

C. M. STEELY.
EXPLOSIVE ENGINE.
APPLICATION FILED JUNE 16, 1908.

912,751.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

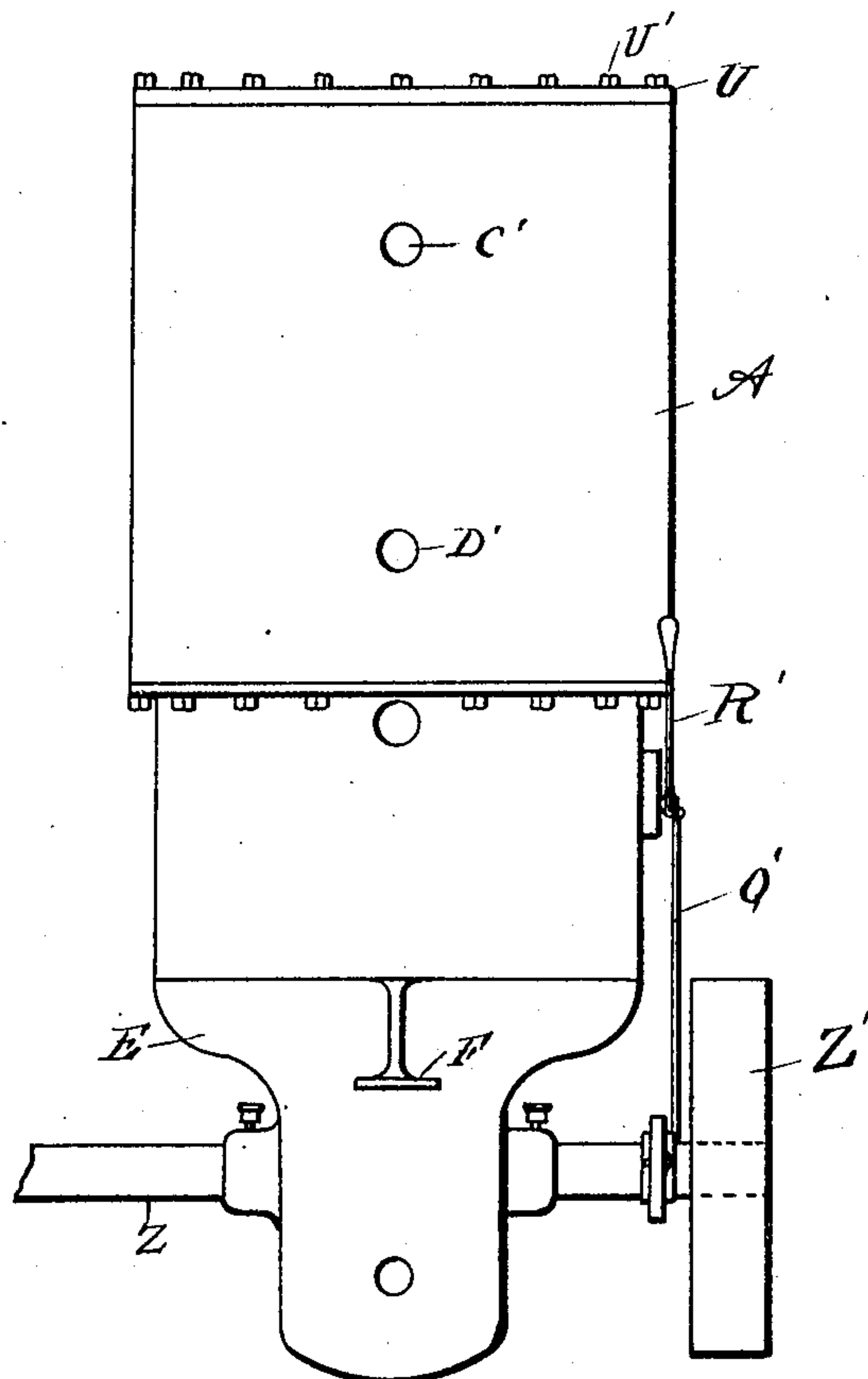


Fig. 3.

