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 AUTOMATIC EXPANSION VALVE FOR REFRIGERATING SYSTEMS.
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1,380,787.

Patented June 7, 1921.

FIG. 2.

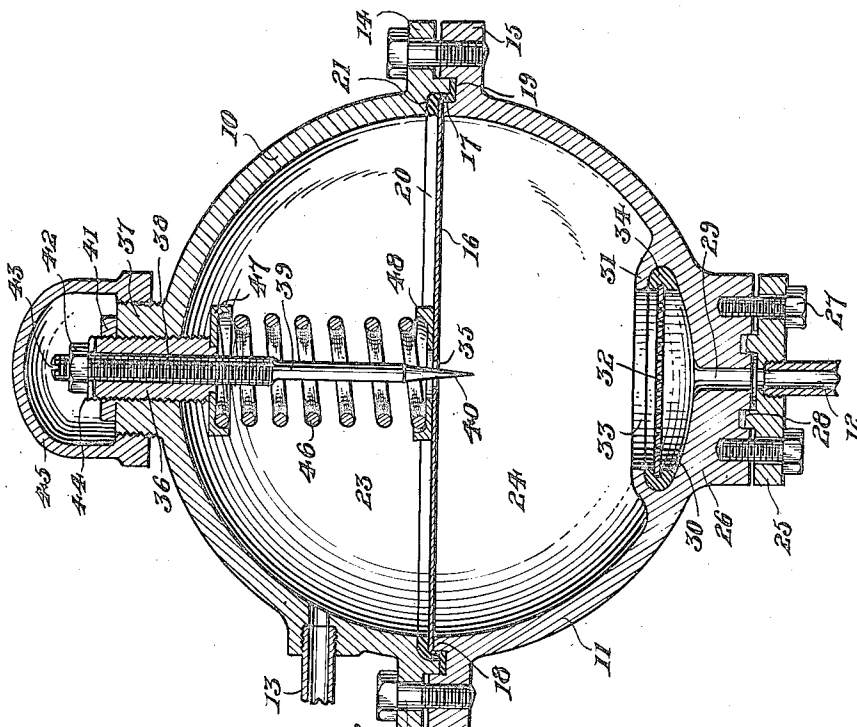
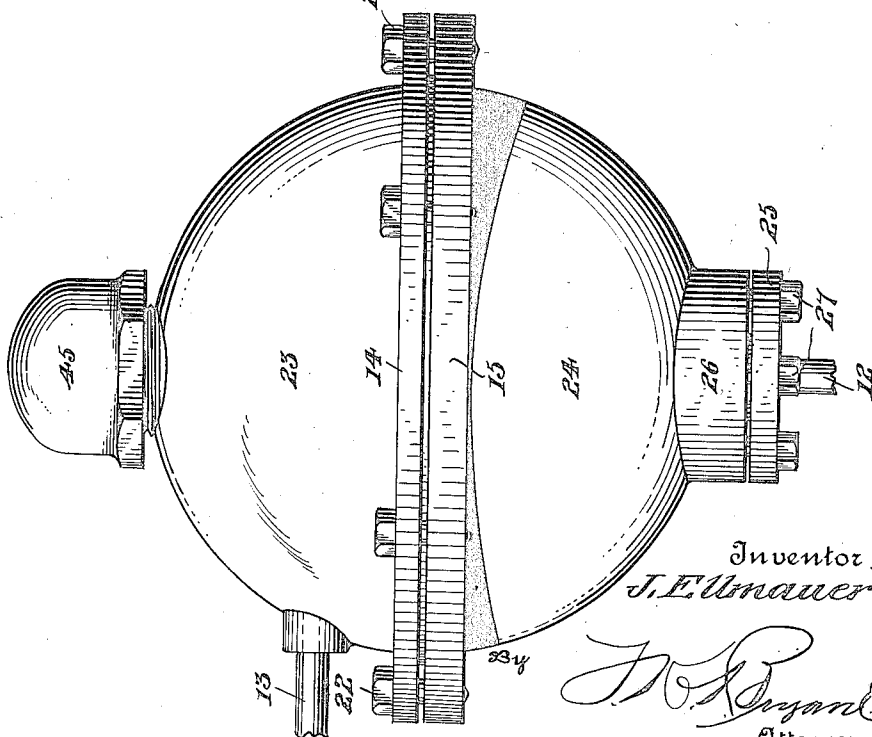


FIG. 1.



