April 14, 1931. E. H. DAGGETT 1,800,512

ALARM SOUNDING DEVICE

Original Filed May 31, 1928 3 Sheets-Sheet 1

FIG.1.

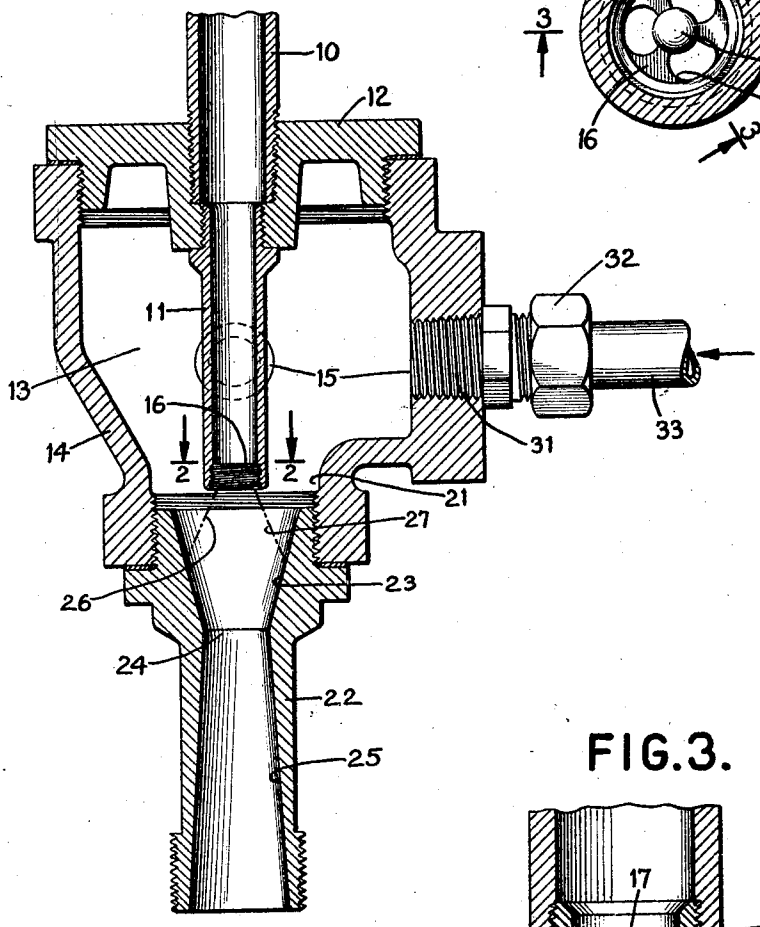


FIG.2.

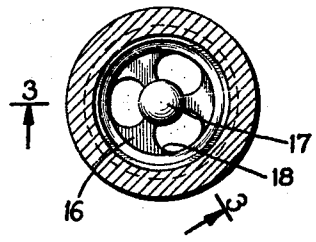
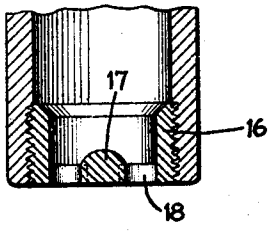


FIG.3.



