No. 811,162. PATENTED JAN. 30, 1906.

E. MONDT.

APPARATUS FOR DISCHARGING CONDENSED STEAM.

APPLICATION FILED MAY 25, 1904.

2 SHEETS—SHEET 1.

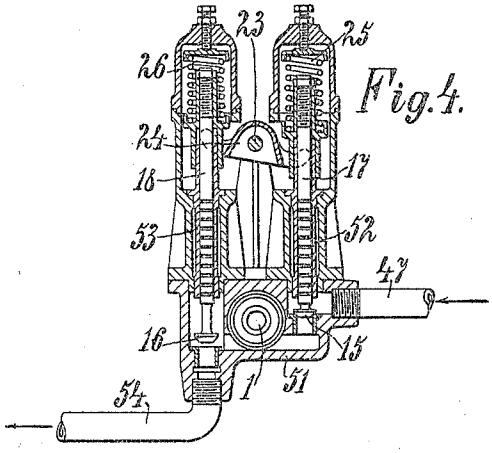


Fig. 4.

Fig. 1.

Witnesses.
F. Heeren
L. Waldman

Inventor
Eugen Mondt
by P. Singer
Atty

No. 811,162. PATENTED JAN. 30, 1906.

E. MONDT.

APPARATUS FOR DISCHARGING CONDENSED STEAM.

APPLICATION FILED MAY 25, 1904.

2 SHEETS—SHEET 2.

Fig. 3.

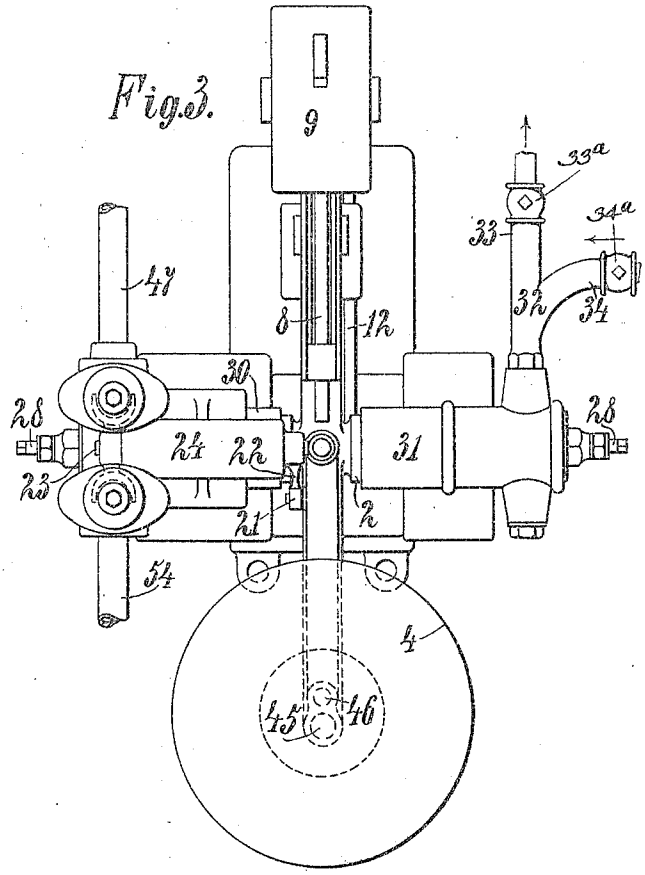
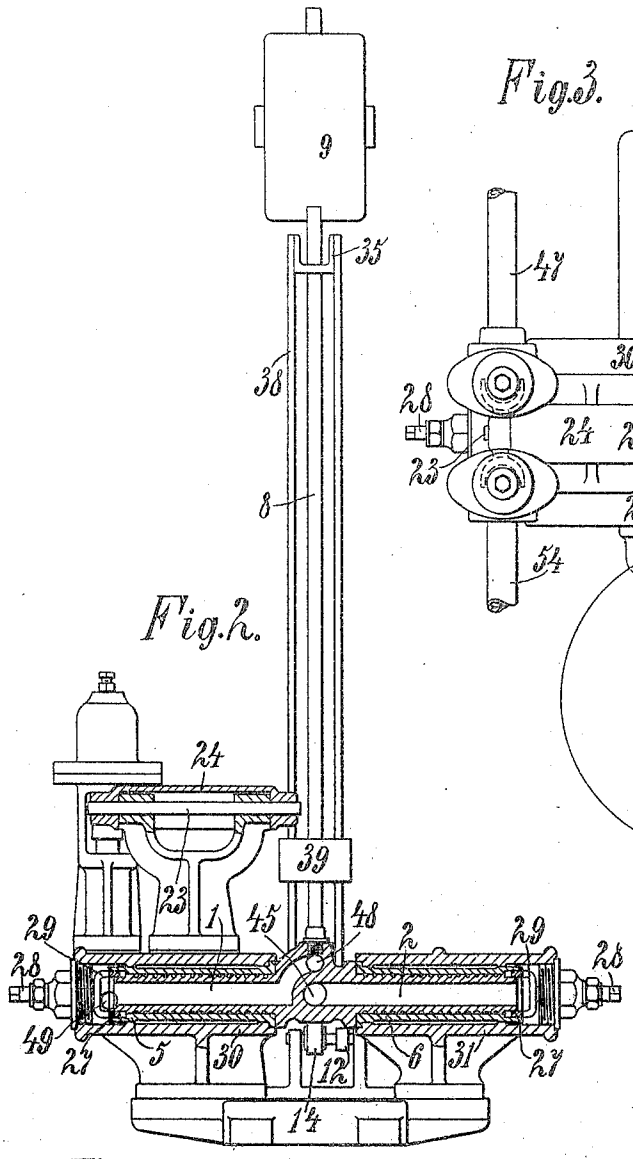


