May 28, 1935. C. K. PEVEAR 2,002,830

CONVEYER

Filed Sept. 11, 1930 2 Sheets-Sheet 1

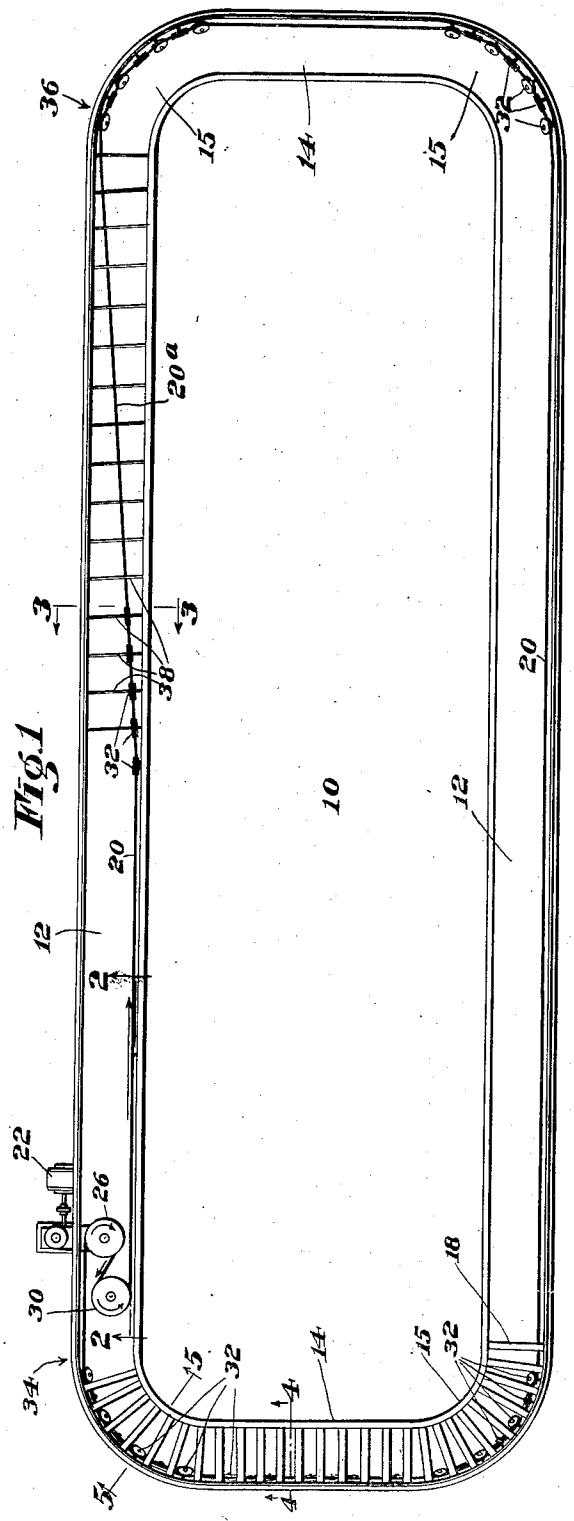


Fig. 1

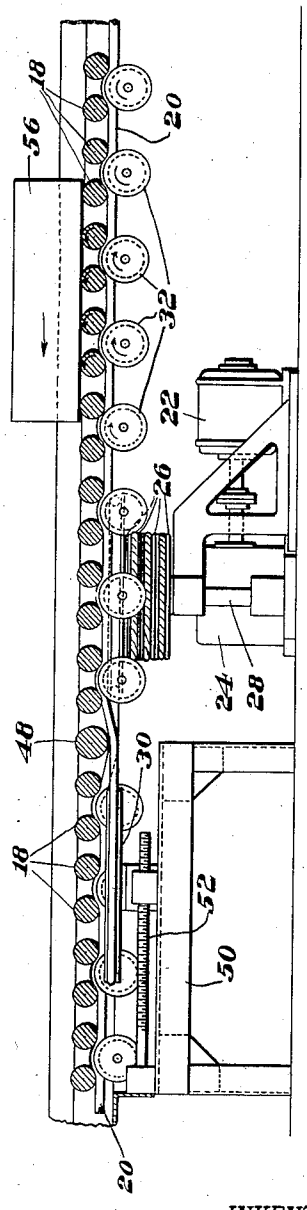


Fig. 2

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CONVEYER

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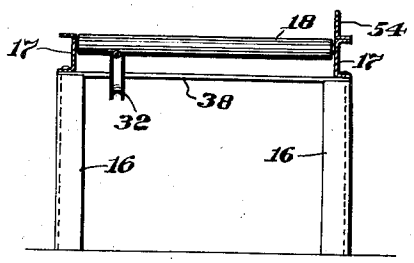


Fig. 3

Fig. 4

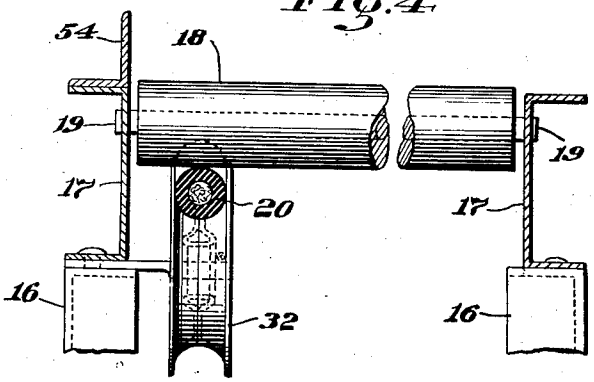
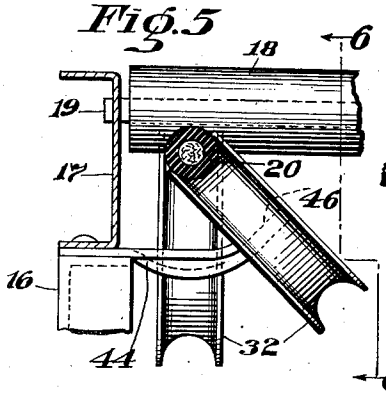


Fig. 5



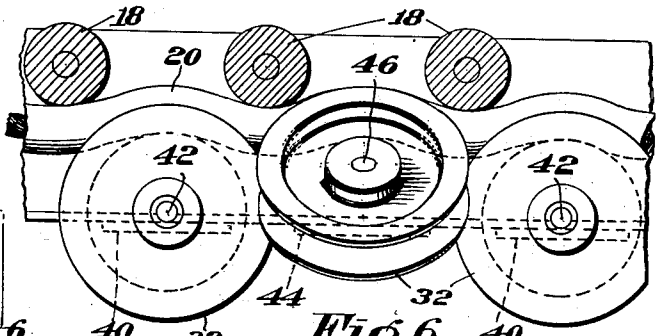


