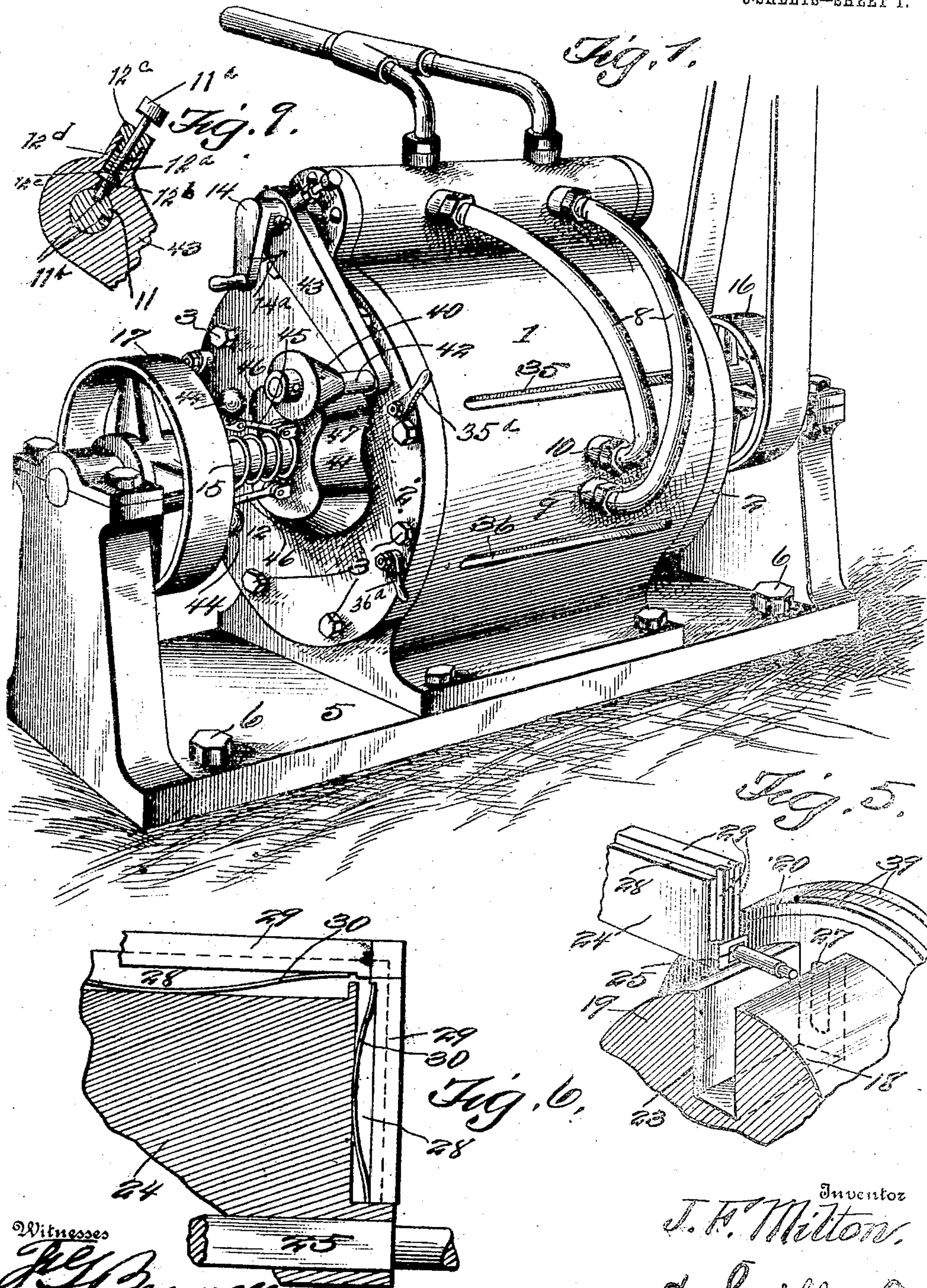


J. F. MILTON.
 ROTARY ENGINE.
 APPLICATION FILED MAR. 16, 1909.

951,960.

Patented Mar. 15, 1910.

