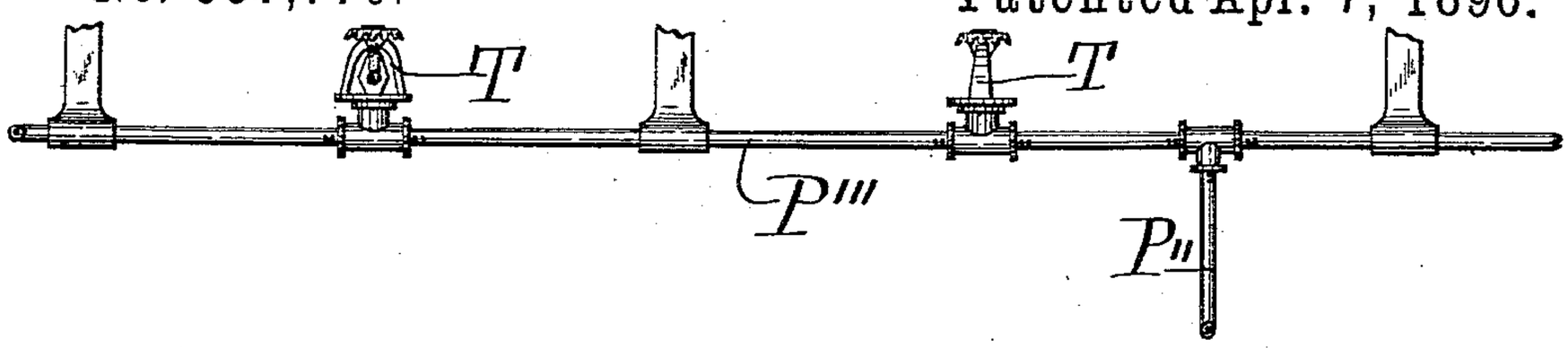
(No Model.)

F. H. CYRENIUS.

AUTOMATIC CHEMICAL FIRE EXTINGUISHER.

No. 557,770. Patented Apr. 7, 1896.



