No. 679,448. Patented July 30, 1901.

J. G. WESTBROOK.

DEVICE FOR OPERATING GRAIN SHOVELS.

(Application filed Oct. 27, 1900.)

(No Model.) 5 Sheets—Sheet 1.

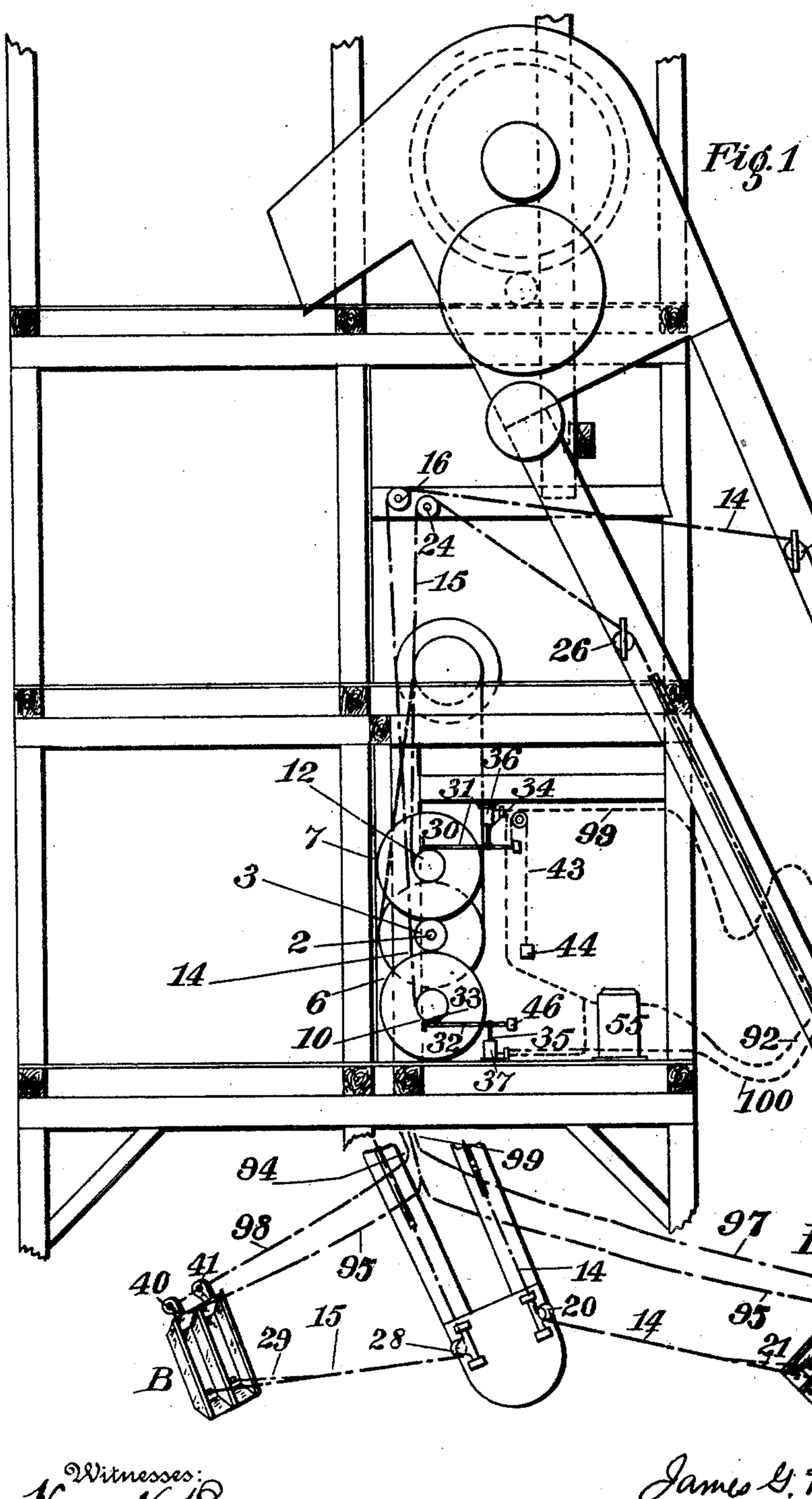

Fig. 1

Fig. 2

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Fig. 3

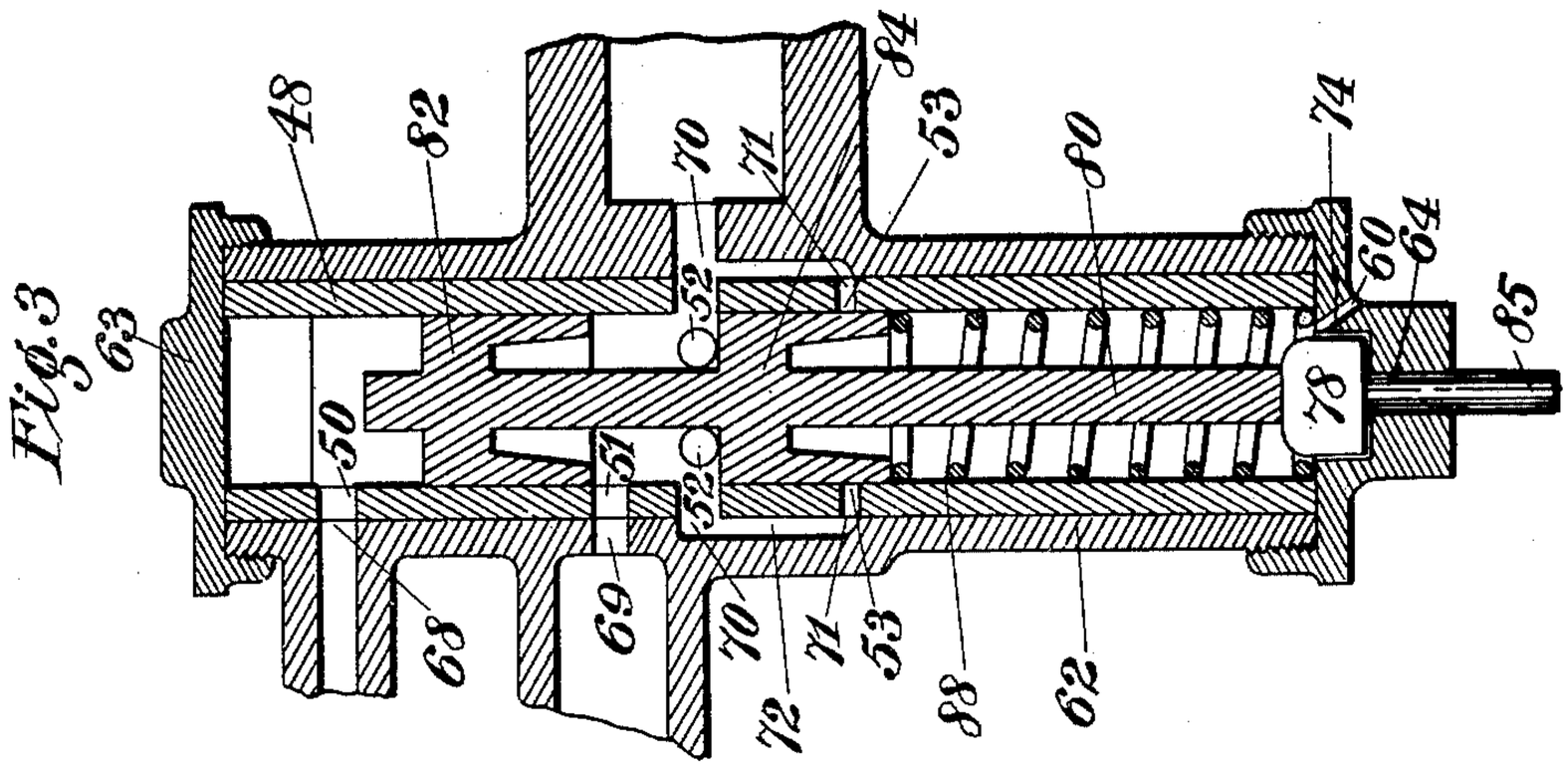

