April 13, 1937. C. F. SMITH 2,077,158

CO_2 EXTINGUISHING SYSTEM

Filed May 5, 1933

Fig. 1

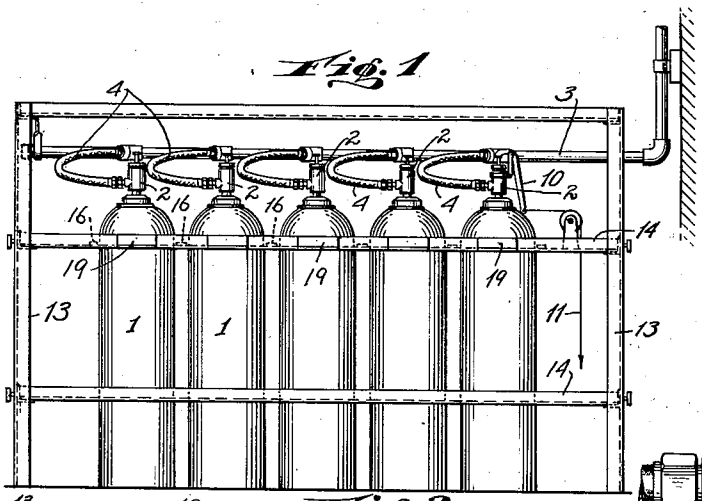


Fig. 4

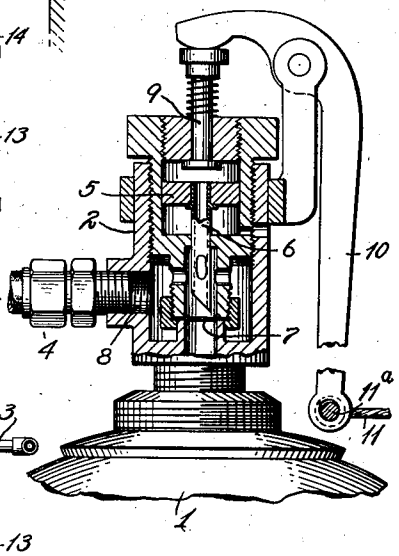


Fig. 2

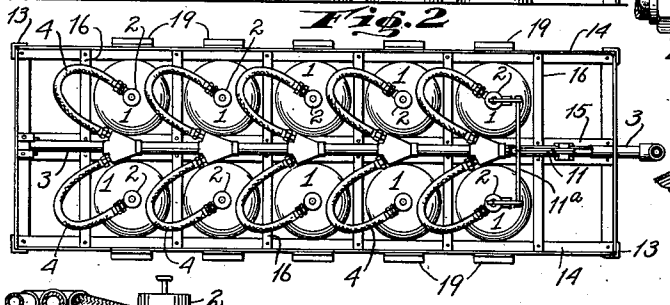


Fig. 5

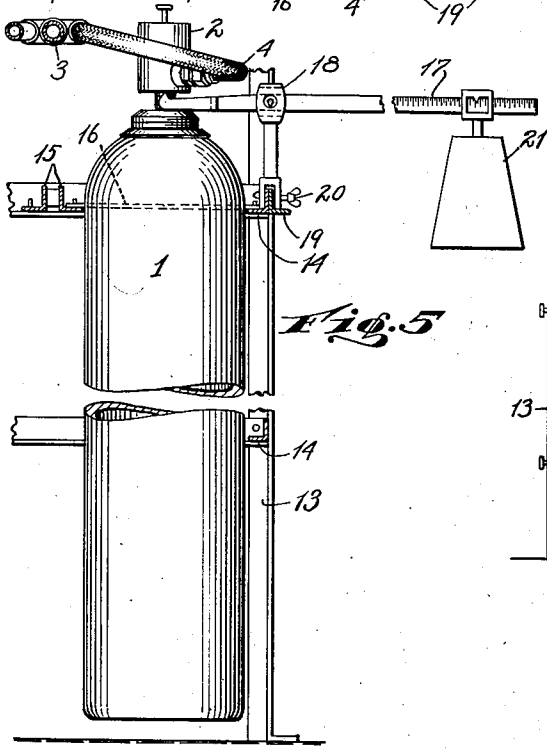
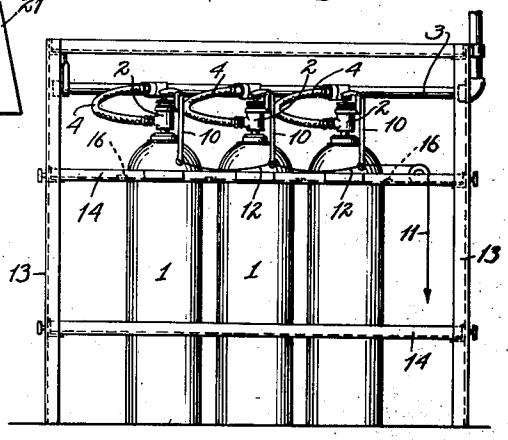


Fig. 3



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CO_2 EXTINGUISHING SYSTEM

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Application May 5, 1933, Serial No. 669,460

4 Claims. (Cl. 169—11)

The invention relates to fire extinguishing systems using CO_2 or like compressed gas as the extinguishing medium, the object being to provide improved facilities for checking the weights of the individual flasks of the system so as to guard against impairment of efficiency as the result of leakage.

