

No. 744,466.

PATENTED NOV. 17, 1903.

C. BOWERS.
ROTARY ENGINE.

APPLICATION FILED SEPT. 21, 1903.

NO MODEL.

Fig. 1

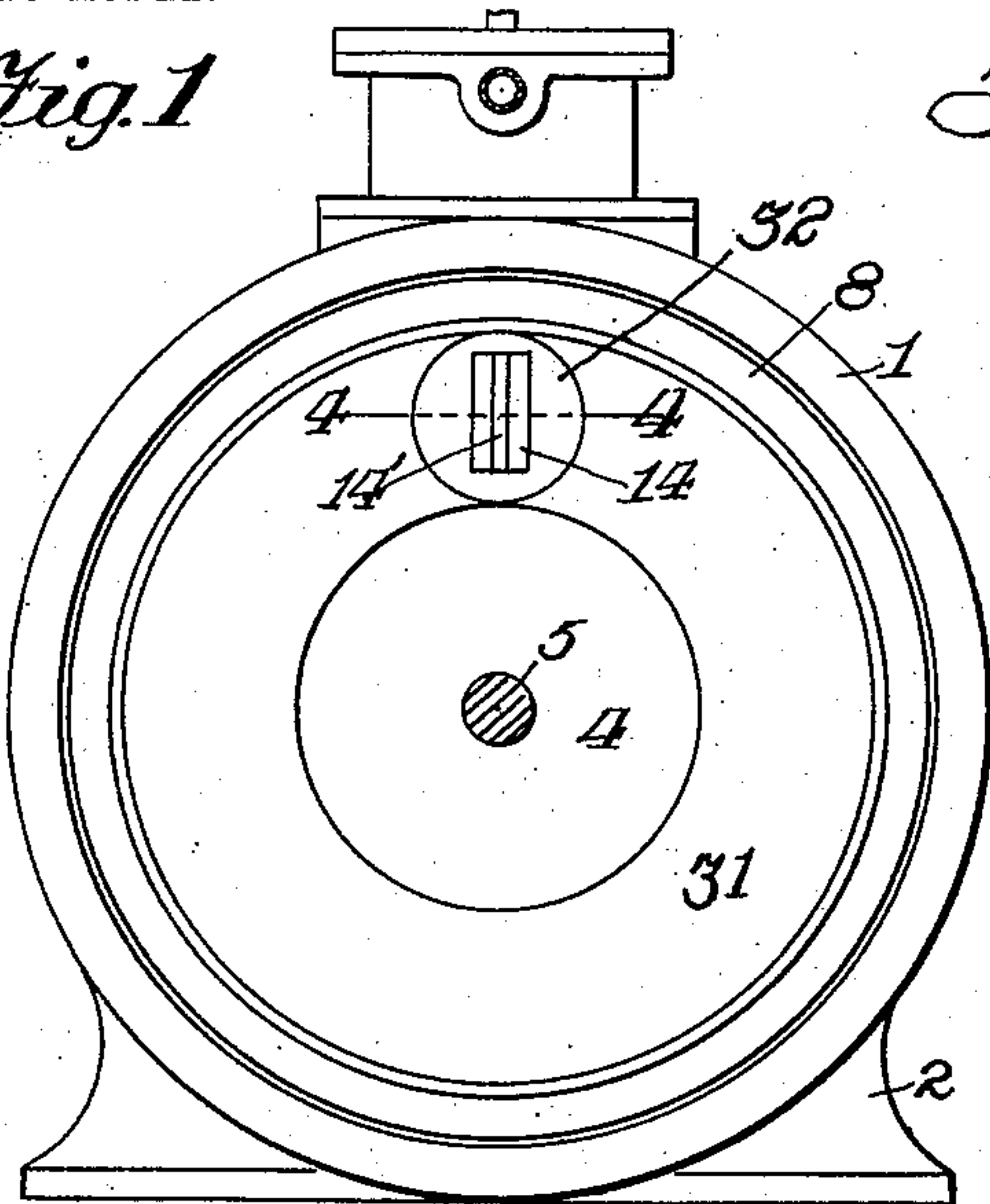


Fig. 2

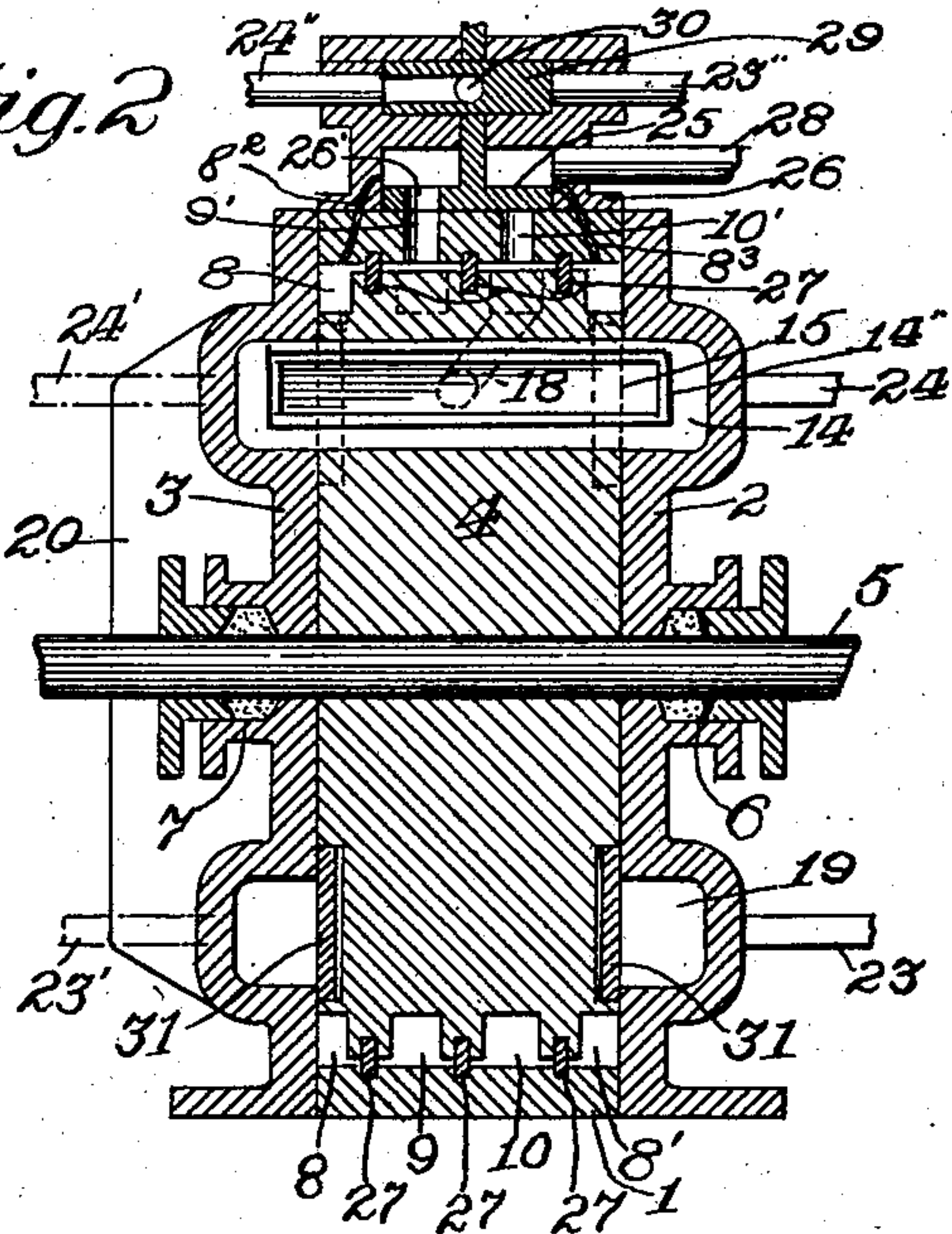


Fig. 4

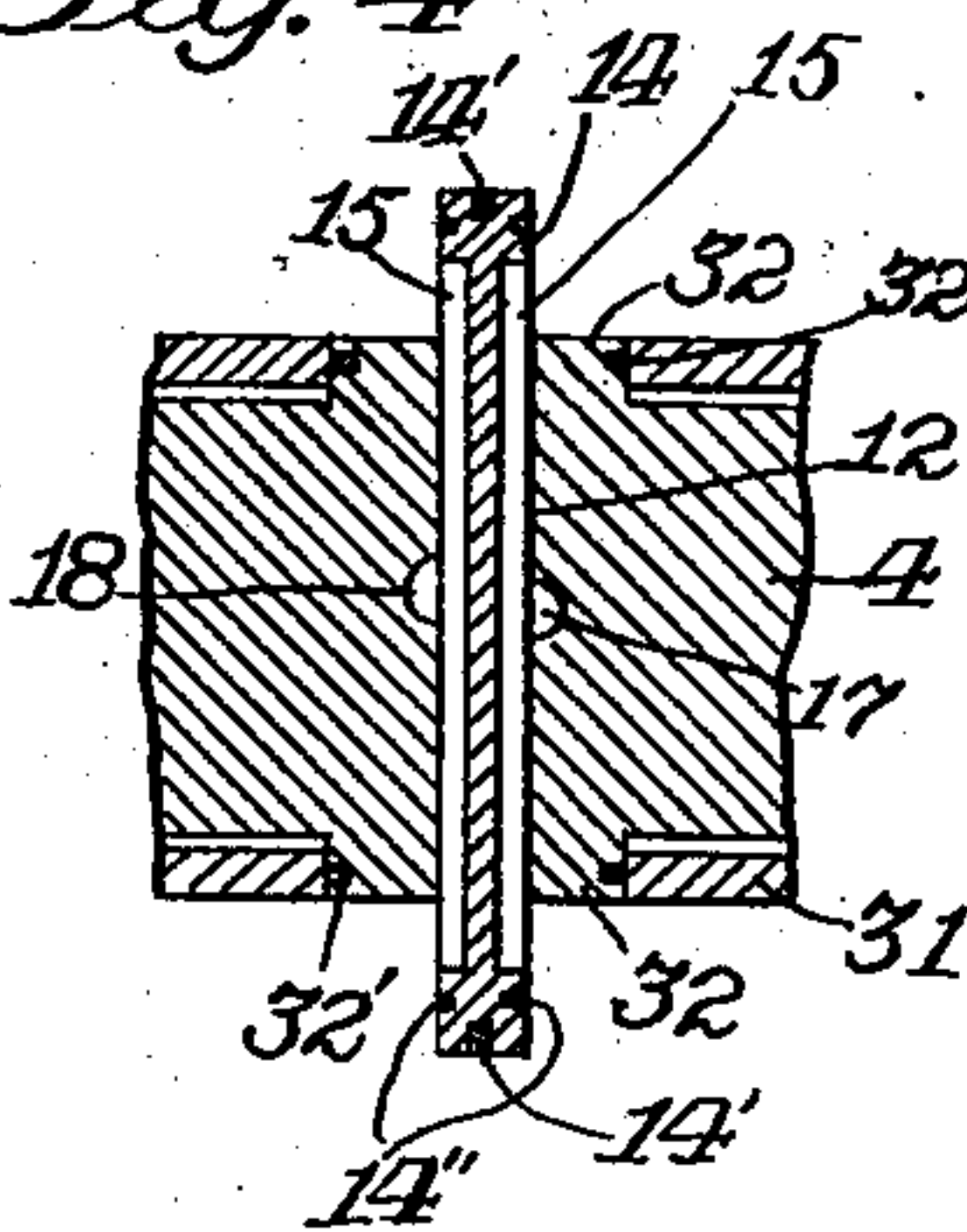


