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Patented Mar. 26, 1901.

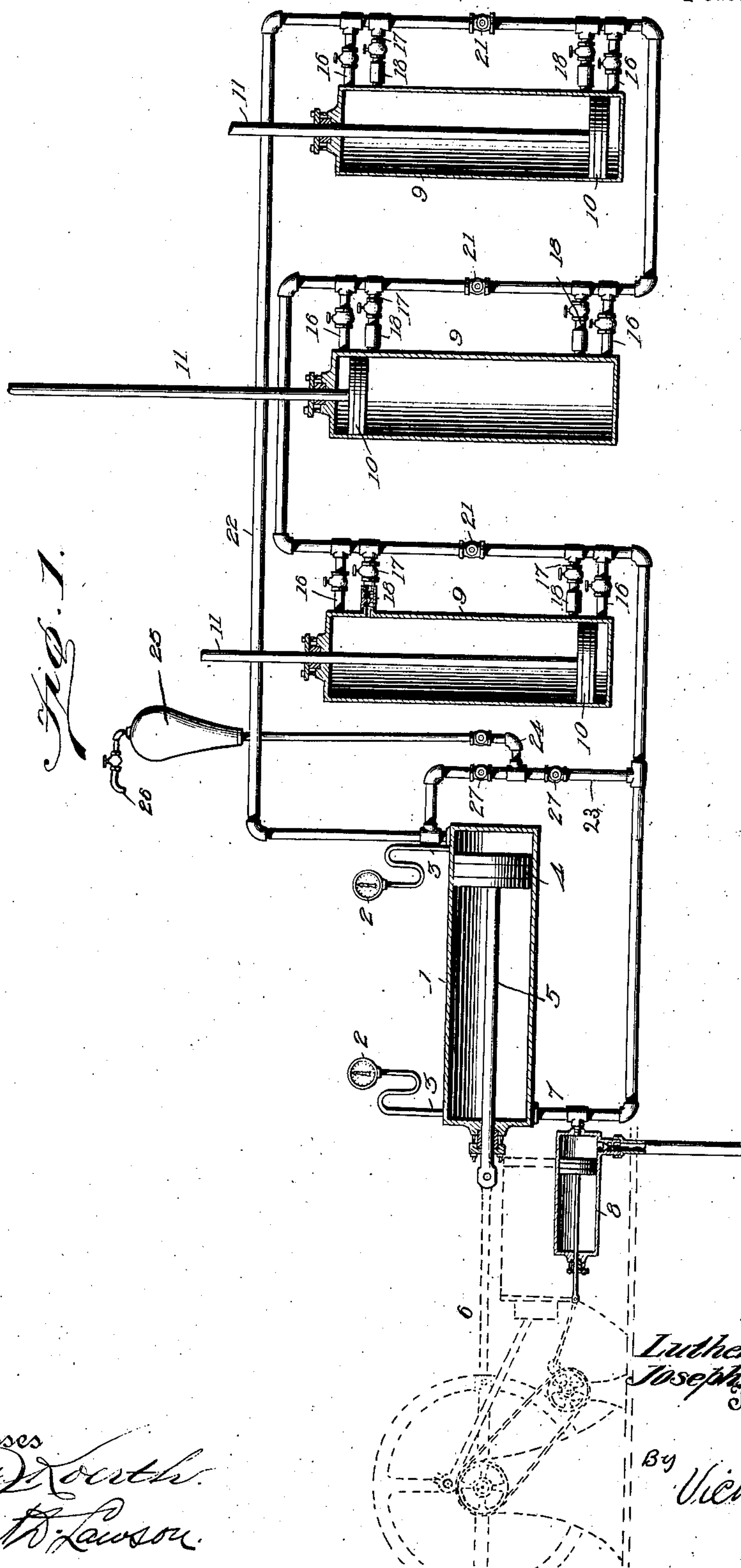
J. N. & L. D. FULTON.

APPARATUS FOR TRANSMITTING POWER.

(No Model.)

(Application filed Apr. 19, 1900.)

