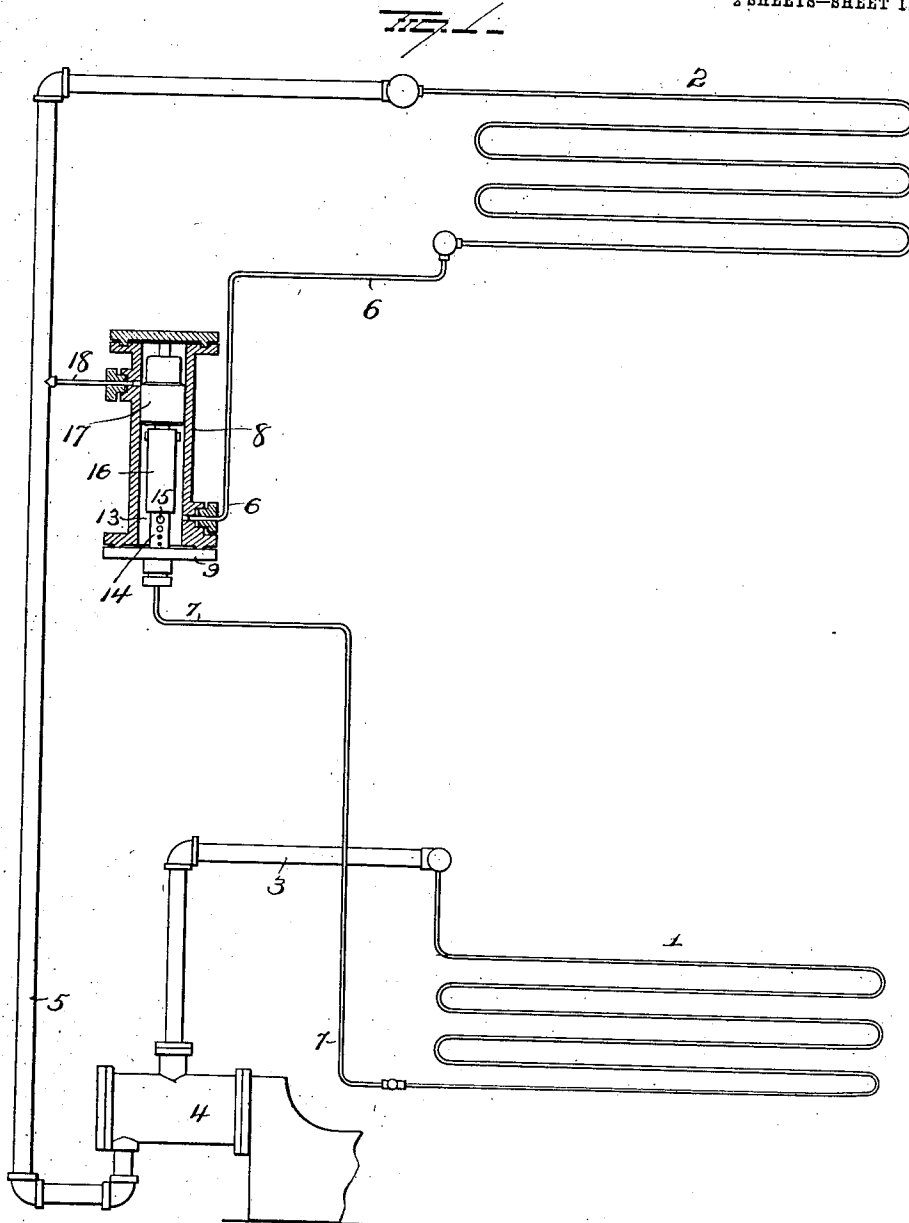


F. A. RIDER.
REFRIGERATING APPARATUS.
APPLICATION FILED NOV. 9, 1908.

920,392.

Patented May 4, 1909.

