O. E. BARTHEL.

EXPLOSIVE ENGINE.

APPLICATION FILED APR. 17, 1916.

1,234,855. Patented July 31, 1917.

Fig. 2

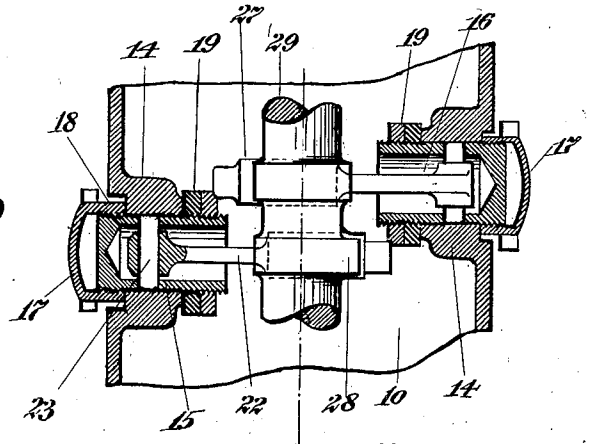


Fig. 1

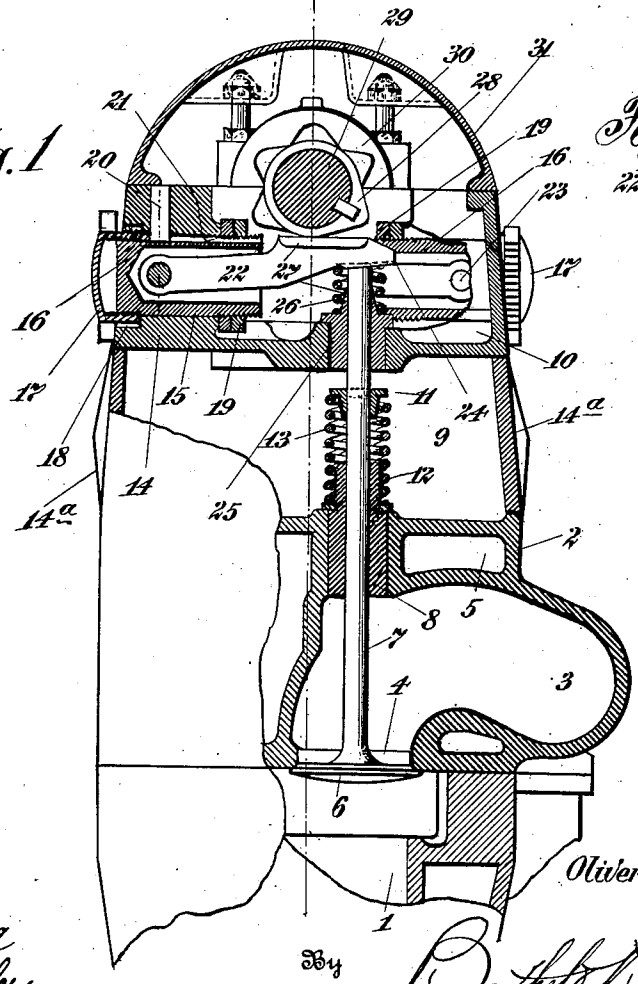
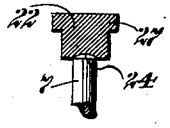


Fig. 3



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UNITED STATES PATENT OFFICE.

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EXPLOSIVE-ENGINE.

1,234,855. Specification of Letters Patent. Patented July 31, 1917.

Application filed April 17, 1916. Serial No. 91,577.

To all whom it may concern:

Be it known that I, OLIVER E. BARTHEL, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to explosive engines, and has particular reference to novel valve operating mechanism therefor.

My invention aims to furnish a multi-cylinder explosive engine with an adjustable valve operating mechanism including cam actuated fingers for operating the valves of the engine, and these fingers may be minutely adjusted during the operation of the engine.

My invention further aims to provide a valve operating mechanism for explosive engines which is positive in its operation, reliable, and of such construction that easy access can be had to the same for adjustment purposes or for maintaining the mechanism in an operative condition.

My invention will be hereinafter described and then claimed, and reference will now be had to the drawing, wherein—

Figure 1 is a vertical cross sectional view of a portion of an engine provided with valve operating mechanism in accordance with my invention,

Fig. 2 is a horizontal sectional view of a portion of the same, and

Fig. 3 is a cross sectional view of a finger.

In the drawing, 1 denotes a portion of a cylinder forming part of a multi-cylinder engine, and on the engine is a head 2 providing intake and exhaust ports for the cylinders of the engine. The head 2 has been illustrated as having a passage 3 and a port 4, both of which are surrounded by a water jacket 5. The port 4 affords a seat for a valve 6 of the puppet type and said valve has a rod 7 extending upwardly through a bushing 8, through a spring chamber 9 and into an operating compartment 10 of the head 2.

The valve rod 7 within the chamber 9, has a fixed guide member 11 coöperating with a member 12 on the bottom of the chamber in holding a coiled spring 13 encircling the valve rod, and the expansive force of this spring holds the valve rod normally elevated and the valve 6 seated or closed. Access is had to the spring chamber 9 by removing detachable side plates 14ª of the head 2.