3 SHEETS—SHEET 1.



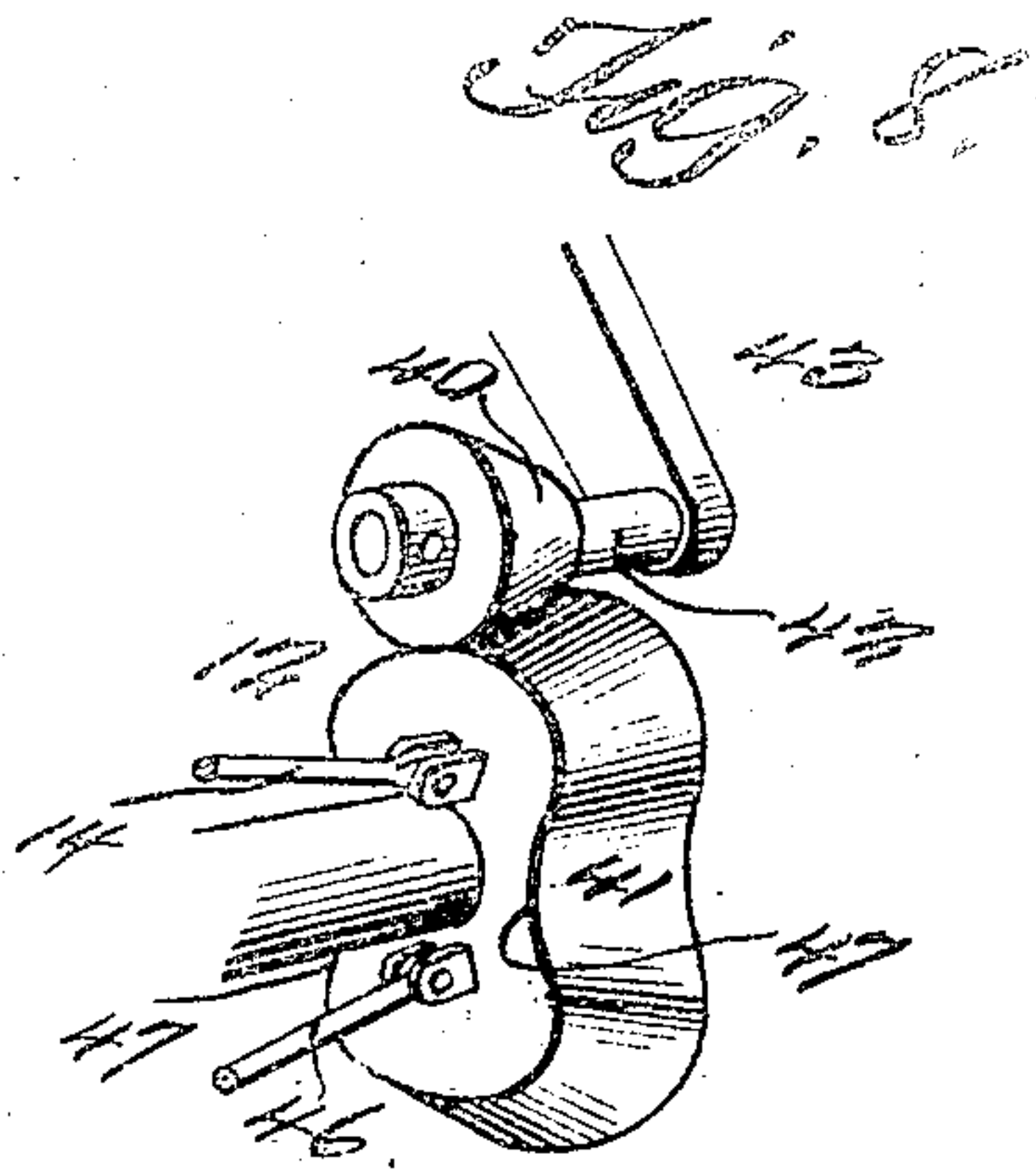
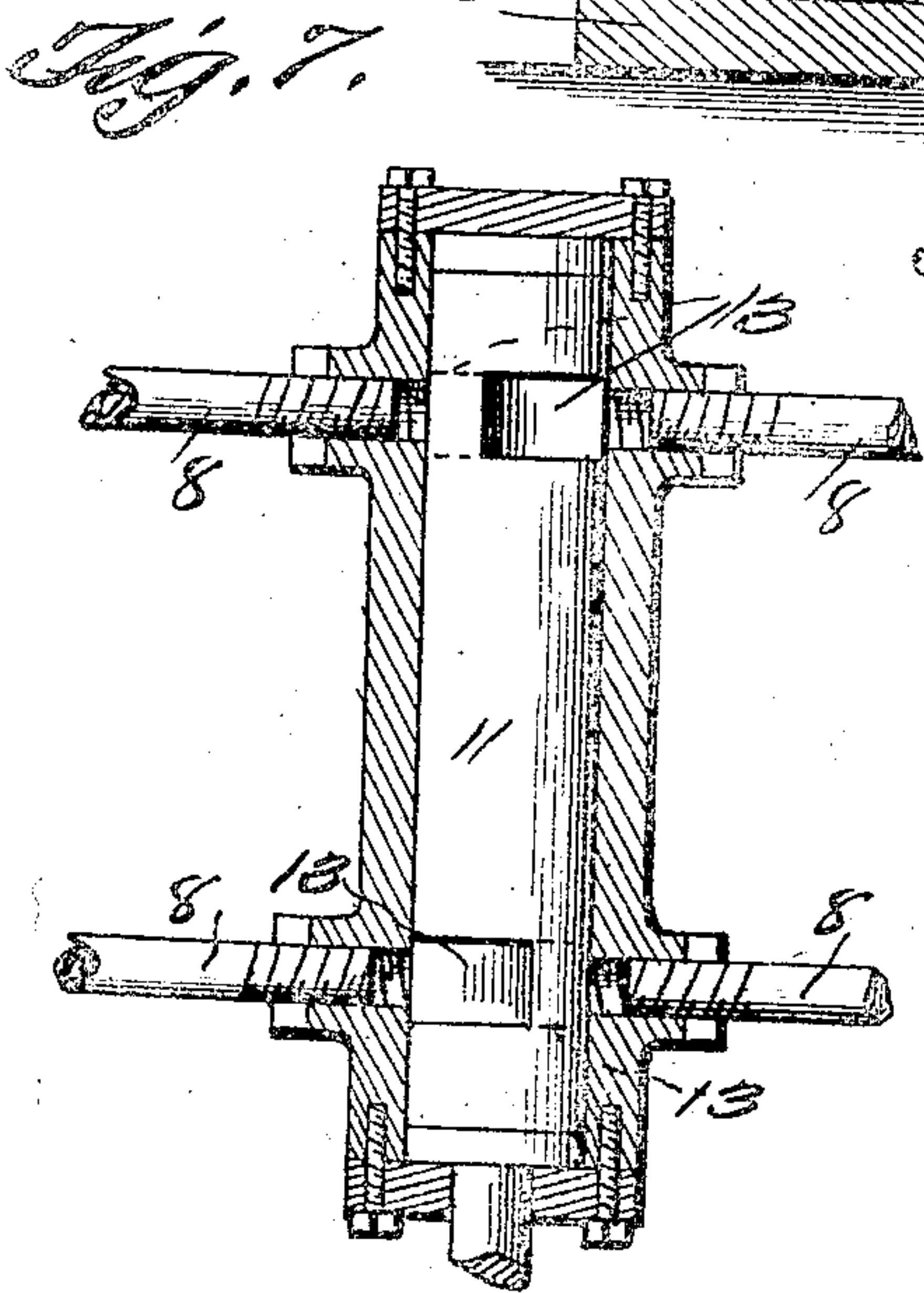