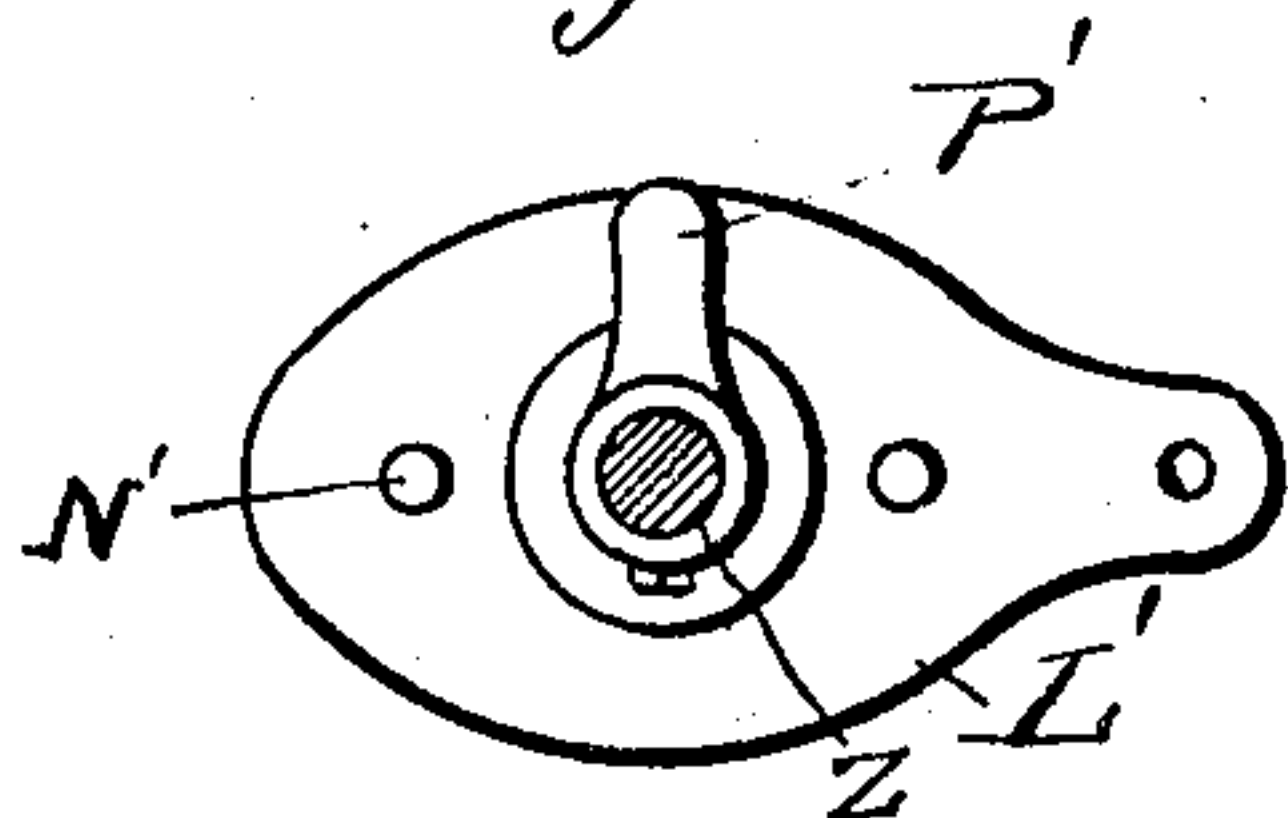
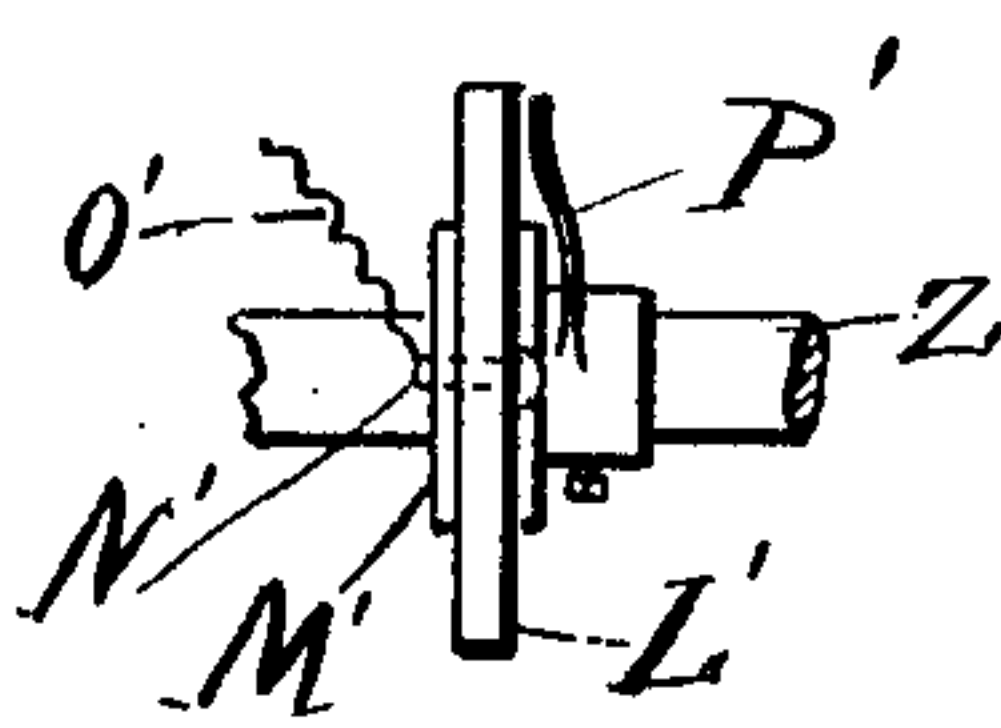


