July 29, 1941. B. G. DAW 2,251,121

CONVEYER

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Fig. 1.

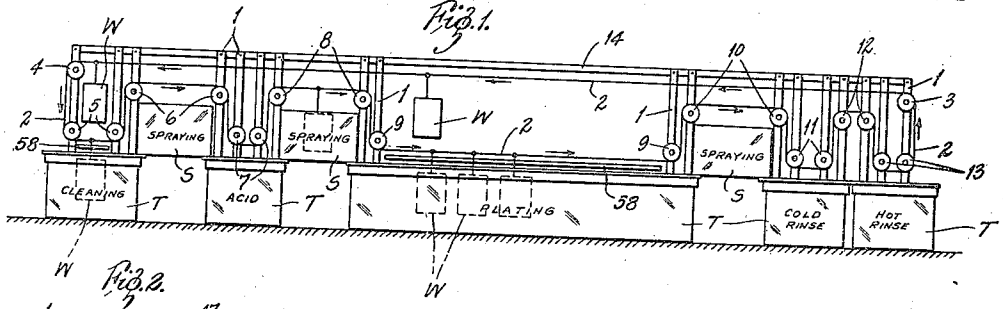



Fig. 2.

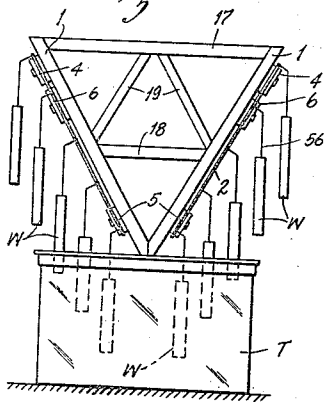


Fig. 8.

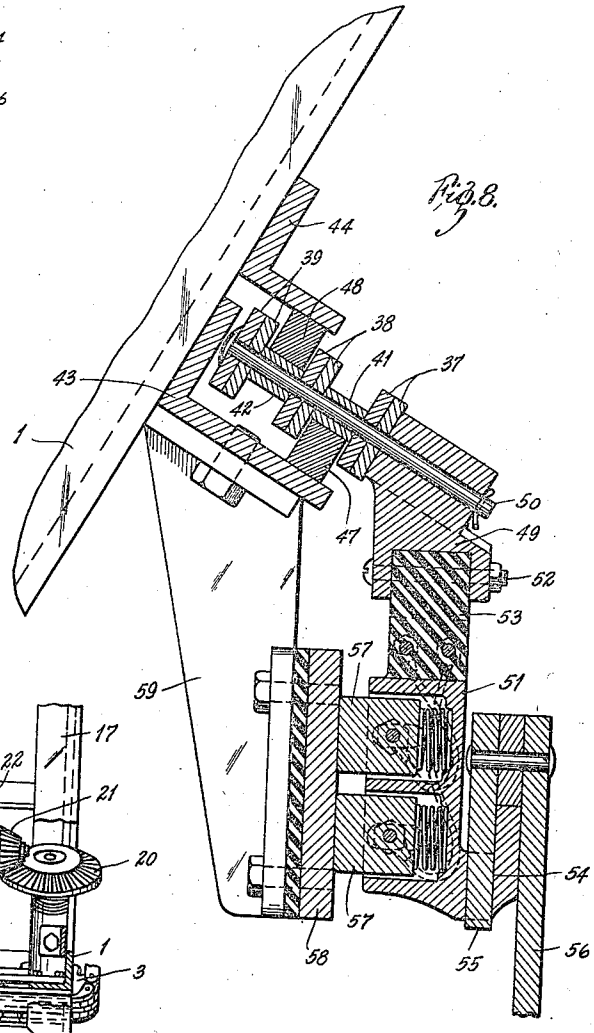
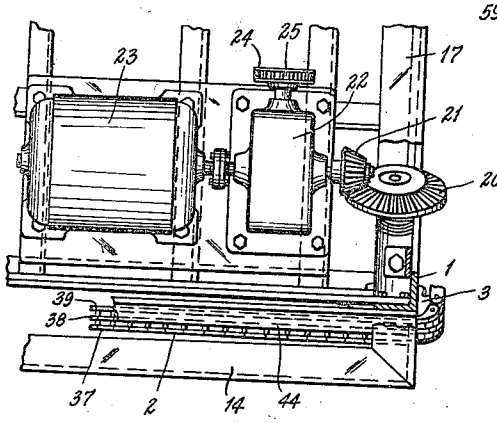


Fig. 7.



