

No. 683,399.

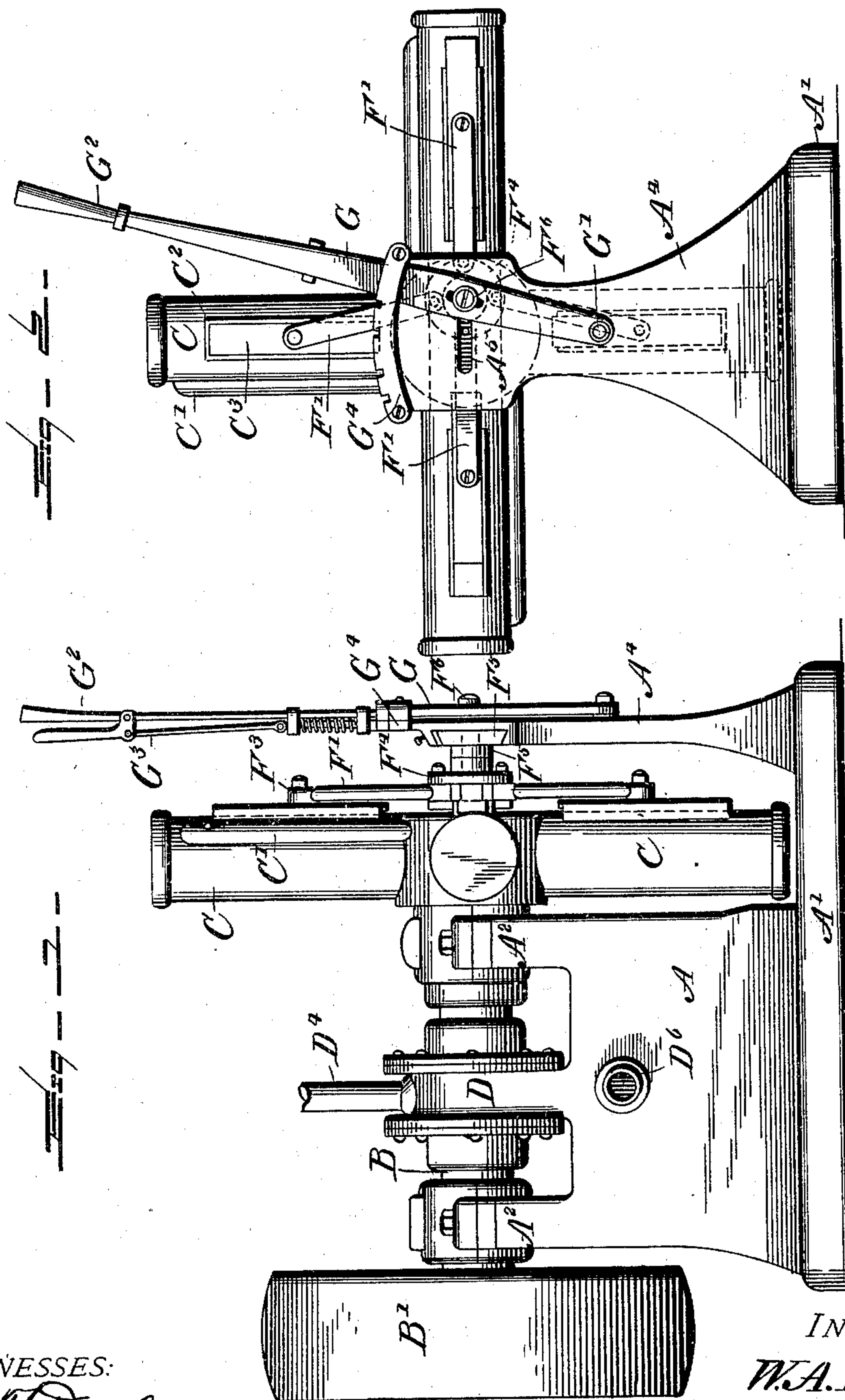
Patented Sept. 24, 1901.

