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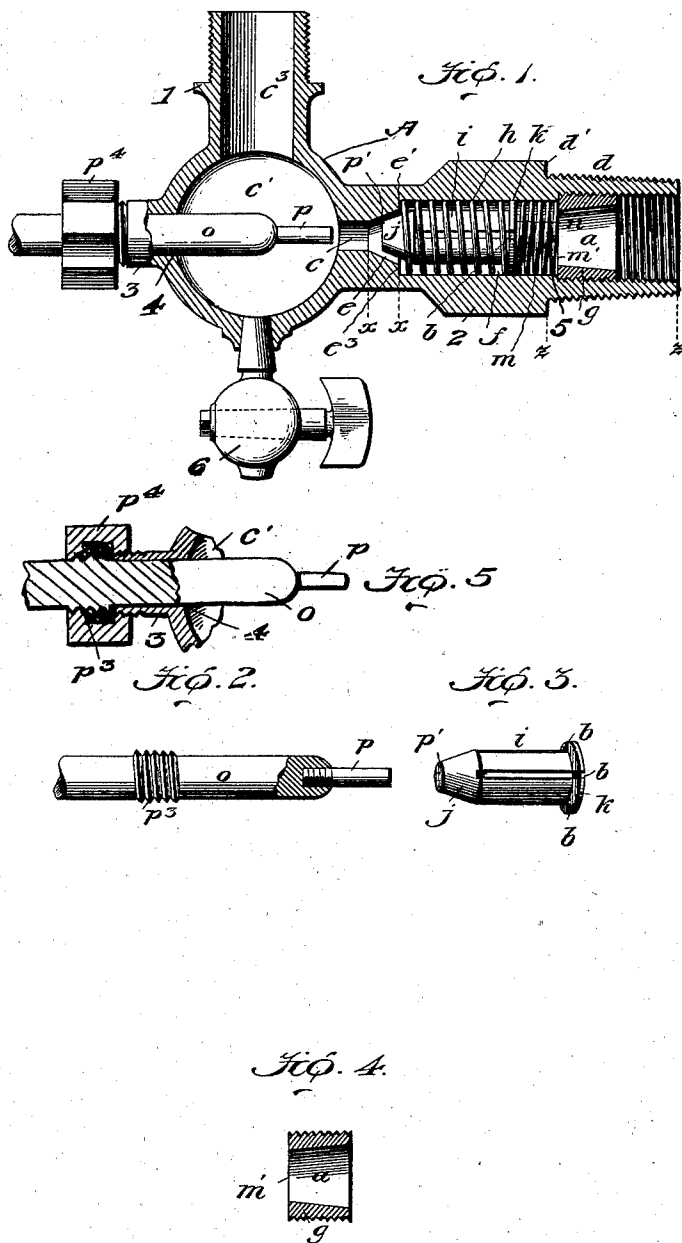
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A. HARTWIG.

AUTOMATIC SAFETY VALVE FOR WATER GAGES.

(Application filed Apr. 30, 1902.)

(No Model.)



Witnesses.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC SAFETY-VALVE FOR WATER-GAGES.

SPECIFICATION forming part of Letters Patent No. 712,376, dated October 28, 1902.

Application filed April 30, 1902. Serial No. 105,369. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH HARTWIG, a citizen of the United States of America, and a resident of Mansfield, Richland county, Ohio, have invented certain new and useful Improvements in Automatic Safety-Valves for Water-Gages, of which the following is a specification.

My invention relates to an improvement in automatic safety-valves for water-gages, which improvement is adapted to be used in connection with water-columns on steam-boilers.

The objects of my improvement are, first, to provide a means for closing the valve automatically when the gage-glass is broken by accident or otherwise, thereby preventing the escape of steam and water and obviating all danger of injury to the person; second, to afford facilities for replacing a broken gage-glass with absolute safety, and, third, to construct an automatic valve that is simple in construction and reliable in operation. I attain these and other objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical cross-sectional view of the valve and its operating mechanism through the center. Fig. 2 is a view in side elevation of a portion of the releasing valve-stem, showing releasing-pin and the manner of its attachment to the release valve-stem. Fig. 3 is a perspective view of the movable valve-plug. Fig. 4 is a view in cross-section of the tapered bushing, and Fig. 5 is a sectional detail view showing the stuffing-box and releasing-valve.

