

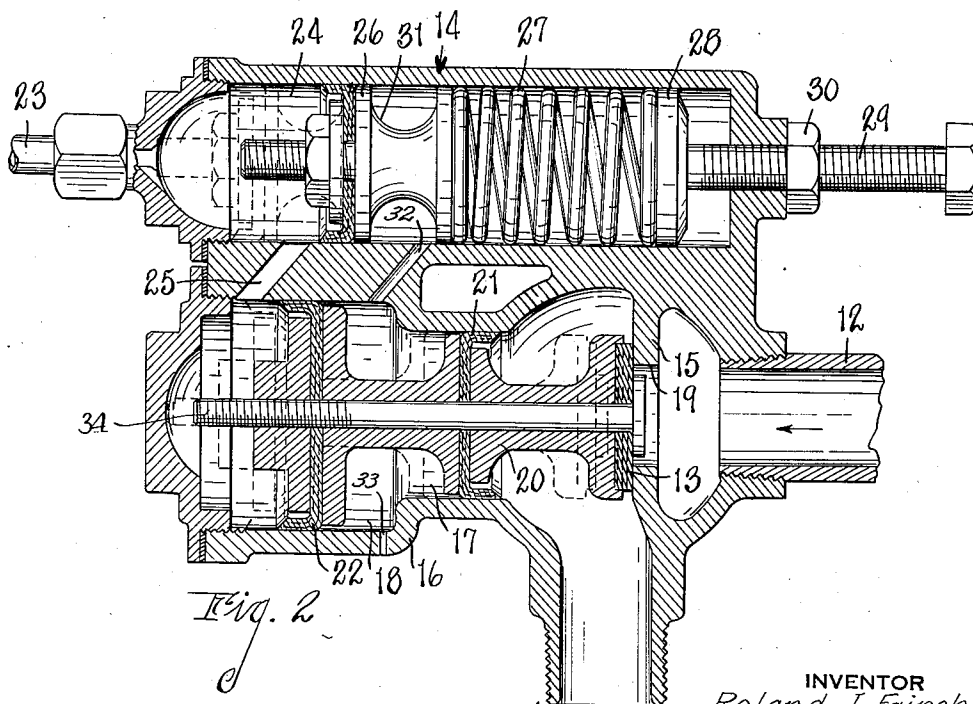
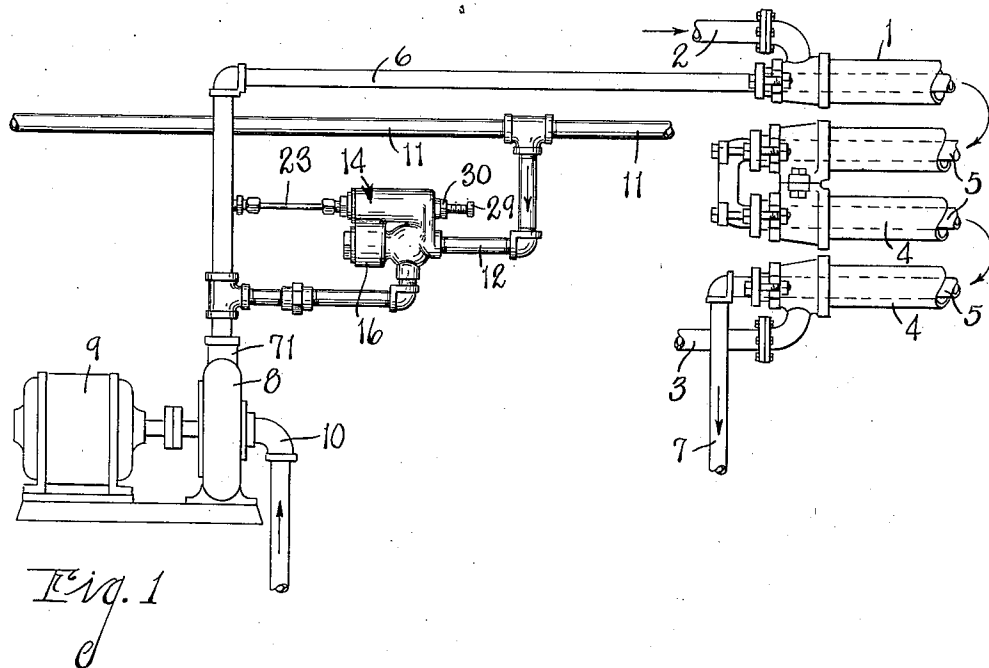
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CONDENSER COOLING WATER CONTROL

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CONDENSER COOLING WATER CONTROL

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13 Claims. (Cl. 257-24)

The main objects of this invention are:

First, to provide a condenser having improved means for assuring an adequate supply of cooling water thereto.

Second, to provide control means for automatically connecting the condenser to a safe cooling water supply in the event of failure of the normal cooling water supply.

