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[54] **PORTABLE BELT CONVEYOR WITH RADIUS
 MOVEMENT AND HYDRAULIC TELESCOPING
 AND RAISING**
20 Claims, 16 Drawing Figs.

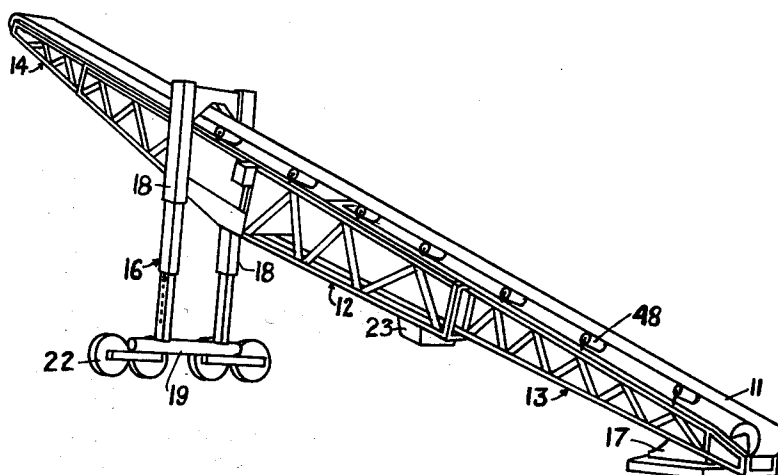
[52] U.S. Cl. **198/233,**
198/139
 [51] Int. Cl. **B65g 15/26,**
B65g 41/00
 [50] Field of Search **198/3, 4,**
89, 96, 101, 113, 117, 139

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Primary Examiner—Richard E. Aegerter
Assistant Examiner—Alfred N. Goodman
Attorney—Darbo, Robertson & Vandenburg

ABSTRACT: A very long belt conveyor is reduced to road transportable length by hydraulically telescoping both of its ends, drawing them under a section of roller way which is cammed up by them and lowered for the lowest possible center of gravity, and for lower clearance. The main frame is supported near a midposition by two-legged hydraulic standard. A "fifth wheel" on the lower end of the main frame can be lowered by hydraulically collapsing the standard, for resting on a tractor truck. Each leg is in three telescoping parts enclosing a hydraulic cylinder and piston combination also in three parts, the two legs being kept in step as they expand and contract by an endless chain for each coupled by a torque tube. At the foot of each leg a pair of tandem wheels is carried by an equalizer beam which in turn rocks in a yoke which may swing between a road travel position and a radius swing position, the yoke being carried by an extendable section hydraulically actuated for providing wide separation of the support points during operation and contracting to a legal spacing for road travel. To accommodate the geometric changes resulting from raising or lowering the conveyor while the wheels are in the radius swinging position. A swing-axis pedestal for the low end of the conveyor has a guide slot that shifts the lift axis correctly according to the changing slope of the conveyor. Both telescopic sections of the conveyor are moved simultaneously by a cable system which is actuated by a cylinder with a single piston projecting from both ends to pay out cable at one end while drawing it in at the other, one direction of movement tensioning the cable for retracting the telescopic sections and the other direction of movement tensioning the cable, or a different cable, for expanding the conveyor. Various safety features and other details are disclosed.



