(No Model.)

W. VIELHABER.

VALVE.

No. 423,097. Patented Mar. 11, 1890.

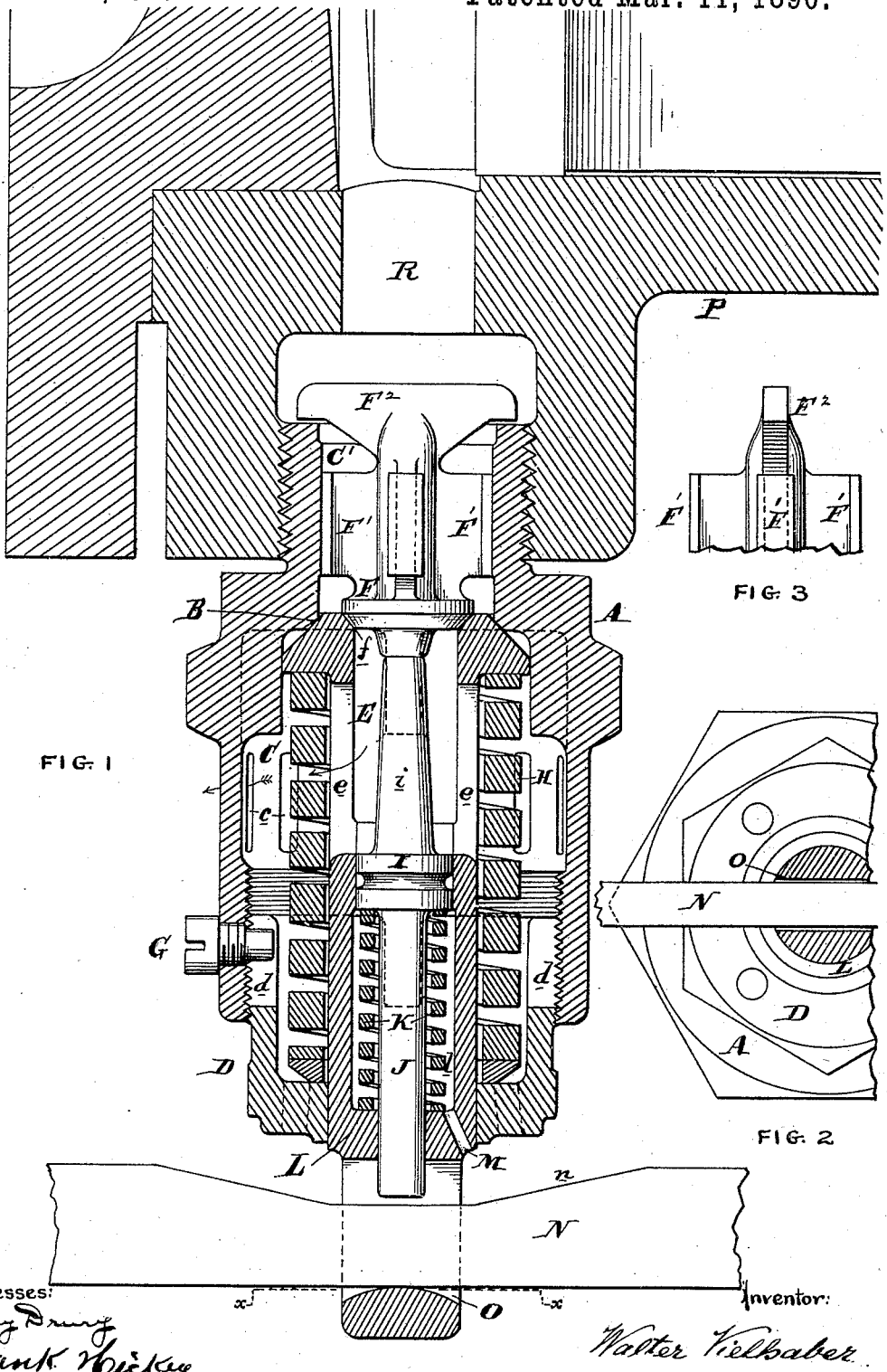

FIG. 1

FIG. 3

FIG. 2

Witnesses:
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UNITED STATES PATENT OFFICE.

