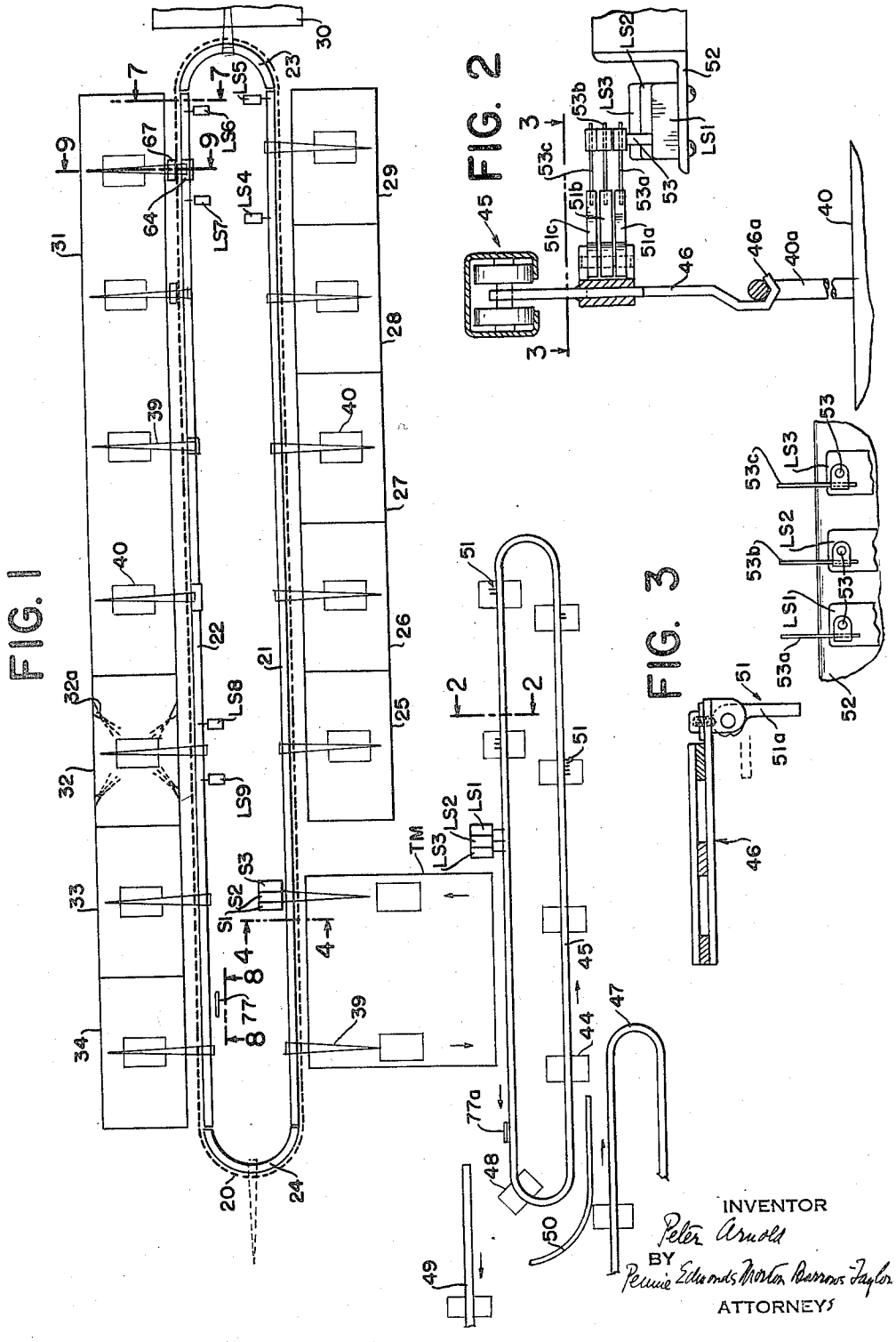
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PROCESSING APPARATUS

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PROCESSING APPARATUS

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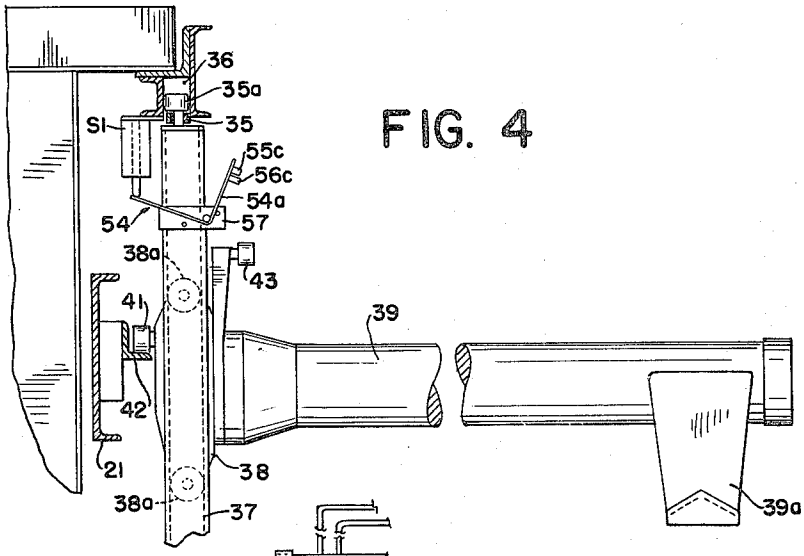


