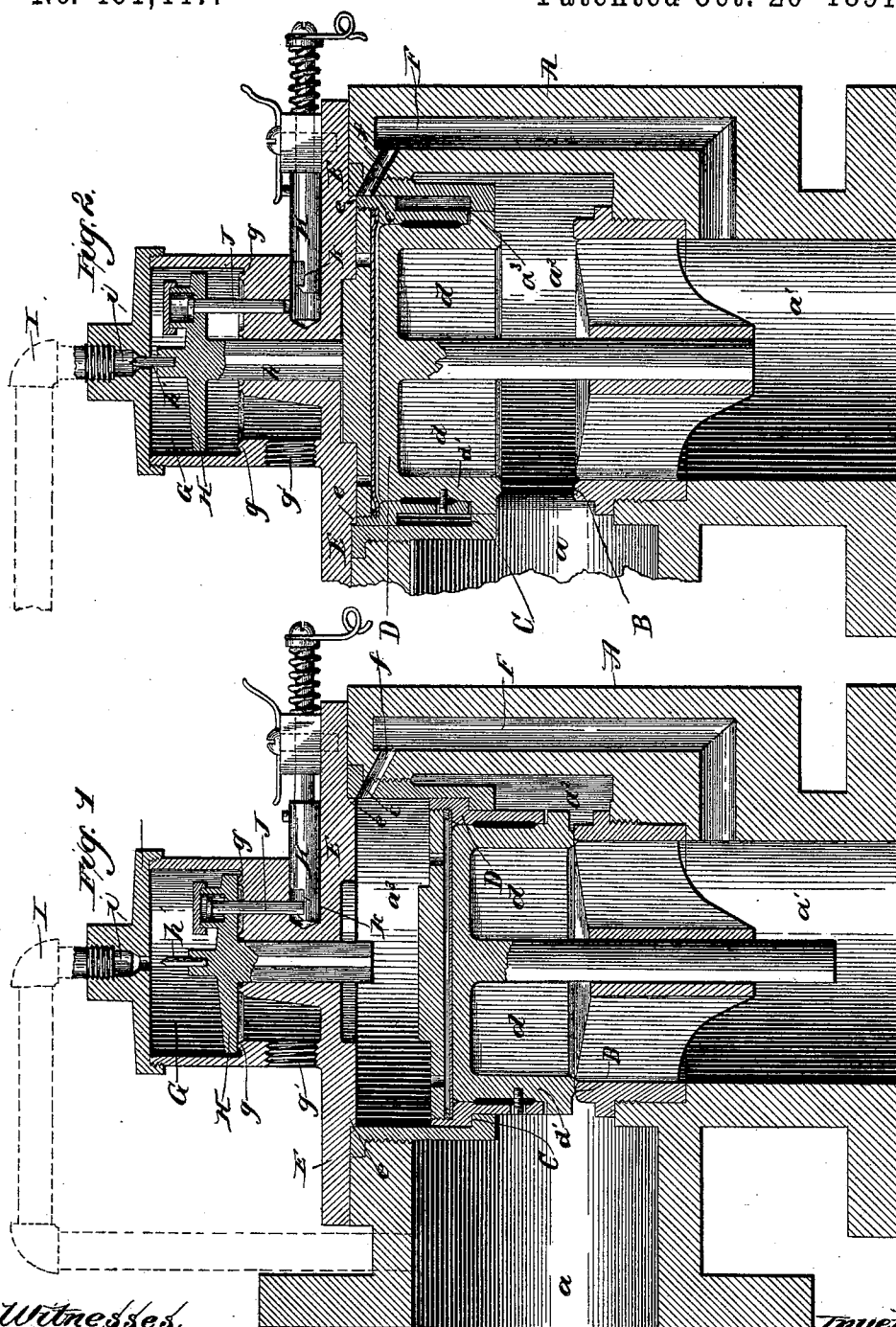


(No Model.)

A. F. NAGLE.
AUTOMATIC VALVE.

No. 461,447.

Patented Oct. 20 1891.



Witnesses.
J. M. H. H. H.
A. M. Bent

Inventor
Augustus I. Nagle
By C. O. Burn & Phacher
Attorneys

UNITED STATES PATENT OFFICE.

AUGUSTUS F. NAGLE, OF CHICAGO, ILLINOIS.

AUTOMATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 461,447, dated October 20, 1891.

