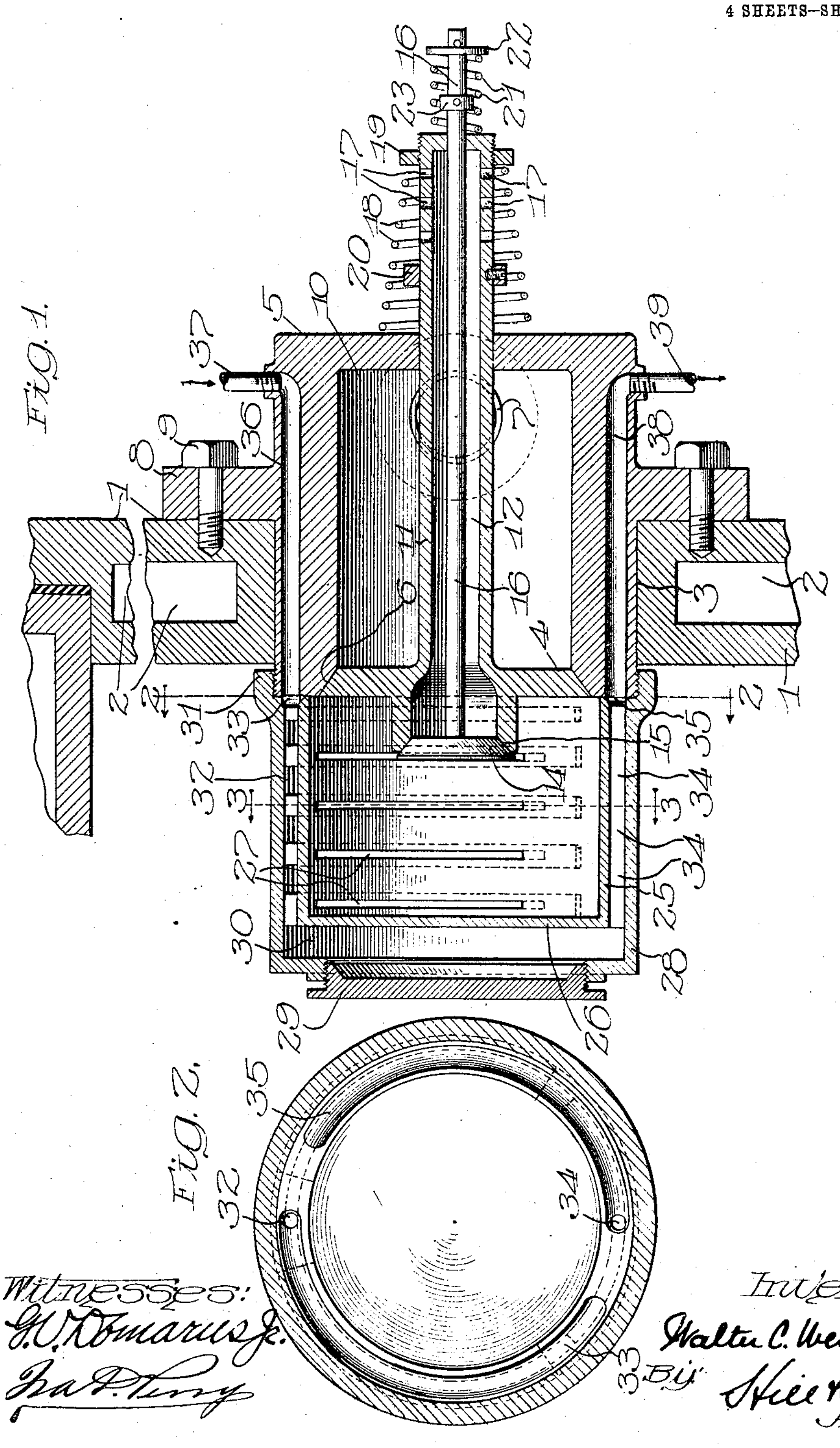
W. C. WESTAWAY.

MIXING DEVICE FOR INTERNAL COMBUSTION ENGINES OR THE LIKE.

APPLICATION FILED OCT. 27, 1911.

1,031,755. Patented July 9, 1912.

