A. B. CARHART.

SAFETY VALVE.

APPLICATION FILED NOV. 13, 1919.

1,393,258. Patented Oct. 11, 1921.

Fig. 1.

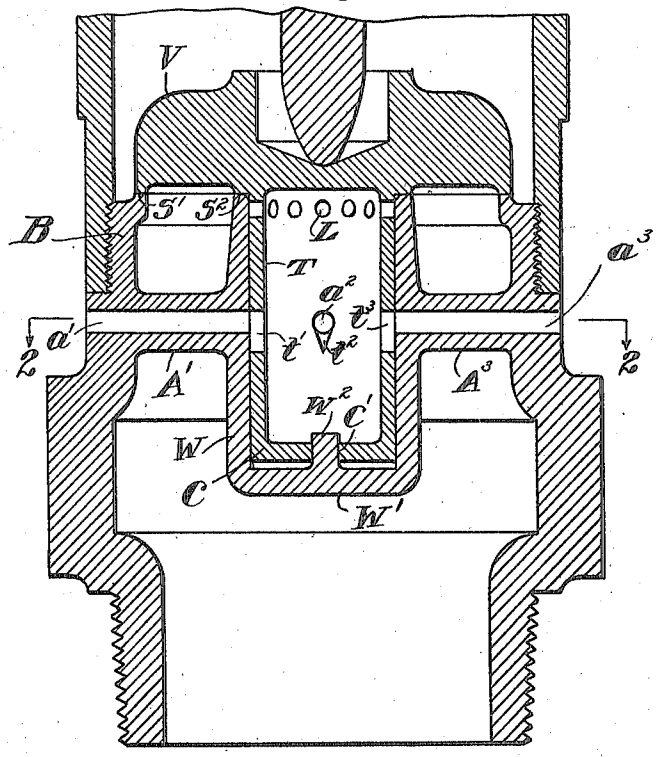
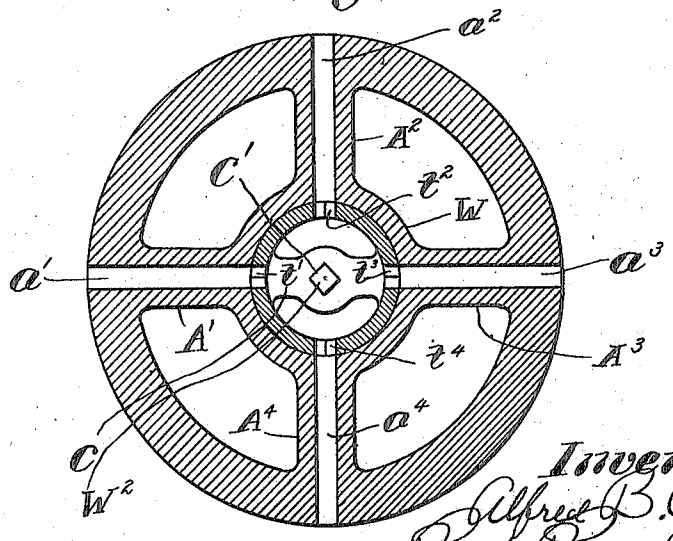


Fig. 2.



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UNITED STATES PATENT OFFICE.

ALFRED B. CARHART, OF WINCHESTER, MASSACHUSETTS, ASSIGNOR TO CROSBY STEAM GAGE & VALVE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

SAFETY-VALVE.

1,393,258. Specification of Letters Patent. Patented Oct. 11, 1921.

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To all whom it may concern:

Be it known that I, ALFRED B. CARHART, a citizen of the United States, and resident of Winchester, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Safety-Valves, of which the following is a specification.

