No. 890,533. PATENTED JUNE 9, 1908.

A. P. SCHMUCKER.

SPEED REGULATING DEVICE.

APPLICATION FILED JAN. 8, 1907.

2 SHEETS—SHEET 1.

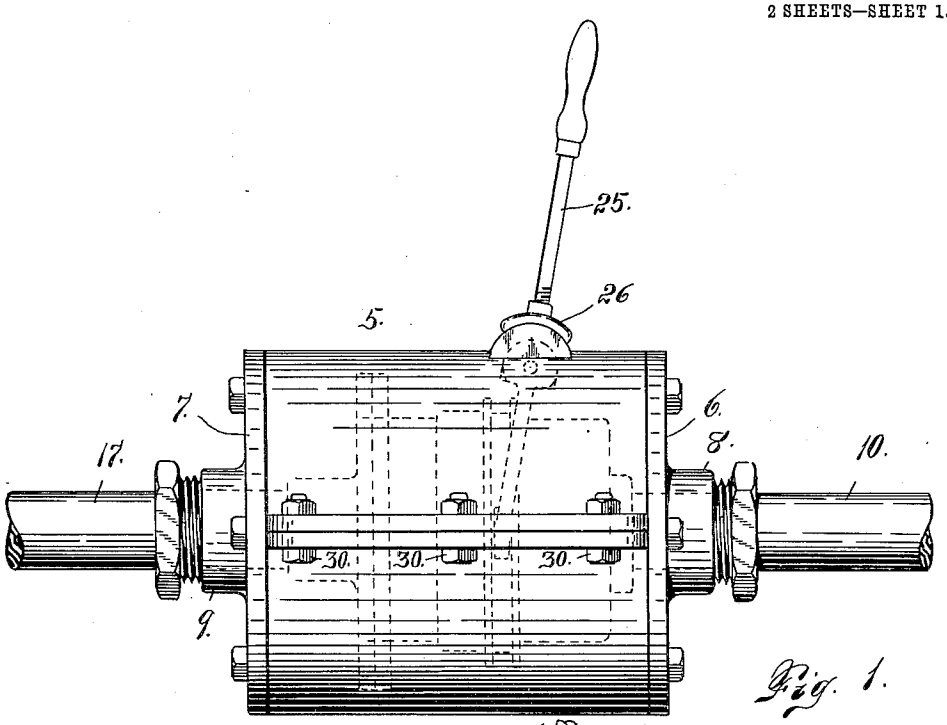


Fig. 1.

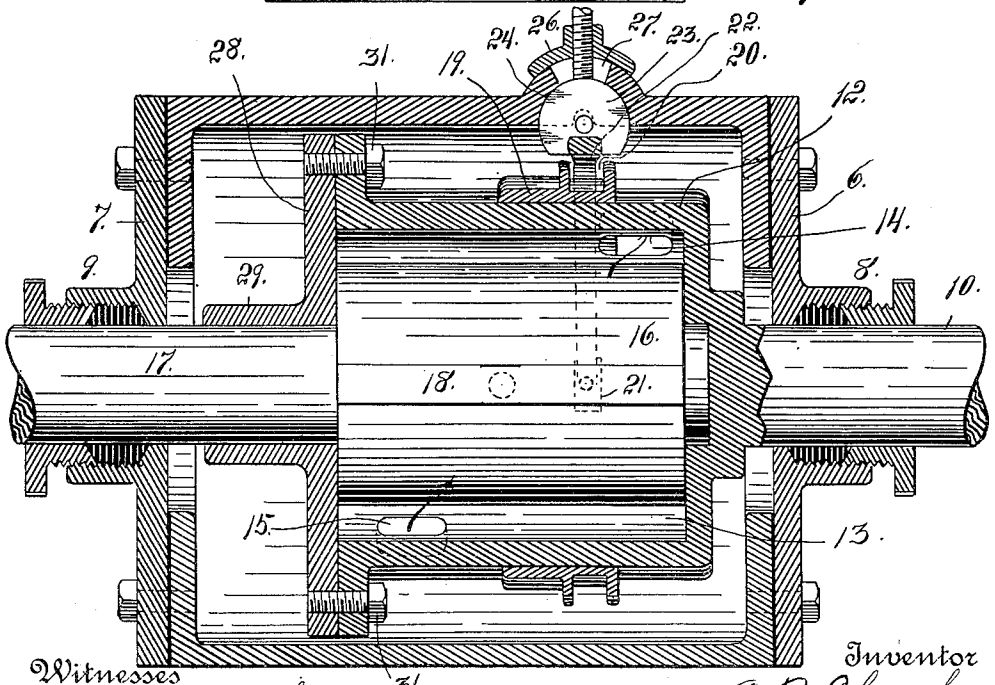


Fig. 2.

