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PATENTED FEB. 24, 1903.

F. D. KOEHLER & T. W. MONAHAN.

STEAM TRAP.

APPLICATION FILED JUNE 6, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

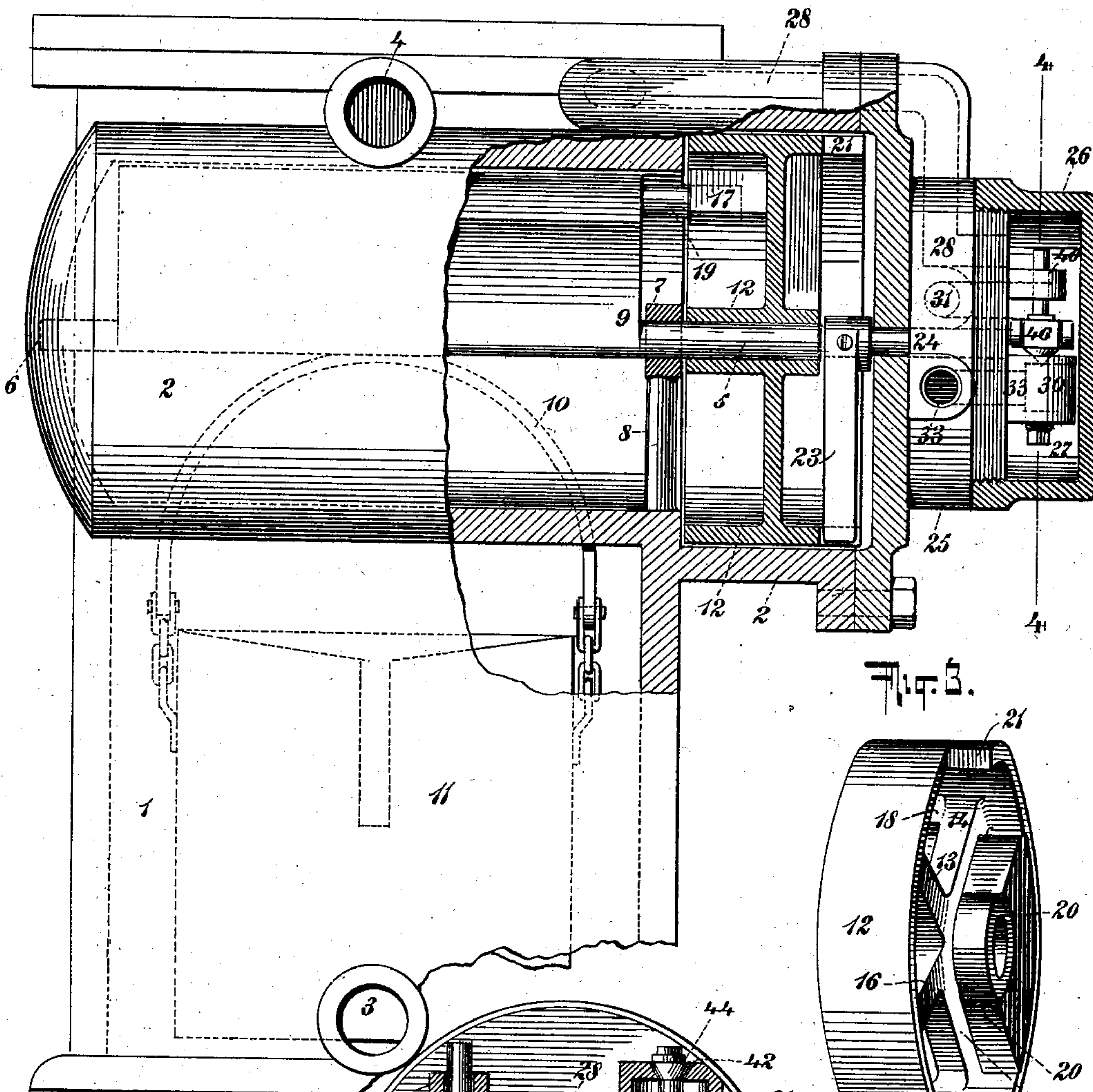
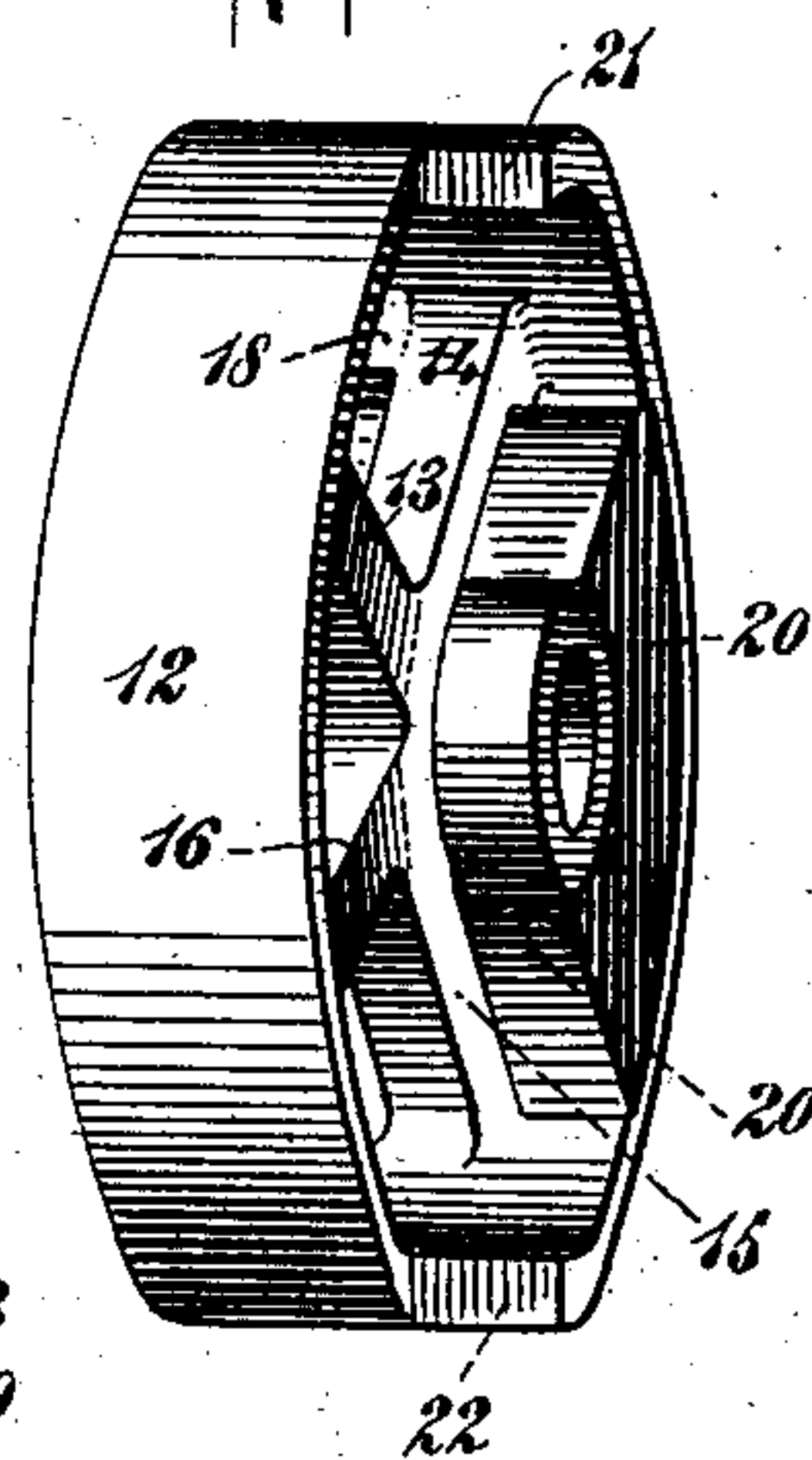
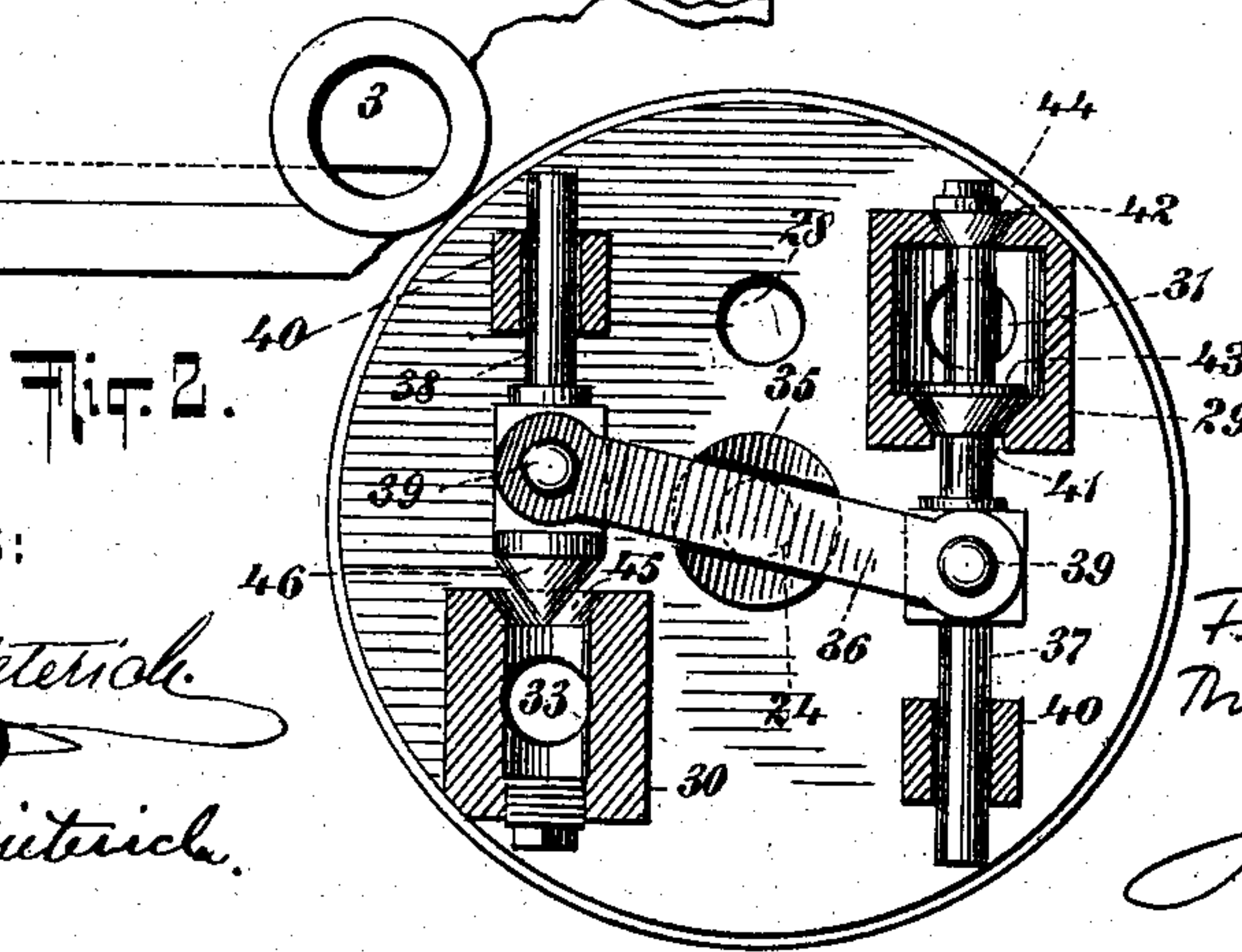


