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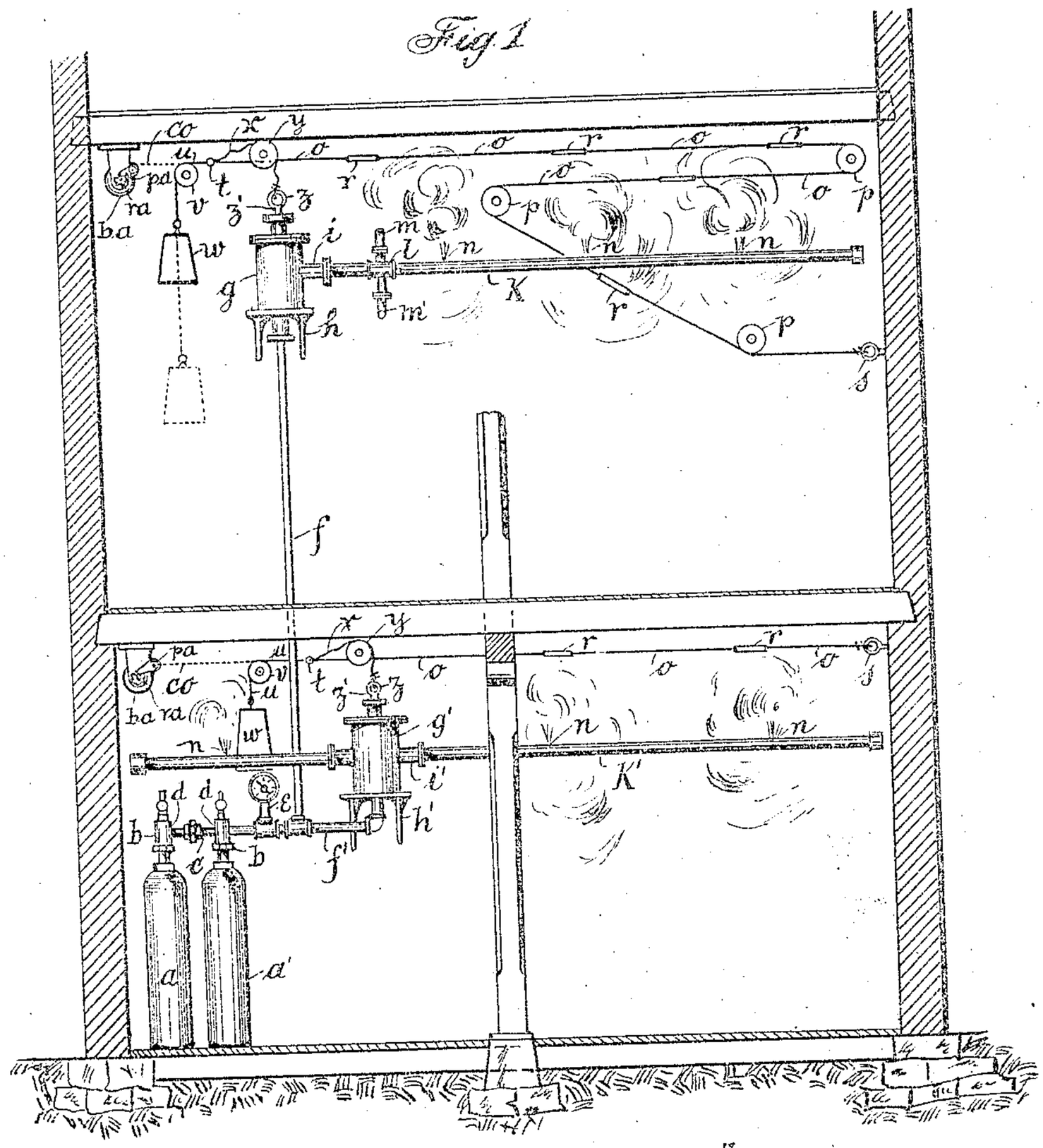
AUTOMATIC FIRE EXTINGUISHER.

APPLICATION FILED FEB. 26, 1906.

Fig. 1



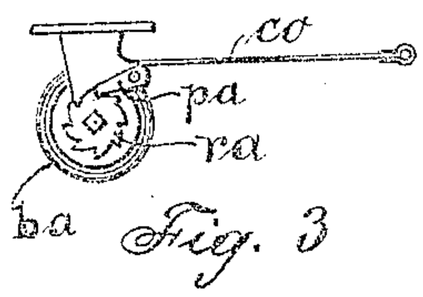


Fig. 3

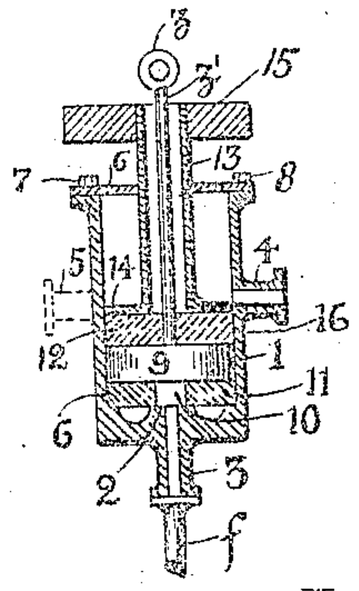


Fig. 2

Witnesses

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UNITED STATES PATENT OFFICE.

