(No Model.) 2 Sheets—Sheet 1.

# L. ATWOOD.

## POWER TRANSMITTING DEVICE.

No. 562,696. Patented June 23, 1896.

FIG. 19.

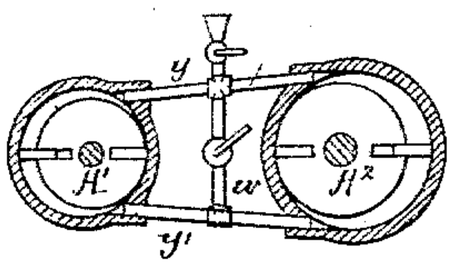



FIG. 1.

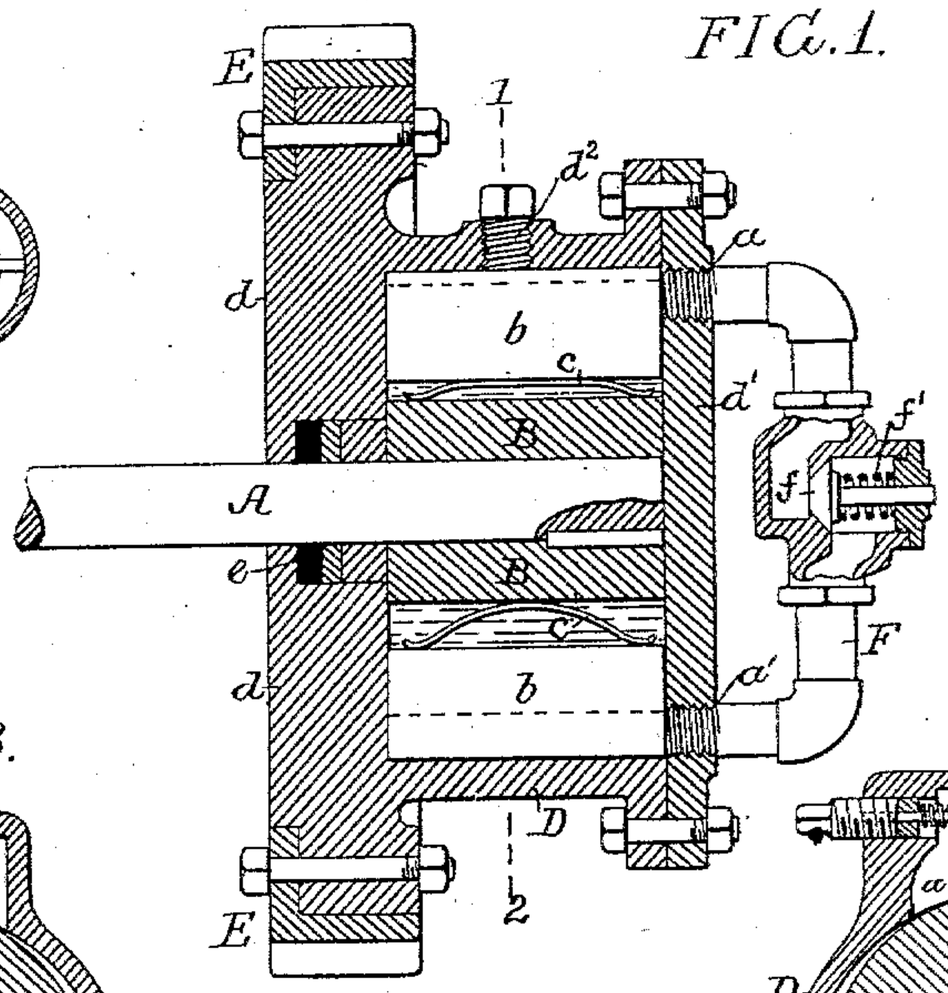



FIG. 13.

