylinders, is drawn into the same by the piston therein creating a vacuum in said cylinder. In carbureters as now used on internal combustion motors, there are generally provisions made for regulating the respective volumes of gas and air that are admitted to the motor cylinder, some of which are hand-operated and others function automatically by the suction of the motor piston. In either case experience has demonstrated that the regulation of the fluid and air-supply is defective when the motor is operated under various speeds and is especially imperfect when the motor is running at high speed. Again, when a motor is shut down by closing the fuel-supply at the carbureter, there remains in the carbureter and the intake pipe a quantity of fuel sufficient to cause the motor to turn a number of revolutions before coming to a stop, so that a quick stop is almost impossible. On the other hand, when the motor after having been stopped in the manner described is to be again started, it generally has to be "cranked" a number of revolutions to draw in a supply of explosive fuel to fill the carbureter and the intake pipe before the charge can reach the cylinder. This drawback in entirely avoided by the introduction of my auxiliary mixer and locating it near the cylinder in the intake pipe so that very little space is left above the auxiliary mixer; and to regulate the supply of explosive fuel by manipulating the butterfly-valve D to more or less throttle the suction of the motor piston, said butterfly-valve being actuated by connecting the arm 33 thereof with any suitable means within easy reach of the operator.

The explosive charges of gas and oxygen, after leaving the carbureter, are generally not thoroughly mixed, and imperfect combustion and misfires are the necessary result. By passing these charges through my auxiliary mixer where owing to the tortuous passage therein and the alternate splitting up and reuniting of the charges in passing through the wire-screens, the gas and air are thoroughly and effectively intermixed, I have entirely overcome this objectionable feature of imperfect combustion and misfiring of the charges.

When an automobile or launch engine of the internal combustion type is running at very high speed, the suction-impulses follow each other in such rapid succession as to practically cause a continuous flow of gasolene or other liquid fuel into the carbureter, whereby the quantity of carbon is disproportionate to the volume of air admitted, and imperfect charges and misfires result therefrom. To overcome this objection, I have placed in my auxiliary mixer the air-admission valve 18, by which I am enabled to regulate the supply of air by furnishing an additional supply by opening the air-admission valve by pushing upon the knob of its valve-stem, or by automatic action caused by the suction in the chamber 26, the resistance to the opening of the valve 18 being regulated by manipulating the nuts 20 and 21 to increase or decrease the tension of the spring 23, in an obvious manner; and it is a fact that I have run an automobile at all possible speeds for several hundred miles without a single misfire, or having to turn the starting-crank after stopping, more than one single turn to restart the motor, this being undoubtedly due to the fact that this motor was supplied with my improved auxiliary mixer.

I have heretofore stated that the baffle-plates E have one-half of their bottom removed and replaced by wire-screening. This construction may, however, be modified by perforating one-half of the bottom of said baffle-plates and locating the perforated portion opposite the non-perforated portion of the adjacent baffle-plates, or I may construct the baffle-plates as illustrated in Fig. 8, by puncturing a disk 46 with a series of

perforations 47, and cutting off a portion of the disk at 48, the aggregate of the area of the perforations and the cut-off portion being fully equal to the area of the intake pipe; or I may adopt any of the several modifications of the construction of said baffle-plates shown and described in the specification which I have filed September 11, 1909, Serial No. 517,291.

I have observed that in cold weather when the temperature of the atmosphere is below freezing, and an automobile stands for some time in the cold, the motor will not readily start, owing to the fact that moisture in the air which is drawn into the carbureter, the auxiliary mixer, and the intake pipe will condense upon the inner surfaces of these parts and by forming ice or snow, clog the perforations in the baffle-plates, and especially so when these plates are provided with wire-screens. This will to a great extent prevent the formation of the explosive charges and their being drawn into the motor cylinder. In order to overcome this drawback, I surround the shell 12 with a jacket 50, as shown in Figs. 6 and 7, so as to afford a space 51 between this shell and the outer jacket, and provide this jacket with an inlet 52 and an outlet 53, and connect these with the water-supply of the motor in any suitable manner. This water, being always warm, will circulate through the space 51 and keep the auxiliary mixer sufficiently heated to prevent freezing of water in the chamber 26.

