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(52) UK CL (Edition L)
C7F FGB F964 F965 F970
B8A AA AH AR2 AT1 AT4
U1S S1664

(56) Documents cited
WO 89/03355 A1 US 5054600 A US 3910297 A
US 3861352 A US 3782522 A

(58) Field of search
UK CL (Edition K) B2L LCFB, B8A AA AH, C7E, C7F FGB FGZ
INT CL[5] B65G, C23C
Online databases: WPI; CLAIMS

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(54) Automatic hot dipping galvanization machine

(57) An automatic machine for hot dipping galvanization has a main frame 1 having rectangular shaped lower and upper frames 11 having a plurality of beams 111 connected thereon which support a slide or conveyor means (2, Fig. 3a), an elevator means (3, Fig. 6) and a control means. The slide means consists of two sets of sprocket wheels 21 each set having two sprocket wheels installed at respective ends of each frame 11 controlling a plurality of guide rails 26 via two link belts 22 to slide along two elliptical slideways 24. The elevator means consists of an elliptical elevator (31, Fig. 6) hanging on top of the lower frame 11 by means of four guide pulleys (32, Fig. 6) which have one end of each connected to the elevator and the other end to a U-shaped rod (34, Fig. 6) via four guide wheels (33, Fig. 6), two arcuate plates 36 extending outwards from respective ends which carry articles to be galvanized into a zinc bath and articles galvanized out of the zinc bath. The control means consists of a central processing unit which controls synchronisation of the entire movement, a motor 42 on top of the upper frame 11 being connected to one of the slideways 24 and controlling the slide means, and a cylinder 43 also on top of the frame controlling the elevator means. The control means sends the required signal to either convey the article by rotating the wheels or to lift the elevator upwards as appropriate. A zinc bath is located at one side of the frame for hot dipping purpose and the other side of the frame is for loading purpose.

