June 1, 1937. R. VAN HYNING 2,082,746

FORM CLEANING APPARATUS

Filed March 29, 1935 4 Sheets-Sheet 1

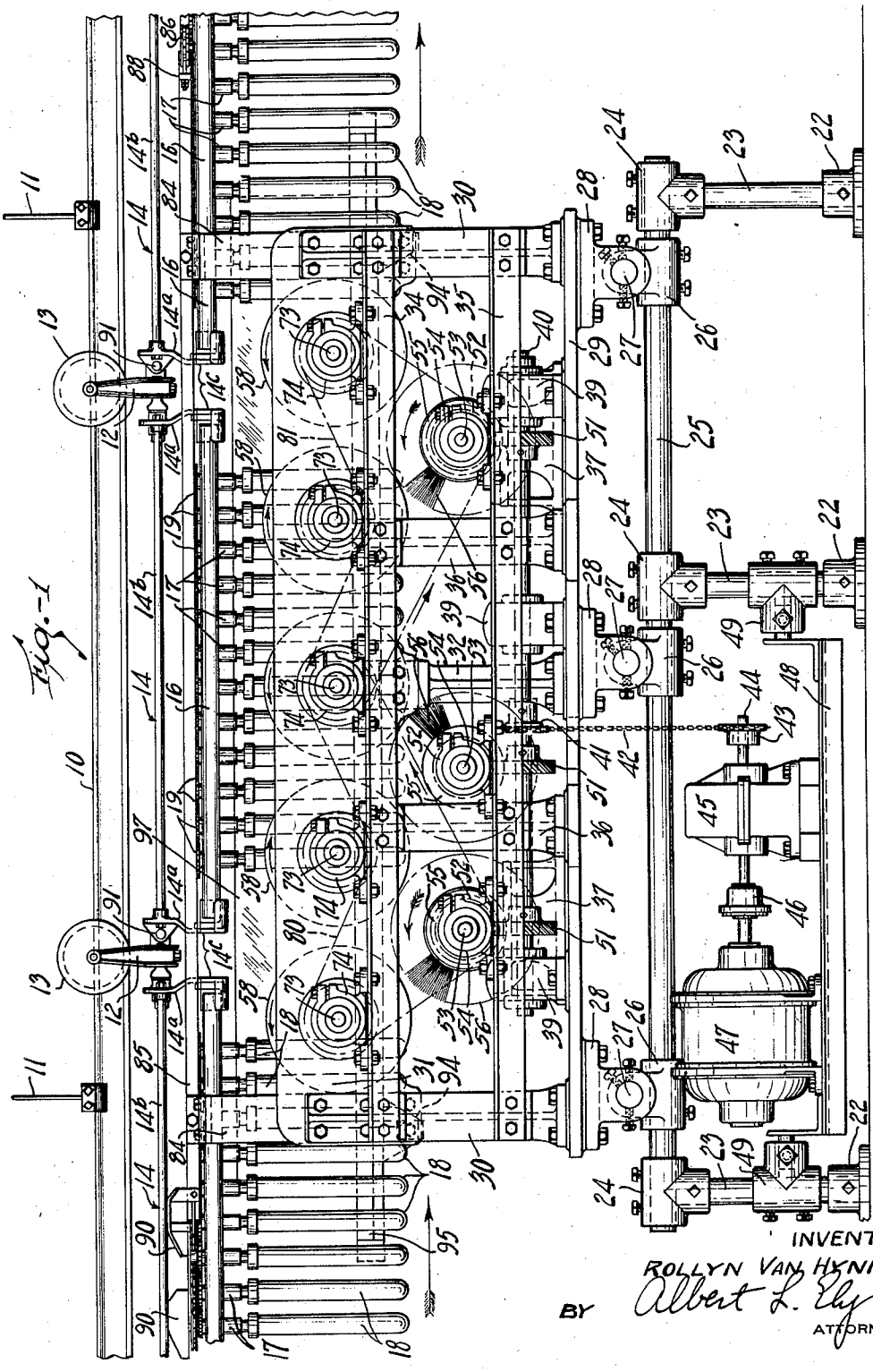


Fig.-1

