

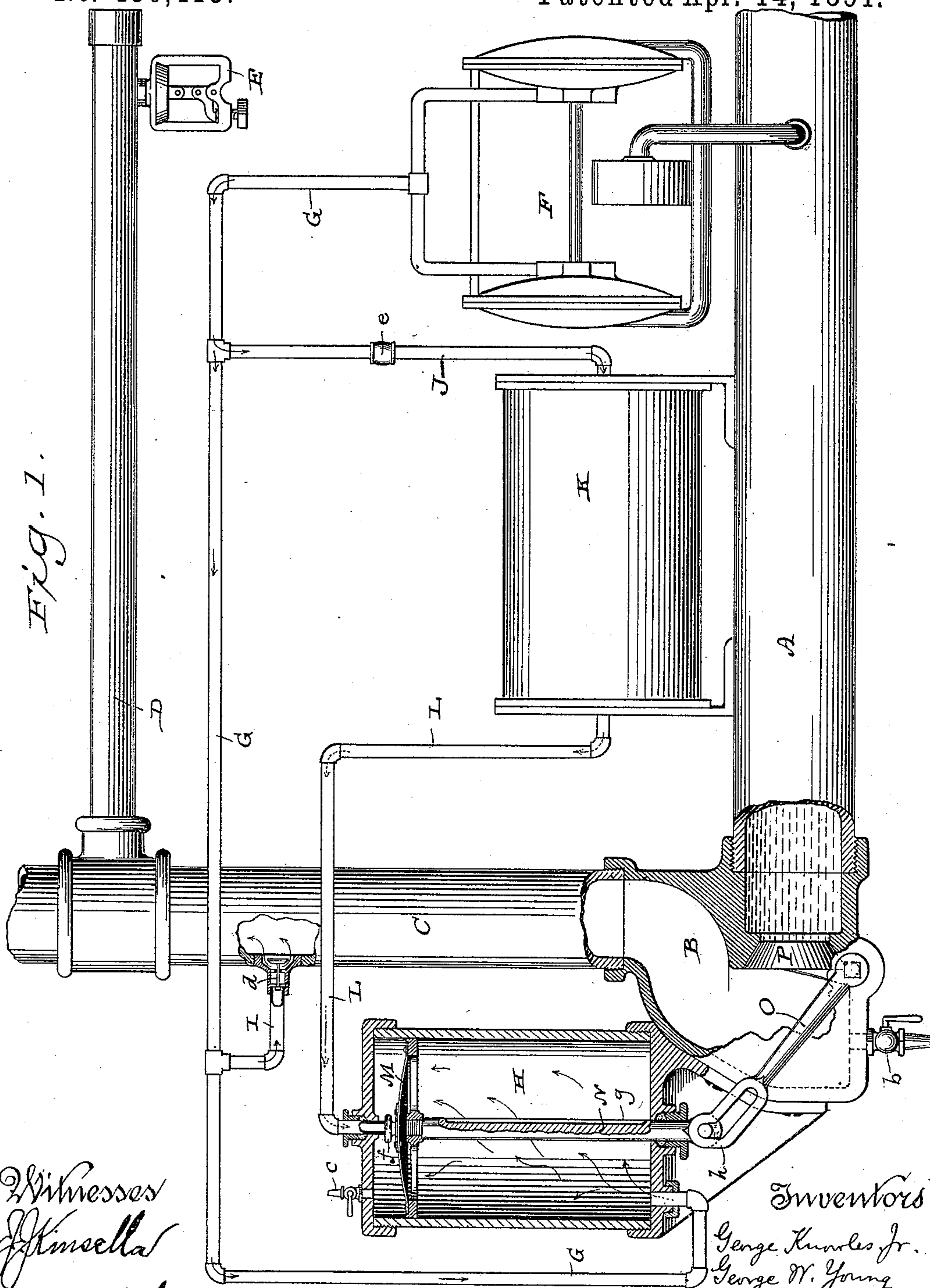
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3 Sheets—Sheet 1.