2 Sheets—Sheet 1.



Witnesses

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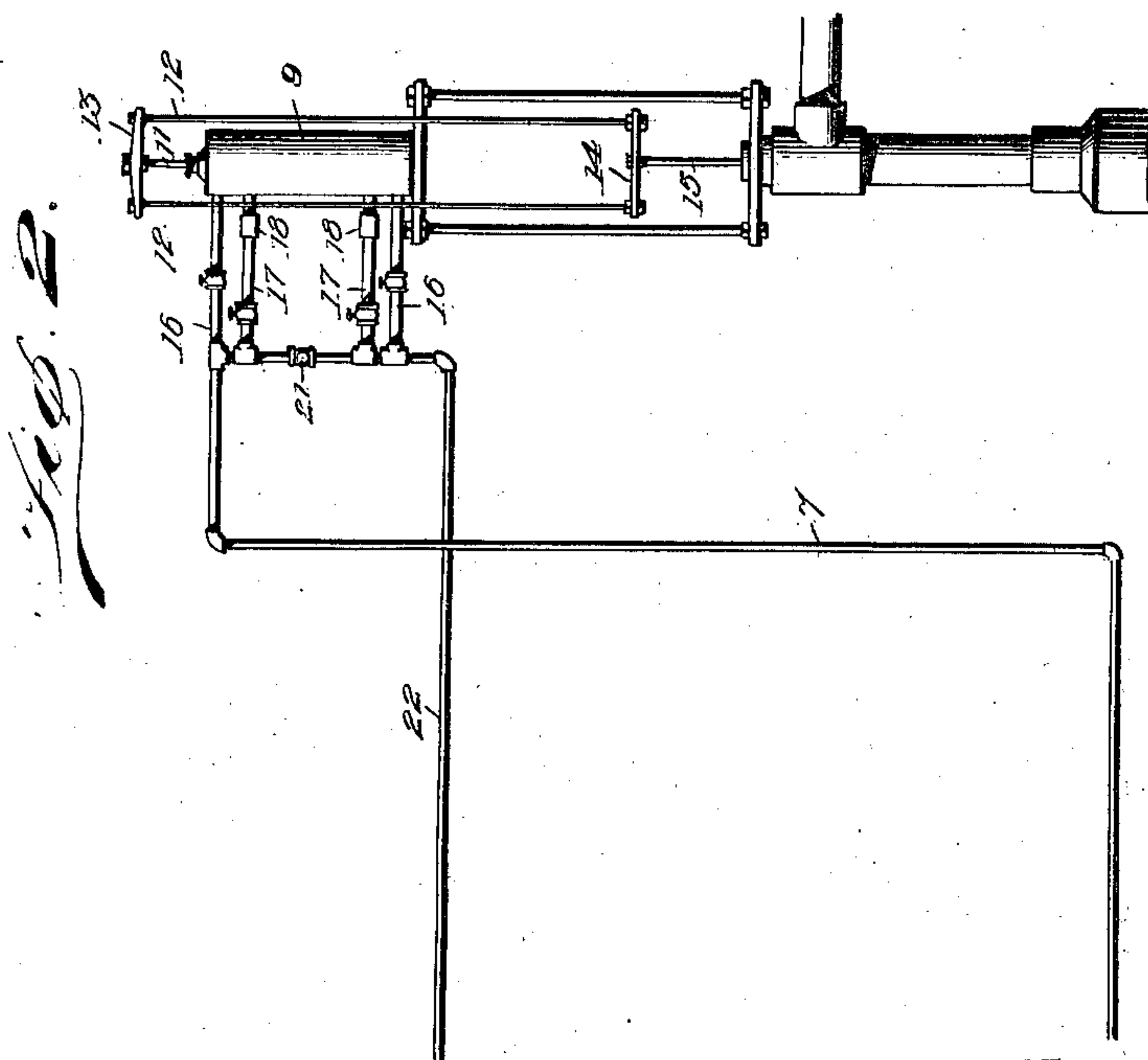