FIG. 4

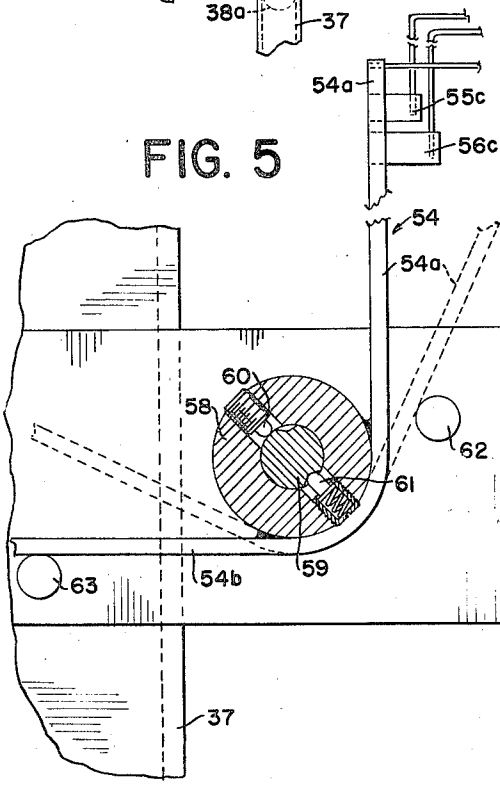


FIG. 5

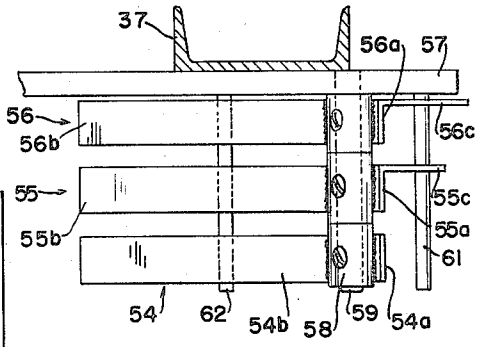


FIG. 6

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FIG. 8

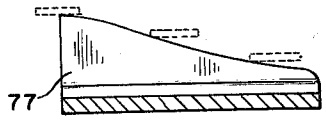


FIG. 7

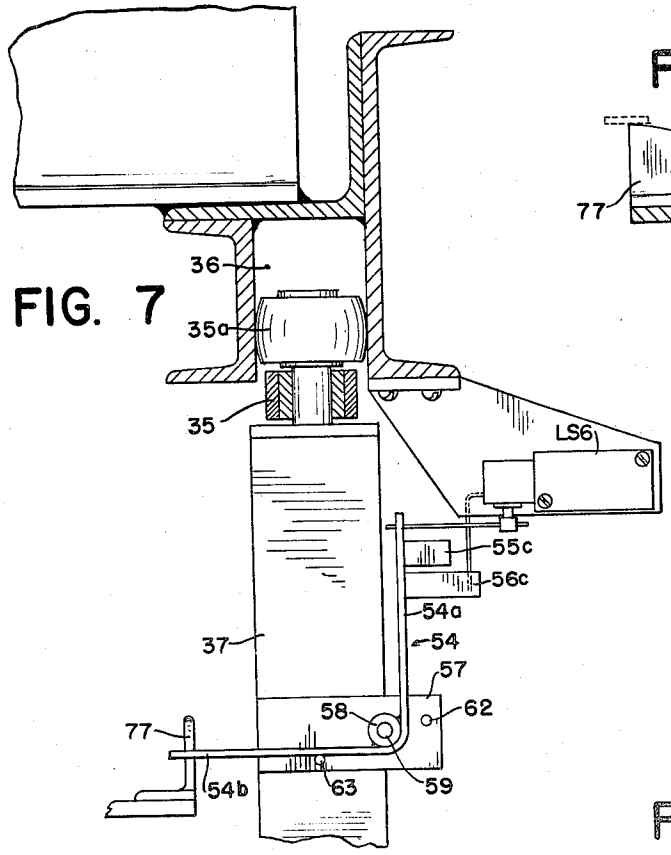


FIG. 13

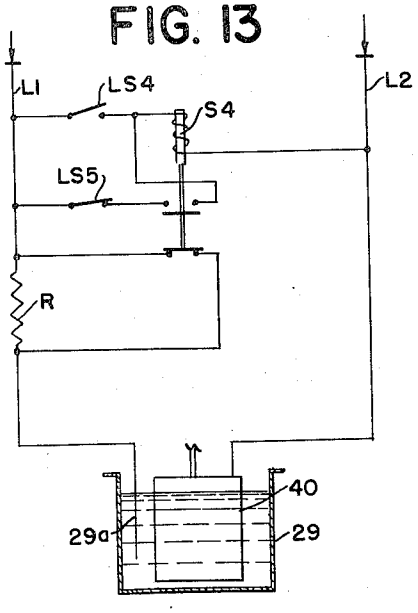
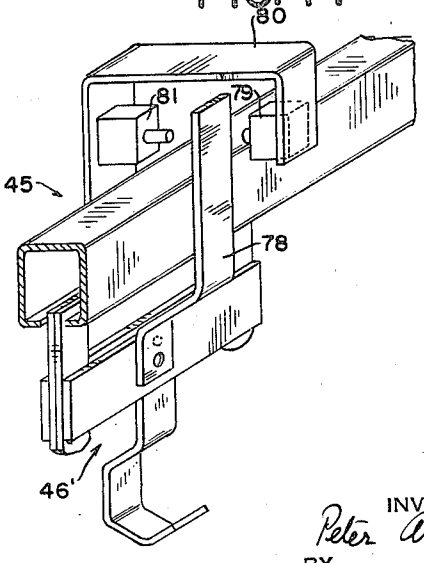


FIG. 14



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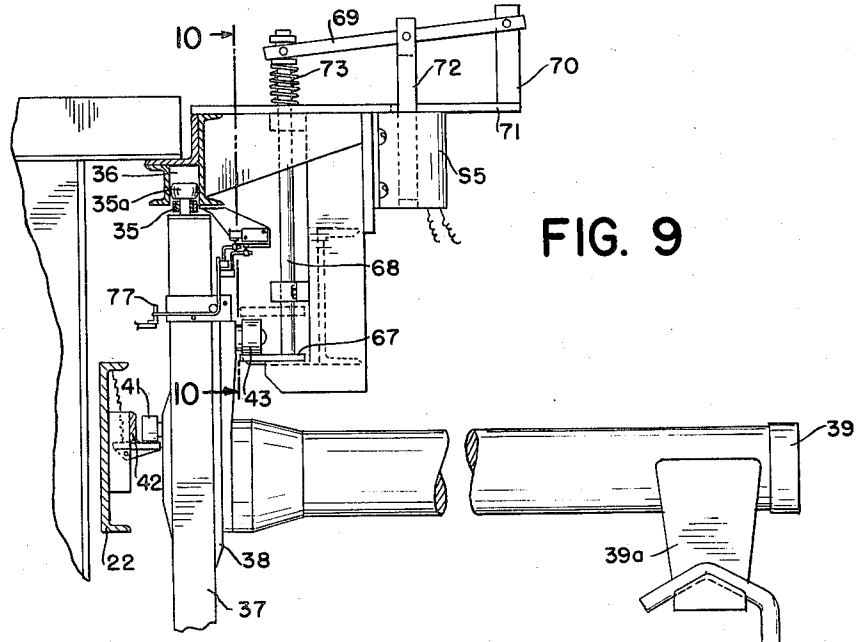


FIG. 9

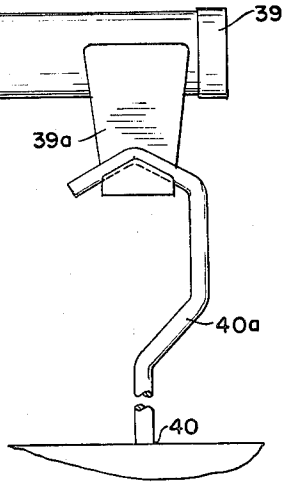


FIG. 10

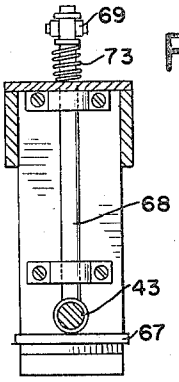


FIG. 11

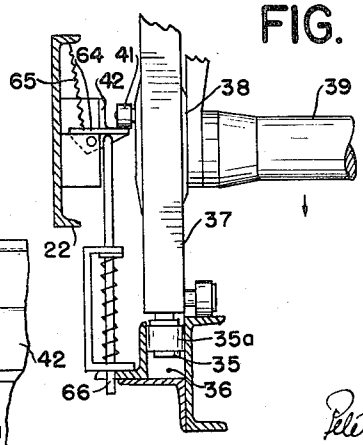
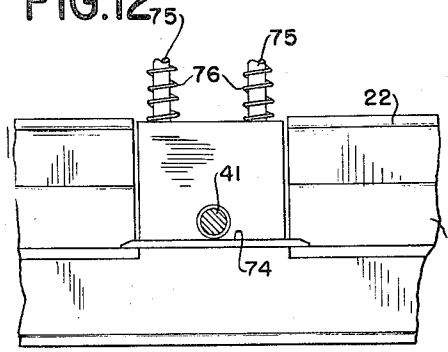


FIG. 12



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United States Patent Office 2,935,989 Patented May 10, 1960

2,935,989

PROCESSING APPARATUS

Peter Arnold, Elberon, N.J., assignor to Hanson-Van Winkle-Munning Company, Matawan, N.J., a corporation of New Jersey

Application December 4, 1957, Serial No. 700,676
10 Claims. (Cl. 134—46)

This invention relates to processing apparatus, in which workpieces are automatically transported to successive stations, where they undergo different treatments in a sequence. More particularly, the invention is concerned with an apparatus of the type described, which is provided with novel means for effecting modifications in the treatments given selected workpieces. The apparatus of the invention may be used for various purposes, but since all the advantages of the invention are realized in its application to electroplating, an apparatus suitable for such use and embodying the invention will be illustrated and described in detail for purposes of explanation.