G. KNOWLES, Jr. & G. W. YOUNG.  
AUTOMATIC FIRE EXTINGUISHING SYSTEM.

No. 450,413.

Patented Apr. 14, 1891.



Witnesses  
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*N. E. Oliphant*

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*Attorneys*

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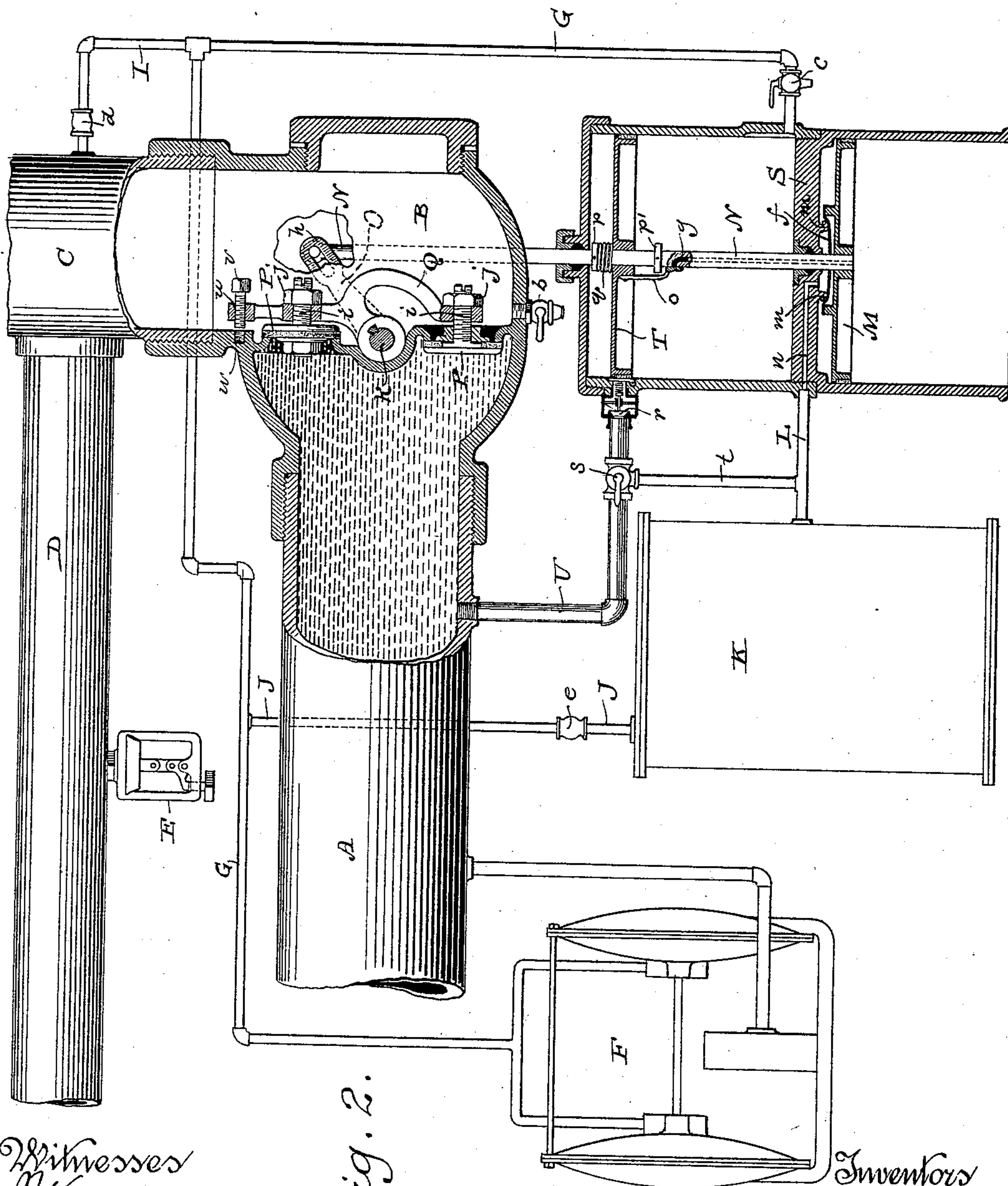


Fig. 2.

