

May 10, 1932.

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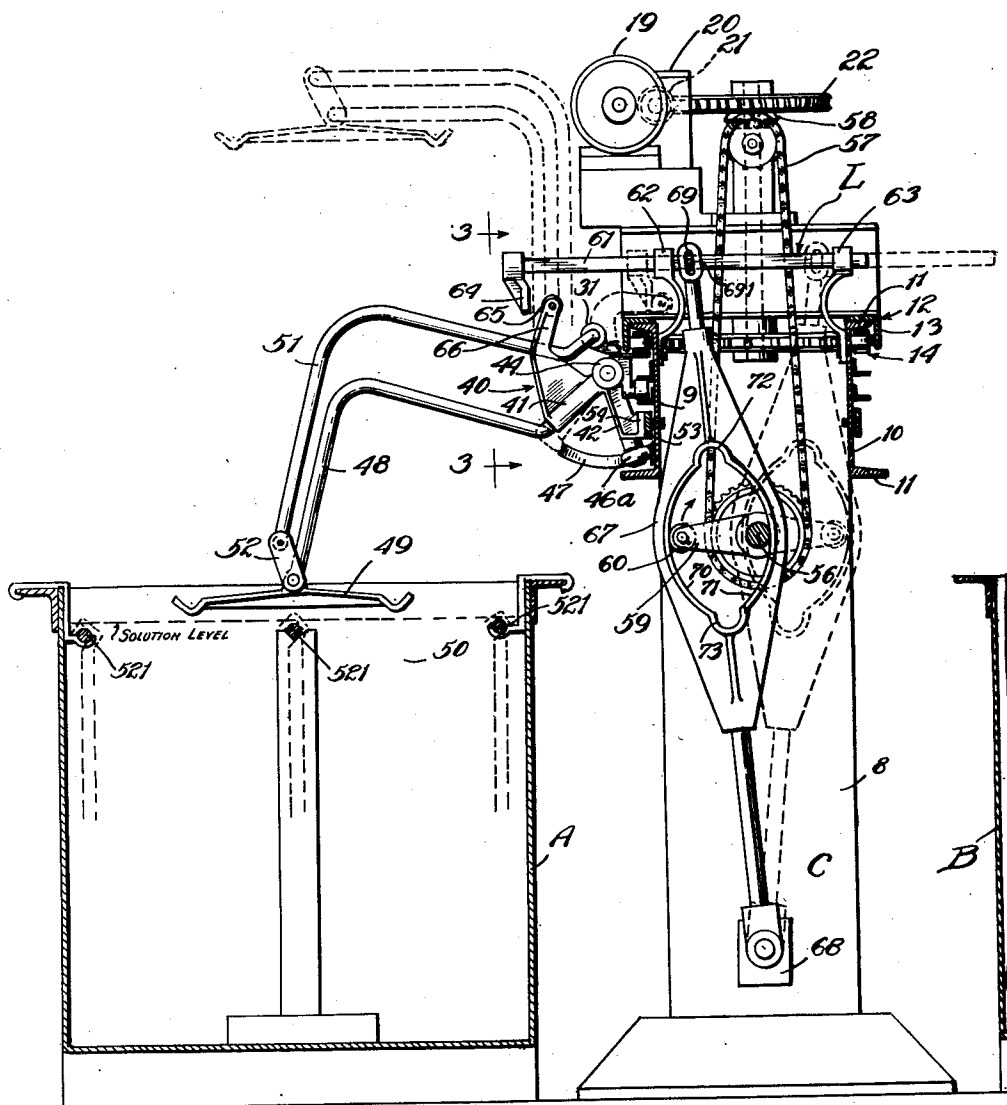
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ELECTROLYTIC PROCESSING MACHINE

