No. 812,176. PATENTED FEB. 13, 1906.

F. D. ALTHAUSE.

RECISION ENGINE.

APPLICATION FILED JUNE 21, 1905.

6 SHEETS—SHEET 1.

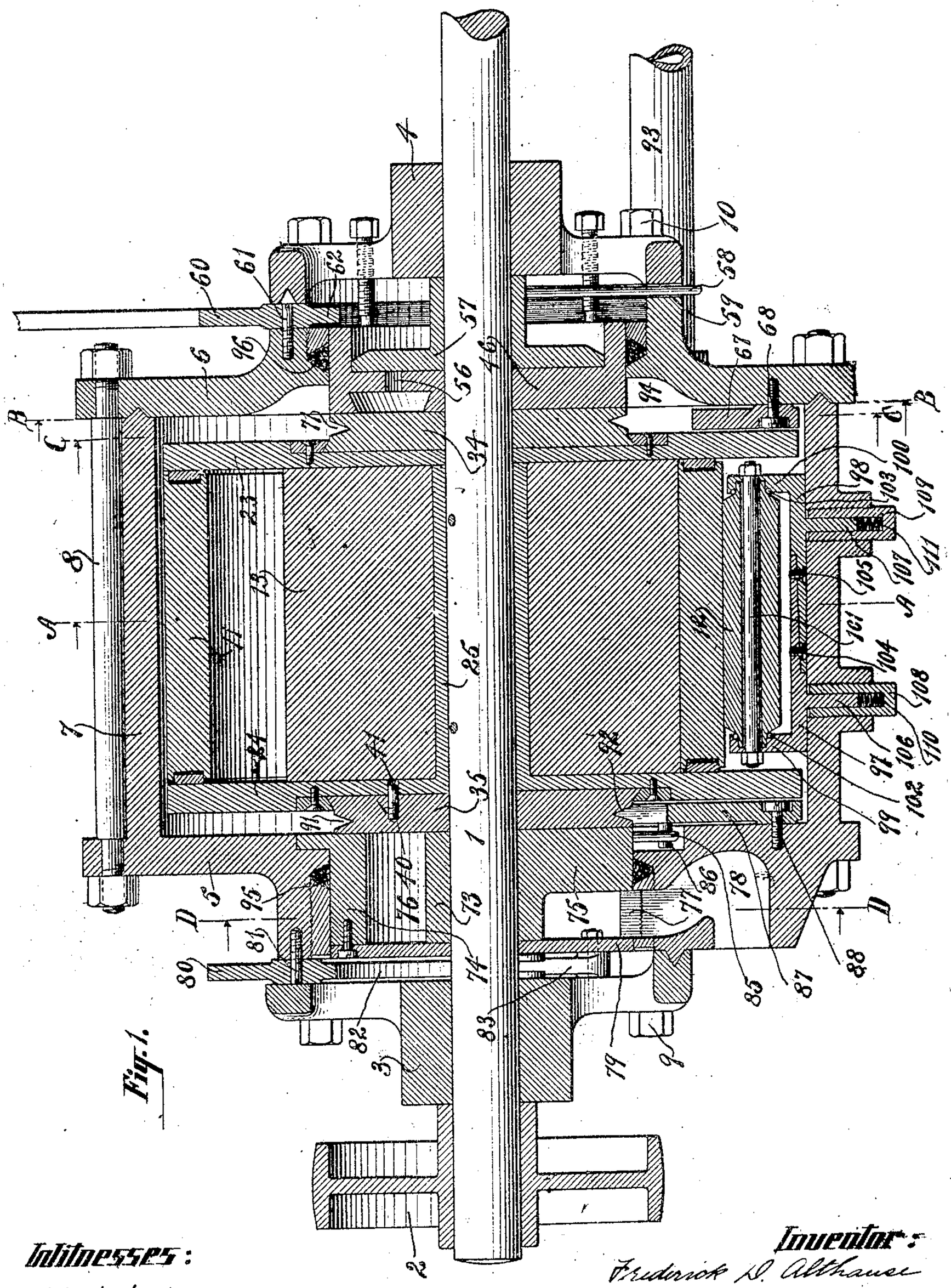

Fig. 1.

Witnesses:

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Henry Orkiewicz.

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6 SHEETS—SHEET 2.

