PUBLISHED

MAY 25, 1943.

BY A. P. C.

V. REMUS

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Filed April 17, 1940

Serial No. 330,197

7 Sheets-Sheet 1

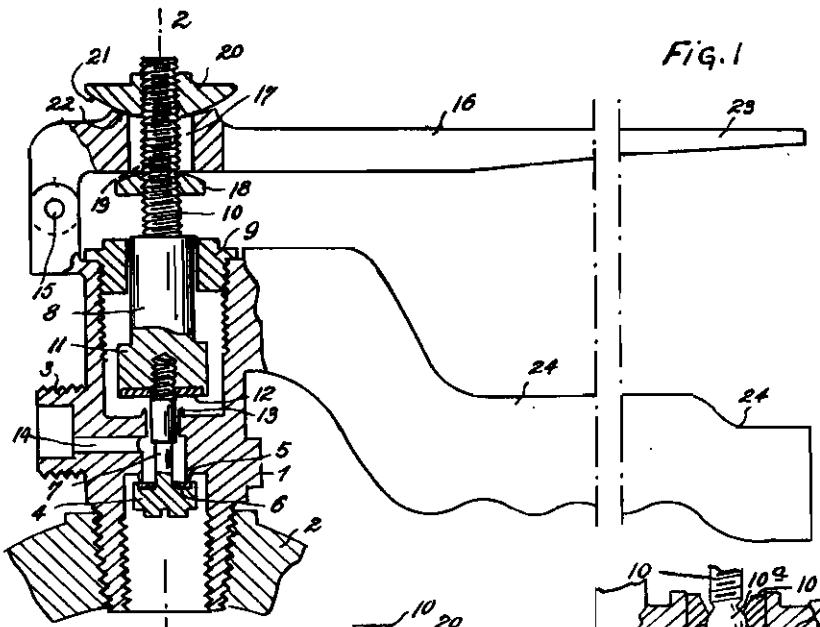


Fig. 1

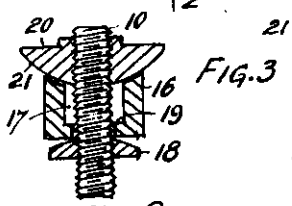
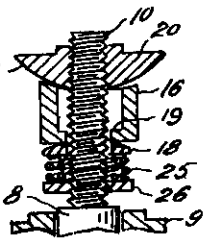


Fig. 3



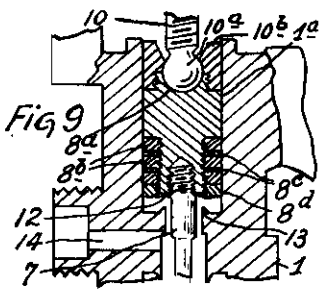


Fig. 9

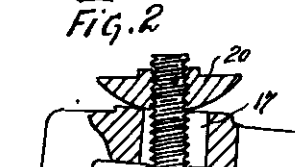


Fig. 2

Fig. 6

Inventor,
V. Remus
By: Glascock Downing & Seibold
Attys.

PUBLISHED

MAY 25, 1943.

BY A. P. C.

V. REMUS

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Filed April 17, 1940

Serial No. 330,197

7 Sheets-Sheet 2

FIG. 4.

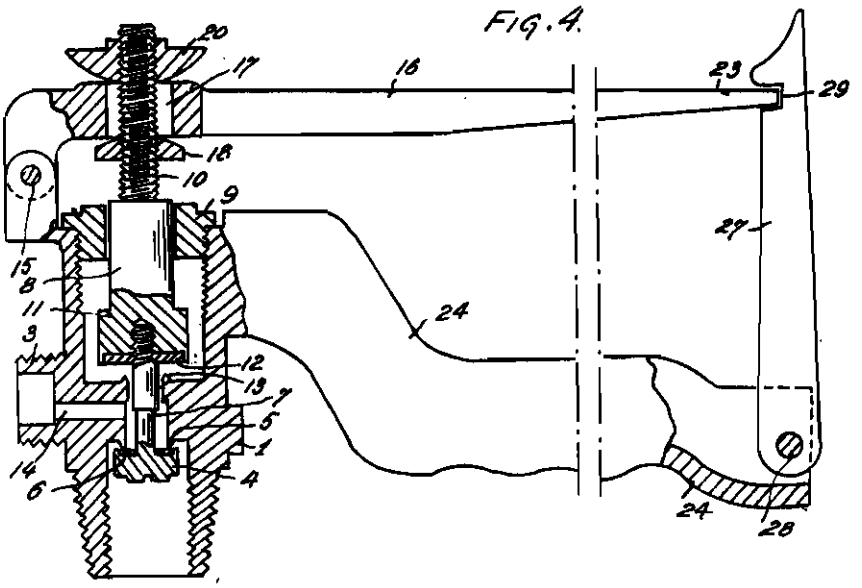


FIG. 5

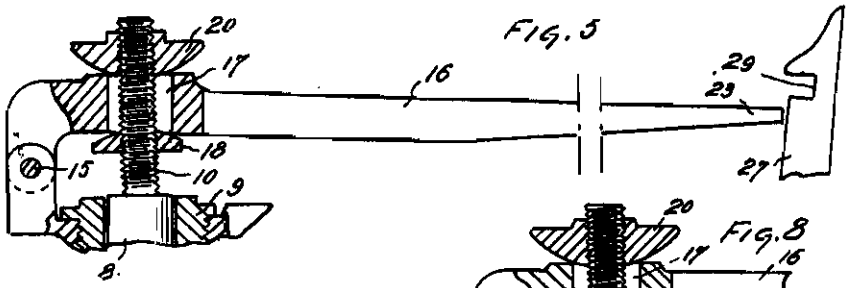


FIG. 7

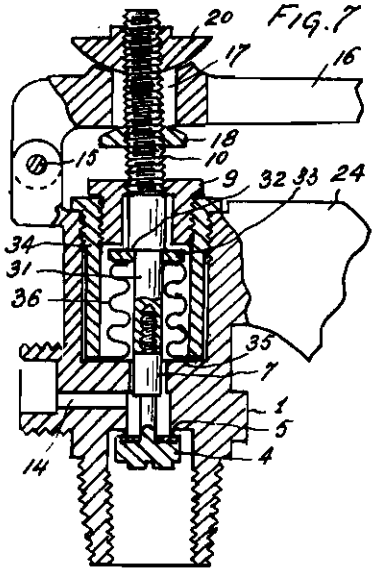
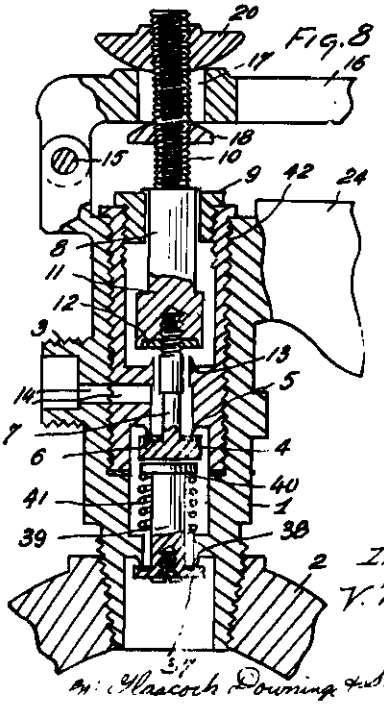


FIG. 8



Inventor,
V. Remus

By: Mascoch Downing & Schofield Attys

PUBLISHED
MAY 25, 1943.
BY A. P. C.

