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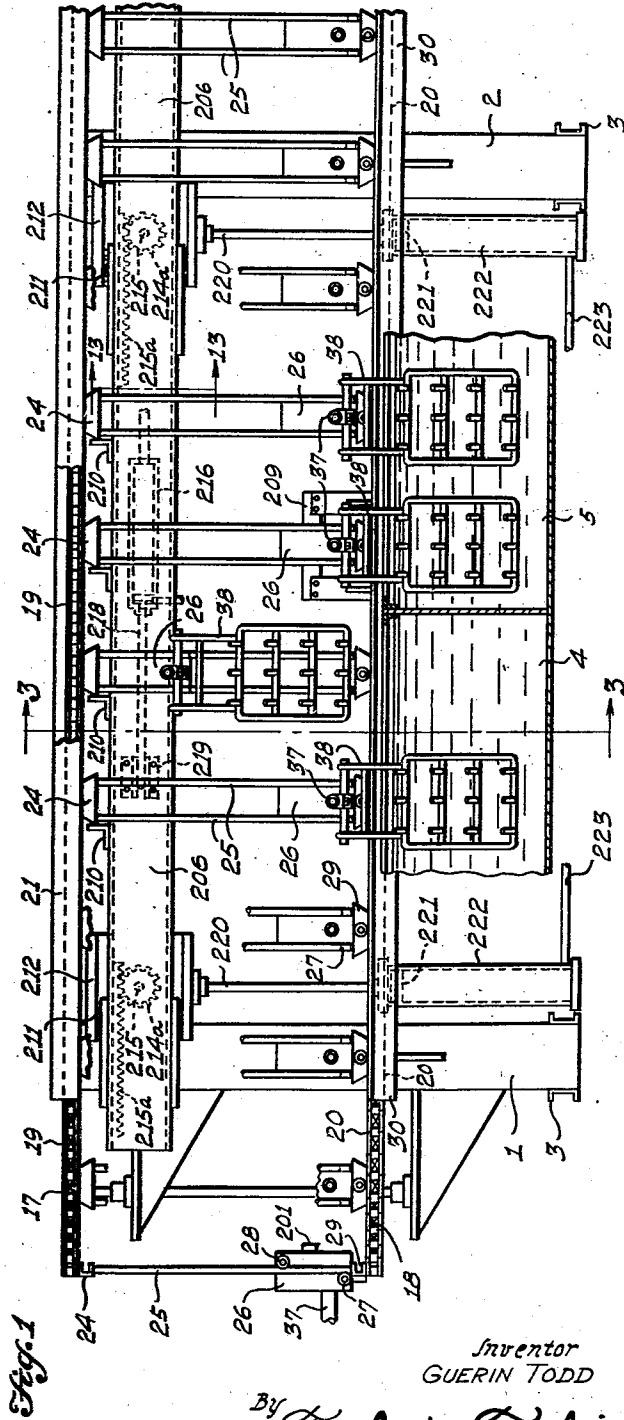
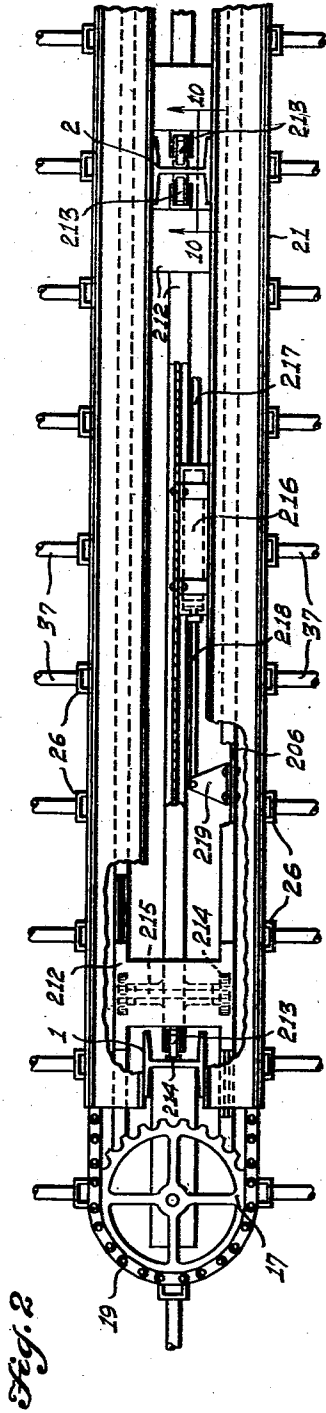
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2,196,131