My invention comprises a body portion A, containing a spherical or globular chamber c' . Vertically extending from this chamber and integral with the body portion is a pipe c^3 , having an external shoulder 1 formed therein and an exteriorly-threaded end. The lower end of the gage-glass is connected with the threaded portion of the pipe c^3 by means of a stuffing-box, which rests against the shoulder 1. An integral horizontally-extending valve-chamber 2 also connects with the body portion A and communicates with the chamber c' through aperture c . Directly op-

posite this aperture c an enlargement 3 is formed on the exterior of the body portion A, and this enlargement is provided with an aperture 4 therein directly in alignment with aperture c . The outer end of this enlargement 3 is exteriorly screw-threaded and adapted to receive an internally-threaded stuffing-box p^4 thereon. A releasing valve-stem o is received in the aperture 4, the valve-stem being provided with a screw-threaded portion p^3 , which threaded portion is received in the threaded stuffing-box and permits the valve-stem to be horizontally adjusted. The inner end of the valve-stem projects into the chamber c' and is provided with a pin p , either integral therewith or preferably received in an orifice formed in the end of the valve-stem, whereby the pin may be renewed and another one substituted therefor when necessary. This pin is of less diameter than the valve-stem or the orifice c .

The opposite end d of the hollow valve-chamber 2 is both exteriorly and interiorly screw-threaded and is adapted to be secured to the water-column. (Not shown.) A shoulder d' is formed on the free end of the valve-chamber 2, which shoulder abuts against the wall of the water-column.

An interior shoulder 5 is formed in the bore of the valve-chamber at the inner end of the interiorly-threaded portion. The opening or aperture c , leading from the valve-chamber to the globular chamber c' in the body portion, gradually increases in diameter as it approaches the valve-chamber f between the lines $x x$, forming a tapered portion e , which constitutes a valve-seat. A shoulder e^3 is formed at the juncture of the passage c with the bore f of the valve-chamber proper. Within the bore f of the valve-chamber 2 is located a removable cylindrical valve-plug z . This valve-plug is provided at its inner end with a tapered portion j , corresponding to the tapered valve-seat e , and at its outer end the valve-plug is provided with an annular flange k , which snugly fits the bore f of the valve-chamber. Longitudinally-extending peripheral grooves $b b$ are formed on the outer surface of the valve-plug from the tapered portion j through the annular flange k ,

dividing the flange into segments. Of course it is obvious that the conformations of the various parts may be changed, if desired, without in any wise departing from the scope of my invention.

A coiled spring *h* surrounds and encircles the valve-plug *i*, the inner end of the spring bearing against the shoulder *e*³ and the outer end thereof contacting with the annular flange *k*, tending to retain the valve in an open position. The grooves *b b* are of course closed when the tapered portion *j* is forced into the tapered seat *e*.

An annular exteriorly-threaded bushing *g* is received in the interiorly-threaded end of the valve-chamber, the bushing being provided with a tapered bore *a* and adapted to rest against the internal shoulder *5*. Between this bushing, the inner face of which partially obstructs the bore *f* of the valve-chamber proper, and the flanged end *n* of the valve-plug *i* is interposed a coiled spring *m*, the inner end of which bears against the flanged end *n* of the valve-plug and the outer end of which contacts with the thickened inner face *m'* of the bushing *g*. The spring *m* normally tends to retain the valve-plug *i* in place and force it toward its seat *e*.

The water in the column (not shown) normally flows through the interiorly-threaded portion of the valve-chamber *2*, through the tapered aperture *a* of the bushing *g* into the bore *f* of the valve-chamber proper, through the grooves *b b* formed in the valve-plug *i*, through valve-seat *e* and passage *c*, into the spherical chamber *c'*, from whence it mounts into the gage-glass (not shown) through pipe *c*³.

The spherical chamber is provided with the usual drip-cock *6*. The coil-springs *m* and *h* exert a tension on each side of the flange *k* of the valve-plug *i*, and as the water in the boiler varies in volume or pressure the springs operate to reciprocate the valve-plug *i* in the bore *f*, thereby preventing the valve-plug from sticking.

The pressure of the steam admitted to the gage-glass from the upper end thereof upon the surface of the water in the gage-glass tends to equalize the pressure of the water against the rear or flanged end *n* of the valve-plug and prevents the valve-plug from being seated in its seat *e*, thus keeping the valve-chamber open.

If the gage-glass is broken by accident or otherwise, the pressure of the steam upon the water in the glass is relieved and the water-pressure on the flanged end *n* of the valve-plug, aided by spring *m*, immediately forces the tapered portion *j* of the valve-plug into its seat *e*, thus closing the communication between the column and the chamber *c'* and preventing the escape of the boiling water. When the glass has been replaced, the movable valve-plug *i* is forced backward against the tension of spring *m* by means of the ro-

tating adjustable releasing valve-stem *o*, the free end of the pin *p* entering the passage *c* and striking against the flattened end *p'* of the tapered portion *j'* of the valve-plug.

It will be observed that a safety-valve constructed as described is efficient and thoroughly practical in operation and insures absolute safety to the operator, as the valve is automatically closed when the gage-glass is broken, thereby preventing the escape of steam and water from the boiler. Two valves are attached, one above the other, to the water-column and are duplicates of each other, so that a description of one will suffice for both.