Third, to provide a control means of the foregoing character which is simple and economical in its parts and very efficient and effective for the purpose intended.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims. A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary view in side elevation of a condenser having cooling water control means of my invention, certain of the parts being conventionalized and no attempt being made to show relative proportions.

Fig. 2 is an enlarged fragmentary view mainly in vertical section of the automatic control mechanism.

In the illustrated embodiment of my invention, the control means is connected to a water cooled condenser 1 having a gas inlet 2 and a liquid outlet 3, and the gas to be condensed may be ammonia. The condenser coils or pipes 4 are provided with internal cooling water pipes 5 having a common cooling water inlet 6 and an outlet 7, the latter delivering to a drain. In condensers of this type, if the cooling water fails, the gas does not condense and an explosion or other serious damage invariably results. It is therefore vitally important that the supply of cooling or condensing water be positively maintained at all times.

The water from a private well or wells is usually obtained much more cheaply than that from the municipal or city water supply. I therefore combine the two for economy and safety. To this end the common cooling water inlet 6 to the condenser is connected to the outlet 7 of a pump 8 driven by a motor 9, the inlet 10 of the pump being connected to a primary water supply such as a private well or wells. The motor driven pump 8 normally supplies the condenser 4 with cooling water.

In order to maintain the supply of cooling water to the condenser even in the event of failure of the primary water supply, I provide a secondary water supply, in this case a city or municipal

water supply main 11, which is connected to a large reservoir or the like, or to the water supply main (not shown). The secondary water supply is relatively expensive, but is remotely subject to failure. A secondary water supply conduit 12 is connected between the city water main 11 and the common condenser inlet 6 near the outlet 7 of the pump 8. This conduit contains a normally closed piston actuated valve 13 controlled by the differential pressures of the two water supplies, the valve acting to keep the conduit 12 closed so long as the pressure of the well supply is maintained, the failure of the latter resulting in the automatic opening of the valve and the delivery of cooling water to the condenser from the municipal water supply.

The control mechanism is housed in a casing 14 having a transverse partition 15 provided with an opening 19 in line with the secondary water supply conduit 12. The casing comprises a cylinder 16 having a medial portion 17 and an enlarged portion 18 axially aligned with the opening 19. The cylinder is provided with a differential piston 20 having the main valve 13 at one end, a medial plunger 21 coacting with the medial portion 17 of the cylinder, and an enlarged plunger 22 coacting with the enlarged portion 18 of the cylinder. The side of the enlarged plunger 22 opposite the main valve 13 is connected by means including a pipe 23, auxiliary cylinder 24 and by-pass 25 to the common cooling water condenser inlet 6. The enlarged plunger 22 normally uncovers the by-pass 25 so that so long as the water pressure of the primary water supply is maintained the main valve 13 is held closed by the action of this pressure on the enlarged plunger 22, the effective area of the enlarged plunger 22 being greater than that of said medial plunger 21, and of the valve 13.

In the auxiliary cylinder 24 of the casing 14 is a normally open valve 26 which is adapted to be closed by a compression spring 27 in the event of failure of the primary water supply. The spring 27 is adjusted for various water pressures by means of a spring thrust or rest slide 28 having a stem 29 threaded to the casing 14, the stem being held in adjusted position by means of a lock nut 30. The spring 27 is adapted to yield to the fluid pressure created by pump 8 and to resist city water pressure. In its advanced or spring actuated position, the valve 26 provides a reservoir for receiving the water entrapped in the enlarged cylinder 18, the body of the valve being deeply grooved at 31 for this purpose. The water thus received in the annular chamber pro-

vided by the grooved portion 31 of valve 26 may be drained therefrom in any suitable manner, as, for instance, by a passage 32 communicating with that chamber and enlarged portion 18 of cylinder 5 16, while portion 18 may be provided with a small aperture or apertures 33 to exhaust this waste water. Alternatively, casing 14 may be provided with apertures opening to the atmosphere adjacent the chamber formed by groove 31 in its re- 10 tracted position or to the right as shown in Fig. 2. Other similar means will suggest themselves by which the collected water may be automatically removed from its trapped location in piston 26, to the end that when the piston is subsequently 15 again moved to the left, a reservoir will be furnished for receiving water from enlarged cylinder 18.

In operation, the parts of the control mechanism normally occupy the positions shown in Fig. 2. The main valve 13 remains closed, the cooling 20 water being delivered to the condenser by the motor driven pump 8 from the private well. If for any reason the water pressure of the normal supply should fail due to the breakdown of the motor or pump or the lack of water in the well, the re- 25 duction of the water pressure causes the spring 27 to automatically close the normally open valve 26. This in turn results in the automatic movement of the piston 20 to open the main valve 13, 30 connecting the city water supply directly to the condenser inlet 6 through the secondary conduit 12. Thus, failure of the primary water supply results in the automatic substitution of the secondary water supply therefor.

