Sept. 3, 1957 A. B. SALKELD 2,804,841

PIPE TREATING APPARATUS

Filed Oct. 2, 1953 2 Sheets-Sheet 1

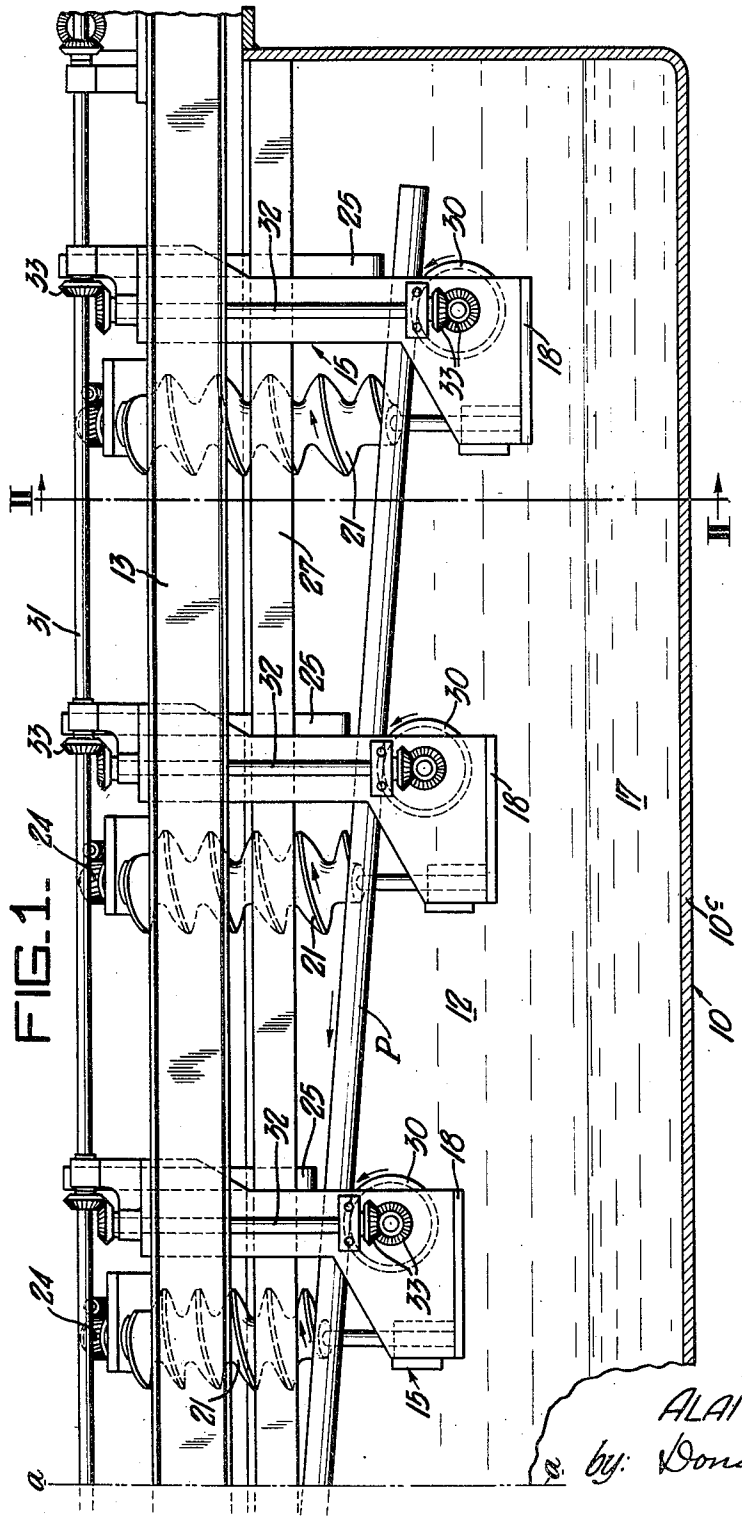


FIG. 1.

Inventor:
ALAN B. SALKELD,
by: Donald G. Dalton
his Attorney.

