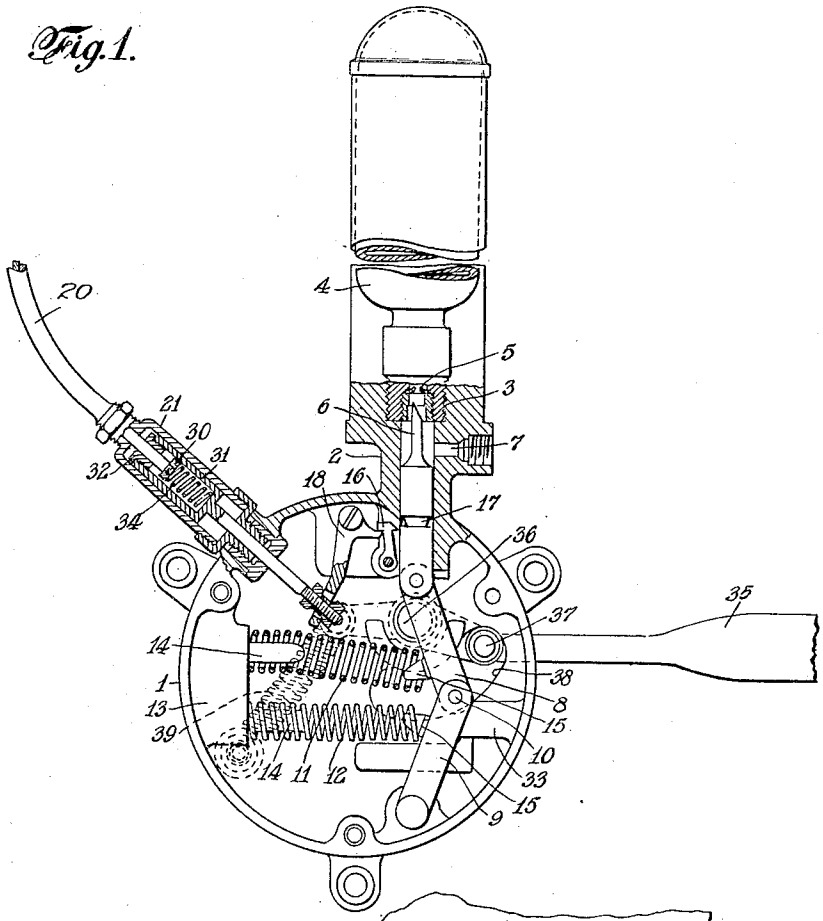
Oct. 11, 1932. J. N. HUNTER 1,881,608

CONTAINER PIERCING MECHANISM

Filed Jan. 6, 1932

Fig. 1.



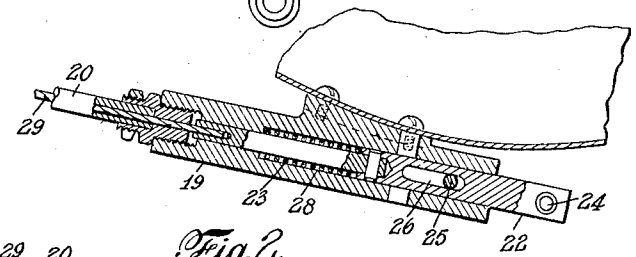


Fig. 2.

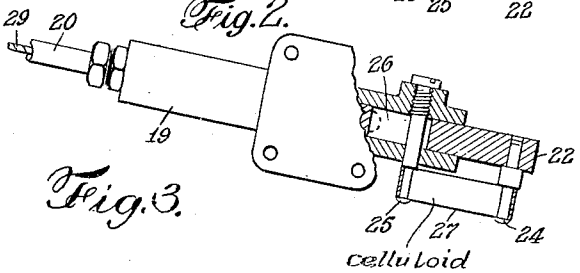


Fig. 3.

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UNITED STATES PATENT OFFICE

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CONTAINER-PIERCING MECHANISM

Application filed January 6, 1932, Serial No. 585,142, and in Great Britain January 7, 1931

This invention relates to mechanisms for piercing containers of liquids or highly compressed gases, and it is particularly applicable to mechanisms for use in fire extinguishing apparatus in which is employed a sealed cartridge or similar container filled with a fire extinguishing gas such as carbon dioxide so highly compressed that it is actually in liquid form in the container.

