(No Model.) 3 Sheets—Sheet 1.

H. D. KRAMER.

FIRE EXTINGUISHING APPARATUS.

No. 530,431. Patented Dec. 4, 1894.

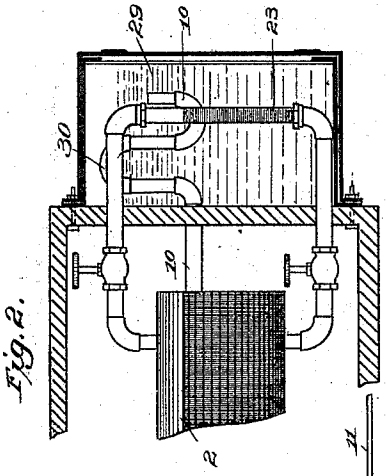

Fig. 2.

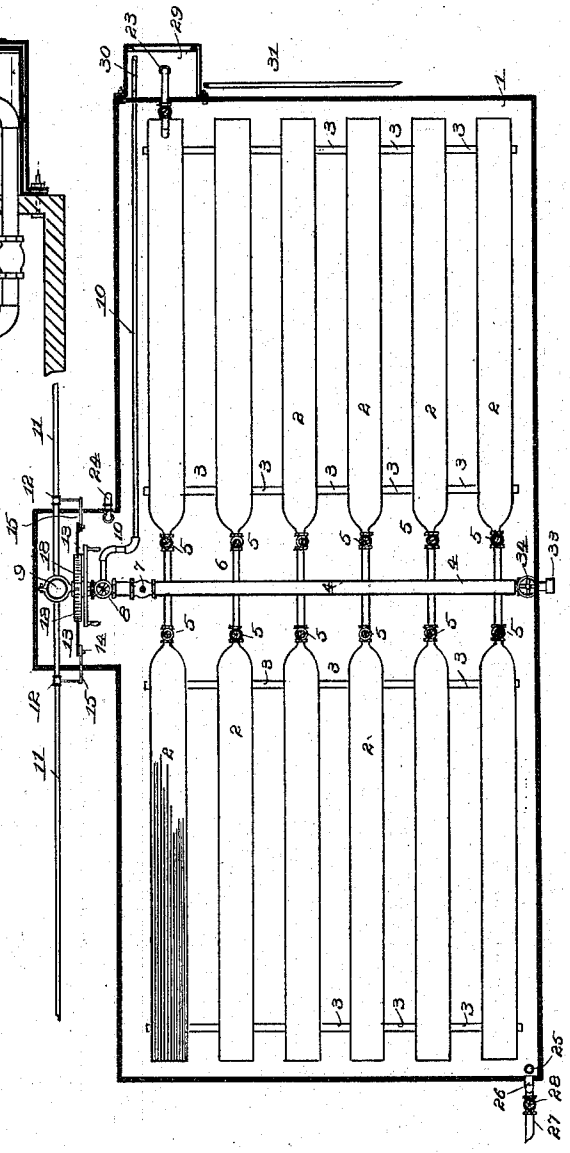

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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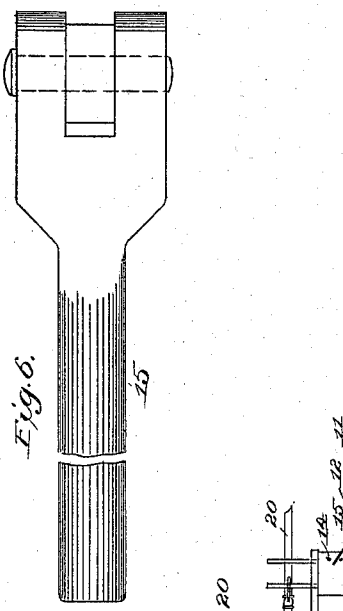

