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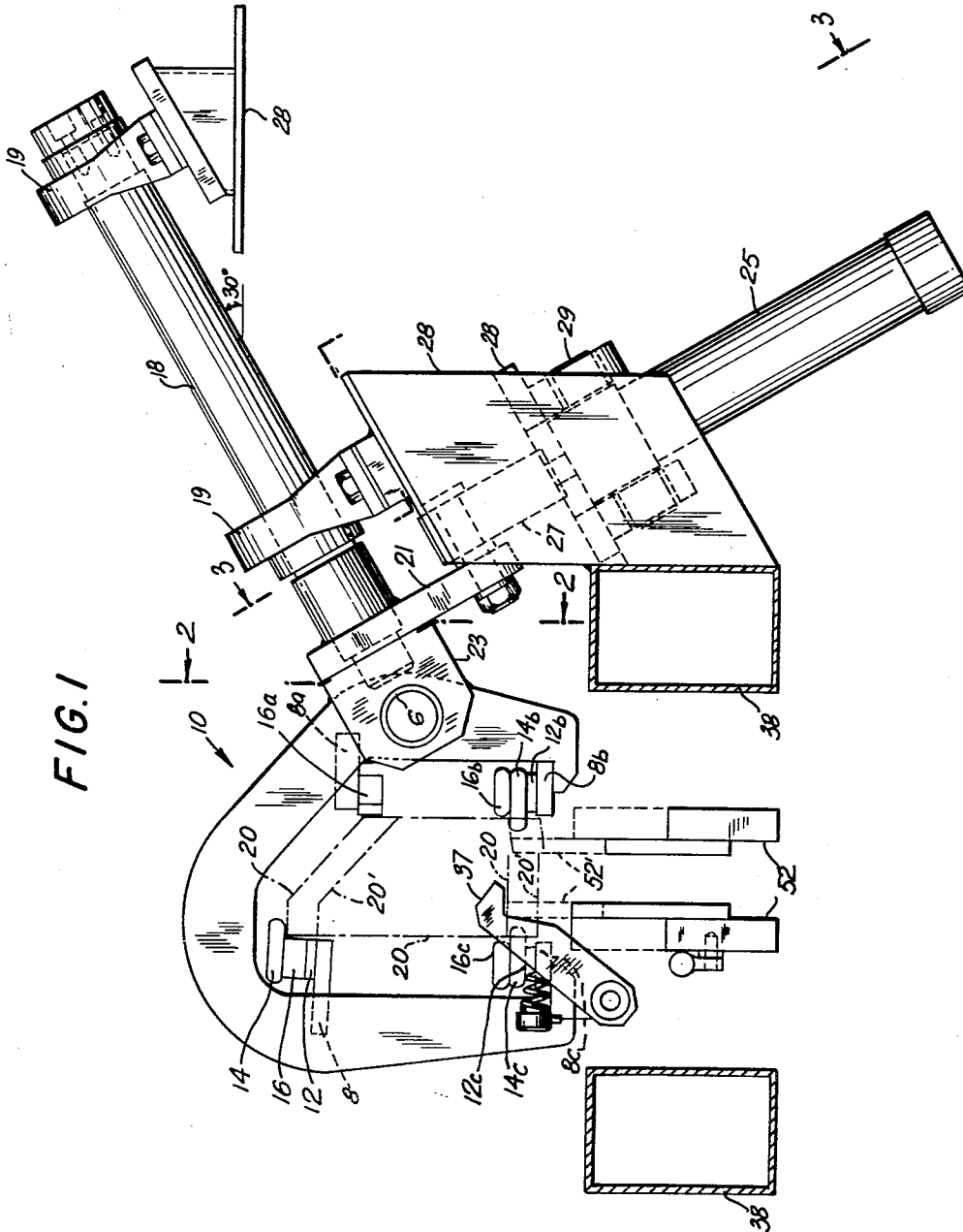
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ARTICLE HANDLING APPARATUS AND METHOD