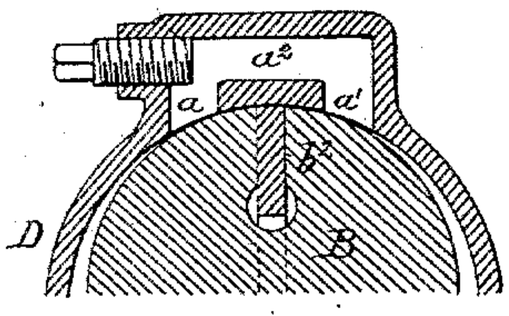



FIG. 15.

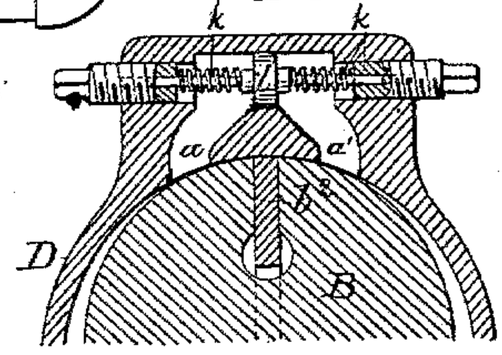



FIG. 16.

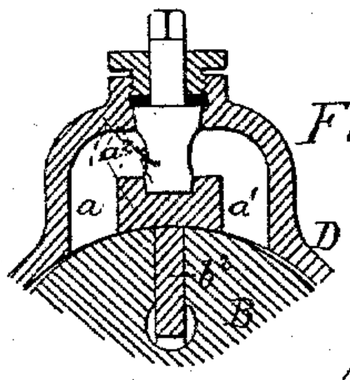



FIG. 2.

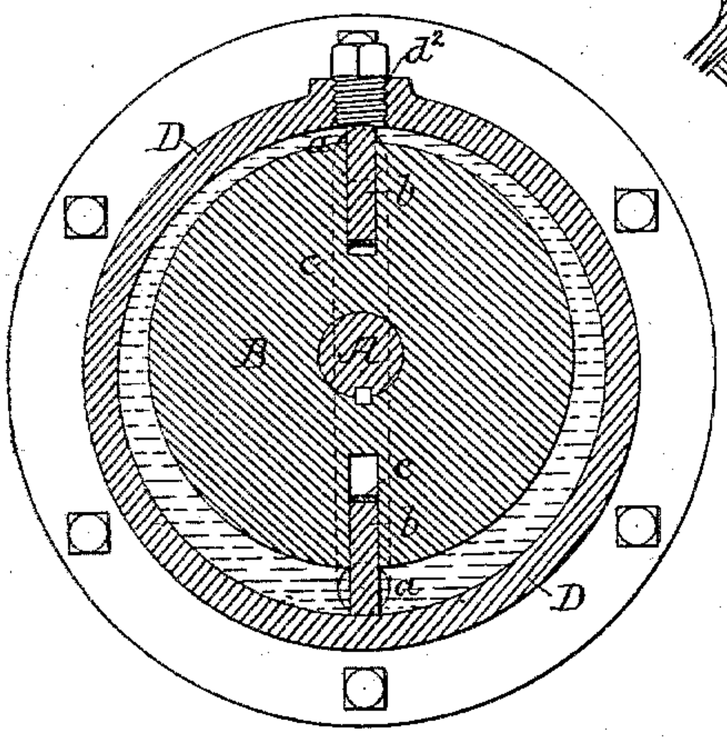



FIG. 3.