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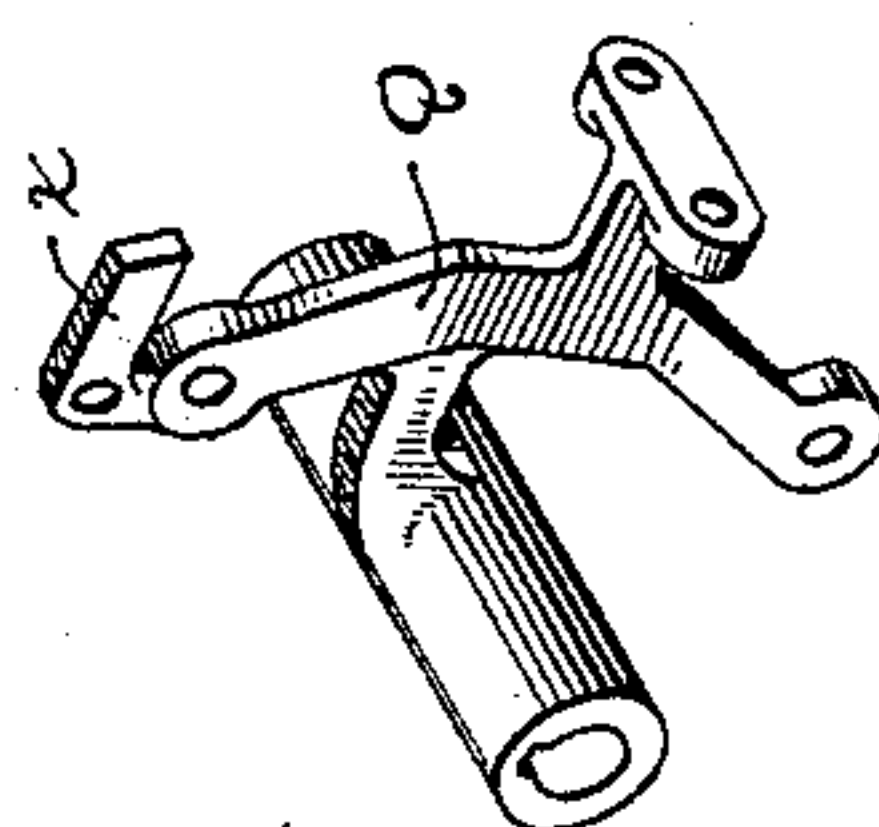