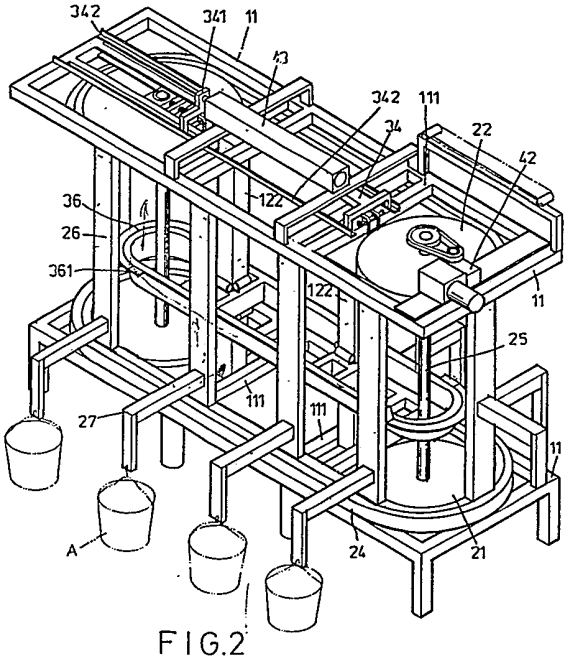


FIG.2

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

GB 2 266 317 A

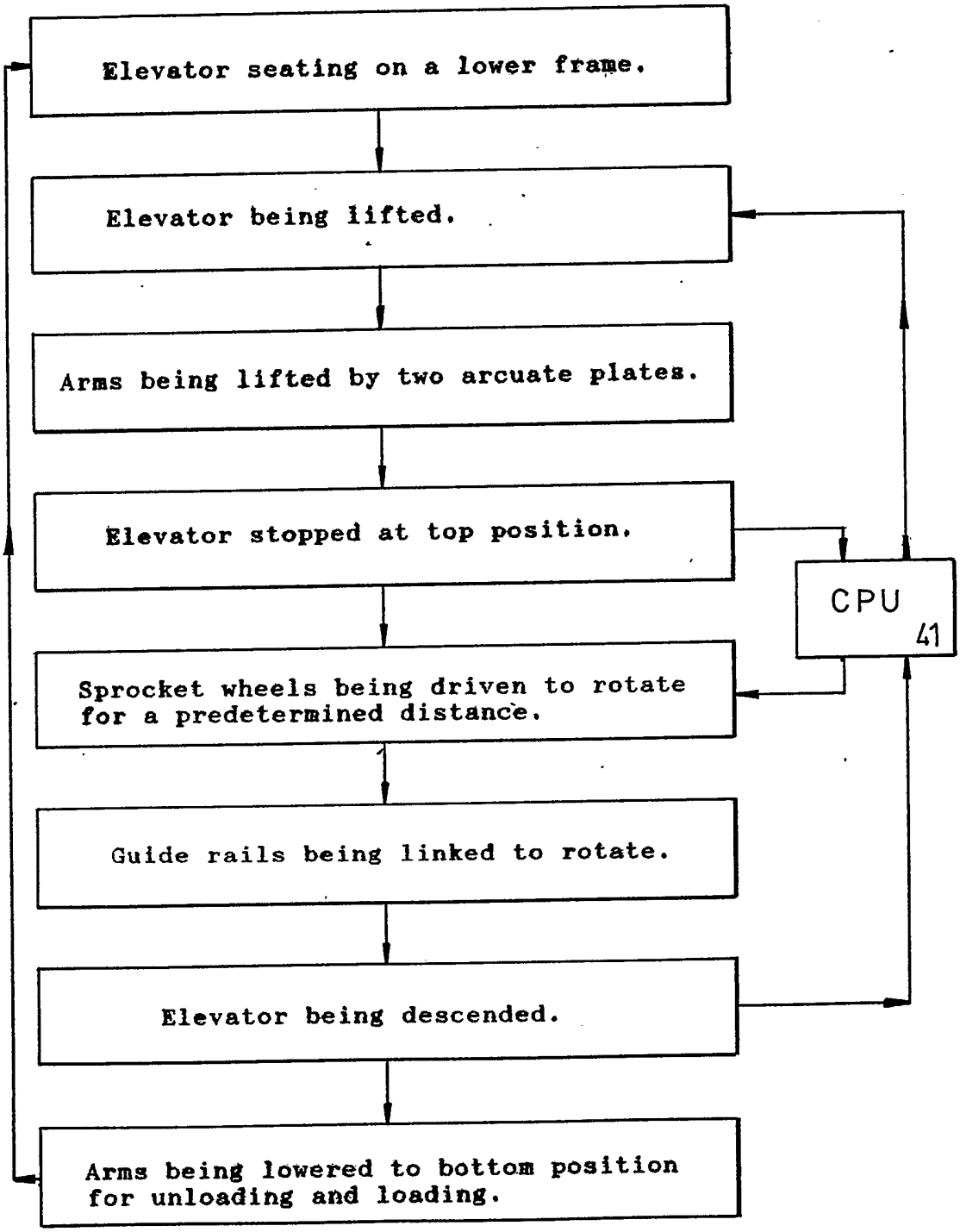
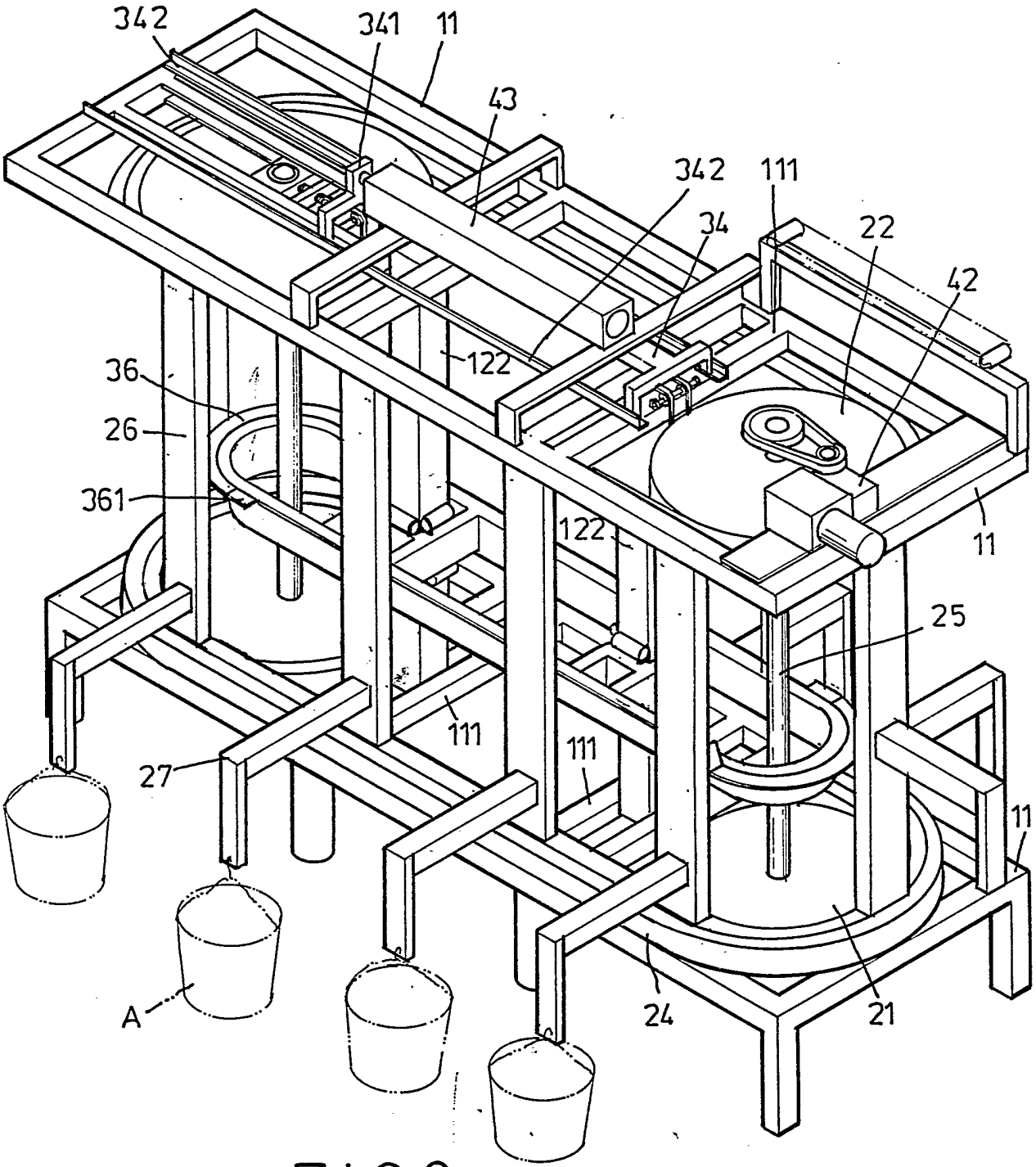

Elevator seating on a lower frame.
Elevator being lifted.
Arms being lifted by two arcuate plates.
Elevator stopped at top position.
CPU
41
Sprocket wheels being driven to rotate for a predetermined distance.
Guide rails being linked to rotate.
Elevator being descended.
Arms being lowered to bottom position for unloading and loading.

FIG.1


342
341
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342
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27
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24
21

