

April 10, 1928.

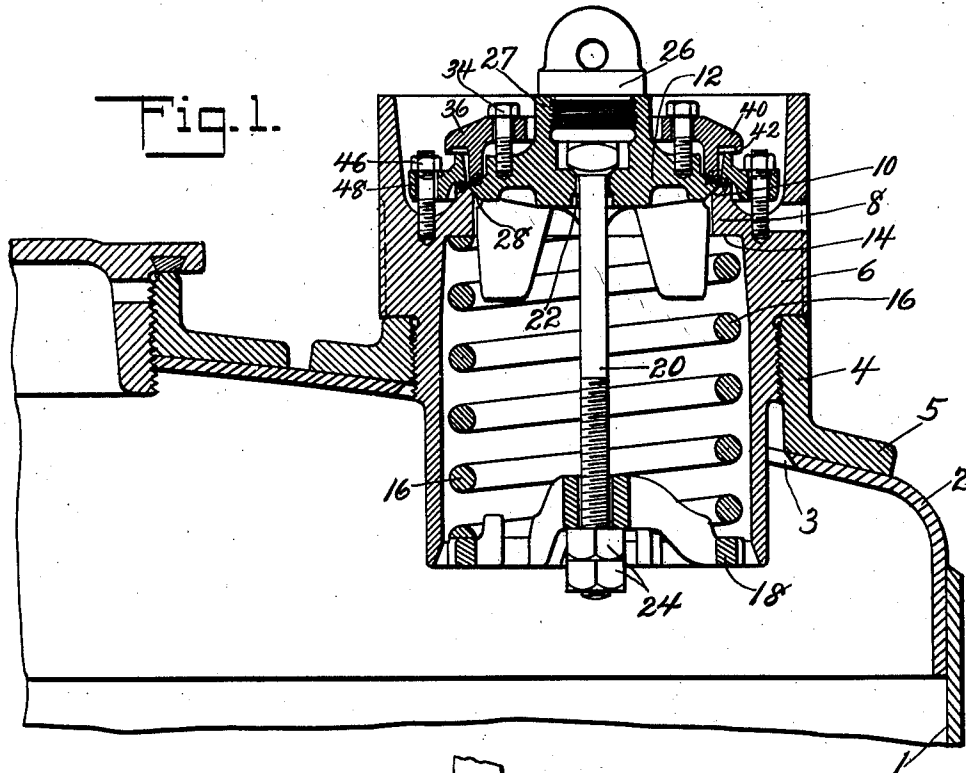
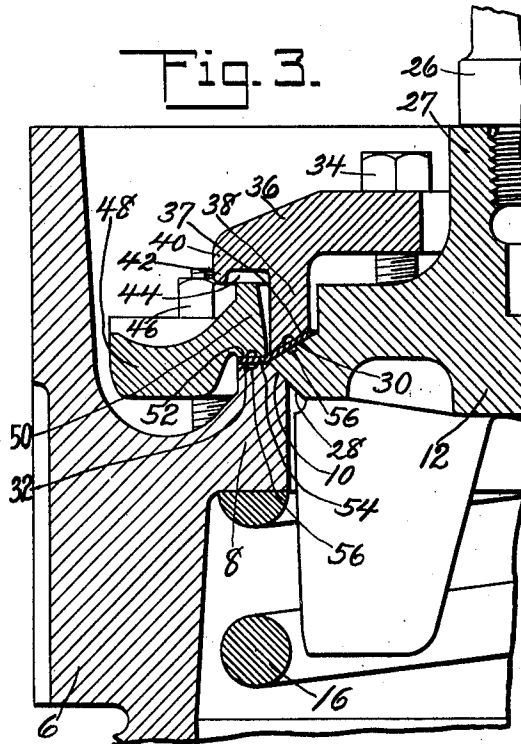
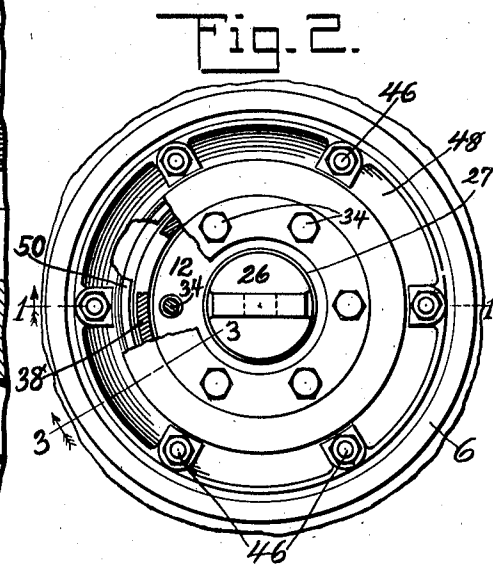
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SAFETY VALVE