Fig. 6

Fig. 7



Fig. 8

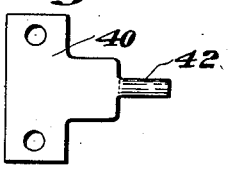
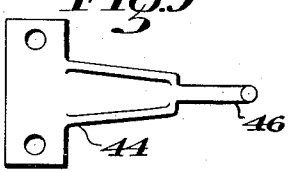


Fig. 9



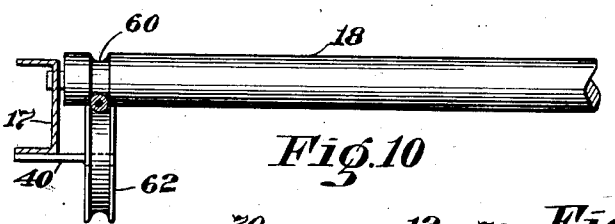


Fig. 10

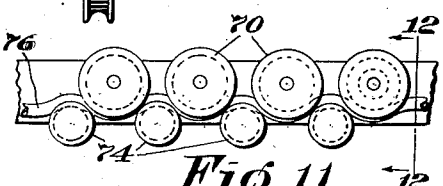


Fig. 11

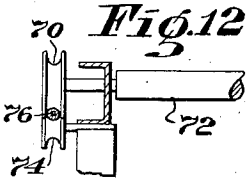


Fig. 12

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UNITED STATES PATENT OFFICE

2,002,830

CONVEYER

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Application September 11, 1930, Serial No. 481,149

