

Feb. 8, 1927.

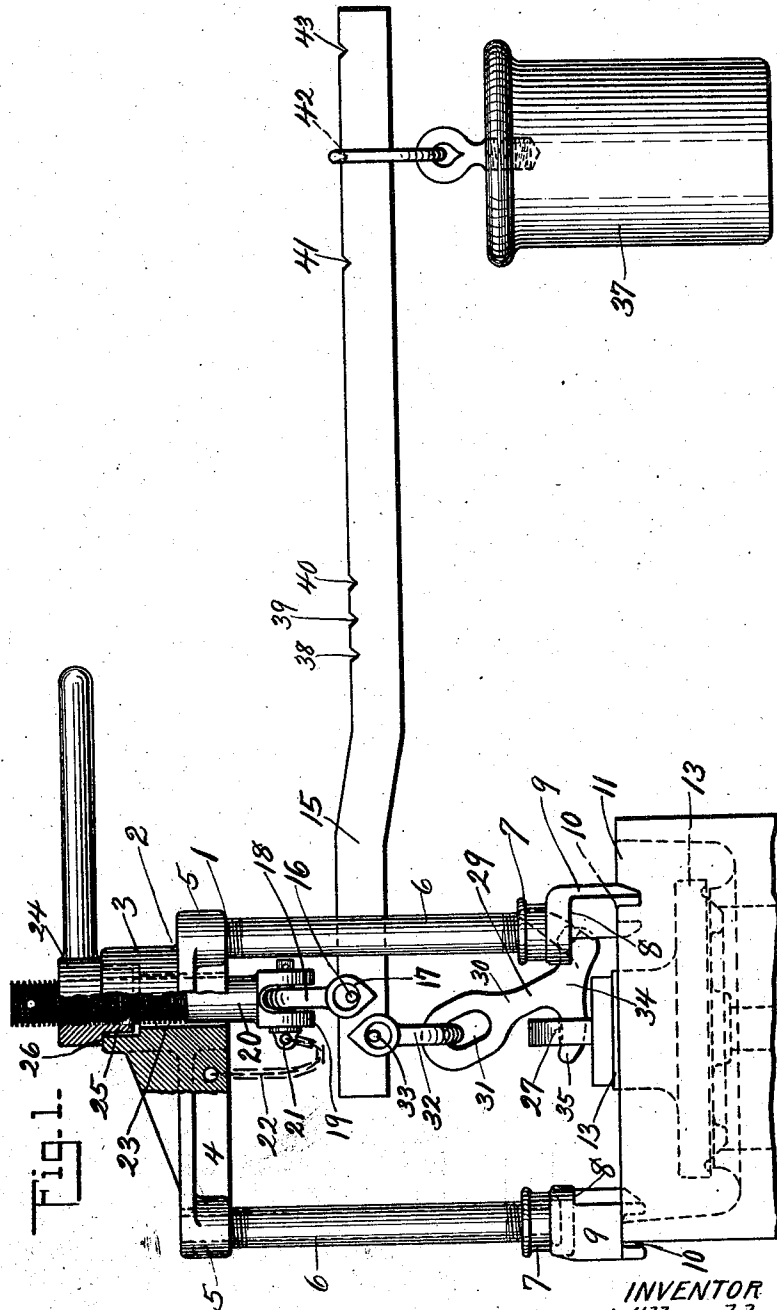
Y. WILLOUGHBY

VALVE TESTER

Filed Nov. 24, 1924

2 Sheets-Sheet 1

1,616,728



INVENTOR
Victor Willoughby
BY F. H. Gibbs
ATTORNEY

Feb. 8, 1927.

