(No Model.)

E. P. GLEASON.

AUTOMATIC FIRE EXTINGUISHING APPARATUS.

No. 392,117. Patented Oct. 30, 1888.

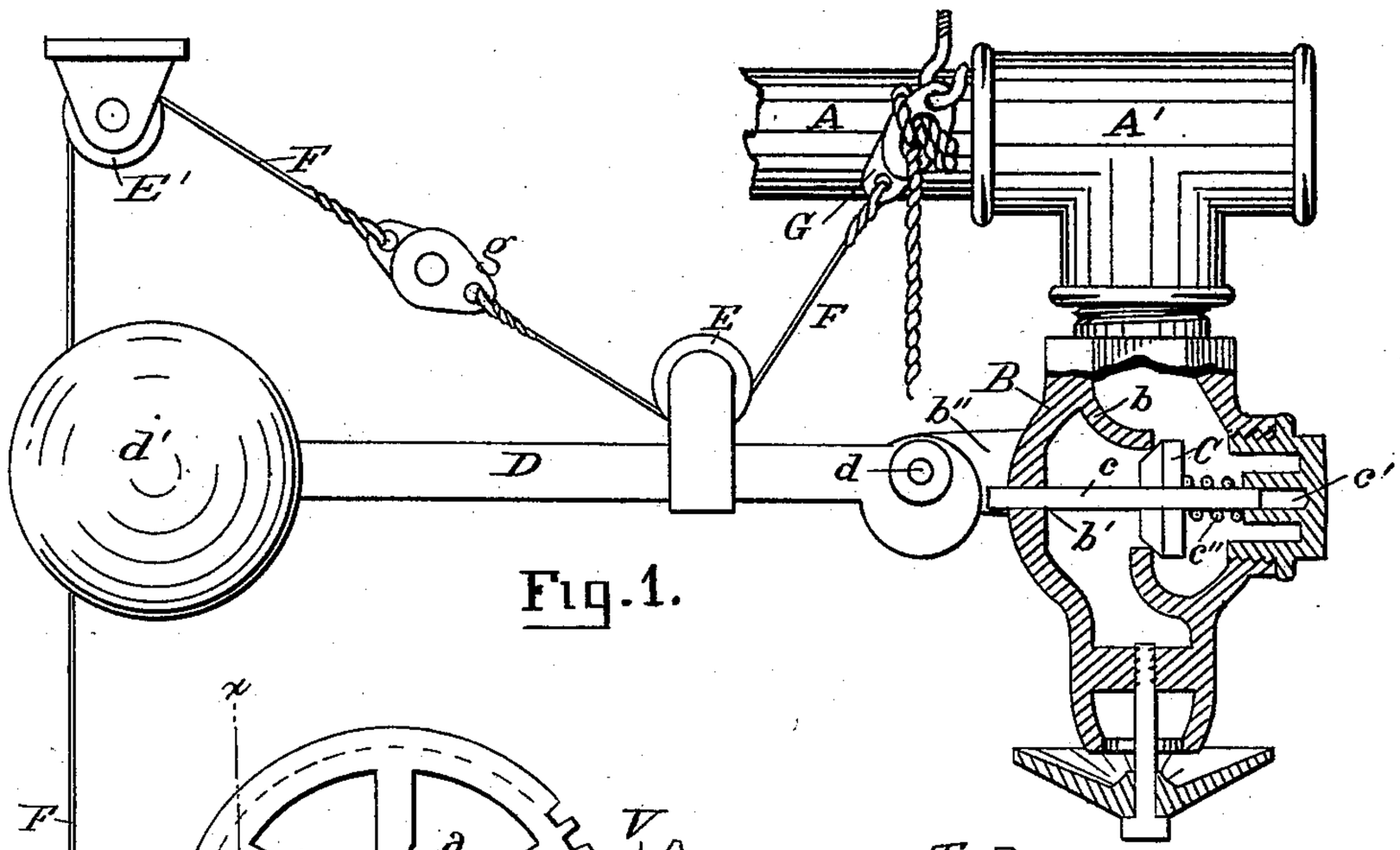

Fig. 1.

