(No Model.)

W. VIELHABER.

VALVE.

No. 423,003. Patented Mar. 11, 1890.

FIG. 1

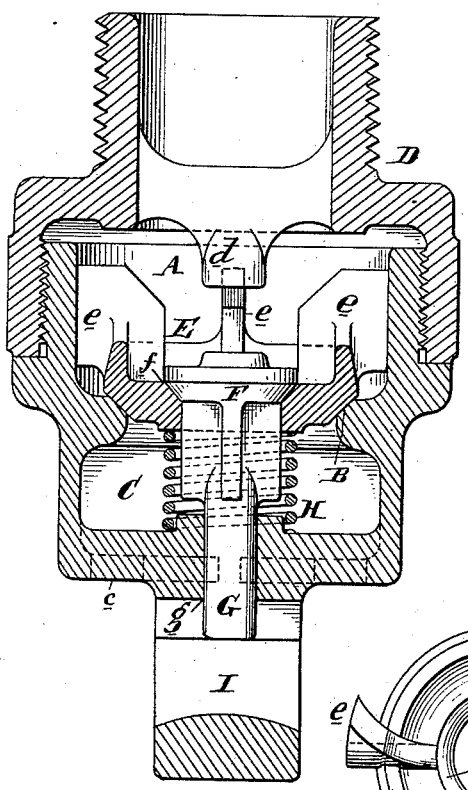


FIG. 4

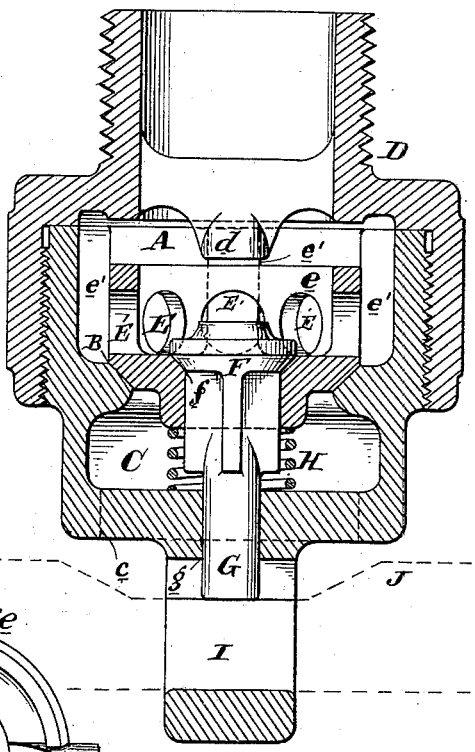


FIG. 3

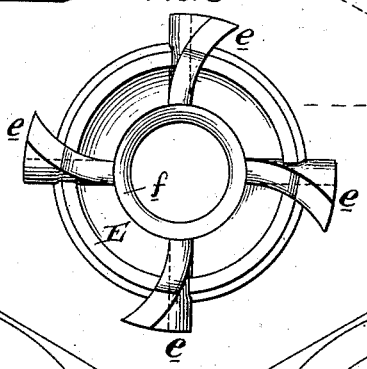


FIG. 2

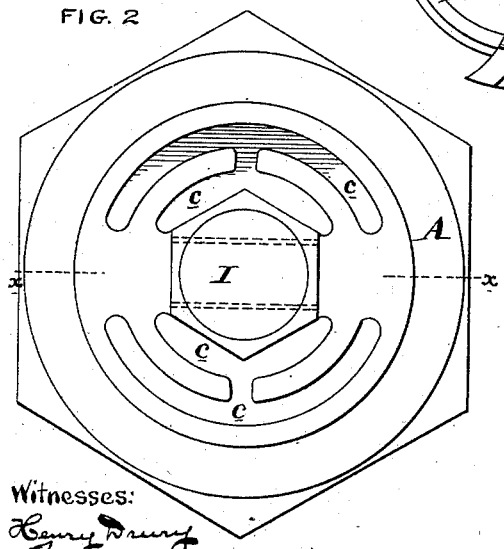
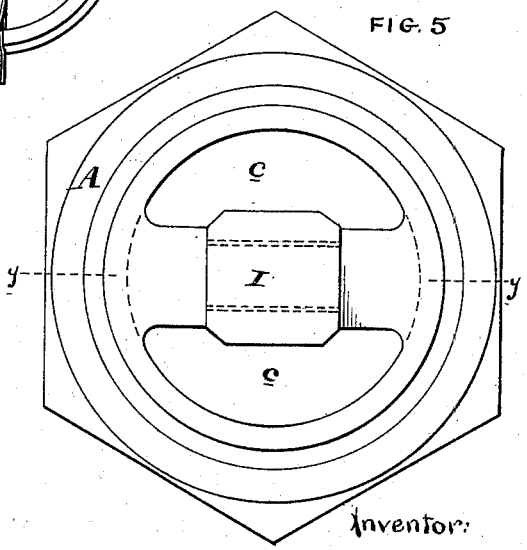