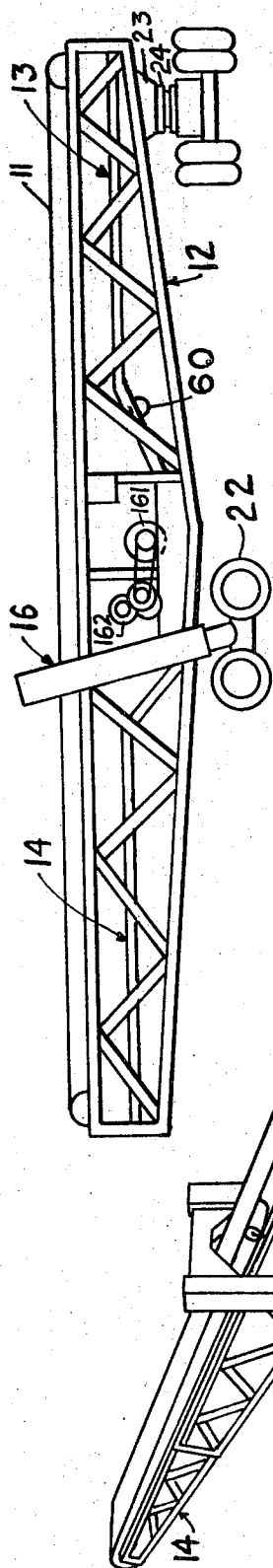


FIG. 1

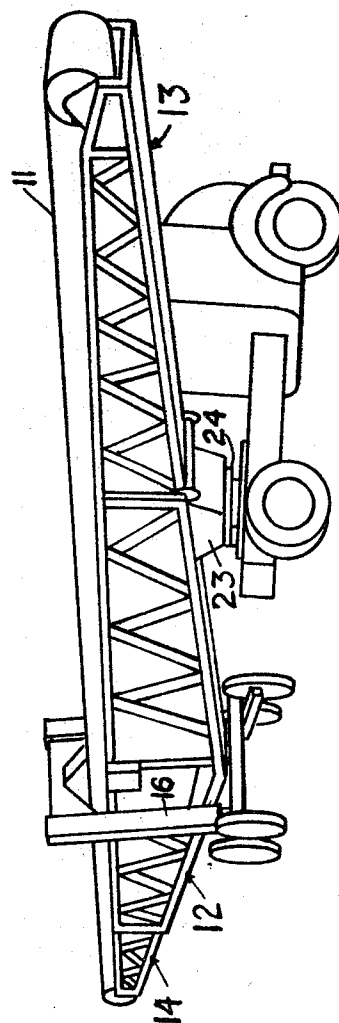


FIG. 2

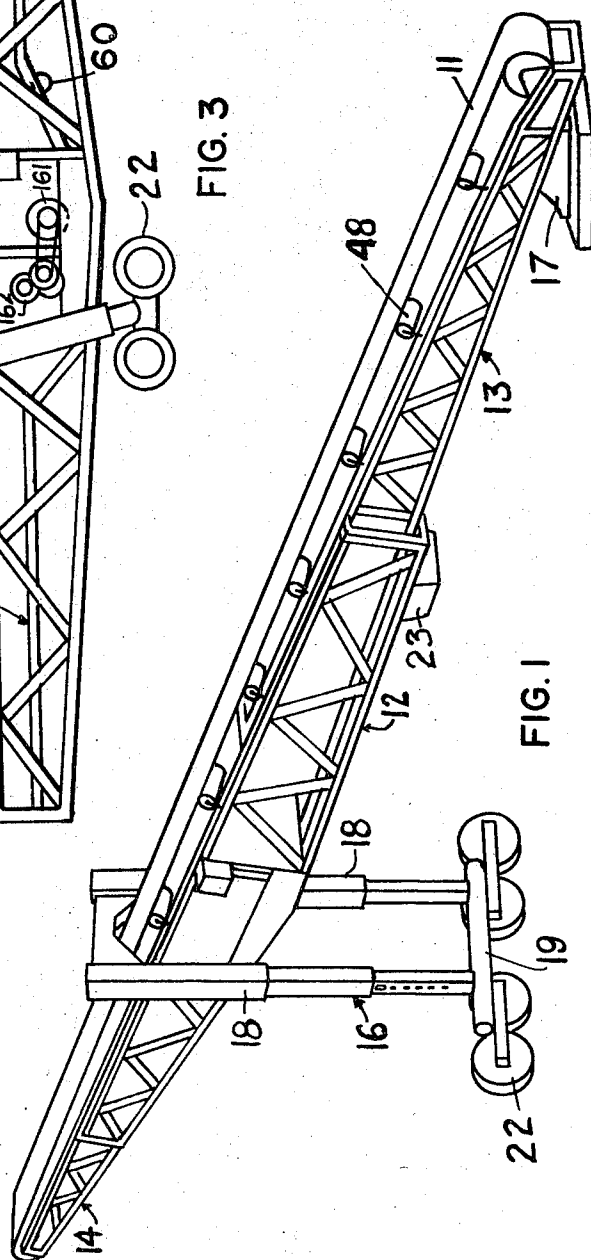


FIG. 3

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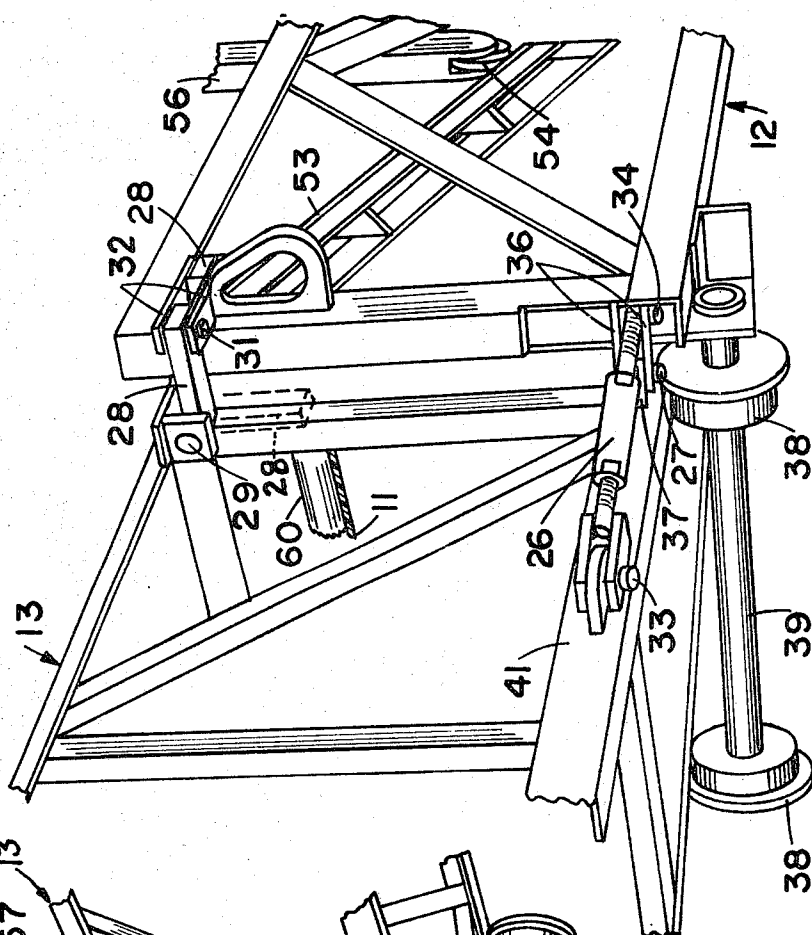