Witnesses
Otto E. Hoddick
Dena Nelson.

Inventor
A. P. Schmucker
By A. P. Schmucker
Attorney

No. 890,533. PATENTED JUNE 9, 1908.

A. P. SCHMUCKER.

SPEED REGULATING DEVICE.

APPLICATION FILED JAN. 8, 1907.

2 SHEETS—SHEET 2.

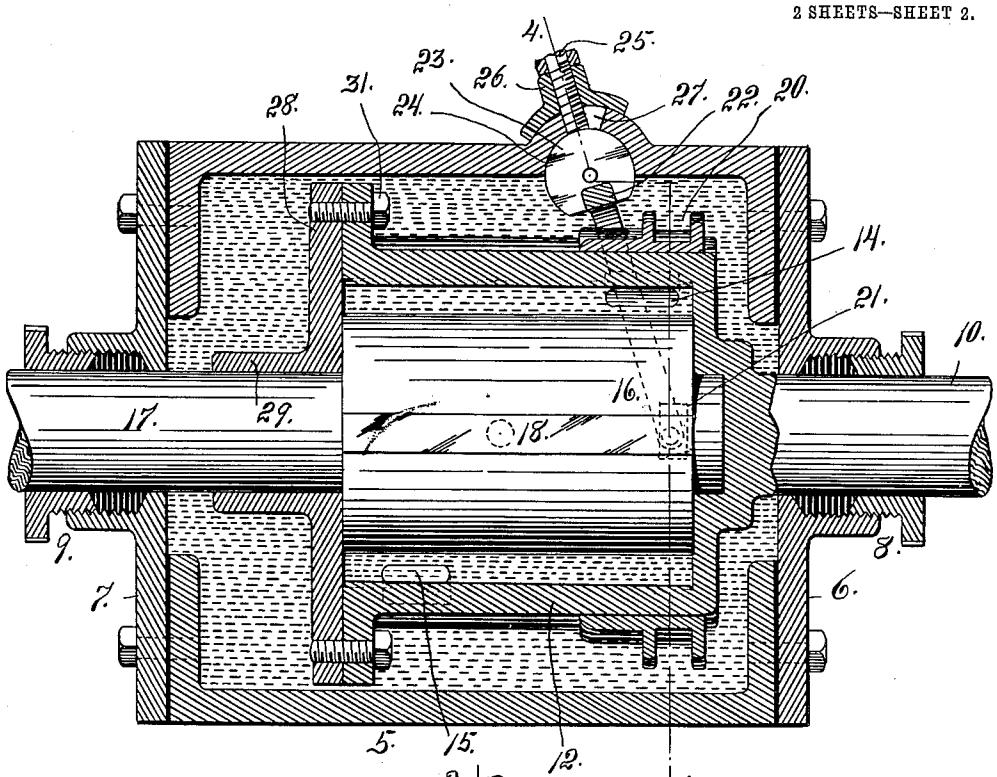


Fig. 3.