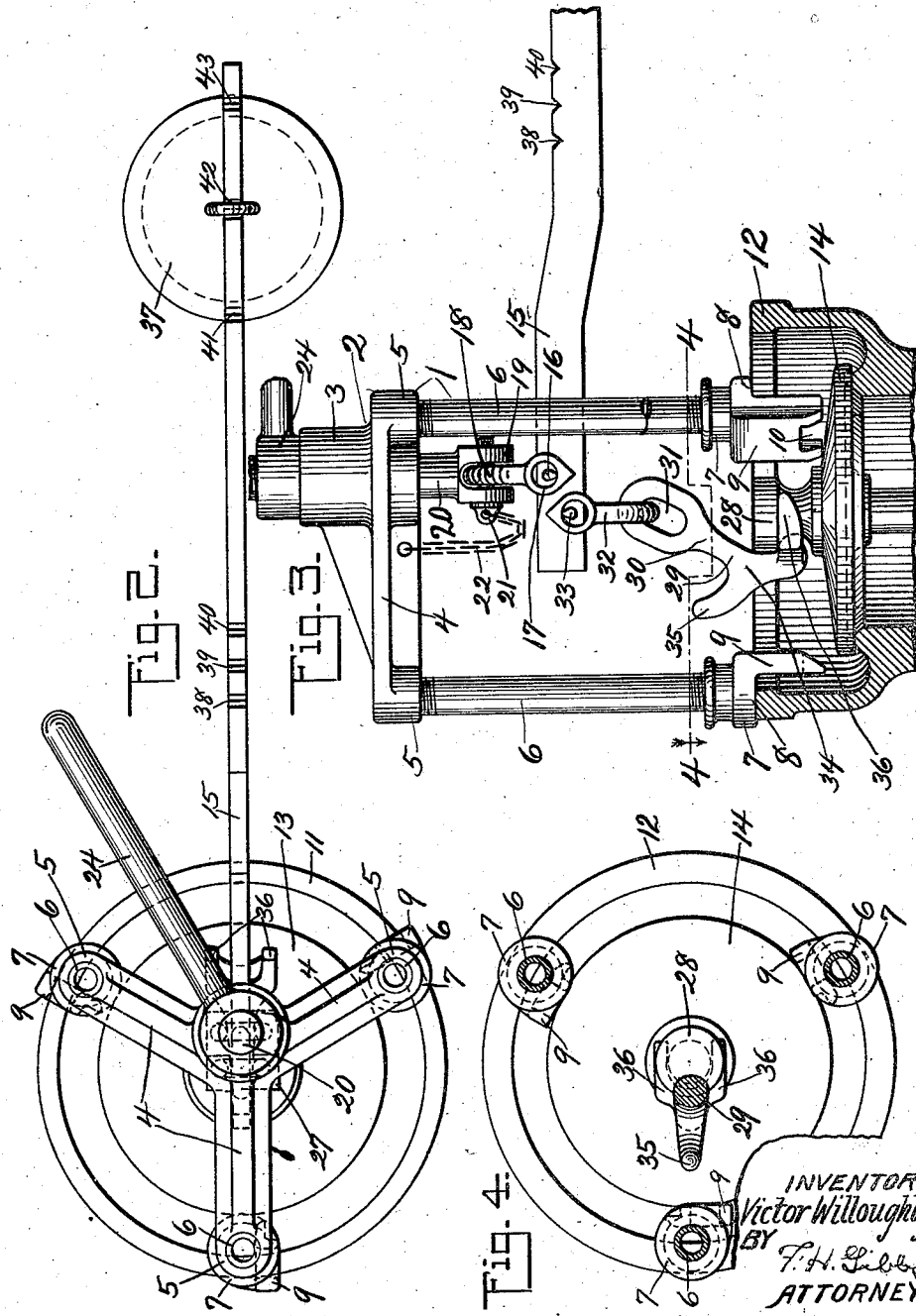
V. WILLOUGHBY

1,616,728

VALVE TESTER

Filed Nov. 24, 1924

2 Sheets-Sheet 2



INVENTOR
Victor Willoughby
BY
T. H. Gibbs
ATTORNEY

UNITED STATES PATENT OFFICE.

VICTOR WILLOUGHBY, OF RIDGEWOOD, NEW JERSEY, ASSIGNOR TO AMERICAN CAR AND FOUNDRY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

VALVE TESTER.

Application filed November 24, 1924. Serial No. 751,749.

Figure 1 is a view showing the improved valve tester principally in side elevation and partially broken away and showing the tester in use in connection with one type of safety valve;

Figure 2 is a top plan view of the valve tester;

Figure 3 is a view in side elevation showing the valve tester in use in connection with a slightly modified form of safety valve and

Figure 4 is a transverse sectional view taken along the line 4—4 of Figure 3.

An object of this invention is to provide a valve tester by means of which the valves provided in the dome heads of tank cars may be tested to determine whether or not these valves are properly adjusted so that when gas accumulates in a tank the valves will open at the proper pressure to permit accumulated gas to escape from the tank. These valves have to be adjusted so that they will normally open at a predetermined pressure and must further be so adjusted that they will not open under too light a pressure.

Another object of the invention is to provide a valve tester which may be easily and quickly put in place in connection with dome head valves of a conventional construction and to further so construct the tester that a lever forming a part of the tester may be pivotally suspended at a desired distance above the valve.

