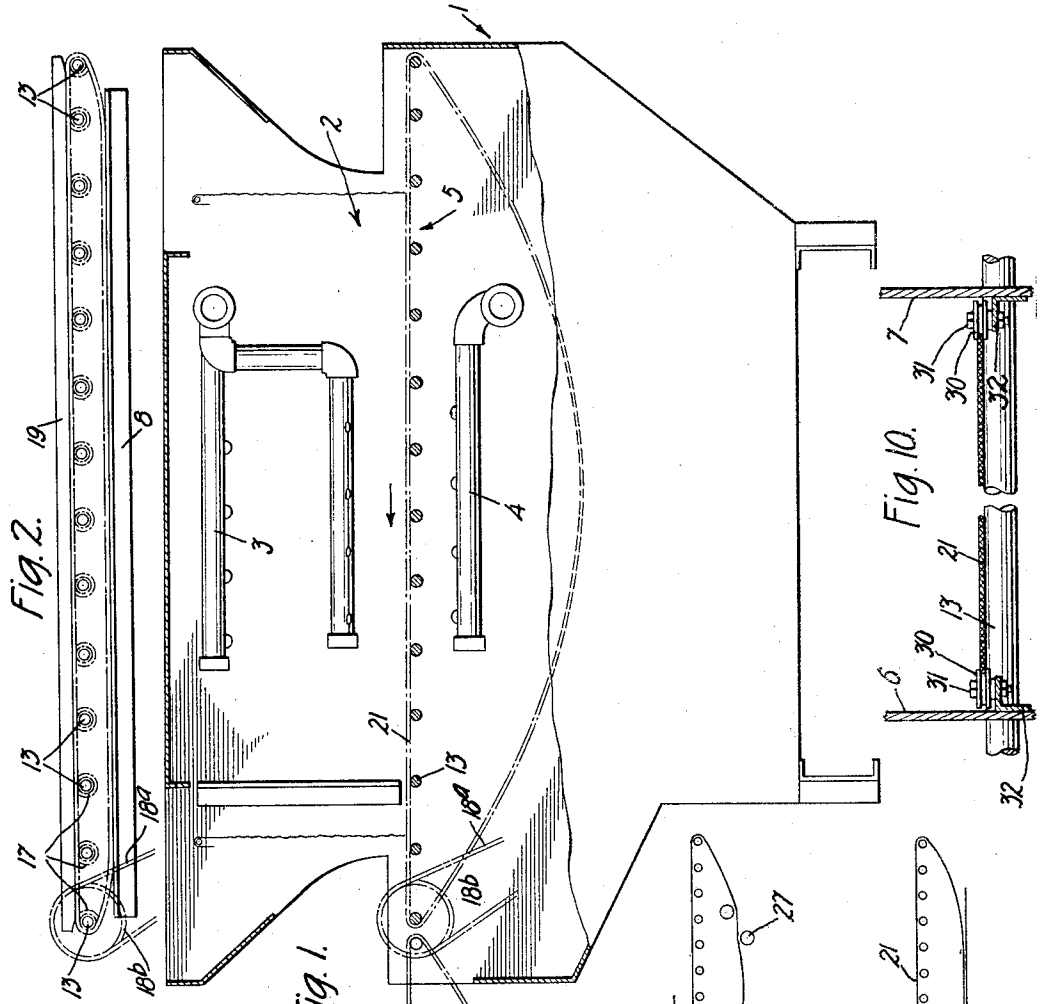
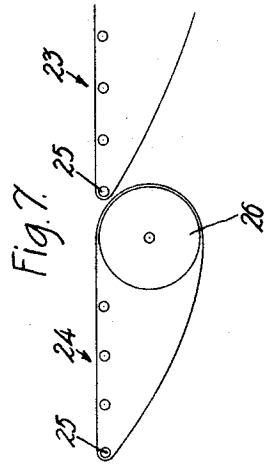
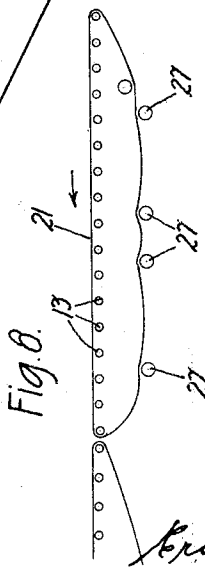
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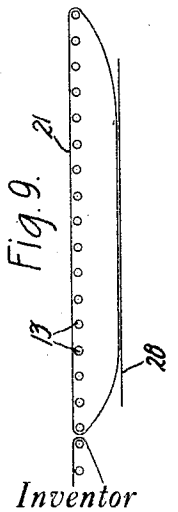
CONVEYER

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CONVEYER

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Fig. 3.

