

No. 719,746.

PATENTED FEB. 3, 1903.

B. B. CHANDLER, JR.

FLUID CLUTCH.

APPLICATION FILED AUG. 28, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

FIG. 1

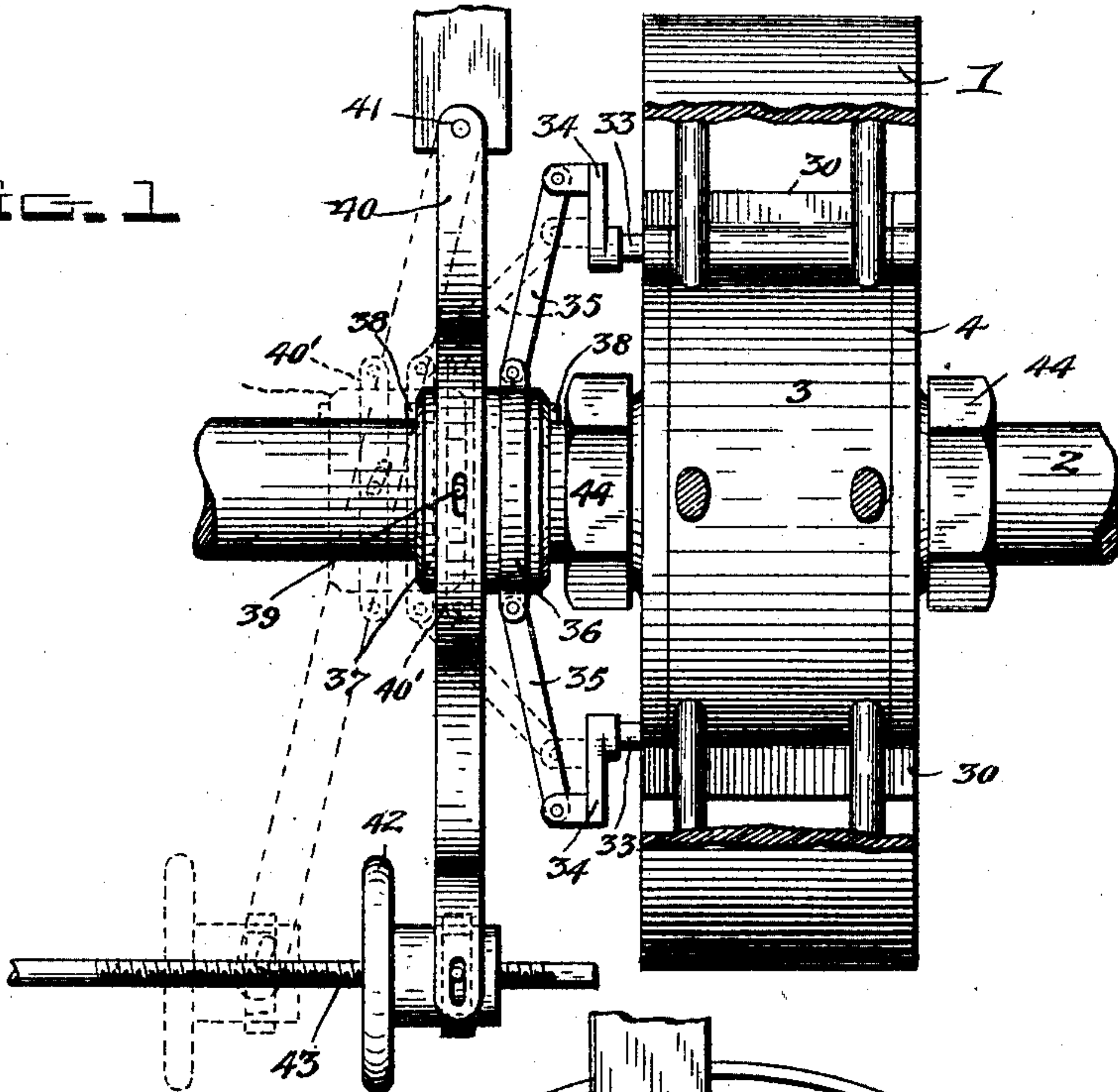
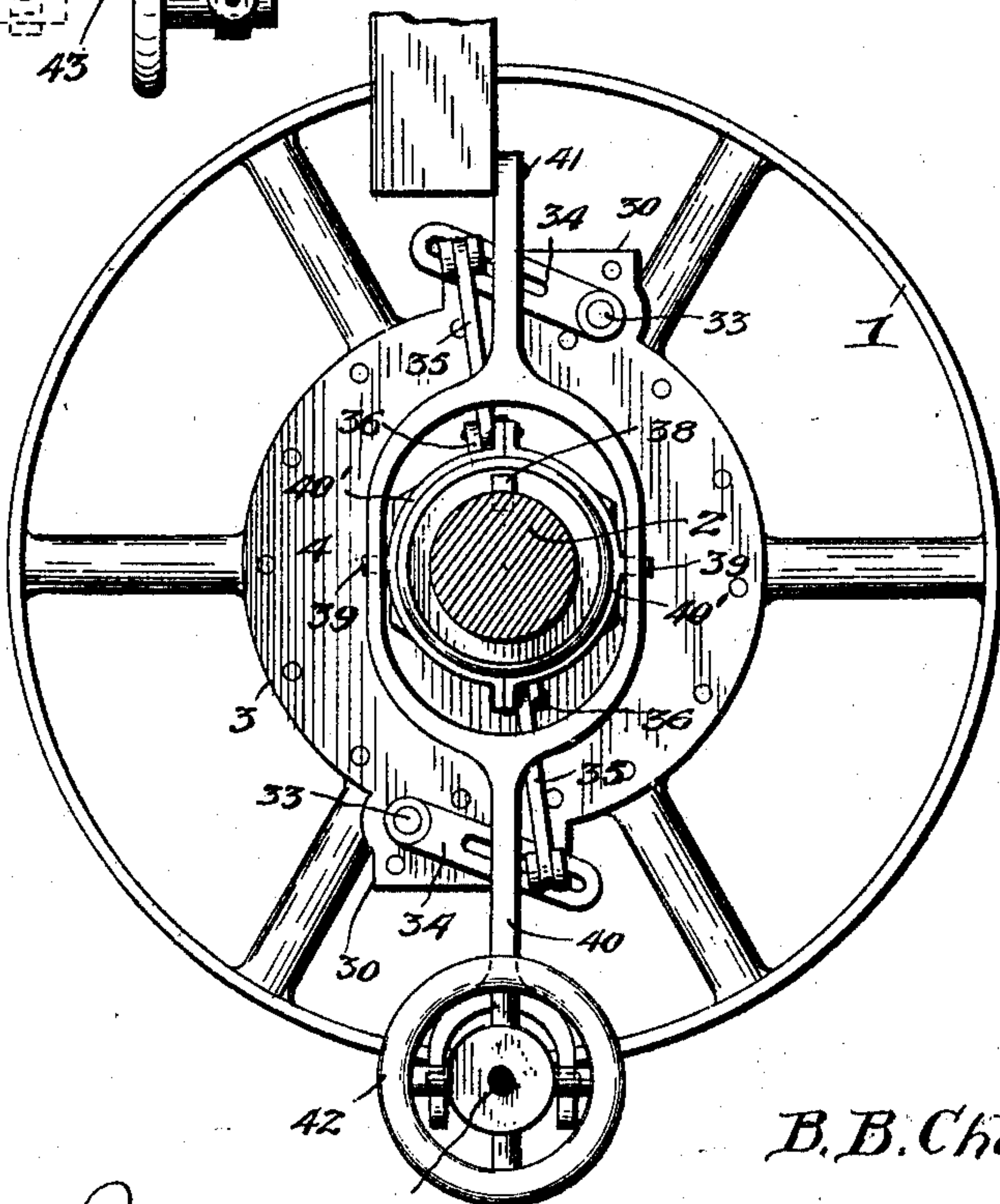


