No. 706,494. Patented Aug. 5, 1902.

M. T. MINOGUE.

MOTIVE POWER ENGINE.

(Application filed June 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

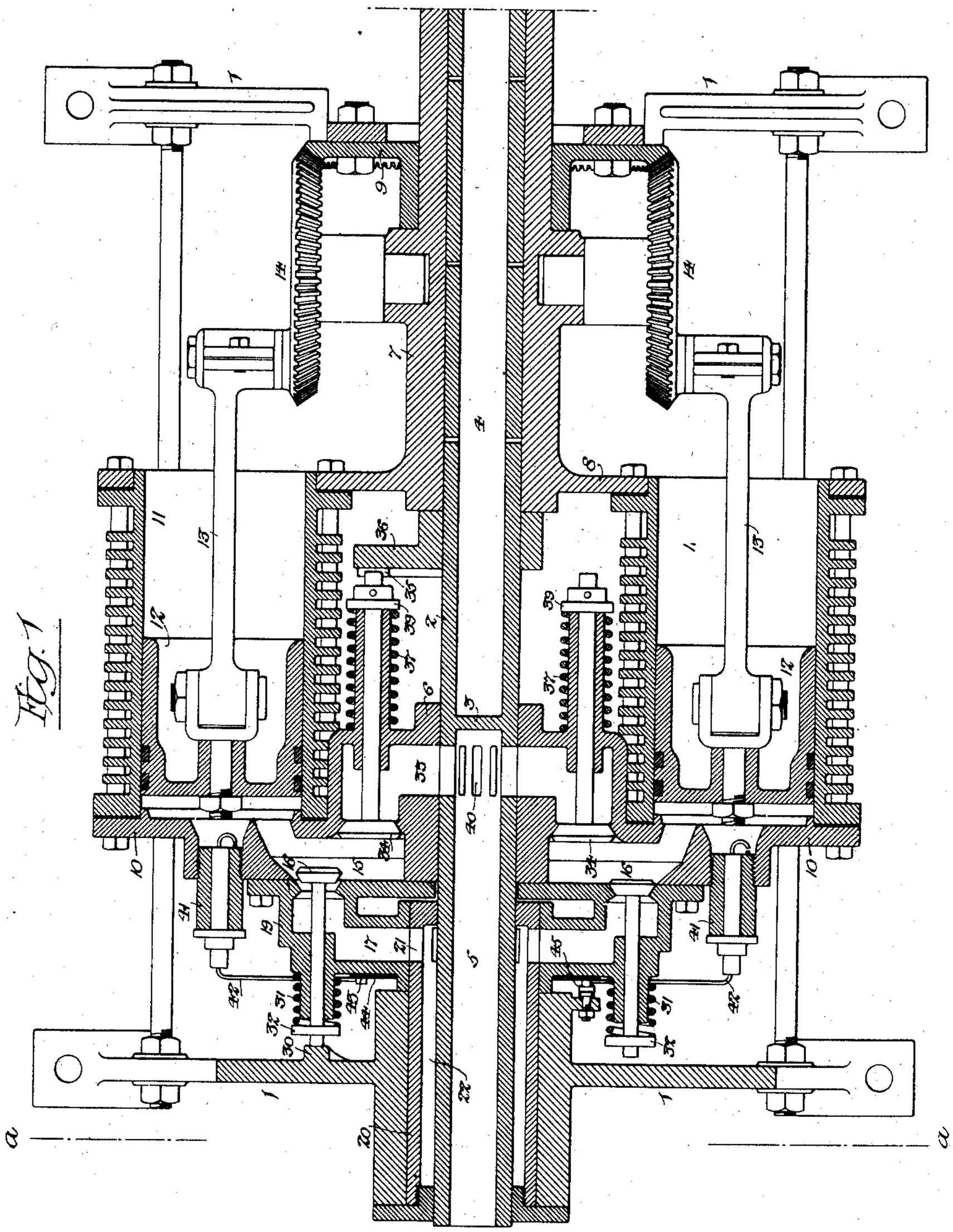

FIG. 1

Witnesses:-
Louis W. T. Whitehead

Inventor:-
Martin T Minogue
by his Attorneys:-
Howson & Howson

No. 706,494.

