No. 745,701. PATENTED DEC. 1, 1903.

R. B. WEAVER.

COOLING DEVICE FOR EXPLOSION ENGINES.

APPLICATION FILED JULY 8, 1903.

NO MODEL.

Fig. 1.

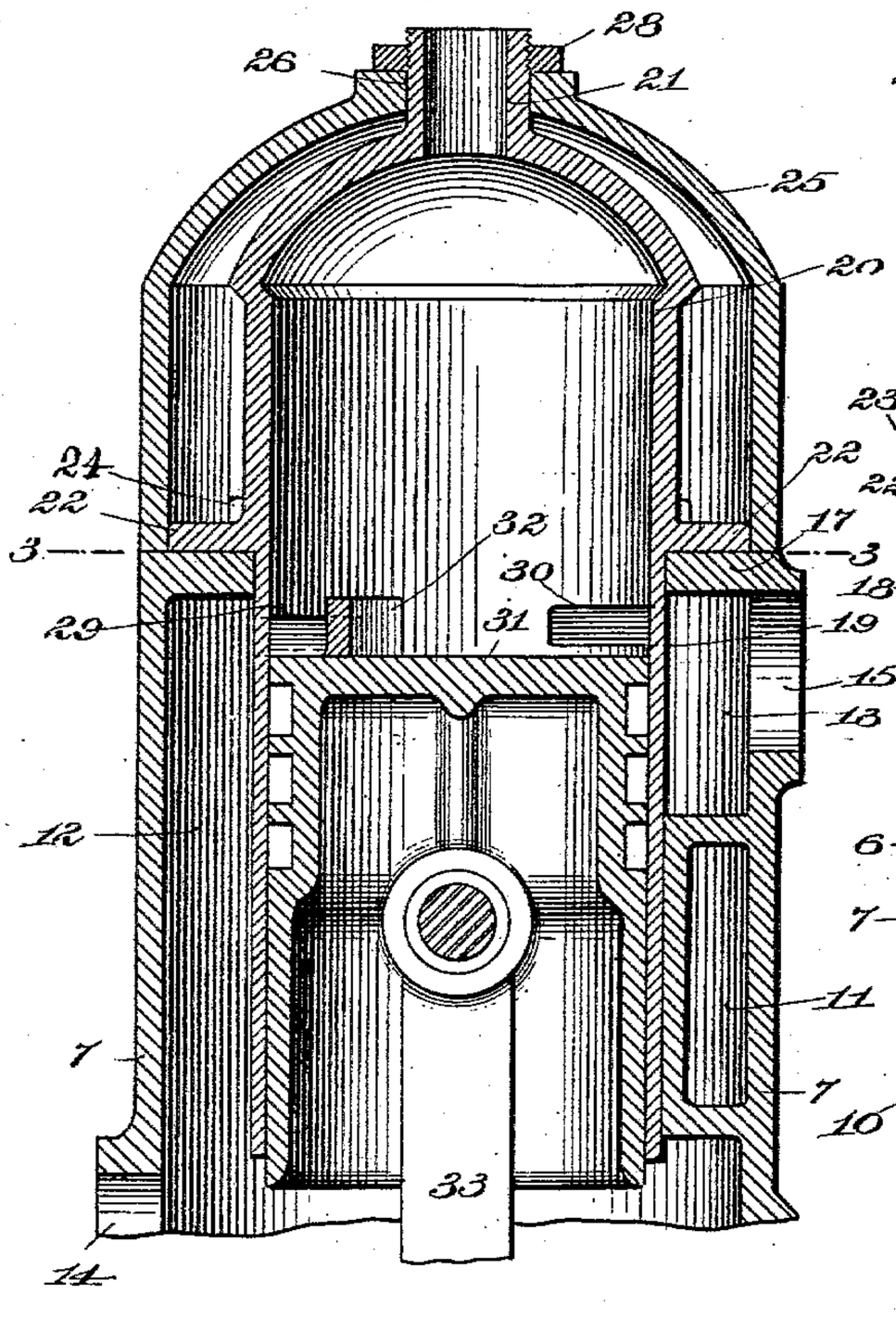
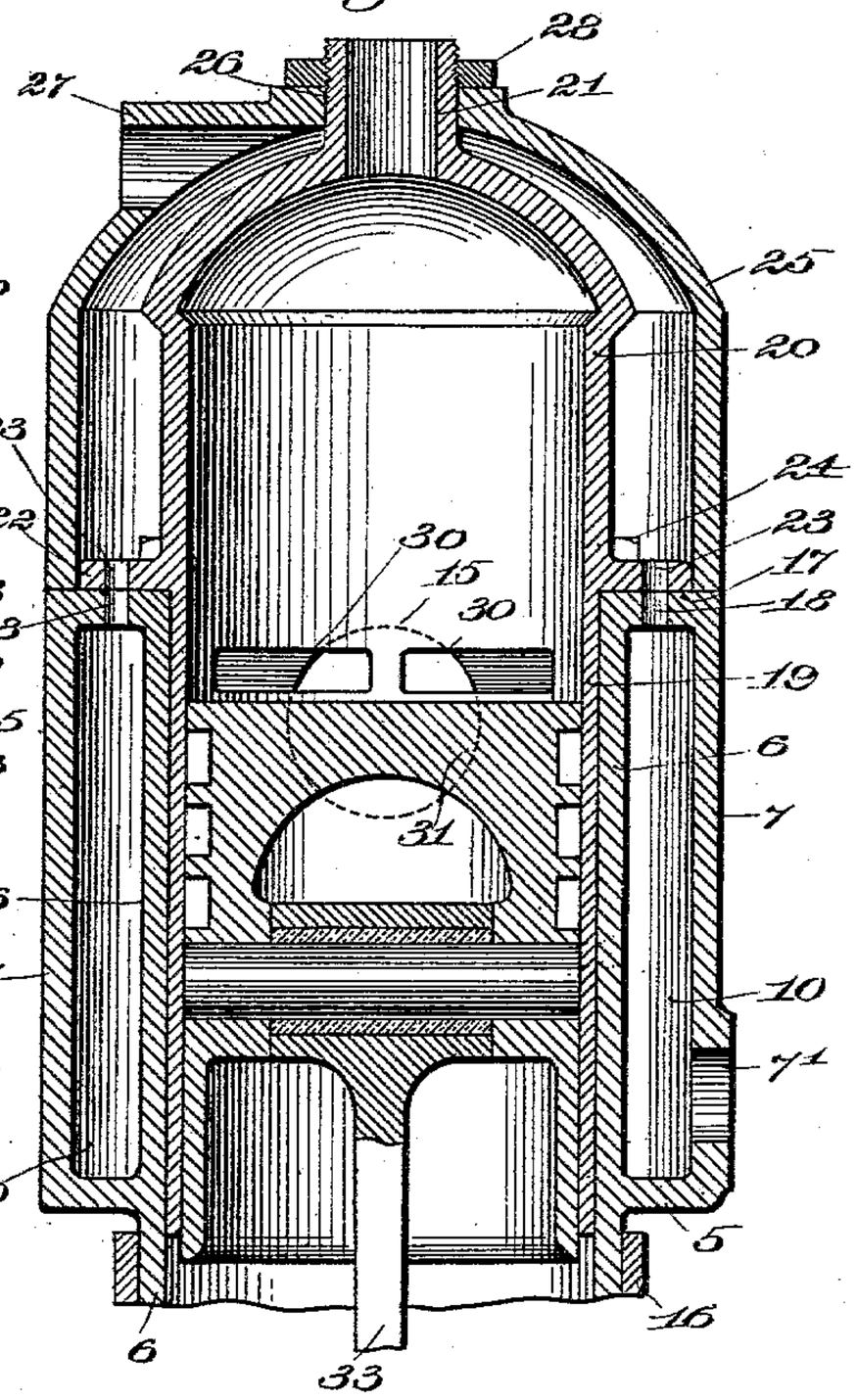