The invention is illustrated in the accompanying drawing, wherein Fig. 1 is a side elevation of a 10-flask battery or system incorporating the invention;

Fig. 2 a plan thereof;

Fig. 3 a side elevation of a mechanically operated 3-flask system;

Fig. 4 a section illustrating the operation of the flask valve; and

Fig. 5 a partial cross section illustrating the method of weighing individual flasks.

The battery may be composed of any number of flasks, marked 1, set in a row or rows on the floor or any suitable base. Each flask, it will be understood, contains liquefied CO_2 confined therein under a pressure approximating 800 lbs. at normal temperatures. The weight of each such flask, normally approximates 180 pounds or upward when charged. The gas is confined in them by valves 2 fixed in their heads and which may be opened in various ways to discharge the contents as presently pointed out. Each flask is connected through its valve with a common manifold 3 by means of a connector tube 4 made of reenforced rubber hose or equivalent metal tubing of the freely flexible type and which is considerably longer than the distance from the valve to the point of connection to the manifold so that it takes the form of a loop, and preferably a horizontal loop as indicated. Also such tubes are preferably connected to the manifold by couplings or unions entering the manifold at an acute angle to the axis thereof, as indicated more plainly in Fig. 2, thus avoiding any sharper bending of the flexible connectors than they will accommodate without strain and also disposing all of them in low-down positions about level with the valves, the manifold being also located preferably at or just above the level of the valves, and being attached in fixed position on the adjacent stationary support. It will be understood that all the connector tubes and the manifold are normally empty or under atmospheric pressure until the flask valves are opened and that the manifold discharges through a pipe or system terminating in one or more restricted outlets or nozzles located at the hazard, but not shown in the drawing.

The valves may be of any desired type and are opened in any suitable or usual way, being herein indicated for convenience as of the kind adapted to be operated either pneumatically or mechanically, as desired, and which is well known in the art. Briefly described, such a valve comprises a piston 5 carrying a disc-opener in the form of a tubular cutter 6, which is adapted to be forced down by the piston through the sealing disc 7 of the flask, thereby opening the disc and valve, venting the contents of the latter through the interior of the cutter and the outlet 8 of the valve into the connector 4. When this valve is operated pneumatically the pressure gas (CO_2) is admitted to the space above the piston, reaching such space through the connector tube and through the bore of the tubular cutter and thus depresses the latter. When operated mechanically, mechanical force is applied to the top of the piston by the knobbed plunger 9, by hand or by a lever, or the like.

In the pneumatic system of Figs. 1 and 2 the two flasks at the right hand end of the battery are the so-called pilot flasks and are arranged to be opened mechanically, by a pull on the bell cranks 10 which are connected to the pull cable 11, by a spreader rod 11ª loosely swivelled in the ends of cranks and so that the cable will operate both. This pull cable 11 is carried on a suitable sheave mounted on the fixed guard structure and represents the battery release device by which the compressed gas is caused to issue from the flasks into the discharge manifold. The gas pressure released from these pilot flasks extends through the manifold and the several flexible connectors 4 to the piston chambers of the several valves 2 forcing the cutters therein through the sealing disc as described, thus discharging practically simultaneously the whole battery into the manifold.

Instead of the pneumatic operation just described all of the valves can be equipped with plungers 9 and bell cranks 10 as indicated in Fig. 3, the piston being functionless in such case or omitted. The bell cranks 10 are all connected to a main cable 11 by which they can be coincidently operated to discharge the flasks and the main cable, as well as the cable sections 12 connecting successive bell cranks, are flexible so that, as in the case of Figs. 1 and 2, all physical connection between the flasks and the fixedly located structure is of freely flexible nature.

In both forms a rigid guard structure is provided which extends alongside or adjacent or around the row of cylinders. It can be made of angle-iron posts 13, or equivalent, appropriately

fastened to the floor, with horizontal longitudinal rails 14 removably thumb-screwed or otherwise fastened to such posts. Wire mesh or grating may be applied to this framework, if desired to form a more complete protective housing for the flasks. The side rails 14 are conveniently also made of angle-iron, and in double row batteries the two rows are divided or spaced apart by longitudinal center rails 15, and it is desirable in some cases that the flasks in each row be spaced from each other by cross rails 16 and when these are present they are preferably removably held on pins or other appropriate seats on the rails 14 and 15, so that they can be readily removed and replaced.

