Nov. 8, 1938. R. R. PUTT 2,135,601

APPARATUS FOR COATING ARTICLES

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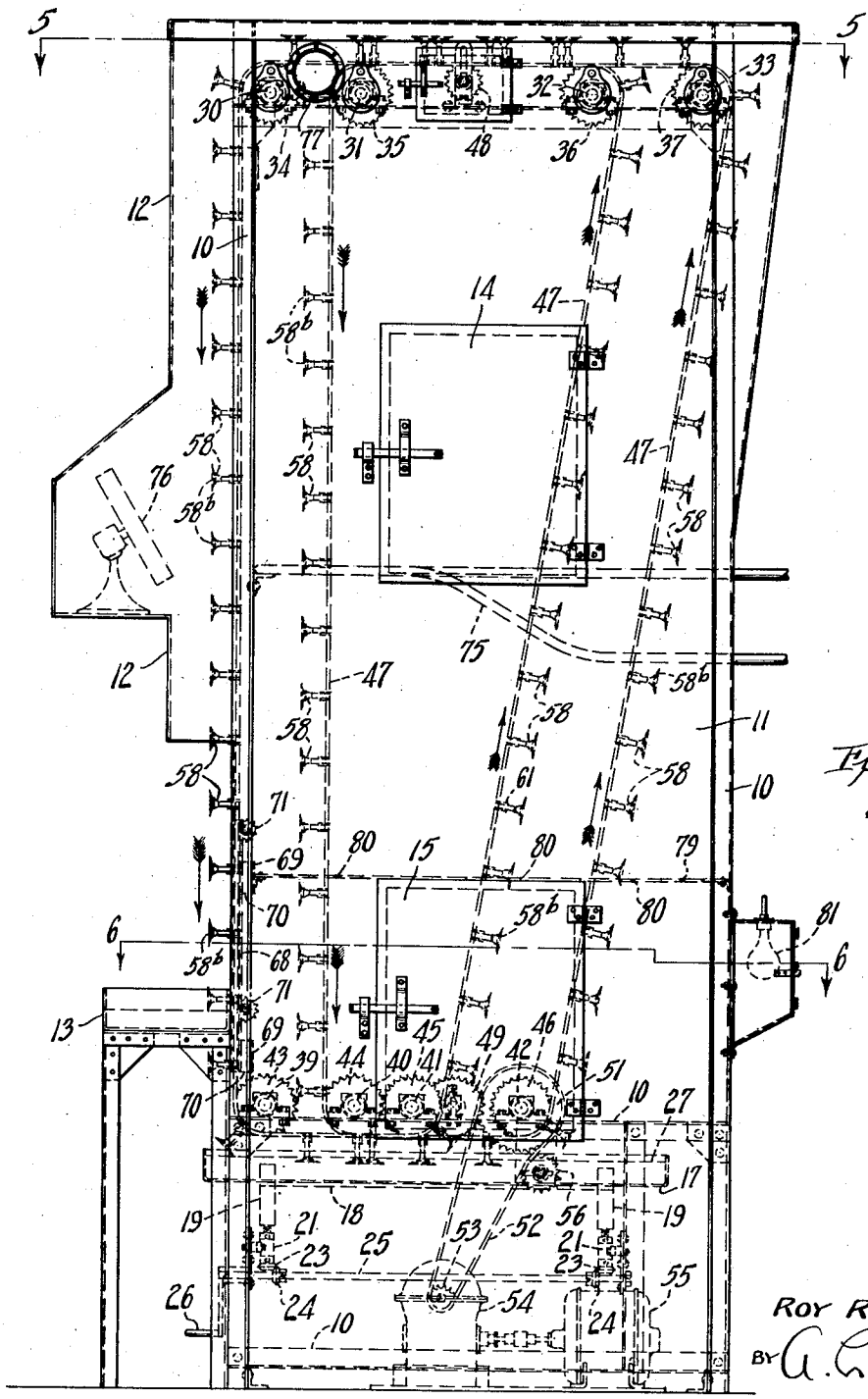


Fig. -1

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APPARATUS FOR COATING ARTICLES

