Aug. 28, 1962 H. L. KIRBY 3,051,356

CARTRIDGE PIERCING MECHANISM OR THE LIKE

Original Filed Aug. 29, 1955

Fig. 1.

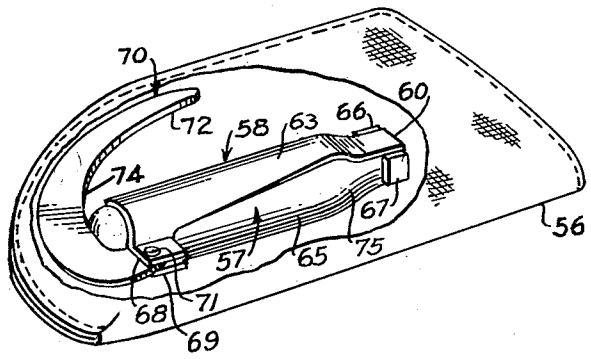


Fig. 2.

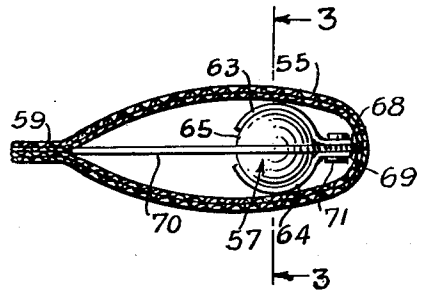


Fig. 3.

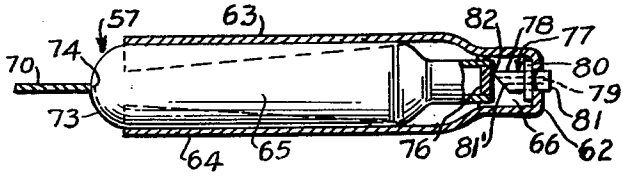
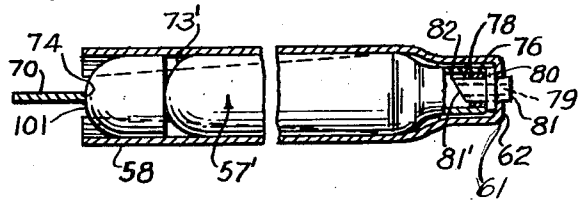


Fig. 4.



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CARTRIDGE PIERCING MECHANISM OR THE LIKE

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Original application Aug. 29, 1955, Ser. No. 531,169, now Patent No. 3,031,693, dated May 1, 1962. Divided and this application May 4, 1959, Ser. No. 810,891

3 Claims. (Cl. 222—5)

This invention relates to cartridge piercing mechanisms, and, more particularly, to mechanisms for piercing gas cartridges, such as carbon dioxide cartridges, which may be completely encased within a flexible bag.

This application is a division of co-pending U.S. application Serial No. 531,169, filed August 29, 1955, now Patent No. 3,031,693, May 1, 1962.

An object of the present invention is to provide a novel piercing mechanism for piercing a gas cartridge, which mechanism has a handle which can be squeezed to force the cartridge against a piercing point.

A further object of the present invention is to provide a piercing mechanism for a gas cartridge, having a hollow, circular piercing member tapered at one end to form a piercing point which functions as a wedge to open a passage in the cartridge.

These and other objects of the invention not specifically set forth above will become readily apparent to those skilled in the art upon examination of the accompanying description and drawing in which:

FIGURE 1 is a perspective view of a gas cartridge and piercing mechanism in accordance with the present invention, shown located entirely within a flexible bag;

FIGURE 2 is an end view of the apparatus shown in FIGURE 1, with the bag in section;

FIGURE 3 is a vertical section, partly in elevation, along line 3—3 of FIGURE 2, showing the cartridge piercing mechanism prior to discharge of the cartridge; and

FIGURE 4 is a vertical section, similar in aspect to FIGURE 3, of a modification of the piercing mechanism and showing the cartridge after operation of the piercing mechanism.