FIG.2

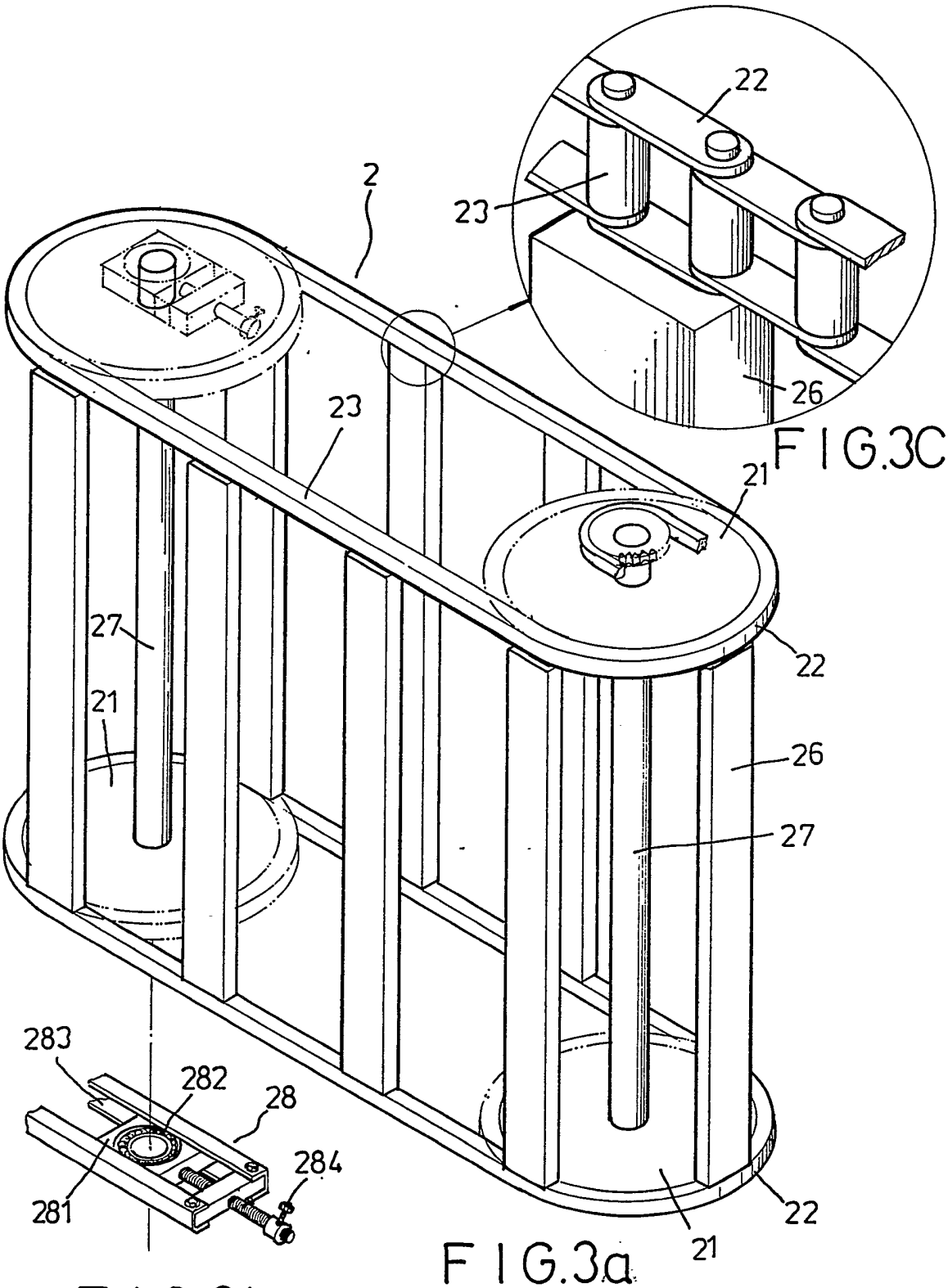

FIG.3C

FIG.3a

FIG.3b

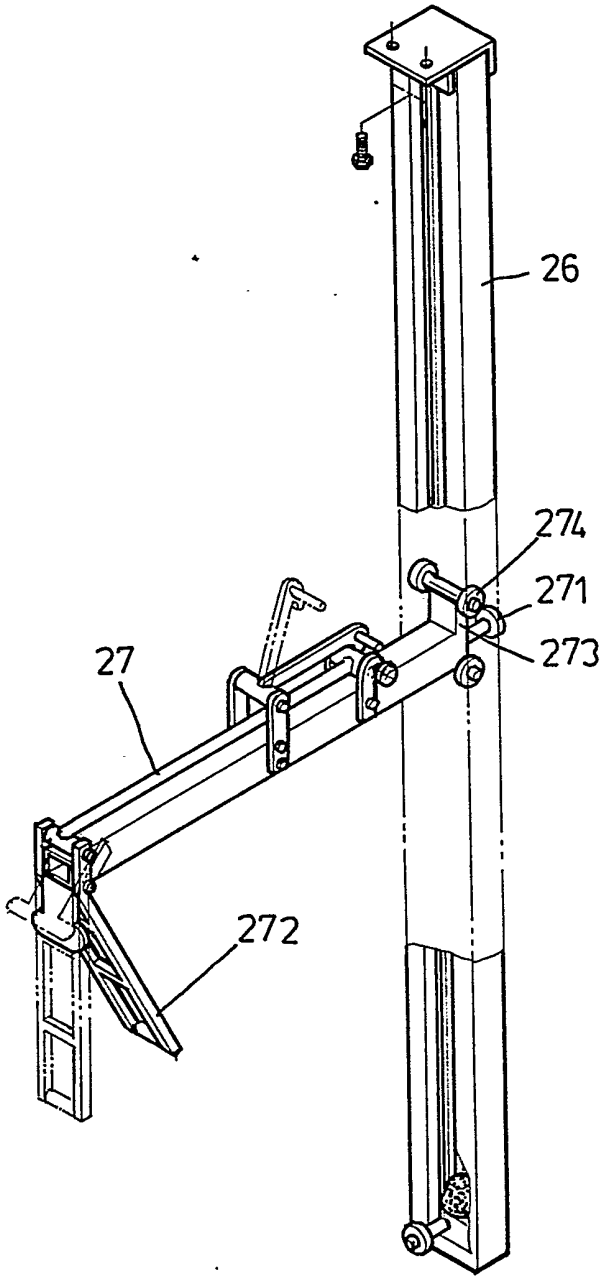

FIG.4

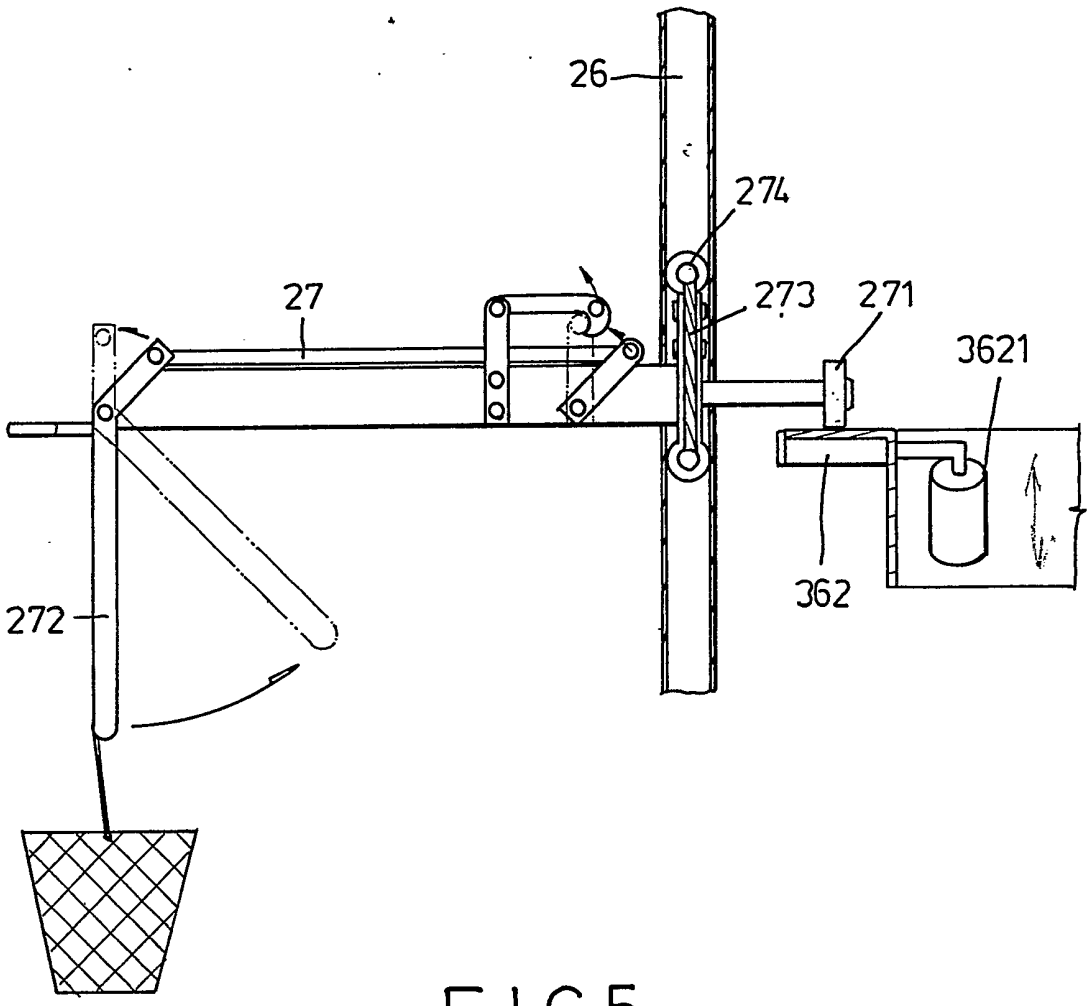

FIG.5

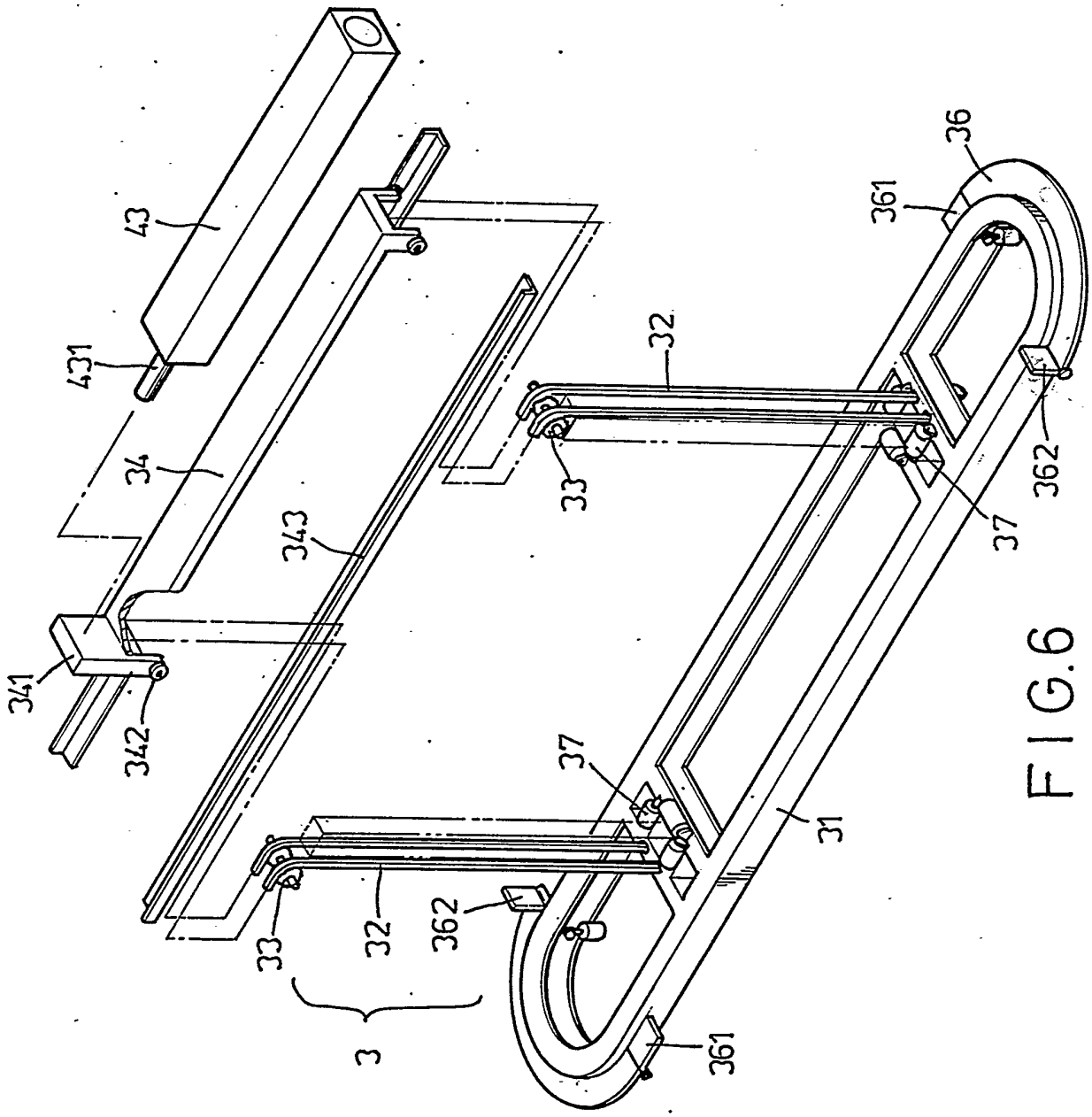

FIG.6

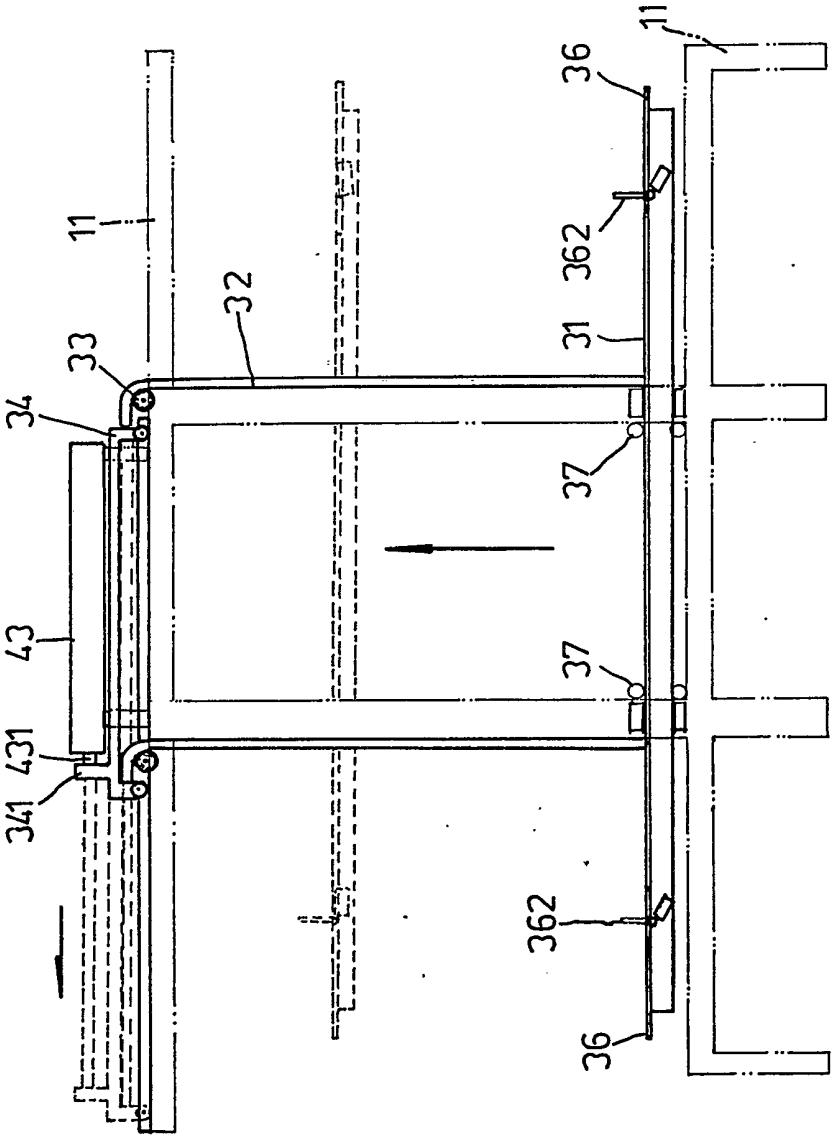

FIG.7

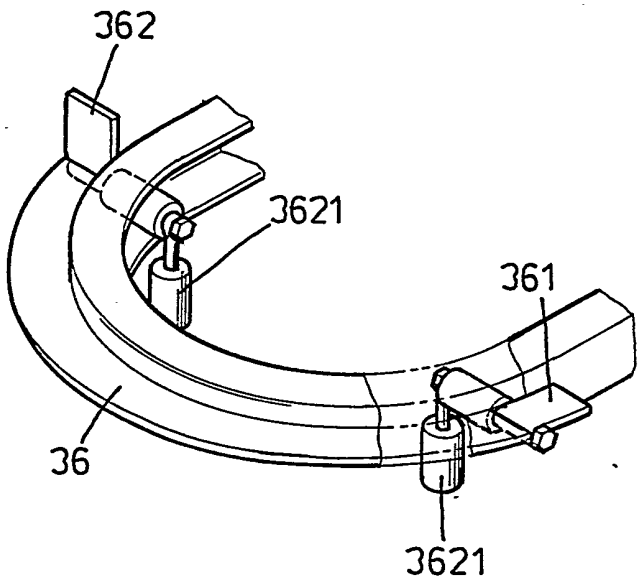

FIG.8

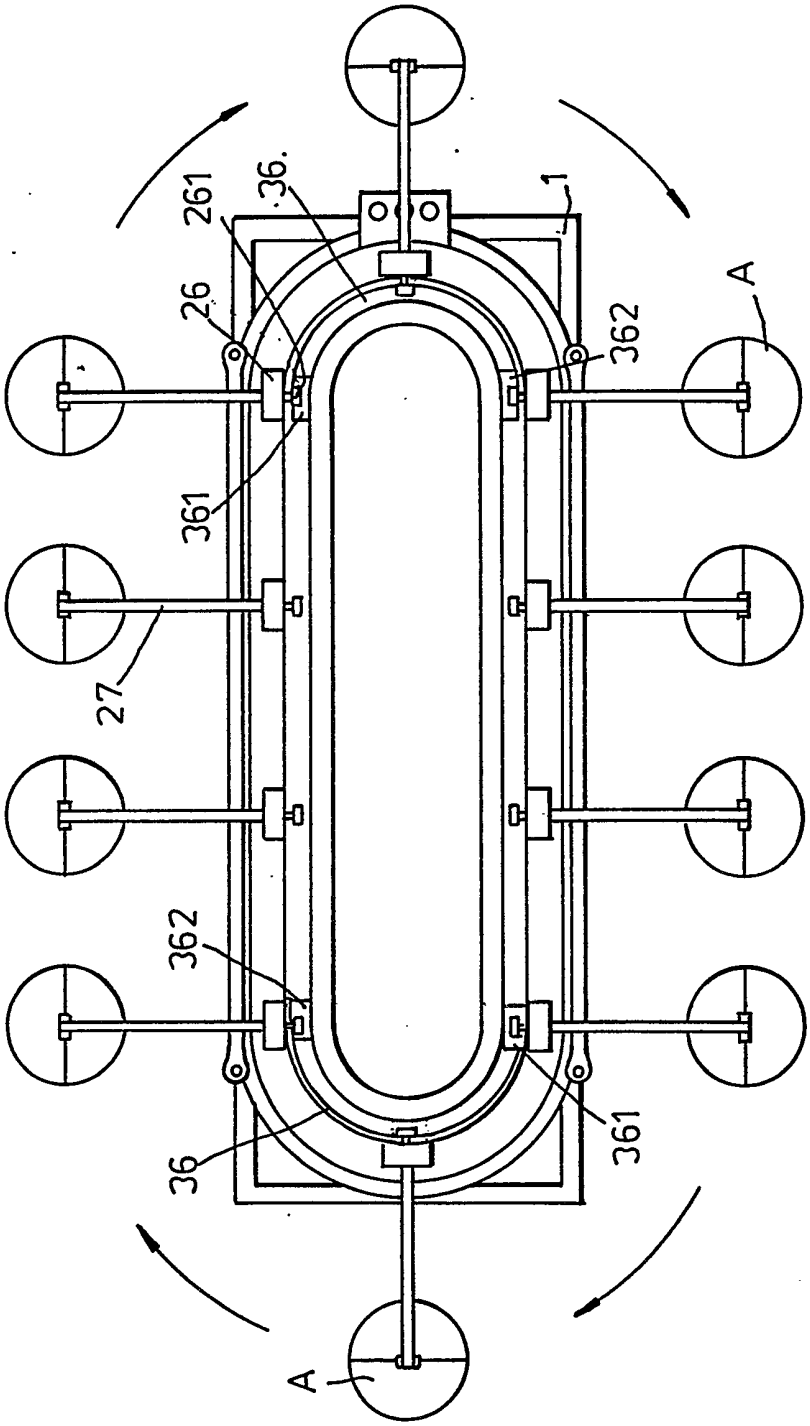

FIG.9

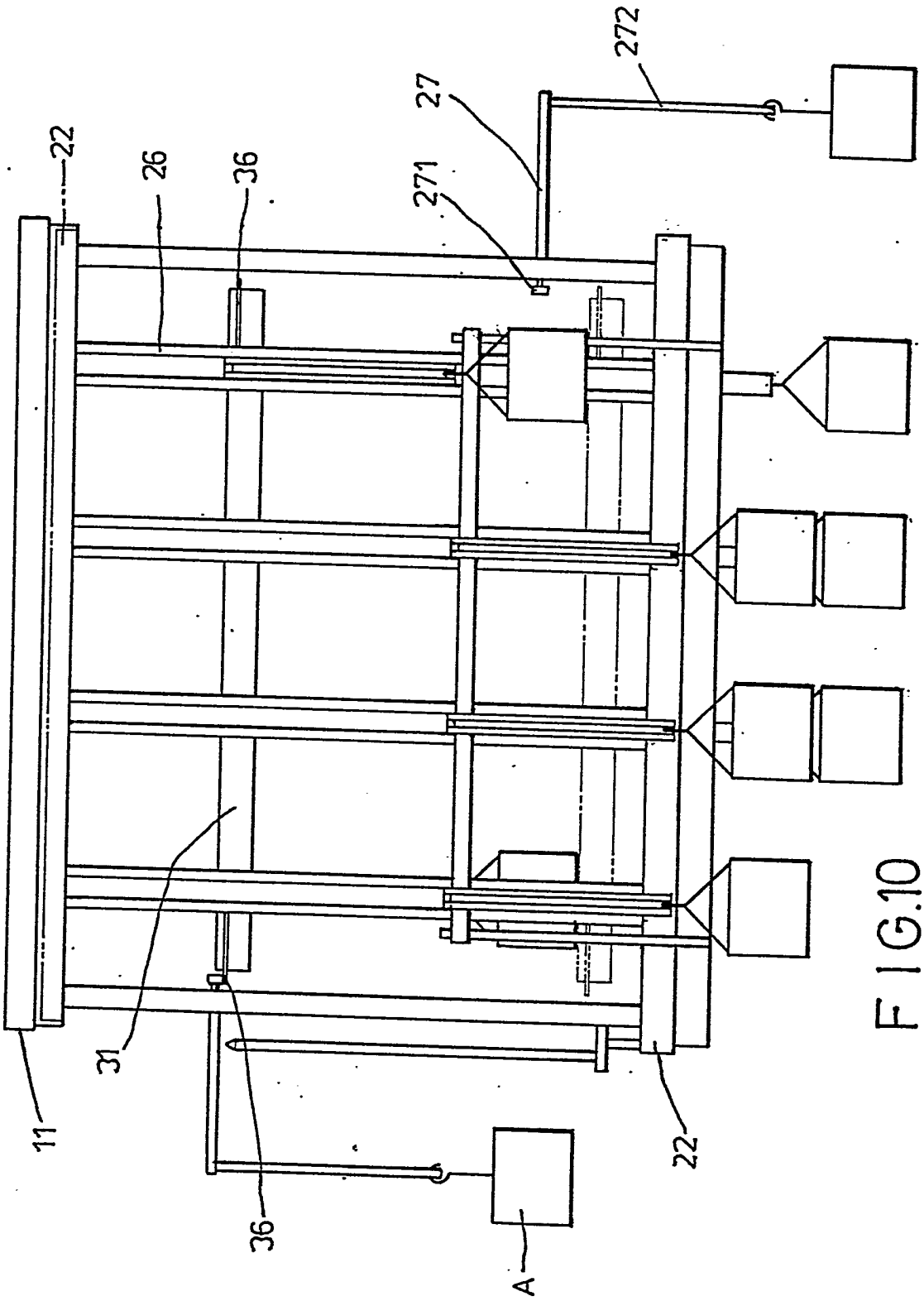

FIG.10

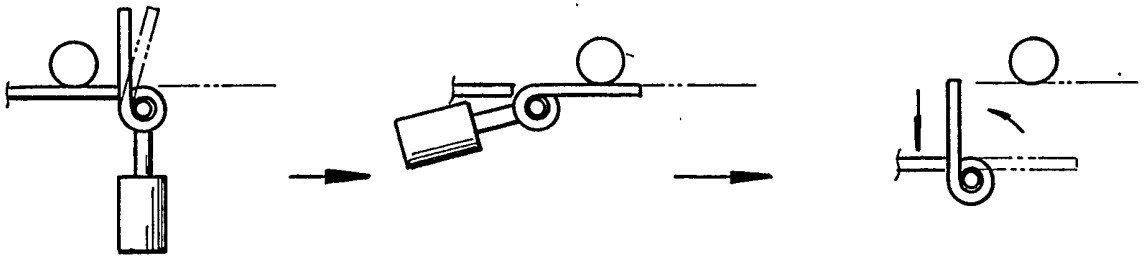

FIG.11a FIG.11b FIG.11c

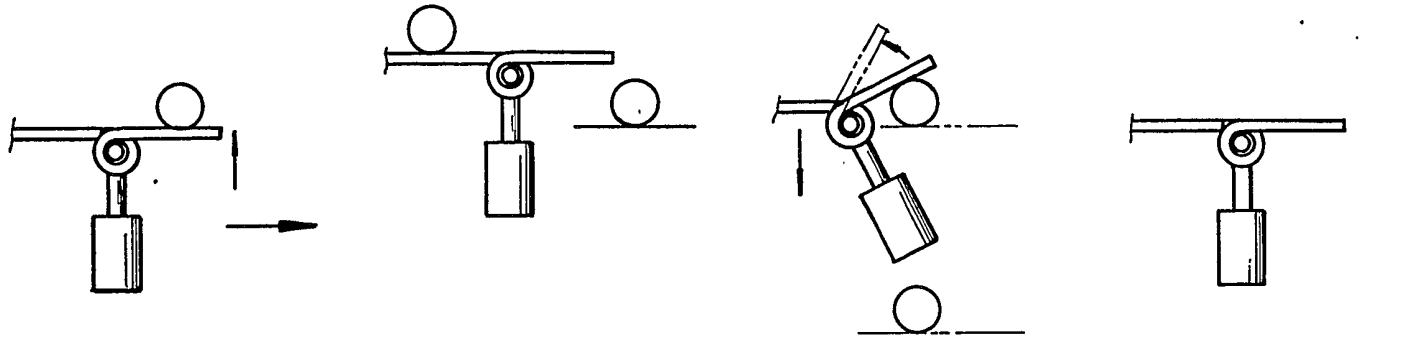

FIG.12a FIG.12b FIG.12c FIG.12d

TITLE: AUTOMATIC MACHINE FOR HOT DIPPING GALVANIZATION

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an automatic machine for hot dipping galvanization, more particularly to a machine to galvanize small metallic parts into zinc bath in a predetermined time and to pull the parts outwards from zinc bath in an automatic system.

Related of Prior Art

Galvanization of metallic parts is one of the method to produce a protective layer which prevents galvanized parts from corroded or from cracked easily.

Galvanization has been adapted by industry for the purpose of anti-corrosive for a long time. There are many processing steps in galvanization which includes filling, hot dipping, vibration, cleaning and cooling. Among these steps, hot dipping is an important step which requires precise estimation on dipping time which is