Feb. 13, 1934. L. A. MEKLER 1,946,945

RETURN BEND PLUG DEFLECTOR

Filed Sept. 2, 1930

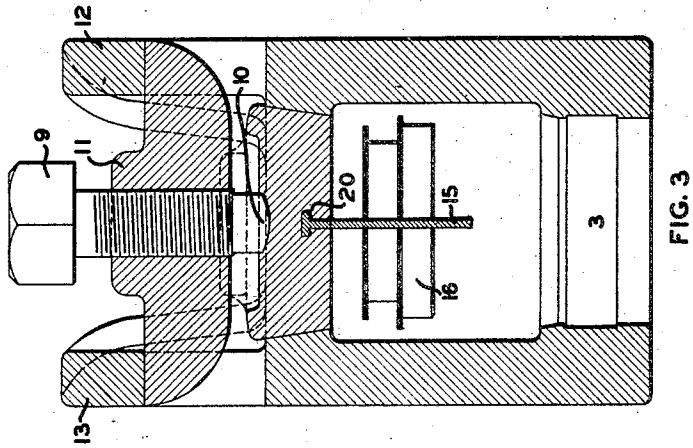


FIG. 3

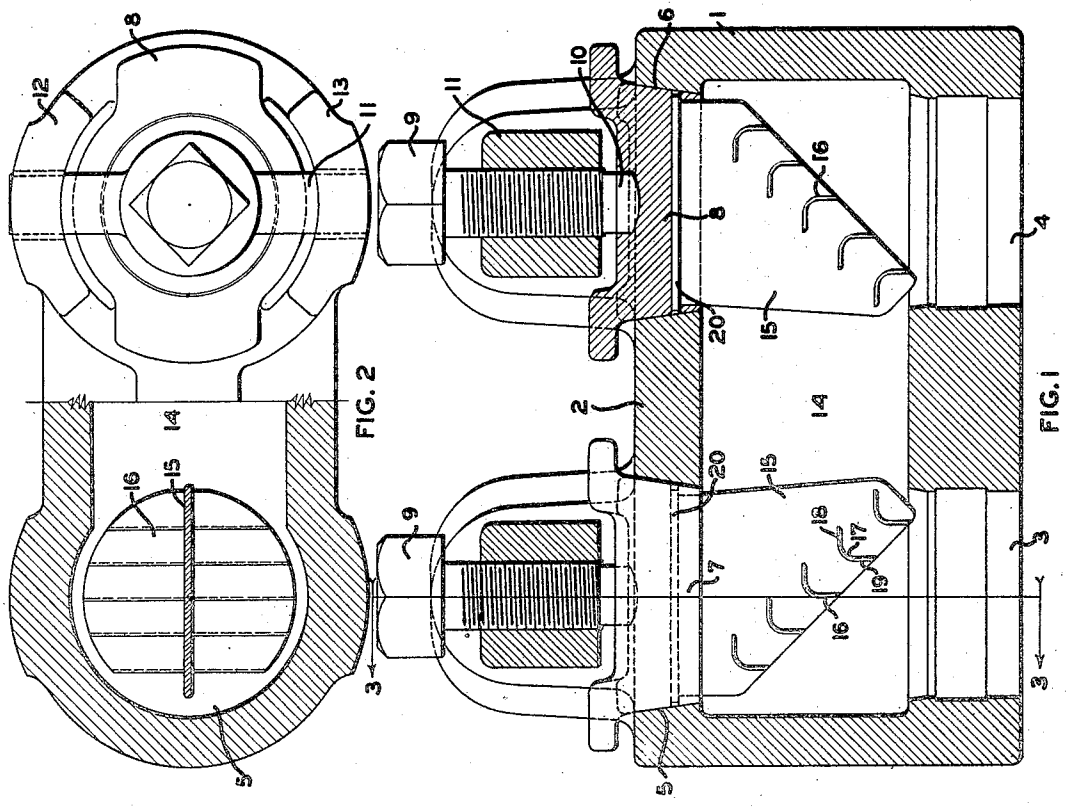


FIG. 2

FIG. 1

INVENTOR

LEV A. MEKLER

BY Frank L. Belknap

ATTORNEY

Patented Feb. 13, 1934 1,946,945

UNITED STATES PATENT OFFICE

1,946,945

RETURN BEND PLUG DEFLECTOR

Lev A. Mekler, Chicago, Ill., assignor to Universal Oil Products Company, Chicago, Ill., a corporation of South Dakota

Application September 2, 1930. Serial No. 479,409

6 Claims. (Cl. 137—75)

This invention relates to improvements in a means and method of decreasing the turbulence and friction within return bends connecting adjacent fluid conduits, and is especially applicable to return bends utilized in connection with tubes of the heating elements of a cracking or oil distilling process.

The objects and advantages of my invention will be apparent from the accompanying drawing and following detail description.

In the drawing, Fig. 1 is a longitudinal sectional elevation of a return bend suitably equipped to carry out my invention.

Fig. 2 is a plan view partly in plan section of the device shown in Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1.

Referring more in detail to the drawing, 1 indicates the body portion of a return bend 2. The body 1 may be provided with apertures 3 and 4 into which adjacent tubes (not shown) may be threaded or otherwise suitably fastened. Said tubes may constitute one pair of a plurality of tubes which go to make up a tube bank of a furnace which may be utilized to heat water, oil or other fluid.