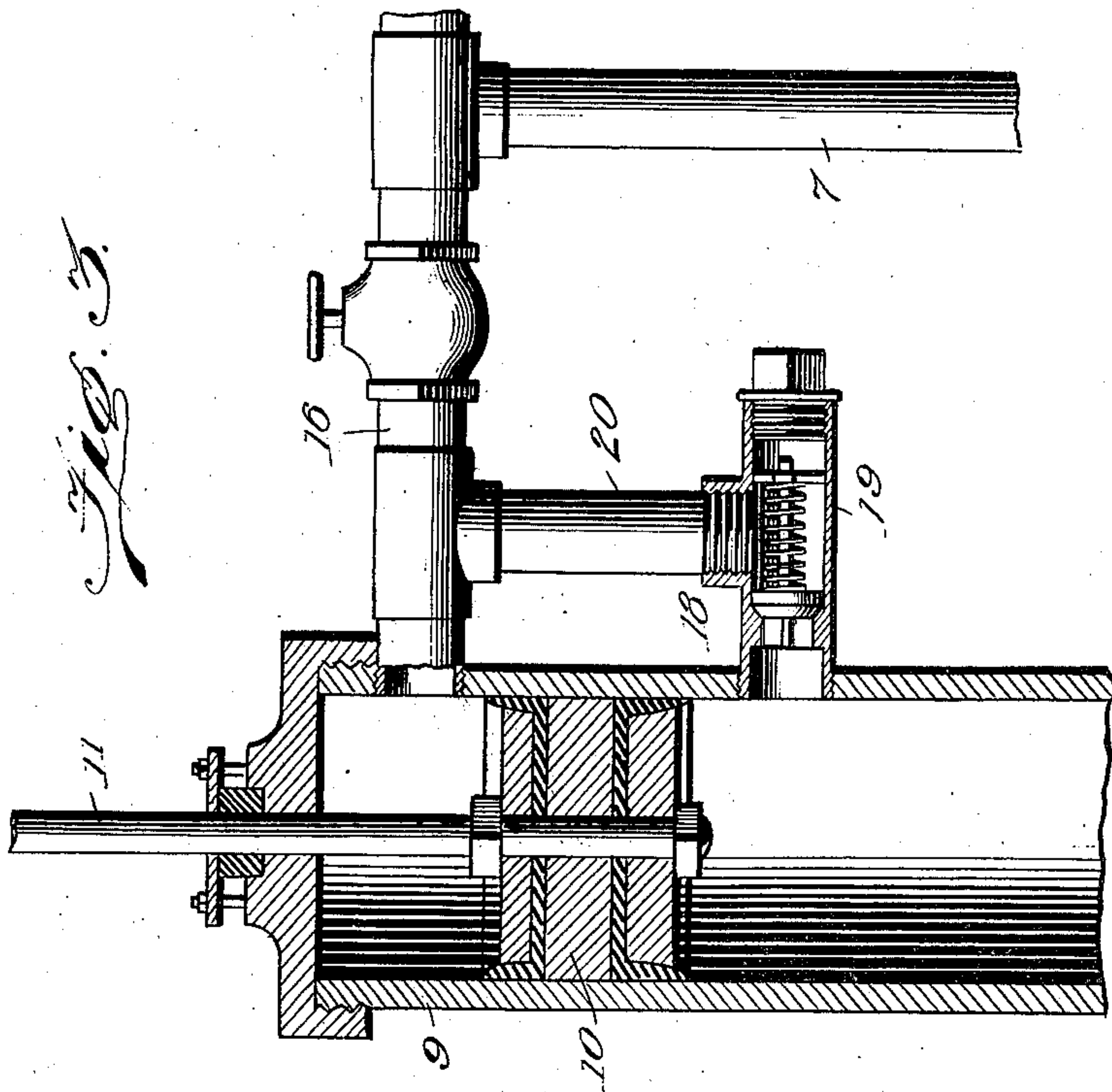
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Witnesses

