No. 748,011. PATENTED DEC. 29, 1903.

W. REMINGTON.

FEEDING AND IGNITING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED AUG. 5, 1903.

NO MODEL.

Fig. 1.

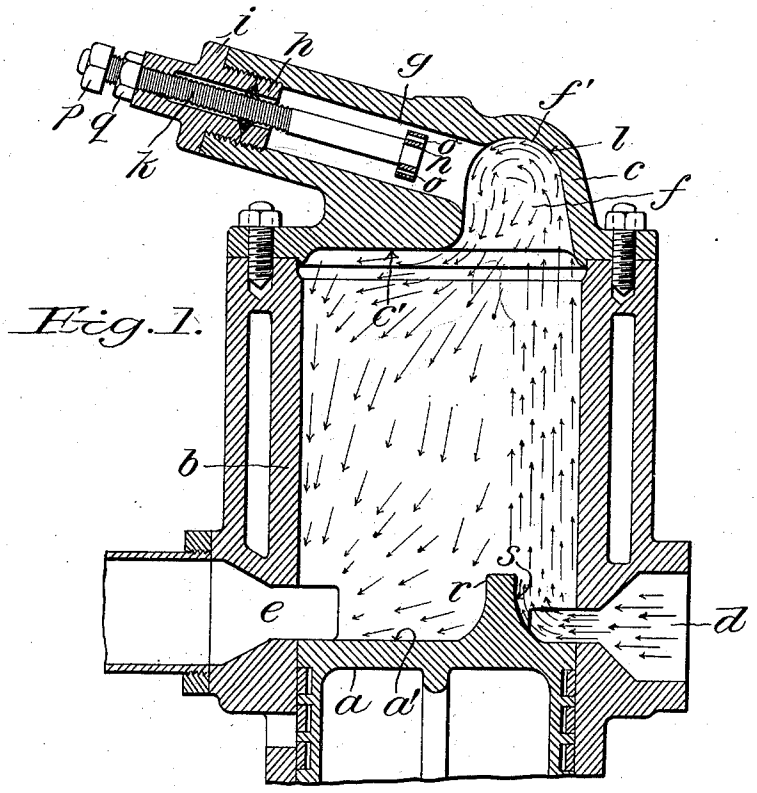
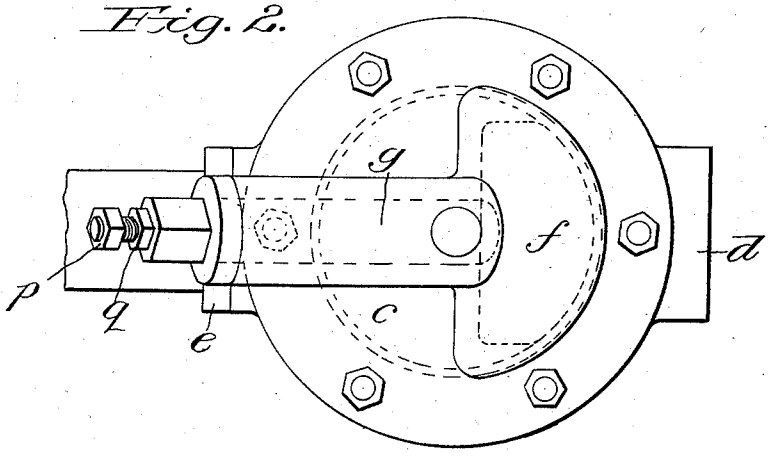


Fig. 2.



Witnesses

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No. 748,011. Patented December 29, 1903.

UNITED STATES PATENT OFFICE.

WOLCOTT REMINGTON, OF STAMFORD, CONNECTICUT, ASSIGNOR TO INTERNATIONAL POWER VEHICLE COMPANY, OF STAMFORD, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

FEEDING AND IGNITING DEVICE FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 748,011, dated December 29, 1903.

Application filed August 5, 1903. Serial No. 168,375. (No model.)

To all whom it may concern:

Be it known that I, WOLCOTT REMINGTON, a citizen of the United States of America, and a resident of Stamford, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Feeding and Igniting Devices for Explosive-Engines, of which the following is a specification.

My invention relates to "hot-surface" igniters for explosive-engines and to a construction of such engines whereby the fresh charge introduced after an explosion is with certainty brought into a position from which it will be on the succeeding compression-stroke of the piston-head caused to come into contact with the hot surface and to be exploded.

Heretofore difficulties have been experienced when only a small charge of explosive mixture is being introduced into the engine-cylinder (as is the case when the engine is running light) in causing the explosions to occur with regularity and during or after each compression-stroke of the piston-head, explosions being often missed and not occurring until after the piston-head has made several strokes and the charge in the cylinder from the last explosion has been driven out or so diluted by the several fresh charges as to become explosive. The deleterious effects of these missed explosions are well known. By my invention these defects are avoided, while at the same time the advantages of introducing the explosive mixture through a port controlled by the piston-head are retained.

For these purposes my invention consists in the construction, arrangement, and combination of the several parts of which it is composed, as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings, in which corresponding parts are designated by corresponding marks of reference, Figure 1 is a central longitudinal section of a part of an explosive-engine having my invention applied thereto. Fig. 2 is a plan view thereof.

As my present invention relates only to the means of introducing the explosive charge into the cylinder and governing the subsequent movement thereof and in the igniting means, I do not deem it necessary to show all parts of an explosive-engine in the drawings, as the parts not shown may be, for instance, of the character illustrated in my other application, Serial No. 150,915, filed April 3, 1903.

