Aug. 14, 1945. G. A. MILLER 2,382,087

CONVEYER

Filed Nov. 19, 1943 3 Sheets-Sheet 1

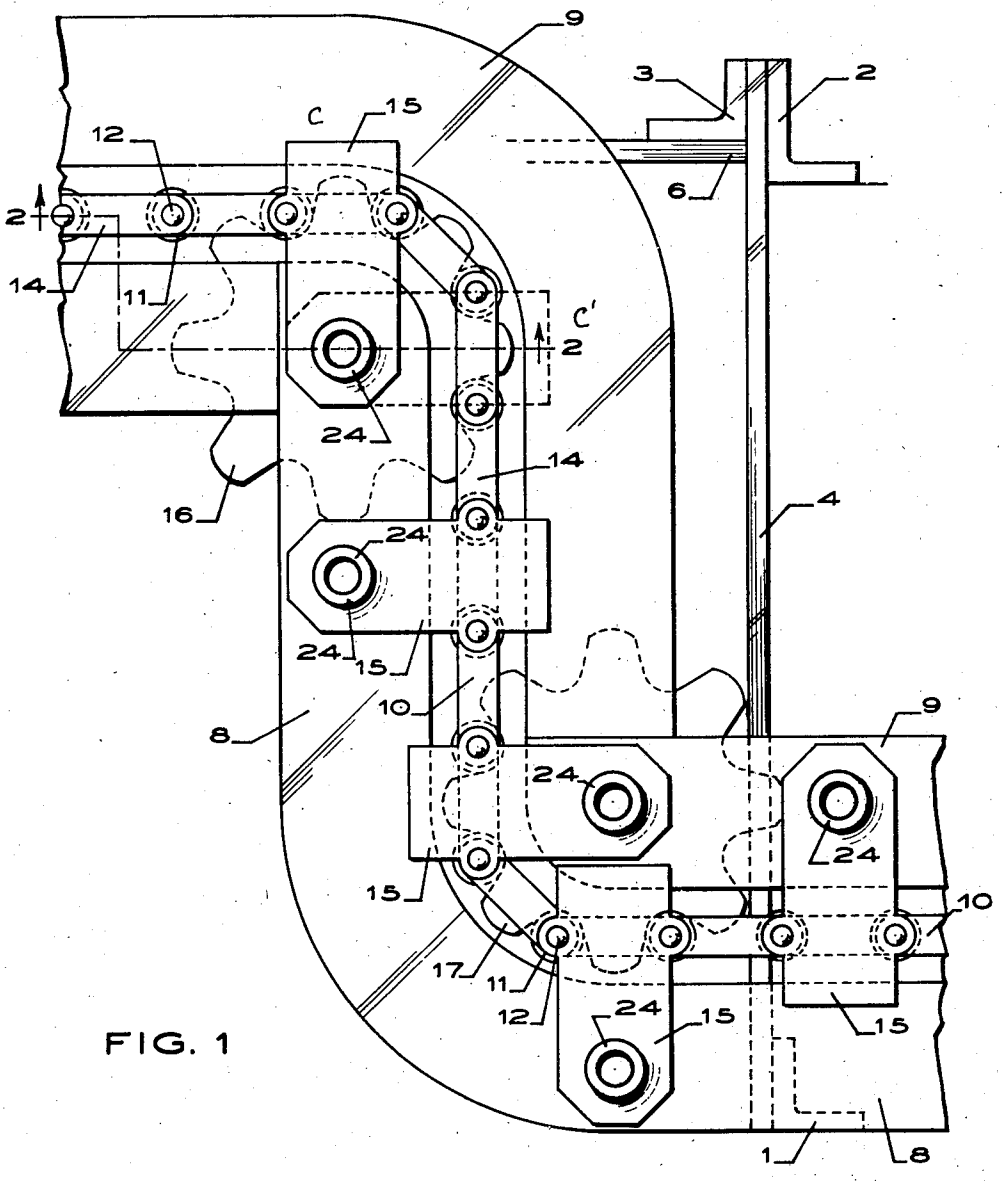