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UNITED STATES PATENT OFFICE.

JOSEPH NEWTON FULTON AND LUTHER D. FULTON, OF TITUSVILLE,
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APPARATUS FOR TRANSMITTING POWER.

SPECIFICATION forming part of Letters Patent No. 670,447, dated March 26, 1901.

Application filed April 19, 1900. Serial No. 13,519. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH NEWTON FULTON and LUTHER D. FULTON, citizens of the United States, residing at Titusville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Transmitting Power, of which the following is a specification.

10 This invention relates to new and useful improvements in apparatus for transmitting power, and is more especially adapted for use in operating series of pumps. Its primary object is to provide an apparatus of simple construction which dispenses with all movable levers, rods, &c., in transmitting power and which permits of the direct application of power from a central station to one or more pumps or other devices to be operated.

20 A further object is to provide an apparatus whereby the devices to be operated may be moved in unison without loss of motion.

To these ends the invention consists in providing a central or main cylinder connected by means of supply and return pipes to suitably-disposed cylinders, each of which, together with the main cylinder is, provided with a piston of suitable construction. The piston of the main cylinder is adapted to be operated by a suitable motor, and the pistons of the remaining cylinders are secured directly to the pumps or other devices to be operated. The pipes and cylinders are completely filled with a non-compressible fluid adapted to be moved back and forth within the supply and return pipes and the cylinders by the movement of the main piston, said pipes being provided with suitable valves and cocks, whereby circulation within one or more of the cylinders may be cut off and leakage of water from one side to the other of the pistons within the cylinders be automatically compensated for.

45 The invention also consists in the further novel constructions and combinations of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of our invention, and in which—

50 Figure 1 is a diagrammatical view of the apparatus, showing the cylinders in section. Fig. 2 is an elevation of a portion of the ap-

paratus, showing its application to a pump; and Fig. 3 is a detail view of a modified arrangement of pipes.

Referring to said figures by numerals of reference, 1 is a main cylinder having gages, as 2, connected thereto by means of pipes 3 and having mounted therein a piston 4, the rod 5 of which may be secured to any suitable motor 6. (Shown in dotted lines, Fig. 1.) Extending from this cylinder, near one end thereof, is a pipe 7, which may for convenience in describing the apparatus be termed the "supply-pipe." A pump, as 8, is connected to this pipe and may be driven in any suitable manner, said pump being adapted to force liquid into pipe 7 as desired. The supply-pipe is arranged adjacent to each of one or more cylinders 9, each of which is provided with a piston 10, having a rod 11, which may be connected in any suitable manner to the device to be operated thereby. In Fig. 2 we have shown said rod applied to a pump and connected thereto by means of parallel rods 12, which run parallel to the cylinder and are secured at opposite ends to a cross-beam 13 upon the piston-rod 11 and a similar beam 14 upon the pump-rod 15, respectively.

Near each end of the cylinder 9 is an inlet-pipe 16, which connects the cylinder with the supply-pipe 7, and said inlet is supplied with a suitable cock, whereby the passage of liquid therethrough may be readily controlled. Pipes 17 are arranged between the cylinders and the supply 7 at points between the inlets 16, and these are supplied with valves, as 18, adapted to open outward when the piston passes the pipes 17 thereof in the event of water escaping from one side to the other of the piston, thereby compensating for the leakage.

In Fig. 3 we have shown a modified form of inlet and valved pipes, which is especially adapted for use where the supply-pipe is remote from the cylinders. In said figure the supply-pipe is connected with the cylinder by means of inlets, hereinbefore described. In lieu of extending the valved pipe from the cylinder to the supply, however, we provide a short outlet-pipe 19, communicating by means of a connecting-pipe 20 with the inlet.

The supply-pipe is laid adjacent to each of

the cylinders 9 and is provided at a point between the inlets of each cylinder with a cock, as 21, for the purpose hereinafter more fully described. The end of this pipe is connected to a return-pipe 22, which passes directly to that end of main cylinder 1 which is farthest removed from the supply-pipe 7.

A connecting-pipe, as 23, preferably extends from the supply to the return pipes, as shown, and is provided with a branch pipe 24, opening into an air-exhaust chamber 25, having a suitable outlet 26, which may be closed in any suitable manner. Cocks, as 27, are arranged between the branch pipe 24 and the pipes 7 and 22, respectively.

In operation all of the valves of the apparatus are opened and a non-compressible liquid, preferably formed of water and calcium chlorid, is forced into all of the pipes and cylinders by means of the pump 8. It will be understood that all air within the system will be forced out through the chamber 25, and the expulsion thereof may be accelerated by operating the piston of the main cylinder during the filling of the machine. When the air has been expelled, the cocks 27 and 21 are closed and the piston 4 is driven by means of a motor, as 6. It is obvious that as the piston moves toward the supply-pipe 7 the water in the path of said piston will be forced into the pipe, causing a portion of the contents of the pipe to be forced into one inlet 16 of the cylinders, moving their pistons in unison with the main piston, and the liquid in their paths being forced out through the other pipe 16 of the cylinders, causing, as is obvious, a portion of the liquid within the return-pipe to flow into the main cylinder in the rear of its piston. When the movement of the piston 4 is reversed, the movement of the current within the pipes and cylinders will be reversed therewith, and as the liquid used completely fills the system and cannot escape or be compressed it will be readily understood that the pistons of each cylinder will move in harmony with the main piston 4.

