(No Model.)

C. W. PINKNEY.

GAS ENGINE.

No. 511,158. Patented Dec. 19, 1893.

Fig. 1.

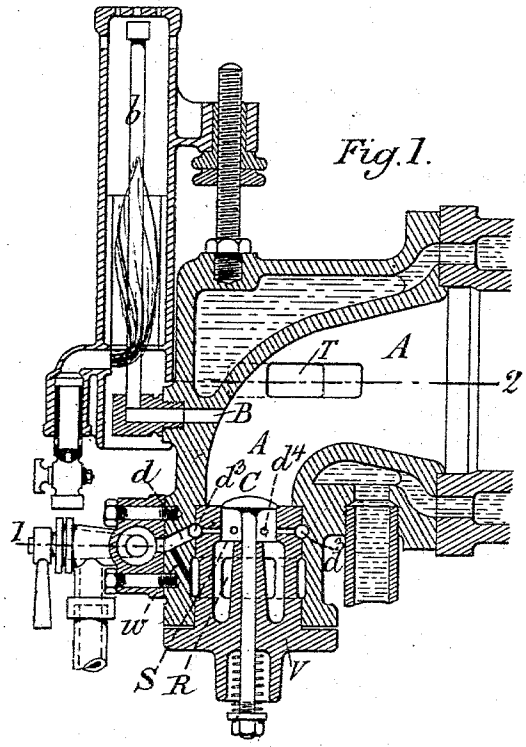


Fig. 2.

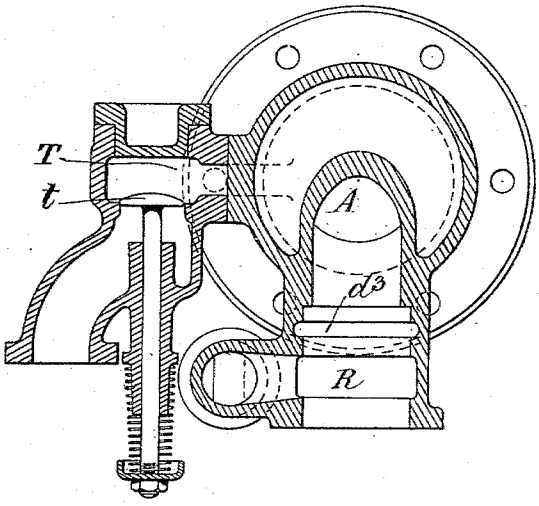
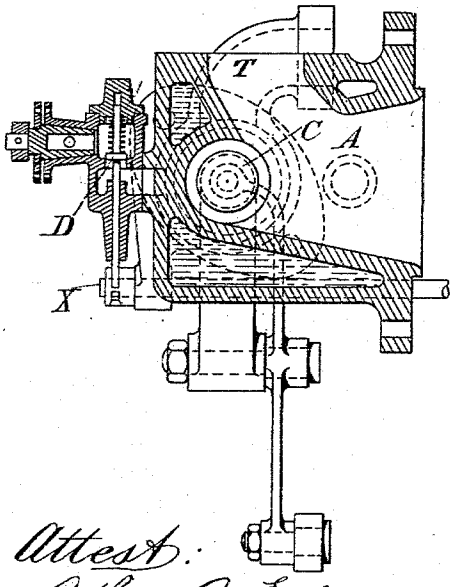


Fig. 3.



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CHARLES WILLIAM PINKNEY, OF SMETHWICK, ASSIGNOR OF TWO-THIRDS TO GEORGE TANGYE AND GEORGE HANDEL HASWELL, OF BIRMINGHAM, ENGLAND.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 511,158, dated December 19, 1893.

Application filed February 13, 1893. Serial No. 462,186. (No model.) Patented in England April 28, 1891, No. 7,313.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM PINKNEY, mechanical engineer, a subject of the Queen of Great Britain and Ireland, residing at 77 Raglan Road, Smethwick, in the county of Stafford, England, have invented certain Improvements in Gas-Engines, (for which I have obtained a patent in Great Britain, No. 7,313, dated April 28, 1891,) of which the following is a specification.

My invention has for its object to provide gas engines which are capable of working with less shock than hitherto. With this object I make the combustion chamber conical or lessening in capacity as it recedes from the working cylinder the smaller or rear end being turned down or round in other convenient direction in a curve toward the gas inlet and ignitor passage so that as the charge enters the combustion chamber it easily spreads out clearing the chamber of burned gases and presenting the pure or practically pure gaseous mixture to the ignitor the ignition commencing at the combustion chamber and spreading without shock to the larger end of the said chamber.

