

H. W. ALLEN.
MIXING DEVICE FOR USE WITH EXPLOSION ENGINES.
APPLICATION FILED MAY 25, 1915.

1,173,157.

Patented Feb. 29, 1916.

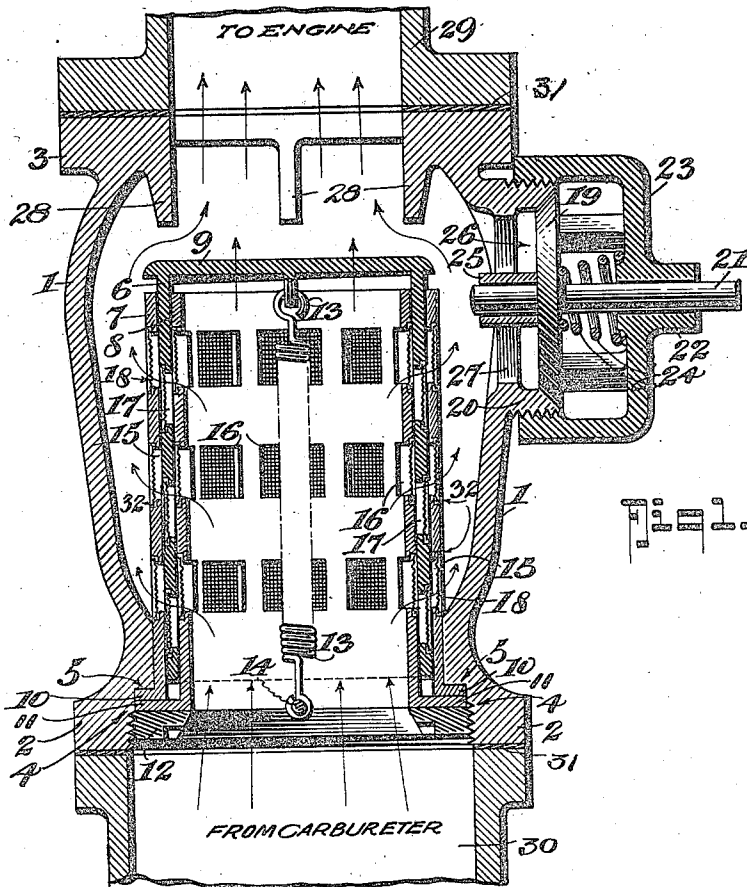


Fig. 1.

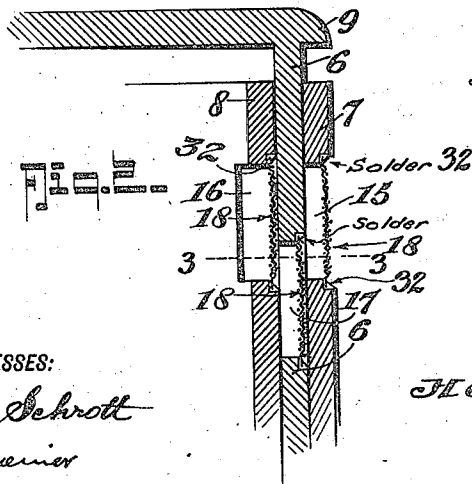


Fig. 2.

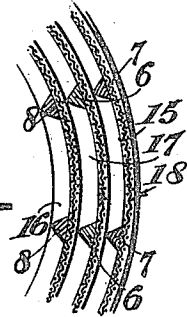


Fig. 3.

WITNESSES:

John E. Schrott
C. E. Tremier

INVENTOR

Herbert W. Allen

BY *Munn & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

HERBERT W. ALLEN, OF COALINGA, CALIFORNIA.

MIXING DEVICE FOR USE WITH EXPLOSION-ENGINES.

1,173,157.

Specification of Letters Patent.

Patented Feb. 29, 1916.

Application filed May 25, 1915. Serial No. 30,275.

To all whom it may concern:

Be it known that I, HERBERT W. ALLEN, a citizen of the United States, and a resident of Coalinga, in the county of Fresno and State of California, have invented a new and useful Improvement in Mixing Devices for Use with Explosion-Engines, of which the following is a specification.