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Fig. 3.

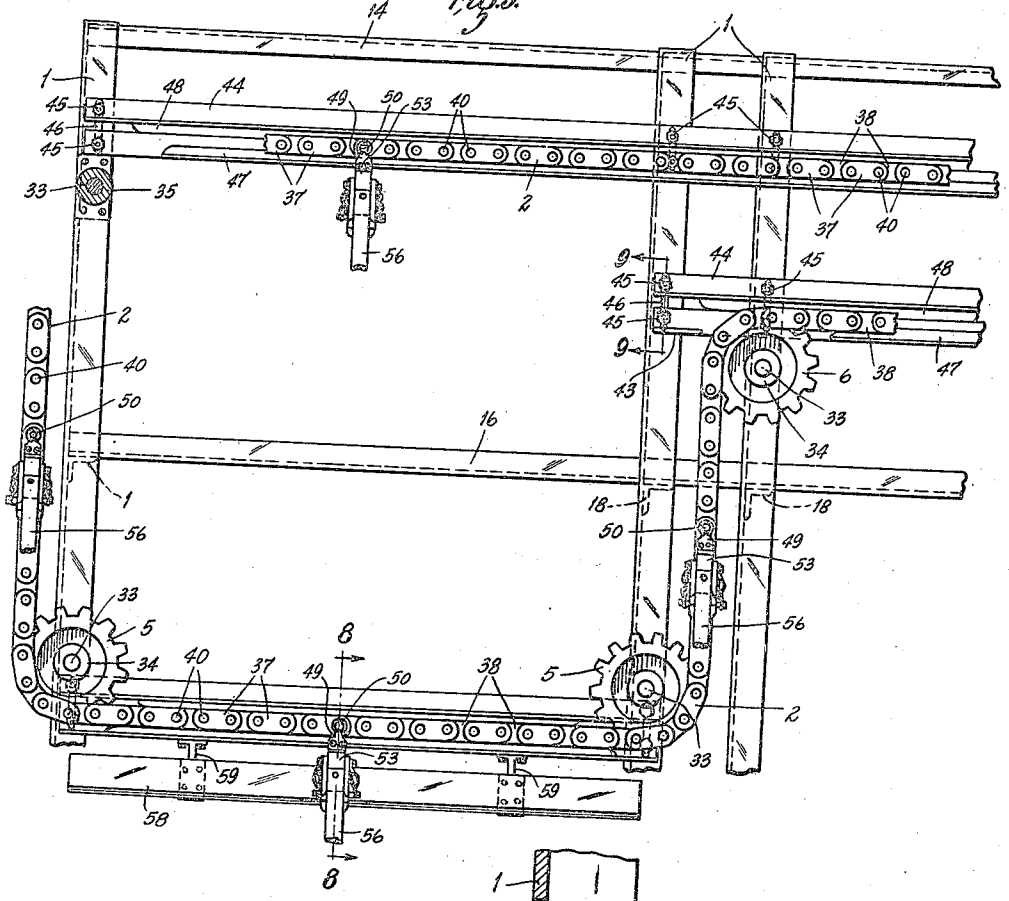



Fig. 9.