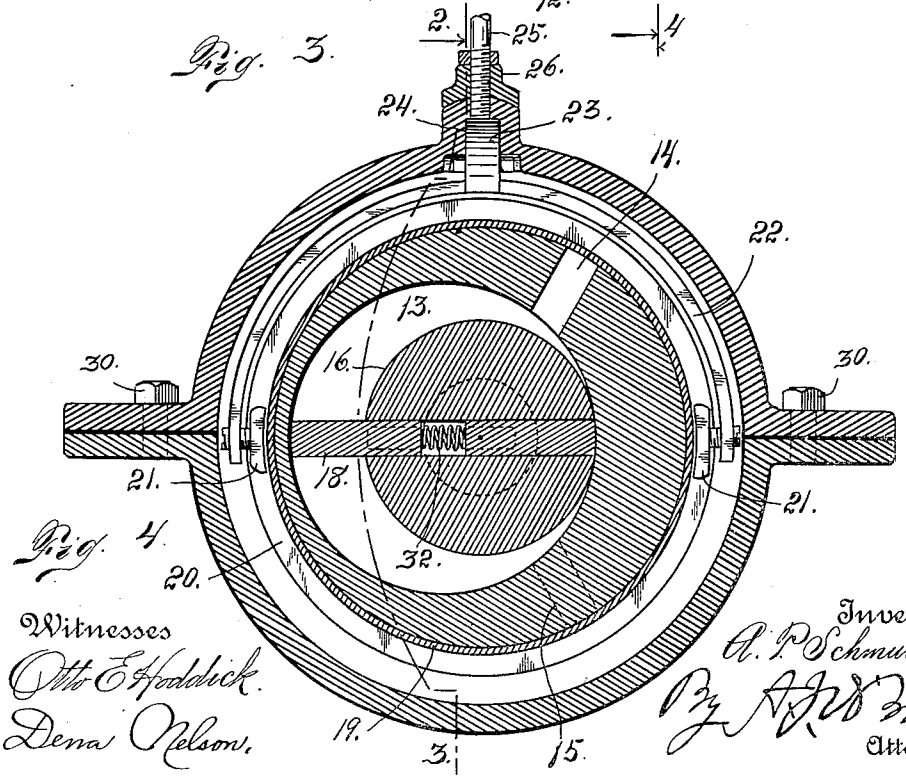


Fig. 4.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
A. P. Schmucker.
By A. W. Brien
Attorney

UNITED STATES PATENT OFFICE.

ALFRED P. SCHMUCKER, OF DENVER, COLORADO.

SPEED-REGULATING DEVICE.

No. 890,533. Specification of Letters Patent. Patented June 9, 1908.

Application filed January 8, 1907. Serial No. 351,329.

To all whom it may concern:

Be it known that I, ALFRED P. SCHMUCKER, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Speed-Regulating Devices; 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in means for regulating or controlling the speed of a driven device whereby the same may be made to conform to that of the driving device or vary therefrom as desired, said means being entirely free from gears such as are ordinarily employed in connection with speed changing or regulating mechanisms as heretofore employed.

In my improvement I employ a liquid-containing reservoir, a casing located therein and communicating with the reservoir by inlet and outlet ports, the said casing being connected with the driven shaft, and provided with a chamber in which is located a cylinder fast on the driving shaft, the cylinder being arranged within the casing and provided with a movable piston or blade rotating with the cylinder and arranged to draw the liquid into the chamber of the casing through one port and expel it through the other port when the device is in operation. The casing is provided with a sliding valve device for controlling the exit port thereof whereby the passage of liquid through the said port is controlled at will. The theory of operation of the device is as follows: If both the inlet and outlet ports are wide open, the interior cylinder connected with the driving shaft will rotate within the casing without imparting any movement to the driven shaft or the casing which is connected with the last named shaft. Now if the exit port of the casing is partially closed so that the liquid cannot be expelled from the chamber of the casing as fast as it enters the said chamber, motion will be imparted to the casing but at a less speed than that of the interior cylinder and the driving shaft, the variation in speed between the two shafts being in proportion to the degree of the exit port's closure. That is to say the greater the degree of closure, the greater the speed of the driven shaft or the nearer the speed of the driven shaft approaches the speed of the driving shaft; but when the exit port is completely closed, the driven shaft and the driving shafts will rotate in unison or both at the same speed. Hence my improved mechanism becomes a very efficient instrumentality for regulating or controlling the speed of the driven device as compared with that of the driving device, without the serious loss of power incident to the friction resulting from the use of cogged or other gearing as heretofore explained.

Having briefly outlined my improved construction, I will proceed to describe the same in detail reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a side elevation showing one embodiment of my improved construction. Fig. 2 is a sectional view of the same showing the cut off valve in a different relative position and the parts on a larger scale. Fig. 3 is a similar view showing the cut-off valve in position to entirely close the exit port of the casing or thrown to the extreme opposite position from that shown in Fig. 1. Fig. 4 is a cross section taken on the line 4—4 Fig. 3. In Figs. 2 and 3 the section is taken approximately on the line 2—2 Fig. 4 looking toward the right or in the direction indicated by the arrow.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a reservoir provided with heads 6 and 7 with which are connected stuffing boxes 8 and 9. The driven shaft 10 passes through the stuffing box 8 and merges into a casing 12 located within the reservoir and provided with a chamber 13 eccentrically arranged with reference to the axis of the driven and driving shafts. This casing is provided with an inlet port 15 and an exit port 14, both ports being preferably of the same size and so arranged that the exit port may be controlled without interfering with the inlet port. Within the chamber of the said casing, is located a cylinder 16 which is fast on the driving shaft 17, the axis of the cylinder being in alinement with the axes of the driving and driven shafts. Hence the chamber of the casing is eccentrically arranged with reference to the cylinder therein. The casing and the cylinder are so constructed that they are always in