My invention is an improvement in mixing devices for use with explosion engines, and the invention has for its object to provide a device of the character in question adapted to be arranged between the engine and the carbureter, and having mechanism for thoroughly mixing the several elements of the explosive charge to make a homogeneous mixture, and wherein controlling mechanism is provided controlled by the action of the engine for regulating the amount of the charge of fuel admitted.

In the drawings: Figure 1 is a longitudinal section of the improved device, Fig. 2 is an enlarged detail section of the screen construction, and Fig. 3 is a section on the line 3—3 of Fig. 2.

The present embodiment of the invention comprises a casing 1 of circular cross section and provided at each end with an external marginal rib or flange 2 and 3, respectively. The ends of the casing are open, and at the end adjacent to the rib 3 the casing is provided with a lateral relief port to be later described.

The lower end of the casing, that is, the end adjacent to the rib 2 of the casing is cylindrical for a short distance and outside of the cylindrical portion the casing is counterbored as indicated at 4 to form an annular shoulder 5, and the counterbored portion is internally threaded as shown. Between the cylindrical portion of the bore and the end adjacent to the rib 3 the casing is enlarged internally for a purpose to be presently described.

A series of sleeves 6, 7 and 8 is arranged within the casing, the sleeves 7 and 8 being on the outer and inner sides of the sleeve 6. The sleeves are concentric and are arranged coaxial with the casing, and the sleeve 6 has its upper end closed as indicated at 9. Each sleeve 7 and 8 is provided at its lower end with an outwardly extending lateral flange 10 and 11, respectively, and the sleeve 7 is of an external diameter to fit within the cylindrical portion of the bore of the casing. The flange 10 of this sleeve is of an external diameter to fit the counter-

bored portion of the bore of the casing, and the flange 10 abuts against the shoulder 5, as shown.

The flange 11 of the sleeve 8 is of sufficient width to abut at its periphery against the internal surface of the counterbored portion of the casing, and the inner face of the said flange abuts against or laps upon the outer face of the flange 10. These sleeves 6, 7 and 8 are held in place in the casing by means of an externally threaded ring 12, the said ring being engaged with the threads of the counterbored portion of the casing, and the ring clamps the flanges 10 and 11 of the sleeves 7 and 8 against the shoulder 5 of the casing. Thus the sleeves 7 and 8 are held immovable in the casing, but the sleeve 6 is movable with respect to the sleeves 7 and 8 and longitudinally of the casing.

A coil spring 13 is arranged within the sleeves, between the closed end 9 of the sleeve 6, and a bridge 14 extending transversely of the counterbored end of the casing, and the spring normally acts to draw the sleeve 6 toward the ring 12. The spring is connected at one end at the center of the closed end of the sleeve, and the movement of the sleeve 6 toward the ring 12 is limited by the engagement of the end thereof with the flange 11 of the sleeve 8.

The sleeve 7 has annular series of radial ports or openings 15, three series being provided in the present instance, and the sleeve 8 has similar openings 16, the said openings 16 being arranged similar to the openings 15 and corresponding in number to the number of the openings 15, and the sleeves are so arranged with respect to each other that the openings 15 of the sleeve 7 will register with the openings 16 of the sleeve 8. The sleeve 6 is also provided with ports or openings 17 corresponding in number to the number of the ports 15 or 16, and similarly arranged. The arrangement is such that when the sleeve 6 is in a certain predetermined position with respect to the sleeves 7 and 8, the ports 17 of the said sleeve will register with the ports 15 and 16 of the sleeves 7 and 8.

Each port of each sleeve is covered by a screen 18 of suitable mesh, and arranged in such manner that the screen will not interfere with the sliding movement of the sleeve 6. That is, each screen is so arranged that the outer face thereof will be flush or within the peripheral surface of the sleeve to which it is connected. The

screens may be set in any desired position, provided that they are within the surface of the sleeve to which they pertain.

