No. 793,985. PATENTED JULY 4, 1905.

J. P. BRUYÈRE.

ROTARY ENGINE.

APPLICATION FILED NOV. 4, 1904.

3 SHEETS—SHEET 1.

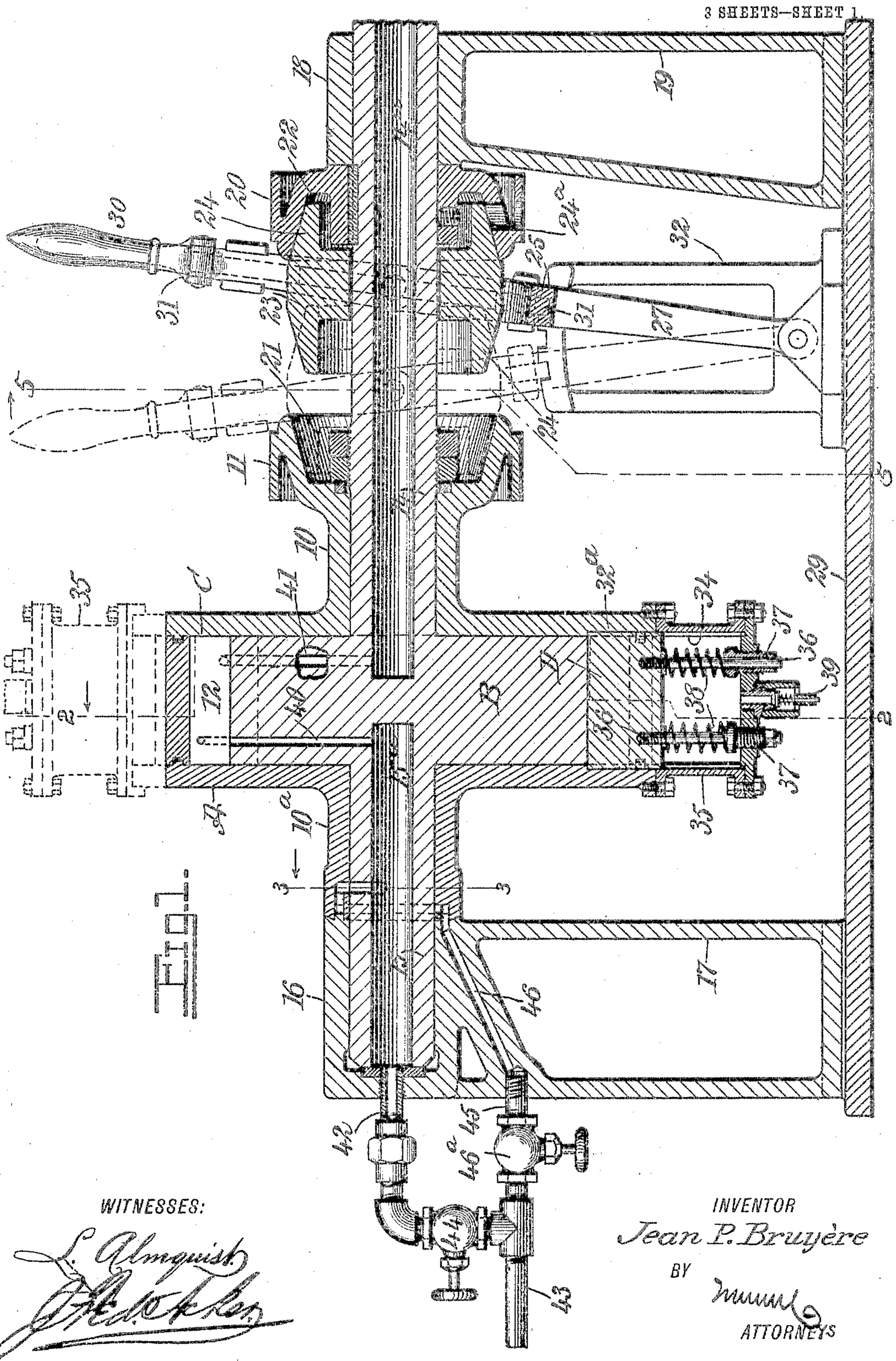