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ALARM SOUNDING DEVICE

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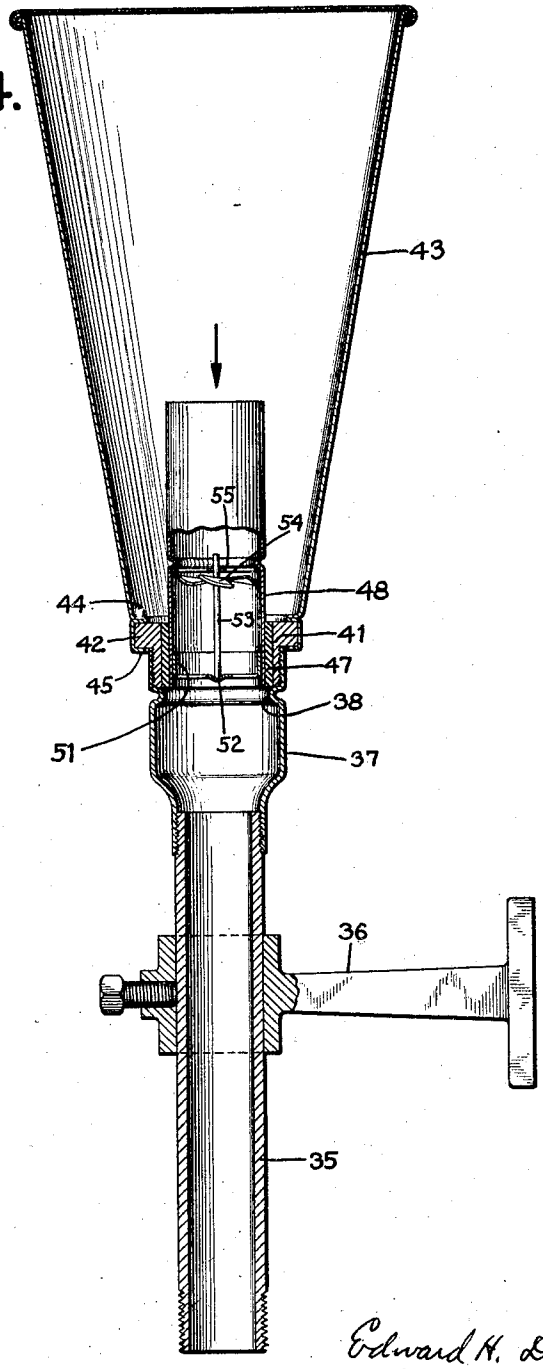
FIG. 4.



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ALARM SOUNDING DEVICE

Original Filed May 31, 1928 3 Sheets-Sheet 3

FIG.5.

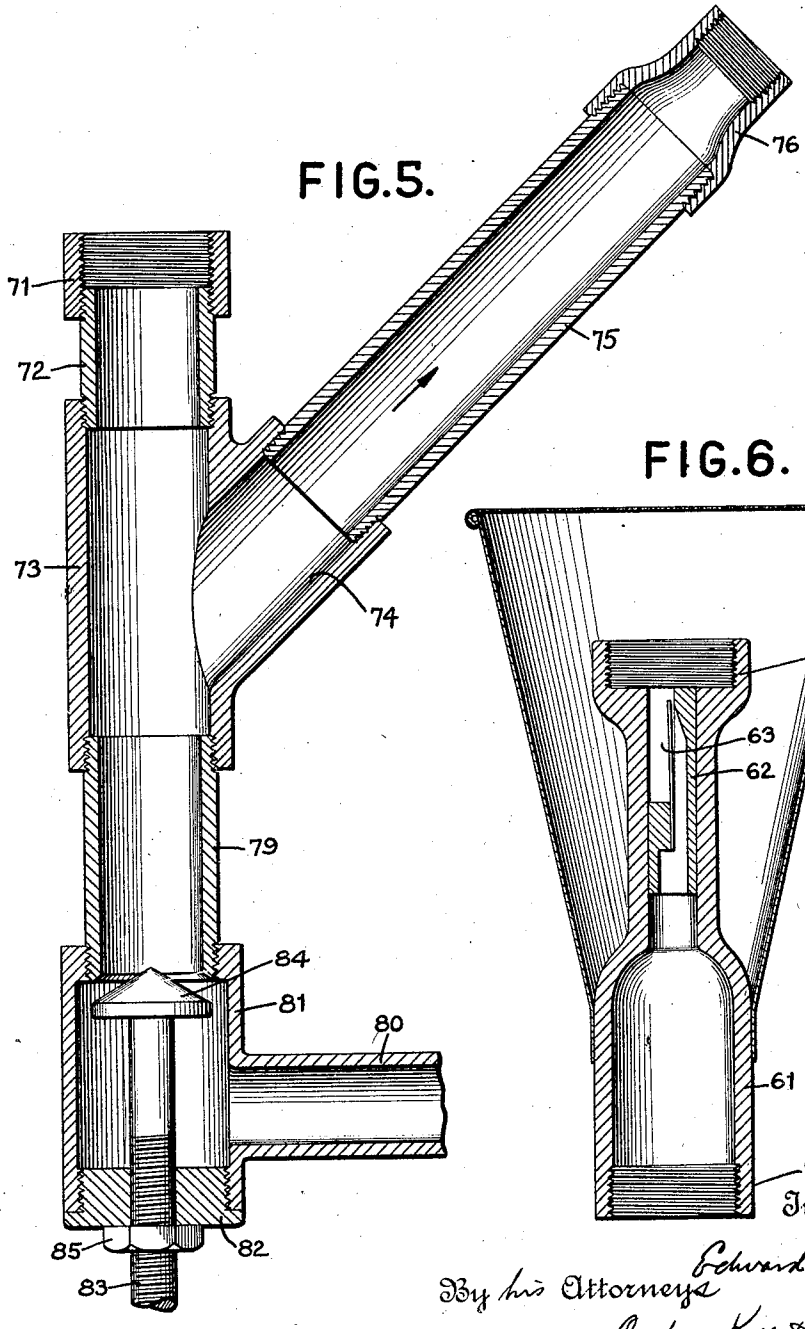
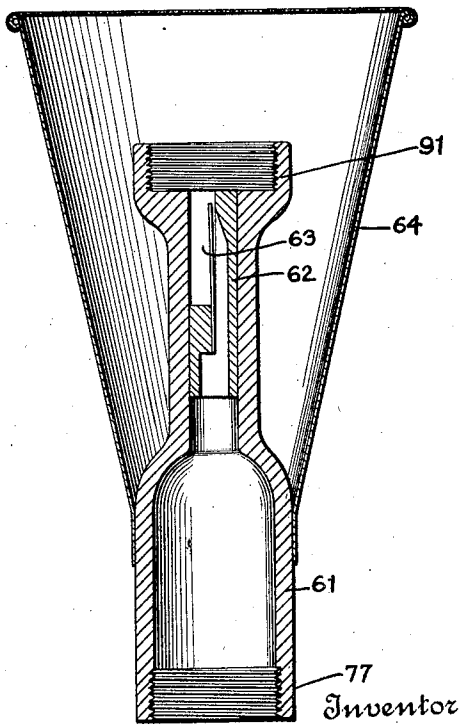