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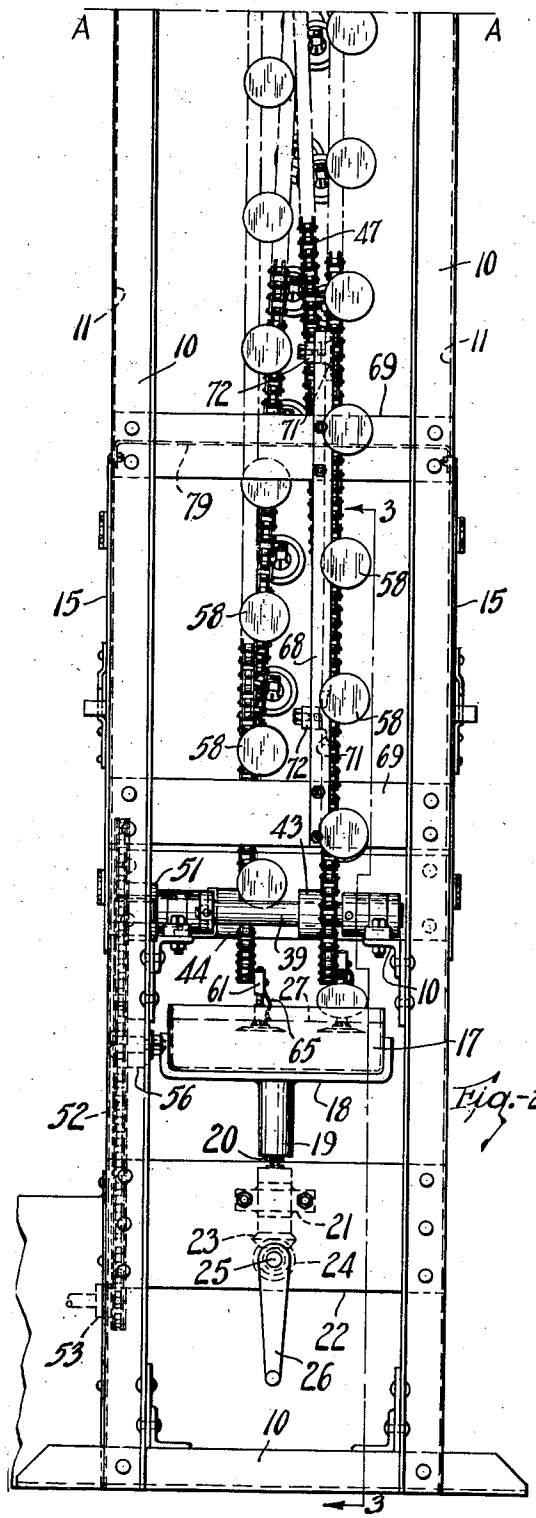


Fig.-2a

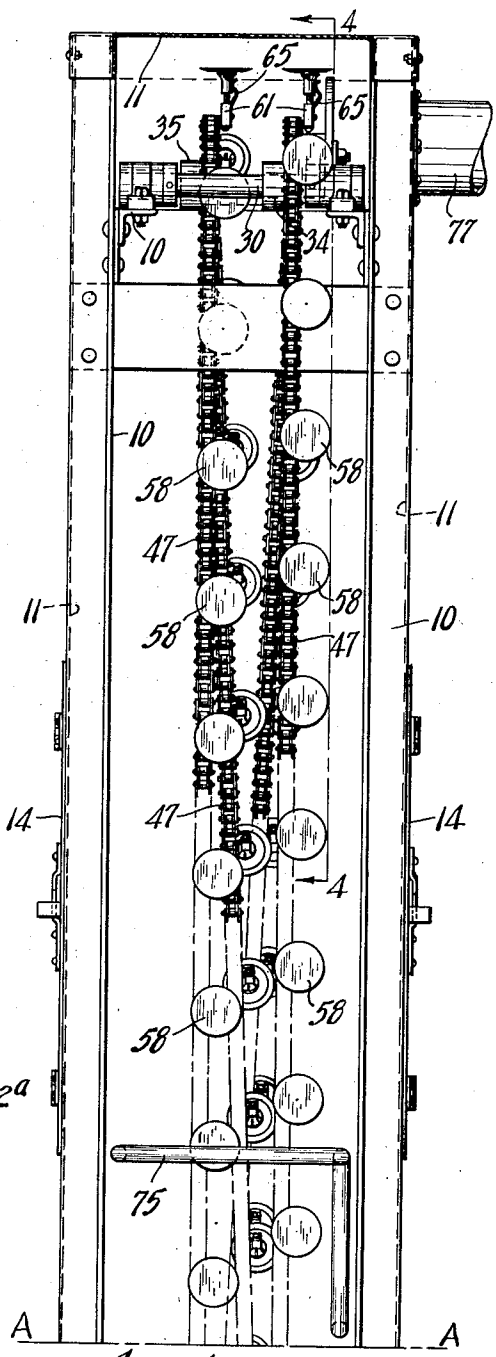


Fig.-2b

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APPARATUS FOR COATING ARTICLES