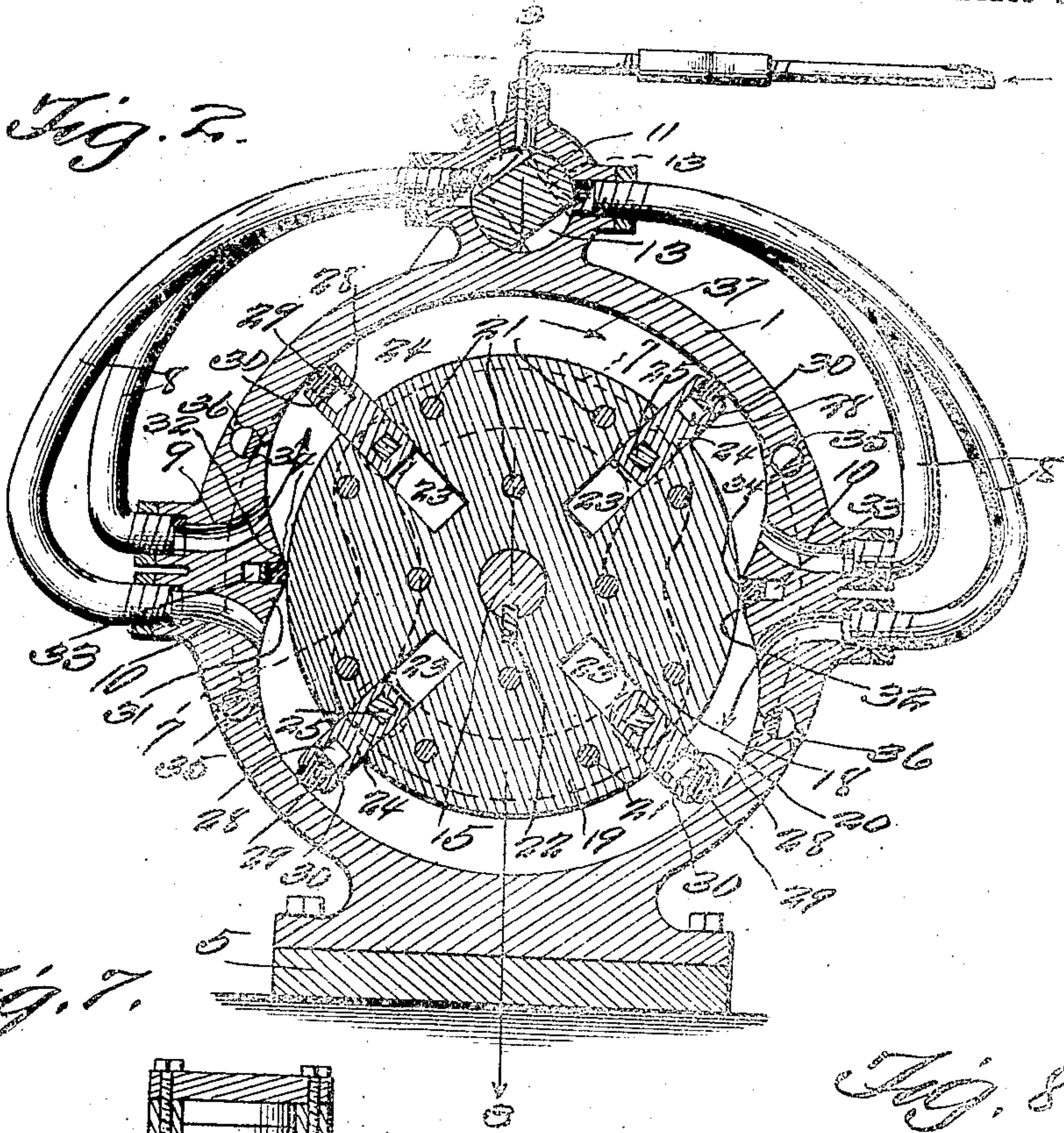
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 3 SHEETS--SHEET 2.