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

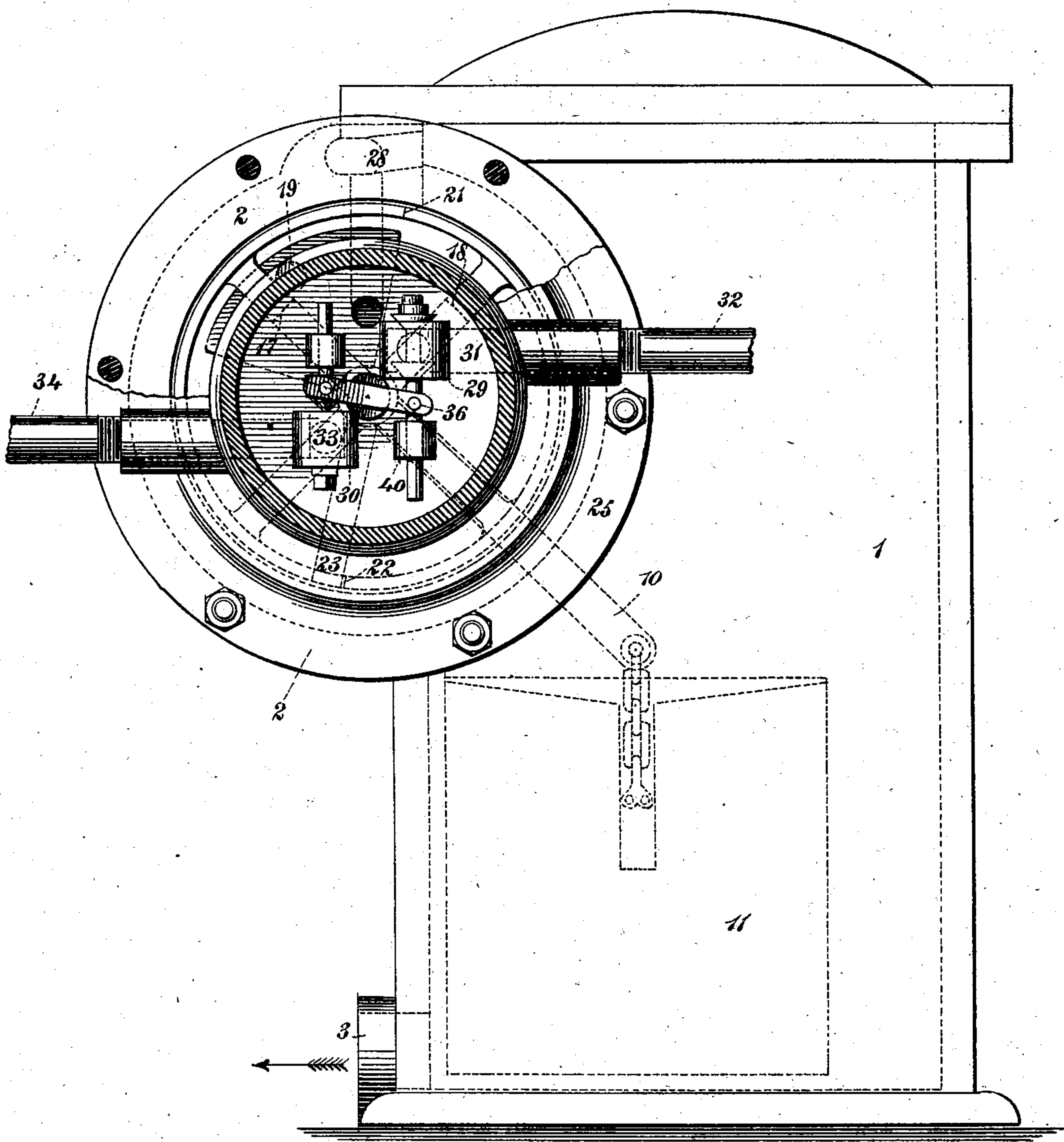
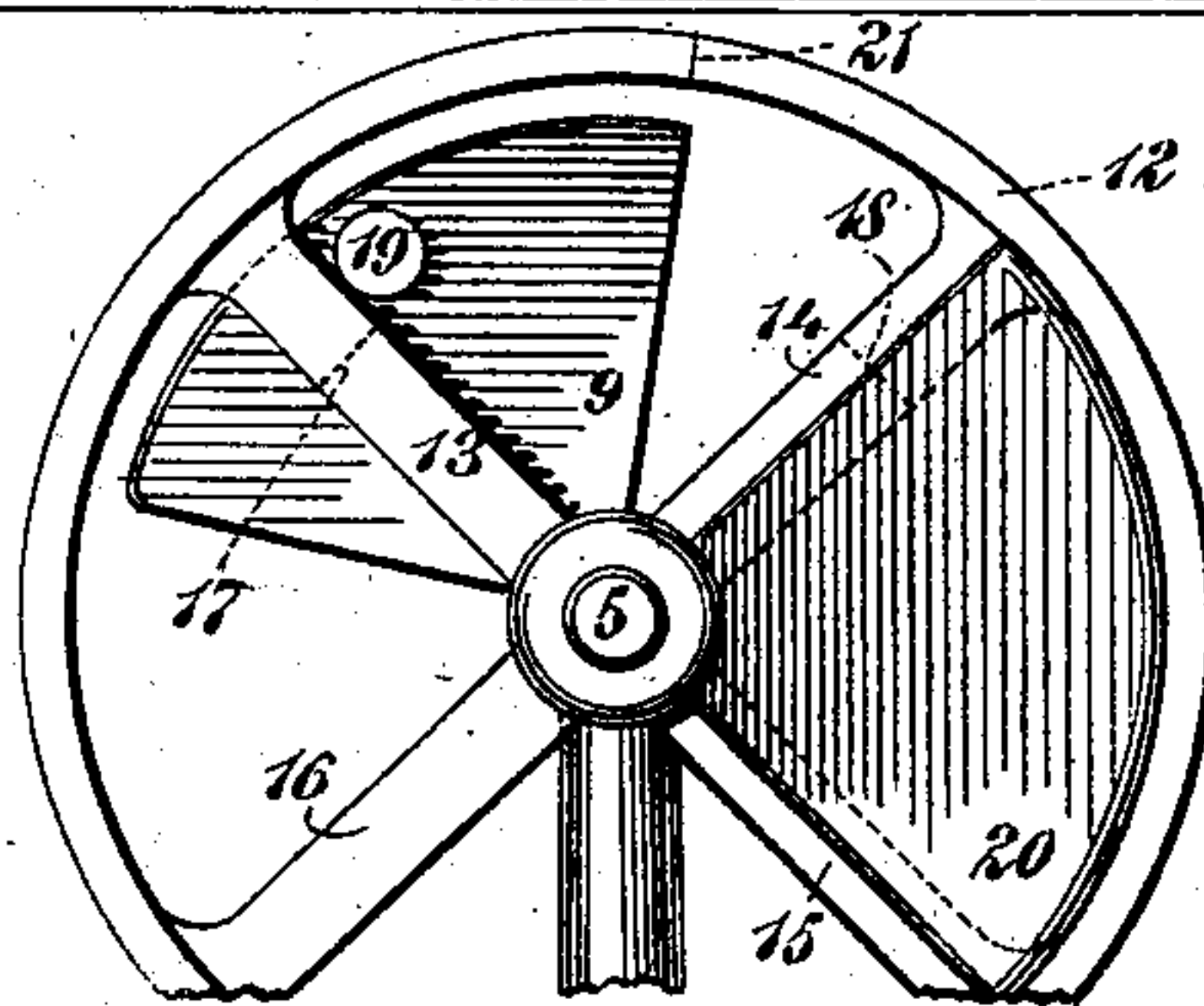


