BARREL FINISHING INSTALLATION

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Fig. 5.
The present invention relates to apparatus for use in metal finishing processes such as barrel finishing or electro plating, more particularly such apparatus in which the articles to be treated are processed successively in a series of tanks, and has for an object to provide an installation having improved means for transferring the articles from one tank to another.

According to the invention a metal finishing installation comprises a set of open topped tanks for containing liquid in which articles are to be immersed, an article-supporting means adapted to be removably positioned in a tank for immersing the articles in the liquid contained in the tank, and transfer means releasably engageable with the said article-supporting means and vertically and horizontally movable for raising the said article-supporting means from one tank and transferring and lowering it into another tank.

According to a further feature of the invention the said transfer means is arranged so that in the lowered position thereof it can be traversed along the row of tanks free from engagement with the article-supporting means positioned in the tanks.

Conveniently the said transfer means comprises a hoist supported for movement along a lengthwise extending track positioned above the row of tanks, and provided with hooks or similar elements adapted to engage a portion of the article-supporting means when the hoist is raised, and remaining free from engagement with said portion when the hoist is in the lowered position.

The invention finds special application to barrel finishing installations in which the barrels are removably positioned in tanks to be submerged in liquid contained therein and are transferred from one tank to another, and one such installation embodying the invention will now be described with reference to the accompanying drawings in which:

**FIGURE 1** is a side elevation of the installation.

**FIGURE 2** is a plan view thereof with parts omitted.

**FIGURE 3** is a side elevation of a portion of the hoisting means of **FIGURE 1** and drawn to an enlarged scale.

**FIGURE 4** is an end elevation of the structure of **FIGURE 3**.

**FIGURE 5** is a side elevation partly in section of a barrel assembly and a tank of **FIGURE 1** and also drawn to an enlarged scale, and

**FIGURE 6** is an end elevation of the structure of **FIGURE 5**.

As shown in **FIGURES 1** and **2** the installation comprises a plurality of open topped tanks 1 of rectangular cross section and secured together in a row, each tank being adapted to receive a barrel assembly 2 one of which is shown in the raised position at 2r in **FIGURE 1**. The tanks 1 have secured thereto uprights 3 which support a framework extending above the row of tanks and providing rails 4 for supporting a wheeled hoist carriage 5 for movement along the rails. The tanks 1, the uprights 3 and the framework supported thereby form a completely free standing unit which can readily be installed in a building without the need of support from the walls or roof of the building.

Each barrel assembly comprises a yoke 6 which rotatably supports a tumbler barrel 7 of known construction and which is adapted to contain the parts to be surface finished, the yoke 6 having rods 8 which extend outwardly from each side thereof to be received in V-shaped located blocks 9 secured to the top of the tanks thereby to position the barrel correctly within the tank with the barrel drive shaft 10 (**FIGURES 5** and 6) in engagement with drive means 11 supported at one side of each tank.

The hoist carriage 5 supports a telescopic lifting device indicated generally at 12 and an electric hoist 13 of known construction having a hoisting chain 14 which passes freely through a carrier bar 15 (**FIGURE 4**) of the lifting device, the chain having a stopper 16 secured thereto at its lower end for engaging the carrier bar when the chain is raised thereby to lift the carrier bar.

As more clearly shown in **FIGURES 3** and 4 the lifting device 12 comprises four fixed tubular members 17 depending from the carriage 5 and secured thereto at their upper ends, the members 17 being brazed by side channel section members 18 and rods 19 connecting the respective side members 18. Each tubular member 17 has slidably positioned therein a lower tubular member 20, the members 17 and 20 thus forming a telescopic arrangement by means of which side plates 21 secured to the lower members 20 are permitted to move from a lowered position shown in full line in **FIGURE 3** to a raised position shown in broken line.

Each side plate 21 has downwardly divergent leg portions 22 the lower ends of which extend horizontally as at 23 to be secured as by welding in slots 24 in the lower ends of the respective lower members 20, and an upper portion 25 defining a vertically extending slot or channel 26 closed at its upper end. Each of the horizontal ends 23 of the leg portions 22 is provided with a notch or recess 27 extending from its lower surface and adapted closely to engage over the rods 8 of a barrel assembly 28 when the barrel assembly is raised as will be hereinafter described the rods 8 are firmly held in the recesses 27 thereby to steady the barrel assembly and maintain it in a vertical position.

The side plates 21 are braced by tubes 28 extending therebetween and the channels 26 receive wheels 29 supported on brackets 30 at each end of the carrier bar 15 there being two wheels 29 at each end in vertical alignment one with another. Stops 31 and 32 on the side plates 21 limit the downward and upward movement of the carrier bar with respect thereto and it will be noted that in the lowered position of the bar shown in full line in **FIGURE 3** the lower wheel 29 is free from the channel 26 so that the carrier bar is permitted limited forward and rearward swinging movement about the axis of the upper wheel 29 which is engaged in the lower end of the channel 26.

