C. DE LUKACSEVICS

GAS ENGINE.

APPLICATION FILED JUNE 25, 1906.

998,363.

Patented July 18, 1911.

2 SHEETS—SHEET 1.

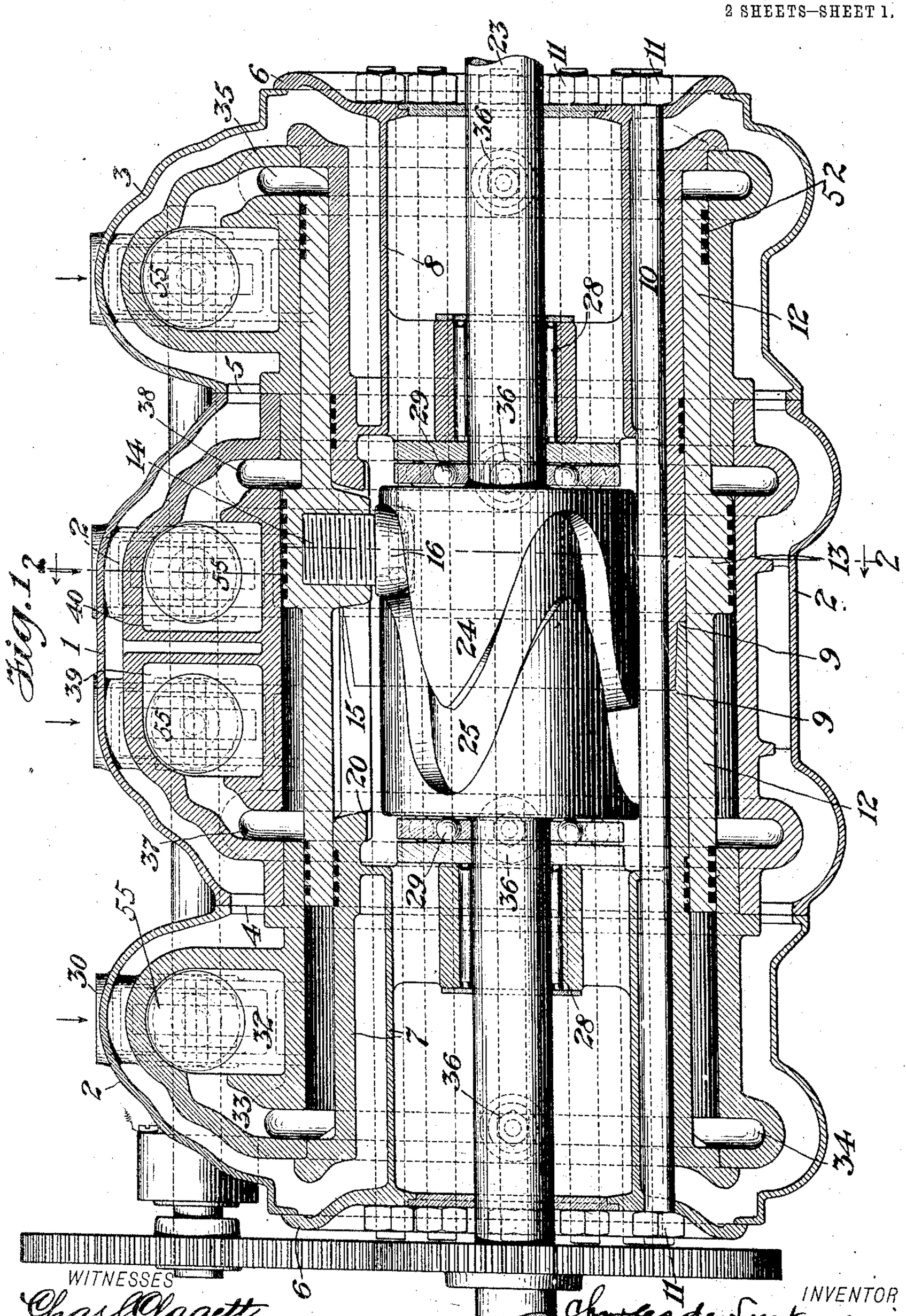


Fig. 1.

WITNESSES

Chas. J. Daggett

Thos. D. Brown.