V. REMUS
VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE
Filed April 17, 1940

Serial No.
330,197

7 Sheets-Sheet 3

Fig 10

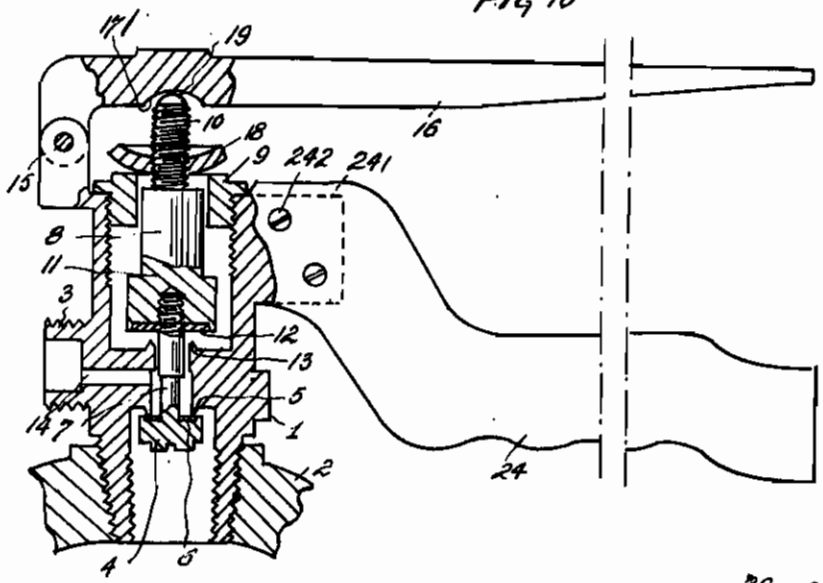


Fig. 11

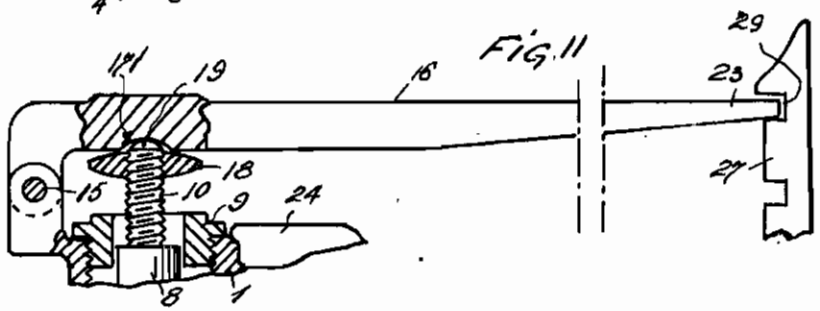
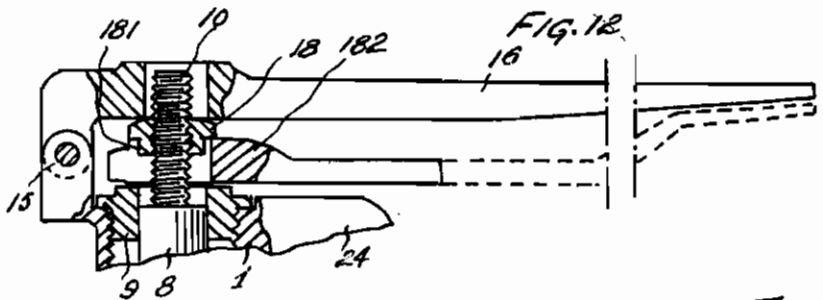


Fig. 12



Inventor:
V. Remus

By: Glascock Downing & Seebold
Attys.

PUBLISHED

MAY 25, 1943.

BY A. P. C.

V. REMUS

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Filed April 17, 1940

Serial No. 330,197

7 Sheets-Sheet 4

FIG. 13

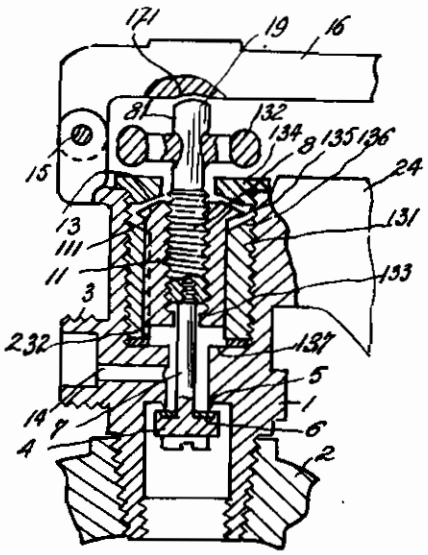


FIG. 14

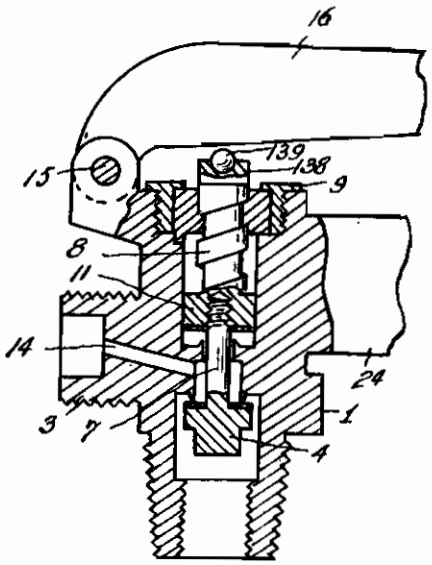


FIG. 15

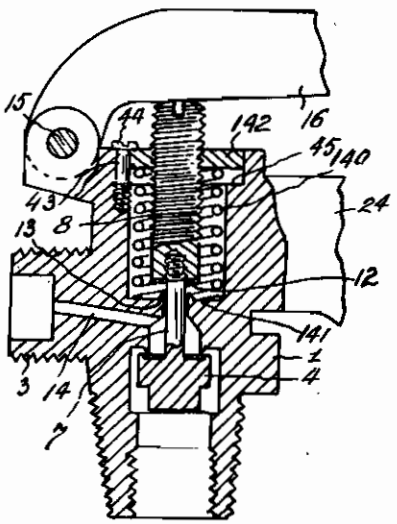
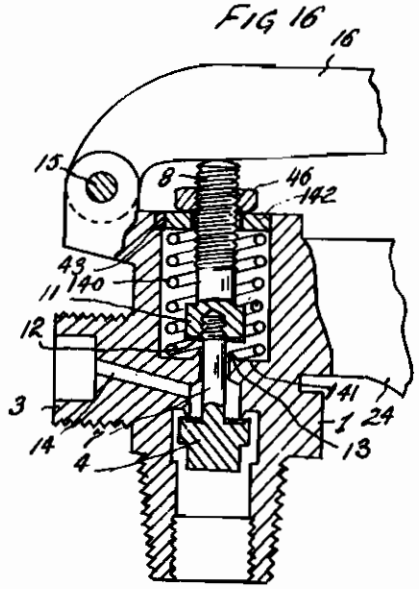


FIG 16



Inventor,
V. Remus

by: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 25, 1943.
BY A. P. C.

V. REMUS

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Filed April 17, 1940

Serial No. 330,197

7 Sheets-Sheet 5

FIG. 25

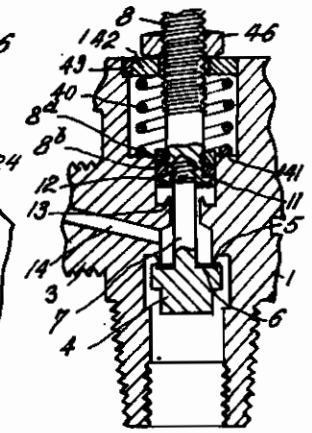


FIG. 24

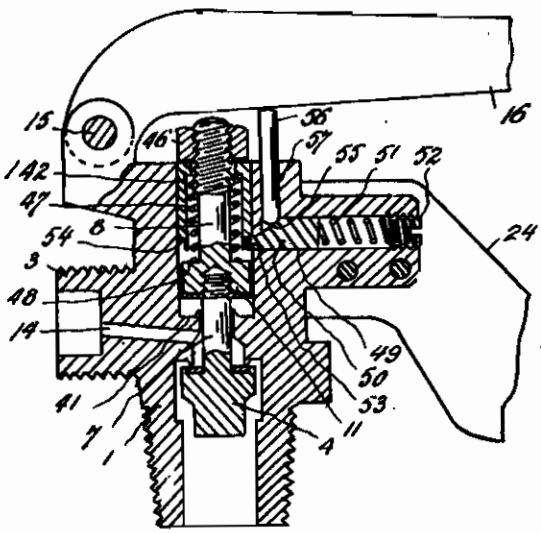
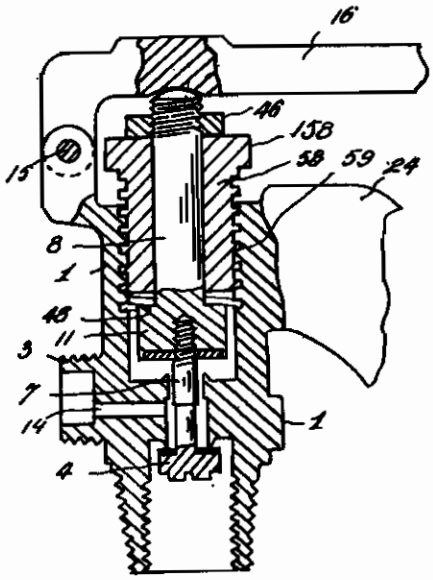
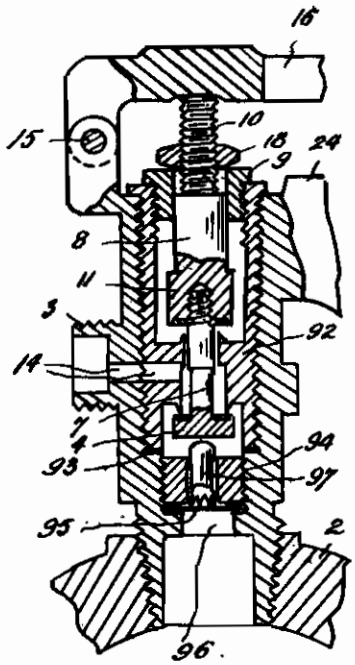


FIG. 17

FIG. 18





Inventor,
V. Remus

By: Glascock Downing & Seebold
Attys.

