

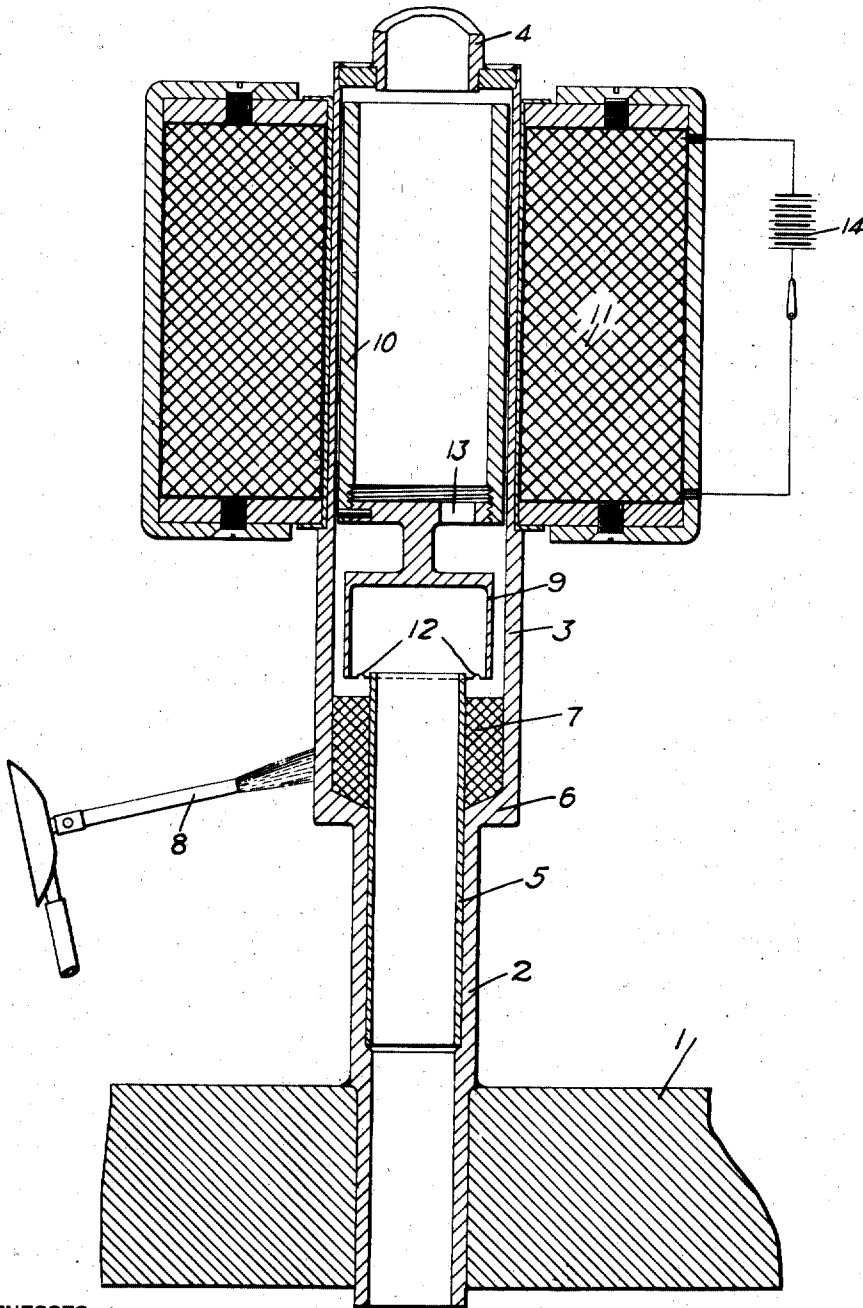
E. E. ROSE.

VALVE.

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1,223,736.

Patented Apr. 24, 1917.



WITNESSES:

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VALVE.

1,223,736.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD E. ROSE, a citizen of the United States, and a resident of Swissvale, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valves, of which the following is a specification.

My invention relates to valves, and it has for its object to provide a device of the character indicated that shall have few, simple and easily manufactured working parts and that shall be adapted to form an extremely tight closure in a fluid passage and to maintain said closure in spite of rough treatment.

The single figure of the accompanying drawing is a side view, in section, of a valve embodying a preferred form of my invention, together with associated auxiliary apparatus.

In the use of large vapor-arc converters, especially of the metal-case type and of allied forms of apparatus, it is essential that means be provided whereby an evacuating pump may be connected to, and disconnected from, the interior of the container. The ordinary valve is unsuitable for maintaining the extremely high degree of vacuum required in apparatus of the character indicated and, accordingly, valves have been developed wherein a mechanical closure within the exhausting tube may be sealed by mercury or other sealing fluid, as shown, for example, in the patent to Sakai No. 1,001,455, and in my copending application, Serial No. 39,363, filed July 12, 1915, (Case No. 4468) both assigned to the Westinghouse Electric & Manufacturing Company.

I have found that under exceptional circumstances, such, for example, as in railway work, absolute dependence may not be placed upon a sealing fluid of the character indicated because of the violent agitation to which the apparatus is subjected. According to the present invention, I substitute for the said sealing fluid a mass of solder or other suitable impervious readily fusible material and, furthermore, I associate with said sealing material a heating source whereby the same may be readily fused when it is desired to operate the valve. By this

means, the valve may be sealed by said material when in a fused condition and said material may then be permitted to solidify, thus forming an extremely tight closure which may be subjected to violent agitation without permitting leakage therethrough.

