No. 717,308. Patented Dec. 30, 1902.

J. WIECHMANN.

FLUID PRESSURE SPEEDING DEVICE.

(Application filed June 28, 1902.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

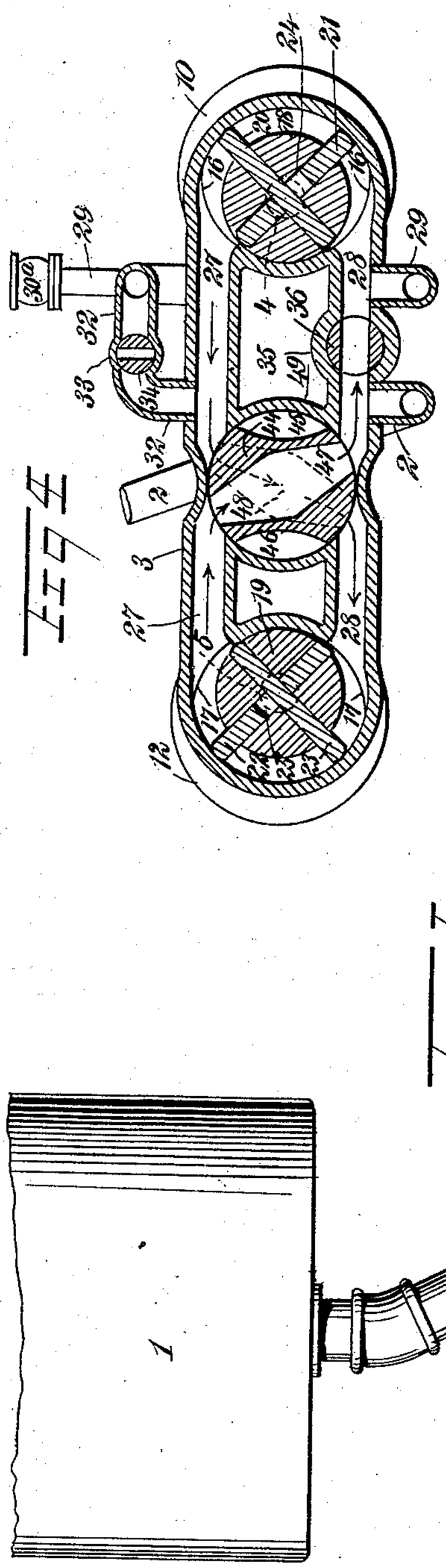

FIG. 2.