FIG. 2



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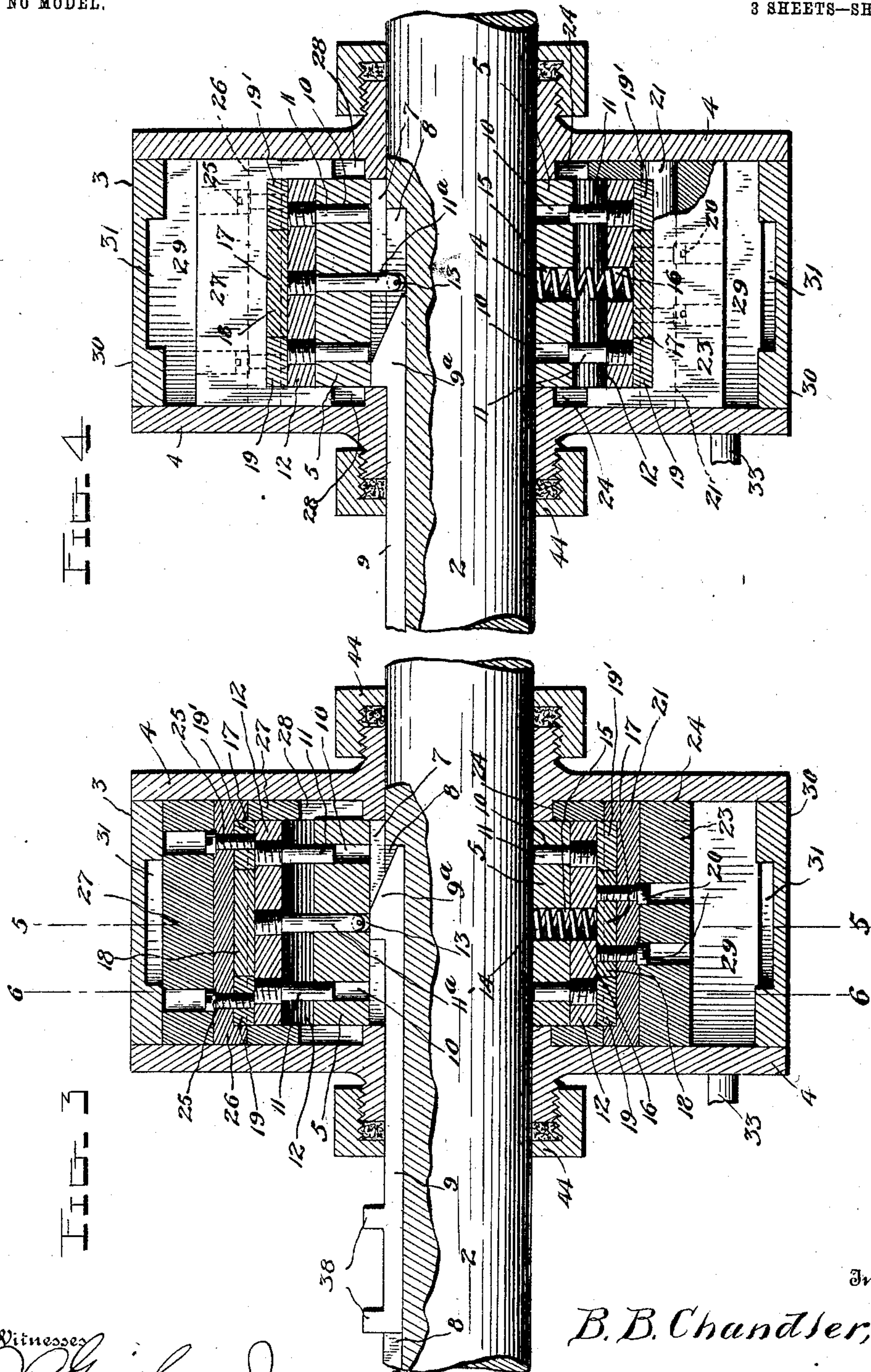
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