FIG. 4

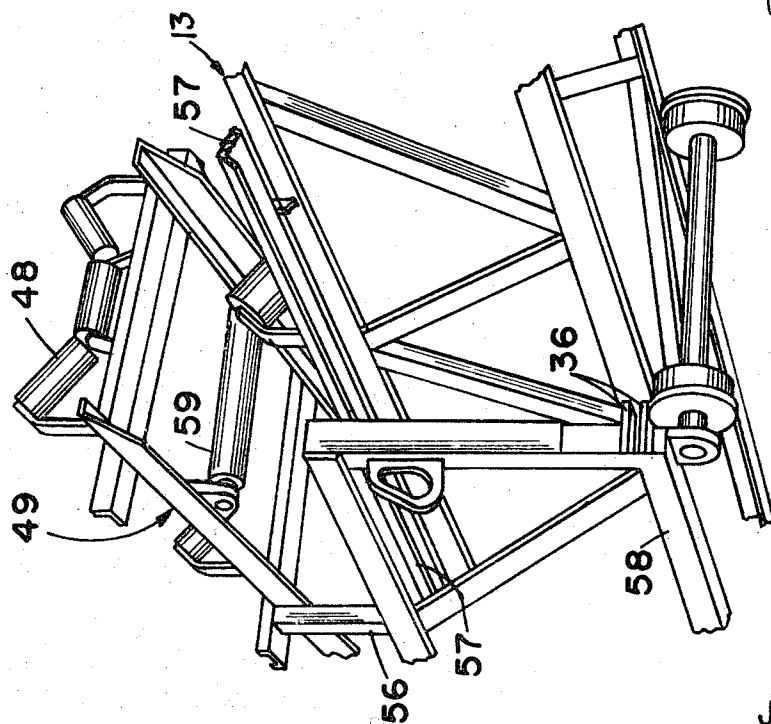


FIG. 5

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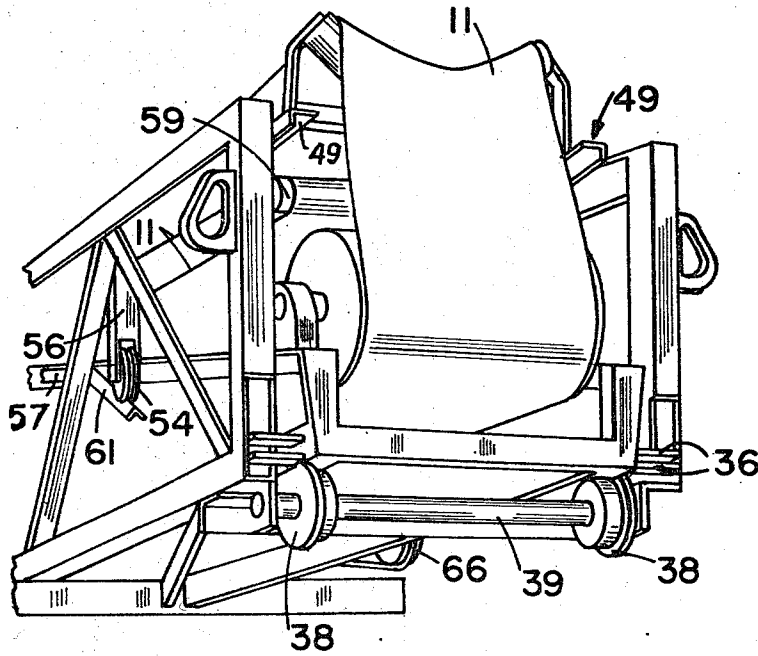