My invention relates to safety valves, particularly to that class of safety valves in which the valve disk is provided with two seats and the released steam has two avenues of egress, one over one seat, the other over the other, to the atmosphere, the lift of the valve disk being controlled by means of the egress apertures with which the opening over the smaller and inner valve seat communicates. The type of safety valve, included in this class, on which this invention is an improvement, is that in which the effective cross-section of the auxiliary egress passage for escaping steam is progressively constricted as the valve disk rises, so as to increase the total lifting effect on the disk and afford high lift when it is necessary to dispose of accumulating pressure. This is broadly, the invention of Mr. George Hall Clark; the improvement herein described is specific thereto, and has for its objects the simplification of the lift-controlling factors.

In the drawings hereto annexed, which illustrates my invention,—

Figure 1 is a vertical section of a safety valve, and

Fig. 2 is a cross section at the level 2—2 of Fig. 1.

The valve disk is designated by V; the base by B; on the base two concentric disk-seats S' and S^2 are formed; the latter is the upper lip of a well-shaped body W, integrally connected to the base B by arms A', A^2, A^3, A^4, each of which is drilled, at a', a^2, a^3, a^4, respectively. The bottom W' of the well W has a square stud W^2 formed on it.

On the disk V there is formed a tubular extension T, which makes a sliding fit with the interior of the well W. A bridge C, formed above the lower end of the tubular extension T, is provided with a square hole C', which makes a loose fit with the stud W^2; the engagement of the square stud with the square hole prevents the valve disk V from rotating and keeps the regulating apertures, presently to be described, in proper alinement.

The tubular extension T is perforated near the disk V, with holes L, which, when the disk V lifts from its seats, permit escaping steam to enter the tubular extension. Egress from the interior of the tubular extension T is provided by the apertures a', a^2, a^3, a^4, above described; and the ports t', t^2, t^3, t^4, in the tubular extension T which register respectively with the apertures a', a^2, a^3 and a^4.

Preferably, the ports t', t^2, t^3 and t^4 are tapered so that as the disk V and with it the tubular extension T rises, the effective egress passage is progressively constricted. If the valve disk, after attaining its pop lift, provides a sufficient escape passage to reduce the boiler pressure, the full opening of the apertures a', a^2, a^3, a^4 will suffice to keep the total lifting pressure on the disk at the value balanced by the valve spring, and as the boiler pressure is reduced, the valve disk V will close with moderate blow down.

In case of accumulation which the normal lift will not take care of, the valve disk V rises, and the effective cross section of the apertures a', a^2, a^3, a^4, is progressively reduced as the ports t', t^2, t^3, t^4 slide up and past the said apertures. Pressure rises in the interior of the tubular extension T, and the bottom of the well W, and the disk V assumes a position of high lift, to relieve the accumulation. When the accumulation of presure subsides and the valve disk V descends, the lifting pressure is diminished in an increasing ratio by the progressive opening of the egress apertures a', a^2, a^3, a^4.

I claim:

1. In a safety-valve of the plural seat class, the combination of escape apertures communicating with the inner seat-aperture, a tubular extension on the valve disk provided with means directly associated with said escape apertures, to constrict their effective cross-section as the valve disk rises and means associated with said extension for preventing rotation of the valve disk.

2. A valve of the class described having inner and outer valve seats, and a valve disk movable toward and from said seats, an extension on the valve disk projecting within said inner seat, said extension being provided with discharge ports, and with an angular opening at the end, and a fixed member engaging said angular opening whereby to prevent angular displacement of said discharge ports.

3. In a safety valve of the plural-seat class, the combination of a well inside the inner disk-seat, egress apertures from said well to the atmosphere, and a tubular extension on the valve disk provided with ports coacting with said egress apertures to constrict the same as the disk rises.

4. A safety valve of the plural-seat class, having in combination a well inside the inner seat, a disk movable toward and from such seat, egress apertures opening from said well, and a tubular extension of the valve disk provided with ports coöperating with said egress apertures whereby to constrict the latter as the valve disk rises, said ports being of tapering form and elongated in the direction of the axis of the valve disk and being of greatest width at that end adjacent the valve disk.

Signed by me at Boston, Massachusetts, this 12th day of November, 1919.

ALFRED B. CARHART.