

Dec. 2, 1941.

J. S. PECKER

2,264,549

CONVEYER SYSTEM

Filed June 9, 1939

6 Sheets-Sheet 1

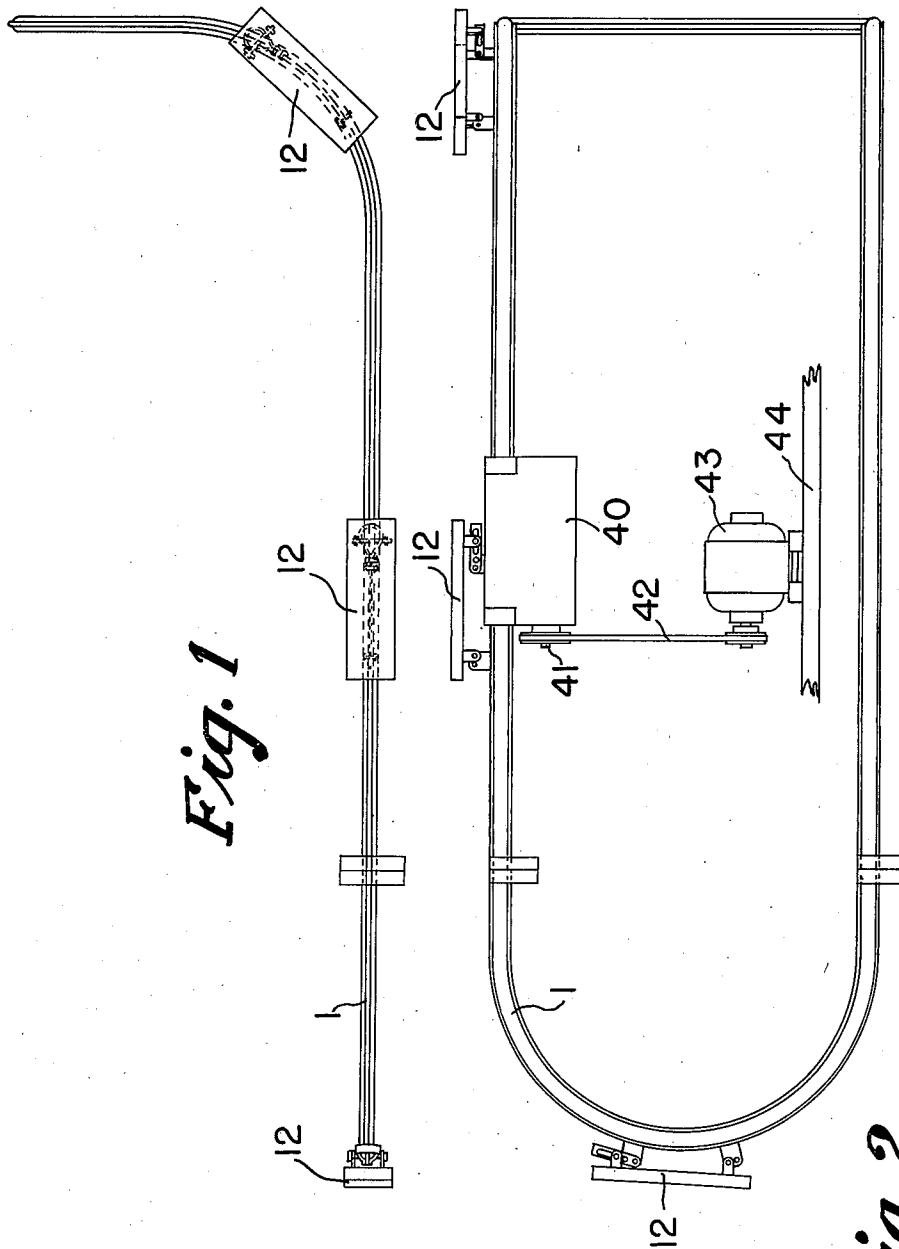


Fig. 1

Fig. 2

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6 Sheets-Sheet 2

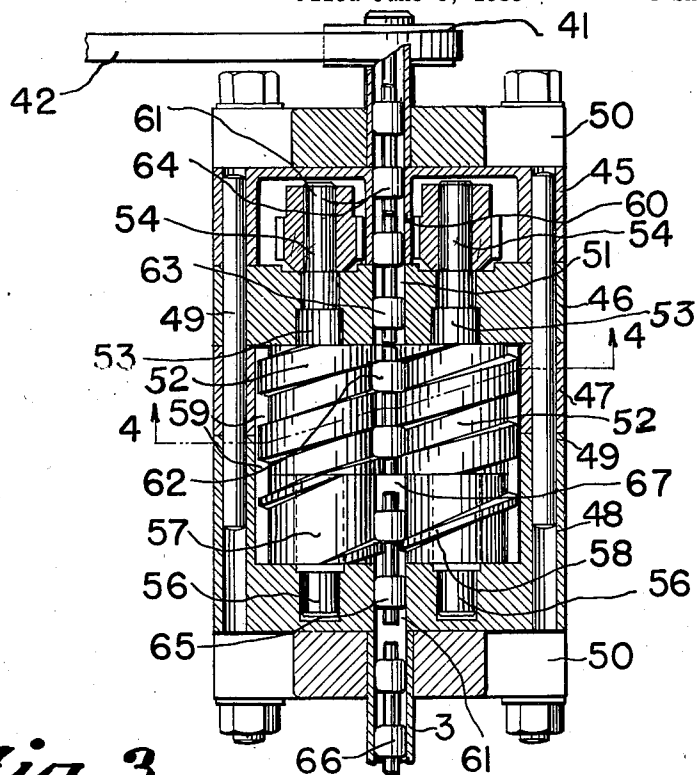


Fig. 3

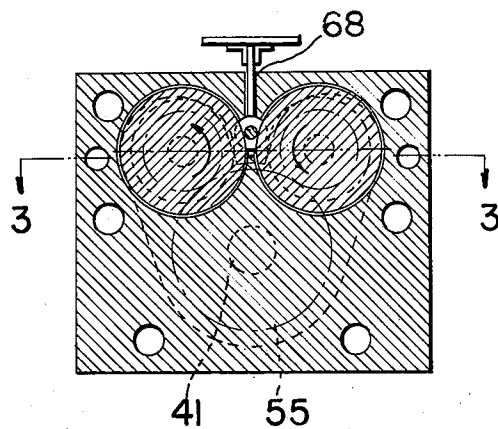


Fig. 4

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6 Sheets-Sheet 3

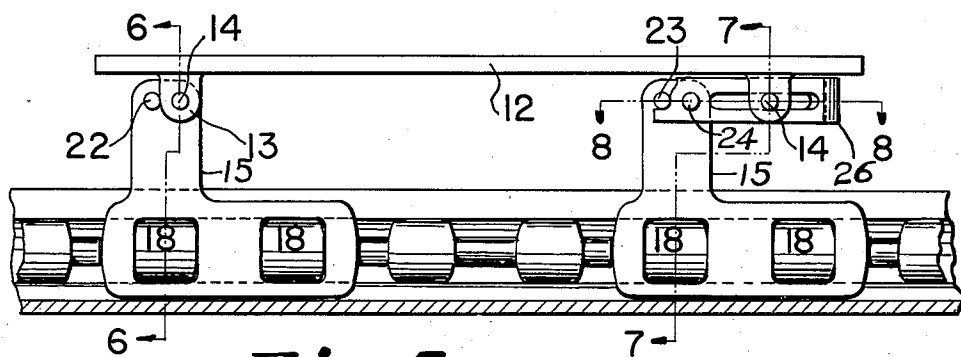


Fig. 5

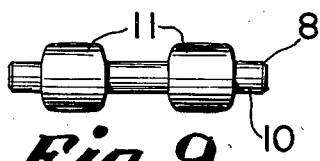


Fig. 9

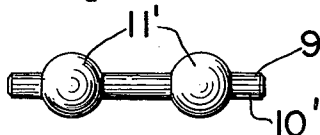


Fig. 10



Fig. 11

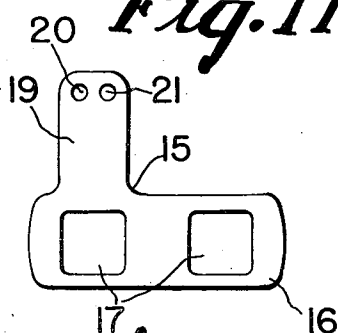


Fig. 12

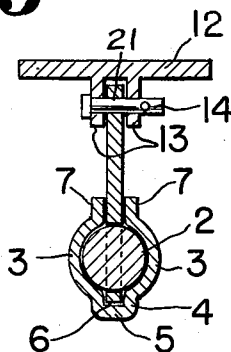


Fig. 6

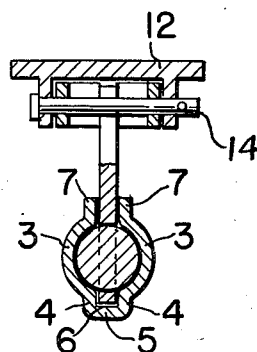


Fig. 7

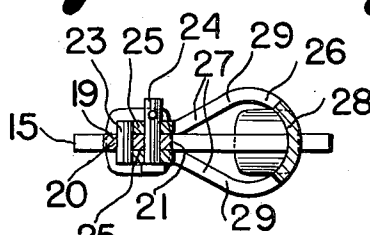


Fig. 8

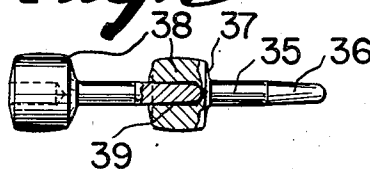


Fig. 13

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2,264,549