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FORM CLEANING APPARATUS

Filed March 29, 1935 4 Sheets-Sheet 2

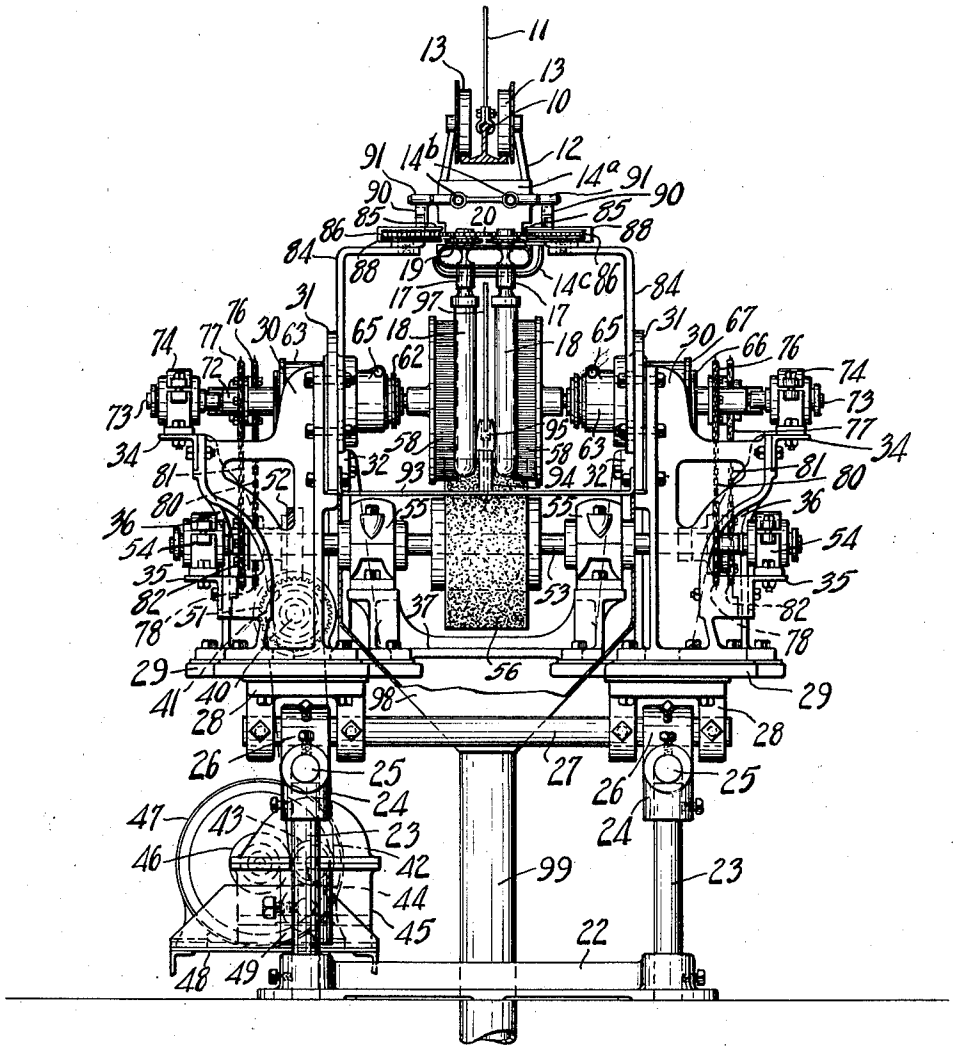


Fig.-2