Patented Aug. 5, 1902.

M. T. MINOGUE.

MOTIVE POWER ENGINE.

(Application filed June 5, 1901.)

(No Model.)

2 Sheets—Sheet 2

Fig. 4.

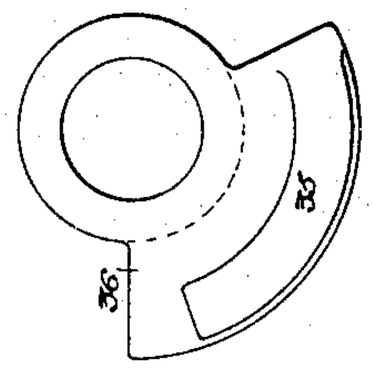

Fig. 2.

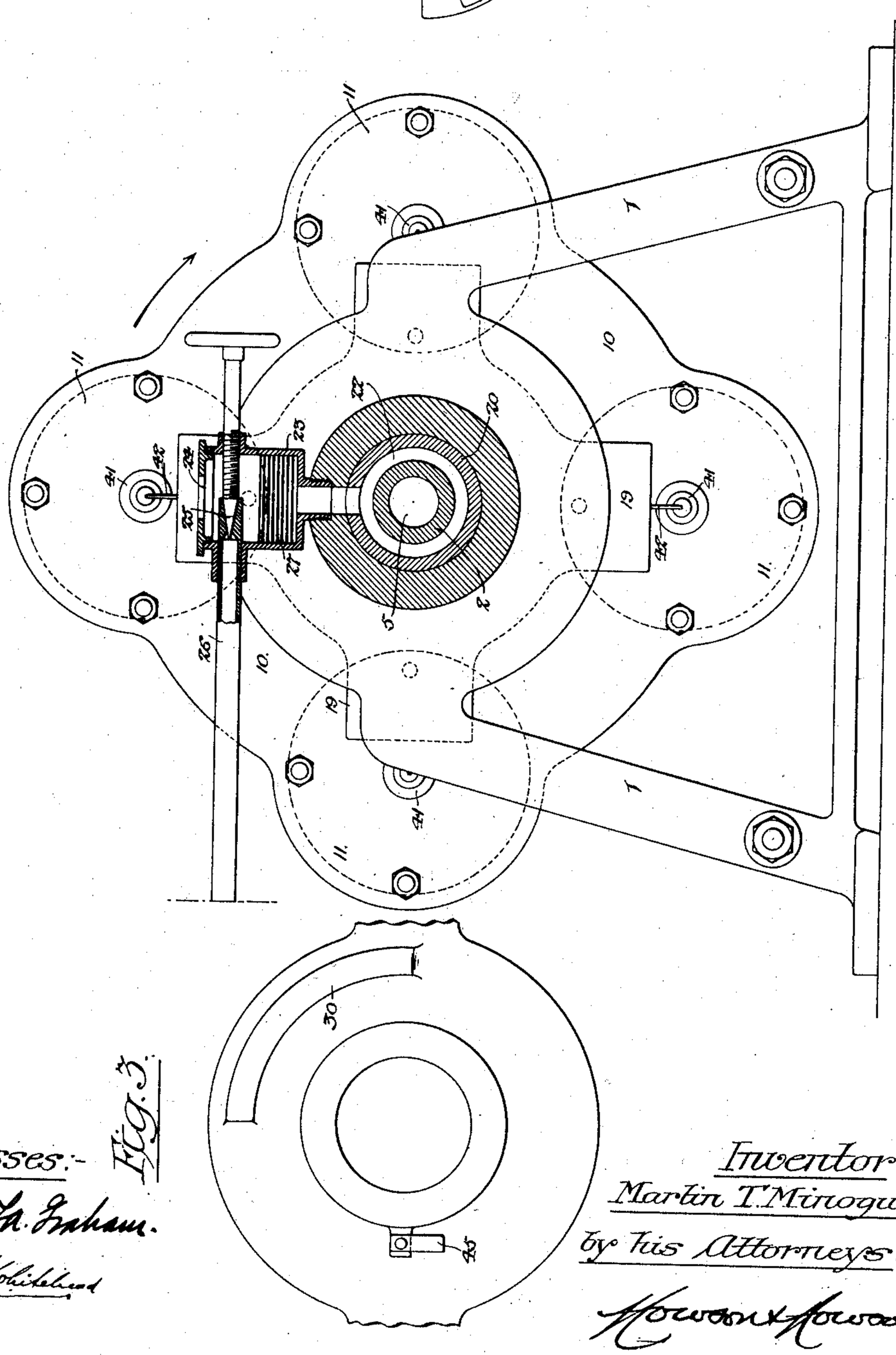

Fig. 3.

Witnesses:-

Frank L. Ingham.

Louis W. Schickelgruber

Inventor:-

Martin T. Minogue

by his Attorneys:-

Howson & Howson

UNITED STATES PATENT OFFICE.

MARTIN T. MINOGUE, OF SPRINGFIELD, OHIO, ASSIGNOR OF ONE-HALF TO SIMEON F. PIERCE, OF ST. PAUL, MINNESOTA.

MOTIVE-POWER ENGINE.

SPECIFICATION forming part of Letters Patent No. 706,494, dated August 5, 1902.

Application filed June 5, 1901. Serial No. 63,241. (No model.)

To all whom it may concern:

Be it known that I, MARTIN T. MINOGUE, a citizen of the United States, residing in Springfield, Ohio, have invented certain Improvements in Motive-Power Engines, of which the following is a specification.

My invention relates to that class of engines in which are employed a series of cylinders, each with reciprocating piston, said cylinders being mounted so as to turn around an axis parallel with the cylinder-axes, the objects of my invention being to construct a simple and effective form of engine of this type which can employ steam, air, or other motive fluid under pressure or can operate as an explosive-engine, using as motive fluid a mixture of air and gas or air and hydrocarbon vapor.

The special features of construction or combinations of parts constituting my invention are fully set forth and specifically claimed hereinafter.

In the accompanying drawings, Figure 1 is a sectional plan view of an engine embodying my invention. Fig. 2 is a transverse section on the line *a a*, Fig. 1; and Figs. 3 and 4 are face views of certain cam structures of the engine.

