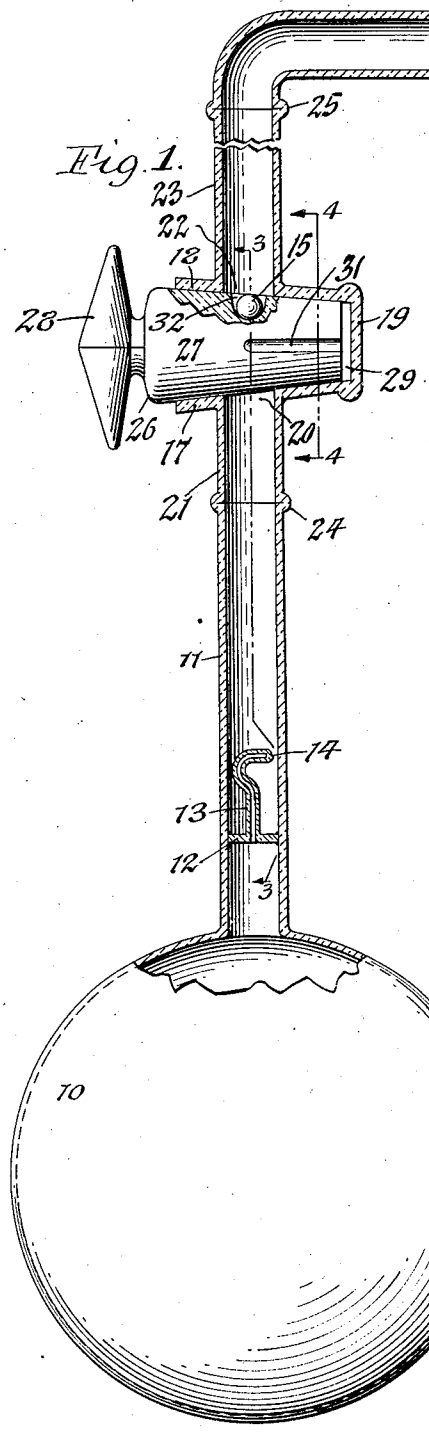
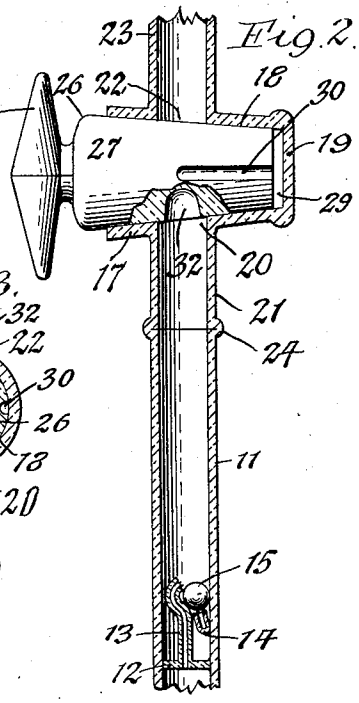
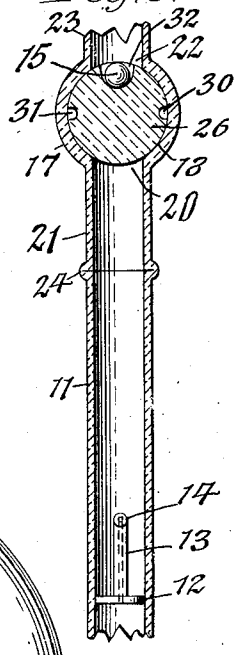
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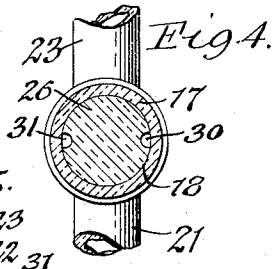
GAS EVACUATING DEVICE

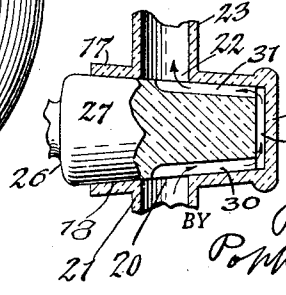
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GAS EVACUATING DEVICE

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5 Claims. (Cl. 222—5)

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This invention relates to a device for evacuating gas from a container having a neck and a hermetically sealed tip or stem in said neck which is adapted to be broken by the falling of a weight, such as a round ball, preparatory to withdrawing the gas therefrom and transferring the same into tubes or elsewhere for use.