FIG. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

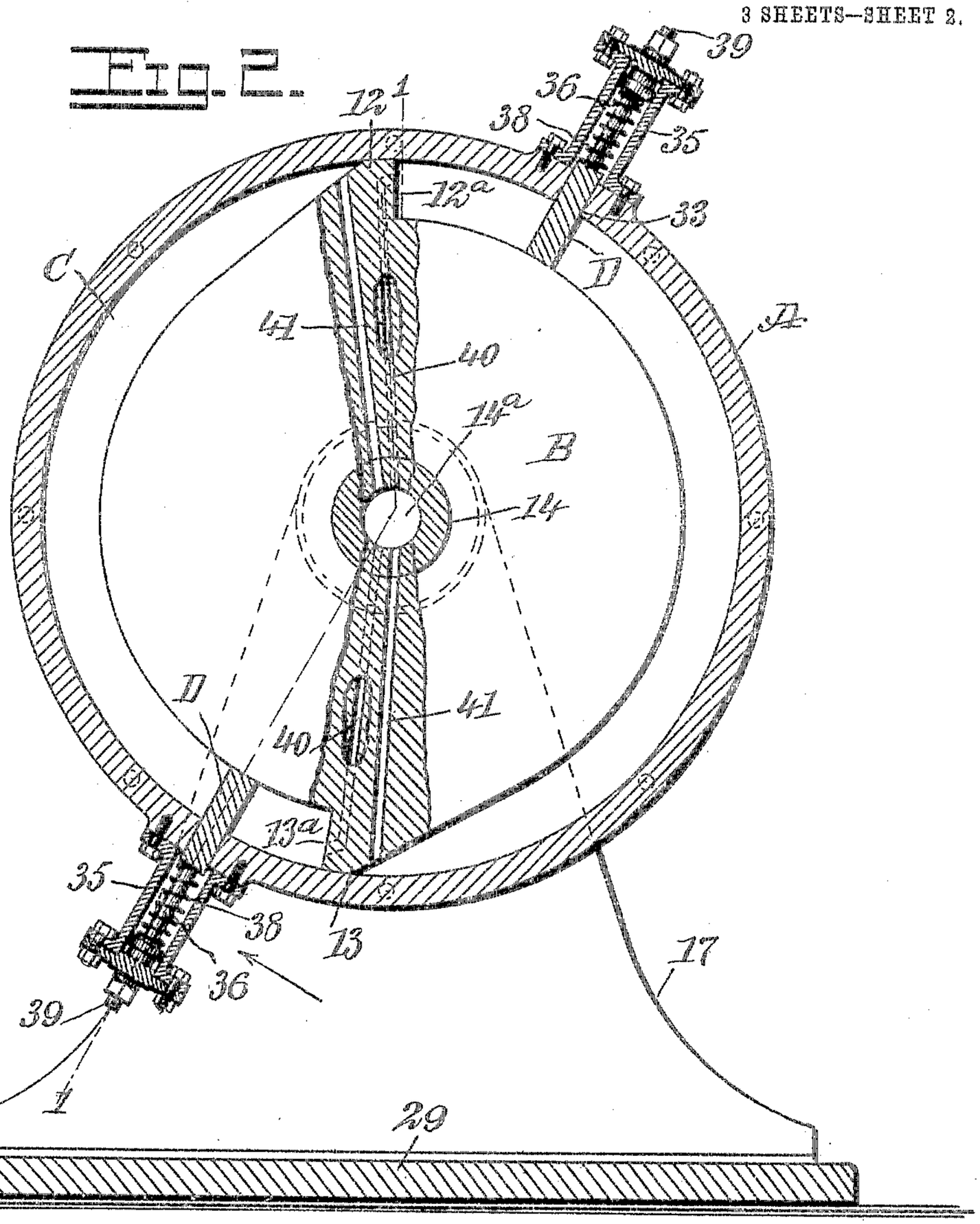


Fig. 4.

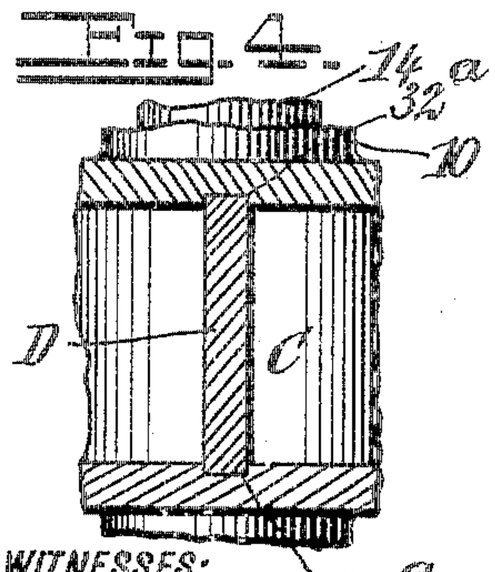
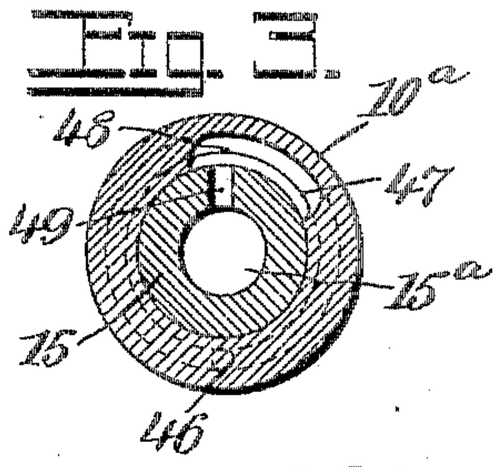