ELECTROPROCESSING MACHINE

Filed Jan. 21, 1938

4 Sheets-Sheet 1



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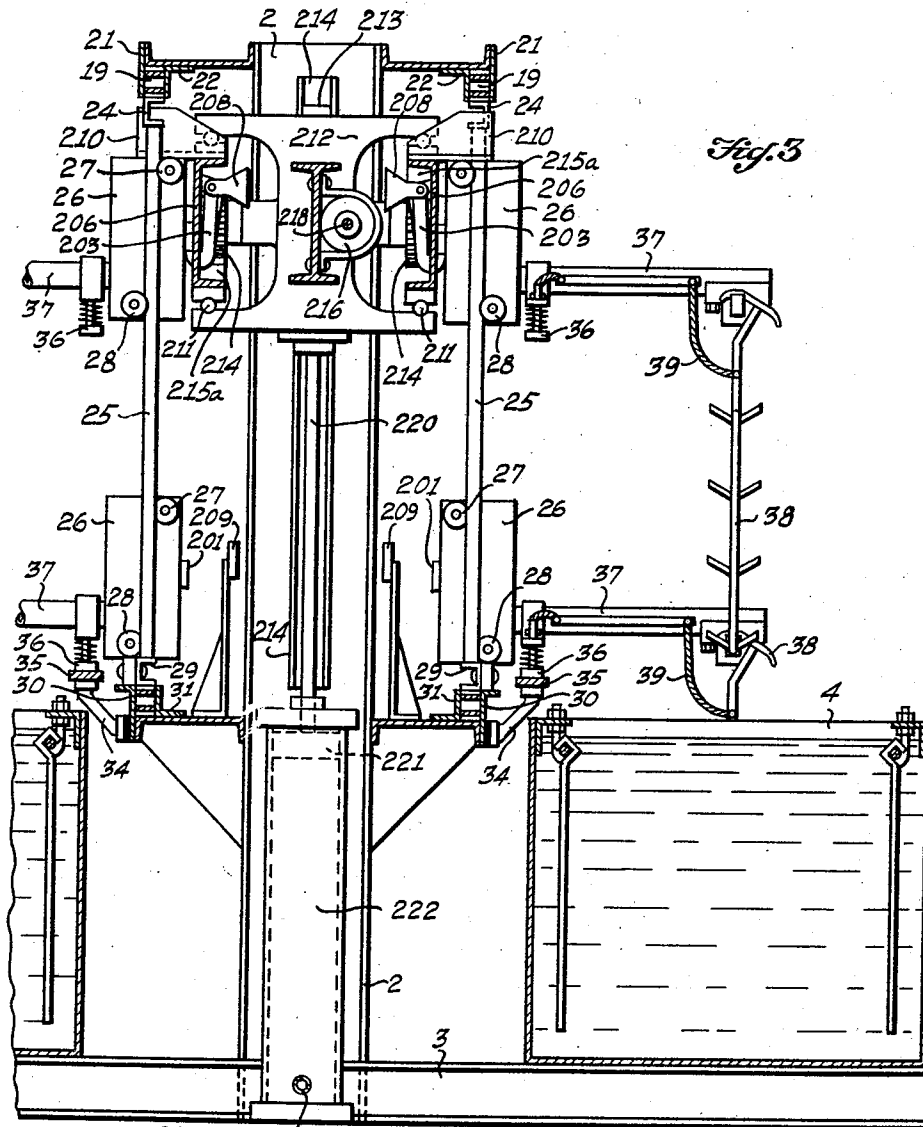