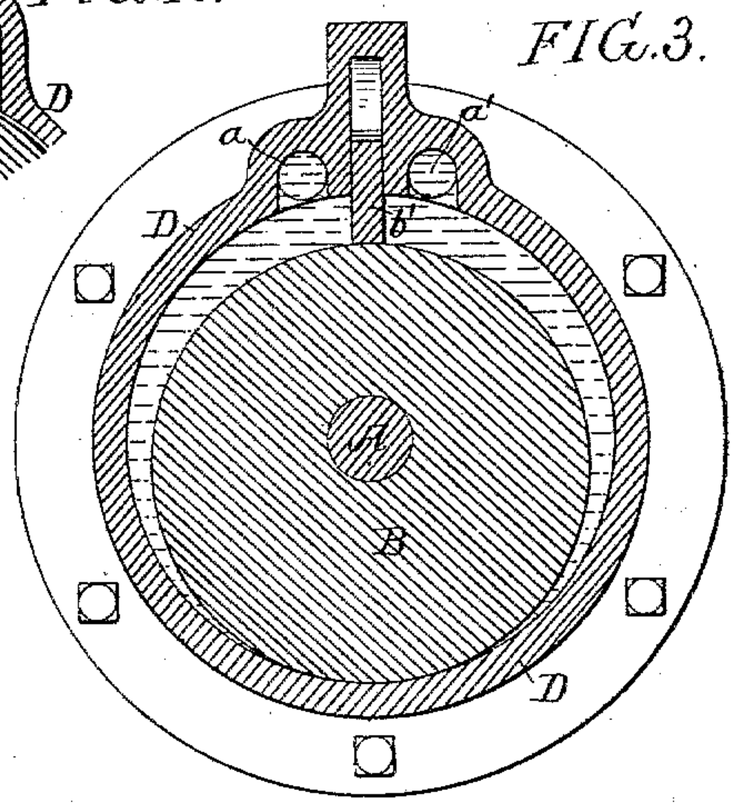



FIG. 14.

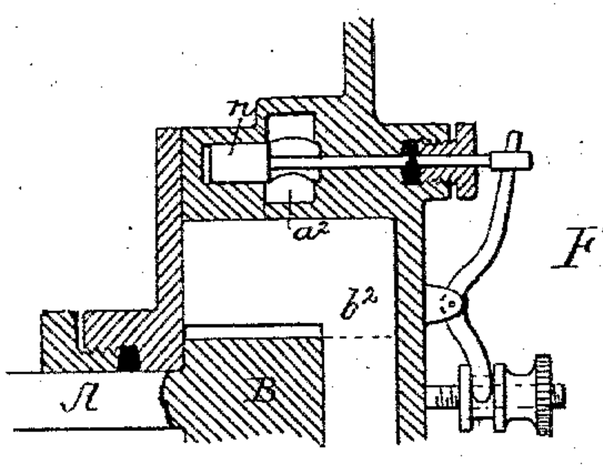
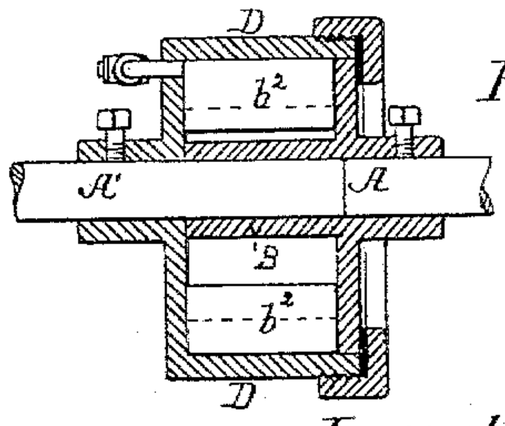



FIG. 17.




Witnesses:
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Alex. Barkoff

Inventor:
Leonard Atwood
by his Attorneys
Howson & Howson

(No Model.) 2 Sheets—Sheet 2.

# L. ATWOOD.

## POWER TRANSMITTING DEVICE.

No. 562,696. Patented June 23, 1896.

FIG. 5.