Filed May 22, 1925

2 Sheets-Sheet 1



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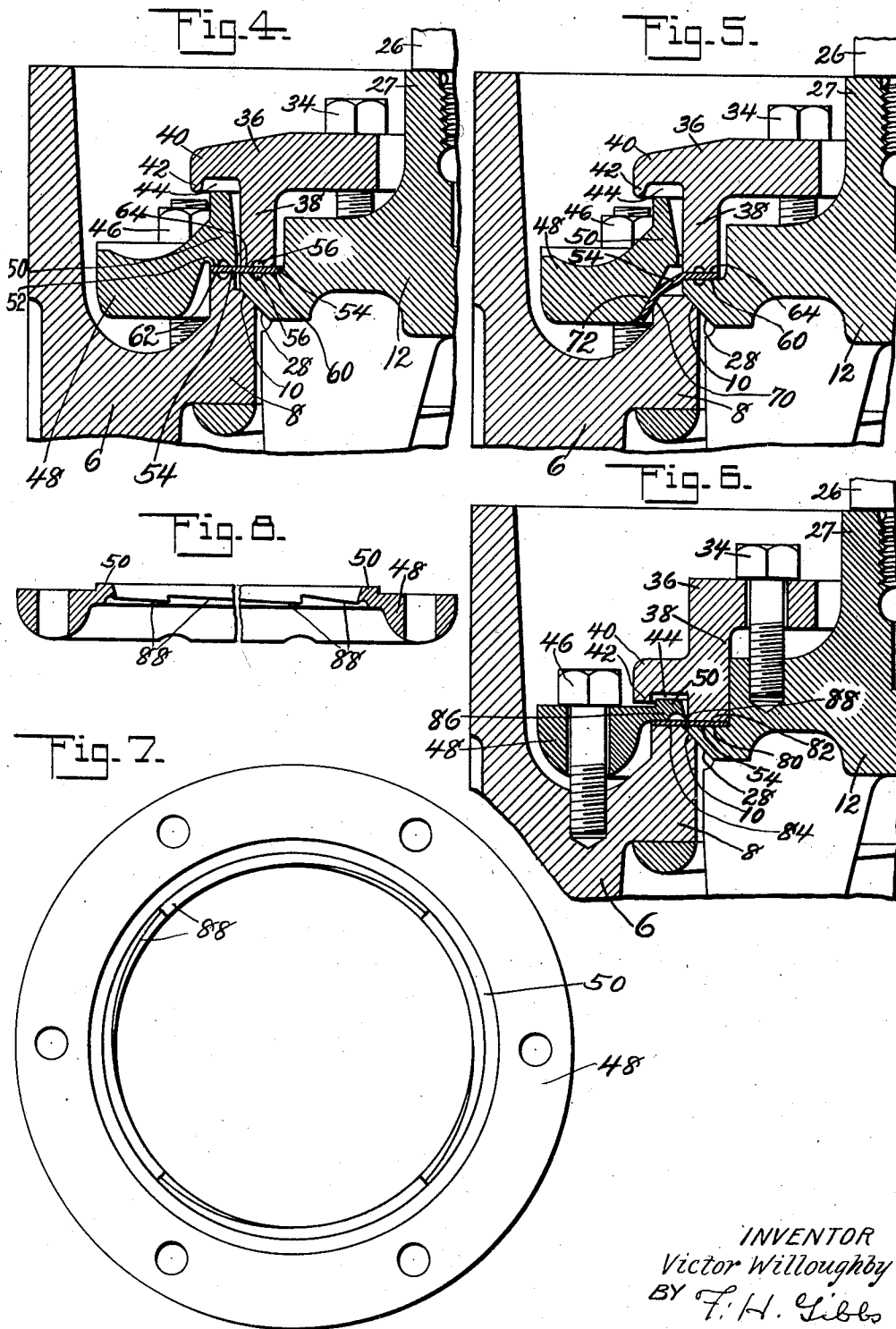
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UNITED STATES PATENT OFFICE.

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SAFETY VALVE.

Application filed May 22, 1925. Serial No. 32,095.

