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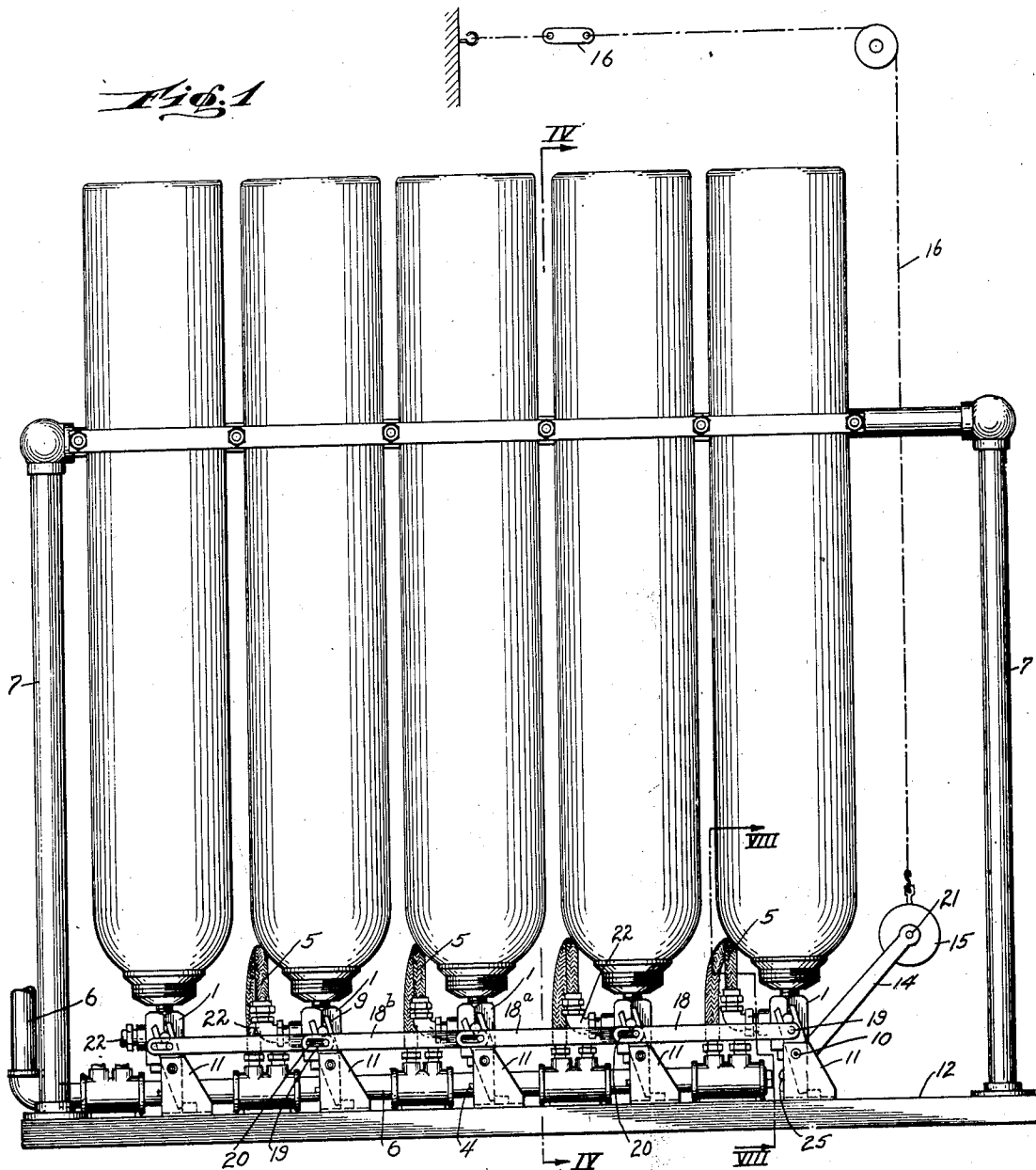
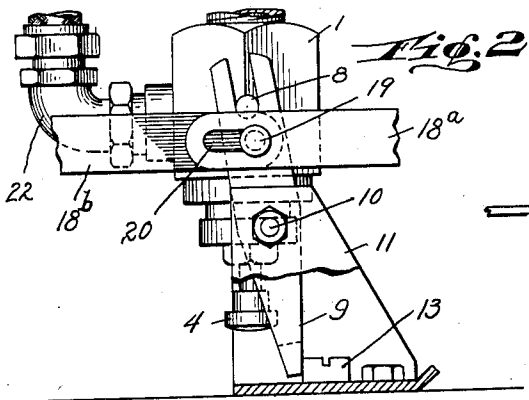
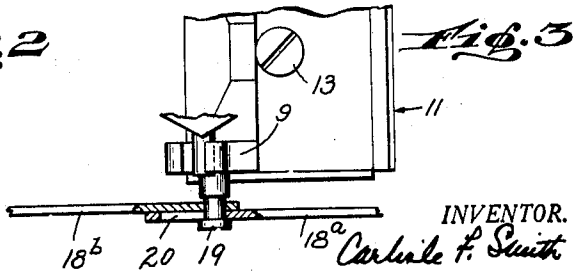
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1,998,593