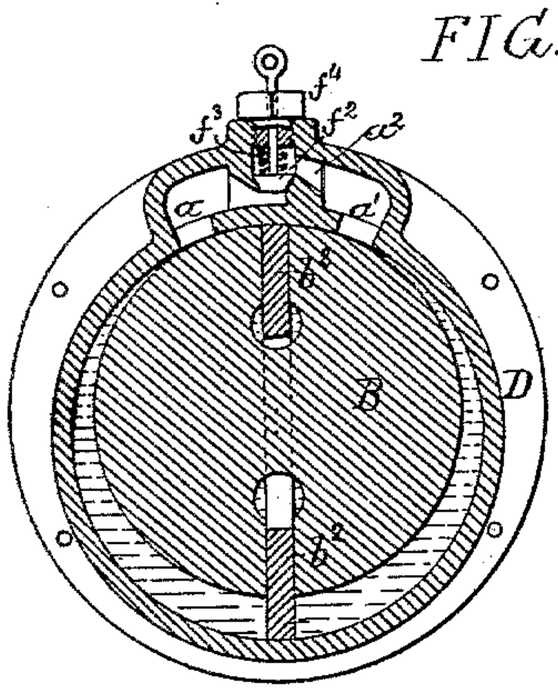



FIG. 4.

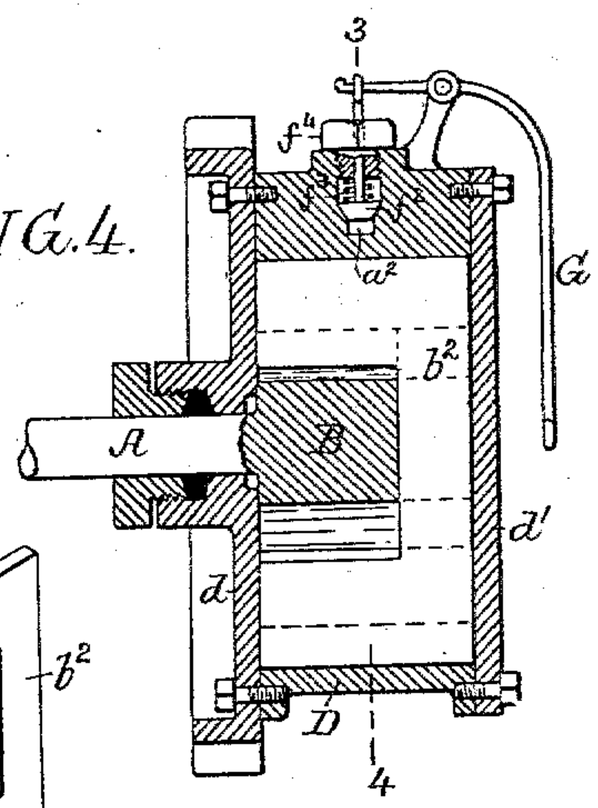



FIG. 6.

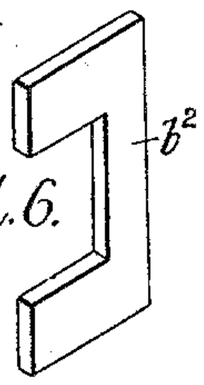



FIG. 7.