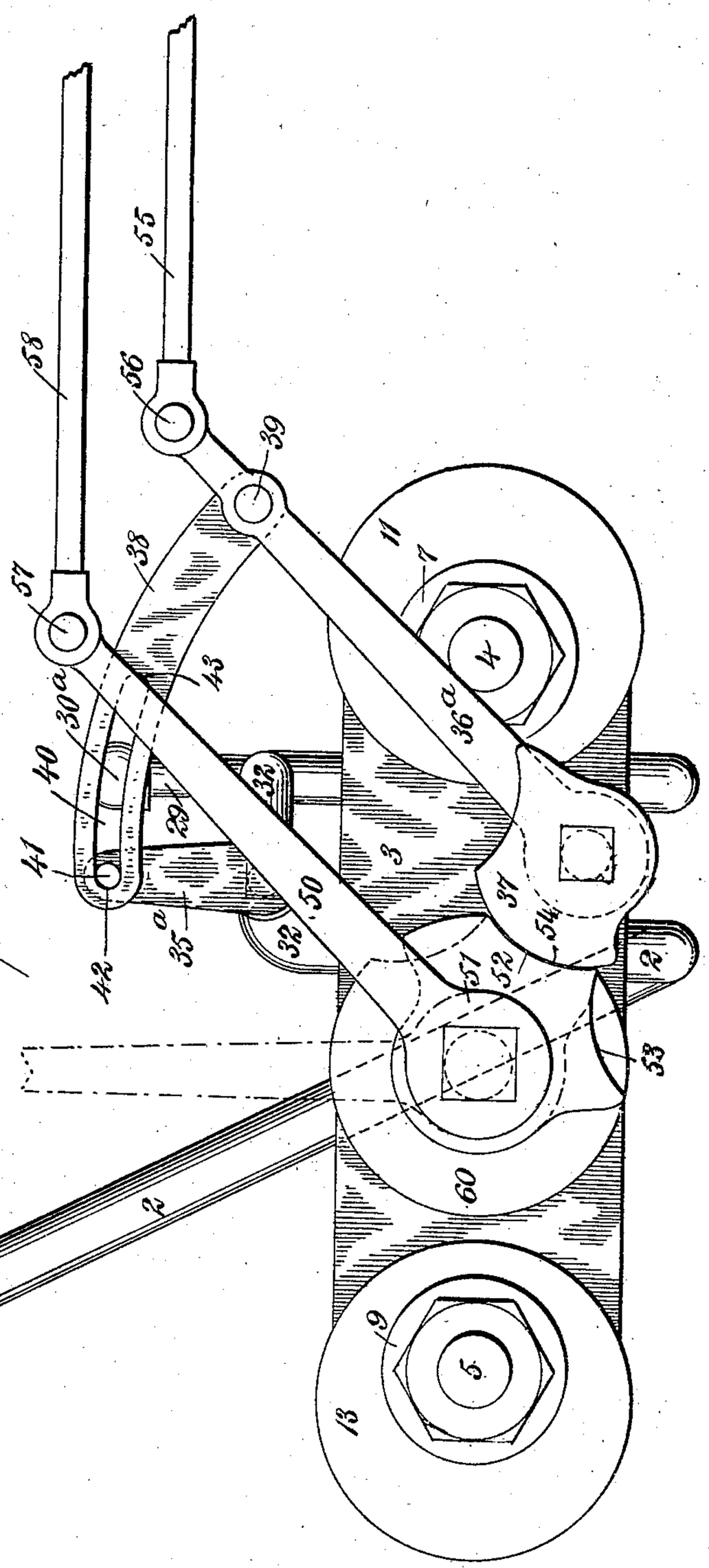

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Fig 2