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FORM CLEANING APPARATUS

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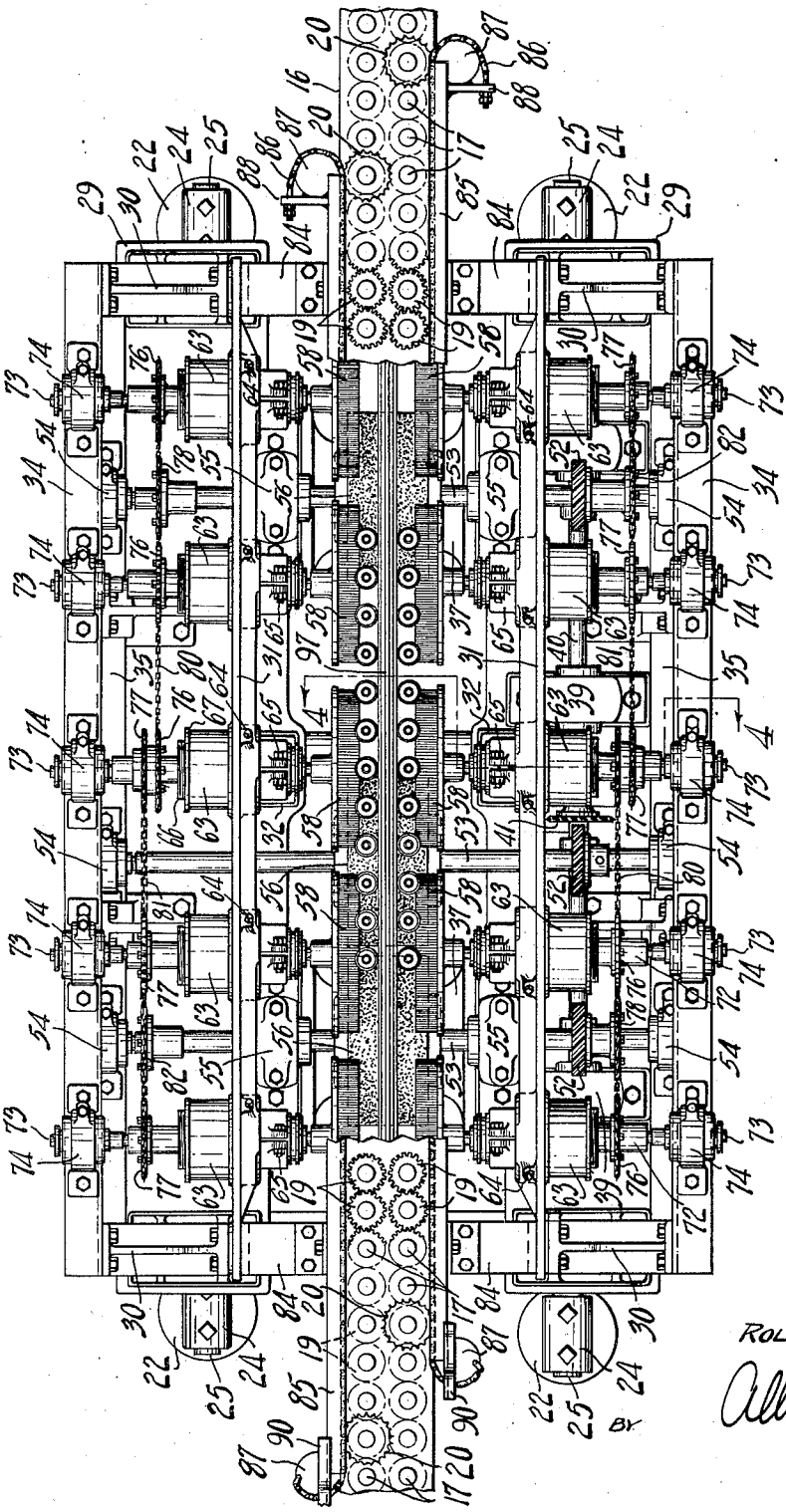