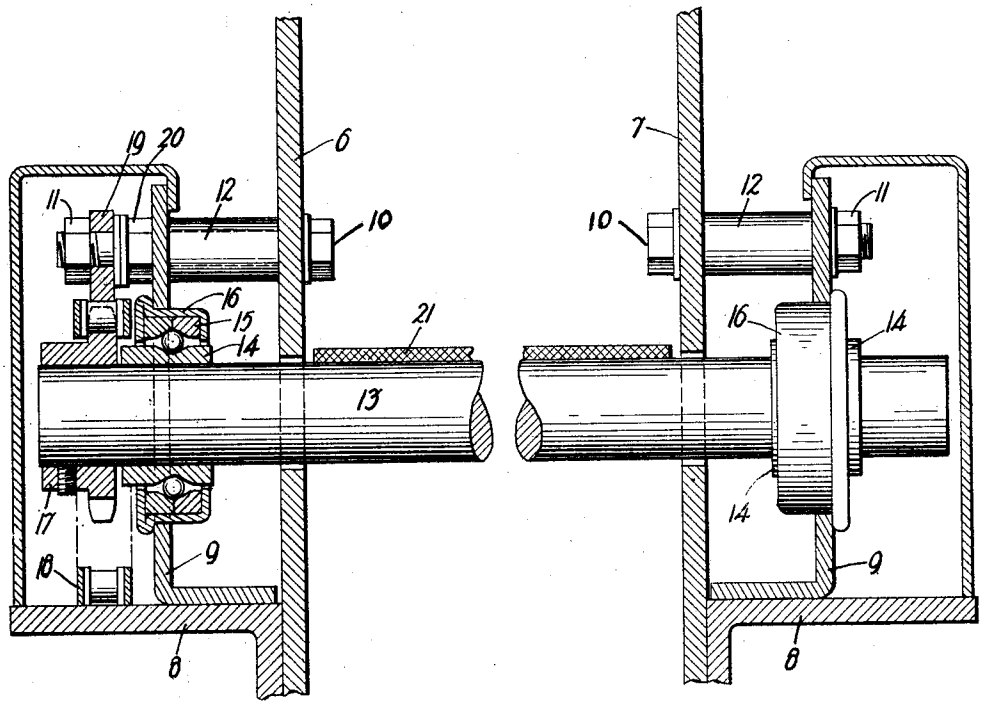



Fig. 4.

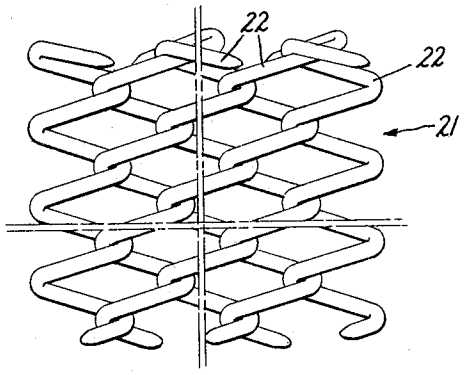



Fig. 5.

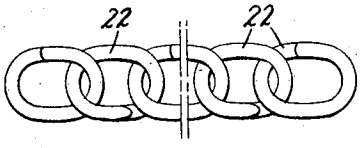
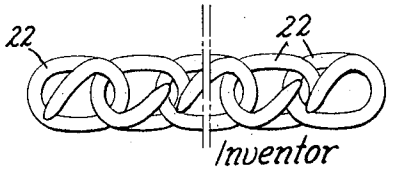



Fig. 6.




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# UNITED STATES PATENT OFFICE

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## CONVEYER

Application filed October 1, 1927. Serial No. 223,468.

This invention relates to conveyers for use in treating apparatus or for other purposes.

It is an object of the invention to provide a conveyer which can be operated rapidly and without danger of breakage, which requires little power for its operation, and involves little wear in use, and which is adaptable for use with articles of widely varying sizes and weights.

It is a further object of the invention to provide a conveyer made up of a plurality of conveyer relays arranged in tandem and capable of transferring small articles directly from one relay to the next without the interposition of any auxiliary transferring means.

Other objects and advantages will hereinafter appear.

In the drawings forming a part of this specification:

Figure 1 is a side elevation, partly in section, of an article treating apparatus having the conveyer of the present invention embodied therein;

Figure 2 is a detail elevation showing features of the conveyer driving means;

Figure 3 is a fragmentary, transverse, vertical section through the conveyer;

Figure 4 is a detail view showing a fragment of the conveyer belt in plan;

Figure 5 is a longitudinal, sectional view of a portion of the conveyer belt;

Figure 6 is a side elevation of a portion of the conveyer belt;

Figure 7 is a diagrammatic, side elevation of a modified form of conveyer;

Figure 8 is a side elevation showing a further modification;

Figure 9 is a side elevation showing a still further modification; and

Figure 10 is a transverse, vertical section of an embodiment of the invention in which side guide rollers are mounted along the edges of the conveyer belt.