CONVEYER SYSTEM

Filed June 9, 1939

6 Sheets-Sheet 4

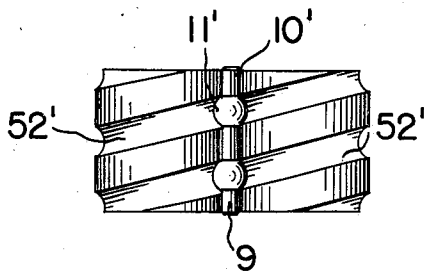


Fig. 15

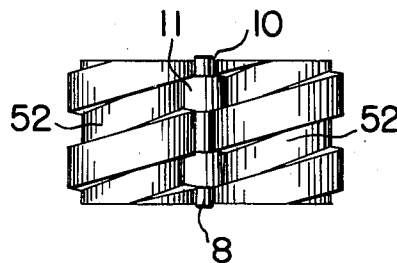


Fig. 14

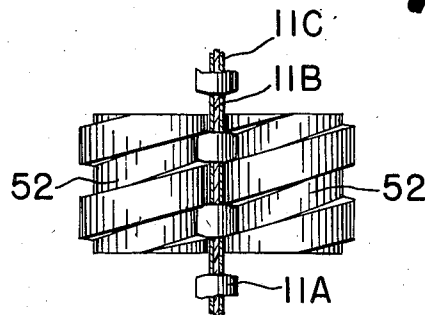


Fig. 16

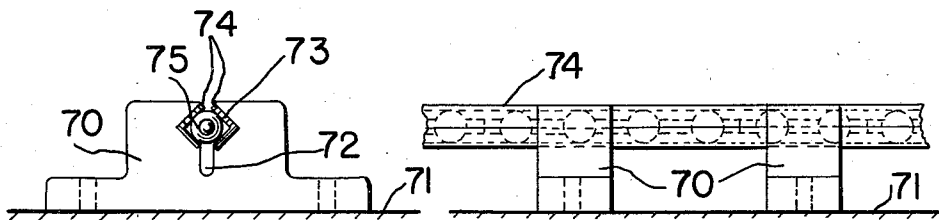


Fig. 17

Fig. 18

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6 Sheets-Sheet 6

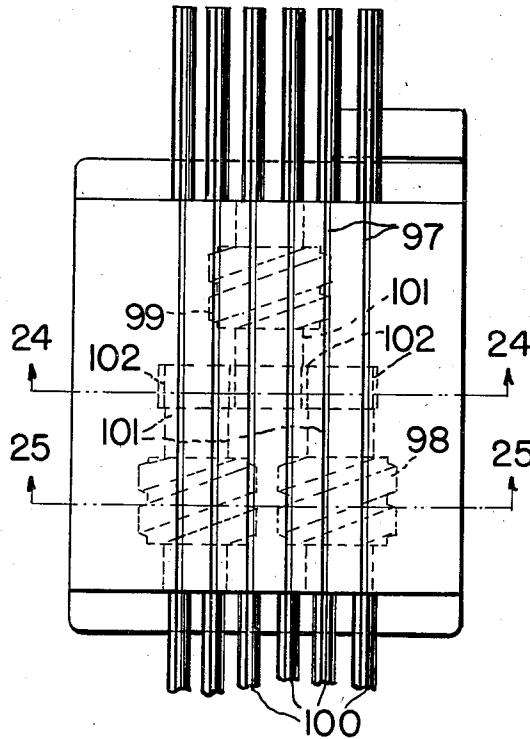
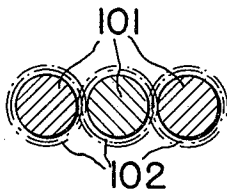


Fig. 23

Fig. 24

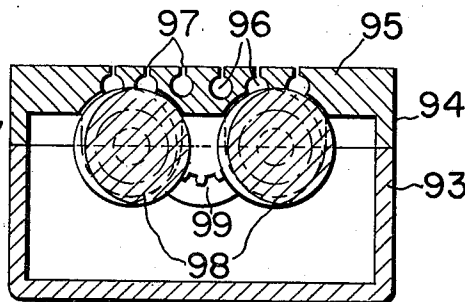


Fig. 25

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2,264,549

CONVEYER SYSTEM

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Application June 9, 1939, Serial No. 278,336

16 Claims. (Cl. 198—108)

The object of the invention in its broadest sense is to provide improvements in conveyer systems, and more particularly in a system by means of which one or more suitable carriers can be propelled through a given path, which may assume any course whatsoever, and may be either fixed or instead may be adapted for shifting into various configurations.

Heretofore, chains, belts of various sorts, webs and similar devices have been employed, but practically if not all of these have been limited to operation in a given plane, or are otherwise limited by reason of the fact that the carrier (when present) must maintain its initial fixed relation with respect to the propelling means, as long as they are operatively associated. It should also be understood that, even if round belts may have been adapted to light work, as for instance in cash carrying systems, this type of construction is unquestionably unsuited to the requirements of heavy duty work, such as the present invention has been designed to handle.