determined by worker's experience according to the current procedure and mistakes happen once in a while. Moreover, zinc disperse poisoning gas in a high temperature atmosphere and which is dangerous to human body if inhaled.

The inventor, in view of this, has invented this invention which is operated automatically.

SUMMARY OF THE INVENTION

It is the primary object of the present invention to provide an automatic machine for hot dipping galvanization which galvanizes articles automatically.

It is another object of the present invention to provide an automatic machine for hot dipping galvanization which increases the quality of galvanization.

It is still another object of the present invention to provide an automatic machine for hot dipping galvanization which requires no manual operation for dipping articles into as well as pick up from a zinc bath.

It is a further object of the present invention to provide an automatic machine for hot dipping galvanization which requires less man power that complies with the cost effectiveness.

It is still a further object of the present invention to provide an automatic machine for hot dipping galvanization which is easy to operate.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a flow chart shwoing the entire movement of the present invention;

FIG. 2 is a perspective view of the present invention;

FIG. 3a is a perspective view of a slide means of FIG. 2

FIG. 3b is an enlarged view showing adjusting member of FIG. 3a;

FIG. 3c is an enlarged view showing link belt of FIG. 3a;

FIG. 4 is a fragmentary view showing a guide rail and an arm of FIG. 3a;

FIG. 5 is an enlarged side view of a guide rail and an arm of FIGS. 3a & 5 with partially cross section;

FIG. 6 is an exploded view showing an elevator means of FIG. 2;

FIG. 7 is a plan view of FIG. 6 showing lifting movement by the phantom line;

FIG. 8 is an enlarged perspective view showing an arcuate plate of the elevator means of FIG. 5;

FIG. 9 is a top view of FIG. 2;

FIG. 10 is a front elevational view;

FIGS. 11a, 11b & 11c are showing a vertical block being pushed by an arm; and

FIGS. 12a, 12b, 12c & 12d are showing a horizontal block being pushed upwards by an arm.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 2, there is shown the present invention comprising a main frame 1 having a rectangular shaped lower and an upper frames 11 having a plurality of beams 111 connected thereon, a slide means 2, an elevator means 3, and a control means 4. The upper frame is standing on the lower frame by means of two rectangular posts 122 which having one ends secured to the lower frame and the other ends secured to the upper frame respectively.