Automatic electroplating apparatus commonly includes a plating machine having a plurality of preparation tanks for cleaning, rinsing, etching, and like treatments, one or more plating tanks, which usually have a plurality of plating stations, and a plurality of finishing tanks for reclaim, hot and cold rinsing, etc. In one common form of such apparatus, the workpieces are handled by being mounted in groups on carriers, such as racks, and, in the plating operation, the racks are hung from arms on a processing conveyor, which extends along the tanks and advances the racks stepwise one tank or station at a time. An elevator extends over the tanks, where the racks must be raised to pass from one tank to the next, and the elevator operates during the periods of rest of the conveyor to move the racks vertically into and out of the tanks. The workpieces are usually loaded on and removed from the racks at a station remote from the location of the tanks and, in a type of installation frequently used, the workpieces are loaded by a workman on racks suspended by hooks from a conveyor of the monorail type, which moves in timed relation to the movement of the processing conveyor and advances the racks to a transfer station. In each period of rest of the conveyors, a rack of raw work at the transfer station is delivered, manually or by a suitable transfer mechanism, from the monorail conveyor to the processing conveyor and a rack of finished work is removed from the processing conveyor and placed on the monorail conveyor. The racks of finished work are then moved by the monorail conveyor to an unloading station, where the racks are unloaded, after which the empty racks are moved to the loading station and the cycle of operations is repeated.

In the operation of such electroplating apparatus, it frequently happens that the workpieces are of two or more kinds requiring different treatments, as, for example, some of the workpieces may require a heavier plating than others. Such a difference in plating may be achieved in various ways and one expedient involves causing the racks of workpieces, which are to be given a light plating, to be held out of the plating tank for a part of the length thereof by such means as are disclosed in Curtis Patent 2,605,882, issued August 5, 1952. The Curtis apparatus includes a processing conveyor with arms raised and lowered by an elevator and a selectively operable device is mounted at each plating position to be bypassed and acts to prevent a conveyor arm from being lowered by the elevator at such position. The devices are operated by elements, such as cams or tabs, which are mounted on the conveyor arms and are set to actuate the devices or to leave them inoperative, depending on the kind of plating to be given the workpieces on the racks hung from the respective arms. While the Curtis apparatus functions satisfactorily, the elements on the conveyor arms must be set manually in accordance with the kind of workpieces carried by the arms and the adjustment of the elements is difficult to carry out while the conveyor is in operation and requires the services of an alert skilled workman at the transfer station.

The present invention is directed to the provision of a processing apparatus for subjecting workpieces on racks to a series of treatments, which is provided with means for modifying the treatments given to the workpieces on selected racks and in which the treatment to be given the workpieces on any rack can be determined by the workman who loads the racks or by another person located remotely from the processing conveyor. The new apparatus thus achieves the desired result without the services of an alert or highly trained workman at the transfer station.

The new apparatus includes a processing machine with a conveyor and elevator for transporting workpiece racks to and removing them from treating stations, a transfer station where the racks of work are delivered to and received from the machine conveyor, and a second conveyor between the transfer station and a station for loading and unloading the racks. The machine is provided with means for modifying the treatments ordinarily given the workpieces and the modifying means may produce any of a number of effects, such, for example, as applying a plating of less than usual weight, varying the current density in certain plating cells, subjecting workpieces to special sprays, skipping certain cells, etc. In order to actuate the modifying means selectively, the machine conveyor is provided with elements, which are disposed adjacent the supports for respective racks on the conveyor and can be set to render selected modifying means effective as the conveyor advances. The setting of the elements is accomplished by means operable selectively by members on parts of the second conveyor and the construction is such that, when a workman places a rack of raw workpieces on the second conveyor, he adjusts the members on parts of the second conveyor adjacent the rack support to produce the treatment modifications desired for such workpieces. As the rack approaches the transfer station, the support on the machine conveyor, on which the rack is to be placed, is approaching the place where it will receive the rack and, during such approaching movements, the operative members on the second conveyor actuate means for setting corresponding elements on the machine conveyor adjacent the rack support thereon. When the rack has been transferred to the machine conveyor and is moved through the machine, the selected elements operate their related modifying means so that the workpieces on the rack are given modifications of the usual treatments.

