April 19, 1932. P. A. BANCEL ET AL 1,854,288

CONDENSING SYSTEM

Filed Nov. 29, 1930

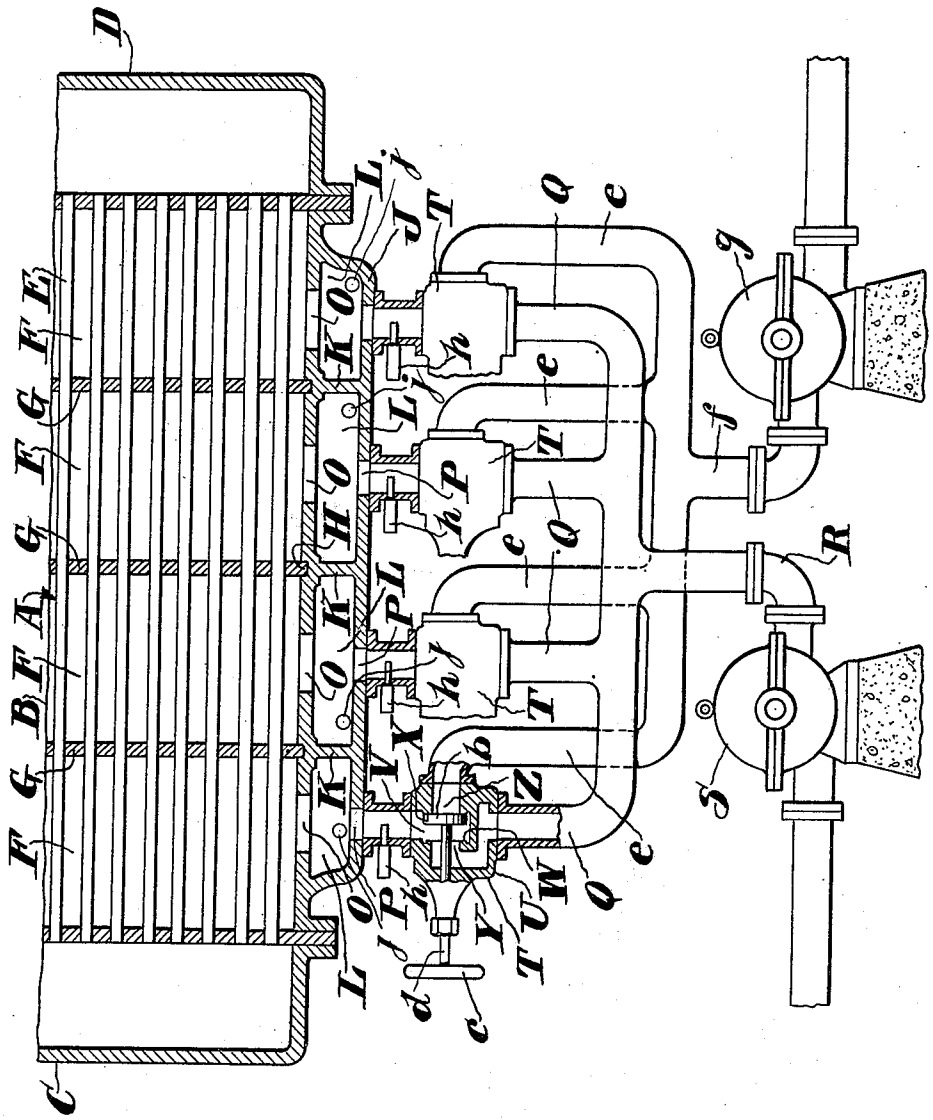


Fig. 1

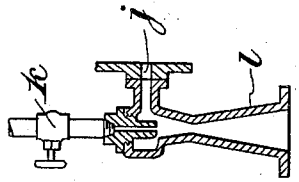


Fig. 2

INVENTOR.
Paul A. Bancel
And John Kingan
BY Charles A. Adee
HIS ATTORNEY.

Patented Apr. 19, 1932 1,854,288

UNITED STATES PATENT OFFICE

PAUL A. BANCEL, OF MONTCLAIR, NEW JERSEY, AND JOHN KIRGAN, OF EASTON, PENNSYLVANIA, ASSIGNORS TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY

CONDENSING SYSTEM

Application filed November 29, 1930. Serial No. 498,923.