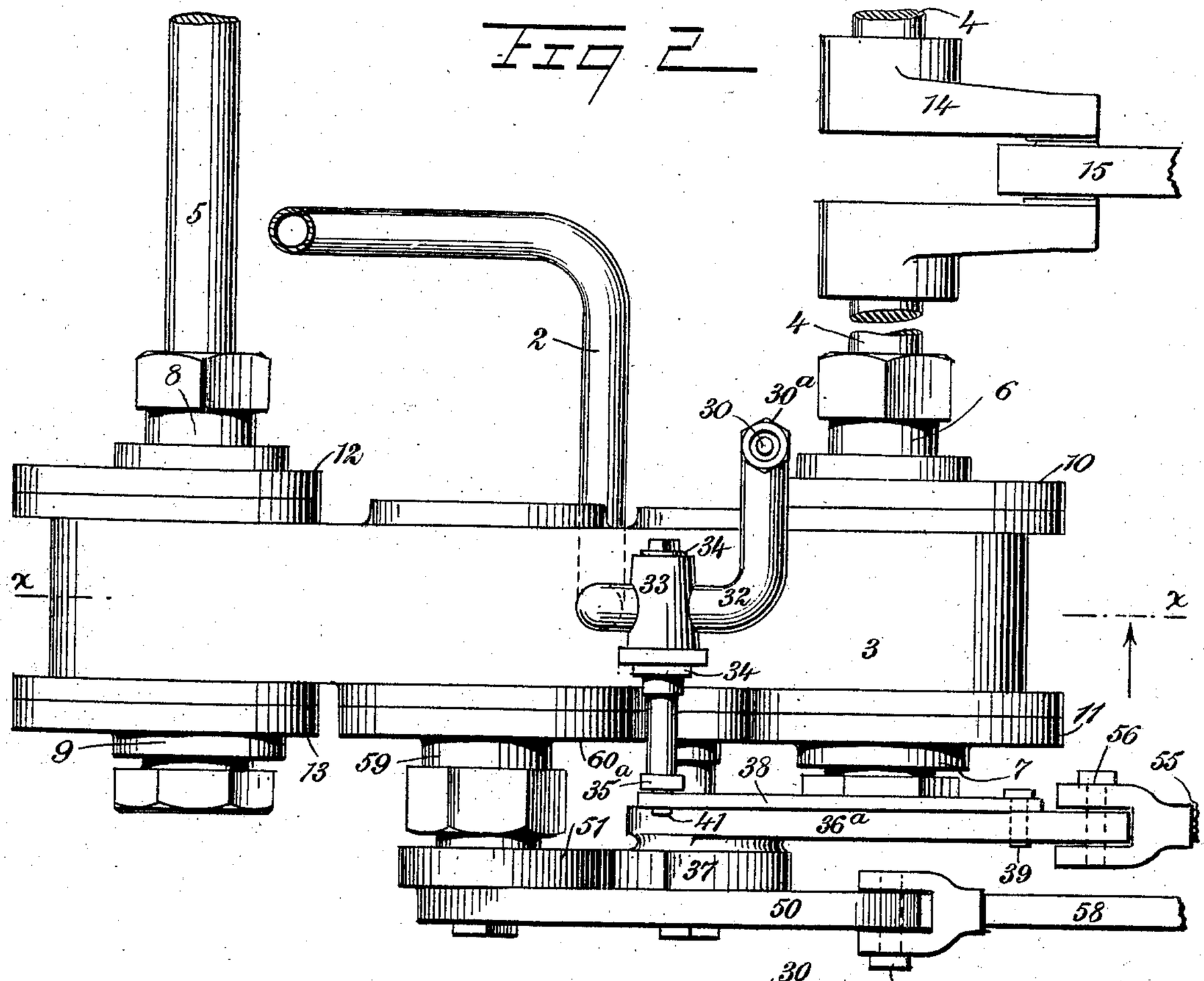
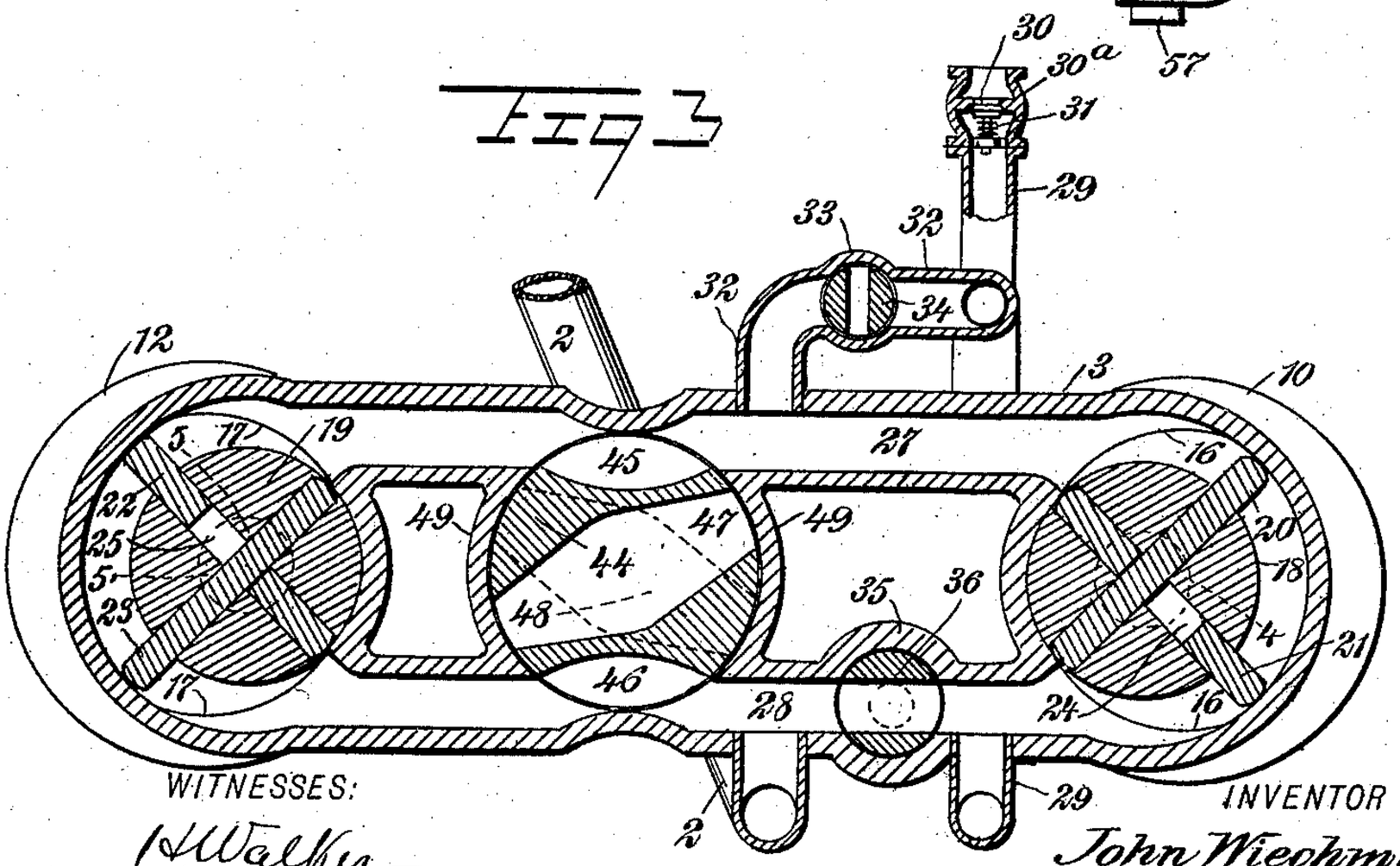


