

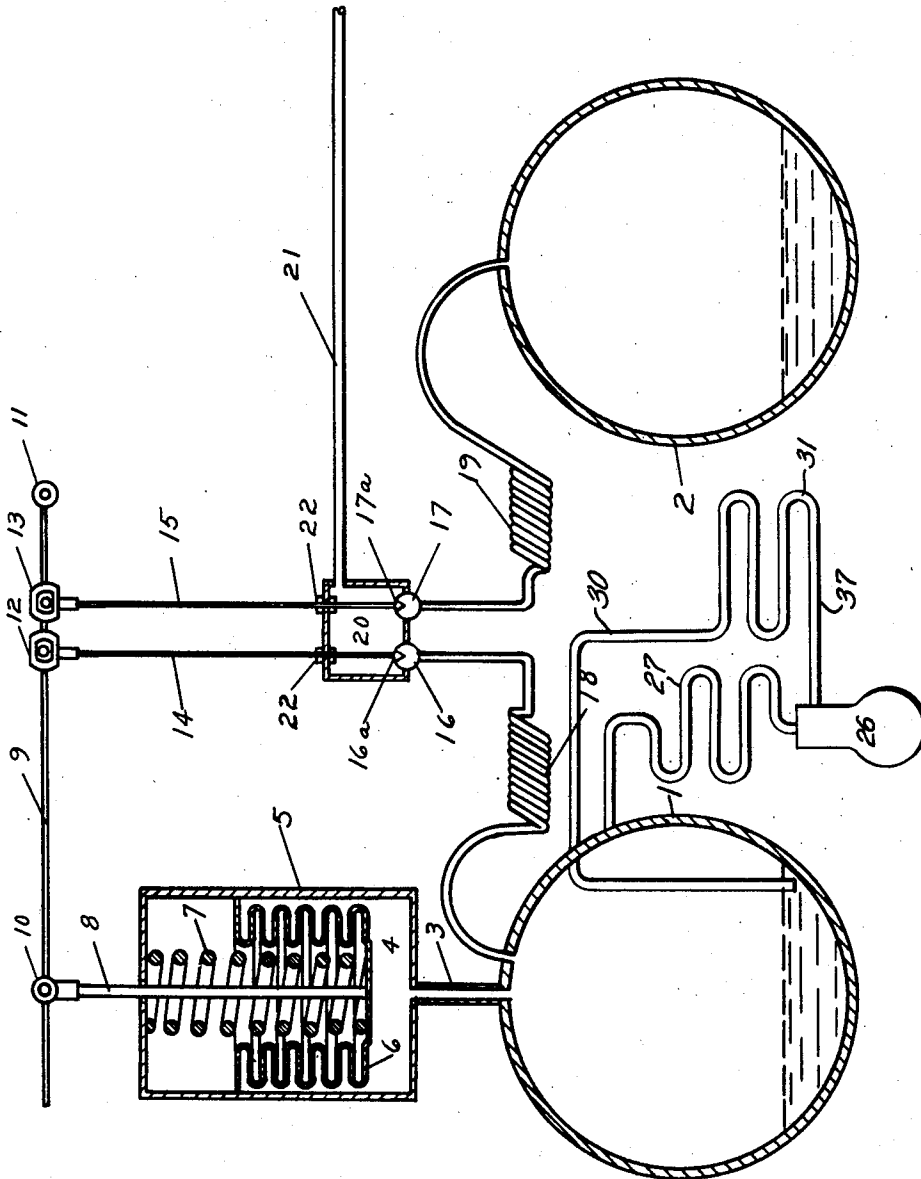
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DILUTION OF REFRIGERANT GASES

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DILUTION OF REFRIGERANT GASES

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5 Claims. (Cl. 62-1)

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My invention relates to a safety valve and means for diluting high-pressure, inflammable refrigerant gases used in connection with refrigerating systems.

One object of my invention is to provide a relief valve for refrigerating systems wherein high-pressure, explosive gases are released to the outer atmosphere.

Another object of my invention is to provide automatic means for diffusing and diluting dangerous or combustible gases as they escape from a pressure system.

Another object is to provide means for simultaneously permitting the exhaust of combustible gases from refrigerating systems and the like, and the dilution thereof.

Another object of my invention is to provide a method of safely operating and valving off dangerous gases from a refrigerating system.

Other objects will appear from time to time in the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawing, which discloses a vertical section through that part of the refrigeration system which includes my invention.

Referring to the drawing, I show a tank or receiver 1, preferably part of a refrigerating system the details of which are not illustrated, as they form no part of the present invention. This tank contains inflammable gas such as propane or ethylene under pressure, as part of the refrigerating system, though, to be sure, the invention is equally applicable to any situation where gases under pressure escape, and safety requires their dilution.

Another tank 2 is a receiver containing a smothering, inert diluent gas such as CO₂. The passage 3 connects the receiver 1 with the pressure chamber 4 in a pressurestat housing 5. A bellows 6 in the housing 5 is exposed on one side to the pressure in the refrigerating system or in the receiver 1, and on the opposite side is exposed to the atmosphere or to some other pressure independent of the refrigerating system or independent of the pressure in the receiver 1.