In the accompanying drawings Figure 1 is a longitudinal section; Fig. 2 a transverse section and Fig. 3 is a horizontal section on the line 1—2 Fig. 1.

A is the combustion chamber constructed as hereinbefore described. The ignitor passage B and the inlet valve C are both arranged at or toward the small end of the combustion chamber. When the piston of the working cylinder (not shown) is making its charging stroke the inlet valve C lifts by the action of the piston (or by being mechanically operated) and the gas valve D (Fig. 3) is caused to lift by the governor which may be done by levers on the shaft X in the usual way. Gas and air then enter the smaller end of the combustion chamber A and expand on their way to the larger end of the said chamber (which is fixed at the explosion end of the cylinder) thus clearing out all the spent gases of the previous charge. The gaseous charge in the small or lower end of the combustion chamber A at the ignitor passage B being now free from inert gases will be easily and regularly ignited in the following manner: The piston having completed its charging stroke commences to compress the gaseous charge (taken into the cylinder) back into the combustion chamber A to say about one-fifth of its previous volume a small portion of the charge passing through the passage B into the ignition tube *b* until it reaches the part thereof which is hot enough to cause ignition and this being ignited will ignite the main charge in the combustion chamber A at the small or lower end thereof and the charge will burn gradually and regularly through the entire charge owing to the conical or contracted and curved shape of the chamber A thus preventing shock.

To insure the gas and air being properly mixed I cause them to enter directly at or about right angles to each other the gas flowing round an annular passage surrounding the inlet chamber beneath the inlet valve and passing from the said passage through a number of small openings into the inlet chamber the air entering into the inlet chamber also from an annular passage surrounding it so that the air cuts across the incoming streams of gas.

I arrange the valve box V so that the air enters the cylinder in line with the inlet valve C through the passage R while the gas enters the said box V at right angles to the valve C as follows: when the gas valve D is opened the gas passes through the passage *d* into the annular passage d^3 and through the small holes d^4 in streams into the box V and mixes with the air on its way to the cylinder through the valve C.

To prevent waste of gas and insure the whole of it being cleared out of the annular gas passage d^3 I make the passage *w* Fig. 1 in connection with the annular air passage R and arrange the gas supply valve D so that it closes just before the piston of the working cylinder reaches the end of its charging stroke so that air alone then enters and passes by the communicating passage *w* into the gas passage to clear it of gas which passes out through the holes d^4. Gas cannot pass down

the said communicating passage *w* during the charging stroke owing to the vacuum necessary for charging purposes in the inlet chamber being greater above the air inlet passage to the said chamber than below it which can be effected by contracting the space above the said air inlet passage. This is shown in the drawings as being effected by the contraction in the valve box V at the point S which makes the vacuum greater at the holes d^4 than at the lower end of the passage *w*.

T represents the exhaust passage leading to the exhaust valve *t* which may be operated in the usual way.

From the foregoing description it will be understood that the present invention relates more especially to that particular class of gas engines which charge with vacuum, as it is expressed by those familiar with the art, wherein the explosion of the charge (or ignition thereof) takes place at the beginning of every alternate outstroke of the piston. The instroke immediately following each working stroke drives the products of combustion from the combustion chamber by forcing them through the exhaust passage, opening into the rear of the conical curved combustion chamber, the shape of which assists to the more complete expulsion of the said products. The succeeding outstroke, called the charging stroke, forms a vacuum (or partial vacuum) in the combustion chamber, whereupon the pressure beneath the inlet valve opens the latter, permitting the influx of the explosive mixture, which is compressed and ignited during the next in or compression stroke.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a gas engine charging with vacuum, wherein the ignition or explosion of the charge takes place at the beginning of every alternate outstroke of the piston the combination with the cylinder of a combustion chamber opening at its forward end into the cylinder and terminating at its rear end in a plane approximately at right angles to the plane of opening at its forward end, said combustion chamber being contracted and curved substantially in the arc of a circle from its forward end throughout its entire length, and having an exhaust passage opening into the contracted portion thereof an inlet valve for the explosive at the rear end of said chamber, and means for igniting the charge, substantially as described.

2. In a gas engine the combination with the ignition chamber and inlet valve of a mixing chamber normally closed by the inlet valve, a passage for the gas communicating with the interior of the mixing chamber, a channel for the air communicating with the interior of the mixing chamber below the gas passage, and a connecting passage leading from the said air channel to the gas passage, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES WILLIAM PINKNEY.

Witnesses:

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