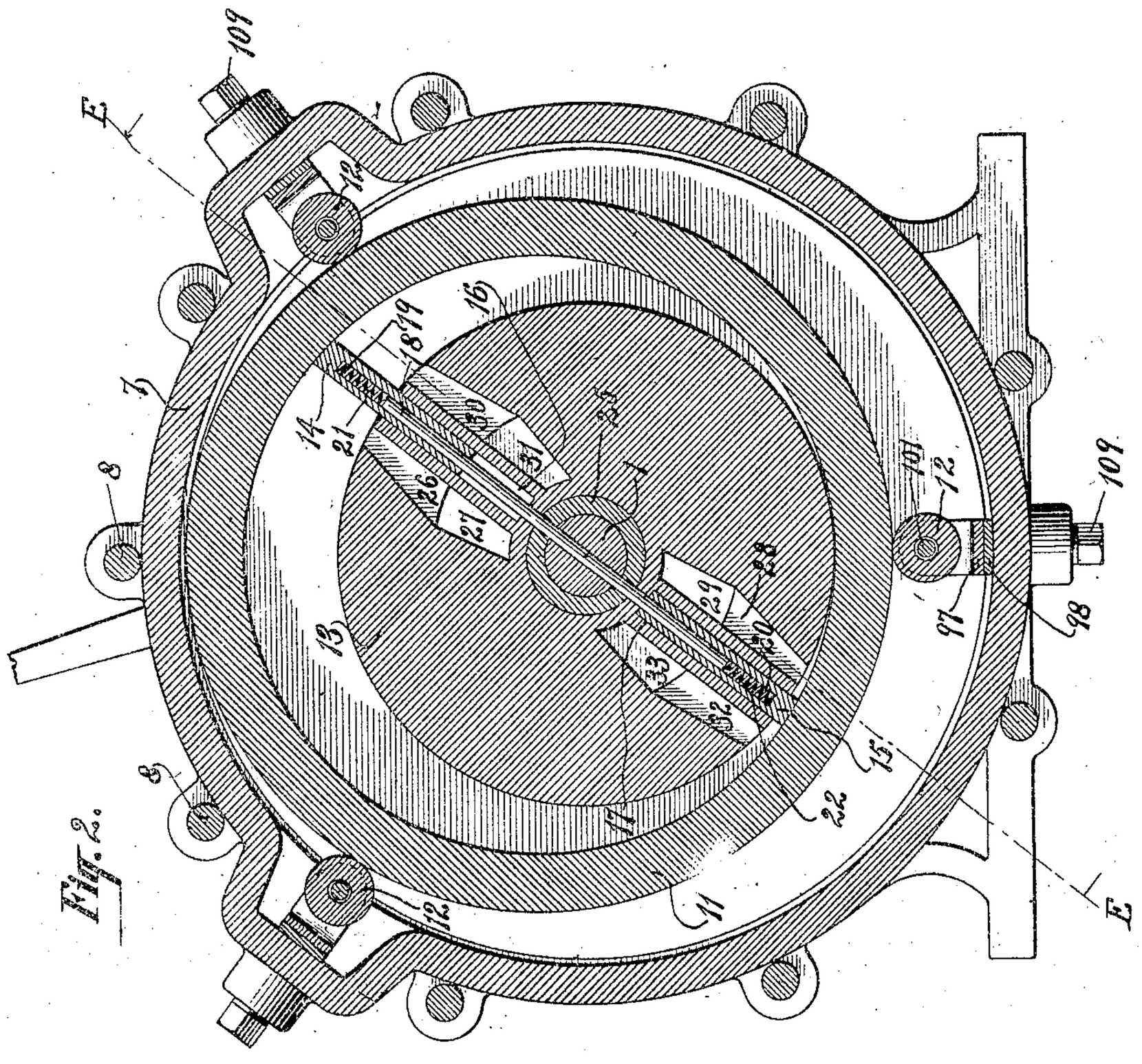

Fig. 2.

Witnesses:

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6 SHEETS—SHEET 3.

