

Aug. 19, 1941.

W. E. CROSBY

2,252,916

PLATE-TYPE APPARATUS

Filed March 20, 1939

2 Sheets-Sheet 1

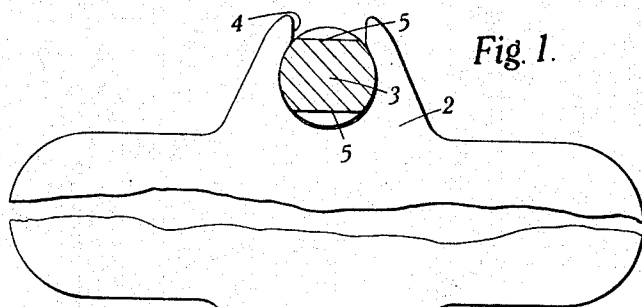


Fig. 1.

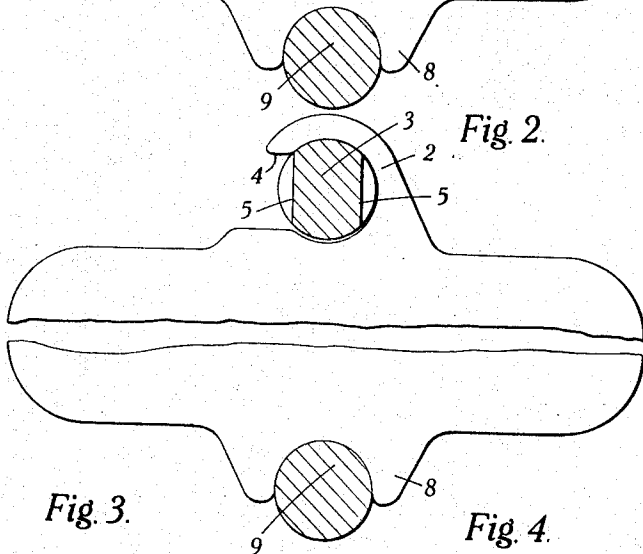


Fig. 2.

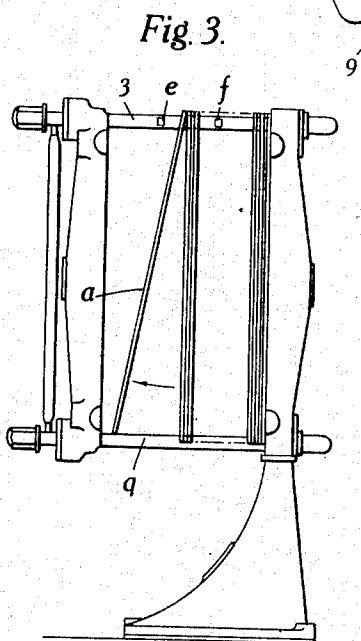


Fig. 3.

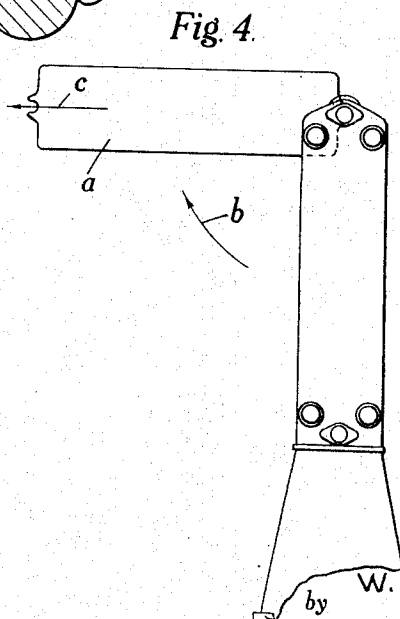


Fig. 4.

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Fig. 5.

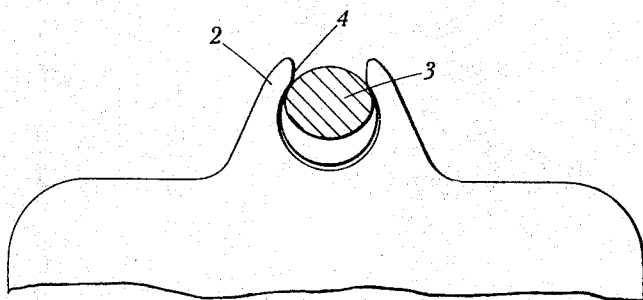


Fig. 6.