The slide means 2, according to FIGS. 2, 3a, 4, 5, is composed of two sets of sprocket wheels 21 each set having two sprocket wheels at two ends of the lower and the upper frames 11, respectively, two link belts 22 being engaged with the two sets of sprocket wheels 21, respectively, and a plurality of rollers 23, as shown in FIG. 3c, being spaced anchored to one side of each link belt 22 and sliding within two elliptical slidways 24, respectively, two shafts 25 having one end of each connected to the center portion of the lower sprocket wheels and the other end of each connected to the center portion of the upper sprocket wheels. A plurality of guide rails 26, each being formed with two U-shaped plates, having one end of each rail 26 secured to the lower link belt and the other end of which secured to the upper link belt respectively.

A plurality of arms 27 are adapted to hook baskets A having filled with articles to be galvanized and are conveyed to the zinc bath for dipping. Each arm 27 has a roller 271 extending from at one end outwardly and a crank 272 swivelably mounted to the other end. A flange 273 is formed at one end of each arm 27 having four wheels 274 fixedly secured to four corners thereon and is sildably installed within each guide rail 26. An adjusting device 28 is adapted to adjust the distance between two sprocket wheels having a plate 281 sliding in two rails 283 and having an aperture 282 to receive one end of the shaft 25, a screw extending from one end of the device so as to adjust the distance by screwing the screw to push the shaft outwards.

The elevator means 3, according to FIGS. 2, 6, 7 & 8 is composed of an elliptical elevator 31 hanging on top of the lower frame 11 by four guide pulleys 32 having one end of which connected to respective sides of the elevator 31 and the other end of which extending upwards, secured to respective ends of an U-shaped rod 34 via four guide wheels 33. The rod 34 located on top of the upper frame 11 offsets a ledge 341 at one end upwardly and is sliding along two rails 342. Two arcuate plates 36 extends outwards from respective ends of the elevator 31 defining two horizontal blocks 361, which are hinged to one side of respective plates 36,

and two vertical blocks 362 which are hinged to the other side of respective plates 36. Each horizontal block 361 has a balancer 3611 secured to the hinged end to maintain blocks 361 in a constant horizontal position, whereas each block 362 has a balancer 3621 secured to the hinged end to maintain blocks 362 in a constant upright position. Two sets of rollers 37 are secured on the elevator 31 around the two posts 122 in such a manner that each side of the rectangular posts 122 has engaged with a roller 37 which functions as a guide preventing the elevator 31 from shaking when elevator 31 is actuated to move either upwards or downwards.