Fig. 4

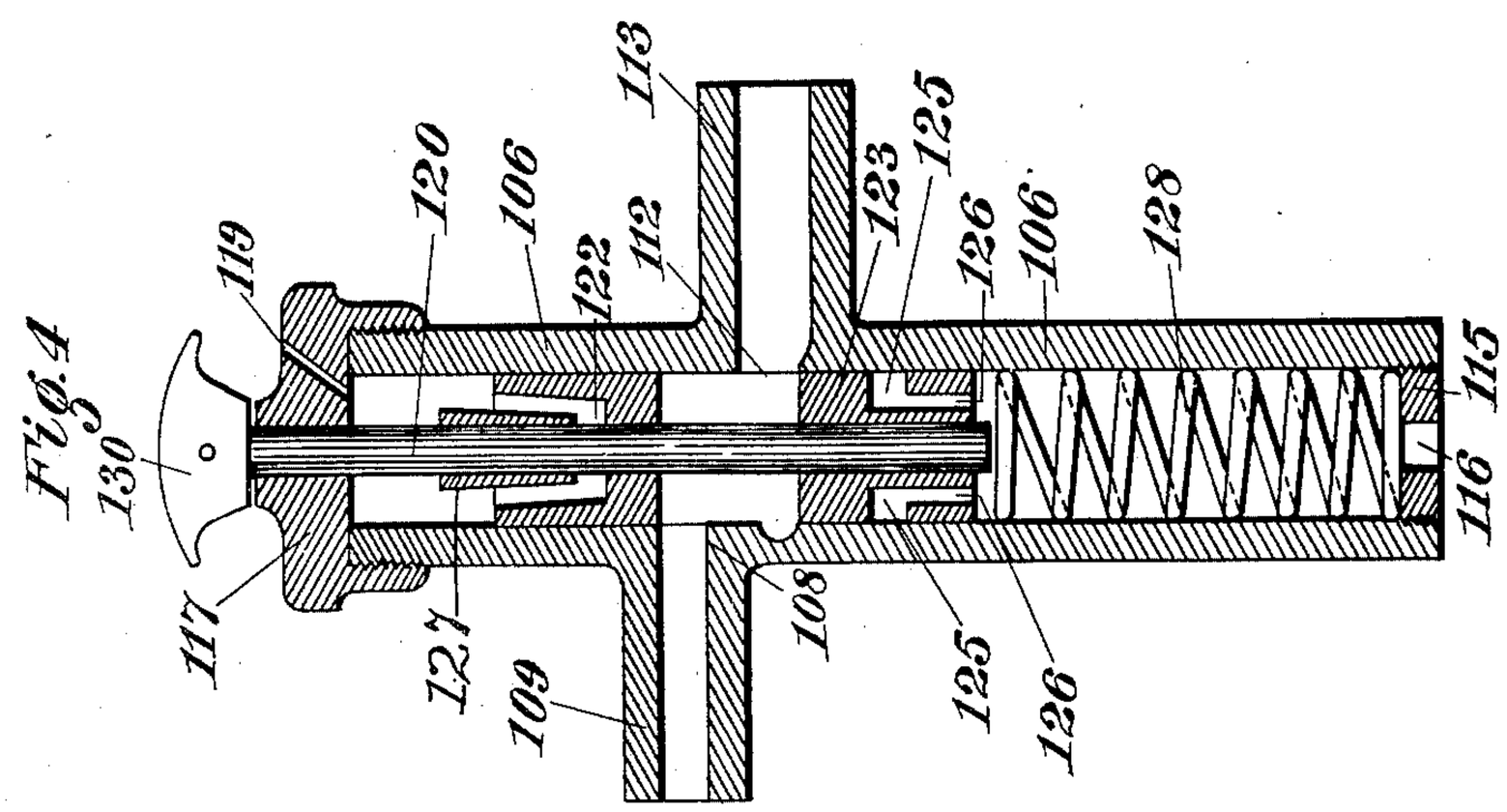

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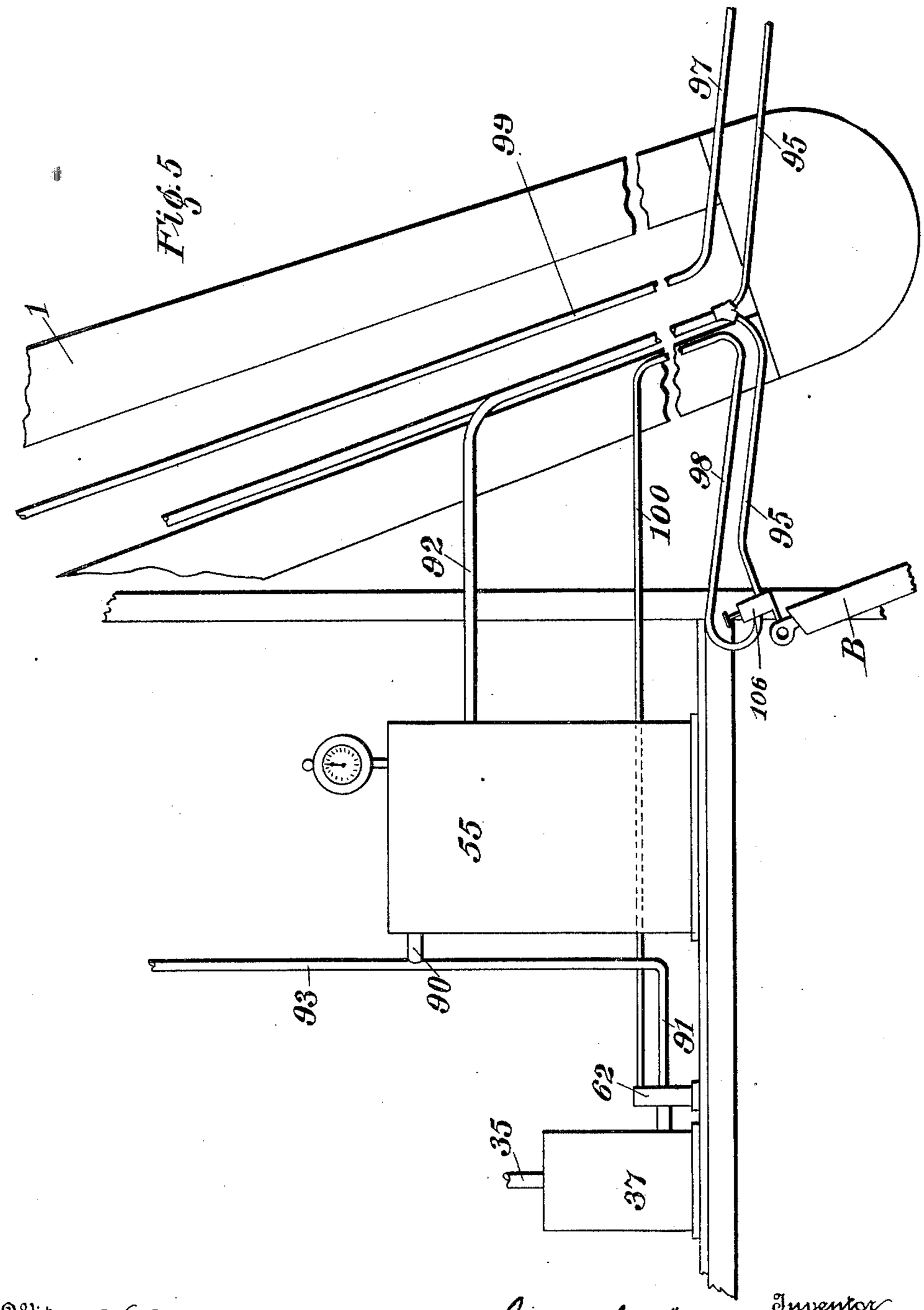
Fig. 5