Referring to the drawing for a more detailed understanding of my invention, I show a portion of the wall of a vapor converter or other closed container at 1. A vertically disposed tube 2 is welded, or otherwise tightly sealed in the wall 1 and is provided with an enlarged portion 3 communicating with a tube 4 leading to a pump or other apparatus. A sleeve 5 is seated within the tube 2 and extends above the shoulder 6, thus providing an annular trough 7 in which is disposed a mass of readily fusible impervious material, such, for example, as solder. Any suitable means may be provided for melting said material, such, for example, as a burner 8 or a suitably located electric heating coil.

A cap 9 surmounts the upper end of the tube 5 and is supported from an armature member 10 adapted to coact with a solenoid 11 surrounding the member 3. The cap member 9 is preferably provided with small notches 12 in the lower edge thereof, and the armature 10 is provided with a gas passage 13 to facilitate the flow of material through the device.

Having thus described the structure of my valve, the operation is as follows: As shown, the solenoid 11 is energized from a suitable source 14 and draws up the armature 10, raising the cap member 9 and providing a free passage between the container 1 and the tube 4, via the sleeve 5, thence beneath the lower edge of the cap 9 and upwardly through the opening 13 and the interior of the armature 10. If said free passage is to be maintained for a long period of time, as, for example, during extended pumping, the sealing fluid 7 may be permitted to solidify, and the solenoid 11 be deenergized; whereupon the lower edge of the cap member 9 will rest upon the upper surface of the material 7, and gas will flow freely through the notches 12. When it is desired to close the valve, the material 7

may be heated to the fusing point, whereupon the weight of the cap member 9 and the armature 10 will cause the former to descend into the material 7 to completely submerge the notches 12. The source of heat will then be removed, whereupon the fluid will solidify and a permanently tight and effectual seal be obtained.

To open the seal, a reverse process will be followed. The material 7 will first be fused by the application of heat, and the solenoid 11 will then be energized to raise the cap 9, whereupon the material 7 may be permitted to solidify and the cap member 9 allowed to rest on the upper surface thereof.

While there is a wide range of material available for use as a solidifying agent, I preferably employ solder or other similar alloy, particularly such as contains small portions of antimony or bismuth which will cause said material to expand slightly when solidifying, thus providing an extremely tight closure.

The cap member 9 and the tubular member 3 are preferably composed of non-magnetic material in order to facilitate the action of the solenoid 11 and I find copper to be especially adapted for use in this connection, as it readily adheres to alloys of the character described in the production of a tight closure.

While I have described my invention in its preferred form, it will be obvious to those skilled in the art that it is susceptible of various other minor changes and modifications without departing from the spirit thereof and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or indicated in the appended claims.

I claim as my invention:

1. The combination with a tube, of means for providing a mechanical closure therein, and a mass of readily fusible solid material arranged to seal said closure when in the closed position, said sealing material being non-vaporizable under high vacuum at ordinary temperatures.

2. The combination with a tube, of means for providing a mechanical closure therein, and a mass of readily fusible alloy arranged to seal said closure when in the closed position.

3. Sealing means for a valve comprising a mass of readily fusible solid material which is non-vaporizable at ordinary temperatures under high vacuum.

4. Sealing means for a valve comprising a mass of readily fusible alloy.

5. Sealing means for a valve comprising a mass of solder.

6. The combination with a valve, of sealing means therefor comprising a mass of readily fusible alloy and retaining means for said alloy when fused.

7. The combination with a valve, of sealing means therefor comprising a mass of readily fusible alloy and retaining means for said alloy when fused, said retaining means being intimately associated with said valve.

8. In a valve, the combination with a vertically extending tube having an open upper end, of a mass of readily fusible alloy surrounding the upper portion thereof, an impervious cap fitting over the upper end of said tube, and means for causing relative movement of said alloy when fused and of said cap, whereby the lower edge of said cap may be submerged and passage through said tube be closed.

9. In a valve, the combination with a vertically extending tube having an open upper end, of a mass of readily fusible alloy surrounding the upper portion thereof, an impervious cap fitting over the upper end of said tube, and means for raising and lowering said cap relatively to said alloy when fused, whereby the lower edge of said cap may be submerged and the passage through said tube be closed.

10. In a valve, the combination with a vertically extending tube having an open upper end, of a casing surrounding the upper end of said tube, a mass of readily fusible alloy contained in said casing and surrounding the upper end of said tube, an impervious cap surmounting said tube and having its lower edge incased in said sealing material, and means for then raising said cap to provide a passage between the lower edge thereof and said sealing material.

11. In a valve, the combination with a vertically extending tube having an open upper end, of a casing surrounding the upper end of said tube, a mass of readily fusible alloy contained in said casing and surrounding the upper end of said tube, an impervious cap surmounting said tube and having its lower edge incased in said sealing material, and means exterior to said casing for then raising said cap to provide a passage between the lower edge thereof and said sealing material.

12. In a valve, the combination with a vertically extending tube having an open upper end, of a casing surrounding the upper end of said tube, a mass of readily fusible alloy contained in said casing and surrounding the upper end of said tube, an impervious cap surmounting said tube and having its lower edge incased in said sealing material, an armature of magnetic material attached to said cap, and a solenoid exterior to said casing for actuating said armature, whereby said cap is raised and an opening formed between the lower edge thereof and said alloy.

13. Sealing means for a valve comprising

a mass of readily fusible solid material which expands when solidifying.

14. Sealing means for a valve comprising a mass of readily fusible alloy which expands when solidifying.

15. Sealing means for a valve comprising a mass of solder which expands when solidifying.

16. Sealing means for a valve comprising

a mass of solder which contains constituents causing it to expand when solidifying.

17. Sealing means for a valve comprising a mass of readily fusible metal.

In testimony whereof, I have hereunto subscribed my name this 30th day of Oct., 1915.

EDWARD E. ROSE.