Referring to the drawing, a flexible bag **55** is formed of a double layer of muslin cloth which is folded at edge **56** around an inflation cartridge **57** contained in a piercing mechanism **58** and the bag is then closed by stitching **59**.

The piercing mechanism **58** is constructed of a single piece of metal, such as aluminum, which is bent at edges **60** and **61** to form an end **62** and two flared sides **63** and **64** are bent to receive the circular body **65** of the cartridge **57**. The end **62** carries two pieces **66** and **67** which are bent towards the sides **63** and **64** to form a square container portion at the end of the mechanism. Also, the sides **63** and **64** carry flanges **68** and **69**, respectively, which are adjacent to each other after the mechanism is formed. Between the flanges **68** and **69** is positioned one end of an operating handle **70**, which end is pivotally secured to the flanges by a pin **71**. The handle **70** has a curved end **72** which extends in a direction substantially parallel with the body of the cartridge **57**. A dome end **73** of cartridge **57** projects beyond the sides **63** and **64** and engages a cam surface **74** formed in the handle **70**. The opposite end **75** of cartridge **57** is in the form of a reduced cylinder which is closed by a soft metal plug **76**. The end **62** has a circular opening for receiving a circular piercing member **77** which is comprised of a cylindrical body **78** having a central opening **79** and a collar **80**. An end **81** of member **77** is inserted in an opening in end **62** with a press fit to hold the collar **80** against end **62**. The other

end of the piercing member has a slanted surface **81'** which terminates in a point **82** located adjacent to the soft metal plug **76**. Thus, it is apparent that if the piercing mechanism is gripped in the hand and the handle end **72** pivoted downwardly by finger pressure, the handle portion **74** will engage the dome end **73** and will serve as a cam to force the soft metal plug **76** against the pointed end **82** of the piercing member **77**. Because of its slanted shape, the pointed end **82** will serve as a wedge to force the soft metal away from the piercing member as the piercing member is forced into the soft metal plug to connect opening **79** with the interior of the cartridge. Because of the ease with which the piercing member penetrates, the handle **70** will quickly move the end **75** of the cartridge into engagement with collar **80**. It is understood that any suitably shaped cam surface can be used for the edge **74** of the handle as long as it transmits the downward motion of the handle **70** into an end thrust on the end of the cartridge **57**. Since the gas in the cartridge is at high pressure, the gas will be throttled through opening **79** and pass into bag **55**.

In operation, the operator will grip the bag **55** and, because of the flexibility of the bag, is able to squeeze the handle **70** in order to pierce the cartridge **57** with the piercing mechanism **58**.

Cartridge **57** can contain carbon dioxide or other suitable gas under pressure.

FIGURE 4 illustrates a modification in which the piercing mechanism **58** receives a smaller cartridge **57'** of the same diameter as cartridge **57**. A dowel **101**, having the same diameter as the cartridge **57'**, is inserted between the edge **74** of handle **70** and the dome **73'** of the cartridge **57'** so that the dowel will transmit the force exerted by the handle to the cartridge. Thus, the same piercing mechanism can be used for various sizes of cartridges of the same diameter, depending upon the size of the casing which is to be inflated. In FIGURE 4, the cartridge and piercing mechanism are in the position assumed after the cartridge has been pierced by the operator.

By the present invention, a novel, low cost piercing mechanism is provided for piercing the cartridge in which the cartridge is slidably supported and forced against the piercing pin by the camming action of the handle. Also, because of the wedging action of the cylindrical piercing point, the soft material at the end of the cartridge can be moved away quickly by the force applied to the handle to provide a positive, quick operation of the inflation process. Said piercing member **77** is held by a press fit in end **62**, the piercing member is easily replaceable and the end **62** is of a proper thickness to hold the pin rigidly in position during piercing of the cartridge. Also, the piercing members can be economically manufactured from non-magnetic material, such as copper and aluminum alloys, and can be replaced after a single use if so desired. It is further understood that the edge **74** of the handle, which applies the pressure to the cartridge, can be varied in shape depending on the shape of the end of the cartridge so that the desired camming action will result.