FIG. 1

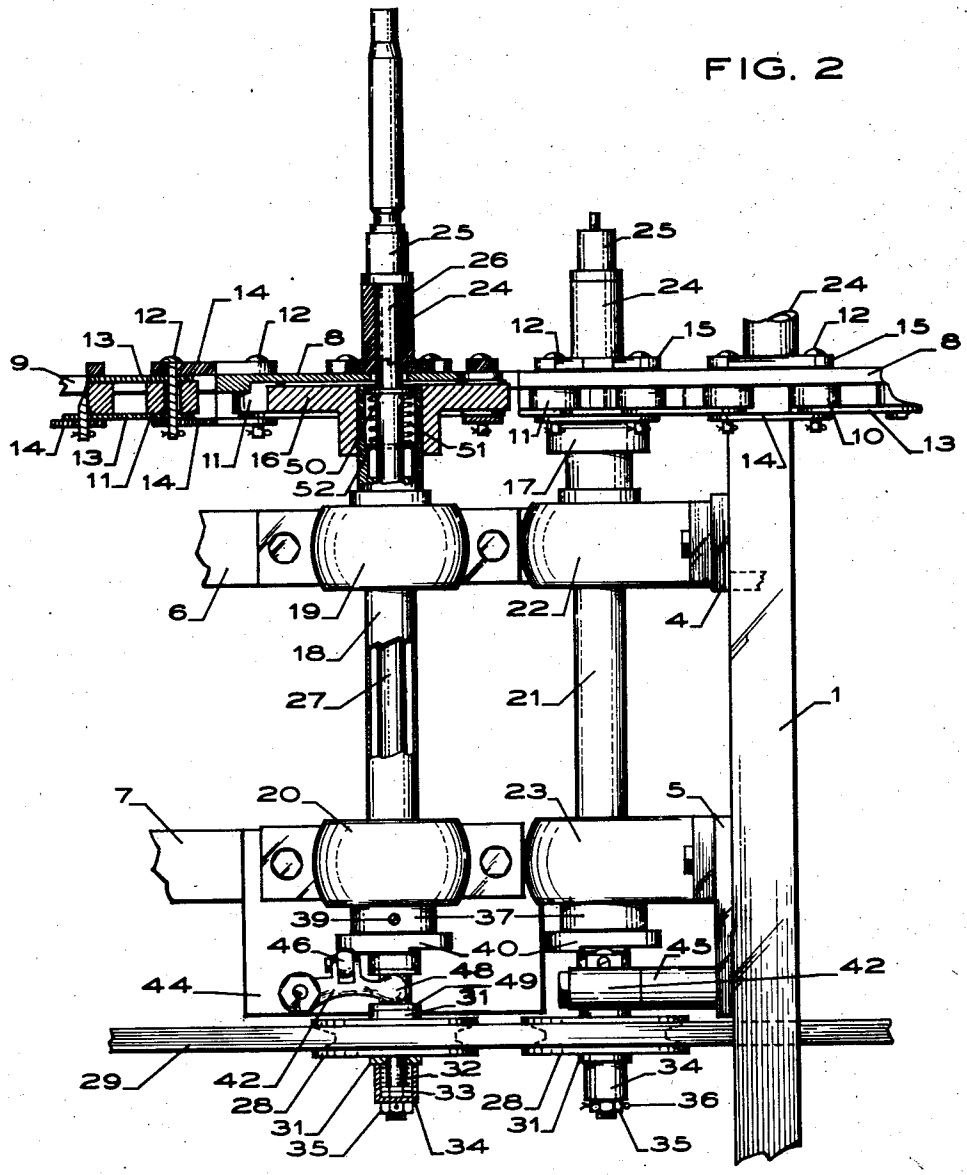
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FIG. 2