Fig. 3.



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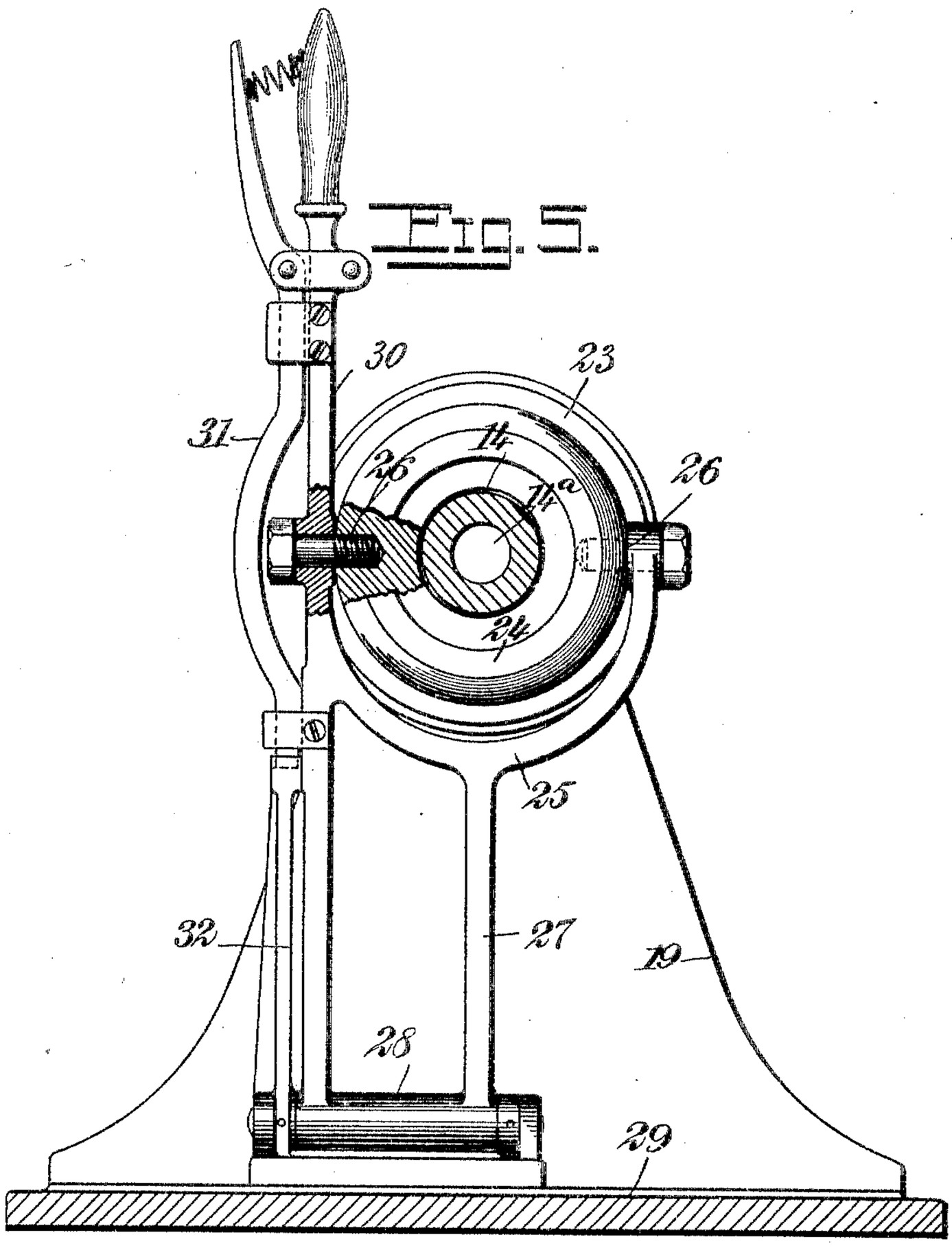
3 SHEETS—SHEET 3.