Fig. 2.



Witnesses.

F. Heeren

L. Waldman

Inventor

Eugen Mondt

by B. Singer atty

UNITED STATES PATENT OFFICE.

EUGEN MONDT, OF CHEMNITZ, GERMANY.

APPARATUS FOR DISCHARGING CONDENSED STEAM.

No. 811,162. Specification of Letters Patent. Patented Jan. 30, 1906.

Application filed May 25, 1904. Serial No. 209,761.

To all whom it may concern:

Be it known that I, EUGEN MONDT, a subject of the German Emperor, residing at Chemnitz, in the Kingdom of Saxony and Empire of Germany, have invented certain new and useful Improvements in Apparatus for Discharging Condensed Steam and Returning Same to Boilers, of which the following is a specification.

This invention relates to apparatus for discharging condensed steam, and more particularly for returning same to boilers.

The apparatus hitherto used for conducting away condensed steam, more particularly for returning same to the boiler by means of a tiltable collecting vessel and balance-weight, has the disadvantage that the valve, cock, or the like controlling the supply and exhaust of steam to and from the apparatus is already operated at the beginning of the tilting movement. The considerable pressure on the said valve, cock, or the like is in this case liable to prevent the opening thereof and to interrupt the tilting of the vessel. For this reason it was necessary to give the valve or cock the smallest possible passage area in order to reduce the pressure thereon to the greatest possible extent. The reduction of the passage area has, however, the disadvantage that during the period of pressure the equalization of pressure between the boiler and the collecting vessel is slow, and equally so the equalization of pressure between the collecting vessel and the outer atmosphere during the period of supply, so that the efficiency of the apparatus is considerably reduced.

According to the present invention this disadvantage is removed by an arrangement by means of which the valve or cock in question is not operated, more particularly not opened, by the water vessel until the latter has completed part of its rocking movement in one or the other direction, so that the said vessel acquires sufficient momentum to overcome the resistance of the valve or cock. By this means comparatively large pressures can be overcome, so that the steamways can be given comparatively large cross-sections and the periods of supply and exhaust can be made of shorter duration. The efficiency of the apparatus is by this means considerably increased.

One form of the invention is illustrated in the annexed drawings, in which—

Figure 1 is a side view of the improved apparatus in partial section; Fig. 2, a vertical section through the axis about which the vessel rotates; Fig. 3, a plan view, and Fig. 4 a vertical section, of the valve-box.

1 and 2, Fig. 2, are parts of the hollow axle, to the arm 3 of which the vessel or drum 4 is secured. The said axle is mounted in cylinders 5 and 6, surrounded by jackets 30 and 31, suitable packing being inserted between the axle and its bearings. To prevent the access of impurities to the bearings, stuffing-boxes 27 are provided at the ends of the axle and adapted to be tightened up by means of screws 28 and cross-heads 29. The arm 3 is provided with a rearward projection 7, to which the lever 8, provided with the balance-weight 9, is fixed. The said lever 8 is adapted to move in the guide 35, at the ends of which the stops 36 and 37 are provided, so that the stroke of the lever is limited by the said stops and the supply and exhaust valves are not subjected to any strain by the momentum of the rocking lever. The guide 35 is arranged in the slotted resilient U-iron 38, which is fixed to the projection 40 of the bed-plate 41 by means of the shrunk ring 39, two screws, and a cotter.