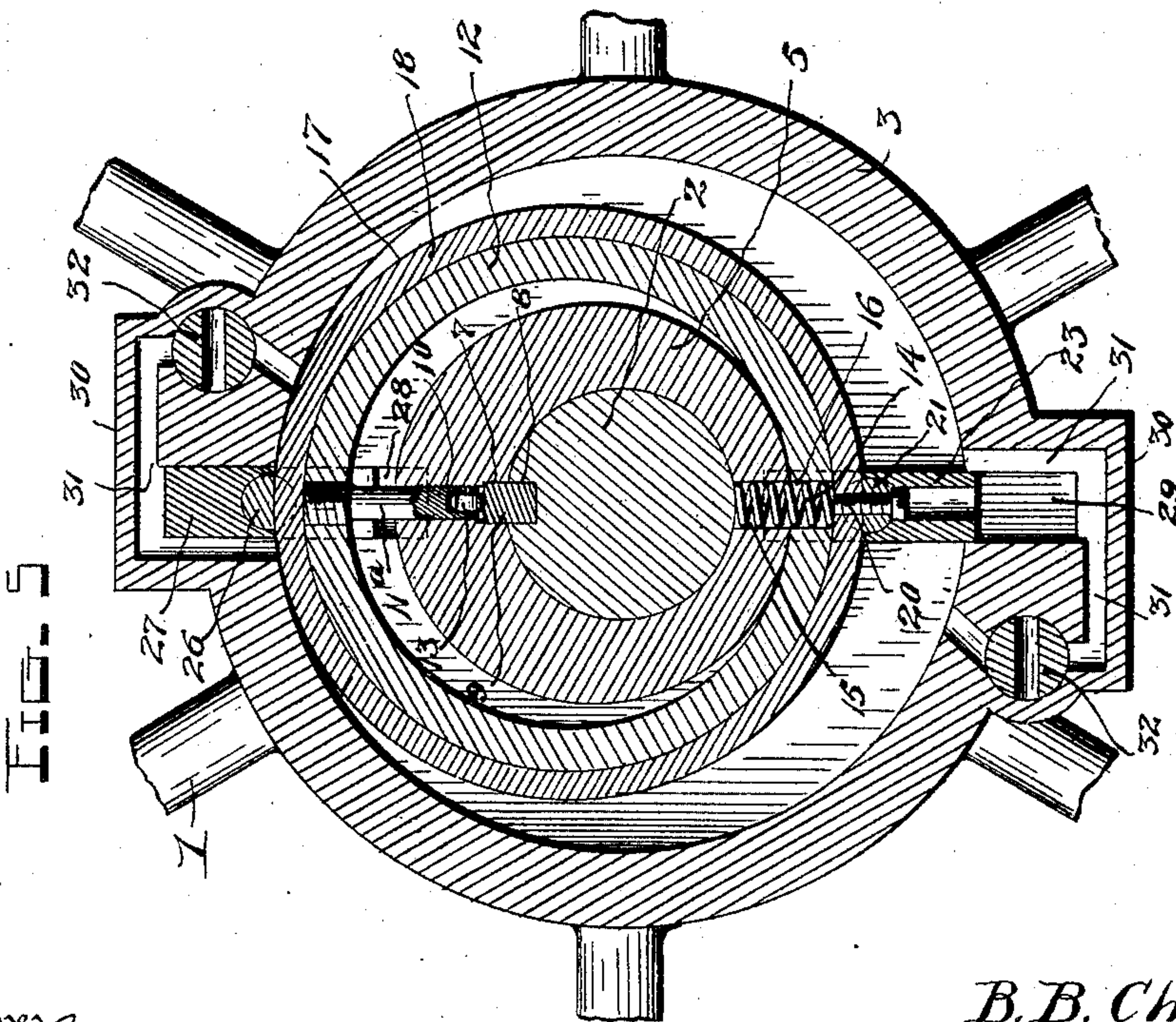
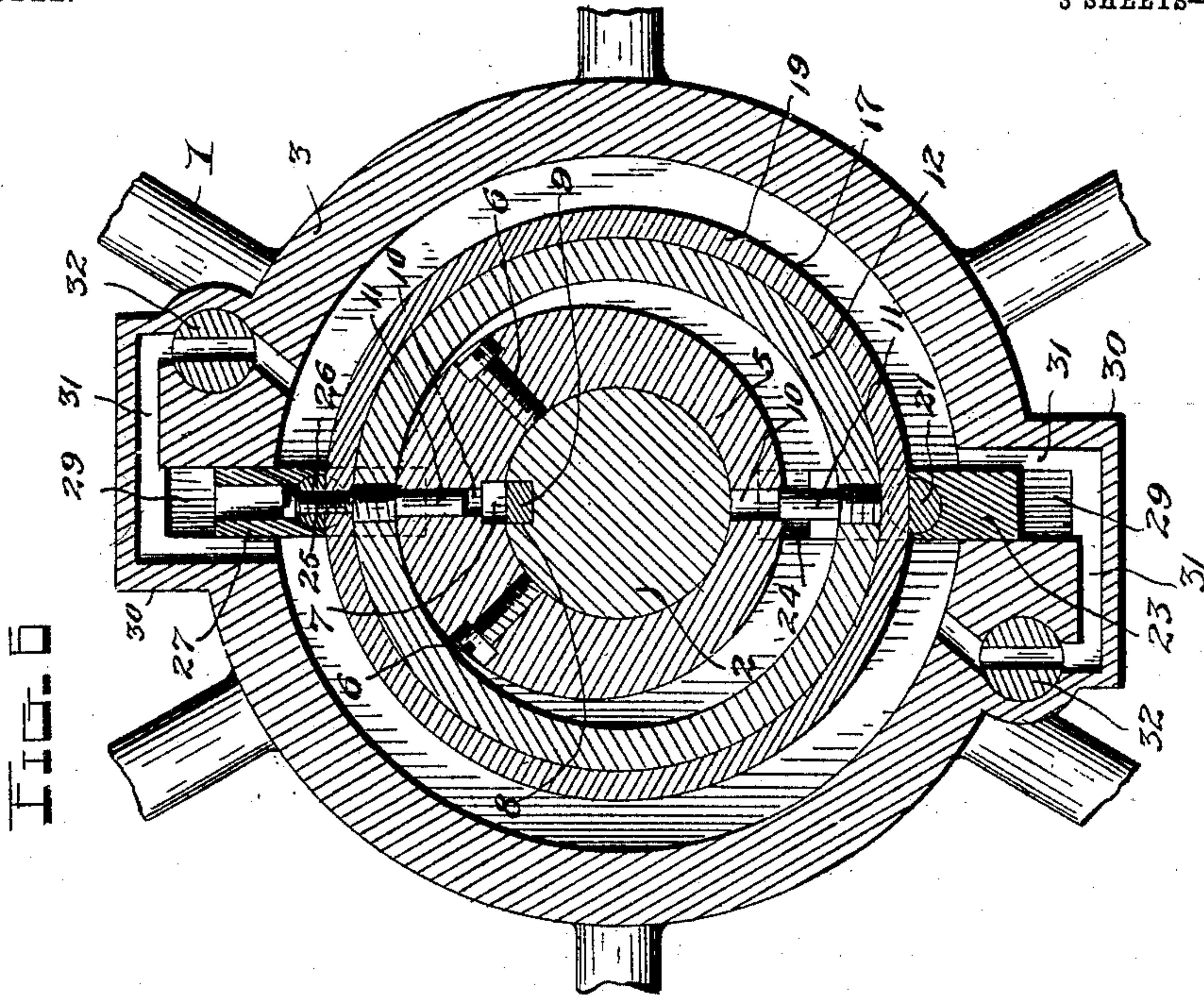
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

