July 10, 1934. H. E. MUCHNIC 1,966,038

RETURN BEND JOINT FOR OIL STILLS

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Fig. 1.

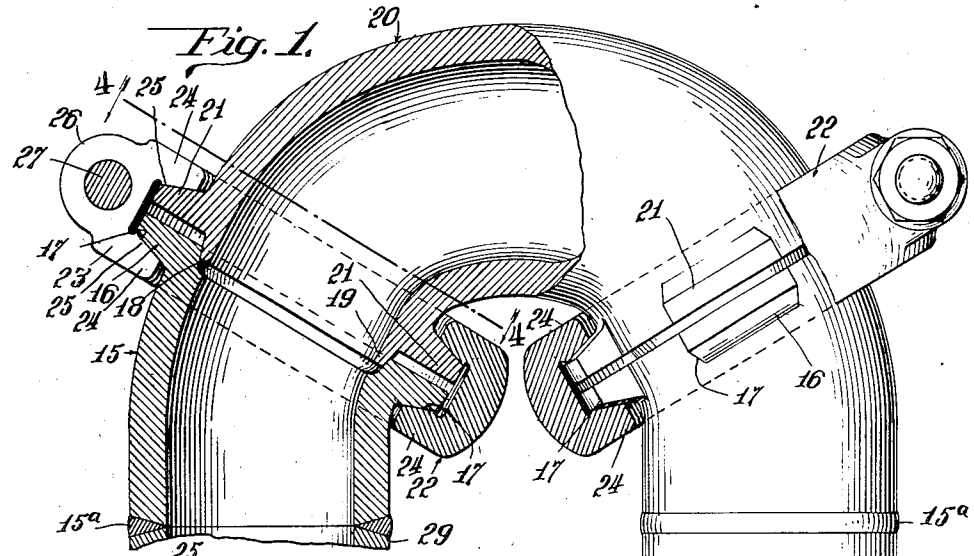


Fig. 2.

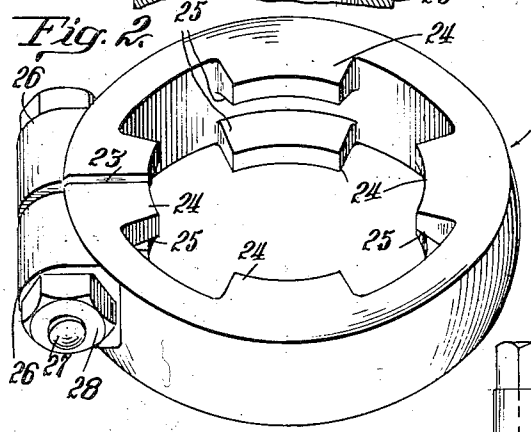


Fig. 4.

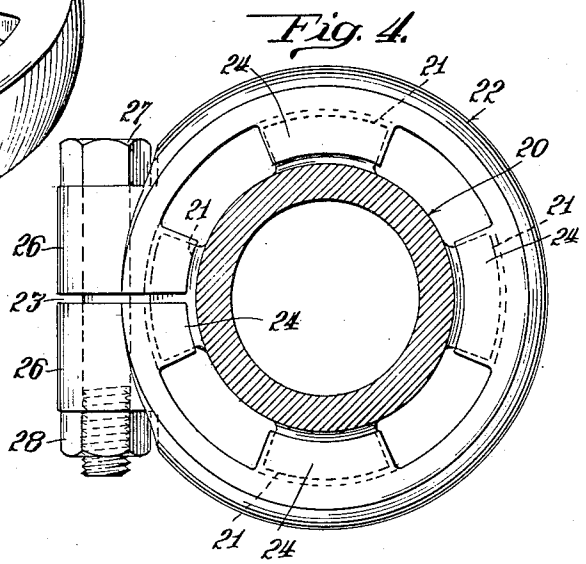
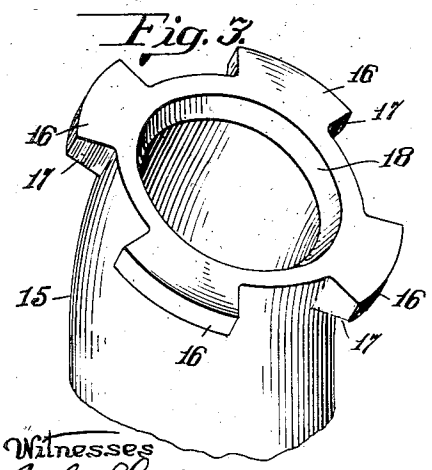