The puppet valves are preferably arranged in staggered relation to each other on opposite sides of the central plane of the cylinder 1 and in the chamber 10 of the head 2 are staggered bosses 14 corresponding in number to the valve rods 7. Each boss has a smooth bore 15 and in the bore is an adjustable sleeve 16, said sleeve having the outer end thereof closed and both ends exteriorly screwthreaded. The outer end of the sleeve receives a cap 17 extending into an enlarged portion 18 of the bore 15, and the inner end of the sleeve receives jamb and lock nuts 19. It is by virtue of the nuts 19 and the cap 17 that the sleeve 16 may be minutely shifted longitudinally of the bore 15, and to prevent rotation of said sleeve in the bore, the boss 14 has a pin 20 extending into a longitudinal slot 21 in the sleeve 16.

Extending into the inner open end of the sleeve 16 is a finger 22 and the inner end of this finger is pivoted upon a transverse pin 23 in proximity to the closed end of the sleeve. The outer end of the finger 22 terminates in a grooved inclined or beveled seat 24 for the upper end of the valve rod 7, and encircling said valve rod, between the seat 24 and a valve rod guide 25 in the bottom of the chamber 10, is a coiled spring 26. The expansive force of this spring is adapted to hold the finger 22 elevated with a wear plate 27 thereof normally in engagement with the cam member 28 keyed or otherwise mounted upon a cam shaft 29, journaled in bearings 30 provided therefor on the head 2.

The chamber 10 is closed by a cap or cover 31 suitably connected to the head 2.

With the upper end of the valve body 7 extending into the groove in the outer end of the finger 22, said finger cannot laterally shift relative to the upper end of the valve rod, consequently when said finger is depressed by the cam 28 impinging upon the wear plate 27 of the finger 22, the beveled or inclined seat 24 is caused to ride upon the upper end of the valve rod and lower the same to open the valve 6. Since the spring 26 holds the wear plate 23 of the finger 22 normally in engagement with the cam mem-

ber 28, the spring 13 can easily elevate the valve rod 7 and hold the valve 6, thus restoring the parts to normal position.

The alternate and staggered relation of the fingers 22 relative to the cam shaft 29 is clearly shown in Fig. 2, and even while the engine is in operation, the cap or cover 31 may be removed and the cap 17 and nuts 19 of each sleeve 16 adjusted to shift the sleeve longitudinally of the boss to correctly position the finger 22 relative to its valve rod 7. The beveled or inclined seat 24 of the finger is therefore a factor in obtaining a desired movement of the valve rod 7 by a finger 22 after the finger has been properly set, and since the cap 17 and the nuts 19 can be easily removed, it is possible to bodily remove a sleeve and its finger when necessary.

In the operation of explosive engines, the valve rods are subjected to expansion and contraction, and by reason of a great heat at the valve ends of the rods and said rods being of considerable length, there is an appreciable elongation of the valve rods when the engine is placed in operation. Naturally there is a certain clearance between the valve rods and the direct actuating means thereof, and in adjusting the actuating means and valve rods prior to placing the engine in operation, provision must be made for such clearance, otherwise, the valves of the rods could not properly seat. When such a clearance is not considered, there is a loss of compression and other difficulties are encountered which render the engine anything but effective. It is therefore evident that a very fine clearance calculation must be made in order that valves may properly seat, without too great a clearance, which produces noise and considerable wear. It is furthermore evident that the best time to provide for such clearance, and ease of operation is after elongation of a valve rod, consequently I have devised a means of adjusting the actuating means of the valve rods after the engine is placed in operation. The beveled or inclined seats of the fingers not only compensate for wear of the contacting faces of the fingers and the upper ends of the valve rods, but permit of the fingers being minutely shifted whereby an accurate and exact seating of the valve can be actually accomplished. The inclination or bevel of the ends of the fingers also permits of said fingers being maintained in proper relation to a cam shaft and the upper ends of the valve rods, whereby there will be no noise or lost motion between the valve rods, the fingers or the actuating means thereof.

My invention is not necessarily limited to a multicylinder engine or to an engine having a cam shaft in its head, and while in the drawing, there is illustrated a preferred embodiment of my invention, it is to be understood that the structural elements are susceptible to such variations and modifications as fall within the scope of the appended claims.

What I claim is:—

1. In a valve operating mechanism for explosive engines, the combination with a cylinder head, valve rods extending therein, and a cam shaft, of an adjustable sleeve slidable in said head for each valve rod, means engaging said cylinder head at each end of said sleeve for holding said sleeve in an adjusted position, and a finger for each sleeve having the inner end thereof pivoted in the outer end of the sleeve and adapted to be actuated by said cam shaft to move said valve rod.

2. In an explosive engine, a cylinder head having bosses, a cam shaft, valve rods extending into said cylinder head, adjustable sleeves in said bosses, and fingers having the inner ends thereof pivoted in the outer ends of said sleeves and extending between said cam shaft and said valve rods, said fingers having a long leverage within said sleeves and adapted to impart movement to said valve rods from said cam shaft.

3. In an explosive engine, a cylinder head having bosses, a cam shaft, valve rods extending into said cylinder head, sleeves slidable in said bosses, means at the inner and outer ends of said sleeves to hold said sleeves relative to said bosses, fingers having the inner ends thereof pivoted in the outer ends of said sleeves and extending between said cam shaft and said valve rods and adapted to impart movement to said valve rods from said cam shaft.

4. In a multi-cylinder explosive engine, the combination with a cylinder head, and staggeredly arranged valve rods extending into said head and normally maintained in elevated position, of valve sleeves slidable in said cylinder head, capable of being independently adjusted, fingers pivoted in the outer ends of said sleeves and extending out of the inner ends thereof and having beveled ends on the upper ends of said valve rods and adapted to lower the same, means above said fingers adapted to depress the same, and means below said fingers holding said fingers normally in engagement with said means.

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

OLIVER E. BARTHEL.

Witnesses:

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G. E. MCGRANN.