In the event of any leakage which might occur through the pistons of the cylinders causing the amount of liquid on one side of the piston to be less than the amount required to drive said piston its full stroke the pressure will be equalized by the admission of liquid to the side of the piston requiring the same through one of the valves 18. In other words, should the piston in one of the cylinders 9 reach the end of its stroke prior to the completion of the stroke of the piston 4 the water which continues to flow into the cylinder in rear of its piston will force open the valve 18 adjacent to said piston, and thus flow past the closed valve 21, arranged within the supply-pipe 7 at a point between the valves 18.

When it is desired to stop the motion of one of the cylinders without interfering with the operation of the balance of the system, it is merely necessary to open the cock 21 of

that cylinder, and the liquid will then pass directly through the supply-pipe 7 without entering the cylinder by way of the inlets 16. By opening the cocks 27 all of the cylinders 9 will be placed out of circuit, as the water will flow directly from one end to the other of the cylinder 1.

While we have shown and described this device as being especially adapted for use in pumping systems, we do not limit ourselves thereto, as the same may be used for any of numerous purposes for which a stationary engine may be employed, nor do we restrict ourselves to any particular form of motor for driving the main piston 4. The pump 8 may be operated by means of the motor 6; but it is preferably driven independently thereof.

It is our idea to have an air-chamber 25 arranged at one or more points above the balance of the system. We find that when a system is charged with fluid from the pump 8 the air is forced ahead of the same and through the opened cocks 27 into the air-chamber. The small amount of air which mixes with the water soon finds its way to the air-chamber, from which it may be readily discharged. The cocks within the pipes 16 and 17 are employed for preventing the water from flowing into the cylinders when it is desired to repair them or for any other reason.

In the foregoing description we have shown the preferred form of our invention; but we do not limit ourselves thereto, as we are aware that modifications may be made therein without departing from the spirit or sacrificing the advantages thereof, and we therefore reserve the right to make such changes and alterations as fairly fall within the scope of our invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described, the combination with a main cylinder and piston, and a supply and return pipe; of a cylinder, a piston therein, inlet-pipes connecting the cylinder at opposite ends with the supply-pipe, fluid within the cylinders and pipes, a cock within the supply-pipe at a point between the inlets, and outlet-pipes connecting the cylinder with the supply-pipe at points between the inlets to said cylinder, and a valve within each outlet-pipe adapted to open outward when under pressure.

2. In an apparatus of the character described, the combination with a main cylinder and piston and supply and inlet pipes; of a cylinder, a piston therein, inlet-pipes connecting said supply-pipe and the ends of the cylinder, outlets to said cylinder adjacent to and communicating with the inlet-pipes, valves within the outlets, each adapted to open outward after the piston has passed the same toward the end of its stroke and when under pressure, and fluid within said cylinders and pipes.

3. In an apparatus of the character de-

scribed, the combination with a main cylinder, a piston, a supply and an inlet pipe; of cylinders, a piston within each cylinder, inlet-pipes connecting the supply-pipe with the
5 ends of each of the cylinders, outlet-pipes extending from each cylinder at points adjacent to the inlets and communicating with the supply-pipe, valves within the outlet-pipes adapted to open outward when under pressure when the pistons in the cylinders approach the limits of their movements, a cock within the supply-pipe between the inlet-pipes of each cylinder, and non-compressible fluid within the cylinders and pipes.

5 4. In an apparatus of the character described, the combination with a main cylinder and piston and a supply and return pipe; of a second cylinder, a piston therein, inlet-pipes connecting said cylinder at opposite ends with the supply-pipe, fluid within the

cylinders and pipes, a cock within the supply-pipe at a point between the inlets, outlet-pipes connecting the second cylinder with the supply-pipe at points between the inlets to said cylinder, a valve within each outlet-
25 pipe adapted to open outward when under pressure, a cross-beam secured to the piston of the second cylinder, a pump-rod, a cross-beam secured thereto, and means for connecting the beams of the piston and pump-rod. 30

In testimony whereof we affix our signatures in presence of witnesses.

JOSEPH NEWTON FULTON.

LUTHER D. FULTON.

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CHESTER L. KERR,

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