

(No Model.)

E. E. GOLD.
SAFETY VALVE.

No. 563,371.

Patented July 7, 1896.

FIG. 1.

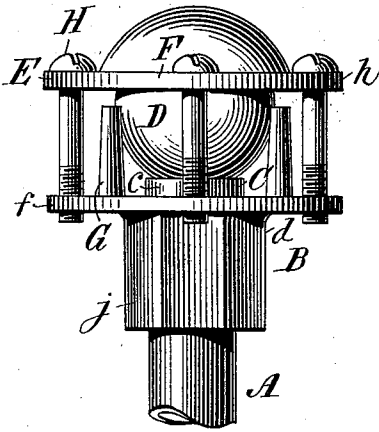


FIG. 2.

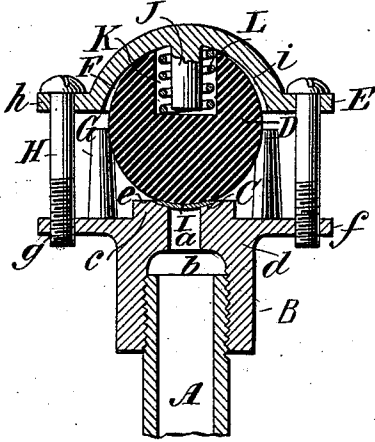


FIG. 3.

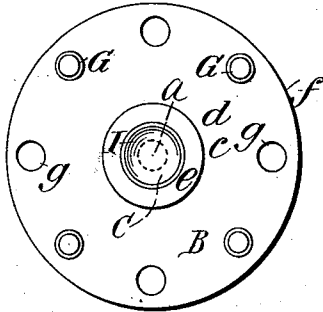


FIG. 4.

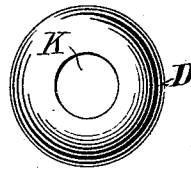


FIG. 6.

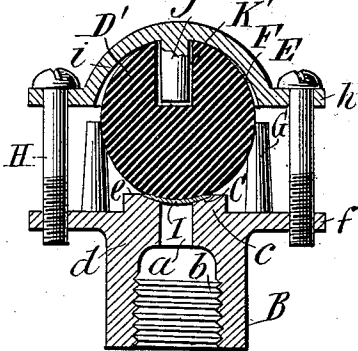
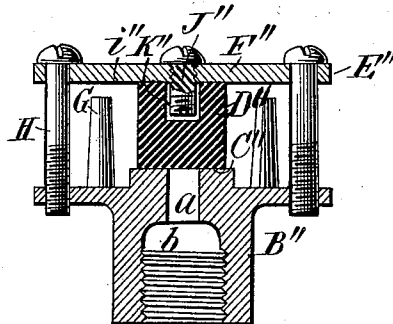


FIG. 5.



FIG. 7.



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UNITED STATES PATENT OFFICE.

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SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 563,371, dated July 7, 1896.

Application filed April 17, 1896. Serial No. 587,896. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Safety and other Valves for Car-Heating Systems and the Like, of which the following is a specification.

This invention relates to safety, puppet, or other valves, and aims to provide an improved valve especially applicable for use as a relief or safety valve for car-heating systems and the like.

In car-heating systems it is customary to place a safety-valve at a suitable point in the system, usually the most elevated portion thereof, and on or above the expansion-chamber, if such is used, in order that at a predetermined limit of pressure the valve may act to relieve the excess of pressure and prevent bursting of the apparatus. One common expedient for this purpose has consisted of a fragile metal diaphragm designed to burst at a certain pressure, but difficulty has been found in ascertaining the exact bursting strain of each diaphragm, and when burst the broken diaphragm leaves the system open and permits evaporation of the liquid medium therein, endangering destruction of the apparatus. Another expedient has been the use of a pop-valve, but, owing to the great infrequency of its operation, such valves are found to sometimes become so adhered to the seat through long contact therewith that they refuse to act.