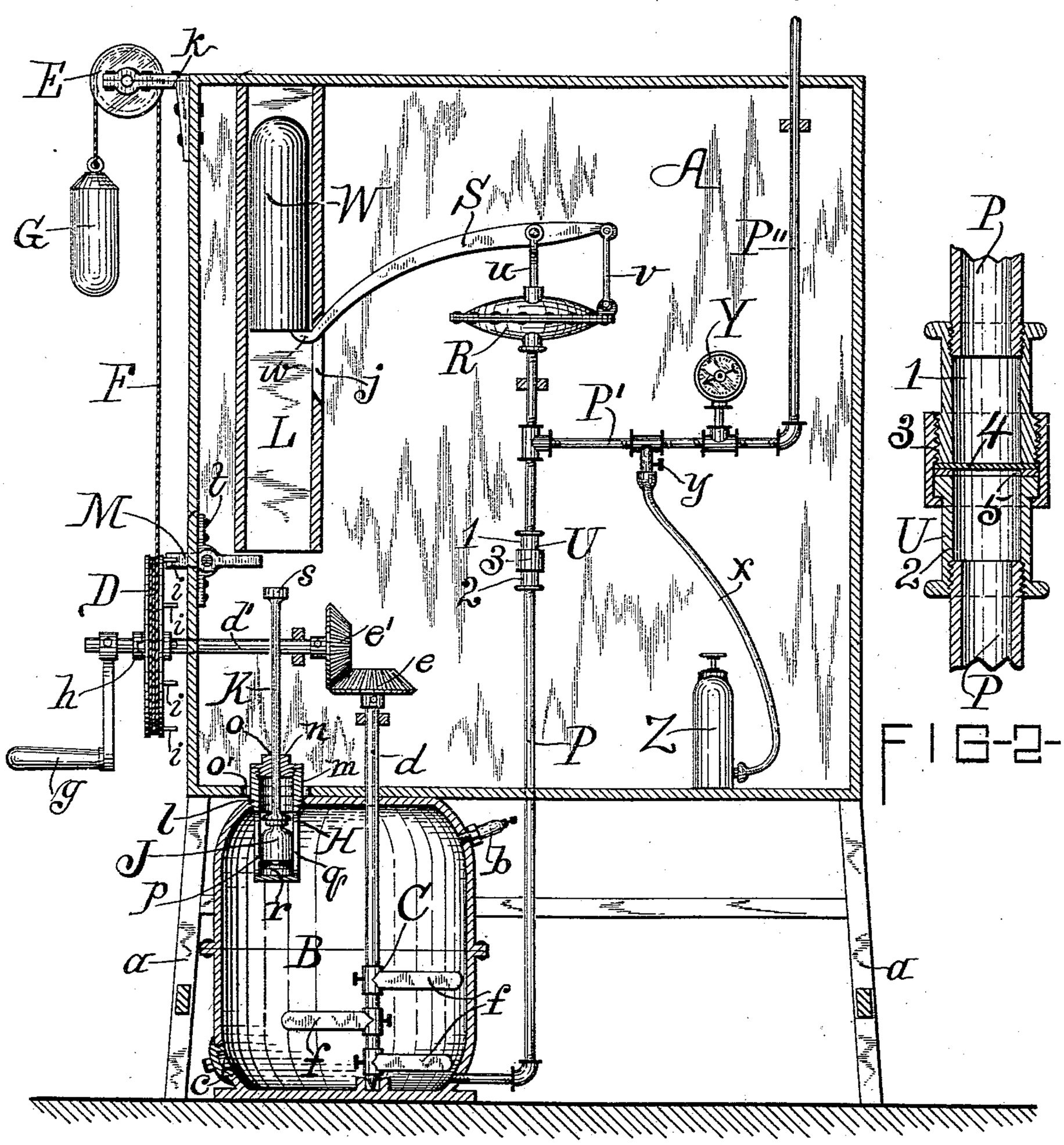


FIG-2-

FIG-1-

WITNESSES:

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AUTOMATIC CHEMICAL FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 557,770, dated April 7, 1896.

Application filed April 25, 1895. Serial No. 547,099. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. CYRENIUS, a citizen of the United States, residing at Oswego, in the county of Oswego and State of New York, have invented certain new and useful Improvements in Automatic Chemical Fire-Extinguishers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, in which—

Figure 1 is a conjoint sectional and side elevation of my automatic chemical fire-extinguisher as normally arranged in readiness for operation, and Fig. 2 is an enlarged sectional detail of the restriction-valve member forming a component and all-essential element of my apparatus.

Like letters and figures of reference indicate corresponding parts throughout both the views of the drawings.

My invention relates to that division of fire-extinguishers denominated as "chemical fire-extinguishers," and, moreover, to that subclass known as "stationary chemical fire-extinguishers" and located permanently at a desired spot or spots within a building.

The object of my invention is the production of an automatically-working chemical fire-extinguisher instantaneous in action, adapted upon the opening of a fusion valve or valves to eject through said valve or valves a compact and thus effective volume of gas or gaseous fluid, and, furthermore, the embodiment in comparatively simple and non-complex construction and assembling of coacting parts of a quick-acting, satisfactory, accessible, and durable apparatus for the extinguishing, automatically, of inceptive conflagration in a room or rooms of a building by fire-extinguishing chemicals.

To that end my invention consists in the novel features of construction, arrangement, and coöperation of parts, and method, as hereinafter described, and specifically enumerated in the clauses of claim hereunto annexed.

Referring to the accompanying drawings, forming a coördinate part of my specification, A denotes a rectangular case or box of ample dimensions suitably supported above the floor of a building by means of sustaining legs or standards *a* or other preferred means of ordinary character, said case inclosing and supporting portions of the mechanism or parts appertaining to my apparatus.

B is a generating or supply tank of metal of suitable height and diameter and preferably of cylindrical shape, said tank usually being located underneath the case or box A contiguous an edge thereof, its base resting upon the same foundation that the legs of the case stand upon and its top abutting the under side of the flat bottom or floor of the referred-to case.