4 SHEETS—SHEET 1.



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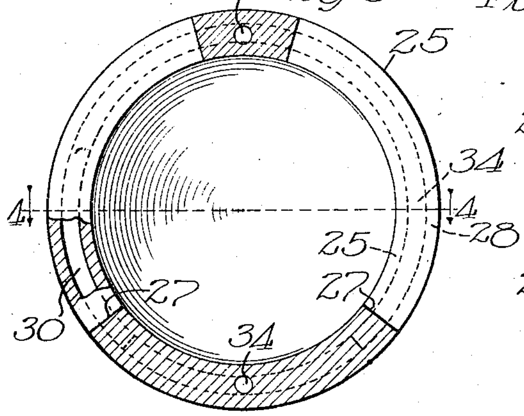

Fig. 3.

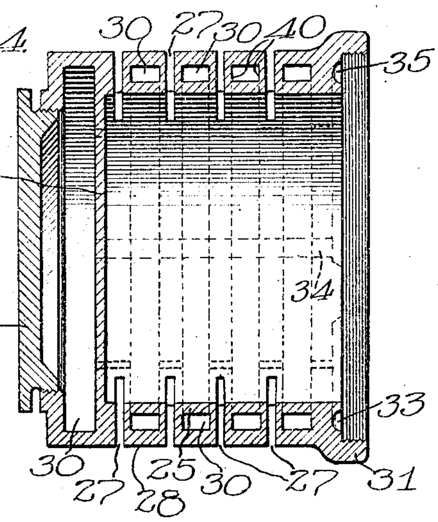

Fig. 4.

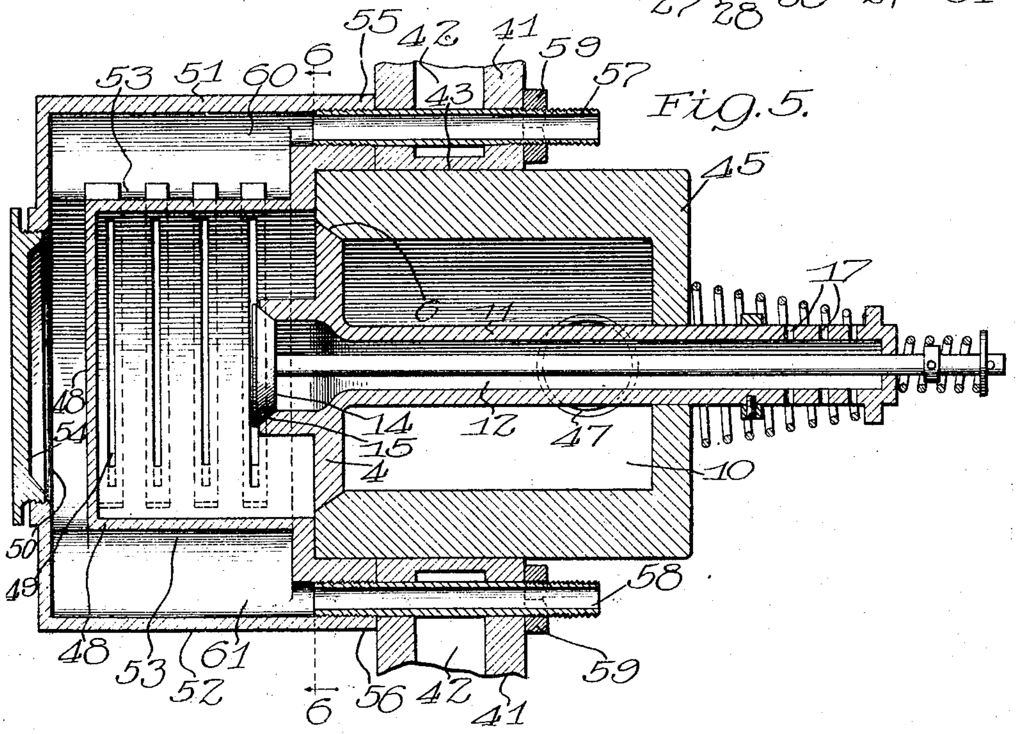

Fig. 5.

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4 SHEETS—SHEET 3.

Fig. 6.

