Nov. 18, 1924. 1,516,102

L. KASSANDER

BALANCED VALVE

Filed Dec. 5 1921

Fig. 1.

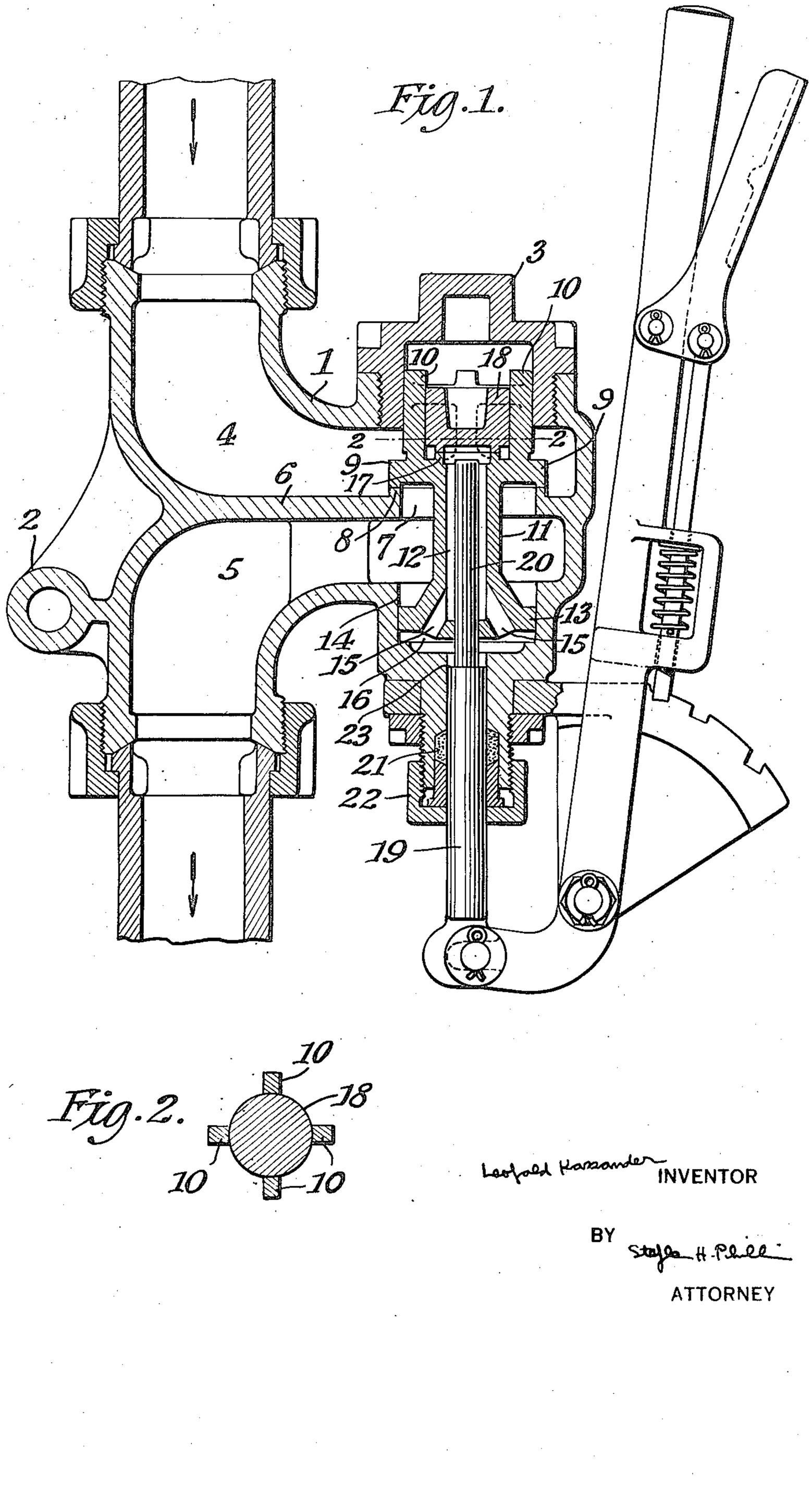

Fig. 2.

Leopold Kassander INVENTOR

BY Stefan H. Phillips

ATTORNEY

Patented Nov. 18, 1924. 1,516,102

UNITED STATES PATENT OFFICE.

LEOPOLD KASSANDER, OF NEW YORK, N. Y., ASSIGNOR TO NATHAN MANUFACTURING COMPANY, OF NEW YORK, N. Y.

BALANCED VALVE.

Application filed December 5, 1921. Serial No. 520,003.

