Nov. 10, 1925. 1,561,036

G. F. SUGDEN

APPARATUS FOR CHARGING LIQUIDS WITH CARBON DIOXIDE GAS

Filed Dec. 17, 1924 2 Sheets-Sheet 1

Fig. 1.

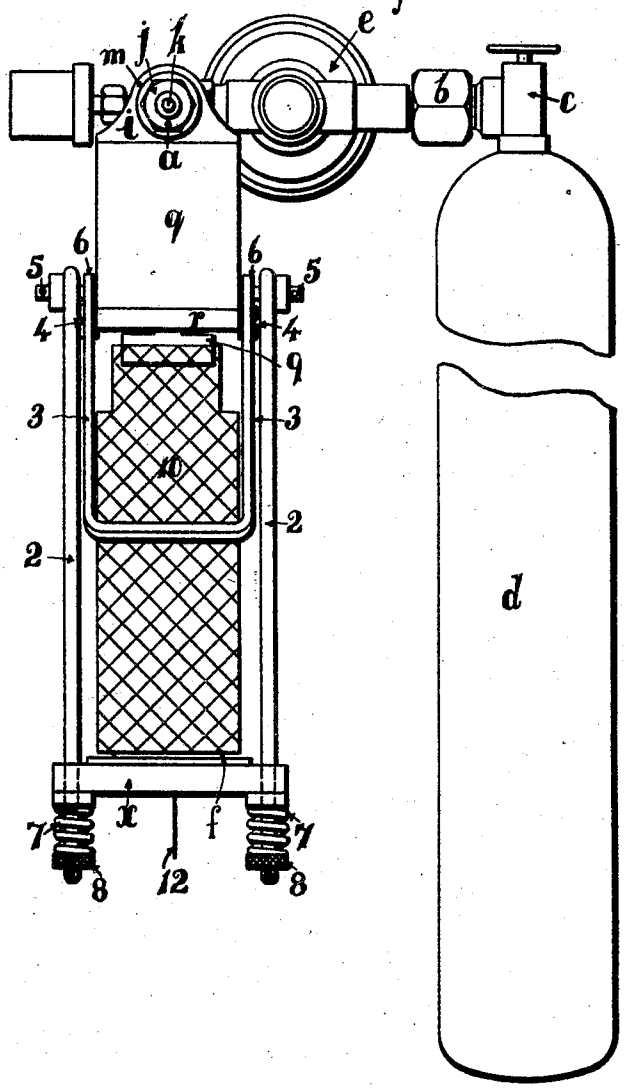

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Fig. 2.

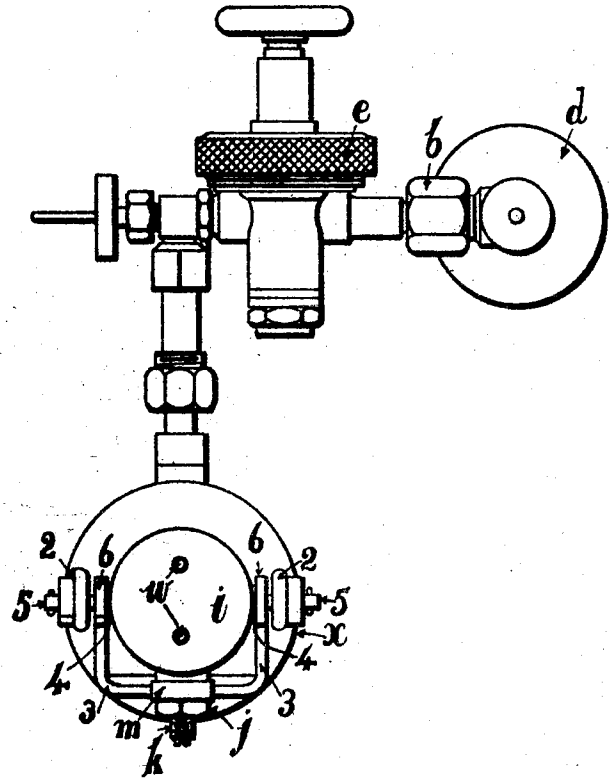
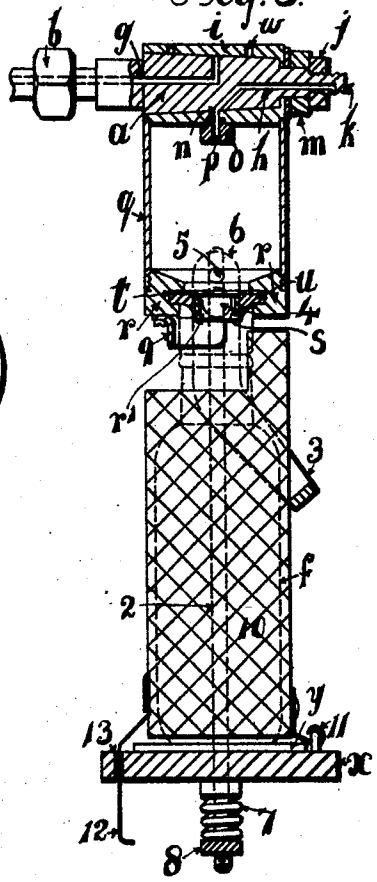


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE FRANCIS SUGDEN, OF MANCHESTER, ENGLAND.