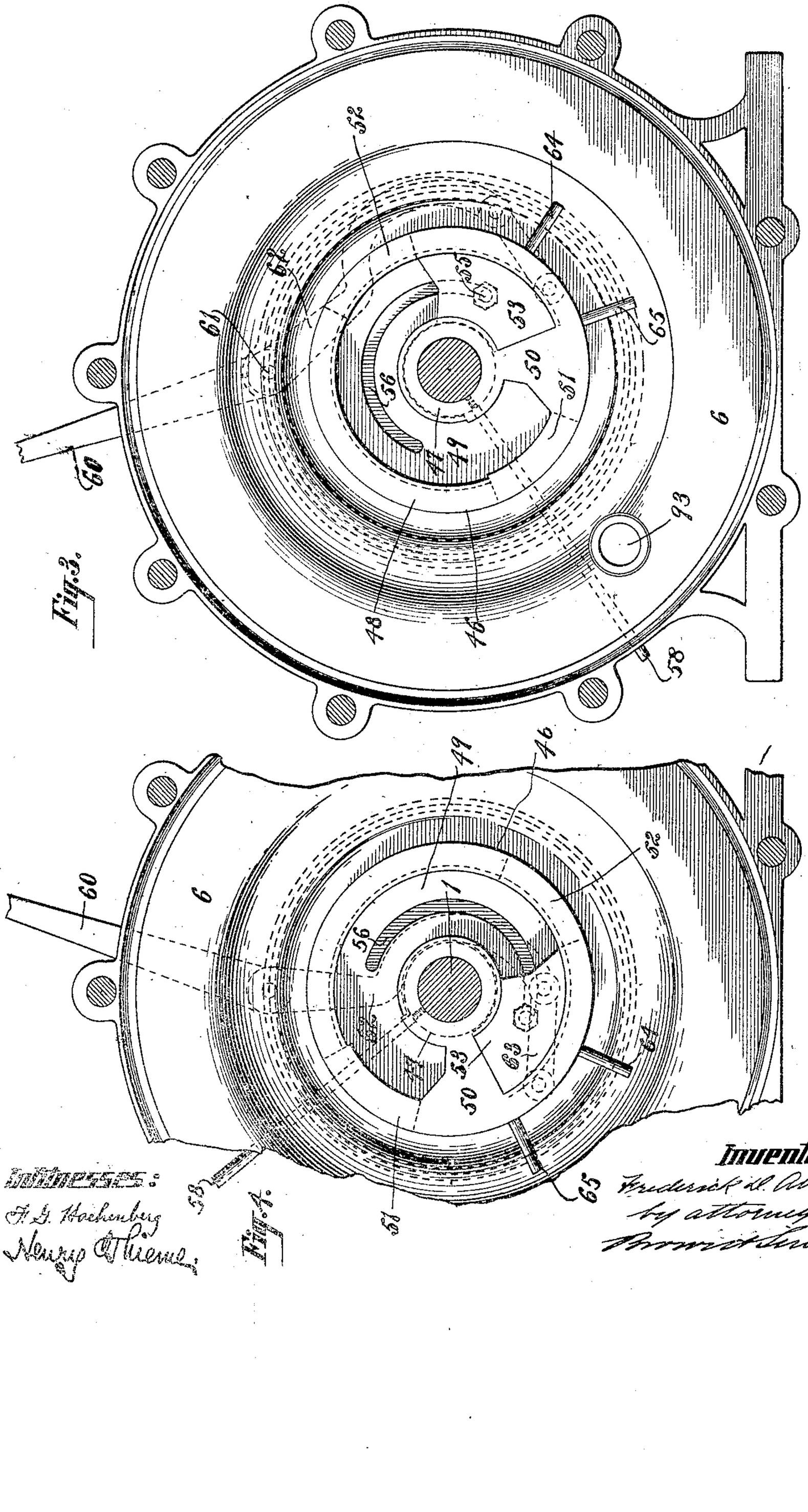

Fig. 3.

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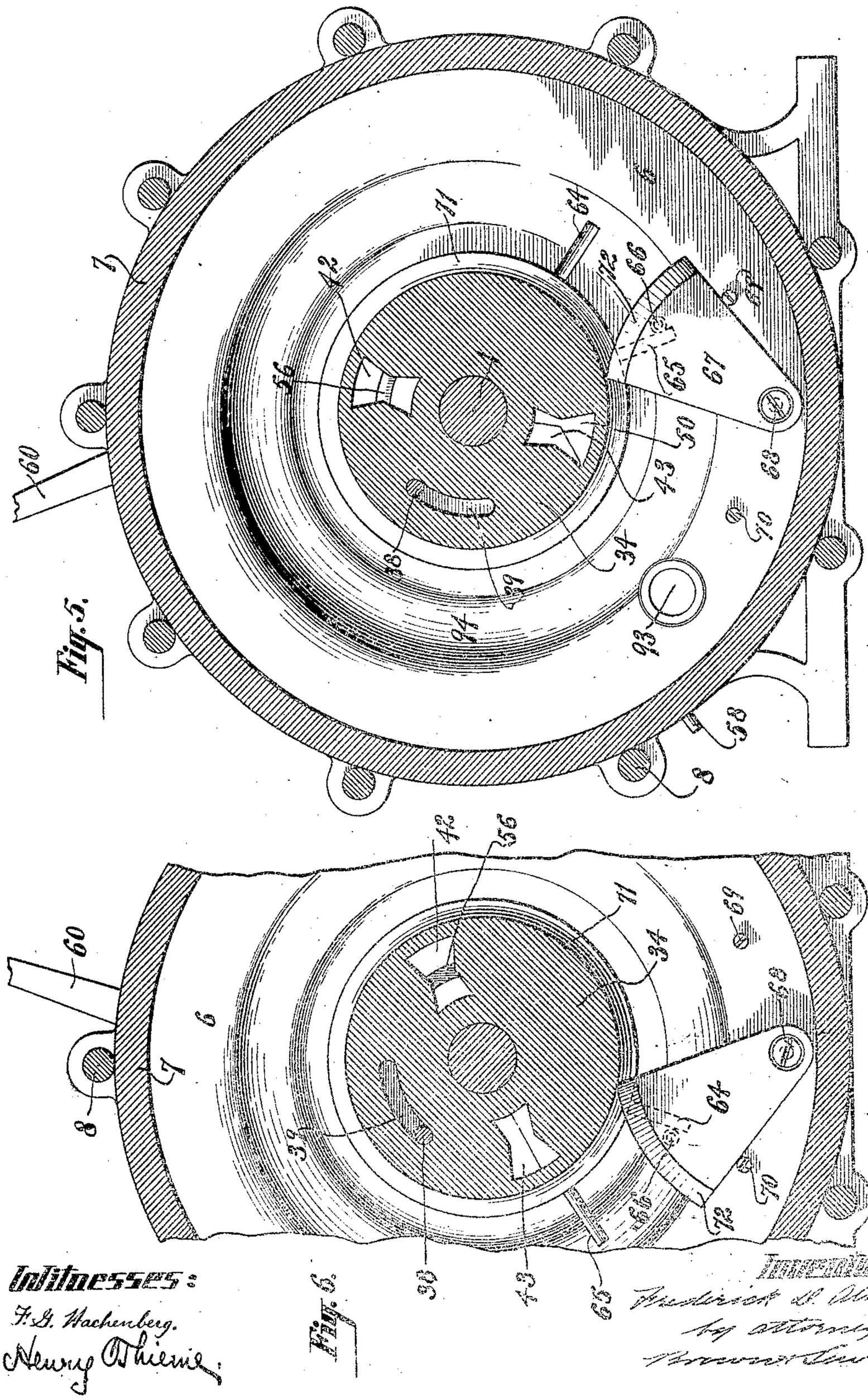