Fig. 4.



WITNESSES
Francis A. Pocock
S. M. Gallagher

INVENTOR
Charles M. Steely
BY
W. P. [Signature] ATTORNEY

C. M. STEELY.

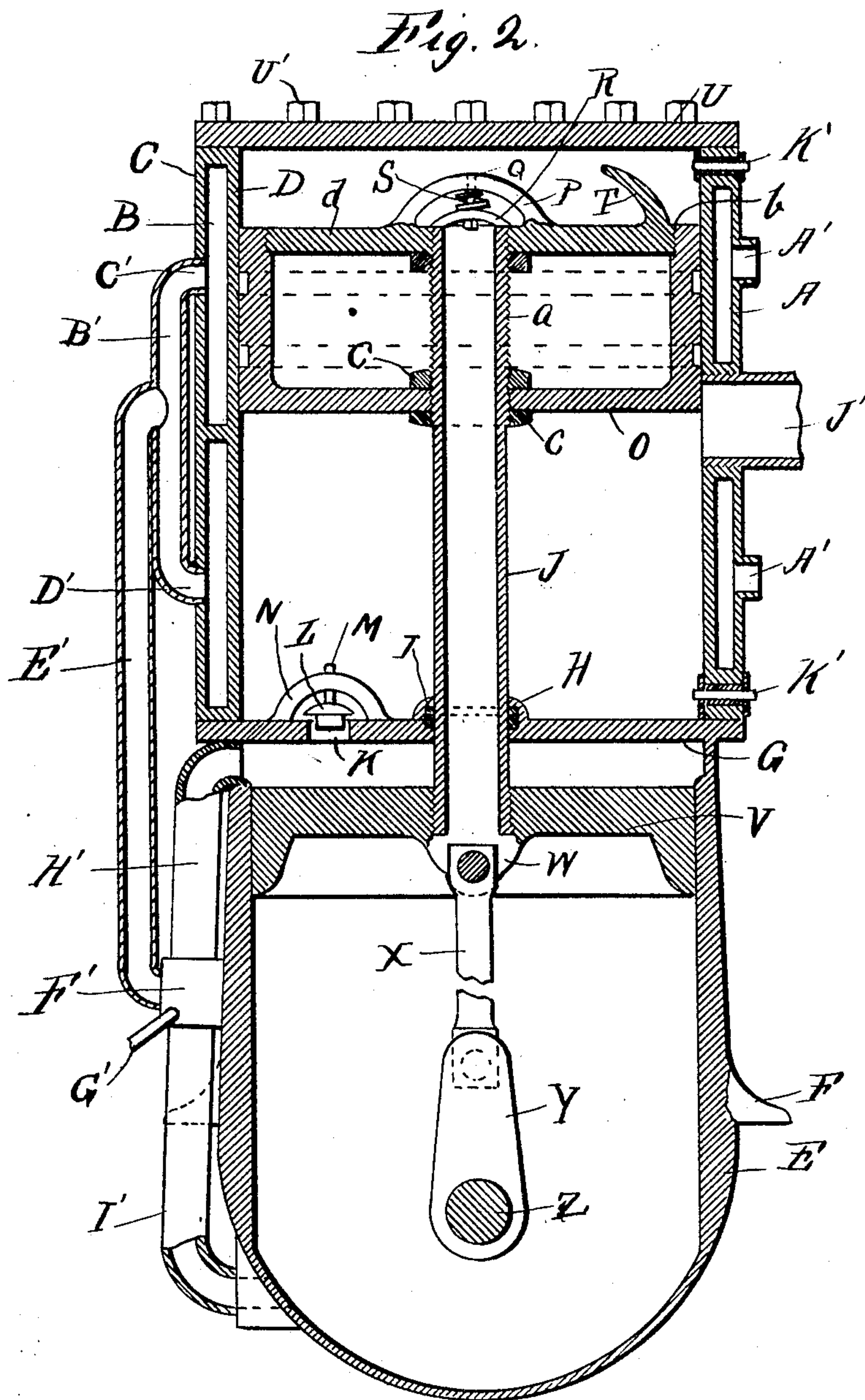
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2 SHEETS—SHEET 2.