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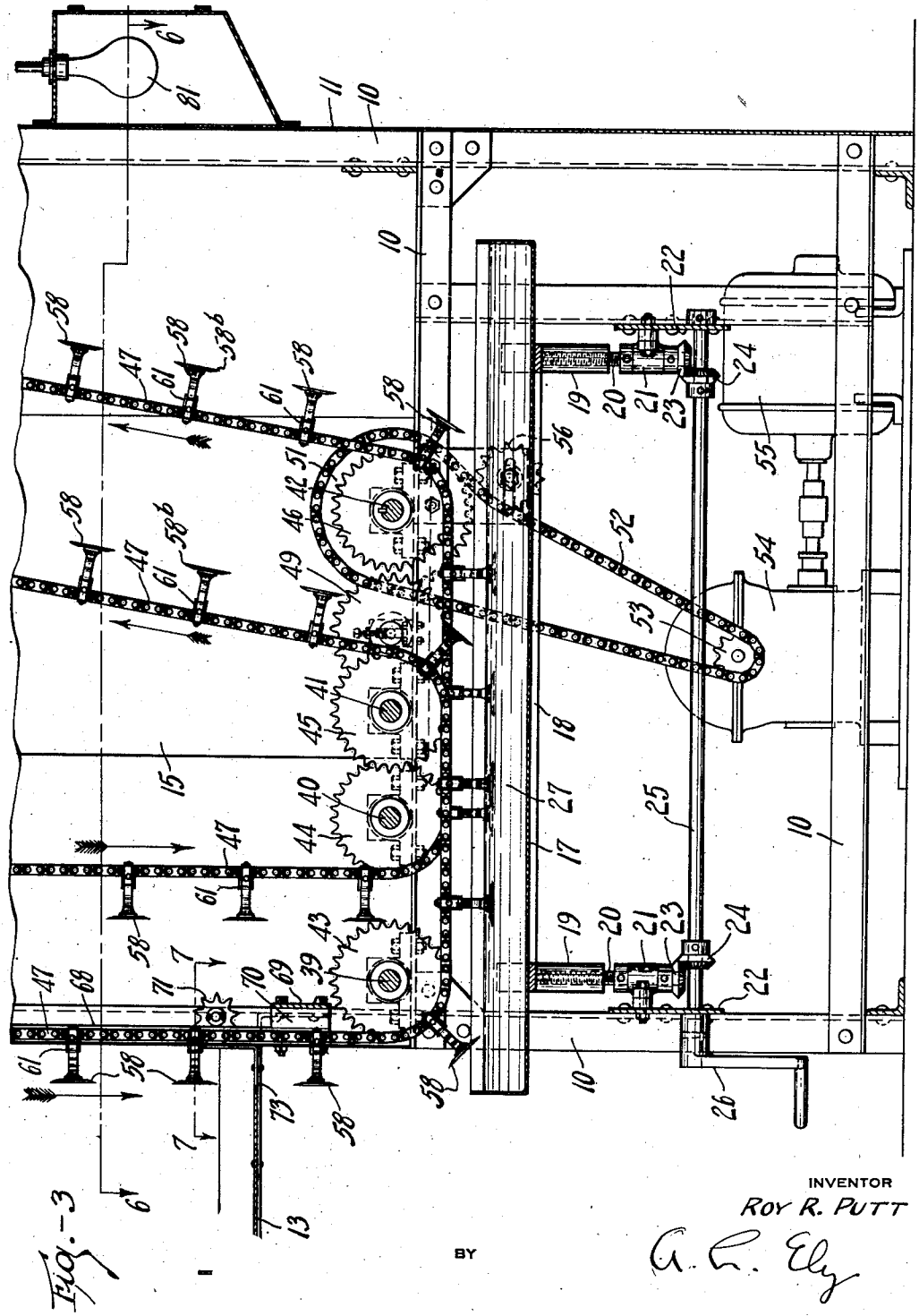