To all whom it may concern:

Be it known that I, LEOPOLD KASSANDER, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Balanced Valves, of which the following is a description.

This invention relates to valves adapted to control the admission of steam and the like to apparatus, and is particularly fitted for use with injectors on steam locomotives. I have invented a balanced valve of superior efficiency, responsiveness, simplicity, durability, cheapness of construction and accessibility of operating parts for purposes of inspection and repair. The essential characteristics of my invention will sufficiently appear from the illustration thereof herein described and shown in the accompanying drawings.

Fig. 1 is a central vertical section of a valve structure embodying my invention and Fig. 2 is a cross section on line A—A of Fig. 1.

In the drawings, 1 is the valve casing, which may be attached to the boiler or other support by the support lug 2, the casing having the cap 3 screwing into its upper portion. Within the casing are inlet passage 4 and outlet passage 5 separated by wall 6 in which is port 7 and upon which is the seat 8 of the main valve 9. The inlet and outlet passages are suitably connected to the steam pipes.

Main valve 9 has upper portion consisting of four vertical vanes 10 sliding freely on inner wall of cap 3, cylindrical extension 11 with tubular bore 12 and lower piston 13 sliding freely on inner wall 14 of casing 1. Passages 15 lead from tubular bore in the cylindrical extension of main valve 9 to chamber 16 thereby affording access to the underside of piston 13. Main valve 9 has annular shoulder 17 surrounding an opening therethrough affording a seat for secondary valve 18, which fits closely between the vanes 10 of the main valve and is bored centrally for the greater upward portion thereof.

Valve stem 19 has valve stem extension 20 of smaller cross section, the valve stem passing through the usual stuffing box 21 secured to the casing 1 by nut 22 and the shoulder 23 of the valve stem contacting with the piston 13 of the main valve as the valve stem moves upward. The valve stem extension 20 passes through the piston 13 and in its upward movement it is adapted to unseat the secondary valve.

The valve stem may be moved upward by any convenient means, there being well known in the art various forms of operating levers, latches, latch rods, quadrants and the like, whereby the moving of a lever manually will cause the valve stem to be forced upwards. There are also well known means, when the movement upward of the valve stem extension ceases, of locking the operating lever in the desired position and thereby retaining the valve stem in any desired position. My invention does not relate to means for operating or locking the valve stem.

The operation of this illustration of my invention is as follows:

When the main valve and the secondary valve are closed and, respectively seated, the steam entering through the inlet passage presses forcibly downward upon each of the valves and holds them tightly closed, the construction of the main valve with its wings enabling the steam to reach freely the upper portion of the secondary valve. When it is desired to allow the travel of steam from the inlet passage to the outlet passage, the valve stem is caused to move upward, this movement first causing the valve stem extension to unseat the secondary valve, thereafter causing the shoulder of the valve stem to contact with the piston of the main valve. As soon as the secondary valve is unseated and before the shoulder of the valve stem contacts with the piston of the main valve, steam flows through the tubular bore and passages 15 of the main valve into the chamber 16, and thereupon exerts pressure upward upon the under surface of the piston. This pressure of the steam upward partially balances the pressure of the steam downward upon the greater upper area of the main valve and this pressure balancing causes the exertion of only a comparatively small force to move upward the piston and main valve. The fit of the piston 13 in the inner wall 14 is not absolutely steam tight, thus permitting steam to leak into the outlet chamber from the pressure chamber.

The closure of the main valve is accomplished by ceasing to exert positive force

upward sufficient to overcome the differential pressure of the steam downward upon the secondary valve and the main valve. Upon the withdrawal of the stem 19 the differential pressure on the valves seats them positively.

It is apparent that the described constructions of the main valve and the secondary valve result in a strong and adequate pressure forcing them upon their seats. Upon the unseating of the secondary valve, the steam flows smoothly and uninterruptedly between the vanes of the main valve and through the port into the tubular bore until it reaches the chamber under the piston, where the steam exerts its pressure upwards and against the steam pressure upon the upper part of the main valve. The tubular bore, the passages and the chamber cause an almost immediate response to the opening of the secondary valve and the consequent upward pressure upon the piston. The facility and completeness of discharge from the valve by the upward movement of the piston is also one of the characteristics of this invention.

What I claim is:

1. In combination, a valve casing; an inlet chamber; a discharge chamber; a main valve with upper and lower portions fitting and slidable in the interior wall of the valve casing, the main valve seating on a seat surrounding a port in the partition between the inlet chamber and the outlet chamber; a passage through the main valve from the inlet chamber to a chamber underneath the piston-like lower portion of the main valve; a secondary valve with recessed top adapted when seated to close said passage and slidable on inner wall of main valve and means for unseating said valves.

