W. W. ANNABLE & J. W. FITZ GERALD.

FLUID COMPRESSOR.

APPLICATION FILED JAN. 4, 1909.

954,605. **Patented Apr. 12, 1910.**

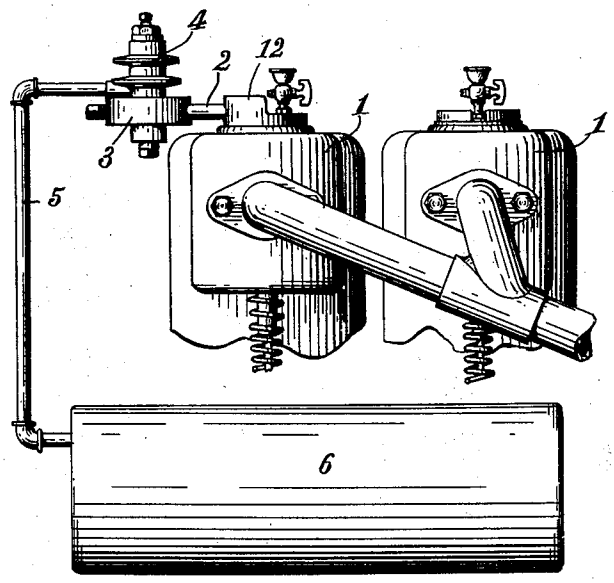

Fig. 1.

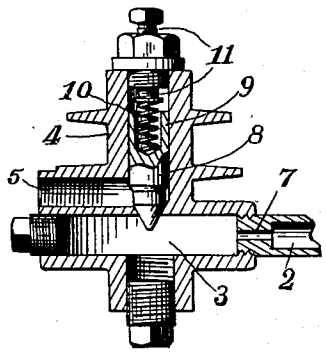

Fig. 2.

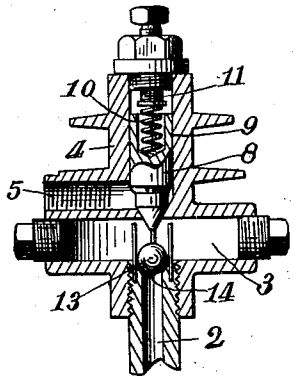

Fig. 3.

Witnesses
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UNITED STATES PATENT OFFICE.

WARREN W. ANNABLE AND JOHN WATSON FITZGERALD, OF GRAND RAPIDS, MICHIGAN.

FLUID-COMPRESSOR.

954,605. Specification of Letters Patent. Patented Apr. 12, 1910.

Application filed January 4, 1909. Serial No. 470,736.

To all whom it may concern:

Be it known that we, WARREN W. ANNABLE and JOHN WATSON FITZGERALD, citizens of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Fluid-Compressors; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in fluid compressors, and more particularly to such devices adapted to provide compressed fluid for starting internal combustion engines, inflating tires, sounding an alarm and various analogous uses.

Heretofore it has been customary to take out a portion of the products of combustion from the engine through a check valve, depending on the pressure in the engine. This pressure remains high but a very short time at each working stroke, and but little escapes through the valve. By our device the high pressure generated is retained much longer and the operation greatly expedited and improved.

Our invention consists essentially of an auxiliary combustion chamber communicating with the combustion chamber of an internal combustion engine through a restricted passage adapted to permit the passage of the compressed charge of the engine and firing of the same, and also adapted to restrict the escape of the fired charge, a check valve and pipe through which the said fired charge escapes into a reservoir to receive and retain the same, and in the combination and arrangement of parts, as hereinafter more fully described and particularly pointed out in the claims, reference being had to the accompanying drawings, in which:

Figure 1 is an elevation of a device embodying our invention; Fig. 2 an enlarged vertical section of the auxiliary chamber and adjacent parts; and, Fig. 3 a detail of a modification.

Like numbers refer to like parts in all of the figures.