Gases which must be used in their pure state for some specific purpose are usually stored in containers of this character and must be transferred from the same as free as possible from oxygen to the place where they are to be used in order to get the maximum benefit therefrom and at the least cost. Gases of this character include neon, argon, krypton, xenon and the like which are used for illumination, chemical, electrical and other purposes.

Heretofore it has been customary to store special gases of this character in a glass container or flask comprising a spherical body, a tubular neck and a hollow glass tip or stem arranged in this neck. This tip was left open during the operation of filling the flask with the gas, which had previously been manufactured, so as to permit this gas to pass through the neck of the flask and the tip into the body and after the desired quantity had been introduced into the flask the tip was closed by fusion so as to hermetically seal the gas in the flask.

Preparatory to withdrawing the gas from such containers and delivering the same to the place where it was to be used, it has been the practice to employ an evacuating valve the members of which were made wholly of glass or similar material so that it would not be affected by the gas, which valve comprised a casing having an inlet and an outlet adapted to be welded respectively to the glass neck of the container or flask and to a discharge pipe of glass or similar material which was connected with a vacuum pump and other apparatus for the purpose of producing a vacuum, and a stopper or closure member which controlled the flow of gas from the storage container to the receptacle intended to receive the gas.

Preparatory to connecting this control valve with the neck of the storage flask and the pipe leading to the place of consumption, it was customary to place within the neck of the storage flask, a steel ball or similar weight which could be manipulated from the outside of the flask so that it would drop onto the tip and break off the end of the same for releasing the gas stored within the flask. Before, however, breaking off this tip, the evacuating valve was opened a sufficient length of time to enable the exhausting device to create a vacuum in the spaces between the tip of the flask and the place of use and remove, as much as possible, the oxygen or other elements in these spaces which would injuriously affect the gas stored in the flask. After producing a vacuum in the line or conduit between the tip of the flask and the exhausting pump, the evacuating valve was opened, then the ball weight was permitted to drop onto the tip in the neck of the flask so as to break off this tip and release the gas, and then the evacuating valve was opened to permit this gas to flow from the flask into the receptacles designed to receive it.

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In the evacuating valves heretofore employed for this purpose, the ball utilized for breaking the outlet tip of the storage flask was usually free to move about in the neck of the flask and this at times resulted in accidentally dropping the ball prematurely onto this tip and fracturing the same, thereby releasing the gas before the proper time and this not only resulted in a waste of expensive gases but also caused an interruption in the manufacturing operation.

It is therefore the object of this invention to provide an evacuating valve which not only enables the discharge of gas from the storage container to be controlled but also to control the operation of the tip breaking ball or weight so that the latter cannot perform its function accidentally but is retained in a captive position within the valve and can only be released intentionally so that it performs the operation of breaking the outlet tip of the storage container when this is definitely desired by the operator.

A further object of this invention is to provide a valve device for this purpose which is very simple and inexpensive in construction, which is reliable in its operation and is not liable to get out of order.

In the accompanying drawings:

Fig. 1 is a vertical section showing this invention embodied in an evacuating valve which is coupled with a gas container and a discharge conduit and shows the parts in the position which they occupy preparatory to breaking the tip in the outlet of the container and connecting the same with the discharge conduit.

Fig. 2 is a fragmentary view similar to Fig. 1 but showing the parts in a position in which the stopper or movable closure member of the valve has been shifted into a position in which it has released the ball weight and permitted the same to drop onto and break the outlet tip

of the storage flask to permit gas to flow from the latter up to the stopper of the valve.

Figs. 3 and 4 are fragmentary vertical sections taken on the correspondingly numbered lines in Fig. 1.

Fig. 5 is a fragmentary sectional view, similar to Fig. 2, showing the stopper of the valve device moved into a position in which it is open to permit the gas to flow through the same from the storage place to the place where it is to be used.