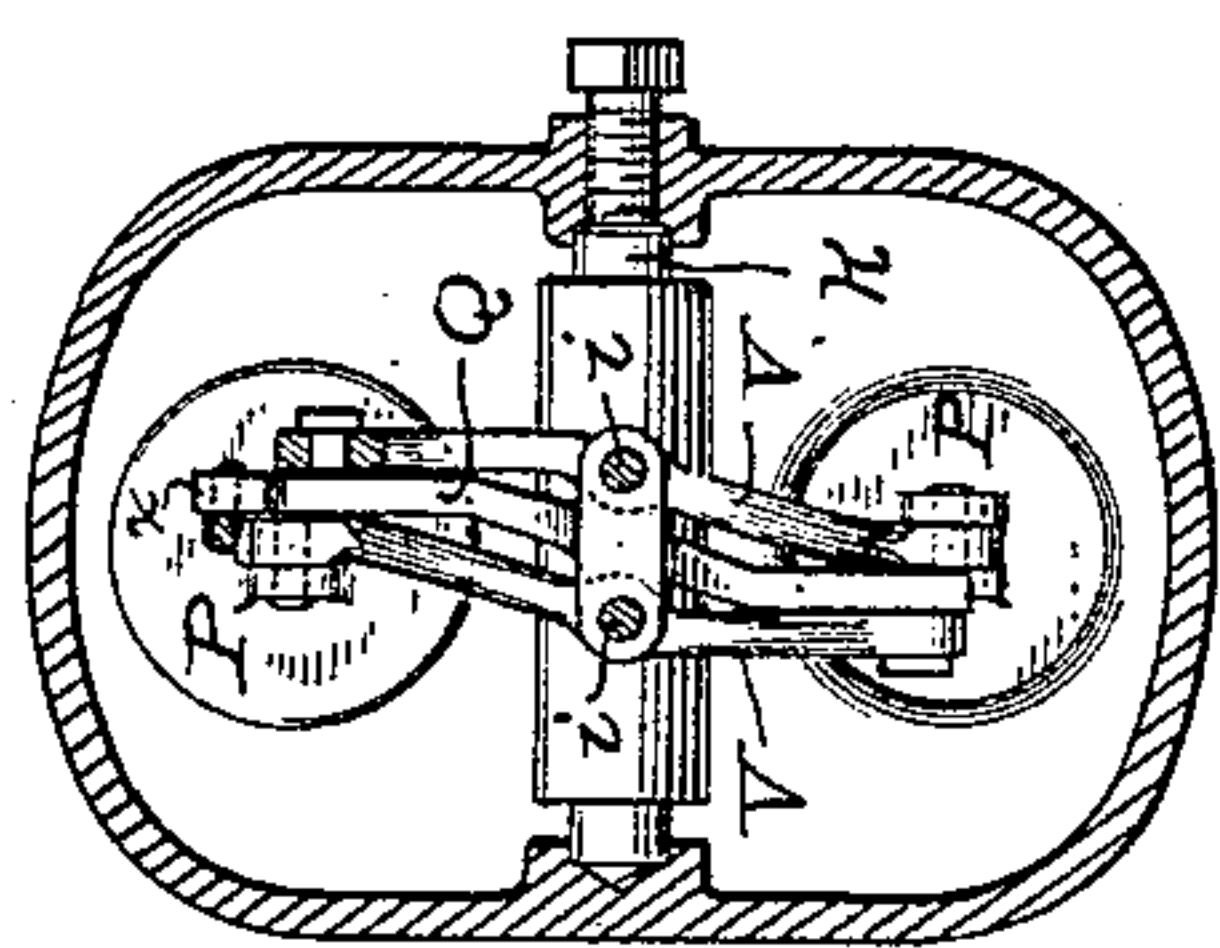
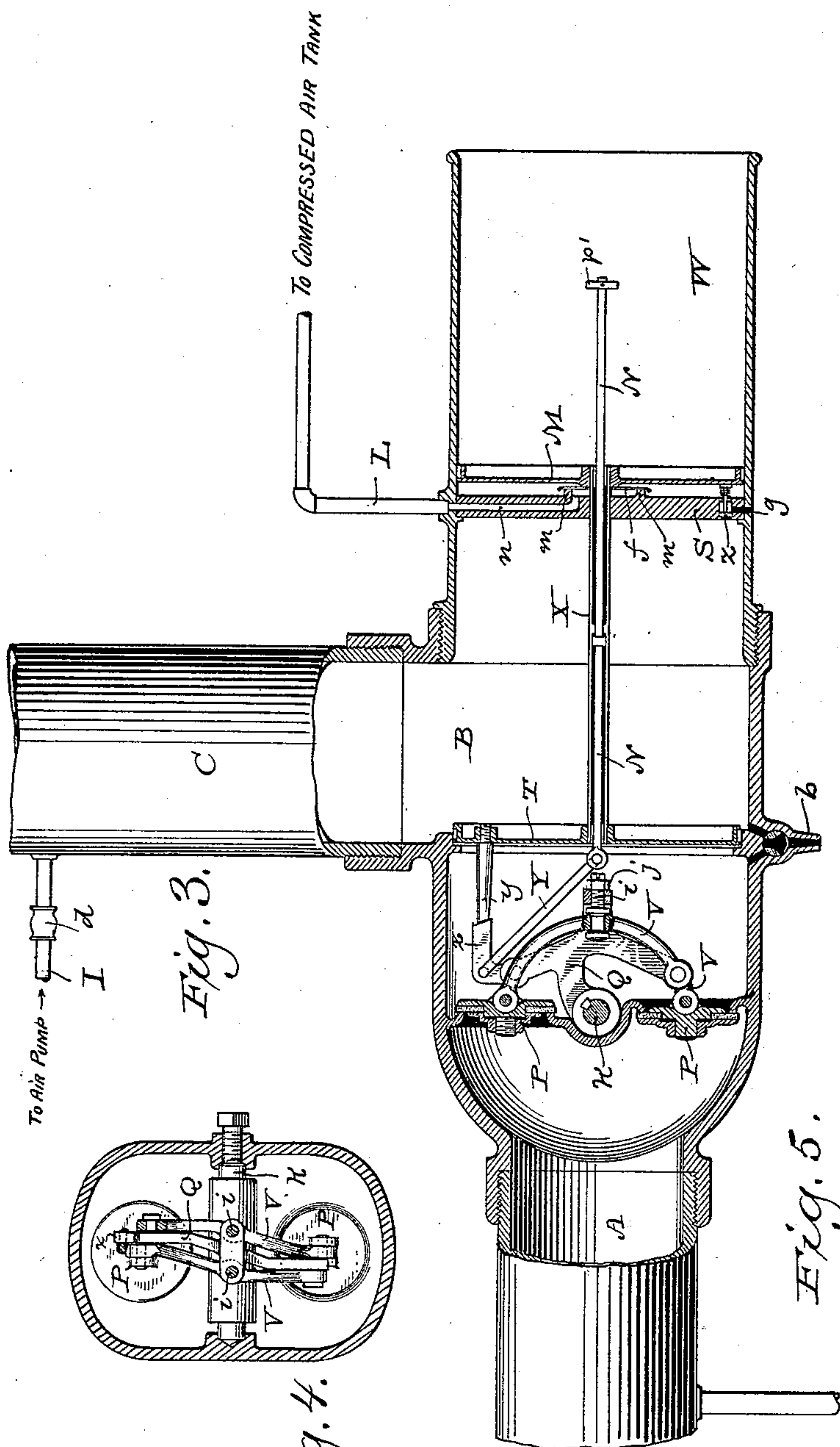
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# UNITED STATES PATENT OFFICE.

