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SAFETY DEVICE FOR REFRIGERATING MACHINES.

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1,297,975. Patented Mar. 18, 1919.

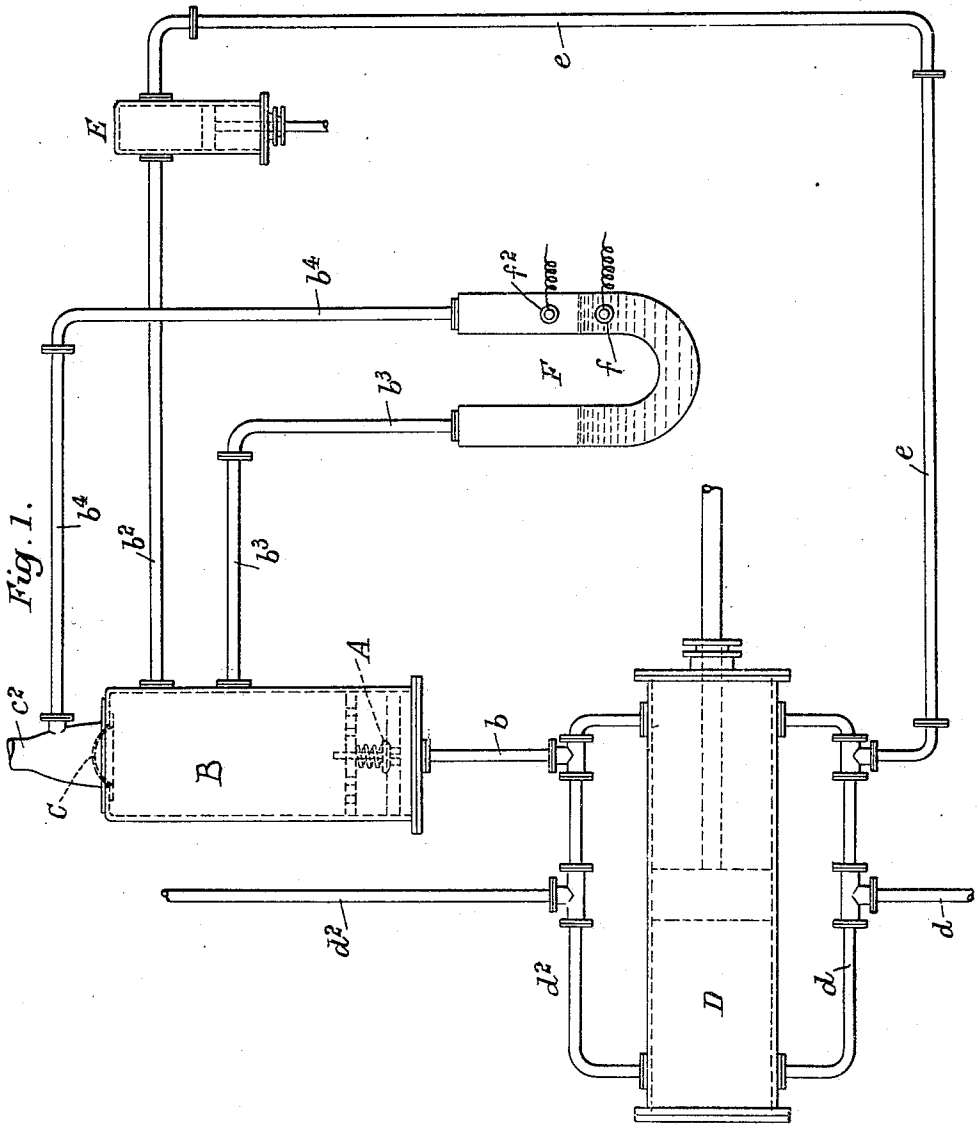


Fig. 1.

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SAFETY DEVICE FOR REFRIGERATING-MACHINES.

1,297,975. Specification of Letters Patent. Patented Mar. 18, 1919.

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To all whom it may concern:

Be it known that I, FRANK AINSWORTH WILLCOX, a subject of the King of Great Britain, residing at Dartford Ironworks, Dartford, in the county of Kent, England, have invented new and useful Improvements in Safety Devices for Refrigerating-Machines, of which the following is a specification.

This invention relates to the safety devices used in connection with refrigerating machines, which devices prevent the escape of gases, or vapors, under normal conditions, but act to relieve abnormal pressure, and the object of this invention is to provide devices which satisfactorily answer those conditions and are not liable to defects applying to the safety devices hitherto employed or proposed, but combine the functions of efficient safety valves without leakage therefrom into the atmosphere of the place where the refrigerating machine is situated.

According to this invention, the ordinary spring-loaded, or other suitable, safety-valve, or valvular arrangement, is inclosed in a casing constituting a vessel (which is normally closed against communication with the atmosphere) surrounding the safety valve, or valvular arrangement or otherwise adapted to receive any gas, or vapor, which may pass the said safety valve, or valvular arrangement, which is in connection with the delivery, or compression side of the compressor of the refrigerating machine by a pipe, or passage, distinct from that which passes the compressed gases, or vapors, to the place where their expansion is to be utilized. In the top, or other wall of this casing is an opening normally closed by means for relieving pressure when it exceeds any predetermined amount in the casing, such as the known device consisting of a diaphragm of a material and thickness which will allow it to break at a predetermined pressure, say a pressure of from five, to ten pounds per square inch. The casing of the said safety valve or valvular arrangement is in communication with means (distinct from the aforesaid compressor of the refrigerating machine) for removing gases or vapors from the said casing, such for example as the suction of a small compressor, or pump, whose delivery may communicate with the suction of the main compressor, or with any other suitable place, one of my chief objects being to prevent loss of NH_3—SO_2,CO_2, etc.