FIG. 6

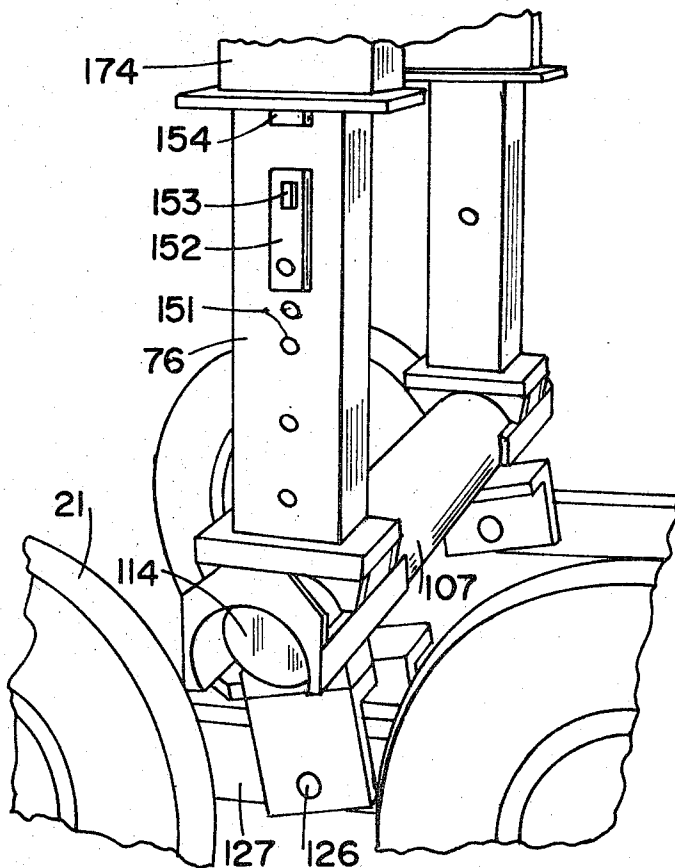


FIG. 8

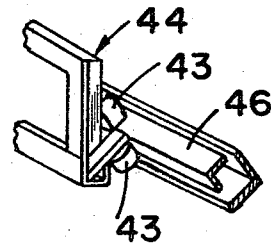


FIG. 7

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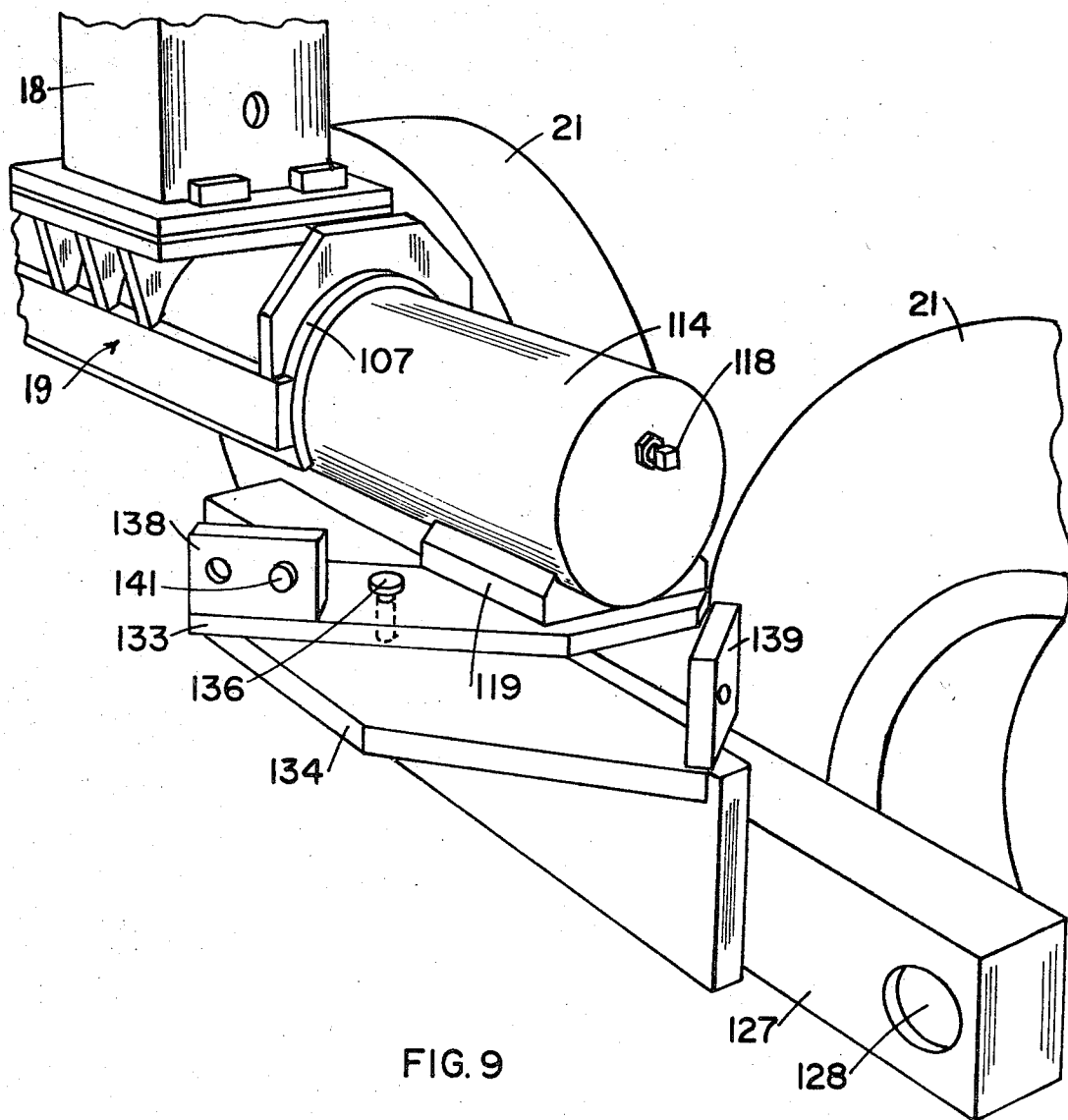


FIG. 9

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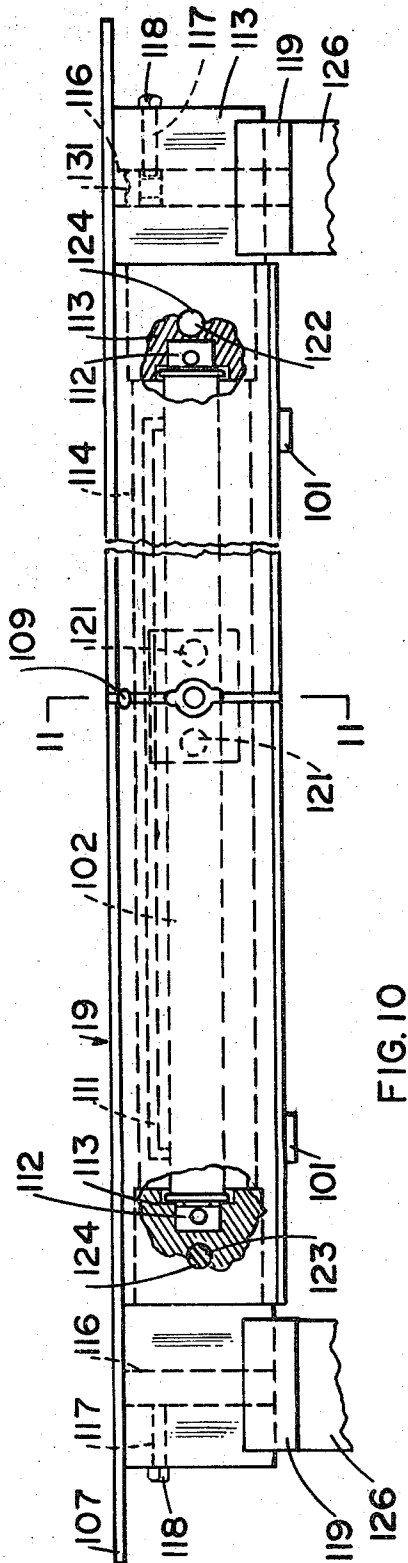