GEORGE KNOWLES, JR., AND GEORGE W. YOUNG, OF MILWAUKEE,  
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## AUTOMATIC FIRE-EXTINGUISHING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 450,413, dated April 14, 1891.

Application filed December 9, 1889. Serial No. 333,071. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE KNOWLES, Jr., and GEORGE W. YOUNG, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Automatic Fire-Extinguishing Systems; and we do hereby declare that the following is a full, clear, and exact description thereof.

Our invention relates to automatic fire-extinguishing systems; and it consists, primarily, in means for effecting a positive opening of a service-pipe closure by fluid under pressure as well as for holding said closure in its normal position by the same force.

Our invention further consists in certain peculiarities of construction and combination of parts to be hereinafter described with reference to the accompanying drawings and subsequently claimed.

In the drawings, Figure 1 represents an elevation, partly in section, and illustrates the application of one form of our invention; Fig. 2, a similar view illustrating the application of another form of our invention; Fig. 3, a like view illustrating still another form of said invention; Fig. 4, a section on line 4-4 of the preceding figure, and Fig. 5 a detail perspective view of a valve-yoke shown in Figs. 3 and 4.

Referring by letter to the drawings, A represents a service-pipe for connection with a water-main; B, a coupling connected to the inner end of the service-pipe; C, the riser or pipe for leading the water-supply from said service-pipe to the upper stories of a building, and D one of a series of branch pipes connected to the riser, this branch pipe being provided with a sprinkler E, as is common in automatic fire-extinguishing systems. The coupling B in each of the several forms shown is provided with a waste-cock *b*, and connected to the service-pipe A is an air or other fluid pump F of any suitable construction.

In that form of our invention illustrated by Fig. 1 a pipe G connects the pump with the lower end of a cylinder H, that is provided with a waste-cock *c* and supported on the coupling B, said pipe having branches I J,

that respectively connect with the riser C and a fluid-storage tank K, the branch I having a one-way valve *d* and the branch J a check-valve coupling *e*, for the purpose to be hereinafter specified. The upper end of the cylinder is connected by a pipe L with the storage-tank, and arranged to work in said cylinder is a flexible metal piston M, provided with a stopper *f* for the outlet of said pipe. Extending from the piston down through the lower end of the cylinder is a rod N, provided with a leak-groove *g* and connected to the slotted end *h* of a lever O, the latter being fast on a trunnion of a valve P, that is journaled in the coupling B to normally close the service-pipe A, and said valve is held closed by the fluid-pressure upon the under side of said piston.

The riser C and branch pipes D are filled with the fluid under pressure, and in case a leak occurs at any point throughout the pipe system the escape of said fluid will remove the pressure from the under side of the piston M, and a pressure will be exerted upon the upper side of this piston by the escape through pipe L of the fluid accumulated in the storage-tank K, whereby the rod N is run down to actuate the lever O, and thus the valve P is brought away from its seat to permit a flow of water through said pipe system. As soon as the leak-groove *g* on the rod N is exposed the exhaust of the fluid upon the under side of the piston will be hastened, and the force of the water from the service-pipe will close the valve *d* to cut-off the pipe G and its several connections, while at the same time the check-valve in the coupling *e* will prevent the fluid in the tank from escaping in the wrong direction.

In that form of our invention illustrated in Fig. 2 we employ two valves P of equal area, adjustably connected to a yoke Q by set-screws *i* and jam-nuts *j*, said valves being arranged to open and close in opposite directions. The yoke Q is fast to a rod *k*, journaled in the coupling B, and connects with the slotted lever O, actuated by the rod N, connected to a piston M, that works in the cylinder H, and carries a flexible metal stopper *f* for the flanged portion *m* of a par-



tion S in said cylinder, this partition being provided with a channel *n* for connection with the pipe L, that leads from the storage-tank K. In the latter form of our invention the  
5 rod N is provided with a leak-channel *g* instead of the groove shown in Fig. 1, and this leak-channel is normally closed by a cut-off *o*, depending from another piston T, loose on said rod between two collars *p p'*, a spring *q*  
10 being interposed between the collar *p* and the latter piston. The pipe G leads into the latter form of cylinder above the partition S, and the fluid forced in by the pump F acts to hold the piston T up against the resistance of  
15 spring *q*, while at the same time a spring-controlled valve *r* is held closed by said piston to cut-off a pipe U, that connects the upper portion of said cylinder with the service-pipe A.

We prefer to provide the pipe U with a  
20 three-way cock *s*, having a connection *t* with the pipe L, whereby we may use either water from the service-pipe or fluid from the tank K as a means for exerting pressure on the piston T; or, if desired, the fluid from both  
25 sources may be cut off by said cock.

When a leak occurs in the riser C or any of its branches, the pressure of the fluid on the piston T is removed and the spring *q* forces this piston out of its normal position against  
30 the collar *p'* on the rod N, thereby opening the leak-channel *g* and valve *r*, while at the same time the pressure from the tank K acts against the piston M and said rod is run down to actuate the lever O, thus causing the valves  
35 P P to open in opposite directions. By the arrangement of pistons M T with relation to the inlets for the fluid or fluids under pressure a very considerable force is exerted to actuate the rod N, and consequently the opening  
40 of the valves P P is insured.