Fig. 3

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FORM CLEANING APPARATUS

Filed March 29, 1935 4 Sheets-Sheet 4

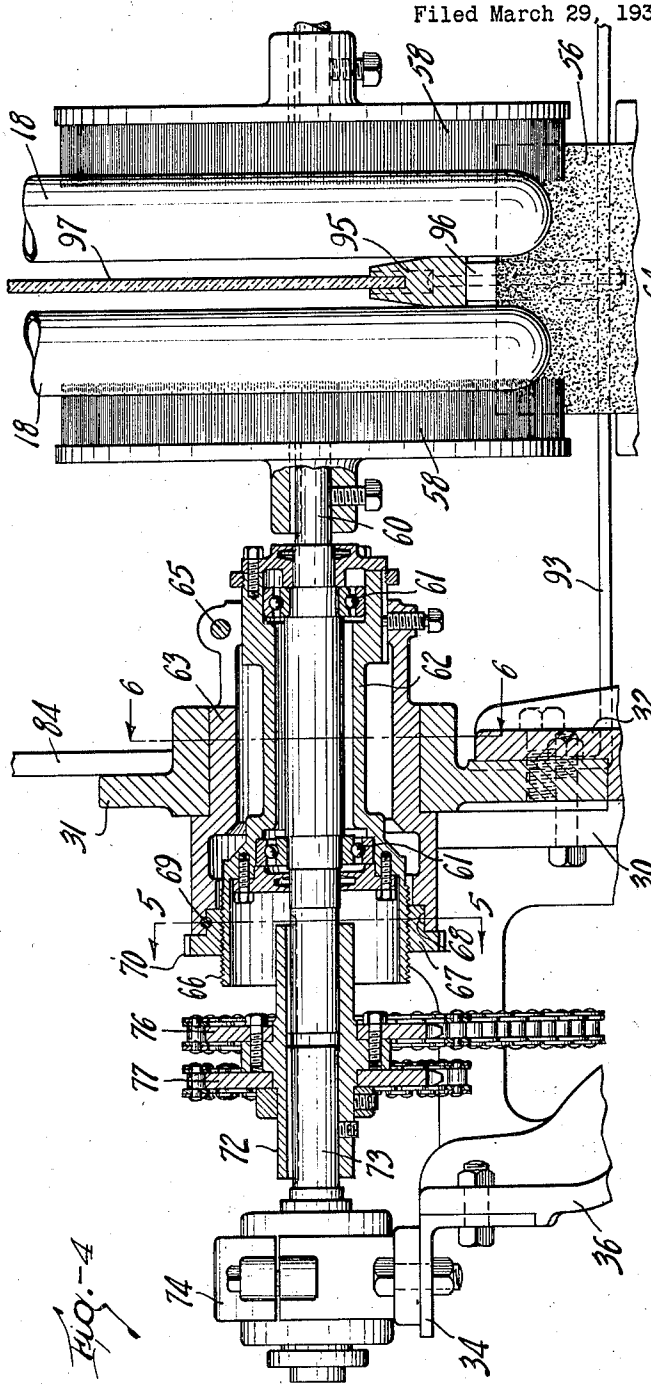


Fig.-4

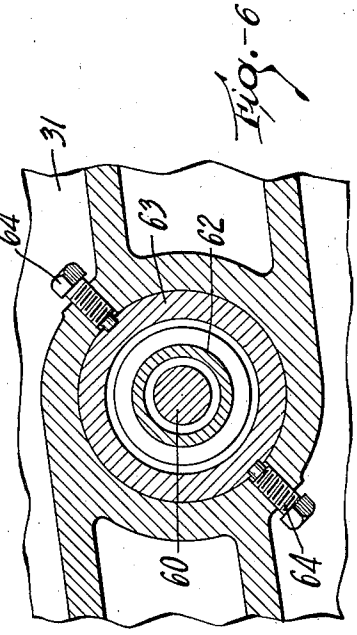


Fig.-6

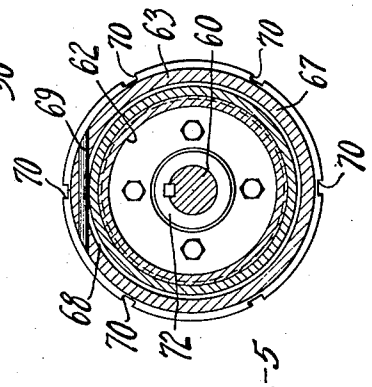


Fig.-5

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UNITED STATES PATENT OFFICE

2,082,746

FORM CLEANING APPARATUS

Rollyn Van Hyning, Akron, Ohio, assignor, by mesne assignments, to John R. Gammeter, Akron, Ohio