Fig. 3

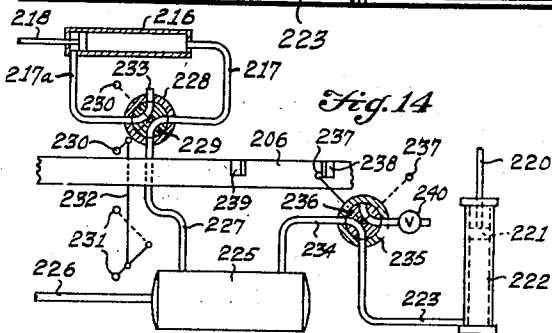


Fig. 14

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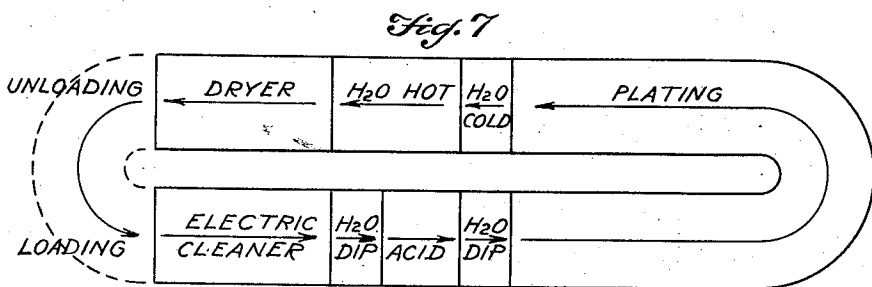
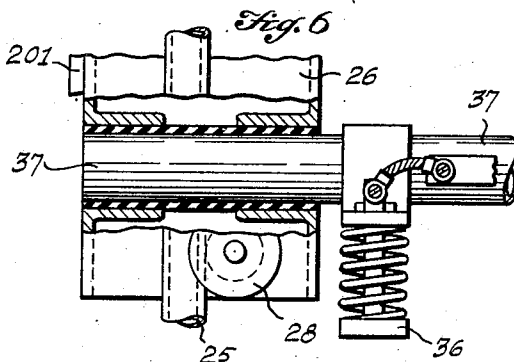
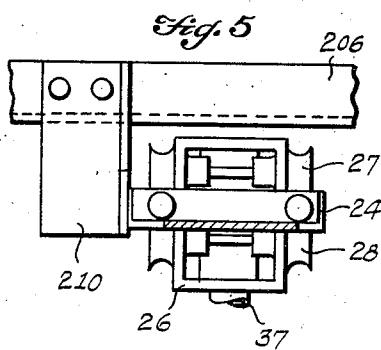
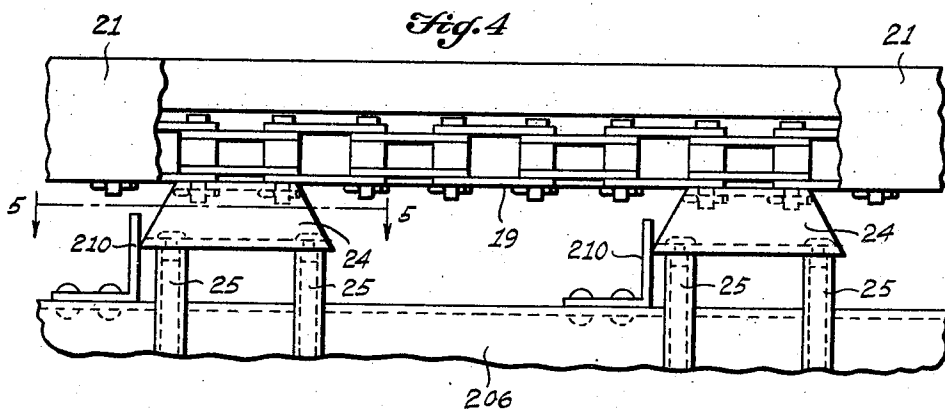
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4 Sheets-Sheet 3