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4 Sheets-Sheet 1



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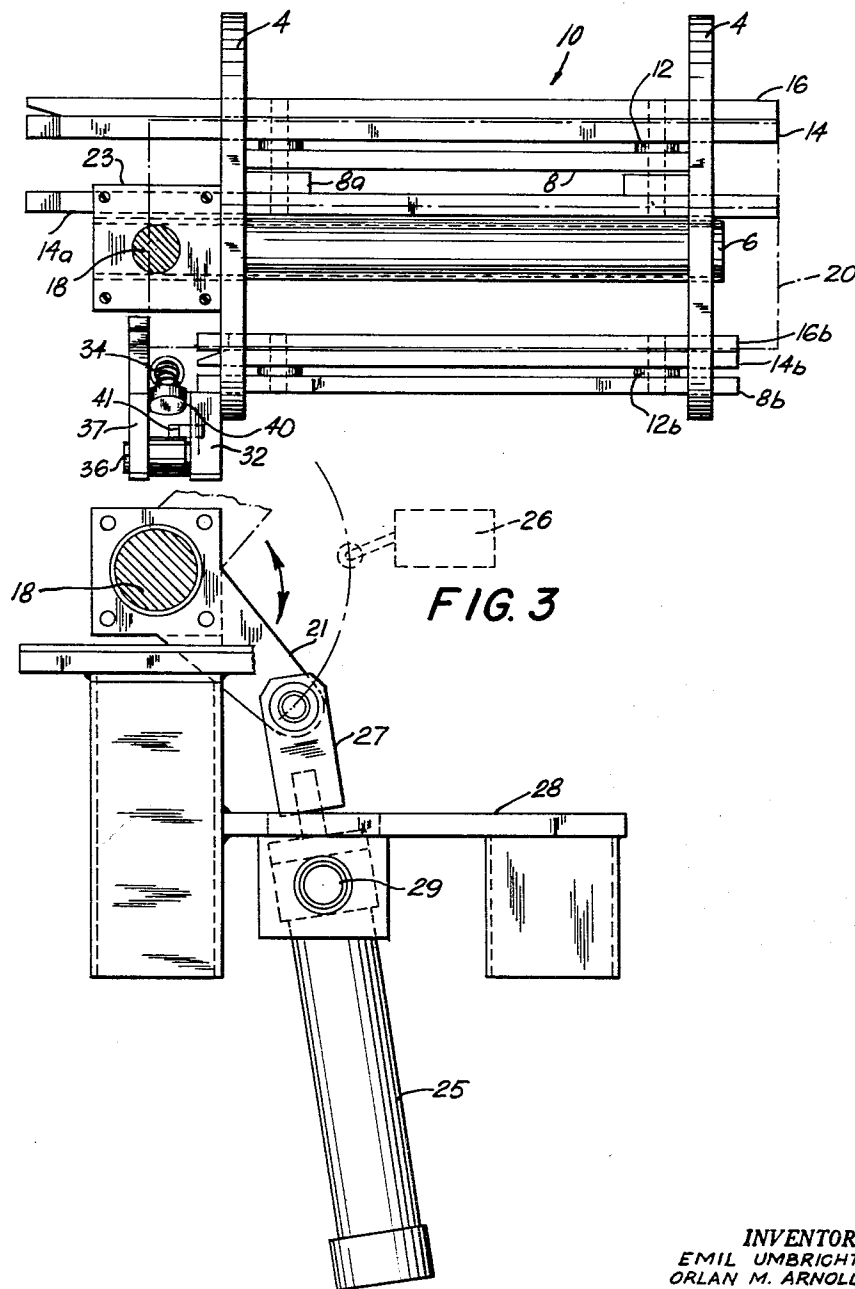
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FIG. 2



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ARTICLE HANDLING APPARATUS AND METHOD

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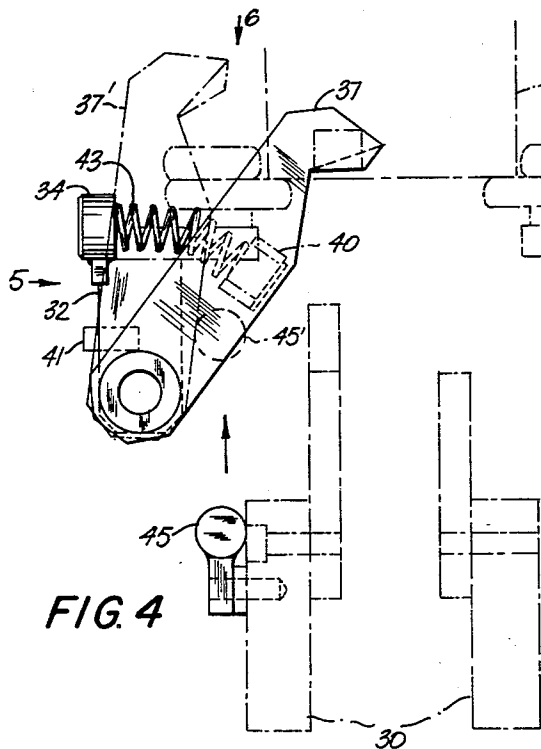


