

No. 626,652.

Patented June 6, 1899.

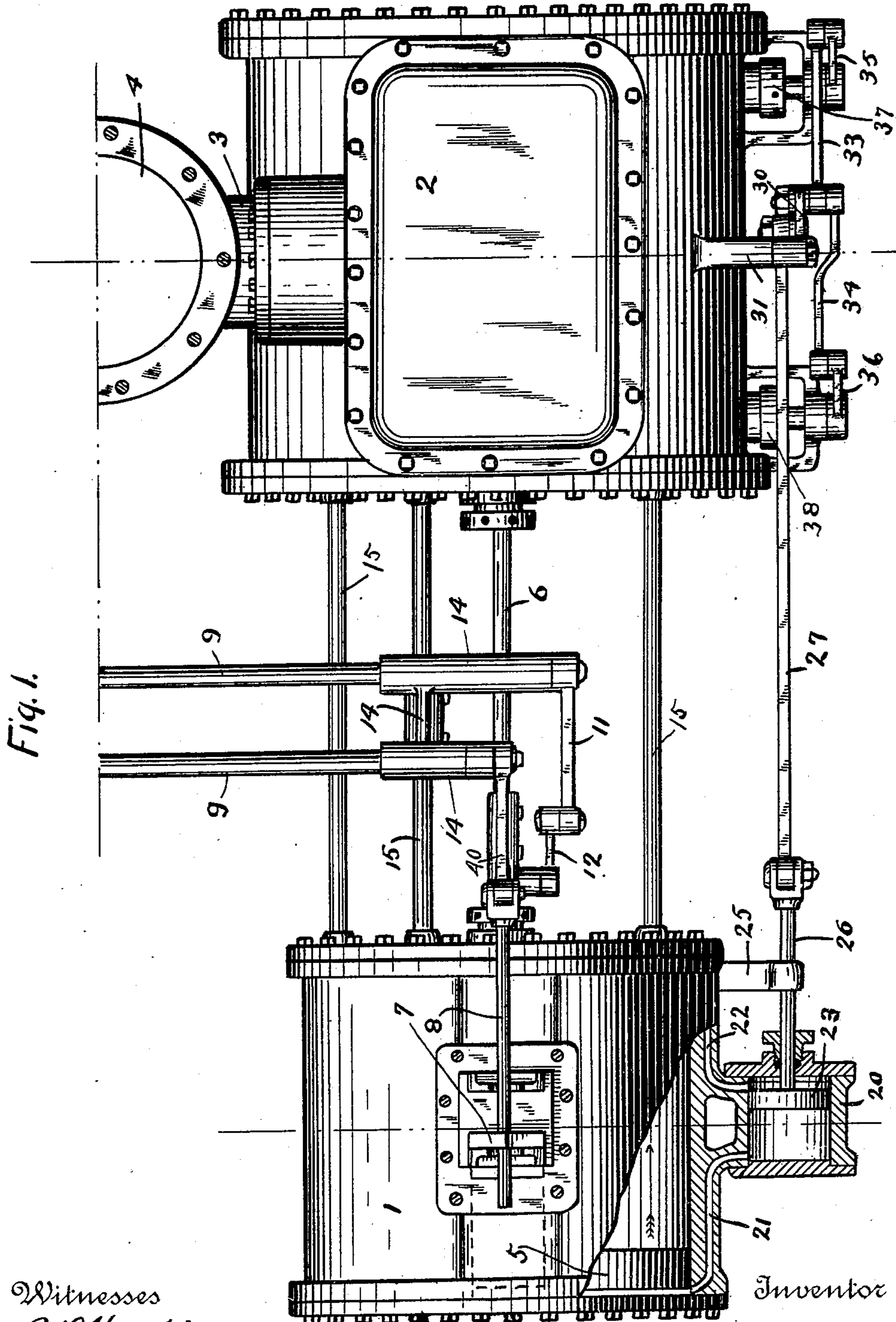
J. K. DEAN.