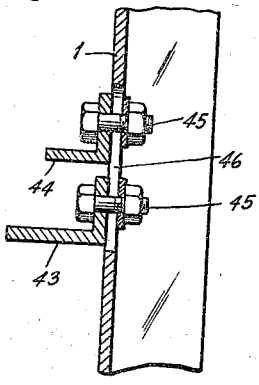
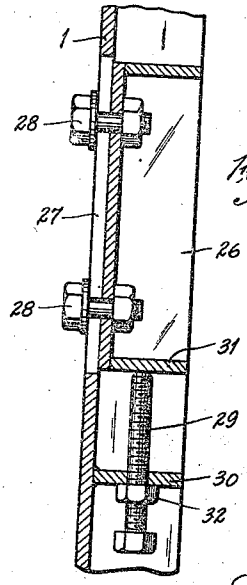



Fig. 10.




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Fig. 4.

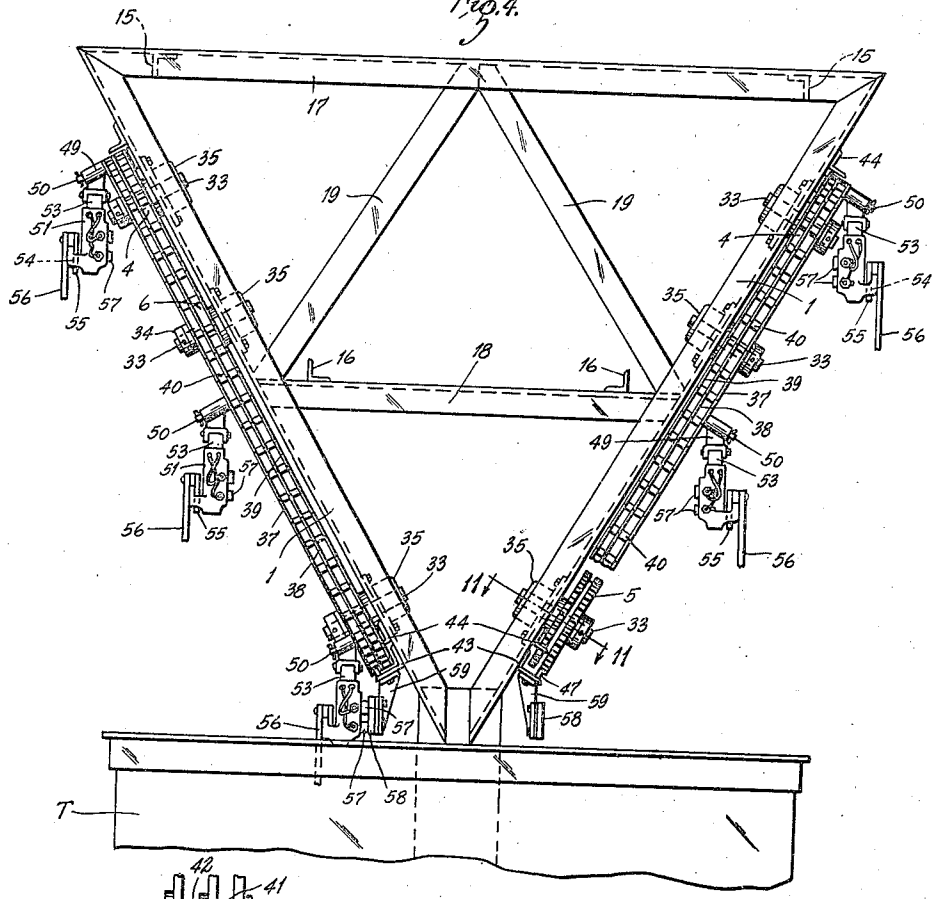



Fig. 11.