Sept. 3, 1957 A. B. SALKELD 2,804,841

PIPE TREATING APPARATUS

Filed Oct. 2, 1953 2 Sheets-Sheet 2

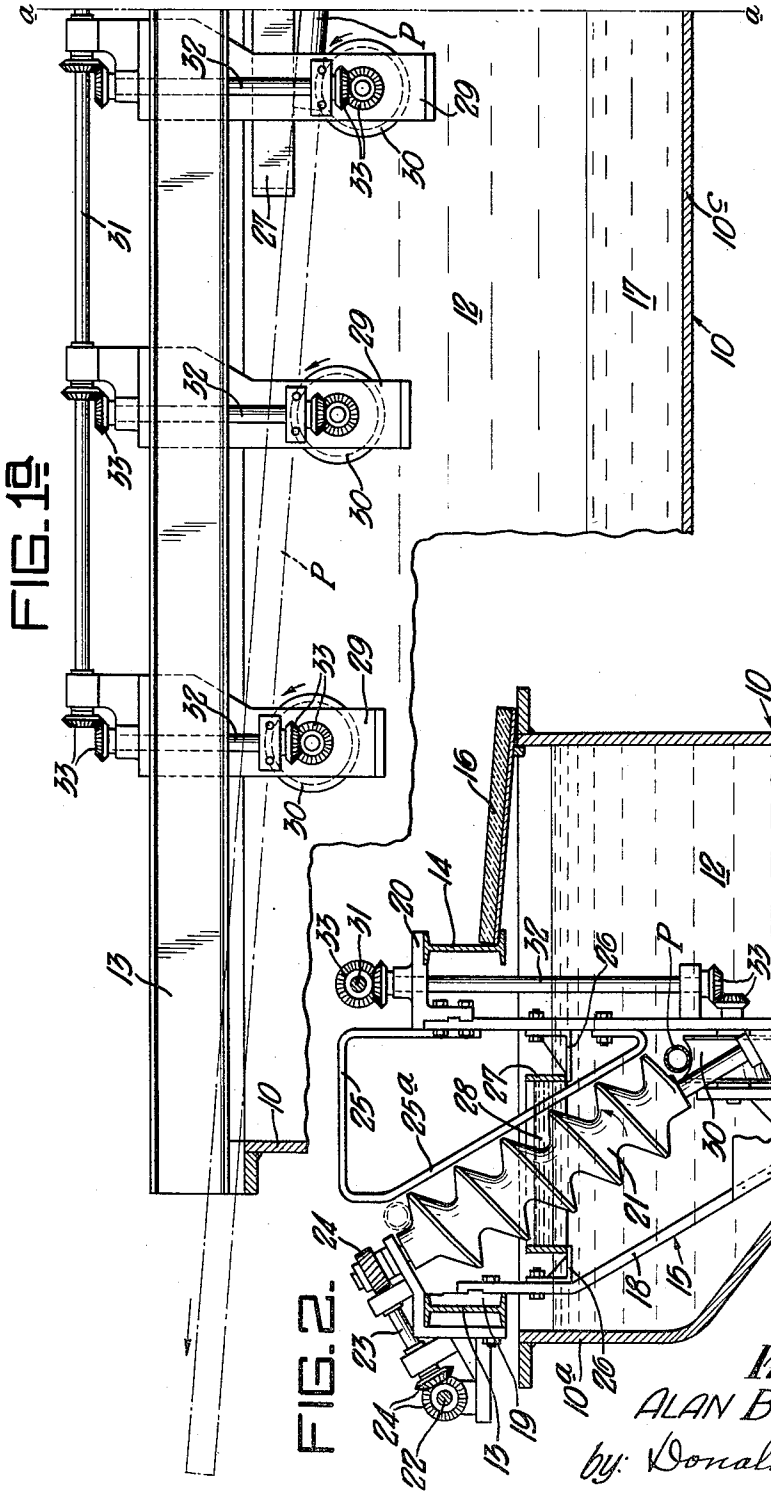


FIG. 1a

FIG. 2.