The present invention, which falls broadly in the link belt classification, overcomes the drawbacks of previous link constructions, in which the adjacent links are fixedly connected pivotally together, by making each a separate and distinctly independent unit, whether such links butt up against one another with merely a readily separable contact, or instead telescope to a certain degree into one another, but in all cases are respectively free to rotate angularly about their common axis without any restraint whatever. Furthermore, links that are fixedly connected together in a continuous chain can have their courses changed only by directing them over pulleys of various sorts, whereas the present structure comprises in reality a chain or series of separable links connected only to the extent of mere physical contact, which therefore must be restrained against more than a certain predetermined degree of lateral or transverse motion by means of a confining tubular guide, or track provided with a longitudinally extending slot through which access to said links may be constantly maintained. Such a tube may obviously assume any desired shape, position, curvature, or direction, while the slot instead of being actually rectilinear with respect to the tube's axis, may progress angularly about such axis wherever such a change in course is found desirable, as for instance to dump or eject the contents of a carrier being propelled by the chain of links.

A further object is to provide in such a sys-

tem a novel form of link unit, which essentially comprises an axially extending shank and one or more radial enlargements, one form of said unit being characterized by the fact that at least one of its radial enlargements is spaced from its adjacent end or ends, and another form comprising an axial shank provided with one or more such enlargements, one of which is at one end of the shank and centrally recessed to receive the opposite end of the shank of the next adjacent unit.

Another object is to provide an improved type of driving means for such chain of links, in the form of a specially designed worm, which while remaining in a fixed position receives lateral enlargements of the consecutive links between its adjacent spiral threads or ridges, as it revolves upon its axis and thereby causes the links to successively forge ahead, due to said links being held to a fixed longitudinal path, so that each link proceeds to press forwardly those in front of it, said worm being also so shaped as to reach out in effect and bring within its range of normal operation the next succeeding link of the chain, in order to overcome any gap that may exist between such succeeding link and the next link forwardly thereof, and already positioned in the grip of the worm. Such a gap, it should be noted, may be definitely permitted in order to permit elongation of the chain without buckling and resulting binding under relatively high temperatures.

A still further and more specific object is to provide for such a link system a propelling mechanism, comprising preferably a plurality of worms which rotate in unison, and in the grooves of which the one or more enlargements of each link extend, while the longitudinal path of said links is restrained and determined by a tubular element, forming a track having a channel through which said links are accessible for propulsion purposes. At this point it should be also understood, that each reference to links and chain is intended to refer to independent detached links in a system, which as an entirety comprises a chain in the broad sense of that term.

With the objects thus briefly stated, the invention comprises further details of construction and operation, which are hereinafter fully brought out in the following description, when read in conjunction with the accompanying drawings, in which Fig. 1 is a plan view of a conveyer system, comprising one embodiment of the invention; Fig. 2 is an elevational view of

the same; Fig. 3 is an enlarged detail sectional view of the propelling unit comprising a part of the improved conveyer system shown partly in section and taken on the line 3—3 of Fig. 4; Fig. 4 is a vertical section of the said propelling unit on the line 4—4 of Fig. 3; Fig. 5 is a still further enlarged fragmentary detail view showing the co-relation of a carrier with the conveyer chain of links and the tubular guide for said chain; Fig. 6 is a section on the line 6—6 of Fig. 5; Fig. 7 is a section on the line 7—7 of Fig. 5; Fig. 8 is a transverse section on the line 8—8 of Fig. 5; Figs. 9 and 10 are plan views of two forms of individual links; Fig. 11 is a plan view of a cylindrical bead-like unit corresponding with one of the laterally enlarged portions of the links shown in Figs. 8 and 9; Fig. 12 is a plan view of one of the members by which a carrier is connected operatively to the improved chain; Fig. 13 shows a pair of adjacent inter-engaging links of modified design, as compared with those shown in 9 and 10; Figs. 14 and 15 are plan views of the propelling worms by means of which the links shown in Figs. 9 and 10 respectively are propelled by the unit shown in Figs. 3 and 4; Fig. 16 is a plan view of the propelling worms shown in Fig. 14, but operatively engaging a modified form of flexible conveyer medium; Fig. 17 is an end elevation of a conveyer channel and its support, but of a modified form over that hereinbefore illustrated; Fig. 18 is a side elevation of this modifying form of channel, a propelling chain of units positioned therein, and a pair of spaced supports for said channel; Fig. 19 is a longitudinal section on the lines 19—19 of Figs. 21 and 22; Fig. 20 is a transverse section on the line 20—20 of Fig. 19; Figs. 21 and 22 are sections on the line 21, 22—21, 22 of Fig. 19, the first showing a single and the second showing double or twin chains being propelled by a single worm, gear, or equivalent rotary element; Fig. 23 is a plan view of a propelling unit with as many as six chain guiding tubes, the chains of which are propelled by three worms or equivalent elements shown in dotted lines; Fig. 24 is a fragmentary section on the line 24—24 of Fig. 23, showing one method of so interrelating the said driving elements that the chains are propelled in opposite directions at the same speed, though by altering the size or pitch of the worm threads and by changing their direction, said chains may be driven at different speeds and either all in the same direction or by various combinations of different directions; and Fig. 25 is a transverse section on the line 25—25 of Fig. 23, with the worms meshing as indicated in both of Figs. 23 and 24.

