March 27, 1945. C. F. SMITH 2,372,454

FLASK OPERATING HEAD

Filed April 4, 1941

Fig. 1.

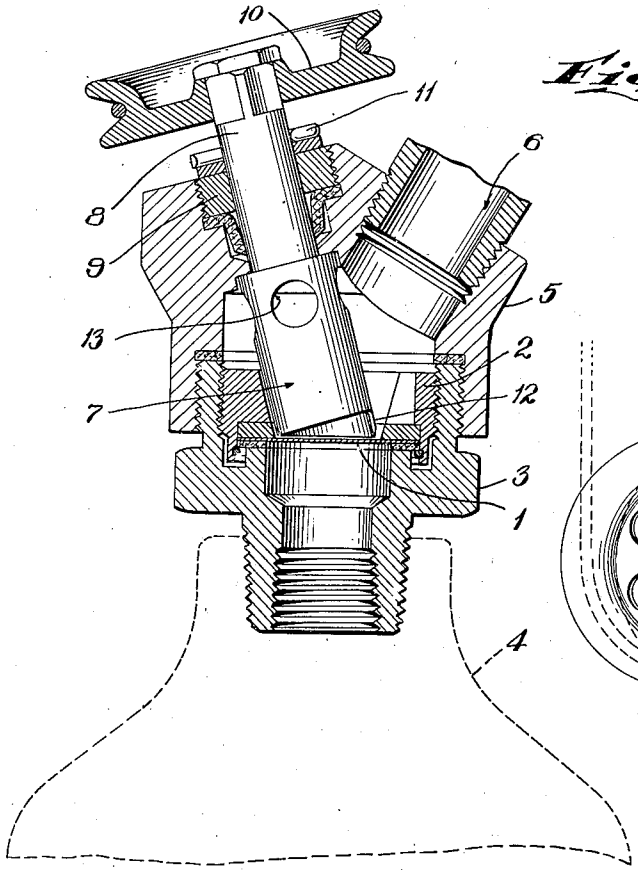


Fig. 2.

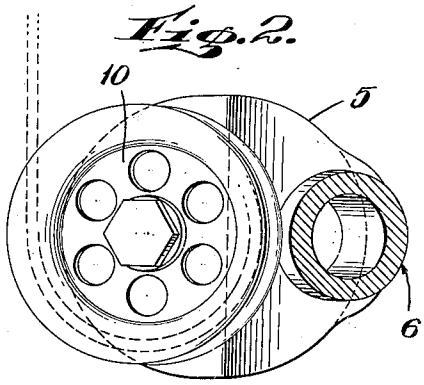


Fig. 3.

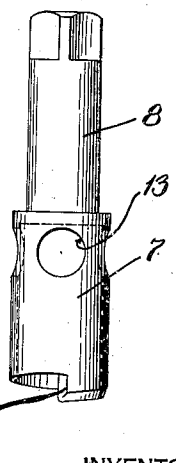
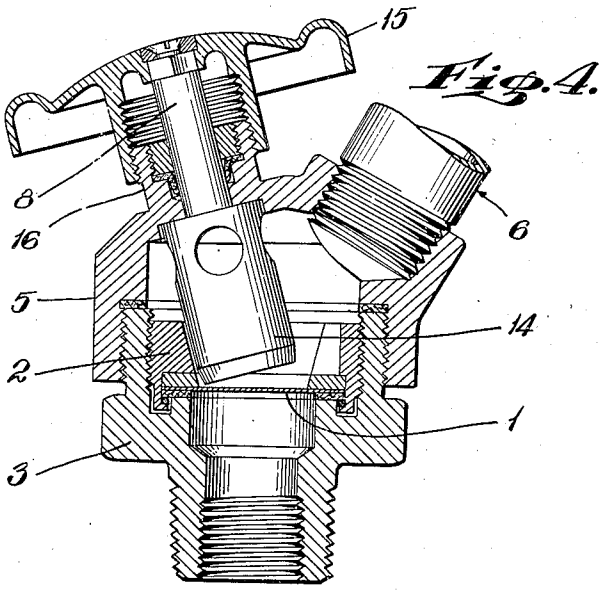


Fig. 4.



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FLASK OPERATING HEAD

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Application April 4, 1941, Serial No. 386,836

5 Claims. (Cl. 222—5)

The invention relates to pressure containers or flasks of the type closed by sealing discs which are punctured or cut to release the contents and, more particularly, to carbon-dioxide flasks which are required to be opened quickly and fully in time of emergency, as, for example, in fire extinguishing systems. The need in all cases is for a wide opening in the disc made with the least mechanical effort and for a direct and easy path for the escaping medium, as well as for compactness and lightness of weight, the latter properties being of prime importance for air-craft installations.

This invention provides an exceptionally efficient head to meet these requirements and is essentially characterized by the arrangement of the disc-cutting element in an oblique position, thereby affording a number of important advantages as will presently appear, and which can be utilized in various ways separately or collectively according to circumstances, but in all cases producing a head of small size and weight capable of superior performance.

In the accompanying drawing, Fig. 1 represents an axial section of the form of the invention at present preferred and herein used for illustration only, Fig. 2 a top plan, Fig. 4 a detail of the disc-cutter and Fig. 4 a variant form.