BARTLETT B. CHANDLER, JR., OF NEVADA CITY, CALIFORNIA.

## FLUID-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 719,746, dated February 3, 1903.

Application filed August 28, 1902. Serial No. 121,360. (No model.)

*To all whom it may concern:*

Be it known that I, BARTLETT B. CHANDLER, Jr., a citizen of the United States, residing at Nevada City, in the county of Nevada and State of California, have invented certain new and useful Improvements in Fluid-Clutches; and I do 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.

This invention relates to new and useful improvements in clutches of that type in which a fluid is used to cause the motion of one clutch member to be gradually imparted to the other clutch member.

The object of the invention is to provide a device of this character by means of which the motion of a rapidly-rotating pulley, drum, gear, or body may be imparted gradually and at the will of the operator to a shaft, or vice versa, from a rapidly-rotating shaft to a pulley, drum, gear, or any form of rotating device.

A further object of this invention is to provide a device of this character which is simple of construction, durable in use, and extremely powerful and efficient in operation.

With the above and other objects in view, which will readily appear as the nature of the invention is better understood, said invention consists in certain novel features of construction and combination and arrangement of parts, which will be hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a pulley, showing my invention applied thereto, the rim of the pulley being partly broken away to more clearly illustrate the fluid-cylinder, which forms the hub of the pulley. Fig. 2 is an end elevation of the same. Fig. 3 is a central longitudinal section through the cylinder, showing the same locked to turn with the shaft. Fig. 4 is a similar sectional view showing the position of the parts when the shaft is free to rotate within the cylinder or pulley. Fig. 5 is a cross-sectional view taken on the line 5 5 of Fig. 3, showing the cylinder locked to turn with the shaft. Fig. 6 is a similar sectional view taken on the line 6 6 of Fig. 3, showing the position of the parts when the shaft is free to rotate in the cylinder or hub of the pulley.