STEAM PUMP VALVE ACTUATING MECHANISM.

(Application filed Aug. 13, 1898.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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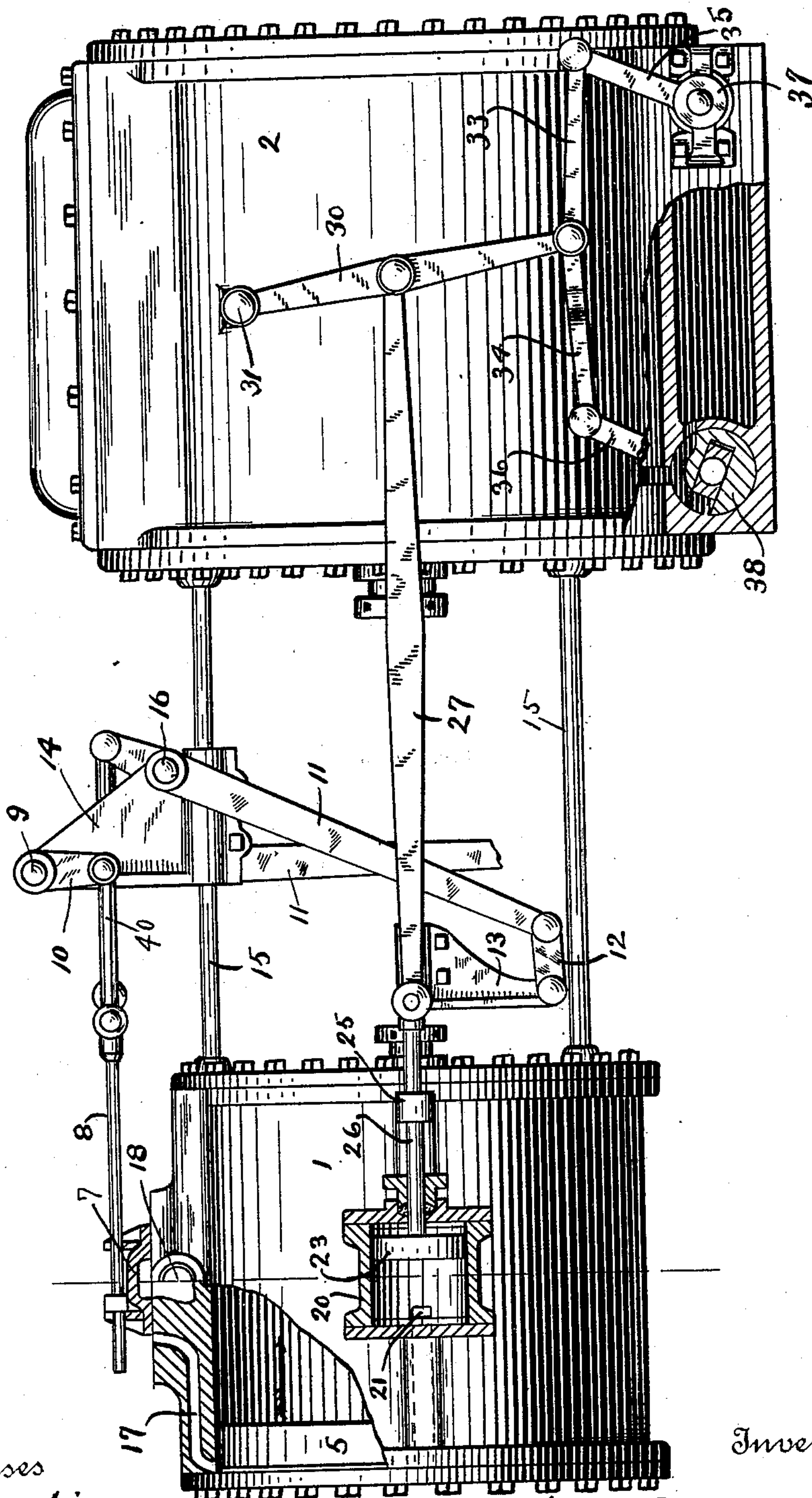
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Fig. 2.