The spring 13 normally holds the sleeve 6 in its lowermost position, that is, in such position that all of the ports 17 are out of register with the registering ports 15 and 16. When the sleeve 6 is moved upward or toward the end of the casing having the rib 3 the ports 17 will gradually come into register with the ports 15 and 16 until finally all of the ports 17 will be in complete register with all of the ports 15 or 16. The enlargement of the bore of the casing 1 between the cylindrical portion and the end adjacent to the rib 3 spaces the inner surface of the said casing apart from the outer surface of the sleeve 7, so that the ports 15, 16 and 17 are freely open.

The improved device is adapted to be arranged between the carbureter and the cylinder of the engine or motor in the connection between the carbureter and the motor, and in such manner that the mixture passing from the carbureter to the motor must pass through the casing 1. The end at the rib 3 is adjacent to the cylinder of the engine, while the end at the rib 2 is adjacent to the carbureter. Thus the mixture enters at the ring 12 and leaves the casing 1 at the opposite end.

The valve 19 at the port 26 before mentioned, is a relief valve, and the said valve is tapering as shown, and fits against the similarly shaped outer end of a nipple 20 at the port 26. The valve is secured to a stem 21, which is arranged to slide in a bearing 22 in a spider 23, which is connected with the nipple, the spider having a threaded ring threaded on to the nipple, and a coil spring 24 is arranged between the bearing 21 and the valve, and acts normally to press the valve into closed position. The stem 21 is further guided by a bearing 25, held coaxial with the bearing 22, by a spider 27. This bearing 25 is at the opening or port 26.

In operation when the engine is in motion, a partial vacuum will be created in the casing 1 when the engine is on that stroke which will draw in the charge. This partial vacuum will cause the sleeve 6 to move toward the engine against the resistance of the spring 13, and the movement of the sleeve will cause the ports 17 to partially register with the registering ports 15 and 16. The greater the pressure, that is, the stronger the suction in the casing 1, the farther the sleeve 6 will be moved, and the more nearly the ports 17 will be brought into register with the ports 15 and 16. The air and fuel pass through the screens of the several ports, and thus the charge is thoroughly broken and intimately mixed. As soon as the pressure tending to open the

sleeve 6 relaxes the spring 13 will return the sleeve to original position. In case of back firing, the relief valve 19 will open to prevent injury to the parts. Such back firing would tend to close the sleeve 6 and to open the valve 19. The tension of the spring 24 may be varied to suit conditions. The sleeve 6 is in fact a valve opened by the suction and closed by the spring. The sleeves 7 and 8 are cooperating elements for guiding the sleeve or valve. Thus the mixture before it reaches the engine is thoroughly broken up and intimately mixed entering the cylinder of the engine as a homogeneous mixture, every part being uniform. The coil spring 13 normally presses the valve sleeve 6 toward the carbureter, and stops 28 are provided for limiting the movement of the valve sleeve toward the engine. These stops extend inwardly from the end of the casing 1 adjacent to the engine, in such position that their inner ends will engage the closed end of the sleeve when the sleeve is at the end of its movement toward the engine. At this time the ports 17 are in complete register with the ports 15 and 16. That end of the casing adjacent to the rib 3 is adapted to be connected with the pipe 29 leading to the engine, or forming a part thereof and the opposite end of the casing is intended for connection with the pipe 30 leading to the carbureter. Packing rings or gaskets 31 are arranged between the pipes or connections 29 and 30 and the casing. It will be seen from an inspection of Figs. 2 and 3 that the screens 18 are held in place in the openings by solder 32, the said solder being arranged to form a species of frame complete encircling each screen and connecting the screen to the wall of the port or passage in which it is arranged. It will be noted from an inspection of Fig. 3 that those portions of the sleeves 6, 7 and 8 between the openings 15, 16 and 17, that is, the bridges, are beveled inwardly. That is, these portions are triangular in cross section and have their apices inward. This arrangement is for the purpose of permitting a full opening of the ports at all positions.