Fig. - 3

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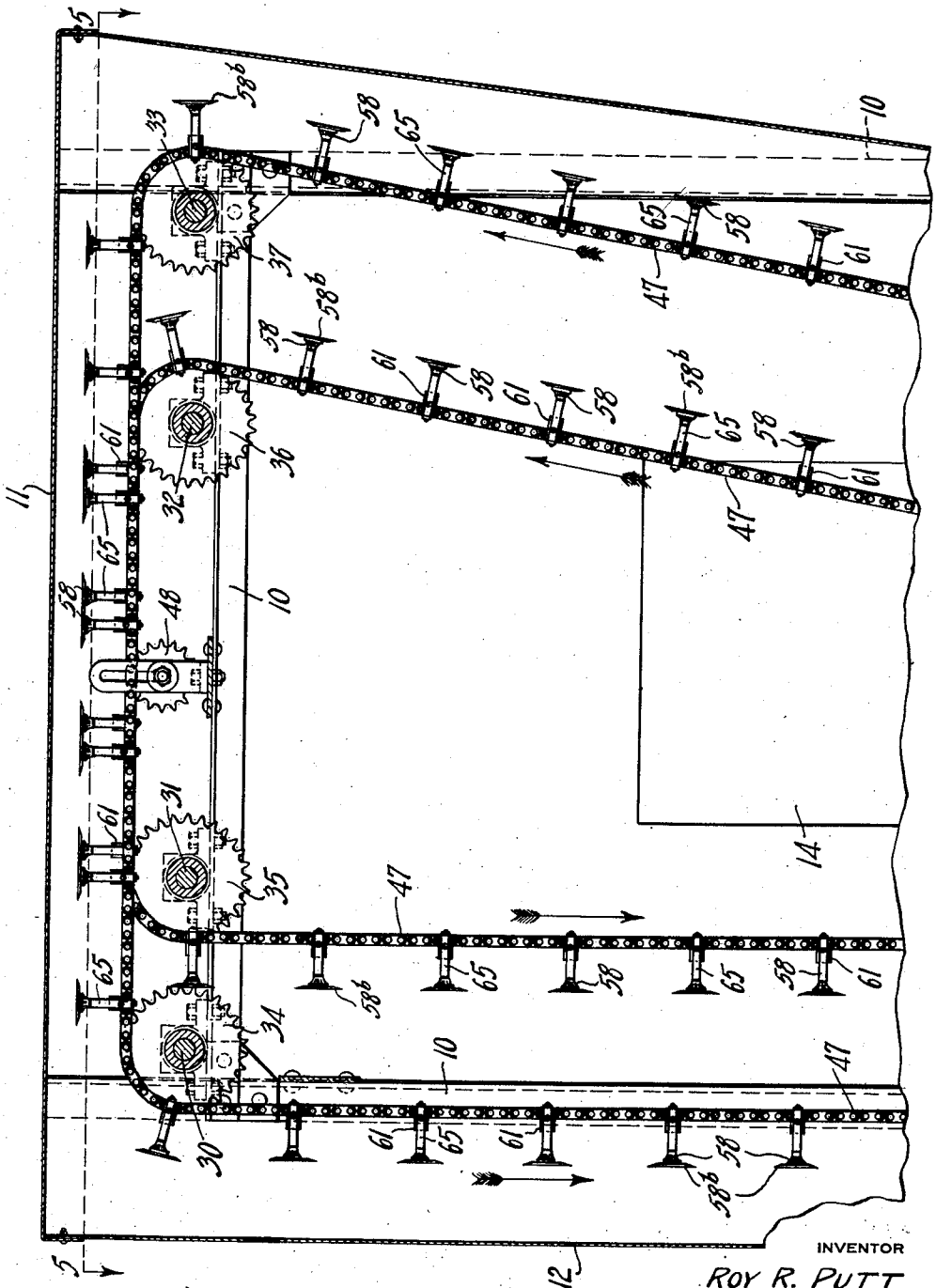


Fig. -4

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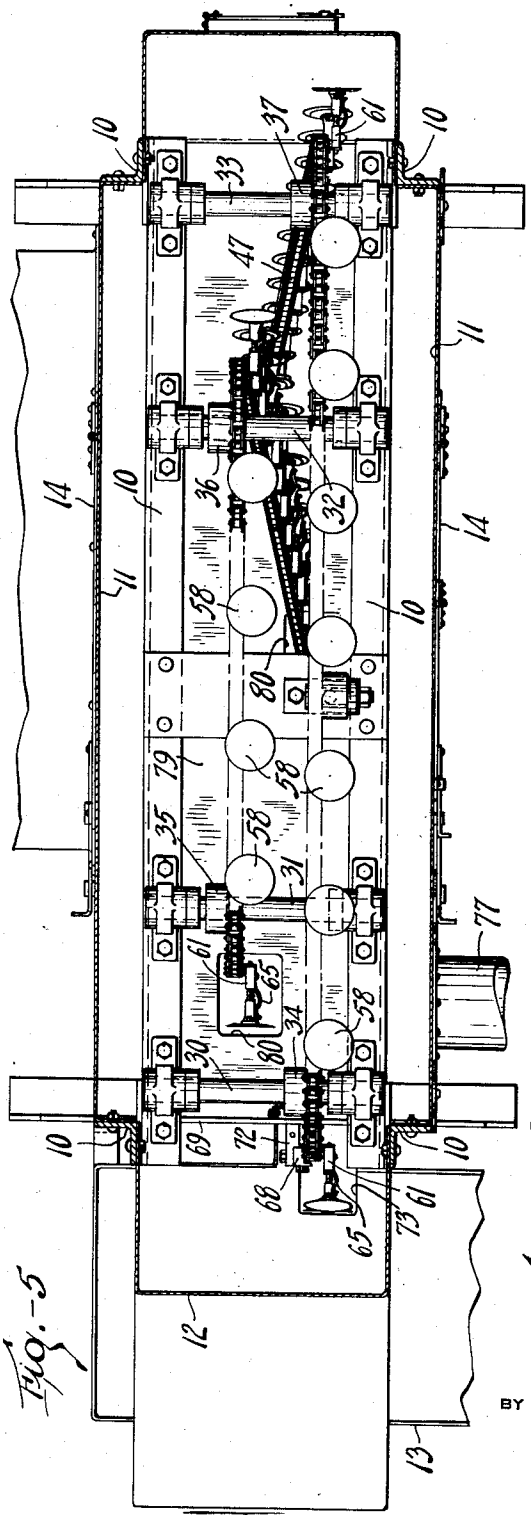