1 represents the combustion chamber of any preferred form of internal combustion engine; 2 a pipe or other passage communicating therewith at one end, and preferably provided with a reduced or restricted portion 7 of only sufficient capacity to permit a small part of the engine charge and fire to pass therethrough, and so limited that when combustion occurs in the auxiliary chamber the pressure will be retained therein much longer than in the combustion chamber of the engine wherein it rapidly falls on account of the movement of the piston. We prefer inserting this pipe in an enlargement 12 of the combustion chamber, but it may communicate with the combustion chamber of the engine in any convenient manner.

3 is an auxiliary combustion chamber of relatively small dimensions as compared with the combustion chamber of the engine, and provided with an upwardly extended cylindrical valve chamber 4, in which is a valve 8 to close the communication between this valve chamber and the chamber 3. Extending from the valve chamber is a passage or pipe 5 communicating with any convenient reservoir 6 adapted to receive and retain the fluids driven from the chamber 3. The valve 8 is provided with an upwardly extended tubular portion 9, fitting loosely and slidably within the chamber 4, which portion serves to prevent free passage of the hot fluids to the spring 10, but permits leakage enough so that the valve is not balanced thereby, which spring is engaged by a screw 11 at its upper end to adjust the tension thereof. Said screw extends through a plug which closes the upper end of the valve chamber 4.

The operation of our device is as follows: The compressed charge of the engine passes through the pipe 2 and restricted passage 7 into the chamber 3 and is ignited by the combustion of the charge in the engine. The restricted passage 7, however, prevents the pressure of fluids due to combustion in the chamber 3 from rapidly escaping and following the piston of the engine. The pressure in the auxiliary combustion chamber 3 is thus separated from that in the engine and longer retained, which pressure lifts the valve 8; compresses the spring 10, and the fluids escape through the passage 5 into the reservoir 6. As the pressure in said reservoir rises, this pressure together with the spring 10 will eventually hold the valve 8 closed against the pressure in the chamber 3 and the contents thereof will then escape slowly through the restricted passage 7 and

thus either prevent the incoming of a fresh charge or will fail to add to the pressure in the reservoir. Thus in either event the reservoir pressure is automatically limited and determined by the tension placed on the spring by the screw 11. The higher this tension, the lower will be the limit of ultimate pressure in the reservoir 6. When the reservoir is thus charged with the fluids under pressure, this fluid may be used for starting the engine, inflating tires, sounding an alarm or other analogous purposes.

In some cases it is desirable to provide for free inlet of the compressed charge into the auxiliary combustion chamber. For this purpose we provide a modified construction having a check valve and restricted by-pass substantially as illustrated in Fig. 3, in which 13 represents a valve to close the end of the pipe 2 and grooves 14 in the valve seat provide a restricted by-pass whereby the ball rises and freely admits the compressed charge and the grooves operate the same as the restricted passage 7 to permit firing the charge in the chamber 3 and retain the pressure therein.

What we claim is:—

1. In combination with an internal combustion engine and a fluid reservoir, an auxiliary combustion chamber communicating with the combustion chamber of the engine by a restricted passage adapted to retain pressure in the auxiliary chamber longer than in the engine chamber, a check valve to the auxiliary chamber, and a pipe leading from the check valve to the reservoir.

2. In combination with an internal combustion engine and a fluid reservoir, an auxiliary combustion chamber communicating with the combustion chamber of the engine by a restricted passage adapted to retain pressure in said auxiliary chamber longer than the pressure in the engine chamber, a tubular extension to said auxiliary combustion chamber, a check valve between said auxiliary combustion chamber and the extension, a tubular member on said valve and loosely slidable in said extension, a spring in said member, a screw engaging said spring to adjust the same, and means for conducting fluid from said valve to the reservoir.

3. In combination with an internal combustion engine and a fluid reservoir, an auxiliary combustion chamber communicating with the combustion chamber of the engine, a passage from the auxiliary combustion chamber to the reservoir, a check valve in said passage, a check valve between the auxiliary combustion chamber and the combustion chamber of the engine, and a restricted by-pass around the last named check valve.

In testimony whereof we affix our signatures in presence of two witnesses.

WARREN W. ANNABLE.
JOHN WATSON FITZGERALD.

Witnesses:
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LUTHER V. MOULTON.