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FIRE EXTINGUISHING SYSTEM.

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1,241,664. Patented Oct. 2, 1917.

Fig. 1.

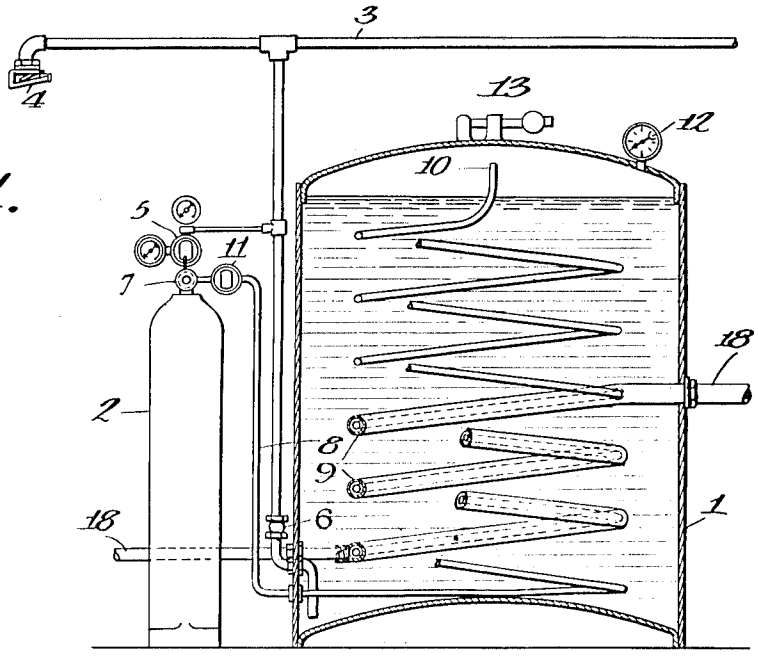
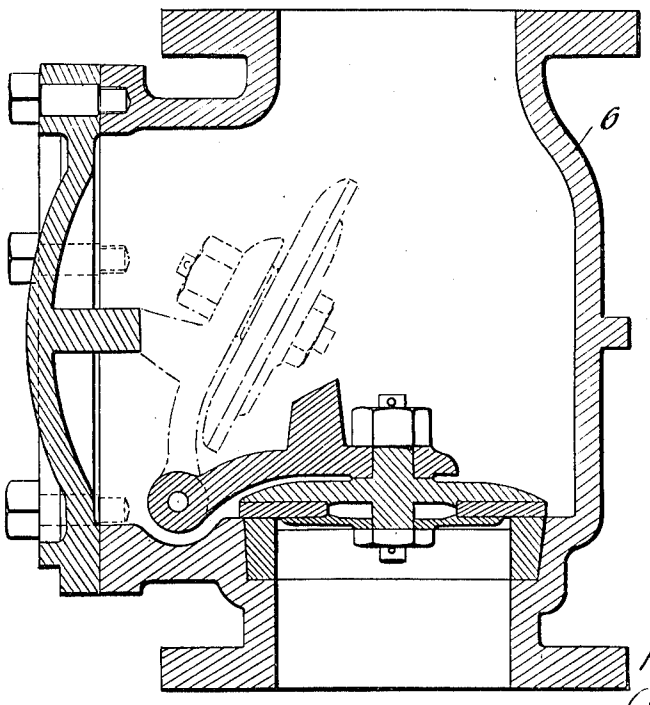


Fig. 2.



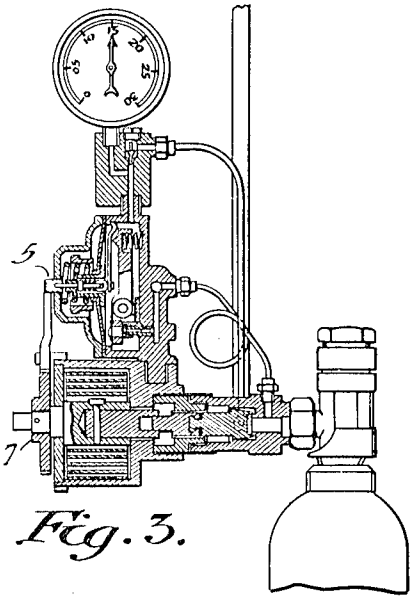


Fig. 3.

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FIRE-EXTINGUISHING SYSTEM.

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To all whom it may concern:

Be it known that I, FRANS JOHAN HENRIK RUSTIGE, a subject of the King of Sweden, residing at Stora Essingen, Stockholm, Sweden, have invented new and useful Improvements in Fire-Extinguishing Systems, of which the following is a specification.

The present invention relates to a system of extinguishing fire by means of water, said system being of the kind in which the water is expelled by the pressure of a gas, for instance carbonic acid, stored in liquid form. The invention is principally distinguished by the fact that the water receptacle is normally not under carbonic acid pressure which is only applied thereto when the apparatus comes into action. When introduced into the receptacle, the carbonic acid is preferably kept at a comparatively high temperature obtained by absorption of heat from the liquid. By holding the liquid carbon dioxid normally shut off from the water in the receptacle the said carbon dioxid is prevented from being dissolved in larger quantities in the water; moreover such a dissolution is also prevented by the water having a higher temperature than the liquid carbon dioxid which, during its passage through the water, absorbs heat from the latter whereby its solubility in the water is reduced and the loss of carbon dioxid by dissolution in the water thus is avoided.