Fig. 5.



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FREDERICK D. KOEHLER AND THOMAS W. MONAHAN, OF NEW YORK, N. Y.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 721,312, dated February 24, 1903.

Application filed June 6, 1902. Serial No. 110,410. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK D. KOEHLER and THOMAS W. MONAHAN, citizens of the United States, residing in the borough of Richmond, New York city, county of Richmond, State of New York, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

Our invention relates to steam-traps adapted to return water of condensation from the pipes of the system to the boiler or generator. It may also be used as a gravity-pump.

The object of our invention is to provide an inexpensive trap of quick and positive action, requiring little lubrication, with accessible valves, and of large capacity for its size.

In the drawings, Figure 1 is a side view partly cut away and showing some of the operating parts in section. Fig. 2 is a front view of the valves and ports, the valve-frames being shown in section. Fig. 3 is a perspective view of the weighted wheel carried on the main shaft. Fig. 4 is a front view, the valve-casing being shown in section on the line 4-4 of Fig. 1. Fig. 5 is a front view of the weighted wheel and counterweight.

Referring to the drawings, 1 is the main chamber of the trap with the cylinder-shaped extension 2 at the top.

3 is the opening for the outlet-pipe, and 4 the opening for the inlet-pipe. The main shaft 5 is journaled at 6 in the side of the chamber 1 and at 7 on a post 8, extending up from the other side of the chamber. Fast on shaft 5 is the counterweight 9, and opposite thereto fast to the shaft 5, midway between bearings 6 and 7, is the forked arm 10, on the end of which the bucket 11 is hung. The weighted wheel 12 is loosely carried on the end of shaft 5, which extends beyond bearing 7. The wheel 12 has four spokes 13, 14, 15, and 16, the two adjacent spokes 13 and 14 having lugs 17 and 18, adapted to contact with the pin 19, extending from counterweight 9. The space between spokes 14 and 15 is weighted, as indicated at 20, Figs. 3 and 5. Starting half-way between spokes 13 and 14 the wheel is cut away for one hundred and eighty degrees opposite the weight 20, Fig. 3, to form the ledges 21 and 22, adapted