FIG. 10

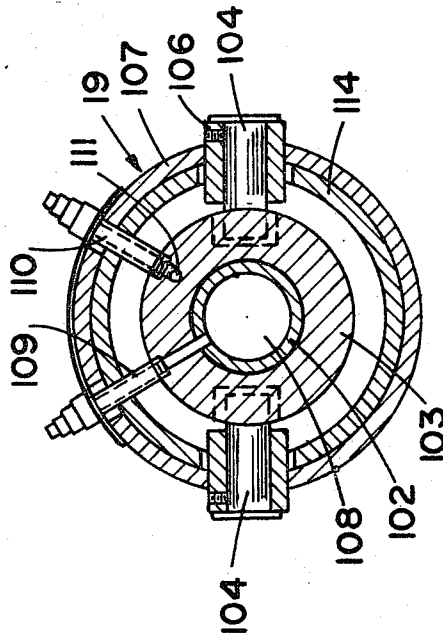
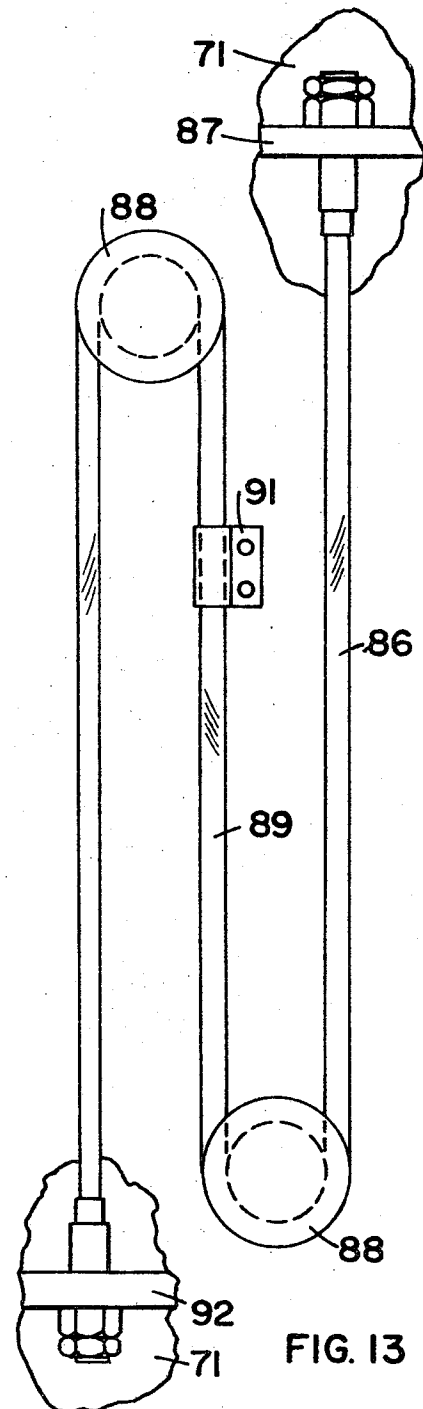
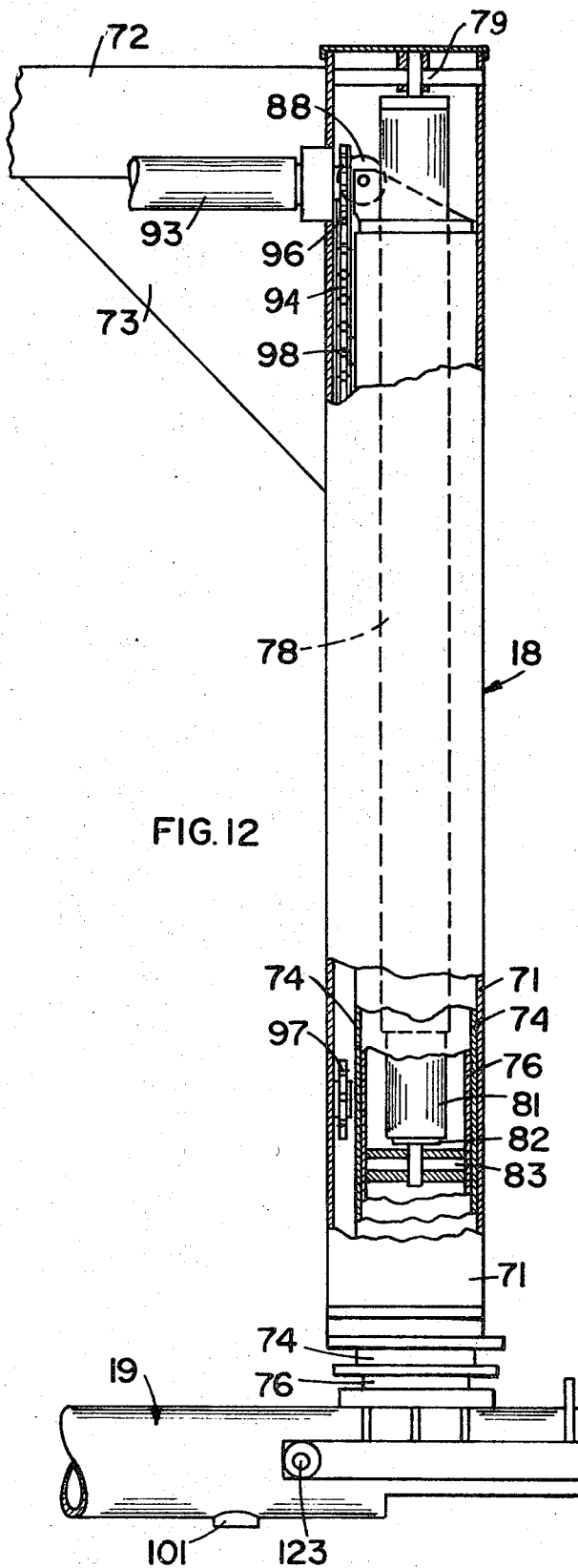