This invention relates to safety valves for car tanks and it is an object of this invention to provide an improved safety valve having a seal which maintains a gas tight closure prior to the operation of the valve and which is sheared or ruptured by the operation of the valve. It is also an object of this invention to provide a safety valve of the type described of such construction that a broken seal may be replaced without dismantling the valve or necessitating the opening of the valve or the removal of the valve from the tank.

The accompanying drawings illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof within the scope of the claims will occur to persons skilled in the art.

In said drawings:

Fig. 1 is a vertical section of a safety valve constructed in accordance with this invention and shown applied to a car tank dome;

Fig. 2 is a top plan view of the safety valve shown in Fig. 1 part of the seal retaining rings being broken away to show other parts more clearly;

Fig. 3 is a vertical section drawn to a larger scale taken on the line 3—3 of Fig. 2;

Figs. 4, 5 and 6 are views similar to Fig. 3 showing modified constructions of the seal retaining rings, valve and valve casing;

Fig. 7 is a bottom plan view of the retaining ring of Fig. 6 which secures the seal to the valve casing, and

Fig. 8 is a broken transverse section of the ring shown in Fig. 7.

In the drawings the safety valve forming the subject matter of this invention is shown applied to a car tank dome 1 having a dome head 2 in which is the usual opening 3 to receive the safety valve surrounded by the ring 4 secured to the dome head 2 by rivets (not shown) engaging the flange 5 of the ring 4 and the dome head 2. The ring 4 is interiorly threaded to receive a valve casing 6 having an inwardly projecting flange 8 which is provided with an inclined valve seat 10 to receive the valve 12 and with a surface 14 which serves as a shoulder against which bears one end of the valve spring 16. The other end of spring 16 bears against a

spider 18 carried by the stem 20 which is pivotally mounted in an opening 22 in the valve 12. The spider 18 is secured in adjusted position on the stem 20 by the nuts 24. Leakage through the opening 22 is prevented by the plug 26 threaded in the annular flange 27 surrounding the opening 22.

The valve 12 is provided with a surface 28 inclined to seat on the valve seat 10 and with a surface 30 inclined upwardly and inwardly from the outer edge of the surface 28, and the flange 8 is provided with a horizontal surface 32 extending outwardly from the upper edge of the surface 10. Secured to the valve 12 by bolts 34 is a ring 36 having a downwardly projecting flange 38 provided with an outer surface 37 corresponding in inclination to the surface 30. The ring 36 is also provided with a flange 40 projecting outwardly beyond the flange 38 and provided at its outer edge with a downwardly projecting flange 42, the flanges 40 and 42 forming with the flange 38 a shallow groove 44. Secured to the valve casing 6 by the bolts 46 is a ring 48 having a flange 50 provided with a bottom surface 52 adapted to bear upon the surface 32 of the valve casing, the flange 50 projecting upwardly and lying beneath the shallow groove 44. Between the surfaces 30 and 37 and between the surfaces 32 and 52 is a frangible seal 54 securely held in position when the bolts 34 and 46 are tightened, as the projections of the flanges 38 and 50 are such that the rings 36 and 48 do not bear against the valve 12 and valve casing 6, respectively, at any points other than these surfaces. As shown in Figs. 1 and 3, the surfaces 30, 37, 32 and 52 are provided with shallow grooves 56.

In the modification shown in Fig. 4 the valve 12 is provided with an inclined surface 28 which seats against the valve seat 10 on the flange 8 of the valve casing 6. The valve 12 is provided with a horizontal surface 60 above and offset slightly from the surface 28 and the flange 8 is provided with a horizontal surface 62 offset from the valve seat 10. To the valve 12 the bolts 34 secure a ring 36 provided with a downwardly projecting flange 38 having a horizontal surface 64 which cooperates with the surface 60 of the valve and with an outwardly projecting flange 40 having a downwardly projecting

flange 42 forming a shallow groove 44 with the flange 38. To the valve casing 6 bolts 46 secure a ring 48 having a flange 50 with a horizontal bottom surface 52 which co- operates with the surface 62 of the valve casing flange 8. The flange 50 projects upwardly beneath the shallow groove 44 as in the construction shown in Fig. 3. In this construction as in the construction shown in Fig. 3, the surfaces 60, 64, 52 and 62 are provided with shallow grooves 56. Secured between the cooperating surfaces 60 and 64 and 52 and 62 is a frangible seal 54 held in position when the bolts 34 and 46 are tightened as the rings 36 and 48 in this construction, as in construction shown in Fig. 3, do not bear against the valve 12 or valve casing 6 except at the surfaces which secure the seal in position.