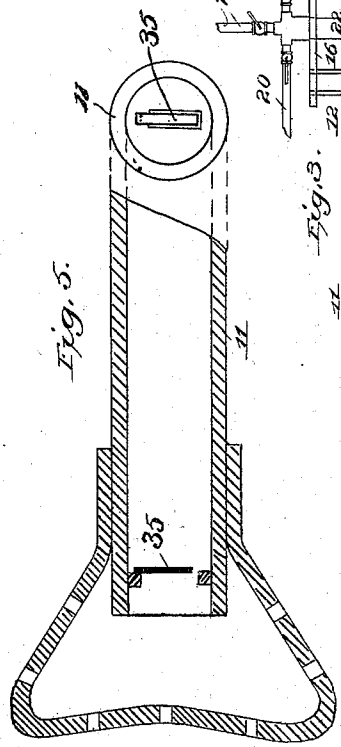

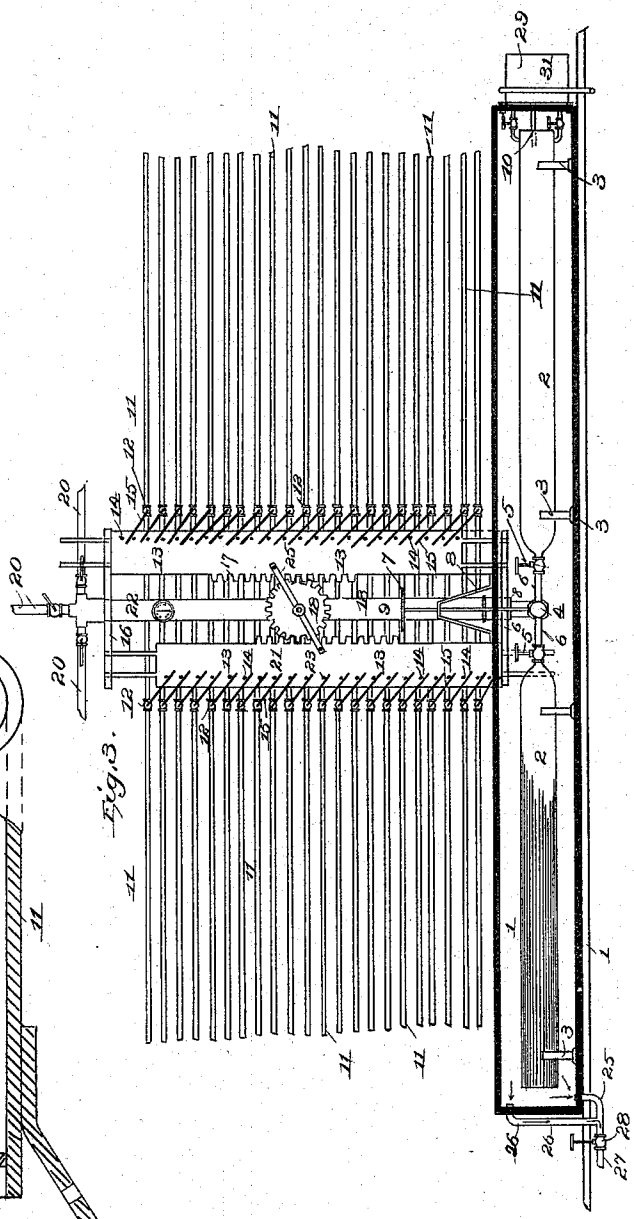

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(No Model.) 3 Sheets—Sheet 3.

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FIRE EXTINGUISHING APPARATUS.