WITNESSES

Francis A. Rosch
S. M. Gallagher

INVENTOR

Charles M. Steely

BY

W. P. Williams

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES M. STEELY, OF PHILADELPHIA, PENNSYLVANIA.

EXPLOSIVE-ENGINE.

No. 912,751.

Specification of Letters Patent.

Patented Feb. 16, 1909.

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To all whom it may concern:

Be it known that I, CHARLES M. STEELY, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Explosive-Engines, of which the following is a specification.

My invention relates to a new and useful improvement in explosive engines, and has for its object to provide an exceedingly simple and effective device of this character whereby an explosion may take place upon either side of the piston thus providing a double action explosive engine; a further object of my invention is to provide an engine of this character which will be cooled by the air which is to be used with the gasoline or other fuel to provide a charge for the engine.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, I will describe its construction in detail, referring by letter to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a side elevation of my improved engine. Fig. 2, a longitudinal section thereof. Fig. 3, a plan view of the commutator, and Fig. 4, an edge view thereof.

In carrying out my invention as here embodied, A represents the cylinder having the passages B formed between the outer and inner walls C and D respectively thereof, and E the base having the brackets F formed on the outside thereof for securing the engine in position upon a suitable frame.

G represents the bottom of the cylinder which is formed therewith, and formed with this bottom is the bearing H in which are placed the packing rings I adapted to bear against the piston rod J to prevent the escape of the gas. The hole K formed in the bottom G of the cylinder acts as an intake for the charge and the edges thereof form a seat for the valve L, the stem M of which slides up and down in the arch N which holds it in position relative to the hole K. The piston rod J is formed from a hollow

tube having a thread *a* cut on its upper end on which is threaded the piston O, the bottom and side of said piston being cast in one piece and on the inside surface of the upper portion of these sides is formed a thread *b*.

c indicates nuts threaded upon the piston rod upon either side of the bottom of the piston so that they may be run against the bottom thus holding the piston permanently in place. The top *d* is threaded on the piston and has an arch P formed therewith in which the valve stem Q of the valve R is adapted to slide, said valve R closing the passage way of the piston rod when it is forced down against the same by the spring S. T indicates a guard which is also formed on the top of the piston so that when the piston passes the outlet or exhaust it will prevent the charge which is being taken in from also passing out said exhaust. The cylinder head U is secured to the top of the cylinder by suitable bolts U' so that it may be readily taken off if it should be so desired.

Secured to the lower end of the piston rod J is the cross-head V which is tight fitting and adapted to slide up and down within the base, and has a bracket W formed on the lower side thereof, and to this bracket is secured one end of the connecting rod X, the other end of which is attached to the crank shaft Y, and this is fastened to the shaft Z on which is secured the fly wheel Z'.

A' indicates an air inlet pipe through which the air passes into the passages B around the cylinder, cooling the same as it does so, into the pipe B' which has the two inlets C' and D' then through the pipe E' to the carbureter F' which may be of any desired style where it is mixed with the gasoline entering the same from the gasoline supply pipe G', this mixture or charge leaving the carbureter passes into the pipes H' and I', the pipe H' leading to the chamber between the bottom of the cylinder G and the cross-head V, the other pipe I' leading into the base E. The charge which enters the chamber formed between the bottom of the cylinder and the cross-head at the proper time enters the lower portion of the cylinder through the hole K, the charge entering the base passing up through the piston rod J at the proper time into the upper portion of the cylinder as will be hereinafter described.