Fig. 3.



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Fig. 5.

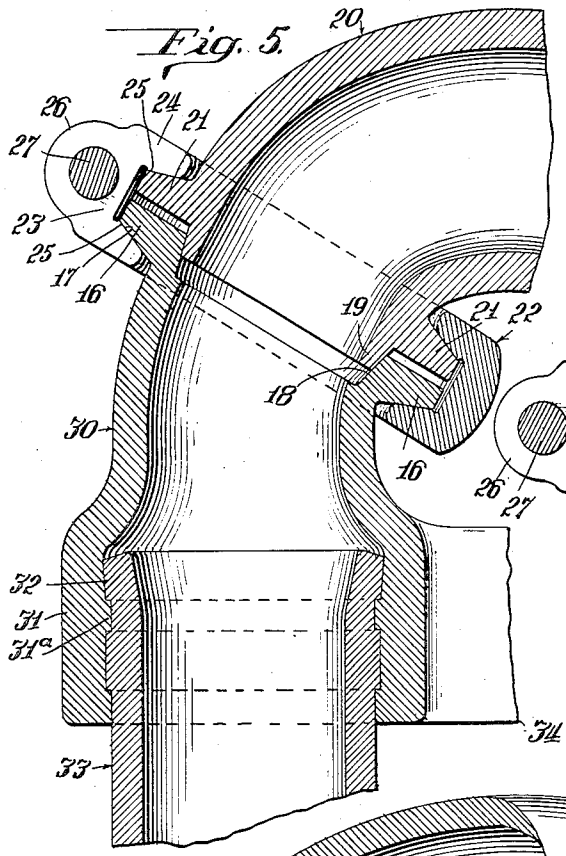


Fig. 6.