This invention relates to condensers, but more particularly to a condensing system comprising a condenser and condensate removal apparatus and in which cooling water unsuited for boiler feed purposes is circulated through the cooling tubes of the condenser for condensing the steam.

One object of the invention is to prevent contamination of the boiler water feed supply.

Another object is to permit of ready removal of condensate which has become contaminated by cooling water leaking into portions of the condenser while at the same time removing pure condensate from other portions of the condenser by means of instrumentalities provided for that purpose.

Still another object is to readily effect communication between a plurality of separated compartments of a condenser and any one of a plurality of condensate removal pumps.

Other objects will be in part obvious and in part pointed out hereinafter.

In the accompanying drawings Fig. 1 shows an elevation partly in section of a condensing system constructed in accordance with the practice of the invention, and Fig. 2 illustrates a typical steam ejector suitable for evacuating the condenser.

Referring to the drawings, A designates generally a condenser which comprises a casing B having arranged at its ends water heads C and D.

For the purposes of this invention the water head C may constitute the inlet head into which water from a suitable source of supply may be introduced to assure an ample flow of cooling water through the cooling tubes E which extend longitudinally through the casing B. The cooling tubes E extend transversely of the direction of steam flow through the casing B, it being assumed that the steam inlet (not shown) of the casing B is located at the top of the casing.

The cooling liquid flowing through the tubes E is discharged into the water box D whence it may pass to its destination, as for instance, over-board in cases where the system is used on marine craft.

In accordance with the present invention the interior of the casing B is divided into a plurality of compartments F by partitions G which are seated in suitable grooves H in the casing B. Preferably the partitions G and the grooves H wherein they are disposed are so arranged as to form fluid tight joints and thus prevent leakage of condensate from one compartment F to another.

Beneath the casing B, of which it forms a part and with respect to which it is spaced, is a wall J having lateral walls K which unite with the bottom of the casing B to form a plurality of non-communicating hotwells L into which condensate may flow through outlet openings O in the lowermost portions of the compartments F.

Each hotwell L has an outlet opening P through which condensate may flow into branch conduits Q of a main conduit R connected to the inlet opening (not shown) of a condensate removal pump S. The arrangement of the conduits Q and R is such that upon operation of the pump S condensate will be withdrawn from each of the hotwells L.

In apparatus of the character to which the present invention pertains it happens not infrequently that, due to fracture of the cooling tubes E or failure thereof through other causes, a portion of the water used for supplying the cooling tubes leaks into the condenser and intermingles with the condensate. When cooling water of inferior quality, as for instance salt water, is used as a cooling medium, such water mixing with the condensate renders the condensate unfit for use in the boilers. It is accordingly contemplated to provide means whereby, when the condensate in any of the compartments F becomes polluted, the removal of such polluted condensate may be effected without seriously interfering with the normal operation of the condensing system. To this end the branch conduits Q are provided with valve mechanisms designated generally by T. Each valve mechanism T comprises a casing U having a central chamber V into which the condensate flows from the outlet openings P. On the opposite sides of the chamber V are seats W and X in which are formed ports Y and

Z respectively, and a valve *b* which may be of the reciprocatory type, is arranged in the chamber to cooperate with the seats W and X for controlling the ports Y and Z. The valve *b* may be actuated in any suitable manner, as for instance by means of a hand wheel *c* carried by a stem *d* to which the valve *b* is connected.

In the construction shown the ports Y in the valve casing U are in communication with the branch conduits Q and the ports Z afford communication between the chamber V of the valve casing U, and branch conduits *e* which communicate with a main conduit *f* connected to convey condensate to a pump *g*.

Any suitable means may be provided for detecting the presence of salt water in the condenser, as for instance, salinometers designated by *h* and which may be inserted in the branch conduits Q between the hotwells and the valve casing U.

During the normal operation of the condenser the valves *b* are seated upon the seats X to prevent the entrance of condensate into the conduits *e* and *f* and to provide a free path for pure condensate through the conduits Q and R to the pump S.