In the following description similar reference characters indicate like parts in the several figures of the drawings:

Referring to Fig. 1, the numeral 10 represents the body of the container which is made of globular form and provided on its upper side with a vertical tubular neck or outlet 11 through which the container is filled with gas and also discharged therefrom. Both the body and the neck of the container are made of glass or similar material.

Within the neck sealing means are provided through which the gas passes upon filling the container but which are subsequently closed by fusion so as to hermetically seal the gas within the container. The means for this purpose which are shown in the drawings are similar to those commonly employed for this purpose and comprise a partition 12 fused in the neck and a tubular tip or stem 13 projecting upwardly from this partition and opening at its lower end into the container 10 while its upper end is adapted to be hermetically sealed by fusing a cap 14 thereon. The upper part of this tip is turned so that it stands at right angles to the lower vertical part of this tip for the purpose of enabling the same to be broken by means of a weight 15 which is adapted to be dropped thereon and thus release the gas in the container. The partition 12 and the tip 13 are also made of glass or similar material.

While the container is being filled with gas, the upper end of the neck is open and only connected with the filling mechanism and the upper end of the tip is also open so as to permit the gas to flow through the tip but after the required amount of gas has been introduced into the container the upper end of the tip is fused to form the closing cap thereon in a manner well known.

The weight for breaking off the upper end of the tip preferably consists of a round ball of steel or other heavy material and this is dropped through the upper end of the neck so as to hit the tip and break the same off from the lower part thereof, as shown in Fig. 2, whenever it is desired to release the gas from the container.

Preparatory to breaking off the tip, the ordinary oxygen laden air in the neck of the flask above the tip and in any spaces communicating therewith is first drawn off by a suction device, such as a vacuum pump, in order that these spaces are as free from oxygen as possible and thus enable the special gas which is drawn from the container to be delivered to the place where it is to be used in the maximum state of purity. The apparatus for producing a vacuum in the gas passages, as above described, may be of any suitable and well known construction and the drawings therefore only show a discharge pipe or tube 16 which is made of glass or the like and utilized for delivering the gas to the desired place.

Between the upper end of the neck of the container 10 and the discharge or delivery pipe 16 an evacuating valve device is arranged which controls the flow of gas from this neck to the exhausting mechanism and the receptacles which are to be filled therewith which evacuating device or valve embodies the present invention and is organized to hold the ball weight 15 in a captive or inoperative position when not required but will release the same and permit it to break off the sealed end of the tip or stem 13 when this is required. Although this improvement may be varied in its detailed construction, that form of the same shown in the drawings, as an example of one which is satisfactory, is constructed as follows:

The numeral 17 represents the casing or housing of the evacuating valve which is preferably constructed in the form of a tubular barrel and has its bore 18 tapering from a relatively large diameter at its front end to a smaller diameter at its rear end. This barrel shaped casing is open at its front end but closed at its rear end by means of a transverse head 19, and on its diametrically opposite sides the same is provided with a lower port 20 which is surrounded by a nipple 21 and an upper port 22 which is surrounded by a nipple 23. The barrel 17 together with its rear head 19 and upper and lower nipples 23, 21 are preferably made integrally of glass or similar material. When this valve device is in use, the lower end of the lower nipple 21 is connected by a fused joint 24 to the upper end of the flask neck 11 and the upper end of the upper nipple 23 is connected by a fused joint 25 to the adjacent end of the gas discharge pipe 16, as shown in Fig. 1.

Within the bore of the valve casing or barrel is arranged a stopper or closure member which is movable into different positions for the purpose of connecting the ports 20 and 22 on the bottom and top sides of the casing for opening the valve, and also disconnecting said ports for closing the valve and this stopper is also provided with means whereby the ball weight 15 may be held captive or in an inoperative position to permit the oxygen laden air to be withdrawn from the passages above the tip 13 preparatory to opening the latter and thereafter releasing this ball weight so that the same drops and breaks off the end of this tip and thereby releases the gas in the container 10 and permits the same to flow through the valve device and the discharge pipe 16 to its destination. In the preferred construction of this stopper the same has the form of a circular plug 26 and is provided with a conical periphery 27 which tapers from its front end toward its rear end and is adapted to rotate in engagement with the bore 18 of the valve casing with a tight fit. At its front end this conical valve plug is provided with a handle or finger piece 28 whereby the same may be turned manually and its rear end terminates short of the rear head 19 of the valve casing so as to form a connecting space or chamber 29 between the rear end of this plug and said head.