Various other modifications may be contemplated by those skilled in the art without departing from the spirit and scope of the invention, as hereinafter defined by the appended claims.

What is claimed is:

1. A piercing mechanism for piercing a relatively rigid cylindrical cartridge adapted to contain a gas, comprising:

a body member for mounting the gas cartridge, said body member being U-shaped in longitudinal configuration and having a pair of substantially identical, opposed, substantially parallel side members arcuately shaped in transverse section to receive said car-

tridge so as to prevent lateral movement of said cartridge while permitting axial movement thereof;

the bight portion of said U-shaped member being provided with two ears which are bent at right angles thereto so as to form with said arcuately shaped side members a square container portion;

a piercing member secured in said bight portion and extending coaxially between said side members in parallelism therewith for piercing a relatively soft plug end portion of said cartridge;

handle means pivotally connected to and between said side members at the ends of said members remote from said bight portion and having a cam portion extending across the end of said cartridge opposite said soft end portion for moving said cartridge axially along said body member towards said piercing member when said handle means is actuated;

said piercing member comprising a tubular body having a tapered portion at one end to form a piercing point and a central opening in said tubular body to emit the gas from the interior of said cartridge after insertion of said piercing member in said soft portion, said tapered portion of said piercing member serving as a wedge to push the soft portion away from the piercing member as it enters into the cartridge, said handle means and said body member being so related as to be manually grippable for piercing said cartridge.

2. A piercing mechanism for piercing a gas cartridge comprising:

a body member for movably supporting the gas cartridge relative to the body member, said body member being U-shaped in longitudinal configuration and having a like pair of spaced parallel side members arcuately shaped in transverse section to receive said cartridge in movable relationship thereto;

the bight portion of said U-shaped member being provided with two ears which are bent at right angles thereto so as to form with said arcuately shaped side members a square container portion;

a piercing member fixed in said bight portion and extending between said side members in parallelism therewith for piercing a soft end portion of a cartridge supported by said body member, said piercing member comprising:

a cylindrical body having a tapered portion at one end to form a piercing point and a central opening in said cylindrical body to emit the gas from the interior of said cartridge after insertion of said piercing member in said soft portion, said tapered portion of said piercing member serving as a wedge to push the soft portion away from the piercing member as it enters into the cartridge, each of said side members adjacent the other end thereof having a flange extending laterally therefrom, said flanges being positioned adjacent and in spaced parallel relationship to each other; and

an operating handle pivotally secured to and between said flanges and in a plane substantially parallel thereto and having a cam portion extending across the end of said cartridge opposite said soft metal end thereof

and another portion substantially parallel to the axis of said cartridge and laterally outwardly spaced therefrom so that said side members and said handle are pivotable to manually actuate said cartridge to move linearly into a position for piercing of said piercing point through said soft end of said cartridge.

3. A piercing mechanism for piercing a gas cartridge having a relatively hard, impenetrable cylindrical body and a relatively soft pierceable end portion, comprising:

a body member for mounting the gas cartridge, said body member being formed of a single piece of sheet metal and having a like pair of substantially parallel, spaced side members arcuately shaped in transverse section to slidably receive said gas cartridge and a bight portion provided with ears which are bent at right angles thereto so as to form with said side members a square container portion;

a piercing member secured to said container portion of said body member and having a tapered piercing point directed axially at said soft end portion and having a central passage communicating with said piercing point for permitting escape of the gas from the interior of said cartridge after insertion of said piercing member through said soft portion;

an operating handle pivotally secured to said body member at the end of said member remote from said bight portion and having a portion extending across the end of the cartridge opposite said soft end portion and having another portion substantially parallel to the axis of said cartridge so that said body member and said handle may be laterally gripped to axially move said soft penetrable end portion against said piercing member for piercing thereof for release of the gas,

said extending portion having a cam surface in continual engagement with said opposite end of said cartridge to move said cartridge axially within said body member and towards said piercing member.

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