contact at one point. This cylinder carries a two part blade or piston 18 slidable within a slot formed in the cylinder, the opposite edges of the blade engaging the interior walls of the casing and separating the chamber 13, whereby as the cylinder rotates within the casing, the liquid within the reservoir is taken in through the port 15 and returned to the reservoir through the port 14, assuming that the last named port is open. Surrounding the casing 12 and slidable thereon is a cut-off valve 19 for controlling the exit port 14 of the casing. This valve is provided with a circumferential groove 20 in which are located two shoes 21 pivotally connected with the opposite ends of a semi-circular yoke 22, the latter being connected at its upper extremity with a disk 23 located in a counterpart socket 24 formed in the top of the casing. Connected with this ball is an exteriorly protruding lever arm 25 carrying a shield 26 for closing an elongated opening 27 formed in the wall of the socket and permitting the required movement of the lever arm for manipulating the cut-off valve.

By an inspection of the drawing it will be understood that the chamber of the casing 12 is cut-off from communication with the reservoir except by way of the ports 14 and 15. As shown in the drawing one extremity of this casing is closed by a disk 28 having a sleeve 29 surrounding the driving shaft 17, the said shaft being free to rotate within the sleeve. The disk 28 is connected with the casing by means of bolts 31 passing through the disk and a circular flange formed on one extremity of the casing. It will also be noted that as shown in the drawing the cylindrical portion of the reservoir is composed of two substantially similar members provided with opposing flanges connected by bolts 30.

From the foregoing description the operation of my improved construction will be readily understood. Assuming that power is applied to the shaft 17 heretofore termed the driving shaft, and assuming that the ports 14 and 15 are both open and the chamber 13 of the casing filled with the liquid in the reservoir, the said liquid will be expelled from the casing through the one port as fast as it enters through the other port, and the driven shaft 10 together with the casing will remain stationary. In other words when it is desired to leave the power upon the driving shaft without operating the driven shaft, the exit port is left wide open. Now if it is desired to transmit motion to the driven shaft, the cut-off valve 19 will be adjusted to close the exit port 14 more or less according to the speed which it is desired to impart to the driven shaft as compared with the speed of the driving shaft. If a small part of the port 14 only is closed, the driven shaft will be rotated but not nearly as fast as the driving shaft. Now if the movement of the valve is such as to gradually cut off more and more the passage of liquid through the exit port, the speed of the casing and the driven shaft will continue to increase in direct proportion to the degree of the port's closure, and when this port is completely closed, the driving and driven shafts will be rotated in unison or as a continuous shaft since the liquid within the chamber 13 of the casing cannot escape therefrom through the exit port and consequently the liquid within the chamber of the casing and between the sliding blade or piston and the point where the exterior wall of the interior cylinder engages the interior surface of the casing, forms a solid body, compelling the two instrumentalities to rotate together.

The two members of the blade or piston 18 passing through the cylinder as heretofore explained, are acted on by an interposed coil spring 32, which is of such tension as to keep the opposite edges of the said blade or piston in close engagement with the interior walls of the casing chamber. There is also sufficient space between the two blades when they are completely expanded or occupy a position in line with the diameter of the chamber 13, so that the two members may be allowed to approach each other when they are compelled to assume a position of less length which of course only occurs when the cylinder is rotating faster than the casing. Of course when the cylinder and casing are rotating in unison, the blades do not change their position as long as this condition exists, but simply remain in the position they occupied when the cut off valve was shifted to completely close the exit port.

In this application the casing 12 and the cylinder 16 located therein together with the blade 18 may be considered a rotary pump or a pumping engine or means for circulating the liquid within the reservoir, one member of the pump, namely the casing 12 being connected with one shaft and the other member, namely the part 16 being connected with the other shaft; while the slide valve mounted on the casing may be considered means for regulating the circulation of the liquid by controlling the exit port of the casing. It must be understood that while I have shown but one specific construction of this type of pump, I am aware that other constructions operating on the same principle may be employed. Hence the invention is not limited to any specific construction of this type of pump.

While it is believed that my improved construction for regulating the relative speed of the driving and driven devices, has a decided advantage over constructions heretofore in vogue for accomplishing a similar function, from the standpoint of friction reduction there is another very important element of advantage in this construction, since by

means of the same, the relative speed of the driving and driven devices may be more closely and accurately regulated than is practicable by the employment of speed-changing gears, since in the latter construction there must be a different gear for use every time the speed is changed. That is to say where the old form of construction is employed, the number of gears must correspond with the number of speed variations while in my improved construction there may be theoretically an infinite number of changes in speed without the employment of any additional apparatus, since the slightest movement of the slide valve for controlling the passage of liquid through the exit port, results in a change of the relative speed between the driving and the driven shafts.