Referring to Figs. 1 and 2, a tube 1 of special construction is here shown as being shaped so as to conform to various curves and connecting tangents extending in a plurality of angularly related planes. This tube, shown also in Figs. 5, 6, and 7, comprises in transverse section a central cylindrical portion formed between oppositely positioned, internally concentric arcuate sides 3, the bottom portions of which merge into short parallel sections 4, which are connected together by a transversely extending bottom section 5 to provide within said tube a centrally positioned depending groove 6. The opposite edge portions of the arcuate sections 3 merge into upwardly directed parallel guide sections 7, the space between which is in vertical diametrical alignment with the groove 6.

Adapted to move longitudinally through the central arcuate portion of said tube are a series of independent links 8 and 9, such for instance, as those shown in Figs. 9 and 10 respectively. Each of these links comprises an axially positioned longitudinally extending shank 10, provided at spaced regions with lateral bead-like enlargements 11 which in each instance are preferably spaced from the respective opposite ends and also from each other, the space of each bead-like enlargement from the adjacent end of said shank being preferably about one-half of the space between the enlargements upon each of said shanks. By this construction, when a plurality of said links either of the same or different form are operatively positioned end to end, the spaces between adjacent enlargements upon neighboring links will be equal to the space between the enlargement upon each link. At this point it should be noted that the two forms of links shown in Figs. 9 and 10 are merely representative of probably innumerable forms which might be used in the present conveyer system, as the invention is by no means limited to the exact shape, size or arrangement of the various details which cooperate to form each of said links.

In Figs. 5, 6, and 7 a carrier of any desired type or construction is represented by the platform 12, which is provided upon its under surface with two or more depending integral pairs of lugs 13, provided with aligned bores, through which extend pins 14. A pair of connecting members 15, such as is shown in Fig. 12, are provided to operatively connect said platform 12 to the chain of links within said tubular guide. Each of these members comprises a longitudinally extending body portion 16, provided with spaced apertures 17 of such shape as to receive bead-like members 18, such as the one shown in Fig. 11, but which may be substantially spherical in shape, in order to more nearly approximate the shape of the spherical enlargements 11 of the links shown in Fig. 10, as compared with the more cylindrical type of enlargement 11, shown upon the link of Fig. 9. Each of the members 15 also comprise a normally upwardly extending projection 19 which at its free end is provided with spaced apertures 20 and 21.

One of these connecting members 15 is positioned, as shown in Figs. 5 and 6, between the depending lugs 13 carried by the platform 12, with the pin 14 extending through the aperture 21, and a second pin 22 secured within the aperture 20 laterally disposed in front of the spaced depending lugs 13. The other member of the pair of connecting members 15, provided for each of said platforms, is in turn provided with a pin 23 extending through its aperture 20 and with a second pin 24 extending through its aperture 21, said second pin also extending through the aligned apertures in the laterally opposite sides 25 of a transversely enlarged U-shaped slidable connecting member 26, such as that shown in Fig. 8. The apertured portions 25 of said member are spaced apart only sufficiently to receive between them the upper portion 19 of one of the connecting members 15, while the opposite portion of said member 26 comprises diverging sides 27 connected together by a curved opposite end portion 28, said sides 27 being provided with aligned slots 29 through which extends an elongated pin 30, the opposite end of which also extends through the depending spaced

lugs 13, as shown in Figs. 5, 7 and 8, this structure being for a purpose hereinafter described.

Referring to Fig. 13, there is here shown a modified form of link or in fact a pair of such modified links in their normal cooperative relationship. Each of these modified links comprises a central, preferably cylindrical shank portion 35, terminating at one end in a conical end portion 36, while its other end is provided with a substantially cylindrical radial enlargement 37, the circumferential surface 38 of which is preferably slightly convex longitudinally, while that side of said enlargement opposite to said shank is provided axially with an inwardly extending bore 39 of suitable size and shape to receive the adjacent conical end portion of the link adjacent thereto, and within which the end 36 of the next adjacent link can readily gyrate.

Referring now to Figs. 5, 6, 7, 8 and 12, it will be seen that a series of links of a type such as that shown in Fig. 9 or 10, or of other desired shape, is assembled within the tube 3 with the end of one link abutting against the links next adjacent thereto with this exception, that where the connecting members 15 extend into said tube and interrupt the continuity of the otherwise regular arrangement of the links 8 or 9, as the case may be, these said connecting members are of such length that they exactly fill longitudinal spaces within said tube equal to that of said links. In addition, two of the bead-like members 18 are inserted in the apertures 17 in each of said connecting members 15, so as to thereby comprise means to lock said connecting members operatively with respect to said tube, so that said members and the platform (or other extraneous object or objects) connected thereto will be prevented from becoming disengaged from said tube, except only at such location as the slot opening to said tube may be enlarged for the purpose of attaching and detaching said connecting members and the said restraining bead-like members 18. Thus, throughout all of the remaining extent of said tube, said connecting members and platform must necessarily follow the path set by said tube, irrespective of whatever shape it may take, or the planes or spirals through which it may progress, as suggested by Figs. 1 and 2.