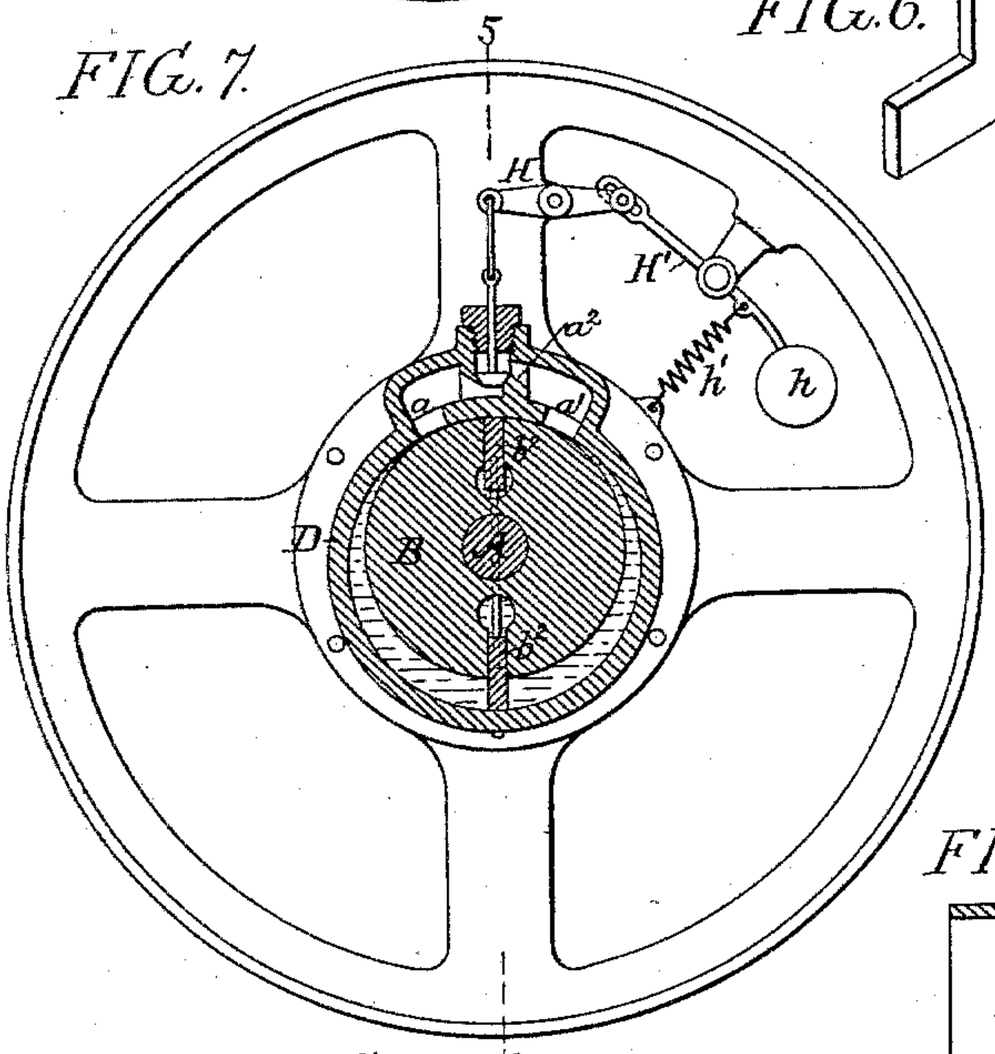



FIG. 11.

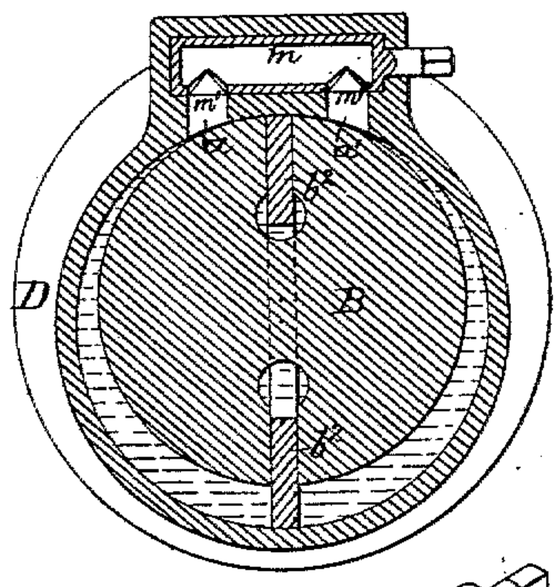



FIG. 8.

