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VALVE ACTUATING MEANS

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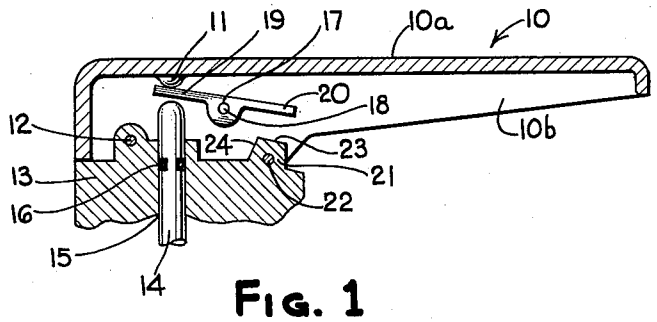


FIG. 1

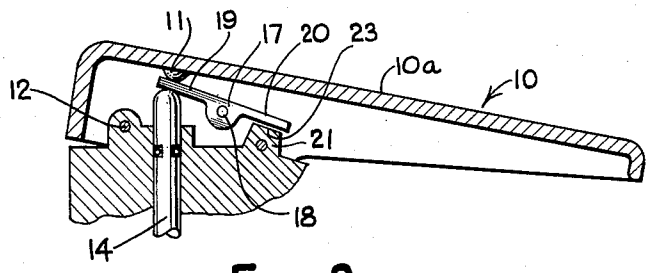


FIG. 2

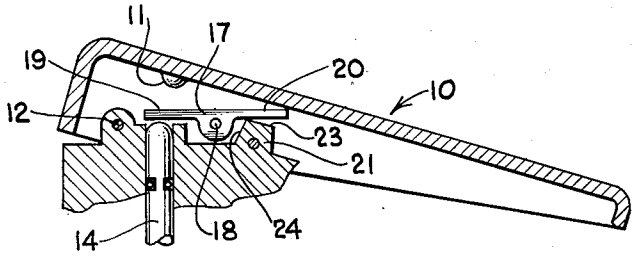


FIG. 3

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VALVE ACTUATING MEANS

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4 Claims. (Cl. 74—102)

This invention generally relates to valve actuating means, and more particularly relates to valve actuating means for depressing a valve stem in a body. The invention has been primarily developed for application in valve bodies incorporated in head assemblies of fire extinguishers, although it will be appreciated that the invention has utility in a great many diverse applications.

The present invention is deemed to be an improvement over a construction for actuating a valve stem as set forth in applicants' co-pending application, Serial No. 626,336, filed December 5, 1956, and entitled "Fire Extinguisher Head Assembly." In the latter application, applicants disclose a means for actuating a valve stem through cooperating movement of a lever and a cam element, the cam element functioning as a second lever. It is to be noted, however, that the same cam of applicants' referred to application is pivotably secured to the body of the head assembly in a position such that the effective actuating length of the main lever is decreased with respect to the pivot point thereof.

It is, therefore, an object of the present invention to provide a valve actuating means for depressing a valve stem in which the hand actuated lever may be pivotably connected to the body member of a conventional fire extinguisher head assembly at a point such that substantially the entire length of the lever extends in one direction from the pivot point thereby enabling a relatively small manual force for its actuation.

Another object of the present invention is to provide a valve actuating means in accordance with the foregoing object, which will effect a multiplication of movement so as to rapidly depress the valve stem or the plunger through an appreciable distance in response to limited pivoting action of the main lever means employed.

A still further object of the present invention is to provide a valve actuating means for depressing a valve stem in a body, which may be applied with relatively minor modifications to conventional fire extinguisher head assemblies and more particularly to the valve bodies incorporated therein, and furthermore which is susceptible of economical production with a minimum number of parts and which will additionally perform satisfactorily in a rugged manner over a long period of life.

These and other objects and advantages of the present invention are generally achieved by providing a valve actuating means for depressing a valve stem in a body, in which the valve actuating means comprises a first lever means pivotably mounted on the body. Second lever means are pivotably mounted on the first lever means, the second lever means having one arm thereof adapted to engage the body upon given angular movement of the first lever means with respect to the body. The second lever means has another arm thereof positioned to pivotably engage the valve stem in response to given angular movement of the first lever means.

