Dec. 19, 1944. R. TEMPLE 2,365,364

OUTLET VALVE

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Fig. 1

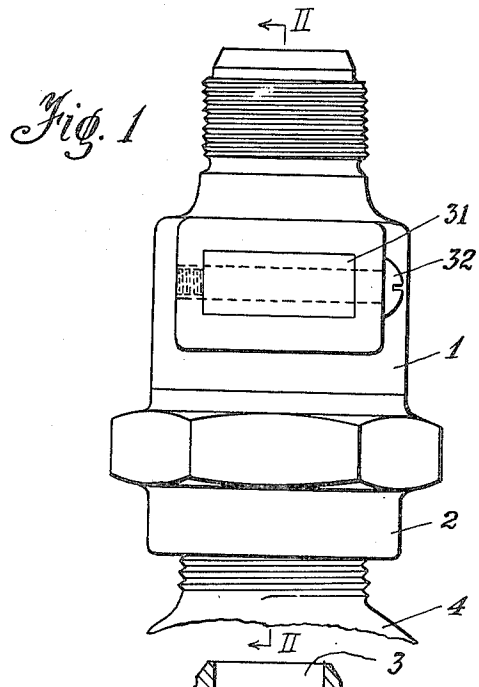
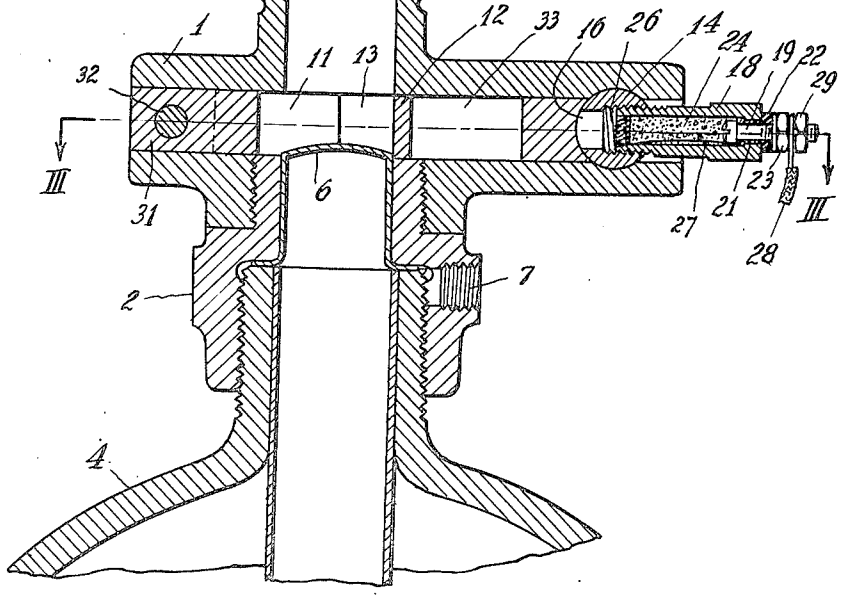



Fig. 2




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Fig. 3

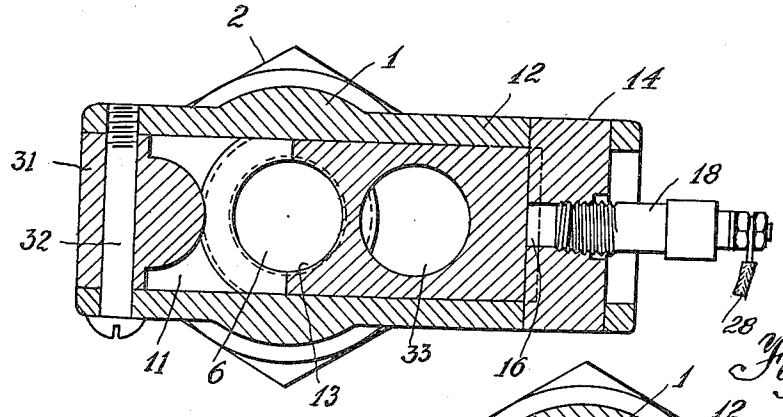



Fig. 5

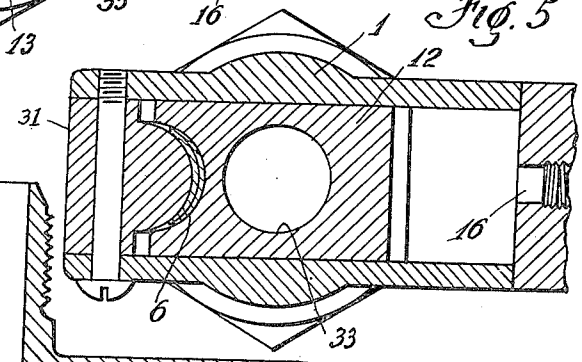



Fig. 4




Fig. 6




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# UNITED STATES PATENT OFFICE

2,365,364

## OUTLET VALVE

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Application June 26, 1943, Serial No. 492,357

12 Claims. (Cl. 169—11)

This invention relates to outlet valves, and more particularly to valves for containers of high pressure fluids.