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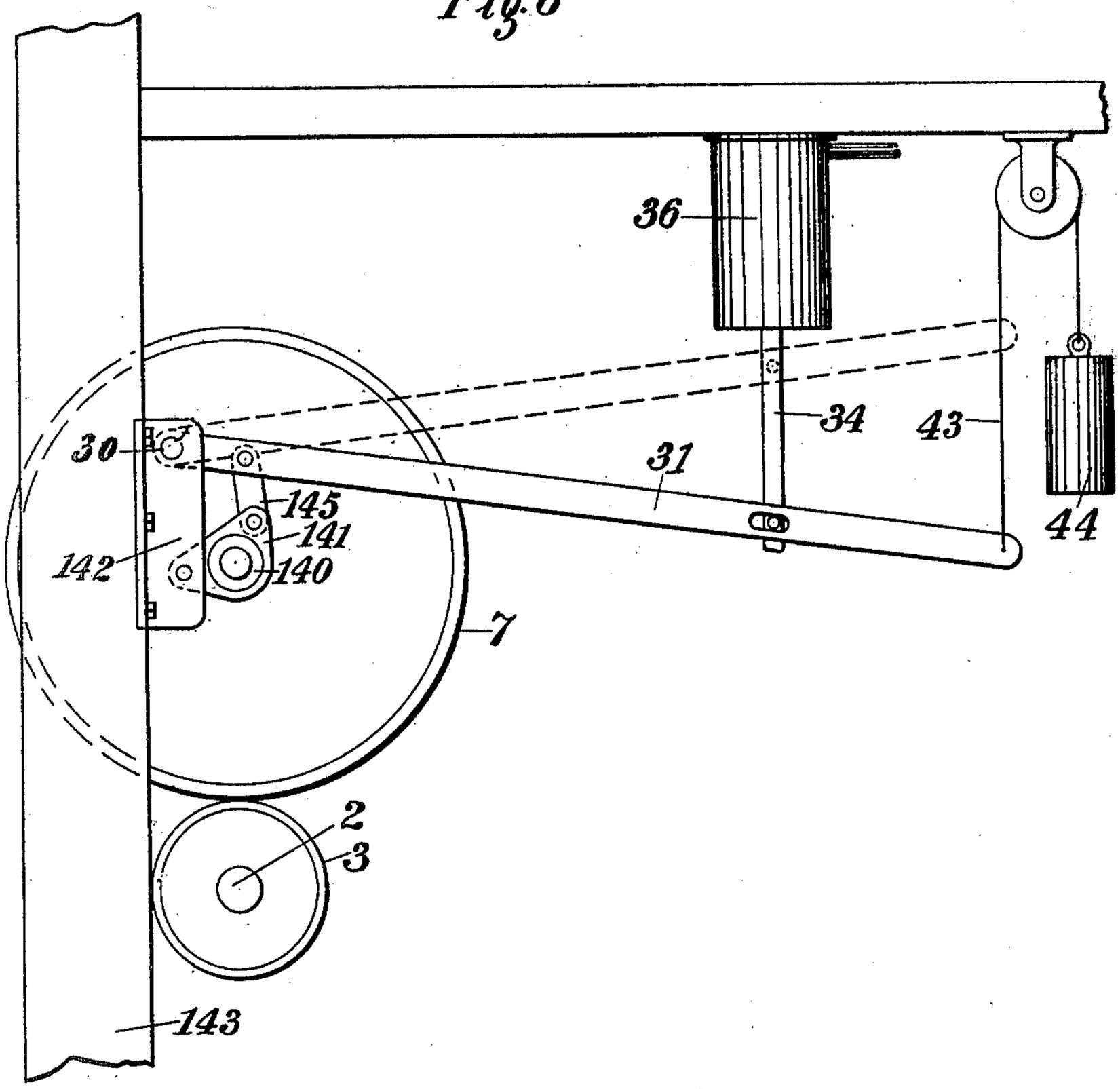
(No Model.) 5 Sheets—Sheet 4.

Fig. 6



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(No Model.) 5 Sheets—Sheet 5.