An object of the present invention is to provide an improved container-piercing mechanism which is simple in construction, reliable in operation, and which is adapted not only to force a suitable piercing element through the container seal but also to automatically retract such element as soon as the piercing operation is completed so as to permit the contents of the container to escape from the container in an unobstructed manner by way of the opening formed by the piercing element.

Another object of the invention is to provide an improved remote control means which is simple and reliable and which is adapted to so operate upon the outbreak of a fire in the vicinity of such means as to automatically effect the operation of the piercing mechanism.

A further object of the invention is to provide means whereby both the puncturing mechanism and the remote control means therefor may be easily reset and conditioned for operation by a single operator.

Other objects and advantages of the invention will become apparent from the following description, taken in connection with the accompanying drawing in which—

Fig. 1 is a view partly in section and partly in elevation of a container-piercing mechanism, Fig. 2 is a central, vertical, longitudinal, sectional view of a remote control device adapted to control the container-piercing mechanism of Fig. 1, and Fig. 3 is a view partly in plan and partly in section of part of the mechanism shown in Fig. 2.

The piercing mechanism consists essentially of a unit which includes a casing 1 having an integral piercer guide 2 to the end of which the neck 3 of a gas bottle 4 may be screwed. The bottle is normally sealed by a disc 5 which is shown fractured in Figure 1 because the piercing mechanism is illustrated in the position that it takes up after it has been released. When the disc 5 is pierced as a result of the reciprocation of a piercer 6, gas compressed in the bottle 4 escapes through an outlet 7 formed in the piercer guide 2. The piercer 6 consists of a member having a narrow prong formed at the end of a somewhat wider shank, to the lower end of which is pivoted a link 8. A link 9 is pivoted to a point on the casing which lies on the axis of the piercer 6. The links 8 and 9 are pivoted together at 10 so that they form a toggle.

If the toggle is cranked in the opposite direction to that shown in Figure 1, so that two springs 11 and 12 are compressed between the links 8 and 9 and an abutment 13 on the casing 1, and is thereafter released, the pivot point 10 will move across the axis of the piercer 6; that is to say the toggle will move through a dead centre, and in so moving it first becomes straightened, causing the piercer to break the seal 5, and then assumes its position shown in Figure 1, thereby causing the piercer to be thus withdrawn from the seal 5. The piercer is thus positively withdrawn from the neck of the bottle after the seal has been pierced so that it cannot constitute an obstruction to the outlet of gas. The springs 11 and 12 are held in position by two projections 14 on the abutment 13 and a projection 15 on each of the toggle links.

When the piercing mechanism is set, it is restrained from action by a trigger 16 which is held in engagement with a recess or groove 17 in the piercer shank by means of a bell-crank lever 18. When the bell-crank lever 18 is withdrawn from the trigger 16, the upward thrust of the piercer 6 can then cause the head of the trigger 16 to leave the groove 17 so that the piercer 6 becomes free to reciprocate under the influence of the springs 11 and 12.

Although the piercing mechanism may be controlled in various ways, it is herein illustrated in association with remote control device 19 which acts through the medium of a push and pull cable 20 and a compensator 21.

The body of the remote control device 19 is bored at 28 to receive a plunger 22 and a spring 23 located between the plunger and the end of the bore. A pin 24 is fixed at the end of the plunger 22 and a second pin 25, which passes through a slot 26 in the plunger 22, is fixed to the body of the remote control device. The pins are arranged so that they can lie inside a "Celluloid" loop 27, which serves to keep the spring 23 compressed beneath the plunger 22. The remote control device is located in a position where fire is liable to occur, and if fire breaks out the "Celluloid" loop fuses at once so that the spring 23 is then free to force the plunger 22 outwards from the bore 28 and pull on the central stranded wire 29 of the cable 20.