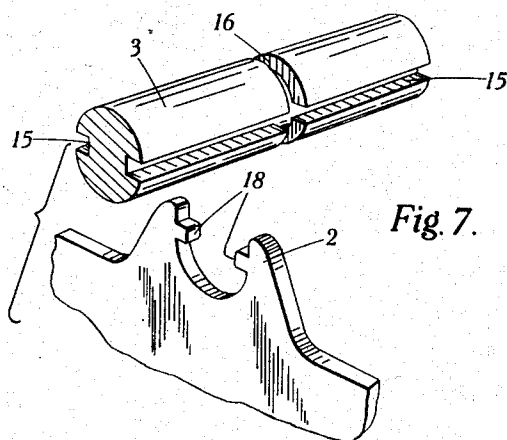
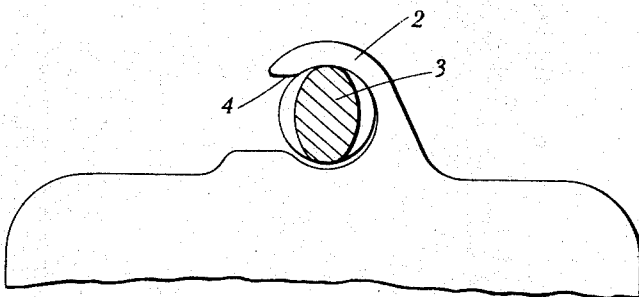


Fig. 7.

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UNITED STATES PATENT OFFICE

2,252,916

PLATE-TYPE APPARATUS

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Application March 20, 1939, Serial No. 262,972
In Great Britain May 30, 1938

9 Claims. (Cl. 257-245)

This invention relates to plate type heat exchangers, filter presses and like apparatus built up of a plurality of juxtaposed plate members or plate member and frame members.

The invention is more particularly concerned with apparatus of the type referred to in which the plate members or the plate members and the frame members are supported in position on or by a pair of horizontally disposed bars one of which may be arranged at the upper end of the said members and the other at the lower end of said members. Usually in such apparatus, each member is provided with an apertured lug at its upper end and with a slotted lug at its lower end so that the members can be threaded over and suspended from the upper bar with their lower lugs resting on or extending over the bottom bar.

The chief object of the present invention is to simplify the means for supporting the said members so that they may be more readily removed from the heat exchanger, filter-press or the like when necessary and yet will not fall out of their own accord.

According to the invention the apertured lugs provided at one end of the said members are slotted or formed with cut-away portions extending outwardly from the aperture to the periphery of the lug and the upper bar or one of the bars is shaped or formed over at least a part of its length to enable the slotted lug of the member to be removed to be detached therefrom as, for example, by sliding the same laterally of the bar.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to the accompanying drawings, in which—

Figs. 1 and 2 illustrate two modes of forming the lugs at the upper ends of plate members or frame members.

Figs. 3 and 4 are explanatory views showing the procedure adopted for removing from a heat exchanger or filter-press plate members or frame members provided with lugs of the forms shown in Figs. 1 and 2; and Figs. 5, 6 and 7 illustrate further alternative modes of carrying the invention into effect.

According to the form of the invention illustrated by Fig. 1, the lug 2 provided at the upper end of a plate or frame member of a heat exchanger or filter press is formed, at the part hereof which is normally disposed above the upper supporting bar 3 of the heat exchanger

or filter press, with a slot 4 of a width which is less than the diameter of the said bar and at a convenient point along its length the bar is reduced in cross section as, for example, by forming the same with two diametrically opposite flat portions 5 spaced from one another a distance which is less than the width of the said slot, the said flattened portions being disposed horizontally or in some other non-vertical position.

Alternatively, the slot 4 may, as indicated in Fig. 2, be provided at a part of the apertured lug which is normally disposed to one side of the upper bar so that the upper end of the plate or frame member has a hook-like formation. Also, the part of the bar of reduced cross section may then be formed by two vertically or obliquely disposed flat portions 5.

At their lower ends, the plate or frame members are preferably formed with slotted lugs 8, which rest on or extend over the bottom bar 9 of the heat exchanger or filter press.

In order to remove a plate member or frame member formed as described from a heat exchanger or filter press, the said member is first tilted or swung away from the other elements of the apparatus into a position such as that illustrated by the member *a* in Fig. 3, in which the forked portions of the lug 8 are free to move laterally of the lower bar 9. Thereafter it is slid along the top bar 3, until the slot 4 and the part of the bar of reduced cross section register with one another and swung upwardly about the bar (as indicated, for example, by the arrow *b* in Fig. 4) until, by longitudinal displacement of the said member in the direction of the arrow *c* in Fig. 4, it can be freed from the supporting bar. If desired, the bar 3 may be formed with a plurality of portions of reduced cross sectional area. For example, as shown in Fig. 3, it may be provided with two such portions as indicated at *e* and *f*. In some instances, it may be undesirable, from a practical standpoint, to use a supporting bar with parts thereof permanently removed therefrom to provide portions of reduced cross-sectional area and, in such cases, the removed part or parts corresponding in shape with the shape of the removed parts may be used as detachable pads which are normally screwed or otherwise secured in position on the parts of reduced cross-section to give the bar a substantially constant cross-section and which can be removed therefrom when it is necessary to uncover the part

of reduced cross sectional area for the purpose of enabling a plate or the like to be removed.