Fig. 2.



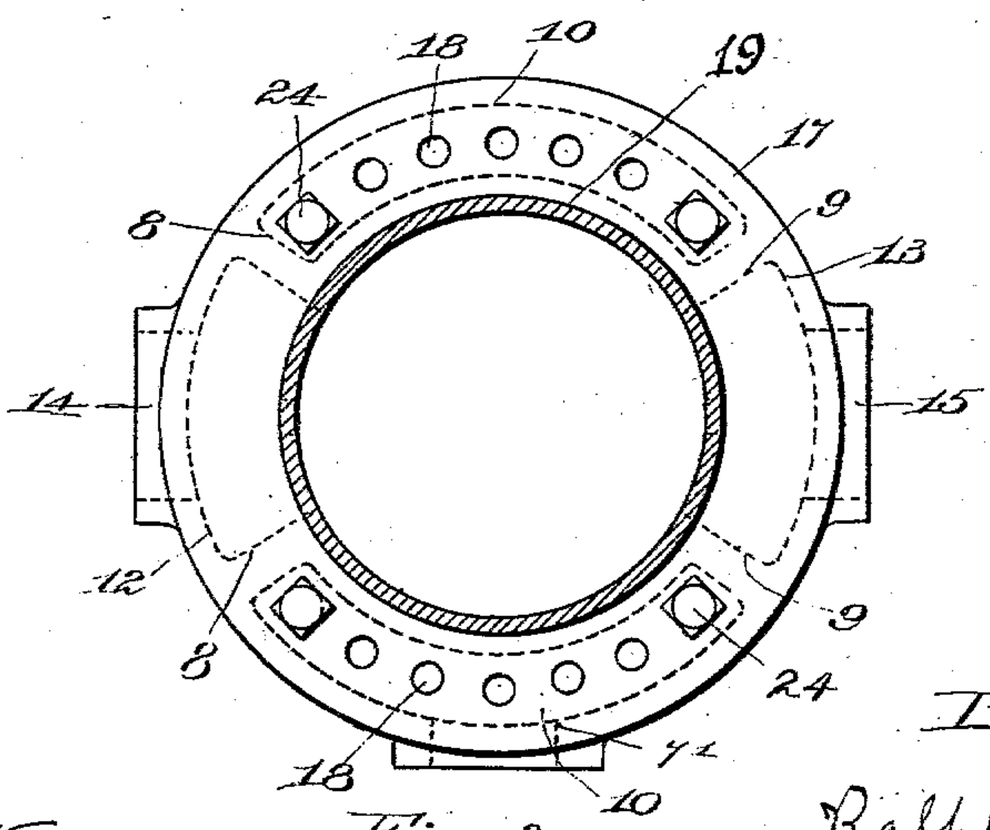


Fig. 3.

Witnesses

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No. 745,701. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

RALPH B. WEAVER, OF MILTON, MASSACHUSETTS, ASSIGNOR TO SAMUEL CABOT, OF BOSTON, MASSACHUSETTS.

COOLING DEVICE FOR EXPLOSION-ENGINES.

SPECIFICATION forming part of Letters Patent No. 745,701, dated December 1, 1903.

Application filed July 8, 1903. Serial No. 164,680. (No model.)

To all whom it may concern:

Be it known that I, RALPH B. WEAVER, of Milton, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Cooling Devices for Explosion-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention relates to improvements in engines, and particularly in cooling devices for explosion-engines.

The object of the invention is to so construct an engine that the cylinder-lining may be removed and replaced.

Another object of the invention is to so construct a gas-engine comprising a cylinder and an outer water-circulating chamber or chambers and gas supply and exhaust channels that the cylinder may be readily removed.

Another object of the invention is to improve the construction of the water-circulating-chamber, and particularly as regards the reduction in temperature of that portion below the exhaust.

Another object of the invention is to improve the general construction of engines, and particularly of gas-engines.

The invention consists in the peculiar construction of the water-jacket or water-circulating chamber.

The invention also consists in the peculiar construction of the cylinder.

The invention still further consists in such other peculiar features of construction and combination of parts as shall hereinafter be more fully described, and pointed out in the claims.

Figure 1 represents a vertical sectional view of parts of the improved engine. Fig. 2 represents a similar view taken at right angles to Fig. 1. Fig. 3 represents a cross-sectional view taken on line 3 3, Fig. 1.

Similar numbers of reference designate corresponding parts throughout.

As illustrated herein in its preferred form, the invention is shown as applied to a gas-engine of the two-cycle principle—that is, in which a charge of explosive gaseous compound is compressed at each return stroke of the piston and is then exploded, the next charge of explosive being forced into the cylinder during the working stroke of the piston and but slightly after the escape of the products of combustion from the prior charge begins. The invention is not, however, limited to this or to any other particular class of engine, and in describing the invention as applied to this class of engine it is not my intention to restrict this invention in any manner.

In the drawings, 5 indicates the lower section of the water-jacket or water-circulating chamber having the inner and outer annular walls 6 and 7, the space between which is divided by the partitions 8 8 and 9 9, Fig. 3, into the water-compartments 10 10, connected by the cross-channel 11 and the gas supply and exhaust channels 12 and 13, connecting, respectively, with the openings 14 and 15, the wall 6 being omitted between the partitions 8 8 and 9 9 to open the channels 12 and 13 directly to the central portion of the jacket, the wall 6 extending downward and being supported by any suitable crank-box or base 16 and the upper end of the compartments 10 10 and channels 12 and 13 being closed by the partition 17, through which above the compartments 10 10 are formed the openings 18 18.