INVENTOR

Charles de Lukacsevics

BY

George H. Stockbridge

his ATTORNEY

C. DE LUKACSEVICS.

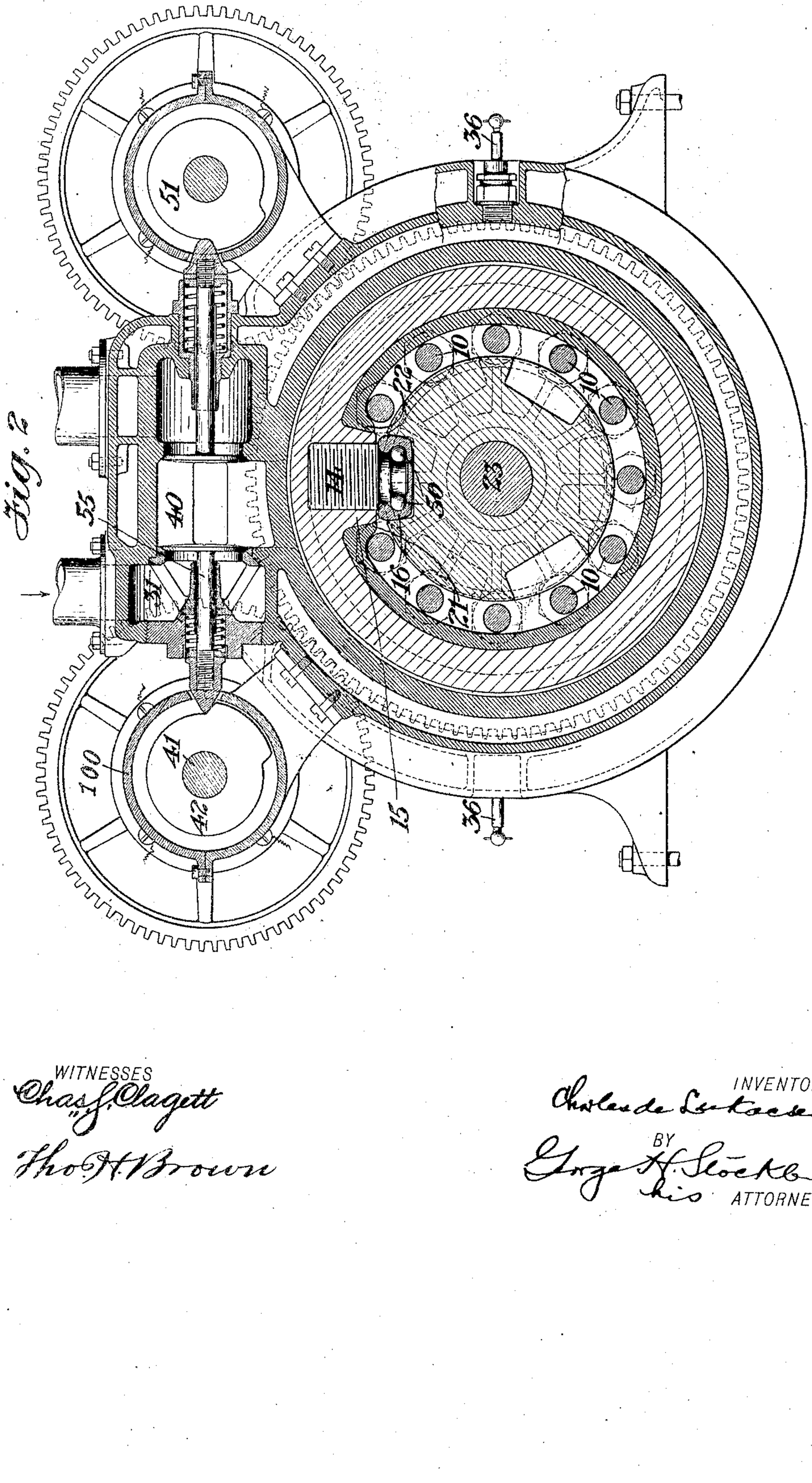
GAS ENGINE.

APPLICATION FILED JUNE 25, 1906.

998,363. Patented July 18, 1911.

2 SHEETS—SHEET 2.

Fig. 2



WITNESSES

Chas. J. Clagett

Thos. H. Brown

INVENTOR

Charles de Lukacsevics

BY

George H. Stockbridge

his ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES DE LUKACSEVICS, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND GEORGE W. MORGAN, JR., OF NEW YORK, N. Y.

GAS-ENGINE.

998,363. Specification of Letters Patent. Patented July 18, 1911.

Application filed June 25, 1906. Serial No. 323,220.

To all whom it may concern:

Be it known that I, CHARLES DE LUKACSEVICS, a citizen of the United States, and resident of New York, county of New York, State of New York, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification.

The present invention relates to improvements in gas engines, the details of which will be fully set forth in the specification which follows.

By way of introduction it may be said that the present gas engine, although embodied in a simple and compact apparatus, is in many ways the equivalent of a four cylinder gas engine so far as effectiveness is concerned.

Figure 1 is a central longitudinal section of the engine of my invention, and Fig. 2 is a transverse section on line 2—2 of Fig. 1.