The introduction of the carbonic acid into the water receptacle preferably is effected automatically by apparatus responsive to a fire.

The invention is diagrammatically illustrated in the accompanying drawing where Figure 1 shows a complete system in which the pipe conduits normally contain carbonic acid under reduced pressure and the introduction in the water receptacle is effected automatically by the decrease of pressure occurring in the conduit when one or more fusible valves open. Fig. 2 is a section through a non-return valve. Fig. 3 is a section taken approximately through the centers of the reduction valve 5 and spring actuated valve 7.

1 is the water receptacle and 2 a receptacle for liquid carbonic acid, 3 the extinguishing pipe system with automatic fusion sprinklers 4. According to fire insurance provisions, the pipe system must normally contain no water when the latter is likely to freeze, and in Fig. 1 the system therefore contains carbonic acid under reduced pressure, for instance 1.5 atm., obtained by a reduction valve 5 through which the pipe system normally communicates with the carbonic acid receptacle. A non-return valve 6 prevents this pressure from affecting the water receptacle.

The carbonic acid receptacle has also a spring actuated valve 7 of great area which valve is opened by the action of a decrease of pressure on the low pressure side of the reduction valve. The conduit to the reduction valve 5 is supposed to be behind this valve 7. From the valve 7 a conduit 8 leads into the receptacle 1, runs through the latter in a number of bends, for instance as a coil 9, and finally opens above the water level at 10. In the conduit 8 there may also be a reduction valve 11 which however does not reduce more than to a sufficient pressure for ejecting the water. The receptacle 1 finally can be provided with a manometer 12 and a safety valve 13, and manometers may be inserted in other suitable places.

Normally the pipe system, as stated, is filled with carbonic acid at a low pressure, for instance 1.5 atm., while the atmospheric pressure prevails in the receptacle 1. If now a fire arises adjacent to one of the valves 4 and opens the latter, the pressure in the pipe system will immediately sink to near the atmospheric one. Hereby the valve 7 is opened, so that carbonic acid of high pressure enters the conduit 8. This carbonic acid is heated at the passage through the coil 9 by the water surrounding the latter so as to be vaporized either in the conduit or immediately as it escapes therefrom. The coil 9 also can be totally or partially surrounded by another source of heat which is permanently available at the system, for instance by a steam conduit 18 shown in dotted lines in Fig. 1, which gives the carbonic acid a higher temperature than the water and thus a higher tension than elsewhere. The mouth of the coil, however, must always be above the liquid level in the receptacle 1. Hereby the liquid carbonic acid is kept from direct contact with the water which is of importance, as the carbonic acid under such circumstances is readily dissolved in the water and thus lost for the desired purpose.

Fig. 2, the conduits of which are supposed to be connected to the receptacle at their lower end in the same way as in Fig. 1,

shows an arrangement for introducing the carbonic acid in the receptacle by electrical means. For this purpose, adjacent to the sprinkler is arranged a contact device 14 which, when the sprinkler is opened, closes a circuit through a relay 15 which opens the outlet valve 16 of the carbonic acid receptacle while a signaling device 17 may simultaneously be caused to act in a known manner.

Having now particularly described the nature of my invention and the manner of its operation, what I claim is:

1. A fire extinguishing apparatus comprising a system of pipes provided with exposed automatic sprinkler heads, a tank containing liquid carbon dioxid, a water tank having a connection at its bottom part with said system of pipes, a conduit connecting said carbon dioxid tank with said water tank arranged to pass through and open above the water in said latter tank, a valve disposed in said conduit, and means for opening said valve on the opening of a sprinkler head.

2. A fire extinguishing apparatus comprising a system of pipes provided with exposed automatic sprinkler heads, a tank containing liquid carbon dioxid, a water tank having a connection at its bottom part with said system of pipes, a conduit connecting said carbon dioxid tank with said water tank arranged to pass through and open above the water in said latter tank, means for supplying heat to said conduit for a portion of its length, a valve disposed in said conduit, and means for opening said valve on the opening of a sprinkler head.

3. A fire-extinguishing apparatus comprising a series of pipes arranged about a room or building and provided with exposed automatic sprinkler heads, a tank containing liquid carbon dioxid and a tank containing water, a conduit connecting the former tank with the sprinkler pipes, a pressure reducing valve in said conduit, another conduit connecting said tank with the interior of the water tank, a valve opening at a decrease of pressure on the low pressure side of the reduction valve disposed in said other conduit, said other conduit passing through, and opening above the water in the tank, and a connection to the sprinkler pipes at the lower part of said water tank.

4. A fire extinguishing apparatus comprising a series of pipes arranged about a room or building and provided with exposed automatic sprinkler heads, a tank containing liquid carbon dioxid and a tank containing water, a conduit connecting the former tank with the sprinkler pipes, a pressure reducing valve in said conduit, another conduit connecting said former tank with the water tank, a valve opening at a decrease of pressure on the low pressure side of the reduction valve disposed in said other conduit, said other conduit passing through and opening above the water in the tank, heating means surrounding the said other conduit, and a conduit between the lower part of the water tank and the sprinkler pipes.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANS JOHAN HENRIK RUSTIGE.

Witnesses:
H. TELANDER,
BIRGER NORDFELDT.