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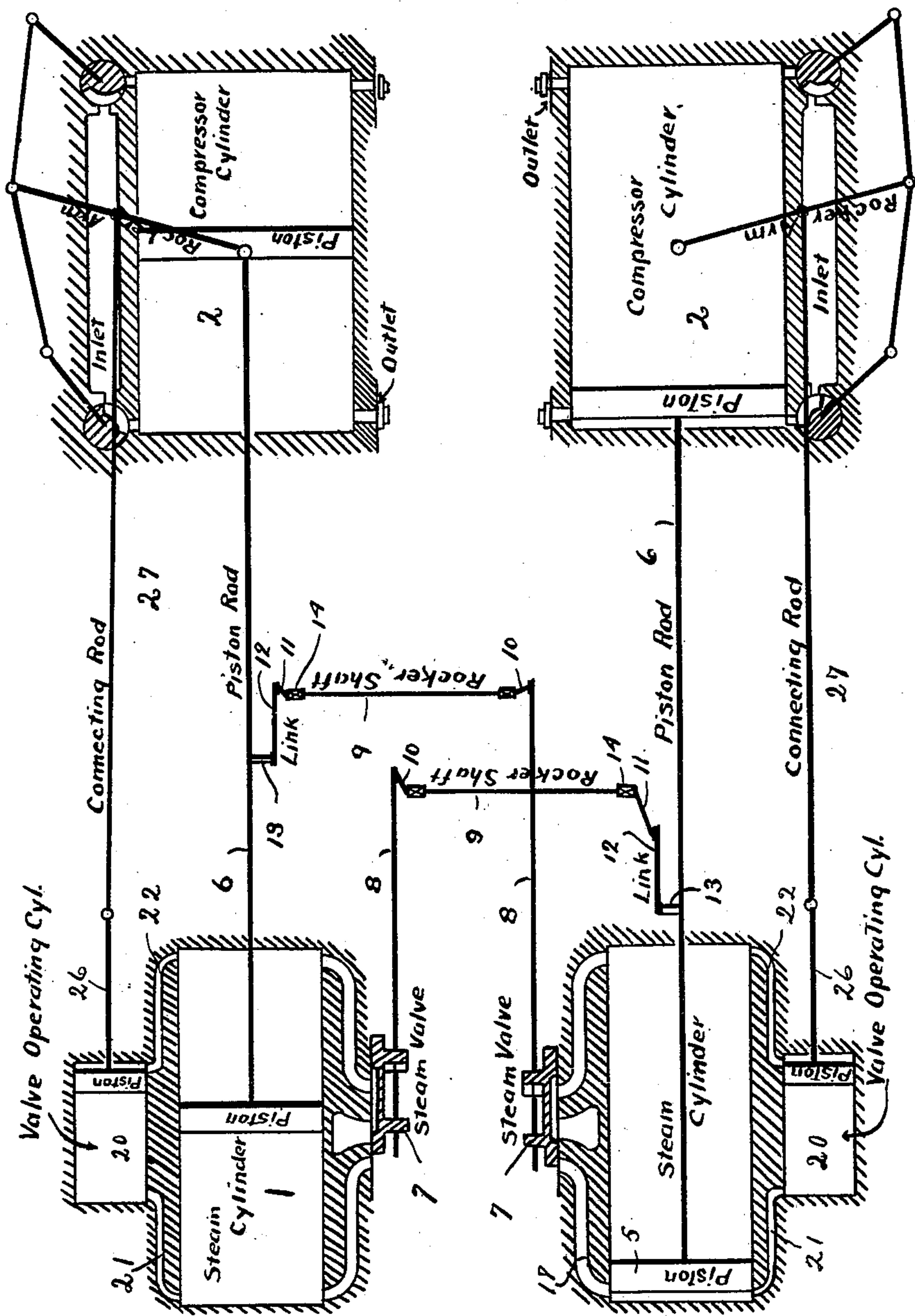
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3 Sheets—Sheet 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN K. DEAN, OF INDIANAPOLIS, INDIANA.