APPARATUS FOR DISCHARGING SEALED CONTAINERS

Filed Feb. 28, 1931

3 Sheets-Sheet 1



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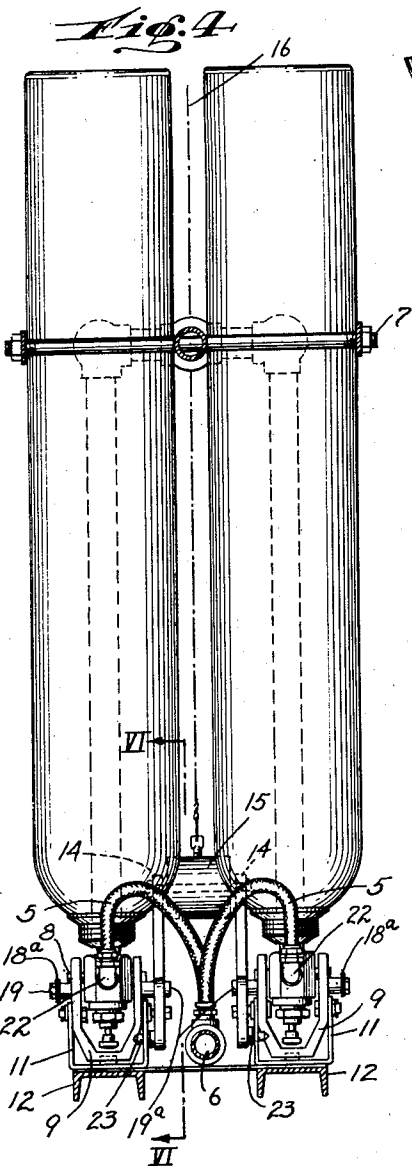
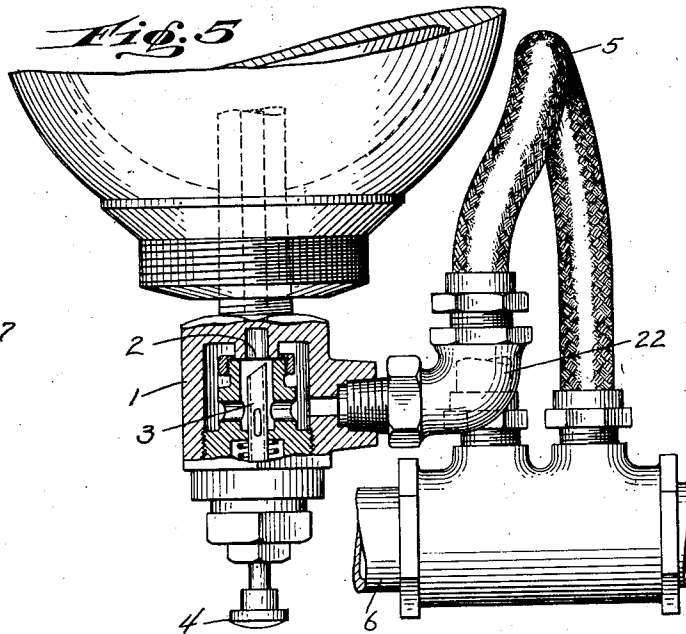
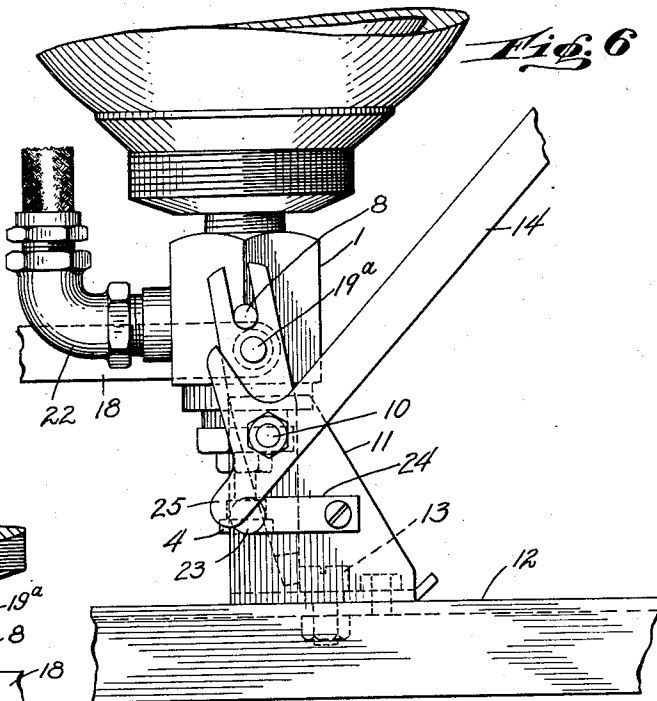
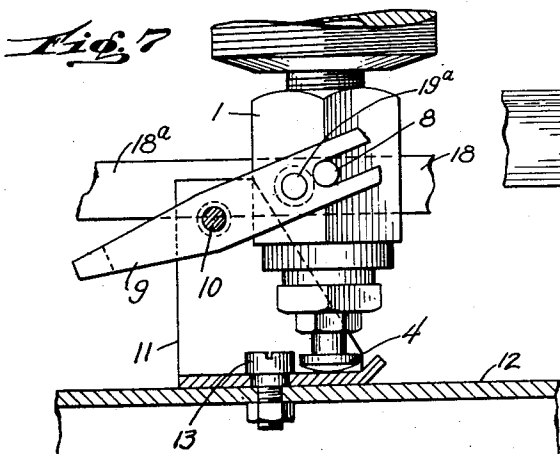
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APPARATUS FOR DISCHARGING SEALED CONTAINERS