For propelling the chain of individual links, there is provided a special mechanism, as hereinbefore referred to, the same being represented diagrammatically at 40 in Fig. 2, where extending from said propelling mechanism as a unit there is a shaft 41, driven by any suitable power transmitting means, such for instance, as the belt 42, which is also connected to the electric motor 43 mounted upon any available support 44.

Referring to Figs. 3, 4, 14, 15 and 16, the said propelling mechanism is shown in detail. For convenience said mechanism comprises an external casing formed of a series of longitudinally disposed intermediate sections 45, 46, 47 and 48, secured together and in operative alignment by any suitable arrangement of dowel pins 49 and bound together between end sections 50. Section 46 is provided with a centrally positioned bore 51, through which said chain of links is adapted to pass after leaving the worms 52, which receive the radial enlargements of the respective links within their grooves, whereby upon being rotated said worms effect a propulsion of said links longitudinally. These worms are mounted upon a shaft, or are provided in one direction with trunnions or shafts 53, which are journaled within and extend through bearings provided

in the section 46, while beyond said section said shafts are provided with gears 54, which constantly mesh with and are driven by a larger gear 55, carried by the driving shaft 41, hereinbefore referred to; said gears 54 and 55 being housed within the hollow section 45 at one end of said casing.

Extending in the opposite direction, said worms are provided with additional trunnions or shafts 56, to which are secured specially designed advance worm sections 57 having spiral ridges 58, while beyond said advance worm sections said last-mentioned shafts are journaled within bearings provided by and within the casing section 48. The sections 47 and 48 are provided with aligned chambers 59, which cooperate to form a housing for the pairs of main and advance worms 52 and 57, as clearly shown in Fig. 3. The end sections 50 are so constructed as to receive the adjacent end portions of the tube 3, while the sections 45 and 48 are also provided with channels 60 and 61, respectively, in alignment with the channel 51 in the section 46, so as to thereby provide with the intervening pairs of worms 52 and 57 a continuous channel, through which the chain links are propelled, as also shown in Fig. 3. In this figure it will additionally be made clear how a link in the propelling position 62, between and in contact with the worms 52, is pushed ahead against the next adjacent links 63, 64, and so on throughout the series comprising the chain, until the propelling force reaches that link 65 which is immediately to the rear of the propelled link 62, and in front of a further link 66.

However, in order to provide for expansion and contraction, the total length of said chain of links is purposely less than the total length of the link channel, composed of the tube 3 and the several parts of the propelling mechanism, so that a gap occurs at 67 between the link 62 and 65. Ordinarily the link 65 would then not be in correct position to properly enter the space between the propelling worms 52, wherefore the specially shaped advance worm sections 57 are provided, the operation of these worm sections being such that their threads or ridges 58, being of greater pitch than the threads or ridges of said propelling worms, reach into the space to the rear of the forwardly positioned enlargement of the link 65, and operate to snatch this link, as it were, away from the link 66 and thus bring it up into a position closely adjacent to and in contact with the next forward link 62, so that as this forward link 62 passes partially from said propelling worms, the next succeeding link 65 will be gripped by said worms and in turn take its position in the forward portion of the chain and operate to propel the link 62, after it has passed through the successive positions of the links 63, 64, et cetera, from the position occupied by the link 66 in Fig. 3.

However, it is to be understood and will be clearly obvious, that the auxiliary worms 57—58 are only necessary when the chain adjacent thereto is being propelled in upwardly, horizontally, or only slightly downwardly directions, for the reason that when the chain approaches the propelling means in a distinctly downward direction, gravity will cause the forward links to automatically drop into the proper position to be engaged by the ridges or threads of the main propelling worm or worms 52, in which case installations of said propelling means should preferably eliminate the said auxiliary worm or

worms entirely. At this point it is well to note also that said propelling unit may comprise either one, two, three or even more rotary worms, gears or similar propelling means, in cooperation either with the same or a different number of chains, guides and associated elements, wherefore those appended claims which are not specifically limited to a given number or type of propelling means, are to be construed as covering any or all members and types suitable for the purpose at hand.

Referring to Fig. 4, it will be seen that the several sections of the propelling mechanism are provided with aligned slots 68, into which extend the lower portions of the platform connecting members 15, so that as the bead-like members 18, carried by said connecting members 15, pass through said propelling mechanism, said beads are likewise engaged by the pairs of worms 57 and 52 in succession, so as to force said beads and said connecting members through said propelling mechanism, exactly as hereinbefore described with respect to the beads of the regular form of chain. Also, having in mind what has been stated with respect to the opening of the chain at the point 67 to permit expansion and contraction, this obviously results in a need for the members 15 of each carrier being relatively variable as to the distance between them. This, then, explains the reason for providing the connecting member 26 with the elongated slots 29, so that the right hand (as viewed in Fig. 5) or following member 15 can lag behind, as the forward of said members 15 is rather suddenly propelled forwardly by the advance worm sections 57, when the beads of said advance member are caught by said last-mentioned worms. However, when the position of said advance connecting member 15 and its beads have progressed into the position of the link 63, the beads of the rearward connecting member are caught by the said advance worms 57 and propelled at greater speed forwardly, until finally the beads of said advance and following members are again in normally operative relation, in the relative positions indicated by the respective beads 64 and 62.