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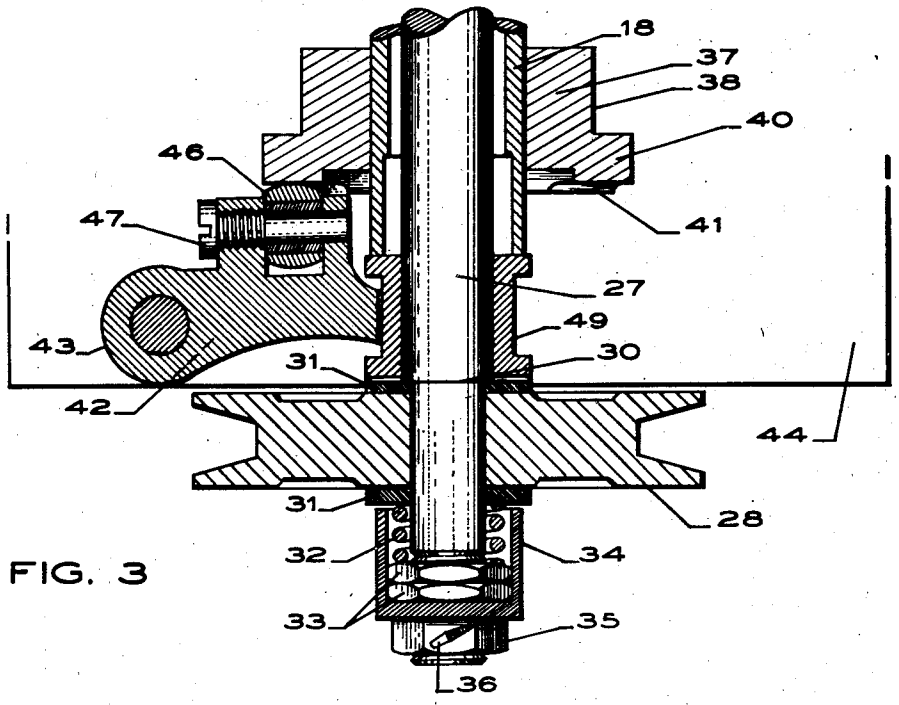


FIG. 3

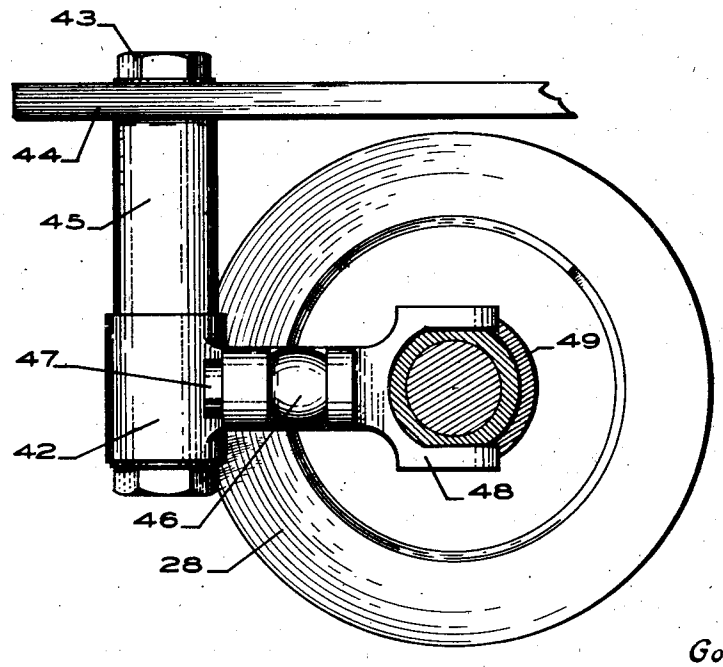


FIG. 4

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CONVEYER

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Application November 19, 1943, Serial No. 510,979

7 Claims. (Cl. 198—19)

The present invention relates to conveyers and particularly to such apparatus for carrying a series of articles to be spray coated or otherwise treated at one or more stations along the path of travel.

