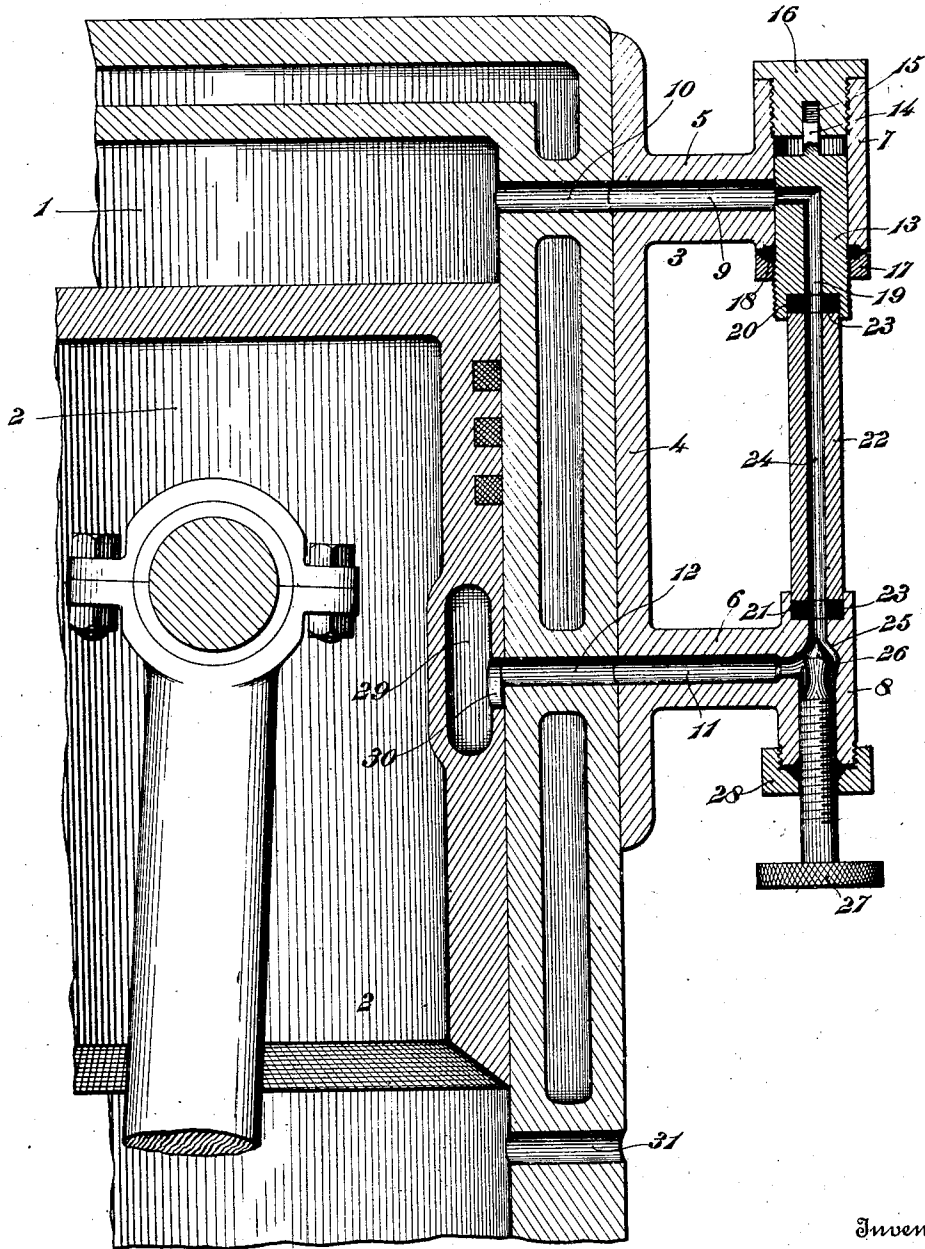


A. BUTSCH.
IGNITION TUBE.
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1,025,050.

Patented Apr. 30, 1912.



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IGNITION-TUBE.

1,025,050.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALPHONSE BUTSCH, a citizen of no country, residing at St. Lucia, in the British West Indies, have invented 5 new and useful Improvements in Ignition-Tubes, of which the following is a specification.