The exhaust indicated by the reference letter J' is situated in a central position or

about one half way between the top and bottom of the cylinder or in that position which will bring the piston above it when it is on its upward stroke and below it when it is on its downward stroke.

The openings K' in proximity to the upper and lower ends of the cylinder are for the reception of suitable spark plugs for igniting the charge when it has been compressed.

L' represents the commutator which is secured to the shaft Z by the carrier M'. Passing through the commutator are the contact bolts N' to which is secured the wire O'.

P' indicates a contact spring which as the commutator revolves with the shaft will come in contact with the contact bolts N' thus forming a connection allowing the current of electricity to pass to the spark plugs.

In order that the commutator may be turned so as to advance the spark I secure to said commutator a rod Q', and to this rod I fasten a lever R' which is attached to the engine so that it may be readily moved in the desired direction.

In practice the air is taken in through the pipe A' when it then passes around the cylinder between the inner and outer walls then into the pipe B' through the inlets C' and D' then into the pipe E' from where it passes to the carbureter F' at which point it is mixed with gasoline entering through the supply pipe G', from this point it passes as a mixture through the pipe H' into the chamber formed between the bottom G of the cylinder and the cross-head V. On the upward stroke of the piston this charge is drawn into the lower portion of the cylinder through the opening K' by suction, as the piston descends it compresses the charge into the lower portion of the cylinder the valve L preventing the escape of the charge and at the same time the charge which left the carbureter and entered the base through the pipe I' is drawn upward through the hollow piston rod J into the upper portion of the cylinder. When the piston is at the length of its downward stroke the charge in the lower portion of the cylinder is exploded which drives the piston upward compressing the charge in the upper portion of the cylinder discharging the burned gases through the exhaust J' and drawing a new charge through the opening K to the lower part of the cylinder, and when this piston has reached its upward stroke the charge in the upper part of the cylinder is exploded which drives the piston down again discharging the burned charge through the exhaust J' and takes in a new charge through the hollow piston rod J, the guard T preventing this charge from passing out of the exhaust. This up and down movement continues as long as the proper charge enters

the cylinder and is exploded, and this movement will cause the crank shaft Y to turn through the medium of the connecting rod X which will cause the shaft Z to rotate.

Of course I do not wish to be limited to the exact details here shown as these may be varied without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful, is—

1. An engine consisting of a base, a cylinder mounted upon said base, a shaft passing through said base, a crank shaft secured thereto, a cross-head adapted to slide up and down within the base, a connecting rod one end of which is secured to said cross-head, the other end to the crank shaft, a hollow piston rod through which the charge is adapted to pass into the upper portion of the cylinder to the cross-head, and adapted to move up and down therewith, a piston secured to the upper end of the piston rod, means for drawing the charge first in the upper end then in the lower end of the cylinder, and means for exploding said charges, as shown and described.

2. In combination, a base, a cylinder mounted thereon, a shaft passing through said base, a fly wheel secured thereto on the outside of the base, a crank shaft fastened to the shaft within the base, a cross-head having a bracket formed therewith adapted to slide up and down within the base, a connecting rod one end of which is secured to the crank shaft, the other to the bracket formed with the cross-head, a cylinder bottom having suitable openings formed therein secured to the cylinder, a bearing formed with said cylinder bottom, packing rings placed therein, an arch also formed with the cylinder bottom, a valve for closing the inlet opening in the cylinder bottom, the stem of said valve adapted to slide up and down within the arch, a hollow piston rod through which a charge is adapted to pass secured to the cross-head and passing through the cylinder bottom, a piston secured to the upper end of said piston rod, an arch formed with the top of the piston extending over the piston rod, a valve resting above the piston rod, the stem of which slides within the arch, a spring interposed between the arch and the valve for normally holding the valve against the piston rod, a guard also formed with the top of the piston in proximity to its outer edge so as to prevent the charge from passing out of the exhaust, a cylinder head detachably secured to the cylinder, means for conveying charges to the cylinder alternately to either side of the piston, and means for exploding said charges, substantially as and for the purpose set forth.