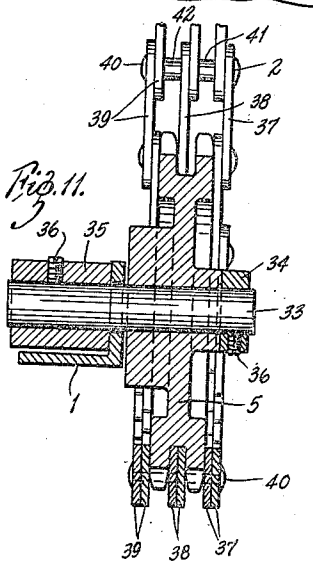
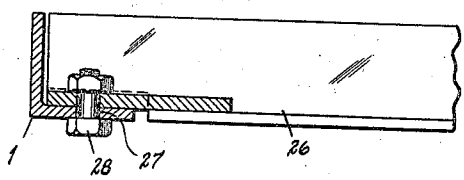


Fig. 12.



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Fig. 5.

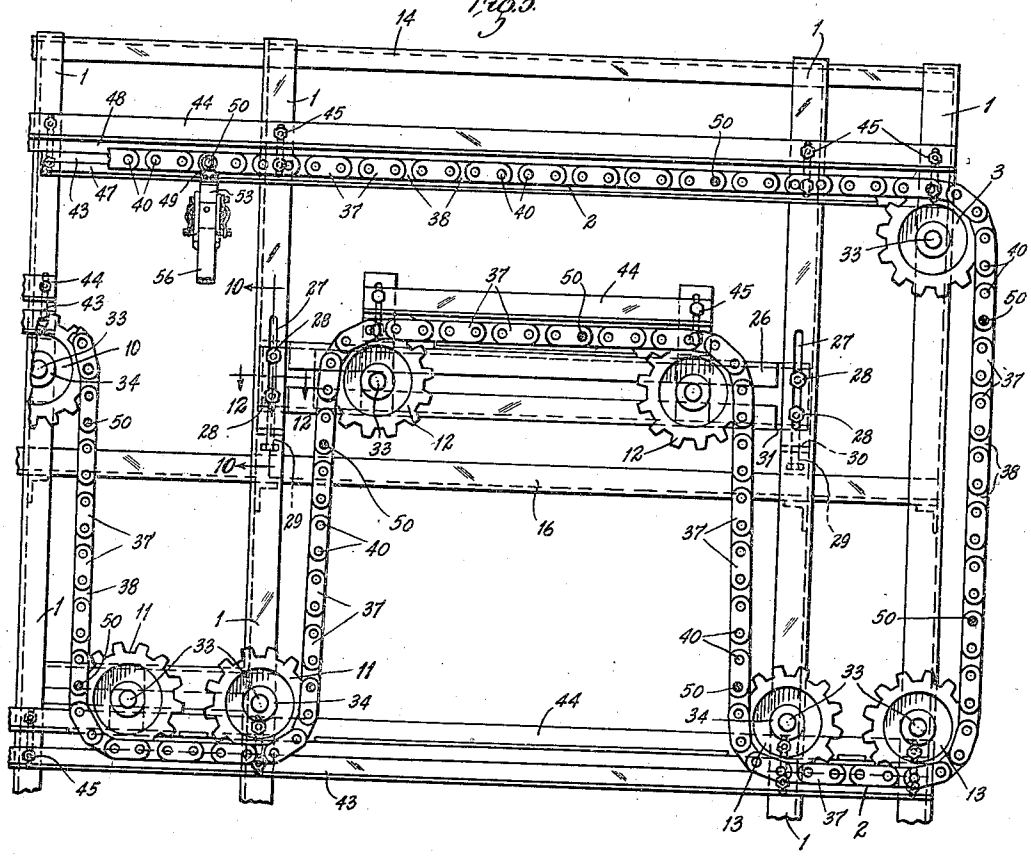
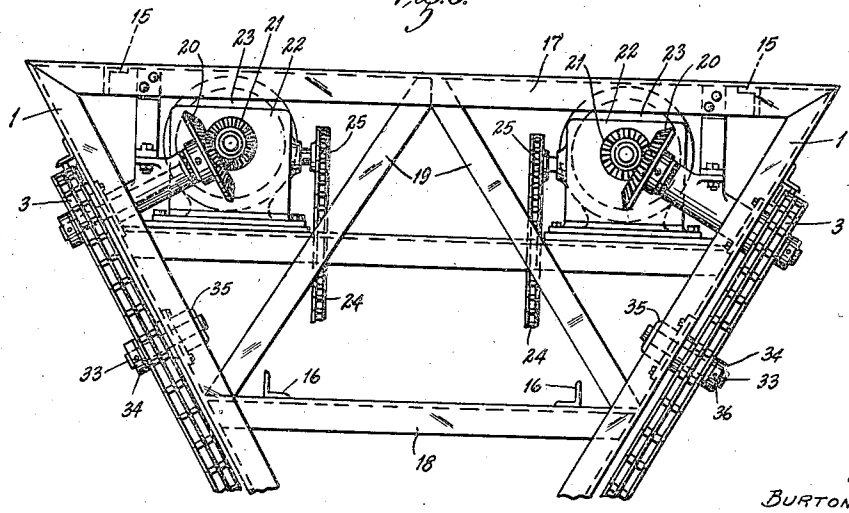