Fig. 5.

Fig. 6.

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6 SHEETS—SHEET 5.

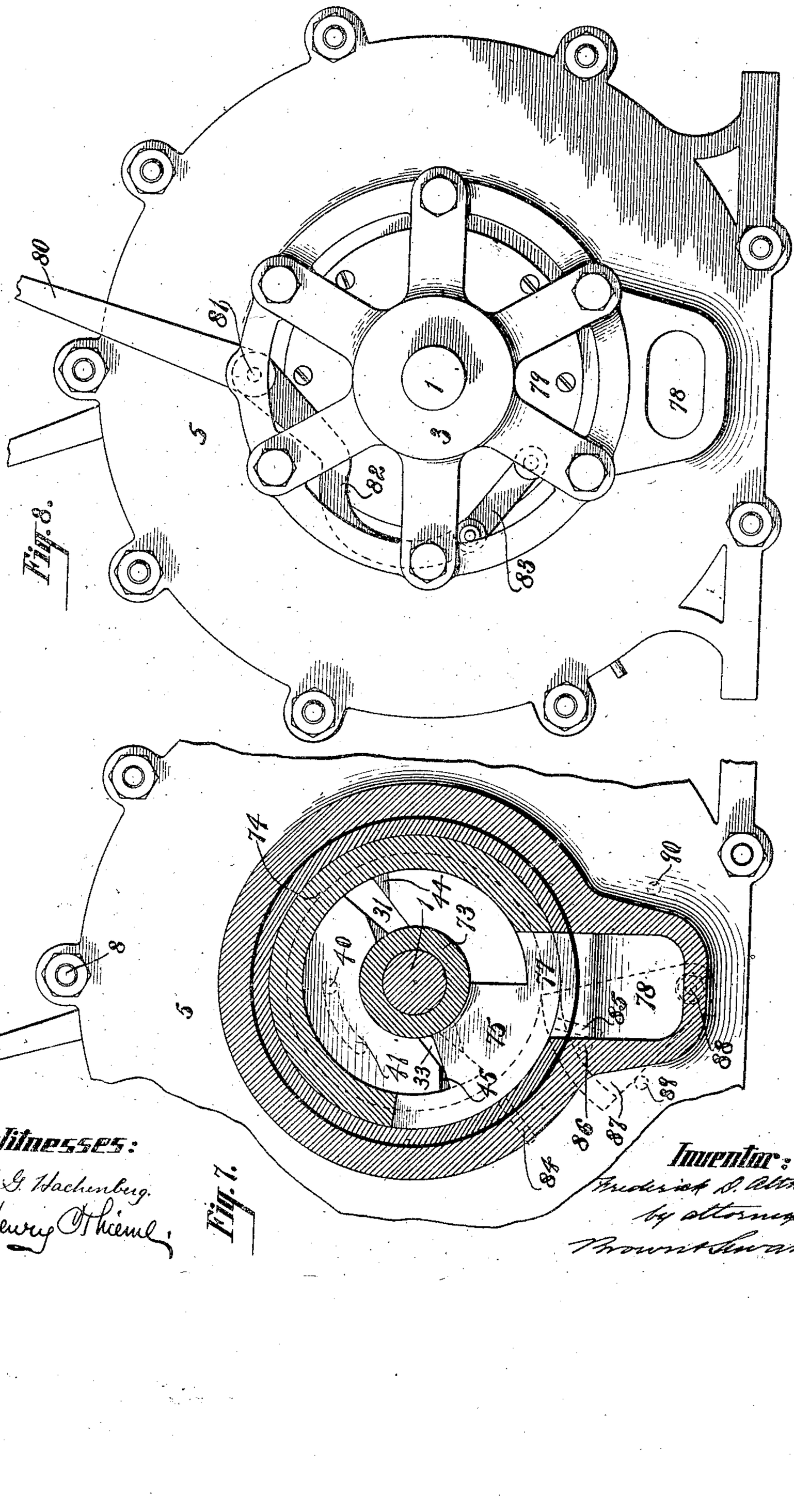

Fig. 8.