The fixed frame of the engine is represented at 1, and this frame has securely attached to it at one end a central hollow shaft 2, which is divided by a transverse partition 3 into two chambers 4 and 5, the former constituting a chamber for the reception of lubricant and the chamber 5 representing the exhaust-chamber of the engine.

The cylinder structure of the engine is carried by a hub 6 and by a tubular shaft 7, both of which are free to turn on the shaft 2, the shaft 7 also having a bearing in the hub of an annular rack 9, which is fixedly secured to the frame 1 by bolts and nuts or in any other available manner.

The outer ends of the cylinders 11 are carried by a flange 8 on the shaft 7, and the inner head 10 of the cylinder structure of the engine forms part of the hub 6, there being in the present instance four cylinders 11, each open at the outer end and containing a trunk-piston 12, which is connected by a rod 13 to a crank-pin on a pinion 14, which meshes with the annular rack 9 and has a short shaft free to turn in a bearing on the tubular shaft 7, as shown in Fig. 1, whereby as the pistons 12 reciprocate in the cylinders 11 rotating movement will be imparted to the pinions 14, and the latter by reason of their engagement with the fixed rack 9 will be caused to travel around the latter and will thus cause the cylinder structure of the engine and the hollow shaft 7 to rotate around the axis of the central shaft 2, the shaft 7 being the means of transmitting the power of the engine.

Suitable openings in the shaft 2 serve to permit the lubricant therein to gain access to the bearing between said shaft and the shaft 7.

Each of the cylinders 11 is provided with lateral circumferential ribs, as shown in Fig. 1, so as to present a large area of radiating-surface, which as it is carried around rapidly through the air will be cooled thereby and will thus serve to maintain the cylinders in the cool condition necessitated by the requirements of an engine of the explosive type.