Fig. 6.



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# UNITED STATES PATENT OFFICE

2,251,121

## CONVEYER

Burton G. Daw, Webster Groves, Mo.

Application May 18, 1940, Serial No. 335,925

4 Claims. (Cl. 214—17)

This invention relates to conveyer and transfer mechanism, particularly adapted for electroplating.

An object of the invention is to provide improved conveyer and transfer mechanism, so arranged that it will convey work through various tanks and steps for electro-plating, such as chromium plating; and so arranged as to increase the capacity of such mechanism, to reduce the overall height of the mechanism, and to provide for convenience in loading and unloading the conveyer.

Other and specific objects will be apparent from the following detail description, taken in connection with the accompanying drawings.

Fig. 1 is a diagram showing a side elevation of mechanism embodying this invention;

Fig. 2 is an end elevation;

Fig. 3 is a detail side elevation showing one end of the mechanism, the left end with reference to Fig. 1;

Fig. 4 is an end elevation showing the left end of the mechanism;

Fig. 5 is a side elevation taken at the right end of the mechanism;

Fig. 6 is an end elevation showing the right end of the mechanism;

Fig. 7 is a plan view showing driving means;

Fig. 8 is a section on line 8—8, Fig. 3, showing a work hanger in detail;

Fig. 9 is a section on line 9—9, Fig. 3, showing means for adjustably supporting the track;

Fig. 10 is a section on line 10—10, Fig. 5, showing slack take-up means;

Fig. 11 is a section on line 11—11, Fig. 4, showing in detail a sprocket with chain; and

Fig. 12 is a section on line 12—12, Fig. 5.

In the embodiment of the invention illustrated in the accompanying drawings a longitudinal frame, having a plurality of inclined supports 1, carries an endless conveyer chain 2 with horizontal and upwardly and downwardly extending reaches obtained by the proper elevation of sprockets for the chain 2. The frame is mounted over a plurality of tanks (T) and along other work spaces (S) and is so arranged that work (W) carried by the chain is conveyed through the tanks and across the work spaces without any attention to the individual pieces of work except their loading and unloading. It will be understood that the upwardly and downwardly extending reaches, or some of them, are so arranged as to lift the work out of a tank, across the ends of the tank, and deposit it into a succeeding tank, or carry it across an intervening work space.

As illustrated and as preferably used, the frame had two sets of conveyers one on each side. This results in economy of space and equipment, particularly tanks, because the same tank can be used for both conveyers. Because of the arrangement of the conveyers inclined upwardly and outwardly they converge toward the bottom, thus placing the work of the two conveyers close together at the bottom, so that a comparatively narrow tank may be used for both conveyers.

Each conveyer or chain 2 is arranged in a plane inclined upwardly and outwardly from the vertical at an angle of 21° to 45°, 30° as specifically shown in the drawings. The inclined supports 1 for each conveyer are parallel to each other and extend at an angle in the plane as indicated.

