C. R. GREUTER.

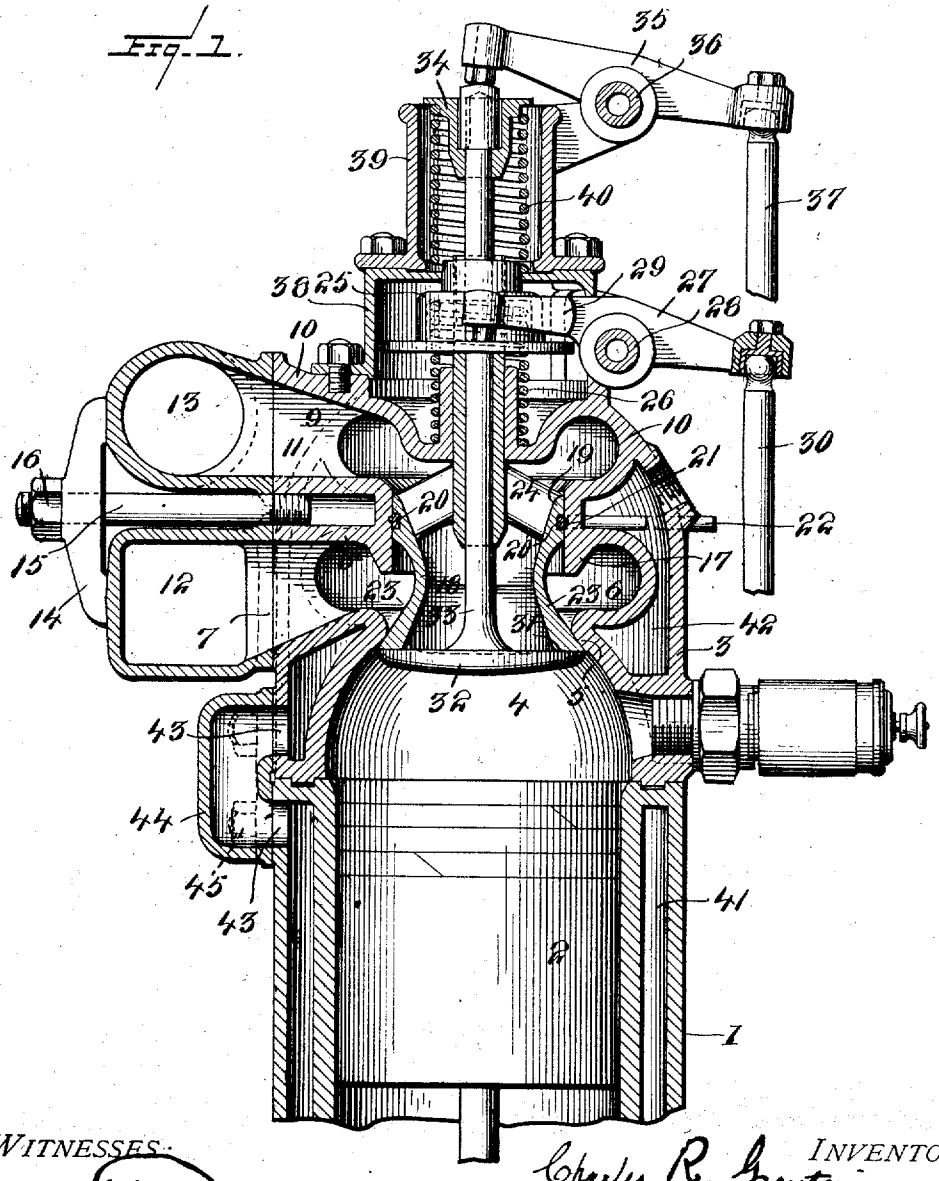
VALVE MECHANISM FOR EXPLOSION ENGINES.

APPLICATION FILED APR. 17, 1909.

987,801. Patented Mar. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

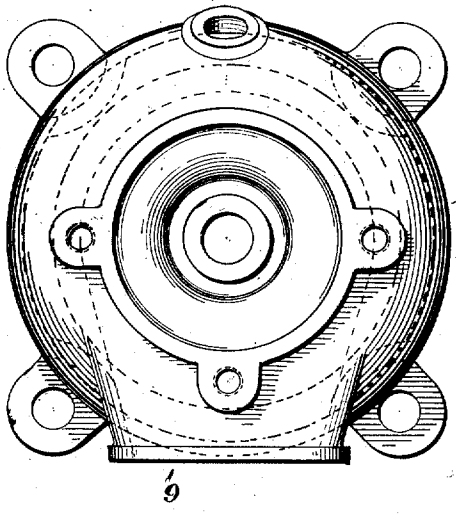


Fig. 3.