The invention relates to an improvement in explosive engines and particularly to 10 means for igniting the charge at a predetermined movement of the compression stroke.

The main object of the present invention is the provision of an ignition tube normally maintained at a degree of heat sufficient to 15 ignite the particular gases used and the direction of a portion of the fresh charge through said ignition tube at a certain point in the compression of said charge within the cylinder, the depression of the parts serving 20 to utilize the spent or exhausted gases as a means for preventing the fresh charge from reaching the ignition tube except under a predetermined compression of said fresh charge.

A further object of the invention is the provision of means whereby the particular degree of compression at which the fresh charge will enter the ignition tube may be 30 manually controlled in a simple way, whereby, in effect, the ignition may be advanced or retarded as is absolutely essential to the proper working of explosive engines.

The invention in its preferred details of construction will be described in the following 35 specification, reference being had particularly to the accompanying drawings, in which the figure represents a sectional view of a portion of the cylinder and piston, illustrating the application of the improved 40 charge igniting means thereto.

Referring particularly to the accompanying drawings, it will be understood that the engine includes the usual cylinder 1 and piston 2 operative therein, which parts, with 45 the exception of the details hereinafter noted, may be of any usual or preferred construction. Secured to the cylinder 1 at the ignition end is what may be termed a by-pass casting 3. This casting includes a 50 base plate 4 shaped to conform to that surface of the cylinder on which it is secured, and lateral extensions 5 and 6 terminate, at the respective ends, in sleeve-like extensions, as 7 and 8.

The extension 5 of the casting is formed 55 with a central bore 9 arranged in open com-

munication with a bore 10 leading through the cylinder wall and to the interior thereof, said bore 9 communicating at its outer end with the interior of the sleeve 8. The 60 extension 6 is also formed with a central bore 11 communicating at the inner end with a port 12 opening through the cylinder wall and at the outer end with the interior of the sleeve 8. Within the sleeve 7 is mounted a 65 clamping plunger 13, said plunger being slidably mounted in the sleeve and formed at the upper end with a non-circular projection 14 to seat in a similarly formed recess 15 arranged in a plug cap 16 threaded 70 or otherwise removably secured in the upper end of the sleeve to close the same. The lower end of the plunger extends beyond the similar end of the sleeve 7 and is exteriorly threaded to receive an adjusting nut 17 75 designed in operation to bear against the lower end of the sleeve 7, whereby the plunger 13 may be vertically adjusted within the sleeve while at the same time, through the medium of the projection 14, being held against ro- 80 tary movement. The juncture of the nut 17 and sleeve end may, if desired, be packed, as at 18, to prevent leakage at this point, and the plunger is formed with a port 19 including two right angularly disposed sections, 85 one of which communicates directly with the bore 9 and the other of which opens through the lower end of the plunger. The port 19 is of materially less diameter than that of the bore 9, serving a particular func- 90 tion as will presently appear and at the same time preventing non-registry of said port and bore within the limited vertical adjustment of the plunger.

The lower end of the plunger is formed 95 with a circular recess 20 and the upper end of the sleeve 8 with a similar recess 21, said recesses, which are disposed in alinement, being adapted to receive the respective ends of an ignition tube 22; suitable non-heat- 100 conducting packing, as 23 being arranged beyond the respective ends of the ignition tube. The tube 22 is of porcelain or similar material and is maintained at the desired degree of heat by any desired means, while the 105 engine is running.

With the ignition tube applied it will be obvious from the above described adjust- ment arranged for the plunger, the latter 110 may be operated to secure fixedly in place in a simple manner so that the interior or central bore 24 of the tube is in direct com-

munication and alinement with the port 19 of the plunger. The interior of the sleeve 8 is, immediately adjacent the proximate end of the ignition tube, formed to provide a valve seat 25, and a valve 26 is arranged for coöperation therewith, said valve being threaded into the sleeve below the bore 11 and provided below the sleeve with a milled disk head 27 for convenience in operation. The usual packing gland or cap 28 is applied to the lower end of the sleeve to prevent leaking.

The piston 2 is formed at an appropriate point with a chamber 29 having a reduced opening 30 leading therefrom through the surface of the piston, which opening is of greater diameter than the similar dimension of the opening 12 in the cylinder wall, said openings 12 and 30 being so relatively disposed that they will register to establish communication between the bore 11 and the chamber 29 when the piston is in a certain position within the cylinder.