WALTER VIELHABER, OF PATERSON, NEW JERSEY.

VALVE.

SPECIFICATION forming part of Letters Patent No. 423,097, dated March 11, 1890.

Application filed October 9, 1888. Serial No. 287,659. (No model.)

To all whom it may concern:

Be it known that I, WALTER VIELHABER, a citizen of Germany, and a resident of Paterson, in the county of Passaic and State of New Jersey, have invented a certain new and useful Improvement in Valves, of which the following is a full, clear, and exact description, due reference being had to the drawings which accompany and form part of this specification.

My invention has reference to combined air, water-relief, and safety valves especially adapted to locomotives, and is an improvement upon Letters Patent No. 367,563, and dated August 2, 1887, granted to me, said patent being essentially upon a combination of safety-valve and water-relief valve. My present improvement combines with such a valve a construction adapted to enable the relief-valve to act as an air-valve also.

The object of my invention is to combine a water-relief valve and safety-valve with an air-valve, and thus do away with the usual air-valves on the steam-chest, as used at present in locomotives. The employment of air and water-relief valves is to prevent cinders from being sucked from the smoke-box through the exhaust-pipe and steam-ports into the cylinder, as in case with the latter, and also prevents the hot gases taking the oil from the slide-valve and seat.

In carrying out my invention I employ a suitable casing adapted to attachment to the cylinder of the engine and having a valve-seat opening away from the inlet of the casing. Located within this case and resting against the seat is a safety-valve held in position by a suitable spring, the tension of which may be adjusted. The safety-valve is made hollow or formed with a passage through it terminating at its upper part in a valve-seat. Guided in the upper part of the casing is an independent air-valve, whose downward limit of movement is fixed, so that when the safety-valve is lowered by pressure a double opening is formed for the escape of steam or water, both valves leaving their seats and allowing the said escape. An independent stem is provided for operating the air-valve as a relief-valve to allow the escape of water when desired and when no excessive pressure exists, and this stem extends to the outside of the casing and safety-valve, being preferably guided within the safety-valve and counterbalanced by a suitable spring, the said spring acting also to lift the air-valve off its seat when no pressure exists within the steam-cylinder. These various constructions are clearly shown in the drawings, in which—

Figure 1 is a sectional elevation of my improved combined air, water-relief, and safety valve in connection with the steam-cylinder of an engine. Fig. 2 is an inverted plan view of same on line $x\,x$, and Fig. 3 is an elevation of the upper part of the air and water-relief valve.

A is the valve-casing, and is provided with a tubular extension C′, screw-threaded or otherwise formed to be attached to the engine-cylinder P, and adapted to receive the water of condensation or steam therefrom through a port R. Below the tubular extension is a valve-seat B, opening away from the inlet R and located within the chamber C of the casing A. Below, and resting against the valve-seat, is a safety-valve E, made tubular or hollow, with apertures *e* through its sides. This valve E is pressed against its seat B by means of a heavy spring H, the tension of which spring may be adjusted by means of the adjustable cap D, which is screwed into the casing A at the bottom and has notches *d*, into which a locking-screw G enters. It will thus be seen that if there is an excessive pressure above the valve E it is forced down, compressing the spring and allowing the escape of the water or steam into the chamber C, and thence through the apertures *c* in the walls of the casing A, escaping into the atmosphere. This valve E is thus a safety-valve. The upper portion of this hollow valve E is provided with the seat *f*, opening toward the inlet R, and upon this seat rests an air-valve F, provided with wings F′, guided in the tubular extension C′ to guide the valve F in its vertical movement. The upper part of the valve F is furnished with a cross-head F^2, which prevents the valve from falling to follow the safety-valve when the latter is forced down, thus insuring two passages for the es-

cape of the water or steam. If a vacuum should be produced within the cylinder, the valve F would be sucked up off its seat and the air would rush in through apertures *e* and between the valves F and its seat to the cylinder.

Located within the safety-valve is a stem *i* extending upward to the valve F and guided by a cylindrical portion I, having a downwardly-extending stem J, the lower part of which is exposed and is adapted to be acted upon by the cam-face *n* of the cam-bar N, guided in the extension O of the safety-valve stem.