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3 Sheets-Sheet 2



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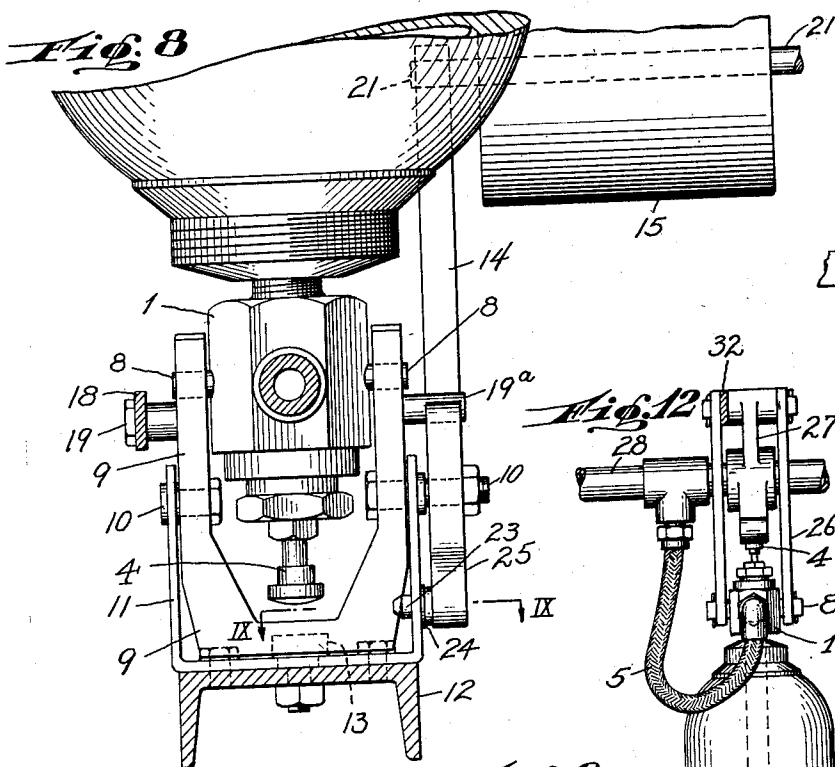
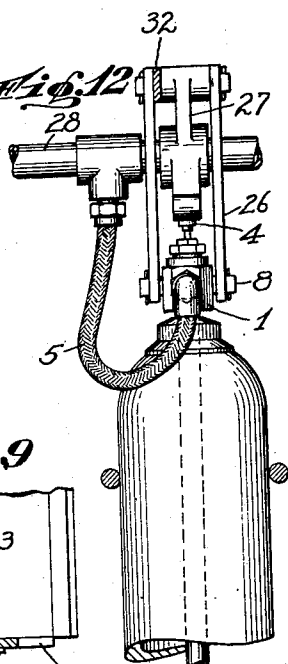
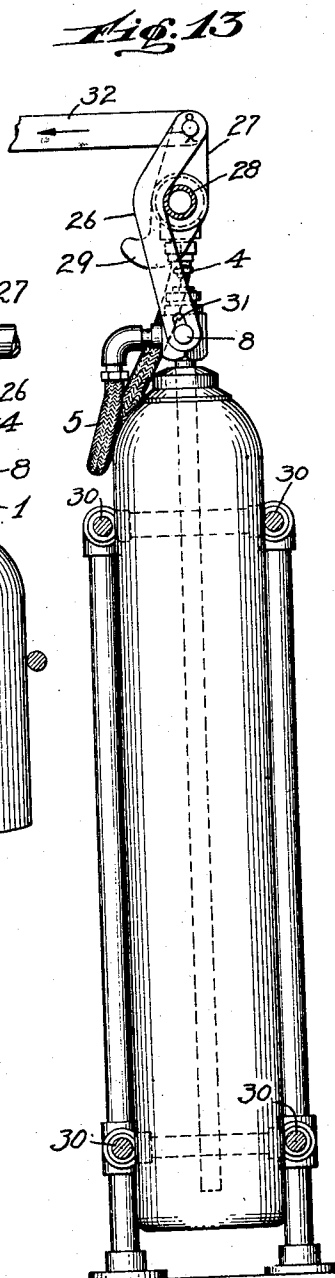
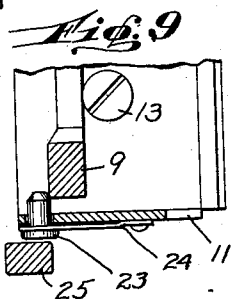
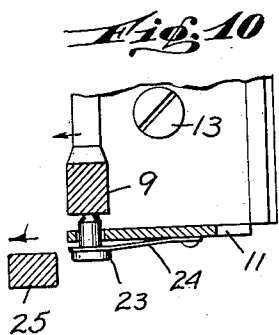
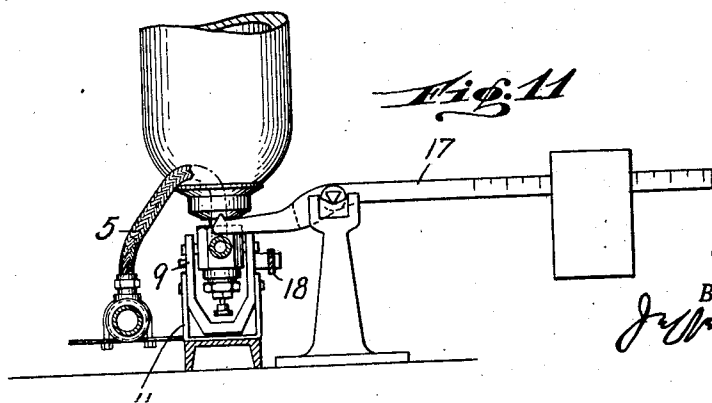
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APPARATUS FOR DISCHARGING SEALED CONTAINERS

Filed Feb. 28, 1931

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,998,593

APPARATUS FOR DISCHARGING SEALED CONTAINERS

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Application February 28, 1931, Serial No. 519,075