2 SHEETS—SHEET 1.



WITNESSES

E. Nottingham
G. F. Downing

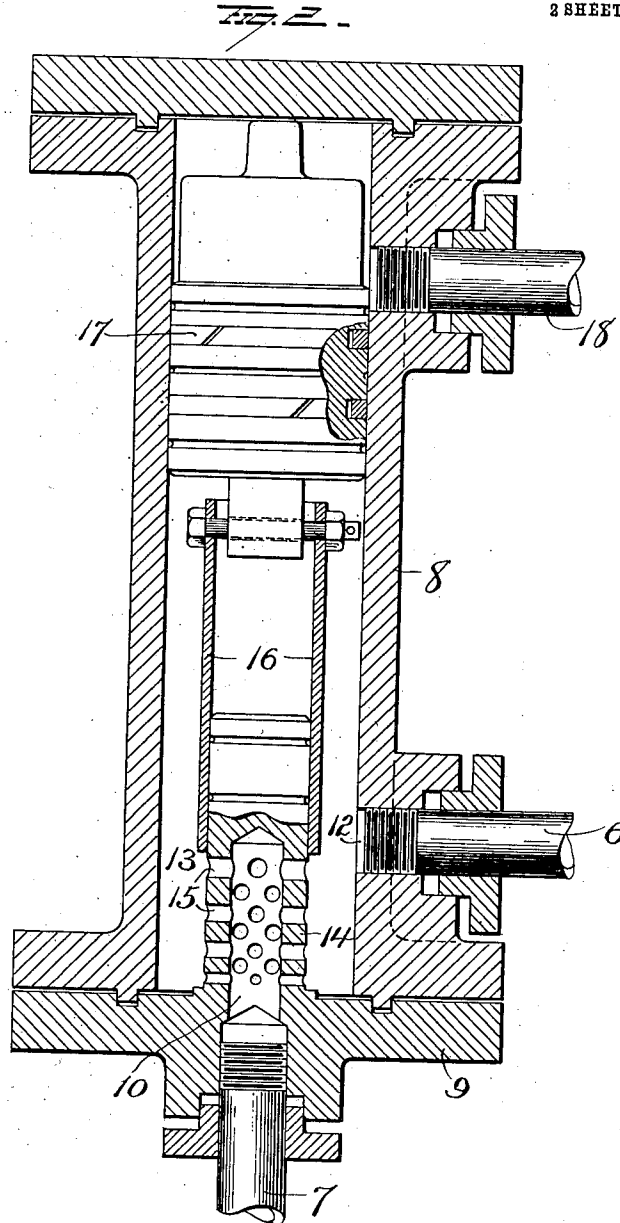
INVENTOR

F. A. Rider
By H. A. Seymour
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UNITED STATES PATENT OFFICE.

FRANK A. RIDER, OF PITTSBURG, PENNSYLVANIA.

REFRIGERATING APPARATUS.

No. 920,392.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed November 9, 1908. Serial No. 461,764.

To all whom it may concern:

Be it known that I, FRANK A. RIDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain
5 new and useful Improvements in Refrigerating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable
10 others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in refrigerating apparatus, and more particularly to means for passing liquid ammonia from the condensers to the expansion coils.

15 Experience has demonstrated the advisability of keeping the expansion coils supplied with liquid ammonia and of feeding the ammonia in bulk from the condensers where it is liquefied, to the expansion coils.

20 An object of my present invention is to provide means whereby the liquid ammonia is passed to the expansion coils as fast as it is produced in the condensers, irrespective of amounts, pressure, temperatures or other
25 external influence.

A further object is to provide means whereby the unbalanced weight or "head" of a column of liquid ammonia is utilized to automatically control the operation of a
30 delivery valve and pass accumulated liquid ammonia from the condensers to the expansion coils,—at the same time holding back sufficient pressure on the condensers to liquefy the ammonia therein.

35 With these objects in view the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings, Figure 1
40 is a diagrammatical view of refrigerating plant and illustrating an embodiment of my invention, and Fig. 2 is an enlarged sectional view of the valve devices which control the passage of liquid ammonia from the condensers to the expansion coils, the pipes 6 and 18
45 being shown at the same side of the device, instead of on opposite sides as in diagrammatical view, Fig. 1.

1 represents the expansion coils and 2 the
50 condensers. At one end, the expansion coils are connected by means of a suction pipe 3 with a compressor 4 and the latter is connected by means of a pipe 5 (which may be conveniently termed the "high pressure hot
55 gas pipe") with one end of the condensers.

Liquid ammonia leaves the condensers by the pipe 6, a portion of which is disposed vertically or approximately so in order to give a "head" or weight of liquid for a purpose
hereinafter explained, and the liquid ammonia enters the expansion coils by way of a
60 pipe 7. Between the pipes 6 and 7, my improved valve devices are located and the construction and operation of the same will now be explained.

65 A cylinder or casing 8 is provided in its bottom plate 9 with an outlet 10 with which the pipe 7 leading to the expansion coils is connected. The cylinder 8 is also provided with an inlet 12 for the reception of the pipe
70 6 which conducts liquid ammonia from the condensers,—the passage of this liquid ammonia from the inlet 12 to the outlet 10 with which the pipe 7 communicates being controlled by means of a valve 13. In constructing this valve the bottom plate 9 of the casing
75 is provided centrally with a post 14 made tubular throughout a portion of its length and provided in its walls with perforations 15 located at different levels and connecting the
80 interior of the cylinder with the tubular portion of the post so that liquid ammonia entering the cylinder by the pipe 6 can pass through perforations of the post and from the tubular portion of the latter pass to the
85 expansion coils by way of the pipe 7. The movable part of the valve consists of a tube 16 adapted to telescope over the post 14 and open or close more or less of the perforations 15 according to the position of said tube.
90 The tube 16 is connected with and moved by a weighted piston 17 located in the upper portion of the cylinder or casing 8, and at a point above this piston, a pipe 18 connects the cylinder with the high pressure side of the
95 apparatus; *i e*, the hot gas return pipe 5.