Application filed September 26, 1889. Serial No. 325,168. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS F. NAGLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Fire-Extinguishing Apparatus, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a vertical central section of the main valve and adjacent parts with the valve closed, and Fig. 2 a similar section with the valve open.

My invention relates to the main valve of what is known as the "dry-pipe" system of automatic fire-extinguishers, in which the water is prevented from entering the distributing-pipes by a main valve, which is controlled by a light air-pressure in said pipes, so that the closing pressure is relieved when the air-pressure in the distributing-pipes is reduced by the opening of one or more of the sprinkler-heads.

The main features of the device are substantially as shown in my patent, No. 387,179, dated July 31, 1888, and the present invention is an improvement upon the structure there shown and described.

The particular improvements which form the subject-matter of my present invention are shown in my patent, No. 407,676, dated July 23, 1889, but constitute no part of the invention which is the subject of said patent, as is stated in the patent itself. The two-part valve, which is the subject of my last-named patent, is also shown in the drawings of my present application, but simply for the purpose of illustration, as it constitutes no part of my invention.

I will proceed to describe the construction and operation of a valve structure in which I have practically embodied my present invention, and will then point out definitely in claims the special improvements which I believe to be new and wish to secure by Letters Patent.

In the drawings I have shown only so much of the automatic extinguishing apparatus as is necessary to an understanding of the invention. The general construction and arrangement of the distributing-pipes and sprinklers in apparatus of the kind mentioned

above are well known, and as they constitute no part of my present invention I have not shown an entire apparatus in the drawings, but have only shown the main valve mechanism which controls the inlet of water to the distributing-pipes.

In the drawings, A represents the body or shell within which the valve is located. This shell has a flanged outlet-nozzle *a*, adapted to be secured to a pipe leading to the distributing-pipes, which are provided, as usual, with sprinkler-heads. It also has a similar flanged inlet-nozzle *a'*, adapted to be secured to the main water-supply pipe. This shell or case for the valve is very much the same as in my prior patent, No. 387,179, and within it are the lower seat B and upper seat C for the valve, also arranged substantially as shown and described in said patent. The valve here shown is a two-part valve like that shown and described in my patent, No. 407,676. This particular construction constitutes no part of my present invention and does not require further description here. The valve is double-seated, as in Patent No. 387,179, but differs in construction from the valve there shown in having a chamber *d* below its face instead of above. This is formed by arranging the face of the valve at the top of the stem and having a flange *d'* depending therefrom, as seen in the drawings. The upper part of the shell is open, and is covered and closed by a suitable cap or head E, as in my previous patents. It will be seen that within the shell there is a central chamber *a*² and a chamber *a*³ above the valve, as in my former construction, and that the latter is gradually closed as the valve is raised or opened. A by-pass F is formed in the valve case or shell and extends from the inlet-nozzle below the lower valve-seat upward past the valve alongside the chamber above the upper valve-seat. At the upper end of this pass a small opening *f* is made inward, which registers with a similar opening *c* in the rim or flange of the upper valve-seat. This opening *c* is made at the extreme upper portion of the seat so that it communicates with the upper chamber at its extreme upper portion just underneath the shell-cap. In this respect the construction is also different from my patent, No. 387,179, in which this com-

municating passage is made at the extreme lower portion of the valve-seat or just over the valve when seated.

The head or cap E is provided with a depending flange *e*, adapted to fit within the opening at the upper portion of the shell, so that the cap securely closes this opening and forms the top of the chamber over the valve. Above this cap or formed upon the top thereof is a chamber G, within which is located a waste-valve H, which is properly seated upon a ledge *g* within the chamber, and is provided with a winged stem *h*, that passes down through a suitable tubular bearing extending through the cap into the upper chamber over the valve. This waste or check valve, it will be seen, is also seated on the upper edge of this tubular bearing, so that it has both an inner and outer seating, the bearing-points being arranged in the same horizontal plane, so that there is no difficulty in making them tight. It will also be seen that the diameter of the outer seating is very much larger than that of the inner, so that the exposed upper area of the valve will be very much greater than that of the similar lower area on the under side thereof. An air-inlet pipe I opens into the chamber above this check-valve and connects at its other end with the distributing-pipes. This may be effected by connecting it with the outlet of the valve-shell, as shown in the drawings, or in any other suitable way. There is therefore the same pressure in the chamber above this check-valve as in the outlet *a*; or, in other words, the pressure in the distributing-pipes and the said chamber is the same. This chamber is also provided with a waste or outlet aperture *g'* below the valve, through which waste water is discharged, and which also admits atmospheric air into the chamber on the under side of the valve. The valve itself is provided with an upwardly-projecting pin *h'*, which, when the valve is raised, serves to close the mouth or inlet-aperture *i* of the air-pipe I. The check-valve H is also provided with a detent-pin J, which has a slight vertical motion in the valve. When the valve is seated and the pin depressed, it engages a spring-bolt K by a notch *k* therein. When the valve is raised, the pin is disengaged from the bolt, which is then reciprocated by the action of the spring and sets off an alarm by closing an electric circuit or in any other ordinary manner.