In the heating of fluids such as those hereinabove mentioned in tubular boilers or tubular stills, when said fluid is passed through the individual tubes which make up the tube bank considerable turbulence exists in the return bends which connect adjacent tubes. This turbulent state, as can readily be seen, increases the friction of the passage of the fluid, and hence decreases the rate of flow therethrough. My invention is especially directed to the elimination of this turbulent state of fluid passing from one tube to the next adjacent tube through a return bend, and hence is directed to the maintenance of a high velocity of flow of fluid through the tube bank as a whole.

The body 1 in addition to being provided with apertures 3 and 4 may also be provided with apertures 5 and 6, which may be, respectively, oppositely disposed from the apertures 3 and 4. Plugs 7 and 8 may be normally positioned within the apertures 5 and 6 and may be provided, if desired, with conically tapered peripheral edges which may be ground to fit similarly tapered sides defining the apertures 5 and 6. In this manner a substantially perfect fit of the plugs 7 and 8 within the apertures 5 and 6, respectively, may be obtained.

To maintain the plugs 7 and 8 in position within apertures 5 and 6 when pressure is established within the body 1 a screw 9, provided with a blunt tip 10, may be operatively disposed above each of said plugs, the tip of said screw being adapted to bear upon the upper portions of the plugs. The screw 9 may be threadedly engaged in a yoke 11, the ends of which may project under arches 12 and 13 positioned upon opposite sides of each of the apertures 5 and 6. By this arrangement it can readily be seen that rotation of the screw 9 will tend to exert a downward force upon the upper portion of each of the plugs 7 and 8.

By the provision of the apertures 5 and 6 directly opposite apertures 3 and 4, respectively, it can readily be seen that plugs 7 and 8 may be removed at will, and the tubes connected into the return bend 2 may be cleaned.

As a feature of my invention, fluid passing, for instance, upwardly through aperture 4 may be directed at right-angles to its upward flow through the connecting conduit 14 of the return bend and downwardly through aperture 3. In order to decrease the turbulence and friction in this portion of the flow of the fluid I may provide a supporting plate 15 which may depend from the lower surface of each of the plugs 7 and 8. A plurality of fins 16 may be mounted upon the plates 15, said fins being formed similar to structural angle irons except that the right angle bend is preferably rounded, both inside and out, instead of having a sharp outer corner. In other words, the fins 16 may be centrally bent to a rounded contour, as shown at 17, to provide two right angularly disposed legs 18 and 19. The fins 16 upon the plates 15 depending from each of the plugs 7 and 8 may be disposed upon said plates at an angle of approximately 45° to the axis of the apertures 3 and 4, and also to the axis of the space 14 provided within the return bend 2.

The fins 16 upon the plate 15 depending from the plug 8 may be oppositely disposed with respect to the fins upon the plate 15 depending from the plug 7 in such a manner that fluid passing upwardly through the aperture 4 will contact the fins 16 positioned upon the plate 15 depending from the plug 8, and said fluid will be directed at right-angles to its initial direction of travel. In other words, a fluid will be directed to the fins disposed beneath the plug 7 and said latter fins will direct said oncoming fluid downwardly through aperture 3. In this manner the body of fluid passing upwardly through aperture 4 will be virtually cut into a plurality of parallel sheets, the flow of which, in turn, will be directed at right-angles to the flow through the aperture 4,

and each sheet will respectively contact one of the fins beneath the plug 7, whereupon said sheets will again be deflected at right-angles downwardly through aperture 3.

It can readily be seen that by this means of reversing the direction of flow of the fluid, turbulence within the return bend 2 will be substantially eliminated, and hence friction within the tube bank as a whole will be decreased to a minimum.

The plates 15, if desired, may be constructed integral with the plugs 7 and 8, respectively, and the plates 15 and the accompanying fins may be removed from the return bend 2 as a unit with the removal of the plugs 7 and 8. If desired, the plates 15 may be removably mounted upon the lower portions of the plugs 7 and 8, in which case the upper portion of the plates 15 may be formed in the shape of a T, as shown at 20, the lower portion of said plugs being provided with a diametrical T-shaped aperture into which T 20 may be adapted to slide.

I claim as my invention:

1. A removable plug in a box type return bend fluid conduit, comprising in combination, a depending support member associated with said plug, and a plurality of angularly bent deflecting vanes carried by said support member for diverting the flow of fluid through said conduit.

2. A removable plug in a box type return bend conduit, comprising in combination, a depending support member associated with said plug, and a plurality of fins bent at right angles mounted on said support member and adapted to deflect the flow of fluid through said conduit.

3. A removable plug in a box type of return bend conduit, comprising in combination a depending support member formed integral with said plug, and a plurality of angularly bent vanes mounted in progressive, stepwise relationship on said support member adapted to divert fluid during its passage through said conduit.

4. A removable plug in a box type return bend through which hydrocarbon oil passes at high velocity, comprising in combination, a depending support member formed integral with said plug, and a plurality of deflecting fins bent at right angles mounted on said depending support member in progressive, step-wise relationship for diverting the flow of hydrocarbon oil through and out of said conduit.

5. In combination, a return bend conduit, a plurality of openings in the body of said conduit, removable plugs insertable into said openings, a depending support member associated with each of said plugs, and a plurality of angularly bent deflecting vanes carried by said support member adapted to divert the flow of fluid through said conduit.

6. In combination, a return bend conduit, a plurality of openings in the body of said conduit, removable plugs insertable into said openings, a depending support member associated with each of said plugs, and a plurality of deflecting fins bent at right angles mounted on said support member adapted to deflect the flow of fluid through said conduit.

LEV A. MEKLER.