This improved valve tester is provided with a frame indicated in general by the numeral 1 and having a head 2 formed with a vertically disposed bearing 3 from which extend arms 4. These arms are cast integral with the bearing 3 and at their outer ends are provided with sockets 5 open at their lower ends and internally threaded so that the supporting legs or standards 6 may be screwed into these sockets. Feet 7 are screwed upon the threaded lower end portions of the legs 6 and are provided with shoulders 8 and depending portions 9 which have their lower ends provided with slots 10. It will therefore be seen that the feet 7 can be adjusted upon the legs 6 by being rotated thereon, so that when the tester is used in connection with the type of valve shown in Figure 1, the upper edge portion or rim of the wall 11 of the valve housing may be received in the seats 10, and when in use in connection with the type of valve shown in

Fig. 3, the shoulders 8 may rest upon the upper edge or rim of the wall 12 and the depending portions 9 extend along the inner face of the wall. In either case, the support of the frame 1 on the safety valve rim is distributed stably therearound, and spreading of the feet 7 outward from their footing on the rim is effectually prevented.

When a valve is to be tested it must be drawn upwardly against the action of its seating spring and this device is to be used to determine whether or not the spring is properly adjusted so that a valve such as shown at 13 in Figure 1 or 14 in Figure 3 will be lifted by excessive pressure and not lifted before a predetermined pressure is reached. In order to test this valve there has been provided a lever 15 which is provided adjacent one end with pivot pins 16 extending from opposite sides of the lever and extending into the eyes 17 of the U shaped shackle 18. This shackle 18 forms a part of the fulcrum means for mounting the lever and is disposed between the arms 19 at the lower end of the stem 20 where it is retained in place by a pin 21. This pin 21 extends through the arms 19 and shackle 18 and is provided with a chain 22 secured to one of the arms 4 of the frame head so that this pin will not be liable to become lost. The stem 20 of the shackle projects upwardly through the passage 23 of the bearing 3 and is threaded for receiving a lever nut 24 which is screwed upon the stem and provided with a reduced portion 25 extending into an enlarged upper portion of the passage 23. It has, therefore, an annular shoulder 26, which rests upon the upper edge of the bearing 3. It will thus be seen that by adjusting the nut 24 the shackle may be vertically adjusted and the lever caused to be supported at the desired distance above the valve when the device is in use.

In order to engage the eye 27 of the valve 13 or lifting knob 28 of the valve 14 there has been provided a grapple 29 which has the upper end portion of its shank 30 provided with an eye 31 to receive the U shaped shackle 32. The shackle 32 is similar in shape to the shackle 18 and has its arms extending upon opposite sides of the lever 15 and provided with eyes receiving the pins 33 which extend from opposite sides of the lever between the pins 16 and the inner end of the lever. At its lower end the grapple

29 is provided with a foot portion 34 which extends transversely of the shank 30 and is provided at one end with a hook 35 for passing through the eye 27 of the valve 13 and at its other end with hooked forks 36 for extending upon opposite sides of the knob 28 and engaging this knob as shown in Figures 3 and 4. It will therefore be seen that this grapple can have proper engagement, alternatively, with valves of very diverse forms; e. g., with a valve such as shown in Figures 1 and 2, where the eye 27 extends above the wall 11, and also with a valve such as shown in Figures 3 and 4, where the knob 28 is disposed within the confines of the wall 12.

This device is to be used for testing valves which are to be subjected to various predetermined pressures and therefore there has been provided a weight 37 which is slidable along the lever 15. Groups of scale notches 38, 39 and 40, and 41, 42 and 43 have been provided in the upper edge portion of the lever so that by moving the weight along the lever from one notch to another a predetermined pressure may be applied to the valve through the medium of the lever and the action of a valve at a predetermined pressure accurately determined. The notches 38, 39 and 40 are to be used when testing a valve set for a pressure of 12 pounds per square inch, notch 38 indicating a pressure of 215 pounds upon the valve, notch 39 indicating a pressure of 235 pounds, and notch 40 indicating a pressure of 255 pounds. The notches of the second set are for testing a valve set for a pressure of 25 pounds per square inch and represent, respectively, a pressure of 430 pounds for notch 41, a pressure of 490 pounds for notch 42, and a pressure of 550 pounds for notch 43.

When a valve is to be tested the frame will be put in place with its feet engaging the wall and the grapple 29 will be moved into engagement with either the eye 27 or knob 28 of the valve. If it is found that this grapple cannot be readily engaged with the eye or knob of the valve the nut 24 will be adjusted upon the thread stem 23 of the fulcrum so that this fulcrum will be raised or lowered as necessary. It will be assumed that the valve to be tested is set for a pressure of 12 pounds per square inch. The normal pressure at which a valve of this type is supposed to be lifted from its seat by gas accumulating in a tank car is 235 pounds which is indicated by the notch 39 and will be termed the normal pressure. The minimum pressure is 215 pounds as indicated by notch 38 and when the weight is placed in this notch 38 the valve is supposed to remain upon its seat. If it is found that when the weight is placed in this notch 38 sufficient pressure is exerted to lift the