Fig. 5.



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No. 793,985. Patented July 4, 1905.

UNITED STATES PATENT OFFICE.

JEAN PIERRE BRUYÈRE, OF PASSAIC, NEW JERSEY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 793,985, dated July 4, 1905.

Application filed November 4, 1904. Serial No. 231,433.

To all whom it may concern:

Be it known that I, JEAN PIERRE BRUYÈRE, a subject of the King of Great Britain, and a resident of Passaic, in the county of Passaic and State of New Jersey, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

The purpose of the invention is to provide a very simple, durable, and effective construction of rotary engine, and one which will be economic in the use of steam.

A further purpose of the invention is to so construct the engine that a piston is located in a casing, both of which parts may be employed as drivers, and wherein each is mounted to revolve relatively to the other.

Another purpose of the invention is to provide the engine with a simply-applied and readily-effective reversing mechanism and cut-off.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal vertical section through the engine, taken practically on the line 1 1 of Fig. 2. Fig. 2 is a vertical transverse section taken practically on the line 2 2 of Fig. 1. Fig. 3 is a transverse section through the cut-off, taken substantially on the line 3 3 of Fig. 1. Fig. 4 is a detail horizontal section through a portion of the steam-chamber of the engine and one of the abutments; and Fig. 5 is a transverse vertical section taken practically on the line 5 5 of Fig. 1, illustrating the reversing mechanism in detail.

A represents a cylindrical casing which is provided with tubular hubs 10 and 10^a, a driving-pulley 11 being attached to or made integral with the hub 10, as is shown in Fig. 1.

B represents a piston mounted to rotate within the cylinder, and the said piston B is of lesser diameter than the diameter of the casing, so as to provide an annular steam-chamber C, which chamber is interrupted at nearly opposite points by means of heads 12 and 13, formed on the periphery of said piston, as clearly shown in Fig. 2. The working surfaces 12^a and 13^a of the said heads 12 and 13 are practically straight and face in opposite directions, as is also shown in Fig. 2, the working surfaces 12^a of the head 12 being substantially on a line with the axial center of the piston, while the working surface 13^a of the opposing head 13 is at one side of the axial center of said piston, or that side in direction of which the said working surface 13^a faces. The opposite surfaces of the said heads 12 and 13 are curved or inclined, as is shown in Fig. 2, except the peripheral portions of the heads adjacent to the working surfaces 12^a and 13^a, which peripheral surfaces are closely fitted to the inner surface of the casing A, as is also shown in Fig. 2.

The piston B is provided with two trunnions 14 and 15, extending from the center at opposite sides. These trunnions are tubular, and the chambers therein are designated, respectively, as 14^a and 15^a, extending some distance into the body portion of the piston B, as is illustrated in Fig. 1. The trunnion 15 is shown shorter than the opposing trunnion 14, and said trunnion 15 is passed through the hub 10^a of the casing A and serves as a bearing for said hub, the outer end of the trunnion 15 being mounted to turn in a bearing 16, supported from a base 29 by a suitable standard 17. The trunnion 14 is pivoted at its outer end in a suitable bearing 18, supported by standards 19, connected with the said base 29, and the trunnion 14 serves as a bearing for the hub 10 of the casing A. A pulley 20, which is also a driving-pulley, is secured in any suitable or approved manner on the trunnion 14, and the outer face of the driving-pulley 11 is provided with a preferably conical recess 21. The inner face of the pulley 20 is provided with a similar recess 22, as is best shown in Fig. 1. These recesses 21 and 22 in the pulleys 11 and 20 are adapted to receive flanges

24, formed at the periphery of a reversing-pulley 23, mounted to slide freely on the trunnion 14, the said trunnion turning freely in said pulley, and when a flange of the reversing-pulley 23 is in frictional engagement with the recessed portion of the pulley 20, as shown in positive lines in Fig. 1, the pulley 20 is held stationary, while the pulley 11 is free from engagement with the reversing-pulley, so that the casing A can turn while the piston B is held stationary. When, however, the direction of rotation is to be reversed, the reversing-pulley 23 is carried from engagement with the driving-pulley 20 and is brought into frictional engagement with the driving-pulley 11, thus holding said pulley 11 stationary and likewise the casing A, permitting the piston B to revolve, thus reversing the driving direction of the engine.