Fig. -5

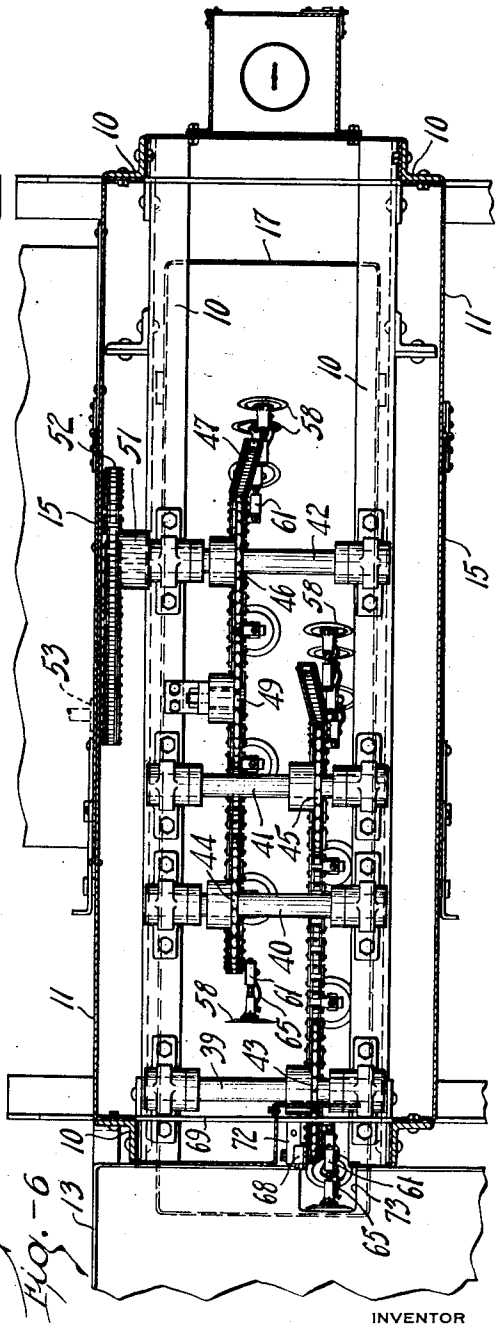


Fig. -6

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APPARATUS FOR COATING ARTICLES

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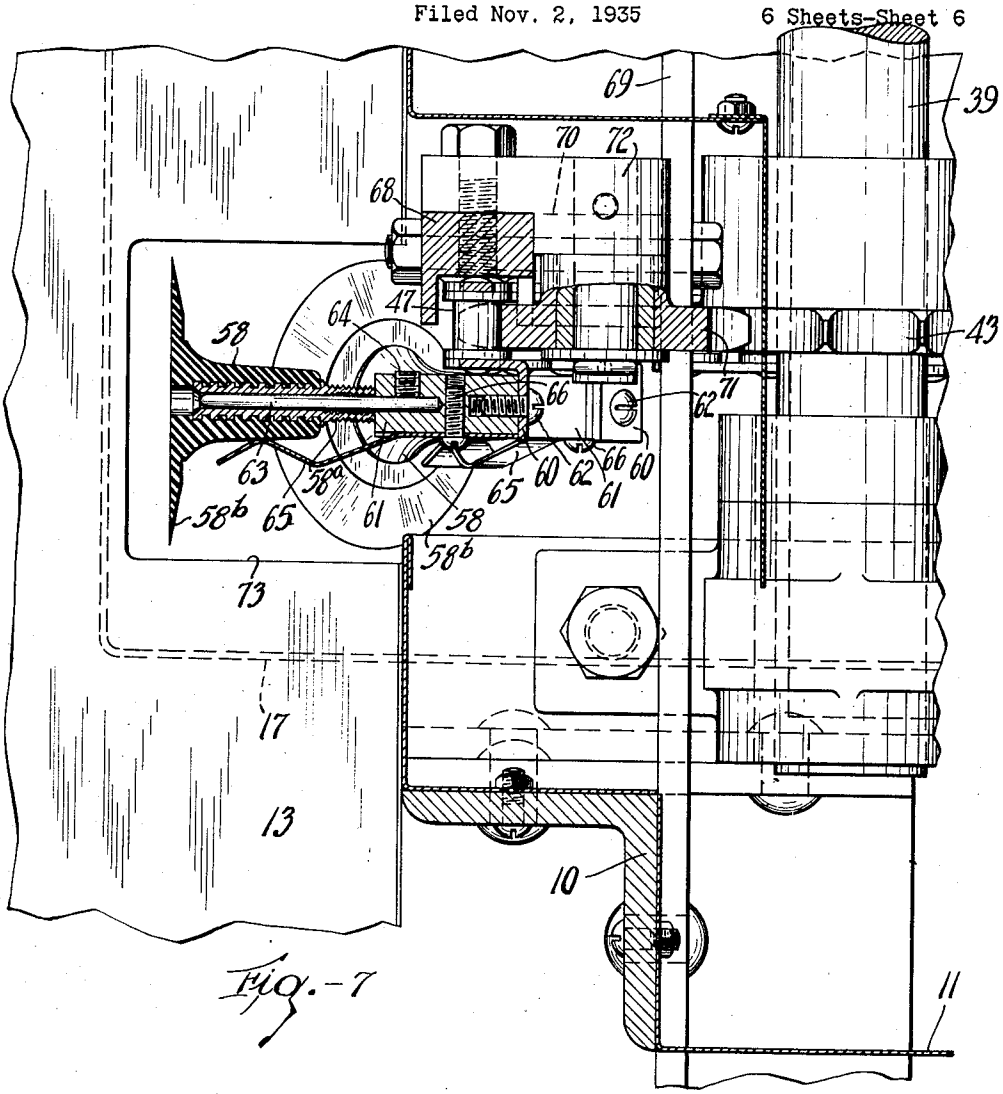