PUBLISHED
MAY 25, 1943.
BY A. P. C.

V. REMUS

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Filed April 17, 1940

Serial No. 330,197

7 Sheets-Sheet 6

FIG. 19

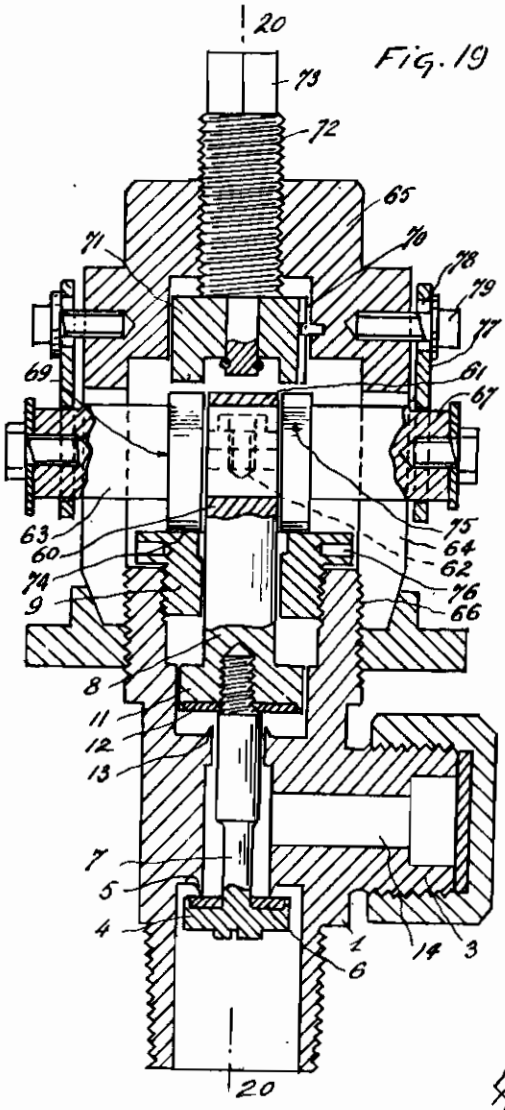


FIG. 21

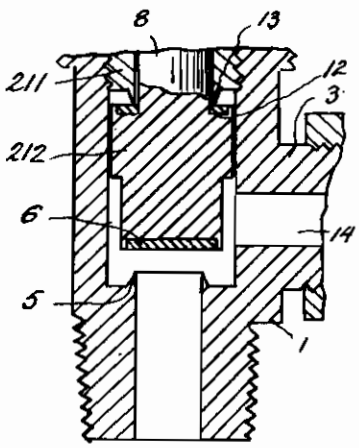
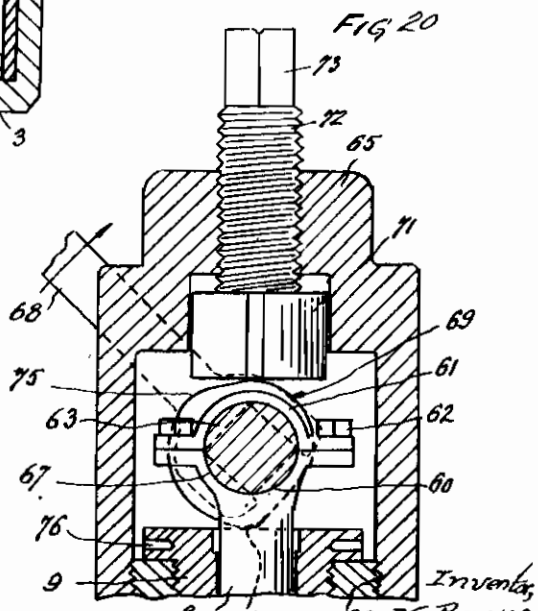


FIG. 20



Inventor,
V. Remus
By: Glascock Downing & Seybold

PUBLISHED
MAY 25, 1943.
BY A. P. C.

V. REMUS

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Filed April 17, 1940

Serial No. 330,197

7 Sheets-Sheet 7

FIG 22

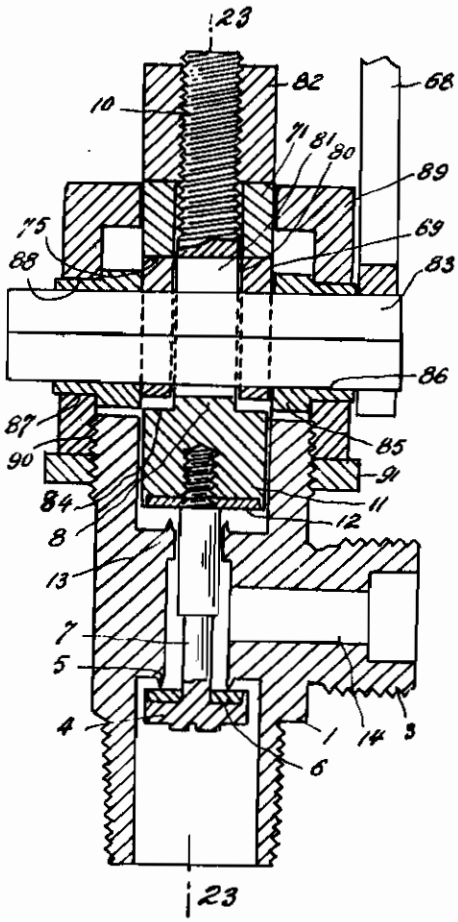
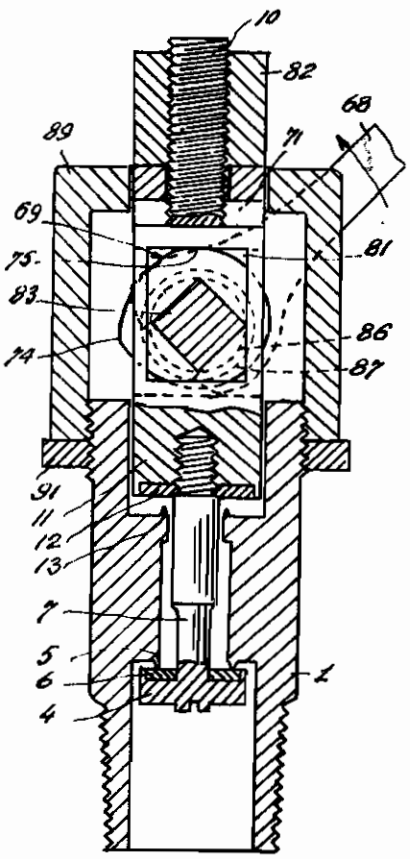


FIG. 23



Inventor,
V. Remus

By: Glascock Downing & Seebold
Attys.

Published May 25, 1943 Serial No. 330,197

ALIEN PROPERTY CUSTODIAN

VALVES OR OBTURATING DEVICES FOR FLUID PIPES AND CONTAINERS UNDER HIGH PRESSURE, PARTICULARLY FIRE EXTINGUISHERS AND THE LIKE

Valentin Remus, Brussels, Belgium; vested in the Alien Property Custodian

Application filed April 17, 1940

The invention relates to obturating means for fluid pipes and containers under high pressure, and particularly concerns the obturating devices used in connection with such pipes and containers in which an obturating valve opens against the pressure of the fluid.