I claim:—

1. A device of the character specified, comprising a casing having open ends and being internally enlarged intermediate its ends, said casing being counterbored at one end and having an annular shoulder between the counterbored portion and the interior of the casing, a pair of concentric sleeves arranged within the casing at the said counterbored end, said sleeves being spaced apart from each other, and each having an outwardly extending flange fitting the counterbored portion of the casing, a holding ring threaded into the said counterbored portion and clamping the flanges against the shoulder.

der, a third sleeve arranged between the pair and having its inner end closed, the first-named sleeves having annular series of registering ports or openings, and the last-named sleeve having ports or openings adapted to register with the first-named ports when said last-named sleeve is moved away from the counterbored end of the casing, a spring arranged between the said sleeve and the counterbored end of the casing and normally holding the ports of the said last-named sleeve out of register with the ports of the other sleeves, said casing being adapted to be arranged between an engine and its carbureter and with the counterbored end adjacent to the carbureter, a screen for each port of each sleeve, said casing having a relief port near the opposite end from the counterbored portion, and a spring controlled valve normally closing the said port.

2. A device of the character specified, comprising an approximately cylindrical casing adapted to be arranged between an explosion engine and a carbureter for conducting the charge from the carbureter to the engine, a pair of sleeves arranged within the casing and detachably connected to the casing at the end adjacent to the carbureter, the casing being spaced apart from the sleeves beyond the said end, and the said sleeves being spaced apart from each other and having annular series of ports, the ports of one sleeve registering with the ports of the other sleeve, a valve sleeve mounted to slide between the sleeves and having its inner end closed, means at the end of the casing adjacent to the engine for limiting the movement of the said sleeve toward the engine, the valve sleeve having annular series of ports adapted to register with the ports of the first-named sleeves when the last-named sleeve is at the end of its movement toward the engine and to be out of register with the ports when the said last-named sleeve is at the other end of its movement, a spring pressing the last-named sleeve toward the carbureter, said casing having a relief port, and a spring controlled valve for the port.

3. A device of the character specified, comprising a casing having open ends and adapted to be arranged between an explosion engine and a carbureter for conducting the charge from the carbureter to the engine, a pair of guide sleeves detachably connected with the casing at the end adjacent to the carbureter, the guide sleeves being spaced apart from each other, a valve sleeve slidable between the guide sleeves, and having its inner end closed, a spring normally pressing the valve sleeve toward the carbureter, and a stop for limiting the

movement of the valve sleeve toward the engine, said guide sleeves having registering ports and the valve sleeve having ports adapted to register therewith when at the end of its movement toward the engine and to be out of register therewith when at the end of its movement toward the carbureter.

4. A device of the character specified, comprising a casing having open ends and adapted to be arranged between an explosion engine and its carbureter, a guide sleeve connected to the casing at the end adjacent to the carbureter, a valve sleeve slidable on the guide sleeve and having its inner end closed, stops for limiting the movement of the valve sleeve toward the engine, a spring pressing the said sleeve in the opposite direction, said sleeves having ports adapted to register when the valve sleeve is at the end of its movement toward the engine and to be out of register when the valve sleeve is at the end of its movement toward the carbureter, screens at the ports, said casing having a relief port, and a spring controlled valve for the port.

5. A device of the character specified, comprising a casing having open ends and adapted to be arranged between an explosion engine and its carbureter, a guide sleeve connected to the casing at the end adjacent to the carbureter, a valve sleeve slidable on the guide sleeve and having its inner end closed, stops for limiting the movement of the valve sleeve toward the engine, a spring pressing the said sleeve in the opposite direction, said sleeves having ports adapted to register when the valve sleeve is at the end of its movement toward the engine and to be out of register when the valve seat is at the end of its movement toward the carbureter, and screens at the ports.

6. A device of the character specified, comprising a casing having open ends and adapted to be arranged between an explosion engine and its carbureter, a guide sleeve connected to the casing at the end adjacent to the carbureter, a valve sleeve slidable on the guide sleeve and having its inner end closed, stops for limiting the movement of the valve sleeve toward the engine, a spring pressing the said sleeve in the opposite direction, said sleeves having ports adapted to register when the valve sleeve is at the end of its movement toward the engine and to be out of register when the valve seat is at the end of its movement toward the carbureter.

HERBERT W. ALLEN.

Witnesses:

G. W. LEYDER,
W. G. STUBBS.