The chain 2 is carried by sprockets 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. The sprockets 3 and 4 form the upper or return reach of the chain which extends the entire length of the frame. A conveyer is preferably loaded and unloaded along this reach and the invention here involved makes this possible and convenient. From the sprocket 4 the chain extends downwardly at the extreme end of the conveyer to the sprockets 5, which form a horizontal reach for the cleaning tank (see Fig. 1). The chain then extends upwardly over the sprockets 6, across a work space where a spray may be applied to the work. The chain then extends down to the sprockets 7 which traverse an acid tank; then upwardly over the sprockets 8 through another spraying space; then downwardly to a major reach formed by the sprockets 9 where the work is dipped in a plating tank; then through a reach formed by the sprockets 10 and traversing a spraying space; then down and over the sprockets 11 to cross a rinse tank; then upwardly to lift the work over the end of that tank and into a second rinse tank through a reach formed by the sprockets 12; then downwardly and through a reach formed by the sprockets 13; and finally upwardly and over the sprockets 3, at the end of the conveyer to complete the circuit.

The frame, in addition to the inclined supports 1, should include as many longitudinal, cross and brace members as may be necessary to secure a rigid construction. As specifically illustrated, it includes longitudinal members 14, 15 and 16; cross members 17, and 18, and braces 19.

The conveyers are preferably driven separately and are so illustrated. Each conveyer is driven through the sprockets 3 (Figs. 6 and 7, driving

means not being shown in Fig. 5). The sprocket 3 is secured to one end of its shaft, on the other end of which is a bevel gear 20, driven by a pinion 21 through a variable speed reducer 22 by a motor 23. The speed reducer 22 is of a commercial type and is adjustable by a depending chain 24, about a sprocket 25.

In order to provide an adjustable tension for the chain 2, means are provided as best illustrated in Figs. 5, 10 and 12. The sprockets 12 are mounted in a frame 26 which extends between two supports 1. The supports to which the frame is fastened have vertical slots 27 to accommodate bolts 28 by which the frame 26 may be secured to its supports. Set screws 29 are threaded in lugs 30 secured to the supports 1 and engage a flange 31 on the bottom of the frame 26. A lock nut 32 is placed on each of the set screws 29 with which the set screws may be locked in position. It may be understood that the frame 26 can be raised or lowered by means of the set screws 29 after the nuts on the bolts 28 and the lock nuts 32 have been loosened. By raising the frame 26 the chain will be tightened and by lowering the frame the chain will be loosened.

Fig. 11 illustrates the mounting of the sprockets on the supports 1. A sprocket, for example 5, is journaled on a shaft 33. The shaft 33 extends through a flange of a support 1, and has a collar 34 on its outer end and a collar 35 on its inner end each fastened by a set screw 36.

The chain 2, as specifically shown, is double, having two rows of interstices formed by three rows or series of links 37, 38 and 39 (Figs. 8 and 11), for engagement by teeth of the sprockets, which are arranged in two parallel circles on each sprocket. Pins 40 join the links together. Rollers 41, on the pins 40, space the links 37 and 38, and rollers 42 space the links 38 and 39. Thus the chain is formed of a longitudinal series of links 37, a series of rollers 41, a series of middle links 38, rollers 42, and a series of links 39, joined together by pins 40. The chain 2, in place of being double only, may have three or more courses.

Guideways comprise two opposed sections or rails (a lower section 43 and an upper section 44) support the chain (see Figs. 3, 4, 8 and 9) along the horizontal reaches. The sections or rails 43 and 44 are secured to the supports 1 by bolts 45 which pass through slots 46 in the supports. The lower section 43 has a track 47, upon which the rollers 41 run, and the upper section has an overhanging track 48 engaging the top of the rollers 42. Thus the chain is sustained in a proper angular path.

