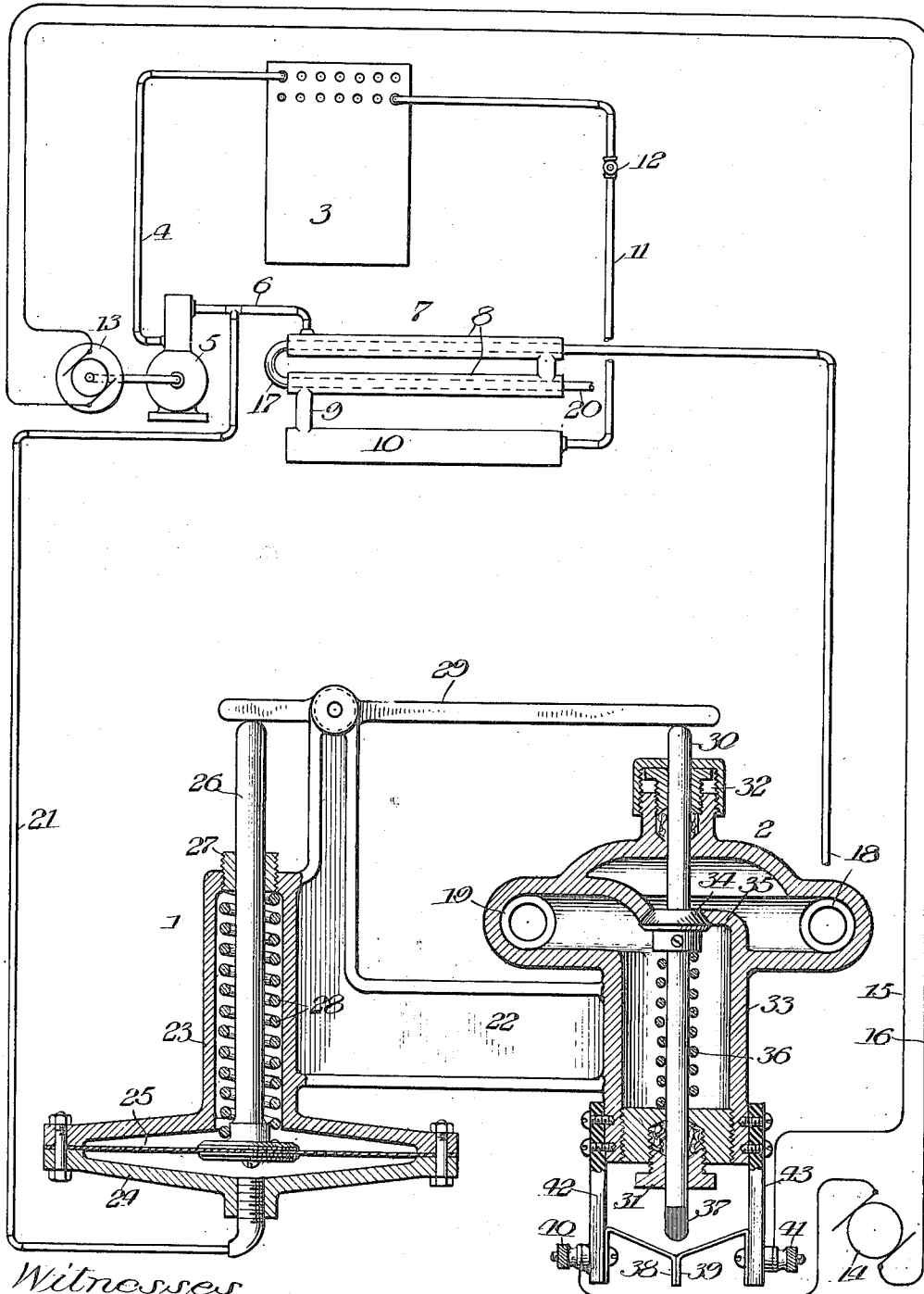


G. J. SAYER.
CONTROLLING DEVICE FOR REFRIGERATING APPARATUS.
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1,148,464.

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Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE J. SAYER, OF CHICAGO, ILLINOIS.

CONTROLLING DEVICE FOR REFRIGERATING APPARATUS.

1,148,464.

Specification of Letters Patent. Patented July 27, 1915.

Application filed February 2, 1914. Serial No. 816,020.

To all whom it may concern:

Be it known that I, GEORGE J. SAYER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Controlling Devices for Refrigerating Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to controlling devices and more particularly to controlling devices and systems of control as applied to refrigerating apparatus. As a specific case, for example, my invention is applicable to control the cooling of a refrigerant such as ammonia gas for instance. In such a system, for instance, a compressor is used which draws in the ammonia gas and supplies it under pressure to a condenser or cooler, whereafter the cooled and compressed refrigerant may enter a reservoir from which through the interposition of a suitable valve refrigerant may be liberated through the coils of the refrigerating system, where, by its consequent expansion it serves as a cooling medium in the refrigerating system to be again drawn into the compressor after use.

The condenser is supplied with a cooling medium such as water to cool the refrigerant, and my invention concerns itself with the provision of a device whereby the pressure of the refrigerant as it leaves the compressor, for instance, may control the amount of cooling medium such as water to be supplied through the agency of a suitable valve to the condenser. My invention furthermore has means whereby should the supply of cooling water run short or cease entirely, which then become operative to stop the actuations of the compressor and thus save the system from possible harm.

I will explain one form which my invention may take more in detail by reference to the accompanying drawing illustrating my improved controlling device in longitudinal section and showing the same as associated with a refrigerating system, which refrigerating system is more or less diagrammatically indicated.

