Coalescing plates for fluid mixture separators are formed with integral spacers permitting the plates to be joined into stacks. Stacks can be made with the plates vertically aligned, or offset laterally for inclined stacks.

5 Claims, 8 Drawing Figures
COALESCING PLATE FOR FLUID MIXTURE PLATE SEPARATOR

BACKGROUND OF THE INVENTION

This invention relates generally to plate separators for fluid mixtures, and more particularly to an improved plate for such separators.

In my copending application entitled Plate Separator for Fluid Mixtures, Ser. No. 248,421, filed Apr. 28, 1972, there is disclosed a separator employing corrugated plates. As described therein, the plates are stacked to form a plurality of fluid passages by using tie rods with spools on the rods to achieve the desired spacing.

This prior stacking approach, while operative, is somewhat time consuming, limits to some extent the way a stack can be arranged, and requires the stocking of many tie rods and spools.

SUMMARY OF THE INVENTION

In a preferred form of the invention, a coalescing plate is formed having a plurality of crests separated by depressions forming transverse corrugations. Bleed holes are provided in the crests of the corrugations with some of the bleed holes also functioning as receptacles for spacers extending from similar plates. The receptacles are slotted to permit joined plates to be laterally offset if desired.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 and FIG. 1A are isometrics of a portion of a plate in accordance with the invention; FIG. 2 is a detail, partially in cross-section, of the plate of FIG. 1; FIG. 2A is a side view, in cross-section, of a portion of FIG. 2; FIG. 3 is a cross-section of an alternative spacing and receptacle means; FIG. 4 is a cross-section of another alternative spacing, receptacle and bleed hole configuration; FIG. 5 is a plan view of a portion of a liquid mixture separator showing one arrangement for using the plates of this invention; and FIG. 6 is an elevation in cross-section of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a portion of a coalescing plate 10 for a fluid mixture plate separator. Plate 10 has a plurality of crests 11 separated by depressions 13 which form transverse corrugations. In a plate separator for a fluid mixture such as oil/water, plates 10 are stacked with additional stacks placed end to end and/or side by side. As the mixture passes through the separator, the lighter component rises and collects beneath crests 11. At crests 11 are a plurality of circular bleed holes 12 along the center line of the plate which permit oil, or the like, to pass through a lower plate to an upper. Partial bleed holes 14 are located at the edges of plate 10, which, when abutted to a similar plate, form complete bleed holes. Also at crests 11 between center bleed holes 12 and partial bleed holes 14, are elongated or slotted bleed holes 16.

In addition to functioning as a bleed hole, slotted bleed holes 16 act as receptacles for integral spacers 18 (FIGS. 2 and 2A). Slotted bleed holes 16 together with integral spacers 18 permit plates 10 to be joined together either aligned vertically or displaced laterally. Slotted bleed holes 16 and integral spacers 18 may be designed to have a snug fit as in FIGS. 2 and 2A, or a snap fit as shown in FIG. 3.

As an alternate embodiment, integral spacers 18 together with slotted receptacles 20 may be located at the bottom of the corrugations with separate bleed holes 12 at the top (FIG. 4). Also, as shown here, spacers 18 may be on the top of the plate.

Returning to FIG. 1, and in particular FIG. 1A, it can be seen that in addition to partial bleed holes 14, slits 22 extend into plate 10. Slits 22 are provided to receive thin metal strips which will act as buffers preventing undesired flows.

For example, in the arrangement shown in FIGS. 5 and 6 (plan and elevation respectively) plates 10 have been stacked in an inclined fashion in separator 24. This arrangement permits sand, sludge or the like, heavier than the liquid to move down the bottoms of the corrugations and into trough 26 for collection and removal, as well as facilitating the upward flow of lighter components. Side strips 28 fit in the slots at the outer edge of the plates to force the liquid up the sides to pass between the plates. Center strips 30 also perform this function, but if desired may be made hollow and used to inject air into the mixture to aid in separation. In some cases the region above the plate banks can be used to collect the lighter components of the mixture.

The coalescing plates of this invention can also be horizontally oriented rather than inclined. The stacks formed in this arrangement can be closely abutted and do not require strips 28 as in FIG. 5 and 6.

Plates in accordance with this invention have been fabricated of polypropylene with overall dimensions of 2 feet by 1 foot by 1 inch. The spacers have been fabricated to give a vertical distance between plates of one-fourth inch, however, provision has been made (in the molds) for changing the length of the spacers. Thus if an oil/water mixture has only a small amount of oil, the distance between plates should be less than when a larger proportion of oil is contained.

While particular embodiments of coalescing plates have been illustrated and described, it will be obvious that changes and modifications may be made without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. A coalescing plate for a fluid mixture plate separator comprising:
   a plurality of crests separated by depressions forming transverse corrugations;
   spaced bleed holes in the crests of the corrugations;
   spacing means including a projection integral with and extending from a first surface of said plate to space it from a similar plate; and
   receptacle means including a slot in a second surface of said plate positioned opposite said projection and being adapted to receive a projection from a similar plate;
   whereby a plurality of said plates may be positioned in stacked relationship, the projections being received by corresponding slots so that the transverse corrugations of each plate are spaced at all points from the transverse corrugations of adjacent plates.
3. A coalescing plate in accordance with claim 1 wherein:
said spacing means and said receptacle means are located at the bottom of the depressions.

4. A coalescing plate in accordance with claim 3 wherein:
said receptacle means is an integral part of at least some of said bleed holes.

5. A coalescing plate in accordance with claim 4 wherein:
slits extending inwardly from the sides are formed at the crests and depressions of the corrugations.