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AUTOMATIC FIRE-EXTINGUISHER.

No. 865,407.

Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed February 26, 1906. Serial No. 302,347.

To all whom it may concern:

Be it known that I, JACOB ADOLPH LOEB, and I, HUGO DAVID LOEB, and I, JUSTUS CHRISTIAN GOOSMANN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Automatic Fire-Extinguishers; and we hereby declare that the following is a full, clear, and accurate description of the same.

Our invention relates particularly to that class of fire extinguishers in which liquefied carbon dioxid is used, which when liberated, deprives the fire of the required oxygen, thereby extinguishing it. The great majority of fire extinguishers using carbon dioxid for that purpose belongs to the class of chemical fire extinguishing apparatus; in these apparatus carbon dioxid is generated by the chemical action of certain acids upon the carbonates of the alkali earth containing it, and it is necessary to start the process of gas generation by automatically or otherwise admitting such acids into the compartment containing a carbonate or bi-carbonate. These apparatus have the disadvantage that the volume of carbon dioxid gas, which it is possible to generate within, is so limited as to make them nearly ineffective and that it requires time before the gas can be generated and applied continually. To overcome these disadvantages we have adopted the use of carbon-dioxid in its most concentrated form, *i. e.* as a liquid, in this form it can be kept on hand in considerable quantities. It is then only necessary to allow this gas to evaporate into the room in which the conflagration has started, in doing so it diffuses into the air and rarefies the percentage of oxygen therein, whereby it deprives the flame of the necessary element for its existence and smothers it.

Liquid carbonic acid is contained in steel cylinders under a high pressure, and as it is necessary in an effective automatic device to provide instantaneous action, it is difficult by automatic means to open the valve confining the gas within quickly and positively. If, on the other hand the liquid carbonic acid valve is opened prematurely, it is difficult to confine the gas in the evaporating line owing to its high pressure. By reducing the pressure, however, before it enters the evaporating line, it is not difficult to control the gas within, and it is then only necessary to use a valve which can be opened quickly by automatic means without the application of considerable power and which is so constructed that gas leakage through this valve, when closed, cannot take place.

Our invention is carried out as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of the interior of a building, showing the equipment in position and indicating the distributing pipes as well as the line containing fusible links. Fig. 2 is a detail of the operating valve in section and Fig. 3 is a detail drawing of the spring barrel which may be used in place of the weight.

Similar characters refer to similar parts throughout the several views.

In the drawing *a* and *a'* represent liquid carbonic acid cylinders, each of which is provided with a valve *b*. Connection to the liquid pipe line *c* is made at points *d*; *e* represents a pressure reducing valve by means of which the pressure obtaining in the liquid cylinder is reduced to any desired point so that the pressure in pipe line *f* and *f'* connecting the reducing valve with the operating valves *g* and *g'* is so low as to be easily controlled. Operating valves *g* and *g'* are placed on a wall bracket *h* and *h'* and are provided with an outlet flange *i* and *i'* to which the gas distributing pipe K and K' is connected. Distributing line K is provided with a cross *l* and pipe nipples *m* and *m'*, simply to show that the distributing line may be run in various directions throughout the room.

n represents openings with which pipes K and K' are provided.

A metallic wire or other flexible metallic cord *o* is strung back and forth across the room under the ceiling or at any other convenient place. Pulleys *p* are used to support line *o*, and fusible links, or thermostats, *r* are interposed at various points. Line *o* is fastened with one end by means of suitable wall hooks *s* and with the other end to an eye *t*. A flexible non-combustible connection *u* is also fastened to eye *t*, it is placed over a suitable pulley *v* and carries on its other end weight *w*. Another flexible non-combustible connection *x* is run from eye *t* over pulley *y* to the eye *z* of movable valve stem *z'* of operating valve *g* and *g'*. In place of weight *w*, a spring barrel *ba*, containing a spring, a ratchet wheel *ra*, a pawl *pa* and a flexible cord *co* fastened with one end to the spring barrel *ba* and with the other end to eye *t*—as shown in Fig. 3—may be used.