9 Claims. (Cl. 198—127)

This invention relates to conveyers, and more especially to roller conveyers employing a series of rollers arranged in lateral or transverse alignment and driven in a common direction to advance a load placed thereon. Various forms of drives have been provided for roller conveyers and one of the most common includes a continuous flat belt frictionally engaging and driving the rollers from beneath. This construction has, however, been found to have various objections and limitations, partly on account of the fact that the flat belt, not being laterally flexible, does not readily permit lateral deviation of the conveyer from a straight path. It cannot, therefore, be used conveniently in other than straight conveyers. Other forms of drive heretofore available have been cumbersome and inefficient when used to drive rollers located in curved portions of conveyers which bend laterally out of straight alignment. Obviously, this is a serious limitation since various obstacles and installation requirements frequently prevent the use of a straight line conveyer and make a curved or partially curved conveyer necessary. One of the objects of my invention is to provide an improved roller conveyer wherein the roller-driving means functions to rotate the rollers in straight and curved portions of the conveyer with substantially equal efficiency.

The improved conveyer of my invention is of the belt-driven roller type and the belt used therein is of such character that it may be freely flexed laterally or vertically to follow a convoluted conveyer path and maintain its frictional driving contact with the rollers with equal efficiency in all parts of the conveyer. As will be hereinafter apparent, this belt may be round in cross section or of any cross sectional shape which will permit lateral flexing thereof to accomplish the desired functions of the invention. Another object of my invention is, therefore, the provision of an improved belt-driven roller conveyer wherein the driving belt is so laterally flexible as to readily follow any path the conveyer may take and efficiently drive the rollers thereof throughout the length of the conveyer.

My invention more particularly concerns a roller conveyer wherein the rollers are driven by a continuous round or substantially round belt held against rotary portions of the conveyer rollers by grooved sheaves supported on brackets secured to the conveyer. The belt is preferably so equally flexible in all directions and so supported by the sheaves that it may be led around corners in the conveyer path and engage and drive the rollers with equal efficiency throughout the entire path of the conveyer. The improved combination, including the belt and the several cooperating parts of the conveyer, not only operate more efficiently, regardless of the directional path of the conveyer, but all of such parts are cheaper to construct and operate than have been conveyers of this type heretofore known. The provision of such an improved construction and novel means for supporting the belt and maintaining proper tension thereon comprises further features of my invention.

My invention also contemplates a roller type conveyer built in the form of a continuous loop around an island or area and driven by a single continuous belt of the improved type herein defined. The conveyer can, furthermore, be built in the form of a spiral, embodying several loops all driven by a single continuous belt, thus making it possible to provide a conveyer of this type leading to and from adjacent floors in a minimum amount of distance and using a minimum amount of floor space. The provision of a new and improved conveyer adapted for these and other new and useful installations comprises a further object of my invention.

In the accompanying drawings I have illustrated one specific embodiment of my invention but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended hereto being relied upon for that purpose.

Referring to the figures of the drawings,

Fig. 1 is a diagrammatic plan view of a conveyer illustrating my invention;

Fig. 2 is an enlarged vertical section thereof taken on line 2—2 of Fig. 1;

Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a like view taken on line 4—4 of Fig. 1;

Fig. 5 is a like view taken on line 5—5 of Fig. 1;

Fig. 6 is a view taken on line 6—6 of Fig. 5;

Figs. 7, 8 and 9 are detail views showing the sheave-supporting brackets;

Fig. 10 is a fragmentary view illustrating a modification of the invention;

Fig. 11 is a side elevation showing a modification of the roller drive; and

Fig. 12 is a fragmentary sectional view taken on line 12—12 of Fig. 11.