On its diametrically opposite sides, the periphery of this valve plug is provided with two longitudinal grooves or passages 30, 31, each of which terminates at the rear end of this plug and opens into the connecting chamber 29 while its front end terminates in line with the ports 20, 22 and is adapted to communicate with either one of these ports upon rotating the valve plug in the valve barrel by means of its handle 28.

Between the front ends of the gas passages 30, 31 and transversely in line with the gas ports 20, 22, the valve plug is provided on one side of its periphery with a pocket 32 which is of sufficient

depth to receive the ball weight 15 so that upon rotating this plug in a position in which this pocket faces the bore of the barrel, this ball will be retained in this pocket and be incapable of escaping therefrom, but when the valve plug is turned so that the pocket 32 registers with the lower port 20, then said ball will be released and free to drop from said pocket through the port 20, the nipple 21 and the neck 11 onto the upper end of the hermetically sealed tip 13 and fracture the same so as to release the gas from the container.

The operation of using this evacuating valve for the purpose of first withdrawing oxygen laden air from the conduits leading to the spaces which are to be filled with special or oxygen free gas in the container 10 and subsequently breaking the outlet tip of the container so as to permit the special gas in the container to flow to the places for which they are designated, is as follows:

Exhaustion of the air from the neck 11 of the gas container and the passages communicating therewith for creating a vacuum therein and reducing the presence of oxygen to a minimum is effected after the lower and upper nipples 21 and 23 of the valve case have been connected by fusion or welding with the neck 11 of the container and the discharge pipe 16 and while the valve plug 26 is open but before the sealed tip 13 is unbroken.

The ball shaped tip breaker 15 may be inserted into the pocket 32 of the valve plug through the upper nipple 23 while the plug is within the valve case or this ball can be placed in this pocket while this plug is withdrawn from the valve casing and thereafter the plug may be inserted in the casing together with the ball in the pocket while the latter is out of register with the lower port 20 so that the ball cannot drop through the latter.

After the ball weight has been inserted in the pocket of the plug the latter is rotated one quarter turn in the casing so that the front ends of the passages 30, 31 register with the ports 20, 22, as shown in Fig. 5, whereby the valve is opened and the neck of the gas container is connected with the exhausting device. Upon now operating the exhausting device a vacuum is produced in the gas conduits or passages above the breakable tip 13 and the presence of oxygen is virtually eliminated in these spaces.

When the valve plug is in this position the air passes from the neck 11 upwardly through the lower port 20, thence rearwardly through the passage 30 in the plug, thence upwardly through the chamber 29 in the casing, thence forwardly through the passage 31 in the plug and thence upwardly through the upper port 22 in the casing to the discharge pipe 16 which leads to the suction device.

After the gas conduit has been thus evacuated, the valve plug is rotated another quarter turn in the same direction so as to bring the pocket 32 to the underside of the same and in register with the lower port 20, as shown in Fig. 2, in which position of the plug the ball drops by gravity out of this pocket and through the lower port 20 onto the sealed tip 19, whereby the latter is broken off and the gas in the container is released and permitted to escape to the valve but cannot pass the same because it is still closed.

Whenever it is desired to use the gas of the container, the valve is opened by rotating the plug a quarter turn in either direction so as to

bring the front ends of its passages 30, 31 respectively into register with the ports 20, 22, thus placing the latter in communication with each other, as shown in Fig. 5, and permitting delivery of the special gas from the container 10 to the place desired.

When the desired amount of special gas has been withdrawn from the container the valve plug may be again turned into its closed position, thereby holding the unused portion of the special gas in storage in the container until required for another operation.

When all the special gas has been withdrawn from the container the evacuating valve is removed by unfusing the same from the container neck 11 and the delivery pipe 16 and used in connection with another container holding a charge of the desired gas.