Having thus described my invention, what I claim is:

1. In speed regulating mechanism, the combination of a liquid-containing reservoir, a driving shaft, a driven shaft, means located in the reservoir for circulating the liquid therein as the driving shaft is rotated, the said means including two coöperating members, one of which is eccentrically mounted in the other, and slidable means surrounding the outer member and independent of the shafts for controlling the exit port, whereby the passage of liquid therethrough may be cut off to any degree desired, for the purpose of regulating the speed of the driven shaft as compared with that of the driving shaft, substantially as described.

2. The combination with a driving and a driven shaft, a liquid-containing reservoir into which both shafts project, one of the said shafts having a casing forming a chamber provided with inlet and exit ports communicating with the reservoir; the other shaft having a cylindrical part located within the chamber of the casing and eccentrically mounted thereon, the said cylindrical part being provided with a blade slidable therein and adapted to engage the inner wall of the casing on two opposite sides, whereby as the cylinder is rotated within the casing the liquid is taken into the casing chamber through one port and expelled through the other port, and means for controlling the exit port, whereby the passage of liquid therethrough may be cut off to any degree desired, for the purpose of regulating the speed of the driven shaft as compared with that of the driving shaft, substantially as described.

3. In speed controlling mechanism, the combination with a driving shaft, a driven shaft, a liquid-containing reservoir in which the said shafts are journaled, a casing located in the reservoir and secured to one of the shafts, the said casing forming a chamber and having inlet and exit ports whereby its chamber is in communication with the reservoir, a cylinder secured to the other shaft and located within the casing, the said cylinder being eccentrically mounted within the casing chamber and tangential to the wall of said chamber at a point between the said ports, the said cylinder having an expansible blade whose opposite edges are constantly in engagement with the inner walls of the casing, and means for controlling the exit port of the latter, substantially as described.

4. In speed controlling mechanism, the combination of a driving device, a driven device, a liquid-containing reservoir in which the said devices are journaled, a casing located in the reservoir and secured to one of the said devices, the said casing forming a chamber and having inlet and exit ports whereby its chamber is in communication with the reservoir, a cylinder secured to the other of said devices and located within the said casing, the said cylinder being eccentrically mounted within the casing chamber tangential to the inner wall of the casing at a point between the said ports, the cylinder having members normally pressed outwardly against the inner walls of the casing on opposite sides, and means for controlling the exit ports, substantially as described.

5. In speed-controlling mechanism, the combination of a driving part, a driven part, a liquid-containing reservoir in which the said parts are journaled, the said journals having their axes in alinement, a casing located in the reservoir and secured to one of the said parts, the said casing forming a chamber and having inlet and exit ports whereby its chamber is in communication with the liquid of the reservoir, a cylinder secured to the other of the said parts and located within the said casing, the said cylinder being eccentrically mounted within the casing chamber and tangential to the inner wall of the chamber at a point between the said ports, the said cylinder having a member movably mounted therein and engaging the inner walls of the chamber on opposite sides, the said member being diametrically located in the cylinder, and suitable means for controlling the exit port of the casing.

6. In speed-controlling mechanism, the combination of a driving shaft, a driven shaft, a liquid-containing reservoir in which the said shafts are journaled, the axes of the shafts being in alinement, a casing located in the reservoir and secured to the driven shaft, the said casing forming a chamber and having its axis in alinement with the axes of the two shafts and having a cylindrical chamber eccentric to its axis, the said casing having inlet and exit ports, whereby its chamber is in communication with the liquid of the reservoir, a cylinder secured to the driving shaft and located within the said casing, the said cylinder having its axis in alinement with the axes of the two shafts and the casing and being tangential to the wall of

the casing chamber at a point between the said ports, the said cylinder having an expansible blade diametrically located and freely movable therein, its opposite edges being in constant engagement with the walls of the casing chamber.

7. In speed regulating mechanism, the combination of a liquid-containing reservoir, a driving shaft, a driven shaft, a casing forming a chamber and having inlet and exit ports communicating with the reservoir, a cylindrical body mounted in the chamber of the casing, the said body being tangential to the wall of the said chamber at a point between the two ports, and slidable means surrounding the casing for controlling the exit port, whereby the passage of liquid therethrough may be cut off to any degree desired, for the purpose of regulating the driven shaft as compared with that of the driving shaft, substantially as described.

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

ALFRED P. SCHMUCKER.

Witnesses:
DENA NELSON,
H. W. STONE.