Also, in some instances, instead of forming the supporting bar 3 with one or more portions of reduced cross sectional such as are provided by the flattened portions described with reference to Figs. 1 and 2, the bar may be formed so that it is non-circular, e. g., elliptical, in cross section over the whole or a part of its length. Examples of such arrangements are illustrated in Figs. 5 and 6, the parts being proportioned so that a plate or frame member to be removed can be detached from the bar by swinging it laterally about the bar until the slot 4 is opposite a portion of the bar of reduced thickness and then displacing the same longitudinally.

Also, in some instances, the reduction in the cross section of the supporting bar may be obtained by forming in the bar an annular or arcuate groove. For example, as is illustrated by Fig. 7, the bar 3 may be formed with one or more longitudinally extending grooves 15 which terminate or merge into an annular or arcuate groove 16 and the lug 2 may be formed with an inwardly extending projection or projections 18 engaging the groove or grooves 15, the arrangement being such that a plate member or the like can be detached by sliding it along the bar until the groove 16 is reached and then displacing the same longitudinally.

It will be appreciated that the invention is not restricted to use with apparatus provided with upper and lower bars for supporting the elements or plates and that it is also applicable to apparatus in which the elements, plates or frames are adapted to be supported in position on bars arranged in the same or substantially the same horizontal plane.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:

1. An apparatus of the built-up plate type for the treatment of fluids, comprising a supporting bar, a plurality of plate-like elements, and a lug on each element adapted to receive the supporting bar, said lug being slotted to provide a mouth for the opening, said mouth being of a width less than the major cross-sectional dimension of the bar to prevent the removal of the bar through the mouth, and said bar having a portion of a cross-section less than the width of the mouth adapted to freely pass through the mouth.

2. An apparatus of the built-up plate type for the treatment of fluids, comprising a round supporting bar, a plurality of plate-like elements, and a lug on each element adapted to receive the supporting bar, said lug being slotted to provide a mouth for the opening, said mouth being of a width less than the major cross-sectional dimension of the bar to prevent the removal of the bar through the mouth, and said bar having a portion of a cross-section less than the width of the mouth adapted to freely pass through the mouth.

3. An apparatus of the built-up plate type for the treatment of fluids, comprising a round supporting bar, a plurality of plate-like elements, and a lug on each element adapted to receive the supporting bar, said lug being slotted to provide a mouth for the opening, said mouth being

of a width less than the major cross-sectional dimension of the bar to prevent the removal of the bar through the mouth, and said bar having two diametrically opposed flat portions spaced apart a distance less than the width of said mouth adapted to freely pass through the mouth.

4. An apparatus according to claim 10, in which the supporting bar is reduced in cross-section by the formation therein of an annular groove.

5. An apparatus of the built-up plate type for the treatment of fluids, comprising a round supporting bar, a plurality of plate-like elements, a lug on each element adapted to receive the supporting bar, said lug being slotted to provide a mouth for the opening, said mouth being of a width less than the major cross-sectional dimension of the bar to prevent the removal of the bar through the mouth, said bar having a longitudinally extending groove formed therein, and a projection carried by said lug and extending into said longitudinal groove, and said bar further having a portion of reduced cross-section to enable the bar to pass freely by said projection.

6. An apparatus of the built-up plate type for the treatment of fluids, comprising a round supporting bar, a plurality of plate-like elements, a lug on each element adapted to receive the supporting bar, said lug being slotted to provide a mouth for the opening, said mouth being of a width less than the major cross-sectional dimension of the bar to prevent the removal of the bar through the mouth, said bar having a longitudinally extending groove formed therein, and a projection carried by said lug and extending into said longitudinal groove, and said bar having an annular groove merging into the longitudinal groove to enable the bar to pass freely through the mouth of the lug and by said projection.

7. An apparatus for the treatment of fluids, comprising a pair of spaced parallel bars, a plurality of plate-like elements, lugs on opposite edges of said elements, each lug having an opening therein to receive one of said bars, the mouth of the opening of one of said lugs being of a width at least equal to the diameter of the bar to be received thereby to provide for the movement of the bar into and out of said opening through the mouth thereof, the mouth of the opening of the other of said lugs being of a width less than the diameter of the bar to be received thereby, and said last-mentioned bar having portions of reduced cross-section to provide for the movement of the bar into and out of the opening through the mouth thereof.

8. An apparatus of the built-up plate type for the treatment of fluids, comprising a supporting bar, a plurality of plate-like elements, a lug on each element adapted to receive the supporting bar, said lug being slotted to provide a mouth for the opening, said mouth being of a width less than the major cross-sectional dimension of the bar to prevent the removal of the bar through the mouth, and said bar having a portion of a cross-section less than the width of the mouth adapted to freely pass through the mouth, a second bar parallel to said supporting bar, and a lug on the opposite edge of each plate-like element having an opening for receiving said second bar.

9. An apparatus according to claim 1, in which the bar is elliptical in cross-section.

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