Fig. 3

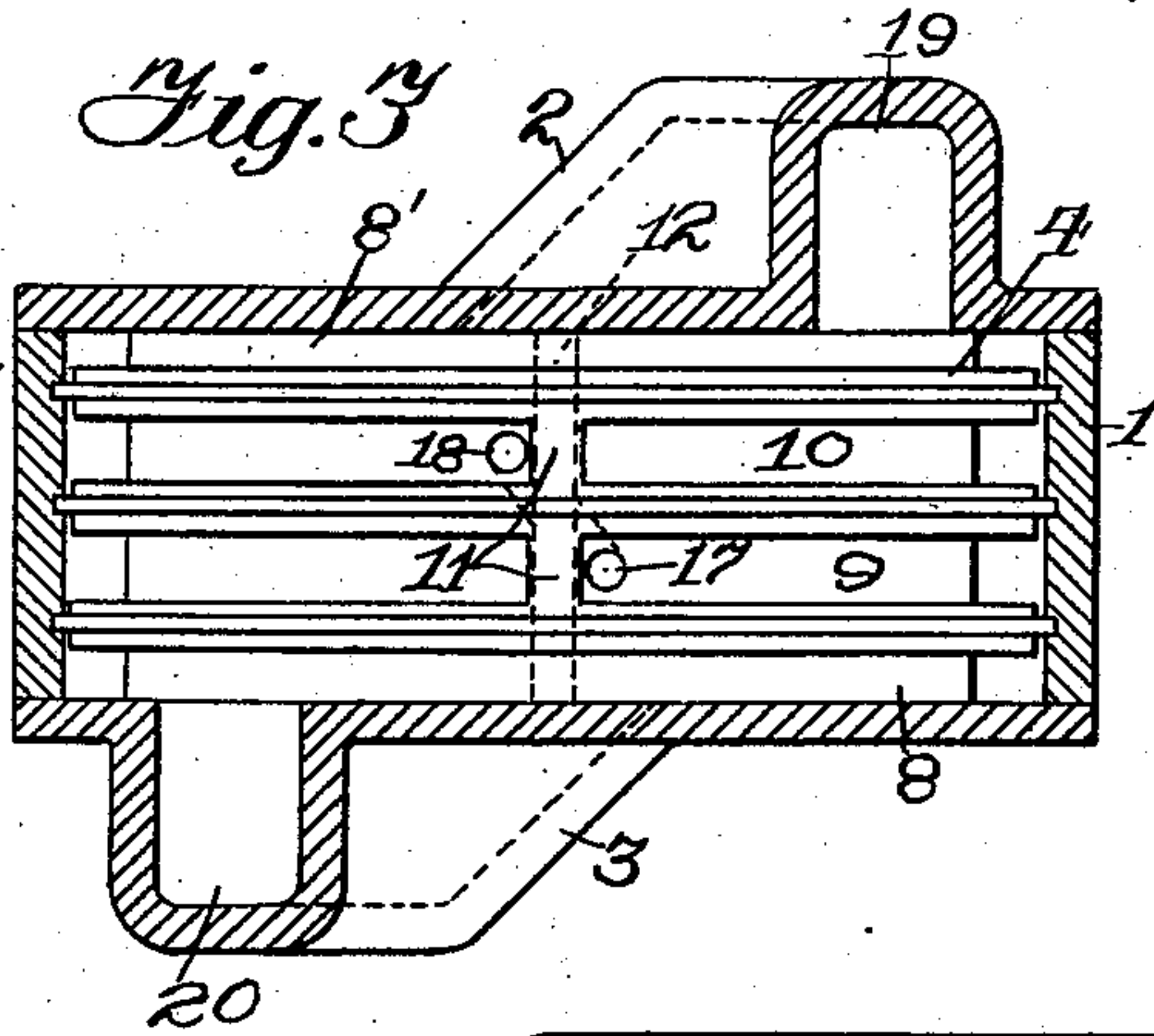


Fig. 5

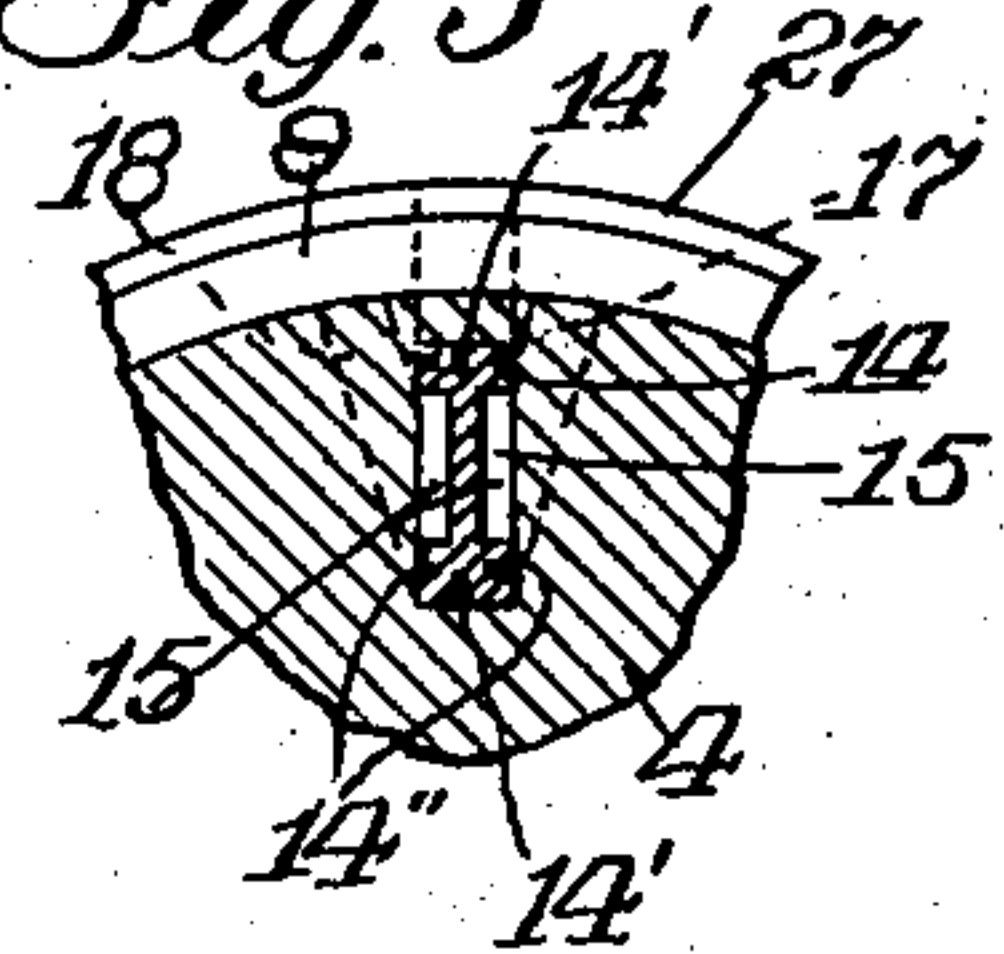