Fig. 8

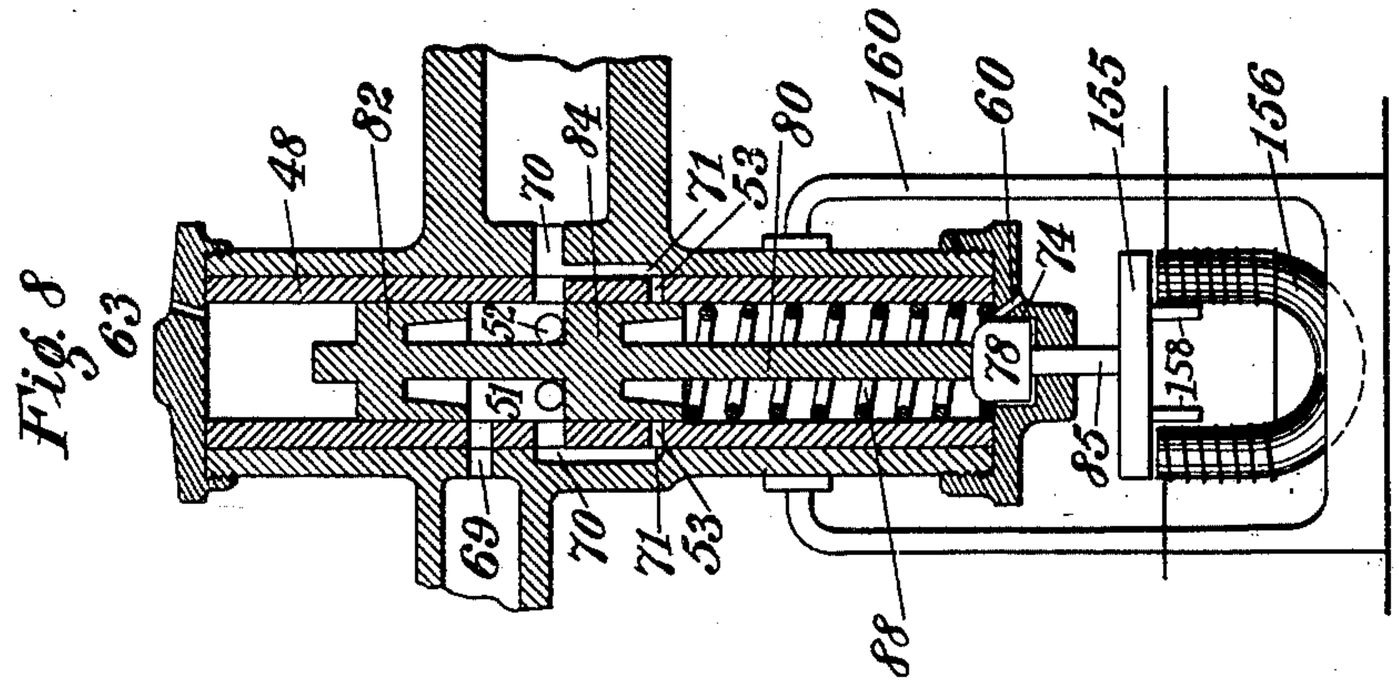
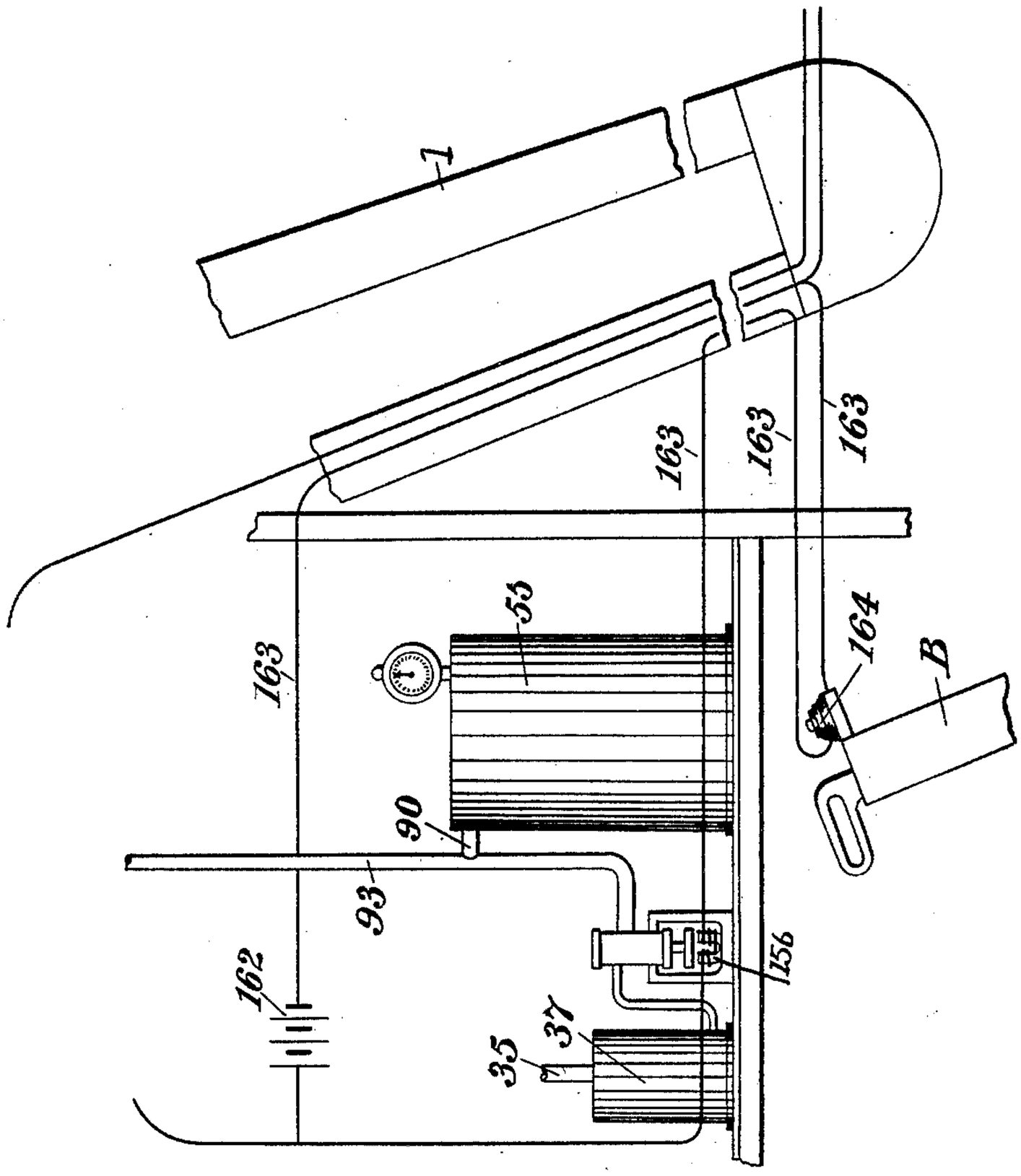


Fig. 7



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UNITED STATES PATENT OFFICE.