My improved device consists of a pressure responsive element 1 which is adapted to control a suitable valve 2. I will describe in general the association of these elements in

a refrigerating system so as to indicate their availability and arrangement in the system. The refrigerating system consists of the refrigerator 3 from which through the agency of a tube 4 the used refrigerant is withdrawn by means of a compressor 5 which compresses the refrigerant and forces the same through the tube 6 into a condenser 7 consisting of the tubes 8, through which the refrigerant passes to be then conducted by means of the tube 9 to a reservoir 10. From the reservoir 10 the refrigerant is led through a tube 11 to the refrigerator 3, a valve 12 controlling the passage of the refrigerant toward the refrigerator. A motor 13 drives the compressor 5 and the motor receives its current from a suitable source of supply 14 through the conductors 15 and 16. A water circulating system consisting of the pipe 17 receives its water through the pipe 18 through the interposition of the valve 2, which valve controls the flow of liquid to the pipe 18 from a suitable source of water supply 19. The water after leaving the tube 17 is suitably conducted away by means of the pipe 20. The amount of liquid thus furnished to the condenser 7 to cool the refrigerant depends upon the degree of opening of the valve 2 and the amount of opening of this valve is controlled by the pressure responsive means 1, which pressure responsive means is supplied with pressure through the tube 21, thus to be responsive to the pressure in the tube 6, that is, the pressure of the refrigerant as it leaves the compressor 5. Should the valve 2 be open to its fullest extent and the pressure still rise, which would be the case if the source of water supply in the tube 19 had failed or become insufficient, then the valve spindle of the valve 2 would still be moved farther, thereby opening the circuit to the motor 13 by breaking the circuit through the conductor 15, thus to stop the operation of the compressor 5. It will thus be seen that the pressure responsive means controlling the supply of liquid to the condenser, serve to furnish cooling liquid to the condenser to cool the refrigerant in accordance with the pressure of the refrigerant as it leaves the compressor.

I will now describe specifically the particular form of my improved device herein which accomplishes the object stated. This device as set forth has a pressure responsive element 1 and a valve 2, both forming in-

tegral parts of a web 22. The pressure responsive device consists of a casing 23 and a plate 24 between which a diaphragm 25 is secured. The underside of this diaphragm has pressure applied to it directly as furnished by the tube 21. Thus the diaphragm is always pushed upwardly in proportion to the pressure of the refrigerant as it leaves the compressor. The diaphragm is fixedly secured to a spindle 26 which travels within the casing 23 and is guided by the end piece 27. A spring 28 normally acts in opposition to the diaphragm against the pressure furnished through the tube 21. A spindle 26 acts against a lever 29, which lever rests on top of a valve spindle 30 suitably supported within stuffing boxes 31 and 32 within a valve casing 33. A valve 34 in association with the customary valve seat 35 controls the flow of liquid from the pipe 29 to the pipe 18. A spring 36 normally presses the valve 34 against its seat and this spring is strong enough to continually keep the left hand extremity of the lever 29 resting on top of the spindle 26. It will be seen that the amount of liquid thus passing the valve depends upon the pressure in the tube 6. The structure and arrangement of course are such that when the valve is fully open and water flows therethrough in sufficient quantities, then the system is operating at its maximum capacity. Should the source of liquid however cease, then naturally the pressure in the tube 6 would rise beyond that arranged for, and the valve spindle 30 would be pressed downwardly far enough to permit the fiber tip 37 to open circuit between the springs 38 and 39. The springs 38 and 39 are serially included in the conductor 15 through the agency of the binding posts 40 and 41. Normally the circuit through the springs 38 and 39 is complete and it is only after the source of water supply fails or becomes insufficient that the valve spindle 30 moves downwardly sufficiently to open circuit between the springs 38 and 39, thus to stop the supply of current to the motor 13, and then means to stop the further actuation of the compressor 5. The springs 38 and 39 are mounted on suitable insulating strips 42, 43 secured to the valve casing 33.

From what has been described, the nature of my invention will be entirely clear to

those skilled in the art, and it will also be clear that my invention is susceptible to a variety of different modifications without departing from its spirit.

Having however thus described one form which my invention may take, what I claim as new and desire to secure by Letters Patent is:

1. In a refrigerating system the combination with refrigerant holding means, of cooling fluid holding means associated therewith and adapted to cool the refrigerant, a valve to control the amount of cooling fluid supplied to said cooling fluid means, a diaphragm actuated element to control said valve responsive to the pressure of said refrigerant, a casing for said element, a web to which said casing and said valve are fixedly secured, said valve having a movable element, and a lever interposed between said valve element and said diaphragm actuated element pivotally mounted on said web.

2. In a refrigerating system the combination with refrigerant holding means, of cooling fluid holding means associated therewith and adapted to cool the refrigerant, a valve to control the amount of cooling fluid supplied to said cooling fluid means, a diaphragm actuated element to control said valve, a spring to oppose the movement of said diaphragm, means to conduct fluid under pressure from said refrigerant holding means to one side of said diaphragm so that said diaphragm is responsive solely to the action of said pressure and said spring, a casing for said diaphragm and spring, a casing for said valve, a web for uniting said two casings, a lever pivotally mounted on said web controlled by said diaphragm actuated element to control said valve, a pump, an electric motor to control said pump, switching means serially included with said motor circuit to control the operation thereof, and a valve stem for said valve having means to control said switching device.

In witness whereof, I hereunto subscribe my name this 17th day of January, A. D., 1914.

GEORGE J. SAYER.

Witnesses:

WM. A. CHAPIN,
JOHN M. PETERSON.