FIG. 11

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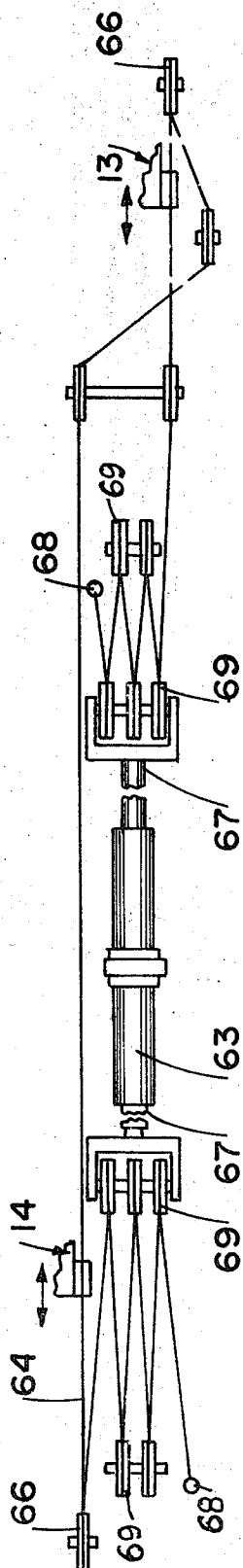


FIG. 14

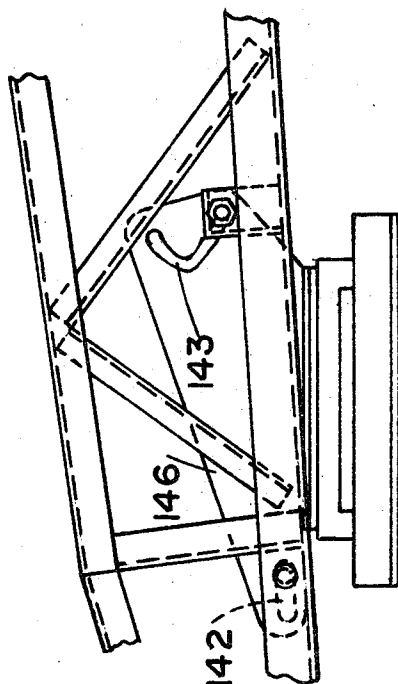


FIG. 15

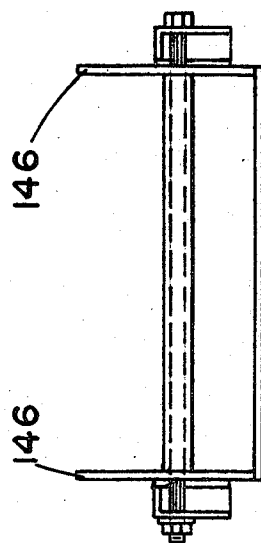


FIG. 16

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PORTABLE BELT CONVEYOR WITH RADIUS MOVEMENT AND HYDRAULIC TELESCOPING AND RAISING

INTRODUCTION

Although telescopic portable conveyors are not new, the larger sizes of portable conveyors have been contracted by a foldover operation, apparently because of unsolved difficulties in applying the telescopic principle to the huge conveyors. The foldover type has at least three serious disadvantages. Because the foldover parts lie on top of the main part the center of gravity and clearance are both high. A crane or like power equipment must be at hand to accomplish the foldover of the very heavy parts of such large conveyors. A great deal of looseness appears in the belt and this can be very troublesome unless skillfully handled. Such huge conveyors also have presented a severe problem of sufficiently distributing the load for legal travel on public roads while adequately supporting the load in various conditions. Of course, the concept of travel by public road requires collapsing the conveyor to acceptable maximum dimensions.

SUMMARY OF THE INVENTION

The foldover faults are avoided by telescoping both ends centrally into the main frame, the belt being drawn around a roller which maintains it in orderly condition. Adequate distribution of weight is achieved by using tandem wheels on each side, distributing the weight between them on each side by an equalizer beam. Suitable width is achieved by hydraulically drawing in the wheels, the wheels being repositioned from their positions for radial movement to positions for roadability, and alignment for the latter being provided.

The invention includes important features too numerous to treat further individually in a summary.

The objects and advantages of the invention will be further apparent from the following description and from the drawings.

FIG. 1 illustrates the conveyor in its working condition resting on a swivel pedestal at one end, having its wheels turn for radius movement, and both the conveyor and the standard being fully extended.

FIG. 2 illustrates the conveyor when its towing pedestal has been set on the fifth wheel of a tractor truck by collapsing the standard, and the standard further collapsed to make the conveyor substantially level, the wheels having already been turned to the road position and retracted laterally.

FIG. 3 illustrates the greatly shortened conveyor when its two end sections have been telescopically retracted.

FIG. 4 is a more detailed view showing the junction zone between an extended end section of the conveyor and the main body and showing also the V-shaped cam track and follower wheel for raising a hinged subframe carrying a section of the rollway of the main body to allow the end section to pass under it.

FIG. 5 is a view from the opposite side showing the end section partially drawn in.

FIG. 6 is a similar view with the end section fully retracted and the hinged rollway subframe lowered.

FIG. 7 is a fragmentary view showing one corner of an end section with its V-mounted guide rollers riding on a V-shaped guide track.

FIG. 8 is a view of the lower portion of the standard, mainly from the side.

FIG. 9 is a view of one end of the base of the standard, extended, and with the wheels in radius movement position.

FIG. 10 is a longitudinal view partly in section of the base of the standard.

FIG. 11 is a cross-sectional view taken approximately at the nearly midplane 11-11 of FIG. 10.

FIG. 12 is a longitudinal view of one of the legs of the standard partly broken away to successive sections, showing connected parts.

FIG. 13 is a view of the hoist cable system for pacing the movement of the three parts of one leg.

FIG. 14 is a largely schematic view of the cable system for extending and retracting the telescopic end sections.

FIGS. 15 and 16 are side and vertical sectional views of the geometric accommodation features of the swivel pedestal.

GENERAL DESCRIPTION

Although the following disclosure offered for public dissemination is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose.