An important object of the invention is the provision of means for momentarily arresting the forward movement of each article as it reaches a treating station without affecting the constant forward movement of the conveyer.

Another important purpose of the invention is to provide means for rotating the article during the period its travel is temporarily checked.

Other objects of the invention will be revealed in the following description, the claims and the several views contained in the accompanying drawings, in which:

Fig. 1 is a partial plan view of an apparatus embodying my invention;

Fig. 2 is a front elevation of the same portion of the apparatus with the upper left half shown in section, taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary vertical cross section of the mechanism for rotating the parts carried by the conveyer; and

Fig. 4 is a view, from above, of the yoke and pulley shown in Fig. 3. The shaft and contact bushing, straddled by the yoke, are shown in section.

Referring in more detail to the drawings, the apparatus selected to illustrate the invention is shown supported by vertical members 1, 2 and 3, and horizontal bracing bars 4, 5, 6 and 7. Upon the frame, including these vertical and horizontal members, is mounted a flat table comprising sections 8 and 9 on opposite sides of and forming a guide for a link chain conveyer 10. The drive for the chain may be the conventional arrangement comprising an electric motor and speed reducer. This chain is used on edge with its rollers 11 in a vertical position. These are mounted on pins 12 which are connected together alternately by a set of two inner links 13, one on either side of the rollers, and then by a set of two outer links 14. In most cases the upper one of the set of links 14 has been replaced by a plate 15, which extends laterally on both sides of the chain with side portions sliding upon the table sections 8 and 9. One of the lateral extensions 15 is longer than the other and has a tubular upright 24 extending through it.

The chain conveyer is carried on sprockets 16 and 17 which are preferably of the same diameter. In this description of the apparatus the chain travel has been assumed to be from left to right, passing first around sprocket 16. Above and coaxial with each of the sprockets is a treating station for the articles carried on the conveyer. Sprocket 16 is mounted on a hollow shaft 18 which is rotatably held in bearings 19 and 20. Sprocket 17 is supported on a similar hollow shaft 21 which is held in rotatable position by bearings 22 and 23.

The distance of each upright 24 from the center line of the chain is the same as the radius of either sprocket 16 or 17. Consequently while the portion of the chain carrying a plate 15 travels around the sprocket on the same side of the chain as the tubular upright 24, the latter assumes a position coaxial with the sprocket.

In the upper end of tubular upright 24 is set an article holding adapter 25. This has a rod-like depending extension fitting into the cylindrical cavity of upright 24. This extension has a serrated or saw tooth end reaching to near the bottom edge of the plate 15. During the interval the tubular upright 24 is coaxial with the sprocket, a revolving shaft 27 within the hollow shaft 18 (or 21) is moved upwardly. This shaft has an upper end serrated complementarily in regard to the end of the extension 26. The rotating movement of the shaft 27 and its upward shift brings it into driving connection with the rod extension and thereby rotates the article supporting device 25 upon the tubular upright 24. Any article on the device 25 is of course rotated with it.

The supporting adapter 25 may be made to accommodate whatever part is to be treated. In Fig. 2 a small calibre shell is shown on the left one of the two supporting adapters 25. In practice most, if not all, uprights 24 would hold a device 25 and an article to be treated thereon. A spray gun or other treating device may be mounted in a stationary position adjacent the sprocket to act upon the shell or other article to be treated while it is momentarily retained at the treating station. The rotating movement provided the article supporting device brings the peripheral surface of the article several times before the treating device. Should the latter be a spray gun, a multiple layer of a coating material may thus be applied. As may be seen, my apparatus brings the articles to be treated to a station for treatment and holds them there for the time required. This is done without bringing the conveyer to a stop. To stop the conveyer for each article requires costly mechanism and the con-

tinuous stopping and starting of the whole conveyer, which may be very long, takes extra power and heavier construction because of the jarring effect upon the whole machine.