The yoke Q of the valve-gear is provided at one end with an eye *u* for engagement with a screw *v*, and the coupling B is provided with a screw-threaded socket *w* in register with  
45 said screw. To adjust the valves P P with relation to their seats, the screw *v* is run into the socket *w* to lock the yoke Q in position and the set-screws *i* actuated. Consequently it will be seen that each valve may be ad-  
50 justed without displacement of the other.

In that form of our invention illustrated by Fig. 3 the valves P P are pivotally connected to bows V V, that are in turn pivotally connected to opposite ends of the yoke Q, each  
55 bow being adjustably connected to an arm of said yoke by a set-screw *i* and jam-nut *j*, whereby when this set-screw is actuated the corresponding valve is independently adjusted with relation to its seat. By having the  
60 valves pivoted they will more readily yield to any inequalities in the seats, and when open said valves will turn on their pivots to present the least possible surface to the flow from the service-pipe. In the present form  
65 of our invention the yoke Q has its upper end extended and provided with an arm *x*, that normally impinges against a pin *y* on a piston

T, normally held against a seat in the coupling B by the pressure in the distributing system and connected by a sleeve X with another piston M, provided with a flexible stop-  
70 per *f* for the flanged portion *m* of a partition S in an extension W of said coupling, this partition being provided with a channel *n* for connection with the pipe L, leading from the  
75 storage-tank K, as in that form of our invention illustrated by Fig. 2. A rod N extends through the sleeve X and is provided at its lower end with a collar *p'*, while at its upper end said rod has a link connection Y with the  
80 valve-yoke.

The partition S in the present form of our invention is provided with a spring-controlled valve *z*, held closed by the piston M to cut off a leak-opening *g*, that takes the place of  
85 the leak groove or channel above described in connection with the rod N of the two preceding forms of our invention.

The waste-cock *b* (shown in Fig. 3) is of the three-way pattern, and thus we can drain  
90 from either side of the piston T when the latter is in its normal position.

In the operation of the latter form of our invention, if a leak occurs in the distributing system, the pistons M T will leave their normal position and the pressure from the stor-  
95 age-tank K will be exerted on the former piston to force it down against the collar *p'* on the rod N to actuate the latter and through the link connection Y bring the valves P P  
100 away from their seats. The flow from the service-pipe A will act upon the piston T, and thereby assist the pressure from the tank K on the piston M to insure a full opening of the valves; or in case there is not sufficient  
105 pressure from said tank to more than partially open said valves the operation will be completed by said flow from the service-pipe.

In that class of invention to which ours relates a great deal has been done to counter-  
110 balance or overcome the pressure of the water-supply against the service-pipe closure, this pressure being heretofore partially or wholly relied upon to open said closure in case of a  
115 leak in the distributor system.

By our invention we seek to insure a positive opening of the service-pipe closure at any time a leak occurs in the distributor system, and to accomplish this result we connect the  
120 closure to devices positively actuated by fluid under pressure independent of the water-supply pressure that is directly exerted against said closure, although we may utilize the water-supply as the fluid under pressure for actuating said devices or as an aid to an-  
125 other such fluid for the same purpose.

In that form of our invention illustrated by Fig. 1 the proportions are such that the pressure from the pump is multiplied against an area of such dimensions that the service-pipe  
130 valve is held closed against any possible pressure of the water-supply, while in those forms illustrated by Figs. 2 and 3 we show two such valves connected to a pivotal yoke



and arranged to move in opposite directions, whereby the water-supply pressure is equalized, and there can be no movement of the yoke except by the action of the rod connected thereto.

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

1. In a fire-extinguisher system, the combination of a service-pipe, distributer-pipes connected thereto, a closure for the service-pipe, an inclosed actuating mechanism connected to the closure, a source of fluid under pressure communicating with the distributer-pipes and having outlets on opposite sides of the closure-actuating mechanism, and a cut-off controlled by this closure-actuating mechanism and arranged to normally close one of said outlets, substantially as set forth.