APPARATUS FOR CHARGING LIQUIDS WITH CARBON-DIOXIDE GAS.

Application filed December 17, 1924. Serial No. 756,501.

To all whom it may concern:

Be it known that I, GEORGE FRANCIS SUGDEN, a subject of the King of Great Britain and Ireland, and resident of Manchester, in the county of Lancaster, England, have invented a new or Improved Apparatus for Charging Liquids with Carbon-Dioxide Gas, of which the following is a specification.

This invention relates to a new or improved apparatus for charging water or other liquids, such for instance, as mineral waters, with carbon dioxide gas and aims at providing a simple and cheap device of that class more particularly intended for domestic and like uses, for the smaller classes of mineral water shops, restaurants, public houses and the like so as to enable such places mainly to obtain freshly gas-charged waters in small quantities for immediate use, though such waters or liquids may be stored in ordinary mineral water or like bottles for subsequent use.

My invention has particular reference to that type of known apparatus in which the bottle containing the liquid to be charged with the gas named is supported in a carrier adapted to be turned about an axis or valve to an inverted position, the action of turning the carrier from the normal to the inverted position placing the bottle and its liquid contents in communication with the gas supply whilst on returning the bottle to the upright position after aeration the gas supply is cut off and the bottle placed in communication with a snifting port or valve by which excess gas is discharged to atmosphere.

In the aforesaid type of apparatus my invention consists of a fixed plug or equivalent tap or valve adapted to be connected to a gas cylinder, gas inlet and outlet ports in the plug, a gas and liquid-receiving chamber arranged at its upper end to form a casing to surround the plug so that it may normally depend below the plug and provided at its lower end with means for making a gas and liquid-tight joint with the neck of the bottle, said chamber being of suitable capacity for receiving the liquid and gas to enable them to be mixed by moving the chamber about the axis of the plug and thus controlling through the ports referred to the passage of gas into the chamber and the exit of excess gas out of itself.

Further features of my invention comprise the combination with the aforesaid means of a reducing valve located between the gas cylinder and the plug for reducing the gas from a high to a low pressure as it passes into the bottle to be charged; means for supporting the bottle and for making a tight joint between its neck and the gas and liquid-mixing chamber consisting of a resilient platform for the bottle to be charged, a rubber packing washer at the end of the mixing chamber and a toggle lever and link device connected with a mixing chamber and the bottle support platform and the combination with the latter of a hinged or slidable guard for preventing the glass flying in case of the bottle breaking during charging, such guard being adapted to be moved into or out of position by hand or automatically.

My invention will be fully described with reference to the accompanying drawing in which,

Fig. 1, is a front elevation of an apparatus constructed in accordance with my invention,

Fig. 2, plan of same and,

Fig. 3, side elevation, partly in section.

In accordance with my invention I provide a fixed plug or like valve *a* adapted to be connected by a union *b*, or other simple means, with the outlet pipe *c* of a known type of carbon dioxide gas cylinder *d* containing the gas at high pressure, a reducing valve *e* of any suitable type being located between the plug *a* and cylinder *d* to reduce the pressure of gas to be admitted to the bottle *f* containing water, mineral water or other liquid to be charged with the gas. The plug *a* is provided with an inlet port *g*, or ports, for the gas communicating with the reducing valve and an outlet port *h*, or ports, for discharging to atmosphere excess gas after each bottle-charging operation. The plug *a* or like fixed valve element is suitably supported from a bench, counter or stand and is surrounded by a revolvable casing *i* having means for insuring a gas tight joint between the two parts. That is to say the plug *a* may be kept tight in the casing *i* by a nut *j* on a reduced screw-threaded extension *k* at its smallest end and a rubber washer or spring *m* located between the nut and casing *i*. The movable element or casing *i* is provided with a port

n which at one time coincides with the gas inlet port g of the plug a to pass gas to the bottle and at another time to coincide with the gas or vent outlet port h of the plug for discharging the excess gas to atmosphere after the charging operation, the registering of the plug and movable-element port being obtained by moving the casing element i round the plug by hand, first to the charging and then back to the discharging position alternatively as hereinafter described. The plug casing i is fitted with a jet device in connection with the gas inlet port g, for spraying the gas into the water or other liquid. This jet device may be of any suitable type and consists of a plug o with a fine hole p though it may consist of a solid cone lying within a hollow cone communicating with the inlet port g, one of the conical faces being very finely fluted to form passages for the gas. Or the jet may be of a similar type to the ordinary jets as used in petrol or paraffin carburettors.