FIG.6.



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UNITED STATES PATENT OFFICE

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ALARM-SOUNDING DEVICE

Application filed May 31, 1928, Serial No. 281,652. Renewed December 19, 1929.

This invention relates to alarm sounding devices and one of its objects is to provide an alarm apparatus which is extremely simple and inexpensive, but which is, nevertheless, very efficient and possessed of many other advantages over prior art devices for the same general purpose.

The apparatus is intended primarily for substitution for the water motor operated gongs now in general use in connection with automatic sprinkler systems. Such gong devices comprise a water pipe leading to the motor chamber and to which water under pressure is admitted by an automatic control valve when one or more of the sprinkler heads open. The same water pipes, although possibly of different capacities, can be used to operate the apparatus of the present invention instead of operating a motor gong.

In addition to the motor gong, it is customary to have the automatic control valve mechanism control one or more switches or contacts for an electric alarm mechanism comprising gongs distributed around sprinklered buildings. This invention contemplates the idea of using the apparatus also to replace all or a part of such an electric mechanism, as the new apparatus is such that a number of its alarm sounding units may be widely distributed and connected by air lines to a central air chamber from which air movement is started when there is occasion for an alarm, or each unit may have its own air driving unit with a separate lead to a common water supply turned on by operation of the automatic control valve.

While, as stated above, the invention is intended primarily for use in connection with automatic sprinkler systems, the idea is capable of use in connection with a hand control such as a valve in a water line. It may, therefore, be used for signaling or to supplement an automatic alarm by manual operation of a control valve.

In addition to the other advantages which have been specifically and incidentally mentioned, the new apparatus has nothing likely to get out of order and does not require protection against freezing, as normally it contains no water until the control valve turns the water on and, after the alarm has served its purpose, any water remaining in the pipes may be allowed to drain off through the ordinary drain cocks.

With the foregoing and incidental objects in view, the invention consists in a novel construction and association of parts, the features of novelty being pointed out in appended claims, and a preferred embodiment of which is hereinafter described with reference to the drawings which accompany and form a part of this specification.

In said drawings,

Fig. 1 is a cross section through the air chamber and devices for inducing an air current through the chamber.

Fig. 2 is a section along the line 2—2 of Fig. 1.

Fig. 3 is a section along the line 3—3 of Fig. 2.

Fig. 4 shows, mainly in cross section, a form of siren which may be employed.

Fig. 5 shows a device which may be used in connection with the apparatus of Fig. 1 to utilize the air leaving the air chamber to operate an alarm sounding device.