Whereas the worms 52, shown in Figs. 3, 14 and 16, represent that shape of worm which is adapted to propel links of the form shown in Fig. 9, the pair of worms 52' shown in Fig. 15 are designed to propel links of the shape shown in Fig. 10. Likewise, various other shapes of worms may be provided in order to accommodate correspondingly different shapes of links.

Referring to the modification shown in Fig. 16, a series of individual beads 11a are here shown as being connected together by means of a slender cable 11b, which is threaded through them in addition to cylindrical spacers 11c, which alternate with said beads and maintain said beads in proper predetermined spaced relation. This composite type of "chain" can then be propelled by any suitable form of one or more rotary members, as suggested by the pair of cooperating worms 52.

Referring to Figs. 17 and 18, a modified form of conveyer channel is shown as a substitute for the tube 3, hereinbefore described. In this case spaced brackets 70 are supported at spaced intervals upon a suitable base 71, and are each provided in their upper surfaces with U-shaped recesses 72, the upper portions of the opposite sides of which are oppositely V or U shaped, as at 73, to provide for correspondingly shaped pairs

of grooved members 74, together providing a continuous channel through which the chain of links 75 is adapted to be propelled, as hereinbefore described. However, it will be obvious that this modification in the form of channel presents no variation in the principles involved, but instead indicates merely that the invention is not limited to the exact arrangement hereinbefore described.

Referring to Figs. 19, 20, 21 and 22 of the drawings, there is here shown a propelling unit which essentially comprises a sectional hollow base 80, having a closure 81 for its otherwise open upper portion, said closure cooperating with the said base to provide bearings 82 for a shaft 83, said bearings being spaced apart at a point conveniently located between the opposite ends to rotatably receive a worm 84, comprising alternately positioned spiral ridges 85 and intervening grooves 86. The uppermost wall of the closure portion 81 is relatively thickened and provided with a longitudinally extending slot 87, which leads into a cylindrical channel 88, through which a series of chain-forming links 89 is adapted to pass, said links being of any suitable shape, size and material, such for instances as those represented by Figs. 9 and 10.

The radial enlargements of the respective links, as indicated in Fig. 19, enter the spiral grooves 86 of said worm, while the intervening ridges 85 of said worm enter the spaces between the consecutive radial enlargements of said links, whereby rotation of said worm effects a propulsion of the chain of which said links are formed. It will also be noted that the tubular channel 88 through this modified form of propelling unit communicates in opposite directions with the adjacent end portions of a tube 90, which is otherwise understood as being continuous and of a form represented in Figs. 1 and 2. In the form of the device represented by Fig. 22, the longitudinal construction is similar to that shown in Fig. 19, but unlike the form represented more specifically by Figs. 20 and 21, the form shown in Fig. 22 shows two independent channels 91 in which as many chains of links 92 are propelled longitudinally by engagement with the single worm 84, thus representing any such structure in which a plurality of link chains are propelled by the same worm gear or equivalent rotary propelling element.

Referring now to Figs. 23, 24, and 25, the propelling unit here shown comprises a lower base section 93 and an upper closure section 94, providing a relatively thickened top wall 95, through which extend longitudinally three pairs of tubular channels 96, each of which is provided with an outwardly opening slot 97, through which access is permitted at all times to the chains of links positioned within and movable longitudinally of the respective slots under propulsion of the several worm gears 98 or 99. In this construction there are also shown a pair of link chain channels in communication with each of said worms, similar to the construction shown in Fig. 22, but it is to be understood that this showing is purely illustrative and that one, two, three, or even more such channels may be in communication with each of the respective worms.

Also, by reason of the fact that it is usually desirable to confine the chain-guiding channels and their respective tubes 100 to a minimum transverse space, at least at the locality of the propelling unit, the second or central worm 99

is here shown as being longitudinally spaced from the plane of the said first and third worms 98, while the shafts 101 (Fig. 24), upon which said worms are mounted, are inter-connected through inter-meshing gears 102. With this construction and with the ridges and grooves of the worms 98 and 99 all representing right-hand spirals, it will be noted that link chains propelled by both of the first and third worms 98 will be downwardly, while those chains propelled by the intervening or second worm 99, will be upwardly when viewed in the position illustrated by Fig. 23. However, all of the chains may be driven downwardly or upwardly by constructing the spiral of the central worm 99 in an opposite or left-hand direction to that of the first and third worms 98. On the other hand, by changing the direction of the spirals upon one of the worms 98, without changing it upon the other, the chains driven by them will be propelled respectively in opposite directions, instead of in the same direction, while the chain or chains propelled by the central worm 99 may be made to coincide in direction of movement with that of either one of the two first-mentioned worms.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent of the United States is:

1. In a power transmitting system, a link comprising a relatively slender axially extending shank, provided with a plurality of spaced circumferentially extending radial enlargements, the length of the shank between said enlargements being equal to the aggregate of the lengths of shank at the opposite ends of said link beyond said enlargements.