2. In combination, a valve casing; inlet and outlet chambers therein separated by a partition with a port therein adapted for the seating of a main valve; a cylindrical main valve within which a valve stem may reciprocate; a shoulder on the main valve; a passage through the main valve from the inlet chamber to a pressure chamber; a secondary valve for seating on said shoulder of the main valve and slidable on the inner wall of the main valve and adapted when seated to close said passage through the main valve from the inlet chamber to said pressure chamber; a valve stem reciprocable within the main valve and adapted to unseat the main and secondary valves by contacting with same.

3. In combination, a valve casing; inlet and outlet chambers therein separated by a partition with a port therein adapted for the seating of a main valve; a main valve within which a valve stem may reciprocate, having an upper extension adapted to guide said valve within said casing and within which extension a secondary valve may reciprocate; a secondary valve for seating on the main valve and adapted when seated to close a passage through the main valve from the inlet chamber to a pressure chamber beneath the main valve; a valve stem reciprocating within the main valve and adapted to unseat the secondary valve; a pressure chamber beneath the main valve; a passage through the main valve from the inlet chamber to said pressure chamber and a secondary valve seat on the main valve surrounding said passage; and means for unseating the main valve after the secondary valve has been unseated.

4. In combination, a valve casing; inlet and outlet chambers therein with a separating partition having a port upon which may be seated a main valve; a main valve having an upper portion of greater horizontal area than its lower and piston-like portion; a secondary valve adapted when seated on the main valve to close a passage in the main valve from the inlet chamber to a chamber beneath the piston-like lower portion of the main valve; a valve stem adapted to contact with and unseat the secondary and main valves.

5. In combination, a valve casing; inlet and outlet chambers therein with a separating partition having a port upon which may be seated a main valve; a main valve having an upper portion of greater horizontal area than its lower and piston-like portion; a secondary valve with recessed top adapted when seated on the main valve to close a passage in the main valve from the inlet chamber, said passage communicating through said lower portion with a chamber beneath same; a valve stem adapted to contact with and unseat the secondary and main valves.

6. In combination, a valve casing; inlet and outlet chambers therein with a separating partition having a port upon which may be seated a main valve; a main valve having an upper portion of greater horizontal area than its lower and piston-like portion; a secondary valve with recessed top adapted when seated on the main valve to close a passage in the main valve from the inlet chamber, said passage communicating through said lower portion with a chamber beneath same; a valve stem having a portion moving through the main valve for operating the secondary valve; and a portion adapted to unseat the main valve after the secondary valve has been unseated, said stem being separate from the valve structures.

7. In combination, a valve casing; inlet and outlet chambers therein with a separating partition having a port upon which may be seated a main valve; a main valve having an upper portion of greater horizontal area than its lower and piston-like portion; a secondary valve with recessed top adapted when

seated on the main valve to close a passage in the main valve from the inlet chamber, said passage communicating through said lower portion with a chamber beneath same and in which said lower and piston-like portion is slidable; and a valve stem adapted to contact with and unseat the secondary valve and then the main valve.

8. A valve assembly, comprising a valve casing; inlet and outlet chambers therein with a separating partition having a port for the seating of a main valve; a main valve having an upper portion of greater horizontal area than its lower and piston-like portion, said upper portion being provided with vanes slidable on the inner wall of said casing; a secondary valve with recessed top slidable on the inner wall of the main valve and adapted when seated on the main valve to close a passage in the main valve from the inlet chamber, said passage communicating through said lower portion with a chamber beneath same and in which said lower and piston-like portion is slidable; and a valve stem adapted to contact with and unseat the secondary valve and then the main valve.

9. A valve assembly, comprising a valve casing; curved inlet and outlet chambers therein with a separating partition having a port for the seating of a main valve; a main valve provided with vanes slidable on the inner wall of said casing; a secondary valve slidable on the inner wall of the main valve and adapted when seated on the main valve to close a passage in the main valve from the inlet chamber, said passage communicating with a chamber beneath the main valve, a piston portion of the main valve being slidable in said chamber, and means for unseating the secondary and main valves.

10. In combination, a valve casing, inlet and outlet chambers therein with a separating partition having a port on which may be seated a main valve; a main valve having an upper portion of greater horizontal area than a lower and piston-like portion; a secondary valve with recessed top, adapted when seated on the main valve to close a passage in the main valve from the inlet chamber, said passage communicating through said lower portion with a chamber beneath same and in which said lower portion is slidable; and a valve stem adapted to contact with and unseat the secondary valve and then the main valve.

LEOPOLD KASSANDER.