JAMES G. WESTBROOK, OF OGDENSBURG, NEW YORK.

DEVICE FOR OPERATING GRAIN-SHOVELS.

SPECIFICATION forming part of Letters Patent No. 679,448, dated July 30, 1901.

Application filed October 27, 1900. Serial No. 34,636. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. WESTBROOK, a citizen of the United States of America, and a resident of the city of Ogdensburg, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Devices for Operating Grain-Shovels, of which the following is a specification.

My invention relates to improvements in devices which are particularly adapted to control the motors which actuate the cables or ropes by which the cleaning-up shovels are operated in removing cargoes of grain from the hulls of vessels.

By the term "cleaning-up shovels" I designate the comparatively small shovels by which the residue of a cargo that remains after the great bulk thereof has been removed from a vessel's hold by the grain-elevators is moved to the elevator-leg to be taken up into the bins by the elevator-buckets. These cleaning-up shovels are generally sufficiently small to be each lifted and carried by the men who are in charge of them, and cables are employed only to pull them toward the elevator-leg when they are pulling the grain in that direction. When the shovels arrive at the leg, the drums which actuate the cables are stopped, and a man then carries the shovel back to the part of the hold where there is grain at a distance from the elevator-leg, the cables unwinding as the shovels are carried back. When the shovels have been brought to this place and inserted in the grain, the cable-drums are again started up and the shovels drawn again toward the elevator-leg, and so on until all the grain has been removed.

My invention aims to provide simple and effective means for enabling the man who is in charge of the shovel to readily stop and start the cable-drums, which are usually in the elevator-building on shore and at a considerable distance from the shovel. I accomplish this result by employing a fluid-pressure motor operated by compressed air, steam, or other fluid-pressure, which is, in fact, a single-acting cylinder, to throw frictions which are fixed on the cable-drums or on their shafts into and out of contact with frictions which are on a constantly-running shaft that is driven by any suitable engine. This motor is controlled by a fluid-pressure valve, substantially as hereinafter shown and described, near and preferably on the motor, and this valve is in its turn thrown to admit the fluid-pressure to or exhaust it from the motor by a suitable device on the shovel, which device is operated by the man in control thereof. Said device on the shovel may either be a fluid-pressure valve operatively connected with the valve at the motor or it may be a device for opening and closing an electrical circuit, which circuit operates a magnet or solenoid which throws the valve at the motor so as to control the admission and exhaust of the fluid-pressures to and from said motor.

I prefer to use a fluid-pressure valve at the shovel as the means for operating the valve at the motor, but do not intend to limit myself thereto, and expressly include in my invention other devices, such as the electric circuit above referred to, as means to be operated at the shovel to control the said valve at the motor.

Referring to the accompanying drawings, Figure 1 is a broken sectional elevation of an elevator and building, illustrating diagrammatically the general arrangement of the cable-drums, cables, and motor which throws the said drums into and out of engagement with the disk on the constantly-running shaft. Fig. 2 is a perspective view, on a smaller scale, illustrating diagrammatically the shovels, the cables for actuating the same, and the fluid-pressure pipes. Fig. 3 is a longitudinal section, on a large scale, of the fluid-pressure valve at the motor. Fig. 4 is a longitudinal section, on the same scale as Fig. 3, of the fluid-pressure valve on the shovel. Fig. 5 is a diagrammatic representation, on a large scale, of the lower end of the elevator-leg, the compressed-air reservoir, motor, and its valve. Fig. 6 is an elevation, on a large scale, of the upper cylinder and devices for moving the drum friction into and out of contact with the friction on the constantly-running shaft. Fig. 7 is a diagrammatic representation of an electrical device for operating the valves of the cylinder 37. Fig. 8 is a sectional elevation, on a large scale, showing an arrangement of the magnet for throwing the balanced piston-valve.