In the modified construction shown in Fig. 5, the valve 12 is provided with the inclined surface 28 to engage the valve seat 10 on the flange 8 of the valve casing 6 as in previous construction. The valve 12 is also provided with a horizontal surface 60 and has secured thereto by bolts 34 a ring 36 having a downwardly projecting flange 38 provided with an outer surface 64 as in Fig. 4. The ring 36 is also provided with the outwardly projecting flange 40 having the downwardly projecting flange 42 forming with the flange 38 the shallow groove 44 as in the previous constructions. The valve casing flange 8 is provided with an inclined surface 70 offset from the surface 10 and extending at an angle thereto and the flange 8 has secured thereto by the bolts 46 a ring 48 which has an inclined surface 72 which cooperates with the surface 70. The ring 48 is also provided with the flange 50 which projects upwardly beneath the shallow groove 44. Secured between the surfaces 60, 64, 70 and 72 is a frangible seal 54 which is held in position when the bolts 34 and 46 are tightened as the rings 36 and 48 do not contract with the valve 12 and valve casing 6, respectively, anywhere except where in engagement with the seal 54.

In the modified construction shown in Fig. 6, the valve 12 is provided with the inclined surface 28 which engages the valve seat 10 upon the flange 8 of the valve casing 6 and the valve 12 is provided with a horizontal surface 80 extending at an angle from the outer edge of the surface 28. To the valve 12 bolts 34 secure the ring 36 having a downwardly projecting flange 38 which has an outer surface 82 which cooperates with the surface 80 on the valve. To the flange 38 is secured the outwardly projecting flange 40 having the downwardly projecting flange 42 which forms with the flange 38 the shallow groove 44. The valve casing flange 8 is provided with a horizontal upper surface 84 extending from the upper edge of the

valve seat 10. To the valve casing 6 bolts 46 secure a ring 48 having a horizontal surface 86 which cooperates with the horizontal surface 84 on the valve casing. Secured between the surfaces 80, 82 and 84 and 86 when the bolts 34 and 46 are tightened is a frangible seal 54.

In the construction shown in Fig. 6 the ring 48 is shown provided with a flange 50 which projects upwardly beneath the groove 44 and has its outer bottom edge formed into a series of inclined cutting edges 88, the lower corners of which will bear upon the seal 54 and gradually shear the seal as the valve is raised by the pressure in the tank. The inclined cutting edges may be applied to the constructions shown in Figs. 3 and 4.

In the construction shown in Fig. 5 the seal is ruptured by the strain put on it without the aid of cutting edges on the retaining rings. In cases where the shearing action is desired, seals formed from thin sheets of iron, brass or lead may be used, while where the rupturing action only is desired, seals of brass, lead or rubber may be used.

In the action of this device the valve 12 will be held to its seat by the spring 16 until the pressure in the tank exceeds the pressure for which the spring 16 is set whereupon the pressure will lift the valve causing the seal to be broken upon the opening of the valve. The opening of the valve and the breaking of the seal will permit the discharge of the excess pressure from the tank. Upon the discharge of the excess pressure from the tank, the broken seal may be replaced by removing the bolts 34 and 46 and removing the rings 36 and 48, whereupon the remains of the broken seal may be removed and a new seal placed in position. Placing the rings 36 and 48 in position on the seal and securing the rings in position by the bolts 34 and 46, respectively, will secure the seal in position. It will be noted that during the removal of the broken seal and replacement of the new seal that the valve 12 is not disturbed on its seat so that the seal may be replaced without in any way interfering with the lading of the tank.

What is claimed is:

1. In a safety valve, a casing having a valve set, a valve for said seat, a ring carried by said valve, a frangible seal secured to said valve by said ring and means securing said seal to said casing to prevent release of fluid pressure between the valve and said valve seat until said seal is broken.

2. In a safety valve, a casing having an inclined valve seat and an annular surface surrounding said seat, a valve yieldingly held to said valve seat and having a surface adjacent the seat engaging surface, a ring carried by the valve, a frangible seal secured to said surface on said valve by said ring

and means securing said seal to said annular surface of said casing to prevent release of fluid pressure between the valve and said valve seat until said seal is broken.