W. A. HILL.
ENGINE.

(Application filed Apr. 29, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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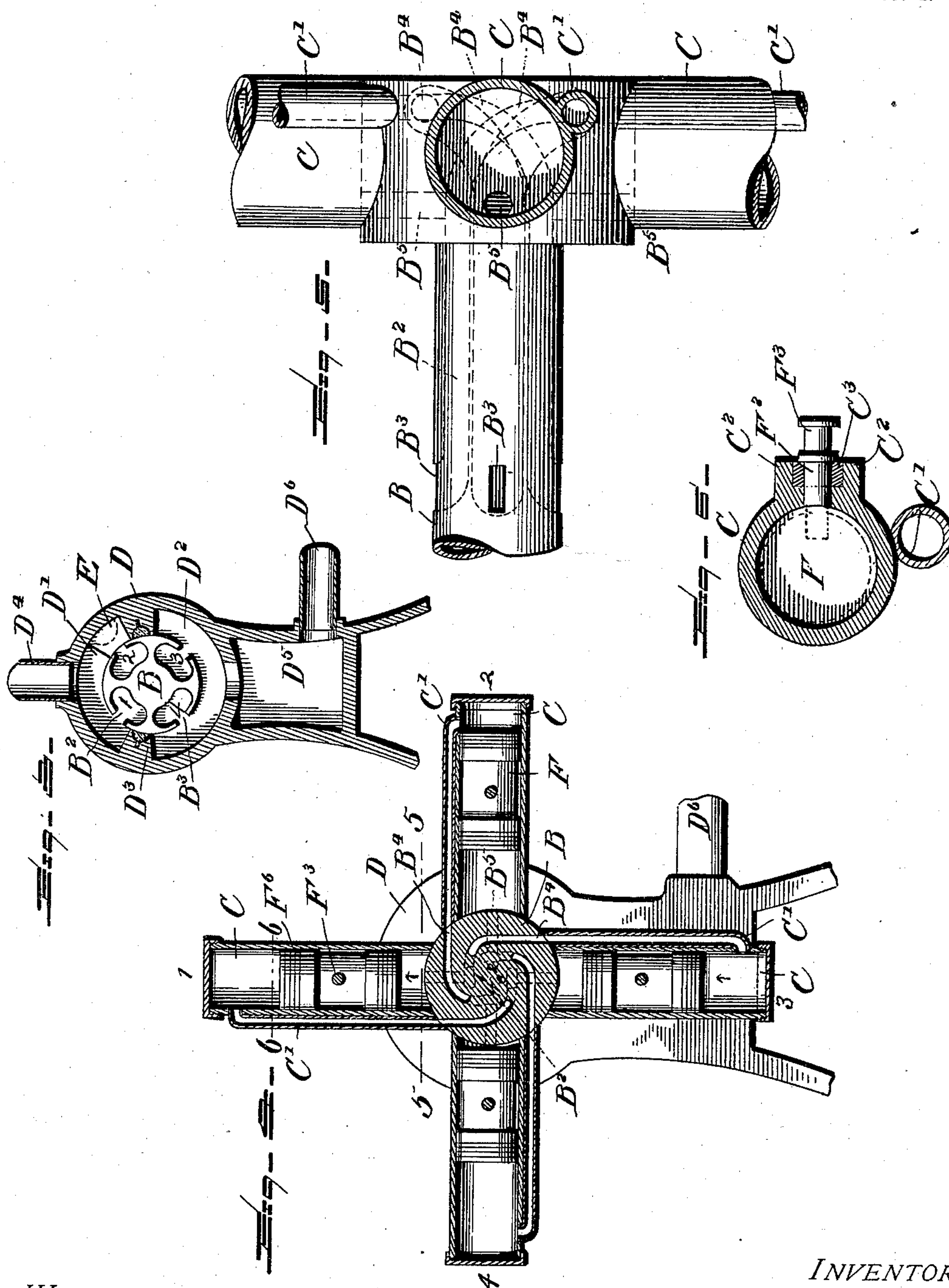
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WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM A. HILL, OF RUTLAND, VERMONT, ASSIGNOR OF ONE-HALF TO
FRED R. PATCH, OF SAME PLACE.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 683,399, dated September 24, 1901.

Application filed April 29, 1901. Serial No. 58,026. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. HILL, a citizen of the United States, residing at Rutland, in the county of Rutland, State of Vermont, have invented certain new and useful Improvements in Revolving - Cylinder Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to a revolving-cylinder engine, and particularly to a structure wherein a plurality of cylinders are mounted upon a rotatable shaft and connected by piston-rods to a relatively fixed point, which is adapted to be shifted into positions eccentric to the axis of said shaft.

15 The invention has for an object to provide a structure of rotatable shaft carrying a plurality of pistons whereby the propelling medium shall be fed to the respective cylinders in succession and exhausted therefrom, so as to produce a continuous rotation of the shaft and cylinders carried thereby.