The frame of the machine consists of what may be called a three-part cylinder, the middle part being shown at 1, the left hand part at 2, and the right hand part at 3. The line dividing 1 and 2 is shown at 4, and the line dividing 1 and 3 is shown at 5. These are simply the junction lines between the end parts and the middle part. The three are joined together and compressed one against another by means of end flanges, 6, 6, at the opposite ends of a central tube or sleeve, 7, 8, these ends being joined on the line 9. Bolts, 10, 10, run through the central tube, and when the nuts, 11, 11, at the ends of these bolts are screwed tight, the flanges 6, 6 are brought against the ends of the parts 2, 3, thereby compressing the elements 1, 2 and 3 into a single frame. When this frame has been thus put together there are provided three separate cylinder chambers in which a piston, 12, reciprocates. Along the central portion the piston-head is provided with a flange, 13, which operates as the piston for the central cylinder, while the two ends, 12, 12, operate as the piston-heads for the two end cylinders already mentioned.

In Fig. 1 it is seen that a screw-pin, 14, is seated in an extension, 15, from the central part of the piston 12, 12, and that it carries on its outer end a roller, 16. By referring to Fig. 2, it will be seen that this roller is provided with ball-bearings, as shown at 50, 50.

The extension 15 passes into a longitudinal slot, 20, arranged in the cylindrical tube 7 and 8. The said slot represents by its length the throw of the piston during any given reciprocation, and by its width from 21 to 22 (see Fig. 2) it shows by what means the extension is held rigidly in a given path from end to end of its movement, so that the piston, while it has a reciprocating motion, cannot rotate.

Inside the cylinder 7, 8, is a main shaft, 23, of the engine and parallel to the axis of the piston 12. On this shaft is rigidly mounted a drum, 24, having a groove, 25, which is so arranged as to change its direction six times upon the periphery of the drum.

It will be understood that the reciprocations of the piston will operate the drum by virtue of the fact that the roller 16 sets into the groove 25 and by coöperating with the walls thereof causes a rotation of the drum and consequently a rotary motion of the shaft 23 itself. It will be clear that each stroke of the piston causes one-sixth part of a revolution of the drum and the shaft 23. For this reason a single rotation of the shaft calls for six strokes of the piston. The shaft 23 is seated in roller-bearings, 28, 28, to reduce the friction while the drum is also provided with ball-thrust bearings shown at 29, 29.

It now remains to describe the mode in which the piston is caused to reciprocate under the influence of gas explosions.

The gas enters at 30 and passes through a valve chamber, 31, into a combustion chamber, 32, and a channel, 33, whence it passes (see Fig. 1) to the communicating combustion chamber, 34, which surrounds the cylinder, 7. In passing from the valve chamber 31 into the combustion chamber 32, the gas traverses an inlet valve, 55. With opposite sides of the combustion chamber 34 communicate igniting plugs, 36, 36. Besides the combustion chamber 34 there exists at the opposite end a similar combustion chamber, 35, and at intermediate points on opposite sides of the extension 13, are combustion chambers 37 and 38. These communicate severally with combustion chambers 39 and 40. Each of the combustion chambers 37, 38, is provided, as already stated, with igniting plugs on opposite sides thereof, while the igniting chambers 39, 40, are each

guarded by an inlet valve 55 and an outlet valve in a manner similar to combustion chamber 32.

The means for igniting the gas in the several chambers consist of a commutator, 100, of the usual type mounted on a shaft, 41, which shaft carries a cam, 42, for operating the valve 55. A similar construction may exist at the right hand side of the machine, and it is not thought necessary to give further details.

Assuming that the first ignition takes place in chamber 34, the cylindrical piston will be driven to the right until it occupies the position shown, for example, in Fig. 1. When this action takes place, the gas in combustion chamber 35 is compressed. Then, the commutator acts to cause the ignition of the gas in the chamber 35, whereupon the piston is forced backward and the gas is compressed in the chamber 37, while the gas in the chamber 34 is pushed out, the cam 51 being so arranged as to open the exhaust valve with which it coöperates so as to let out the burned gas from the chamber 34. The next action of the commutator is that of igniting the gas in the combustion chamber 37, which causes the piston to be moved again to the right; compressing the gas in the combustion chamber 38, and sucking gas into the chamber 34 through the valve 55, which valve is operated by the cam 42 at the appropriate time. After this, the gas in chamber 38 is ignited and the action from that point is repeated, as already set forth.

It is obvious that, in the particular construction shown, six explosions are made in order to produce a single rotation of the driving shaft. I do not limit myself to precisely six turns in the groove 25, but may select any suitable number, although I prefer to make use of either four or six turns. It will thus be seen that in order to produce a single rotation of the driving shaft, the power utilized in each explosion may be very much less than has usually been the case. In other words, I may utilize small amounts of gas at the different combustion chambers, and thereby produce a smaller heating effect, and at the same time secure a very efficient production of power as applied to the piston and the driving shaft. At each rotation of the shaft, six applications of power are made instead of what is usually a single power application for two revolutions.