The general operation of this mechanism is much the same as in my patent, No. 387,179; but the differences in construction, which have been pointed out, effect some changes in operation, which are quite advantageous. The provision of a chamber *d* on the under side of the valve forms a permanent air-space, so that an air-cushion is provided between the valve and the water in the main pipe, and hence any sudden increase in the water-pressure is cushioned upon the valve and danger of opening from violent concussions, gener-

ally known as "water-hammer," is almost entirely obviated. The accumulation of air below the valve under this construction is much greater in quantity than can be secured above the valve in the construction shown in the patent referred to, and it is much more efficient in its action.

In the structure shown in Patent No. 387,179, the by-pass opening is closed to the chamber above the valve immediately the latter is moved from its seat, and when the valve is to be closed down there is no passage of water from the by-pass into this chamber until the valve is just about seated. Now it is desirable that the pressure of water upon the upper side of the valve shall begin as soon as possible when the valve is to be closed, and this is effected by the construction herein shown and described, wherein the communicating passage between the by-pass and chamber is at the extreme upper end of the latter.

In the present construction the air-pressure upon the waste or check valve is direct, the latter being provided with two pressure-areas, that upon its upper face, which is exposed to air-pressure, being very much greater than that upon its lower face, which is exposed to the water-pressure. In practice I make the former about sixteen times the size of the latter, so that the light air-pressure in the distributing-pipes will overcome the water-pressure below. The whole operation is therefore effected by a single check-valve arranged to receive both air and water pressure direct. It will be understood, of course, that the waste-outlet in the top chamber is considerably larger than the water-passage from the by-pass into the space above the valve, the same as in Patent No. 387,179. In all other general features the operation in this instance is the same as set forth in the said patent. The two-part valve shown in the drawings in this case may be used; but the valve shown in the said patent is also applicable, the improvements herein described not being dependent upon either construction of valve.

The alarm device shown and described is not an essential to the operation of the other improvements; but it is a simple and efficient device for the purpose, though some other mechanism may be substituted for the purpose intended. Some changes may be made in details of construction and arrangement and may become necessary in different locations. Hence I do not wish to be understood as limiting myself to the precise detailed construction herein shown.

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

1. The valve-shell provided with outlet and inlet *a a'*, in combination with the valve-seat B, and the valve D, having a depending flange *d'*, adapted to fit the said seat B, whereby an air-chamber *d* is provided on the under side of the valve to cushion the latter against un-

seating by the direct action of water from the supply-pipe, substantially as described.

2. The valve-shell A, provided with the by-pass F, in combination with the upper and lower valve-seats B C, the latter being provided with a passage *c* at its upper extremity communicating with a passage *f* opening into the by-pass and the valve D, substantially as and for the purposes specified.

3. The supply-pipe charged with water under pressure, in combination with the outlet and distributing pipes charged with air under less pressure than the water, a double-seated valve arranged at the junction of said two pipes, one head closing the supply-pipe and the other a chamber on the opposite side of the valve, a by-pass connecting the supply-pipe with the said valve-chamber, a waste-chamber communicating with said valve-chamber and

provided with an outlet larger than the by-pass opening into the latter, a differential check or waste valve with its small area closing the communication between the valve-chamber and waste-chamber, and an air-pipe connecting the distributing-pipe with the waste-chamber immediately above said valve to bring the pressure of the air directly upon the greater area of said waste-valve, substantially as and for the purposes specified.

4. A check or waste valve H, in combination with the detent-pin J and the notched sliding spring-bolt K, arranged to start an alarm when released from the pin, substantially as and for the purposes specified.

AUGUSTUS F. NAGLE.

Witnesses:

CARRIE FEIGEL,
A. M. BEST.