Inventor:
ALAN B. SALKELD,
by: Donald G. Dalton
his Attorney.

United States Patent Office

2,804,841

Patented Sept. 3, 1957

2,804,841

PIPE TREATING APPARATUS

Alan B. Salkeld, Pittsburgh, Pa., assignor to United States Steel Corporation, a corporation of New Jersey

Application October 2, 1953, Serial No. 383,825

8 Claims. (Cl. 118—423)

This invention relates to an improved apparatus for continuously treating pipe or the like, such as by galvanizing.

Various treating operations, of which galvanizing is an example, produce a by-product which collects as residue in the treating vessel and is deleterious to the treated product. In the example of galvanizing a residue, commonly known as "dross," collects in the kettle at the bottom of the molten zinc bath. Such dross consists essentially of solid particles of iron-zinc alloy, and it must be cleaned out regularly to prevent its interfering with galvanizing operations or damaging the equipment or product. Before dross can be cleaned from previous galvanizing apparatus with which I am familiar, it has been necessary to shut down the apparatus and remove the rigging. This practice not only causes a production loss, but is deleterious to the equipment. Because of such objections, dross often is allowed to accumulate to an undesirable extent before it is removed.

An object of the present invention is to provide an improved continuous treating apparatus for pipe or the like from which residue can be removed without stopping normal operations nor removing the rigging.

A further object is to provide an improved treating apparatus in which the treating vessel has a residue pocket offset from the rigging and readily accessible for cleaning while the apparatus continues to operate.

A further object is to provide an improved treating apparatus in which the moving parts that handle the product are sufficiently removed from the residue pocket that they do not agitate the residue but allow it to remain quiescent and out of contact with both the product and the mechanism.

A further object is to provide a treating apparatus which embodies an improved and simplified means for removing the treated product from the bath, namely magnetic conveyor rolls submerged in the bath.

In accomplishing these and other objects of the invention, I have provided improved details of structure, a preferred form of which is shown in the accompanying drawings, in which:

Figure 1 is a longitudinal vertical section of the entry portion of a treating apparatus which embodies my invention;

Figure 1*a* is a longitudinal vertical section of the discharge portion and is a continuation of Figure 1; and

Figure 2 is a cross section on line II—II of Figure 1.

My treating apparatus includes a vessel **10** which is adapted to contain a bath **12** of treating material, for example, molten zinc, to approximately the level indicated in Figure 2. The vessel is supported on suitable brickwork and can be heated from burners, not shown, but located outside its upper portion, as known in the art. A pair of spaced longitudinally extending beams **13** and **14** are supported above the vessel. Beam **13** is located adjacent one side edge of the vessel, and beam **14** intermediate the width thereof. Rigging **15**, hereinafter described, is suspended from said beams into the bath **12**, and occupies somewhat less than the full width of the vessel and bath.

In accordance with my invention, the vessel **10** has a shallow vertical side wall **10***a* at the side where the rigging **15** is supported, a sloping bottom wall **10***b* under the rigging, a horizontal bottom wall **10***c* offset from the rigging, and a relatively deep vertical side wall **10***d* at the side opposite the rigging. All the junctures between these walls preferably are rounded, as shown in Figure 2, to avoid crevices where residue such as dross can accumulate. Any welded seams preferably are located away from the wall junctures also as shown in the same figure, to keep such accumulations as do form away from the welds. The portion of the vessel between the beam **14** and the wall **10***d* carries a removable insulated cover **16**.

The space within the vessel **10** bounded by the bottom wall **10***c* and the lower portions of the walls **10***b* and **10***d* forms a pocket for collecting residue **17**, for example dross. Residue which forms in the vicinity of the rigging **15** falls on the sloping wall **10***b* and thence into the residue pocket. This pocket is directly under the cover **16** and offset laterally from the rigging **15**. The pocket is sufficiently removed from the rigging that the moving parts thereof do not agitate the residue. Thus there is no likelihood of residue particles being thrown into contact with the rigging nor the treated product, where they are harmful. The residue can be cleaned out with a strainer or other suitable implement, on removal of cover **16** without interfering with normal operation of the apparatus.