K is a spring located within the tubular part *l* of the safety-valve stem L, and acting upon the under side of the large portion I of the stem *i*, and indirectly tending to raise the valve F against a pressure in the cylinder less than that of the exhaust-steam.

M is an aperture to allow the escape of water from the compartment *l*, and also to prevent any suction by the movement of the enlarged or piston portion I.

If the cam-bar is moved, the valve F is raised, and it then acts as a water-relief valve, and if the pressure within the cylinder should be entirely removed the spring K causes the valve F to leave its seat and thus admit air to the cylinder before a partial vacuum could be created.

I do not limit myself to the mere details of construction shown, as these may be modified in various ways without departing from my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a combined air, water-relief, and safety valve, the combination of a case having a valve-seat, a safety-valve resting against said seat and having an air-passage through it, a spring to hold said valve to its seat against pressure, an air-valve seated loosely upon said safety-valve, but opening in the opposite direction, a stop to limit its downward movement, and a spring to open said air-valve when normal pressure above it is removed.

2. In a combined air, water-relief, and safety valve, the combination of a case having a valve-seat, a safety-valve resting against said seat and having an air-passage through it, a spring to hold said valve to its seat against pressure, an air-valve seated loosely upon said safety-valve, but opening in the opposite direction, a stop to limit its downward movement, a spring to open said air-valve when the normal pressure above it is removed, and a stem independent of the air-valve interposed between the spring and air-valve.

3. In a combined air, water-relief, and safety valve, the combination of a case having a valve-seat, a safety-valve resting against said seat, and having an air-passage through it, a spring to hold said valve to its seat against pressure, an air-valve seated loosely upon said safety-valve, but opening in the opposite direction, a stop to limit its downward movement, a spring to open said air-valve when the normal pressure above it is removed, a stem independent of the air-valve interposed between the spring and air-valve and extending down and projecting below the case to operate the air-valve against pressure to utilize it as a water-relief valve.

4. In a combined air, water-relief, and safety valve, the combination of a case having a valve-seat, a safety-valve resting against said seat and having an air-passage through it, a spring to hold said valve to its seat against pressure, an air-valve seated loosely upon said safety-valve, but opening in the opposite direction, a stop to limit its downward movement, a spring to open said air-valve when the normal pressure above it is removed, a stem for lifting the air-valve extending to the outside of the case, and a counterbalancing-spring therefor.

5. In a combined air, water-relief, and safety valve, the combination of a case having means for attachment to an engine or other apparatus employing steam and formed with a valve-seat opening downward or away from the inlet, a safety-valve guided by the case working against said seat and made with a passage through it terminating in a valve-seat opening upward or toward the inlet, a spring to hold the safety-valve to its seat, and an air-valve guided by the case and resting upon the seat on safety-valve.

6. In a combined air, water-relief, and safety valve, the combination of a case having means for attachment to an engine or other apparatus employing steam and formed with a valve-seat opening downward or away from the inlet, a safety-valve guided by the case working against said seat and made with a passage through it terminating in a valve-seat opening upward or toward the inlet, a spring to hold the safety-valve to its seat, a valve guided by the case and resting upon the seat on safety-valve, and an extension from said last-mentioned valve to the outside of the case.

7. In a combined air, water-relief, and safety valve, the combination of a case having means for attachment to an engine or other apparatus employing steam and formed with a valve-seat opening downward or away from the inlet, a safety-valve guided by the case working against said seat and made with a passage through it terminating in a valve-seat opening upward or toward the inlet, a spring to hold the safety-valve to its seat, an air-valve guided by the case and resting upon the seat on safety-valve, and a spring to counterbalance the air-valve.

8. The combination of the case A, having

an adjustable cap D and valve-seat B, with the hollow safety-valve E, its spring H, the air-valve F, resting upon the seat *f* in the safety-valve, the independent stem J *i*, for operating the valve F, and the spring *l*, for acting on the valve F through the mediation of the said stem.

In testimony of which invention I have hereunto set my hand, at Paterson, State of New Jersey, this 28th day of August, A. D. 1888.

WALTER VIELHABER.

Witnesses:
JOSEPH H. MOORE,
FRANK P. HICKEY.