STEAM-PUMP-VALVE-ACTUATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 626,652, dated June 6, 1899.

Application filed August 13, 1898. Serial No. 688,554. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. DEAN, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Steam-Pump-Valve-Actuating Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like figures refer to like parts.

My invention relates to a peculiar and novel means for actuating the valve of the compressor-cylinder in a pump driven by steam or similar means.

I show my invention here in connection with a duplex air or gas compressor.

The invention consists in the employment of an auxiliary steam-cylinder for operating the valves of the compressor-cylinder and means controlled by the main-steam-valve-actuating mechanism for supplying steam to the auxiliary cylinder.

In duplex pumps the main valve of one steam-cylinder is actuated by a connection with the piston-rod of the other. Because of the loss of motion by reason of said connection the two pistons will not accurately agree in their stroke. Often one for a time will fall far short of a full stroke, so that most of the work will be done at the time by the other piston. It has been a common practice to actuate the valves of the compressor-cylinder by suitable lever connection with the connection above spoken of for actuating the main steam-cylinder valve. By reason of this the loss of motion above referred to affects the valves of the compressor-cylinder and only partially opens or closes them, so as to materially and injuriously limit and affect the operation of the pump. By employing an auxiliary cylinder and piston for operating the valves of the compressor-cylinder and means for conveying steam to it and the admission of steam being controlled by the connection or mechanism that actuates the main steam-cylinder valve full and complete action of the compressor-cylinder valves will always take place, regardless of the movement of the main piston, whether it makes a full stroke or a short stroke.

The nature of my invention will be under-

stood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a plan of one-half of a duplex pump, a portion of the main steam-cylinder broken away or in section. Fig. 2 is a side elevation of the same with the main steam-valve, as well as part of the main steam-cylinder and all of the auxiliary cylinder and one of the compressor-cylinder valves, in section. Fig. 3 is a diagram of a duplex pump provided with my auxiliary cylinder.

In detail, 1 is one of the steam-cylinders, and 2 is one of the compressor-cylinders.

3 is a connection between the compressor-cylinders, and 4 is an outlet.

5 is the main steam-piston, and 6 is the main piston-rod.

7 is the valve mechanism controlling the supply of steam to the main cylinder 1, and 8 is the valve-stem connected therewith. Said valve 7 operates in a suitable steam-chest, which is not here shown; but this and all other parts of the device above referred to may be made in any well-known form, as their particular construction constitutes no part of my invention.

The valve 7 of one of the pumps is actuated by the piston-rod 6 of the other pump through a connection consisting of a rock-shaft 9, which is connected with the valve-stem 8 at one end by the connecting-rod 40 and at the other end connected with the piston-rod by a lever 11, pivoted to the link 12, which is pivoted to the arm 13, secured to the piston-rod. The rock-shaft 9 is mounted in the brackets 14, secured to supporting-rods 15. The lever 11 is also pivoted between its ends to said bracket at 16. The other valve 7 in the other pump is actuated by the same kind of connection with the other piston-rod. This description of the means of actuating said valves 7 and for controlling the supply of steam to the main cylinders in duplex pumps suggests the loss of motion that results from the described connections, permitting the two pistons to operate somewhat independently so far as their length of stroke is concerned.

17 is the port or conduit leading from the steam-chest to the main cylinder 1. 18 is the outlet from said cylinder.

To the main steam-cylinder 1 I secure an

auxiliary cylinder 20, which is supplied at each end with steam by the ports or conduits 21 and 22, that lead from the corresponding ends of the main cylinder 1.