The rigging **15** includes a plurality of longitudinally spaced depending U-shaped supports **18**, illustrated as three in number, and fixtures **19** and **20** which mount said supports on the beams **13** and **14** respectively. A plurality of downwardly sloping feed screws **21** are rotatably mounted at their lower ends in bearings carried by the supports **18** and at their upper ends in bearings carried by the beam **13**. The feed screws are driven by any appropriate means, such as a line shaft **22**, individual connecting shafts **23**, and gearing **24**. Each support **18** also carries a guide **25** which has a downwardly sloping leg **25***a*. The three legs **25***a* occupy a common plane approximately tangent to the upper edges of the feed screws **21**, but are offset longitudinally from the respective screws. In the example of galvanizing, the supports **18** also carry brackets **26** on which a flux reservoir **27** is mounted. Said reservoir is adapted to contain a molten fluxing bath **28** through which the feed screws **21** and guide legs **25***a* extend.

Ferrous articles, such as pipes P, are introduced to the upper ends of the feed screws **21** and are carried through the fluxing bath **28** and into the bath **12** of treating material via the spaces between these screws and the legs **25***a* of the guides **25**. In the example of galvanizing these articles preferably are preheated to the temperature of the molten zinc bath (approximately 800°–850° F.). The screws **21** are arranged to introduce the articles to the bath so that they incline downwardly away from the discharge end of the vessel (i. e., downwardly toward the right as viewed in Figure 1). Thus the articles are dipped smoothly into the bath, and the inside surface as well as the outside is treated as the articles are lowered. In the construction illustrated, the feed screws **21** are of increasing pitch away from the discharge end of the vessel to incline the articles. Nevertheless it is apparent that equivalent results can be attained in other ways, for example by operating the screws at progressively higher speeds away from the discharge end of the vessel, or by introducing the articles to the screws with one end lower than the other.

The rigging also includes a plurality of longitudinally spaced depending U-shaped auxiliary supports **29** (Figure 1*a*), illustrated as three in number, and fixtures mounting these auxiliary supports on the beams **13** and

14 toward the discharge end of the vessel 10 from the supports 18. Each of the three supports 18 and three auxiliary supports 29 has bearings which carry rotatable magnetic conveyor rolls 30. These six conveyor rolls are situated at progressively decreasing depth toward the discharge end of the vessel. Per se they are of a known construction embodying permanent magnets; hence they are not shown nor described in detail. The rolls are driven by any appropriate mechanism, for example, a line shaft 31, individual vertically extending connecting shafts 32 and gears 33.

The three rolls 30 which are mounted on the supports 18 are positioned to receive articles P directly from the lower ends of the feed screws 21 and eliminate any need for lifters to transfer articles from the bath to an externally mounted conveyor. Movement of gears and rolls which are submerged in a bath produces considerable agitation which normally would throw too much residue into contact with the mechanism and articles to make such an arrangement feasible. By virtue of locating the residue pocket well away from the rigging, I am able to utilize submerged rolls and gears without agitating the residue. Thus there is a special cooperation between the vessel configuration and the article removing means, and this relation permits elimination of the usual lifters.

The rolls 30 carry the articles P toward the discharge end of the vessel 10 with the articles sloping in the same direction as they are introduced, although not necessarily at the same angle. Thus excess molten bath material drains from both the outside and inside. In the example of galvanizing the articles commonly are conveyed next to air and steam-wiping equipment which completes the removal of excess coating material, as known in the art. The rolls operate at a sufficient speed that each article clears the feed screws before the next article is deposited on the rolls. Thus the operation is fully continuous.

While I have shown and described only a single embodiment of the invention, it is apparent that modifications may arise. Therefore I do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

I claim:

1. A treating apparatus comprising a vessel adapted to contain a bath of treating material and having a relatively shallow vertical side wall, a downwardly sloping wall extending from said side wall, a horizontal bottom wall extending from said sloping wall, and a relatively deep vertical side wall extending above said bottom wall, support means above the portion of said vessel having the downwardly sloping wall, and rigging carried by said support means and extending into said vessel for introducing articles to the vessel and removing them therefrom, said bottom wall and the lower portions of said sloping and second named side walls defining a residue pocket offset sideways from said rigging and therebelow enabling residue to be removed with the rigging in operation.