Application March 29, 1935, Serial No. 13,651

4 Claims. (Cl. 15—21)

This invention relates to form-cleaning methods and apparatus and more especially it relates to procedure and apparatus for removing residual deposits from dipping forms that are used in the manufacture of dipped goods, such as toy balloons, finger cots, prophylactics and the like that are made from natural or artificial aqueous dispersions of rubber, for example, rubber latex.

The forms requiring to be cleaned are made of dense, impervious material such as metal, porcelain or glass, and are shown herein as being of generally cylindrical shape having one rounded, closed end. After being dipped the required number of times in the rubber dispersion to acquire a deposit of the desired thickness thereon, the said forms are carried through a vulcanizing medium such as hot water to vulcanize the said deposit. Thereafter the vulcanized deposits are stripped from the respective forms. Removal of the articles from the forms leaves upon the latter an extremely thin deposit of material, which is the residue of the latex that has been deposited, vulcanized, and removed from the form. This residual deposit, if not removed, will increase in thickness with successive vulcanizing operations and eventually will impair the quality of the goods. Said deposit adheres to the forms with great tenacity, and if allowed to accumulate for three or four days, is removed with difficulty even with the aid of a harsh abrasive such as steel wool.

To avoid the difficulties aforementioned, applicant cleans the dipping forms after each vulcanizing operation, and to avoid unnecessary handling of the forms, has associated the improved cleaning apparatus with the endless conveyor that carries the forms through the vulcanizing medium, said apparatus being positioned beyond the work-removing station through which said conveyor travels.

The chief objects of the invention are to save time and labor in the cleaning of dipping forms; and to provide improved procedure and improved apparatus for cleaning dipping forms in a facile and economical manner. Other objects will be manifest.

Of the accompanying drawings,

Figure 1 is a side elevation of apparatus embodying the invention, in its preferred form;

Figure 2 is an end elevation thereof, as viewed from the right of Figure 1;

Figure 3 is a plan view of the apparatus, a part thereof being broken away for clearness of illustration;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a section on the line 5—5 of Figure 4; and

Figure 6 is a section on the line 6—6 of Figure 4.

Referring to the drawings, 10 is the rail or track of an endless overhead conveyor system, which rail is suspended from a suitable support or from the ceiling by hangers 11, 11. Suitably propelled along said track is an articulated endless conveyor comprising spaced-apart C-shaped yokes or brackets 12, 12 upon which are journaled respective pairs of wheels 13, 13 that ride upon the lateral flanges of the track 10. Adjacent yokes 12 are connected to each other by carriers 14 each of which comprises a pair of end-brackets 14^a, 14^a connected to each other by a pair of rods 14^b, 14^b. One end of each carrier 14 is pivotally connected to a yoke 12 so as to be movable relatively thereof about a horizontal axis, and the other end of the said carrier is pivotally connected to an adjacent yoke 12 so as to be movable relatively thereof about a vertical axis, the arrangement being such that the conveyor may turn corners, or move upwardly and downwardly to different levels. Each carrier-bracket 14^a is formed with an angular, depending portion 14^c, which angular portions of each carrier are directed toward each other and constitute cradle-like supports for a dipping form assembly or rack.