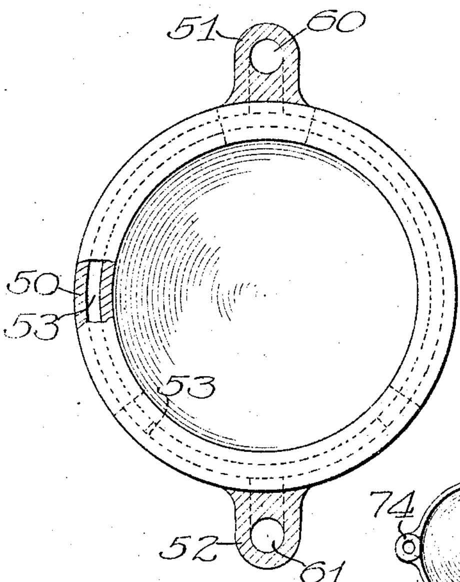
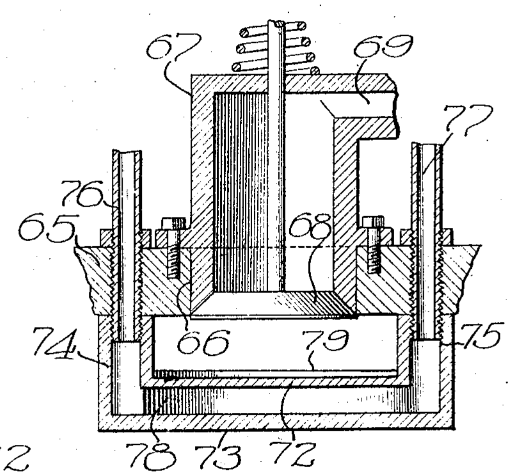


Fig. 7.



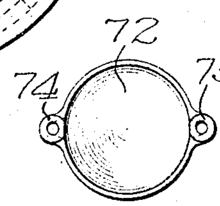
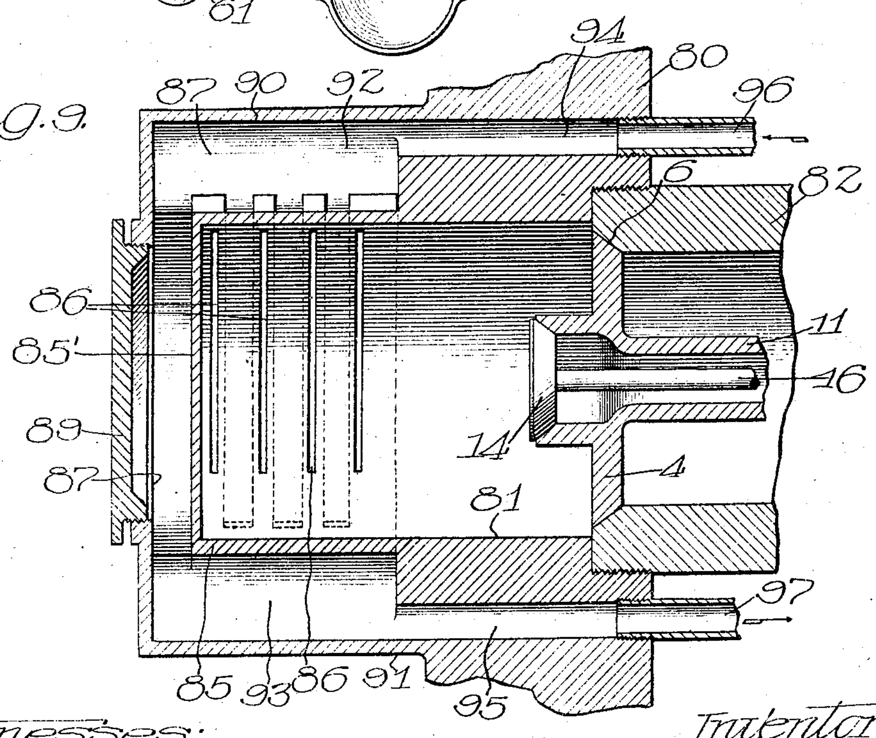


Fig. 8.

Fig. 9.



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4 SHEETS—SHEET 4.

Fig. 10.

