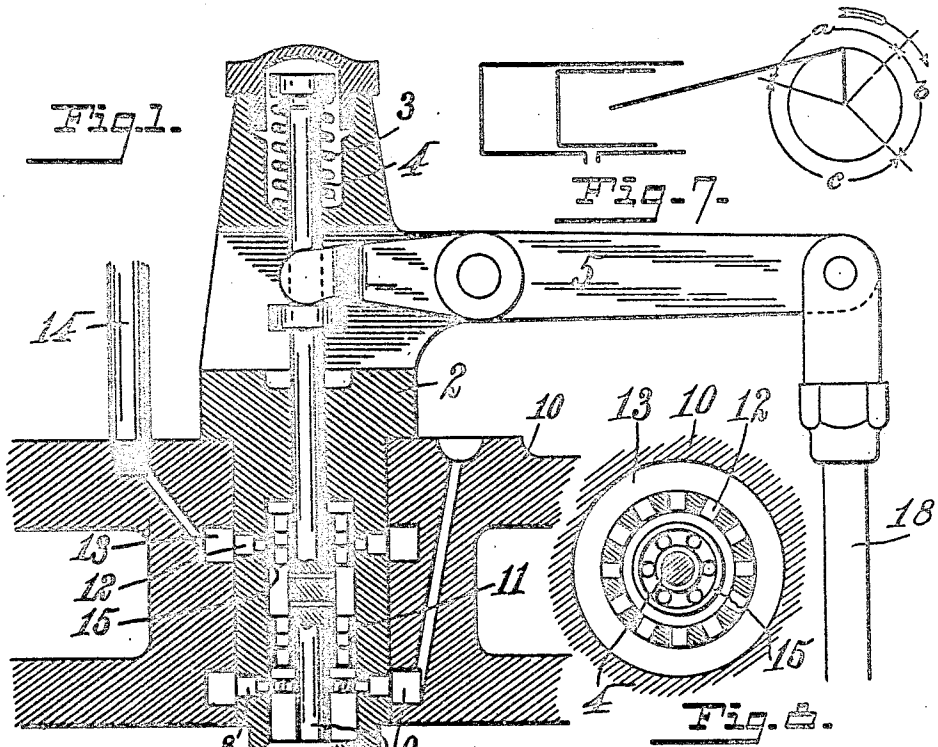
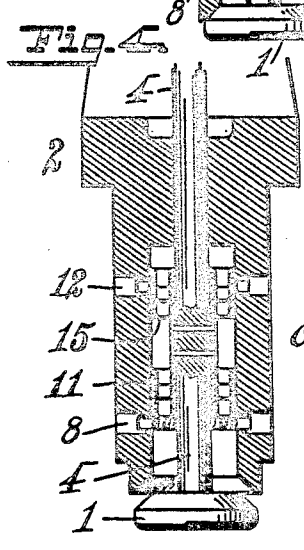
C. RORABECK.

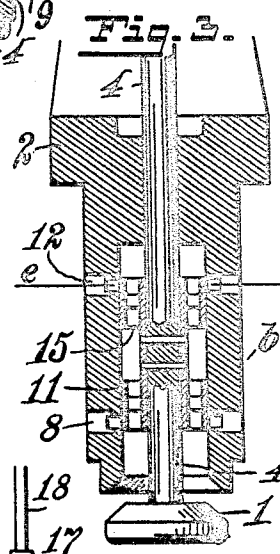
AIR STARTER AND RELIEF VALVE.

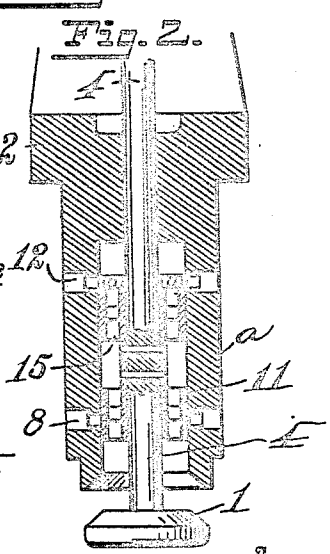
APPLICATION FILED DEC. 23, 1912.

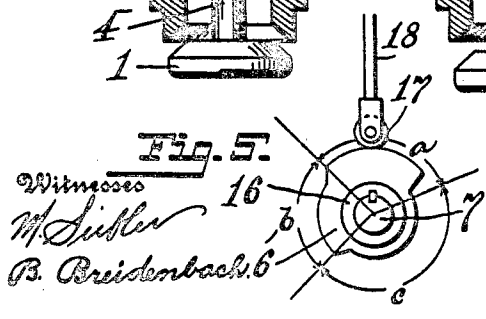
1,066,756. Patented July 8, 1913.