For a better understanding of the invention, reference may be made to the accompanying drawings, in which—

Fig. 1 is a diagrammatic plan view of an electroplating apparatus embodying the invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary vertical sectional view on an enlarged scale of the triggers for operating the treatment modifying means;

Fig. 6 is a plan view of the group of triggers;

Figs. 7, 8, and 9, are sectional views on the lines 7—7, 8—8, 9—9, respectively, of Fig. 1;

Fig. 10 is a sectional view on the line 10—10 of Fig. 9;

Fig. 11 is a vertical sectional view illustrating one form of elevator flipper, which may be used in the apparatus;

Fig. 12 is a view of a bridge, which may be employed with the elevator;

Fig. 13 is a wiring diagram of a circuit for varying the current density in a treatment cell; and

Fig. 14 is a perspective view of a modified feature of the apparatus.

The electroplating apparatus illustrated in Fig. 1 comprises a series of stations disposed along an endless conveyor indicated at **20**. The conveyor has parallel stretches connected by curved end portions and an elevator structure is disposed within the conveyor and includes beams **21, 22** extending along the parallel stretches of the conveyor. At one end of the conveyor, the elevator has a curved beam **23** connecting the stretches **21, 22**, while, at the other end, there is a fixed track **24**. The conveyor advances stepwise and, in each period of rest between successive conveyor movements, the elevator moves down and then rises to its up position.

A group of treatment tanks **25, 26, 27, 28** lie at respective stations along the stretch of the conveyor adjacent the elevator beam **21** and the tanks may be employed for pre-plating treatments such as cleaning, etching, etc. The apparatus illustrated includes a cell **29** in which an electrolytic treatment is carried on and the cell contains one or more anodes indicated diagrammatically in Fig. 13 at **29***a*. The tanks **25–29**, inclu., are of unit size and each step in the conveyor movement has a length equal to the spacing between the centers of the adjacent tanks. Beyond tank **29**, there is treatment tank **30** of unit size disposed at the curved end of the conveyor, and, at the beginning of the second stretch of the conveyor, there is a plating tank **31**, which is of multiple unit size and, in the apparatus shown, has a length equal to that of four unit tanks. Tanks **32, 33, 34** for post-plating treatments are disposed beyond the plating tank and are of unit size.

The conveyor may be of different types, but that shown comprises upper and lower chains **35** (Figs. 4, 7, 11), provided with rollers **35***a* running in channels **36** on the machine frame. The chains are connected at intervals equal to the unit tank spacing by pairs of vertical guides **37**, between which are mounted skate-like slides **38** having rollers **38***a* running in the guides. Each slide has an arm **39** which extends out over the tanks and is provided with a hook **39***a* or like means, from which a workpiece carrier, such as a rack **40** with a hook **40***a*, may be suspended. Each slide **38** is provided at the rear with a pick-up roller **41** and each of the elevator beams has an angle iron **42** serving as a track, on which the roller **41** may run. Each slide is also provided with a hold-out roller **43** at its front.

The racks **40** are loaded with raw workpieces at a loading station **44** disposed along one stretch of a loading conveyor **45**, which may be of the monorail type and have carriages **46** provided with hooks **46***a* for engagement with the hooks **40***a* of the racks. The raw work is supplied to the loading station by a plant conveyor **47** of any suitable type. The racks of finished work are removed from the conveyor **45** at an unloading station **48** and the finished workpieces are carried away on a plant conveyor **49**. In some installations the loading conveyor **45** and the conveyors **47** and **49** may be part of a single, plant conveyor system. A siding **50** may be installed to extend between the loading and unloading stations and provide means for transferring the racks emptied at the unloading station to the loading station.

The conveyor **45** has a stretch lying parallel to one stretch of the processing conveyor **20**, and a transfer mechanism TM of conventional construction is advantageously provided at a transfer station located between the parallel stretches of the conveyors. The conveyors **20** and **45** move stepwise substantially in synchronism in opposite directions and the steps in the movements of the two conveyors are of the same length. Conveyor **45** is so constructed that successive stations, at which

carriages on the conveyor come to rest at one end of the transfer mechanism, lie opposite successive stations, at which arms on conveyor **20** come to rest. Accordingly, in the operation of the apparatus, the transfer mechanism may act in each period of rest of the conveyors to transfer a rack of raw work from a carriage on conveyor **45** to an arm on conveyor **20** and to transfer a rack of finished work from an arm on conveyor **20** to a carriage on conveyor **45**. In some cases the transfer mechanism may be omitted and a workman may perform the task of transferring the racks of workpieces during periods when the conveyors are at rest.

The apparatus illustrated includes means for modifying three of the treatments, to which the workpieces are ordinarily subjected, and, by way of example only, one modification involves a change in the current density in cell **29**, a second modification involves subjecting workpieces to less than normal plating treatment, while the third modification consists of the use of sprays **32***a* in tank **32**. In order to operate the modifying means selectively, each carriage **46** on the conveyor **45** is provided with a set of tabs **51** pivotally mounted thereon and movable to operative positions at right angles to the direction of movement of the carriage, the tabs being held in operative or inoperative position by suitable detent means, for example. The individual tabs **51***a*, **51***b*, and **51***c* are disposed one above the other (Fig. 2) and, as each carriage moves to the first station in alignment with the transfer station, it passes a group of limit switches **LS1, LS2, LS3** mounted on a bracket **52** attached to a part of the machine framework. The limit switches have operating shafts **53** extending vertically therefrom and carrying respective laterally extending rods **53***a*, **53***b*, **53***c*, and the shafts of the switches are of different lengths, so that the rods lie at different levels and are engageable by respective tabs **51***a*, **51***b*, **51***c* in operative position.