39 Claims. (Cl. 169-11)

This invention provides simplified means for discharging batteries of high pressure gas flasks such as the flasks of liquid CO₂ used in CO₂ fire-extinguishing systems, in which the internal pressure is normally some 800 pounds per square inch, increasing with rise of temperature. The flasks used for these systems are heavy-walled, tubular containers of great strength and unwieldy bulk, weighing about 170 lbs. each, and the liquid gas is confined in them by means of metal sealing discs of corresponding strength closing their outlets. To discharge such a battery of flasks requires the cutting of a hole in the disc of each, of suitably large size to guard against freezing and consequent stoppage of the gas flow under the rapid expansion. In such systems, as heretofore installed, the flasks are set in rows on a floor or platform with their several discharge heads connected to a common manifold through which the gas from all the flasks is delivered to its point or points of use. The discharge heads contain the piercing or cutting members or devices by which the holes are produced in the sealing discs and it has been customary and is also necessary to provide a suitable power agency to actuate these devices, because the discs are strong and the work of cutting holes of adequate size in all of them is considerable, besides which it is generally required that such systems be controlled from a remote point or automatically, which demands the use of a local power agency. In some systems the opening of such flasks has been accomplished by the power of gravity, applied in the form of heavy weights suspended over the several discharge heads, which when released from a sufficient height drive the cutters through the discs, thus accomplishing simultaneous discharge into the manifold. In other and later systems, now generally in use, the pneumatic principle is employed, according to which fluid pressure derived from one of the flasks of the battery, called the pilot flask, is admitted into fluid pressure motor apparatus, the latter being mechanically connected to actuate the cutters and thus do the work of opening the other flasks in the battery; each flask in such system is commonly equipped with its own fluid pressure motor, in the form of a piston and cylinder, mounted directly on, or forming a part of its discharge head, all the pistons being simultaneously actuated by the compressed gas distributed to them from the pilot flask. In some cases also individual electric motors have been applied directly to the flasks for the same purpose, being mounted directly on the discharge heads thereof. In all prior methods of battery discharge each discharge head requires to be provided with one or the other of the cutter actuating mechanisms referred to and to be connected up not only to

the common manifold for discharging its gas, but also to the common actuating system which applies the power to its disc-cutter, and this involves highly skilled labor not only when installing the system in the first place but also whenever the system requires to be recharged, i. e. to have its empty flasks substituted by filled flasks.

The present invention eliminates these and other objections, at the same time affording special advantage over the systems heretofore employed or proposed, and consists among other things in organizing the battery so that the flasks themselves do not support either the apparatus by which their respective seal-opening members are operated or the common conduit into which they discharge, in this way reducing the work of installing or recharging a battery so that it involves merely the setting of the flasks in seats already provided for them and there connecting them to the common discharge pipe or manifold. In this way only one connection is required to be made with each discharge head, that being the gas discharge connection. The mechanism which causes or controls the actuation of the cutters does not have to be disturbed beyond resetting it, if already actuated.

Notwithstanding the heavy bulk of these flasks, I have found that it is entirely practical to use their own weight as the source of power for cutting through or opening the discs and to this end my invention also and further provides novel supporting and releasing means particularly suited to the manipulation of these unwieldy objects for this purpose. In this case the cutter-actuating mechanism or seal-opening system becomes in part at least the means of supporting the flask so that it may be dropped, which movement actuates the disc-opening means in some appropriate way. In this manner the complication and expense incident to the use of the fluid-pressure and other motor-devices heretofore used, is eliminated. Preferably the series of flasks is set up in inverted positions, supported by means of their discharge heads which are made to be received in the seats referred to, the cylindrical bodies of the flasks being laterally supported, and also guided in their descent, by suitable cage work or equivalent. Thus organized the flasks require to be lifted but a slight distance in order to be set in place on their seats, an operation which two men can do with ease, whereupon the system is ready for use as soon as the necessary gas connections have been coupled up. In addition to its simplicity, the gravity operation of the flasks affords the special and further advantage that the abundance of power, made available by this use of the heavy flask, permits its cutter to be made larger, to cut a larger hole in the disc than

practical in existing systems, this being of peculiar importance in CO₂ systems in that it avoids all risk of stoppage of flow by internal freezing which as well known, is most likely to occur at the hole in the disc and is a frequent source of failure.

This invention also includes either as incidental to or independent of the features and functions above referred to, the organization of the individual flasks of the battery whereby they can be weighed in place, each separately from the others, as later described, without disconnecting them from the manifold or disturbing or complicating the actuating mechanism by which their sealing discs are ruptured or opened. Other and incidental advantages are also afforded by this invention which will become apparent from the description which follows and all of which, including individual features and combinations thereof, are intended to be broadly covered by the claims.

In the accompanying drawings, Fig. 1 is a side elevation of a double-row battery of flasks arranged to be opened according to the principles of this invention. This represents one of many different possible embodiments and is the form of the invention at present preferred.

Figs. 2 and 3 are larger scale details of the releasable flask mounting of the form of Fig. 1. Fig. 4 is a sectional elevation on line IV—IV of Fig. 1.

Fig. 5 illustrates the detail construction of the particular valve device with which the flasks of Figs. 1 and 2 are illustrated as equipped, and by which they are normally closed and maintained connected in the system.

Fig. 6 illustrates the same releasable mounting and its tripping means, being a section on line VI—VI of Fig. 2.

Fig. 7 is the same in discharged or opened position.

Fig. 8 is another elevation of the same mounting and releaser.

Figs. 9 and 10 are details of a lock device.

Fig. 11 is a detail of maintenance.

Figs. 12 and 13 represent a different embodiment of the same principle, using upright flasks.

The flasks indicated in the drawings will be understood to be standard CO₂ flasks of say 50 pounds, capacity, each equipped with a flask valve or discharge head 1, by means of which its contents are normally confined, and through which such contents escape when the valve is opened. As shown in Fig. 5, the closure of the flask is made by a disc 2 clamped tight on the flask outlet and arranged to be punctured by a spring-retracted plunger-type cutter 3 which is carried in the head and extends to the outside where it is provided with a knob 4 for actuation. When the piercer is pressed inwards it ruptures the disc and permits the contained gas to flow out through or around the piercer and through the flexible tube or conduit 5 into a fixed discharge conduit or manifold 6, which leads to the fire.