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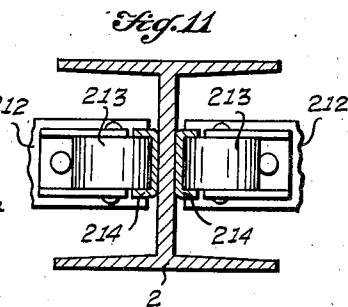
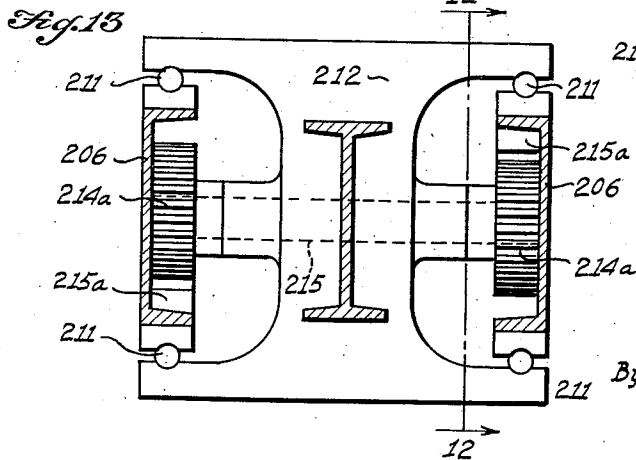
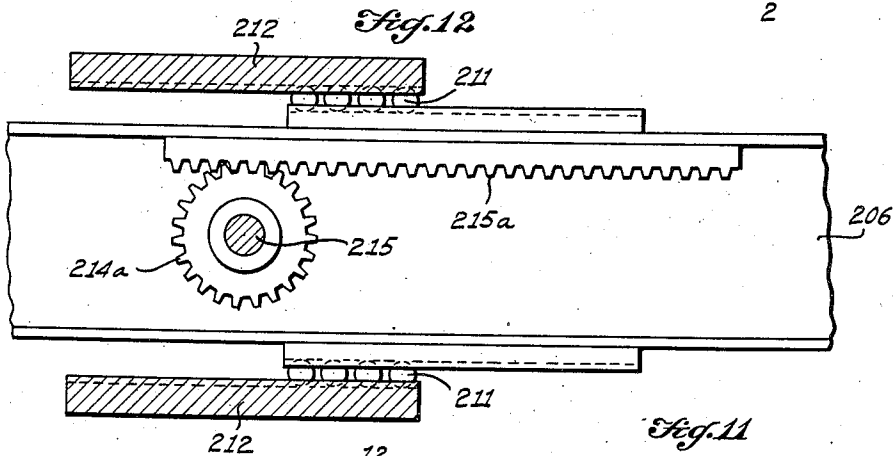
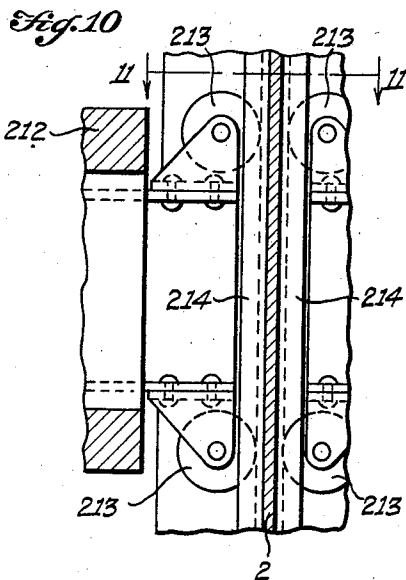
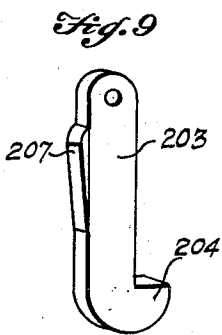
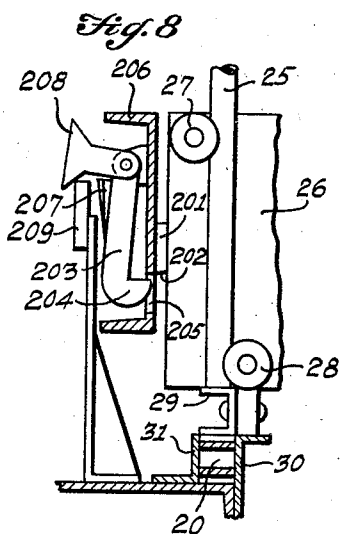
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ELECTROPROCESSING MACHINE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,196,131

ELECTROPROCESSING MACHINE

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Application January 21, 1938, Serial No. 186,190

9 Claims. (Cl. 214—17)

My invention relates to electroprocessing machines.