In the drawings I have illustrated my improved conveyer as built around an island or area 10, the conveyer as thus installed comprising two relatively long straight portions 12, two relatively short straight end portions 14 and four curved corner portions 15 connecting the four straight portions. The conveyer frame comprises side elements 17 between and on which are mounted conveyer rollers 18 rotatably supported by pins or rods 19, the conveyer frame being supported on posts 16. The rollers are arranged in relatively spaced alignment laterally of each other, parallel at the straight portions and relatively diverging outwardly at the curved portions of the conveyer.

In accordance with my invention, improved means is provided for rotating the rollers in a common direction whereby to advance loads placed thereon, this improved means being in the form of a horizontally and vertically flexible belt adapted to operate with substantially equal efficiency at both straight and curved portions of the conveyer.

The belt 20 is continuous and in the conveyer installation illustrated it extends along the conveyer in one complete loop. One of the main advantages of my improved belt is that it can be flexed laterally of the conveyer, it thus being adapted to follow any path taken by the conveyer. The flat type of belt heretofore used in these conveyers will not permit of lateral flexing and I entirely eliminate this objection and limitation by employing a non-flat or generally round belt, it being understood that the belt should be constructed to flex in two relatively right angular directions, as distinguished from the flat belt, and for this purpose it may even be square or of any cross sectional shape between square and round. It is my intention herein that the term "substantially round" shall relate more to the function of permitting lateral flexure for the purpose stated than to the exact geometrical shape of the belt.

The belt is driven by a motor 22 connected through reduction gearing at 24 to a driving sheave 26 on a vertical shaft 28. A take-up sheave 30 adapted to cooperate with the sheave 26 is mounted in horizontal alignment therewith. As illustrated in Figs. 1–6, the belt frictionally engages the lower portions of the conveyer rollers 18 and I provide grooved sheaves 32 for supporting the belt and holding it thus engaged. The sheaves are rotatably supported on brackets secured to the conveyer frame and I preferably provide differently arranged brackets for the different sections of the conveyer. It will be noted that the belt passes from a point 34 at the outer edge of the conveyer about the driving sheave 26, about the cooperating take-up sheave 30, to the inner edge of the conveyer, and thence diagonally across the conveyer to the outer edge thereof at 36. From the point 36 the belt continues along the outer edge of the conveyer until it again encircles the driving sheave 26.

The different portions of the belt require certain variations in the supporting thereof by the sheaves 32 and in accordance with one feature of my invention I prefer to use a common form of sheave 32 and provide different forms of brackets therefor for this purpose. The cross-over portion 20*a* of the belt requires that the sheaves shall be located at progressively different points transversely of the conveyer. For this portion of the belt, I provide the rod bracket 38 shown in Fig. 7 and having two flat perforated end portions to be secured to the conveyer frame and an intermediate round portion for supporting the sheave. These rods or brackets are so mounted that they extend at right angles to the belt and, therefore, support the sheaves in alignment with the belt, the sheaves being free to adjust themselves along the rods in accordance with the position taken by the belt. The straight portions of the belt extending in a straight direction along an edge of the conveyer are supported by sheaves 32 carried on brackets 40. Each of these brackets comprises a flat perforated portion adapted to be secured to the top of a conveyer post 16 beneath the frame 17 and a round inwardly-extending sheave-supporting portion 42. At the curved portions of the conveyer, the belt must not only be vertically supported and held in contact with the rollers but must also be laterally supported around the curve. The bracket 44 for this purpose is similar to the bracket 40, the sheave-supporting shank portion, however, being longer and the round sheave-carrying end 46 thereof being bent to an angle of substantially 45°.