In obturating devices of this kind, serious difficulties are encountered to ensure the tightness of the valve due, amongst other things, to the fact that the generally soft packing materials, normally used, are liable to deteriorate, such tendency being so much more marked that said materials are subjected to more severe temperature conditions, such as those due to the expansion of highly compressed fluids, or by reason of the climate as in hot countries, or for other reasons, such for example as a chemical action due to the fluid himself.

On the other hand, owing generally to the same reasons, during the discharge of the fluid, fluid losses through the valve operating device are unavoidable, and the same is true also during the loading of the pipes or containers with fluid under pressure, when, as in most of the cases, such loading is effected by causing the fluid to flow through the obturating device.

Also, it is of importance to ensure the perfect tightness of the obturating and valves devices in fluid containers under high pressure, not only under all the conditions to which these containers may be subjected in service, but also during transportation of such containers. While, generally, the levers, cams and like operating members associated to the obturating valves for actuating the latter are locked during transportation, such a locking, which is ensured through more or less strong bonding members, seals, lead seals, and similar devices, is in fact relatively safe only and does not positively prevent external accidental action on the valves and the unseasonable operation of the latter.

Moreover the containers with their levers, cams or other operating members mounted thereon are not only more bulky but, to avoid damages to these members, they require to be handled with great care, and this is not always the case during transportation.

Therefore, serious advantages would be gained if the levers, cams and other operating means of the valves or obturating devices could be separated from them during transportation of the containers equipped therewith.

Owing to crowding and possible injures to which may be subjected not only the levers, cams and the like, but also the valves themselves, as by striking of the valves on their seats during transportation of separate obturating or valves devices, as for example those intended to be mounted on pipes, it is of interest to separate these members from the obturating or valves devices or to be able to clamp them on their seats for transportation purposes.

The main object of the invention is to remedy these drawbacks, and to provide an obturating or valve device the tightness of which may be ensured under all conditions, that is as well in the state of complete or partial load of the associated pipe or container, as during the loading of said pipe or container with fluid under pressure or the discharge of said fluid and this whatever may be either the climatic or other conditions to which the obturating or valve device may be subjected, or the nature of the fluid.

Also the invention aims to ensure the tightness during the loading operation, in principle in an automatic manner.

Another object of the invention is to provide obturating or valves devices so arranged that injures to their parts will be avoided during transportation.

The invention consists, while providing the obturating device with valve packing members made of durable and unalterable materials such as metals and metal alloys, fibre, ebonite synthetic resins and materials behaving similarly, as synthetic rubber and the like, hereafter designated as materials of the kind specified, which are generally hard and deprived from the required softness to form easily tight joints, to provide means adapted to block mechanically a main valve on its seat, said means comprising an operating lever or an equivalent member which by cooperation with either a clamping member associated with the valves, or a stop or other locking member, provides a firm fulcrum for the member blocking the main valve on its seat.

The invention also consists in forming the fulcrum as a resilient member, the resiliency of the fulcrum cooperating to the blocking of the said main valve on its seat.

The invention also consists, in order to improve the isolation or separation of the passage through which the fluid is caused to flow as well during the loading operation as during the discharge of the fluid, to provide in combination an auxiliary valve as well as devices for mechanically blocking, eventually with the aid of resilient means, this auxiliary valve on its seat.

With advantage, the said main and auxiliary valves are arranged so that the action of the

fluid will be different on each of them, and preferably of lower value on the auxiliary valve than on the main valve.

Also the invention consists in arranging the lever, cam or the like through which the valve or valves is or are operated so that it may be easily separated, and in providing devices adapted to enable, without the aid of the said operating lever, cam or the like, at least one of the valves closing the pipe or container to be blocked on its seat. According to the invention, the expression operating lever, cam or the like means operating devices for valves or valve obturating devices providing for, at least, the axial displacement of said valves.

The invention also consists in associating with a valve closing the container or pipe, hereafter referred to as the main valve, and adapted to be blocked on its seat, a second valve adapted to isolate or separate the passage for the fluid from the operating device as well during the loading operation as during the discharge of the fluid, and which is preferably arranged to be blocked on its seat by the operation of the device blocking on its seat the first named valve.

Further, together with the valves named may be associated either a valve which is also adapted to close the container or pipe, or a structure comprising a diaphragm and a percutting member and adapted to answer the same purpose.

And in order to enable the manner in which the aforesaid arrangements may be practically devised, there will now be described with more detail, certain preferred embodiments given by way of examples and more or less diagrammatically illustrated in the annexed drawings, in which:

Fig. 1 is a part sectional side elevation view of a first embodiment;

Fig. 2 is a part cross sectional view, taken along the line 2—2 of Fig. 1;

Fig. 3 is a part cross sectional view, similar to Fig. 2, of an alternative construction;

Fig. 4 is a part sectional side elevation view of another embodiment;

Fig. 5 shows a detail of the embodiment according to Fig. 4;

Fig. 6 shows, in a manner similar to Fig. 4, an alternative construction of the arrangement illustrated in said figure;

Fig. 7 is a part sectional view of another alternative;

Fig. 8 illustrates the application of the invention to devices comprising two closure valves;

Fig. 9 is a part axial sectional view of an alternative;

Fig. 10 is a part sectional side elevation view of an embodiment comprising a separable operating lever;

Figs. 11 and 12 show similarly two alternative constructions of the embodiment of Fig. 10;

Fig. 13 is a part sectional side elevation view of an embodiment in which the main and auxiliary valves may be blocked on their respective seats by means of the same operating device;

Figs. 14, 15 and 16 show, in a similar manner, alternative constructions of the arrangement according to Fig. 13;

Fig. 17 is a part sectional side elevation view of an embodiment including a controlled locking of the main valve;

Fig. 18 is a part sectional side elevation view of another alternative;

Fig. 19 illustrates in sectional elevation an embodiment in which the valves are operated by cam devices;

Fig. 20 is a part sectional view along 20—20 of Fig. 19, this section being taken at right angles to that of this figure;

Fig. 21 shows a part sectional view, similar to that of Fig. 19, of an alternative construction;

Fig. 22 is a part sectional side elevation view of another embodiment in which the valves are operated by means of a cam;

Fig. 23 is a sectional view along 23—23 of Fig. 22, and taken at right angles to the plane of this figure;

Fig. 24 is a part sectional side elevation view of another embodiment, showing the association of a main valve with a percuting member;

Fig. 25 shows an alternative arrangement.

Referring to Figs. 1 and 2, 1 designates the body of a valve device mounted on a container for fluid under high pressure, shown by part at 2, and intended to control the discharge of the fluid from this container through the nozzle 3 to which any suitable distributing pipe, not illustrated, may be connected.

In the valve body 1 is mounted a valve 4 resting on its seat 5, with an interposed packing made of a material of the kind specified, preferably a metal.

In the illustrated embodiment, this packing is formed with a ring of white or antifriction metal, or the like, 6, sets in an annular groove of the valve 4.

For actuation purposes, the valve 4 is connected, as by screwing, through the intermediary of an extension 7, with a sliding rod 8 passing through a guide member 9 secured as by screwing to the body 1.

Past this guide, the operating rod is screw threaded as seen at 10.

On the other hand, made integral with the rod 8 or connected therewith there is provided a disc 11 in which is formed a circular groove also receiving a packing made of a material of the kind specified, as a metallic packing, for example made of white or antifriction metal, 12, said disc being adapted to cooperate with a seat 13 integral with or inserted in the body 1, in such a way that when the rod 8–10 is lowered to move the valve 4 away from its seat, the said disc 11 presses through its packing 12 against the seat 13 and forms a seal with the latter.

Between the seats 5 and 13 is formed a passage 14 adapted to ensure communication between the interior of the container 2 and the nozzle 3 when the valve 4 is moved away from its seat.

Further, on the body 1 is mounted, through the intermediary of a pivotal connection 15, or the like, an operating lever 16, provided with a more or less elongated opening 17 through which passes the screw threaded portion 10 of the operating rod.

On this screw threaded portion, and below the lever 16, is mounted a stop 18 of which the upper surface has been shaped, and for example curved in order to cooperate with lateral shoulders 19 provided on opposite sides of the opening 17 as better seen in Fig. 2. On the screw threaded portion 10, but above the lever 16, is mounted a stop 20 having a shaped and preferably curved bottom surface 21, and which cooperates with the edges 22 of the opening 17, such edges having been shaped as a curved seat, the curvature of which corresponds approximately to that of the surface 21.