The piston-head *a* reciprocates in the usual way in the cylinder *b*, provided with the head *c*, the cylinder having in one side thereof the induction-port *d* for the fresh charge and on the opposite side the eduction-port *e* for the exploded charge, both of which are so located as to be opened by the piston-head *a* during the last part of its outward or work stroke and to be closed by the head upon the first part of its compression-stroke.

The cylinder-head *c* has a substantially flat inner face *c'*, having a depression thereon on one side of its center, forming a chamber *f*, which has a rounded bottom *f'*. A firing-tube *g* is formed integral with the head, being located at an angle to the axis of the cylinder, and opens into the chamber *f* from one side and not from the bottom thereof. In the drawings the tube is shown as slightly diverging from the flat face *c'* of the head, and this is of convenience, as compactness is retained. The tube is still accessible for heating it by a torch in starting the engine. The rear end of the tube is closed by the packing-nuts *h* and *i*, which are bored longitudinally to receive the stem *k*, which is threaded and engages corresponding threads in the bores of the nut. Upon the forward end of the stem and within the tube is mounted the ignition-surface, which I prefer to make in the form of a cylindrical block *n*, having a series of perforations *o* extending longitudinally therethrough.

The block *n* may be moved axially in the tube by rotating the stem *k*, for which purpose the latter is provided with an angular head *p* to receive a spanner, it being also provided with a lock-nut *q*, by which it may be fastened when once adjusted.

As the firing-tube is carried by the cylinder-head and the induction-port is located at a point in the side of the cylinder so remote from the head thereof as to be only un-

covered while the piston-head is at the outer range of its movement, a charge admitted through such port has a tendency to mix to a greater or less extent with the exploded products of the preceding charge, (the proportion of the fresh charge in the mixture decreasing as the distance from the inlet-port is increased,) so that the introduction of a large quantity of the exploded mixture might be necessary before the mixture adjacent to the firing-tube would become sufficiently rich to become explosive. On a light load this is a serious drawback, as it is then advisable for proper regulation and economy to introduce a small charge only, several of which, under the conditions stated, must be introduced before the inert gases adjacent to the firing-tube resulting from the previous charge are sufficiently displaced to permit an explosion. Thus instead of producing a series of explosions of a series of small charges explosions of a large charge would be produced at intervals of several strokes of the piston. In order to overcome these defects, I place on the rear surface a' of the piston-head, which is substantially flat, a flange r, located at right angles to the axis of the induction-port d and registering with the chamber f in the head and, if desired, entering the said chamber when the piston-head is at the rear limit of its movement, the face s of the flange toward the induction-port being so concaved as to cause the fresh charge introduced through the port and impinging thereon to be deflected rearwardly in the cylinder in a body in a line substantially parallel with and to one side of the axis of the cylinder toward and into the chamber f, which, as hereinbefore stated, has a rounded bottom. The fresh charge striking this bottom, say at the point l, is again deflected and sweeps along the curve thereof, as shown by the dotted lines in the drawings, finally spreading out into the interior of the cylinder, which it enters from the rear, thus, if of sufficient volume, driving the exploded charge forwardly in the cylinder and out of the eduction-port therein, which port has been uncovered by the outward or forward stroke of the piston. If the fresh charge is not sufficiently great in volume to do this, it at least displaces the exploded charge in the recess f, which it replaces. It will be noted that the firing-tube enters the recess from one side, forming a pocket, so that the fresh charge is not, on entering the cylinder and the recess, thrown therein, the exploded products of the previous charge being thus retained in the tube and serving to prevent a premature explosion. Upon the rearward or compression stroke of the piston the mixture in the cylinder will be compressed and the fresh charge contained in the recess will be driven up into the tube and compressed therein to the pressure at which it will be exploded by the hot surface n, (which will be maintained at a high temperature by the heat absorbed by it from the successive explosions,) and this will be repeated on each cycle of movement of the engine.

By varying the position of the hot surface axially in the firing-tube by the mechanism hereinbefore described the time of the explosion in respect to the stroke of the piston may be regulated, for the reason that when the hot surface is drawn closer to the closed end of the tube the contents of the cylinder must be compressed to a higher degree before the fresh charge will by driving back the inert gases contained in the tube come in contact with the hot surface, and thus the time of explosion will be retarded. The opposite result will of course be obtained if the hot surface is moved toward the entrance to the hot tube.

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

1. In an explosive-engine, the combination with an engine-cylinder, having an induction-port therein, a piston-head uncovering the said port on its outward movement, and having a deflecting-flange thereon opposite the said port, a head upon the cylinder having a recess therein to receive the charge deflected by the flange, and a firing-tube opening into the recess on one side of the line of movement of the charge deflected by the flange, substantially as described.

2. In an explosive-engine, the combination with an engine-cylinder, having an induction-port therein, a piston-head uncovering the said port, and carrying a deflecting-flange to one side of its center and opposite the said port, a head upon the cylinder having a recess therein with a rounded bottom, located above the flange, and a firing-tube opening into a side wall of the recess and extending therefrom at an angle to the line joining the recess and flange, substantially as described.

3. In an explosive-engine, the combination with an engine-cylinder, having an induction-port therein, a piston-head uncovering the said port, and carrying a deflecting-flange to one side of its center and opposite the said port, a head upon the cylinder having a recess therein with a rounded bottom, located above the flange, a firing-tube opening into a side wall of the recess and extending therefrom at an angle to the line joining the recess and flange, a hot surface contained in the firing-tube, and means for moving the said surface axially in the said tube, substantially as described.

Signed at Stamford, Connecticut, this 17th day of June, 1903.

WOLCOTT REMINGTON.

Witnesses:
WALTER S. HATCH,
FRANK B. GURLEY.