The effective operation of my six explosions of gas, as applied to the apparatus shown in the drawings, is equivalent to what would ordinarily be the result of twelve cylinders of the usual kind. By virtue of the facts already recited the ordinary reducing gears made use of in apparatus of this kind are no longer necessary, this being due to the fact that the present apparatus provides for a low speed of rotation and that the power is developed at a lower rather than a high speed.

The parts shown at 52, 52 are packing devices intended to prevent leakage. This will be clearly understood by those skilled in the art.

The cylindrical piston 12, 12, together with the flange 13, secured thereto or forming part thereof, forms an important part of the invention herein described. By virtue of the fact that the ends of the piston are represented by the ends of a cylinder of considerable size, the gas which expands under explosion by means of the commutator against one or the other ends of the said piston, is provided with a considerable surface against which the explosion can take place, so that the effect of the gas explosion is an efficient one. Moreover, the flange 13, which itself acts as a piston for the expanding gas from the chambers 37 and 38 also affords a good purchase for the expanding gas to act upon, and the total effect of the explosions of gas upon the cylindrical piston 12, 12, with its flange 13 is of great efficiency.

I claim as my invention:

1. In an engine, a reciprocating tubular piston open at its ends and formed with a plurality of piston-heads, a revoluble shaft mounted within said piston parallel to its axis, a cylinder within which said piston reciprocates, and means connecting said shaft with said piston whereby to operate the shaft by the reciprocations of the piston.

2. In an engine, a reciprocating tubular piston open at its ends and formed with a plurality of piston heads, a revoluble shaft mounted within said piston, parallel to its axis, means intermediate the outermost piston heads connecting said shaft and piston whereby to operate said shaft by the reciprocations of the piston, and a cylinder surrounding said piston.

3. In an engine, a reciprocating tubular piston open at its ends and formed with a plurality of piston heads, a revoluble shaft mounted within and parallel with the axis of said piston, a drum carried by said shaft intermediate the ends of said piston and provided with a peripheral cam groove, means carried by said tubular piston, and having engagement with said groove, whereby the shaft is rotated through the reciprocation of said piston, and a cylinder formed with an annular chamber within which chamber the piston reciprocates.

4. In an engine, a reciprocating open ended tubular piston formed with a plurality of concentrically arranged piston heads, a double walled cylinder between whose walls the piston reciprocates and provided with a plurality of combustion chambers,

means for supplying explosive charges to said chambers, means for effecting explosion of said charges sequentially within said chambers, a revoluble shaft mounted within and parallel with the axis of said piston, a drum provided with a peripheral cam groove mounted on said shaft, and means carried by said piston adapted to operate within said groove whereby to rotate said shaft by the reciprocations of the piston.

5. In an engine, a reciprocating open ended tubular piston formed with a plurality of concentrically arranged piston heads, a cylinder surrounding said piston and provided with sleeves fitting within either end thereof, and connected together at their inner ends, said cylinder and sleeves forming a plurality of combustion chambers containing said piston, a revoluble shaft mounted within and parallel with the axis of said piston, and means connecting said shaft and piston whereby said shaft is operated by the reciprocations of the piston.

6. In an engine, a reciprocating hollow piston comprising a plurality of concentrically arranged piston heads, a cylinder surrounding said piston and having sleeve portions fitting within the opposite ends of said hollow piston, said sleeves and cylinder providing a plurality of combustion chambers, a slot within said sleeves intermediate the ends thereof, a revoluble shaft mounted within said sleeves, and means carried by said piston and shaft whereby the latter is operated through the reciprocations of the former, said piston means operating within the slot of said sleeves whereby to prevent partial rotation of said piston.

7. In a gas engine or like apparatus, a tubular piston open at each end and having a flange or enlargement intermediate said ends, a cylinder having a chamber of a diameter which accommodates said flange during movement of the piston, a shaft parallel with the axis of said piston, a rotatable member mounted on the shaft, and a projection on the inner side of said tubular piston which engages said rotatable member and thereby turns said shaft.

8. In a gas engine or like apparatus, a tubular piston open at each end and provided with a flange or enlargement intermediate said ends, a shaft parallel to the axis of said piston, a rotatable member mounted on the shaft, a projection within said piston opposite its exterior flange or enlargement arranged to engage with said rotatable member and operate said shaft, and a series of combustion chambers associated one with each end of the piston and one with opposite sides of said flange or enlargement.

Signed at New York, in the county of New York, and State of New York, this 21st day of June, A. D. 1906.

CHARLES DE LUKACSEVICS.

Witnesses:

GEORGE H. STOCKBRIDGE,

THOS. H. BROWN.