Referring to FIG. 1, the main purpose of the conveyor is to support and drive an endless conveyor belt 11. This is supported by a framework including a main body or midsection 12 and telescopic end sections 13 and 14. End section 14 is the discharge end which may be raised and lowered and swung circumferentially by hydraulic standard 16. The end 13 is the feed end and rests swivelly on a pedestal 17, which in turn rests on any suitable support prepared at the location.

The standard 16 includes hydraulic telescopic legs 18 of which upper and lower sections are respectively fastened to head 72 and base 19. At each end of base 19 a pair of wheels 21 is carried, hydraulically extendable and retractable as will be described.

GENERAL OPERATION

While working, the conveyor is in the condition shown in FIG. 1 except that it may be lowered to various heights by the hydraulic standard 16. It also may be swung about the pedestal 17. A common use for such conveyors is in stock piling. The material to be stock piled is loaded onto the belt 11 at the feed point at the bottom, a hopper often being provided, is carried along and up by driven belt 11 and discharged at the top. Initially the standard 16 will be largely collapsed, but as the piles grows higher and higher, the standard 16 will be raised. Also the conveyor will be swung from time to time about the pedestal 17 running on wheels 21 which are suitably disposed for this purpose, to swing the discharge point about an arc for providing a long arcuate pile or several separate piles.

When it is desired to move to another site, a tractor truck will be brought in and backed under the conveyor, aligning its fifth wheel under the mating structure 23 on the underside of the conveyor. The standard 16 will then be lowered to set the mating structure 23 down on the fifth wheel 24 and further lowered to bring the conveyor to approximately the horizontal position shown in FIG. 2. At any convenient time, the wheels will be swung into parallelism as seen in FIG. 2 for road travel. After releasing suitable securing means, a hydraulic cylinder seen in FIG. 14 and carried by the main body 12 will be operated to retract the end sections 13 and 14, the conveyor finally reaching the condition shown in FIG. 3, ready to travel to the next site.

CONVEYOR-TELESCOPING FEATURES

Before retraction of the end sections securing means at the four corners are released. At each of the four corners a turnbuckle 26 (FIG. 4) will be operated to relieve the load on a pin 27, and this pin will be removed. The turnbuckle will be operated, probably in the opposite direction, until the end section settles to be supported independently of the remaining securing means, so that they can be released. The U-latch 28 will now be swung down about its pivot bolt 29, after removing bolts 31 and plates 32. Pin 33 will be removed (and probably pin 34 also so that the turnbuckle can be stored).

When extending the end sections the operation is substantially reversed. The U-latch 28 is turned up and secured, then the turnbuckle is applied and adjusted to align the three openings for pin 27, two openings in plates 36 projecting from main frame 12 (seen better in FIG. 6) and one opening in plate 37 extending from the end section and which moves between plates 36.

With the securing means disconnected, the end section 13 or 14 is free to run on the rollers 38 which turn on fixed shaft 39. The bottom surface of bottom stringer 41 runs on the roller, and the stringer is at all times over the roller so that the running surfaces are debris free.

While end section 14 is extended, most of its weight is outwardly of the rollers 38, so that the resulting cantilever forces must be withstood. The means for withstanding these cantilever forces and later for supporting the weight of the inner end of the telescoping end section is seen best in FIG. 7. A pair of "V-disposed" rollers 43 is carried by the rear end 44 of the telescoping end section, and these rollers engage the upper and under faces of an angle bar track 46. Because the top face of the angle bar track 46 slopes at an angle of 45°, it is debris free, and of course the lower face is also.

As seen in FIGS. 1 and 2 the belt 11 is carried by a series of roller sets 48. The roller sets carried by end sections 13 and 14 are, of course, in alignment with the roller sets of the main section 12. This presents a problem for retraction, should the roller sets strike one another and prevent the retraction. As seen best in FIG. 5, this problem is solved by raising a hinged portion of the roller way comprising, in the illustrated form, the last four roller sets 48 at the end of main section 12. These roller sets are carried by a hinged subframe 49.

The means for swinging the subframe 49 upwardly is perhaps best seen in FIG. 4. It comprises a sloping track or cam track 53 extending downwardly and rearwardly from the top inner end of the end section on which a cam roller 54 rides. Cam roller 54 is carried by a leg 56 extending downwardly from subframe 49. Cam track 53 is an angle bar so that its upper faces will slope laterally at 45° to be debris free, and the cam roller 54 is correspondingly a V-roller, grooved at the apex of the V so that it rides on the flat surfaces of cam track 53. Cam track 53 may be either part of or secured beside a structural member forming part of the inward extension from the "business portion" of the end section. This extension serves to separate the V-disposed rollers 43 from the rollers 38, even with the end section fully extended far enough for supporting the cantilever weight of the end section.

In FIG. 5 the subframe 49 is in its uppermost position, its cam follower roller 54 having just passed the top of cam track 53. It now rests on a similar upwardly pointed V-shaped trackway 57. Although this trackway 57 is substantially horizontal, it is gradually lowered during the retracting operation due to the fact that the end section follows the downward slope of bottom stringer 58. The angle bar track 46 is parallel to this bottom stringer, as is track or stringer 41. The length of leg 56 is such that as the end section approaches its innermost position the parts carried by subframe 49 have only slight clearance above the roller sets 48 carried by the end section. The lowermost part carried by subframe 49 is return roller 59. The end section preferably carries a deflector roller 60 near return roller 59, which passes under it as retraction begins and which lies above the belt so as to draw it under roller 59. During operation of the conveyor this is one of the widely spaced rollers which supports the return run of the belt 11. During retraction of the end section, this return run is doubled back around roller 59 by movement of the end section.

During the very final portion of the retraction of the end section it is desirable to lower the subframe 49 abruptly after the last roll set 48 has passed under it as seen best in FIG. 6, this is accomplished by steeply sloping V-track section 61 on which the cam roller 54 finally rides.

Some other minor preparation preparatory to retracting the end sections would be apparent to users. For example, if stationary portion of pedestal 17 is removed, since there is not room for it to pass into the main section, this merely requires unscrewing the king pin bolt.