The sealing disc indicated at 1 is clamped as customary by means of a ring nut 2 upon the gasketed seat of a tubular fitting 3, which latter is screwed into the neck of the flask 4. The disc is flat in the present case, though flatness is not essential, and is seated in a plane normal to the axis of the flask. A cover or casing 5 is screwed on or otherwise attached to the fitting 3, forming therewith an outlet chamber for the flask through which the gas flows to the discharge pipe 6 when the disc is opened. The disc-opening-cutter is set in the wall of this chamber at an angle which, in Fig. 1, is approximately 15 degrees to the plane of the disc and therefore also oblique to the flask axis, but the angle can be greater if desired. With the cutter thus disposed the discharge pipe 6 can be led off directly from the chamber in a direction generally away from the flask, and more or less parallel to the axis thereof, which simplifies certain distribution layouts but, as will be observed, the outlet to the pipe can also be arranged at right angles to the flask axis when that is preferred.

The cutter used in Fig. 1 includes a cutter element 7 which is tubular, and carried on or formed as part of a shank 8 extending through a packing nut 9 to the exterior where it is provided with a cable sheave or pulley 10 or any other appropriate means of rotation. It is held in the chamber wall against endwise movement by the shoulder formed by the top of the cutter element inside the chamber and by the pin 11 outside. Its innermost end or toe is formed with a spur or knife edge 12, longitudinally placed and normally occupying a position with its point or toe very close to or in contact with the face of the disc. Due to the oblique relation the rotation of the cutter on its axis carries this edge through the plane of the disc producing an oblong or elliptical hole therein. Such a hole is of larger cross area than the section of the cutter that makes it and it will be observed that this will be the case whether the cutter functions by being rotated as just described or by being pushed into the disc as a straight punch, without rotation or as referred to below. In either case a given size of hole is made with a smaller cutter than in any prior design, and with a smaller cutter the operating head as a whole can also be smaller and therefore of lighter weight. It may be noted in this connection that in any system the point of greatest restriction always occurs at the disc and that in the case of carbon-dioxide particularly, even moderate restriction must be avoided.

On the execution of the cut, the pressure contents of the flask flow out through the hole through the cutter element and the holes 13 therein if it is tubular, and through the outlet chamber, to the discharge pipe 6. The elliptical cut-out part or blank, if not torn off by the force of the flow, remains hinged to the clamped body part of the disc, as customary in other forms of flask-opening mechanism, and this hinging effect can be assured where desired, by appropriately spacing the toe of the cutter from the disc when in its normal position. By imparting a slight endwise movement to this cutter a complete ellipse may be cut out, as will presently appear. The cutting of the disc is done with a wiping action along the length of the cutting edge on the spur, and this makes the cutting easier. Also it is noted that while the cutting stroke is inward or downward during the first half of the rotation it is upward or outward during the remaining half, and this assists in turning the cut-out flap upwardly into the interior of the cutter or the outlet chamber so as to be out of obstructing position to the out-flow.

In Fig. 4, the oblique tubular cutter 14 is advanced endwise toward and into the disc as it

rotates, such endwise movement being imparted by the threading of its hand wheel 15 on the boss 16, the construction otherwise being about the same as in Fig. 1. However the cutting edge in this case is shown square to the cutter axis and gives a specially pronounced wiping cut, the cut beginning at the heel of the cutter, but it is apparent that the cutting edge can be variously designed in any form of the invention to enter the disc either by virtue of its rotation or its simultaneous rotation and endwise movement, as preferred. When the action is solely rotary the operating head has its most compact form since no clearance for endwise cutter motion is required, and the outlet chamber can thereby be reduced to its minimum functioning dimension. It is pointed out that the location of the cutter-advancing thread on the exterior of the boss instead of on the inside of the casing as heretofore is a further factor of compactness permitting a shorter stem or shank for the cutter. While it is preferred to have the disc square to the flask axis and the cutter oblique thereto, it is obviously quite possible, also practical, for this relation to be reversed with the disc obliquely placed and the cutter located at such angle to it as to produce the same elliptically enlarged hole in it. This and many other possible variations are intended to be embraced in the claims which follow.

I claim:

1. An operating head for the outlet of disc-sealed flasks forming a flask outlet chamber, a sealing disc clamped in the chamber to seal the flask outlet therein, and a rotary disc-cutter mounted in the chamber on an axis oblique to the disc and having a toe with a substantially longitudinal cutting edge adapted to cut an elliptical hole in the disc.

2. An operating head for the outlet of disc-sealed flasks forming a flash outlet chamber enclosing a sealing disc of thin material clamped in the chamber to seal the flask outlet and a disc-cutter operating in said chamber on an axis oblique to the disc and means for imparting endwise and rotary movement to said cutter to cut an oblong hole therein.

3. An operating head for the outlet of disc-sealed flasks forming an outlet chamber enclosing a sealing disc clamped in the chamber to seal the flask outlet and a disc-cutter extending through an externally threaded boss to the outside of said chamber and a cutter-operating wheel element connected to said cutter and engaging the threads on said boss.

4. A connection device between a flask of liquified gas and a delivery pipe comprising an operating head fixed to the flask outlet neck and to said pipe and containing a sealing disc of thin material normally closing the passage through such outlet neck, disc-cutting means mounted in the wall of said head and including a disc-cutting element held against any substantial endwise movement with respect to said wall, said element being rotatable on its longitudinal axis which is oblique to the disc, and having a cutting edge projecting from it and said disc having a part adapted to be cut by the rotation of said element.

5. An operating head for the outlet of disc-sealed flasks forming a flask outlet chamber, a sealing disc of thin material clamped in the chamber to seal the flask outlet, a rotary disc-cutter in the chamber mounted at an oblique angle to the disc and adapted to cut an oblong or elliptical hole therein, and means to rotate the cutter.

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