In connection with such containers it sometimes is desirable to use a valve that can be fully opened practically instantaneously by an operator located some distance away from the valve. For example, to extinguish fires it has been proposed to use a gas normally stored under high pressure in a container. To be effective, however, a large quantity of the gas should be liberated all at once so that the fire will be smothered by a cloud of gas. This makes it necessary to provide an outlet for the gas container that can quickly be opened wide. A valve suitable for such a purpose also has utility in connection with containers of other fluids used for various purposes.

It is among the objects of this invention to provide an outlet valve that can always be fully opened in an instant, that will not clog the outlet line, that can be actuated from any distance, that can be used many times, and that is inexpensive and dependable.

In accordance with this invention a valve body, provided with a passage therethrough, is adapted to be connected to the outlet of a container of fluid under pressure. The valve body also has a cutting chamber extending transversely of the passage. A sealing cap for the container outlet is disposed in one end of the valve passage and projects into the cutting chamber. A cutting member is slidably mounted in the chamber at one side of the cap, and means is provided for driving the cutting member across the passage to cut off the end of the cap and thereby open the valve. If the cutting member is so long that it does not entirely cross the passage when it severs the cap, it is provided with an opening that will register with the passage so that the fluid in the container can escape through it. The driving means for the cutting member preferably is an explosive such as a cartridge that can be fired by an electrically heated wire under the control of the operator. The sheared-off portion of the sealing cap is caught between the front end of the cutting member and a stop member and thereby forms a cushion for arresting the movement of the cutter. The valve can be used over again by removing the remains of the sealing cap and inserting a new one and a new cartridge.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is an end view of my valve attached to a high pressure container; Fig. 2 is a vertical section taken on the line II—II of Fig. 1; Fig. 3 is a horizontal section taken on the line III—III of Fig. 2; Fig. 4 is a view, similar to Fig. 2, showing the valve open after the cartridge has been fired; Fig. 5 is a horizontal section taken on the line V—V of Fig. 4; and Fig. 6 is an enlarged vertical section through the cartridge shown in Fig. 2.

Referring to the drawings, a valve body is formed from two parts detachably connected together; a blade housing 1 and a seal holder 2. The latter is in the general form of a nut that has a reduced upper end screwed into the inlet end of a passage 3 through the blade housing. The lower end of the nut can be screwed onto the neck of a gas pressure bottle 4 or the like. Nuts like these can have neck-receiving portions of different sizes to fit different bottles, but their upper ends are of standard size to fit the blade housing. The wall of the upper end of passage 3 is threaded externally so that the valve can be connected to a tube (not shown) leading to a location where it is desired to discharge the gas. This valve is especially suitable for use in equipment for extinguishing fires.

The gas bottle is sealed by an inverted flanged sealing cup or cap 6 that is inserted in the upper portion of the nut with its flange clamped tightly between the top of the bottle neck and the annular shoulder formed in the nut by its reduced upper end. The nut is provided with a radial opening 7 through which the bottle can be filled when the nut is loose on the neck. At that time cap 6, the side wall of which tightly engages the surrounding nut 2, has its lower end spaced from the top of the bottle neck. Gas under pressure can therefore be introduced through opening 7 and through the space between the bottom of the cap and the top of the bottle neck in order to fill the bottle. After filling, the nut is tightened to seal the cap against the bottle neck. The closed end of the cap projects a short distance above the top of the nut for a purpose to be described presently. Before the bottles are mounted in operative position they do not need to have blade housing 1 attached to them, but only the sealing cap and holder 2. Blade housings therefore are not required for the reserve bottles, but only for the one being used.

The blade housing of the valve body has a rectangular passage extending transversely through it and across passage 3 to form a cutting chamber 11 into which the sealing cap projects. Slidably mounted in this chamber is a block-like shear blade 12 that is the same shape in transverse sec-

tion as the chamber. The front or cutting end of the blade is provided with a semi-circular notch 13 so that when the blade is in its normal position at one side of the cap, as shown in Figs. 2 and 3, it extends about half way around it. The other end of the blade is concave vertically for receiving a portion of an adjoining cylindrical pin 14 which forms a breech block. This pin extends across the outer end of the cutting chamber with its ends tightly mounted and frictionally held in openings in the side walls of the chamber. The breech block is provided with a central transverse passage 16 the outer end of which is threaded for receiving the threaded inner end of an explosive cartridge. The portion of the passage between the cartridge and blade forms a combustion chamber open to the blade.

The cartridge may be made in any suitable way, the one illustrated being a tubular shell 18 from the outer end of which projects a bolt 19 that is electrically insulated from the shell by a headed sleeve 21 and a washer 22 of insulating material. The bolt is held in place by a nut 23 threaded on it. The cartridge shell is filled with powder and gun cotton 24 sealed in by a plug 26 of wax at the inner end. Extending through the explosive material is an electric resistance wire 27 that is connected to the head of the bolt and to the inner end of the shell. A wire 28 is clamped on the outer end of the bolt by a nut 29 and is adapted to be connected through a switch 35 to a battery 36 (Fig. 6) which is grounded, as is also the cartridge shell. When the switch is closed, the electric current flowing through resistance wire 27 will heat the wire and thereby ignite the powder. The resulting explosion behind the blade drives it across the valve passage where it shears off the top of sealing cap 6 as shown in Figs. 4 and 5.