My invention aims to provide a simple, convenient, and effective valve which will be certain in operation, of long life, and of slight cost. To this end, in carrying out the preferred form of my present invention, I provide a suitable valve seat or member, which may be attached to or form part of the heating system, a block of suitable material constituting the valve proper and seating on this seat, and improved means for holding the block in position on the seat and for maintaining the valve in operative position. The block is preferably of substantially spherical form and of yielding or elastic or packing material, capable of adapting itself to fit the seat and of itself yielding to relieve pressure.

The seat is preferably concaved to substantially correspond with the block, and has a broad outer surrounding portion to receive and sustain the block against undue seating and compression. The holder for the block covers and protects the top of the latter, and has a concave holding-socket, concentric with the seat, receiving and holding the block, so that it can compensate for imperfections or irregularities in or between the holder and seat, and engaging the upper face of the block over a considerable portion of its periphery. Reciprocal guiding and holding provisions between the block and holder, preferably consisting of a projection from the holder entering a socket in the block, are provided. Elastic holding means, tending to keep the block against the seat, are preferably used, and when desirable a protector preventing direct contact of the steam with the block is employed, in the preferred form of the invention, as well as means preventing undue compression of the block or adjustment of the holding means, avoiding escape of the block when loose, and improvements in the details of construction and for adjustment of the valve.

In the accompanying drawings, which show certain adaptations of my invention, Figure 1 is a side elevation of my improved valve as applied to the top pipe of a system with which it is to be used. Fig. 2 is a vertical axial section thereof. Fig. 3 is a plan view of the seat member and protector. Fig. 4 is a top plan of the valve proper or block. Fig. 5 is a top and edge view of the protector therefor. Fig. 6 is a vertical axial section showing a modification, and Fig. 7 is a similar view showing another modification.

Referring first to Figs. 1 to 5, inclusive, I will describe in detail the preferred form of my invention as therein shown. In these figures let A represent the end of a pipe or other object to which the valve is applied; B, the seat member of the valve; C, the seat thereof; D, the valve proper or block; E, the holder therefor; F, the active portion of the latter; G, the compression stops and guards; H, the compressing provisions or screws; I, the protector for the valve proper or block; J, a guiding projection on the holder; K, a

guiding-socket in the block, receiving the projection J, and L a spring or elastic provision pressing the block toward the seat.

Preferably the seat member B of the valve 5 is a metal casting, having a duct *a*, leading inwardly from the seat and opening into a screw-threaded socket *b*, within which the end of the pipe A is screwed when the member B is designed for attachment to a part having 10 a male screw-thread. If it is desired to attach the valve in any other way to any character of device, the member B will be correspondingly modified. The member B consists of a tubular body *d*, having a wide flat 15 flange *f*, on or above the top face of which is located a boss *c*, on which is formed the valve-seat C. The valve-seat comprises an annular inner concave portion and an annular outer flat portion *e* in the construction shown. 20 The flange *f* is suitably screw-threaded, as by having threaded holes *g* near its outer edge, receiving the screws H, to provide for adjustment of the holder toward the body. On the flange are formed or located suitable 25 provisions, as the fingers G, which are cast integrally with the body in the construction shown for limiting the relative adjustment of the holder and body, and for preventing undue displacement or falling out of the block 30 either during the assembling or use of the valve. The fingers G, of which four are shown, are disposed around the seat to protect the sides of the block. The screws H are located intermediate of the fingers and at a 35 like distance from the seat, thus also serving as protection against lateral injury or displacement of the block in the construction shown.

The holder E is a plate, casting, or other 40 suitable member, having a flange or edge *h* surrounding its middle or top F, and is disposed at a suitable distance from the seat to allow for the block D between the latter and the holder, and adapted to be adjusted toward 45 or from the body *d*, as by screwing in or out the screws H. In the construction shown the holder has a holding socket or portion, concave on its inner side and adapted to receive and partly inclose, while embracing the outer 50 side of, the block D, to hold and press it toward the seat. The block D is shown as a substantially spherical block of yielding or packing material, as hard rubber or composition, which at one side rests on and partly 55 enters the concave portion of the valve-seat, and at substantially opposite portions bears against the concave wall of the holder. In this instance this wall is of less curvature than the periphery of the block, so that the 60 latter will be engaged by the wall near the top, and an increasing space for expansion of the block within the wall under pressure is provided. The concave seat and holding-wall, and the convex top and bottom of the 65 block, permit the latter to properly seat itself to compensate for any irregularities or imperfections in any of the parts, and the yield-