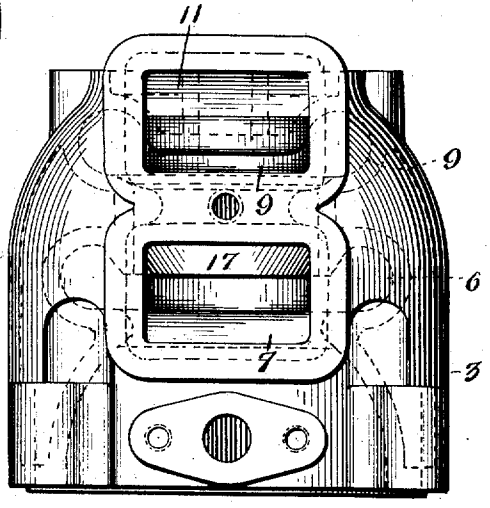
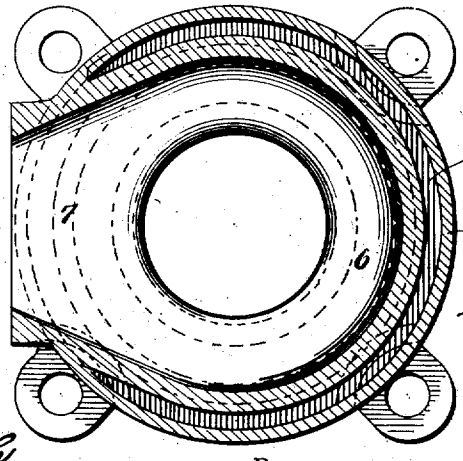


Fig. 4.



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VALVE MECHANISM FOR EXPLOSION-ENGINES.

987,801. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed April 17, 1909. Serial No. 490,482.

To all whom it may concern:

Be it known that I, CHARLES R. GREUTER, a citizen of the United States, and a resident of Saugus, in the county of Essex and State of Massachusetts, have invented a certain new and useful Improvement in Valve Mechanisms for Explosion-Engines, of which the following is a specification.

The present invention relates more particularly to the valve mechanism of explosion engines, and especially to the type, in which a tubular valve controlling the exhaust is employed, forming a passage through which the charges flow, said passage being in turn controlled by a valve mounted in the tubular valve.

One of the principal objects of the present invention is to provide a valve structure of the type outlined above, which will permit the positive operation of both valves.

A second and important object is to so arrange the controlling springs that they are located wholly out of the range of heat from the exhaust.

Still another object is to so construct the valve casing that it constitutes in the strict sense of the term a head for the cylinder, said head also forming a valve casing with a water jacket in which the water is brought into close association with the valve seats.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical sectional view through a portion of an explosive engine. Fig. 2 is a top plan view of the head casting. Fig. 3 is a side elevation of the same. Fig. 4 is a horizontal sectional view therethrough.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In said drawings, the cylinder is designated 1, and operating therein, is the usual piston 2. Secured to the rear end of the cylinder 1, is a valve casing, constituting a cylinder head. It will be observed that in this structure, the term "head" is used properly, for upon the removal of the casing or head 3, the piston can be removed through the open end of the cylinder. This head 3 is provided with a rearwardly contracted chamber 4 terminating in a valve seat 5 that surrounds a passage communicating with an exhaust chamber 6. The chamber has a port 7 opening through one side of the casing. The rear wall of this chamber is a partition 8, in rear of which is an intake chamber 9 having a rear wall 10 that constitutes the rear wall of the head. The intake chamber 9 is provided in the same side as the port 7 with a port 11, and said ports 7 and 11 register with the ends of exhaust and intake pipes 12 and 13, which are spaced apart, as shown. A yoke 14 has its ends bearing upon the pipes over the ports, and a stud bolt 15 projecting from the casing between the pipes, passes through the yoke 14, and has a nut 16 threaded upon its outer end.

