

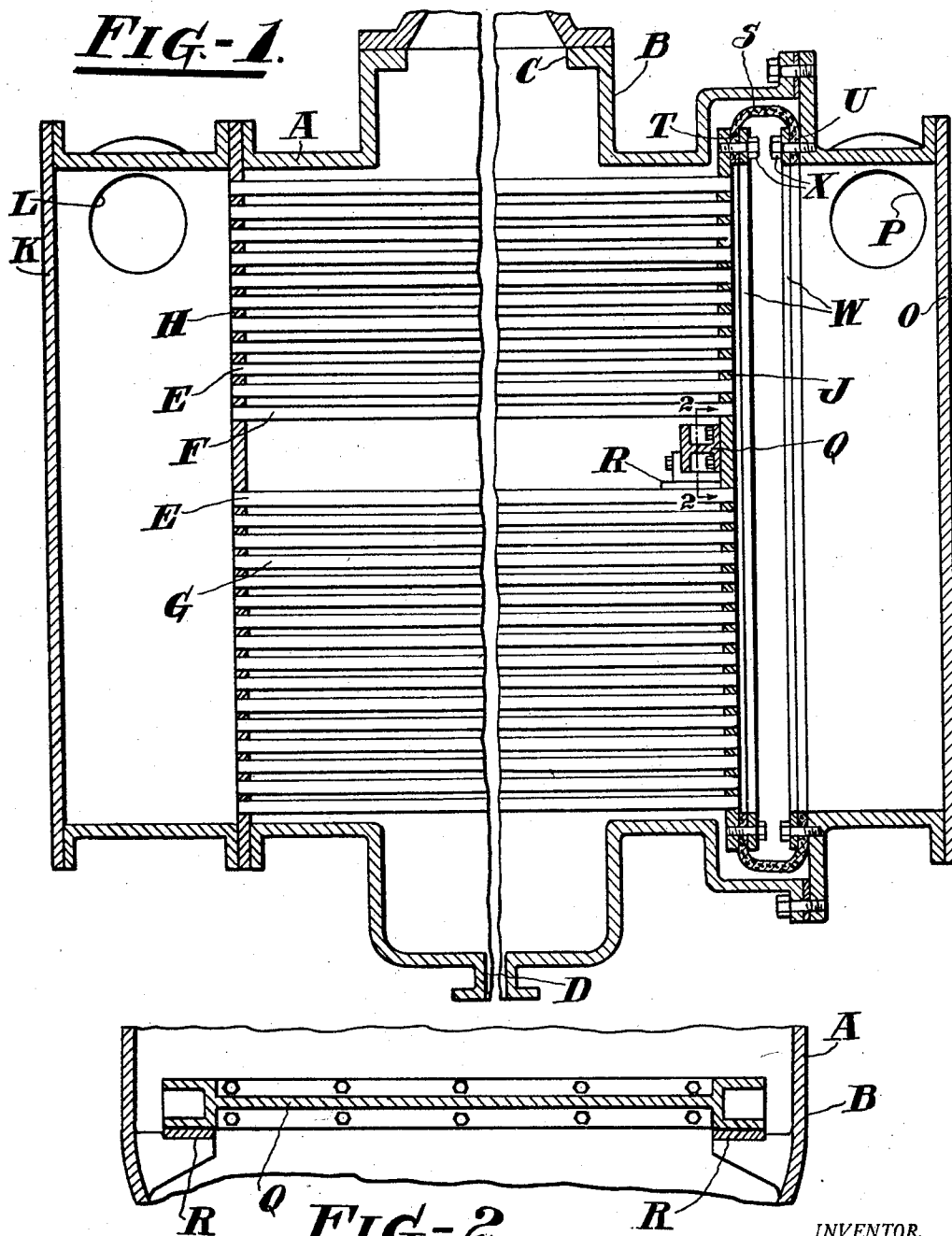
Nov. 10, 1931.

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1,831,454

CONDENSER

Filed Aug. 15, 1930



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CONDENSER

Application filed August 15, 1930. Serial No. 475,572.

This invention relates to condensers, but more particularly to a flexible joint for condensers of the surface type.

One object of the invention is to assure the maintenance of fluid tight joints between the tubes and the tube sheets whereby they are supported.

Another object is to permit of free contractile and expansive movement of both the cooling tubes and the casing without imposing one of these elements to a strain as a result of such movement of the other element.

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

In the drawings accompanying this specification and forming a part thereof,

Figure 1 is a longitudinal sectional elevation of a surface condenser constructed in accordance with the practice of the invention, and

Figure 2 is a transverse view taken through Figure 1 on the line 2—2 looking in the direction indicated by the arrows.

Referring more particularly to the drawings, A designates generally a condenser comprising a casing B which is provided with the usual inlet opening C for steam and an outlet opening D through which the products of condensation may pass from the casing B.

For simplicity of illustration the condenser A is shown as being of the single pass type in which the tubes E are arranged in this instance in groups designated as F and G. The tubes E are arranged longitudinally of the casing B and extend with their opposite ends into tube sheets H and J to which they may be secured in fluid tight relationship in any well known manner, as for example, by expanding the ends of the tubes in the tube sheets.