The conveyor **20** is provided with a set of triggers **54, 55, 56** adjacent each arm **39** and the triggers of each set may be mounted on a plate **57** attached to one of the guides **37** for the slide, on which the arm is mounted. Each trigger consists of a bell-crank lever attached to a collar **58** pivotally mounted on a rod **59** attached to plate **57** and the collar of each trigger has a pair of spring-pressed detents **60, 61** adapted to enter notches in rod **59** and hold the triggers in one or the other of two positions. When the detent **60** of a trigger, for example, the trigger **54**, lies within its notch in rod **59**, the trigger is in inactive position (Fig. 5) and its arm **54***a* lies against a rod **62** carried by the plate **57**. When the trigger has been moved angularly to cause its detent **61** to enter the corresponding notch in rod **59**, the trigger is in active position and the arm **54***a* of the trigger extends vertically, while the arm **54***b* extends horizontally and lies on top of a rod **63** carried by a plate **57**. The vertical arms **54***a*, **55***a*, **56***a* of triggers **54, 55, 56** are of gradually decreasing length and arm **55***a* has a laterally extending tab **55***c* at its upper end, while arm **56***a* has a similar, but longer tab **56***c*.

When an arm **39** on conveyor **20** comes to rest opposite that point at the transfer station, at which a rack of raw work is loaded on the arm, the triggers **54, 55, 56** associated with the arm are in idle position and their arms **54***b*, **55***b*, **56***b* lie beneath respective push-pull devices which are mounted on a part of the machine framework and may be solenoids **S1, S2, S3**, hydraulic or air cylinders, etc. At that time, a carriage **46** on conveyor **45** loaded with a rack of raw work is passing the limit switches **LS1, LS2, LS3** and is about to stop at the transfer station. The limit switches control the energization of respective solenoids and, as the carriage passes the limit switches, the tabs on the carriage, which have been moved to operative position, operate their associated limit switches to energize the corresponding push-pull solenoids. Upon energization of a solenoid, its plunger moves to strike the arm of a trigger and moves the lat-

ter angularly to operative position. Accordingly, when the rack of workpieces is transferred from the carriage 46 on conveyor 45 to the arm 39 on conveyor 20, the triggers associated with the arm are selectively moved to operating position as determined by the setting of the tabs 51 on the carriage.

After an arm 39 on the conveyor 20 has received a rack of workpieces, it is advanced by the conveyor to the successive tanks 25, 26, 27, 28 and 29. As the arm comes to rest at each tank, it is lowered by the elevator to immerse the workpieces in the solution in the tank and is then raised for the next advance by the conveyor. A normally open limit switch LS4 is mounted adjacent the path of an arm 39 being moved by the conveyor from tank 28 to tank 29 and, if the appropriate trigger on the arm has been moved to operative position, it causes the limit switch LS4 to be closed as the arm passes the limit switch. The limit switch LS4 lies in a circuit (Fig. 13) between power lines L1, L2 and, when the limit switch is closed by a trigger, current flows between the lines to energize a solenoid relay S4, which establishes a holding circuit for the solenoid, containing the normally closed limit switch LS5. The energization of solenoid S4 also opens a circuit around a resistance R between line L1 and the anode 29*a* in tank 29. The workpieces on the rack 40 in the tank are connected to line L2 and, when the circuit around resistance R is opened, a reduction in the density of the current flowing through the tank between the anode and workpieces results. When the rack is raised from tank 29 and advanced beyond the tank, the trigger on the arm 39, which closed the limit switch LS4, opens the limit switch LS5. The solenoid S4 is thereupon de-energized and the circuit around the resistance R is closed, so that the conditions for the passage of current at normal density through cell 29 are again established.

The modification in the length of the plating treatment given selected workpieces can be accomplished in different ways and, in the apparatus shown, the racks of workpieces, which are to receive a light plating, are advanced along half the length of the plating tank before being lowered to immerse the workpieces in the plating solution. It is to be understood that the same result can be obtained in other ways and the late set-down of the workpieces is merely typical.

In order to plate the workpieces selectively, the track 42 on elevator beam 22 has an opening at the first plating station in tank 31 and a flipper 64 is pivotally mounted in the opening and is normally held by a spring 65 to close the opening and complete the track. A spring-pressed plunger 66 is mounted on the machine frame near the lowered position of arm 39 at the plating station and, when the arm has been moved down, the plunger acts to tilt the flipper, so that the elevator can rise with the flipper missing the roller 41 on the slide of the arm. The flipper is thus active in the up position of the elevator to support an arm, whose roller moves on to the flipper, but the flipper always leaves the arm in down position.