The movable casing element i constitutes also a mixing chamber q of suitable cubical capacity, preferably substantially equal to the cubical capacity of the bottle f to be charged said chamber q normally depending below the plug. At the opposite end to the plug it is provided with an outlet port r^1 of about the same diameter as the hole in the bottle neck, such port being conveniently constituted by a short tube s forming part of a metal disc t, the tube being surrounded by a coned rubber packing washer u. The disc t and washer u are held tightly in the lower end of the chamber q by a removable and tight fitting and preferably screw threaded cap r. The washer u forms a tight joint with the bottle neck during the charging operation. w are holes for lubricating the plug a.

The bottle f to be charged is supported on a small platform x provided with a rubber or other resilient cushion y, such platform being connected with the casing element i in such a way that it can partake of its rotary movement about the plug a. The means of connection is preferably such as will also constitute the means for rapidly forming a gas-tight joint between the bottle neck and the washer u—so also holding the bottle firmly in position—and likewise enables the charged bottle to be quickly released. In one way of doing this the platform x is slung by hooped rods 2 from the casing i, such rods constituting with a movable pivoted lever 3 and links, a toggle device adapted to draw the bottle neck tightly against the packing washer u on the casing and so firmly to hold the parts. The lever 3 is pivoted at 4 to the casing i and the rods 2 slung from studs 5 in its short arms 6. By pulling down the forward end of the lever 3, the bottle supported by the platform x is raised to bring the end of the bottle neck tightly against the washer u and the resilient cushion y, but further resilience is provided for against the pressure of gas and liquid in the bottle f and mixing chamber q by arranging springs 7 on the rods 2 between the underside of the platform x and the nuts 8 or heads at the lower ends of the rods 2, or between the platform x and the base of the bottle. The nuts on the rods 2 are capable of adjustment to vary the pressure of the springs.

The platform x and chamber q are provided with stops or guides such as 9 against which the bottle f is placed to centre it. In order to prevent fragments of glass flying should the bottle break during charging I provide a guard which is of a slidable or hinged type. In the drawing I have shown a guard 10 of tubular type made from perforated metal and hinged at its lower end at 11 to the platform x so that its upper end may be tilted forward to an angle to enable the bottle to be placed within or to be taken away from the guard. To limit the forward movement of the upper end of the guard, its lower end is provided with a wire arm 12 passing through a hole 13 in the platform x, the lower end of the wire being bent to engage the latter when the guard is pulled forward.

The charging of the bottle with gas is carried out as follows:—The bottle f is first filled with the liquid to be charged with gas, the guard 10 is pulled forward and the bottle placed in position after which the guard and bottle are pushed into the vertical position. The lever 3 is at this time in its raised position but is now pulled down so as to operate the other toggle elements to make a tight joint between the bottle neck and the washer u. The bottle, carrier and casing are then turned through an angle of 180 degrees about the plug a, thus bringing the port n opposite the gas inlet port g and allowing the gas from the cylinder and reducing valve to pass into the chamber q. During the turning movement the liquid commences to descend into the chamber q and by the time the ports are opposite one another the water or liquid is met by an ascending stream of gas from the jet device in the chamber q. Through agitation of the liquid and intermixing of the gas takes place within the neck of the bottle until the internal pressure within the chamber q and bottle f equals the pressure of gas from the reducing valve. When this occurs the inlet of gas is automatically stopped. The bottle carrier and other parts are then turned back to the original position so closing the gas inlet port g and bringing the port n opposite the outlet port h to allow excess gas to escape to atmosphere. During the last action the liquid passing from the mixing chamber

back into the bottle meets the gas which has previously passed into the latter thus effecting further agitation and complete intermixing. The toggle device is then released and the bottle removed and replaced by another one when the operations described are again gone through. The charged bottle may be sealed immediately by a stopper or its contents be used.

Apparatus arranged as described gives a quiet gas charging and discharging action at a comparatively low gas pressure.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a charging apparatus, a valve provided with a stationary plug and a casing pivoted thereon, and having inlet and charging ports for compressed gas, a receiving chamber secured to the valve casing at one end and provided with packing at its other end, and a support for a bottle pivoted to the said chamber and provided with means for holding the bottle neck in engagement with the said packing.

2. A charging apparatus as set forth in claim 1, the said stationary plug being also provided with a vent outlet port for communicating with the charging port of the casing when the latter is out of line with the inlet port of the plug.

3. A charging apparatus as set forth in claim 1, the said support for the bottle being provided with springs for pressing it towards the said packing, and having toggle mechanism which operates it and the said springs.

4. A charging apparatus as set forth in claim 1, and having also a tilting guard for the bottle pivoted at one end and upon one side to the said support, and provided at its other side opposite its pivot with means for limiting its tilting movement.

In testimony whereof I have set my hand.

GEORGE FRANCIS SUGDEN.