FIG. 4

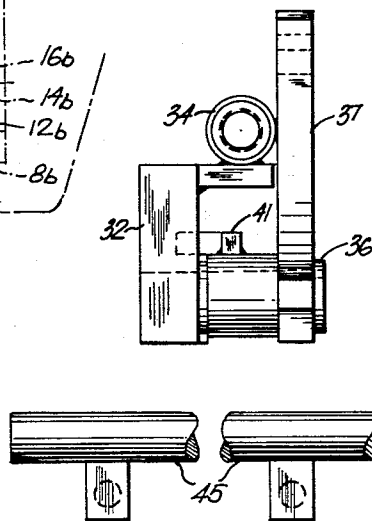
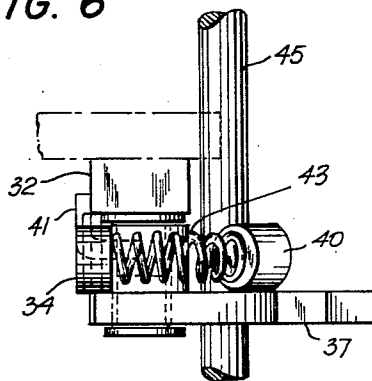


FIG. 5

FIG. 6



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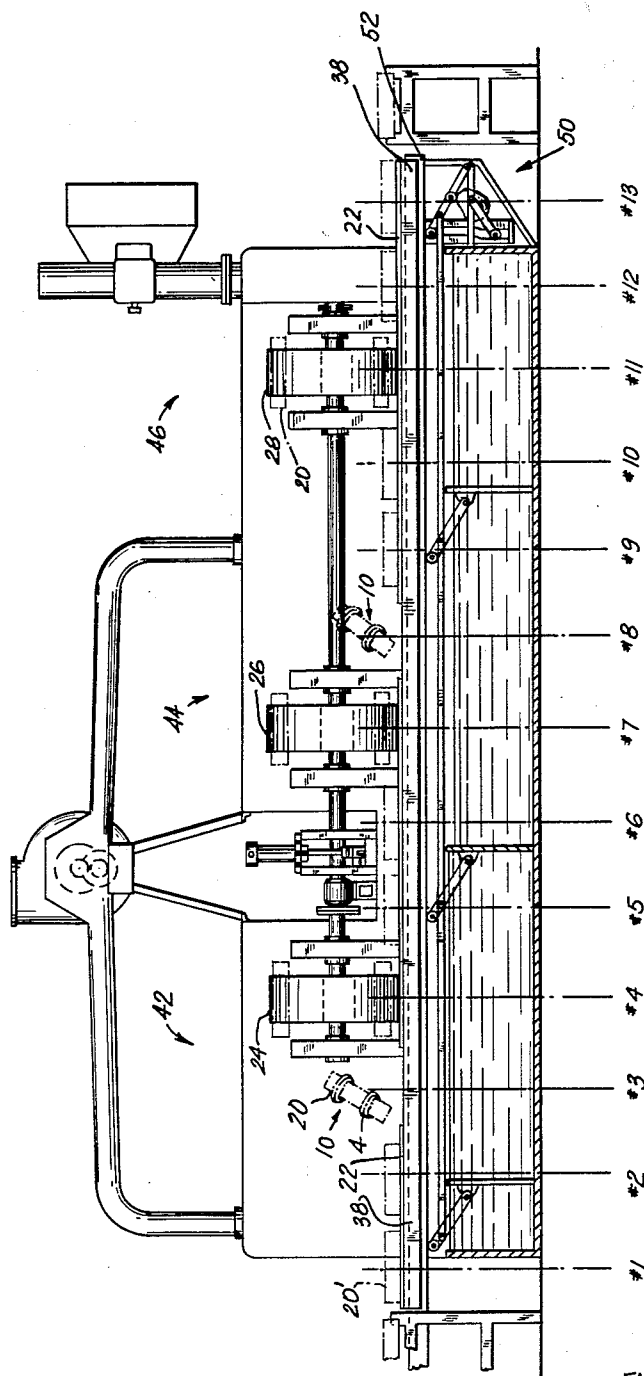
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FIG. 7



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ARTICLE HANDLING APPARATUS AND METHOD
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 7 Claims. (Cl. 214-1)

The present invention relates to apparatus for tipping a manufactured article in a processing line away from its normal position in the line to achieve an advantageous angle for treatment by means of a fluid medium or for the best drainage after such treatment.