Fig.-7

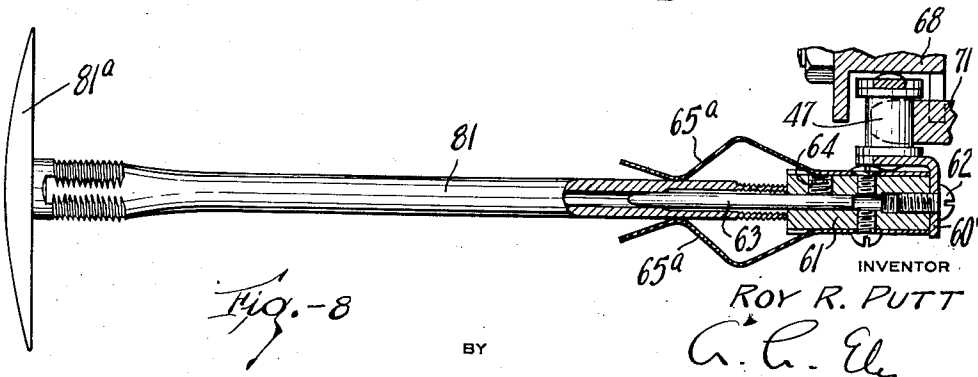


Fig.-8

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2,135,601

UNITED STATES PATENT OFFICE

2,135,601

APPARATUS FOR COATING ARTICLES

Roy R. Putt, Portage Lakes, Ohio, assignor to The Firestone Tire & Rubber Company, Akron, Ohio, a corporation of Ohio

Application November 2, 1935, Serial No. 47,992

3 Claims. (Cl. 91—46)

This invention relates to apparatus for coating articles, and more especially it relates to apparatus for applying a plurality of coatings to articles and for drying the articles after each coating.

In the illustrative embodiment of the invention herein illustrated, the invention is shown in its application to the cementing of the rubber base flanges of valve stems for inner tubes. It will be understood, however, that the invention is applicable to the coating of other articles, and that other coating material may be employed.

The chief objects of the invention are to conserve floor space; to provide apparatus of the character mentioned employing but a single supply of coating material and a single conveyor means for the articles; to conserve time and labor in the applying of two coatings to articles; and to provide for the safety and convenience of the operator of the apparatus. 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*a* is a front elevation, on a larger scale, of the lower half of the apparatus shown in Figure 1, the front wall of the structure being removed for clearness of illustration;

Figure 2*b* is a view similar to Figure 2*a* of the upper half of the apparatus shown in Figure 1;

Figure 3 is a section, on a larger scale, on the line 3—3 of Figure 2*a*;

Figure 4 is a section, on a larger scale, on the line 4—4 of Figure 2*b*;

Figure 5 is a section on the line 5—5 of Figure 1 and Figure 4;

Figure 6 is a section on the line 6—6 of Figure 1 and Figure 3;

Figure 7 is a section on the line 7—7 of Figure 3; and

Figure 8 is a detail sectional view of a modified work-holding structure.

Referring to the drawings, 10 is a framework of angle iron or other suitable structural material and 11 is a sheet metal sheathing thereon, the assembly constituting a housing that is relatively tall, relatively narrow in width, and of substantial depth from front to rear. The front of the housing comprises an overhanging portion 12, the lower end of which is located about midway between the top and bottom of the housing and is open. The front of the housing is open below the overhanging portion 12, and located in front of said open region is a work table 13 for the operator of the apparatus. The housing may be provided on one or both sides with upper and lower doors 14, 15 respectively, by which access to the interior of the housing may be had.