Fig 3



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JOHN WIECHMANN, OF ALBANY, NEW YORK.

FLUID-PRESSURE SPEEDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 717,308, dated December 30, 1902.

Application filed June 28, 1902. Serial No. 113,620. (No model.)

To all whom it may concern:

Be it known that I, JOHN WIECHMANN, a citizen of the United States, and a resident of Albany, in the county of Albany and State of New York, have invented new and useful Improvements in Fluid-Pressure Speeding Devices, of which the following is a full, clear, and exact description.

My invention relates to a fluid-pressure speeding device—that is to say, to a device normally employing fluid-pressure and used as a transmission-gear from a driving-shaft to a driven shaft, the relative speeds of which are controllable at will.

My invention is also used as a reversing-gear.

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 side elevation of my device. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section upon the line x x of Fig. 2 looking in the direction of the arrow; and Fig. 4 is a reduced view somewhat similar to Fig. 3, but showing certain of the parts occupying positions relatively different from the positions occupied by the same parts in said Fig. 3.

From an elevated tank 1 a pipe 2 leads to the lower portion of a hollow casing 3, in which are journaled the revoluble shafts 4 5, provided with stuffing-boxes 6 7 8 9 and closed by means of heads 10 11 12 13 after the manner of rotary pumps. The shaft 4 is provided with a crank 14, which is operated by a pitman 15 for the purpose of giving motion to the shaft 4. This shaft in its relation to my invention serves as a driving-shaft.

Inside of the casing 3 and substantially concentric with the heads 10 11 12 13 are cam-like surfaces 16 17, located adjacent to the several heads of the casing. Revoluble members 18 19, provided with movable blades 20 21 22 23, after the manner of rotary pump-pistons, are connected with the shafts 4 5, and thereby rendered revoluble. The blades are provided with slots 24 25 in the usual manner, so as to lock each other in position within certain limits and yet allow a reasonable play of each blade. The casing is provided with channels 27 28, as shown more particularly in Figs. 3 and 4. An inlet air-pipe 29 is provided with an inwardly-opening valve 30, mounted within a valve-casing 30^a and normally held against its seat by a spiral spring 31. This valve can be opened when a partial vacuum is formed within the pipe 29. Connected with the pipe 29 is another pipe 32, this pipe being provided with an enlargement 33, containing a revoluble valve 34.