Fig. 6 shows in cross section a reed trumpet which may be connected for operation to either the air intake or the air outlet from the air chamber.

Stated in general terms, the apparatus in the drawings is designed to operate a siren, horn or trumpet by an air current induced by a flow of water which is turned on either by a hand valve or by the automatic control valve of an automatic sprinkler system. In fact, the apparatus illustrated is capable of effecting the operation of a plurality of sound instruments.

The delivery pipe for the water is equipped with a device for transforming the water into substantially a conical sheet which impinges against an oppositely inclined funnel wall merging at the lower end of the funnel with an oppositely expanded funnel. The point of juncture between the two funnel walls has a much greater cross area than the water inlet. Surrounding, and preferably above, the delivery end of the water pipe, is an air chamber provided with one or a plu-

rality of air inlets. When the water is running in the conical sheet form mentioned, it tends to exhaust air from the air chamber and this induces a rapid flow of air through the inlets.

Connected to each air inlet is an air hose or tube leading to a sound making instrument, so that as the air is drawn through the inlet it will cause the alarm to be sounded.

In the constructon in the drawings, the air and water flow through the same outlet, but the air may be allowed to escape free from the water and used to operate another trumpet or siren.

Described in detail and with reference to the drawings, the pipe shown at 10 leads to a connection, through the well-known automatic control valve, to a source of pressure water supply, or, if the apparatus is to be controlled by hand, to a hand valved pressure supply. Adjacent the end of the pipe 10 is a continuation 11 which preferably has an inside diameter smaller than that of the pipe 10. Both the end of the pipe 10 and the adjacent end of the continuation 11 are threaded to cooperate with the threads of axially aligned holes in a cap 12 of an air chamber 13. The air chamber 13 is formed in a casing 14, which may be in the form of a casting, having internal threads engaging threads on the periphery of the cap 12. The wall of the casing has one or more openings 15, the number of depending upon the number of alarm devices to be operatively connected to the casing.

Threaded into the lower end of the extension 11 of the water delivery pipe is a plug or nozzle device 16 constructed to convert the stream in the pipe into diverging sheets. It has been found that the best results are had by having the device 16 equipped with a central projection 17 and holes or perforations 18 around the central projection. The central projection 17 may be conical and the holes or perforations may be in the form of slots, but it has been found that slightly better results are obtained if the projection 17 is rounded as shown and the perforations 18 of a generally ovoid shape arranged relatively and with reference to the central projection 17 in the manner illustrated in Fig. 2.

The air chamber casing 14 has an outlet 21 having internal threads for engaging corresponding threads on an outlet conduit 22. The interior 23 of a conduit adjacent the end of the pipe 11 is substantially funnel-shaped and merges at 24 into an oppositely expanding portion 25. When water under pressure is admitted to the pipe 10, the nozzle device causes the water to assume the form of a sheet for each perforation or orifice 18 in the nozzle device 16, the sheets collectively forming a substantially continuous sheet striking the funnel shaped interior 23 of the outlet at an angle represented by the dotted lines 26 and 27 in Fig. 1 of the drawings.

Threaded into each of the openings 15 in the air chamber casing 14 is a fitting 31 having a tubular interior and connected, as by a union 32, to one end of an air hose or pipe 33. The openings 15 are air intakes for the air chamber.

When the water is forced through the nozzle 16, the conical sheet of air cooperates with the interior of the conduit 22 to act as an aspirator tending to exhaust air from the chamber 13 and thereby inducing a strong current of air through the air intake openings.

The air hose or pipe 33 is connected in any suitable way to a tube 35 (Fig. 4) of a siren. The siren may be supported by any suitable hanger or bracket 36 engaging the tube 35. Threaded on the end of the tube is a sheet metal element 37 preferably of substantially the shape shown and having an internally projecting rib 38. Threaded into the sheet metal element 37 is a plug 41 having a peripherally projecting rib or flange 42 supporting a siren horn 43, the horn having a rib 44 engaging one side of flange 42 and a portion 45 spun down to attach the horn to the plug.

Inserted in a central opening in the plug 41 is a collar or sleeve 47 holding a tube 48 of the siren mechanism. Frictionally held in position in the tube 48 is an element 51 having a flange engaging the interior of the tube and cut out to form a spider having a central depression 52 forming a bearing for one end of the shaft 53 of the bladed rotor 54 of the siren. The other end of the shaft 53 rotates in a bearing in a spider 55 held in position by crimping or forming the wall of the tube 48.