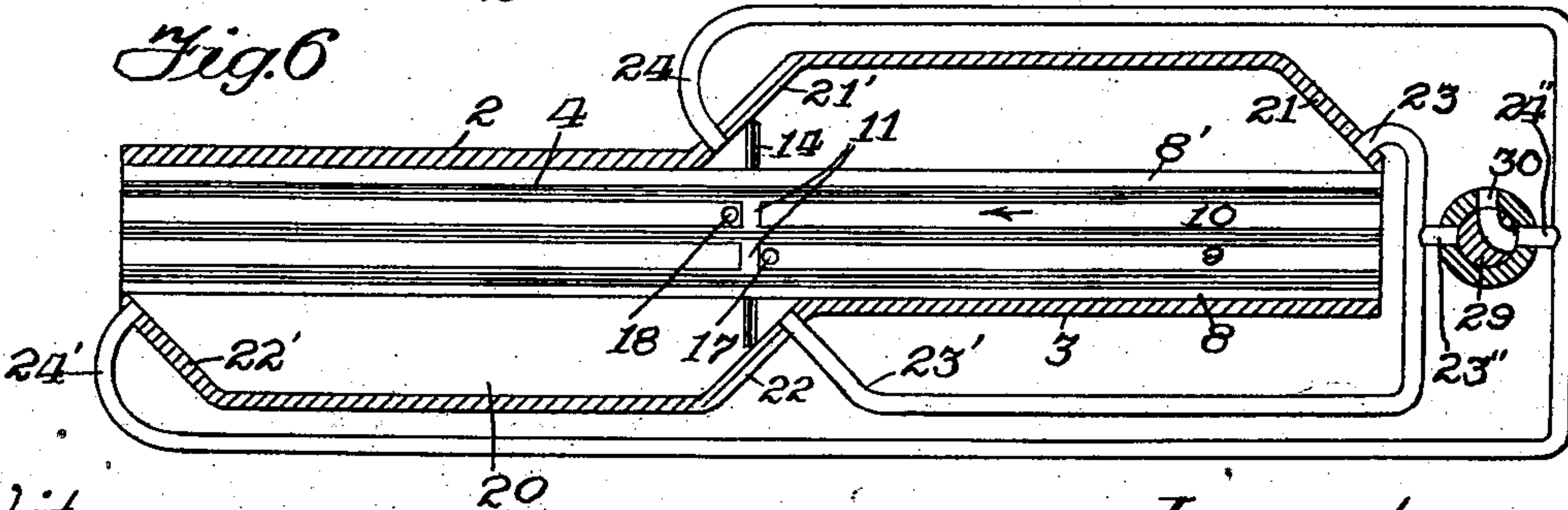


Fig. 6



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UNITED STATES PATENT OFFICE.

CHRISTOPHER BOWERS, OF MCKEESPORT, PENNSYLVANIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 744,466, dated November 17, 1903.