To the part 7 the lever 11, carrying the weight 10, is rigidly fixed. The weight 10 is calculated to balance the drum 4. The lever 12, pivoted at 50 and carrying the weight 13, bears on the arm 3 by means of its roller 14. The weight 13 is so calculated that it balances the axle, the arm 3, the weights 9 and 10, and the drum 4 half-full of water, so that the load on the axle is almost completely balanced, or, in other words, the friction of said locking-axle is reduced to a minimum.

The drum 4 communicates with the valve-box 51 by means of the tube 46, the duct 48 in the arm 3, part 1 of the hollow axle, and the aperture 49. The said drum also communicates with the union 32. To the branches 33 and 34 of the latter are connected valves 33^a and 34^a, which are adapted to give passage in the directions of the arrows shown in Fig. 3, and the said branches communicate with the supply-pipe and discharge-pipe, respectively, for the condensed steam. The valve-box 51 is provided with two guide-cylinders 52 and 53 for the rods 17 and 18 of the supply and discharge valves 15 and 16, respectively, suitable packing and stuffing boxes being inserted between the said rods and their guides. Against the rods 17 and 18 bear springs 25 and 26, respectively; but the said rods are also adapted to be operated by means of the lever 24, pivoted at 23. To said lever 24 is fixed an

arm 22, to which a rod 19 is pivoted at 21, the lower end of the said rod being pivoted at 20 to the arm 3. The lever 24 is not positively connected to the rods 17 and 18, its ends being adapted to move upward through a certain distance without operating the said rods.

The before-mentioned lever 8 is so inclined with regard to the horizontal that the static momentum of the weight 9 with regard to the axle 1 2 is largely reduced during the downward movement of the drum 4 and largely increased during the upward movement of said drum. In the example illustrated the angle of inclination is approximately seventy degrees when the lever 8 is in its lower position and approximately eighty degrees when the said lever is in its upper position, so that during the upward and downward movements the static momentum decreases and increases, respectively, by more than half. It is obvious that the valves 15 and 16 can be replaced by equivalent devices—such as cocks, slides, or the like—without affecting the principle of the invention.

The action of the apparatus is as follows: When empty, the drum 4 is held in its uppermost position by the weight 9, as shown in Fig. 1, the discharge-valve 16 being open and the supply-valve 15 closed. With the part in this position the steam in the drum can escape through the pipe 46, duct 48, axle part 1, valve-box 51, and pipe 54, so that condensed steam can enter the drum through the union 32, axle part 2, and duct 45. Since in the position described the static moment of the weight 9 is greatest, the drum 4 does not overbalance the said weight till the water-level in the drum has approximately reached the upper end of the tube 46. Then the drum descends and operates the lever 24 by means of the rod 19. The rotation of the said lever 24, which is anticlockwise, as seen in Fig. 4, first closes the valve 16 by means of the spring 26, the supply-valve 15 not being opened till the lever has completed approximately two-thirds of its stroke. Steam then passes from the pipe 47 to the valve-box 51 and through the axle part 1, duct 48, and tube 46 into the drum 4 above the water-level, so that the water is discharged through the duct 45, axle part 2, and the union 32 either to waste or to the boiler. Since the static moment of the weight 9 has then been reduced by about one-half, the said weight is incapable of overbalancing the drum until all the water has been discharged from the latter. Then the drum is moved into its upper position and imparts clockwise rotation to the lever 24, so that the valve 15 is first closed by means of the spring 25, the valve 16 not being opened till sufficient momentum has been acquired during approximately two-thirds of the stroke of the lever. When the steam has been exhausted from the drum, condensed steam enters the latter again and the operation is repeated.

Having now fully described my invention, I declare that what I claim is—

1. In an apparatus for discharging condensed steam and returning same to the boiler the combination of a vessel adapted to rock and provided with a balance-weight, said vessel having a hollow axle communicating with a supply-pipe and a discharge-pipe for the condensed steam, of a fixed casing containing a supply-port and an exhaust-port for steam communicating with said vessel, of a pivoted lever with said vessel connected to said lever and means for balancing the load on the rocking axle, comprising a pivoted lever 12 provided with a weight 13 and a roller 14, said lever 12 adapted to bear on an arm 3 of said axle by said roller, substantially as and for the purpose set forth.

2. An apparatus of the class described comprising a hollow rocking axle, a receiving vessel carried by and communicating with said axle, a balance for said vessel having a variable momentum, a supply and discharge for condensed steam delivering to one end of said axle, a valved steam supply and discharge connected with the opposite end of said axle, and means connecting said valves with said axle for operating said valves approximately at the completion of movement of the axle, substantially as described.