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3 SHEETS—SHEET 3.

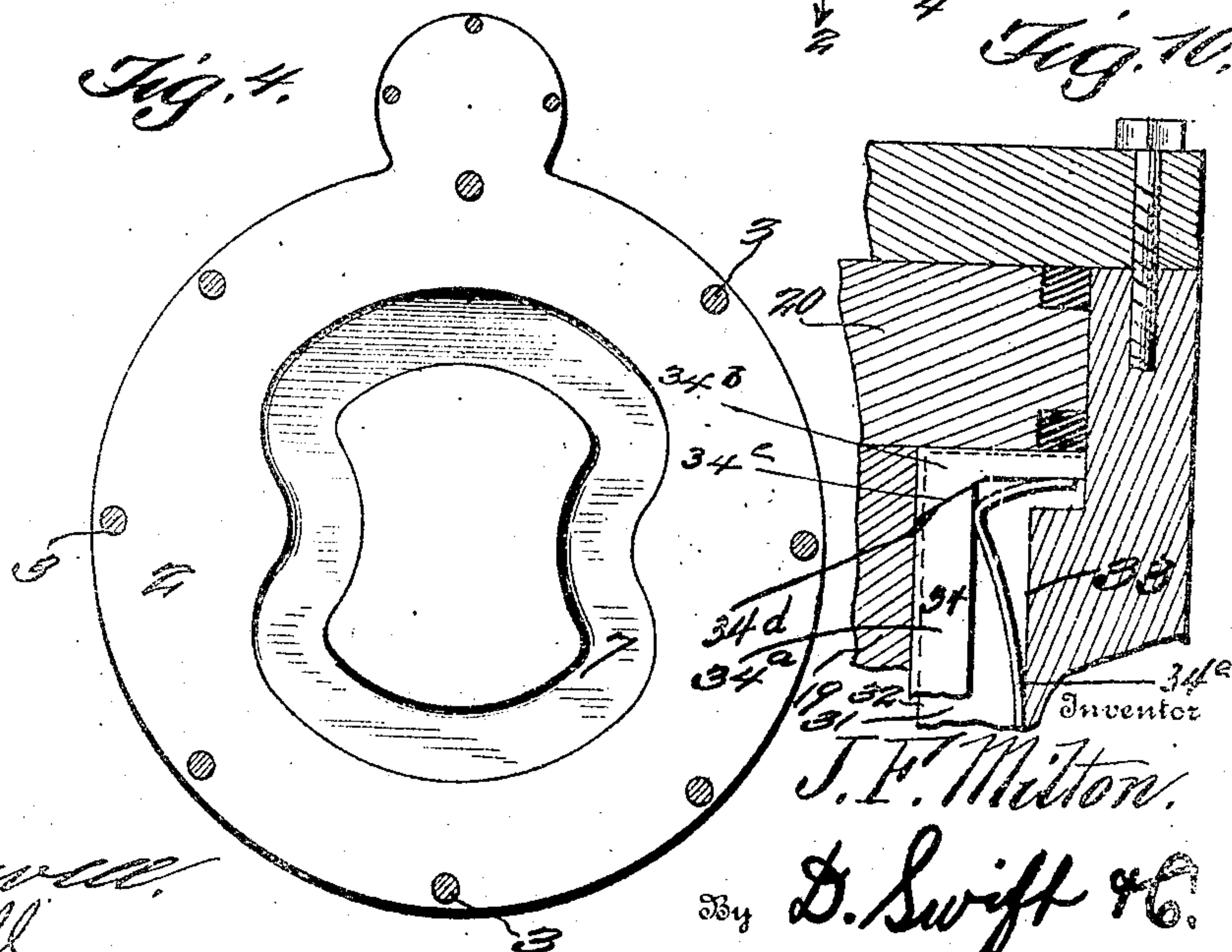