Upon restoration of pressure in the primary 35 water supply, water enters cylinder 24 through pipe 23 urging valve 26 to the right as viewed in Fig. 2 against the tension of spring 27 and un- 40 covering by-pass 25. The water gains access to cylinder 18 due to the fact that by-pass 25 at its entrance to cylinder 18 is not completely closed by plunger 22, the stem 34 upon which valve 45 plunger 13, medial plunger 21, and enlarged plunger 22 are mounted striking against the left hand head of cylinder 18 prior to complete closure of the by-pass opening. Accordingly 50 pressure is built up on the left hand side of plunger 22 with the result that the plunger is urged to the right as viewed in Fig. 2 on account of the differential water pressures acting upon the same. Valve 13 is thus closed shutting off the secondary water supply.

From the foregoing description of my invention, it will be apparent to those skilled in the art that 55 I provide means for economically supplying cooling water to the condenser of the refrigerating system, failure of the supply resulting in the automatic change-over to the municipal water supply. Thus, an adequate supply of condenser 60 cooling water is assured and explosions or accidents or injury to the refrigerating system due to failure of the cooling water are minimized. My improvements are simple and economical in operation and are very effective for the purpose 65 intended.

I have illustrated and described my improvements in an embodiment which I have found very 70 practical. I have not attempted to illustrate or describe other embodiments or adaptations, as it is believed this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired. Although I have shown and described a certain specific embodiment of my invention, I am fully aware that many modifi- 75 cations thereof are possible. My invention is

therefore not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters 5 Patent is:

1. The combination of a water cooled condenser having a water discharge delivering to a drain, and means for supplying said condenser with cooling water, including a primary water 10 supply and a secondary water supply, the primary water supply being relatively inexpensive and relatively subject to failure, and the secondary water supply being relatively expensive and relatively not subject to failure, the primary water 15 supply being connected to said condenser for normally supplying the same with cooling water, and a control responsive to the water pressure of said secondary water supply and of said primary water supply for automatically connecting 20 said secondary water supply to said condenser in case of the failure of the primary water supply, said control comprising a secondary water supply conduit and a primary water supply conduit connected to a common condenser cooling 25 water inlet, a control casing having a transverse partition provided with an opening in line with said secondary water supply conduit, a cylinder having a medial portion and an enlarged portion 30 axially aligned with said opening, a differential piston having a main valve normally closing said opening, a medial plunger coacting with the medial portion of said cylinder and an enlarged plunger coacting with the enlarged portion of 35 said cylinder, means including a by-pass connecting the common inlet with the enlarged portion of the cylinder on the side of plunger opposite said main valve, a normally open spring-closed 40 valve controlling said by-pass, the spring-closed valve normally being held open by the primary water pressure within said inlet, the effective area of said enlarged plunger being greater than that of said medial plunger and of said main valve whereby said main valve is normally closed, the failure of said primary water supply resulting in the moving of said spring-closed valve to cut off 45 communication between said enlarged cylinder portion and said inlet and the opening of said main valve so that the secondary water supply is automatically substituted for the primary water supply. 50

2. The combination of a water cooled condenser and means for supplying said condenser with cooling water, including a primary water supply and a secondary water supply, the primary 55 water supply being connected to said condenser for normally supplying the same with cooling water, and a control responsive to the water pressure of said secondary water supply and of said primary water supply for automatically connecting 60 said secondary water supply to said condenser in case of the failure of the primary water supply, said control comprising a secondary water supply conduit and a primary water supply conduit connected to a common condenser cooling 65 water inlet, a control casing having a transverse partition provided with an opening in line with said secondary water supply conduit, a cylinder having a medial portion and an enlarged portion 70 axially aligned with said opening, a differential piston having a main valve normally closing said opening, a medial plunger coacting with the medial portion of said cylinder and an enlarged plunger coacting with the enlarged portion of 75 said cylinder, means including a by-pass connect-

ing the common inlet with the enlarged portion of the cylinder on the side of the plunger opposite said main valve, a normally open spring-closed valve controlling said by-pass, the spring-closed valve normally being held open by the primary water pressure within said inlet, the effective area of said enlarged plunger being greater than that of said medial plunger and of said main valve whereby said main valve is normally closed, the failure of said primary water supply resulting in the moving of said spring-closed valve to cut off communication between said enlarged cylinder portion and said inlet and the opening of said main valve so that the secondary water supply is automatically substituted for the primary water supply.

3. The combination of a water cooled condenser and means for supplying said condenser with cooling water, including a primary water supply and a secondary water supply, the primary water supply being connected to said condenser for normally supplying the same with cooling water, and a control responsive to the water pressure of said secondary water supply and of said primary water supply for automatically connecting said secondary water supply to said condenser in case of the failure of the primary water supply.