The travel of the blade is limited by an arresting block or plug 31 detachably secured in the end of the cutting chamber by a screw 32 extending through the block and the side walls of the chamber. The inner end of this plug is provided with a semi-circular projection that extends into notch 13 of the blade when the latter is driven against the plug. The top of the cap which is sheared off by the blade is carried by its notched end against the stop plug, and in being compressed between them the severed piece of metal serves as a cushion which decreases the impact shock of the blade against the plug, thereby prolonging the life of this valve.

Extending through the blade behind its notched end is a vertical opening 33 of substantially the same diameter as valve passage 3. The position of this opening is such that when the blade has been shot across the valve passage to cut off the sealing cap, opening 33 registers with the valve passage, as shown in Fig. 4, so that the gas in the bottle is free to escape through the valve.

It will be seen that by shearing off the entire top of the sealing cap by an explosively-actuated blade, the valve is completely opened in an instant. As the sheared-off top of the cap is carried to one side of the valve passage by the end of the blade and there jammed between it and the stop plug, there is no danger of its blocking the passage. Because of the instantaneous action of this valve, a large bottle of compressed gas can be emptied almost instantaneously. This rapid liberation of gas is highly desirable in fighting fires because a smothering cloud of gas should envelope the burning material. A stream of gas is often ineffective. Due to the cartridge being fired by an electrically heated wire, this valve can be opened from any point to which it is connected by an electric wire. The valve can be used again by removing the remains of the sealing cap from the valve body and inserting a new cap. This is done by unscrewing the two parts of the valve body and by also removing the stop plug so that the sheared-off top of the cap can be extracted from the cutting chamber. A new cartridge can easily be inserted in the breech block.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member movably mounted in said chamber at one side of the cap, and means for driving the cutting member across the passage to cut off the cap.

2. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member movably mounted in said chamber at one side of the cap, and means for driving the cutting member across the passage to cut off the cap, said cutting member being provided with an opening therethrough that registers with said passage after the cap is cut off.

3. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cap, and explosive means for driving the cutting member across the passage to cut off the cap, said cutting member being provided with an opening therethrough that registers with said passage after the cap is cut off.

4. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cap, explosive means disposed at the outer end of the cutting member, and electrically energized means for firing said explosive means to drive the cutting member across the passage to cut off the cap.

5. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber

extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cap, an explosive cartridge rigidly mounted at the outer end of said chamber, and an electrically heated wire in said cartridge for firing it to drive the cutting member across the passage to cut off the cap.

6. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cap, a breech member rigidly mounted at the outer end of said chamber and provided with a cartridge chamber, an explosive cartridge connected to the cartridge chamber, and means for firing the cartridge to drive the cutting member across the passage to cut off the cap.

7. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cap, a stop member disposed at the opposite side of the cap, and means for driving the cutting member across the passage and against said stop member to cut off the cap, said cutting member being provided with an opening therethrough that registers with said passage after the cap is cut off.

8. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in the inlet end of said passage and projecting into said chamber, the cap-receiving portion of said body being detachably connected to the rest of the body, a cutting member slidably mounted in said chamber at one side of the cap, and means for driving the cutting member across the passage to cut off the cap, said cutting member being provided with an opening therethrough that registers with said passage after the cap is cut off.

9. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing member for the container outlet in the form of a cup provided with an annular flange adapted to be pressed against the container by said body, said cup being disposed in said passage with its closed end projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cup, and means for driving the cutting member across the passage to cut off said closed end of the cup.

10. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member movably mounted in said chamber at one side of the cap, the cutting end of said member being provided with a notch receiving a portion of the cap whereby said member extends part way around the cap, and means for driving the cutting member across the passage to cut off the cap, said cutting member being provided with an opening therethrough that registers with said passage after the cap is cut off.

11. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across and on both sides of said passage, a sealing cap for the container outlet disposed in said passage and projecting into said chamber, a cutting member slidably mounted in said chamber at one side of the cap, a stop block forming one end of said chamber at the opposite side of the cap, removable means for holding said block rigidly in position, and means for driving the cutting member across the passage toward said block to cut off the cap and thereby open the valve.

12. An outlet valve comprising a valve body provided with a passage therethrough, means to connect said valve body to the outlet of a fluid container, said body also having a cutting chamber extending transversely across said passage, a sealing cap for the container outlet disposed in the inlet end of said passage and projecting into said chamber, the cap-receiving portion of said body being screwed into the rest of the body and being internally threaded for attachment to said container, a cutting member slidably mounted in said chamber at one side of the cap, and means for driving the cutting member across the passage to cut off the cap.

ROBERT TEMPLE.