ed to contact with the lever-arm 23, Fig. 1, which is fast to shaft 24. Shaft 24 extends through cap 25, which is bolted to the head of cylinder extension 2. The valve-casing 26 is screwed over the cap 25 to form the auxiliary chamber 27, from which the port 28 extends through cap 25 to the top of chamber 1, as indicated by dotted lines in Fig. 1. Extending from cap 25 into auxiliary chamber 27 are the valve-frames 29 and 30, Figs. 1, 2, and 4. The port 31 extends through cap 25 from valve-frame 29 to pipe 32, Fig. 4, which leads to the boiler. The port 33 extends through cap 25 from valve-frame 30 to pipe 34, Fig. 4, which opens to the atmosphere. The shaft 24 carries on its end opposite to lever-arm 23 an enlargement 35, through which extends the lever 36, forked at each end to receive the valve-stems 37 and 38, which have horizontal slots (not shown) engaged by pins 39 to connect the valve-stems to the ends of the forked lever 36.

The guides 40 control the path of the valve-stems. In valve-frame 29 are two seats 41 and 42 for the puppet-valves 43 and 44, the lower valve 43 being slightly larger in diameter than the upper valve 44. In valve-frame 30 there is a single seat 45 for puppet-valve 46.

The operation of the trap is as follows: The inlet and outlet pipes are provided with the usual check-valves. (Not shown.) When the trap is empty, the bucket 11 remains at the bottom of chamber 1 and wheel 12 is in the position shown in Figs. 1, 3, and 4, the ledge 22 contacting with lever-arm 23, lever 36 being in the position indicated in Figs. 2 and 4 to raise puppet-valve 46 from its seat 45, thus venting to the atmosphere auxiliary chamber 27 and chamber 1, connected therewith by port 28. Puppet-valves 43 and 44 are held closed, shutting off boiler-pressure. As the trap is now vented to the atmosphere, the water of condensation runs into chamber 1 through the check-valve in the inlet-pipe 4, (not shown,) the check-valve in the outlet-pipe 3, which leads to the boiler, being closed by excess of boiler-pressure. As the water rises in chamber 1 counterweight 9 overbalances the weight of bucket 11, which rises, counterweight 9 falling. The pin 19 then contacts with lug 17 on spoke 13 and slowly

revolves wheel 12, raising weight 20 thereon. When chamber 1 becomes nearly full of water, wheel 12 has been revolved until weight 20 has reached the top of its path directly over shaft 5, and a slight addition of water throws weight 20 over the center, allowing it to drop freely until the ledge 21 strikes against lever-arm 23, shoving it quickly to the right, Fig. 4, thus rocking shaft 24, enlargement 35, and lever 36 to close puppet-valve 46, leading to the atmosphere, and open puppet-valves 43 and 44, leading to boiler-pressure. The admission of boiler-pressure to auxiliary chamber 27, and thence through port 28 to the top of chamber 1, closes the check-valve (not shown) in the inlet-pipe at 4. As both the pipe 32 and outlet 3 lead to the boiler, the pressure is equalized and the weight of the water in chamber 3 opens the check-valve (not shown) in the pipe from outlet 3, allowing the water in the trap to flow by gravity down to the boiler through outlet 3. As the water escapes the weight of bucket 11 overbalances counterweight 9, so that pin 19 contacts with lug 18 on spoke 14 and slowly revolves wheel 12 in the reverse direction from that above described, the ledge 21 leaving lever-arm 23. When chamber 1 becomes nearly empty, wheel 12 has been revolved back until weight 20 has again reached the top of its path directly over shaft 5, and a slight further fall in the level of the water throws weight 20 over the center, allowing it to drop freely until the ledge 22 strikes against lever-arm 23, shoving it quickly to the left, Fig. 4, thus rocking back shaft 24, enlargement 35, and lever 36 to reopen puppet-valve 46, leading to the atmosphere, and reclose puppet-valves 43 and 44, leading to boiler-pressure. This leaves the device in the position first described, the trap being empty and vented to the atmosphere ready for the reception of another charge of water of condensation from the system through inlet 4. The operation above described is repeated indefinitely and automatically.

