D. H. CHAMBERLAIN.

Safety-Valves.

No. 134,126. Patented Dec. 24, 1872.

Fig. 2.

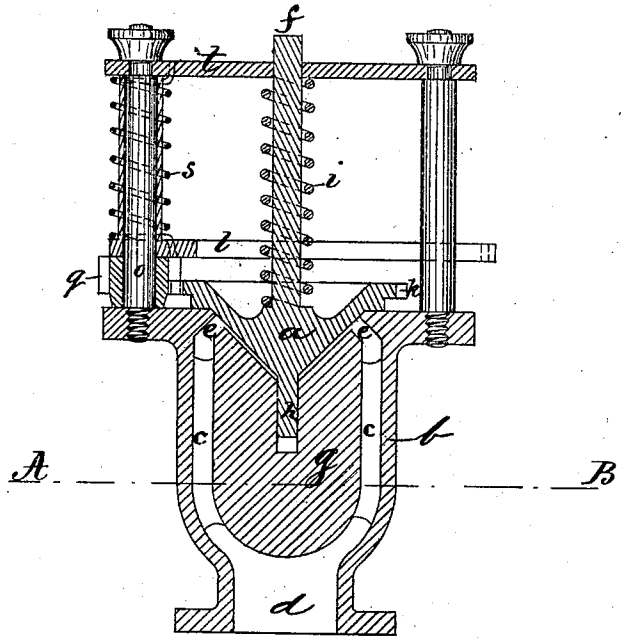


Fig. 1.

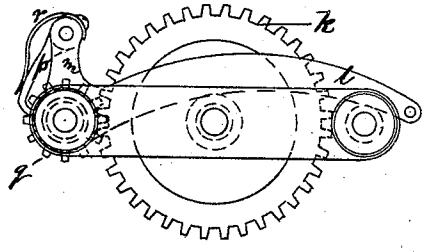
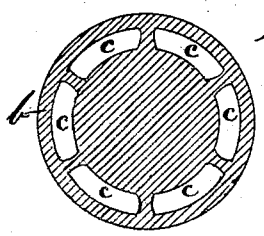


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

DEXTER H. CHAMBERLAIN, OF WEST ROXBURY, MASSACHUSETTS.

IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **134,126**, dated December 24, 1872.

To all whom it may concern:

Be it known that I, DEXTER H. CHAMBERLAIN, of West Roxbury, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Safety and other Valves, of which the following is a specification:

Nature and Objects of the Invention.

The nature of my invention relates to improvements on valves constructed in such a manner that the valve will rise gradually as the pressure on the valve increases; and especially does my invention relate to a new arrangement of the valve-seat and passages for the purpose of avoiding what is generally termed the "pneumatic paradox;" secondly, my invention relates to a suitable arrangement whereby the valve may be occasionally rotated around its axis, for the purpose of preventing the clogging up of the valve on its seat, occasioned by the deposition of salts, dirt, or minerals thereon, which is of frequent occurrence on many of the river-steamers, as well as on the ocean steam-boats, where such a feed-water is used for the boilers.

On the drawing, Figure 1 is a ground plan; Fig. 2 is a central longitudinal section; and Fig. 3 is a transverse section over the line A B taken on Fig. 1.

Similar letters refer to similar parts wherever they occur on the drawing.

As the peculiar action of the pneumatic paradox may not be generally known among engineers and others, I will here describe the same.