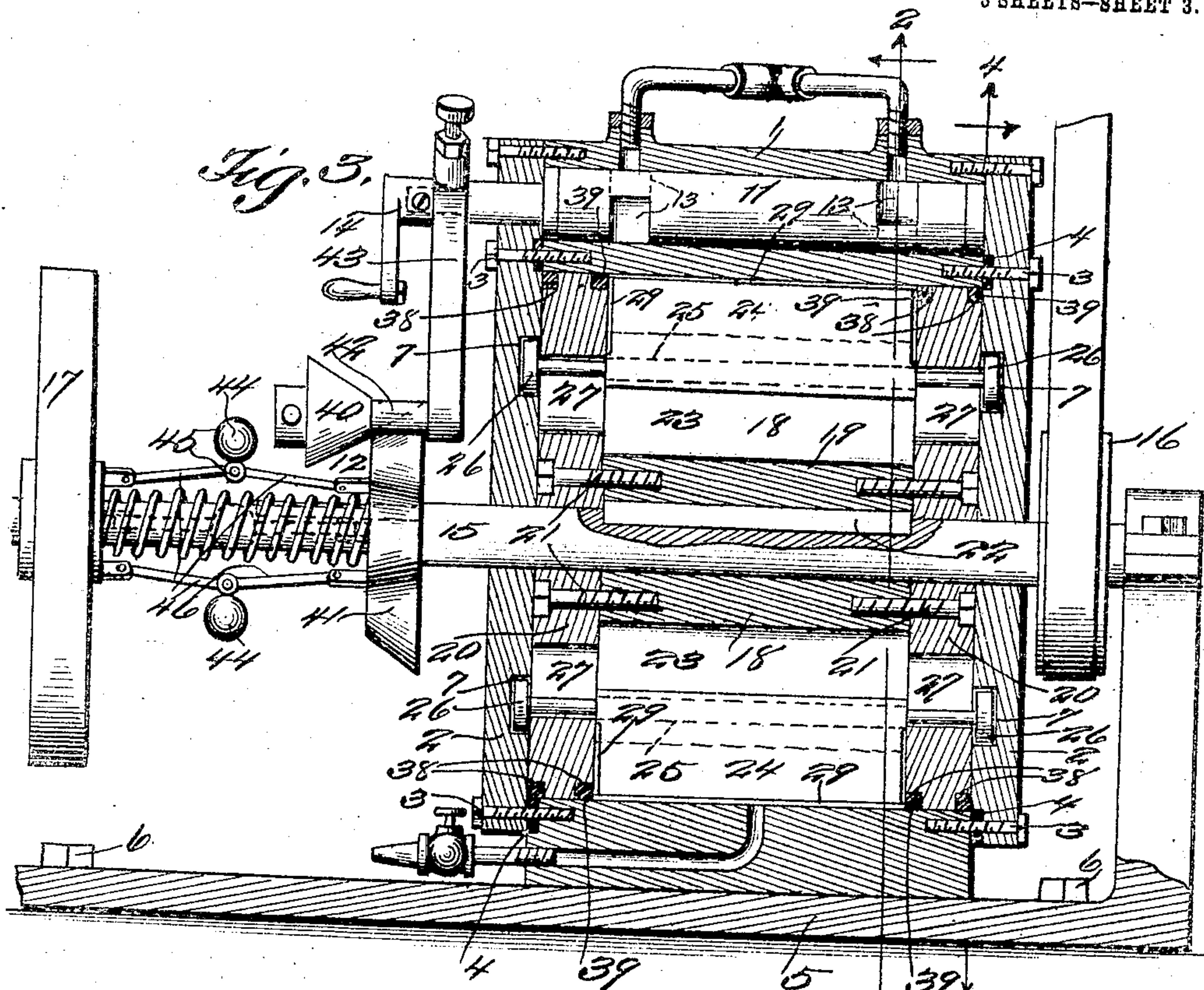
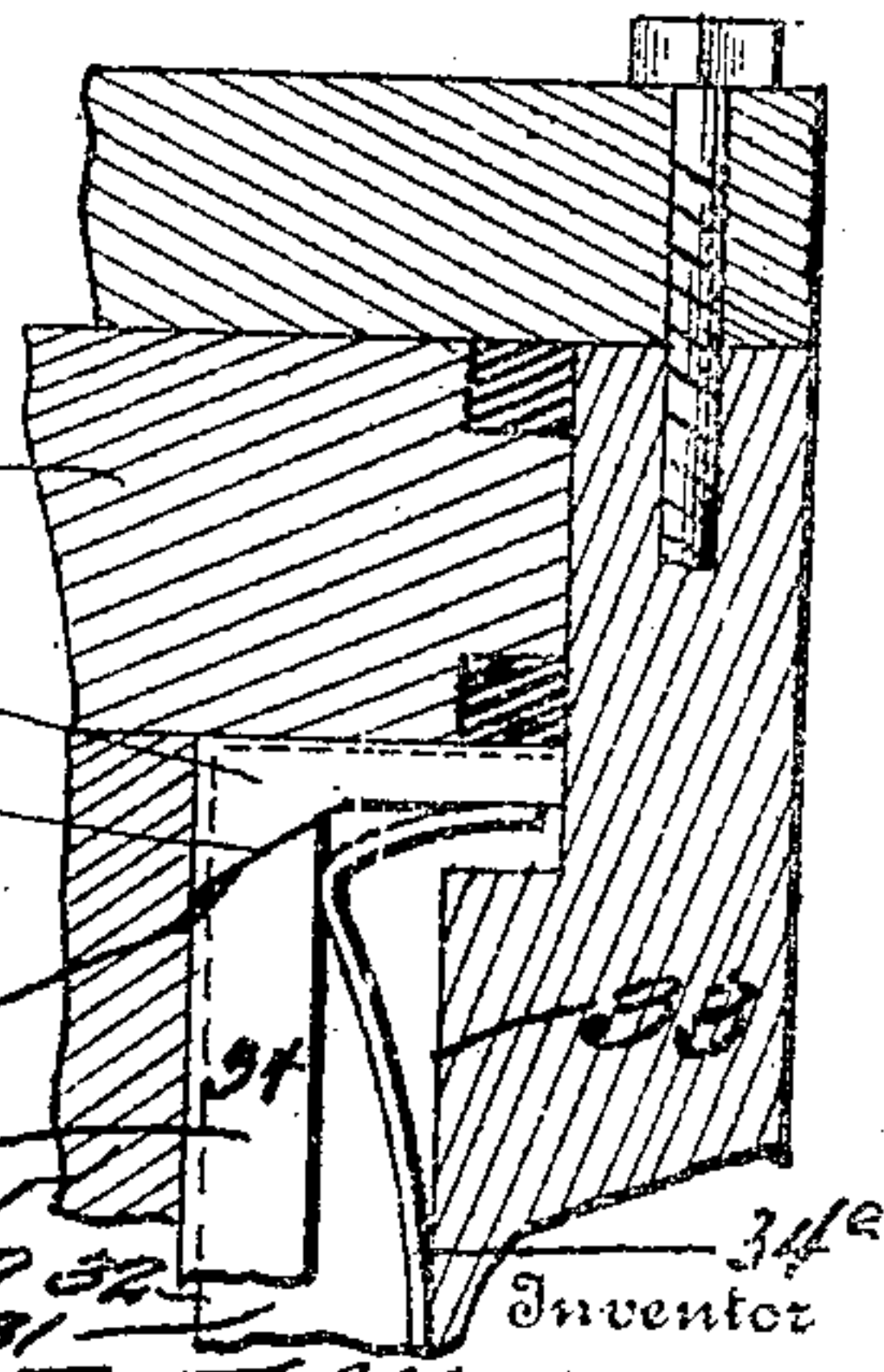