The carrier bar is provided centrally lengthwise thereof with a vertically extending aperture 35c through which the chain 14 of the hoist can pass freely, the chain being provided as hereinafter mentioned with the stop 16 so that when the chain is raised the stop 16 engages the under surface of the carrier bar to raise the bar.

Freely pivotally supported on a pin 35a extending horizontally through the carrier bar adjacent each end thereof is a depending hook member 33 adapted to engage in a pocket formed by a laterally extending ear or lug 34 secured to a bracket 35 extending upwardly at each side of the yoke 6 of a barrel assembly shown in broken line in **FIGURES 3** and 4, the surface of the ear or lug being of inverted V-shape as shown. The hook members 33 are weight biased to swing downwardly and are provided with lugs 36 which engage stops 37 on the carrier bar to limit the downward swinging movement of the hook members to the position shown in full line in **FIGURE 4** in which the lower ends of the hook members are clear of the brackets 35. This enables the hoist carriage to be traversed along the rails 4 while the lifting device is in the lowered position. The brackets 35 are laterally out-
wardly convex so that if a barrel assembly positioned in the tank should be slightly out of alignment one of the hook members will engage the convex surface of the bracket and be swung thereby so as to pass freely over the surface.

When it is required to lower a barrel assembly on to a loading or unloading platform shown at the left hand end of FIGURE 1, or to remove a barrel assembly for maintenance purposes it is necessary to lock the side plates 21 and lower tubular members 20 in the raised position while leaving the carrier bar free for raising and lowering by means of the hoist 13.

To this end each side plate 21 is provided with a laterally outwardly extending pin or lug 38 adapted when the side plates are raised to engage in a vertical track 39 supported on the side members 18 of the lifting device. The rod 40 is adapted to be engaged under the lug 38 when the side plates are in a required raised position and when this engaged prevents the side plates from lowering when the carrier bar is lowered by the hoist. The rod 40 is spring loaded in a position in which it clears the lug 38 to permit normal operation of the lifting device and is operable to engage under the lug 38 when so required by means of a manually operable lever 41. In FIGURE 3 an alternative position of the rod is shown at 40b which may be used when it is not required that the side plates be locked in the extreme upper position.

Referring now to FIGURES 5 and 6 it will be seen that the yoke 6 of a barrel assembly is formed by side members 42 having downwardly extending portions 43 provided with lower ends with bearings for supporting the end shafts 45 of the tumbling barrel 7. The side members 42 are secured at their upper ends to a channel section cross member 46 to which the aforementioned brackets 35 are secured, and extend forwardly and rearwardly from the cross member to receive the rods 8 which extend outwardly thereof for engagement in the locating blocks 9 secured to the top of the tanks 1. The barrel is rotated by means of a chain 49 engaging over a chain wheel 47 secured on one of the barrel end shafts 45 and driven from a sprocket 48 mounted on the drive shaft 10 which is journaled in the side members 42 and is adapted in known manner to be engaged with the drive means 11 positioned at one side of the tank.

Each side wall of the tank has secured on the inner surface centrally thereof a pair of spaced vertically extending rail members 50 defining a vertical track 51 the upper end of which is outwardly flared as at 52. The downwardly extending portions 43 of the side members 42 support at their lower ends a pair of rollers 53 adapted to engage the rail members 50 to guide the barrel assembly into the tank and position it correctly with respect to the front and rear walls thereof. In addition to the rollers 53 each side member 42 is provided at the lower end thereof with a laterally extending guide member 54 adapted to engage the corresponding side wall of a tank to position the assembly laterally with respect to the tank, the guide members 54 being positioned below the rollers 53 so that upon lowering the barrel assembly into a tank the guide members 54 engage the side walls of the tank before the rollers 53 enter the track 51.

In operating the installation and when it is required to transfer a barrel assembly from one tank to another, the carriage 5 with the telescopic lifting device 12 in the lowered position is moved along the rails 4 into position over the tank from which the assembly is to be removed, the hook members 33 passing freely by the upstanding brackets 35 of the barrel assemblies in the other tanks. The carriage 5 may be moved manually or it may be electrically driven in which case limit switches 55 (FIGURE 1) are provided adjacent the rails 4 for interrupting the current means when the carriage is correctly positioned over a tank. The hoist 13 is then energised to raise the chain 14 thereby to raise the carrier bar 15 and in the initial upward movement of the bar the hook members 33 engage under the lugs or ears 34 of the barrel assembly. Upon continued upward movement of the carrier bar, the wheels 29 roll upwardly in the channel 26 until the upper wheels engage the upper stops 32 on the side plates, the barrel assembly then having been raised sufficiently for the rods 8 thereof to engage in the notches or recesses 27 of the barrel. Further upward movement of the carrier bar raises the side plates 21 with consequent telescoping of the tubular members 17 and 20 until the carrier bar is in the fully raised position in which the barrel assembly, as shown at the right hand side of FIGURE 1, is clear of the tank and of other barrel assemblies positioned in the other tanks.