In many mass-production type industrial operations it is necessary to provide for deburring and soil removal from articles in the process of manufacture. This has often been efficiently accomplished by automatic power washers and liquid abrasive deburring machines. Complete cleaning of articles, such as the machined castings soiled with casting sand and cutting oils found in automobile manufacture, is often difficult due to complex configurations and intricate internal passages. The problem involves exposing the part of the article to be treated to the optimum angle for impinging the abrasive deburring, washing or rinsing solution and in gaining as complete drainage as possible so as to minimize the expense of high-powered, prolonged drying and to reduce the retained sand and metal particles. The type of machine described herein as embodying the present invention is well adapted to tip up the article to the desired drainage angle. The present invention is unique in its application to power washing, chemical treating and stripping systems.

In the preferred embodiment described herein, the article is transferred from the preceding processing station into a cradle supporting a segment of the track along which the articles are moved. The article is locked in place and the cradle is swung end first up into a desired position where a spray or blast of air or other process to be performed at this station meets it, then the article is returned to its normal position along the track and is transferred on to the next processing station.

Among the many advantages of the machine described is the fact that once a good drainage angle is attained, the necessity of using expensive and difficult to maintain high pressure heated drying air is done away with. Better impingement of liquids also results, especially when there is simultaneous advantageous drainage.

A further advantage of this machine is its relatively low space consumption, not only in actual space used but also in efficiency by accomplishing more effective operation within a given space.

Other advantages of this machine are its adaptability to various compound angles or to immersion impingement washing, stripping or electroplating. The former results in placing the article at any desired spacial angle. The latter obviates the need for long immersion tanks or complicated overhead immersion devices.

Among the further advantages of this machine is its adaptability to different types of indexing mechanisms. A good example would be the use of the article transfer apparatus as described in detail and claimed in my copending continuation-in-part application Serial No. 263,383, filed March 4, 1963. This transfer device picks the articles up on a transfer member, moves them forward and sets them down in the new position. By setting the present tipping apparatus above the processing line in its loading position so that the article when transferred upward and forward will slide into the tip-up cradle one will have adapted the present invention to the given transfer device.

Another advantage of this machine is its adaptability

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to be constructed so as to handle different geometrically shaped parts.

The various features and advantages will more easily be understood by a consideration of the following description of one illustrative embodiment of our invention in conjunction with the drawings, in which

FIGURE 1 is a front elevation of the tip-up apparatus looking along the line of travel and showing a phantom outline of an automobile engine head ready to be tipped up;

FIGURE 2 is a side elevation taken generally along the line 2-2 in FIGURE 1 showing the engine head in phantom outline being supported by the cradle and being secured by the locking dog;

FIGURE 3 is a side view taken generally along line 3-3 in FIGURE 1, looking down and to the left along the rotatable shaft, showing the crank arm linked to the hydraulic cylinder mounted on trunnions to the machine frame;

FIGURE 4 is a front elevation looking along the line of travel showing the locking dog and locking dog release bar in the engaged position showing the relation of the former to the cradle and to the engine head and of the latter to the transfer mechanism, and showing both the locking dog (i.e., holding means) and release bar in phantom outline in the disengaged position;

FIGURE 5 is a side elevation taken looking to the right in FIGURE 4, showing the locking dog and its release bar;

FIGURE 6 is a plan, taken looking down as indicated in FIGURE 4 showing the locking dog in the engaged position, and

FIGURE 7 is a schematic longitudinal section of a power washer as disclosed in the copending application Serial No. 467,746, filed November 9, 1954, now issued as Patent No. 2,979,062, showing generally the washing, rinsing and drying stages each with a turret for holding a plurality of engine heads, showing the engine heads resting in their processing stations along the track, more particularly showing two engine heads in tipped positions at station #3 and station #8 right before and right after a turret, as they would look if the present invention were incorporated in the disclosed power washer at those stations, and showing a "walking beam" type article transfer apparatus mounted on said power washer and adapted to load and unload the present tipping apparatus.