3. An apparatus of the class described comprising a hollow rocking axle, a receiving vessel carried by and communicating with said axle, a balance for said vessel having an increasing and decreasing momentum, a supply and discharge for condensed steam delivering to one end of said axle, a valved steam supply and discharge connected with the opposite end of said axle, and means connecting said valve with said axle for operating said valves approximately at the completion of movement of the axle, substantially as described.

4. An apparatus of the class described comprising a hollow rocking axle, a receiving vessel carried by and communicating with said axle, a counterbalance for said vessel, a supply and discharge for condensed steam delivering to one end of said axle, a valved steam supply and discharge connected with the opposite end of said axle, and means connecting said valve with said axle for operating said valves approximately at the completion of movement of the axle, and antifriction balancing mechanism for said axle, vessel and its counterbalance.

5. An apparatus of the class described comprising a hollow rocking axle, a receiving vessel carried by and communicating with said axle, a balance for said vessel having an increasing and decreasing momentum, a supply and discharge for condensed steam delivering to one end of said axle, a valved steam supply and discharge connected with the opposite end of said axle, and means operatively connecting said valve with said axle for operat-

ing said valves approximately at the completion of movement of the axle, and balancing mechanism for said axle, vessel and its counterbalance.

6. An apparatus of the class described comprising a rocking member, a receiver supported by and communicating therewith, a condensed-steam supply and discharge and a valved steam supply and discharge communicating with said member, means operatively connecting said valves and member serving to operate said valves approximately at the completion of movement of said member, and a counterbalance for said receiver having an increasing and decreasing momentum, substantially as described.

7. An apparatus of the class described comprising a rocking member, a receiver supported by and communicating therewith, a condensed-steam supply and discharge and a valved steam supply and discharge communicating with said member, means for operatively connecting said valves and member serving to operate said valves approximately at the completion of movement of said member, and antifriction balancing mechanism for said axle, vessel and its counterbalance.

8. An apparatus of the class described comprising a rocking member, a receiver supported by and communicating therewith, a condensed-steam supply and discharge and a valved steam supply and discharge communicating with said member, means operatively connecting said valves and member serving to operate said valves approximately at the completion of movement of said member, a counterbalance for said receiver having an increasing and decreasing momentum, and balancing mechanism for said axle, vessel and its counterbalance.

9. An apparatus of the class described comprising a rocking axle provided with non-communicating condensed-steam and steam passages, a receiver mounted on said axle and having separate condensed-steam and steam ducts communicating with said passages, the steam-duct extending into the receiver, a valve-box communicating with said steam-passage and provided with steam inlet and outlet valves, springs normally seating said valves, a rocking lever operatively connected with said axle and serving to alternately unseat said valves, a counterbalance for said vessel having an increasing and decreasing momentum, stops limiting movement of said counterbalance, an axle-counterbalance, and a third counterbalance acting upon said axle, said receiver, and the counterbalances thereof.

10. An apparatus of the class described comprising a rocking axle provided with non-communicating condensed-steam and steam passages, a receiver mounted on said axle and having condensed-steam and steam ducts communicating with said passages, a valve-box communicating with said steam-passage and provided with steam inlet and outlet valves, springs normally seating said valves, a rocking lever operatively connected with said axle and serving to alternately unseat said valves, a counterbalance for said vessel having an increasing and decreasing momentum, stops limiting movement of said counterbalance, and an axle-counterbalance.

11. An apparatus of the class described comprising a rocking axle provided with non-communicating condensed-steam and steam passages, a receiver mounted on said axle and having condensed-steam and steam ducts communicating with said passages, a valve-box communicating with said steam-passage and provided with steam inlet and outlet valves, springs normally seating said valves, a rocking lever operatively connected with said axle and serving to alternately unseat said valves, an axle-counterbalance, and a counterbalance acting upon said axle, said receiver, and the counterbalances thereof.

12. An apparatus of the class described comprising a rocking axle provided with non-communicating condensed-steam and steam passages, a receiver mounted on said axle and having condensed-steam and steam ducts communicating with said passages, a valve-box communicating with said steam-passage and provided with steam inlet and outlet valves, springs normally seating said valves, a rocking lever operatively connected with said axle and serving to alternately unseat said valves, said lever having a limited play thereby serving to unseat the valves at the completion of movement of said axle, an axle-counterbalance, and a third counterbalance acting upon said axle, said receiver, and the counterbalances thereof.

In testimony whereof I affix my signature in presence of two witnesses.

EUGEN MONDT.

Witnesses:

MORRIS LIPMAN,

FELIX PAUL.