3. The herein described combination of a base, a cylinder composed of an inner and

outer wall thus leaving a passage around the cylinder between these walls mounted upon the base, a shaft passing through said base, a fly wheel secured thereto on the outside of the base, a crank shaft fastened to the shaft within the base, a cross-head having a bracket formed therewith adapted to slide up and down within the base, a connecting rod one end of which is secured to the crank shaft, the other to the bracket formed with the cross-head, a cylinder bottom having suitable openings formed therein secured to the cylinder, a bearing formed with said cylinder bottom, packing rings placed therein, an arch also formed with the cylinder bottom, a valve for closing the inlet opening in the cylinder bottom, the stem of said valve adapted to slide up and down within the arch, a hollow piston rod through which a charge is adapted to pass secured to the cross-head and passing through the cylinder bottom, threads cut thereon, a piston threaded on the upper end of said piston rod, the bottom and sides of said piston rod being cast in one piece, a top threaded in said piston, nuts threaded on either side of the bottom of the piston for holding it in place, an arch formed with the top of the piston extending over the piston rod, the stem of which slides within the arch, a spring interposed between the arch and the valve for normally holding the valve against the piston rod, a guard also formed with the top of the piston in proximity to its outer edge so as to prevent the charge from passing out of the exhaust, a cylinder head detachably secured to the cylinder, pipes entering the passage formed between the two walls of the cylinder for allowing air to pass therein, other pipes leading from said passage, a carbureter, a pipe connecting the last named pipes with said carbureter for carrying the air which has passed around the cylinder through the passage way into the carbureter, a gasoline supply pipe for supplying gasoline to the carbureter where it is mixed with the air, another pipe leading from the carbureter upward to the chamber formed between the bottom of the cylinder and the cross-head so that a charge may be drawn in to the lower part of the cylinder at the proper time, another pipe leading from the carbureter downward into the base for carrying the charge from the carbureter into said base where it is drawn upward through the hollow piston rod into the upper portion of the cylinder, and means for exploding said charges after they have entered the cylinder and been compressed, as specified.

4. In combination, a base having brackets formed on the outside thereof for securing the engine to a suitable frame, a cylinder composed of an inner and outer wall thus leaving a passage around the cylinder be-

tween these walls mounted upon the base, a shaft passing through said base, a fly wheel secured thereto on the outside of the base, a crank shaft fastened to the shaft within the base, a cross-head having a bracket formed therewith adapted to slide up and down within the base, a connecting rod one end of which is secured to the crank shaft, the other to the bracket formed with the cross-head, a cylinder bottom having suitable openings formed therein secured to the cylinder, a bearing formed with said cylinder bottom, packing rings placed therein, an arch also formed with the cylinder bottom, a valve for closing the inlet opening in the cylinder bottom, the stem of said valve adapted to slide up and down within the arch, a hollow piston rod through which a charge is adapted to pass secured to the cross-head and passing through the cylinder bottom, threads cut on the piston rod, a piston secured to the upper end of said piston rod, the bottom and sides of said piston being cast in one piece having a thread cut around the inner surface of the sides at the upper end thereof, nuts threaded on the piston rod on either side of the bottom of the piston, a top threaded on said piston, an arch formed with said top extending over the piston rod, a valve resting above the piston rod the stem of which slides within the arch, a spring interposed between the arch and the valve for normally holding the valve against the piston rod, a guard also formed with the top in proximity to its outer edge so as to prevent the charge entering the upper portion of the cylinder from passing out of the exhaust, a cylinder head detachably secured to the cylinder, below the piston, pipes entering the passage formed between the two walls of the cylinder for allowing air to pass therein, other pipes leading from said passage, a carbureter, a pipe connecting the last named pipes with said carbureter for carrying the air which has passed around the cylinder through the passage way into the carbureter, a gasoline supply pipe for supplying gasoline to the carbureter where it is mixed with the air, another pipe leading from the carbureter upward to the chamber formed between the bottom of the cylinder and the cross-head so that a charge may be drawn into the lower part of the cylinder at the proper time, another pipe leading from the carbureter downward into the base for carrying the charge from the carbureter into said base where it is drawn upward through the hollow piston rod into the upper portion of the cylinder, means for exploding said charges after they have entered the cylinder and been compressed, a commutator, means for securing it to the shaft, a contact spring secured thereto, a bolt attached to the commutator adapted to come in contact with the contact spring, wires leading to said com-

mutator, a lever secured to the engine, and an arch one end of which is secured to the lever and other end to the commutator so that by moving said lever it will turn the commutator thus advancing the spark, as and for the purpose set forth.

In testimony whereof, I have hereunto af-

fixed my signature in the presence of two subscribing witnesses.

CHARLES M. STEELY.

Witnesses:

FRANKLIN BAKER,

CHARLES KIRCHNER, Sr.