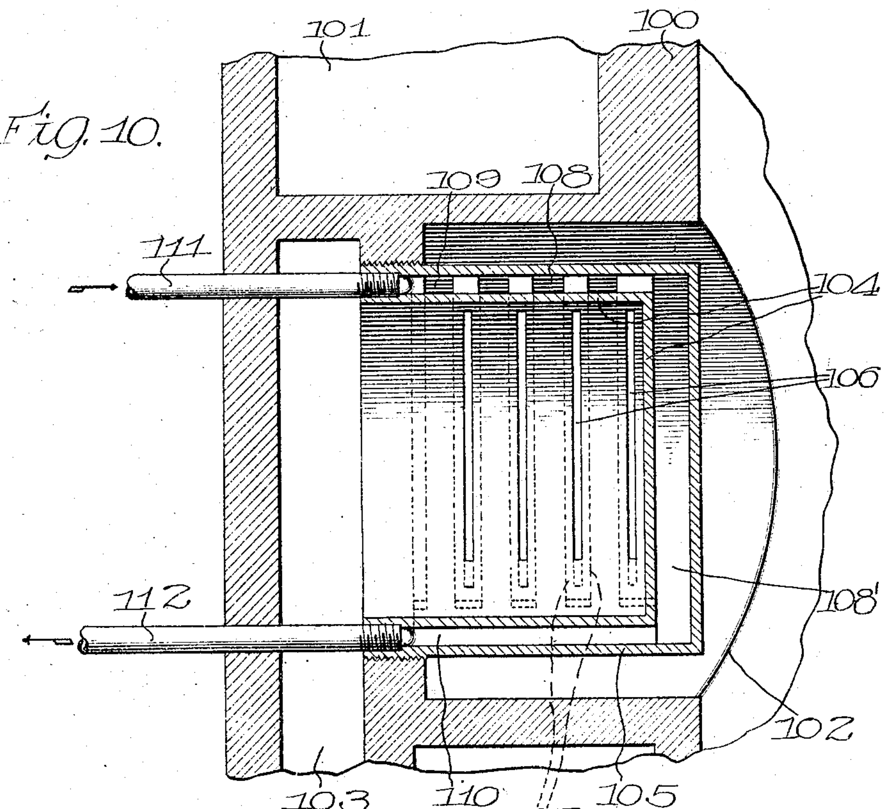
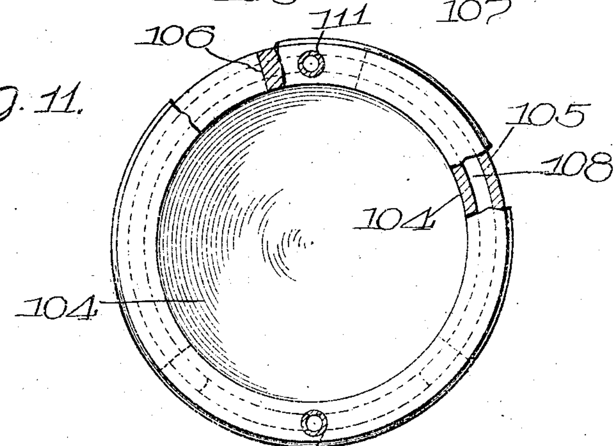


Fig. 11.



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UNITED STATES PATENT OFFICE.

WALTER C. WESTAWAY, OF BELVIDERE, ILLINOIS.

MIXING DEVICE FOR INTERNAL-COMBUSTION ENGINES OR THE LIKE.

1,031,755. Specification of Letters Patent. Patented July 9, 1912.

Application filed October 27, 1911. Serial No. 657,089.

To all whom it may concern:

Be it known that I, WALTER C. WESTAWAY, a citizen of the United States, residing at Belvidere, in the county of Boone and State of Illinois, have invented certain new and useful Improvements in Mixing Devices for Internal-Combustion Engines or the Like, of which the following is a description.

My invention belongs to that general class of devices known as mixers for internal combustion engines or the like, and relates particularly to an improved fluid cooled mixing device, adapted to be arranged within the cylinder, preferably at the intake port, for mixing or co-mingling the charge as it enters, or just after it has entered the engine cylinder.

The device has among its objects the production of a simple, durable, efficient and satisfactory device of the kind described for use wherever found applicable.