The tube sheet H is preferably seated against the end of the casing B and in turn acts as a seating surface for an inlet water box K which may be secured to the casing in any suitable and convenient manner. The water box K has an inlet opening L through which cooling water may enter the water box K for supplying the tubes E.

Secured in suitable manner, as for instance to the casing B, is an outlet water box O into

which the cooling water is discharged from the tubes E and said water box O has a discharge opening P through which the cooling water may pass from the condenser A.

As is well known, in apparatus of the character to which the present invention relates, the several component parts or groups of parts are exposed to mediums of different degrees of temperature, so that in condensers where the tube sheets are affixed to the casing of the condenser and the tubes are secured to the tube sheets any expansive or contractile movement of one element or groups of elements will be directly transmitted to the associated or contacting elements. This is objectionable, and especially so in condensers wherein the tubes are secured to the tube sheets by the method of expansion of the ends of the tubes, since it tends to loosen the seal between the tubes and the tube plates and frequently causes tube breakage, particularly in such cases where the tubes have been previously weakened by corrosion.

The present invention contemplates the provision of means adapted to prevent the exposure of the tubes to the contractile and expansive movement of the casing B. To this end the tube sheet J is formed of smaller cross sectional area than the casing B wherein it is disposed so that throughout the entire operation of the condenser A, irrespective of the relative change of positions of the tube sheet J and the casing B, there will at all times exist a space or spaces between these elements.

The tube sheet J is accordingly provided with a beam Q which may be bolted to the tube sheet or otherwise suitably secured thereto, and the said beam Q, which preferably extends transversely of the casing B and is located between the groups of tubes F and G, is seated with its ends upon bearing members R located within the casing B and on the side walls thereof.

The ends of the beam Q are seated loosely on the bearings R so that whenever the tubes E expand or contract the said beam Q may slide freely on the bearings R whereby it, the tube sheet and elements connected thereto will be supported.

In order to prevent communication between the interiors of the water box O and the casing B a flexible connection or band S, which may consist of rubber or other suitable impervious material, is disposed between the water box O and the tube sheet J so that, in effect, it forms a portion of the water box O. Preferably the band S is of U-shape cross sectional area of which the straight legs T and U are in this instance introverted to lie against the adjacent surfaces of the tube sheet J and the water box O respectively. Disposed upon the inner surfaces of the legs T and U are clamping rings W which are firmly clamped in position by bolts X to compress the legs T and U for forming fluid tight joints between the band S and the associated elements.

As will be readily apparent from the foregoing description, any relative movement between the casing B and the tubes E, such as may result from unequal expansion of these elements, may freely take place without imposing one element to strains resulting from movement of another element.

I claim:

1. A surface condenser, comprising a casing, a water box for the casing, cooling tubes in the casing, a tube sheet having the tubes secured thereto, supporting means on the tube sheet cooperating with the casing for holding the tube sheet suspended in the casing, and flexible means spaced from the casing and associated with the tube sheet and the water box to form a joint therebetween.

2. A surface condenser, comprising a casing, a water box, cooling tubes in the casing, a tube sheet having the tubes secured thereto, bearing means carried by the casing, supporting means on the tube sheet for holding the tube sheet suspended in the casing and being slidably supported by the bearing means, and flexible means spaced from the casing and associated with the tube sheet and the water box to form a joint therebetween.

3. A surface condenser, comprising a casing, a water box at the end of the casing, cooling tubes in the casing, a tube sheet having the tubes secured thereto, bearing means carried by the casing, supporting means on the tube sheet and being slidable on the bearing means relatively to the casing to permit of free contractile and expansive movement of the tubes, and flexible means connected to the tube sheet and the water box to form a joint therebetween.

4. A surface condenser, comprising a casing, a water box fixedly secured to the end of the casing, cooling tubes in the casing, a tube sheet in the casing having the tubes secured thereto and being of smaller area than the casing to avoid contact between the tube sheet and the casing, integral bearing means on the casing, supporting means on the tube sheet slidable on the bearing means in the casing to

permit of movement of the tube sheet relatively to the casing, and flexible means spaced from the casing and connected to the tube sheet and the water box to form a joint therebetween.

5. A surface condenser, comprising a casing, a water box, cooling tubes, a tube sheet in the casing having the tubes secured thereto, bearings in the casing, a beam secured to the tube sheet and loosely seated on the bearings to hold the tube sheet suspended in the casing, and a flexible joint between the tube sheet and the water head to seal the interior of the casing from the water head.

6. A surface condenser, comprising a casing, a water box fixedly secured to the end of the casing, cooling tubes in the casing, a tube sheet in the casing spaced from the water box and having the tubes secured thereto, bearing means carried by the casing, supporting means on the tube sheet slidable on the bearing means to permit movement of the tube sheet relatively to the casing, flexible means spaced from the casing and connected to the tube sheet and the water box to enclose said space and seal the interior of the casing from the water box.

In testimony whereof I have signed this specification.

JOHN KIRGAN.