Each dipping form rack comprises a hollow metal tray-structure 16 in which is journaled a double row of vertical shafts 17, 17, the lower end of which, below the tray, carry respective hollow dipping forms 18, 18 of metal, glass, or other suitable material. The upper ends of shafts 17, above the tray, have respective spur gears 19 secured thereon, the gears of each row of shafts being meshed in a train, and one gear of each train having a superposed sprocket 20 thereon for the purpose of driving the train of gears, as subsequently will be described. The sprockets 20 of each rack are offset from each other, as shown in Figure 3, so as not to interfere with each other. The endless conveyor moves the form-racks in the direction indicated by the arrows in Figure 1.

The improved form-cleaning apparatus is positioned beneath the endless conveyor above described, and arranged to engage and clean the forms 18 carried by said conveyor. The forms come to the cleaning apparatus after the articles have been removed therefrom, and usually are

somewhat wet from the water that constitutes the vulcanizing medium.

Said form-cleaning apparatus comprises a plurality of foot-castings 22, 22 that are disposed transversely of the endless conveyor, and have short posts 23, 23 rising from their respective ends. Upon the top of each post 23 is mounted a bracket 24, and said brackets carry a pair of axially adjustable supporting bars or rails 25, 25 that are parallel to each other and to the endless conveyor. Mounted upon each rail 25, and adjustable longitudinally thereof, are three brackets 26, 26, which brackets support three transverse bars 27, 27 by engagement with the end portions thereof. Mounted upon the respective end portions of each bar 27, astraddle the bracket 26 thereat, is a supporting bracket 28, and mounted upon the several brackets 28 are a pair of parallel base plates 29, 29 that are disposed at opposite sides of the overhead conveyor, somewhat below the same. Rising from each end of each base plate 29 is a bracket 30, and the pair of said brackets on each base plate support an elongate bearing plate 31 that is disposed in a vertical plane, somewhat above its base plate. A somewhat smaller bracket 32 is mounted on each base plate 29, medially thereof, for supporting the respective bearing plates 31 from their middle. Mounted upon each pair of brackets 30 on each side of the conveyor is an upper bearing rail 34 and a lower bearing rail 35, which bearing rails are supported intermediate their ends by a pair of brackets 36, 36 carried by the base plate 29. The bearing rails 34, 35 are parallel to and coextensive with the bearing plates 31, and are disposed on the outermost side of their supporting brackets, relatively remote from said bearing plates. A pair of transverse brackets 37, 37 span the space between the base plates 29 and connect the same to each other for the purpose of imparting rigidity to the structure and for supporting bearing brackets presently to be described.

Mounted upon the base plate 29 on the near side of the apparatus as viewed in Figure 1, are three spaced apart bearing brackets 39, 39 in which is journaled a countershaft 40. For driving the said countershaft, a sprocket 41 is mounted thereon and connected by a sprocket chain 42 with a sprocket 43 on the driven shaft 44 of a reduction gear device 45, the latter being coupled at 46 to the shaft of a suitable motor 47. The reduction gear device 45 and motor 47 are mounted upon a platform 48 that is supported from its respective ends upon brackets 49 that are slidably mounted for vertical adjustment upon two adjacent posts 23. The arrangement provides conveniently for maintaining the chain 42 in taut condition.

Mounted upon countershaft 40, at spaced points thereon, are three spiral gears 51, 51, which mesh with respective spiral gears 52, 52, Figures 2 and 3, on respective shafts 53, 53 that extend transversely of the machine. Each end of each shaft 53 is journaled in a bearing bracket 54 that is mounted upon one of the lower bearing rails 35, and each of the outermost shafts 53 is also journaled in a pair of bearing brackets 55, 55 that are mounted upon one of the transverse brackets 37, at each side of the middle of the shaft. Mounted upon the middle of each shaft 53 is a rotary bristle brush 56 of such width and diameter as to engage the closed lower end portions of both rows of forms 18 as the latter are carried through the cleaning apparatus by their endless conveyor. The brushes 56 rotate in the direction indicated by the arrows in Figure 1, which, it will be observed, causes the form-engaging portion of each brush to be moving in the opposite direction to the general direction of movement of the forms.