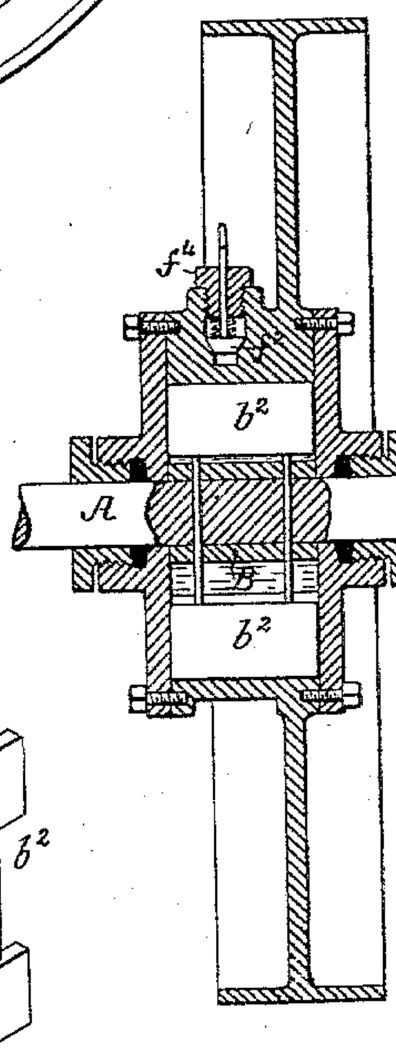



FIG. 12.

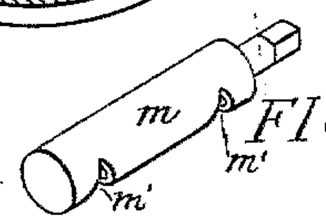



FIG. 10.

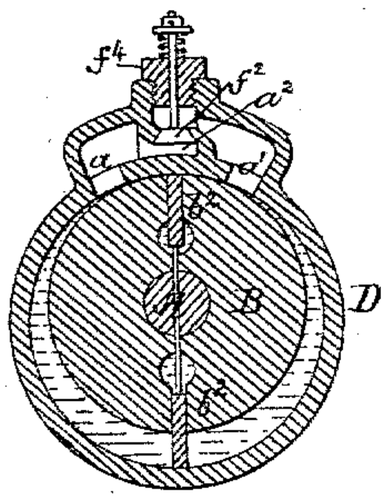



FIG. 9.

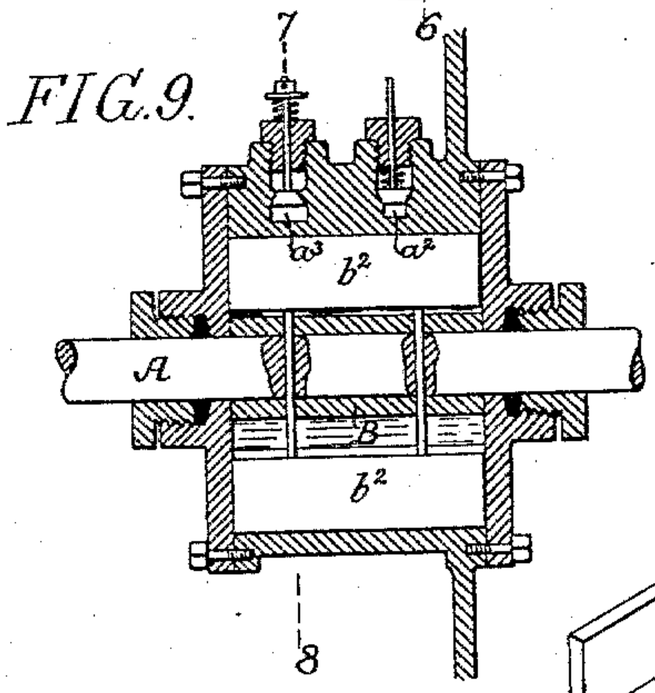
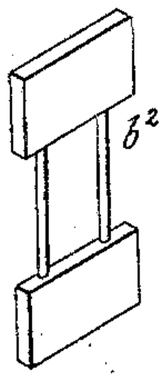



FIG. 18




Witnesses:
A. V. Groupe.
Alex. Barkoff

Inventor:
Leonard Atwood
by his Attorneys
Howson & Howson

# UNITED STATES PATENT OFFICE.

LEONARD ATWOOD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES M. DODGE, OF SAME PLACE.

## POWER-TRANSMITTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 562,696, dated June 23, 1896.

Application filed March 12, 1890. Serial No. 343,656. (No model.)

*To all whom it may concern:*

Be it known that I, LEONARD ATWOOD, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Power-Transmitting Devices, of which the following is a specification.