Fig. 10.



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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

951,960.

Specification of Letters Patent.

Patented Mar. 15, 1910.

Application filed March 16, 1909. Serial No. 483,782.

To all whom it may concern:

Be it known that I, JOHN F. MILTON, a citizen of the United States, residing at Palestine, in the county of Anderson and State of Texas, have invented a new and useful Rotary Engine; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention about to be set forth and claimed belongs to the art of motor engines, and particularly pertains to that subclass known generally as rotary engines, in which the pistons of the engine are reversible, by reversing the action of the steam or other motive power thereon.

The primary and essential object of the invention is the provision of a device of this nature, whereby all steam leakage is obviated, as well as relieving the engine of all back pressure of the steam.

A further object of the invention is to construct the pistons of the engine in such a manner as to allow them to have a continuously close and packed contact entirely about the inner circumference of the engine's casing, throughout the entire movement of the pistons.

The invention has for a further object the provision of means whereby an automatic cut-off is provided, thereby increasing the steam expansion within the engine's casing or cylinder. This automatic cut-off mechanism is designed to be automatically governed and gradually increased or decreased, through the motion of the engine's driving shaft. The applicant, in this present invention, desires to term the means for regulating the cut-off as an intermeshing cone governor, one of the cones of which also performs the function of a cam, as the engine's driving shaft is rotated, said cone that performs the function of a cam being moved longitudinally of the engine's driving shaft through the centrifugal force of the balls, thereby governing the speed of the engine. The links which carry the balls of the governor are connected between the cone performing the function of a cam and the fly wheel, which is rotatable with the engine's driving shaft.

Another object of the invention resides in the provision of a rotatable piston carrying

head, constructed of a central body portion and two head portions, which are bolted or otherwise secured to the said body portion, and between which and in radial slots of the body portion the pistons are movably mounted, their movements being governed by cam grooves of the engine's casing or cylinder.

Another object in view is to provide the pistons with spring actuated packing blocks which continually contact with the inner circumference of the engine's cylinder.

The invention comprises further objects and combinations of elements which will be hereinafter more fully described, shown in the accompanying drawings, and the novel features thereof will be pointed out by the appended claims.

The features and elements and the arrangement thereof, for accomplishing the objects of this device or apparatus, may be changed and varied, that is to say, in an actual reduction to practice, with an understanding that the changes and variations accruing from said reduction to practice are limited to the scope of the appended claims.