The present invention is in the nature of an improvement over that shown and described in my pending application, Serial No. 636,316, filed June 30, 1911.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts, Figure 1 is a sectional view of a portion of an engine cylinder head or wall, provided with my mixing device. Fig. 2 is a cross sectional view taken substantially on line 2, 2 of Fig. 1. Fig. 3 is a sectional view taken substantially on line 3, 3 of Fig. 1. Fig. 4 is a sectional view taken substantially on line 4, 4 of Fig 3. Fig. 5 is a sectional view similar to Fig. 1 of another form of my device. Fig. 6 is a sectional view of the same taken substantially on line 6, 6 of Fig. 5. Fig. 7 is a sectional view of a simplified form of my device. Fig. 8 is a plan view of the same removed from the cylinder wall or head. Fig. 9 is a sectional view of another form of my device, in which the cylinder wall or head and mixer are formed integrally. Fig. 10 is a sectional view of another form of my device, showing the application of the same to what is known as a two-cycle engine, and Fig. 11 is an end elevation of the same, a portion broken away to show the construction.

Referring particularly to Figs. 1 to 4, in which one form of my device is shown, 1 represents the cylinder head or wall, which may be provided with the usual water jacket space 2, if desired. The charge is admitted to the interior of the cylinder through the intake port 3, suitable valve mechanism being provided, that shown being similar to that described in my pending application above mentioned. This valve mechanism comprises a valve casing 5 provided with a suitable inlet 7, the casing being secured to the cylinder head or wall by bolts 9 extended through the flange 8, or in an equivalent manner. The casing 5 may be extended within the cylinder any desired distance. As shown, it extends slightly beyond the interior face of the cylinder head. The casing 5 is provided with a valve seat 6 for the intake valve 4, the valve being provided with a stem 11 extending without the casing. The valve is normally maintained on its seat by a resilient member 18, arranged between the collar 19 and the casing 5, 20 being an adjustable stop for limiting the travel of the valve. Where it is desired to admit air to the interior of the cylinder simultaneously with the admission of the charge, I form the stem 11 hollow, or with a chamber 12 therein, and extend the valve 4 to form a valve seat 15 for an auxiliary valve 14. The auxiliary valve 14 is provided with a stem 16, which extends without the valve stem 11, the auxiliary valve being normally maintained upon its seat by a resilient member or spring 21 arranged between the collar 22 and the end of the stem 11. If desired, an adjustable stop or limiting member 23 for the auxiliary valve may be arranged on the stem. The stem 11 is provided with one or more openings 17 therethrough, to form air inlets, so that as the charge of combustible is drawn through the inlet 7 and through the chamber 10, past the valve 4, a charge of air or other suitable fluid is drawn through the openings 17, through the chamber 12 and stem 11, past the auxiliary valve 14, the charge of combustible and air being mixed or co-mingled upon entering the cylinder. It may be men-

tioned, and I wish it clearly understood, that the auxiliary valve arrangement described may be omitted, and is shown omitted in one of the figures of the drawing, the same being clearly a more efficient construction. The mixer, which is arranged within the cylinder, comprises a shell 25 provided with a plurality of slots 27 therethrough, the shell 25 being surrounded by an outer shell or casing 28. In the construction shown, the two shells are connected together so as to form a cooling chamber about the inner shell. One end of each of the shells is closed by partitions 26 and 29. Referring particularly to Fig. 4, in which the construction is most clearly shown, the two shells are connected by partitions 40 at the slots 27, the slots extending through the outer shell. By this construction chambers 30 are formed between the slots by the two shells, and the partitions 40 and the chamber 30 between the two ends 26 and 29. The mixer is cooled by admitting a suitable cooling fluid, such as water, air or the like, to the chambers 30. It will thus be seen that the mixer is provided with fluid cooling jacket, which prevents the same from becoming overheated. The mixer and its jacket may be secured in position within the cylinder in any desired way, as shown the other shell is extended as at 31 and arranged to screw upon the extended end of the casing 5. In the form shown in these figures, the fluid is conducted to the mixer through a pipe 37, and through a duct 36 in the casing 5 to the chamber or duct 32 between the two shells, and thence passes through the chambers 30 and out through the duct 34, duct 38 and pipe 39. For convenience in positioning the mixer, the face of the two shells, which bear against the casing 5, may be provided with grooves 33 and 35, so that if in turning the mixer in place, the ducts 32 and 34 do not register with the ducts 36 and 38, the cooling fluid will be conducted to the ducts 32 and 38 through the grooves, which are most clearly illustrated in Fig. 2. Any suitable means may be employed for providing the flow or supply of cooling fluid, as for example, a pump, a gravity tank, or the like (not shown.) In the construction shown in Figs. 1 to 4, it is not necessary to extend the pipes through the cylinder head or walls, so that the device is applicable on any type of engine. The sizes of the ducts 36 and 38 may be made as desired, the size of the same depending upon whether it is desired to cool the parts as the charge passes through the valve casing 5.