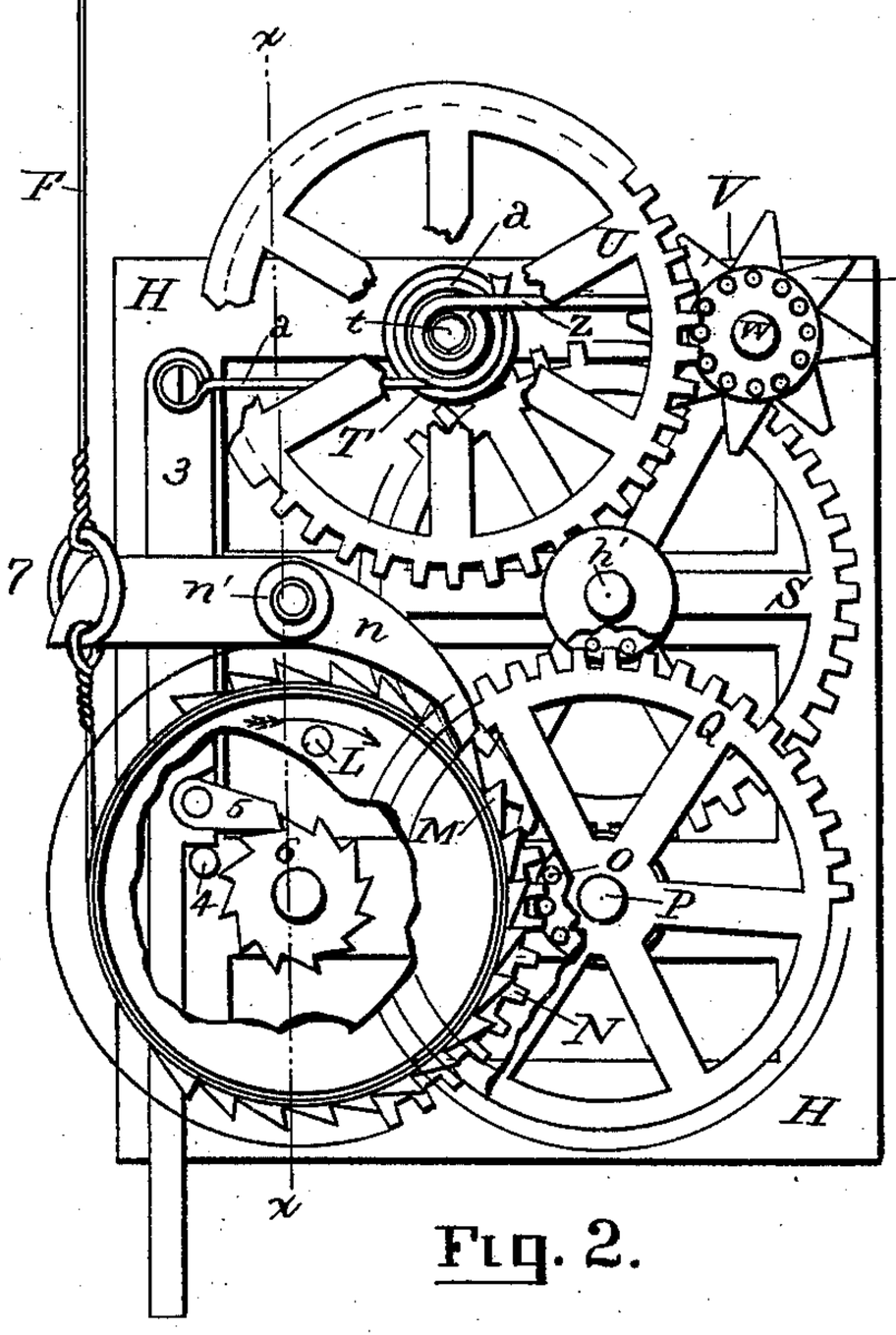

Fig. 2.