Embraced by the water-jacket is the cylinder 19, having the compression-chamber 20, furnished with the tubular screw-threaded extension 21, through which the spark-plug or other igniting device is introduced. From the cylinder 19 extends the flange 22, having the perforation 23 23, adapted to register with the holes 18 in the partition 17, this flange being secured to the partition by bolts 24 24.

Inclosing the upper portion of the cylinder 19 and the compression-chamber is the dome 25, the annular edge of which fits closely against the portion 17 beyond the periphery of the flange 22, while in the upper portion of the dome is the opening 26, fitting closely the tubular extension 21, and the opening 27, adapted to be conneced with a water-pipe. The dome 25 is secured in place by the unit 28, screwed onto the screw-thread of the tubular extension 21.

The cylinder 19 is furnished with the usual gas-inlet ports 29 at that portion opposite the channel 12 and with the outlet-ports 30 at

that portion of its wall opposite the exhaust-channel 13, the ports 30 being located slightly nearer to the compression-chamber 20 than are the ports 29. Within the cylinder works the piston 31, having the usual deflector 32 and connected with any suitable driving mechanism by the piston-rod 33 in the ordinary manner for piston-driving.

With the parts thus assembled water is supplied through the opening 7′ in the lower portion of the wall 7 and passes through the compartments 10 10 and their connections 11 and cooling that portion of wall 7 beneath the exhaust-opening 15. As the temperature of the water and the supply of the same increases the water circulates upward through the holes 18 and the perforations 23, respectively, in the partition 17 and in the flange 22 and around the upper portion of the cylinder and its compression-chamber until it (the water) passes away through the outlet 27.

In the operation of the piston a charge of gaseous compound is exploded in the chamber 20, and the pressure thus created forces the piston outward from the closed end of said chamber. As the end of the piston passes the ports 30 these ports are opened to permit of the escape of the products of combustion to the exhaust-channel 13, while the ports 29 are immediately thereafter opened to the ingress of gaseous compound forced by the action of the piston from the opening 14 through the channel 12 and said ports, the deflector 32 directing this compound toward the compression-chamber and preventing its undue mixing with the products of combustion which are approximately at the same time passing out of the ports 30. On the return stroke of the plunger the new charge of explosive is compressed and ignited in the usual well-known manner.

Attention is particularly called to the facility with which the cylinder 19 and its compression-chamber can be removed by simply loosening the nuts 28 and 24 22 after taking off the dome 25. This is of great importance in gas and other engines, as by this construction a worn cylinder can readily be removed and a new cylinder substituted without skilled labor or the use of complicated tools or machinery. By this construction the water-jacket and dome may be of metal of less weight than that of the cylinder, thus effecting a large saving in the weight of the engine, as the water-jacket is usually the heaviest part of the engine, but is not required to resist any high degree of pressure.

The engine is herein shown as of the vertical type; but it is understood that the cylinder and its associated parts may be placed in a horizontal position without changing the invention and that the references to the relative locations of the parts of the engine are used herein merely to designate the preferred locations of the same.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A gas-engine comprising a cylinder having fuel inlet and outlet ports formed in its wall, and a water-jacket section removably secured to the cylinder and having supply and exhaust channels registering with said ports.

2. A gas-engine comprising a water-jacket section having inlet and exhaust channels connecting with the interior thereof and a series of water-compartments connected by a channel located beneath the exhaust-opening, and a cylinder removably secured to said jacket-section.

3. A gas-engine comprising a cylinder having a water-compartment formed between the wall of the cylinder and an outer shell, and a water-jacket section embracing the lower portion of the cylinder and having inner and outer walls independent of the cylinder-walls.

4. A gas-engine comprising a cylinder-support in the nature of a water-jacket and having a gas-inlet and an exhaust open to the interior of the support, and a cylinder removably secured in said support, the wall of the cylinder forming the inner wall of the inlet and exhaust.

5. The combination with a water-jacket section having a water-compartment furnished with a perforated end partition, a cylinder having a perforated flange secured to said partition, and a shell embracing the upper portion of the cylinder and fitting against the water-jacket section.

6. The combination with the cylinder 20 having the tubular extension 21 and the perforated flange 22, and a water-jacket section having compartments connected by channels with the perforations of such flange and a water-inlet, of the shell 25 embracing the flange 22 and having an opening, to fit over the extension 21, and the outlet 27, and means for securing the shell 25 to such extension, as and for the purpose described.

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

RALPH B. WEAVER.

Witnesses:
HENRY J. MILLER,
C. A. LISET.