Referring to the figures of the drawings, 1 designates the device, which in the present instance is a pulley or band-wheel, but which may be a gear, disk, drum, or any similar device to impart motion, and 2 the shaft to which the motion of said pulley is adapted to be imparted through the clutch mechanism which forms my invention. The same consists in casting the hub of said pulley or other device in the form of a cylinder 3, the ends of which are closed by the heads or covers 4, through which the shaft 2 extends. Upon said shaft, within the cylinder, is an eccentric head 5, secured thereto against rotation by the set-screws 6 and provided with a keyway 7, which registers with a deep longitudinal keyway 8, formed in the shaft 2, to receive the sliding or operating key 9, hereinafter described. The said eccentric head 5 has formed in its periphery, at diametrically opposite sides, the guide openings or apertures 10, in which the guide-pins 11, secured to the inner periphery of a shifting ring 12, are adapted to slide. The shifting ring 12 has a bore of larger diameter than the eccentric head 5, which it surrounds and is supported upon the same by the guide-pins 11. The said shifting ring is also provided with a pin 11<sup>a</sup>, of greater length than the pins 11, which has a roller 13 journaled upon its end, which is adapted to be moved in and out of the keyways 7 and 8 by the beveled end 9<sup>a</sup> of said operating-key 9 to change the position of the shifting ring 12 upon the eccentric head 5. A coil-spring 14 is seated in an aperture or bore 15 in the eccentric head 5, and the registering aperture or bore 16 in the ring 12, with its ends bearing against the shaft 2, and an annular three-part abutment-carrying ring 17 surrounding the ring 12 and exerting its energy to hold the ring 12 centered upon the shaft 2, which is the normal position of said ring when the shaft is free to turn within the cylinder, as illustrated in Fig. 6. The said three-part abutment-carrying ring 17 consists of a central ring 18 and two outer rings 19 19' of less width than the central ring. To the central ring 18 is secured by the screws 20 the circular cross-rod 21 of greater length than the width of the cylinder and having a portion cut away to allow it to bear firmly upon the surface of the ring 17. The said rod car-



ries the abutment or wing 23, which is of greater length than the width of the cylinder, and the ends of the same extend into and slide in guide-slots 24, formed in the heads or covers of the cylinder. Secured to the two outer rings 19 and 19' by the screws 25 is a circular cross-rod 26, similar to the rod 21, which carries the other abutment or wing 27, the ends of which slide in slots 28, formed in the cylinder-heads. The said abutments 23 and 27 are adapted to slide in the abutment-chambers 29, formed in enlarged portions 30 of the cylinder and separate the cylinder-space into two chambers or compartments which are in communication through the passages 31, formed in said enlargements of the cylinder and extending around the abutments. The turning plug-valves 32, located in the said enlargements, are adapted to close these passages to cut off this communication between the two chambers of the cylinder at the proper time. The valves 32 are formed with stems 33, extending through one of the heads of the cylinder, with the crank-arms 34 secured thereto. Pivoted to the ends of these arms are links 35, which have their opposite ends pivoted to a loose ring 36, mounted to turn upon the collar 37, which is slidably mounted upon the shaft 2, but keyed to turn therewith. The said collar is secured between the lugs or projections 38 upon the sliding operating-key 9 and is provided with a second loose ring 40', mounted to rotate upon said collar and having two pins 39 at diametrically opposite points, which enter elongated apertures in an operating-lever 40, suitably pivoted at 41 to any stationary support and having in its opposite end elongated apertures to engage pins upon a loose ring mounted to revolve upon a hand-wheel 42, which has a screw-threaded engagement with a stationary rod 43.

In order to insure a fluid-tight connection between the cylinder 3 and the shaft 2, I form the opening in the heads through which the shaft extends with screw-threaded flanges, between which and the packing-caps 44 I confine any desired packing material.

The operation of the invention is as follows: When the parts are properly assembled, the cylinder-space is filled with water, oil, or any desired fluid and made fluid-tight. The pulley and cylinder are free to turn upon the shaft when the parts are in the position illustrated in Figs. 4 and 6 and the operating-lever 40 is in the dotted-line position seen in Fig. 1. It will be noticed that in this position the shifting ring 12, which is locked by the pins 11 to turn with the shaft, is practically concentric with the shaft and also with the cylinder which turns concentrically upon the shaft, so that the cylinder-space is about the same width all around, the sliding key 9 is withdrawn from the cylinder, and the plug-valves 32 are in their open position to permit of a free circulation of the fluid from one chamber of the cylinder to the other through