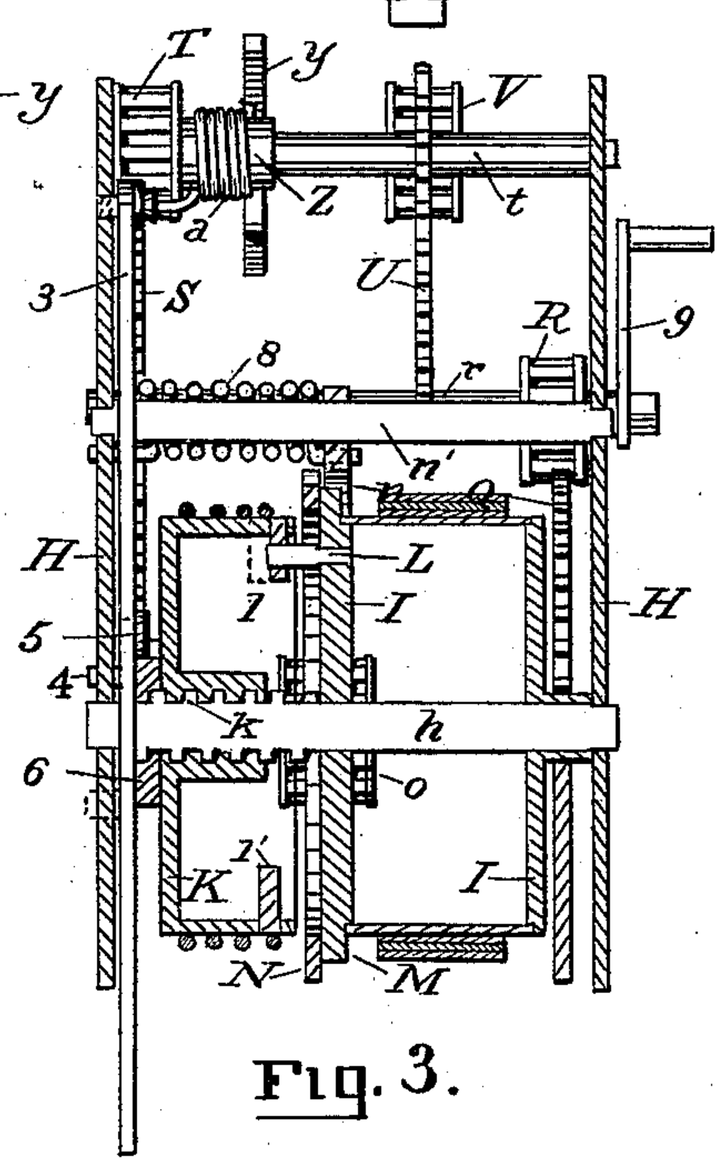

Fig. 3.

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AUTOMATIC FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 392,117, dated October 30, 1888.

Application filed October 25, 1887. Serial No. 253,291. (No model.)

To all whom it may concern:

Be it known that I, ELLIOTT P. GLEASON, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Fire-Extinguishing Apparatus, of which the following is a specification.

My invention relates to fire-extinguishers of that class employing a system of pipes and distributers for automatically discharging an extinguishing-fluid.

It consists in the adaptation and new combination of the several parts comprising the automatic distributing device; the adaptation and new combination of the several parts comprising a clock mechanism and the arranging and combining of the same with each other, whereby an automatic means of starting and stopping the flow of the extinguishing-fluid is effected, my object being to amplify and perfect fire-extinguishers of the said class, so as to render them certain to act automatically, or to be capable of hand-manipulation whenever occasion requires, and to produce apparatus which will be simple in construction, reliable and lasting in use, and efficient and non-destructive in operation. How I accomplish these objects will more fully appear in the following specification, of which the accompanying drawings form part, in which—

Figure 1 is a side elevation of the distributing device, showing a central section of the nozzle, valve, and distributer; also a side elevation of the clock mechanism, from which part of the frame has been removed; also central portions cut from a gear-wheel, and the spring-drum and windlass, in order to show parts in the rear. Fig. 2 is a skeleton cross-section of the same through the plane *x x*, through which parts in the rear may be seen.

Like letters refer to like parts in both the figures.

A represents a system of pipes arranged throughout a building, to a T joint or elbow, A′, of which is screwed a discharge-nozzle, B, made in the form of a globe-valve and having an open diaphragm, *b*, crossing its interior, which is made to serve as a seat for a valve, C, and may be of any approved form, but which is held in position and guided in action by means of a stem, *c*, which has a bearing in one side of the nozzle B, through which it extends outward a suitable distance to make it capable of serving as a means to communicate motion to the valve C. It may also have an extension from the opposite side of the valve C, adapted to slide in a suitable bearing, as is shown at *c′*. Projecting from the nozzle B and firmly fixed to it in vertical position, one on each side of the valve-stem bearing *b′*, are flanges or lugs *b″*, which serve as the fulcrum-support for the weighted lever D, which is pivoted between them by the pin *d*, on which it is free to swing. Its free end carrying a weight, *d′*, the pivoted end of this lever D is enlarged and formed into an eccentric-cam, so as to adapt it to engage with the end of the valve-stem *c* in such manner that when the lever D swings from a horizontal to a vertical position the cam or periphery of the eccentric will advance toward the nozzle B, impinging in its course against the end of the valve-stem *c* and forcing it inward and through it, raising the valve C from its seat and allowing a free flow through the nozzle of the extinguishing-fluid; or the lever D may have a short arm instead of the eccentric end and a link-connection between it and the valve-stem *c*, through which the same action of the valve-stem and valve may be effected.