In the construction shown in Fig. 5, the cooling fluid is conducted to the mixer through pipes, which extend through the cylinder wall or head instead of through the valve casing. Referring to Figs. 5 and 6, 41 represents the cylinder wall or head provided with a cooling chamber 42, if desired. Through the intake port 43 is arranged the valve casing 45, provided with an inlet 47, the valve arrangement being similar to that previously described. The mixer shown in these figures comprises an inner shell and end 48. About the inner shell is an outer shell 50 and head 54, the outer shell being also slotted to correspond with the slots in the inner shell, and the two shells integrally connected so as to form cooling chambers 53 between the slots. In this form the mixer is extended at each side, as at 51 and 52 (see Fig. 6), the extended parts being provided with ducts 60 and 61, connected with the water jacket spaces 53. The extended parts 51 and 52 are extended as at 55 and 56 (see Fig. 5) and the mixer secured in position by extending pipes 57 and 58 through the wall 41, and engaging the mixer. Nuts 59, or their equivalents, on the exterior of the cylinder maintain the mixer in position. The operation of this form of mixer is similar to that previously described, the cooling fluid being admitted through one of the pipes to the mixer and conducted away by the other pipe. If desired, the cooling fluid for the mixer may be taken from the water jacket 42, but this construction being so obvious, I have not considered it necessary to illustrate the same.

In the form shown in Figs. 7 and 8, which is a simplified construction, 65 represents the engine wall or head, 67 a valve casing for the valve 68, 66 the intake port to the engine cylinder, and 69 the inlet to the casing 67. The mixer in this case is a fluid cooled baffle plate 72, upon which the charge is directed as it enters the cylinder. The baffle or mixer is in reality two plates 72 and 73, spaced to form a chamber 78 between them, the parts being extended as at 74 and 75 substantially similar to the construction shown in Fig. 5 for securing the device in position. Pipes 76 and 77 extended through the wall 65 secure the baffle in position and conduct the cooling fluid to and from the space 78. If desired, a lip or ledge 79 may be provided about the plate 72, as illustrated in Fig. 7. This figure illustrates the simplified valve construction previously mentioned, and also the water jacket or space in the wall 65 is omitted.

Fig. 9 illustrates a cylinder head or wall and mixer formed integrally. Referring to the figure, 80 represents the cylinder head provided with an intake port 81, the charge being admitted through the intake port 81, through the casing 82, suitable valve mechanism being provided. The cylinder head is extended at 85 and 87 to form the two shells, through which are the corresponding slots 86. The two shells are provided with ends 85^1 and 89, and are integrally con-

nected together, or in an equivalent manner, about the slots, similar to the other constructions. Each side is preferably extended as at 90 on one side and at 91 on the other side, so as to form passages 92 and 93 to which a cooling fluid may be conducted to and from the mixer by the pipes 96 and 97 and ducts 94 and 95. A cross section of this form of mixer will be substantially the same as a cross section of the mixer illustrated in Fig. 5. The mixers previously described are particularly applicable for four-cycle engines, and may be modified as found necessary, for use on a two-cycle engine. In Figs. 10 and 11 I illustrate the use of a similar fluid cooling mixer on a two-cycle engine. This type of engine is so well known that a description of the same is unnecessary other than to say that 100 represents the cylinder wall, provided with a water jacket space 101, if desired, and with a combustible or charge passageway 103 to the intake port 102. At the intake port is arranged the mixer, which comprises an inner shell 104 surrounded by an outer shell 105, the two being connected so as to form a jacket, into which the cooling fluid may be introduced. The two shells are connected at 107 and slotted at 106, so that a plurality of cooling chambers 108 are formed about the slots, and a chamber 108^1 between the two ends of the shells. Fluid is admitted to cool the mixer through a pipe 111, or its equivalent, and passes through the ducts 109 between the shells to the duct 110, and thence out through a pipe 112, or its equivalent.