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AUTOMATIC EXPANSION-VALVE FOR REFRIGERATING SYSTEMS.

1,380,787.

Specification of Letters Patent. Patented June 7, 1921.

Application filed October 7, 1919. Serial No. 329,166.

To all whom it may concern:

Be it known that I, JOSEF ELLMAUER, a citizen of the United States of America, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Automatic Expansion-Valves for Refrigerating Systems, of which the following is a specification.

The primary object of the invention is the provision of automatic means for regulating the pressure within the circulating system of a refrigerating plant and is especially adapted for machines employed for household use, the structure being simple and inexpensive and not likely to get out of order or require repairs.

A further object of the invention is to provide an automatic expansion valve permitting the passage of the refrigerant therethrough at all times but adapted to automatically vary the diameter or capacity of the passage for the refrigerant by means of the pressure thereof before passing the valve.

A still further object of the invention is the provision of an automatic regulating valve for refrigerating fluid which is complete in itself adapted for the protection of an automatically-operated diaphragm capable of suitable regulation for different installations thereby rendering the refrigerating plant safe and economical for domestic employment.

With these general objects in view my invention consists of the novel combination hereinafter fully described in connection with the accompanying drawing and in which like reference characters designate corresponding parts throughout the several views.

In the drawing,

Figure 1 is a side elevation of the invention with portions of the pipe line of the refrigerating system illustrated as broken away and

Fig. 2 is a central sectional view thereof.

Referring more in detail to the drawing, my invention broadly consists of a spherical casing comprising two hemispherical sections 10 and 11, automatic pressure-regulating means hereinafter described being provided in the casing with an inlet pipe 12 and an outlet pipe 13, communicating with

the interior of the latter forming portions 55 of the refrigerant circulating system.

The casing sections 10 and 11 being hollow form a shell when the marginal flanges 14 and 15 thereof are flatly positioned together at the equator or waist of the casing. A diaphragm 16 is centrally secured within the casing between the sections 10 and 11 with its outer edge 17 crimped over the inner marginal edge portion 18 of the section 11 and within an annular groove 19 in the flange 15. A lead gasket 20 overlies the periphery of the diaphragm 16 and its flange 17 and is seated within the groove 19 and a corresponding annular groove 21 in the inner edge of the section 10 that is juxtapositioned with respect to the portion 18 of the casing 11. Stud bolts 22 secured through the flanges 14 and 15 firmly hold the gasket 21 in position with the diaphragm 16 dividing the interior of the casing into upper and lower chambers 23 and 24 respectively.

The inlet pipe 12 is furnished with a flange 25 in the form of a plate secured to a boss 26 at the bottom of the casing centrally of the section 11 by means of stud bolts 27, an annular packing means 28 being provided therefor.

The boss 26 has a central inlet opening 29 leading to a basin 30 formed by an annular flange 31 in the chamber 24 of the section 11. A perforated disk or strainer 32 is arranged in the opening 33 in the flange 31 and secured in position by a lead ring 34 beneath said flange 31. The strainer 32 prevents scale and other foreign matter from entering the valve chamber 24, the plate 25 being readily removable for cleaning the basin 30.

The outlet 13 for the refrigerant is tapped into the upper section 10 of the casing and communicates with the chamber 23, the passing of the refrigerant in the cooling system from the pipe 12 to the pipe 13 being through a central perforation 35 in the diaphragm 16, the flow of fluid therethrough being continuous during the operation of the system.