Referring particularly to Figs. 1 and 2, 1

is the elevator-leg; 2, the constantly-running shaft, with its friction-disk 3, and driven by belt and pulleys, as shown, from any suitable engine. 6 and 7 are the friction-disks, respectively fixed on the shafts of the cable-drums 10 and 12. Cable 14, being wound on drum 10, is guided by suitable idlers, as 16 18 20, to and down said elevator-leg 1 and to the shovel A or to a bridle 21, which is fastened thereto, as indicated in Fig. 2. Cable 15, being wound on drum 12, is guided by suitable idlers, as 24 26 28, to and down said elevator-leg 1 and to the shovel B or to a bridle 29, fixed thereto, as indicated in said Fig. 2. Of course there may be one, two, or any number of shovels; but two is the more common number, and two shovels are therefore indicated in the drawings. The shafts of said friction-disks 7 and 6 are supported at one end in movable boxes, which are connected with the ends of levers 31 32, which are respectively fulcrumed in the well-known manner at 30 33, and said levers are respectively pivotally connected with the piston-rods 34 35 of the motors or single-acting cylinders 36 37, which cylinders 36 37 are bolted to beams or floors of the elevator-building, as indicated. The device for operating the friction-disk 7 of the upper drum 12 is illustrated in Fig. 6. To the box 140 of the drum-shaft is fixed a lever 141, which is pivoted at one end to a bracket 142, which is fixed to the framing 143. The other end of said lever 141 is pivotally connected by the link 145 with the said lever 31, the end of which is pivoted to said bracket at 30. Thus when compressed air is admitted to cylinder 36 friction-disk 7 is forced down on the constantly-running friction-disk 3, and when the air is released from said cylinder 36 the weight 44 raises said friction-disk 7 out of contact with said friction-disk 3. The box of the lower winding-drum 10 is similarly arranged, except that the weight 46 is now directly on the lever 32. In practice there may be a cylinder, lever, movable box, and connections at each end of the shafts of the winding-drums, or there may be such cylinder-box and connections at only one end. In the former case I will use two sets of friction-disks and in the latter case only one set. Said shovels A and B are represented, as usually employed, as made in two compartments and with two handles 40 41; but any suitable style of grain or other shovels may be employed. Each of said motors 36 37 is preferably a single-acting cylinder open at its outer end to the atmosphere. Said piston-rods 34 35 are each pivotally connected with their corresponding pistons. Said lever 31 is connected by the chain or cable 43 with the counterbalance-weight 44, and lever 32 is provided with the counterbalance-weight 46, and the arrangement is such that when fluid-pressure is admitted to the said cylinders 36 37 the friction-disks 6 7 are forced against the disk 3 and that when the fluid-pressure is released from the said cylinders 36 37 the said counterbalance-weights move said disks 6 7 out of contact with said disk 3, and thus the admission or release of the fluid-pressure to or from said cylinders 36 37 will control the operation of the drums 10 12 and therefore of the cables 14 15 and the shovels A B. The admission and release of the fluid-pressures to and from said cylinders are controlled by the balanced piston-valve, (shown in Figs. 3 and 5,) which is connected to the shell of its cylinder 36 or 37 and is controlled from the shovels, as will be hereinafter explained. Said piston-valve consists of an inner shell 48, provided with the ports 50 51 52 53, port 50 being always in communication with the valve on the shovel. Port 69, which is connected with a source of fluid-pressure, as the compressed-air reservoir 55, Fig. 1, sometimes communicates by port 51 through the valve with ports 52 and thence with its cylinder 36 or 37, while at other times the piston 84 cuts off the communication between said ports 69 51 and said ports 52, of which there are a number around said shell 48, as indicated in Fig. 3, being sometimes in communication with the cylinder 36 or 37 and at other times in communication by the ports 53, of which there are also a number around said shell 48, as indicated in Fig. 3, with the relief-port 60. Said shell 48 is inclosed by an outer case 62, between the heads 63 64 of which said shell 48 is held; and said outer case 62 is provided with the port 68, which registers with said port 50, the port 69, which registers with said port 51, and the annular chamber or groove 72, which registers at 70 with the series of said ports 52 and at 71 with the series of said ports 53. The head 64 is provided with the aforesaid relief-port 60 and with a dash-pot 74, in which works the plunger 78 of the valve-stem 80. On said stem 80 are two pistons 82 84, respectively, preferably hollowed, as shown, and provided with any suitable air-tight packing, as leather cups. The small end 85 of said valve-stem works with nice fit through a hole in said head 64, and the other end of said stem 80 is prolonged beyond piston 82 so far as to prevent the said piston from moving up sufficiently to close port 50, which is always open. A spring 88 moves the pistons 84 82 to their upward limit when there is no pressure on the upper end of piston 82.

Evidently the pressures from the reservoir 55, which is connected with the valve 62 by the piping described, will be balanced on pistons 82 and 84, and therefore fluid-pressure entering the upper end of the valve by ports 68 and 50 from the valve 106 on the shovel overcoming the tension of spring 88 will force the pistons down to the position of Fig. 3, throwing the disk 6 or 7 into contact with disk 3, and thus winding up the cable of the shovel which it is desired to operate.

The piping from the air-reservoir 55 is preferably arranged as indicated in Fig. 5. A pipe 92 goes from said reservoir 55 to and down the elevator-leg to a T or Y, whence