The control means 4, according to FIGS. 1 & 2, includes a central processing unit 41 which controls the entire movement of the present invention, a hydraulic operated motor 42 on top of the upper frame 11 being connected to one of the upper sprocket wheels 24, and a hydraulic operated cylinder 43 on top of the upper frame 11 having its shaft 431 connected to the ledge 341.

When a main switch is turned on, the central processing unit 41 will transmit a signal to order the hydraulic pump to eject oil into the cylinder 43 to push the shaft 431 outwards, the ledge 341 is pushed simultaneously and the elevator 31 is lifted upwards via the guide pulleys 32 and the rod 34. The horizontal blocks 361 of plates 36 carry two arms 27 upwards,

whereas, the blocks 362, because of its constant upright position, will bypass an arm 27 and lifted unload. Upon the shaft 431 is stopped, elevator 31 stops simultaneously. Cpu 44 then transmit a signal to order the motor 42 via the pump to drive the sprocket wheels 21 to rotate. The guide rails 28 are linked to rotate simultaneously this switches the arms 27 on the blocks 361 to the next positions which means the arms 27 seated on the blocks 361 of the plates 36 are moved to the middle position of the plates 36 and arms 27 seateed on the middle positions of the plate 36 are moved towards the blocks 362, as shown in FIG. 9, The arms 27 moving towards blocks 362 from middle positions of the plates 36 will push the blocks 362 downwards gradullly until blocks 362 become in a horizontal position and can no longer be pushed downwards, as shown in FIGS. 10a, 10b, & 10c. Upon motor 42 is stopped, Cpu 41 send a signal to the cylinder 43 to retract the shaft 431 back into the cylinder 43 via the pump, the elevator 31 is linked to lower down simultaneously. When elevator 31 has reached to its lowerest position, the arms 27 originally carried by the block 362 will be stopped by two stoppers at the positions which are higher than the blocks 362 so that blocks 362 will bypass the arms 27 when elevator 31 is actuated to lift upwards at its next cycle, as shown in FIGS. 11a, 11b, 11c, & 11d. The blocks 361, which are unloaded when elevator is descending, will be urged

upwards when engaging with the rollers 271 of the arm 27. Upon passing through the rollers 271, the blocks 361 will return to its original position. This has completed one cycle of the present invention in dipping procedure.

A zinc bath is located at one side of the frame for hot dipping purpose and the other side of the frame is for loading purpose. when elevator 31 is driven to lift upwards, one arm 27 carried by the block 361 of one of the plate 36 is lifted up from the zinc bath, whereas, the other arm 27 carried on the middle position of the other plate 36 is lifted up across the wall of the bath and is brought into the zinc bath. The basket A hooked on the arm 27 came out of the zinc bath may be unloded by worker for vibration.

I CLAIM:

1. An automatic machine for hot dipping galvanization comprising a main frame, a slide means, an elevator means and a control means:

said main frame having a lower and an upper rectangular frame each having a plurality of beams transverse connected thereon, said upper frame being supported by two rectangular posts to stand above said lower frame;

said slide means having at least two pairs of sprocket wheels each having two sprocket wheels mounted at respective ends of said lower and upper frame, two link belts engaged with said two sets of sprocket wheels each having a plurality of rollers secured at one side thereof and slidably located with two slidways, respectively, two shafts having one end of each connected to the center portion of each said lower sprocket wheel and the other end of which connected to the center portion of each upper sprocket wheel to drive said lower sprocket wheels to rotatewith said upper sprocket wheels, a plurality of guide rails each being formed with two U-shaped plates having one end of each secured to said lower link belt and the other end of which being mounted to said upper link belt, respectively, to be slide along with

said link belts, and a plurality of arms each having a roller at one end, a crank swivelably mounted to the other end; each said arm has a roller extending outwards from one end thereof, a flange extending upwards from the same end, four rollers mounted at four corners of said flange being slidably installed within said guide rail for sliding within the concave of said guide rail, and a crank swivelably mounted at the other end;

said elevator means having an elliptical elevator hanging on top of said lower frame by at least four guide pulleys each having an end secured to said elevator and the other end of which being extending upwards and secured to an U-shaped rod via a guide wheel, a block offset from one end of said U-shaped rod, two arcuate plates extending outwards from respective ends of said elevator defining two horizontal blocks at one end for carrying two arms upwards and two vertical blocks at the other end of said arcuate plates for carrying two arms downwards, two sets of rollers being secured on the elevator, respectively;

said control means having a central processing unit controlling the entire movement, a motor connected with one of said sprocket wheels to drive said sprocket wheels to rotate, a cylinder having a shaft connected with said flange of said

U-shaped rod to lift up and lower down said elevator.

2. An automatic machine for hot dipping galvanization of claim 1, wherein each said horizontal block has connected with a balancer to maintain said horizontal block in a constant horizontal position; and wherein each said vertical block has connected a balancer to maintain said vertical block in a constant upright position.

3. An automatic machine for hot dipping galvanization of claim 1, wherein each said rectangular post surrounded by four rollers of said elevator means at each surface as guide to prevent said elevator from shaking.

Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number

9208478.9

Relevant Technical fields

(i) UK Cl (Edition K) C7F (FGB, FGZ); C7E; B2L (LCFB); B8A (AA, AH)

(ii) Int CL (Edition 5) C23C; B65G

Search Examiner

P G BEDDOE

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI, CLAIMS

Date of Search

22 JUNE 1992

Documents considered relevant following a search in respect of claims 1-3

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	WO 89/03355 A1 (LINDVALL) See especially Claim 1; figures 1, 2; and page 5 line 28 - page 10 line 26	1
X	US 5054600 (METOKOTE) See especially Claim 1; figure 1; column 5 line 20 - column 6 line 63	1
X	US 3910297 (PINKHAM) See especially Claim 1; figures 1, 2, 3; column 1 line 56 - column 3 line 55	1
X	US 3861352 (HAMMER) See especially Claim 1; Figure 1	1
X	US 3782522 (FLOUROWARE) See especially Claim 1; figure 2; column 2 line 3 - column 3 line 47	1

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Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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