The accompanying drawing shows, diagrammatically in elevation, arrangements, in accordance with my invention, applied to a vapor compression refrigerating machine only as much of which is shown as is necessary to illustrate the application of my invention thereto, in which a small compressor, or pump, is used.

Referring first to the drawing, the safety device is shown as a spring valve at A. The casing surrounding it is marked B. The aforesaid diaphragm, which breaks under objectionable pressure, is marked C. The valve A, is in communication, by the pipe b, with the delivery, or compression, pipe d^2, of the main compressor D, of the refrigerating machine, the remainder of which machine it is not necessary to show. The interior of the casing B above the safety-valve A, is in communication, by the pipe b^2, with the suction side of the small compressor, or pump, E.

When the apparatus is in operation, and the small compressor, or pump, E, is at work, gases, or vapors, which may leak past the safety valve, or valvular arrangement, at A, are withdrawn from the inclosing casing B by the small compressor, or pump E, and discharged, through the pipe e into the suction d, of the main compressor D, (or other desired place), and, as long as the small compressor, or pump, E, is at work, the pressure in the casing B, will be approximately atmospheric pressure, or below atmospheric pressure, as may be arranged, and the valve at A, will open at the pressure, for which it is adjusted. If, for any reason, the small compressor, or pump, E, should not be at work, any gases, or vapors, which may leak past the valve A will accumulate in the casing B and, when the pressure exceeds that which the diaphragm C is adjusted to stand, it will rupture (the escaping gases, or vapors, passing off by a continuation of the pipe C^2 to the external air) and the attention of the attendant will be drawn to the fact that the small compressor, or pump, E, has not been working. In large plants, it is preferred to drive the small compressor, or pump E, by a motor whose starting gear is put into action by an electric contact made for the purpose, for example, by means of a U tube F, containing mercury, one leg being

in communication with the casing B, by the pipe b^3 and the other leg being in communication with the atmosphere (if desired by the pipe b^4 leading into the pipe C^2) so that, when contact is made by the mercury between the terminals f and f^2, under predetermined pressure in the casing B, the motor and small compressor, or pump, E, will be started and, when the pressure falls in the casing B, the said compressor, or pump, E. will stop. If desired the mercury in the U tube F, can make contact to ring a bell, or to give other signal, before the diaphragm C is broken and, in cases where the small compressor, or pump, E, is not motor-driven, the attendant can then start the said compressor, or pump, E.

Owing to the pressure in the casing B (when the small compressor, or pump, E, is at work), being practically constant, the valve at A will always open at, or about, the pressure for which it is set and, when this pressure rises abnormally and the safety valve consequently lifts, the rush of gases, or vapors, breaks the diaphragm C and the gases or vapors pass to a pipe C^2, or other suitable passage, leading to the atmosphere or to some receptacle provided for absorbing the vapors.

Any required number of the aforesaid incased safety valves, or valvular arrangements, may be connected to the suction of one compressor, or pump, such as E, or to the suctions of a number of such compressors, or pumps, which may be driven as described, or in any other suitable way, for example by gearing, from the main compressor D, or, in an absorption machine by gearing, from the main pump.

It will be understood however, that I do not limit myself to the use of the small compressor, or pump, for withdrawing the gases or vapors, from the casing B, as any suitable means may be used.

What I claim is:—

1. In connection with the safety devices of refrigerating machines, a casing constituting a vessel normally closed to the surrounding atmosphere and adapted to receive gases, or vapors, which may pass the safety device, and means, distinct from the main compressor of the machine, for removing such gases, or vapors, from the said casing.

2. In connection with the safety devices of refrigerating machines, a casing constituting a vessel normally closed to the surrounding atmosphere and adapted to receive gases, or vapors, which may pass the safety device, and means, distinct from the main compressor of the machine, for removing said gases, or vapors, from the said casing, the said vessel being provided with an opening normally closed by a diaphragm adapted to break on the attainment of a predetermined pressure in the casing.

3. In connection with the safety devices of refrigerating machines, a casing constituting a vessel normally closed to the surrounding atmosphere and adapted to receive gases, or vapors, which may pass the safety device, and means, distinct from the main compressor of the machine, for removing such gases, or vapors, from the said casing, and comprising a small compressor, or pump connected at its suction side with the interior of the casing and at its delivery side with the suction side of the main compressor of the refrigerating machine.

4. In connection with the safety devices of refrigerating machines, a casing constituting a vessel normally closed to the surrounding atmosphere and adapted to receive gases, or vapors, which may pass the safety device, and means distinct from the main compressor of the machine for removing such gases, or vapors, from the said casing, and comprising a small compressor or pump connected at its suction side with the interior of the casing, and at its delivery side with the suction side of the main compressor of the refrigerating machine, and a motor for the said small compressor or pump, and means for starting it, and means for making an electric contact by pressure from the interior of the casing of the valve, or valvular arrangement.

5. In connection with the safety devices of refrigerating machines, a casing constituting a vessel normally closed to the surrounding atmosphere and adapted to receive gases, or vapors, which may pass the safety device, and means distinct from the main compressor of the machine for removing such gases, or vapors, from the said casing, and a mercurial device subject to pressure from the interior of the casing surrounding the valve, or valvular arrangement, and adapted to make electrical contact, for the purposes described.

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

FRANK AINSWORTH WILLCOX.

Witnesses:

PERCY R. GOLDRING,

W. R. YEADELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."