If a gas is forced through an aperture provided with a seat, and a disk is made to rest loosely thereon, the disk cannot by any known pressure of the gas or vapor be forced away from the seat except just enough to let a very thin sheet of the gas or vapor escape in a horizontal direction all round the disk, if the disk is laid horizontally, and the disk will not rise any higher no matter how much the pressure is increased. It matters not whether the disk is placed on the top of the aperture or on the bottom of it, or whether the pressure on the disk is applied from above instead of from below; in all cases the disk will actually be pressed harder against the seat instead of being forced away from it as the pressure increases. This is owing to the thin escaping gas or vapor that passes out all round the disk, creating a vacuum, or nearly so, between the disk and its seat, by which the disk is held onto its seat by the atmospheric pressure on the outside of the disk. This is just what takes place on many of the faultily-constructed safety, steam, and escape valves now in use; and to avoid this difficulty I construct my improved valve as follows:

I make the escape-valve *a* conical and tapering—about forty-five degrees, or nearly so—to the center line of the axis, as shown. The valve chest or house *b* is provided with an annular opening, *c*, that stands in open communication with the pipe *d*, through which the steam or gas is forced from the boiler or other supply apparatus. The upper part *e* of the annular opening *c* is tapering inward where it comes in contact with the valve *a*, as shown. The inclination of the said tapering annular opening *e* is of about forty-five degrees to the center line of the valve-spindle *f*. I have found by a series of experiments that by such an arrangement, or nearly so, I am able to raise the valve *a* gradually from its seat in the same proportion as the pressure from below increases, and that the valve will sustain itself in a fixed position as long as a corresponding pressure from below is retained. When the pressure increases the valve will gradually rise higher, and when the pressure decreases the valve will descend toward its seat, thus allowing a proportionate amount of steam or gas to escape corresponding to the increase or decrease of the pressure in the boiler or other apparatus where the steam or gas is generated. A corresponding conical or similar recess is made in the upper part of the central part *g*, but the valve *a* is not resting directly in said recess, as a small space is left between the valve *a* and the recess for the purpose of giving a larger area for the steam to act upon the valve *a*. The valve *a* may be provided with a spindle, *h*, guided in a suitable hole in the central part *g*, as shown. The resultant of the force of the steam or gas as it strikes the tapering valve *a* is divided into two equal, or nearly so, forces, one horizontal, allowing the gas or steam to escape, and one vertical, in the direction of the valve-spindle, by which the valve is forced upward in the same ratio as the pressure in-

creases. The valve *a* may be weighted down by means of a spring, *i*, or by means of any ordinary appliance now in use, to which part I do not attach any great importance, as it may be done in many good and practical ways.

The second part of my invention relates to a suitable arrangement for rotating the valve *a* around its axis, for the purpose of preventing the sticking of the valve on its seat. For this purpose I provide the valve *a* with teeth *k k* on its periphery, whether on its inside or outside, upper or under side, as may be convenient, and start the valve by means of an angular lever, *l m*, that is movable around the standard *o*, as shown. To the extreme end of the piece *m* is hinged a pawl, *p*, that engages with the teeth of the pinion *q*, that is also movable around the standard *o*, and engages with the teeth on the periphery of the valve *a*. The pawl *p* is held in contact with the pinion *q* by means of a light spring, *r*, as shown. From this will be understood that the valve *a* may be moved around its axis by a rocking motion of the lever *l*, as shown. A suitable spring, *s*, may be wound around the standard *o*, and attached with its lower end to the lever *l*, and with its upper end to the cross-bar *t*, for the purpose of returning the lever *l m* automatically to its normal position, as shown on Fig. 1.

I do not, however, confine myself to any particular arrangement whereby the valve may be rotated, as I may have to construct it differently, according to the size and nature of the valve.

The valve *a* may be spherical instead of conical, and the annular outlet *e* may be curved toward the valve *a* instead of linear, as shown on Fig. 2.

Having thus described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. The valve-chest *b*, constructed with the annular chamber *c*, tapered to a focus at its outlet, as at *e*, for the purpose of precipitating the steam or gas at a suitable inclination against the valve *a*, as herein set forth and described.

2. In combination with the annular tapering chamber *c e*, constructed substantially as herein shown, the conical valve *a* or its equivalent, for the purpose as herein set forth.

3. In combination with a valve, *a*, the permanently-attached mechanism, as described and shown, for moving the said valve *a* around it, for the purpose of preventing it from sticking on its seat, as herein set forth.

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Witnesses:
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