Filed June 3, 1931

2 Sheets-Sheet 1

FIG. 1



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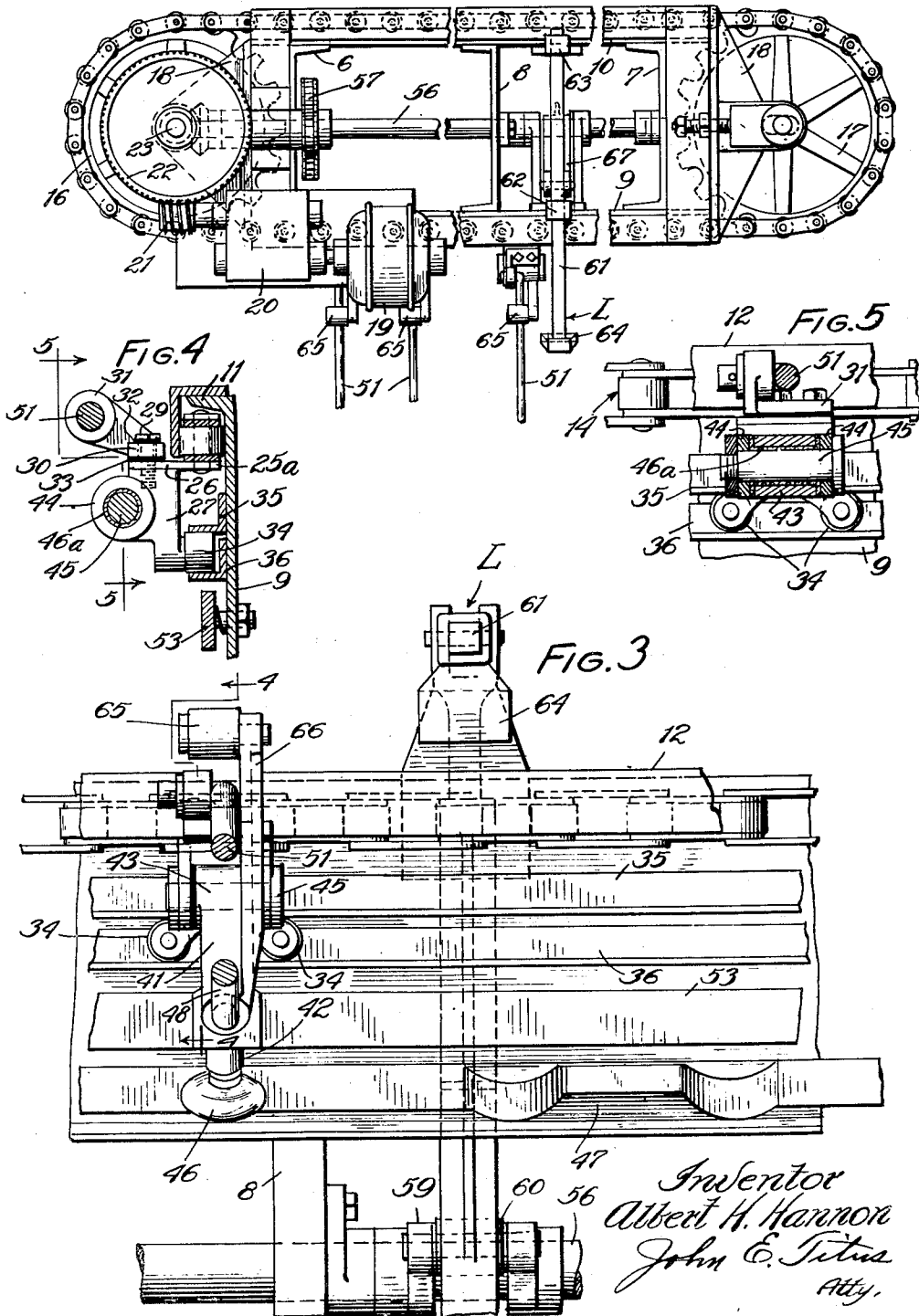
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FIG. 2



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ELECTROLYTIC PROCESSING MACHINE

Application filed June 3, 1931. Serial No. 541,863.

The invention relates to electrolytic processing machines for plating and the like, and more particularly to machines having means for automatically carrying the work, or pieces being processed, along through a series of tanks containing the washing, cleaning, and various plating or other solutions, the work being automatically transferred from one tank to the next by lifting the work out of one tank and lowering it into the next.

Such a machine is fully shown and described in my application Serial No. 522,267, filed March 13, 1931; and this invention is primarily an improvement over the machine shown in said application. In some kinds of plating it is desirable to transfer as quickly as possible to prevent oxidization by exposing the work to the air, and objects of the present invention are to provide means for lifting the work quickly out of the tank. This reduces the time required for transferring and the exposure to the air, and also increases the capacity of the machine to some extent because the work may remain in each tank for a relatively longer period and the conveyor can be operated at a higher speed; also the arms may be more closely spaced on the conveyor.

In the machine shown in said application the arms are lifted by moving into relation with, or sliding over, stationary cams. This results in considerable friction, strains on the supporting elements and resistance to the movements of the conveyor if the racks, which are hung on the ends of the arms, are heavily loaded. Therefore, further objects of the present invention are to provide means for lifting the arms in such a way that heavier loads can be carried, and so that the machines can be built for greater capacities.

Further objects and advantages will become apparent in the following description, with reference to the accompanying drawings, in which an illustrative embodiment of the invention is shown.

In the drawings:

Fig. 1 is a transverse sectional view of the machine, looking toward the end on which the motor is mounted.