In any of the constructions shown, the ingoing charge is thoroughly and efficiently mixed or co-mingled before being fired. The mixer being cooled by the cooling fluid, is prevented from being heated by the firing in the cylinder, so that it does not heat enough to fire the charge. The parts being cooled, there is no tendency for back firing. As before mentioned, any style or valve mechanism, where desired, may be used, and it will be particularly noted that in all the forms illustrated in Figs. 1 to 9, the valve, valve casing, etc., are prevented from becoming overheated. In the four-cycle type of engine, the mixer is preferably arranged within the cylinder in proximity to the intake port, but in the two-cycle type of engine, owing to the construction of the engine, it is arranged within the intake port. However, in this construction of engine, it is practically the same as if in the engine cylinder.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention, hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement or combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:—

1. The combination in an internal combustion engine of mixing means arranged within the cylinder in the path of the ingoing charge, and means for cooling said mixing means.

2. The combination of an internal combustion engine, a mixer, means for securing the said mixer in the interior of the engine cylinder in proximity to the intake port, and means for cooling said mixer.

3. The combination in an internal combustion engine of a mixer, means for securing the mixer in the interior of the engine cylinder, said mixer provided with a fluid chamber therein, and means for conducting a cooling fluid to said chamber.

4. The combination in an internal combustion engine of a mixer, means for securing the mixer in the interior of the engine cylinder, proximate the intake port, said mixer provided with a fluid chamber therein, and means for conducting a cooling fluid to and from said chamber.

5. An auxiliary mixer for combustion engines, consisting of a shell provided with a plurality of openings therethrough, means for securing the same on the interior of the engine cylinder in the path of the ingoing charge, and means for cooling said mixer.

6. The combination in an internal combustion engine of a cylinder provided with an intake port, a mixer arranged at said port, means for cooling said mixer, means for controlling the admission of a charge into said mixer, and means for simultaneously controlling the admission of air to said mixer simultaneously with the admission of the charge therein.

7. The combination in an internal combustion engine of a cylinder provided with an intake port, a mixer arranged at said port provided with a cooling chamber therein, means for conducting a cooling fluid to said chamber, means for controlling the admission of a charge into said mixer, and means for simultaneously controlling the admission of air to said mixer simultaneously with the admission of the charge therein.

8. A fluid cooled mixer, and means for securing the same at the inner side of the intake port of an internal combustion engine.

9. An auxiliary mixer for combustion engines, consisting of a plurality of spaced shells, provided with a plurality of openings therethrough, said shells integrally connected about said openings.

10. A mixer for internal combustion engines, comprising a shell provided with a

plurality of slots therethrough, means for cooling said shell about said slots, and means for securing said shell to the interior of the engine in the path of the combustible.

11. A mixer for internal combustion engines, comprising a shell provided with a plurality of slots therethrough, means for cooling the exterior of said shell about said slots, means for securing said shell to the interior of the engine in the path of the combustible thereto, and means for conducting a cooling fluid to the mixer.

12. A mixer having an internal combustion engine, comprising an inner shell and an outer shell spaced therefrom, said shells each arranged with a plurality of corresponding slots and connected together about said slots to form chambers between the slots and shells, and means for conducting a fluid to said chambers.

13. The combination in an internal combustion engine of mixing means arranged at the inner side of the intake port in the path of the ingoing charge, and means for cooling said mixing means.

14. The combination in an internal combustion engine of a mixer arranged at the inner side of the intake port in the path of the ingoing charge, said mixer consisting of a plurality of spaced shells suitably connected together to form a water jacket, and means for conducting a cooling fluid to said water jacket, and means for securing said mixer in position.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

WALTER C. WESTAWAY.

Witnesses:
ROY W. HILL,
CHARLES I. COBB.