2. A power transmitting system, comprising the combination of a tube having a slot in one side, a chain of independent links operative to push one another within said tube, rotary worm means engageable with consecutive links in sequence to propel said chain by pushing the remaining links, a carrier, and means extending through said slot to operatively connect said carrier to said links.

3. A power transmitting system, comprising the combination of a tube having a slot in one side, a chain of independent links within said tube having radial enlargements wider than said slot, a carrier, a plate-like connecting member having an aperture and extending through said slot into said tube and substantially filling the space of one of said links, a bead-like member within said aperture to prevent said member from accidentally escaping from said slot, and means to propel said links and thereby said carrier along said tube as a guide, and a loose connection between one of said links and said carrier, to permit said members and carrier to negotiate curves in said tube.

4. A power transmitting system, comprising the combination of a tube having a slot in one side, a chain of independent links within said tube having radial enlargements wider than said slot, a carrier, a pair of plate-like connecting members having apertures, and extending through said slot into said tube and substantially filling the space of two of said links, a bead-like member within each of said apertures to prevent said members from accidentally escaping from said slot, and means to propel said links and thereby said carrier along said tube as a guide, and a loose connection between one of said links and said carrier, to permit said mem-

bers and carrier to negotiate curves in said tube.

5. A power transmitting system, comprising the combination of a tube adapted to extend in multiple planes and having a longitudinally extending opening, a chain of separable links movable longitudinally within said tube, a member also within said tube of greater width than said opening, a carrier upon the outer side of said tube, and a connecting member attached to said carrier and extending into said tube into alignment with said chain, so as to span said member longitudinally and form in effect one of the links of said chain, and by engagement with said first member being prevented from separation from said tube.

6. A power transmitting system, comprising the combination of a tube adapted to extend in multiple planes and having a longitudinally extending opening, a chain movable longitudinally within said tube, a bead-like member also within said tube of greater width than said opening, a carrier upon the outer side of said tube, and a pair of connecting members attached to said carrier, the attachment of one such member being by means of a longitudinally and laterally yielding connection, said connecting members extending into said tube and engaging said bead-like members, to insure said carrier moving with said chain and substantially parallel with the axis of said tube.

7. A power transmitting system, comprising the combination of a tube, with a series of independent links in said tube having less aggregate length than the axis of said tube, rotary means to propel said series through said tube, and a second rotary means in advance of said first rotary means to bring the most advanced link into the field of operation of said first rotary means.

8. A power transmitting system, comprising the combination of a tube, with a series of independent links in said tube having less aggregate length than the axis of said tube, a worm to propel said series through said tube, and a second worm in advance of and having a thread of greater pitch than that of said first worm to engage and bring the most advanced link into the plane of operation of said propelling means.

9. A power transmitting system, comprising the combination of a tube, with a series of independent links in said tube having less aggregate length than the axis of said tube, propelling means for said links comprising a plurality of worms rotatable in synchronism, and a worm having a thread or ridge of increased pitch compared with that of said propelling worms, operative to engage the most advanced link and bring it into the plane of operation of said propelling worms.

10. A power transmitting system, comprising the combination of a series of independent links, means to guide and restrain said links to a given path, a carrier, and connecting members securing said carrier to spaced links in said chain, one of said members being attached to said carrier through a longitudinally yielding connection.

11. A power transmitting system, comprising the combination of a series of independent links, means to guide and restrain said links to a given path, a carrier, and connecting members securing said carrier to spaced links in said chain, one of said members being attached to said carrier through a longitudinally and laterally yielding connection.

12. A power transmitting system, comprising the combination of a series of independent links, means to guide and restrain said links to a given

path, a carrier, and connecting members securing said carrier to spaced links in said chain, one of said members being attached to said carrier through a longitudinally and angularly yielding connection.

13. A power transmitting system, comprising the combination of a series of independent links, means to guide and restrain said links to a given path, a carrier, and connecting members securing said carrier to spaced links in said chain, one of said members being attached to said carrier through a connection which permits the adjacent portion of said carrier to shift longitudinally with respect to said member, laterally with respect to said guide at curves in a transverse plane, and angularly with respect to said guide at curves in a vertical plane.

14. A power transmitting system, comprising a plurality of series of independent links combining to form a corresponding plurality of flexible chains, channels to restrain said chains of links

in predetermined paths, and rotary worm means common to all of said chains and operative to propel them simultaneously.

15. A power transmitting system, comprising a plurality of series of independent links combining to form a corresponding plurality of flexible chains, channels to restrain said chains of links in predetermined paths, and a plurality of rotary worm means, one such means being common to a plurality of said chains, and all of said means being rotatable in unison.

16. A power transmitting system, comprising a plurality of series of independent links combining to form a corresponding plurality of flexible chains, channels to restrain said chains of links in predetermined paths, and a plurality of rotary worm means, one of such means being common to a plurality of said chains, and said means being inter-connected so as to drive certain of said chains in different directions.

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