A hold-out plate 67 is mounted in line with arm 39 on conveyor 20 at the first plating station of tank 31, and the plate is attached to the lower end of the arm 68 depending from one end of lever 69. The other end of the lever is pivoted on a standard 70 rising from a bracket 71 attached to the machine framework and lever 69 is attached between its ends to the plunger 72 of a push-pull device, such as a solenoid S5, which can be energized by closing of a limit switch LS6. The rod 68 is encircled near its upper end by a spring 73 and, when the solenoid S5 is deenergized, the spring raises rod 68 so that the plate 67 lies above the hold-out roller 43 on the arm 39. When an arm carrying workpieces, which are to be given half the normal plating treatment, approaches the plating tank 31, the appropriate trigger on the arm will have been set to operate limit switch LS6. Operation of the

switch causes the solenoid S5 to be energized and plate 67 is moved to its down position, so that, as the arm approaches the first plating station of tank 31, its auxiliary roller 43 rolls on top of the plate 67. Thereafter, when the elevator moves down, the arm 39 is held in upper position by its roller 43 resting on the plate. Upon the ascent of the elevator and the next forward movement of the conveyor, the arm 39 is advanced along the elevator track to the second plating station in the tank. In such movement, the trigger on the arm, which operates LS6 to cause energization of solenoid S5, operates a limit switch LS7 and causes the solenoid to be de-energized.

At the second plating station of tank 31, the elevator track has an opening, which is normally closed in the up position of the elevator by a bridge comprising a plate 74 mounted on a pair of rods 75 attached to the machine framework and urged to downward position by springs 76 encircling the rods. When an arm 39 is advanced along the raised elevator track 42 to the second plating station of tank 31, the roller 41 of the slide of the arm rolls upon the plate 74 and, when the elevator is lowered, the arm remains in the up position. Upon the next advance of the conveyor, the arm is moved to the third plating station of tank 31, at which point the arm is to be lowered to immerse the workpieces thereon in the solution. At the third plating station, the elevator track has an opening, in which is mounted a flipper similar to flipper 64, and, when an arm rests upon the flipper, the arm is lowered when the elevator moves down. In the down position of the elevator, the flipper is operated by a spring-pressed plunger similar to plunger 66, so that the flipper is made inactive and cannot pick up the lowered arm when the elevator next rises. The arm in the down position is movable on a rail extending along the top of tank 31, and, when the elevator has reached its up position, the arm resting on the rail is moved to the last station in tank 31. At this station, the elevator rail has an opening in which is mounted a flipper similar to flipper 64 and normally held closed by a spring. When an arm 39 has been moved along the tank rail to the last plating station in the tank and the elevator is lowered, the flipper engages the roller 41 on the slide of the arm and is swung so as to pass by the roller and then swings back into position beneath it. Upon the next ascent of the elevator, the arm is raised from the plating station and is ready for advance by the conveyor to tank 32.

In the operation of the apparatus, the triggers of arms carrying workpieces, which are to receive a full plating treatment, are not set to active position by the solenoid S2. Accordingly, when such an arm is advanced along the elevator track to the first plating station in tank 31, the limit switch LS6 is not operated, so that the hold-out plate 67 remains in the up or inactive position. When the elevator descends, the arm is lowered with it, because the roller 41 of the slide of the arm rests upon flipper 64. When the arm comes to rest on the tank rail and the elevator rises, the flipper is operated by plunger 66 to miss the roller 41 and leave the arm. Upon the next advance of the conveyor, the arm is moved along the tank rail to the second plating position in the tank and, since the elevator track has an opening at this point, the elevator can not raise the arm at this position. When the arm is moved along the tank rail to the third plating position, the arm is in line with a flipper on the elevator, which is similar to flipper 64 and is made inactive in its down position by a spring-pressed plunger. Accordingly, when the elevator rises, the flipper leaves the arm behind. The arm is then advanced along the tank rail to the last plating position in tank 31, from which it is raised by an elevator flipper in the same manner as an arm lowered to the tank at the third plating position.

Tank 32 is the first of the ,nishing treatment tanks and it is provided with spray nozzles 32*a* by which a suitable liquid may be sprayed upon workpieces carried by an arm at the tank. The operation of the nozzles is con-

trolled by a trigger on each arm and the operation of the nozzles is initiated by operation of limit switch LS8 by the trigger and is terminated when the trigger operates limit switch LS9. If it is desired to skip one or more of the tanks or cells, the machine may be provided, at appropriate places, with hold-out plates of the type shown in Figs. 9 and 10. Limit switches, at suitable locations, would be actuated by triggers on the arms 39, in the manner described, to lower the hold-out plates adjacent tanks to be skipped. Skipping of particular tanks is frequently desirable in multiple electroplating or anodizing and dyeing operations, for example.