the passages 31. Since the three-part ring 17, carrying the abutments 23 and 27, turns freely upon the shifting ring 12 and with the cylinder 3, when said cylinder or pulley is rapidly rotated the cylinder will turn upon the shaft 2 and the ring 17 will turn upon the ring 12, which is concentric, or practically so, with the cylinder, and hence the abutments and ring 17 will have but slight movement with respect to the cylinder, and there will be little or no flow of the fluid from one chamber to the other; but as soon as the operating-key 9 is forced into the cylinder by the sliding collar 37 being forced inwardly by the lever 40, which is swung to the full-line position seen in Fig. 1 by running the band-wheel 42 upon the screw-rod 43, the beveled end 9<sup>a</sup> of the said key 9 will engage the roller 13 upon the end of the pin 11<sup>a</sup>, which is carried by the ring 12, and the said ring 12 will be gradually forced out toward the inner periphery of the cylinder, or to a position eccentric to the cylinder and shaft, as illustrated in Figs. 3 and 5. When the ring 12 is moved to an eccentric position, the cylinder-space upon each side of the abutment 27 will be narrowed and the passage of the fluid from one side to the other retarded, and at the same time the collar 37 is moved inwardly the links 35, pivoted to the loose ring upon said collar, will be forced to a more nearly vertical position, as shown by the full lines in Fig. 1, to swing the crank-arms 34 and gradually close the plug-valves 32, which cut off the flow of the fluid through the passages 31 around the abutments. It will thus be seen that when the operating-lever 40 is operated gradually the ring 12 will be forced to an eccentric position with respect to the shaft which carries it by means of the guide-pins 11 and to the cylinder, while at the same time the plug-valves 32 will be gradually closed to cut off the flow of fluid from one side of the cylinder to the other. As the ring 12 is gradually moved to an eccentric position in the cylinder, which is in rapid rotation, the ring 17 and the abutments 23 and 27, which turn with the cylinder, will be forced to move back and forth in the abutment-chambers of the cylinder, owing to said eccentric position of the ring 12, upon which the ring 17 slides. This shifting movement of the ring 17 and abutments with respect to the cylinder will cause a circulation of the fluid from one side of the cylinder-space to the other through the passages 31. The continued eccentric movement of the ring 12 narrows the cylinder-space upon each side of the abutment 27, and at the same time the plug-valves 32 are gradually closing. Hence the flow or circulation of fluid around the abutments is retarded, and a pressure upon the eccentric ring 12 is thus produced. This pressure behind the ring 12 increases as the same is moved to a greater degree of eccentricity, or, in other words, as the circulation of the fluid is more and more retarded, until



said pressure overcomes the resistance of the shaft to which the ring 12 is locked, when said shaft will gradually take up the motion of the cylinder or pulley. The continued shifting of the eccentric ring 12 and the complete closing of the valves 32, which occurs immediately after the ring 12 has reached the limit of its eccentric movement, will entirely cut off the flow of fluid, and hence the fluid will act as a lock to cause the cylinder and shaft to rotate together.

It will be observed that by this construction the operator has complete control and can impart the motion of the pulley, gear, or other device to the shaft or from the shaft to any device to receive motion as gradually as is desired, and it will be further observed that by rigidly securing one of the movable members I may use the device as a brake to gradually retard the motion of the other part or member. I further wish it distinctly understood that I do not limit myself to the device illustrated in the drawings, as they simply show one embodiment of my invention, and the same may be adapted to and used upon various kinds of machines and for various purposes. I also hold that various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. A device for imparting the motion of a driven body to a body to be driven, comprising a fluid-containing casing having abutment-chambers and passages around said abutment-chambers, a shaft, a shiftable ring upon said shaft, abutments controlled by said ring and operating in said abutment-chambers in the casing, to separate the same into compartments or chambers, means for shifting said shiftable ring to an eccentric position upon said shaft and thereby restrict and check the flow of fluid from one compartment of the casing to another to cause the casing and shaft to move in unison by reason of the pressure of the fluid upon the eccentric ring carried by the shaft, substantially as described.

2. A device for imparting the motion of a driven body to a body to be driven, comprising a casing having abutment-chambers and passages around said abutment-chambers, valves located in said passages, a shaft, a shiftable ring upon said shaft, abutments controlled by said ring and operating in said abutment-chambers in the casing to separate the same into compartments or chambers, means for shifting said shiftable ring to an eccentric position upon said shaft, means for operating the valves in said passages to cut off the flow of fluid from one compartment of the casing to another and thereby cause the casing and shaft to move in unison by reason of

the pressure of the fluid upon the eccentric ring carried by said shaft, substantially as described.