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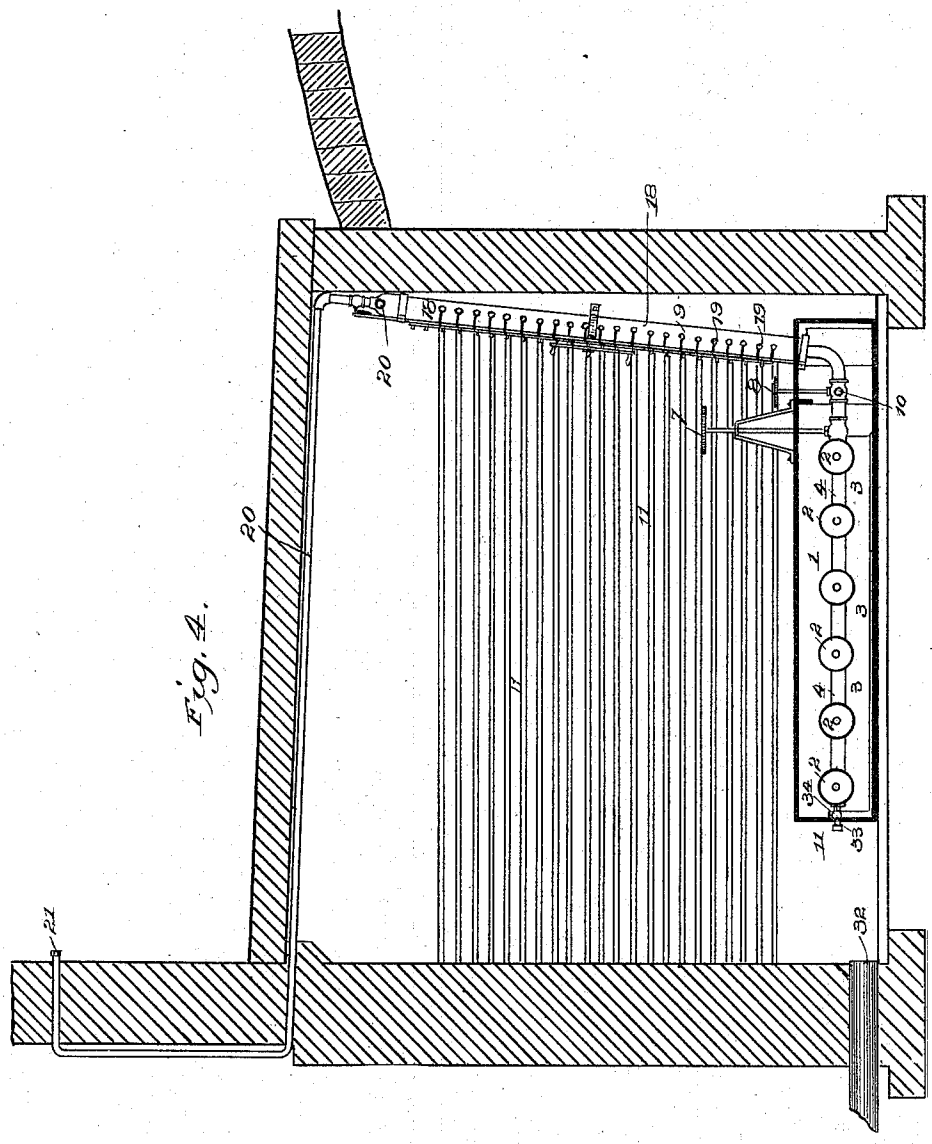

Fig. 4.

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UNITED STATES PATENT OFFICE.

HOMER D. KRAMER, OF PITTSBURG, PENNSYLVANIA.

FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 530,431, dated December 4, 1894.

Application filed July 25, 1893. Serial No. 481,399. (No model.)

To all whom it may concern:

Be it known that I, HOMER D. KRAMER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Fire-Extinguishing Apparatus; and I do 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.

The invention relates to that class of apparatus in which a fire extinguishing gas is stored in readiness for use in the extinguishment of fires.

The present invention has for its main object the application to buildings or vessels of a system of pipes so arranged in connection with storage tanks charged with liquefied carbonic acid gas, that the gas generated from such storage is, by directed action, carried to and projected into the section of such building where fire may be discovered. By means of the carbonic acid gas in its liquefied condition, and by means of the apparatus, hereinafter fully set forth, it is my purpose to provide a plant complete in all its parts and simply controlled, as will not be open to the objections heretofore known in this class of apparatus.