In a preferable form of the invention, the one arm of the second lever means is initially disposed between the

valve stem and the first lever means so as to act as a force transmitting member until the first lever means has moved through a given angular distance. With this type of construction, the first lever means acts for a limited period of time as a force means effecting movement of the valve stem, and thereafter the second lever means functions for this purpose. As a consequence thereof, the movement of the valve stem is initially controlled according to the arcuate movement of the first lever means and thereafter according to the combined arcuate movement of the first lever means and the second lever means.

A better understanding of the present invention will be had by reference to the drawings, showing an illustrative embodiment, and in which:

Figure 1 is a sectional view of the valve actuating means according to the present invention in the normal unactuated position;

Figure 2 is a view of the valve actuating means of Figure 1 in a partially actuated position; and,

Figure 3 is a sectional view of the valve actuating means of Figure 1 in a fully actuated position.

Referring now to the drawings, there is shown in Figure 1 valve actuating means according to the present invention including a first lever means or lever **10**, which is concave or U-shaped in construction. The first lever means **10** includes an upper member **10***a*, from which downwardly depend side walls **10***b*, only one of such side walls being shown in the sectional view of Figure 1. The upper member **10***a* has a downwardly projecting boss or detent **11**.

The lever **10** is pivotably mounted as with a pin **12** or the like to the valve body **13**, which is only partially shown. The manner in which the valve body **13** is incorporated in the fire extinguisher head assembly, for example, will be apparent from an examination of the previously referred to co-pending application of applicants.

A valve stem or plunger **14** is mounted in the valve body **13** and is disposed in a bore **15** for sealed vertical movement therein. Towards this end, the valve stem or plunger **14** would normally be provided with an O ring seal **16** of conventional construction. It will be noted that the valve stem **14** has its upper end, as viewed in Figure 1, positioned in a vertical line below the boss **11** secured to the lever **10**.

According to a primary feature of the present invention, there is pivotably secured to the side wall **10***b* of the lever **10** a second lever means or lever **17**. Towards this end, a rivet or pin member **18** serves as a means of coupling the lever **17** to the lever **10** and permitting pivotable movement of the lever **17** with respect to the lever **10**. For clarity of description, the lever **17** may further be defined as having an arm **19** extending in one direction from the pin or pivot point **18** and another arm **20** extending in the other direction from the pivot point **18**. It will be noted that the arm **19** is normally interposed between the boss **11** and the valve stem **14**, such that upon downward arcuate movement of the lever **10**, the arm **19** will act as a force transmitting member. The other arm **20** is positioned in vertical spaced relationship from a projection **21** of the valve body **13**. The projection **21**, in conventional construction would normally be provided with a bore **22** to receive some type of safety locking member preventing movement of the lever **10** until it has been removed. The projection **21** may be additionally described as having an upper inclined surface **23**, as further partially defined by an inner side surface **24** extending down to the upper surface of the valve body **13**.

The important features and advantages of the present invention will be more fully appreciated by an explanation of the operation of the valve actuating means. It

is to be understood that the lever **10** is normally in the position of Figure 1 prior to actuation of the valve or operation of the fire extinguisher, for example. In order to operate the valve actuating means the lever **10** is pressed downwardly by manual force so as to pivot and move in an arc about the pivot point **12** of the lever **10**. As this motion occurs, the lever **10** will first move to the position as shown in Figure 2. In achieving the position of Figure 2, the boss **11** will have exerted a force on the arm **19** of the second lever means or lever **17**, to in turn transmit force to the valve stem **14** and urge it downwardly. Thus, until the lever **10** has assumed the position of Figure 2, the arm **19** of the lever **17** has acted merely as a force transmitting member interposed between the valve stem **14** and the boss **11**. In the meanwhile, the other arm of the lever **17** will have moved down so as to be brought in engagement with the upper surface **23** of the valve body projection **21**. It will be appreciated that once the arm **20** is in engagement with the supper surface **23** that further arcuate movement of the lever **10** will necessarily effect a pivoting action of the lever member **17** about the pivot point **18** thereof.