The reversing-pulley 23 is attached to the end portions of a yoke 25 through the medium of screws 26 or their equivalents, as is shown in Fig. 5. The said yoke 25 is provided with a downwardly-extending centrally-located arm 27, which arm is secured to a sleeve 28, mounted to turn on a suitable support at the base 29, as is shown in Fig. 5, and the lower end of a hand-lever 30 is secured to the said sleeve 28 and is also preferably secured to one end portion of the said yoke 25. The lever 30 is provided with a thumb-latch 31, adapted to engage with a rack 32, secured to the base 29, as is shown in Figs. 1 and 5. The reversing-pulley 23 is thus moved by means of the lever 30 and is held in adjusted position by means of the thumb-latch 31 and the rack 32.

Two barriers D are employed, located within the casing A opposite the working surfaces 12^a and 13^a of the piston-heads 12 and 13, as is illustrated in Fig. 2. These barriers D, when in working position, engage with the peripheral surface of the piston B, as also shown in Fig. 2, and they have sliding movement in grooves 32^a, produced in the sides or heads of the casing A, as is shown in Fig. 4. The said barriers are adapted to slide into and to enter housings 35, which are located over openings 33 in the periphery of the casing A, through which openings the barriers pass. The housing is provided with grooves 34, forming guides for the said barriers. Rods 36 are secured to the outer longitudinal surfaces of the barriers D, as is particularly shown in Fig. 1, and these rods extend out in a steam-tight manner through glands 37 in the outer end portions of the housings 35, and springs 38 are coiled around the rods 36, having bearing upon the barriers and against the glands, as is also shown in Fig. 1. Thus when a piston-head passes a barrier the barrier is forced up into its housing, placing the springs 38 under tension, and as soon as the head passes the barrier brought into action is forced by its controlling-springs again to working position in the casing A, and in order that there shall be but little noise or thumping when this action takes place each housing 35 is provided with a relief-valve 39 of any description.

Each head of the piston B is provided with two ports—namely, a supply-port 40 and a relief-port 41. The supply-ports 40 connect with the chamber 15^a of the trunnion 15 and connect with the steam-chamber C at the working surfaces of the piston-heads, while the exit-ports 41 connect with the steam-chamber C at a point back of the working surfaces of the piston-heads and also connect with the chamber 14^a in the trunnion 14. Steam is supplied to the chamber 15^a of the trunnion 15 through the medium of a pipe 42, provided with a suitable valve 44 and connecting with a main supply-pipe 43. When the valve 44 is opened, the steam will enter directly into the chamber 15^a of the trunnion 15 and will find an exit into the steam-chamber C in the casing A through the ports 40, and if the reversing-pulley 23 is in engagement with the driving-pulley 20, as is shown by positive lines in Fig. 1, the piston will be held stationary and the steam will act upon the barriers D to force the casing to revolve. If it is desired to reverse the engine, the reversing-pulley 23 is carried to an engagement with the driving-pulley 11, thus locking the casing, and the steam will then act upon the working surfaces of the piston-heads and will force the piston to revolve, which it will at such time be free to do. The exhaust-steam leaves the steam-chamber C through the ports 41 and escapes through the medium of the chamber 14^a in the trunnion 14. It will be understood that the engine may be compounded by using the steam from the exhaust-chamber of one engine to supply the supply-chamber of another engine.

A cut-off is employed in connection with this engine, and this cut-off is shown in Figs. 1 and 3. It is a standard cut-off—that is, is not variable—and in the form of cut-off illustrated an annular groove 47 is made in the outer face of the trunnion 15 of the piston and a port 48 is produced in the inner face of the hub 10^a of the casing A, the said port 48, for example, being about one-quarter of the interior diameter of the said hub, as is shown in Fig. 3. An opening 49 is produced in the trunnion 15 of the piston, which opening is always in communication with the chamber 15^a of the trunnion 15, but only at times connects with the port 48. At such time only is steam supplied to the chamber 13^a, and consequently to the inlet-ports 40 of the piston. The steam is supplied to the groove 47 of the cut-off by means of a channel 46 connecting

therewith and produced, for example, in an extension from the bearing 16 for the trunnion 15, as shown in Fig. 1. A branch pipe 45, connected with the main supply-pipe 43, connects with this channel 46, and the branch pipe 45 is provided with a suitable valve 46ª, so that in operation when the engine is started the valve 46ª is closed and the steam is supplied directly and in volume to the chamber 15ª; but when the engine has attained sufficient momentum the valve 44 is closed and the valve 46ª is opened, thus bringing the cut-off into action.