The generating-tank is provided with customary safety-valve *b* and hand-hole *c*, admitting of the cleaning of the tank's interior when desirable, which hand-hole is closed by any satisfactory screw-plug or cover.

Erected inside the tank, usually slightly removed from its center, is an agitator C, comprising a vertical rotating shaft *d*, stepped in a satisfactory bearing at the bottom of the chamber, and upwardly extending through the top of the tank and bottom of the case A by suitable apertures, and terminating at a proper height within the interior of the case in a bevel pinion or gear *e*, keyed to its said extremity, and *f* are the agitating blades or paddles for stirring, extending laterally from the lower portion of the agitator-shaft equidistant apart and securely retained on said shaft by satisfactory means.

d' indicates a horizontal shaft working in suitable bearings standing away upon a higher plane from the vertical shaft *d* of the agitator, the case-penetrating portion terminating in a satisfactorily-keyed bevel pinion or gear *e'*, meshing with the pinion *e*, or possibly with a horizontally-located pinion in the rear of the gear *e*, which in turn may impel said pinion *e* and the shaft *d* operating the agitator-blades.

The stated horizontal shaft *d'* extends outwardly through the side wall of the case A a moderate distance, and is provided at its outer end with an operating-handle *g*. Between the handle and the side of the case said shaft is provided with a rope-drum or wheel D and, componently therewith, a clutch *h* of any ordinary construction, and projecting from the inner disk-like face of said drum

and disposed equidistant apart contiguous its peripheral edge are small pins *i* of brief and coinciding length.

At some distance above the drum D there is a pulley E, working in a line transverse to that of the drum, which pulley is journaled in a bracket *k*, standing out laterally from the outside of the top portion of the case A.

F is a rope secured to the drum D, and, passing around same one or more times, continues upwardly to and partially around the pulley E, and beneath the same secured to a satisfactory weight G.

Referring to the generating or supply tank B, I show at H a bottle-holder wherein is seated an acid-containing bottle or jar J. Said bottle-holder is preferably located at the upper portion of the tank and to one side of the center thereof and contiguous that side of the case through which passes the shaft *d'*. This bottle-holder, which is removably erected in position by means of screw-threads about its periphery somewhere midway its height engaging with the threaded edge of a circular opening *l*, located in the top of the tank B, comprises a cylindrical upper portion *m*, closed by a screw-cap *n*, having a circular aperture *o* in its center, and obviously a circular opening *o'* is existent in the floor of the case A of larger diameter than the bottle-holder, that rises into the case a brief degree, and the pendent portion *p* of the bottle-holder structure projecting down into the chamber of the tank a suitable distance is longitudinally apertured, as at *q*, to permit of the ready precipitation of the acid within the bottle J into the tank's chamber following the fracturing of the bottle by means hereinafter to be specified. The flat bottom of the bottle-holding member is, by preference, solid, although I may have it perforated, if preferred. Contiguous the bottom of the acid-containing bottle its external periphery has a circumferential groove *r*, rendering the glass quite thin and fragile thereat.

K denotes a bottle-fracturing rod standing vertically through the circular aperture *o* in the screw-cap of the bottle-holder member, its lower extremity having a circular enlargement of concave form adapted normally to rest upon and close the opening of the bottle's neck, while upwardly said bottle-rod rises a moderate distance and terminates in a swelled or head portion *s*.

Directly over the bottle-rod K there is erected a chute or guideway L, vertically elongated, its top terminating at or adjacent the top of the containing-case A and its bottom stopping at a spot slightly away from the head of the bottle-rod, said rod being in its normally-disposed position.

M is a pivoted bar journaled to one side of its center in a bearing-plate *t*, secured to that side wall of the case A standing contiguous the rope-drum D, the longer end of said normally horizontally-lying bar projecting upon a plane underneath the lower end of the chute L into the case A to such degree as to be in the path of an object descending from the chute, while the outstanding shorter end of said pivoted bar or "trip-lever" normally impinges a peg or pin *i* of the drum D, and preventing, until disengaged from contact, rotation of said rope-carrying drum.