By making valve 43 but slightly larger than valve 44 the valves are readily and quickly opened and closed by the blow of weighted wheel 12 against lever-arm 23.

The bucket 11 is constantly full of water. Any solid body to overbalance counterweight 9 with the leverage of arm 10 when the trap empties may be employed.

The speed of rotation of the weighted wheel under the influence of gravity depends upon the relation of the weight of the entire wheel to that of the weighted portion 20. The greater the relative size of the weighted portion the more rapid will be the rotation of the wheel. By varying the proportions the speed with which the valves are operated may be regulated in accordance with the needs of the steam system. The blow against lever-arm 23 to operate the valves is delivered with the entire force of the weighted wheel; but the suddenness of the blow is tem-

pered by the fact that the weighted portion 20 of the wheel must move the rest of the wheel, which acts as a drag or brake.

What we claim as new, and desire to secure by Letters Patent, is—

1. In a steam-trap a main chamber, a bucket and counterweight adapted to be rocked by changes in the level of the water in said chamber, a valve-actuating shaft having a lever-arm fixed thereto, an intermediary weighted wheel adapted to be rotated in one direction for about ninety degrees by contact with the counterweight during the rise of the water and for about ninety degrees in the same direction by gravity and to be rotated in the other direction for about ninety degrees by contact with the counterweight during the fall of the water and for the remaining ninety degrees by gravity, ports adapted to connect the chamber to the atmosphere or to boiler-pressure, valves for said ports adapted to be actuated by the rocking of said shaft, and ledges on said intermediary weighted wheel whereby the shaft is rocked at the end of the rotation by gravity of the intermediary weighted wheel.

2. In a steam-trap, a main chamber having an outlet and inlet, an auxiliary chamber connected by a port with the top of the main chamber, ports from the auxiliary chamber leading to the atmosphere and to boiler-pressure, valves for said ports adapted to be actuated by the rocking of a valve-shaft, a lever-arm on said valve-shaft, devices directly actuated by the rise and fall of the water in the main chamber, an intermediary weighted wheel adapted to be driven for a part of its rotation by the rise or fall of the water and for the remainder of its rotation by gravity, ledges on said wheel adapted to contact with the lever-arm of the valve-shaft at the end of the rotation of the wheel in either direction by gravity whereby the valves are actuated by a sudden blow upon the filling or emptying of the main chamber.

3. In a steam-trap a main chamber, devices directly actuated by the rise and fall of the water therein, an auxiliary chamber having a port connected to the top of the main chamber, valves in the auxiliary chamber controlling ports to the atmosphere and to boiler-pressure, a removable cap for the auxiliary chamber, a rock-shaft extending from the main chamber into the auxiliary chamber and adapted to actuate the valves therein, a weighted wheel intermediate between the devices directly actuated by the rise and fall of the water and the rock-shaft adapted to actuate the valves, whereby the rise or fall of the water raises a weight which is released when the main chamber is full or empty to rock the valve-shaft controlling the valves in the auxiliary chamber.

4. In a steam-trap, a main chamber with an outlet and inlet for water, devices therein adapted to be moved by the rise and fall of the water, an auxiliary chamber containing

operating-valves and having a port to the main chamber, a removable cap for the auxiliary chamber, a rock-shaft connected to the stems of the operating-valves, an intermediate weighted wheel adapted to be rotated in either direction for half its movement by the devices moved by the rise and fall of the water and for the remaining half by gravity and contact-points on said weighted wheel adapted to engage and shift a lever-arm on the rock-shaft at the end of the rotation in either direction of the weighted wheel.

5. In a steam-trap, a main chamber, devices therein operated by the rise and fall of the level of the water in the main chamber, a valve controlling a passage from the top of the main chamber to boiler-pressure, a valve controlling a passage from the top of the

main chamber to the atmosphere and a weighted wheel intermediate between the devices operated by the rise and fall of the water and said valves, said wheel being weighted for but a comparatively small part of its circumference so that the mass of the wheel is adapted to lessen the speed with which the weighted portion tends to move under the influence of gravity.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 28th day of May, 1902.

FREDERICK D. KOEHLER.

THOMAS W. MONAHAN.

Witnesses:

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