When the weight or "head" of liquid entering the cylinder by the pipe 6 from the condensers is sufficient to overcome the
100 weight of the piston 17, the latter will be caused to rise and the tube 16 correspondingly moved to uncover more or less of the perforations 15 in the post 14 and thus permit the passage of the liquid ammonia to the expansion coils. The ammonia gas will be
105 caused to be passed, by means of the compressor, from the expansion coils through the pipe 5 to the condensers where it will be liquefied and the liquid ammonia will flow
110 from the condensers as fast as it is condensed

to the expansion coils and maintain the supply of liquid ammonia to the latter constant. Any tendency on the part of the condensers to liquefy the gaseous ammonia with sufficient rapidity (which might occur if the liquid be permitted to leave the condensers more rapidly than the pressure exerted by the compressor can force the gaseous ammonia through the condensers and effect its condensation therein) will be counteracted by the pressure of ammonia gas entering the cylinder 8 by way of the pipe 18,—the pressure thus created within the cylinder above the weighted piston 17 causing the latter to descend against the now diminished "head" of the column of liquid ammonia entering said cylinder by way of the pipe 6 and causing the tube 16 of the valve 13 to descend and cover more or less of the perforations 15 of post 14 and thus retard or completely close the passage of liquid ammonia from the condensers to the expansion coils.

From the above it will be observed that my improvements utilize the unbalanced weight of a column of liquid ammonia to operate a delivery valve and pass accumulated liquid,—serving also to hold back enough pressure on the condensers to effect the liquefying of the ammonia in them. It will also be observed that the liquid ammonia will be passed to the expansion coils as fast as it is produced in the condensers, irrespective of pressure, temperature or other external influence.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is,—

1. In refrigerating apparatus, the combination with a condenser and an expansion coil, of means for utilizing the "head" or weight of liquid ammonia leaving the condenser to control the passage of said liquid ammonia from the condenser to the expansion coil.

2. In refrigerating apparatus, the combination with a condenser, an expansion coil, and means for forcing gaseous ammonia from the expansion coil to the condenser, of means controlled by the "head" or weight of liquid ammonia leaving the condenser, for passing said liquid ammonia to the expansion coil as fast as it is produced in the condenser.

3. In refrigerating apparatus, the combination with a condenser, an expansion coil, a compressor, a connection between the expansion coil and compressor, and a connection between the condenser and compressor, of a cylinder, a valve therein, connections between said cylinder and condenser and between said cylinder and expansion coil, a piston in said cylinder at one side of the inlet and outlet for liquid ammonia for operating said valve, and a pipe communicating with the cylinder at the other side of said

piston and connected with the pipe between the compressor and condenser.

4. In refrigerating apparatus, the combination with a condenser, an expansion coil, a compressor and connections between the expansion coil and compressor and between the compressor and condenser, of a pipe communicating with the condenser for the passage of liquid ammonia therefrom, a pipe communicating with the expansion coil to conduct liquid ammonia thereto, and means interposed between said pipes for utilizing an unbalanced column of liquid ammonia to pass the liquid ammonia from the condenser to the expansion coil as fast as it is liquefied in the condenser irrespective of temperature, pressure or other external influence.

5. In refrigerating apparatus, the combination with a condenser, an expansion coil, a compressor connected with the outlet of the expansion coil, and a pipe connecting the compressor with the inlet of the condenser, of an outlet pipe for liquid ammonia communicating with the condenser, an inlet pipe for liquid ammonia communicating with the expansion coil, a cylinder communicating with said inlet and outlet pipes, a valve in said cylinder for controlling the passage of liquid ammonia from the outlet pipe of the condenser to the inlet pipe of the expansion coil, a weighted piston connected with said valve, and a pipe connected with the cylinder near the end thereof farthest removed from the valve, said pipe being also connected with the pipe which connects the compressor with the condenser.

6. In refrigerating apparatus, the combination with a condenser, an expansion coil, a compressor connected with the outlet of the expansion coil, and a pipe connecting the compressor with the inlet of the condenser, an outlet pipe for the condenser, and an inlet pipe for the expansion coil, of means for utilizing an unbalanced column of liquid ammonia to control the passage of liquid ammonia from the condenser to the expansion coil, said means comprising a cylinder connected with said liquid ammonia inlet and outlet pipes, a perforated tubular post within said cylinder between said inlet and outlet pipe connection, a tube to telescope with said post, a weighted piston within said cylinder and carrying said tube, and a connection between the cylinder at a point above the weighted piston and the ammonia gas pipe which connects the compressor with the condenser.

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

FRANK A. RIDER.

Witnesses:

A. H. EAMES,
J. WILLIAM MELVILLE.