The regulating means for controlling the flexible diaphragm 16 consists of a sleeve 36 threaded through a central boss 37 in the top of the casing in the section 10 thereof and having the threaded portion 38 of a

needle valve 39 axially positioned there-
through. The pointed free end 40 of the
needle 39 is positioned axially of the perfo-
ration 35, extending in the form of a cone
5 through said perforation. A lock nut 41
upon the sleeve 36 locks the sleeve adjusted
in the boss 37 while a nut 42 upon the needle
valve 39 retains the same adjusted within
the sleeve 36. The valve 39 is adjusted upon
10 releasing the nut 42 by a suitable instru-
ment, not shown, inserted in the kerf 43 at
the upper end of the valve, while a spanner
wrench or similar tool may be inserted in the
grooves 44 at the top of the sleeve 36 for
15 adjusting the same.

A protecting cap 45 is mounted upon the
boss 37 readily removable when desired for
changing the adjustment of the valve. A
spring 46 positioned between the washers
20 47 and 48 carried by the sleeve 36 and the
diaphragm 16 respectively, tensions the dia-
phragm against the pressure of the incom-
ing fluid received into the chamber 24
through the inlet pipe 12. It will be un-
25 derstood that the tension of the spring 46 is
adjusted by means of the sleeve 36 hereto-
fore fully described.

The complete operation of the invention
will be fully understood from this detailed
30 description thereof, it being seen that the
diaphragm 16 and needle valve 39 being
normally seated for use in the manner herein
illustrated permits the flow of refrigerant
through the perforation 35 for maintaining
35 the proper pressure in the circulating sys-
tem.

An increase in the pressure of the incom-
ing fluid in the chamber 24 elevates the dia-
phragm 16 by flexing the same against the
40 action of the spring 46 whereby the size of
the passage 35 is decreased by the increased
diameter of the needle valve point 40.

The flow of fluid is thereby decreased
while upon the lowering of the pressure in
45 the chamber 24, the diaphragm 16 is low-
ered providing a greater available space for
the refrigerant in flowing through the perfo-
ration 35. The needle valve 39 never
closes the perforation 35 but by means of
50 the automatic operation of the diaphragm 16
the capacity of the perforation 35 for the
flow of the refrigerant therethrough is auto-
matically regulated for the maintenance of
the uniform pressure in the piping of the
55 refrigerating system of which the pipe 13
forms a part.

While the form of the invention herein
described is believed to be preferable, it will
be understood that minor changes may be

made therein without departing from the 60
spirit and scope of the invention as claimed.

What I claim as new and desire to secure
by Letters Patent is:—

1. An automatic expansion valve adapted
for employment in the circulating system of 65
a refrigeration plant comprising means
through which the refrigerant is conducted,
retarding means therein having a constantly
open passage and means of less cross-sec- 70
tional area than said passage axially pro-
jecting therethrough and adapted to auto-
matically vary the diameter of said passage
operable upon a change of pressure of the
refrigerant at the inlet side of the retarding
means. 75

2. A device of the class described com-
prising a casing, a diaphragm centrally
traversing the interior thereof and having
a central passage, inlet and outlet pipes en-
tering the casing at opposite sides of the 80
diaphragm, a tensioning spring at one side
of the diaphragm, a needle valve having a
conical point projecting through said cen-
tral passage and of less cross-sectional area
than said passage with said passage con- 85
stantly open, and varying in capacity during
the flexing of the diaphragm in the opera-
tion of the device.

3. A device of the class described com-
prising a spherical casing formed of sepa- 90
rable sections, a flexible diaphragm centrally
of the casing between the edges of said sec-
tions, with a depending flange at its periph-
ery, a lead gasket overlying said flange and
the adjacent portion of the diaphragm se- 95
cured between said sections when the device
is assembled, the diaphragm having a cen-
tral passage, and means of less cross-sec-
tional area than said passage adapted to
automatically vary the size of said passage, 100
during the operation of the device without
entirely closing the same.

4. An automatic valve for refrigerating
systems, comprising a hollow casing, con- 105
nections for the pipe line of the system com-
municating with the interior of the casing at
opposite sides thereof, a central diaphragm
secured within the casing in the path of
travel of the refrigerant, and having a cen-
tral opening, adjustable tensioning means 110
for the diaphragm, and an adjustable needle
valve with a tapered portion constantly pro-
jecting through said central opening adapt-
ed for varying the capacity of the opening
without closing the same during the opera- 115
tion of the device.

In testimony whereof I affix my signature.
JOSEF ELLMAUER.