20 A further object of the invention is to provide means whereby a relatively fixed point of connection for the piston-rods from the cylinders may be shifted into positions either concentric to the axis of the rotating shaft of the cylinders or eccentric thereto when it is desired to rotate said shaft.

25 A further object of the invention is to provide an improved structure of rotating driving means adapted to operate within a steam-chest having inlet and exhaust chambers, whereby the cylinders are fed directly from the shaft upon which they are mounted and numerous auxiliary connections obviated, thus simplifying the structure of engine and rendering the operation thereof direct and positive.

30 Other objects and advantages of the invention will hereinafter appear in the following description and the novel features thereof will be particularly pointed out in the appended claims.

35 In the drawings, Figure 1 is a side elevation of an engine embodying this invention. Fig. 2 is an end elevation of the same. Fig. 3 is a vertical section through the steam-chest of the engine. Fig. 4 is a similar section through the cylinders and driving-shaft. Fig. 5 is

an enlarged horizontal section with parts broken away on the line 5 5 of Fig. 4; and Fig. 6 is a horizontal section on the line 6 6 of Fig. 4, showing the method of connecting 55 the piston within the cylinder with its rod.

Like letters of reference indicate like parts throughout the several figures of the drawings.

The letter A designates a frame, which may 60 be of any suitable construction and provided with a foundation-plate A'. At the opposite ends of this frame bearing-boxes A² are provided for the driving-shaft B and one end of this shaft with the usual driving-pulley B'. 65 The opposite end of the shaft is provided with a plurality of cylinders C, radially disposed to the shaft, as shown in Fig. 2.

Supported from the frame A is a stationary steam-chest D, through which the shaft B 70 passes. This chest has at its upper portion an inlet-chamber D' and at its lower portion an exhaust-chamber D², separated by bridge-walls D³ at opposite sides, each being provided with a suitable packing. The inlet-chamber 75 communicates with a suitable supply-pipe D⁴ for the motive power, while the exhaust-chamber communicates with an enlarged chamber D⁵ and an exhaust-pipe D⁶ leading therefrom. Within the steam-chamber a cut-off valve E 80 is located, as will be more fully hereinafter described.

The shaft B is provided with a series of longitudinal channels B² therein, corresponding in number with the cylinders carried at 85 the end of the shaft B. These passages are closed throughout their length and provided with an opening B³ within the steam-chest, which alternately communicates with the inlet and exhaust chambers.

Each of the cylinders C is provided with a 90 passage C', communicating with the outer end thereof and extending from the shaft B, where they communicate with a passage B⁴, extending from the channels B² to the passages C'. 95 The inner ends of the cylinders also communicate with these passages B² by means of passages B⁵, as shown by dotted lines in Fig. 4, the arrangement of parts being such that the inlet-passage for any one cylinder communicates with the channel at the opposite 100 side of the shaft B from that with which the

exhaust-passage communicates. It will be understood that the cylinders and connections are firmly secured to the shaft and rotated therewith, while the inlet and exhaust of steam are entirely controlled by the movement of the shaft within the steam-chest, wherein one channel thereof alternately communicates with the inlet-chamber and with the opposite end of two cylinders.

Each of the cylinders is provided with a piston F, of any desired construction, adapted to be driven in one direction by the pressure of the motive power and to be restored to its initial position by its operative connection with the other parts of the engine, as the cut-off valve E determines the length of cut-off and permits a direct steam-pressure in only one channel at a time. Each of these pistons is connected with a piston-rod F' by means of a stud F², extending through the slotted wall at one side of the cylinder, which wall is provided with guide-flanges C², adapted to retain in position a cover-plate C³, through which the stud F² passes and which plate forms a closure over the slot in the side of the cylinder. The stud F² forms a wrist-pin connection at F³ for the piston rods or straps F', which at their opposite ends are pivotally mounted on a disk F⁴ in any suitable manner, as shown in Figs. 1 and 2. This disk is in turn rotatably mounted, as shown at F⁵ in Fig. 1, and its fixed point of support is carried by a slide F⁶, suitably mounted in a standard A⁴, rising from the base A'. This slide F⁵ is seated within any usual dovetailed recess of the standard, which is provided with a slot A⁵, adapted to receive a pin F⁶, journaled in the slotted lever G at a point above the pivot G' of said lever. The upper end of the lever G is provided with a handle G², upon which a suitable latch mechanism G³ is supported and adapted to cooperate with a locking-segment G⁴, carried at the upper end of the standard for the purpose of retaining the disk in a position either concentric or eccentric to the axis of the driving-shaft B.