P indicates a vertically-erected pipe adapted to be filled with and carry a gaseous fire-extinguishing liquid, said pipe rising within the case A a satisfactory distance, say in the vicinity of its top, its lower end communicating with the interior of the generating-tank B at its bottom portion.

R is a diaphragm secured to the upper end of the pipe P in a manner insuring requisite steadiness thereof and solidity upon said communicating pipe, said diaphragm member being of any suitable ordinary construction, preferably of a swelled circular form, and comprising two similarly-shaped segments, as shown, bolted together, the chamber of the shell having, as is obvious and therefore not necessary to illustrate, a rubber disk extending across the interior and secured circumferentially between the binding-flanges of the shell's segments, while there rests upon said disk and is supported thereby a flat circular plate of a smaller diameter and adapted to rise upward with the protuberant expansion and central raising of the diaphragm-disk impelled and so sustained by suitable air-pressure. Centrally the said circular plate, supported by the diaphragmic disk, terminates in a vertical stem *u* of moderate length, passing up through an opening in the top of the said diaphragm member.

S is the diaphragm-arm, (or weight-upholding lever,) preferably of the proportionate dimensions and contour shown, the upper end of the diaphragm-stem *u* being fulcrumed to said arm at a brief distance from inlying extremity, while *v* denotes a connecting rod or bar pivotally attached at one end to the instanding extremity of the arm S, and its lower end pivotally secured to a lug or ear projecting from the periphery of the diaphragm-shell.

The outstanding curvilinear portion of the diaphragm-arm, tapering, as shown, terminates in a lip *w*, which by means of a vertically-elongated opening *j* in the side of the chute L admits of such requisite degree of penetration thereof into the interior of said chute as is necessary to uphold contiguous the upper end of said passage-way a heavy cylindrical weight W.

At a point slightly beneath the diaphragm R there branches off from the vertical pipe or duct P a horizontal length of pipe P', and from which in turn extends a lengthy pipe P'', rising vertically through the interior of the case A, and, penetrating the top thereof, passing upward a satisfactory height, whence it communicates with a horizontal pipe (or series of pipes) P''', supported beneath the ceiling of a room or rooms by suitable hangers or other common supports, said pipe or pipes

having at desirable points any common or preferred form of fusion-valves (or automatic sprinklers) T.

Intermediately the junction of the pipe P′ and the tank, a distance away, the pipe length P is provided with a restriction valve or member U, which evidently may be of varied formation. Preferably, however, said restriction member comprises two tubular short sections of pipe 1 2, screwed to the entering ends of the pipe P, while the centrally-approaching ends of the sections 1 2 are united firmly by a coupling ring or union 3, there being seated between the contiguous ends aforesaid a disk-like membrane 4, forming a barrier to the passage at that point, which membrane is formed of a sheet of lead or other material adapted to be ruptured under a certain degree of fluid or gaseous pressure penetrating that portion of the pipe P located below the membrane normally closing the pipe. Leakage is prevented at the point of coupling by having an annular washer 5 interposed between the boundary edge of the lead disk and the binding end of one of the tubular threaded sections 1 or 2.

At a suitable point of its length the horizontal pipe-section P′ is provided with a satisfactory pressure-gage Y, and at Z, I indicate an air-pump of any suitable ordinary construction, provided with a flexible tubing *x*, leading from the same and communicating with the overhead pipe-section P′ at a spot situated between the vertical pipe length P and the pressure-gage aforementioned.

The T whereto the upper extremity of the tubing is secured is provided with a stop-cock *y* for regulating the admission of air from the air-pump into the receivable portions of the pipes.

The several portions of my apparatus being in the normal attitude represented in the drawings, the operation of my device is substantially as follows:

The generating or supply tank B is properly filled with a gas-generating substance, while the acid-bottle J contains an acid of such nature as will have the effect of causing formation of carbonic-acid gas or gaseous fluid in the tank upon its commingling with the substance located therein, the mixing of the acid and the substance forming, evidently, a fire-extinguishing gas or fluid. Next I supply the several pipes with compressed air carried from the air-pump Z or other satisfactory air-condenser, the effect thereof being to raise and uphold the diaphragm-arm S in a raised attitude, as shown, and whereby, through its engagement with the weight W in the chute L, said weight is normally supported stationary at the upper portion of the chute. (Obviously the air-pressure does not penetrate that portion of the pipe P located beneath the restriction-valve member U.)