In the battery of Fig. 1 the several flasks are arranged in inverted positions in a double row and supported in a suitable frame or cage marked 7, which may be developed, if desired, to serve as the usual protective enclosure to keep persons and objects from accidental contact with them although not so shown in the present case. This frame or cage supports the upper parts of the flasks in prescribed relative positions with freedom for vertical movement therein but with little or no lateral movement, and each flask rests in

or upon a releasable mounting by or from which it may be dropped within its cage when desired, causing its opening knob to engage or strike a co-active member or an abutment and thereby release the flask contents into the manifold. In the design selected for illustration the discharge head is provided with two gudgeons 8 projecting from opposite sides thereof and these gudgeons seat in open slots or crotches in a pivoted strut member 9 of U-shape which latter is pivoted at 10 in a U-shape bracket 11, the latter being secured on a suitable platform 12 supporting all the mountings in predetermined positions, one under each flask. The flask is thus vertically supported by its own head.

In its normal position, Fig. 2, the gudgeon axis is located just over the dead center line of the strut, so that the latter is then slightly inclined and bears by its lower end against a fixed stop represented in the present case by a large bolt-head 13 set in the floor of the U-bracket 11. By laterally shifting the gudgeon axis, so as to throw it over the dead center, the strut flops over dropping the flask as shown by Fig. 7 so that its opening member or knob strikes the floor of the bracket 10, which constitutes in this case its coacting member. See Fig. 5. The impact opens the flask by rupturing or causing the rupture of the sealing disc and the flask then rests on its knob as shown in the figure referred to.

The tripping or releasing of the flask to drop and open it is accomplished in the case in hand by a bell-crank 14 which is fulcrumed on the extended pivot 10 of the trip strut and arranged to engage a stud 19a on such strut; it may be actuated by hand or automatically, and a moderate force is sufficient to throw the axis over dead center notwithstanding the weight of the fully charged flask, and the force required can be regulated as desired in various ways as by varying the position of the stop screw 13. In automatic systems a small weight 15 may be attached to the bell-crank, and sustained by a cord and thermostat such as indicated by 16 in Fig. 1 which releases the weight, in time of fire and thereby causes the flask to drop and open itself.

This particular form of flask mounting is obviously only one of many that could be designed for normally holding the flask so that a moderate force will suffice to cause it to drop and thereby open its valve device, whether automatic or manual. It has the advantage that none of the weight of the flask normally rests on the releaser member, which may thus be made as light and sensitive as desired for automatic operation, but with other kinds of withdrawable or releasable supports it will be apparent that close approximations to the same effect can also be produced.

The flexible conduit 5 and the mounting of the flask in its cage with capacity for vertical movement therein enables the flask to be weighed from time to time without incapacitating the system or disconnecting the flask from the fixed manifold 6. Periodic weighing is necessary in CO₂ fire systems in order to make sure the contents have not leaked away and that the flask is still charged. It is a particular convenience to be able to weigh it without disconnecting it from the manifold, which can be done with fair accuracy, by the simple process of slipping the forked end of an ordinary scale beam such as shown at 17 for example, under the neck portion, as indicated diagrammatically by Fig. 11, the flexible tube remaining connected. The crotch slots of the trip strut 9 are sufficiently vertical

and sufficiently deep to accommodate the movement incident to weighing. The weight effect of the tube, being constant, can be allowed for in the measurement and the slight friction of the body of the flask on the parts of the cage in which it is guided is negligible. Irrespective of the source of power for opening the flask or its method of application, it will be apparent that this method of supporting the flasks of a battery so that they can be individually weighed and the system thereby easily kept in efficient condition without disconnecting the flasks from the manifold into which they are later to discharge, constitutes one of the advantages of the present system. A collateral advantage will be observed in that any flask can be readily removed from the system by merely opening the cage and lifting it out of the strut crotches, having first uncoupled the flexible tube.

The invention prefers to utilize the weight of one of the flasks of a series as the source of power for tripping or causing the dropping of all of the other flasks in the series, which are similarly arranged for gravitational opening. Thus in Fig. 1 the flask at the end of each row, arranged to be released or tripped by a bell crank as described, is connected with the next flask in the row by a connecting rod or link 18. This link is pivoted to a stud 19 on the trip strut of the first flask and has a lost motion slot connection 20 with a similar stud 19 on the trip strut of the next flask in the row. When the first flask is tripped, the lost motion of the slot 20 is taken up at some point in its descent and the connecting link 18 then jerks the second flask over its dead center, causing it to drop practically simultaneously with the first. This second flask has a similar connecting link 18a pivoted to its stud 19 with a similar lost motion slot connection to the stud 19 of the third flask in row, pulling it over dead center in the same way, and this flask by its link 18b pulls over the next and so on progressively throughout the whole row regardless of the number of flasks in it. Each row of the battery is similarly equipped and the two bell cranks of the first flasks of each row are joined together for simultaneous operation by a cross rod 21, so that all the flasks are discharged at once into the common manifold 6 which is conveniently located centrally between the rows of flask mountings where it is out of the way though sufficiently accessible for making the connections with it. With this arrangement each flask valve is provided with an elbow 22 and the flexible tube 5 takes the form of an inverted U and may thus be shorter than if the elbow were omitted.

In cases where it is necessary to guard against accidental tripping of the flasks in any over-the-center type of mounting, as for example in a marine installation, where the motion of the ship might trip them, it is desirable to lock the strut or the flask against lateral movement. This may be done by furnishing the bell crank or other actuating member with a positive lock device, such as shown by way of example in Figs. 9 and 10 where the lower end of the strut is locked or blocked by a latch bolt 23 working in a hole in the base bracket 11 and confined thereto by a spring holder or the like indicated at 24. The bevelled end of this bolt normally protrudes into the path of the trip strut as indicated in Fig. 9 and its outer end is normally covered by the heel 25 of the bell crank 14, so that it may not be pushed out of the way by the strut. When, however, the bell crank has been operated, its

heel is removed from the latch bolt, as shown by Fig. 10, and the trip strut may easily push it out of the way. At all other times the strut is positively locked by the bolt, and the locking of the first flask suffices for the whole row.