Slight changes may be made in the construction of the valve without deviating from the principle involved in my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. An automatic-safety-valve casing comprising a body portion having a projecting valve-chamber casing provided with a bore of varying diameter, a valve-seat formed in the bore, a movable valve-plug located in the valve-chamber, the valve-plug provided with a flange *k*, a shoulder formed in the bore of the valve-chamber casing, a spring located in the valve-chamber and surrounding the valve-plug, a second spring located in the valve-chamber, a removable bushing located in the bore of the valve-chamber casing, the second spring bearing against the flanged end of the valve-plug and the bushing respectively.

2. An automatic safety-valve for water-columns on boilers, comprising a body portion provided with a projecting valve-casing, the end of the valve-casing exteriorly threaded for engagement with the water-column, the valve-casing provided with a valve-chamber of varying diameter and having a valve-seat formed therein, a coil-spring located in the valve-chamber, a shoulder surrounding the valve-seat, one end of the spring bearing against the shoulder, a movable valve-plug surrounded by the spring, the valve-plug provided with a flange against which the opposite end of the spring bears, a bushing inserted in the end of the valve-casing, a second spring located between the bushing and the flanged end of the valve-plug, a rotatable releasing-pin mounted in the body portion of the safety-valve to force the valve-plug away from the valve-seat.

3. An automatic safety-valve comprising a hollow body portion, a valve-casing projecting therefrom, the valve-casing inclosing a valve-chamber, a valve-seat formed in the valve-chamber affording communication between the hollow body portion and the valve-chamber, a coil-spring located in the valve-chamber, a valve-plug surrounded by the spring and adapted to contact with the valve-seat, a flange formed on the valve-plug, a second spring located behind the valve-plug and a bushing provided with a tapered bore lo-

cated behind the second spring, against which bushing and the valve-plug the second spring is adapted to bear.

4. An automatic safety-valve for water-columns consisting of a hollow body portion, a valve-casing connected thereto, the valve-casing inclosing a valve-chamber of varying diameter communicating with the hollow interior of the body portion, a movable valve-plug located in the valve-chamber, a flange formed on the valve-plug, a spring surrounding the valve-plug, a second spring located in the valve-chamber, and a removable bushing inserted in the valve-casing, the second spring bearing against the end of the valve-plug and the bushing, respectively.

5. An automatic safety-valve comprising a hollow body portion, a valve-casing connected thereto, the valve-casing inclosing a valve-chamber in communication with the hollow body portion and provided with a valve-seat, a flanged valve-plug located in the valve-chamber, a coiled spring surrounding the valve-plug, the valve-plug adapted to contact with the valve-seat, a second spring located in the valve-chamber, a bushing inserted within the valve-casing the second spring contacting with the valve-plug and bushing respectively, an enlargement on the body portion, a valve-stem rotatably supported in the enlargement, and a removable releasing-pin fitted to the inner end of the rotatable valve-stem, the releasing-pin adapted to force the valve-plug from its seat.

6. An automatic safety-valve for water-gages comprising a hollow body portion, and a valve-casing, the valve-casing inclosing a valve-chamber which communicates with the hollow interior of the body portion, a valve-seat formed in the valve-chamber, a movable valve-plug located within the valve-chamber, the valve adapted to contact with the valve-seat to close the communication between the valve-chamber and hollow body portion and oppositely-acting tension devices located within the valve-chamber and bearing against the valve-plug to actuate it in opposite directions.

7. An automatic safety-valve comprising a hollow body portion, a pipe integrally secured therewith, the bore of the pipe in communication with the hollow interior of the body portion, a valve-casing integral with the body portion, the valve-casing inclosing a valve-chamber of varying diameter in communication with the hollow interior of the body portion, a valve-seat formed in the valve-chamber, a movable valve-plug adapted to contact with the valve-seat to close the communication between the valve-chamber and hollow body portion, tension means located in the valve-chamber and exerting pressure on either side of the valve-plug and removable means for retaining the plug and springs in position.

8. An automatic safety-valve comprising a hollow body portion, a pipe secured therewith,

the bore of the pipe in communication with the hollow interior of the body portion, a valve-casing, the valve-casing inclosing a valve-chamber of varying diameter in communication with the hollow interior of the body portion, a valve-seat formed in the valve-chamber, a movable valve-plug adapted to contact with the valve-seat to close the communication between the valve-chamber and hollow body portion, an annular shoulder formed at the juncture of the valve-seat and valve-chamber, a coiled spring surrounding the valve-plug, a flange on the valve-plug, the flange snugly fitting the bore of the valve-chamber, and provided with grooves therein, the coiled spring bearing against the shoulder and the flange, respectively, the end of the valve-casing provided with internal screw-threads, an annular externally-threaded bushing received in the valve-casing, and a second spring located in the valve-chamber between the bushing and the flanged end of the valve-plug against which the ends of the second spring bear, respectively.