When air is drawn through the intake 15 (Fig. 1) of the air chamber, a strong flow of air will be drawn into the siren through the openings in the spider 55 and the blades of the rotor cutting across the air streams through the spider will produce the desired sound.

Instead of using a siren such as described, it may be desired to connect to the air chamber intake a reed trumpet such as illustrated in Fig. 6 of the drawings. This trumpet comprises a body 61 of wood or other suitable material having a removable element 62 carrying a reed disposed in an air channel 63 through the element in the manner usual in reed instruments. Frictionally held in position on the body 61 is a sound amplifying horn 64. The reed carrying element 62 and the horn 64 are both removable and reversible with respect to the body 61, their positions depending upon whether it is desired to operate the device through a connection to the air inlet 15 or by a connection to the outlet conduit 22 hereinafter described.

In addition to using the suction through the air intake 15 to operate the alarm sounding devices, the blast of air leaving through

the outlet conduit 22 may also be used for the same purpose. This involves the provision of separate outlets for the air and water so that the latter will not interfere with sounding the alarms. Any construction giving the separate outlets may be employed, a simple one being the construction illustrated in Fig. 5, which is adapted to be attached to the lower end of the outlet conduit 22 (Fig. 1). In order to facilitate the attachment the lower end of the conduit 22 has external threads to be engaged by the threads in a connection 71. A short nipple 72 is threaded in the connection and supports, in the manner shown, a member 73 having a vertical passage for the water and a side passage, or outlet, 74 for the air, which is preferably given an upward inclination. A short tube 75 threaded in the air outlet and also extending upward carries at its outer end a reducing nipple 76 which may be threaded externally or internally to receive the air hose connection 31 or a connection which will directly support the trumpet 61.

Connected to the member 73 by a short tube 79 is an apparatus which will cause the water to form an air seal, but which can be regulated to allow the water to escape through an outlet 80 rapidly enough to prevent it from backing up to the air passage 74. The outlet 80 leads from a shell 81 attached to the tube 79 and having its lower end closed by a threaded plug 82. Threaded in the plug 82 is a member 83 having a conical head 84 cooperating with the chamfered lower end of the tube 79. In installing the apparatus the member 83 is adjusted so that the space between the conical head and the lower interior of the tube will retard the outward flow of water just enough to prevent air from escaping, after which the adjustment may be maintained by setting the lock nut 85.

In case it is desired to use the air blown through the air outlet 76 to operate a siren, the previously described apparatus, shown in Fig. 4, may be employed by removing the supporting tube 48 for the siren rotor and turning it end for end. The form of bearing shown will also require supporting the siren with the horn directed downward so that the end of the rotor shaft 53 will be properly supported in the seat 52, although obviously a bearing construction might be used which will prevent endwise movement of the shaft no matter which end is down. If the siren mechanism is reversed as stated, the air hose 33 may be connected to the air nozzle 76 (Fig. 5) and turning on the water through the pipe 10 will cause the air driven by the water to actuate the siren.

The trumpet apparatus is shown in Fig. 6 with the parts assembled in proper relation for operation by the air suction through the air intake 15. For connecting purposes an air hose or pipe like 33, with suitable fittings or connectors, may be used when the alarm is to be placed at some distance from the air current producing mechanism.

In the event that it is desired to operate the trumpet apparatus by pressure, that is, by connecting it to the air outlet 75 (Fig. 5), the horn 64 may be removed and replaced so as to surround the end 77 of the trumpet, although this reversal is not essential to satisfactory operation. After this change is made, the end 91 of the trumpet may be screwed on the end of the outlet pipe 75, the reducing nozzle 76 being first removed, or an air hose connection may be used when necessary or desirable.

Instead of the outgoing air being used to operate the siren or trumpet, it is obvious that a suitable air whistle may be connected at the nozzle 76, although the results are not as satisfactory as with the other two alarms mentioned.

In describing the construction it has been necessary incidentally to describe the operation of the apparatus to such an extent that it is thought the usual summary may be omitted.

While the construction shown and described is admirably adapted to fulfill the purposes stated, it is obvious that the ideas are capable of other embodiments, with suitable modifications and changes, all coming within the scope of the claims which follow.