The carriage drive is then actuated to move the carriage into position over the tank to which the barrel assembly is to be transferred, and the hoist chain 14 is lowered to permit the carrier bar to descend and lower the barrel assembly supported thereby. Upon the barrel assembly reaching the upper end of the tank the guide members 54 engage the side walls of the tank to position the assembly laterally with respect to the tank and upon continued downward movement of the barrel assembly, the rollers 53 thereof engage in the track 51 on each side wall of the tank to locate the barrel assembly correctly with the front and rear walls of the tank so that the drive shaft 10 engages the drive means 11 at the side of the tank. When the barrel assembly is completely lowered into the tank the rods 8 engage in blocks 9 to support the barrel assembly thereon and upon further lowering of the carrier bar, the hook members 33 disengage from the ears or lugs 34 of the barrel assembly and the lifting device is then in condition to be moved along to another tank when required.

It will be noted that when raising a barrel assembly from a tank, the rods 8 engage in the recesses 27 of the side plates 21 to steady the assembly, before the rollers 53 of the assembly disengage from the track 51 thus preventing undesirable swinging of the barrel assembly.

When it is required to remove a barrel assembly from a tank for positioning it on a load or unload station as for example that shown at left hand side of FIGURE 1, the barrel assembly is raised in the above described manner and when fully raised the rod 40 is operated to latch the side plates 21 in the raised position and the carrier bar can then be lowered until the lower wheels 29 thereof engage the lower stops 31 of the side plates. In this position the rods 8 of the barrel assembly are disengaged from the recesses 27 of the side plates.

It will be understood that although the invention has been described with reference to barrel finishing apparatus, the invention is not limited thereto and is applicable to other processes for example electro plating in which articles are treated in tanks and are required to be transferred in batches from one tank to another.

I claim:

1. An installation for metal finishing of articles comprising a row of open-topped tanks for containing liquid in which the articles are to be immersed, article-supporting means adapted to be removably positioned in a tank for immersing the articles in the liquid contained in the tank, a rail structure fixedly supported above and extending lengthwise of said row of tanks, a carriage moveable along said rail structure, a hoist supported by said carriage, vertically slideable members depending from said carriage, a carrier bar supported by said slideable members for connecting the carrier bar to the hoist for raising and lowering the bar upon actuation of said hoist, and hook members supported by the carrier bar for releasably engaging the article-supporting means to raise and lower the said supporting means by operation of said hoist.

2. An installation for metal finishing of articles comprising a row of open-topped tanks for containing liquid in which the articles are to be immersed, article-supporting means adapted to be removably positioned in a tank for immersing the articles in the liquid contained in the
tank, bracket means secured to and extending upwardly from said article supporting means, a rail structure fixedly supported above and extending lengthwise of said row of tanks, a carriage movable along said rail structure, a hoist supported by said carriage, a lifting device connected to said hoist for upward and downward movement between a lowered position and a raised position upon actuation of said hoist, and means carried by said lifting device for releasably engaging the bracket means for effecting raising and lowering of the article supporting means by operation of said hoist, the said bracket-engage means in the lowered position of the lifting device being free from engagement with the bracket means to permit the lifting device in its lowered position to be traversed along the row of tanks, and being effective to engage the bracket means upon initial upward movement of the lifting device from its lowered position.

3. An installation as claimed in claim 1 in which the said vertically slideable members comprise telescopic members secured at their upper ends to said carriage and provided at their lower ends with means for engaging the article-supporting means when raised by the carrier bar thereby to prevent swinging of the article-supporting means while being transferred from one tank to another.

4. A barrel finishing installation in which finishing barrels are adapted to be removably positioned in tanks to be submerged in liquid contained in the tanks, and to be transferred from one tank to another, the said installation comprising a row of open topped tanks of rectangular cross-section; at least one barrel assembly adapted to be removably positioned in any one of said tanks and including a finishing barrel rotatably supported in said assembly and a drive shaft operatively connected to the barrel for effecting rotation thereof; drive means carried by each tank and engageable with said drive shaft when the barrel assembly is positioned in the tank; for effecting rotation of the barrel; a rail structure fixedly supported above and extending lengthwise of said row of tanks to form therewith a free standing structure; a carriage movable along said rail structure; a hoist supported by said carriage; vertically slideable members depending from said carriage; a carrier bar supported by said members; means connecting the carrier bar to the hoist for raising and lowering the carrier bar upon actuation of the hoist; and means carried by said carrier bar for releasably engaging the barrel assembly to raise and lower the barrel assembly by operation of said hoist.

5. A barrel finishing installation as claimed in claim 4 and further including vertically extending tracks on the inner surface of two opposed side walls of each tank and rollers on the barrel assembly engageable with said tracks to guide the barrel assembly into the tank in a required location with respect to the other two side walls of the tank.

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