Incidental to the above general object it has been the aim to so construct the fire extinguishing plant in all its details as to render the same thoroughly effective in operation, and may be set forth as follows: To provide for the escapement of the gas from the storage tanks, and prevent the same from entering the building apartments I have provided an escapement pipe which is so connected with the plant as to carry off into open air any gas which may leak from the storage chambers, and through the valve which establishes communication with the distributing system, thus rendering the escapement of gas into the said distributing system, and thence into the building, impossible.

Again other objects of the invention have been to provide the apartment containing the plant, with an eduction flue or passage through which any escaping gas will be drawn, and the apartment ventilated; to provide means for furnishing the plant with an auxiliary supply of extinguisher gas from an adjoining plant or portable gas apparatus; to provide a novel construction of nozzle combining the functions of an alarm and projecting nozzle; to provide means for determining the amount of liquefied gas in the storage tanks and the pressure of gas in the distributing chamber when the plant is in operation.

Furthermore, an important object of the invention has been to provide means to prevent the freezing of the liquefied gas, which, owing to its rapid liberation, causes a very low and rapid reduction in its temperature.

To these ends the invention consists in the novel construction and arrangement of parts, all as hereinafter fully described and specifically defined in the claims.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1, is a top or plan view of the fire extinguishing plant or apparatus. Fig. 2, is a vertical sectional view of a portion of the apparatus disclosing the outlet of the escape pipe, and the gage for determining the quantity of liquid within the tanks. Fig. 3, is a view in side elevation. Fig. 4, is a view in end elevation, and in which is shown the connection leading to the outside of the building for the purposes above mentioned. Fig. 5, is a longitudinal sectional view taken through the combined nozzle and alarm, and also an end view thereof. Fig. 6, is a detail view of one of the valve operating levers.

The operating portion of the plant is placed preferably within a room located beneath the pavement which is readily accessible from without and within, and may be provided with a fire proof door opening into the cellar, and when the location and surroundings would admit the plant would be best placed in a special room in the center of cellar.

The base of the apparatus consists of a shallow tank 1 in which are placed, in a horizontal position, the series of storage tanks 2, which rest on the supporting racks 3. There are preferably two rows or series of storage tanks for holding the liquefied gas, and these are connected to a central chamber 4, which, from the fact that it aggregates the supply of

gas contained in the tanks, is preferably designated the aggregating chamber. Each tank 2 is provided with a valve 5 located between the tank and the communicating pipe 6 by which communication may be established or cut off as desired.

One end of the aggregating chamber is provided with valves 7 and 8, the valve 7 being necessary to effectually cut off the gas supply from the distributing parts of the plant, which will be referred to hereinafter, and to provide for the escaping gas. The valve 8 being a two-way valve, operates to control the passage to the distributing chamber 9 and the escape pipe 10. When the valve 8 is turned so as to cut off communication with the distributing chamber, communication is then established between the section of pipe located between the two valves and the escape pipe 10, so that in the event of gas escaping through valve 7 it will be conducted off into the outer air, as will be more fully described.

The distributing chamber 9 with which the aggregating chamber communicates is arranged in an upright position or approximately so, and to it connect the series of small pipes 11 on both sides thereof and at various heights throughout its length. Each pipe is provided with a valve 12 near its connection with the distributing chamber, which is operated in unison with the remaining valves 12 and from one point, but may be operated separately when it is desired to direct the gas only into certain apartments and not throughout the entire system.