To obtain a full and correct understanding of the details of construction, combinations of features, elements and advantages, reference is to be had to the hereinafter set forth description and the accompanying drawings in connection therewith, wherein—

Figure 1 is a perspective view of the new and novel rotary engine, as above referred to, embodying the essential features of the invention. Fig. 2 is a transverse sectional view of the engine upon line 2—2 of Fig. 3, clearly disclosing the interior structure thereof and the intakes and the exhaust ports of the engine. Fig. 3 is a longitudinal sectional view upon line 3—3 of Fig. 2, further disclosing the interior structure of the rotatable piston carrying head. Fig. 4 is a sectional view through the engine's casing or cylinder upon line 4—4 of Fig. 3, clearly illustrating one of the cam grooves in which the rollers or friction members operate, so as to radially move the pistons. Fig. 5 is a detail perspective view of a portion of the rotatable piston carrying head, one of the pistons, and the spring actuated packing blocks or strips, which are carried by the pistons. Fig. 6 is a sectional view through a portion of one of the pistons clearly illustrating the manner in which the

said packing blocks or strips are spring actuated. Fig. 7 is a detail sectional view of a portion of the engine's casing or cylinder, clearly showing the locations of the steam
 5 intakes, the steam being reversed from one to the other, that is to say, when it is desired to reverse the moving elements of the engine. Fig. 8 is a perspective view of the intermeshing or the interengaging cone gov-
 10 ernor mechanism, showing the manner in which the same operates the steam reversing valve. Fig. 9 is a sectional view through a portion of the arm 43 and the valve 11, showing the novel means for holding the
 15 valve in the requisite position. Fig. 10 is a detail sectional view through a portion of the engine's cylinder and the packing 34 showing the spring for holding the same inwardly, and in contact with the piston-
 20 carrying head.

In regard to the accompanying drawings, wherein similar reference characters indicate corresponding parts in the several illustrations, 1 designates the engine's casing or
 25 cylinder, which is cylindrical in contour, and is provided with the head pieces or members 2. These head pieces or members 2 are bolted to the casing or cylinder by suitable bolts or other means 3, there being packing
 30 4 disposed between the head pieces and the engine's casing or cylinder. The casing or cylinder is provided with a suitable base portion 5 which may be integral or otherwise secured to the cylinder. This base portion
 35 may be secured by bolts or other means 6 to the floor of the room in which the engine is positioned for transmitting power to other machinery.

The head pieces or members 2 are pro-
 40 vided with cam grooves 7, the purpose of which will hereinafter appear, as the invention is further described. There are four steam pipes 8, two of which are connected to steam inlets 9 upon one side of the casing,
 45 while the other two are connected to similar steam inlets 10 of the other side of the casing. The steam is reversed from one to the other of these pipes, by means of a suitable valve 11, the valve rod of which is auto-
 50 matically controlled by the intermeshing or interengaging cone governor 12, the operation of which will be hereinafter fully explained. The valve rod is recessed upon op-
 55 posite sides, as shown at 13, which recesses are designed to register with one or another of the pipes 8, that is to say, when it is desired to operate the engine in one direction or the other. This valve rod is partially ro-
 60 tated or moved by the device 14 so as to reverse the action of the engine. This partial rotation or movement of the rod is entirely independent of the movement imparted to the rod by the governor mechanism. When the valve 11 is independently rotated, that
 65 is to say, partially, and regardless of the

movement imparted to it by the governor mechanism, the same is held in its desired position by means of the pin 11^a, which is held in engagement with one or another of the recesses 11^b of the valve, by means of the
 70 spring 12^a. This spring 12^a is interposed between a collar 12^b threaded upon the pin, and the nut 12^c, as shown clearly in Fig. 9. This nut 12^c is threaded into a hollow
 75 threaded boss 12^d, of the arm 43. The hollow portion of the boss extends entirely through it and communicates with the unobstructed bore of the said arm 43, so as to allow the pin to extend therethrough and
 80 into one or another of the recesses 11^b. The bore of this boss is provided with an annular shoulder 12^e, against which the collar 12^b contacts. To reverse the position of the valve 11 opposite to that position shown in
 85 Fig. 2, the arm or member 14 is raised in the direction of the arrow 14^a, shown in Fig. 1, thereby allowing the pin 11^a to engage the other recess 11^b. In this manner, the steam is reversed, in order to reverse the action of
 90 the engine.

15 denotes the engine's driving shaft, upon one end of which a driving pulley 16 is mounted, while upon the other end the usual fly wheel 17 is mounted. Rotatable with the
 engine's driving shaft is the rotatable piston
 95 carrying head 18. This piston carrying head consists of a central body portion 19, and the two head portions or pieces 20. These head portions or pieces 20 are bolted or
 100 otherwise secured to the central body portion by means of the bolts or other means 21, thereby causing the head pieces or portions and the body portion to rotate as one body. The piston carrying head is keyed by
 105 a suitable feather or other means 22 to the engine's driving shaft, so as to cause the two to rotate as one. The central body portion is radially slotted, and in these slots 23 the
 110 pistons 24 are movably mounted. Traversing the pistons are shafts 25, upon either end of which rollers or friction members 26 are mounted, which are designed to travel in the cam grooves of the engine's cylinder or casing.

The head pieces or portions 20 are pro-
 115 vided with radially disposed slots 27, through which the shafts or rods 25 extend, as clearly disclosed in the accompanying drawings. The pistons upon either end and the outer
 120 faces thereof are provided with recesses 28, as shown in the drawings. In these recesses packing blocks or strips 29 are movably mounted, and between the said blocks and the bottom or the rear of the recesses, springs
 125 30 are interposed, so as to continually hold the packing blocks or strips outwardly pressed, thereby causing them to continually contact with the inner circumference of the
 engine's cylinder or casing, during the en-
 130 tire movement of the piston carrying head.