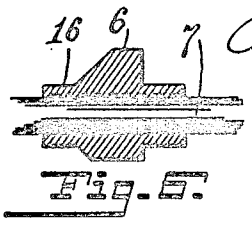












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UNITED STATES PATENT OFFICE.

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AIR-STARTER AND RELIEF VALVE.

1,066,756. Specification of Letters Patent. Patented July 8, 1913.

Application filed December 23, 1912. Serial No. 738,323.

To all whom it may concern:

Be it known that I, CLAUDE RORABECK, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Air-Starter and Relief Valves; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to an improved air starter and relief valve for oil or gas engines.

The object of the invention is to utilize the pocket space in the head of an engine cylinder to a minimum extent, and to produce a compact form of valve of the above type. In other words, to provide means for obtaining in a single valve organism the relief of compression in starting and the injection of compressed air for starting. This involves a structural organism such as is illustrated in the accompanying drawings, with more or less modifications.

Referring to said drawings, Figure 1 is a sectional view of my combined air starting and relief valve; Fig. 2 is a sectional view showing the valve opened to its full extent, thus allowing the compressed air to enter the cylinder for starting; Fig. 3 is a similar view showing the valve in a neutral position; Fig. 4 is a similar view showing the valve in a compression-relief position; Fig. 5 is a view of the cam, one of the elements through which the valve is operated; Fig. 6 is a sectional view of said cam; Fig. 7 is a diagram showing the approximate relation of the valve with the piston of the engine; Fig. 8 is a section on the line *e*—*e* of Fig. 3.

In a detailed description of the invention, similar reference characters indicate corresponding parts.

The puppet valve 1 is held to its seat in valve cage 2 by a spring 3 which surrounds the stem 4 of said valve in the upper portion of the valve housing. The said valve 1 is opened by the valve lever 5 which is timed with the cam 6 on cam shaft 7 with the engine. The relief ports 8 in the valve body or cage communicate with the relief port 9 in the cylinder head 10 and said ports are directly controlled by a piston valve 11 mounted upon the stem 4 of the valve 1. The compressed air ports 12 in the valve body or cage communicate with a compressed air port 13 in the cylinder head 10. This port 13 in turn communicates with a compressed air pipe or line 14 which extends to the source of supply. The compressed air ports 12 are controlled by a piston valve 15 which is similar to the valve 11 and, like the valve 11, is attached to the common stem 4. The relief piston valve 11 and the compressed air piston valve 15 are so placed on the valve stem 4 that they time properly with the relief ports 8 and the compressed air ports 12 and are properly timed with the valve lever 5 and the cam 6.

Fig. 2 illustrates the puppet valve 1 in a position to allow the compressed air through ports 12 to enter the engine cylinder and the timing of said valve is approximately shown at *a* in Fig. 7, and the rise of the cam 6 is shown at *a* in Fig. 5. In Fig. 3, the valve 1 is in a neutral position, as before stated, in which the air relief ports 8 are closed by the piston valve 11 and the compressed air ports 12 are closed by the piston valve 15. The timing is shown at *b* in Fig. 7 and at *b* of the cam in Fig. 5. In Fig. 4, the valve 1 is in the position of relieving the compression, which position is indicated at *c* in the diagram in Fig. 7 and on the cam at *c* in Fig. 5. The position of the valve 1 in Fig. 1 illustrates the valve closed, for example, when not in operation. The ports 8 are closed just before the ports 12 are opened. The cam 6 at point 16 is concentric with the cam shaft 7 and when said cam is shifted so that the point 16 is in line with the antifriction roller 17 of the valve connecting rod 18, the valve 1 is permitted to remain closed, as in Fig. 1. When the engine is running on its fuel, the valve 1 remains closed owing to the valve rod 18 and roller 17 being on the portion 16 of the cam 6.

Having described my invention, I claim:

1. In a valve of the type specified, the combination with the head of an engine cylinder having a relief passage and a compressed air passage therein, of a valve housing mounted in said cylinder head having ports communicating with said relief passage and compressed air passage in said cylinder head, a puppet valve controlling the admission of compressed air to the cylinder of the engine and the relief, piston valves

mounted in said valve housing and controlling the relief ports and compressed air ports thereof which communicate with the relief passage and compressed air passage in the cylinder head, said puppet valve and piston valves being mounted upon a common stem, substantially as specified.

2. In a valve of the type specified, the combination with the head of an engine cylinder having a relief passage and a compressed air inlet port, of a puppet valve controlling the admission of air to the engine cylinder, a piston valve controlling relief ports communicating with the relief passage in the cylinder head, a piston valve controlling ports communicating with the compressed air passage in the cylinder head, a common stem to which said puppet and piston valves are connected, and means comprising a cam and connecting rod suitably timed with the engine for operating said valves.

In testimony whereof I affix my signature, in presence of two witnesses.

CLAUDE RORABECK.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."