It is an object of this invention to provide means for the carrier arms, and pneumatic or hydraulic shifter means for simultaneously shifting through the elevator, both the carrier arms in engagement with the elevator and those not engaged with the elevator, that is by shifting the carried chains through the elevator.

It is an object of this invention to provide a vertically moving elevator that also reciprocates, and by its reciprocation, advances the transverse horizontal conveyor means appropriate steps so that the elevator is utilized as a common means for raising and lowering the carrier arms and for also shifting them bodily as a unit, horizontally.

It is an object to provide an elevator that selectively elevates certain carrier arms and lowers others, while it is also capable of moving all of the carrier arms a predetermined horizontal distance.

It is an object to provide such a hydraulic and pneumatic shifting means which eliminates the necessity for any motor drives, or other mechanical means of imparting horizontal or vertical movement to the several parts of the electroprocessing machine.

It is a further object of the invention to provide such mechanism so that when one part of the elevator is moving horizontally, the other half of the elevator is moving in the opposite direction horizontally so that one part of the conveyor arm is moving in one direction, and the other part moving in the other direction, simultaneously and equally.

Referring to the drawings:

Figure 1 is a side elevation of one end of an electroprocessing machine of this invention with a portion of the tanks in section, and a portion of the chain guide rail and vertical carrier guides broken away;

Figure 2 is a top plan view of Figure 1 showing a part of the supports for the guide rails broken away, with a portion of the elevator mechanism in section;

Figure 3 is a section on the line 3—3 of Figure 1, looking in the direction of the arrows;

Figure 4 is a detail side elevation of the top carrier chain, the top of the elevator and the means of engaging with the vertical guides for the carrier arms by the elevator to bring about horizontal shifting;

Figure 5 is a section on the line 5—5 of Figure 4, looking in the direction of the arrows;

Figure 6 is a side elevation partially broken away showing the method of support of the side arms within the carrier block that is mounted upon the vertical guides;

Figure 7 is a plan view of a typical electroprocessing treatment cycle indicating the arrangement of the tanks;

Figure 8 is a vertical section through one of the elevator plates showing the latch means for picking up a carrier block with its side arm from its lower position

Figure 9 is a perspective of the weighted latch;

Figure 10 is a section of the line 10—10 of Figure 2 looking in the direction of the arrows, showing how the elevator is guided vertically on the upright standards;

Figure 11 is a section on the line 11—11 of Figure 10, looking in the direction of the arrows;

Figure 12 is a section on the line 12—12 of Figure 13; and

Figure 13 is a section on line 13—13 of Figure 1, looking in the direction of the arrows.

Figure 14 is a diagram of the control of the elevator and shifter mechanism.

Referring to the drawings in detail, 1 and 2 indicate vertical standards of a framework. 3 designates horizontal floor pieces upon which rest the tanks 4 and 5. The horizontally disposed chains 19 and 20, which are mounted upon the sprockets 17 and 18, are connected together by the vertically disposed pairs of guide rods 25. These chains travel in upper guide rails 21 and 22, and in lower guide rails 30 and 31.

The transverse guide rails for the carriers 25 are provided with heads 24 at the top, and 29 at the bottom. On these rods are mounted the blocks 26, which are provided with the rollers 27 and 28. These blocks 26 carry the side arms 37. These side arms 37 carry the work carriers 38, that are connected by cables 39 to spring pressed contact shoe 36, which is supported by the bracket 34.