The stranded wire 29 is connected to a button 30 inside the compensator 21. The button 30 is slidable inside a cylinder 31 connected to one arm of the bell-crank 18. When the piercing mechanism is set ready for use, the head of the trigger 16 lies in the recess 17 in the piercer so that the cylinder 31 lies nearer the casing of the piercing mechanism than is shown in Figure 1, and the button 30 lies in contact with the bush 32 at the end of the cylinder 31. Thus, when the piercing mechanism is set and the stranded wire 29 is thereafter pulled, the tension is transmitted directly to the bell-crank 18 and the piercer is released. After release, the piercer comes to rest in the position shown in Figure 1, that is to say it does not descend quite so low as when the toggle is cranked in the opposite direction, the travel of the link 9 being limited by an abutment 33, so that the head of the trigger 16 cannot enter the recess 17.

The compensator 21 is provided because the remote control device 19 and the piercer cannot be reset simultaneously by one man. The method of resetting is as follows: First a new "Celluloid" loop is placed on the pins 24 and 25. This results in the plunger 22 being thrust into the bore 28 and consequently the button 30 being so moved in the cylinder 31 of the compensator as to compress a spring 34. The piercer is then reset by means of a handle 35 pivoted at 36 to the back of the casing 1. The handle 35 carries a projection 37 which projects through a slot 38 in the back of the casing, so that when the handle is pulled downwards the projection 37 bears on the link 8 and forces the toggle to the opposite cranked position until the recess 17 in the piercer 6 is on the level of the head of the trigger 16. When this position is reached the spring 34 in the compensator, acting through the medium of the bell-crank 18, urges the trigger 16 into the recess 17 of the piercer. The mechanism is then set ready for further action. When the handle 35 is released a spring 39 causes it to return to its uppermost position.

Although only one form of the invention is herein shown and described, it will be understood that various changes may be made without departing from the spirit of the invention or the scope of the following claims.

What is claimed is:

1. A piercing mechanism for sealed containers of liquid or highly compressed gas comprising a piercer, and tension means operable to forcibly drive said piercer through the wall of the container and to thereafter positively retract said piercer.

2. A piercing mechanism for sealed containers of liquid or highly compressed gas comprising a piercer, tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter positively retract said piercer, retaining means for retaining said tension means in readiness for operation, and release means for actuating said retaining means whereupon said tension means is operated.

3. A piercing mechanism for sealed containers of liquid or highly compressed gas comprising a piercer, tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter positively retract said piercer, retaining means for retaining said tension means in readiness for operation, and thermally-controlled release means for actuating said retaining means whereupon said tension means is operated.

4. A piercing mechanism for sealed containers of liquid or highly compressed gas, comprising a piercer, tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter retract said piercer, said tension means including a toggle cooperatively associated with said piercer, and a spring adapted to move said toggle from one cranked position across dead center to another cranked position.

5. A piercing mechanism for sealed containers of liquid or highly compressed gas, comprising a piercer, tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter retract said piercer, said tension means including a toggle cooperatively associated with said piercer, a spring adapted to move said toggle from one cranked position across dead center to another cranked position, retaining means for retaining said tension means in readiness for operation, and release means for actuating said retaining means whereupon said tension means is operated.

6. A piercing mechanism for sealed con-

tainers of liquid or highly compressed gas, comprising a piercer, tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter retract said piercer, said tension means including a toggle cooperatively associated with said piercer, a spring adapted to move said toggle from one cranked position across dead center to another cranked position, retaining means for retaining said tension means in readiness for operation, and thermally-controlled release means for actuating said retaining means whereupon said tension means is operated.

7. A piercing mechanism for sealed containers of liquid or highly compressed gas comprising a piercer, tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter positively retract said piercer, retaining means for retaining said tension means in readiness for operation, and release means for actuating said retaining means whereupon said tension means is operated and including a temperature-responsive device operatively connected to said retaining means.

8. A piercing mechanism for sealed containers of liquid or highly compressed gas comprising a piercer; tension means tending when conditioned for operation to so operate as to forcibly drive said piercer through the wall of the container and to thereafter positively retract said piercer; retaining means for retaining said tension means in readiness for operation; and release means for actuating said retaining means whereupon said tension means is operated, said release means including a temperature-responsive device and a push and pull connection operatively connecting said temperature-responsive device to said retaining means, said push and pull connection including a compensator operable to permit resetting of said temperature-responsive device preparatory to conditioning said tension means for operation.

In testimony whereof, I have signed this specification.

JOHN NORMAN HUNTER.