Fig. 2 is a plan view of the machine, with intermediate portions broken away, and the tanks omitted, which, as shown more fully in said application, are arranged along both sides and the ends of the conveyor frame.

Fig. 3 is a side elevation of a portion of the machine, taken substantially on the lines 3—3 of Fig. 1.

Fig. 4 is a detail section on the line 4—4 of Fig. 3.

Fig. 5 is a sectional view on the line 5—5 of Fig. 4.

The machine comprises the rows of tanks A and B, between which is positioned the conveyor frame C. The frame is supported by structural channels 6 and 7, at the ends, and one or more intermediate channels 8 between the ends; and the upper ends of the supports are connected by the horizontally disposed channels 9 and 10, arranged one on each side of the frame. The flanges 11, of the horizontal channel members, project outwardly, as shown, and on the top of each of the upper legs is secured an angle 12 having one leg 13 projecting downwardly and thus forming a guideway along the sides of the frame for the two reaches of the conveyor chain 14. At the ends of the frame the chain is supported on sprocket wheels 16 and 17, which are rotatably supported in bearing brackets 18 bolted to the frame.

The sprocket 16, shown at the left in Fig. 2, is continuously driven by a motor 19, mounted on the top of the frame, through a speed reducer 20, worm 21, to the worm gear 22 which is keyed on the shaft 23 of the sprocket wheel 16. The chain is of a well known construction, having rollers 24 connected by side bars 25, the lower, outer side bars 25 being of special construction and having a laterally projecting portion 26 to which the carriages 27 are secured (see Fig. 4) at intervals along the chain. The carriages may be provided as closely spaced as two links apart, or at greater intervals if desired for large pieces of work.

The carriages are secured to the projection 26 by the bolts 29, which extend through the foot 30 of a bracket 31, through the projection, and threaded into the carriage mem-

ber, the bracket being insulated by suitable flanged bushings 32 and 33. At the lower portions of the carriage are provided inwardly projecting, antifriction rollers 34 which engage between the projecting flanges of the angles 35, 36 which are secured to the web of the channels 9 and 10. In this manner the carriages are firmly supported to move in horizontal paths along the tanks as the chain is actuated.

On each carriage is pivotally mounted an insulated lever 40 having an outwardly projecting arm 41 and a downwardly projecting arm 42, and having a hub 43 which is secured between the lugs 44 of the carriage by a bolt 45, and insulated therefrom by a sleeve 46. An insulated roller 46^a is provided on the lower end of the arm portion 42 which bears against the surface of the web of the horizontal channel members 9 and 10 and thus supports the member 40 in rotative position. At the ends of the tank the cam members 47 are bolted to the channels, as described in said application. The cams 47 force the rollers 46 outwardly and rotate the members 40 upwardly.

In the arm portion 41 is secured a bent rod 48 which projects over the tanks; and on the end of the rod is pivotally mounted a yoke 49, on which are hooked or suspended the work support racks 50. For maintaining the yokes in a substantially horizontal position as the arm is raised or lowered an auxiliary arm rod 51 is provided. The inner end of the rod 51 is pivoted to the insulated bracket 31, and the outer end is pivotally connected to a link 52 which is rigid with the yoke 49. The pivotal connections of the inner and outer ends of the rods 48 and 51 are similarly related for obtaining parallel motion of the yoke. One polarity of the electrical source is connected to the bus bars 521 mounted near the top of the solution tank; and the other polarity is connected to a bus bar 53 which is mounted on the side of the frame member 9. The bus bar 53 is resiliently pressed outwardly into contact with the shoe portions 54, formed on the arm portions 42, so that the current flows between the solution and the pieces of work as the carriages move along the tank.

This construction corresponds substantially to prior constructions where the cam 47 is depended upon for both lifting and lowering the work-support arm. For obtaining a faster and more powerful lift with less strain on the parts, a lifter mechanism L is provided at the tank ends for engaging and lifting the arms as they approach. This mechanism is continuously operated by a shaft 56 which extends along the mid portion of the frame, rotatably mounted in the vertical channels. The shaft 56 is connected for driving by a chain belt 57 and miter gears 58 to the sprocket-wheel shaft 23, and is provided with crank arms 59 having rollers 60 at the outer ends.

The lifter bar 61 is slidably supported in brackets 62, 63, bolted to the frame members 9 and 10, and extends transversely across the frame above the path of the arms. At the end, the bar 61 is provided with a downwardly projected plate or blade 64 which engages, as the bar is retracted, with a roller 65 which is mounted on the upper end of an upwardly projecting arm 66 integrally formed on the arm 41.