The block 26 is provided on its back with a projecting lug 201 that has a cam surface 202 on its under side. A pivoted weighted latch hook 203 is adapted to have its nose 204 project beneath this lug 201. When it does so, this nose 204 projects through the opening 205 in the shifter member 206 in the elevator. The latch member 203 is provided with a flange extension 207 against which the weighted arm member 208 rests. This weight member tends to force the

latching member into engaging position. The weighted arm 208 is held out of engagement with the latch member 207 by the stop 209 mounted adjacent the lower ends of the guide rods 25.

5 When this shifting elevator 206 is in its uppermost position, as in Figure 4, the angle irons 210 are adapted to engage with the heads 24 to shift the carrier chains 19 and 20 and all of the carriers a predetermined horizontal distance. Then the elevators lower the arms they have picked up. The elevator shifter is returned to its initial position, and is ready to pick up a new set of arms.

10 When this occurs, the shifters 206, of which there is a pair, have been shifting on the ball bearing 211 in the elevator frame 212 that is guided vertically by the rollers 213 on the guide rails 214 on the vertical members 1 and 2. This elevator frame 212 carries a transverse shaft 20 with pinions 214a engaging with racks 215a carried by the respective elevator shifters 206, so that when one elevator is moved in one direction to move the carrier arms in one direction, the other elevator shifter will be moving in the other direction an equal amount with the opposite carrier arms.

15 This shifting is brought about by the pneumatic or hydraulic cylinder 216, which is supplied with fluid pressure through the pipes 217 and 217a. The cylinder is mounted upon the elevator frame 212. Its piston rod 218 is connected to the bracket 219 to one of the shifters 206.

20 The elevating means for the elevator consists of piston rods 220 operated by pistons 221 in the lifting cylinders 222, which are supplied with fluid pressure 223 from a suitable source. Thus the elevators are lifted for giving vertical movement to the carrier arms 37 on the guide rods 25. When the elevator is in its uppermost position, it is actuated by the cylinder 216 and piston rod 218 to move it to the right, which results in the angle irons 210 pushing the carriers and the chains 19 and 20 a given distance horizontally. Then the elevator is lowered and the carrier arms are disposed in their lower position having been advanced one step. Thereupon the shifters on the elevator 206 are returned to their initial positions, ready for another latch engagement with another set of carrier arms to lift them and transport them over the adjacent partitions between the tanks 4 and 5.

25 Thus this machine is characterized by the fact that it has (a) means for elevating the carrier arms selectively as only those arms opposite the latches are elevated; (b) it has means on the elevator for moving the selected arms when in an elevated position, and all the rest of the arms in a lower position, equally a given horizontal distance (c) it has means for lowering the elevator and the selected arms and means for returning the elevator to its new left hand position for another cycle of operations.

30 Referring to Figure 14, this illustrates diagrammatically one form of control for the raising, lowering and lateral shifting of the elevator. The pressure tank 225, which may alternatively be an accumulator, supplies fluid pressure to the lifting cylinders 222 through pipes 223 as heretofore described. Fluid pressure is supplied to the tank 225 through the pipe 226. Fluid pressure is also supplied from the tank 225 through the pipe 227, valve 228, rotor 229 and pipes 217 and 217a, to the lateral shifting cylinder 216. Connected to the rotor 229 is the lever 230 which is connected to the lever 231 by

the link 232. This lever system is controlled by the raising and lowering of the elevator 206 so that the lateral shifting movement will be timed therewith at the top and bottom of the movement of the elevator 206. The resulting lateral shifting of the elevator 206 results in the stops 238 and 239 engaging the lever 237 which rotates the rotor of the valve 235 controlling the fluid pressure in the cylinder 222. In one position the fluid pressure passes through the pipes 234 and 223 to the cylinder 222 and in another position communication is established with the relief pipe through the valve 240. It is obvious that there are numerous different ways by which the movement of hydraulically lifting and lowering and hydraulically shifting may be accomplished. Either air or fluid may be utilized.

15 It will be understood that I desire to comprehend within my invention such modifications as may be necessary to adapt it to varying conditions and uses.