The partition 8 is provided with a sleeve portion 17, in line with the passage that communicates with the chamber 4, and a tubular valve 18, bridging the exhaust chamber 6, has its inner portion coöperating with the valve seat 5, and has a slidable bearing 19 in the sleeve portion 17. This bearing is preferably provided with a packing ring 20, which is lubricated by means of an annular groove 21 and an oil pipe 22 leading thereto. It will be observed that the valve 18 has a peripheral channel 23 located in the exhaust chamber 6, this channel affording sufficient clearance when the valve is opened and tending to direct the exhaust outward, as will be obvious. The valve 18 furthermore has a tubular stem 24 slidably mounted in the rear wall 10 and projecting beyond the same, its projecting end carrying a head 25. A coiled spring 26, bearing at one end against the wall, also has a bearing against the inner side of the head 25, thus normally maintaining the tubular valve in closed position. A lever 27, fulcrumed between its ends, as shown at 28, has at its inner end a yoke 29 that bears upon the head 4. A valve actuating rod 30, operated by any suitable and well known means, is provided for actuating the lever 27, and consequently the valve to unseat the same.

The inner end of the valve 18 constitutes a seat 31, with which coöperates a second valve 32 controlling the intake, said intake passing from the chamber 9 through the valve 18, as will be obvious. The valve 32 has a stem 33 which slidably passes through the tubular stem 24 and projects beyond the same, its projecting end being provided with a head 34. A lever 35, fulcrumed between its ends, as shown at 36, has its inner end bearing against the head, while a suitable actuating rod 37, operating against the outer end of the lever, moves the same periodically to open the valve 32. The projecting por-

tions of the stems are surrounded by suitable casings 38 and 39, and a spring 40, housed within the casing 39, bears against the head 34 to normally hold the valve 32 seated.

It will be observed that the cylinder 1 has a suitable water jacket 41, and the valve casing also has a water jacket 42, the latter being so arranged that water is carried into juxtaposition to the valve seat 5, and the sliding bearing. The two jackets are provided in one side with ports 43, and a coupling conduit 44 having ears bolted, as indicated at 45, is provided with ports that register with the ports 43.

It is to be understood that the principal advantages claimed are rendered possible by the peculiar formation of the exhaust valve and the parts coöperating therewith. Said valve, while of general hourglass form, has its central portion in longitudinal section constructed on a curve of relatively small radius, which curve extends to a curve of larger radius toward the seating end of said valve facing the cylinder, and the cylinder head is gradually tapered inward to the valve-seating point, the curve thereof merging into the curve of the exterior of the exhaust valve, the two forming substantially an ogee curve. This construction obtains an efficient and unobstructed injector inlet action for the incoming charge through the interior of the valve and at the same time a smoothly directed and unobstructed exhaust over the exterior thereof.

With this construction, it will be noted that both valves are unseated by positive mechanism. Furthermore the parts subjected to the heat of the exhaust are properly cooled. In addition, the springs and operating mechanisms for the valves are located entirely away from the heat from the exhaust, being disposed outside the valve casing.

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

1. In combination, a cylinder head having an inward taper in longitudinal section to the valve seat forming at the extremity of said taper a valve seat, a tubular exhaust valve of hourglass form adapted to engage said seat, the coöperating portion of said valve being formed on a taper merging into that of the cylinder head, and a second valve adapted to seat on the end of the tubular valve.

2. In combination, a cylinder head, inwardly tapering in longitudinal section, forming at the extremity thereof a valve seat, a tubular valve of hourglass form adapted to engage said seat, the central portion of said valve being formed on a curve of relatively small radius and extending to a curve of larger radius merging into the taper of said cylinder head, and a second valve adapted to seat on the end of said tubular valve.

3. In combination, a cylinder head inwardly curved in longitudinal section, forming at the extremity thereof a valve seat, a tubular valve of hourglass form adapted to engage said seat, the central portion of said valve being formed on a curve of relatively small radius and extending in a curve of increasing radius toward the end facing the cylinder, the outline of the walls of said valve and of said cylinder head forming in central longitudinal section substantially an ogee curve, and a second valve adapted to seat on the end of said tubular valve.

4. A gas-engine valve mechanism, comprising an exhaust valve of tubular hourglass shape, formed longitudinally on a curve of relatively small radius at its center, extending in a curve of increasing radius toward the cylinder-facing end thereof, and having a piston formation at the other end thereof, and an inlet valve guided in said exhaust valve and adapted to seat on the end thereof.

Signed at Boston in the county of Suffolk and State of Massachusetts this 12th day of April, A. D. 1909.

CHARLES R. GREUTER.

Witnesses:
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