The entire system of pipes 11 is operated by means of reciprocating bars 13 which are provided with projections 14 which engage the levers 15 by which valves 12 are operated. The bars 13 are movably supported in the frames 16, and their inner edges are provided with teeth 17 which engage the pinion wheel 18, and in the turning of the pinion one of the rack-bars is caused to move up while the other is carried down. The engagement of the pins or projections 14 with the levers 15 in the movement of the bars 13 causes the said levers to be moved and to open and close their respective valves. The levers 15 are hinged or pivotally connected with the valves 12, as shown in Fig. 6, so that any one of them may be thrown out of engagement with the pins, but the hinge movement not being in the direction of the swing of the lever in operating the valve, the same remains rigid when in said engagement. The pinion 18 for operating the rack-bars is mounted on a shaft supported by the distributing chamber at about its central point, and is provided with a cross arm or lever 19 for turning the same.

Upon the bars 13 opposite each pin it is the purpose to designate each valve so that in the operation of the plant any apartment or number of apartments may be cut off from the flow of extinguisher gas.

To the upper end of the distributing chamber are connected pipes 20 which are designed to extend to any desired point, as shown by Fig. 4, wherein the outlet 21 is in the outer face of the building so that gas may be liberated at this point for application through a hose, should fire become exterior; and further to allow the distributing chamber to be connected with a portable apparatus for augmenting the gas supply. The other pipes 20 are for connection with adjoining plants for furnishing or receiving an additional supply of extinguisher.

As before stated the invention is designed especially for the use of liquefied carbonic acid gas, and as it is of the greatest importance that the condition of the plant should be known by simply a quick inspection at any time, I have provided the distributing chamber with a pressure gage 22, and one of the storage tanks is provided with a tube-gage 23 in which the height of the liquid in said tank is shown, and as the storage tanks connect with the aggregating chamber communication is thereby established between all the tanks, and owing to the condition of the gas and its natural tendency to equalize throughout the entire system of tanks, an inspection of one tank is an inspection of all.

It will be understood that the communication of the several tanks with the aggregating chamber, is normally open, and by this means there is communication between all the tanks, and hence the gage-tube 23 can be inspected at any time to ascertain the aggregate condition of the tanks.

The tank 1 in which is located the holders of the liquefied gas, is filled with water or any suitable compound, which will form a surrounding body to the gas tanks to yield heat thereto, or take up the cold produced by the rapid liberation of the gas when the plant is in operation, thus preventing the liquid from freezing.

It is the purpose to supply the water of the tank with a quantity of salt to make a heavy solution of brine, the object of which is to produce a surrounding medium which will not freeze except at a very low degree of temperature. The depth of the solution need not be such as to cover the gas tanks at all times, but can be increased when it is desired to operate the plant by opening the water supply pipe. The tank is provided with a supply pipe 24, a drain pipe 25 and an overflow pipe 26, the last two of which pipes connect with a common drain pipe 27 controlled by valves 28.

On one side of tank 1 is provided a chamber 29 having glass faces through which can be seen the glass tube gage 23 located therein. The chamber 29 preferably does not communicate with the tank 1 and is filled with alcohol or a liquid compound, but may communicate with the tank 1 and be filled with its liquid, if so desired, and the pipe 10 hav-

ing its outlet in said chamber 29 and submerged in the body of liquid therein, any leakage of gas from the plant can be readily detected. That part of pipe 10 which extends into the chamber 29 is provided with an upward return bend 30 which carries the pipe above the liquid level and prevents the liquid from entering the entire length of the pipe. From the chamber 29 extends a pipe 31 which terminates at the entrance of the pipe or flue 32 connected with the chimney of the building, which not only causes the ventilation of the entire space in which the plant is located, but carries away any escaping gas directly from the said chamber 29.