20 Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a machine for supporting and conveying work pieces along while processing the same, a plurality of spaced carriers, a plurality of successively arranged tanks, means for moving said carriers as a unit, common means comprising an elongated elevator member for raising and lowering the carriers as the same advance adjacent the end walls of the tanks through which they are moved for transferring them from one tank into an adjacent tank, and means associated with the elevator for shifting the carriers which are elevated and those which are in lowered position horizontally as a unit before the carriers that are elevated are lowered.

2. In a machine for conveying work pieces along while processing the same, a plurality of spaced carriers, means comprising an elongated elevator which extends over said carriers for selecting and elevating said carriers as they approach the end of their process treatment, said elevator being adapted to move vertically and horizontally intermittently, means associated with said elevator for moving all of the carriers horizontally while some of said carriers are in elevated position, and means for returning said elevator to its initial position.

3. In combination, a pair of spaced chains, carrier guides interconnecting said chains, carriers mounted thereon, an elevator between said chains adapted to move horizontally and vertically intermittently, means thereon for selecting and elevating a certain portion of said carriers, means on said elevator for engaging with the carrier guides to move said chains horizontally therealong with all of the carriers, while a portion of the carriers are in elevated position, and means for returning said elevator to its initial position.

4. In a machine for conveying work pieces to be processed, a plurality of carrier arms, means comprising an endless movable member for transporting said arms in spaced predetermined horizontal relationship including means to guide said arms vertically while engaged with said endless movable member, and means comprising an elongated elevator reciprocable vertically and horizontally for elevating selectively said arms and means associated with said elevator to shift it horizontally moving all of the arms horizontally a predetermined distance.

5. In combination, in a machine for conveying

work pieces to be processed, a plurality of tanks arranged in an orbital path, work piece carriers mounted upon a frame support structure adjacent said tanks and arranged to be positioned in and out of the tanks, common means comprising an elevator for intermittently moving said carriers horizontally subsequent to selectively elevating the carriers as they approach the end wall of the tank in which they have been previously lowered, and retaining them in raised position while all of said carriers are moved horizontally to a new position with respect to said tanks.

6. In combination, in a conveyor type processing machine, a plurality of tanks, carriers mounted in spaced relationship upon an endless conveyer adjacent said tanks, means for moving said carriers and conveyer horizontally as a unit, elevator means for selectively elevating certain of the carriers and means responsive to the vertical movement of said elevator to shift said elevator horizontally for effecting the horizontal movement of all of said carriers when said elevator is in raised position, and means for lowering said elevator and previously elevated carriers.

7. In an electroprocessing machine, a central framework, a series of tanks on either side, carrier arms projecting over said tanks from said framework, upper and lower chains on said framework carrying said arms, vertical guides between said chains for guiding said arms vertically, a vertical and horizontal moving elevator latch means thereon at intervals attached to engage carriers adjacent the partitions of the tanks, means for elevating said elevator, means for

moving said elevator horizontally and means associated therewith for moving all of the carrier arms equally during said horizontal movement, said elevator having two sections and being so arranged that when one section thereof moves in one direction the other section moves an equal distance in the opposite direction.

8. In a machine for supporting and conveying work pieces along while processing the same, a pair of spaced endless movable members, work piece carrier guides interconnecting said endless movable members, carriers mounted thereon, an elevator between said endless movable members adapted to move horizontally and vertically intermittently and selectively elevating a certain portion of said carriers, and means on said elevator for engaging with the carrier guides to move said endless movable members horizontally therealong with all the carriers while a portion of the carriers is in elevated position.

9. In a machine for supporting and conveying work pieces along while processing the same, the combination of a pair of spaced endless circulatory members, carrier guides interconnecting said circulatory members, an elevator between said circulatory members adapted to move horizontally and vertically intermittently, means thereon for selecting and elevating a certain portion of said carriers, means on said elevator for engaging with the carrier guides to move said circulatory members horizontally therealong with the attached carriers while a portion of the carriers is in elevated position, and means for returning said elevator to its initial position.

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