Mounting the flasks in inverted positions has the advantage that no internal siphon tube is needed for them. But the same principle of gravity operation can be applied to upright flasks with or without such tubes. Figs. 12 and 13 illustrate this form of the invention, and also a form of flask mounting in which there is no lateral movement of the flask itself, which has a vertical movement only. In this case, the upright flask is suspended by a pair of links 26, pivoted at one end to the valve gudgeons 8 and at their upper ends to a rocking cam lever 27 corresponding to the trip strut in the form first described. The normal position of the top pivot of the links is just over the dead center line and sustained in that position by contact of the links with some fixed abutment, for example the manifold pipe 28. The cam surface 29 on the rocking lever is located and shaped to coact with and depress the piercer knob 4 when the links are thrown over dead center and pull the rocking lever 27 around on its axis. Here also the gravitational energy of the flask thus supplies the power for opening the flask, the latter being guided in fixed ways in a cage 30 with provision for vertical movement only. The slots 31 in the suspension links 26 permit these flasks to be easily weighed as already described. The fulcrum for the rock link and the support for the flask itself, may be constituted if desired by the fixed discharge manifold 28 and is so shown in these figures, the discharge head being connected to it as before by a flexible tube 5. The tripping force is applied laterally as by a rod 32 and pulls the links over the dead center line as indicated until the flask drops onto the floor as shown. The discharge heads and their disc opening members are of heavy construction specially constituted to carry the weight of the flasks and to sustain safely the shock incident to their dropping when released. Except as particularly noted in the following claims however there is no intended limitation to any particular design of discharge head or disc opening member so long as these parts are capable of safely sustaining the shock of impact, which is considerable, nor to the support of the flasks by their said heads, nor to the opening of the sealing discs as the effect of the dropping of the flasks since as already stated, certain features of this generic improvement can be utilized with profit to the exclusion of the others.

Having described the invention, the following is claimed:

1. Discharge apparatus comprising a disc-sealed flask of liquefied gas held in an elevated position with its sealed outlet at the bottom whereby on the opening of said outlet liquefied gas issues therefrom, and having an opener for its sealing disc, a releasable mounting for supporting the flask in said position, a movable tube connecting said flask to a fixed conduit and means for releasing the flask to cause gravity actuation of its disc-opener and discharge of gas through said tube and fixed conduit.

2. Apparatus of the kind described, comprising a battery of flasks provided with openable sealing means and containing liquefied gas and respectively provided with opening members for said sealing means, means for releasably supporting one of such flasks in elevated position, means for

causing the releasing and opening of said flask, means whereby gravitational movement of said flask on release causes actuation of the opening member or members of one or more of the other flasks, a common discharge conduit and connections thereto from all said flasks.

3. Discharge apparatus comprising a battery of sealed flasks of liquefied CO₂ gas having individual opening members adapted to open the seals thereof arranged to be operated by the gravitational movement of the flasks, a releasable mounting for each flask arranged so as to permit its gravity movement and connections between said mountings whereby the gravitational movement of one of the flasks causes the gravitational movement and operation of the others.

4. Discharge apparatus comprising a battery of sealed flasks releasably supported in elevated positions and having individual opening members for the seals thereof arranged to be operated by the gravitational movement of the flasks, a releaser device for one flask to allow its gravity to become effective; a releaser device for a second flask operated by the gravitational movement of the first flask, and a common discharge conduit for all the flasks having individual communication therewith.

5. Apparatus of the kind described comprising, a series of flasks of liquefied gas, sealing means normally serving to confine the gas therein, a discharge manifold normally at substantially atmospheric pressure and to which each flask is connected by movable conduit means, a supporting structure for the series of flasks including means whereby the flasks may be dropped within such structure and means whereby such dropping opens the sealing means.

6. Apparatus of the kind described comprising a series of flasks each sealed with a disc and having a piercer therefor, means for supporting said flasks whereby they may be dropped on their piercer members, means for releasing said flasks from their supported positions, a fixed manifold and movable connecting means between said flasks and manifold.

7. Apparatus of the kind described comprising a series of flasks each provided with a sealing disc and an opening member and releasably supported against gravity, means for releasing one of said flasks to cause it to drop upon and actuate said member and means whereby the dropping of one flask causes the dropping of other flasks in the series.

8. In apparatus of the kind described, a flask suspended in a releasable mounting and having a discharge head at its top and an opening member in said head, said mounting including a coactive member to engage and operate said opening member, and means for causing the gravitational movement of the flask to actuate said coactive member on release of said mounting.

9. In apparatus of the kind described, a fixed discharge conduit, a flask releasably supported thereon and means whereby the release of said flask discharges its contents into said conduit.

10. A fire extinguishing system comprising a battery of disc-sealed flasks containing liquid CO₂ or like compressed gas having discharge heads thereon with disc-cutters respectively mounted in said heads, combined flask-operating and flask-supporting mechanism on which said flasks are releasably held in predetermined elevated positions, a fixed discharge pipe common to all said flasks, movable conduit means connecting said discharge heads to said pipe, a device for

actuating said mechanism to release said flasks to allow them to drop, and means whereby the gravitational movement of said flasks operates the cutters thereof to produce discharge of said flasks into said common pipe.

11. A fire extinguishing system comprising disc-sealed flasks containing liquid CO₂ or like gas, each having a discharge head with disc-cutting means mounted therein, combined flask-operating and flask-supporting mechanism on which said flasks are releasably held in predetermined elevated positions, a fixed discharge pipe common to all said flasks, movable conduit means connecting all said discharge heads to said pipe, a device for actuating said mechanism to release the vertical support and open the disc of one of said flasks, and means whereby the gravitational movement of that flask removes the support and causes actuation of the disc-cutting means of another flask.