The outlets of the distributing pipes 11 are provided with the nozzle shown in Fig. 5 which is so formed as to combine the functions of an alarm and a nozzle. The alarm feature is constructed after the manner of a horn and is provided with a vibrating key 35, or other equivalent means for producing an alarm by the pressure of the gas. Over the end of the outlet is provided a perforated hood 36 of substantially conical form, which receives the gas and deflects it in all directions and particularly toward the wall through which extends the distributing pipe, thus distributing the gas to such points as would most require it. It has also been found desirable to provide the aggregating chamber 4 with a connection whereby to renew the supply of gas without disturbing the tank connections which would be necessary if the tanks were re-shipped to be again charged. Therefore the connection 33 is provided at one end of the aggregating chamber, which extends through the inclosing tank 1, and is provided with a valve 34 in that portion extending within the tank.

On discovery of fire valve 8 is operated so as to open way to distributing chamber 9 and to close leakage pipe 10 in the same operation. Then valve 7 is opened which establishes communication between the aggregating chamber 4 and the distributing chamber admitting gas to the same at a stated pressure, as indicated by gage 22, sufficient to sound an alarm at outlets. The valves of the distributing pipes being closed and their levers engaged, the operation of the pinion wheel 18 opens all the valves and sounds the alarm, principally by the pressure of the gas on the air naturally contained in the pipes. The hinged levers attached to pipes to be further supplied with extinguisher are thrown out of action and the remaining valves are closed by a reverse movement of pinion wheel 18. It will therefore be seen that by the above described construction and arrangement that I have provided a stationary, direct acting non-automatic fire-extinguishing apparatus that is easily and readily operated to a certainty, and one which is always accessible and capable of furnishing an amount of extinguisher adequate for the protection of large structures, as the entire supply can be directed to one outlet pipe, or any number of them, and be augmented by further supply from surrounding plants or portable apparatus.

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

1. In a fire extinguishing apparatus, the combination with the storage tanks adapted to contain fire extinguishing gas, of an aggregating chamber with which all of said tanks connect, a distributing chamber with which the pipes of the distributing system connect, a valve for cutting off the gas supply, a communicating passage between the aggregating chamber and the distributing chamber, an escape pipe connecting with said communicating passage, and a two-way valve adapted to control the passages to the distributing chamber and escape pipe, so that when one is open the other will be closed, as and for the purpose set forth.

2. In a fire extinguishing apparatus, the gas tanks and distributing chamber connecting therewith, in combination with a system of distributing pipes connected with the distributing chamber and provided with valves, levers for operating said valves, reciprocating bars provided with pins or projections for engaging the said levers adapted to operate the valves in their reciprocation, and means for reciprocating said bars, substantially as described.

3. In a fire extinguishing apparatus, the combination with gas tanks, a distributing chamber connected therewith, and a system of distributing pipes connected with said distributing chamber, of valves located in the distributing pipes having operating levers, reciprocating rack bars provided with pins or projections for engaging the valve levers, and a pinion wheel between said rack bars and in engagement therewith adapted to be turned to operate the bars, substantially as described.

4. In a fire extinguishing apparatus, the combination of the storage tanks adapted to contain fire extinguishing gas, of an aggregating chamber, an escape pipe connecting with said aggregating chamber, a distributing chamber connecting with a system of distributing pipes and with the aggregating chamber, and a tank adapted to be filled with liquid having located therein a tube gage communicating with one of the storage tanks, and the end of the escape pipe also submerged in the body of liquid contained therein, substantially as and for the purpose set forth.

5. The fire extinguishing apparatus comprising a tank adapted to contain water or other liquid, gas-holders located within said tank and submerged in the body of liquid contained therein, a distributing chamber connected with said gas-tanks through a suitable communication, a series of distributing pipes connected with the distributing chamber

each having a valve, and means for operating the said valves singly or in unison, as and for the purpose set forth.

6. In a fire extinguisher, the distributing pipe having its discharge end provided with an alarm key adapted to be vibrated by the passage of the gas, in combination with a conical hood into which said pipe extends, said hood having perforations formed in its face and sides whereby to direct the gas in all directions, substantially as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HOMER D. KRAMER.

Witnesses:
JOSEPH HEPLER,
FRED T. GILBERT.