The arrangement is sueh that when the stop

20 is screwed up so as to ensure an intimate contact between the surface 21 and the edges 22, while tightening the lever 16 between the stops 20 and 18, owing to the screwing operation this lever takes the position illustrated in the figure, in which it presses firmly the valve 4 on its seat 5.

From this position of the lever, one may, by an action applied at the end 23 of the lever 16, move the valve 4 away from its seat and further cause the packing 12 of the disc 11 to contact with the seat 13, thus isolating or separating the passage for the fluid flowing from the container 2 towards the nozzle 3. This operation is assisted by the provision on the body 1 of a handle 24, which may be grasped by the operator simultaneously with the lever 16—23, and which, in the case of fire extinguishers, also enables the apparatus to be directed towards the fire and this by the hand operating the said lever.

The intimate engagement of the packing 12 with the seat 13 may further be ensured by giving to the valve 4 an useful working surface greater than that of the auxiliary valve 11, so that when the valve 4 has been moved away from its seat, the fluid under pressure will exert a more considerable action on this valve than on the auxiliary valve.

In the foregoing only the fluid discharge from the container 2 has been considered.

When the container is again to be loaded with compressed fluid, a communication must be provided between it and the fluid source, and to this end, in most of the cases use is made of the nozzle 3 and passage 14.

When the aforesaid communication has been made, by depressing the lever 16 while at the same time applying firmly the disc 11 with its packing 12 against the seat 13, the compressed fluid also acts on the valve 4, and if a larger useful working surface has been given to this valve as compared with the auxiliary valve, this latter valve will be retained on its seat, even when releasing the lever 16—23 from the manual action thereon.

It has been found in practice that under these conditions the action of the fluid on the valve 4 will be sufficient to ensure a perfect tightness.

As the fluid passage between the container 2 and the nozzle 3 is isolated or separated as well during the loading operation as during the discharge of the fluid, no packing for the rod 8 will be necessary in the extend of its passage through the guide 9, and such passage through this guide may occur with a clearance sufficient to permit the operating rod to slide easily therein.

Owing to the use of valve packings of the kind specified, such as the metallic packings 6 and 12, no injure or damage is to be expected as well from a considerable lowering in temperature due to the expansion of the compressed fluid during the discharge as from high temperatures resulting from local climatic conditions, or for other reasons, as for example the vicinity of a fire, a chemical action of the fluid, or the like.

In the embodiment of Figure 3, the arrangement is similar to the one described with reference to the Figures 1 and 2, except that the stop 18 may slide freely along the portion 10 of the operating rod while it is pressed against the seat elements 19 by means of a strong spring 25 retained under desired compression by means of a disc member 25 screwed onto the screw threaded portion 10.

Owing to this spring, the actuation of the lever 16—23 is rendered more easy while the operation of the device is in other respects the same as that of the device according to Figures 1 and 2.

According to Fig. 4, the fulcrum taken on the lever 16 to secure the blocking of the valve 4 in the closed position of said valve is not obtained by imparting an appropriate shape to a portion of this lever, such as the edge 22 of its opening 17 as aforesaid, but either by means of a fulcrum or through the locking of this lever on or by means of an easily removable member.

In the illustrated embodiment, the said fulcrum is formed by means of a lock 27 pivoted on a pivot 28 of the handle 24 and engaging on the end 23 of the lever 16 by a notch 29.

When the lock 27 is thus engaged, it will be sufficient to engage somewhat more the stop 20 on the threaded portion 18 to cause the valve 4 to be firmly applied against its seat 5 and to prevent any possible escape of the fluid past this valve. On the other hand, for opening the valve 4, it will be sufficient to cause the lock 27 to be tilted outwardly in order to release the lever 16 and to enable the latter to be depressed as hereinafter explained.

When the discharge has been completed, the released lever 16 is returned in the upwards position by the action of the residual fluid on the valve 4, and then the lock 27 may again be engaged, the stop 20 being eventually screwed somewhat more to ensure the fluid tightness of the valve.

Instead of operating this stop, advantage may be taken from the resiliency of the lever 16, by arranging that in the raised position of this lever, the end thereof is located somewhat below the notch 29 as illustrated in Fig. 5.

Then, by exerting a pull from below upwards on the end of this lever, one may engage the end thereof in the notch 29 and thus firmly press at the same time the valve 4 on its seat.

Otherwise, the operations for re-loading the container or pipe to which the valve device is associated, are performed as described with reference to the Figures 1 and 2, the setting on its seat of the auxiliary valve 11—12 being eventually ensured by giving to this valve 11—12 a smaller useful working area than that of the valve 4.

However, as well during the loading as during the discharge of the fluid, an intimate and well tight contact of the auxiliary valve 11 on its seat 13 may be ensured in a permanent manner, by retaining the lever 16 in its depressed position by engagement of its end 23 in a notch 30 formed at a suitable location in the lock 27, and by raising somewhat, eventually, the stop 18 on the threaded portion 10 (Fig. 6).

The result of this is to press the packing 12 on the seat 13, and to remedy to any lack of tightness of the auxiliary valve should a fluid leakage occur thereon.

As in the locking action described with reference to the Figures 4 and 5, it can be arranged so that, when the lever 16 is depressed so as to merely ensure the contact of the packing 12 with the seat 13, the end 23 of the lever 16 is located somewhat above the notch 30, the further lowering of said lever and the engagement of said end in the said notch resulting in the firm application of the packing 12 on the seat 13, thus ensuring a perfect tightness of the auxiliary valve.

At the completion of the discharge or when reloading the pipe or container with compressed fluid, it will be sufficient to release the lock 27 by

tilting it outwardly in order to restore the lever 16 in its raised position, while eventually locking it again in this position by engaging the end 23 thereof in the notch 29.

As hereinbefore indicated, the auxiliary valve may be other than a disc member, and Fig. 7 illustrates one of the other possible embodiments.

In this figure, the rod 8 is reduced in diameter at 31 so as to provide a shoulder at 32, and on this reduced portion and in contact with the shoulder, a disc member 33 is secured in a fluidtight manner.

Between this disc member 33 and the end of a sleeve 34 screwed in the body 1, is mounted an undulated metallic cylinder 36, the flanged end portion of which is tightened between the said end of the sleeve 34 and a shoulder 35 on the body 1.

Under such conditions, when the lever 16 is depressed to move the valve 4 away from its seat, in order to secure the discharge of the fluid from the associated container or pipe, or to permit same to be re-loaded with fluid under pressure, the undulated cylinder prevents any leakage of the pressure fluid.

Instead of using an undulated cylinder 36, the diaphragm may be arranged as a simple disc member formed by means of a membrane or a set of superimposed membranes made of flexible material, the peripheral portion of which is pressed in a fluidtight manner between the body 1 and the bottom of the sleeve 34, while the edge of the central opening thereof is pressed in a fluidtight manner between a shoulder such as 32 and a disc plate such as 33.

Besides the described particular arrangements of the auxiliary valve, the construction in this figure is similar to the one set forth with reference to the Figs. 1 and 2.

Figure 8 shows the invention as applied to valve devices including two valves, the main valve 4 cooperating with a valve 37 also opening against the fluid pressure.

As will be seen on the figure, the assembly including the main valve 4, the auxiliary valve 11 and the operating rod 7—8—10, is mounted within a member 42 engaged in the body 1 and secured to the latter in any approved fluidtight manner, for example by screwing as illustrated. The member 42 includes a section of the discharge passage 14 which cooperates with another section of this passage formed in the body 1.

Otherwise, the body 1 includes the pivotal supporting bracket for the lever 16, and a seat 38 for the valve 37, the rod 39 of this latter valve being provided with a disc plate 40 and being mounted in line with the operating rod 7—8—10 for the valves 4 and 11.

The valve 37 may be either urged on its seat by means of a spring 41, or not so urged, and it includes a packing similar to those of the valves 4 and 11.

In operation, when the lever 16 is depressed to move the valve 4 away from its seat, this latter valve engages the disc plate 40 and moves the valve 37 downwardly away from its seat, the tightness being ensured during the discharge by the application on its seat of the valve 11.

When the lever 16 is returned in raised position, the valve 4 is raised and under the pressure of the fluid and, or the action of the spring 41, the valve 37 is also restored on its seat. The tightness is ensured by the two valves 37 and 4, and in any case by the blocking on its seat of the valve 4 in the manner already indicated in the foregoing.