The side of the nozzle B opposite to the lugs *b″* has an opening through which the valve C may be placed in its position. This opening is securely stopped and sealed by the screw-plug *c′*, which is also adapted to serve as a bearing for the valve-stem and the seat for a spiral spring, *c″*, which may be used, in the manner shown, to press the valve C against its seat, and thus assure the closing of said valve, the sealing of the nozzle B, and stoppage of flow of extinguishing-fluid, (when the lever D is returned from the vertical to a horizontal position,) the pressure of which will hold it closed.

At a suitable place on the lever D a pulley, E, is attached by means of a clip which is firmly fixed to said lever. F represents a chain, cord, or wire, one end of which is secured to a fusible joint, G, hereinafter described, which in turn is secured at a point about vertically above the lugs *b″* by a screw-hook, as shown,

or in any other suitable manner. From this fusible joint G the wire F extends down and around under the pulley E, then upward and around over another pulley, E′, and then over any such other as may be required to carry it to where the clock mechanism is located, with which it connects and terminates. In its course between the pulley E on the lever D and the fixed pulley E′ the wire F is severed and another fusible joint, *g*, is intervened and the severed ends of the wire F securely attached to it, as shown. These fusible joints G and *g* are made by soldering together two plates or rings with solder which will fuse at a low temperature. In each of these plates an eye is made to afford means for attaching the wire F or the screw-hook, the eye of each plate being to the other respectively at the opposite side of the solder-joint. This wire F′, when in position as described and shown, serves to support the lever D in the horizontal position, and it will be obvious that if either of the fusible joints G or *g* should separate the lever D will fall to a vertical position. To allow it full freedom to do so, a sufficient length of wire is left between each of the fusible joints and the pulley E. There is also a sufficient length of wire left between the fusible joint *g* and the pulley E′ to allow it to be drawn upward over and through the pulley E′ to bring the lever D back to a horizontal position, in case the fusible joint G becomes separated, either by the action of the clock mechanism or by the hand of a person, as hereinafter described.

As beforestated, the wire F is led over other pulleys to any desired or suitable place for locating the clock mechanism, (shown by Figs. 1 and 2,) to which it is connected. In the construction of this clock mechanism, H represents the frame, which is similar to ordinary clock-frames.

h is a fixed shaft or axle for the spring-cylinder I, which is made to revolve upon it, the spring (not shown) being securely fastened to each in the usual manner. This shaft *h* is also the axle for a windlass-cylinder, K, which also is made to revolve and move longitudinally upon it, the longitudinal movement being effected by means of a screw-thread, *k*, which is formed on the shaft *h*, and to which the hub of the windlass-cylinder K is adapted.

A pin, L, which projects from the end of the spring-cylinder I, will impart motion to the windlass-cylinder K, which, as shown, is hollow, and is provided with two pins, *l* and *l′*, projecting radially inward from the cylinder-shell, one of these pins, *l*, being positioned so that it will remain in the orbit traversed by the pin L on the end of the spring-cylinder I, while the other pin, *l′*, may be drawn out of the said orbit or kept within it accordingly as the windlass-cylinder K is moved longitudinally on the shaft *h*, as it will be, by half a revolution in the direction shown by the arrow at L, Fig. 1, which will bring it to a position outside said orbit, as shown by the dotted lines at *l*, Fig. 2.

It will be apparent that if the spring-cylinder is revolved its pin L will engage with either one or the other, the pin *l* or *l′*, thus imparting its motion and force to the windlass-cylinder, the object of which will be explained hereinafter.

A ratchet, M, and cogged rim or gear-wheel N are firmly attached to the spring-cylinder, and a pawl or lever, *n*, is mounted on a shaft, *n′*, in such position that its pawl end will engage with the teeth of the ratchet N and serve to prevent the spring-cylinder from revolving in the direction contrary to that shown by the arrow at L, which is the direction the spring when wound up will impel it to move. The lever end of this pawl-lever *n* projects beyond the frame of the clock mechanism, and is adapted by suitable formation—as a hook or holder—for securing the wire F, hereinafter described, so that the same may be adjusted and connected, as hereinafter explained.