The shaft 27 is revolved through V-pulley 28 and belt 29. The source of the power of the driving belt 29 is not shown, but may be a standard electric motor with a V-pulley.

On either side of each pulley is a washer 31. The upper one bears against a downwardly facing shoulder 31 on the shaft 27, while the lower washer receives the thrust of spring 32. The tension of the spring may be varied by changing the position of lock nuts 33. A housing 34 is held in place over the spring and the lock nuts by a nut 35 also threaded upon the shaft 27 and held against turning by a cotter pin 36. It may be seen that the pulley 28 does not have a positive driving connection with the shaft 27. The spring tension is so set however that under ordinary conditions the shaft 27 will rotate with the pulley 28 through the contact between the pulley and the upper washer 31 and that between this washer and the shoulder 30 on the shaft 27. Should the pulley be sharply accelerated or an increased load be applied suddenly to the shaft, there will be a momentary slippage between the pulley 28, washer 31 and shoulder 30. This is inclined to prevent any sudden change in speed of the shaft or any jerky movement when the shaft contacts an article supporting adapter.

The vertical reciprocation of shaft 27 is controlled by cam 37. This has an upper hub section 38 through which it is fixed to the revolving shaft 18 by a set screw 39. On the under edge of the lower flange portion 40 is a camming surface 41 divided approximately quarterly in alternate higher and lower parallel sections.

Below the cam 37 is a cam follower arm 42, fulcrumed on bolt 43, extending from plate 44. The latter is held between brace 7 and pillow block 20. The arm 42 is spaced from plate 44 on the bolt 43 by spacer bushing 45. Carried by the arm 42 is cam contacting roller 46 on stud bearing 47. At the free end of the arm 42 is a yoke 48 which has straddling engagement with flanged bushing 49. When the cam follower arm 42 is forced downwardly by one of the lower quarter sections of the cam 37, the yoke 48 drives the bushing 49 against washer 31 and through pulley 28, lower washer 31, spring 32 and lock nuts 33 moves the shaft 27 downwardly. As the hollow shaft 18 revolves, a following higher quarter section of the cam surface permits arm 42 to be raised by the upward push of shaft 27. At the upper end of this shaft is a flange 50 against which a spring 51 bears. The other end of the spring rests upon washer 52 which is set against an upwardly facing shoulder within hollow shaft 18. The tension of spring 51 is sufficient to immediately raise the shaft 27 when it is not held in its lower position by the cam 37. It may be seen therefore that during each revolution of the hollow shaft 18 the inner shaft 27 is in raised position twice and lower position twice, alternately moving up and down quarterly of each revolution.

The cam 37 is carefully positioned radially upon shaft 18 so that the cam surface will permit the article rotating shaft 27 to rise during the swing of each plate 15 through the quarter arc around sprocket 16 or 17, as the chain carrying the particular plate 15 travels about the sprocket.

Consequently, as soon as the plate 15 reaches position C shown in Fig. 1, the tubular upright 24 becomes concentric with sprocket 16 and the shaft 27 rises to contact and rotate the article support 25 carried by the tubular upright 24. A similar action occurs above sprocket 17 when plates carrying uprights 24 on that side of the track swing around sprocket 17.

This driving contact continues until the plate 15 reaches position C^1 (shown in interrupted lines) at which time the shaft 27 is moved downwardly by cam follower arm 42 and the tubular upright 24 moves away from the center of the sprocket.

While in this particular embodiment the treating period is provided by a 90° turn about the sprocket the size of the arc may be increased if it is desirable to lengthen the treating period.

The long lateral extensions of plates 15 do not interfere with each other even where they replace all upper links 14, if they are positioned alternately on opposite sides of the chain. If this arrangement is used, a treating station on each side of the chain must be provided as in the embodiment herein disclosed. In case it is desired to have treating stations on one side of the track only, the plates 15 may replace every alternate link 14.