12. A fire extinguishing system comprising disc-sealed flasks containing condensed gas and each having a discharge head with disc-opening means mounted therein, supporting mechanism on which said flasks are held by their discharge heads, said mechanism including a seat arranged to receive said discharge head and accommodate its vertical movement therein to an extent permitting the weighing of the flask in place, a fixed discharge pipe common to all said discharge heads, freely movable conduit means connecting said heads to said pipe, and a device for initiating actuation of all said disc-opening means to discharge all the flasks into said pipe.

13. A fire-extinguishing system comprising a series of sealed flasks having discharge heads respectively thereon with flask-opening means respectively mounted in said heads, a fixed discharge pipe common to said flasks, conduit means connecting the respective discharge heads to said pipe, means for causing the operation of the opening means of the first flask, means dependent on that operation to cause the operation of the opening means of the second flask and means dependent on the second operation to cause the operation of the next and so on, thereby progressively starting the gas flow in said common discharge pipe.

14. In a fire extinguishing system a cylindrical flask containing liquid CO₂ or like gas confined therein by a sealing disc, a discharge head on said flask, a disc-cutter mounted in said head, a fixed discharge pipe, a movable conduit connecting said discharge head to said pipe, means for supporting said flask comprising a releasable mounting carrying the vertical load thereof and a cage structure surrounding and forming lateral support for the cylindrical wall of said flask and in which said flask is vertically movable, a device for actuating said mounting to allow the flask to drop within said structure and means whereby the gravitational movement of said flask actuates the disc cutter thereof to cut a hole in said sealing disc.

15. In a fire extinguishing system a cylindrical flask containing liquid CO₂ or like gas confined therein by a sealing disc, a discharge head on said flask, a disc-cutter mounted in said head, a fixed discharge pipe, a movable conduit connecting said discharge head to said pipe, means for supporting said flask by its discharge head comprising a releasable mounting carrying the vertical load of the flask and a cage structure forming lateral support for the cylindrical wall of said flask and in which said flask is vertically movable,

a device for causing the flask to drop within said structure and means whereby the gravitational movement of said flask causes the disc-cutter thereof to cut a hole in said sealing disc.

16. A fire extinguishing system comprising a battery of flasks containing liquid CO₂ gas, each having a discharge head with flask-opening means therein, a common base, means thereon for engaging and supporting each of said discharge heads in normally elevated positions thereon, a fixed discharge pipe common to all said flasks, a flexible conduit connecting each discharge head to said pipe, and means for conjointly removing the supports of said flasks to allow them to drop, each said flask-opening means having a part arranged to strike a surface on said base and thereby discharge the flask into said common pipe.

17. A fire extinguishing system comprising a common base, a row of releasable flask mountings therein, a row of flasks containing condensed gas supported in said mountings in positions therein from which they may fall by gravity, means whereby such falling operates to open said flasks, a fixed discharge pipe, movable conduits connecting the same to said flasks and means at one end of said base for causing all of said flasks to fall.

18. In a system of the kind described, a flask mounting including a pivoted member provided with a flask seat, a flask having a gudgeon occupying said seat and normally supporting the flask in an elevated position, means for rocking the member to release the flask and means whereby such release opens the flask.

19. In a system of the kind described, a series of pivoted flask-supporting members each adapted to support a flask in an elevated position and adapted to rock out of supporting relation to release the flasks, a connection whereby the rocking of one of said members rocks another of said members, and means whereby the flasks are opened by the effect of their release.

20. In a system of the kind described, a supporting base, a flask-mounting thereon, a flask having a discharge head provided with a gudgeon adapted to fit said mounting, being held thereby in an elevated position, means for operating said mounting to release the flask gudgeon and means whereby the flask is opened by the effect of such release.

21. A system of the kind described comprising a plurality of gas flasks connected to a common discharge pipe, means for supporting said flasks comprising a base, a plurality of upwardly opening seats arranged thereon, heads on said flasks containing flask openers and having gudgeons formed to be removably held in said seats and means for causing conjoint operation of said openers.

22. In a system of the kind described, a gas flask having opening means arranged to be operated by the dropping of the flask, in combination with supporting means for such flask including a structure laterally supporting the upper part of the flask and in which the flask may move vertically when dropping and a bottom support for said flask carrying the vertical load thereof, means for releasing the flask from said bottom support and coincidentally imparting lateral movement to the lower end of the flask, whereby said flask occupies a slightly inclined position when dropped and opened.

23. Apparatus of the kind described comprising a plurality of flasks of highly compressed CO₂ or like gas, each provided with a sealing

means normally confining the gas therein, a supporting structure for said flasks within or with reference to which said flasks are adapted for vertical movement to an extent permitting individual weighing thereof, a fixed pipe common to said flasks for conducting the discharge therefrom, freely movable conduit means individually connecting said pipe to the flasks, said conduit means being organized and adapted to permit such weighing without disconnecting the flasks from the fixed pipe, and means for conjointly opening said sealing means to discharge the flasks through said conduit means and fixed pipe.

24. A gas-discharge system comprising a battery of disc-sealed flasks each confining a charge of compressed CO₂ or like gas and each having a discharge head with disc-opening means mounted therein, means by which said flasks are held in predetermined positions in the battery adapted to accommodate vertical lifting movement of individual flasks to an extent permitting the weighing thereof in place and including structure for laterally supporting and guiding said flasks when lifted for weighing, a fixed discharge pipe, freely movable conduit means individually connecting the discharge heads of said flasks to said fixed pipe, and means for causing conjoint functioning of the disc-opening means in said discharge heads for thereby delivering the gas into the fixed discharge pipe.

25. Apparatus of the kind described comprising a plurality of flasks of highly compressed CO₂ or like gas, each provided with a sealing means normally confining the gas therein and with a seal-opening member, an associated structure within or with reference to which said flasks are adapted for vertical movement to an extent permitting individual weighing of the flasks in place, means on said supporting structure adapted for coaction with said opening members to cause conjoint discharge of said flasks, a fixed discharge pipe, and freely movable conduit means connecting said pipe to the several flasks.