The conveyer of the present invention is shown for purposes of illustration as embodied in a treating apparatus of the kind disclosed in my pending application, Serial No. 148,295, filed November 13, 1926, for treating machinery, of which the present application is a continuation in part.

The conveyer is useful in other apparatus and for other purposes, however.

The illustrative apparatus includes a treating unit to be used, for example, for projecting hot washing solution on metallic articles or machinery parts, and comprises a tank portion 1 and a treating chamber 2 thereabove. The washing solution or other treating material is forced by a pump (not shown) to an upper projector head 3 and a lower projector head 4, whereby it is projected onto articles fed through the treating chamber upon a conveyer 5. The present invention relates to the conveyer 5, and the other parts of the apparatus will not, therefore, be described further, except in so far as may be necessary to adequately disclose the features and construction of the conveyer. Reference may be had to my pending application referred to above for a more complete understanding of the other parts of the apparatus.

The treating unit comprises side walls 6 and 7 having angle plates 8 supported exteriorly thereon. Angle bearing beams 9 are supported upon the angle plates 8, and are secured to the side walls 6 and 7 by means of bolts 10, nuts 11, and spacer sleeves 12. The bearing beams 9 serve as supports for a multiplicity of closely spaced driven rollers 13 of small diameter, which constitute a roller table and form a part of the conveyer 5. The rollers 13 desirably consist merely of cylindrical rods or tubes which are of uniform diameter from end to end. Near the left hand end of each roller 13, as viewed in Figure 3, provision is made of an inner ball race 14 fast on the roller, which in cooperation with bearing balls 15 and an outer race 16 carried by the bearing beam 9, forms a ball bearing for frictionlessly supporting the roller 13. At the left hand extremity of each roller 13, as viewed in Figure 3, provision is made of a sprocket 17 fast on the roller, which is adapted to be driven by a sprocket chain 18. The sprocket chain 18 is driven by a chain 18*a* and a sprocket 18*b* connected to any suitable source of power and is effective to drive

all of the rollers 13 through their respective sprockets 17.

The ball races 14 and 16 are so constructed that the rollers 13 are capable of some endwise movement, provision for such movement being made in order to avoid the necessity for precision in securing the inner races 14 and the sprockets 17 upon the rollers 13. The bolts 10 mounted on the side wall 6 carry at their outer ends a guide bar 19 which extends into the links of the sprocket chain 18 along the upper or active reach thereof to guide the chain in a straight path and to hold it down in proper engagement with the sprockets. The guide bar 19 is effective through the chain 18 to determine the longitudinal positions of the rollers 13 and the sprockets 17 carried thereby, and therefore serves to keep the sprockets in correct alignment. The guide bar 19 is fixed in the desired position upon the bolts 10 by placing it between the nuts 11 and suitable spacing collars or sleeves 20.

For the purpose of supporting and conveying small articles through the machine, provision is made of an endless flexible open network conveyer belt 21 arranged to run upon the rollers 13. The wire mesh conveyer belt is fully disclosed in Figures 4, 5 and 6. The utilization of a conveyer belt of the form shown constitutes an important feature of the invention.

The belt 21 is made up entirely of spiral wires which extend transversely of the belt. These wires are interlaced so that any one of the wires can be removed simply by straightening out one of its ends and withdrawing it while rotating it. The wire which is being withdrawn twists itself out of the contiguous wires immediately in front of and behind it by this screwing action. It will be seen that the conveyer belt can be adjusted as to length by withdrawing two of these wires, separated from one another a sufficient distance to eliminate the surplus length, and by then rethreading a single wire through to reunite the conveyer ends. Similarly, a damaged section of the conveyer can be repaired or replaced.

A conveyer constructed in this manner is flat, is very light, and is capable of conforming to the contour of a very small end roller so that where successive conveyers or conveyer relays are used, there is no trough or gap of any substantial depth between the ends of the adjacent conveyer sections or relays which would form an obstruction to the feeding of small articles automatically from one conveyer section to another.

As has been pointed out, the conveyer belt is simply placed loosely upon the rollers 13 and is frictionally driven by the rollers. This arrangement has the advantage that the driving force applied to the conveyer increases as the load upon the conveyer increases. It has the further advantage that when an obstruction occurs, the conveyer belt may slip relative to the rollers, and be held stationary by the obstruction, even though the rollers continue in operation. All danger of breakage of the conveyer or other parts of the apparatus, when such an obstruction occurs, is thus avoided.