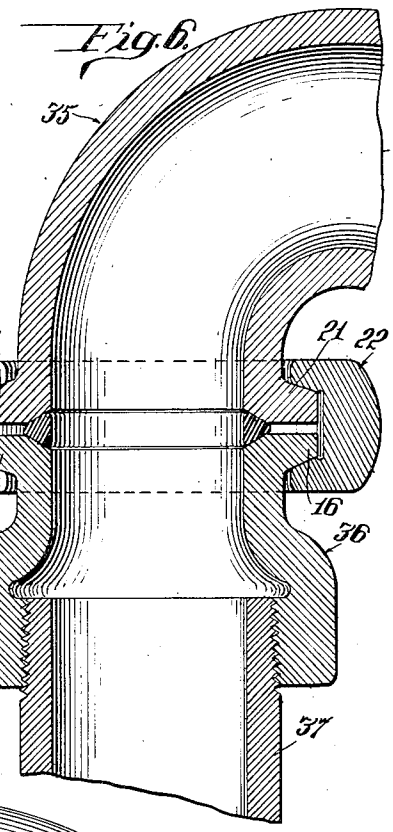
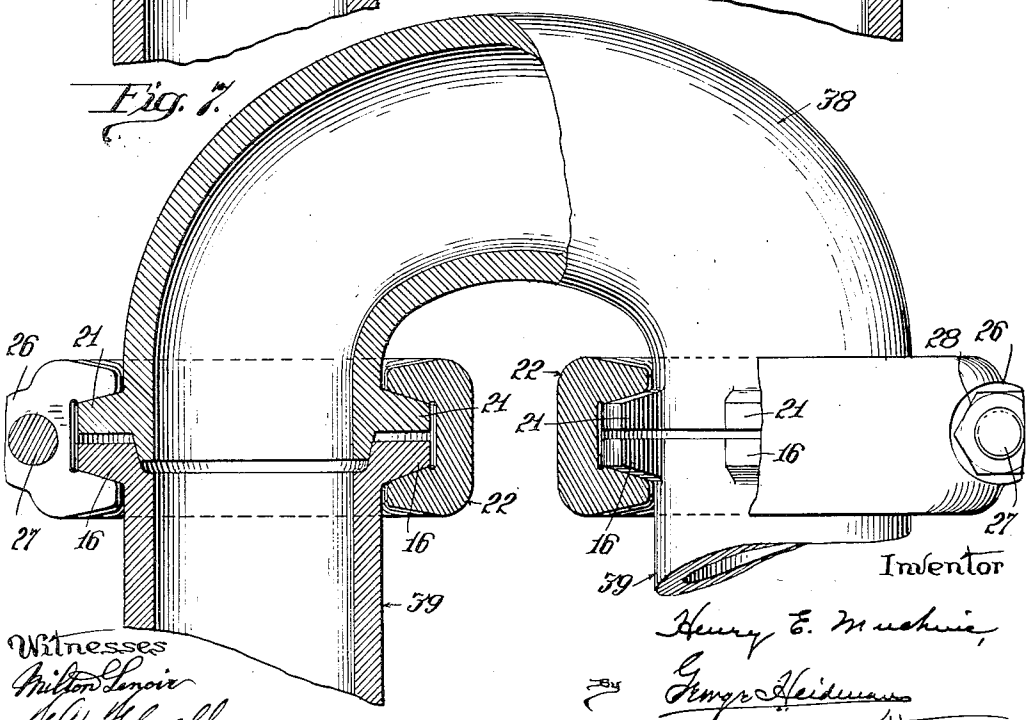


Fig. 7.



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UNITED STATES PATENT OFFICE

1,966,038

RETURN BEND JOINT FOR OIL STILLS

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Application December 24, 1932, Serial No. 648,784

2 Claims. (Cl. 285—20)

My invention relates more particularly to means for effecting pressure resisting joints in the return bends of oil stills, which at the same time will permit the respective bends to be readily removed for cleaning purposes.

In the pressure process of cracking crude oil, the oil is passed through various banks of tubes which are connected to each other by non-integral return bends, which usually consist of steel castings. This distillation process necessitates frequent cleaning of the tubes and the bends, therefore, must be designed to permit the introduction of a tube cleaner into the tube proper.

A common type of return bend in use is of the form known as a box type with removable plugs opposite each tube opening in the return box.

This type of return connection, however, has the disadvantage of causing turbulence or violent agitation, which, with the increased friction resulting from a set of tubes arranged in series, is sufficient to cause a material pressure drop in the tube line.

One object of my invention is to provide what may be termed a stream line bend which obviates this turbulence and causes less reduction in pressure.

My invention involves means adapted to coact with the conduit elements whereby the opposing ends of the conduit elements are tightly drawn together.

Another object of my invention is the provision of joint forming means involving simplicity and accessibility and at the same time less cumbersome and of greatly reduced weight than the conventional type of bends at present employed; while at the same time all portions of my improved means will be in practically the same temperature,—a temperature less than the temperature inside the bend,—so that the heat developed in the operation of the still tends to tighten the joint.

The objects and advantages of my invention will all be readily comprehended from the following detailed description of the accompanying drawings, wherein:—

Figure 1 illustrates my invention in a return bend wherein the joints are at an angle; a portion of the means and portions of the bend and end of one conduit being in section; while the other end of the bend and end of the companion conduit are in elevation with portions of the companion means broken away and in section.

Figure 2 is a perspective view of the joint forming means used in Figure 1.