The operation of our invention in practice is as follows:—Valves *b* of one or more cylinders *a*, which latter may be located in any convenient, preferably cool, place, in the building, are opened and the liquid is allowed to evaporate into the liquid line *c*. The reducing valve is then so set that the pressure in line *f* and *f'* is materially reduced. Flexible connection *x* is relaxed and weighted valve stem *z'* closes valves *g* and *g'* tight against any leakage of gas through the valve into distributing pipes K and K'. In case of fire, or in fact in case of an increase in the temperature above a fixed point, fusible links, or thermostats, *r* melt or disengage, weight *w* drops and pulls flexible cord *x* with it, thereby drawing valve stem *z'* from its seat within valve *g* and the carbonic acid gas immediately evaporates into the space, diffuses into the air, rarefies the percentage of oxygen therein and extinguishes the fire.

Owing to the fact that large quantities of heat are rendered latent during the evaporation of liquid carbonic acid, it will be found that the temperature in the room drops perceptibly. This of course is true only so long as the conflagration is in its infancy. If the weight *w* is dispensed with and a spring barrel *ba* used instead, it is obvious that cord *co* will be wound around spring barrel *ba* as soon as one of the fusible links *r* disengages. Valve *g* will then be opened in the same manner as explained above.

The construction of valve *g* is shown in the detail drawing Fig. 2. 1 is the valve housing having a valve seat 2 and flanges 3 and 4. Flange 3 is connected with the CO_2 gas pipe *f*, while flange 4 is joined with the distributing pipe K. There may be as many distributing pipes as convenient connected to the valve housing 1, as indicated by dotted flange 5. Valve housing 1 is closed on top with cover 6, which latter is fastened to it by screws or bolts 7 and 8. *z'* is the valve stem, containing on its upper end eye *z*. On its lower end it is provided with metallic disk 9 and center pin 10. Around this center pin, a flexible packing disk 11, consisting of rubber, leather, or any other suitable material is placed. Above disk 9 another flexible packing disk 12 is located, and on top of disk 12 a sleeve 13, having a flange 14 is placed; a weight 15 is fastened to sleeve 13, bears down upon flange 14, and compresses disks 12 and 11, which spread apart, impinge against the wall of the housing 1 at points 16 and prevent leakage of gas through the valve into the upper part of the housing 1 and into flange 4. In place of weight 15, spring action may be employed. When the valve stem is pulled upward by the action of weight *w* or spring barrel *ba*, flange 14 rests against cover 6, disk 9 compresses packing disk 12, the latter spreads, impinges against the wall of housing 1 and prevents leakage of gas through the cover 6 around sleeve 13; the gas can then escape only into flange 4 and 5 and into the distributing pipes K, it is therefore immaterial whether operating valve *g* is placed within or without the room into which the CO_2 is eventually made to evaporate.

We are aware of the fact that fusible links are used to put automatic fire extinguishers into action, we are also informed that liquid carbonic acid is used for purposes of extinguishing fire, but we do not know that liquid carbonic acid devices are used automatically for such purposes.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a fire extinguishing apparatus of the class specified, the combination, of a plurality of steel cylinders containing liquid carbonic acid or gas under pressure, with pressure reducing valves by means of which a predetermined low gas pressure can be obtained, a distributing pipe system, operating valves placed in each room, flexible disks in each operating valve, a weight attached to the said flexible disks whereby the latter are made to impinge against the wall of the housing of the said valves, and means to open the said operating valves as soon as a fixed predetermined temperature has been reached, for the purpose and substantially as described.

2. In a fire extinguishing apparatus of the class specified, the combination, of a plurality of steel cylinders containing liquid carbonic acid or gas under pressure, with a pressure reducing valve by means of which a predetermined low gas pressure can be obtained, a distributing pipe system, operating valves placed in each room, flexible disks in each operating valve, which, when compressed impinge against the wall of the housing of the said valves, means attached to the said valves for the purpose of compressing the said flexible disks, and means to open the said operating valves as soon as a fixed predetermined temperature has been reached for the purpose and substantially as described.

3. In a fire extinguishing apparatus, the combination of receptacles containing a fire extinguishing medium under pressure, pressure reducing valves, operating valves provided with flexible disks 11 and 12, which are compressed by weight 15 so that they are made to impinge against the wall of said operating valve, thereby preventing the leakage of the fire extinguishing medium through said valve, substantially as described.

4. In a fire extinguishing apparatus, the combination of receptacles containing a fire extinguishing medium under pressure, pressure reducing valves, operating valves provided with flexible disks, means to compress said flexible disks whereby they are made to expand and impinge against the wall of said operating valve, thereby preventing the leakage of the fire extinguishing medium through said valve, substantially as described.

In witness whereof we have hereunto set our hand in the presence of two witnesses.

JACOB ADOLPH LOEB.
HUGO DAVID LOEB.
JUSTUS CHRISTIAN GOOSMANN.

Witnesses:
JOHN C. MATHEWS,
PAUL GERHARDT.