The major portion of each form 18, above the rounded lower end thereof, is cleaned by the buffing action of a plurality of rotary bristle brushes 58, 58 that are mounted upon axes that are disposed perpendicular to the axes of the forms and transverse to the general course of travel of the forms through the cleaning apparatus. The brushes 58 are arranged in two series of five brushes each, said series being disposed on opposite sides of the machine so as to buff the respective rows of forms carried by each dipping form rack. Each brush 58 comprises a rigid backing having laterally projecting bristles, and since the supporting and driving structures of each brush are substantially identical, the description of one will suffice for all. Attention is directed to Figure 4 wherein a brush-driving mechanism is shown in detail.

The brush 58 is mounted upon the inner end portion of a shaft 60 that is journaled in bearings 61, 61 carried by a sleeve 62 that is mounted for axial movement in a split bearing housing 63. The latter is mounted in and extends through bearing plate 31, being retained therein by a pair of setscrews 64, 64, Figure 6. The split portion of bearing housing 63 is provided with a bolt 65 by which said split portion may be tightened about the sleeve 62. One end portion of sleeve 62 is formed with male screw threads 66, and mounted upon said threaded portion is a threaded nut 67 that is secured in the end portion of housing 63 in a manner that permits it to be rotated therein. To this end a portion of nut 67 that fits within housing 63 is formed with a peripheral groove 68 that engages a tangentially disposed retaining pin 69 mounted in said housing, as is most clearly shown in Figure 5. The perimeter of a nut 67, exteriorly of the housing 63, is formed with a series of recesses or notches 70, 70 by which the nut may be gripped by a suitable turning tool. The arrangement is such that by the loosening of bolt 65 and turning of nut 67 the sleeve 62 and shaft 60 may be moved axially, relatively of housing 63, for the purpose of adjusting the brush 58 in proper position laterally of the forms 18 to buff the same in an efficient manner. The outer end portion of shaft 60 is slidably keyed in a coupling or sprocket hub 72 that is secured upon a stub shaft 73 that is journaled in a bearing bracket 74 mounted upon an upper bearing rail 34.

The sprocket hubs 72 on the middle stub shafts 73 of the series of five such shafts on opposite sides of the machine, are somewhat different than the sprocket hubs on the other stub shafts in that they carry two sprockets 76 and 77, of which sprocket 76 is fixed on the hub and sprocket 77 is loose thereon, as is most clearly shown in Figure 4. The other sprocket hubs 72 carry but one sprocket each. Thus at the front of the machine, the sprocket hubs 72 at the work-receiving end thereof (the left end as viewed in Figures 1 and 3) carry respective sprockets 76 that are aligned with the sprocket 76 on the middle hub 72, and the sprocket hubs at the work-receiving end of the machine (the right end) carry respective sprockets 77 that are aligned with the sprockets 77 on said middle hub. The arrangement is reversed at the rear of the machine whereat the sprockets 76 are mounted on the hubs 72 at the work-delivery end of the ma-

chine and the sprockets 77 are mounted at the work-receiving end of the machine. Trained about each group of sprockets 76, and about respective sprockets 78 on the nearest shaft 53, are respective sprocket chains 80, 80. Each chain 80 is trained over the outermost sprockets 76 of the group and under the middle sprocket, the arrangement being such that when the machine is in operation, adjacent brushes 58 are rotated in opposite direction as indicated by the arrows in Figure 1. In like manner sprocket chains 81, 81 are trained about the respective series of sprockets 77 and about sprockets 82, 82 on the respective driven shafts 53.