smaller flexible hose 95 95 lead to the valves on the shovels A B, Fig. 2, which valves are hereinafter described. From the valve on shovel A flexible hose 97 and pipe 99 lead back to the valve on cylinder 36, while from the valve on shovel B the flexible hose 98 and pipe 100 lead back to the valve on cylinder 37. The parts of pipe 92 from the reservoir 55 to the elevator-leg and the parts of pipes 99 100 from the elevator-leg to the valves on the cylinders 36 37 are sufficiently flexible to permit of the necessary movements of the said elevator-leg. Said valves on the shovels are preferably balanced piston-valves, as shown in Fig. 4, with a cylindrical shell 106, provided with a port 108 and connection 109, to which is attached one of the branches 95 from the compressed-air reservoir 55, and a port 112 and connection 113, to which is attached one of the branch pipes 97 or 98, which lead back, as said, to the valves of cylinders 36 37. One end of said shell 106 is closed by the plug 115, in which is the relief-hole 116, and on the other end is the screw-cap 117, through which works the valve-stem 120, provided with the small hole 119 for the admission and escape of air. On said stem 120 are the balanced pistons 122 123, which are packed with any suitable packing, piston 122 being of the ordinary cup shape and piston 123 provided with the peripheral groove 125, with which connect holes 126, which are bored in from the lower face of said piston. A spring 128 normally presses the valve-stem and pistons upward and so as to close ports 108 112 to the pressure from the reservoir 55 and to open port 112 to the relief 116 by the groove 125 and holes 126, while a button 130 on the outer end of said valve-stem enables the man at the shovel to move the valve-stem and pistons in the opposite direction against the pressure of the spring 128 to open communication through the valve from port 108 to port 112. A stop 127 limits the motion of the stem 120. Normally the ports 108 112 being closed to the fluid-pressure and port 112 being open, as said, to the relief 116, the valves on the cylinders 36 or 37 will also be closed to the fluid-pressure and the shovels at rest. To start a shovel, the man in charge of it presses the button 130 inward, thereby moving piston 123 to open communication from the reservoir 55 by ports 108 112 to ports 68 and 50 of the valve on the proper cylinder 36 or 37. The pressure entering that valve will, as hereinbefore explained, throw the pistons 82 84 so as to open communication by ports 69 51 and 52 70 from the said reservoir 55 to that cylinder, whereby the friction-disk of the particular drum will be forced into contact with the disk 3, and thus start up the drum and cable of that shovel.

Evidently if the pistons 82 84 in the valve of the cylinders 36 37 be operatively connected with a magnet or solenoid and an electric circuit be led from such magnet or solenoid to a push-button or other make-and-brake device on the shovel, then the man at the shovel can by operating the said make-and-break device energize and deënergize the magnet or solenoid, and thus control the opening and closing of the valve on the cylinder and the motion of the cable-drum, cable, and shovel, and I include such electrical control of the valve in my invention, and I illustrate a device for electrically operating said pistons 82 84 in Figs. 7 and 8. On the valve-stem 85 is a soft-iron armature 155, adjacent to the poles of an electromagnet 156. I prefer to form said armature 155 with extensions 158 158, which project inside the arms of the magnet 156, as shown. Said magnet 156 is carried by a frame 160, which is bolted to and suitably insulated from the valve-casing. The wiring, suitably insulated, goes from any source of electrical energy 162 to and down the elevator-leg 1 and to a push-button 164 on the shovel B, thence back to and up the elevator-leg, around said magnet 156, and to the said source of electric energy. Normally the push-button 164 breaks the circuit; but when the man in charge of the shovel wishes to operate the cables he pushes the button to close the circuit, the magnet 156 is energized and attracts the armature 155, drawing the pistons 82 84 to the position of Fig. 8, wherein compressed air is admitted to cylinder 36 or 37, and the corresponding drum and cable will be operated. When the man at the shovel releases push-button 164, the circuit is broken, the magnet 156 demagnetized, and the spring 88 moves the pistons 82 84 back to the position for shutting off the compressed air. There will of course be slack enough in the wires to permit of the movements of the leg 1.

Now, having described my improvements, I claim as my invention and desire to secure by Letters Patent—

1. The combination in grain-shoveling apparatus, of a shovel, a cable for operating the same, a drum for actuating said cable, a motor for throwing the drum friction into and out of contact with a driving friction, a valve for controlling said motor, and means at the shovel for controlling the operation of said valve, substantially as set forth.

2. In friction-gear devices for actuating an appliance at a distance from the said friction-gear devices, the combination with said appliance of a motor for throwing said devices into and out of action, a valve controlling said motor, and means on said appliance for controlling said valve, substantially as set forth.

3. In apparatus for operating a grain-shovel and other appliances, the combination of a friction-gear train, a fluid-pressure motor for connecting and disconnecting said train, a piston-valve on said motor adapted to control the admission of such pressure to and its exhaust from said motor, and means for actuating said piston-valve from the shovel or appliance, whereby the connecting and disconnecting of said friction-gear can be con-

trolled from the shovel, or appliance, substantially as set forth.

4. In apparatus for operating grain-shovels and other appliances, the combination of a friction-gear train, a fluid-pressure motor for connecting and disconnecting the gear-train, a piston-valve adapted to be actuated by fluid-pressure and to control the admission and exhaust of such pressure to and from said motor, and a valve at the shovel or other appliance operatively connected with said first-named valve so as to admit and release fluid-pressure to and from the same, substantially as set forth.

5. The combination in grain-shoveling apparatus of a movable elevator-leg, a main shovel, a cable for operating the shovel, a drum for operating the cables, a friction device for driving said drums, a fluid-pressure cylinder and valve for actuating said friction device, a valve on the shovel, and air-pipes from said last-named valve to the valve of said cylinder led from the shovel to the leg and to the said cylinder and also to a source of fluid-pressure, substantially as described.

6. The combination in grain-shoveling apparatus, of a shovel and a cable for operating the same, a constantly-running shaft, a drum for the cable adapted to be driven from said shaft, a cylinder operatively connected with said drum so as to throw said drum into and out of operative connection with said constantly-running shaft, and means at said shovel for controlling said cylinder, substantially as described.

Signed at New York city this 20th day of October, 1900.

JAMES G. WESTBROOK.

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