Fig. 7.

Witnesses:

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RECISION ENGINE.

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6 SHEETS—SHEET 6.

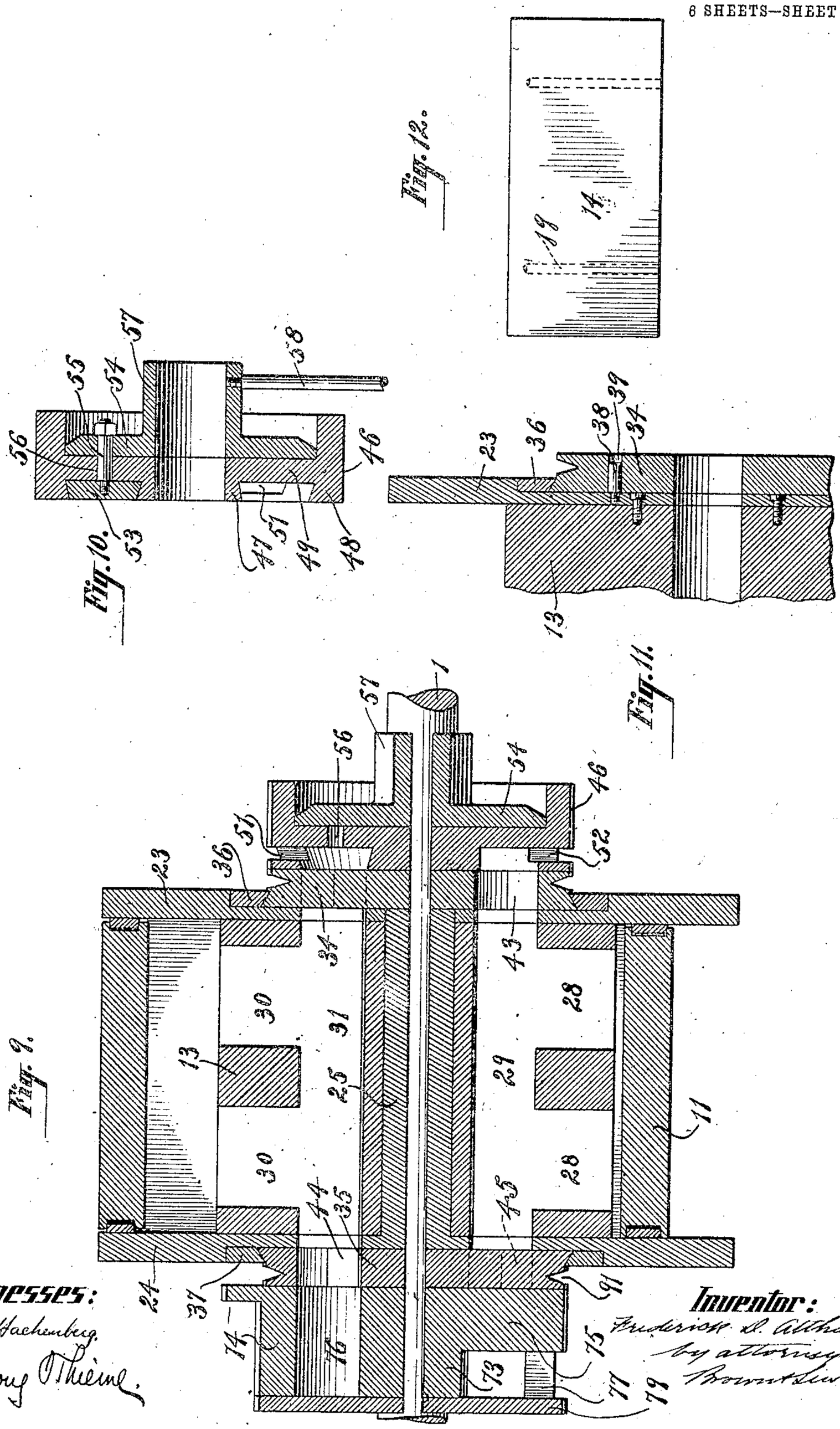

Fig. 10.

Fig. 11.

Fig. 12.

Witnesses:

J. G. Hachenberg.

Henry Thieme.

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UNITED STATES PATENT OFFICE.

FREDERICK D. ALTHAUSE, OF NEW YORK, N. Y.

RECISION-ENGINE.

No. 812,176. Specification of Letters Patent. Patented Feb. 13, 1906.

Application filed June 21, 1905. Serial No. 266,230.

To all whom it may concern:

Be it known that I, FREDERICK D. ALTHAUSE, a citizen of the United States, and a resident of the borough of Bronx, in the city and State of New York, have invented new and useful Improvements in Recision-Engines, of which the following is a specification.

The object of my invention is to provide certain improvements in the construction, form, and arrangement of the several parts of a recision-engine, whereby greatly-improved results may be obtained from its operation, the engine at the same time being capable of reversal and which is under perfect control of the operator.