Application filed September 21, 1903. Serial No. 174,005. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER BOWERS, a citizen of the United States of America, residing at McKeesport, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in fluid-pressure engines, and relates more particularly to that type of engine which is known as the "rotary" engine.

15 The object of this invention is to provide an engine wherein greater power will be produced from a given amount of steam or the like than has heretofore been possible.

20 A further object of the invention is to so construct the parts that the same will be perfectly packed at all times without undue friction in order that no losses may occur due to leakage.

25 A still further object of the invention is to construct an engine in a very simple manner and to make the engine of such design that the same may be cheaply constructed and easily and efficiently operated.

30 With the above and other objects in view the invention consists in the novel construction, combination, and arrangement of parts to be hereinafter more fully described, and specifically pointed out in the claims.

35 In describing the invention in detail reference is had to the accompanying drawings, forming a part of this application, and wherein like numerals of reference indicate like parts throughout the several views, in which—

40 Figure 1 is a side elevation of my improved engine with one of the cover-plates removed. Fig. 2 is a vertical cross-sectional view. Fig. 3 is a sectional plan view, the piston-wheel being shown in elevation. Figs. 4 and 5 are detail sectional views of the piston. Fig. 6 is

45 a diagrammatical development taken through the engine at a point approximately through the cylinders which are formed in the heads. Briefly described my invention consists in providing a circular piston-wheel in which

periphery, two of which form steam-packing and two of which conduct the steam from the steam-inlet to one or the other sides of the piston, dependent upon which direction the same is revolving. Cylinders are formed in the heads of the casing, and said cylinders extend approximately one-half of the circumference of the said casing on each side, and valves are provided whereby the direction of movement of the engine may be readily reversed.

Referring to the drawings, the reference-numeral 1 indicates the circular body-casing, to either side of which are secured the heads 2 3, and rotatably mounted within the casing thus formed is a piston-wheel 4, which is mounted on the shaft 5, which passes through stuffing-boxes 6 and 7, formed in the heads 2 3, respectively. The outer periphery of this wheel has four grooves 8, 8', 9, and 10 formed therein, the grooves 8 8' being for the purpose of packing the wheel within the casing and the grooves 9 10 being for the purpose of permitting the steam which enters one or the other of the same to pass therearound between said wheel and casing. The grooves 9 10 are interrupted in their continuity at one point on their periphery by a portion 11, and slidably mounted therebeneath in the aperture 12 is a piston 14, around the edge of which is the ring 14' and around the sides of which are the rings 14'' 14'', the said piston having its sides concaved for a portion of the length thereof, as at 15, which communicates with one or the other of the grooves 9 10 by means of the ports 17 18 formed in said grooves. The cylinder portions 19 20 are formed in each head 2 3 and extend approximately one-half around each head, the said cylinder portions terminating in the inclined walls 21 and 21' 22 22', and connected with these cylinders at the lower portion of these inclines are the exhaust-pipes 23 23' 24 24'. The length of the piston is such that at all times it may be contained between the two walls of the cylinders, and the angular ends of said cylinders on opposite heads are so arranged that the piston in traveling past the same may be forced by said inclined walls from the cylinder on one side to the cylinder on the other side, and, as indicated in Fig. 6, the piston-

wheel is traveling in the direction indicated by the arrow, and the piston is traveling from the cylinder 19 into cylinder 20.

A valve 25 is rotatably mounted in the valve-casing 26, which is secured to the upper side of a portion 1 of the casing, and two ports 9' 10' communicate with the cut-away portions 9 10, respectively, of the wheel, and packing-rings 27 are provided on the portions intermediate these cut-away portions in the wheel 4, the said rings extending a short distance into said portion 1, and the valve 25 has a port 26', which is adapted to register with one or the other of the ports 9' 10', dependent upon its position, and a steam-inlet pipe 28 connects with said casing 26 above said valve. The stem of the valve is extended upwardly and is connected to the three-way valve 29, which is mounted within the upper chamber of the casing 26 and has connected therewith the pipes 23'' 24'', the pipe 23'' of which connects with the exhaust-pipes 23 23', and the pipe 24'' connects with the pipes 24 24'. The position of the valve 29 determines which of these sets of pipes shall be connected with the exhaust-port 30.

A packing-ring 31 is provided in each face of the wheel 4, said ring slightly overlapping the edges of the cylinder portions formed in the head and being held thereagainst by steam-pressure which is admitted to the grooves 8 8' through the small ports 8² 8³. This ring is formed with a circular portion at some point on its circumference, the said portion being adapted to overlie the lug 32, which is provided with a packing-ring 32', which is formed on the wheel 4 at the point where the piston passes therethrough.