Located in the lower part of the housing, somewhat above the floor, is an open receptacle or tank 17 for receiving coating material. Said tank 17 is supported upon an open frame 18 that is provided at its opposite ends with downwardly extending, internally threaded sleeves 19, 19 that are open at their lower ends and receive respective vertically disposed screws 20, 20. The latter are journaled in respective bearing brackets 21, 21 that are mounted upon cross-plates 22, 22 on the framework 10. The lower end of each screw 20 is provided with a bevel gear 23 that is meshed with a bevel gear 24 mounted upon a horizontal shaft 25, the latter being journaled in the respective cross-plates 22 and extending to the open front of the housing where it is provided with a hand-crank 26 for manual operation. The arrangement is such that the tank 17 may be raised or lowered manually to maintain the liquid coating material therein at the desired level. The liquid in the tank 17 is designated 27, and the tank projects slightly beyond the front of the housing whereby replenishing of the liquid is facilitated.

Journaled at their respective ends in suitable bearing brackets mounted upon the framework 10, at the top of the latter, are four parallel, transversely-extending, horizontal shafts 30, 31, 32, and 33, and mounted upon said shafts are respective sprockets 34, 35, 36, and 37. Sprockets 34 and 37 are disposed in the same vertical plane, and sprockets 35 and 36 are disposed in another vertical plane that is spaced laterally from the plane of the first-mentioned sprockets, as is most clearly shown in Figure 5 of the drawings.

Journaled at their respective ends in suitable bearing brackets mounted upon the framework 10, a little above the tank 17, are four parallel, transversely-extending, horizontal shafts 39, 40, 41, and 42, and mounted upon said shafts are respective sprockets 43, 44, 45, and 46. Of the aforesaid sprockets, 43 and 45 are disposed in the same vertical plane as sprockets 34, 37, and sprockets 44 and 46 are disposed in the same vertical plane as sprockets 35, 36, as will be apparent by comparision of Figures 5 and 6.

A single sprocket chain 47 is trained about the aforementioned sprockets, and when one of the latter is driven in the direction indicated by the arrows, a given point on the chain will pass about the sprockets in determinate sequence, to wit, 43,

45, 36, 35, 44, 46, 37, and 34. From the foregoing it will be seen that the reach of the chain between sprockets 46, 37 crosses the reach of the chain between sprockets 45, 36, but the latter pair of sprockets are positioned sufficiently rearwardly of sprockets 46, 37 that there is substantial clearance at the point of crossing. Furthermore, sprockets 36 and 37 are positioned rearwardly of respective sprockets 45 and 46 so that the reaches of the chain passing upwardly between said sprockets travel obliquely rearwardly for a purpose presently to be explained. An adjustable idler sprocket 48 may be provided for supporting the long reach of chain 47 between sprockets 34 and 37. A second adjustable idler sprocket 49 may engage the chain between sprockets 44 and 46 to maintain the chain in taut condition.

For driving the sprocket chain 47 in the direction indicated, the shaft 42 has one of its end portions extended beyond its journal bearing and provided with a sprocket 51 that is connected by a sprocket chain 52 with a sprocket 53 on the delivery shaft of a reduction speed drive device 54, the latter being driven by a suitable motor 55. An adjustably mounted idler sprocket 56 may be provided for keeping the chain 52 taut at all times.

The chain 47 conveys the work in a continuous course, and so supports the work that the latter is immersed to a determinate depth in the liquid 27 in tank 17 twice before being returned to point of starting. In Figures 1 to 7 the work is shown as a rubber valve stem 58, such as is used in the inner tubes of pneumatic tires, said valve stem being provided with the usual tubular metal insert 58*a* that projects from one end thereof, and having its opposite end formed with the usual base flange 58*b* (see Figure 7). The valve stems 58 are mounted upon the chain with their flange ends outermost, and the tank 17 is so positioned that only said flange ends are immersed in the liquid 27 as the chain passes between sprockets 44, 46 and 43, 45.

For supporting the work upon the chain 47, the latter is constructed with special links spaced uniformly throughout its length. As herein shown, every fifth link of the chain is of special construction. As is most clearly shown in Figure 7, each special chain-link comprises an integral ear or flange 60 projecting laterally from one side thereof, there being a rectangular metal block 61 secured at one of its ends to said ear by means of screw 62. A rod or spindle 63 projects outwardly from the other end of said block, said spindle being removably secured in the block by set screw 64. The spindle 63 is disposed perpendicular to the chain structure, and is adapted to support a unit of the work 58, the spindle having a sliding fit within the tubular insert 58*a* of the work. For yieldingly retaining the work on the spindle, a leaf spring 65 is secured to one of the lateral faces of block 61 by means of screw 66, the free end portion of said spring bearing against the stem portion of the work. The arrangement is such that the valve stems 58 are easily mounted upon or removed from the spindle 63, yet are sufficiently securely retained thereon so as not to drop from the chain when inverted in the lowermost reaches thereof.