Instead of the auxiliary valve 37 and the seat 38, a percuting member and a metallic diaphragm may be used, the metallic diaphragm then being pierced during the first opening operation of the valve 4 and neeessarily remaining so, until it is replaced, that is during the subsequent opening operations, up to the complete emptying of the container 2.

Several partial discharges of the container remain nevertheless possible, as the closing of the container and the tightness of the closure may in any case be ensured through the valve 4.

In the described arrangement, it has been assumed that the part 10 of the operating rod is rigidly connected to the part 8 of this rod. In cases where the opening course has a substantial value, or even in normal cases, it may be of interest to avoid any slight rocking movement of the valves, which may be due to the action of the operating lever when the aforesaid parts 10 and 8 are rigidly connected together.

To this end, a certain freedom of movement, other than in axial direction, may be allowed to the part 10 relatively to the part 8, and this may be ensured by pivoting these parts together in any suitable manner, and for example by means of a spherical connection as illustrated in Fig. 9.

In this figure, the part 10 terminates in a ball member 10*a* engaged in a hollow 8*a* of the part 8, said ball being retained in position by means of a cover 10*b* screwed on the part 8 and which may also be used with advantage for guiding this part 8 in the smooth hole 1*a* of the body 1.

On the other hand, with reference to the described arrangements, it has been said that the tightness as well during the loading operation as during the discharge of the fluid, is ensured in a perfect manner by the valve arrangements set forth. However within the interval of the passage from the open position to the closed position, or vice-versa, a slight escape of fluid may occur should the movement not be executed very quickly, thus leaving the impression of a defect in tightness of the device.

To avoid this drawback, Fig. 9 shows that between the elements which are movable relatively to each other, as the part 8 and the body 1, a packing may be provided, formed by means of a washer or washers 8*b* made of a more or less soft metal, as for example lead, and which are either engaged on the part 8 or located within the body 1, these washers being preferably arranged between or separated by washers such as 8c made of a hard metal. A ring 8*d* secured as by screwing may further be provided for retaining the packing into place.

With reference to Fig. 10, 1 again designates the body of a valve device mounted on a container for fluid under high pressure, illustrated by part at 2, in order to control the discharge of the fluid from this container through the nozzle 3, to which any suitable distribution pipe, not shown, may be connected.

In the body 1 is mounted a valve 4 resting on a seat 5, with the interposition of a packing 6, preferably made of one of the materials of the kind specified.

For operating the valve 4, this valve is connected, as by screwing, through the intermediary of an extension 7, to a sliding rod passing through a guide member 8 screwed on the body 1.

Past said guide, the operating rod is screw threaded as seen at 10.

On the other hand, formed integral with, or mounted on the rod 8, is a disc member 11 provided with a circular hollow or groove also receiving a packing 12, preferably made of one of the materials of the kind specified, and adapted to cooperate with a seat 13 made integral with or mounted on the body 1, in such a way that when the rod 8—18 is lowered to move the valve 4 away from its seat, disc member 11 is applied, through its packing 12 on the seat 13 and forms a tight joint therewith.

Between the seats 5 and 13 is formed the passage 14, ensuring the necessary communication between the interior of the container 2 and the nozzle 3, when the valve 4 is moved away from its seat.

Further on the body 1 is mounted, in an easily separable manner, and preferably through the intermediary of a pin 15 or the like, an operating lever 16 preferably provided with a more or less elongated hollow 171 and resting on the end 19 of the threaded portion 10 of the operating rod 8.

On this threaded portion, and below the lever 16 is mounted a stop 16, preferably made of curved shape, and intended to cooperate with the edge of the guide 9. The arrangement is such that when the stop 16 is screwed on the threaded portion 10, so as to contact with the edge of the guide 9, the valve 4 is mechanically moved in upwards direction and firmly pressed, through its packing 6, against its seat 5, thus ensuring a perfect tightness.

Under such conditions, the lever 16 may be dismounted and removed, and the container, together with its valve device having its valve blocked on its seat, may be safely shipped, without danger of injuring the lever or of accidental opening of the closure valve.

It will be observed that in case of transportation of the valve device separated from the container, and with the lever 16 removed and the valve 4 pressed against its seat 5, by proper screwing of the stop 18 on the threaded portion 18, this valve is prevented from striking its seat under shocks or vibrations, this rendering possible to retain these members in perfect operating conditions and to substantially reduce the required space for the obturating device.

To operate the valve device it will be sufficient to restore the lever 16 in its operating condition, by inserting the pin 15 in place, and thereafter to move the stop 18 away from the edge of the guide 9 in order to permit the axial movement of the valves.

This being done, by properly actuating the lever 16, one may move the valve 4 away from its seat and further, cause the packing 12 of the disc plate 11 to contact with the seat 13, thus isolating or separating the passage for the fluid from the container 2 towards the nozzle 3.

This operation is assisted by the combination, with the body 1, of a handle 24, which handle is also made easily separable and, to this end, constructed as a hollow body, mounted on an extension 241 of the body 1 and secured thereon through the intermediary of screws or the like 242.

The intimate contact of the packing 12 with the seat 13 may be further ensured by giving to the valve 4 an useful working surface which is larger than that of the valve 11, so that when the valve 4 is at once moved away from its seat, a more considerable pressure is exerted by the fluid on this valve than on the valve 11.

This is also applicable to the loading operation of the container 2 with fluid under pressure, which is generally effected through the intermediary of the nozzle 3 and the passage way 14. Under these conditions, by its action on the valve 4, the compressed fluid moves this valve away from its seat, while simultaneously applying firmly the disc plate 11, together with its packing 12, against the seat 13, owing to the larger useful working area of the valve 4. Naturally, this application may be improved by a manual action on the lever 16, but it is found in practice that the action of the fluid on the valve 4 is sufficient to secure a good tightness.

When necessary a more perfect tightness may yet be secured by blocking the valve 11—12 on its seat and Fig. 11 shows a means adapted to secure this result.

In accordance with this figure, a locking member 27 has been associated with the handle 24, such locking member being pivoted to said handle in any suitable manner, for example by means of a pin, not shown, and being provided with at least one notch such as 29 adapted to engage the end 23 of the lever 18 when the latter is depressed in the position for which the valve 11—12 is applied on its seat.

Then by moving upwards the stop 18 along the threaded portion 10, so that it engages the locked lever 16, the packing 12 may be applied against the seat 13 with any desired pressure.

In addition to the aforesaid results, a temporary mechanical blocking of the valve 4 on its seat may be ensured by means of the arrangement, and Fig. 12 shows an example of such an application.

In this figure, the stop 18 is made with a restricted portion 191, on which are preferably formed two lateral flat portions 183. By then engaging a member 182, having a fork shaped end, between the stop 18 and the upper surface of the guide 9, the return movement, and the application, with the desired pressure, of the valve 4 on its seat, is automatically obtained.

The combination of the fork branches with the flat portions 183 of the stop 18 enables this stop to be moved on the threaded portion 10, thus providing for an additional tightening of the stop and an additional pressure upon the valve.

To the handle of the fork member may eventually be given a suitable shape to enable it to be assembled with the end of the lever 18 during the temporary blocking of the valve 4 on its seat.

The embodiment of Fig. 13 comprises the members 1 to 7, 14 to 18 and 24 with the same arrangement as described with reference to Fig. 10 but the rod 7 of the valve 4 is connected, as by screwing, with an operating rod 8 shaped as a screw having a more or less quick pitch, and preferably a left screw pitch, of which an extension 81 is provided with a means for rotating the screw, as for example a hand wheel 132.

The screw 8 is engaged in a sliding sleeve forming the member 11 of the preceding arrangement, and on which is provided a bearing surface, preferably of conical shape, 111, which may be provided with a packing, not shown, and which cooperates with a correspondingly shaped seat 13, preserved in a cap 134 screwed on the end of the body 1.

Another bearing surface, preferably also of conical shape 135, is formed on the sleeve 11, and cooperates with a corresponding seat 135 formed at the end of a sleeve 131.

The sleeve 11 is also provided at its lower end with a shoulder 136 forming an abutment for

the lower end of the screw 8, and it is mounted for sliding movement within the sleeve 131 screwed in the body 1. Rotation of the member 11 in the sleeve 131 is prevented by a suitable means, such as a longitudinal rib 132, in engagement with a corresponding groove of the sleeve 131.

