No. 726,214. PATENTED APR. 21, 1903.

J. CAMUS.

APPARATUS FOR DISCHARGING BOTTLES OR TUBES OF LIQUEFIED CARBONIC ACID OR THE LIKE.

APPLICATION FILED MAY 2, 1902.

NO MODEL.

FIG-1

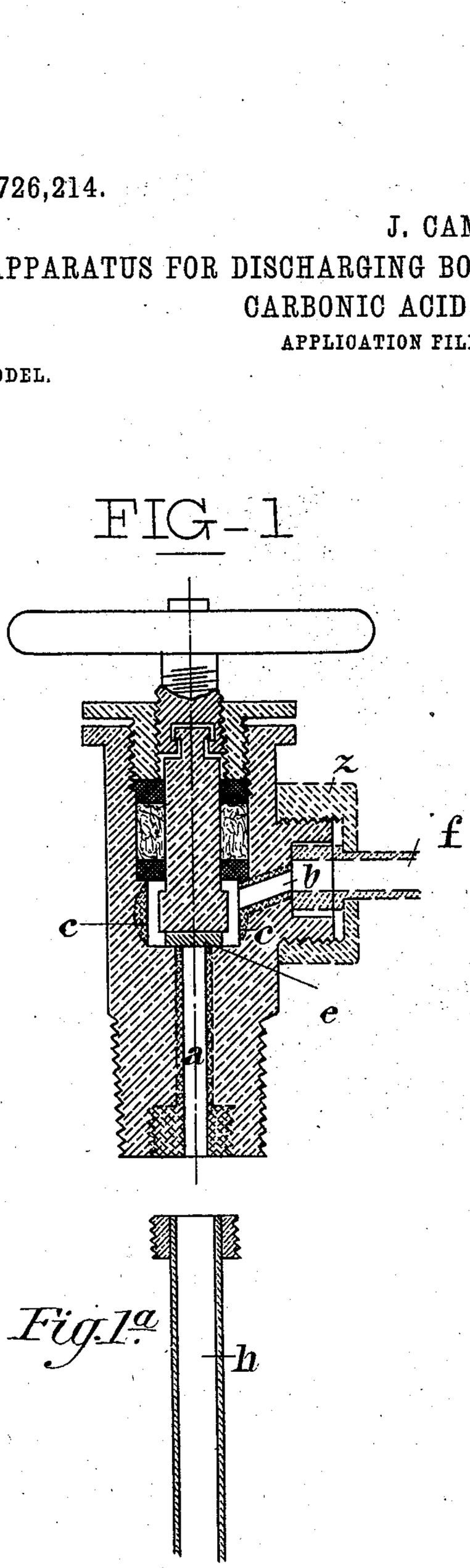
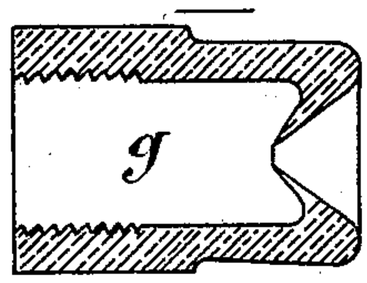


Fig. 1a

FIG-2



Witnesses

Jean Germain

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JOSEPH CAMUS, OF GRAND CROIX, FRANCE.

APPARATUS FOR DISCHARGING BOTTLES OR TUBES OF LIQUEFIED CARBONIC ACID OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 726,214, dated April 21, 1903.

Application filed May 2, 1902. Serial No. 105,639. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CAMUS, engineer, a citizen of the Republic of France, residing in Grand Croix, Loire, in the Republic of France, (whose full postal address is Grand Croix, Loire, aforesaid,) have invented certain new and useful Improvements in Apparatus for Discharging Bottles or Tubes of Liquefied Carbonic Acid or the Like, (for which application has been made in France, dated December 23, 1901, and in Great Britain, dated April 19, 1902,) of which the following is a specification.