The cogged rim or gear-wheel N engages with a pinion-gear, *o*, fixed on the shaft P, on which is fixed another large gear-wheel, *q*, which engages with another pinion-gear, R, fixed on the shaft *r*, which also carries another large gear-wheel, S, that engages with a pinion-gear, T, on the shaft *t*, and this shaft also carries another large gear-wheel, U, which engages with the pinion-gear *v* on the shaft *w*, on which is fixed a star-shaped wheel, *y*, which engages with a tilt-lever or clapper, *z*, which serves as a means of retarding the movement of the said star-wheel *y* and its connected mechanism, and also to produce noise, and thus an alarm, whenever it operates. This tilt-lever *z* is fulcrumed on the shaft *t*, and is held in operative position by a spring, *a*, coiled around the shaft *t*, on which it is free, one end being firmly attached to said tilt-lever *z*. The other, extending from said shaft, is pivoted to a prop or rod, 3, which is supported in position by a stud fixed in the frame, as is shown at 4, a suitable offset or projection being made on the rod to serve as a catch. It will be observed that this rod 3 has a pawl, 5, pivoted to it in such position that it will be engaged by a ratchet-wheel, 6, fixed on the end of the windlass-cylinder K, so that whenever the said cylinder revolves contrary to the direction shown by the arrow at L, Fig. 2, it will carry the said pawl and the rod 3 outward and dislodge the same from the supporting-stud 4, causing its weight to swing on the extended end of the spring *a* and to pull it down, thus releasing the tension of the spring *a* and causing it to swivel on the shaft *t* and carry up the tilt-lever *z* out of contact with the star-wheel *y*. The clock mechanism, being thus freed from its retarding action, will then run very rapidly. It will be noticed that the wire F has a loop, 7, which adapts it for hooking onto the pawl-lever *n*. This is positioned on the wire, so that when it is hooked to said lever the wire F will be adjusted so that it will hold the weighted lever D in a horizontal position and the pawl-lever engaged with the ratchet-rim M of the spring-

cylinder. It will now be seen that when one of the fusible joints G or *g* separates both the weighted lever D and the pawl-lever *n* will be relieved of support and will fall. Thus the pawl-lever *n* will disengage itself from the ratchet-rim M, and leave the spring-cylinder I free to revolve as impelled by the actuating-spring. To assure this action of the pawl-lever, a spring, 8, is coiled with sufficient tension around the shaft *n'*, one end being fixed to said lever and the other to the frame H, the tension being exerted to hold the said lever free from contact with the ratchet-rim M. The wire F continues from the loop or ring 7, and is firmly secured to the windlass-cylinder, so that when it is stretched the windlass-cylinder will be in the position shown, with the pin *l'* down. In this position it is free to be revolved in the direction shown by the arrow, the object of which is to discharge slack wire sufficient in case it is desired to release by hand the loop or ring 7 and slack up wire F, so as to let the weighted lever D drop to a vertical position, and thus open the valve C and start the flow of the extinguishing-fluid.

In case of a fire occurring near where one of these automatic fire-extinguishers is located, it is designed that the heat generated shall first fuse the solder-joint G, either by reason of its having been made with solder which will fuse easier, or because heat is communicated more rapidly to it by means of a fire-transmitting cord, one end of which is wound about it and the other coiled around or about the place, machine, or material which is to be protected.

Now when all the parts of this apparatus are in position and in relation to each other, as shown, should a fire take place near it the operation would be as follows: The heat generated by the fire will cause the solder of the fusible joint G to separate, and thus release from support the weighted lever D, also the pawl-lever *n*, each of which will fall, the eccentric on the weighted lever D forcing open the valve C and starting a flow of extinguishing-fluid through the nozzle. At the same time the spring-cylinder I of the clock mechanism will commence to revolve, communicating motion through the cogged rim N and system of gear-wheels and pinions to the star-wheel *y*, the teeth of which as it revolves will strike the tilt-lever *z* and make a clacking noise, thus serving as an alarm. This action will continue until the pin L on the spring-cylinder engages with the pin *l'* in the windlass-cylinder K and imparts motion to it, and through it to the ratchet-wheel 6, which, engaging the pawl 5, will force it and the rod 3 back and off the stud 4, till it will fall and carry down the end of the spring *a* and overbalance and tilt up the tilt-lever *z*. Rapid movement will then ensue of the revolving parts, and the wire F will be quickly wound upon the windlass cylinder until the weighted lever D is drawn to a horizontal position, permitting the valve C to close and stopping the flow of the extinguishing-fluid. The clock mechanism will stop also, because the fusible joint *g* will have been drawn against the frame of the pulley E'. (It will be observed that the plate of the fusible joint G, to which the wire F remains connected, will catch at the pulley E on the lever D, and thus serve to maintain the required attachment.) In case the fire should continue to burn, then additional heat will fuse the solder of the other fusible joint, *g*, and the weighted lever D will again fall and the flow of extinguishing-fluid again start and continue.