The parts arranged as described, the operation of the improved ignition device is as follows: Assuming the engine at rest, it will be obvious that the several passages, as 10, 9, 19, 24 and 11 are filled with spent or burned gases and on cranking the engine the charge will open into the cylinder in any of the usual ways and during the compression stroke this charge will be compressed in advance of the piston. The compression tends to force some of the live gas through the opening 10, port 9 and succeeding channels, forcing the spent gases with which these passages are filled in advance of the live gas. As the passages 19 and 24, however, are materially less in diameter than the passages 9 and 10, it will be obvious, particularly as no outlet is provided beyond the opening 12, that in reality none of the live gases will reach the ignition tube at this time. Just immediately succeeding the end of the compression stroke, however, the chamber 29 in the piston will register with the opening 12 in the cylinder when, if the valve 26 is open, the spent gases will, by the compression of the live gases behind them, be forced into said chamber and the live gases reach the ignition tube to be ignited, flashing back into the clearance space to ignite the charge. As the chamber 29 is arranged to register with the opening 12 some little time before the crank of the engine is on the central line and maintains its registry after the crank has passed the central line, there is provided a considerable range for exact timing of the explosion at any speed. By regulating the valve 26 an effect exactly similar to the operation of the timing lever with the usual electric ignition is obtained in an obvious manner, as the valve outlet from the ignition tube by controlling the passage of the spent gases, may

be used to advance or retard the ignition. As the ignition tube is maintained at the desired degree of heat, to ignite the charge, and as in the operation of the piston a portion of this charge must pass through the ignition tube with certainty, there is no possibility of a missed explosion in the improved ignition device.

The cylinder, at a point remote from the opening 12, is formed with an additional opening 31 which will register with the chamber 29 on the out stroke of the piston and permit the reduction of the pressure within the chamber 29 to normal atmospheric pressure.

Having thus described the invention, what I claim as new is:—

1. The combination of an explosive engine including a cylinder formed with spaced openings, an igniting device, a by-pass casting secured to the cylinder and having port bores communicating with said openings, one of said openings having communication with the combustion chamber of the cylinder, and the other of said openings being positioned to be normally closed by the engine piston so as to prevent the escape of gas from the igniting device, said second-named opening adapted to be uncovered by the engine piston when the same reaches its highest point of compression whereby to release the gases in the igniting device, said igniting device comprising a plunger carried by the casting and formed with a right angular opening, one section of said opening communicating with one of the bores, means for adjusting the plunger longitudinally, and an ignition tube, arranged in communication with the second-named opening, said casting being formed to receive one end of said tube and the plunger being formed to receive the other end thereof and in communication therewith, whereby in the vertical adjustment of the plunger the tube may be fixed in place, substantially as and for the purpose described.

2. The combination of an explosive engine including a cylinder formed with spaced openings, an igniting device, a by-pass casting secured to the cylinder and having port bores communicating with said openings, one of said openings having communication with the combustion chamber of the cylinder, and the other of said openings being positioned to be normally closed by the engine piston so as to prevent the escape of gas from the igniting device, said second-named opening adapted to be uncovered by the engine piston when the same reaches its highest point of compression whereby to release the gases in the igniting device, said igniting device comprising sleeves formed integral with said by-pass casting and in communication with the bores thereof and in parallel relation with the cylinder, a

plunger adjustably mounted in the upper
one of said sleeves and having communica-
tion at one end with the opening in the com-
bustion chamber and its opposite end in
5 communication with the igniting device and
provided on its upper surface with a non-
circular projection, a plug cap removably
mounted in said sleeve above the said plun-
ger and formed with a non-circular recess
10 adapted to receive said projection, and an
adjusting nut carried by said plunger and
engaging the lower end of said sleeve, said
adjusting nut permitting longitudinal move-

ment of the plunger relative to the said
sleeve and plug cap, and an ignition tube, 15
one end of said tube being carried by one of
the said sleeves and the plunger being
formed to receive the other end thereof,
whereby in the longitudinal movement of
the plunger the tube may be fixed in place. 20

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

ALPHONSE BUTSCH.

Witnesses:

GEO. S. E. GORDO,

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