4. A condenser having a primary water supply and a secondary water supply, the primary water supply being connected for normally supplying the system with water, and a control responsive to the water pressure of said secondary water supply and of said primary water supply for automatically connecting said secondary water supply to the system in case of the failure of the primary water supply, said control comprising a secondary water supply conduit and a primary water supply conduit connected to a common water inlet, a control casing having a transverse partition provided with an opening in line with said secondary water supply conduit, a cylinder having a medial portion and an enlarged portion axially aligned with said opening, a differential piston having a main valve normally closing said opening, a medial plunger coacting with the medial portion of said cylinder and an enlarged plunger coacting with the enlarged portion of said cylinder, means including a by-pass connecting the common inlet with the enlarged portion of the cylinder on the side of the plunger opposite said main valve, a normally open spring-closed valve controlling said by-pass, the spring-closed valve normally being held open by the primary water pressure within said inlet, the effective area of said enlarged plunger being greater than that of said medial plunger and of said main valve whereby said main valve is normally closed, the failure of said primary water supply resulting in the moving of said spring-closed valve to cut off communication between said enlarged cylinder portion and said inlet and the opening of said main valve so that the secondary water supply is automatically substituted for the primary water supply.

5. A condenser having a primary water supply and a secondary water supply, the primary water supply being connected for normally supplying the system with water, and a control responsive to the water pressure of said secondary water supply and of said primary water supply for automatically connecting the said secondary water supply to the system in case of the failure of the primary water supply.

6. The combination of a condenser, means for directing cooling water through said condenser, a motor driven pump acting to normally supply said means with water, and an automatic valve control for connecting said means to a secondary water supply in the event of failure of the normal water supply, said automatic valve control comprising conduit means connecting the secondary water supply to the outlet side of said pump, and a valve in said conduit means normally closed by the water pressure of the normal water supply, the failure of the latter resulting in the opening of said valve by the secondary water pressure.

7. The combination of a condenser, means for directing water through said condenser, a pump acting to normally supply said means with water, and an automatic valve control for connecting said means to an auxiliary water supply in the event of failure of the normal water supply, said automatic valve control comprising conduit means connecting the auxiliary water supply to the outlet side of said pump, and a valve in said conduit means normally closed by the water pressure of the normal water supply, the failure of the latter resulting in the opening of said valve by the auxiliary water pressure.

8. A condenser having means acting to normally supply said system with water, and an automatic valve control for connecting said means to an auxiliary water supply in the event of failure of the normal water supply, said automatic valve control comprising conduit means connecting the auxiliary water supply to the normal supply means, and valve means in said conduit means normally closed by the water pressure of the normal water supply, the failure of the latter resulting in the opening of said valve by the auxiliary water pressure.

9. The combination of a water cooled condenser, a motor driven pump acting to supply said condenser with cooling water from a primary supply, conduit means containing a normally closed valve for supplying said condenser with cooling water from an auxiliary water supply in the event of failure of said primary supply, and means controlled by the differential pressures of the two water supplies and acting to keep said valve closed so long as the pressure of the primary supply is maintained, the failure of the latter resulting in the automatic opening of said valve and the delivery of cooling water to said condenser by the auxiliary water supply.

10. The combination of a motor driven pump acting to supply water from a primary supply, conduit means containing a normally closed valve for supplying water from an auxiliary water supply in the event of failure of said primary supply, and means controlled by the differential pressures of the two water supplies and acting to keep said valve closed so long as the pressure of the primary supply is maintained, the failure of the latter resulting in the automatic opening of said valve and the delivery of water by the auxiliary water supply.

11. The combination of a water cooled condenser, means acting to normally supply said condenser with cooling water, conduit means containing a normally closed valve for supplying said condenser with cooling water from a reserve water supply in the event of failure of said normal supply means, and means controlled by the differential pressures of the two water supplies and acting to keep said valve closed so long as the pressure of the normal supply is

maintained, the failure of the latter resulting in the automatic opening of said valve and the delivery of cooling water to said condenser by the reserve water supply.

- 5 12. The combination of a water cooled condenser, means acting to normally supply said condenser with cooling water, conduit means containing a normally closed valve for supplying
10 said condenser with cooling water from a reserve water supply in the event of failure of said normal supply means, and means acting to keep said valve closed so long as the pressure of the normal supply is maintained, the failure of the latter resulting in the automatic opening of said

valve and the delivery of cooling water to said condenser by the reserve water supply.

13. The combination of a normal water supply means, and means for supplying said normal means with water from an auxiliary water supply in the event of failure of said normal water supply, said auxiliary means being controlled by the differential pressures of the two water supplies acting to keep said means inoperative so long as the pressure of the normal supply is maintained, the failure of the latter resulting in the automatic operation of said auxiliary means and the delivery of water to the system from the auxiliary water supply.

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