No matter what the construction of the flasks and valves, they are prone to leakage under the high flask pressure, and leakage is difficult to detect because the flask contents cannot be seen. The only way the user can be sure sufficient gas is present is by periodically weighing the individual flasks which, with prior constructions has been a tedious task likely to be procrastinated or overlooked on that account. The new construction is organized to permit weighing to be done easily and accurately without disconnecting the flasks either from the manifold or from the means whereby the power is applied to them for actuating the disc-openers when such power is applied other than pneumatically. Each flask is vertically movable upwards within the protecting guard structure to the extent of at least several inches or sufficient for weighing purposes. The length and disposition of each flexible tube connector are such as to permit this motion and the weight or resistance it imposes thereo, I have found, is relatively small and also a constant, substantially equal for all, so that it can be included in the tare without producing any resulting error in the determination of the amount of gas in each flask. The cable sections 12 also, in the mechanically operated system, are flexible and can be treated in the same way. The guard rails which space or protect the flasks contribute no appreciable friction, since they engage only the smooth-sided flasks and indeed it is not necessary that the guard be in contact with the flasks at all, or at least during the weighing process, its purpose being primarily protective to prevent the flasks from being tipped or bumped over, which would throw their weight onto the flexible connections to the injury of the latter. In the mechanically operated system as in Fig. 3, the guard, and particularly the cross-rails 16, hold the flasks upright against the pull of the operating cable. It is so located, also as to serve the further purpose of a support for the weighing scales to rest upon. Such scales may be of any appropriate type and as shown are composed of a simple scale beam 17 mounted on a portable pedestal 18, which is adapted to be seated on or fitted to the guard rail 14 or to a seat 19 applied for the purpose thereto. The pedestal may be secured in place, if desired, by a set screw 20. One end of the scale beam is forked and knife-edged to engage under a ledge or equivalent projection provided on the flask or its valve, and shaped to receive and carry the whole weight of the valve, while the other end is calibrated and carries the bob 21. It is not necessary that the scale-beam be applied directly to the valve, as indicated in the drawing, although it is well to have the flask hanging while being weighed, for it can also take the flask weight by being applied elsewhere or at or under its base, since the guard structure is in any event present to avoid accident to the flexible connectors. By subtracting the known constants from the weight indicated by the bob, the weight of the CO_2 can be quickly arrived at and with sufficient accuracy as I have ascertained, and it will be apparent that this can be done without in any way disturbing the system or impairing its reliability for operation even in the event of a fire occurring during the weighing process.

I claim:—

1. In a system of the kind described, a row of flasks of compressed CO_2 or like gas having flask valves normally confining the gas pressure therein, a horizontal discharge manifold extending adjacent and parallel to said valves and a series of flexible connector tubes connecting said respective valves to said manifold, each said tube being substantially horizontal for a length materially greater than the distance separating said manifold from the row of valves and having a degree of vertical flexibility suited to accommodate the individual weighing of its flask while connected to the manifold.

2. In a system of the kind described, a row of flasks of CO_2 or like gas having flask valves normally confining the gas pressure therein, a plurality of tubes arranged in horizontal loops respectively connected to said valves, a horizontal manifold located parallel and adjacent to said valves and provided with a plurality of pipe-fittings oblique to the axis thereof to which the ends of said tubes are connected, said horizontal loops having a degree of flexibility suited to accommodate the individual weighing of the flasks while connected thereby to said manifold.

3. In a CO_2 fire extinguishing system, a row of flasks of compressed gas having flask valves normally confining the gas pressure, a manifold extending parallel to said row at substantially the level of said valves, a plurality of vertically movable tubes extending horizontally from said respective valves to said manifold, said tubes being vertically movable to an extent suited to the individual weighing of said flasks while connected to the manifold, and vertically movable means connected to one of said valves for causing the opening thereof.

4. A CO_2 fire-extinguishing system comprising a fixed structure composed of uprights with one or more horizontal members supported thereon, a row of gas flasks laterally supported thereby and each flexibly connected to a common delivery conduit, said flasks being normally all positioned at a common level but being vertically movable with reference to said fixed structure to permit individual weighing of them in place, each flask having a disc-closure and carrying the rupturing means therefor, a control device adapted to be set in action in time of fire carried on said fixed structure and having flexible actuating means extending therefrom into connection with said rupturing means, said control device being operative, through said flexible means, in the elevated as well as the normal positions of said flasks, the horizontal member of said fixed structure being organized and adapted to support a weighing instrument adjacent any one of said flasks, whereby any of them can be weighed in place without impairing the efficiency of the system.

CARLISLE F. SMITH.