My invention does not relate to bottles for retaining and discharging liquids containing gases under pressure, but to bottles for liquefied carbonic-acid and like gases, which bottles are usually closed by a simple tap with a reduced orifice. Such liquids, however, in order to volatilize and expand absorb a certain quantity of heat, which can only be borrowed from the bottle and its tap. If the discharge is a large one, the vessel has not time to absorb heat from the surrounding medium and becomes coated with ice, because the water-vapor contained in the bottle and a portion of the carbonic-acid gas condense in the tap and form solids which choke the orifice. By reason of these drawbacks it has never been possible hitherto to rapidly discharge bottles of liquefied carbonic acid and the like, and all the applications requiring large quantities of this substance have not in consequence been capable of being carried out in practice. To overcome the difficulty, I have found that the borrowing of heat from the bottle and its tap must be avoided and transferred to a point where it is easy to furnish this heat. This result is obtained by modifying the taps hitherto employed.

One of the various forms is shown in the accompanying drawings in Figure 1 in vertical central section. Fig. 1ª is a central longitudinal section of the immersion-pipe. Fig. 2 is a preferred form of nozzle.

I take a tap the areas of the apertures *a b c* of which are the same as or are bored out to be in proportion to that of the pipe connection. This latter is in practice usually of one to three millimeters in diameter, as will be hereinafter shown. Fig. 1 shows, as an example, a type of tap of the ordinary construction and modifications introduced therein consisting in parts removed to comply with the form of construction of the improved tap. I connect to this tap an immersion-tube *h*, which may extend to the bottom of the bottle. I connect to this tap by means of a nut, such as *z*, a conducting-tube *f*, terminated by a nozzle *g*, of considerably smaller section than that of the tap and the tubes and shown separately in Fig. 2. The result of these modifications is as follows: By completely opening the tap of the bottle the pressure of the latter forces the liquid to rise by the immersion-pipe *h*, filling the taps, tubes, and pipe up to the nozzle *g*. It is at this latter place, however, only that the change of condition is produced and the absorption of heat takes place. I therefore cause the nozzle to discharge into a pipe or directly into the inclosure to be filled, or it suffices to furnish the necessary heat at the expansion-point. In order to arrive at this result, several means are practical and may be employed. The form of the nozzle *g* is of little importance under these conditions, as the orifice cannot become plugged by the formation of frozen solid particles. The precaution consists in the size of the opening of this nozzle, which must be much smaller than the immersion-pipe or tap. The preferred proportion is to make the opening at the nozzle about one-twelfth of the immersion-pipe and passage-ways at *c* and *b* and pipe *f*. The heat of expansion may be borrowed directly from the surrounding air. This is obtained by employing, for instance, a nozzle of the shape of a reëntering cone having sharp cutting edges, such as is shown in Fig. 2. By this arrangement the icicles or solid particles which form do not intercept at all the outflow-orifice, the major part of the liquid becoming volatilized after its discharge from the apparatus.

As just mentioned, the apparatus is thus composed of—

First. An ordinary tap having suitable orifices and fitted with an immersion-pipe, which has for its object to allow the liquid to reach the orifice of the tap. Of course in case the tap is situated at the base of the container

or if the container is reversed the immersion-pipe is no longer of use and may be dispensed with.

Second. A conducting-pipe terminated by a nozzle. Generally speaking, the proportion of the orifice of the nozzle to that of the tubes and the tap must be as small as possible, the apparatus working very well with a size of one-twelfth of an inch, for instance.

This apparatus may serve industrially more particularly as an injector of carbonic acid for the extinction of fire in houses, provender-stores, mines, warehouses, and the like, also for disinfecting the holds of ships and the like.

I claim as my invention—

1. A device for converting liquefied gas into a gas, consisting of a container in which the liquid is adaptad to be located, a nozzle having the discharge-orifice formed as a reëntrant cone, with sharp inwardly-directed edges, and a tube dipping into the liquid and leading to said nozzle, whose opening is several times smaller than the inner diameter of said tube.

2. In a device for containing liquefied gases, as distinguished from gases in solution, the combination of a tap, and a discharge-nozzle having the discharge-orifice formed as a reëntrant cone with sharp inwardly-directed edges, whereby the surrounding medium is allowed free access to the point of expansion, and whereby condensation or solidification is prevented.

In witness whereof I have hereunto signed my name, this 21st day of April, 1902, in the presence of two subscribing witnesses.

JOSEPH CAMUS.

Witnesses:
JEAN GERMAIN,
FRANCIS GULLIET.