After the fire is extinguished the clock mechanism may be again wound up by the crank or key 9, adapted to the projecting end of the shaft P, (the limit of time the clock will run before tripping the rod 3 being determined by more or less winding.)

It will be seen that if a person should disengage the loop or ring 7 of the wire F from the pawl-lever *n* the operation of the apparatus would be similar to that above described. This, however, would involve the backward revolving of the windlass-cylinder K, in order to let off enough slack wire to allow the weighted lever D to fall, which, because of the longitudinal shift on the shaft *h* of the windlass-cylinder K, will carry the pin *l'* out of the way of the pin L on the spring-cylinder I, thereby allowing it to pass by and engage with the pin *l*. Otherwise the operation is practically the same, thus rendering this apparatus completely automatic, as well as capable of hand-manipulation.

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

1. The combination, in automatic fire-extinguishing apparatus consisting of a system of pipes, nozzles, valves, and distributers, of a distributing-nozzle having a valve-port, a valve for closing the same, which is actuated by a weighted lever, a weighted lever for actuating the same, which is supported and actuated by a wire having connection to a clock mechanism, a wire provided with fusible joints connecting said lever to the starting device and windlass-cylinder of a clock mechanism, and a clock mechanism, such as described, whereby an automatic means is provided of reraising said lever and closing said valve, in the manner and for the purpose specified.

2. In automatic fire-extinguishing apparatus, the combination of a weighted lever adapted to actuate a valve, a valve for closing the distributing-nozzle, a clock mechanism, substantially such as described, for operating an alarm and reraising said weighted lever, having the pawl *n* and the ratchet *m*, and a wire having a joint that will sever by the action of heat for holding said weighted lever in elevated position, and which connects with the said pawl of the clock mechanism, so as to serve as the means of holding it in engagement with said ratchet of the clock mechanism, so that the severance of one of the joints of said wire will effect simultaneously the releas-

ing of the said pawl and the releasing of the said weighted lever, in the manner and for the purpose described.

3. The combination, with automatic fire-extinguishing apparatus consisting of a system of pipes, discharge-nozzle, and valve for controlling the flow of extinguishing fluid, which valve is actuated by a weight, of a wire, as F, for supporting such weight, which is provided with two fusible joints, each of different fusibility, so that one will fuse at a lower temperature than the other, as and for the purpose described.

4. In automatic fire-extinguishing apparatus, the combination of a discharge-nozzle, as B, having a valve which is actuated by an external device, a wire, as F, connecting said external device with a clock mechanism comprising an alarm which it is adapted to operate, a clock mechanism consisting of intermediate wheel and pinion-gears actuated by a cogged rim fixed to a spring-cylinder, as I, a star-wheel, as *y*, a tilt-lever, as *z*, a spring, as *a*, a rod, as 3, having the pawl 5, stud 4, and suitable shafts and frame-work, arranged in the manner and for the purpose described.

5. In automatic fire-extinguishing apparatus employing a clock mechanism, the combination, in the clock mechanism, of a shaft, as *h*, adapted to impart longitudinal movement to a windlass-cylinder, as K, adapted for both rotary and longitudinal movement on said shaft, a ratchet-wheel, as 6, a spring-cylinder, as I, adapted to revolve on the same shaft, and with means to impart motion to the said windlass-cylinder, a ratchet-rim fixed to said cylinder and adapted to engage a pawl-lever, a pawl-lever, as *n*, and a wire, F, connecting said pawl-lever to suitable means employed for actuating a valve adapted to close the discharge-nozzle B, all arranged in the manner and for the purpose described.

6. In automatic fire-extinguishing apparatus, a system of pipes, a distributing device consisting of a nozzle having a valve that is actuated by a weighted lever, a wire for supporting said weighted lever, which is connected to the windlass-cylinder of a clock mechanism, in combination with a clock mechanism, substantially as described, which is provided with and adapted to operate said windlass-cylinder, about which the said wire will be wound, and thereby effect the reraising of the said lever whenever said clock mechanism is started in motion, in the manner substantially as and for the purpose described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 15th day of October, 1887.

ELLIOTT P. GLEASON.

Witnesses:
E. F. GENNERT,
C. F. KELLEY.