

Dec. 10, 1940.

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2,224,643

EXPANSION VALVE

Filed March 16, 1940

Fig. 1

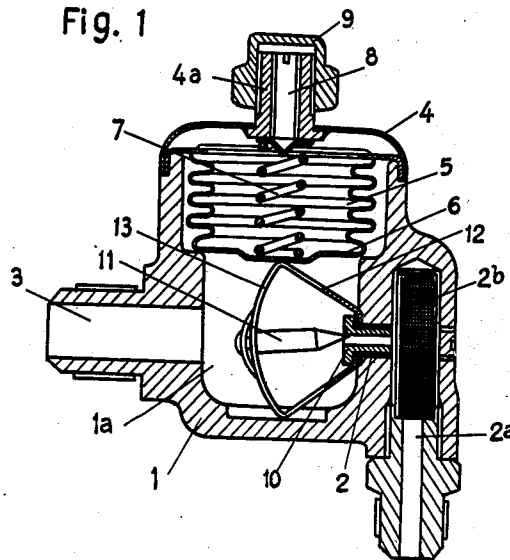
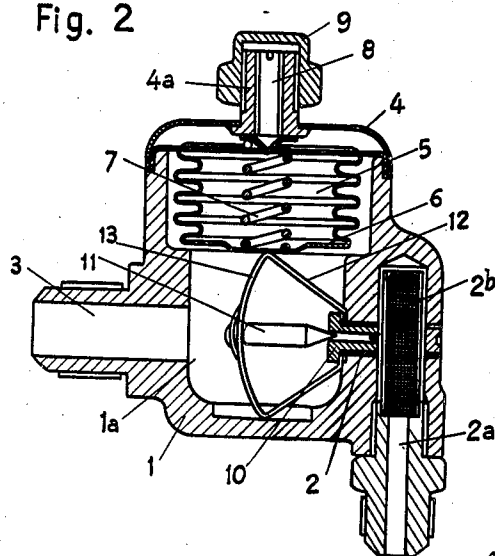


Fig. 2



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UNITED STATES PATENT OFFICE

2,224,643

EXPANSION VALVE

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Application March 16, 1940, Serial No. 324,408
In Italy, April 1, 1939

3 Claims. (Cl. 50—26)

Refrigerating machines are generally provided with expansion valves, the regular operation of which is of great importance for a satisfactory refrigerating process. These valves do not have a great resistance and in view of their high sensitivity passive resistances should be avoided and their arrangement should be such as to prevent jamming.

This invention has for its object an expansion valve intended, more particularly but not exclusively for use with refrigerating machines, said valve being of very simple construction and free of any friction. The valve comprises a conical point needle pressed on its seat by a half-elliptic spring, one of which ends rests on a fixed point of the valve body and the other on a movable wall which is exposed to the action of an adjustable spring and to the difference between the outer pressure and the pressure of the expanded steam. The needle is carried centrally by the half-elliptic spring without any guiding means or friction. In the closed position the spring axis registers with the seat axis; in the open position the spring is depressed and the needle axis may be at an angle with the seat axis on which the conical point rests without however causing any inconvenience.

The annexed drawing shows an embodiment of the invention.

Fig. 1 is an axial section showing the valve in fully opened position.

Fig. 2 shows the valve in the closed position.

The valve body 1 comprises a cylindrical expansion chamber, in the wall of which are formed two diametrically opposed passages, the passage 2 serving for the admission of the high pressure fluid and the passage 3 for delivery of the low pressure vapour. The passage 2 is threaded for engagement with a calibrated nozzle 10, on the outlet of which is fitted the conical point needle 11 as it will be hereafter described. A tubular filter 2b secured by a nipple 2a is fitted on the passage 2.

The chamber 1a is closed at its upper end by a cover 4 and houses the bellows 5; on the cover side the pressure is practically equal to the atmospheric pressure while the pressure of the expanded vapour acts on the bottom or in the chamber 1a. The bellows bottom 6 is exposed on its outer side to the action of the calibrated spring 7, which is adjustable by means of a screw 3 threaded in a nipple 4a on the cover 4, said nipple being closed and protected by a cap 9 with the interposition of a suitable packing. A half-elliptic spring 13 is compressed between the movable wall 6 of the bellows and the bottom of the chamber; said spring is provided with two arms 12 serving to secure the spring to the valve by means of the nozzle 10. The root of the

needle 11 is adjustably connected to the spring 13 in such manner that when the valve is closed (Fig. 2) its axis registers with the axis of the nozzle 10 and when the valve is open the needle axis is at an angle to the nozzle axis. When the pressure in the chamber 1a rises above a certain value, which can be determined by adjustment of the spring 7, the bellows 5 are pressed against the action of the spring 7 and the half elliptic spring 13 is flattened, the valve needle moves into its seat thus closing the valve (Fig. 2). When on the contrary, in normal conditions, the pressure in the chamber is maintained under a determined pressure, the movable wall 6 expands downwards thus bending more sharply the half-elliptic spring.

The valve needle is thus removed from its seat and its axis is slightly inclined towards the nozzle axis; the needle point remaining however on the nozzle (Fig. 1). The valve is thus opened. The half-elliptic spring and its arms work in the manner of a pentagonal linkage; the absence of joints and guiding means permit to obtain a sensitive valve of simple construction without any risk of jamming.

Obviously some constructional details such as the form of the valve body and inner partition may be modified according to requirements without departing from the spirit of the invention.

What I claim is:

1. Expansion valve comprising a casing having a movable wall exposed on one side to the outer pressure and on the other side to the pressure in said casing, a half-elliptic spring in said casing bearing at one of its ends on a fixed wall and at its other end on said movable wall and a needle valve carried by said half-elliptic spring and coacting with the admission opening of said casing.

2. Expansion valve comprising a casing having an admission and a delivery opening, bellows in said casing communicating with the outside, a half-elliptic spring in said casing bearing at one end on a fixed wall of the casing and at its other end on the movable bottom of the bellows, a spring in said bellows adjustable from the outside, a needle valve adjustably secured to the central part of the half-elliptic spring and coacting with the admission opening and means for controlling said springs from the outside in such manner as to bring said needle into the closed position when the pressure in the casing reaches a predetermined value.

3. Expansion valve, as claimed in claim 2, in which the half-elliptic spring is provided at its ends with two crank extensions by means of which it is fixed in the casing.

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