The mounting of the belt loosely upon the roller table without any other tensioning than that provided by the weight of the idle stretch of the belt is a very desirable feature. A tensioned belt tends to creep toward one side or the other, and is subjected to very substantial wear by the guides for limiting such creeping. The loosely mounted belt, on the other hand, has little or no tendency to creep, and such tendency as exists can be overcome by suitable guiding means, such as the walls 6 and 7, without the occurrence of any substantial rubbing force.

The conveyer described is adaptable to a wide variety of uses because the wire mesh conveyer belt is fine enough to support small articles, while the closely spaced driven rollers are sufficiently strong to support articles of great weight, and this without permitting any substantial sagging of the belt.

The conveyer is of general utility, but is especially adapted for conducting articles while being treated. The points of engagement of the conveyer belt with the articles are substantially separated, and the articles are fed relatively to the rollers so that all parts of the surfaces of the articles are freely exposed for treatment.

Because of the lightness of the conveyer belt, because there is no sagging, and because the entire conveyer system is substantially frictionless, the present conveyer can be driven with only a fraction of the power required for driving the heavy flight bar conveyers heretofore used for like purposes, and the present conveyer is capable of being operated at a much higher speed than such flight bar conveyers.

As will be seen from an inspection of Figure 1, it is contemplated to employ a sequence of conveyer relays of the kind described, arranged end to end. The extreme flexibility of the conveyer belt enables rollers 13 of very small diameter to be used, because the belt is capable of conforming to the contour of such small diameter rollers. This characteristic, together with the flatness of the belt, enables successive conveyor relays to be arranged end to end in such relation that very small articles can be transferred automatically from one relay to the next without the necessity for employing any auxiliary transferring mechanism, there being no trough or gap of substantial extent between the adjacent ends of the conveyer relays.

The form of the invention shown in Figure 7 is generally similar to the form already described. In this form successive conveyers 23 and 24 are provided, in which the rollers 25

are small diameter rollers and are driven in the manner already described. In this form of the invention, however, the conveyer 24 includes at the introductory end thereof a large drum 26 on which the belt of the conveyer runs. With this large drum at the receiving end of the second conveyer and the small roller 25 at the delivery end of the first conveyer, the two conveyers can be brought almost into contact with one another so that even articles of very small size can safely be conducted from one conveyer section to the next without any danger that the articles will be permitted to drop through the space between the successive conveyers.

In Figure 8 a further embodiment of the invention is shown, in which the weight of the idle stretch of the conveyer belt 21 is supported by rollers 27 which are similar to the rollers 13. The provision of these supporting rollers for the idle stretch of the belt reduces the tension upon the belt and thereby avoids the objectionable consequences of having the belt under tension, which have already been pointed out.

Figure 9 shows a further embodiment of the invention, in which the idle stretch of the belt 21 is supported by one or more bars 28 to relieve the belt of tension.

In the embodiment of Figure 10 provision is made of horizontally disposed rotatable flanged guide rollers 30 which embrace the longitudinal margins of the conveyer belt 21. These guide rollers are mounted upon vertically extending bearing bolts 31 which are mounted upon horizontal webs of brackets 32 mounted on the side plates 6 and 7 of the apparatus. The rollers are effective to guide the conveyer belt 21 by engagement with the side edges thereof without rubbing contact.

While I have illustrated and described in detail certain preferred forms of my invention, it is to be understood that changes may be made therein and the invention embodied in other structures. I do not, therefore, desire to limit myself to the specific constructions illustrated, but intend to cover my invention broadly in whatever form its principle may be utilized.

I claim:

1. In a conveyer, in combination, a roller table consisting of a multiplicity of small closely spaced driven rollers, including end and intermediate rollers all of substantially the same diameter, and an untensioned flexible endless wire conveyer belt running directly upon the rollers and driven directly and solely thereby, said conveyer belt consisting only of transversely extending wires flexibly interlaced.

2. In a conveyer, in combination, a roller table consisting of a multiplicity of closely spaced driven rollers, the roller at the delivery end of the conveyer being of substantially no larger diameter than the intermediate rollers, and a flexible endless wire conveyer belt running directly upon the rollers and driven directly and solely thereby, said conveyer belt consisting only of transversely extending wires flexibly interlaced.

3. In a conveyer, in combination, a roller table, comprising a multiplicity of driven rollers all of which are of substantially the same diameter, and a longitudinally flexible endless conveyer belt directly supported and directly driven by frictional contact with said rollers, said conveyer belt consisting of flexibly interconnected elements which are relatively inflexible in the direction of the width of the belt.

In testimony whereof I have affixed my signature to this specification.

ERICH R. ZADEMACH.