In the operation of the engine the steam is admitted to the cylinder through the chest D, whence it passes through the channel B², connecting passages B⁴ and B⁵ to the opposite ends of two of the cylinders C. The piston-rods from all of the cylinders are connected to the disk F⁴, which is shifted to a position eccentric to the axis of the shaft B, and the pressure of the motive power upon the piston drives or rotates the cylinder from this eccentric point, as is well known in this art. During this movement the passages B⁴ and B⁵ communicate with one of the channels B² now upon the opposite face of the shaft from the feeding-channel and communicating with the exhaust-chamber D² of the steam-chest. This movement of the cylinder rotates the shaft B, bringing the openings B³ of the passages successively under the cut-off valve E, which is loosely mounted in the steam-inlet chamber

and may be of any desired width to effect a cut-off at the desired length of travel for the piston. As soon as this cut-off closes the channel B² the motive power is shut off from the cylinder just described and the piston returned therein to its initial position through its connection with the disk and in the movement of the successive similar operation of each of the pistons. In order that the operation of two opposite pistons may be clearly understood, the passages B² and cylinders C in Fig. 4 have been respectively numbered 1, 2, 3, and 4, and 1', 2', 3', and 4'. It will thus be seen that the steam from channel 1 enters the inner end of cylinder 1' through the passage B⁵ from the channel 1 and also the outer end of the directly opposite cylinder 3' through the passage B⁴, which also communicates with the channel 1 in the driving-shaft B. It will also be seen that the passages C' and B⁴ from the cylinder 1' communicate with the channel 3 upon the exhaust side of the shaft B, and the opposite passage B⁵ from the inner end of the cylinder 3' also communicates with this channel 3, which acts as an exhaust. During such operations the cylinders 2' and 4' are being restored to their initial position, and in the progressive rotation of the parts the same operation occurs therein as described in connection with cylinders 1' and 3'. In the reversal of the engine the passages B⁴ and B⁵ act in the directly opposite capacity from that heretofore described. This construction applies the power from the two cylinders simultaneously and at a single point, thus increasing the power and capacity of the engine. If it be desired to stop the rotation of the engine, the disk F⁴ may be shifted to a position concentric to the axis of the driving-shaft B, which will render all of the cylinders inoperative, as the force from the piston-rods will be applied in a direct line to the center. If the disk be shifted toward the opposite side of the axis, a reverse movement of the cylinders and shaft will be secured, and the feed to the cylinder will be likewise reversed.

It will be obvious that the controlling-lever G may be shifted to various positions for use as a cut-off to shorten the stroke of the pistons or as a reverse-lever. In this reversing action and the consequent reversal in direction of rotation of the shaft G the cut-off valve E is carried by frictional contact with said shaft to the opposite side of the casing and there acts in the same capacity as before.

It will be apparent that changes may be made in the details of construction and configuration without departing from the spirit of the invention as defined by the appended claims, while the number of cylinders may be varied at will or as found desirable and the connecting passages suitably multiplied or decreased to correspond with such changes in structure. It is also obvious that while the engine is shown as a stationary engine the same may be applied to a vehicle or other rotating machine wherein the rotation of the

cylinders may be directly applied to a rotating member.

Having described my invention, what I claim is—

5 1. In an engine, the combination with a driving-shaft having a series of channels therein, of a series of laterally-disposed cylinders carried thereby and communicating at opposite ends with said channels, pistons
10 within said cylinders, independent connections for each cylinder pivotally secured at opposite ends to said pistons and a fixed point eccentric to the axis of said shaft, and a valve-chest on said shaft to control the feed and ex-
15 haust of the channels therein; substantially as specified.

2. In an engine, the combination with a driving-shaft having a series of channels therein, of a series of radially-disposed cyl-
20 inders carried thereby, pistons within said cylinders, connections between said pistons and a fixed point eccentric to the axis of said shaft, a steam-chest having abutments to form inlet and exhaust chambers surround-
25 ing said driving-shaft and adapted to communicate successively with the several passages in said shafts, and channels extending from said shaft directly to the opposite ends of each cylinder; substantially as specified.

30 3. In an engine, the combination with a driving-shaft having a series of channels therein, of a series of radially-disposed cylinders carried thereby, each having ports at opposite ends thereof, pistons within said cyl-
35 inders, connections between said pistons and a fixed point eccentric to the axis of said shaft, a steam-chest having cut-off abutments to form inlet and exhaust chambers surround-
40 ing said driving-shaft and adapted to communicate successively with the channels in said shaft which communicate with the opposite ends of each cylinder, and means for shifting said fixed point relatively to said shaft; substantially as specified.