Figure 3 is a perspective view of one of the tube ends shown in Figure 1, adapted to receive the means shown in Figure 2.

Figure 4 is a cross sectional view taken substantially on the line 4—4 of Figure 1.

Figure 5 is a longitudinal sectional view of one portion of a modified form of return bend formed to receive the means disclosed in Figure 2.

Figure 6 is a similar view of another form of return bend.

Figure 7 is a view substantially similar to Figure 1, illustrating application to a straight joint effected by my improved means.

My improved joint forming means, although applicable for effecting any pipe or conduit joint, is especially adapted to what are known as stream line return bends particularly involved in oil stills for the process of cracking crude oils, where the oil under pressure is made to flow through various banks of tubes connected together by what are termed return bends, which usually consist of steel castings. These tubes require frequent cleaning and therefore these return bends must be so designed as to enable ready removal of the bends and to permit easy access to the tubes for the introduction of a tube cleaner. At the same time it is essential that a pressure resisting joint be provided; with the return bends preferably of the stream line type so as to obviate the difficulties of turbulence and pressure reduction encountered with certain types of return bends.

My invention is equally well adapted to angular and straight types of joints thus enabling its use in various forms of oil still installations.

In the specific embodiment of the invention illustrated, each aligned end of the conduit elements, as for example the somewhat curved pipe section 15 of Figures 1 and 3, is provided with an interrupted flange consisting of the preferably uniform radial elements 16. These elements, which are integral with the pipe section, consist of segments of an annular flange and are preferably spaced equal distances apart as shown in Figure 3; with the lower faces of each segmental element, namely the faces disposed away from the end of the pipe section, tapered toward the outer perimeters of said segmental elements, as shown at 17, while the outer faces are preferably in a straight plane as shown.

The orifice of this pipe section 15 is shown slightly flared or beveled as at 18, to receive the tapered annular extension or lip 19 at the inner

perimeter of the return bend section 20, which, however, is of somewhat lesser length than the depth of the beveled orifice of the pipe section.

The return bend section 20 is also provided with an interrupted exterior flange consisting of segmental elements 21, similar to the segmental elements 16 of the pipe section; namely segmental elements identically like those of the pipe section 15 and tapered on the faces disposed away from the orifice.

In the particular exemplification of the invention, the other element of my joint forming means comprises a one piece clamp member or continuous collar 22 split radially at 23, see Figure 2, to permit the member 22 to be contracted about the pipe section and bend member. This member 22 is of comparative width, namely of width somewhat greater than the combined thickness of the interrupted flanges 16 and 21 on the adjacent ends of the pipe section 15 and the bend 20, see Figure 1.

The member 22 is provided with a pair of interrupted and parallel flanges on its inner circumference, consisting of the radial and inwardly disposed segmental portions 24, arranged in pairs at the opposite annular ends of the member. The inner or opposing faces of each pair of segmental portions 24 are tapered toward the inner perimeters thereof, as shown at 25, in keeping with the taper of the segmental portions 16 on the pipe section 15 and the segmental portions 21 on the return bend 20.

The segmental portions 24 of both circumferential rows are equally spaced apart, with the spacing substantially equal to the circumferential length of the segmental elements or portions 16 and 21 in order that the element 22 may be brought into concentric relation with the interrupted flanges 16 and 21.

In the particular showing of the invention, the encircling collar 22 is shown split at 23 through one pair of segmental portions 24, and the outer periphery of the member, at opposite sides of the split 23, provided with the apertured lobes 26, 26 adapted to receive a bolt 27 whereby the split collar may be drawn together or contracted when the nut 28 is screwed onto the bolt 27.

With the spacing between the segmental portions 24 of the collar member 22 matching the interrupted flanges 16 and 21, it is apparent that the collar member 22 may be slipped onto either pipe section 15 or the bend 20 before these conduit elements are brought into abutting relation.