2. In a fire-extinguisher system, the combination of a service-pipe, distributer-pipes connected thereto, a closure for the service-pipe provided with a lever, a cylinder, a source of fluid under pressure in communication with the distributer-pipes and with the cylinder at two points of the latter, a piston arranged in said cylinder, a rod connecting the piston and lever of the service-pipe closure, and a cut-off on the piston normally held against one of the fluid-pressure inlets in the aforesaid cylinder, substantially as set forth.

3. In an automatic fire-extinguisher system, a service-pipe closure comprising two connected valves of equal area pivotally connected to a common yoke, and suitable mechanism for adjusting each valve independent of the other, substantially as set forth.

4. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, bows pivotally connected to the valves, and a pivotal yoke likewise connected to the bows, substantially as set forth.

5. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, bows pivotally connected to the valves, a pivotal yoke likewise connected to the bows, and set-screws uniting said bows and yoke, substantially as set forth.

6. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, bows pivotally connected to the valves, a pivotal yoke likewise connected to the bows, and a pull-rod linked to the yoke, substantially as set forth.

7. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, a pivotal yoke connected to the valves, a pull-rod connected to the yoke, pistons on the pull-rod, a cylinder surrounding the pistons and provided with a flanged and channeled partition interposed between said pistons, a stopper on the outermost piston for closing the flanged portion of the par-

tion, and means, substantially as described, for inducing fluid under pressure into the inner portion of said cylinder and the channeled portion of its partition, as set forth.

8. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, a pivotal yoke connected to the valves, a pull-rod connected to the yoke and provided with a leak-channel, a spring-controlled piston loose on the pull-rod and provided with a cut-off for the leak-channel, another piston fast on said pull-rod, a cylinder surrounding the pistons and provided with a flanged and channeled partition interposed between said pistons, a stopper on the outermost piston for closing the flanged portion of the partition, and means, substantially as described, for inducing fluid under pressure into the inner portion of said cylinder and the channeled portion of its partition, as set forth.

9. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, a pivotal yoke connected to the valves, a pull-rod connected to the yoke, pistons on the pull-rod, a cylinder surrounding the pistons and provided with a flanged and channeled partition interposed between the pistons, a branch connecting the service-pipe with the cylinder and provided with a valve normally closed by the innermost piston, a stopper on the outermost piston for closing the flanged portion of the partition, and means, substantially as described, for inducing fluid under pressure into the inner portion of said cylinder and the channeled portion of its partition, as set forth.

10. In an automatic fire-extinguishing system, a service-pipe closure comprising two valves of equal area arranged to open in opposite directions, a pivoted yoke connected to the valves, a pull-rod connected to the yoke, pistons on the pull-rod, a cylinder surrounding the pistons and provided with a flanged and channeled partition interposed between the pistons, a branch connecting the service-pipe with the cylinder and provided with a valve normally closed by the innermost piston, a stopper on the outermost piston for closing the flanged portion of the partition, means, substantially as described, for inducing fluid under pressure into the upper portion of said cylinder and the channeled portions of its partition, a three-way cock in the service-pipe branch, and a pipe connecting this cock with the conductor for leading the fluid under pressure into said channeled portion of the cylinder-partition, as set forth.

11. In a fire-extinguishing system, the combination of a service-pipe, distributer-pipes connected thereto, a closure for the service-pipe and inclosed actuating mechanism for the closure, a source of fluid under pressure communicating with the distributer-pipes and having outlets on opposite sides of the



closure-actuating mechanism, another source  
of fluid having an outlet on one side only of  
said closure mechanism, and cut-offs for the  
latter outlet and one of the former controlled  
5 by the aforesaid closure-actuating mechanism,  
substantially as set forth.

In testimony that we claim the foregoing we  
have hereunto set our hands, at Milwaukee, in

the county of Milwaukee and State of Wisconsin,  
in the presence of two witnesses.

GEORGE KNOWLES, JR.  
GEO. W. YOUNG.

Witnesses:

N. E. OLIPHANT,  
WM. KLUG.