In the machine shown in FIGURE 1, the cradle 10 (please see FIGURE 2 also) consists of two C-shaped frame members 4 kept in alignment and parallel relationship by a longitudinal member 6, said C-shaped frames 4 supporting the guide bar support members 8, 8a, 8b and 8c, which in turn support the spacers 12, 12b and 12c, the vertical guide bars 14, 14b, 14c, and the lateral guide bars 16, 16a, 16b, and 16c.

The rotatable shaft 18 supports and imparts movement to the cradle 10. The shaft is mounted in bearings 19 at a predetermined angle to the horizontal and is fixed to crank arm 21, which in turn is fixed to mounting block 23, which block is finally mounted on longitudinal member 6 and fixed to the front C-shaped frame 4. Actuating the crank arm and thereby rotating shaft 18 is the power source, hydraulic cylinder 25 whose piston 27 is pivotally connected to crank arm 21 (FIGURE 3 shows this more clearly). The machine frame 28 supports the shaft bearings 19 and supports the hydraulic cylinder by trunnion mounts 29. The transfer mechanism 52 positions the engine head 20 within the cradle 10.

The locking mechanism is mounted on the cradle so the dog 37 fits behind the engine head 20 into some appropriate part of the geometry of the head so as to prevent it from sliding out of the cradle when in the tip-up

position. The locking mechanism is shown in FIGURES 4, 5 and 6 and consists of support member 32 with attached spring cup 34 and attached pin 36, locking dog 37 which is pivoted on pin 36 and has attached spring cup 40 and attached stop 41, spring 43, and release bar 45 which is attached to the transfer mechanism.

The sequence of operation of the various parts is as follows:

(I) The transfer mechanism simultaneously moves one engine head 20 out of cradle 10, moves in another in its place, and raises release bar 45 to position 45' thus disengaging locking dog 37 to position 37' during the transfer (please see FIGURE 4).

(II) After the transfer mechanism has retracted and the locking dog has engaged the new engine head, then the hydraulic cylinder is activated and swings the engine head 20 held in cradle 10 up into processing position as shown in the schematic FIGURE 7 at stations #3 and #8. If the full throw of the piston of hydraulic cylinder 25 is too great, then a limit switch 26 (shown in FIGURE 3 in double dot phantom outline) attached to shaft 13 will control the extent of the arc through which said shaft rotates.

(III) After a definite time interval the engine head is returned to the normal horizontal position and is transferred on, thereby starting another cycle.

As shown in FIGURE 7, the present invention is well adapted to be profitably incorporated in such a processing machine as the aforementioned power washer. Note that in the washing stage 42 the tipping apparatus is shown positioned before the multi-processing-positioning turret 24 and in the rinsing stage 44 it is shown after the rinsing stage turret 26. For simplicity of drawing each turret is illustrated as carrying only two articles, while normally such turrets carry any greater number. This positioning of the tipping apparatus is meant to be illustrative and not determinative; for example, it could also be placed anywhere in the drying stage, if found desirable.

The aforementioned article transfer apparatus 50 with its transfer frame member 52 is also shown incorporated in the power washer in FIGURE 7 as the preferred transfer apparatus for the present invention. Note that because of the use of this transfer apparatus 50 the loading position of the cradles of the present tipping apparatus and of the turrets are raised above the processing line track 22. This is illustrated in FIGURE 1 by phantom outline of engine head 20' which is the position the engine head has when resting on track 22. Note also that element 38 (please see FIGURES 1 and 7) serves a dual purpose as a frame member for supporting the processing line track 22 and as a manifold for carrying the wash liquids.

It is to be understood that the foregoing description of the present invention is to be taken as a preferred embodiment and that various changes as to the size, shape, material and arrangement of parts may be made without departing from the spirit of the invention or from the scope of the claims below.