A device arranged as indicated operates in the following manner.

The valve 4 being applied on its seat by the pressure of the fluid filling the container 2, if one actuates the hand wheel 132 by rotating the latter, in anticlockwise direction for a left hand pitch of the member 8, the sleeve 11 is moved upwards and, sliding in the sleeve 131, engages, through its bearing surface 111, the seat 13, forming a tight seal between these members. From this moment, the continued rotation of the hand wheel 132 in the same direction as before, causes the lowering of the screw 8 and consequently of the rod 7 and the valve 4, moving the latter away from its seat. Thus the fluid may flow from the container 2 through the passage 14 or fluid may be introduced in the container 2 through the same passage.

The rotation of the hand wheel 132 and rod 8 in the other direction causes the upward movement of the screw 8 relatively to the sleeve 11 until the valve 4 has been restored on its seat, after which the sleeve 11 moves in downward direction relatively to the sleeve 131, and this until the bearing surface 135 engages the seat 136, any additional rotation of the hand wheel 132 strongly blocking the valve 4 on its seat.

To operate this valve by means of the lever 16, it will be sufficient, after having caused the sleeve 11 to raise relatively to the sleeve 131 for either a small distance or until the bearing surface 111 contacts with the seat 13, to move said lever downwards, thus causing the sleeve 11 to slide in the sleeve 131 and the valve 4 to move away from its seat, and this until the moment the bearing surface 135 and seat 136 come into contact with each other and form a tight joint between them. Thus the fluid may flow from the container 2 through the passage 14, and fluid may be introduced from outside into the container.

From the opening position, the return movement of the valve 4 on its seat is effected under the action of the fluid filling the container, but, should it be necessary or desirable, a return spring or other resilient member may be provided between the shoulder 137 of the body 1 and the lower surface of the sleeve 11.

In the embodiment of Fig. 14, the arrangement of the two valves 4 and 11 of Fig. 1 has been retained, but the operating rod 8 is shaped as a quick pitch screw, mounted in the guide 9 as shown, and at the top of which is provided a square portion 138 supporting an antifriction member, as a ball or roller 139.

The pitch of the screw 8 is such that the pressure of the fluid filling the container 2 is sufficient to move the valves 4 and 11 and the screw 8 to apply the valve 4 on its seat, after which a slight rotatory movement in the same direction imparted to the square portion 138 by means of a wrench or other suitable tool, complete this application by causing a slight jamming action of the screw in its guide.

In order to open the valve 4 and to apply the valve 11—12 on its seat 13, it will be sufficient to depress the lever 16 until this application is obtained, after which a slight additional rotation of the screw 8 results in a considerable contact pressure owing to a slight jamming action of the screw 8 in its guide 9.

According to Fig. 15, the arrangement of the valves 4 and 11 remains the same, but the intimate application of the valve 4 on its seat is ensured by means of a strong spring 140 inserted between a shoulder 141 of the body 1 and a guide member 142 mounted for sliding movement within the body 1, but without turning in the latter owing to the provision of a spur 43 having a head 44 engaged by part in the guide member 142 and by part in the body 1 and retained in the latter as by screwing.

The operating rod 8 for the valves is screw threaded and is engaged by screwing in the guide 142.

To open the valve 4 and to apply the valve 11—12 on its seat, it will be sufficient to depress the lever 16, the opening of the valve 4 being effected against the pressure of the spring 140.

The return movement of the valve on its seat is obtained by the action of the spring 142 and that of the fluid, but should the application so obtained be insufficient to ensure perfect tightness it will be sufficient to rotate the screw 8 in the screw releasing direction, this resulting in the further engagement of the guide 142 within the body 1 and the additional compression of the spring 140, thus increasing the applying pressure.

However, nothing will prevent the rotation of the screw 8 to be continued until the guide 142 contacts with the shoulder 45 of the body 1, after which any additional rotation, in the same direction, of this screw, forces mechanically the valve on its seat.

Similarly, the forced application of the valve 12 on its seat 13 may be obtained by sufficient screwing engagement of the member 8 into the guide 142 retained by the head 44 of the screw 43, as may be easily seen by inspecting the drawing.

In Fig. 16, the application of the valve 4 on its seat is also obtained by the action of the spring 140, the threaded rod 8 passing freely through the guide 142 but being prevented to rotate in this guide by known means not illustrated, while the more or less heavy compression of the spring is controlled by means of the nut 46 or an equivalent member.

In other respects, the arrangement is the same as in Fig. 15 except that the application of the valve 4 is obtained by a resilient action only and that of the valve 11—12 is obtained by means of the lever 16 only.

In Fig. 17, the arrangement is such that the forced application of the valve 4 on its seat does not materially affect the operating conditions of this valve by means of the lever 16.

According to this arrangement, the guide 142 of Fig. 16 is made in the form of a sleeve, sliding in the body 1, and a spring 47 resting against the back surface 48 of the valve 11 retains this sleeve in contact with the nut 46 engaged on the threaded rod 8. Crosswise, within a bore 49 of the body 1, is mounted a sliding bolt 50 pressed by a spring 51 which is compressed between the bolt 50 and a screw 52 closing the bore 49, the said bolt having an extension 53 adapted to engage below the lower flange 54 of the sleeve 142, and an inclined bearing surface 55 following the said extension.

On this inclined bearing surface rests a removable pin or rod 56 guided in a bore 57 of the body 1, and extending upwards to a higher level than that of the end of the threaded rod 8, so as to be

engaged by the lever 16 before any action of this lever on this threaded rod can taken place.

With the members occupying the positions illustrated in the figure, which shows the extension 53 of the bolt 50 engaged under the edge of the sleeve 142, it should be appreciated that the valve 4 is prevented to move away from its seat as long as a pressure applied on the pin or rod 56 has not caused a backward movement of the bolt 50 against the action of the spring 51, and thus also when the pin 56 is removed from its bore 57 as it is the case during transportation of the container or of the separated valve alone.

To the contrary by operating the nut 46, i. e. applying thereto a screwing movement, one can causes the valve 4 to be forced mechanically on its seat 5.

If however the pin 56 is depressed by lowering the lever 16, the bolt 50 will be moved against the action of its spring 51, thus releasing the sleeve 142, so that when the lever 16 engages the end of the threaded rod 8, it is able to move the latter and at the same time to move the valve 4 away from its seat, and this movement may be continued until the valve 11—12 is applied on its seat 13.

The return of the valve 4 on its seat is obtained by the action, on this valve, of the fluid filling the container, which action may be assisted, when necessary, by that of a spring or other resilient member, mounted between the shoulder 141 of the body 1 and the valve 11.

At the same time the assembly formed by the valves 4 and 11 is raised, the sleeve 142 is raised and returns to its original position, permitting to the bolt 50 to engage again, through its projection 53, under the bottom edge of said sleeve.

Should then the tightness of the valve 4 not be perfect, it will be sufficient to screw up somewhat the nut 48 to secure a perfect tightness.

In Fig. 18, the arrangement comprises the same valve arrangement 4 and 11 as before, but the operating rod is threaded at its external end only, where said rod is provided with a nut 46.

Between this nut and the shoulder 48 formed by the upper surface of the valve 11 is mounted a sleeve 58 sliding on the rod 8, but engaged through a screw thread, having preferably a quick pitch in a housing 59 of the body 1.

It will be seen that when moving this sleeve in its housing, consequent to a suitable rotatory movement imparted to a polygonal or milled portion 158 thereof, either of the valves 4 and 11 may be intimately applied on their seats. Similarly by a limited movement of the said sleeve, the valves may be sufficiently released so that the one, 4, is moved away from its seat and the other 11 is applied on its seat by lowering the lever 16.

In the arrangement according to the preceding figures, the operation of the valves is obtained by a simple lever, and it has been said that this operation may also be effected by other means.

In the Figures 19 and 20, the operation of the valves is obtained through the intermediary of cam levers.

As in the preceding figures, 1 designates the body of a valve device, 4, a main valve, preferably provided with a packing made of one of the materials of the kind specified, 6, and cooperating with a seat 5; the reference 11 designates an auxiliary valve, provided with a packing, also preferably made of one of the materials of the kind specified, 12, which cooperates with a seat 13; 7 designates the rod of the main valve, which is screwed in an operating rod 8; 3 designates the discharge nozzle and 14 the passage for the fluid extending between this nozzle and the container or pipe (not shown) with which the valve device is associated. 9 designates the guide screwed on the body 1 and through which the rod 8 passes.