26. Apparatus of the kind described comprising a flask of compressed CO₂ gas or the like having a sealing means and a seal-opening member, a supporting structure for said flask including a pivoted part carrying the vertical load of the flask and another part for laterally supporting said flask, and means for rocking said pivoted part to allow the flask to fall with reference to said structure, said seal-opening member being arranged to be actuated by the falling movement.

27. Apparatus of the kind described comprising a flask of compressed gas or the like having a seal and seal-opening member, a strut capable of being thrown over its vertical center and normally occupying a position at one side of its vertical center and supporting the flask in an elevated position, means for throwing the strut over its center thereby dropping the flask and a relatively stationary part engaged by said seal-opening member whereby the latter is operated by the dropping flask.

28. A gas discharge system including a gas flask, a support by which it is held in a normal position, said support being pivoted and adapted to allow the flask to drop when it is turned on its pivotal axis, a lock to prevent such turning movement, means for conjointly opening said lock and turning the support, and means whereby the act of dropping of the flask serves to open it and discharge its contents.

29. In a system of the kind described, a plurality of flasks containing liquid CO₂ or like condensed gas having discharge heads containing members by the actuation of which the flasks are opened, a common structure having flasks receiving stations on which all said flasks are supported at a predetermined level by the engagement of their discharge heads therewith, a discharge manifold having connector tubes respectively located adjacent said stations on said structure whereby they may be connected to the heads when the latter have been placed in said stations and means on said structure located at said stations but independent of the flasks therein adapted to coact with said opening members to open the discharge heads so placed.

30. Gas discharge apparatus comprising a battery of flasks of highly compressed CO₂ or like gas, a structure having seats on which said flasks are supported and with reference to which they are vertically movable to an extent permitting individual weighing thereof, a fixed discharge pipe, individual connector tubes between said pipe and each of said flasks freely movable in the vertical direction, and means for causing conjoint opening of communication between all said flasks and said fixed discharge pipe.

31. In a fire extinguishing system the combination of a row of flasks of liquefied CO₂ or like gas, normally resting on a supporting base and respectively provided with flask valves containing valve openers, a fixedly located discharge manifold extending adjacent said row, an associated structure supporting said manifold, flexible connector tubes between the respective flask valves and said manifold, said tubes being of substantially equal length and each offering a small and substantially the same degree of resistance to movement of its flask upwardly and relatively to said base and fixed manifold, means on said flasks shaped and adapted for supporting the weight thereof on a weighing instrument, and means whereby the valve openers of said flasks may be conjointly operated to discharge the flasks.

32. Gas discharge apparatus comprising a flask of highly compressed CO₂ or like gas provided with a seal and seal opening means, the latter being adapted to be operated by the effect of the dropping of the flask from a normal position, a structure for releasably supporting said flask in said normal position, said structure having a seat to carry the vertical load of the flask and said seat being faced to accommodate upward vertical movement of its flask sufficient to permit its being weighed in place, a flexible tube connector for said flask, and means for removing the support of said flask to allow it to drop.

33. In a system of the kind described, the combination of a series of flasks containing compressed CO₂ or like gas, each having a discharge head and flask opener therein, means for releasably supporting one of said flasks in an elevated position, means whereby the gravitational movement of said flask when released from such support causes actuation of the opening member thereof, means whereby the gravitational movement of that flask causes the actuation of the opening member of the next flask in the series and so on, and a releasing device for said first mentioned flask adapted to cause the locking of all of said releasable supporting means.

34. In a system as described, the combination of a series of flasks of CO₂ or like gas respectively provided with flask openers arranged to be operated to open the flasks by the effect of the dropping thereof, means to support said flasks in elevated positions, means for causing the release of one of said flasks, a connection whereby the dropping of said flask releases another of said flasks causing it to drop, said connection having lost motion whereby the second flask is released only after the first has started its descent, and a common discharge pipe having movable tube connection to said flasks.

35. In a system as described, a supporting structure, a row of flasks normally holding vertical positions therein, a common pipe to which said flasks are connected and means for simultaneously opening and moving said flasks to slightly inclined positions relative to said structure, thereby indicating their opened condition.

36. In apparatus of the kind described, a flask having a discharge head and a sealing member therein, a seal opening member, a cam to operate said seal-opening member, means for normally supporting the flask in an elevated position, means for releasing said supporting means and means whereby the gravity of the flask actuates said cam.

37. In a system for storing and discharging compressed CO₂ or like gas, the combination of a row of flasks having discharge heads and sealing means normally confining the gas pressure, seal-openers for said heads, a common discharge pipe for said flasks, vertically movable gas-conducting means between said heads and said discharge pipe, a device common to said flasks for initiating the application of seal-opening power to said seal-openers and means independent of said flasks for supporting said discharge pipe and said device, said flasks being adapted for individual vertical movement, with respect to said pipe and said device to an extent enabling each flask to be weighed without disconnection from said pipe.

38. A CO₂ system for fire extinguishing comprising in combination, a discharge pipe leading to the risk, a battery of flasks containing CO₂ or like gas each having a discharge head with a sealing member therein normally confining the gas pressure and a seal-opening member, vertically flexible tubes connecting said flasks with said discharge pipe, said tubes having a degree of flexibility suiting each flask to be individually weighed while connected with said discharge pipe and a control member for the battery adapted to cause operation of all said seal-openers.

39. A fire extinguishing system comprising a battery of flasks containing CO₂ or like gas, each flask having a discharge head containing a sealing member normally confining the gas pressure and a seal-opening member, mechanism for releasably supporting said flasks in predetermined elevated positions, a discharge pipe common to all said flasks, vertically movable conduit means connecting said heads with said pipe, a device for operating said mechanism to release said flasks and cause them to fall and means whereby the gravitational movement of said flasks operates the seal-opening members thereof to produce discharge of said flasks into said common pipe.

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