It is understood that the embodiment herein disclosed is a preferred form of my invention and it may be variously changed without departing from the spirit of the invention as defined in the following claims.

I claim:

1. In a conveyer for carrying a series of articles through a treating station, a link chain, a sprocket for the chain with a hole at its center, a rotatable article support carried by the conveyer in a position offset therefrom a distance equal to the radius of the sprocket so that the article support will assume a position concentric with the sprocket while the portion of the chain carrying it passes around the sprocket, rotating means below the sprocket with an upwardly rotating extending shaft, and means for raising the rotating shaft and bringing it through the center hole of the sprocket and into driving connection with the article support while the latter is concentric with the sprocket.

2. In a chain conveyer for carrying a series of articles to be treated, a sprocket engaging the chain conveyer, a hollow shaft on which the sprocket is mounted, a rotating shaft reciprocably held within the hollow shaft, a cam on the hollow shaft, a cam follower arm having a thrust contact with the rotating shaft to move it vertically in one direction, a spring bearing against the rotating shaft to drive it vertically in the other direction, and means for supportng each successive article carried by the conveyer momentarily over the center of the sprocket, and engaging means between the last said means and the rotating shaft when the latter is in its upper position to provide rotary movement to each article.

3. In a conveyer for carrying a series of articles through a treating station, an endless link chain, a sprocket about which the chain turns at the treating station, a rotatable article support carried by the chain laterally offset therefrom on the same side of the chain as the sprocket a distance approximately equal to the radius of the sprocket so that the support is held concentric with the sprocket while the portion of the chain which carries it turns about the sprocket, and means contacting and rotating the

article support while it is concentric with the sprocket.

4. In a conveyer for carrying a series of articles through a treating station, a link chain, a centrally bored sprocket at the treating station about which the chain travels, arms on links of the chain extending laterally on the same side of the chain as the sprocket, a platform parallel to the chain upon which the arms slide, vertically hollow members for supporting articles at the ends of the arms and spaced from the chain a distance equal to the radius of the sprocket so that each supporting member is concentric to the sprocket while the portion of the chain carrying the support is traveling about the sprocket, and article rotating means movable upwardly through the center bore of the sprocket and each hollow supporting member to rotate the article thereon when it reaches the treating station.

5. In a conveyer for carrying a series of articles through a treating station, a link chain, a centrally bored sprocket at the treating station about which the chain travels, arms on links of the chain extending laterally on the same side of the chain as the sprocket, a platform parallel to the chain upon which the arms slide, vertically hollow members for supporting articles at the ends of the arms and spaced from the chain a distance equal to the radius of the sprocket so that each supporting member is concentric to the sprocket while the portion of the chain carrying the supporting member is traveling about the sprocket, article rotating means movable upwardly through the center bore of the sprocket and each hollow supporting member to rotate the article thereon when it reaches the treating station, and cam means controlling the vertical movement of the article rotating means.

6. In a conveyer for carrying a series of articles through a treating station, an endless link chain, a sprocket on each side of the chain about which the chain turns, and article supports carried by the chain laterally spaced from the center line of the chain, the article supports positioned on each side of the chain being spaced therefrom a distance approximately equal to the radius of the sprocket on the same side of the chain, so that each article support assumes a position concentric with the sprocket on the same side of the chain while the portion of the chain carrying the support moves around the sprocket.

7. In a conveyer for carrying a series of articles through a treating station, a link chain running in a horizontal plane, a sprocket about which the chain travels, horizontal supporting platforms along each side of the chain, links in the chain with integral extensions projecting laterally from both sides and slidably supported upon the platforms, and article holders on the extensions on the sprocket side of the chain, spaced from the chain a distance equal to the radius of the sprocket so that each holder is concentric to the sprocket while the portion of the chain carrying the holder is traveling about the sprocket.

GODFREY A. MILLER.