ing or elastic nature of the block permits its compression until the desired fit is obtained at the seat, and until the necessary resistance 70 against opening by internal pressure is obtained. To guide the block from the holder, I provide a socket in the top of the block, as the cylindrical flat-bottomed socket K, molded therein, and a reciprocal projection on or 75 formed integral with the holder, as the cylindrical pin J, depending from the center of the wall *i*, concentrically of the socket F and seat C, and terminating substantially flush with the bottom face of the holder. When the 80 holder is placed over the block, the pin J is passed into the socket K, and serves to prevent the block from rolling out of position during assembling or use of the valve. The block is thus a single integral body of material, with no tendency to expansion or bursting 85 under the action of the holding or guiding provisions for it. The socket is preferably larger than the pin, so that there is a looseness sufficient for free play, and to permit an inward bulging of the adjacent portion of the block under pressure if necessary. The socket is preferably deeper than the length 90 of the pin, so that the latter does not touch its bottom.

To provide for holding the valve elastically toward the seat, even when it has been so loosened to relieve strain during long periods when its safety function is not required, I 100 prefer to employ elastic means between the holder and block, slightly pressing the latter toward the seat. Any means may be employed, but I prefer to use a small spiral spring L, which is inserted, in the construction shown, within the socket K and sur- 105 rounds the pin J. The spring shown is designed to give sufficient pressure to keep the valve closed against ingress of air or dust, even when the holder has been so far loosened that it would not suffice for this, in which case 110 the spring would also hold the parts against rattling; but, if desired, a sufficiently strong spring can be employed to give any required elastic tendency at any period in the use of the valve. 115

As the holder is adjusted against the block, the carelessness of workmen may lead to undue compression, so that the block will be 120 impaired or its opening resistance rendered too great. The fingers G serve as stops which, by acting against the bottom face of the holder, arrest such adjustment before it is carried to too great an extreme. To permit the use of a distorted block, if this is desired, or to provide for further adjustment, it will 125 only be necessary to file off the tops of the fingers, whereupon the cap can be screwed correspondingly farther in. In constructing the apparatus, however, the parts will be so proportioned that the fingers will not require 130 alteration, provided suitable blocks are used and renewals properly made.

When a hard-rubber block is used for a system involving hot steam or great heat in the

pipe A, or where the contents of this pipe may be injurious to the block, my invention provides the protector I, which is a thin flexible disk of suitable material, as sheet-brass, fitting the inner portion of the valve-seat and the adjacent surface of the block, as shown, for example, and sufficing to isolate the block from the interior of the duct *a* while making a leak-tight joint with the seat. The edges of this disk are best formed flush with or beneath the outer part of the seat, so that if for any reason the fit is imperfect the block can be adjusted until its periphery beyond the disk bears on the seat and makes a tight joint surrounding the edge of the disk. The disk I shown is a concavo-convex elastic protector, which will not become adhered to the seat, since it can yield with the yielding of the block under pressure, and will hence be slightly worked or loosened on the seat from time to time as the pressure beneath the valve fluctuates.

For convenience in applying the valve to the pipe the body B is constructed with an external wrench portion having, for example, the wrench-faces *j*, by which it may be screwed on or off the pipe A.

In operation, the pressure within the valve will compress the block diametrically, as the elastic resistance of the latter is passed, and permit a discharge beneath the block until the pressure falls beneath such resistance, whereupon the block will expand against and close the seat. The opening and closing of the valve will not be so sudden as to produce a perceptible jar, and the noise of escape through the valve will be reduced to the minimum. As the block decreases in elasticity, or the pressure limit for safety is increased, the holder will be adjusted until the desired resistance is obtained. Should the valve leak, a slight adjustment of the holder against it will increase the amount of seating-surface by distorting the block laterally, and will apply a greater pressure against the seating-surface. When the practical working limit of the block has been reached, this will be announced by the refusal of the valve to work effectively at the maximum inward adjustment of the holder, making it apparent to the user that a new block must be supplied, or, if this is unattainable, that the stops must be cut away to effect a temporary closing until the valve can be renewed.