In Figs. 3 and 7 I have shown the baffle-plates horizontally disposed. This construction may be varied by inclining the baffle-plates as illustrated in Fig. 6; and in order that these inclined baffle-plates may be conveniently and cheaply located in said shell, and removed therefrom, when desired, I produce a tube 49, of sufficiently smaller external diameter than the inner diameter of the shell 12, and saw into this tube a number of inclined slots 57, as indicated in Fig. 8, and locate the baffle-plates 46 in these slots and then place the tube 49 into the shell 12, as shown in Figs. 6 and 7, thereby retaining the baffle-plates in the device without any further means of fastening them, either the upper member 28 or the lower member 13 being in this case made removable from the shell 12, in any desired and effective manner.

Having thus fully described this invention, I claim as new and desire to secure to myself by Letters Patent of the United States—.

1. An auxiliary mixer adapted to be located in the intake pipe of an internal combustion motor, between the carbureter and the motor cylinder, said auxiliary mixer comprising, in combination, a shell; a bottom member on said shell; an upper member on said shell, there being means on said upper and lower members whereby said shell is adapted for attachment to the intake pipe of said motor; a series of baffle-plates in said shell and spaced a sufficient distance apart to afford a tortuous passage in said shell, and a valve in the bottom member, said valve being adapted to admit air to the interior of said shell below said baffle-plates.

2. As an improved article of manufacture, an auxiliary mixer adapted for use in the intake-pipe of an internal combustion motor, comprising an outer shell, a bottom-member on said shell, an upper member on said shell, and a series of horizontally-disposed baffle-plates located therein, said baffle-plates being closely spaced and having approximately one-half of their surface perforated, the perforated portion being opposite the non-perforated portion of the adjacent plates, whereby a tortuous, zig-zag passage is afforded in said shell, as described.

3. An auxiliary mixer adapted to be located in the intake pipe of an internal combustion motor, said mixer including a casing comprising a shell, a bottom member on said shell, an upper member on said shell, there being means on said upper and lower members for attachment to the intake pipe of said motor, a series of baffle-plates in said shell, a valve in the bottom member adapted to admit air to said shell below said baffle-plates, and a throttle valve in the upper member above said baffle-plates, said throttle valve being provided with means for limiting its rotative movement.

4. An auxiliary mixer for internal combustion motors, including, in combination, a casing, said casing comprising a shell, a lower member on said shell, an upper member on said shell, means on said upper and lower members adapted to connect said casing to the intake pipe of said motor, a series of baffle-plates in said shell, and a jacket surrounding said shell and in spaced relation thereto, an inlet member, and an outlet member on said jacket adapted for connection with a heating system, as described.

5. An auxiliary mixer for internal combustion motors, including, in combination, a casing, said casing comprising a shell, a lower member on said shell, an upper member on said shell, a tubular member in said shell, said tubular member being slotted, and a series of baffle-plates in said tubular member.

6. An auxiliary mixer for internal combustion motors, including, in combination, a casing, said casing comprising a shell, a lower member on said shell, an upper member on said shell, a tubular member in said shell, said tubular member being slotted, and a series of baffle-plates removably inserted in said slots, said tubular member being removable from said shell.

7. An auxiliary mixer for internal com-

bustion motors, including, in combination, a casing, said casing comprising a shell, a lower member on said shell, an upper member on said shell, and a series of baffle-plates in said shell, there being on the lower member a radially-projecting, internally screw-threaded boss, a valve-casing removably inserted in said boss, a valve at the inner end of said valve-casing, a valve-stem to which said valve is affixed, said valve-stem passing through the outer wall of said valve-casing, there being air-admission openings in said outer wall, an adjusting nut upon said valve-stem and in screw-threaded relation thereto, a helical spring upon said valve-stem, said spring being interposed between said adjusting nut and the outer wall of said valve-casing and adapted to be tensioned by manipulating said adjusting nut.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses at Chicago, Ill. the 24th day of December, 1909.

ROBERT D. LOOSE.

Attest:

MICHAEL J. STARK,

A. G. PETERSON.