Whenever the temperature of the room or rooms reaches about 160° Fahrenheit the fusion-valves T will open, allowing the compressed air in the pipes to quickly escape. Said outflowing of compressed air entails, necessarily, the dropping a brief degree of the pivoted diaphragm-arm S, and consequently the release of the weight W, which instantaneously-falling weight strikes the end of the bottle-breaking rod K, which, fracturing to fragments the acid-bottle, or otherwise, causes the precipitation of the acid into the substance lying in the tank, and thus creating carbonic-acid gas. As the weight W falls it concurrently impels, through striking in instanding end, the outer end of the pivoted bar or lever M upward, causing its disengagement from a pin of the rope-carrying drum or clutch-wheel D, permitting the weight G to drop, and, causing revolution of the drum and coacting shafts and pinions, operates the agitator C.

From time to time, the parts of my apparatus all being in the relative positions illustrated, the agitator may be rotated by hand to stir up the substance in the tank and thus keep it in a better state of action than it would be in were such agitating dispensed with.

The object and function of the restriction-valve U is an all-important and essential one to the desirable and thoroughly-effective operation of my apparatus, the function of said restriction member being, following the formation of carbonic-acid gas in the tank, to retain or hold the pressure within the said tank to a certain degree—say, for instance, fifty pounds to the inch pressure—upon which, when that is attained or passed, the rupturing of the membrane 4 of the restriction-valve occurs, allowing a compact volume of gas to pass through the pipes to and out in force through the melted-open fusion-valves or sprinklers and insuring more expeditious and thorough extinguishing of a fire than otherwise possible.

Devoid of the restriction member, as is evident, the stream of gas would not have the compactness and energy insured thereby.

The pressure-gage Y is for the purpose of showing the pressure desired and necessary for upholding the diaphragm-arm at its highest and weight-supporting plane.

The purpose of the automatic safety-valve *b* is to prevent the tank from bursting through too high pressure.

The advantageous features embodied by my device may readily be perceived from my hereinbefore description.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An automatic chemical fire-extinguisher comprising a gas-generating tank, an agitator and acid-receptacle therein, pipes leading from the tank and communicating with fusion-valves, a diaphragm connected with the pipes and having an arm adapted to normally uphold a weight located in a chute, a vertically-movable rod erected beneath the chute

and entering the tank, a pressure-gage communicating with the pipes in proximity to the diaphragm member, and means intermediate the aforesaid and the supply-tank for automatically preventing the generated gas from passing through the pipes to the fusion-valves until a predetermined degree of pressure is attained, and means for charging the pipe or pipes above the point of restriction with compressed air of sufficient quantity to entail normally the diaphragm-arm assuming and retaining a raised position, substantially as described.

2. In a device of the class described, the combination of a tank adapted to receive a liquid, a fragile vessel within the tank, a breaker-rod in engagement with the fragile vessel, a system of delivery-pipes leading from the tank, a restriction-valve between said tank and distributers, a pressure-held support adapted to be energized from said pipes, a weight bearing upon said support and in line with the breaker-rod, means independent of the tank for supplying pressure to the delivery-pipes, and means for releasing said pressure to release the support and allow the latter to drop the weight and fracture the fragile vessel.

3. A device of the class described, comprising a tank adapted to receive a liquid, a fragile vessel supported therein, a weight adapted to fracture said fragile vessel when released, a pressure-retained support for said weight, means for removing the pressure to release the support and weight thereon, a stirrer in the tank, means for operating said stirrer, and a lock for said operating means in the path of the aforesaid weight and adapted to be opened thereby whereby when the said vessel is fractured the liquid in the tank may be agitated.

In testimony whereof I affix my signature, in presence of two witnesses, this 6th day of March, 1895.

FREDERICK H. CYRENIUS. [L. S.]

Witnesses:
WM. C. RAYMOND,
E. KANKEMOELLER.