We claim:

1. In an apparatus for treatment of heavy recessed castings and the like by a fluid medium, a device for tipping from a processing line to an advantageous angle the article being treated, comprising a machine frame, a processing line track with a gap, a cradle which comprises two C-shaped frame members set transverse to the longitudinal axis of the cradle and a longitudinal torsion-resisting brace rigidly secured to said C-shaped frame members, a plurality of horizontal lower guide bars extending longitudinally between said C-shaped frame members and adapted to extend across said gap in the track, a plurality of upper guide bars extending longitudinally between said C-shaped frame members, said upper and lower guide bars defining an enclosure therebetween for receiving and supporting the article in said

cradle, holding means mounted on said cradle for engaging the article to prevent its sliding along the guide bars while the cradle is in a tipped position, transfer means, holding means release coupled to said transfer means, said longitudinal torsion-resisting brace extending beyond a C-shaped frame member at one end, a rotatable shaft connected to an angle to the extending end portion of the brace, the axis of said shaft lying in a vertical plane, said shaft being rotatably mounted to said machine frame at an angle to the horizontal, a lever arm for rotating the shaft about its axis, a hydraulic cylinder swingably mounted on the machine frame and having its piston rod pivotally connected to said lever arm whereby said cylinder and piston rod are adapted to rotate said shaft about its axis for tipping said cradle, and control means for initiating the tipping cycle and for stopping said cradle at a predetermined canted position thereby to position the article into a predetermined position for drainage and access.

2. In an apparatus for treatment of heavy recessed castings and the like by means of a fluid medium, a device for tipping from a processing line to an advantageous angle at least one of the articles being treated, comprising a machine frame, a cradle which receives and supports such articles therein in a predetermined attitude with respect to a longitudinal axis of the cradle, and a shaft fixed to said cradle at an angle to said longitudinal axis of the cradle and additionally being rotatably mounted on said machine frame with the shaft's axis fixed in a vertical plane and at an angle to the horizontal plane, driving means connected to said rotatable shaft for turning said shaft thereby inclining the axis of the cradle into an advantageous angular position for the treatment of the article therein, transfer means for positioning such articles into and for removing them from said cradle, holding means for securing said article in said cradle to prevent it from sliding longitudinally along the cradle while the cradle is in tipped positions having a pivoted locking dog normally swung into locking engagement with the article within the cradle and biasing means for positioning the dog in locking engagement, and holding means releaseably connected to said transfer means thereby adapted to pivotally disengage said locking dog from said articles during the transfer portion of the tipping cycle.

3. In an apparatus for treatment of heavy recessed castings and the like by a fluid medium, a device for tipping from a processing line to an advantageous angle the article being treated, comprising a machine frame, a processing line track with a gap, a cradle which comprises two C-shaped frame members set transverse to the longitudinal axis of the cradle and a longitudinal torsion-resisting brace rigidly secured to said C-shaped frame members, a plurality of horizontal lower guide bars extending longitudinally between said C-shaped frame members and adapted to extend across said gap in the track, a plurality of upper guide bars extending longitudinally between said C-shaped frame members, said upper and lower guide bars defining an enclosure therebetween for receiving and supporting the article in said cradle, holding means mounted on said cradle for engaging the article to prevent its sliding along the guide bars while the cradle is in a tipped position, transfer means, holding means release coupled to said transfer means, said longitudinal torsion-resisting brace extending beyond a C-shaped frame member at one end, a rotatable shaft connected at an angle to the extending end portion of the brace, the axis of said shaft lying in a vertical plane, said shaft being rotatably mounted to said machine frame at an angle to the horizontal, and rotating means for said shaft.

4. A device as disclosed in claim 3 further having control means for said rotating means to initiate the tipping cycle and to stop said shaft with the cradle at a predetermined canted position thereby to position the article into a predetermined angle for drainage and access.

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5. In an apparatus for treatment of heavy recessed castings and the like by means of a fluid medium, a device for tipping from a processing line to an advantageous angle at least one of the articles being treated, comprising a machine frame, a cradle which receives and supports such articles therein in a predetermined attitude with respect to a longitudinal axis of the cradle, holding means for securing said article in said cradle to prevent it from sliding longitudinally in the cradle while the cradle is in tipped positions, a shaft fixed to said cradle at an angle to the said longitudinal axis of the cradle and additionally being rotatably mounted on said machine frame with the shaft's axis fixed in a vertical plane and at an angle to the horizontal plane, driving means connected to said rotatable shaft for turning said shaft thereby inclining said axis of the cradle into an advantageous angular position for the treatment of the article therein, and holding means release being synchronized with said transfer means to allow free transfer of such articles into

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and out of said cradle during the article indexing portion of the tipping cycle.

6. A device as described in claim 5 further including a transfer means for positioning said articles into and for removing them from said cradle.

7. A device as described in claim 6 further including a control means for said driving means to position said articles in predetermined positions during the tipping cycle.

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