In consequence, with further movement of the lever **10**, the lever **17**, and more particularly the pivot point **18** thereof, will follow a downward arc prescribed by movement of the lever **10** about the pivot point **12**. In addition, simultaneously, the arm **19** of the lever **17** will be forced downwardly in a pivoting movement about the pivot point **18** of the lever member **17**. Thus, a multiplication of movement will be effected upon the lever **17** and in turn upon the valve stem **14** so as to force the valve stem **14** downwardly through a considerably greater distance (assuming a given arcuate movement of the lever **10**) than would have been possible if only the lever **10** and projecting boss **11** had been employed. In fact, as soon as the arm **20** abuts against the projection, **21**, the arm **19** will move against the valve stem **14** independently of the boss **11**.

In the fully actuated position of Figure 3, it will be seen that with a relatively limited arcuate movement of the member **10** from the position of Figure 2 to Figure 3, the valve stem **14** has been caused to move a considerably greater relative distance. It will be appreciated that as the lever **17** is following the arc prescribed by the lever **10** about pivot point **12**, the arm **20** of the lever **17** will necessarily slide along the upper surface **23** of the projection **21**, and more specifically the corner thereof merging into the inner side surface **24**. It will further be appreciated, that the maximum downward vertical movement of the valve stem **14** may be obtained by disposing the corner of the projection **21**, as defined by the upper surface **23** and inner side surface **24**, as close as possible to the pivot point **18**. However, the closer the projection **21** is disposed to the pivot point **18**, the greater the force required to effect movement of the arm **19** against the valve stem **14**. The relative position as generally shown in the drawings has been found to be satisfactory for most purposes, considering the factors involved.

It will be further appreciated from the foregoing description in conjunction with the drawings that a relatively small manual force is required to move the lever **10** downwardly since most of the lever **10** is disposed on the actuated side of the pivot **12** therefor. Thus, the construction of the valve actuating means of the present invention enables a relatively large gripping area for the handle as well as the use of a rather minimum amount of force which achieves a multiplication of movement on the valve stem **14** resulting in substantial vertical movement thereof. It will further be appreciated that at the time initial motion is imparted to the valve stem, which is the time at which the greatest force is required, the valve actuating means is constructed such that the maximum lever arm or nearly the full length of the lever **10** is employed. Thereafter, when the valve stem is moving and less force is required, the resistance force of the projection **21** comes into effect with the increased multiplication of movement.

It will be appreciated that many changes and modifications may be made in the valve actuating means of the present invention without departing from the spirit and scope thereof as defined by the following claims.

What is claimed is:

1. A valve actuating means for depressing a valve stem in a body, said valve actuating means comprising: a first lever means pivotably connected to said body at a first given pivot point, said first lever means including an upper member extending from said first pivot point in a position above said stem; a second lever means pivotably connected to said first lever means at a second given pivot point; said second lever means having a first portion on one side of said second given pivot point interposed between said upper member and said stem, whereby said upper member will transmit force through said first portion to said stem upon downward movement of said upper member; and, said second lever means having a second portion on the other side of said second given pivot point positioned above said body, whereby after a given arcuate movement of said upper member said second portion will engage said body and cause said first portion to pivot about said second given pivot point in continued engagement with said stem and effect a multiplication of arcuate movement of said first portion.

2. A valve actuating means for depressing a valve stem in a body according to claim 1, in which said first given pivot point is on one said of said valve stem and said second given pivot point is on the other side of said valve stem.

3. A valve actuating means for depressing a valve stem in a body according to claim 1, in which said second lever means is dimensioned and positioned such that said second portion will engage said body at a point which is located closer to said second given pivot point than the point at which said first portion engages said stem.

4. A valve actuating means for depressing a valve stem in a body, said valve actuating means comprising: first lever means pivotably mounted on said body; second lever means pivotably mounted on said first lever means, said second lever means having one arm thereof adapted to engage said body upon given angular movement of said first lever means, said second lever means having the other arm thereof disposed between said valve stem and said first lever means to act as a force transmitting member until said given angular movement is effected, whereby said other arm will thereafter continue to engage said valve stem in response to pivoting movement thereof with respect to said first lever means.

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