The head 10 of the cylinder structure contains a series of combined induction and eduction passages 15, one for each of the cylinders 11, each of these passages communicating with the inner end of its respective cylinder and also communicating through an opening controlled by a valve 16 with a supply-chamber 17, contained in a hollow head 19, secured to the cylinder-head structure 10 and rotating therewith, said head 19 turning upon a sleeve 20, which is fixedly mounted upon the end frame 1 of the engine and has ports 21, through which the chamber 17 can communicate with a space 22, intervening between the sleeve 20 and the central shaft 2, this space 22 being in communication with a carbureter 23, Fig. 2, mounted upon the fixed frame 1 and having an air-inlet 24 and a valve 25 controlling the inlet of oil or gas from a supply-pipe 26, which communicates with any adjacent reservoir in which said oil or gas is maintained under pressure.

If the engine is intended to use gasolene or other hydrocarbon, the carbureter 23, by preference, contains a series of perforated disks 27 or other means for insuring intimate admixture of the hydrocarbon and air, so as to properly vaporize said hydrocarbon, and thus

produce an explosive mixture for use in the engine.

The stem of each of the valves 16 passes through a suitable bearing in the head 19 and is acted upon by a cam 30 on the fixed frame 1 of the engine, so as to be opened at the proper time during the rotation of the cylinder structure, closing of the valve being effected by the action of a spring 31 upon a flange or collar 32 on the valve-stem, as will be readily understood on reference to Fig. 1.

The cylinder-head structure 10 of the engine also contains an exhaust-chamber 33, communication between the chamber 15 and said exhaust-chamber being controlled by valves 34, one for each cylinder of the engine, the stems of these valves being acted upon by cams 35 on a structure 36, fixedly mounted on the shaft 2, so that said valves 34 will also be opened at the proper time during the rotation of the cylinder structure, the closing of each valve being effected by the action of a spring 37 on a flange or collar 39 on the valve-stem, as shown in Fig. 1.

The chamber 33 communicates with the exhaust-outlet 5 of the shaft 2 through suitable ports 40, as also shown in Fig. 1.

In connection with each of the cylinders of the engine is employed an electric igniter, consisting of a plug 41, screwed into an opening in the head 10 and carrying the electric terminals of the igniter, one of these terminals being insulated from the other and being connected by a wire 42 to a contact-block 43 on an insulating-ring 44, mounted upon the head 19, this contact-block at a certain point in the rotation of the head 19 coming in contact with a spring-contact finger 45 on the fixed structure 1 of the engine. This spring-contact finger is connected to one pole of the sparking-coil employed in connection with the igniter, the other pole of said coil being connected to each of the blocks 41, so that the spark will be produced only when the block 43 is in contact with the finger 45.

The engine shown is of the four-cycle type—that is to say, one in which the first outward movement of the piston in the cylinder draws into the same the explosive mixture, which is compressed in the cylinder on the first inward movement of the piston, being then exploded, so as to force the piston outward on the active stroke, the spent gases being ejected from the cylinder on the next inward movement of the piston therein.

As shown in Fig. 1, both of the pistons are at the inward limit of the stroke, the piston at the top of the view being about to make its stroke for drawing in the explosive mixture and the piston at the bottom of the view being about to make its active stroke by reason of the explosion of the compressed mixture contained in the inner end of the cylinder and in the chamber 15.

In the cylinders at right angles to those shown in Fig. 1—that is to say, in the cylinders which are respectively at the top and bottom of Fig. 2—the pistons will be at the outer end of the stroke, that in the upper cylinder having completed the drawing-in of the explosive mixture and being about to move inward to compress the same and that in the lower cylinder having completed its active stroke and being about to move inward to express the spent gases from the cylinder. The cams 30 and 35 are so disposed as to effect the proper movement of the valves 16 and 34—that is to say, during the indraft of the motive fluid the valve 16 will be open and the valve 34 closed, during the compression and during the active stroke both of said valves will be closed, and during the ejection of the spent gases from the cylinder the valve 34 will be open and the valve 16 closed.