If, during the course of operation a leak occurs in any of the cooling tubes E so that salty cooling water flows into one of the compartments F the respective valve *b* associated with the compartment wherein leakage occurs may be actuated to its other extreme position to seat upon the seat W. In this way communication is cut off between the affected compartment and the pump intended for removing pure condensate, and the pump *g*, which may be that intended for removing polluted condensate, is then set in operation. In this way the salt water will be prevented from finding its way into the boiler feed supply.

Communication between the affected compartment and the air and non-condensable gas evacuating apparatus which may be a steam ejector *l* may then be cut off by a suitable valve *k*. The ejector *l* may be connected in any suitable manner to the separate hotwells L at air removal outlets *j*. Shutting off the ejector, will cause the affected compartment to become air bound so that only a very small portion of steam will enter the said compartment. As a result the condensate loss due to the condensation of the steam in the affected compartment will be very slight.

We claim:

1. A condensing system, comprising a condenser having a plurality of condensing compartments, a plurality of condensate removal pumps, means connecting each pump with a common outlet of each of the compartments, and means in said outlet for selectively controlling communication between the compartments and the pump.

2. A condensing system, comprising a condenser having a plurality of condensing compartments, a pump for removing pure condensate from the compartments, a second pump for removing polluted condensate from the compartments, and means for selectively placing either pump in communication with the compartments, and simultaneously breaking communication with the other pump.

3. A condensing system, comprising a condenser having a plurality of condensing compartments, a pump for removing pure condensate therefrom, another pump for removing polluted condensate therefrom, and single control means associated with each compartment for effecting communication between any compartment and either pump.

4. A condensing system, comprising a condenser having a plurality of condensing compartments, a plurality of conduits connected to convey condensate therefrom and leading to different destinations, and a valve associated with each compartment for selectively communicating the conduits with the condenser.

5. A condensing system, comprising a condenser having a plurality of condensing compartments, a plurality of conduits connected thereto for conveying condensate therefrom, and a valve associated with each compartment to selectively place any of the conduits in communication with said compartment.

6. A condensing system, comprising a condenser having a plurality of condensing compartments, separate hotwells in the condenser for each compartment and having outlet openings for condensate, a pair of condensate removal pumps, conduits arranged in pairs and connecting each outlet opening to each pump, and a valve associated with each outlet for selectively controlling the flow of condensate to either pump.

7. In a condenser of the surface type, means to segregate condensate from different condensing sections, and separate means to divert contaminated condensate from the feed water system.

8. In combination a surface condenser divided into separate sections for the condensation of steam and the collection of condensate, a condensate outlet from each section, and means associated with each outlet to selectively direct the course of the condensate therefrom.

9. In combination a surface condenser divided into separate sections for the condensation of steam and the collection of condensate, a condensate outlet from each section, and means manually operable associated with each outlet to selectively direct the course of the condensate therefrom.

10. In combination a surface condenser divided into separate sections for the condensation of steam and the collection of condensate, a condensate outlet from each section, and a

valve associated with each outlet to selectively direct the course of the condensate therefrom.

11. In combination a surface condenser divided into separate sections for the condensation of steam and the collection of condensate, a condensate outlet from each section, connections from each outlet to a condensate circulating pump and a discharge pump, and single means in each outlet to selectively direct the condensate to either pump.

12. In combination a surface condenser divided into separate sections for the condensation of steam and the collection of condensate, a condensate outlet from each section, connections from each outlet to a condensate circulating pump and a discharge pump, and a valve in each outlet to selectively direct the condensate to either pump.

13. A surface condenser divided into separate sections for the condensation of steam and the collection of condensate, and means to selectively reduce the condensing capacity of any section and to segregate the condensate therefrom.

14. A surface condenser divided into separate sections for the condensation of steam and the collection of condensate, separate condensate outlets from each section, means to reduce the steam flow through any section, and separate means in each condensate outlet to control the disposition of the condensate therefrom.

15. A surface condenser divided into separate sections for the condensation of steam and the collection of condensate, separate condensate outlets from each section, air evacuation means connected to each section, means to control the air evacuation from each section, and separate means to control the disposition of the condensate therefrom.

In testimony whereof we have signed this specification.

PAUL A. BANCEL.
JOHN KIRGAN.