What is claimed is—

1. An alarm apparatus comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, an air operated device for sounding the alarm, and means cooperating with the pipe and said device whereby the water leaving the delivery end of the pipe will cause an operating flow of air through the alarm sounding device.

2. An alarm apparatus comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, a plurality of air operated devices for sounding the alarm, and means cooperating with the pipe and said devices whereby the water leaving the delivery end of the pipe will cause an operating flow of air through the alarm sounding devices.

3. An alarm apparatus comprising a water pipe through which water is delivered to operate the alarm, a casing surrounding the delivery end of the pipe comprising an air inlet and an outlet, means adjacent the delivery end of the pipe whereby the water leaving the pipe will induce an air current through the casing, and an alarm connected for operation by the air current.

4. An apparatus comprising a water pipe through which water is delivered when the alarm is put in operation, a casing surrounding the delivery end of the pipe comprising

an air inlet and an outlet, means at the delivery end of the pipe whereby the water leaving the end of the pipe will induce an air current through the casing, and an air operated alarm connected to the casing for operation by said induced current.

5. In an apparatus of the character described, a pipe communicating with a sprinkler system and through which water is forced when the sprinkler system is functioning, a casing surrounding the delivery end of the pipe and provided with an air intake and an outlet, means adjacent the delivery end of the pipe whereby water leaving the pipe will induce an air current through the intake and outlet, and an alarm connected for operation by the air current.

6. In an apparatus of the character described, a pipe communicating with a sprinkler system and through which water is forced when the sprinkler system is functioning, a casing surrounding the delivery end of the pipe and provided with an air intake and an outlet, means adjacent the delivery end of the pipe whereby water leaving the pipe will induce an air current through the intake and outlet, and alarm devices connected for operation by the air current.

7. An alarm apparatus comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded and terminating in a sheet forming nozzle, an air operable device for sounding an alarm, and means cooperating with the nozzle comprising a connection to the alarm device for causing an operating flow of air through the alarm device.

8. An alarm apparatus comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, a device at the delivery end of the pipe for forming the water into one or more sheets on a diverging line or lines, an aspirator operated by the water, an air chamber in communication with the aspirator and having an air intake, and an air operable alarm sounding device connected to said intake.

9. An alarm apparatus comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, an air chamber surrounding the delivery end of the pipe and provided with an air intake and an outlet for air and water, a device in the delivery end of the pipe for spreading the water from the pipe into one or more sheets, and an outgoing conduit adjacent said device having its wall first converging and then diverging, said device and conduit cooperating to cause an air current through the air chamber, and an alarm connected for operation by the air current.

10. An alarm apparatus comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded and terminating in a sheet forming nozzle, a casing forming an air chamber around said nozzle and having an air inlet, an outlet for air and water from the chamber opposite the nozzle formed to cooperate as an aspirator with the water from the nozzle whereby to cause an air current to be drawn through the air inlet and chamber, and an air actuated alarm sounding device connected for operation to the air intake.

11. An alarm device comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, a device in the delivery end of the pipe having a central projection into the water current and a plurality of perforations around said projection whereby to give a conical sheet formation to the water leaving the pipe, an air chamber above and in communication with said device, means whereby the sheeted water will tend to exhaust air from said chamber, an air inlet into said chamber, and an air operable alarm connected for operation by the air flowing to said inlet.

12. An alarm device comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, a device in the delivery end of the pipe having a plurality of orifices and a central unperforated portion cooperating to form the water into a substantially continuous conical sheet, a casing surrounding the delivery end of the pipe having an air intake, an outlet having a wall formed as an aspirator to receive the conical sheet of water and of sufficient capacity to accommodate the combined flow of water and air.

13. An alarm device comprising a water pipe through which water is delivered under pressure when an alarm is to be sounded, a device in the delivery end of the pipe, having an unperforated center and a plurality of perforations around said center, to give the water leaving the device a sheet formation, an outlet conduit having a wall adjacent to and converging away from said device, said wall merging with a wall diverging from the point of merger, said outlet at its narrowest point being of larger cross area than the combined areas of the aforesaid orifices, a casing constructed to form an air chamber surrounding the device and having an air inlet, and an air operable sound device connected for actuation by air entering the inlet.

In testimony whereof I hereto affix my signature.

EDWARD H. DAGGETT.