valve from its seat this indicates that the valve is not properly adjusted and therefore the spring which holds the valve upon its seat must be tightened until the valve will remain seated when the weight is placed in notch 38. The weight will then be moved to notch 39 and as this is the normal pressure at which the valve is supposed to open, the pressure should serve to lift the valve from its seat. When the weight is placed in the notch 40 the maximum pressure of 255 pounds will be exerted and if the valve is not lifted from its seat this indicates that the extreme safety point has been reached and there would be danger of accumulated gas destroying the tank car. The valve must therefore be adjusted so that it will open easily at this point and of course it must also open at the normal pressure of 235 pounds. It will therefore be seen that with this device the operation of a valve at its minimum pressure, normal pressure and maximum pressure can be determined and proper adjustments made if it is found that the valve opens at its minimum pressure or fails to open at its normal or maximum pressure. In other words, the notches 39, 38, and 40 afford a means of determining the behavior of the valve for pressures at, below, and above 12 lbs. per square inch while the actual pressure on the valve is all the while just 12 lbs. per sq. in. The manner of testing a valve set for a pressure of 25 pounds per square inch would be the same as that set forth in connection with a valve having a pressure of 12 pounds per square inch except that the notches 41, 42 and 43 would be made use of. It will readily be understood that other sets of notches could be provided if so desired and would be spaced along the lever at the proper points and marked to indicate the pressure per square inch of the valve and the minimum, normal and maximum operating pressures.

What is claimed is:

1. A safety valve tester comprising a frame adapted to be supported above a valve to be tested, a fulcrum carried by said frame, a lever pivotally connected with said fulcrum, valve engaging means carried by said lever comprising a grapple with alternative diverse hook portions for lifting valves of different forms, and pressure applying means engaged with said lever and tending to move the same for testing operation of a valve at predetermined pressures.
2. A safety valve tester comprising a frame adapted to be supported above a valve to be tested and having a bearing with a vertically disposed opening, means for supporting the frame on the valve casing comprising foot members each having a shoulder portion to support the frame at one elevation and an offset projecting portion for supporting the frame at another

elevation, a fulcrum having a stem in said opening with means for adjusting it vertically, a lever pivotally engaged with said fulcrum and having valve engaging means, and means for imparting movement to said lever for testing operation of a valve at predetermined pressures.

3. A safety valve tester comprising a frame adapted to be supported above a valve to be tested and having a bearing provided with a vertically disposed opening, a fulcrum having a threaded stem extending upwardly through the opening and arms at the lower end of the stem, a shackle extending between said arms and a pin extending through the arms and shackle to mount the shackle, an adjusting and supporting unit threaded upon said stem and resting upon said frame, a lever pivotally supported by said shackle and having valve engaging means, and pressure applying means engaging said lever for imparting movement to the lever and testing operation of a valve at predetermined pressures.

4. A safety valve tester comprising a frame including a head portion and depending supporting legs, feet rotatably carried by said legs having portions for engaging a valve casing when the feet are in one position and also having depending valve casing engaging portions offset with respect to the first mentioned valve casing engaging portions and adapted to engage with a valve casing and support said frame in an elevated position when said feet are turned to an adjusted position, means affording a fulcrum carried by the head portion of said frame, a lever pivoted to said fulcrum, valve engaging means carried by said lever, and pressure applying means engaged with said lever.

5. A safety valve tester comprising a frame including a head portion and depending supporting legs, feet rotatably carried by said legs having portions for engaging a valve casing when the feet are in one position and also having depending valve casing

engaging portions offset with respect to the first mentioned valve casing engaging portions and adapted to engage with a valve casing and support said frame in an elevated position when said feet are turned to an adjusted position, means affording a fulcrum carried by the head portion of said frame, a lever pivoted to said fulcrum, valve engaging means carried by said lever and having a shank and a foot portion extending transversely of the shank and having its opposite end portions provided with valve engaging means, and pressure applying means engaged with said lever.

6. In a safety valve tester, a frame adapted to be supported directly upon a valve to be tested and comprising a bearing, arms extending therefrom, means for supporting the frame on the valve casing in positions of different elevation, a vertically movable fulcrum carried in said bearing, a lever pivotally engaged with said fulcrum, valve lifting means carried by said lever at one side of said fulcrum, said lifting means being provided with a member having diverse alternative valve engaging means for lifting valves of different forms, and pressure applying means carried by said lever at an opposite side of said fulcrum.

7. In a tester for tank car safety valves, a frame, means carried by said frame for affording it firm support distributed around the casing rim of a tank car safety valve and for preventing horizontal spreading thereof outward from its footing on such rim, a fulcrum carried by said frame, a lever supported by said fulcrum, means carried by said lever for effecting a latching engagement with the top of a tank car safety valve, and pressure applying means engaged with said lever and tending to move the lever for testing operation of a valve at predetermined pressures.

In witness whereof I have hereunto set my hand.

VICTOR WILLOUGHBY.