This present invention is disclosed in connection with a recision-engine operated by steam.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents the engine in longitudinal central section. Fig. 2 is a transverse section taken in the plane of the line A A of Fig. 1 looking in the direction of the arrows. Figs. 3 and 4 are transverse sections taken in the plane of the line B B of Fig. 1, looking in the direction of the arrows, with the parts in the positions which they assume for driving the engine forward and reversing the same. Figs. 5 and 6 are transverse sections taken in the plane of the line C C of Fig. 1 looking in the direction of the arrows, the parts being shown in the position which they assume for driving the engine forward and for reversing the same. Fig. 7 is a transverse section taken in the plane of the line D D of Fig. 1 looking in the direction of the arrows. Fig. 8 is a view of the exhaust end of the machine with the driving-pulley removed. Fig. 9 is a longitudinal section taken in the plane of the line E E of Fig. 2 looking in the direction of the arrows, the engine-casing being removed. Fig. 10 is a detail central longitudinal section through the inlet-valve, its adjustable cut-off, and the means for operating the same. Fig. 11 is a detail sectional view showing the connection of the piston with the ring-confining disk and the connection of the ring-confining disk with the reversing-disk, and Fig. 12 is a detail view of one of the piston-wings.

The engine-shaft is denoted by 1, and it may be provided with any means for transmitting its rotary motion—such, for instance, as a belt-pulley 2.

The engine-casing is composed of two hubs 3 and 4, end plates 5 and 6, and a cylindrical wall 7, in the present instance formed integral with the end plate 5 and held in snug engagement with the end plate 6 by tie-bolts 8. Bolts 9 and 10 are used for securing the hubs 3 and 4 to the end plates 5. A loose ring 11 is mounted within the casing and is supported by three antifriction-rollers 12, so that the ring is eccentric to the shaft 1. The manner of mounting these rollers will be hereinafter fully described.

A piston 13, having a cylindrical periphery, is fixed to the shaft 1 concentric with the inner wall of the casing and eccentric to the loose ring 11, with the periphery of the piston at its bottom in engagement with the inner wall of the ring opposite its support on the bottom roller 12. This piston 13 is provided with oppositely-arranged piston-wings 14 15, fitted to slide radially in recesses 16 17. These wings are, furthermore, guided by rods 18, which pass through the shaft and into recesses 19 and 20 in the piston-wings. Springs 21 22 are interposed between the ends of these rods 18 and the bottoms of the recesses 19 and 20 for holding the outer ends of the piston-wings in engagement with the inner wall of the loose ring 11.

The loose ring 11 is held in position between end plates 23 24, fixed to the opposite ends of the piston. In the present instance one of these plates 24 is provided with a sleeve 25, which surrounds the shaft 1, on which sleeve the piston is mounted.

The piston-head 13 is provided with a peripheral inlet-port 26, communicating with a longitudinal inlet-port 27 immediately to the rear of the piston-wing 14 and a similar peripheral inlet-port 28 and longitudinal inlet-port 29 immediately to the rear of the piston-wing 15. This piston-head is further provided with a peripheral exhaust-port 30 and longitudinal exhaust-port 31 immediately in front of the piston-wing 14 and a similar peripheral exhaust-port 32 and longitudinal exhaust-port 33 immediately in front of the piston-wing 15. The longitudinal ports 27 29 31 33 all open through both ends of the piston 13 and end plates 23 24. Reversing-disks 34 35 are loosely mounted on the shaft 1 adjacent to the end plates 23 24. The disks 34 35 are held in engagement with the end

plates 23 24 by locking-rings 36 37. The disk 34 at the inlet end of the piston is driven in the one or the other direction by a pin 38, carried by the end plate 23, which enters a curved slot 39 in the said disk, so that the disk has a limited rotary movement with respect to the said plate.

The disk 35 at the outlet side of the piston is rotated by the end plate 24 of the piston in the one or the other direction through a pin 40, carried by the disk, which enters a curved slot 41 in the end plate, so that this disk also has a limited rotary movement with respect to the end plate. The disk 34 is provided with two ports 42 43 therethrough, which are arranged to be brought into alinement with either one set of longitudinal ports 31 33 or the other set of longitudinal ports 27 29 of the piston, according to the direction in which the engine is to be driven. The other disk 35 is similarly provided with two ports 44 45 therethrough, which are arranged to be brought into alinement with one set of longitudinal ports 31 33 or the other set of longitudinal ports 27 29, according to the direction in which the engine is to be driven. The inlet-valve 46 comprises a hub-port 47, loosely mounted on the shaft 1, a ring portion 48, on which the end plate 6 of the casing is fitted, and a web 49 intermediate the ends of the ring. A partition 50 connects the hub and ring on the inner side of the valve. Oppositely-arranged ports 51 52 are provided in the valve-ring 48 on the inner side of the web 49 for opening communication from the interior of the casing to the inner side of the valve.