The object of my invention is to so transmit rotary motion from the driving part to the driven part of a power-rotated device that the speed of the driven part can be readily regulated, and this object I attain by transmitting the power through the medium of a confined volume of fluid, and by regulating the escape of the fluid confined between the two parts. By this means I dispense with the use of change gears and clutches.

In the accompanying drawings, Figure 1 is a longitudinal section illustrating one form of apparatus for imparting motion to or from a central shaft to a gear-wheel or pulley in accordance with my invention. Fig. 2 is a section on the line 1 2, Fig. 1. Fig. 3 is a modification of the device shown in Figs. 1 and 2. Fig. 4 is a longitudinal sectional view showing the escape-passage in the periphery of the casing. Fig. 5 is a section on the line 3 4, Fig. 4. Fig. 6 is a perspective view of the blade shown in Fig. 4. Fig. 7 is a view showing the application of an automatic governing device. Fig. 8 is a section on the line 5 6, Fig. 7. Fig. 9 is a longitudinal sectional view of the casing and shaft, showing two by-passes for use in reversing the direction of rotation of the driving and driven parts. Fig. 10 is a section on the line 7 8, Fig. 9. Figs. 11, 12, 13, 14, 15, and 16 are views illustrating modifications of my invention. Fig. 17 is a view illustrating the application of my invention to line-shafting. Fig. 18 is a perspective view of part of the device shown in Figs. 7 to 10.

Referring in the first instance to Figs. 1 and 2, A is a shaft, which may be a driving-shaft or a driven shaft, and secured to this shaft is a hub B, slotted, as shown, to receive the blades *b b*, which are backed in the present instance by springs *c c*, tending to force the blades radially away from the center of the hub. Surrounding the hub is a casing D, eccentric with respect to the hub B, the blades *b* of the hub resting at all times against the inner face of this casing. The casing, in the present instance, has a flange *d*, to which is secured the toothed ring E, forming a gear-wheel, or a pulley may in some instances be secured to or form part of the casing, as circumstances require.

In the cap *d'* of the casing D are two openings *a a'*, which are connected together by piping F, provided with a suitable valve *f*, held to its seat by a spring *f'*. The piping forms a by-pass between two sections of the chamber formed by the casing, so as to allow the fluid to pass from one section to the other, the passage of the fluid being regulated by the valve *f*, under control from the outside. The valve in the present instance is shown to be on the center line of rotation, so that any form of actuating mechanism may be applied to regulate and adjust the opening of the valve.

Other forms of valves and by-passes may be used, some of which will be described hereinafter. Thus it will be seen that if the valve *f* is closed, cutting off the passage of fluid through the by-pass, the driven part will revolve at the same speed as the driving part, but if the valve is opened to its full extent to allow the free passage of fluid through the by-pass the rotation of the driving part would not be transmitted to the driven part, as the fluid would freely flow through the by-pass, but if the valve was only partially opened it would allow only a certain amount of fluid to pass through the by-pass, and consequently the speed of the driven part would be reduced proportionately to this amount, as there would be a certain amount of slip, or what may be termed "lost motion," in the driving part. Thus any degree of speed can be given to the driven part by simply regulating the opening of the valve.

The liquid can be inserted into the chamber formed by the casing through the plugged opening $d^2$, as shown, or a small valved reservoir may be used in some cases to automatically fill the chamber, and suitable packing *e* can be inserted between the hub B and the portion *d* of the casing.

In Fig. 3 I have shown a blade *b'*, adapted to a slot in the casing D and acting against the periphery of an eccentric hub B, mounted on a shaft A. The by-pass ports *a a'* in this instance are situated on opposite sides of the

blade and connected by a passage $a^2$, formed in the casing. Any suitable regulating-valve may be placed in the passage to regulate the flow of liquid from one side of the blade to the other.