The hanger by which the work is carried on the chain is shown in detail in Fig. 8. A knuckle 49 is connected to the chain 2 by a pin 50, which in place of the usual pin 40, passes through the links and the rollers of the chain as well as through a boss on the knuckle 49. The knuckle 49 is connected to a hanger or shoe 51 by a pin or bolt 52. Since the member 51 is intended to be connected in an electric circuit, a piece of non-conductive material 53 rigidly secured to and a part of the member 51 forms a boss for the pin 52. A slot 54 through an outer projection on the shoe 51 is adapted to receive a downwardly extending lug 55 on a work supporting rod 56. The work may be hung on the lower end of the rod 56 in any convenient manner, and depending upon the work to be handled. Other convenient means for insulating the hanger from the conveyer chain may be used.

Spring pressed brushes 57 are carried by the shoe 51 and engage the outer vertical face of one or more bus bars 58, which are supported on the frame by brackets 59.

The pins 50 and 52 associated with a hanger are in the same vertical plane but at an angle to each other corresponding to the inclinations of the supports 1. Thus, as shown in the drawings, the pin 52 is horizontal while the pin 50 is inclined at an angle of 30° from the horizontal.

There are several advantages to the structure which includes a carrier chain arranged in an overhanging plane. When two carrier chains are used, positioned on opposite sides of the frame, economy of space and tank facilities is provided, as explained in the forepart of this description. The capacity of the machine is increased, as compared to a carrier arranged in a vertical plane. Pieces of work may be arranged close to each other without danger of colliding since they will not be in the same lateral position, but one will be either inwardly or outwardly from the other. In a carrier arranged in a vertical plane the pieces must be spaced from each other a distance greater than the height of any vertical reach through which the work is conveyed. But in a carrier involving this invention the size of the work only determines the spacing.

The overall height of the machine is materially less than in conventional structures, where the return reach of the chain must be sufficiently elevated to have its depending elements clear all other horizontal reaches. In the present structure the return reach extends outwardly beyond other reaches of the chain and depending elements will clear those reaches even if they are not wholly above them.

Because it does not matter how far below the chain the work extends, because the return or top reach extends outwardly beyond the rest of the carrier, and because the upper reach is reasonably low, the carrier may be loaded and unloaded at any point along that reach. This makes for convenience as well as economy of space.

While a particular embodiment of the invention has been illustrated and described in detail, it will be understood that various changes may be made in the details of construction, within the scope of the appended claims, without departing from the spirit of this invention.

I claim:

1. A conveyer of the character described having a frame providing an overhanging support, sprockets supported on the frame in a plane arranged at an angle of 21° to 45° from the vertical, an endless chain mounted on the sprockets, the sprockets being arranged to provide differing directional reaches of the chain, one of said reaches extending horizontally substantially the entire length of the frame above the other reaches, and laterally extending pivotal supports on the chain adapted to carry articles depending therefrom.

2. A conveyer of the character described having a frame including oppositely disposed sets of supporting members, each set being arranged in an overhanging plane with the two sets converging toward each other at their bottom, sprockets mounted on said supporting members, an endless chain mounted on the sprockets in each of said planes, the sprockets being arranged to provide differing directional reaches of the

chains, and laterally extending supports on the chains adapted to carry articles to be conveyed.

3. A conveyer of the character described having a horizontally extending frame mounted above a series of tanks, a set of sprockets supported on each side of the frame, each set arranged in an overhanging plane, the two planes being oppositely disposed and converging toward the bottom of the frame, endless chains mounted on the sprockets in the planes respectively, the sprockets being arranged to provide differing directional reaches of the chains, and laterally extending supports on the chains adapted to carry articles to be conveyed.

4. In a plating mechanism having a series of tanks arranged in line, a conveyer for articles to be plated constructed and arranged to convey said articles through said tanks progressively and over end walls of the tanks, comprising a chain having laterally extending pivotal supports for articles depending therefrom, and sprockets upon which the chain is mounted positioned in a plane at an angle of 21° to 45° from the vertical overhanging the front of the tanks and providing low horizontal reaches, high horizontal reaches and upwardly and downwardly extending reaches between the said horizontal reaches.

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