The passage of steam through the inlet-port 51 may be controlled by a cut-off comprising an inner plate 53, located on the inner side of the web 49 between the hub and ring, an outer plate 54, and a connecting-pin 55, which passes through an elongated slot 56, concentric with the shaft 1.

The outer plate 54 is provided with a hub 57, loosely mounted on the shaft 1, to which hub is secured a lever 58, which extends through a circumferentially-elongated slot 59 between the hub 4 and end plate 6 of the casing. This inlet-valve may be rocked from the outside for the purpose of reversing the disk 34 to reverse the direction of the engine, as follows: A rock-lever 60 is pivoted at 61 between the hub 4 and the end plate 6 of the casing. It has a curved inner arm 62, to the free end of which is attached a link 63, which link is pivoted to the valve-ring 48.

The arm 62 of the lever is curved so as to permit the valve to be rocked the required distance without causing the arm to hit the shaft 1. The valve-ring 48 is provided on its periphery with two outwardly-extended pins 64 65, which are arranged to engage a pin 66 on a cam 67, pivoted at 68 to the end plate 6 of the casing. The cam 67 when at the limits of its rocking movements in engagement with its stops 69 70 is out of engagement with the disk 34. While the cam is being rocked from one position to the other its periphery will be brought into snug contact with the periphery of the disk 34, so that the disk will be rotated the required distance with respect to its piston to permit the ports in the disk to be shifted from one side to the other of the piston-wings. In the present instance the disk is provided with a V-shaped groove 71, and the periphery of the cam is tapered, as shown at 72.

The outlet-valve comprises a hub 73, loosely mounted on the shaft 1, a ring 74, on which the end plate 5 of the casing is fitted, and a web 75, connecting the hub and ring for part of the distance around, the valve leaving a long curved port 76, which is at all times in communication with the ports of the reversing-disk 35. An exhaust-port 77 extends through the ring 74 of the outlet-valve and is at all times in open communication with an exhaust-port 78 in the end plate 5 of the casing, which exhaust-port 78 opens to the exterior of the casing. The outlet-valve is further provided with an end plate 79 for preventing the passage of the steam from the interior of the valve to the exterior of the casing except through the ports 77 78.

The disk 35 is rocked with respect to the piston to shift its ports 44 and 45 to the one or the other side of the piston-wings, as follows: A rock-lever 80 is pivoted at 81 between the end plate 5 and the hub 3 of the casing. The inner curved arm of the rock-shaft is denoted by 82, and it is provided with a link 83, which in turn is connected to the end plate 79 of the outlet-valve. The ring 74 of the outlet-valve is provided with two pins 84 85, which are arranged to engage a pin 86 on a rocking cam 87, pivoted at 88 to the end plate 5 of the casing.

When the cam 87 is at the limits of its movements in engagement with its stops 89 90, its periphery will be out of engagement with the disk 35. As the cam is rocked from one limit of its movement to the other it will frictionally engage the disk 35 and rock it a sufficient distance to shift its ports from one side to the other of the piston-wings. In the present instance I have shown the disks 35 as provided with a peripheral V-shaped groove 91 and the periphery of the cam having a tapered portion 92. The space around the piston within the casing is supplied with steam from an inlet-pipe 93, attached to the end plate 6 of the casing. A recess portion 94 in the said plate 6 serves to bring the interior of the casing into open communication with the ports in the inlet-valve. To prevent leakage of steam between the valves and end plates of the casing, I provide suitable packing-rings 95 96.

Each one of the three rollers which supports the piston-ring is mounted within the

casing, as follows: Two bases 97 98 are provided with uprights 99 100, between which the roller 12 is mounted on an axle 101. Antifriction-bearings 102 103 are interposed between the roller 12 and the uprights 99 100. These two bases 97 98 are overlapped and secured together by suitable screws 104 105.

To yieldingly hold the roller against the periphery of the piston-ring, I provide the bases 97 98 with depending lugs 106 107, which enter sockets in plugs 108 109, screwed into the peripheral wall 7 of the casing. Springs 110 111 are interposed between the lugs 106 107 and the bottoms of the sockets in the plugs. By adjusting the plugs the roller 12 may be pressed against the periphery of the piston-wing to a greater or lesser extent to procure the best result.

Proceeding to describe the operation of this engine, it will be understood that the ports in the reversing-disk 34 are closed to the admission of steam while passing the inner faces of the inlet-valve and the inner plate 53 of the cut-off. It will also be seen that the ports in the reversing-disk 35 are closed against exhaust while the ports are passing over the inner face of the segmental web 75 of the outlet-valve.

Referring to Fig. 2, when the parts are in the position shown therein the space to the left of the piston-wings is being fed with steam from the inlet through the ports 26 27, the ports 32 33 being closed to exhaust by the segmental web 75 of the outlet-valve, as above described. Steam is also just being admitted through the ports 28 29 into the space between the piston-wing 15 and the contact between the piston 13 and ring at the bottom of the piston. At the same time the space between the piston-wing 14 and the contact-point between the piston and piston-ring is open to exhaust through the ports 30 31.