When the pressure in the receiver 1 for any reason whatever exceeds a predetermined point, that pressure applied to the bellows 6 will compress the spring 7 and raise the rod 8 upwardly, the rod 8 being connected to the lever 9 by the connector 10, and will cause the lever 9 to rotate in a clockwise direction, the lever being pivoted at 11 on a suitable fixed abutment. Raising or rotating in a clockwise direction of the lever 9

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will raise the two actuating rods 14 and 15, slidably pivoted as they are at 12 and 13, to the lever 9. This will open the valves 16a and 17a so that gas may simultaneously discharge from receiver 1 through the capillary tube 18 and the valve housing 16 into the chamber 20, and from the receiver 2 through the capillary tube 19 and valve housing 17 into the chamber 20. There the inflammable or dangerous gas will be mixed with the diluent or inert gas and pass out innocuously to the outer atmosphere or to any other suitable point of disposal through the pipe 21, the stuffing boxes 22 encircling the members 14 and 15 insuring that the mixed gases will be discharged only through the pipe 21. 26 is a compressor which discharges refrigerant through a condenser coil 27 to the receiver 1. The refrigerant leaves the receiver 1 through the conduit 30, evaporator 31, pipe 37 to the compressor.

The use and operation of my invention are as follows:

In the use of refrigerant gas such as propane and ethylene, there is danger of serious fire or explosion if the gas is exhausted without being diluted. As it is necessary to let out some of the gas when the pressure in the condensers or compressors goes beyond a predetermined safety point, it was necessary to devise a means of diluting the inflammable gas purposely emitted from the safety valve before exhausting it to the outside.

With my invention, as the pressure in container 1 rises it will be the same in space 4 where it will compress the bellows 6. This compression will lift the shaft 8 which in turn will move the rod 9 upward, pivoting on pin 11. Rods 14 and 15 are connected to 9 by means of pins 12 and 13. As the rods 14 and 15 rise they open the valves 16 and 17 at 16a and 17a, thus allowing the inflammable gas in tank 1 to be metered through coil 18 into space 20 and the smothering gas in container 2 to be metered through coil 19 into the space 20. In the space 20 the inflammable gas and the smothering gas mix so that the inflammability is counteracted and it is safe to exhaust the gas to the outside.

In connection with a refrigerating apparatus of the type with which my invention is intended to be used, normally the system is a closed one, and there is no escape of the refrigerant gases, but there is always the possibility of failure of some of the control mechanisms, in which case pressure might build up dangerously. So the safety valve must be provided.

No additional pressure controls or mixture

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controls are needed, because since the pressure-stat is set to blow off at a predetermined pressure, all that is necessary is that the pressure in the receiver 2 be maintained high enough so that a sufficient amount of CO₂ or other diluent will be mixed in the chamber 20 with the refrigerant gas. Depending upon the type of diluent and the type of refrigerant, the proportion of diluent and dangerous gas may be selected, and so long as the pressure in the receiver tube is high enough to give at least the necessary minimum of diluent, operation is safe and satisfactory.

I claim:

1. In combination a refrigerating system, a refrigerant gas contained under pressure therein, a receptacle containing a diluent gas under pressure, a mixing chamber, conduits leading from the refrigerating system and from the receptacle adapted to conduct the gases separately to the mixing chamber, a valve adapted to control the flow of gas through each conduit, means responsive to increase in pressure of the gas in the refrigerating system, for opening both valves to cause simultaneous discharge of diluent and refrigerant to the mixing chamber.

2. In combination a refrigerating system, a refrigerant gas contained under pressure therein, a receptacle containing a diluent gas under pressure, a mixing chamber, conduits leading from the refrigerating system and from the receptacle adapted to conduct the gases separately to the mixing chamber, a valve adapted to control the flow of gas through each conduit, means responsive to increase in pressure of the gas in the refrigerating system, for opening both valves to cause simultaneous discharge of diluent and refrigerant to the mixing chamber, each of the conduits leading to the mixing chamber including a capillary tube.

3. In combination a refrigerating system, a refrigerant gas contained under pressure therein, a receptacle containing a diluent gas under pressure, a mixing chamber, conduits leading from the refrigerating system and from the receptacle

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adapted to conduct the gases separately to the mixing chamber, a valve adapted to control the flow of gas through each conduit, means responsive to increase in pressure of the gas in the refrigerating system, for opening both valves to cause simultaneous discharge of diluent and refrigerant to the mixing chamber, a discharge pipe leading from the mixing chamber to a safe point of discharge.

4. In combination a pressure system containing dangerous gas under pressure, a reservoir containing an inert gas under pressure, a mixing chamber, separate gas passages extending from the pressure system and from the reservoir to the mixing chamber, valves controlling said passages, a discharge from the mixing chamber, means responsive to increase in pressure in the system for simultaneously opening both valves to permit discharge of the two gases to the mixing chamber, and the discharge from the mixing chamber of a safe mixture of dangerous and inert gas.

5. The method of operating a refrigerating system which consists in maintaining in the system a supply of refrigerant gas at high pressure, maintaining a supply of inert diluent gas, discharging the refrigerant gas from the system when the pressure therein exceeds a predetermined point, to a mixing zone, discharging the diluent gas to the mixing zone in consonance with discharge of the refrigerant gas, then mixing the refrigerant and the diluent gas and then discharging the mixed resultant inert gas to atmosphere.

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