9. An automatic safety-valve comprising a hollow body portion, a pipe secured therewith, the bore of the pipe in communication with the hollow interior of the body portion, a valve-casing, the valve-casing inclosing a valve-chamber of varying diameter in communication with the hollow interior of the body portion, a valve-seat formed in the valve-chamber, a movable valve-plug adapted to contact with the valve-seat to close the communication between the valve-chamber and hollow body portion, an externally-screw-threaded hollow enlargement formed on the body portion and in communication with the hollow interior thereof, the bore of the enlargement being in alignment with the bore of the valve-chamber, an internally-screw-threaded stuffing-box received on the enlargement, a valve-stem receivable in the bore of the enlargement and projecting into the hollow body portion, the valve-stem provided with a screw-threaded portion registering with the screw-threads in the stuffing-box to permit the valve-stem to rotatively travel into the valve-chamber to unseat the valve and to be withdrawn therefrom.

10. An automatic safety-valve comprising a hollow body portion, a pipe, the bore of which communicates therewith, a valve-casing inclosing a valve-chamber communicating with the hollow interior of the body portion, a tapered valve-seat formed in the valve-chamber near the point of communication with the hollow body portion, an internal shoulder formed in the valve-chamber, a valve-plug located in the valve-chamber and provided with a tapered end adapted to contact with the valve-seat to close communication between the valve-chamber and hollow body portion, a flange formed on the valve-plug, the flange snugly fitting the bore of the valve-chamber, the valve-plug provided with longitudinally-extending peripheral grooves which pass

through the flange, a coiled spring encircling the valve-plug, the ends of the spring bearing against the shoulder and flange, respectively, the valve-casing provided with an interiorly-threaded portion, an internal annular shoulder formed at the juncture of the interiorly-threaded portion and the valve-chamber, an exteriorly-threaded bushing provided with a tapering bore received in the internal screw-threaded portion of the valve-casing, the thicker inner face of the bushing partially closing the valve-chamber, the bushing adjustable between the last-named shoulder and the end of the valve-casing, and a coiled spring interposed between the inner end of the bushing and the flanged end of the valve-plug against which the ends of the second spring bear, respectively.

11. An automatic safety-valve comprising a hollow body portion, a pipe, the bore of which communicates therewith, a valve-casing inclosing a valve-chamber communicating with the hollow interior of the body portion, a tapered valve-seat formed in the valve-chamber near the point of communication with the hollow body portion, an internal shoulder formed in the valve-chamber, a valve-plug located in the valve-chamber and provided with a tapered end adapted to contact with the valve-seat to close communication between the valve-plug, the flange snugly fitting the bore of the valve-chamber, the valve-plug provided with longitudinally-extending peripheral grooves which pass through the flange, a coiled spring encircling the valve-plug, the ends of the spring bearing against the shoulder and flange, respectively, the valve-casing provided with an interiorly-threaded portion, an internal annular shoulder formed at the juncture of the interiorly-threaded portion and the valve-chamber, an exteriorly-threaded bushing provided with a tapering bore received in the internal screw-threaded portion of the valve-casing, the thicker inner face of the bushing partially

closing the valve-chamber, the bushing adjustable between the last-named shoulder and the end of the valve-casing, a coiled spring interposed between the inner end of the bushing and the flanged end of the valve-plug against which the ends of the second spring bear, respectively, a hollow externally-screw-threaded enlargement formed on the body portion opposite and in alinement with the valve-chamber, the bore of the enlargement in communication with the hollow interior of the body portion, an interiorly-threaded stuffing-box received upon the screw-threaded end of the enlargement, a rotatable release valve-stem received in the bore of the enlargement, the valve-stem provided with an enlarged screw-threaded portion received in the stuffing-box, and a pin removably held in the end of the valve-stem, the pin adapted to enter the valve-chamber and contact with the face of the tapered portion of the valve-plug to unseat the latter when the valve-stem is rotated in one direction and to be withdrawn from the valve-chamber when the valve-stem is rotated in the opposite direction.

12. An automatic safety-valve comprising a hollow body portion, and a valve-casing, the valve-casing inclosing a valve-chamber in communication with the hollow interior of the body portion, a valve-seat formed in the chamber, and a movable valve-plug adapted to contact with the seat to close the communication between the valve-chamber and hollow body portion, oppositely-acting springs bearing upon the valve-plug and a hollow removable bushing located within the valve-chamber against which one of the springs bears.

Signed at Mansfield this 5th day of April, 1902.

ADOLPH HARTWIG.

Witnesses:

JAMES E. PAYNE,
ALMA HARTWIG.