By adopting the principle of a multicylinder structure revolving around a common axis parallel with the longitudinal axes of the cylinders I am enabled to construct a very simple and compact type of motor, since the use of all independent cam-shafts and gearing for operating the same is rendered unnecessary, the rotation of the cylinder structure and its various valves permitting of the use of fixed cams for operating said valves. Moreover, the rapid movement of the cylinders through the air so cools the ribbed surfaces of the same that no special means for circulating a cooling agent in contact with the cylinders is required. For these reasons my engine is well adapted for employment as a motive power for vehicles, in which structures simplicity of construction and economy of space are especially desirable.

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

1. The combination in an engine, of a series of cylinders each with reciprocating piston therein, a cylinder-carrying structure rotatable about an axis parallel with the axes of all the cylinders, a series of pinions each rotated by connection with the piston of one of the cylinders and each rotating with and rotatable on the cylinder-carrying structure, and a fixed annular rack with which said pinions mesh, substantially as specified.

2. The combination in an engine, of a series of cylinders, a cylinder structure rotatable around an axis parallel with the axes of all of said cylinders, a series of pinions carried by said rotating cylinder structure but rotatable thereon on axes at right angles to its axis of rotation, a fixed annular rack with which said pinions mesh, and trunk-pistons reciprocating in the cylinders of the engine, each of said pistons being connected by a swinging rod to a crank-pin of one of the pinions, substantially as specified.

3. The combination in an engine, of a frame, a series of cylinders each having a reciprocating piston therein, a fixed shaft parallel to the axes of the cylinders, a cylinder structure rotatable about said shaft having inlet and ex-

haust chambers for the motive fluid, valves governing the communication between the cylinder and said inlet and exhaust chambers, and cams on the shaft and on the frame for operating said valves as the cylinder structure rotates, substantially as described.

4. The combination in an engine of a frame, a series of cylinders each having a reciprocating piston therein, a fixed shaft parallel to the axes of the cylinders, a cylinder structure rotatable about said shaft having inlet and exhaust chambers for the motive fluid, spring-closed valves on the cylinder structure governing communication between the cylinders and said inlet and exhaust chambers, and fixed cams upon the said shaft and upon the frame, one set of said cams acting upon the stems of the inlet-valves to open the same as the cylinder structure rotates, and the other set of cams acting upon the stems of the exhaust-valves, substantially as described.

5. The combination of a fixed frame having attached to it an annular rack, a shaft carrying rotatable pinions meshing with said rack, a cylinder structure fixed to the shaft, cylinders provided with pistons carried by said structure having their axes parallel to said shaft, and a connecting-rod between each piston and one of the pinions whereby reciprocating motion of the piston causes its respective pinion to move on said rack, substantially as described.

6. The combination of a fixed frame having attached to it a beveled gear forming an annular rack, a shaft carrying beveled pinions meshing with said rack, a cylinder structure fixed to the shaft, cylinders provided with pistons carried by said structure having their axes parallel to said shaft and a connecting-rod between each piston and one of the pinions whereby the reciprocating motion of the pistons causes the pinions to move on the rack, substantially as described.

7. The combination of a fixed frame having attached to it an annular rack, a shaft carrying a number of auxiliary shafts, pinions on said shafts meshing with said rack, a cylinder structure fixed to the shaft, cylinders provided with pistons and carried by said structure, said cylinders having their axes parallel to the shaft, and means for connecting each piston with one of the pinions whereby the reciprocating motion of the pistons results in a rotary motion of the cylinder structure with its attached shaft, substantially as described.

8. The combination in an engine of a series of cylinders, a cylinder structure rotatable around an axis parallel with the axes of the cylinders and having inlet and exhaust chambers for the motive fluid, valves for controlling the flow of motive fluid to and from the cylinders, and a hollow fixed shaft having within it a partition at right angles to its axis whereby a chamber is formed at one end of said shaft for containing lubricating material, and a second chamber is formed at the other end; said second chamber forming an exhaust-passage and communicating with the exhaust-chamber of the cylinder structure, substantially as described.

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

MARTIN T. MINOGUE.

Witnesses:
F. E. BECHTOLD,
JOS. H. KLEIN.