As the forms 18 are propelled through the machine by the endless conveyor and buffed by the brushes 56 and 58, they are rotated upon their respective axes so as to present their entire surface to the action of said brushes. To this end angular, upwardly-extending brackets 84, 84 are secured to the respective ends of each bearing plate 31, and carry at their upper ends a pair of parallel channels 85, 85 that extend longitudinally of the machine, at each side of the path of the form-dipping racks, the longitudinal grooves of the channels facing each other. Mounted in the said grooves in channels 85 are respective sprocket chains 86, 86 that have their end portions looped about arcuate end-pieces 87, 87. At one end of the machine the chains 86 are fixedly secured to the end-pieces 87. At the other end of the machine the ends of the chains 86 are adjustably anchored to short arms 88 projecting laterally from the channels 85, the arrangement permitting the chains to be loosened or tightened as desired. The chains 86 are so positioned that they engage the respective sprockets 20 of each dipping-form rack as said racks are propelled through the machine. Thus they cause rotation of said sprockets and the interconnected gears 19 of each gear train on said racks, and the forms 18 on the shafts 17 with said gears. Because of the intermeshing of adjacent gears 19, the adjacent forms 18 rotate in opposite directions.

Mounted upon the respective channels 85 at the work-receiving end of the machine are upwardly extending, cam-like structures 90, 90 that are disposed in the path of rollers 91, 91 projecting laterally from one of the brackets 14a of each carrier unit. Thus any carriers that approach the machine in a slightly tilted position will be restored to proper position by engagement of the rollers 91 with the cams 90.

At their opposite ends the bracket plates 31 are connected, at their lower margins, by respective metal straps or bars 93, that extend transversely of the machine. Mounted upon spacer blocks 94 carried by the respective bars 93 is a guide rail 95 that extends longitudinally of the machine between the rows of forms 18 passing therethrough. The rail 95 has tapered end portions, and is of such width and height as lightly to contact the respective forms in a relatively narrow region. The rail 95 provides a rigid backing for the forms and imparts lateral rigidity thereto as they are engaged by the laterally disposed rotary brushes 58.

Extending upwardly from the guide rail 95 to a point above the forms 18 is a separator plate 97 which may be of glass. The plate 97 prevents fine particles of matter buffed from either row of forms 18 from lodging on the forms of the other row.

Beneath the machine may be mounted a trough 98 for receiving the material buffed from the forms, and said trough may be provided with an outlet 99, connected to a suitable source of suction (not shown) if desired.

The brushes 58 are so arranged that they buff the forms transversely, which arrangement has been found to be much more effective than buffing them in the direction of their axes. The feature of driving alternate brushes in opposite directions assures that the forms will be buffed in opposite directions; and that all forms will receive an equal amount of buffing, notwithstanding alternate forms rotate in opposite directions.

The apparatus removes the most obstinate deposits from the forms in one passage through the machine, and achieves the other advantages set out in the foregoing statement of objects.

Modifications may be resorted to without departing from the spirit of the invention or the scope of the appended claims, which are not limited wholly to the specific construction shown or exact procedure described.

What is claimed is:

1. In apparatus for cleaning cylindrical dipping forms, the combination of an axial and a lateral support for each form, means for feeding the forms laterally in a direction transversely of their axes and relatively to their lateral support, means for rotating the forms on their axes as they are so fed, and means for buffing them in a direction transversely of their axes on the opposite side thereof from said lateral support as they are so fed.

2. In apparatus for cleaning cylindrical dipping forms, the combination of an axial support for each form, a lateral support common to a plurality of said forms, means for moving the forms laterally along said lateral support, means for rotating the forms on their axes as they are so moved, and means for buffing the forms in a direction transversely of their axes on the opposite side thereof from said lateral support as they are so moved.

3. In apparatus for cleaning cylindrical dipping forms, the combination of an axial and a lateral support for each form, means for feeding the forms laterally in a direction transversely of their axes, means for rotating the forms on said axes as they are so fed, and means for buffing the forms alternately in opposite directions transversely of their axes on the opposite side thereof from said lateral support as they are so fed.

4. In apparatus for cleaning cylindrical dipping forms, the combination of an axial support for a form engaging one end thereof, means for rotating said support so as to rotate the form on its own axis, a stationary lateral support locally abutting one side of the form, and means for buffing the form on the opposite side thereof from said lateral support.

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