23 is the auxiliary piston, and 24 is the auxiliary-piston rod, supported by the bracket 25. Said auxiliary-piston rod is connected by a connecting-rod 27 with a vertical lever 30, pivoted at its upper end to the arm 31, that extends horizontally from the compressor-cylinder 2. Said lever 30 is pivoted at its lower end to the links 33 and 34, that extend in opposite directions and are pivoted, respectively, to the arms 35 and 36, which are secured to the valves 37 and 38, whereby said valves are oscillated.

The compressor-cylinder valves here shown are oscillatory or of the Corliss type; but any other kind of valve may be employed and the auxiliary-piston rod 26 be connected with the mechanism whereby said valves are operated. The same means for actuating said compressor-cylinder valves are duplicated on the other side of the duplex pump. By this construction it is seen that whether the main piston 5 makes a full stroke or not the auxiliary piston 26 will make a full stroke. It will have a full supply of steam, with nothing to resist its movement excepting the valves which it actuates, and since nothing interferes with its action its movement will always be uniform and complete and will fully actuate the valves, so as to completely open and close the ports, whichever is desired. It is not very material from what source the auxiliary cylinder 20 is supplied with steam provided its inlet and outlet are controlled by the same means that controls the inlet of steam to the main cylinder. This latter is necessary in order to cause a unison of action; but the preferable means of supplying said auxiliary cylinder with steam is that herein shown, as it is very simple, direct, and positive.

While the conduits 21 and 22 lead from the main steam-cylinder to the auxiliary cylinder, the passage-ways for steam to the auxiliary cylinder when traced back come from the steam-ports of the main valve, the chambers in the main steam-cylinder on each side of the piston being a part of said passage-ways, so the steam can go quite direct from the valve-port to the auxiliary cylinder and regardless of the extent of movement of the main piston.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a compressor-cylinder of a pump, valves for the same, a main steam-cylinder to drive the pump, a steam-distribution valve for the main steam-cylinder, and a mechanism for actuating said valve,

of an auxiliary steam-cylinder adapted to actuate the valves of the compressor-cylinder, passage-ways for steam from the main cylinder to the auxiliary cylinder and means controlled by the actuating mechanism of said steam-distribution valve for supplying steam to said auxiliary cylinder.

2. The combination with a compressor-cylinder of a pump, valves for the same, a main steam-cylinder to drive the pump, a steam-distribution valve for the main steam-cylinder, and a mechanism for actuating said valve, of an auxiliary steam-cylinder adapted to actuate the valves of the compressor-cylinder, passage-ways for steam from the ends of the main cylinder to the corresponding ends of the auxiliary cylinder and means controlled by said valve for supplying steam to said auxiliary cylinder.

3. The combination with a compressor-cylinder of a pump, valves for the same, a main steam-cylinder to drive the pump, a steam-distribution valve for the main steam-cylinder, and a mechanism for actuating said valve, of an auxiliary steam-cylinder adapted to actuate the valves of the compressor-cylinder, and passage-ways from the steam-ports of the steam-distribution valve to the ends of the auxiliary cylinder.

4. The combination with a compressor-cylinder of a pump, valves for the same, a main steam-cylinder to drive the pump, a steam-distribution valve for the main steam-cylinder, and a mechanism for actuating said valve, of an auxiliary steam-cylinder adapted to actuate the valves of the compressor-cylinder, and conduits leading from the ends of the main steam-cylinder to the ends of the auxiliary cylinder.

5. A duplex pump including a pair of compressor-cylinders, valves for said cylinders, a pair of main steam-cylinders one for each compressor-cylinder, a pair of main pistons, a steam-distribution valve for each steam-cylinder, a pair of auxiliary cylinders for operating the valves of the compressor-cylinders, passage-ways for steam from the ends of each main cylinder to the ends of the corresponding auxiliary cylinder, connections between the steam-distribution valve on one side and the main piston on the other side, and means controlled by said connections for supplying steam to the auxiliary cylinder.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

JOHN K. DEAN.

Witnesses:

R. D. HAWKINS,
M. C. BUCK.