FIG. 5



Witnesses:
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UNITED STATES PATENT OFFICE.

WALTER VIELHABER, OF PATERSON, NEW JERSEY.

VALVE.

SPECIFICATION forming part of Letters Patent No. 423,003, dated March 11, 1890.

Application filed October 9, 1888. Serial No. 287,658. (No model.)

To all whom it may concern:

Be it known that I, WALTER VIELHABER, a citizen of Germany, and a resident of the city of Paterson, 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 valves especially adapted as air and water-relief valves for locomotive uses to avoid the production of a vacuum within the steam-cylinder, and at the same time to allow the escape of the water of condensation from within the same, obviating hammering and the injury liable to result therefrom, to prevent cinders from being sucked from the smoke-box through the exhaust-pipe and steam-port into the cylinder, and to prevent hot gases taking the oil from the slide-valve and seat.

In carrying out my invention I provide a suitable case adapted to be screwed or otherwise secured to the cylinder and containing a vacuum or air valve adapted to automatically open upon the removal of pressure or the creation of a partial vacuum within the cylinder to allow the entrance of air. The wings of the valve employed to guide it are made more or less curved, oblique or spiral shape, so that as the valve rises the tendency of the incoming air is to cause it to gradually rotate upon its seat and insure a normally-tight fit. This construction, however, is not absolutely necessary. The valve is preferably supported upon a spring designed to cause it to leave its seat upon the removal of pressure from above, and thereby instantly open, and when properly working destroy even the tendency to produce a vacuum within the cylinder. Seated within the same chamber, and preferably upon the vacuum or air valve, is a second or water-relief valve, the function of which is to allow the escape of water of condensation from within the cylinder, or, in other words, from above the vacuum or air valve to below the same, without opening the said vacuum or air valve. The pressure within the cylinder holds the valves in both cases to their seats, and this action in the case of the relief-valve for water of condensation may be assisted by the weight of the valve itself. The movement of the valve in the other direction is, in the case of the vacuum-valve, performed by a spring, and in the case of a blow-off valve by means of a cam-bar or other suitable means acting upon a projecting stem. These constructions are clearly shown in the accompanying drawings, which form part of this specification, and in which—

Figure 1 is a sectional elevation of my improved preferred form of combined air and water-relief valve on line *x x* of Fig. 2. Fig. 2 is an inverted plan view of same. Fig. 3 is a plan view of the vacuum or air valve removed. Fig. 4 is a sectional elevation of a modified form of valve device on line *y y* of Fig. 5, and Fig. 5 is an inverted plan view of same.

A is a valve-chamber, and has a seat B, below which is a compartment C, opening through apertures *c* to the atmosphere. These apertures may be screened or otherwise protected to prevent ingress of cinders or other deleterious substances.

D is an upper cap for the chamber A, and is screw-threaded or otherwise formed to fit or be attached to the cylinder. Located within the chamber A is an air-valve E, which rests upon the seat B and is provided with guide-wings *e*, which travel upon the inner circular wall of the chamber A. These wings *e* may be cast more or less oblique, curved, or spiral-shaped, or may be cast straight and bent to the position shown in Fig. 3, whereby the action of the incoming air will tend to cause the valve to shift its position upon the seat and normally tend to keep it air-tight. The upward movement of the valve E is limited by the cap D. This valve E is supported upon a spring H, which is made of such a strength that it will not lift the valve E against the pressure of the exhaust, but will lift it when no pressure is in the cylinder. Seated upon the valve E at *f* is a water-relief valve F, of smaller area than the air-valve, and this valve F is guided thereon, and also by its stem G, which extends downward, passing through a guide *g* in the case and projecting so as to be acted upon by means of a cam-bar J, (see dotted lines,) guided in the guides I and adapted to be reciprocated. The upward movement of the valve F is limited