2. An apparatus as defined in claim 1 in which the wall junctures of said vessel are rounded to avoid crevices where residue can accumulate.

3. A treating apparatus comprising a vessel adapted to contain a bath of treating material, support means above said vessel, and rigging carried by said support means and extending into said vessel for introducing articles to the vessel and including power driven magnetic conveyor rolls adapted to be submerged in the bath for removing articles therefrom, said vessel having at its bottom a residue pocket at one side of and below said rigging enabling residue to be removed with the rigging in operation.

4. An apparatus as defined in claim 3 in which said rigging introduces articles to said vessel in an inclined position and said rolls are situated at progressively less depth toward the discharge end of the vessel to convey articles therefrom also in an inclined position.

5. A treating apparatus comprising a vessel adapted to contain a bath of treating material, support means above said vessel, and rigging carried by said support means and extending into said vessel and including feed screws for introducing articles to the vessel in an inclined position and power driven magnetic conveyor rolls adapted to be submerged in the bath for receiving articles directly from said screws, said rolls being situated at progressively less depth toward the discharge end of said vessel to convey articles therefrom in an inclined position, said vessel having at its bottom a residue pocket at one side of and below said rigging enabling residue to be removed with the rigging in operation.

6. A treating apparatus comprising a vessel adapted to contain a bath of treating material and having a relatively shallow vertical side wall, a downwardly sloping wall extending from said side wall, a horizontal bottom wall extending from said sloping wall, and a relatively deep vertical side wall extending above said bottom wall, support means above the portion of said vessel having the downwardly sloping wall, and rigging carried by said support means extending into said vessel and including feed screws for introducing articles to the vessel in an inclined position and power driven magnetic conveyor rolls adapted to be submerged in the bath for receiving articles directly from said screws, said rolls being situated at progressively less depth toward the discharge end of the vessel to convey articles therefrom in an inclined position, said bottom wall and the lower portions of said sloping and second named side walls defining a residue pocket offset sideways from said rigging and therebelow enabling residue to be removed with the rigging in operation.

7. A treating apparatus comprising a vessel adapted to contain a bath of treating material, support means above said vessel, and rigging carried by said support means and extending into said vessel for introducing articles to vessel and removing them therefrom, said rigging occupying less than the full width of said vessel and including elements whose operation incidentally agitates the bath, said vessel having at its bottom a residue pocket at one side of said rigging and therebelow out of range of agitation by said elements and accessible from the top of the vessel alongside the rigging enabling residue to be removed with the rigging in operation.

8. A treating apparatus comprising a vessel adapted to contain a bath of treating material and having a relatively shallow side wall, a downwardly sloping wall extending from the lower edge of said side wall, a bottom wall extending from the lower edge of said sloping wall, and a relatively deep side wall extending upwardly from the edge of said bottom wall, support means above the portion of said vessel having the sloping wall but clearing the portion above said bottom wall, and rigging extending from said support means into said vessel and including feed screws for introducing articles to the vessel in an inclined position, magnetic conveyor rolls adapted to be submerged in the bath for receiving articles directly from said screws, and drive means for said screws and rolls, said rolls being situated at progressively less depth toward the discharge end of the vessel to convey articles therefrom in an inclined position, said screw and rolls in operation incidentally agitating the bath, said bottom wall and the lower portions of said sloping and second named side walls defining a residue pocket offset sideways from said rigging and therebelow out of range of agitation by said screws and rolls and accessible from the top of the vessel alongside the rigging enabling residue to be removed with the rigging in operation.

References Cited in the file of this patent

UNITED STATES PATENTS

656,500	Braddock	Aug. 21, 1900
1,906,400	Moon	May 2, 1933
1,935,087	Free	Nov. 14, 1933