45 4. In an engine, the combination with a driving-shaft having a series of channels therein, of a plurality of radially-disposed cylinders communicating at their opposite ends with said channels, a steam-chest having cut-
50 off abutments to form inlet and exhaust chambers communicating successively with the channels in said shaft, pistons disposed within said cylinders, and means for connecting said pistons to a point eccentric to the axis of
55 said shaft; substantially as specified.

5. In an engine, the combination with a driving-shaft having a series of channels therein, of a plurality of radially-disposed cyl-
60 inders communicating at their opposite ends with said channels, a steam-chest having cut-off abutments to form inlet and exhaust chambers communicating successively with the channels in said shaft, pistons disposed with-
65 in said cylinders, studs projecting laterally from said pistons, rods connecting said studs with a rotatably-mounted disk, and means

for shifting said disk in a horizontal plane; substantially as specified.

6. In an engine, the combination with a driving-shaft having a series of channels 70 therein, of a plurality of radially-disposed cylinders communicating at their opposite ends with said channels, a steam-chest having inlet and exhaust chambers communicating with the channels in said shaft, pistons disposed 75 within said cylinders, studs projecting from said pistons, rods connecting said studs with a rotatably-mounted disk, a slide-plate upon which said disk is mounted, a pivoted lever connected to said plate, and means for retain- 80 ing said lever in its adjusted position; substantially as specified.

7. In an engine, the combination with the driving-shaft, of a cylinder disposed radially thereto and having longitudinal opening 85 therein, a piston within said cylinders, a slide-plate over said opening, a stud extending from the piston to said plate, a rod pivotally connected to said stud, and a shifting device pivoted to the opposite end of said rod; sub- 90 stantially as specified.

8. In an engine, the combination with the driving-shaft having a series of longitudinal channels therein, a steam-chest surrounding said shaft and provided at opposite sides with 95 bridge-walls to form inlet and exhaust chambers, a cut-off valve located in said inlet-chamber and adapted to be shifted by the frictional contact with said shaft, and cylinders opera- 100 tively connected to rotate said shaft; substantially as specified.

9. In an engine, the combination with a driving-shaft having a series of channels therein, a plurality of radially-disposed cyl- 105 inders secured to said shaft, passages extending from said channels to the inner end of one cylinder and the outer end of an opposite cylinder, pistons in said cylinders operatively connected to rotate said shaft, and a valve- 110 chest surrounding said shaft to alternately feed and exhaust each passage leading to the cylinders; substantially as specified.

10. In an engine, the combination with a driving-shaft having a series of channels therein, a plurality of radially-disposed cyl- 115 inders secured to said shaft, passages extending from said channels to the inner end of one cylinder and the outer end of an opposite cylinder, a steam-chest surrounding said shaft and provided with inlet and exhaust cham- 120 bers, pistons in said cylinders, rods extending from said pistons to a rotatable disk, and means for shifting said disk into a position either eccentric or concentric to the axis of said shaft; substantially as specified. 125

11. In an engine, the combination with a driving-shaft having a series of channels therein, a plurality of radially-disposed cyl- 130 inders secured to said shaft, passages extending from said channels to the inner end of one cylinder and the outer end of an opposite cylinder, a steam-chest surrounding said shaft

and provided with inlet and exhaust chambers, pistons in said cylinders, rods extending from said pistons to a rotatable disk, a slide-plate upon which said disk is mounted, 5 and a pivoted controlling-lever adapted to shift said slide in a horizontal plane; substantially as specified.

12. In an engine, the combination with a driving-shaft having a series of channels 10 therein, a plurality of radially-disposed cylinders secured to said shaft, passages extending from said channels to the inner end of one cylinder and the outer end of an opposite cylinder, a steam-chest surrounding said 15 shaft and provided with inlet and exhaust

chambers, pistons in said cylinders, rods extending from said pistons to a rotatable disk, a slide-plate upon which said disk is mounted, and a disconnected cut-off valve located 20 in the inlet-chamber of said steam-chest and adapted to be shifted by frictional contact with the driving-shaft when the direction of rotation of the same is reversed; substantially as specified.

In testimony whereof I affix my signature 25 in presence of two witnesses.

WILLIAM A. HILL.

Witnesses:

H. O. CARPENTER,
FRED C. SPENCER.