I claim as my invention:

1. A device for evacuating gas from a container having a neck and a hermetically sealed tip in said neck which is adapted to be broken, comprising a weight adapted to drop on said tip and break the same, a valve casing having a lower port adapted to be connected with said neck and an upper port adapted to be connected with a discharge, a stopper movable in said casing including means which are adapted to connect said ports when said stopper is moved into one position and to disconnect said ports upon moving said stopper into another position, and said stopper being also provided with a pocket which receives said weight and is out of register with said lower port when the stopper is in one position and which is adapted to register with said lower port when the stopper is in another position and thereby permits said weight to escape from said pocket and break said tip and release the gas in said container.

2. A device for evacuating gas from a container having a neck and a hermetically sealed tip in the neck which is adapted to be broken, comprising a weight adapted to drop on said tip and break the same, a valve casing having inlet and outlet ports on different sides thereof and adapted to be connected respectively with said neck and with a discharge pipe, and a stopper movable in said casing and having passages on its opposite sides so that upon moving said stopper into one position said passage registers with said ports and the valve is open while upon moving said stopper into another position said passages are out of register with said ports and the valve will be closed, and said stopper having a pocket which is adapted to receive said weight and retain the same within the casing in one position of the stopper and to release said weight and permit it to drop and break the tip in said neck upon moving the stopper into another position.

3. A device for evacuating gas from a container having a neck and a hermetically sealed tip in the neck which is adapted to be broken, comprising a weight adapted to drop on said tip and break the same, a valve casing having a round seat and inlet and outlet ports on opposite sides of said seat which are adapted to be connected respectively with said neck and with a discharge pipe, and a round stopper rotatable in engagement with the seat of said casing and having passages on its opposite sides and adapted in one position of the stopper to connect said ports and open the valve and in another position to disconnect said ports and close the valve, and said stopper being also provided between said passages

with a pocket which is adapted to receive said weight and in one position of the stopper to retain said weight within the casing and in another position of the stopper to permit said weight to drop into said neck and onto said tip for breaking the latter.

4. A device for evacuating gas from a container having a neck and a hermetically sealed tip in the neck which is adapted to be broken, comprising a weight adapted to drop on said tip and break the same, a tubular casing which is open at its front end and closed at its rear end and provided with a rearwardly tapering conical seat and inlet and outlet ports on opposite sides of its seat which are adapted to be connected respectively with said neck and with a discharge pipe, and a rearwardly tapering stopper rotatable in engagement with the seat of said casing and having passages on opposite sides of its periphery which are adapted upon turning said stopper into one position to be in register respectively with said inlet and outlet ports and open the valve and upon turning said stopper into another position to be out of register wtih said inlet and outlet ports and close the valve, and said stopper also having a pocket in its periphery which is adapted to receive said weight and in one position of the stopper to retain the weight within the casing and in another position to discharge the weight into said neck and permit the same to fall and break said tip for releasing the gas in said container.

5. A device for evacuating gas from a container having a neck and a hermetically sealed tip in the neck which is adapted to be broken, comprising a weight adapted to drop on said tip and break the same, a tubular casing which is open

at its front end and closed at its rear end and provided with a rearwardly tapering conical seat and inlet and outlet ports on opposite sides of its seat which are adapted to be connected respectively with said neck and with a discharge pipe, and a rearwardly tapering stopper rotatable in engagement with the seat of said casing and having its rear end separated from the rear end of the valve casing by a connecting chamber while its front end projects from the open front end of the casing and is provided with a handle, and said stopper, also having longitudinal passages on its opposite sides which open at their rear ends into said connecting chamber while the front ends of said passages in one position of the stopper register respectively with said inlet and outlet ports and open the valve and in another position of the stopper are not in register with said ports and close the valve, and said stopper being also provided on its periphery between said passages with a pocket which receives said weight and in one position of the stopper retains the weight within the casing and in another position of the stopper permits the weight to drop from said pocket into said neck and break said tip for opening the latter and permitting the gas to flow from said container to said discharge pipe.

JOHN B. BRANDT, JR.

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The following references are of record in the file of this patent:

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