The bar is reciprocated by means of an internal cam member 67 through which the shaft 56 extends. At the lower end the member 67 is pivotally mounted in a bearing 68 secured to the channel 8, and the upper end is forked to embrace the bar 61 and provided with slots 69 for receiving the pin 691 secured in said bar.

The roller 60 runs over the oppositely-disposed arcuate dwell surfaces 70 and 71, which terminate at the upper and lower ends in shallow recesses or notches 72 and 73, in which the roller is engaged to swing the cam member from one side to the other, and thus advance and retract the bar 61.

It can now be seen that, with the motor 19 in operation, the carriages 42 are moved continuously along the frame with the arms 48 overhanging the rows of tanks. The lifter mechanisms L, one at the end of each tank, are intermittently operated in cooperative relation with the movement of the carriages to engage the rollers 65, as the carriages approach and raise the arms, which are held up by the roller 46 riding on the outer portion of the cam 47 until the arm is carried over the end of the adjoining tank. The roller then rides down the sloping surface of the cam 47 into contact with the frame for supporting the arm in the lower position in electrical contact with the bus bar 53 and with the work immersed in the tank. The lowering may be rapid because the load on the arm decreases as the work is immersed, and the reaction on the chain decreases, instead of increasing, the resistance to the movement of the chain.

Meanwhile the bar 61 is returned to position for engaging and lifting the next arm.

Having thus described my invention, I claim:

1. In an electroprocessing machine, a solution tank having an electrical connection, a carriage, an insulated work-support arm pivotally mounted on the carriage and extending over the tank, means for moving the carriage along the tank, a bus bar having an electrical connection of different potential than said connection and contacting with the arm in lower position, a movably mounted lifter at the end of the tank, and means for operating the lifter to engage and raise the arm as the arm approaches.

2. In an electroprocessing machine, a solution tank having an electrical connection, a

carriage, an insulated work-support arm pivotally mounted on the carriage and extending over the tank, means for moving the carriage along the tank, a bus bar having an electrical connection of different potential than said connection and contacting with the arm in lower position, a lifter movable transversely to the movement of the carriage, and means for moving the lifter to engage and raise the arm.

3. In an electroprocessing machine, a solution tank having an electrical connection, a carriage, an insulated work-support arm pivotally mounted on the carriage and extending over the tank, means for moving the carriage along the tank, a bus bar having an electrical connection of different potential than said connection and contacting with the arm in lower position, a reciprocally mounted bar near the end of the tank, and means for reciprocating the bar to engage and lift the arm as the arm moves into relation therewith.

4. In an electroprocessing machine, a frame, a row of solution tanks at the side of the frame, a plurality of carriages supported on the side of the frame, a work-support arm movably mounted on each carriage and extending over the tanks, a lifter bar for engaging and raising said arms, the bar being slidably mounted on the frame and projecting over the path of the carriages, means for moving the carriages along the frame, and means for operating the bar to engage the arms as they approach.

5. In an electroprocessing machine, a frame, a row of solution tanks along the side of the frame, a plurality of carriages slidably guided and supported for horizontal movement on the side of the frame, a work-support arm pivotally mounted on each carriage and projecting over the tanks, a transversely disposed lifter bar slidably mounted on the top of the frame near the ends of the tanks, means for moving the carriages along the frame, and means for reciprocating the bar to engage and lift the arms.

6. In an electroprocessing machine, a row of solution tanks having an electrical connection thereto, a frame extending along the sides of the tanks, a horizontally disposed chain extending around the frame, a plurality of work-support arms pivotally mounted on the chain in spaced relation and projecting over the tanks, a bus bar mounted on the side of the frame and contacted by the arms in lowered position, a reciprocating lifter mounted on the frame and adjacent the ends of the tanks for engaging and lifting the arms, means for moving the chain, and means for operating the lifters in cooperative relation therewith so that the lifter engage each arm and lift the same to raise the work out of the tanks, and means for lower-

ing the arms to lower the work into the next tank.

7. In an electrolytic processing machine, a conveyor frame, a carriage mounted for horizontal movement along the side of the frame, a work support arm pivotally mounted on the carriage, means on the frame for supporting the arm so that it extends outwardly from the frame as the carriage is moved along, a cam shaft rotatably mounted on the frame and extending parallel with the path of the carriage, a cam lever pivoted to the frame and oscillated by the cam shaft transversely to the movement of the carriage, a movable lifter operated by the lever for engaging and raising the arm as it is moved along by the carriage, and means for moving the carriage and rotating the shaft in cooperative relation.

Signed at Springfield, Ohio, this 23rd day of May, 1931.

ALBERT H. HANNON.

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