The coated articles are removed from the chain 47 and uncoated articles are mounted thereon manually by an operator seated before the work table 13. In order to avoid strain on the chain 47 as the valve stems are pulled therefrom, a chain-reinforcing structure is provided in the form of a laterally-open channel 68 that embraces the chain in a local region of the nearest vertical reach thereof in front of the operator. The channel 68 is supported at its upper and lower ends by being bolted to respective transverse plates 69, 69 secured to the framework 10, there being a spacer block 70 between each of the said plates 69 and the channel. At two spaced points the rear leg of the channel 68 is cut away and the chain 47 is engaged thereat by idler sprockets 71, 71 that are carried by respective brackets 72 mounted upon said channel. The sprockets 71 are positioned above and below the point that the operator mounts the uncoated articles upon the chain, and serve as a backing for the chain to prevent the latter from being forced against the rear leg of the channel during the work-mounting operation. The work table 12 is formed with an opening 73 of such size as to permit the work on the chain to pass therethrough.

The liquid coating material 27 in the tank 17 usually comprises a volatile solvent, and suitable heating coils 75 may be mounted in the housing to assist in evaporating the solvent from the coating material adhering to the work. Evaporation of the solvent may further be expedited by a fan 76 mounted in the overhanging portion 12 of the housing and adapted to circulate the air in the housing. The housing is provided in the top thereof with a vent 77 to permit escape of the vapors within the housing, or to permit collecting of the vapors so that the solvent may be recovered therefrom.

In the lower part of the housing, at about the level of the loading and unloading station, is a horizontal baffle plate 79, said plate being formed with suitable apertures 80, 80, Figure 5, to permit the chain 47 and work thereon to pass through. The baffle plate serves to keep the solvent vapors in the upper part of the housing, and it also catches most of the drippings of coating material falling from the coated work. Preferably the interior of the housing below the baffle plate 79 is illuminated by a lamp 81 so that the operator may observe conditions in the bottom of the housing at all times.

In the operation of the apparatus, the motor 55 drives the chain 47 at such rate of speed that the work after passing once through the coating material 27 is substantially dried before again being coated, and thereafter substantially dried before being removed from the apparatus. Because the reaches of the chain are parallel and side by side as they carry the work through the coating material 27, the tank 17 may be of smaller size. Because the reaches of the chain carry the work-units obliquely rearwardly and upwardly immediately after said work-units emerge from the coating material 27, any dripping of coating material from the work-units either falls into the tank 17 or upon the baffle plate 79. Thus none of the drippings fall on the subjacent work-units, and the finished work presents a smooth and uniform appearance. It will be observed that the chain 47 is so arranged that the various sprockets engage the same side of the chain, thus simplifying the problem of adapting the chain for the conveying of the work.

The embodiment of the invention shown in Figure 8 is especially adapted for the coating of metal valve stems, such as the valve stem 81 which is provided with a rubber base 81*a*. The apparatus differs from the previously described

embodiment solely in the construction of the special links of chain 47, each of which special links comprises two leaf springs 65*a*, 65*a* adapted to grip the valve stem 81 at diametrically opposite points and thus to hold it securely on the chain notwithstanding the smooth, non-yielding character of the metal of the valve stem. The blocks 61 on the special chain-links are so constructed that either one or two of the leaf springs may be mounted thereon.

Other modification may be resorted to without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. Apparatus for coating articles, said apparatus comprising an endless conveyor, means for supporting articles thereon, means supporting and driving the conveyor in a course that defines two quadrilateral figures disposed in adjacent parallel planes, the reaches of the conveyor crossing each other on one side of said figures, and means for concurrently coating the articles on two adjacent, parallel reaches of the conveyor.

2. Apparatus for coating articles, said apparatus comprising an endless conveyor chain, means for attaching articles to said chain, means supporting and driving the chain in a course that defines two quadrilateral figures disposed in adjacent parallel planes, the reaches of the chain crossing each other on one side of said figures, and means for concurrently coating the articles on two adjacent parallel reaches of the chain, the reaches of the chain into which the articles are carried immediately after coating being obliquely disposed so that drippings from the articles do not fall on the subjacent articles.

3. Apparatus for coating articles, said apparatus comprising an endless conveyor, means for supporting and driving the conveyor, the latter being arranged in two connected courses disposed side by side in two parallel vertical planes, the articles traveling over said courses in sequence so as to be twice coated and dried, at least one region of each course being horizontal and disposed in a horizontal plane with the horizontal region of the other course, means on said conveyor for supporting articles in projecting relation thereto in the vertical planes of the respective courses and means below the conveyor for concurrently applying a coating to the articles that project downwardly from the said horizontal regions of the conveyor.

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