It will, therefore, be seen that the belt is supported throughout the length of the conveyer by a common form of sheave and this sheave may be merely two pressed metal elements secured together as shown in Fig. 4. Furthermore, the three forms of brackets for supporting the sheaves in the different positions along the conveyer are not only of simple and economical construction but are also of very similar construction. The sheaves mounted on brackets 38 and 40 serve the function of holding the belt in frictional contact with the rollers 18 and these sheaves are preferably so spaced that two rollers are located between each two adjacent sheaves, the belt thereby being held in frictional engagement with each roller. While the principal function of the sheaves mounted on brackets 44 is to engage the belt at its inner side and carry it around the curve, it will be seen (Figs. 5 and 6) that these sheaves also aid in holding the belt in frictional contact with the rollers. The sheaves on brackets 40 are mounted alternately with the sheaves on brackets 44 at the curved portions, the former serving the function above pointed out.

The horizontal sheaves 26 and 30 are necessarily located with their belt-carrying grooves slightly below the upper belt-carrying portion of the sheaves 32. For the purpose of bringing the belt into alignment with these sheaves, I provide one roller 48 of the conveyer of a larger diameter. This roller engages the two strands of the belt passing onto the sheave 26 and off from the sheave 30 and holds the same in alignment with these sheaves. For the purpose of adjusting the belt to proper tension, I may mount the horizontal sheave 30 for sliding adjustable movement on a support 50, a screw 52 being provided for adjusting and holding the sheaves. Side rails 54 may be provided on the conveyer frame wherever necessary.

It is believed that the construction, operation and advantages of my improved conveyer will be readily apparent. Movement of the belt in the direction indicated by the arrow will rotate the rollers in the direction indicated and carry the load 56 along thereon. The drive at the curved portions of the conveyer is the same as at the straight portions except for the oblique holding sheaves on the brackets 44. The belt may be of any desired construction which will serve the function of the invention and in its preferred form it comprises a hemp core covered with a relatively thick rubber exterior. The sheaves 32 may be mounted on plain bearings, as illustrated, or ball bearings may be provided therefor, if desired, it being clear that in accordance with my invention and the use of a substantially round belt each sheave requires but a single bearing. It may be desirable to mount the oblique sheaves 32 on ball bearings on the brackets 44 so as to permit these sheaves to float and thereby automatically take a position corresponding to the pull on the belt.

Among the advantages and economies accomplished by my invention may be mentioned the following. The cost of rope belt is but a relatively small fraction of the cost of the flat belt heretofore used for these conveyers and the useful life of the rope belt should be longer. The

sheaves and brackets are standardized and are comparatively simple and much cheaper than the snub rollers heretofore used with the flat belt-driven roller conveyer. Each sheave requires but a single bearing whereas each snub roller required two bearings. In the operation of the flat belt type of roller conveyer, nails and like foreign matter finding its way between the belt and conveyer rollers remained therein and caused considerable damage. This difficulty is eliminated in my conveyer since such material cannot remain on the belt. The driving and take-up connection to the belt are exceedingly simple and inexpensive. The lateral flexibility of the driving belt permits the conveyer to be built in substantially any shape or path desired and including a spiral arrangement extending to and between adjacent floors.

The construction of the belt will ordinarily be such that the surface thereof contacting with the conveyer rollers will flatten out on the rollers and thereby provide a surface contact rather than a line contact. Such contact, particularly as provided by the action of the sheaves **32**, will ordinarily be sufficient to drive the rollers and no difficulty will be experienced. In case, however, a greater driving surface of the belt on the rollers is required for extra heavy loads, the rollers, as shown in Fig. 10, may be grooved at **60** for this purpose. In this case, the belt rides in the groove **60** and thereby forms a considerable driving contact with the roller. Snub sheaves **62** like the sheaves **32** hold the belt engaged with the rollers.