The segmental portions of the pipe section and bend are intended to be in alignment with each other, thus permitting the collar member 22 to be brought into concentric relation with the segmental portions of both pipe section and return bend. The collar member 22 is then given a slight rotational movement, as for example an eighth of a turn in the exemplification shown, so as to position the respective or paired segmental portions 16 and 21 between each pair of segmental portions 24 of the clamp or collar member 22.

It is apparent from the construction shown, that when the nut 28 is screwed onto the bolt 27, the member 22 will be contracted and the opposing tapered surfaces of the segmental portions will effect an absolutely tight, pressure resisting joint, whose firmness or tightness increases as the temperature within the pipe section and bend increases.

In Figure 1, the sections 15 are shown welded, at 15a, to the main or straight pipes, of which only portions are shown at 29.

With my invention, stream line return bends in the various banks of tubes may be employed to obviate serious difficulties, otherwise encountered; a design of return bend of greater simplicity and materially less weight than the conventional type of bend heretofore employed; while at the same time providing the desired accessibility necessary in oil stills. It is also apparent that my improved means lends itself to varying conditions and types of installation necessitating differences in the form of return bends.

For example, in Figure 5 I illustrate a bend section 20, similar to the one shown in Figure 1, wherein the joint is arranged at an angle to the axes of the main tubes; the exemplification of a connecting yoke for the ends of two tubes involving a tubular section 30 provided with an enlarged end 31 having an internal flange as at 31a to form interlocking engagement with the flange 32 at the end of the tube 33 whose end is then rolled or forced outwardly into snug relation with the section 30.

The figure illustrates merely one side or half of the return bend; it being understood that a companion pipe 33 is connected with a similar section 30 at the other end of the yoke or housing and both tubular sections are formed integral with the connecting yoke portion, a part of which is shown at 34.

In Figure 6 the joint is of a type known as a straight joint, wherein both ends of the bend 35 (only one end being shown) is provided with the interrupted flanges or tapered segmental portions 21 similar to those heretofore described for receiving a similar clamp or collar member 22, whereby the bend 35 is firmly secured to the thimble member 36 which is shown screwed onto the main pipe section 37. In a connection of this type a gasket is commonly used between the conduit elements.

Figure 7 also discloses a straight type of joint, wherein the ends of the bend 38 are disposed parallel with the axes of the straight pipes 39, 39 whose ends are provided with the segmental portions 16, corresponding with and matching the segmental portions 21 on the ends of the bend 38. The segmental portions in all forms shown are of identical construction; and the collars for clamping the respective elements together are also the same in all the figures, with the diameters of the collars 22 such that the wedging action between the interrupted tapered flanges of the collars and of the conduit elements may be increased as the nuts 28 are screwed up on the bolts 27, thereby firmly forcing the opposing ends of the conduit elements toward each other.

I have disclosed adaptations of my invention, in return bend joints, to various types of return bend joints and different forms of oil still installations, but it will be understood that the invention lends itself to conduit sections wherein the opposing ends may be differently formed for effecting fluid tight relations, without departing from the spirit of the invention which has been described in terms employed for purposes of description and not as terms of limitation.

What I claim is:—

1. In a return bend assembly for refinery apparatus, the combination of a yoke having a pair of tubes attached thereto, the yoke having lateral extensions with tapered interrupted flanges disposed at an angle to the axis of the tube, a bend section with corresponding and mating flanges coacting with said extensions to form a passageway, and means comprising a ring having spaced

interior tapered flanges adapted to interlock with flanges on the yoke extension and the bend section and means for contracting said ring to force the yoke extensions and bend section into wedging engagement.

2. In a return bend assembly for refinery apparatus, the combination of a yoke having a pair of tubes attached thereto, the yoke having extensions with tapered flanges, a bend section with corresponding and mating flanges coacting with said extensions to form a passageway, and means comprising a ring element having spaced interior tapered flanges adapted to interlock with flanges on the yoke sections and the bend section and means for contracting said ring to force the yoke extensions and the bend section into wedging engagement

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