by a stop *d*, and the travel of the valve F is greater than that of the valve E, so that when the valve E rises to admit air the valve F also rises off its seat, and both valves act as air-valves, greatly increasing the area for the admission of air. When the cam-bar J is shifted, it acts upon the stem G and lifts the valve F against the pressure within the cylinder without disturbing the valve E, and allows the water of condensation to pass off into the chamber C and through apertures *c*.

In the construction shown in Fig. 4 the same general improvements are employed; but in this case the air-valve and its means for being guided are somewhat modified. In this case the air-valve is made cup-shaped, with apertures E′ through its wall, and is guided upon projections *e′* within the chamber A. When the valve is fully raised, the upper part of the cup-shaped portion of the valve rests upon the cap D and the air rushes under the valve to above its seat B, thence through the apertures E′ to the cylinder.

In place of the wings *e* being spirally shaped, they may be made oblique or curved, such constructions being substantially the same and equivalent. The spring H not only assists the valve E in rising when the pressure above is removed, but also assists the valve F until valve E is arrested, after which time the valve F can only rise in case of a production of a partial vacuum within the cylinder of the engine. When both the valves E and F are raised and the valve F is off its seat, the rotation of the valve E not only shifts it with reference to its own seat B, but shifts the seat *f* with reference to the valve F, and thereby insures a normally-good fit of the valve F also.

I do not limit myself to the mere details of construction, as these can be modified without departing from the spirit of the invention.

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

1. In a combined air and water-relief valve, the combination of a casting having a seat, an escape-aperture below the seat, and a steam-inlet above the seat, an air-valve supported upon the seat within the case, and a water-relief valve also within the case and seated upon the air-valve.

2. In a combined air and water-relief valve, the combination of a casting having a seat, an escape-aperture below the seat, and a steam-inlet above the seat, an air-valve supported upon the seat within the case, a water-relief valve also within the case and seated upon the air-valve, guides for the said valves, and stops to allow the valves to move in opening to different distances, whereby both valves are off their seats when fully opened.

3. In a combined air and water-relief valve, the combination of a casting having a seat, an escape-aperture below the seat, and a steam-inlet above the seat, an air-valve supported upon the seat within the case, a water-relief valve also within the case and seated upon the air-valve, a spring to lift the air-valve when the pressure above it has been removed, and an extension from the water-relief valve to operate it against pressure without disturbing the air-valve.

4. The combination of the valve-chamber having a valve-seat with a valve having above its seat curved, oblique, or spirally-arranged wings to cause it to turn above its seat when raised.

5. The combination of the valve-chamber having a valve-seat with a valve having above its seat curved, oblique, or spirally-arranged wings to cause it to turn above its seat when raised, and a spring to raise said valve from its seat when the pressure above it is removed.

6. The combination of a valve-chamber having a valve-seat with a valve having curved, oblique, or spirally-arranged wings to cause it to turn above its seat when raised, and a second valve of smaller diameter seated upon said air-valve.

7. The combination of the valve-chamber having a valve-seat with a valve having curved, oblique, or spirally-arranged wings to cause it to turn above its seat when raised, a second valve of smaller diameter seated upon said air-valve and having a downwardly-projecting stem to operate said valve independently of the air-valve.

8. In a combined air and relief valve, the combination of the casting provided with chamber A, having seat B, and a chamber C below said seat, provided with outlets to the atmosphere, cap D for connection to the engine or other machine, air-valve E, adapted to work in the chamber A and rest upon the seat B, and a water-relief valve F, seated upon the air-valve E and having the stem G for operating it.

9. In a combined air and relief valve, the combination of the casing provided with chamber A, having seat B, and a chamber C below said seat, provided with outlets to the atmosphere, cap D for connection to the engine or other machine, air-valve E, adapted to work in the chamber A and rest upon the seat B, a spring H for opening said valve when the pressure is removed from above it, and a water-relief valve F, seated upon the air-valve E and having the stem G for operating it.

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.