The channel 28 in the bottom of the casing 3 is provided with an enlargement 35, within which is neatly fitted a revoluble valve 36 for the purpose of partially closing the channel 28. This valve is rigidly connected with an external head 37, mounted upon a lever 36^a, as shown more particularly in Fig. 1. An arc-shaped pitman 38 is pivoted at 39 upon the lever 36^a and is provided at its opposite end with a slot 40, engaging a crank-pin 41 upon the upper end of the crank 35^a, which crank operates the valve 34. The arrangement of the parts is such that when the lever 36^a is moved to the left the sector-shaped pitman 38 moves to the left until the right-hand portion 43 of the slot 40 lodges against the crank-pin 41, whereupon the crank-pin is pressed to the left, carrying with it the crank 35^a, thus gradually opening the valve 34. This same movement of the lever 36^a gradually closes the valve 36. The immediate effect of moving the lever 36^a is to move only the valve 36. If, however, the movement of the lever 36^a is continued, the valve 34 is affected.

Located centrally within the casing is a large reversing-valve 44, provided with channels 45, 46, 47, and 48, as shown more particularly in Figs. 3 and 4. This valve is held in position by the framework 49 within the casing and normally occupies the position indicated in Fig. 3, but is capable of occupying the position indicated in Fig. 4. This valve is operated by means of a lever 50, provided with a head 51, this head being mutilated by the formation of the concave surfaces 52 53, as shown more particularly in Fig. 1. Either of these concave surfaces may be engaged by the convex surface 54 upon the head 37 of the lever 36^a. The object of this arrangement is to prevent the reversing-lever 50 from being moved while the mechanism is in motion, as hereinafter explained.

The lever 36ª is actuated by means of a manually-operated rod 55, pivoted thereto at 56. Similarly, the reversing-lever 50 is pivotally connected at 57 with the manually-operated rod 58. The manually-operated rods 55 and 58 therefore constitute the means for operating the cut-off lever 36ª and the reversing-lever 50. The reversing-valve 44 is protected by means of a stuffing-box 59, disposed adjacent to the head 60. (See Figs. 1 and 2.)

The operation of my device is as follows: The tank 1 being partially filled with water, oil, or other appropriate liquid, the driving-shaft 4 is set in motion in a contra-clockwise direction—that is to say, a direction contrary to that of a clock. The parts being in the positon indicated in Fig. 3, the liquid is forced to the left through the channels 27 and 45 to the revoluble member 19, thus imparting contra-clockwise motion to the same and returning through the channels 28 and 46 and the valve 36 to the starting-point. If now the manually-operated rod 55 is moved to the left a slight distance, none of the valves except the valve 36 will be affected. This valve will be partially turned in a contra-clockwise direction, thus partially choking the channel 28. When this occurs, the driving member 18 will create a partial vacuum in the pipe 29, thus causing the valve 30 to open inwardly to a greater or less extent, thereby admitting more or less air through the pipe 29. Owing to the tension of the spring 31 and the fact that the valve 36 is partially open, the flow of liquid through the passage 28 will not be entirely stopped, and the amount of air admitted through the valve 30 is limited to a definite and constant quantity. The result is that the blades 20 21 propel a mixture of air and water through the channels 27 and 45 to the driven member 19. As the air undergoes more or less compression, the extent of rotation of the member 19 is necessarily less than that of the member 18, and a reduction in speed is the result—that is to say, the revoluble member 19 revolves more slowly than the revoluble member 18. The rod 55 being moved still farther to the left, the channel 28 is choked to a still greater extent and the inflow of air through the valve 30 becomes copious. At last, when the valve 36 is turned into the position in which the channel 28 is totally obstructed, the revoluble member 18 receives no water and acts altogether upon the air. It will be understood that during all this time the water displaced from the channels 27 28 by the entrance of the air through the valve 30 is forced upward through the pipe 2 and into the tank 1. The air sucked in also passes up through the pipe 2 and through the liquid in the tank and escapes in the form of bubbles. When the valve 36 totally cuts off the circulation through the channel 28, the valve 34 begins to open—that is to say, the end 43 of the slot 40, by pressing against the crank-pin 41 and moving the crank 35ª over to the left, causes the valve 34 to begin to open just as the valve 36 closes. At this juncture air passes freely through the valve 30 and the pipe 29 and is driven by the revoluble member 18 through the channels 27 and 45 around the revoluble member 19, making its escape through the pipe 2 and bubbling up through the water in the tank 1. The apparatus is now entirely pneumatic in its action—that is to say, its action amounts, in effect, to a driving air-pump operating a driven air-pump. The rod 55 being moved still farther to the left, the valve 34 opens to appreciable extent, with the result that the air propelled to the left through the channel 27 by the revoluble member 18 makes its escape upward through the pipe 32, the valve 34, and the pipe 29 to the bottom of the casing 3, and thence back to the revoluble member 18. In other words, the air makes a complete local circuit from the member 18 through the pipes immediately adjacent thereto and has no effect whatever upon the revoluble member 19. The result is that when the valve 34 is completely open the revoluble member 18 is free to revolve, whereas the member 19 has no motion. More than this, any momentum in any mechanism connected with the shaft 5 is checked by the blades 22 23 tending to rotate, and thereby to force air into the tank 1 through the lower channel 28. In other words, if the driven shaft 5 tends to rotate by its own momentum or that of the machinery connected with it a back pressure is produced in the channel 28, which acts as a brake, and thereby stops the shaft 5 and revoluble member 19 connected thereto.