The operation of my device is as follows: Steam being admitted through pipe 8 and, say, the valve 25 is in position as shown in Fig. 2, the steam will pass through port 6 in the valve and port 9' in the casing, thereby communicating with the groove 9, from whence it is conducted to the port 17, this port 17 permitting it to pass down behind the piston 14 into the cut-away portion 12 thereof. The said steam will then pass through said cut-away portion to the rear of the piston and one or the other of the cylinders 19 20, dependent upon which cylinder said piston is in, thereby confining the same between said piston and the rear angular wall of said cylinder, thus forcing said piston to move forward, carrying with it the piston-wheel, thus revolving shaft 5. When the piston has reached the point where it starts to pass from cylinder on one side of the wheel to the cylinder on the other, the steam at the point near the end of this movement will be cut off from communication with the cylinder which it has just been in communication with and will be permitted to enter the other of said cylinders due to the end portions of the piston which are not cut away passing within the piston-wheel 4, and further movement will cause the free end of the piston to be

entirely within the other cylinder, this movement also uncovering the exhaust-pipe at the lower end of the inclined wall which has just forced the piston to the other cylinder, thereby permitting the steam within said cylinder to escape.

It will be noted by referring to Fig. 2 that the exhaust-valve and steam-inlet valve are so tied together that one set of exhaust-ports and one of the inlet-ports will always be open at the same time, the other corresponding set being then closed. By the rotation of the said valves the other of said cut-away portions 10 is connected with the steam-inlet and the other set of exhaust-pipes are connected with the exhaust, whereby the steam will be admitted to the opposite side of the piston 14, thereby forcing the piston-wheel 4 in the reverse direction.

While I have herein described my invention in detail, it will be obvious that various slight changes may be made—such as different arrangements of controlling-valves, using more than one piston with the correspondingly-increased number of cylinders, &c.—without departing from the general spirit of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a fluid-pressure engine, the combination of a circular casing, heads secured to either side of said casing, radial cylinders formed within said heads, a wheel rotatably mounted within said casing between said heads, a laterally-sliding piston mounted within said wheel, grooves forming steam-passages on the outer periphery of said wheel, means for controlling the admission of fluid to said grooves, exhaust-pipes connected with said cylinders formed in said heads, and means for controlling said pipes, substantially as described.

2. In a fluid-pressure engine, the combination of a casing, radial cylinders formed in said casing, a wheel rotatably mounted within said casing, a piston carried by said wheel, grooves forming steam-passages in the outer periphery of said wheel, ports connecting two of said grooves with opposite sides of the piston, means for controlling the admission of fluid to said grooves, and means for controlling the exhaust from said cylinders, substantially as described.

3. In a fluid-pressure engine, the combination of a casing, heads secured to either side thereof, radial cylinders formed in said heads extending a portion of the circumference thereof, a wheel mounted within said casing between said heads, said head having steam-grooves therein, a piston capable of lateral movement mounted within said wheel, cut-away portions forming a steam-chamber on either side of said piston, ports in said wheel connecting two of said steam-grooves with opposite sides of said piston, exhaust-pipes connected with said cylinders formed in said

heads, and means for simultaneously controlling said exhaust-pipes and the steam-inlet to said grooves, substantially as described.

4. In a rotary engine, the combination of a
5 casing, heads secured to either side thereof, radial cylinders extending around a portion of said heads, a wheel mounted within said casing and extending the distance between said heads, a packing-ring in said wheel, the
10 edges of which overlap the edges of said cylinder, cut-away portions extending around the outer periphery of said wheel for a portion of the length thereof, packing-rings mounted in the periphery of said wheels between the said
15 cut-away portions thereof, said packing-ring extending into the casing, a laterally-movable piston carried by said wheel, cut-away por-

tions formed in the sides of said piston, ports in said wheel, whereby two of said grooves may communicate with the cut-away portions 20 on the opposite sides of said piston, ports in said casing communicating with two of said grooves, exhaust-pipes connecting with said cylinders adjacent to their ends, and means for simultaneously controlling said exhaust- 25 pipes and the admission of steam to the ports in said casing, substantially as and for the purpose described.

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

CHRISTOPHER BOWERS.

Witnesses:

H. C. EVERT,
A. M. WILSON.