Ordinarily, the rollers will be driven by direct engagement of the belt with the under sides thereof but it is conceivable that in some instances it may be desirable or necessary to engage the belt with some other peripheral rotary surface of the rollers. It is also conceivable that it may be desired to drive some portion of the conveyer faster or slower than other portions. This may be conveniently done by a driving arrangement such as is illustrated in Figs. 11 and 12. In this case, grooved sheaves **70** relatively larger than the rollers **72** are mounted on extended ends thereof and snub sheaves **74** are provided for engaging the belt **76** between the sheaves **70**. It will be clear that in this case the rollers **72** will be driven relatively slower than are the rollers **18**, which are directly engaged by the belt. Using sheaves **70** of smaller diameter than the rollers will obviously cause the rollers to be rotated at a relatively greater speed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A conveyer comprising a plurality of relatively spaced rollers arranged in alignment laterally of each other and including one or more portions bending laterally out of straight alignment, a belt driving the rollers by frictionally engaging the under sides thereof, and means acting in a direction oblique to the axis of the rollers for holding the belt in contact with the rollers at said bending portion of the conveyer, said belt being flexible in a direction laterally of the conveyer whereby to follow the bending portion thereof.

2. A conveyer comprising a plurality of relatively spaced rollers arranged in alignment laterally of each other and including one or more portions bending laterally out of straight alignment, a continuous belt driving said rollers by frictional contact, and sheaves including obliquely-supported sheaves for supporting the belt and holding it in frictional driving contact with rotary portions of the rollers at said bending portions of the conveyer.

3. A conveyer comprising a plurality of relatively spaced rollers arranged in alignment laterally of each other and including one or more straight portions and one or more portions bending laterally away therefrom, a continuous belt driving said rollers by frictional contact, and means including a plurality of vertically-arranged sheaves at said straight portions and a plurality of obliquely-arranged sheaves at said bending portions for carrying the belt and holding it in frictional roller-driving contact.

4. In a conveyer having a straight portion and a curved portion, a belt passing along said portions, means including vertically-arranged sheaves at said straight portion and obliquely-arranged sheaves at said curved portion for supporting the belt, and brackets secured to the conveyer and supporting the sheaves, the ends of the brackets at the curved portion being obliquely disposed and carrying the sheaves.

5. A conveyer comprising a plurality of relatively-spaced rollers arranged in curved alignment laterally of each other with the axes of the rollers closer together at their inner ends, a belt extending along the conveyer, and rotary means beneath the belt and holding it in frictional driving engagement with rotary portions of the rollers, the belt extending in a continuous line along the top portions of said rotary means.

6. A conveyer comprising a plurality of relatively-spaced rollers arranged in alignment laterally of each other, a belt frictionally engaging and driving the rollers, a portion of said belt passing diagonally across the conveyer beneath the rollers, a plurality of brackets secured to the conveyer beneath the rollers and having intermediate sheave-supporting portions extending at right angles to the said belt portion, and sheaves rotatably supported on said intermediate bracket portions and holding the diagonal portion of the belt in contact with the rollers.

7. A curve for a live roller conveyer comprising, in combination, a pair of carrying rollers mounted with their axes at an angle to each other, a belt for driving said rollers, and a cinching roller mounted between said carrying rollers to hold the belt in driving contact with the under side thereof, said cinching roller having that portion of its surface which is in contact with the belt positioned with its inner end higher than its outer end.

8. A curve for a live roller conveyer comprising, in combination, a plurality of carrying rollers mounted with their axes lying on radii of the curve, a belt in contact with the under side of said rollers for driving them, and a plurality of cinching rollers mounted alternately between said carrying rollers to hold the belt in driving contact therewith, said cinching rollers being canted to change the direction of the belt from one carrying roller to another.

9. A curve for a live roller conveyer comprising, in combination, a plurality of non-parallel carrying rollers, a belt in contact with the under side of said rollers for driving them, and a plurality of cinching rollers mounted alternately between said carrying rollers to hold the belt in driving contact therewith, said cinching rollers being canted to guide the belt from one carrying roller to another.

CHASE KEITH PEVEAR.