The amount of steam to be fed to the engine may be regulated by sliding the cut-off inlet-valve to a greater or lesser extent for regulating the amount of opening through the port 51 in the said valve.

When it is desired to reverse the engine, the lever 60 is rocked in one direction to reverse the disk 34 and the lever 80 is rocked in the other direction to reverse the disk 35, so that the ports which were the inlet-ports will now be the exhaust-ports and the ports which were the exhaust-ports will now be the inlet-ports.

What I claim is—

1. A recision-engine comprising a rotary piston, its shaft, a loose piston-ring, piston end plates overlapping the ends of the ring to form a piston-chamber, suitable inlet and outlet ports in the piston and rollers for supporting the ring eccentric to the piston and its shaft.

2. A recision-engine comprising a rotary piston having radially-sliding oppositely-arranged wings, a piston-shaft, a loose piston-ring eccentric to the shaft, piston end plates overlapping the ends of the ring to form two piston-chambers and rollers for supporting the ring with its inner wall in engagement with the periphery of the piston at one point and inlet and outlet ports in the piston for controlling the admission and exhaust of steam.

3. A recision-engine comprising a rotary piston, its shaft, a loose piston-ring, means for supporting the ring eccentric to the shaft, piston end plates overlapping the ends of the ring, radially-sliding piston-wings engaging the inner wall of the ring, inlet and outlet ports in the piston and valves for controlling the admission and exhaust of steam.

4. A recision-engine comprising a rotary piston, its shaft, a piston-ring loosely mounted eccentric to the piston with one point of its inner wall in engagement with one point of the periphery of the piston, piston end plates overlapping the ends of the ring, radially-sliding piston-wings engaging the inner walls of the ring, ports in the piston upon opposite sides of each of the wings, reversing-disks and valves arranged to coact with the piston for controlling the admission and exhaust of steam to and from one or the other side of each piston-wing.

5. A recision-engine comprising a rotary piston, its shaft, a loose piston-ring supported eccentric to the shaft with one point of the inner walls of the ring in engagement with one point on the periphery of the piston, piston end plates overlapping the ends of the piston-ring, radially-sliding piston-wings engaging the inner walls of the piston-ring, ports in the piston opening through its periphery upon opposite sides of each of the piston-wings, reversing-disks carried by the piston end plates and inlet and outlet valves arranged to operate the reversing-disks and means for controlling the movement of the inlet and outlet valves.

6. The combination with the rotary piston of a recision-engine and its shaft, of a reversing-disk located at the inlet end of the piston for controlling the movement of the piston, an inlet-valve for controlling the movement of the disk and means for moving the inlet-valve.

7. The combination with the rotary piston of a recision-engine and its shaft, of a reversing-disk located at the inlet end of the piston for controlling the movement of the piston, an inlet-valve for controlling the movement of the disk, means for moving the inlet-valve and an adjustable cut-off for the inlet-valve.

8. The combination with the rotary piston, of a recision-engine and its shaft, of a loose ring supported eccentric to the piston with its inner walls at one point in engagement with the periphery of the piston, two oppositely-disposed radially-sliding piston-wings, means for yieldingly holding the wings in en-

gagement with the inner walls of the piston-ring and piston end plates overlapping the ends of the ring.

9. The combination with the rotary piston of a recision-engine, its shaft, radially-sliding piston-wings and two sets of ports leading from the ends of the piston to the opposite sides of each piston-wing, of a reversing-disk fitted to the end of the piston arranged to open the one or the other set of ports and a valve arranged to move the reversing-disk to the opposite limits of its movements for controlling the movement of the piston in the one or the other direction.

10. The combination with the rotary piston of a recision-engine and its shaft, of an outlet-valve mounted on the shaft and a reversing-disk interposed between the end of the piston and the face of the said valve.

11. The combination with the rotary piston of a recision-engine and its shaft, of a valve, a reversing-disk interposed between the end of the piston and the face of the valve, a cam, means for reciprocating the valve and means controlled by the movement of the valve for bringing the cam into and out of engagement with the disk for moving the disk to the limits of its movements in both directions.

12. A recision-engine comprising a hollow casing, a loose piston-ring therein, a rotary piston, its shaft, means for supporting the piston-ring eccentric to the shaft, radially-sliding piston-wings, piston end plates overlapping the ends of the ring, inlet and exhaust ports in the casing, ports in the piston, an inlet-valve having its inlet-ports opening into the interior of the casing exterior to the piston, an outlet-valve having its outlet-port opening to the exhaust-port in the casing and reversing-disks interposed between the valves and the ends of the piston for controlling the passage of steam from the interior of the casing through the inlet-valve and piston to the outlet-valve upon the proper sides of the piston-wings.

13. A recision-engine comprising a rotary piston, its shaft, a piston-ring, oppositely-arranged piston-wings, rods passing through the shaft and springs interposed between the ends of the rods and the wings for holding the wings in yielding engagement with the inner wall of the piston-ring.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of June, 1905.

FREDERICK D. ALTHAUSE.

Witnesses:

FREDK. HAYNES,

C. S. SUNDGREN.