3. In a safety valve, a casing having an inclined valve seat and an annular surface surrounding and extending at an angle to said valve seat, a valve having a seat engaging surface yieldingly held to said valve seat and a surface lying above said seat engaging surface and extending at an angle thereto, an annular frangible seal engaging said last mentioned surface and the annular surface on said casing, a ring carried by said valve and having a flange holding said seal in position on the surface on said valve and a ring secured to said casing and holding said seal in position on said annular surface on said casing, said seal being broken upon movement of said valve from its seat.

4. In a safety valve, a valve casing having an inclined valve seat and an annular surface surrounding said valve seat, a valve having a surface yieldingly held in engagement with said valve seat and an annular surface at an angle to said seat engaging surface, an annular frangible seal, a ring carried by said valve having a flange securing said seal to said annular surface of said valve and a ring carried by said casing having a flange securing said seal to said annular surface of said casing, a flange projecting upwardly from said ring on said casing and an outwardly extending flange on said ring on said valve overlying said upwardly projecting flange on said ring on said casing.

5. In a safety valve, a valve casing having an annular surface and a valve seat of less diameter than said annular surface, a valve having a surface normally engaging said valve seat and an annular surface adjacent to said seat engaging surface, an annular frangible seal overlying the joint between said valve and valve seat, a ring detachably secured to said valve and having a flange securing said seal to said annular surface on said valve and a ring detachably secured to said casing and securing said seal to said annular surface on said casing, said seal being broken upon movement of said valve from said seat.

6. In a safety valve, a valve casing having an inclined valve seat and an annular surface adjacent said valve seat, a valve having a surface yieldingly held in engagement with said valve seat and an annular surface adjacent said seat engaging surface, an annular frangible seal, a ring detachably secured to said valve and having a downwardly projecting flange securing said seal to said valve and an outwardly and downwardly extending flange forming a groove with said first mentioned flange and a ring detachably secured to said casing and having

a flange holding said seal in engagement with said casing and an upwardly extending flange underlying said groove.

7. In a safety valve a casing having a valve seat, a valve yieldingly held to said seat, an annular frangible seal overlapping said valve and casing, said seal being placed on the side of the valve and valve seat normally free from pressure, and means securing said seal to said valve and casing, said seal being broken by said valve upon opening thereof.

8. In a safety valve a casing having a valve seat, a valve yieldingly held to said seat, an annular frangible seal overlapping said valve and casing on the side thereof normally free from pressure and means securing said seal to said valve and casing, said seal being broken by said valve upon opening thereof of said valve and said seal securing means being adapted to permit replacement of said seal without dismantling said valve.

9. In a safety valve, a casing having a valve seat, a valve for said seat and adapted to be raised from the seat by fluid pressure on the bottom thereof, yielding means for holding said valve in contact with said valve seat, a frangible seal outside the surface of engagement of the valve with the valve seat, and means for securing the frangible seal to the valve and the valve seat to insure breaking of the seal by the valve when the same is operated.

10. In a safety valve having a casing, a valve seat therein, and a valve engaging said seat, a frangible seal across the juncture of said seat and valve, and removable means secured to the valve and said casing for normally retaining the frangible seal in position.

11. In a safety valve having a casing, a valve seat therein, and a valve engaging said seat, said valve and the adjacent portion of the casing having alined surfaces, a frangible seal on said alined surfaces, and retaining means on said casing and on said valve for normally positioning said frangible seal.

12. In a safety valve, a casing having a valve seat, a valve for said seat, a seal retaining element secured to the said casing and positioned adjacent the valve seat, a ring detachably carried by said valve, and a frangible seal positioned across the valve seat and said valve and normally retained by said seal retaining element and said ring.

13. In a safety valve, a casing having a valve seat, a valve yieldingly held to said seat, and a frangible seal secured to said casing and said valve on the side of the valve normally free from pressure, said seal being broken by said valve upon opening thereof to permit release of excess fluid under pressure.

14. In a safety valve, an open ended cas-

ing having a valve seat, a valve yieldingly held to said seat, a frangible seal overlapping the seat and valve in one open end of said casing, and easily accessible means for retaining said seal in its overlapped position. 5

15. In a safety valve, an open ended casing having a valve seat in the upper portion thereof, a valve yieldingly held to said seat, a frangible seal overlapping the seat and valve, and seal engaging means on said valve and said casing in the exposed upper end thereof for retaining said seal in its overlapped position. 10

In witness whereof I have hereunto set my hand. 15

VICTOR WILLOUGHBY.