The improved valve is found of great practical utility and convenience, and it is found that the blocks when used with my improvements have great endurance, life, and efficiency.

My invention removes all danger of bursting or cracking of the block, avoids the necessity of molding or pressing within the latter anything tending to expand or weaken it, provides a block easy of manufacture, and makes its renewal simple and convenient.

It will be understood that the invention is not limited to the particular combination, use,

or details of construction herein set forth as constituting the preferred form of the invention, but that it may be availed of in whole or in part according to such combination and for such purposes, and with such details of construction as circumstances or the judgment of those skilled in the art may dictate, without departing from the spirit of the invention.

One modification is shown in Fig. 6, in which all of the parts are identical with those shown in Figs. 1 to 5, and bear the same letters of reference, except the block lettered D', which has a socket K', substantially fitting the pin J of the holder, and in which no elastic provision other than the elasticity of the block itself is utilized. For many uses this will be an advantageous construction.

Another modification is shown in Fig. 7, in which the holder B'' has a flat valve-seat C''. The block D'' is cylindrical with flat ends, one resting on the valve-seat and the other pressed upon by the flat bottom wall *i''* of the holder E'', the central part F'' of which has in itself a slight downward elastic tendency, which may be accomplished by forming it of a slightly-elastic metal plate, and carries a pin J'', which is screwed through the plate and enters a socket K'' in the block. No protector-plate is shown in this instance.

What I claim is, in safety and other valves for steam-heating systems and the like, the following defined novel features and improvements, substantially as and for the purposes hereinbefore set forth, namely:

1. In valves, a member having a seat, in combination with a holder remote from said seat and adjustably connected to said member, and a separate body of yielding material between said seat and holder, and pressed by the latter against and engaging the seat, and means whereby said body is guided by said holder.

2. In valves and the like, a member having a seat, and a holder adjustably connected thereto and spaced apart therefrom, in combination with a block of elastic material interposed between said holder and seat, embraced by the former and pressed thereby against the latter, having a solid homogeneous body opposite said seat.

3. In valves and the like, a member having a seat, in combination with a valve proper consisting of a body having convex sides, the one opposite said seat, and the other remote therefrom, and a holder adjustably connected to said seat member and bearing against the convex side of said block remote therefrom and pressing said block toward said seat, whereby said block can properly seat itself and irregularities will be compensated for.

4. In valves and the like, a member having a seat and stops surrounding the latter, in combination with a yielding block engaging said seat, and a holder pressing said block toward said seat and adjustably connected to said member, said stops preventing inward adjust-

ment of said holder at a predetermined point, and thereby protecting said block.

5 5. In valves and the like, a member having a seat, an elastic block, a holder engaging the outer side of said block and pressing it toward said seat, means for adjusting said holder toward said seat, and means limiting such adjustment.

10 6. In valves and the like, a member having a seat, a separate valve proper seating loosely thereon, a holder adjustably connected to said member and pressing said valve proper against said seat, and a series of projections carried by one of said parts, surrounding said valve proper, and preventing escape of the latter when loose.

20 7. In valves and the like, a member having a valve-seat, a block seating against said seat, and a holder adjustably connected to said member, and holding said block on said seat and guiding it laterally, in combination with elastic means acting against said holder and block and holding the latter against said seat, and means for adjusting said holder toward
25 said member.

8. In valves and the like, a member having a seat, in combination with a block seating

thereon and having a socket, and a holder pressing said block against said seat and having a projection entering said socket and preventing escape of said block. 30

9. In valves and the like, a member having a seat, in combination with a block seating thereon and having a socket in its outer side, a holder adjustably connected to said member and engaging the outer side of said block, and a spring in said socket reacting against said holder and block. 35

10. In valves and the like, a seat member B, a valve D, a holder E and a protector I, all combined, substantially as and for the purpose set forth. 40

11. In valves and the like, a member B having a seat C, in combination with a valve D, a holder E having a socket portion F, and screws H holding said holder and member together with said block between them. 45

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:

GEORGE H. FRASER,
CHARLES K. FRASER.