This rod is here terminated by a ring made of two parts 60 and 61, connected together by means of screws or the like 62, so as to provide a rotation bearing for a shaft 63 guided in slots 64 of a bell shaped member 65 screwed on the body 1 at 66. This shaft is provided at its ends with non circular portions, for example square in cross section, 67, on which may be placed a lever or other operating member 88 as illustrated in Fig. 20.

The shaft 63 is further provided with two cam shaped members, 69, and in a hole 70 of the bell shaped member 65 is mounted a movable stop 71 the position of which may be adjusted as desired by operating the screw 72 ending in a square or other portion 73 enabling a wrench or other operating member to be placed thereon.

The shape of the cams 69 is such that, in the position illustrated by the figures, they rest, through a boss 74, against the upper surface of the guide 9, thus raising the rod 8 and the valves 11 and 4 and strongly pressing the packing 6 against the seat 5, while in another position, obtained by turning the lever 68 in the direction of the arrow in Fig. 20, preferably with an angle equal to or only slightly larger than 90°, they are caused to engage through a boss 75, on a stop 71 and at the same time to depress the rod 8 and the valves 11 and 4, moving this latter valve away from its seat 5 while firmly pressing the packing 12 on the seat 13.

As the stop formed by the guide 9, as well as the stop 71, are adjustable, upon closure of either of the valves, the pressure between its metallic packing and its seat may always be increased in order to remedy to any lack of tightness.

In respect of the stop 71, the adjustment is obtained by a suitable action exerted on the screw 72 as hereinbefore indicated, and as regard the stop 9, the operation may be effected by means of any suitable device, as for example by means of a rod or other member engaged in holes 76 formed within the peripheral portion of the member 9, as illustrated.

In practice, the stops 9 and 71 are adjusted so that the requisite strong application is obtained when said cams engage the said stops.

It may be easily seen that as in the preceding arrangements, the lever 68 controlling the operation of the cams 69 may be separated or removed for transportation purposes; that the passage 14 may be isolated or separated from the operating mechanism as well during the discharge of the fluid as during the re-loading of the container or pipe with fluid under pressure, and that during loading, the application of the valve 11 on its seat may be automatically ensured by forming the valve 4 with an useful working area greater than that of the valve 11, the auxiliary mechanical application of this latter valve on its seat enabling any possibility of fluid leak at this valve to be prevented. If desired, the shaft 63 may be locked in either of the blocking positions of the valves 4 and 11, for example by placing on the square portions 67, levers or similar members 77, which on the other hand are engaged by means of hook shaped portions 78, on screws or the like 79 screwed in the body 1.

In the arrangement according to Figures 19 and 20, the main valve 4 opens against the pressure of the fluid while the auxiliary valve opens in the opposite direction.

Without any change in the remainder of the arrangement, it can be arranged so that the main and auxiliary valves open in the direction of the fluid pressure and the opposite direction, respectively, and Fig. 21 shows, by way of example, an arrangement answering this condition, in which the seat 5 for the main valve is turned upwardly and the seat 13 of the auxiliary valve is turned downwardly, and further formed on an auxiliary sleeve 211, mounted in a fluid tight manner, as by screwing, in the body 1, the screw threaded portions of each of the members being widely extended.

The valves members proper are formed on a single member 212, adapted to slide in the body 1; and formed integral with or otherwise connected to the operating rod 8.

According to the embodiment illustrated in the Figures 22 and 23, the part 8 of the operating rod is provided with two flat portions 80 within the area of which this part of the rod is formed with an elongated opening 81. Past the flat portions 80 the operating rod shows a reduced and threaded portion 10 on which is mounted a bell shaped stop 71 and an adjusting nut 82.

In the opening 81 freely passes a shaft 83 which is made with advantage of square cross section, and on this shaft two cam shaped members, 69, are mounted adjacent the flat portions 80 and each of these cam members presents two bosses or extensions 74 and 75, best visible on Fig. 23 and adapted to engage with bearing surfaces 84 of the portion 8 of the operating rod and on bearing surfaces of the adjustable stop 71, respectively, when the shaft 83 is rotated.

On the shaft 63 are also mounted two sleeves 85, preferably made with internal holes 88 showing a square cross section fitting the shaft 83, and with external cylindrical bearing surfaces passing through corresponding openings 88 of a cap 89 screwed on the body 1 at 80. The cap 88 is retained in its adjusted position by means of a nut 81.

As in the arrangement of the Figures 19 and 20, an operating lever 68 for the valves is engaged on one of the ends of the shaft 83 and in the position of the lever illustrated in Fig. 23, for which position the bosses or extensions 75 rest on the stop 71, the operating rod is raised and the valve 4 is firmly pressed on its seat 5, while should the bosses or extensions 74 be caused to move from this position to a position in which they cooperate with the bearing surfaces 84 of the rod 8, as indicated by the arrow in Fig. 23, they cause this rod to be lowered and the valve 11 to be applied on its seat.

The force with which the respective valves are applied on their respective seats is adjusted by means of the nut 82 and the position of the cap 89 relatively to the body 1, by screwing or unscrewing this cap which, on the other hand, is secured in the position of adjustment by means of the nut 91.

As in the hereinbefore described embodiments, during the re-loading of the associated container or pipe (not shown) with fluid under pressure, the valve 11 may be retained on its seat by a differential action of the fluid on the valves 4 and 11, the mechanical action of the cams 69 being eventually used to assist in avoiding any possibility of leakage.

Figure 24 shows the invention as applied to a valve device provided with an additional obturating device illustrated as the combination of a diaphragm and a percuting member, but which may be also formed by another valve.

This embodiment includes a general arrangement similar to that of the Figs. 10 and 11, housed in an auxiliary body 92 mounted in a fluidtight manner in the body 1, as by a mutual screw threading engagement of extensive length and, with eventual interposition of a packing joint 93. The fluid passage 14 is formed by part in the body 1 and by part in the auxiliary body 92, and so that they concord with each other when the auxiliary body occupies its operating position.

Within the housing 94 of the body 1, there is mounted in known manner a diaphragm 95 made of metal and closing the fluid passage 98, and a percuting member 97 extended to the vicinity of the lower surface of the valve 4.

Under such conditions, the initial actuation of this latter valve, to secure its opening, causes the said valve to engage the end of the percuting member 97, and the latter to pierce the diaphragm 95, thus permitting the discharge of the fluid from the associated container 2.

The continued emptying of this container may then taken place as explained with reference to the Figures 10 and 11, but naturally the obturating action of the diaphragm may be restored only by replacing the latter when the container has been fully emptied.

It will be appreciated however, that due to the blocking of the main valve on its seat by means of the member 16, together with the additional possibility of removal of the lever 16 and handle 24, the diaphragm 95 will not be disturbed or injured during transportation of the valve device either mounted on a container or as a separate article.

In reference to the described arrangements, its has been said that the tightness is perfectly ensured as well during the loading operation as during the discharge of the fluid by means of the valve arrangements as set forth.

However, during the time period required for moving the valve or valves from the opening position to the closing position, or vice-versa, a slight escape of the fluid may occur in case the movement is not effected with a considerable rapidity, thus leaving the impression of a defect in tightness of the device.

To remedy this drawback, the operating mechanism may be provided with a packing of appropriate nature and location.

By way of example only, Fig. 25 shows how a packing member may be associated with an obturating device according to Fig. 16, it being understood that this arrangement, or a similar or equivalent arrangement, may be associated with the other described embodiments of obturating or valve devices.

In Figure 25, a packing member has been provided between a part of the disc plate 11 or the rod 8 and the body 1, said packing member being formed with advantage of a washer or a series of washers 8b made of a more or less soft metal such for example as lead, engaged on a supporting portion of the disc plate 11 or of the rod 8, or inserted in the body 1. In this example the washer or washers are mounted on the disc plate 11 and the washer or washers 8b is or are re-

tained into place by means of a screwed ring 8*d*. In case several washers 8*b* are used, the latter are preferably separated by washer made of hard metal or the like.

Although the invention has been described in relation with certain embodiments only, it is to be understood that it is not limited thereto and that several modifications may be made in the arrangements set forth while other operating devices providing at least for the axial movement of the valves may be used instead of those more particularly described without exceeding the limits of the invention.

VALENTIN REMUS.