The action of the reversing-valve 44 is quite simple. The valve when shifted from its normal position (indicated in Fig. 3) to its abnormal position (indicated in Fig. 4) simply causes the liquid or air or mixture thereof in the right-hand portion of the channel 27 to course downward into the left-hand portion of the channel 28 and the liquid or air returning through the left-hand portion of channel 27 to course downward to the right-hand portion of the channel 28, thus reversing the direction of rotation of the member 19 and the shaft 5, driven thereby. As it would be dangerous to suddenly reverse the direction of rotation without cutting off the flow of the fluids through the channels 27 28, the device is so constructed that the reversing-valve 44 cannot be moved except when the flow of the fluids is completely stopped. This object is effected by means of the apparatus shown in Fig. 1. If any effort is made to move the reversing-lever 50 by means of the rod 58 or otherwise, the concave surface 52 of the head 51 is pressed against the convex surface 54 of the head 37, so that the valve 44 cannot be moved, even to a slight extent, in either direction. If, however, the rod 55 is moved to the left until it reaches its limit, thereby closing the valve 36 and opening the valve 34, which thus serves as a by-pass, so that no

fluid can affect the revoluble member 19, the reversing-lever 50 may then be actuated—that is to say, when the head 37 moves downward a sufficient distance its convex surface 54 completely disengages the concave surface 52 of the head 51 and leaves the head 51 free to move. The reversing-lever 50 can then be moved by the rod 58 into the position indicated by dotted lines in Fig. 1, in which event the concave surface 53 moves obliquely upward into the position shown in full lines as occupied by the concave surface 52 in Fig. 1. The concave surface 52 will then occupy the position indicated by the dotted lines in Fig. 1. The concave surface 53 being thus moved up in the position normally occupied by the concave surface 52, of course the lever 36^a can be moved back to its normal position, (indicated in Fig. 1,) so that the convex surface 54 of the lever by next engaging the concave surface 53 of the head 51 prevents the reversing-lever 50 from being moved, while the flow of fluids through the left-hand portion of the casing is reversed.

It will therefore be observed that I have produced an efficient speeding device whereby a driving-shaft of a given speed may confer a given speed upon a driven shaft and whereby this speed of the driven shaft can be gradually reduced as compared with the speed of the driving-shaft and in which the speed of the driven shaft may be in the same direction as that of the driving-shaft or in the opposite direction.

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

A fluid-pressure speeding device, comprising a hollow casing provided with channels, a liquid-supply communicating with said channels, a revoluble member journaled within said casing and normally free to force a liquid through said channels, a revoluble member journaled within said casing and normally driven by said liquid circulating through said channels, a valve for obstructing the flow of said liquid through one of said channels, an air-inlet connected with an automatic valve and with one of said channels, the valve connecting said inlet to one of said channels, and means for connecting together said connecting-valve and said valve for obstructing the flow of liquid through one of said channels.

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

JOHN WIECHMANN.

Witnesses:
FRANK MÜLLER,
JOHN H. KOREMAN.