After leaving tank 32, the arms are advanced to tanks 33, 34 and finally arrive at the station of the transfer mechanism, which operates to transfer workpiece carriers from conveyor 20 to conveyor 45. In the movement of the arms past tank 34, the horizontal arms of active triggers on the arms ride up the surface of a fixed cam 77 and the triggers are restored to inactive position. The tabs 51 may be reset automatically to inoperative positions by means of a striker bar 77*a* mounted adjacent the conveyor 45, in the path of movement of the tabs on conveyor carriages 46 leaving the transfer station as the carriages 46 move past the bar 77*a*, all of the tabs are moved to inoperative positions. When the carriages are later reloaded with racks of raw workpieces the tabs 51 may be set selectively in operative position, in accordance with the schedule treatment for the workpieces.

In the apparatus so far described, the carriages on conveyor 45 are provided with tabs 51, which can be set to operate switches which control the action of the solenoids or other push-pull devices setting the triggers on the conveyor 20. Instead of using limit switches for actuating the solenoids, photoelectric means may be employed and a simple form of such a control for a single push-pull device is illustrated in Fig. 14. When a photoelectric control is employed, the carriages 46′ on conveyor 45 are provided with a pivoted flag 78 adapted to be swung from an inactive horizontal position to an active vertical position. A lamp 79 is mounted at one side of the plane of movement of the carriages 46′ and in the approximate location of the limit switches LS1, LS2, LS3 and the lamp is carried by a bracket 80, which also supports a photoelectric cell 81 aligned with the lamp and at the opposite side of the plane of movement of carriages 46′. When a carriage with a load of workpieces, which are to be subjected to the modified form of treatment, approaches the transfer station where the workpieces are to be transferred to an arm on conveyor 20, the flag 78 on the carriage, in its active position, breaks the beam directed by lamp 79 on photocell 81. This causes an energization of a push-pull device which sets a trigger on the arm on conveyor 20, to which the workpieces on carriage 46′ are to be transferred, and the trigger then operates the modifying means at the proper time.

It will be apparent from the foregoing that the new processing aparatus provides remote control means by which selected workpieces being advanced by the processing conveyor 20 may be given modified treatments by the action of triggers on the arms supporting the workpieces. The triggers are set by the tabs on the carriages on conveyor 45 and the tabs can thus be selectively adjusted by the workman loading the carriages or at some other place remote from the processing conveyor.

Substantial advantages are realized with the new apparatus, in that in many cases a workman, otherwise required at the transfer station, may be replaced by an automatic transfer mechanism and, in cases where a workman is used at the transfer station, a semi-skilled or unskilled man can handle the job satisfactorily.

While the invention has been described in connection with its embodiment in an electroplating system, it will be understood that the invention has advantageous application to a wide variety of processes and apparatus, in which selective treatment is given to workpieces. By way of example only, and not of limitation, the invention may be used to advantage in systems for multiple electroplating, anodizing with selective dye bath, phosphating, bonderizing, bonderlubing, pickling, lacquering or enameling, galvanizing, cleaning, electroforming, printed circuit deposition, etching, and the like. And it will be understood that the foregoing and other operations may be carried out singly or in various desired combinations.

I claim:

1. An apparatus for performing a series of operations on a succession of articles, which comprises a plurality of racks for the articles, a plurality of stations, means at respective stations for giving the articles different treatments, means for modifying the action of the several treating means, a processing conveyor having parts engaging and moving the racks stepwise along the stations, elements on the processing conveyor settable to operate selected modifying means as the processing conveyor advances, elevating means operating in timed relation to the processing conveyor and moving the racks vertically into and out of the stations, a transfer station, at which racks are loaded on and unloaded from the processing conveyor, conveying means having parts for delivering racks to and receiving them from the transfer station, members on said parts of the conveying means corresponding to respective modifying means and movable into and out of opertaive position, and means adjacent the transfer station and actuated by an operative member on a part of the conveying means delivering a rack to the station to set an element on the processing conveyor to cause said element to operate a selected modifying means.

2. The apparatus of claim 1, which includes an automatic transfer mechanism at the transfer station for loading racks on and removing them from the processing conveyor.

3. The apparatus of claim 1, which includes means for restoring the elements to initial condition after they have acted on the modifying means.

4. The apparatus of claim 1, which includes means for restoring the members to initial condition after they have acted on the element setting means.

5. The apparatus of claim 1, in which the elements on the processing conveyor are set by push-pull means and the modifying means are operated by switches actuated by the elements.

6. The apparatus of claim 1, in which the elements are set by push-pull means to operate selected modifying means and the push-pull means are operated by the members on the conveying means.

7. The apparatus of claim 1, in which the conveying means has carriages for delivering racks to and receiving them from the transfer station and the members are movably mounted on the carriages.

8. The apparatus of claim 1, in which the processing conveyor has arms for supporting the racks, the means for modifying the action of the treating means, include switches controlling respective modifying means, and the elements are mounted on the processing conveyor adjacent respective arms thereon.

9. The apparatus of claim 1, in which the means actuated to set an element include photoelectric means having beams broken by members in operative positions.

10. The apparatus of claim 1, in which the processing conveyor has arms for supporting the racks, the arms are movable in guides, and the elements are mounted on the guides for respective arms.

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