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

1. In a rotary engine, a casing mounted to revolve and provided with tubular hubs, a piston mounted to revolve within the casing and having trunnions which enter the hubs of the casing, a driving-pulley secured to one of the hubs of the casing, a second driving-pulley secured to one of the trunnions of the piston, and means for locking either of said pulleys stationary.

2. In a rotary engine, a casing having tubular hubs, a piston within the casing and provided with trunnions which enter the hubs of the casing, the casing and piston being each mounted to revolve relatively to the other, a driving-pulley secured to one of the hubs of the casing, a driving-pulley secured to one of the trunnions of the piston, a reversing device for locking engagement with either of said pulleys to hold the same stationary, and a cut-off for the steam-chamber of the casing.

3. In a rotary engine, a casing having tubular hubs, a piston within the casing and provided with trunnions which enter the hubs of the casing, the casing and piston being each mounted to revolve relatively to the other, a driving-pulley secured to one of the hubs of the casing, a second driving-pulley secured to one of the trunnions of the piston, and a reversing-pulley mounted loosely on the said trunnion of the piston, and arranged for locking engagement with either of the driving-pulleys.

4. In a rotary engine, a casing having tubular hubs, a piston within the casing, the piston being provided with trunnions which enter the hubs of the casing, the casing and piston being each mounted to revolve relatively to the other, a reversing mechanism common to both the casing and the piston, one of the trunnions of the piston having a steam-receiving chamber communicating with the steam-space of the casing, and a cut-off for admitting steam intermittently to the said steam-receiving chamber in the trunnion of the piston.

5. In rotary engines, a casing having tubular hubs, a piston mounted to revolve within the casing, the casing having a steam-space, said piston being provided with trunnions which enter the hubs of the casing, the trunnions having chambers, one of said chambers being a receiving-chamber for steam and the other an exhaust-chamber, said piston being provided with supply and exhaust ports, respectively connecting the steam-space of the casing with the said receiving and exhaust chambers in the trunnions, barriers mounted to slide in the steam-space of the casing, the piston-trunnion having the receiving-chamber being provided with an annular groove, and the hub of the casing having a port in its inner face communicating with said groove, the said trunnion of the piston also having an opening connecting at all times with the receiving-chamber in the trunnion and adapted to communicate periodically, with the port in the hub of the casing, a valve-controlled steam-supply pipe communicating directly with the said receiving-chamber, and a valve-controlled branch pipe leading from said supply-pipe and connecting with a channel communicating with the said annular groove in the trunnion of the piston.

6. In rotary engines, a casing having tubular hubs, a piston mounted to revolve within said casing, a steam-chamber intervening between the piston and the casing, the said piston being provided with trunnions which enter the hubs of the casing, said trunnions having chambers therein which extend into the body of the piston, one of said chambers being a receiving-chamber for steam and the other an exhaust-chamber, heads extending from the peripheral portion of said piston into the steam-space of the casing, said heads being provided with supply-ports connecting with the said supply-chamber of the piston and with exhaust-ports which connect with the exhaust-chamber of the piston, both ports connecting with the steam-space in the casing, barriers mounted to slide in the casing, and to engage with the peripheral surface of the piston, a driving-pulley secured to one of the hubs of the casing, a second driving-pulley secured to one of the trunnions of the piston, a reversing-pulley mounted loosely on the trunnion of the piston carrying the driving-pulley, and means for carrying the reversing-pulley to frictional and locking engagement with either one or the other of the driving-pulleys.

7. In a rotary engine, a casing having a steam-space, a piston mounted to revolve within the casing and provided with heads extending into the steam-space of the casing, the said casing being provided with openings in its periphery, housings located over the said openings, spring-pressed barriers engaging with the peripheral surface of the piston and adapted to slide in said housings, and a relief-valve for each of said housings.

8. In a rotary engine, a casing having a steam-space, a piston mounted to revolve within the casing, heads extending from the piston into the steam-space of the casing, the said casing being provided at opposite sides with openings in its periphery, housings located over the said openings, barriers passing through said openings and engaging the peripheral surface of the piston, the barriers being adapted to move into and out of said housings, rods secured to the outer surface of said barriers and extending out through the outer end portions of the housings, and springs coiled around the said rods.

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

JEAN PIERRE BRUYÈRE.

Witnesses:
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JNO. M. RITTER.