Figs. 4, 5, and 6 illustrate still another modification in which the hub B is used having a single blade $b^2$, the two bearing-faces of which are connected to each other by a narrow strip, as clearly shown in perspective view, Fig. 6, the blade during the rotation remaining concentric with the cylinder, but the hub being eccentric, thus forming two fluid-chambers.

The by-ports $a$ $a'$ are situated near each other on each side of the point where the eccentric hub comes into contact with the cylinder. The by-pass $a^2$ in this instance is formed in the casing and a valve $f^2$ cuts off or regulates the flow of fluid through the pass, and above this valve is a spring $f^3$, the tension of which is regulated by the set-screw $f^4$. Hence, by setting the valve to open at a given pressure, the valve will, as soon as said pressure is exceeded, raise and allow the liquid to flow through the by-pass and the valve closing immediately when the pressure is reduced. An actuating-lever G may be used to operate the valve, one arm of the lever being attached to the valve-spindle and the other arm being carried to the center arm of the shaft, where it can be attached to any suitable regulating mechanism.

In Figs. 7 and 8 I have shown the application of an automatic governor to the valve, consisting in the present instance of a lever H, pivoted to the gear-wheel or belt-wheel, one end of said lever being connected to the valve-rod and the other connected to one arm of a governing-lever H', having a ball $h$ at the opposite end, and provided with a spring $h'$ for withdrawing the lever and opening the valve to its full extent. Other forms of governing devices may be used without departing from my invention.

I have shown in Figs 9 and 10 two by-passes $a^2$ $a^3$, each provided with valves, one valve closing in the reverse direction to the other, so that on the rotation of the driving part in one direction the by-pass $a^2$ will be used, and on the rotation of the driving part in the opposite direction the by-pass $a^3$ will be used.

In Figs. 11 and 12 I have shown a hollow cylindrical valve $m$, having tapered openings $m'$, this valve forming the by-pass. The tapered openings $m'$ are opposite the by-ports $a$ $a'$. Hence, by simply turning the valve, the flow of fluid through the by-pass can be regulated.

In Fig. 13 I have shown a simple plug-valve to regulate the flow of fluid through the by-pass.

In Fig. 14 a slide-valve $n$ is shown having ports which can be brought in line with the by-ports by simply giving the valve a sliding motion.

In Fig. 15 I have shown a valve $l$, having springs $k$ $k$ at each side, so that when no pressure is applied, the valve will remain on the seat, as shown in the figure, closing the by-pass, but as soon as pressure is applied in either direction, one or other of the springs will yield, allowing the liquid to pass.

In Fig. 16 I have shown a simple rotary plug-valve, on turning which the flow of liquid through the pass can be regulated.

Fig. 17 illustrates the application of my invention to the transmission of power from one shaft to another, both shafts being in the same line, and one shaft, A, carrying the hub B, while the other shaft, A', carries the casing D.

I claim as my invention—

1. The combination of the driving and driven parts of a power-rotated device, a casing on one of said parts and a hub on the other part, a chamber for fluid formed between said casing and hub, a blade or blades separating the chamber formed by the casing into sections, a by-pass forming a communication between the said sections and a regulating-valve in said by-pass, under control from the outside, substantially as set forth.

2. The combination, with a driver of a rotary pump whose shell is geared or connected to the driven member, of ducts from the discharging to the receiving side of said shell, and of plugs or valves whose closure compels corotation of said shell with said driver, and whose less or greater retraction permits the shell to rotate at any desired lesser speed or to come to rest, substantially as described.

3. The combination of a fluid-clutch, and a valve for controlling it with a centrifugal governor for actuating the said valve, substantially as described.

4. The combination of the driving and driven parts of a power-rotated device, a casing on one of said parts, and a hub on the other part, a liquid-chamber formed between said casing and hub, a blade or blades separating the chamber formed by the casing into sections, a by-pass forming a communication between the said sections, a regulating-valve in said by-pass and a centrifugal governor, attached to the valve and adapted to regulate the opening in the by-pass, substantially as described.

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

LEONARD ATWOOD.

Witnesses:
H. F. REARDON,
HENRY HOWSON.