3. A device for imparting the motion of a driven body to a body to be driven, comprising a casing having abutment-chambers, and passages around said abutment-chambers, valves located in said passages, a shaft, a shiftable ring upon said shaft, abutments controlled by said ring and operating in said abutment-chambers in the casing to separate the same, into compartments or chambers, means for simultaneously shifting said shiftable ring to an eccentric position upon said shaft, and operating the valves in said passages to cut off the flow of fluid from one compartment of the casing to another and thereby cause the casing and shaft to move in unison by reason of the pressure of the fluid upon the eccentric ring carried by said shaft, substantially as described.

4. A device for imparting the motion of a driven body to a body to be driven, comprising a fluid-containing casing formed with abutment-chambers and with passages around said abutment-chambers, valves located in said passages, a shaft, a shiftable ring carried by said shaft, an abutment-carrying ring upon said shiftable ring, abutments carried by said abutment-carrying ring and operating in said abutment-chambers in the casing to separate the same into compartments or chambers, means for simultaneously shifting said shiftable ring to an eccentric position upon the shaft, and operating the valves in said passages to cut off the flow from one compartment of the casing to another, and thereby cause the casing and shaft to move in unison by reason of the pressure of the fluid upon the eccentric ring carried by the shaft, substantially as described.

5. A device for imparting the motion of a driven body to a body to be driven, comprising a fluid-containing casing formed with abutment-chambers and with passages around said abutment-chambers, valves located in said passages, a shaft, a head carried by said shaft, a shiftable ring carried by said shaft and head, an abutment-carrying ring upon said shiftable ring, abutments carried by said abutment-carrying ring and operating in said abutment-chambers in the casing to separate the same into compartments or chambers, means for shifting said shiftable ring to an eccentric position upon the shaft and thereby gradually restrict the flow of the fluid from one compartment of the casing to another through said passages around the abutments, and means for operating the valves in said passages to entirely cut off the flow of the fluid and thereby cause the shaft to move in unison with the casing by reason of the pressure of the fluid upon the eccentric ring carried by the shaft, substantially as and for the purposes described.

6. A device of the character described, comprising a fluid-containing casing formed with



abutment - chambers and with passages  
around said abutment-chambers, valves lo-  
cated in said passages, a shaft, a head upon  
said shaft formed with guide-openings, a shift-  
5 ablering provided with guide-pins adapted to  
operate in said guide-openings, an abutment-  
carrying ring upon said shiftable ring, abut-  
ments carried by said abutment-carrying ring  
and operating in said abutment-chambers in  
10 the casing to separate the same into compart-  
ments or chambers, a sliding key adapted to en-  
gage said guide-pins to shift said shiftable ring  
to an eccentric position, a spring adapted to re-  
turn said ring to a concentric position on said  
15 shaft, and means for operating the valves in  
said passages to cut off the flow of fluid from  
one compartment of the casing to another  
and thereby cause the casing and shaft to move  
in unison, substantially as described.  
20 7. A device of the character described, com-  
prising a fluid-containing casing formed with  
abutment - chambers and with passages  
around said abutment-chambers, turning  
valves located in said passages, a shaft formed  
25 with a longitudinal keyway, a head upon said  
shaft formed with guide-openings, and a key-  
way registering with said keyway in shaft, a

shiftable ring provided with guide-pins adapt-  
ed to operate in said guide-openings and with  
a pin adapted to project into said registering 30  
keyway, an abutment-carrying ring upon said  
shiftable ring, abutments carried by said abut-  
ment-carrying ring and operating in said abut-  
ment-chamber in the casing to separate the  
same into compartments or chambers, a slid- 35  
ing key in said registering keyway provided  
with a beveled end adapted to engage said  
pin projecting into said keyways to move said  
shiftable ring to an eccentric position, a spring  
adapted to restore said shiftable ring to a con- 40  
centric position upon said shaft, a sliding col-  
lar upon said shaft and adapted to engage  
said key to operate same, means connecting  
said collar and said turning valves, for oper-  
ating said valves upon the movement of said 45  
collar, substantially as described.

In testimony whereof I have hereunto set  
my hand in presence of two subscribing wit-  
nesses.

BARTLETT B. CHANDLER, JR.

Witnesses:

JULIUS M. WALLING,  
JOHN WERRY.