The steam intakes or inlets of the engine's cylinder are so directed or disposed as to allow the inflow of the steam to strike fully and squarely upon the pistons, as they are being radially forced outward. The pistons are assisted in their radial or outward movements by means of the inner contour of the inner circumference of the engine's casing, said contour comprises the enlargements 31, which gradually increase from above and below into an apex 32, which is longitudinally recessed, as at 33, to receive the packing 34, as shown clearly in the drawings. By shaping the inner circumference of the cylinder in this manner and by directing the steam inlets or intakes in the manner as shown in the drawings, all back pressure of steam is obviated, as will be clearly manifest.

The cylinder is provided with the usual exhaust ports 35 and 36, the exhaust ports 35, as shown in the drawings, are open, thus allowing the steam to act directly upon the pistons, so as to cause the piston carrying head to rotate in the direction of the arrow 37, as is disclosed in the drawings. When the action of the steam is reversed, the exhaust ports 35 are closed, by the manipulation of the levers 35^a, shown clearly in Fig. 1 of the drawings, and the ports 36 are opened by means of the levers 36^a, also clearly shown in Fig. 1. By throwing the levers 35^a and 36^a upward or downward, the exhaust ports may be closed or opened.

To reverse the engine in a direction opposite to that as indicated by the arrow 37, the valve 11 should be reversed, thereby allowing the steam to act upon the opposite faces of the pistons. When reversing the valve 11, the exhaust ports 35 should be closed, and the ports 36 open.

The peripheries of the head portions or pieces 20 are recessed annularly, as shown at 38, in which recesses suitable packing 39 is disposed, thereby preventing any and all leakage of steam, which is generally found in other engines. The intermeshing or interengaging cone governor 12 comprises the cone members 40 and 41, the cone 40 being journaled upon a pin 42 carried by the arm 43, as shown in the drawings. This arm 43 is designed to move the valve rod of the valve 11, that is to say, when the same is raised, thereby governing the speed of the engine. In case, the speed of the engine is greatly increased, the governor will be automatically operated through the medium of the centrifugal force of the balls 44 thereof, thereby automatically cutting off the inflow of the steam. The cone 41 is mounted slidably upon the engine's driving shaft, but is rotatable therewith by means of its connection 45 with the hub of the fly wheel, as shown clearly in the detail view of the drawings. This connection 45 comprises the link

members 46, to which the balls 44 are securely fastened. The cone 41 as shown in the drawings corresponds with the shape of the concentric cam grooves thereby regulating the inflow of the steam, that is to say, as the cone 40 rides about the periphery of the cone 41. When the cone 40 is moving about the periphery of the cone 41, especially when it engages the depression 47, the flow of steam through the pipes 8 is increased, but, when the cone 40 engages the remainder of the periphery of the cone 41, the steam is decreased, thereby increasing the steam expansion, as will be clearly evident from the above description in connection with the annexed drawings.

The body portion of the piston carrying head is cut away, so as to lighten the same and also to obviate the use of too much metal.

The cam grooves of the heads of the engine's cylinder are disposed concentric with one another, so as to cause the pistons to move in an exact parallel plane with the inner circumference of the cylinder, as will be clearly evident in examining the transverse sectional view of the invention of Fig. 2.

The steam may be received from any suitable source of supply, not shown, there being no particular invention in this feature.

The packings 34 consist of three members or parts 34^a and 34^b, the parts 34^b are provided with beveled portions 34^c, against which the beveled ends 34^a engage, so as to cause the end parts 34^b to continually engage the head portions or pieces 20, as the piston-carrying head rotates. To hold the several parts of the packing 34 in the positions as shown in Fig. 10, springs 34^e are provided, which are mounted in the recesses 33, in the manner shown clearly in Fig. 10.

From the foregoing, the essential features, elements and the operation of the device, together with the simplicity thereof, will be clearly apparent.

Having thus fully described the invention, what is claimed as new and useful is:—

1. A rotary engine having a casing and provided with a rotatable piston carrying head, a shaft driven by said head, said casing having upon its inner circumference at either end thereof concentric grooves having opposite portions curved toward the center of said head, steam inlets and exhaust ports, a valve to control said inlets, said shafts having a member with its periphery at opposite locations conforming to the curves of said grooves, and means carried by said valves to cooperate with said member whereby the inlets are automatically controlled.

2. A rotary engine having a casing and provided with a rotatable piston carrying head, a shaft driven by said head, said cas-

ing having upon its inner circumference at
either end thereof concentric grooves hav-
ing opposite portions curved toward the cen-
ter of said head, steam inlets and exhaust
5 ports, a valve to control said inlets, said
shaft having a cam member with its periph-
ery at opposite locations conforming to the
curves of said grooves, and a lever carried
by said valve and provided with a cone-
10 member to cooperate with the first-named

member whereby the inlets are automatic-
ally controlled.

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

JOHN F. MILTON.

Witnesses:

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GEORGE ASHFORD.