HYDRAULIC SYSTEM FOR TELESCOPING CONVEYOR

Both conveyor end sections are preferably moved simultaneously by a single hydraulic cylinder 63, seen in FIG. 14.

This simultaneous movement has an advantage of only requiring one cylinder and also an advantage of maintaining nearly the same balance of the conveyor on its central standard. This is a safety feature against the possibility that if the truck-supported end should be retracted separately first before being secured to the fifth wheel, the center of gravity might shift with the result of rocking the entire structure and having the far end drop down and crush someone.

Except for the block and tackle arrangement for multiplying the length of movement so that a moderately short cylinder 63 can be used, the cable system of FIG. 14 is essentially an endless or full-loop cable system. The cable 64 loops around two widely spaced sheaves 66, one of which is seen in FIG. 6. These sheaves 66 are separated by nearly the full length of main section 12. The cylinder 63 has a piston, the rod 67 of which projects through each end of the cylinder so that it may draw the looped cable 64 in one direction while it is paying it out in the other direction. One of the end sections will be secured to the run of cable between cylinder 63 and a sheave 66, while the other end section will be secured to the long run of cable between the two sheaves 66. Thus when the cable loop is moved in one direction by the cylinder 63, it will move end sections inwardly for retraction; and when the cable loop is drawn in the opposite direction, it will move both end sections outwardly. If a 6 to 1 movement ratio is chosen, as illustrated, each end of the cable, after running around the block and tackle sheaves 69 will be secured to an anchor 68 on main frame 12. The cylinder 63 is also secured to the main frame. And may, for example, be anchored at a midpoint. This anchoring may be pivotal or otherwise allow enough freedom for angular movement (but not longitudinal) so that the cylinder will align itself with the direction of pull. Since there is virtually no tension on the end of the piston rod 67 which pays out cable, it need only align itself with the direction of pull at one end.

TELESCOPIC STANDARD FEATURES

One of the legs 18 of the telescopic standard is shown in FIG. 12. Preferably all three parts or struts, as they may be called, are of substantially square or rectangular cross section being conveniently fabricated by welding plates or angle bars or channel bars together. The outer strut 71 is firmly secured to main frame 14 and to a cross head 72, being firmly braced with respect to the latter by gusset braces 73. Intermediate strut 74 slides smoothly in strut 71, being suitably guided against cocking. Likewise, inner strut 76 slides smoothly and guidedly in strut 74. Inner strut 76 is carried by and firmly secured to base 19 of the standard.

The up-and-down telescopic action is controlled by a hydraulic lift cylinder 78. This may be a double-acting lift cylinder for the purpose of utilizing safety valves often provided for lift cylinders, but other safety features are provided which make single-acting cylinders acceptable, inasmuch as raising and lowering operations will be rare and cylinder 78 will not be relied upon between times.

Cylinder 78 is pivoted at its upper end to outer strut 71, by pin 79. To provide the necessary length of movement, cylinder 78 is provided with primary piston 81 and secondary piston 82, thus being a three-part cylinder means, or three-part cylinder piston combination. The piston 82 is pivoted to inner strut 76 by pin 83.

When hydraulic fluid is supplied under pressure to the upper end of cylinder 78, it extends the cylinder means, raising outer strut 71. Preferably intermediate strut 74 is raised simultaneously by half the amount, this being accomplished by a cable system shown in FIG. 13. Here it is seen that cable 86 is secured to anchor 87 carried by main section 71. This cable extends around sheave 88, which is carried by intermediate strut 74. For the intermediate strut 74 to be raised at half the speed of outer strut 71, return run 89 of cable 86 is anchored by anchor 91 secured to the inner strut 76. To pace the relative downward movement likewise, a second sheave 88 is car-

ried at the upper end of the intermediate strut 76, and cable 86 extends over it and down to an anchor 92, secured to the lower end of outer strut 71.

To insure equal movement of legs 18, an equalization system is provided, the principal parts of which are a torque tube or equalization shaft 93 extending between the two legs, and (in each leg) an endless chain 94. The endless chain runs over a sprocket 96 and around a lower sprocket 97. The upper sprocket is keyed to the torque shaft 93, which is carried by the two outer struts 71; and the lower sprocket 97 is an idler-tensioning sprocket which is also carried by the outer strut 71 and is adjustable lengthwise thereon for tensioning the chain 94. Each chain 94 is connected at one point thereon by an anchor 98 to intermediate section 74.

Any relative movement between outer strut 71 and intermediate strut 76 produces a movement of chain 94 about its sprockets which turns torque shaft 93. This turns the sprocket 96 in the other leg so that its chain moves about the sprockets and causes exact duplication in the other leg of the relative movement in the first leg. A piston 78 is provided in each leg, and the hydraulic pressure tends to make the movements equal. However, without equalization the movement of one leg could get ahead of the movement of another leg causing cocking forces which might eventually cause binding. The equalization system ensures equal movement between the legs and guards against the possibility of binding. Of course, the cable system of FIG. 13 is part of the equalization system inasmuch as the equalized movement compelled by the chain 94 is carried forward by the cable system to the relative movement between the intermediate strut 74 and the inner strut 76.

EXTENDABLE BASE FEATURES

It is apparent that with a conveyor extending perhaps 30 feet into the air, support on a base having a maximum transverse dimension of 9 feet, permitted for highway travel, would not be sufficiently safe. According to the present invention the base 19 is provided with extension features. The extension is conducted at one side at a time, that side being slightly jacked up manually. In FIG. 12, a jack-receiving socket 101 is shown. FIG. 10 shows the socket 101 on both sides and indicates the internal construction.

A cylinder 102 is centrally located in base 19. It is anchored by a collar 103 into which anchoring studs 104 extend through bushings 106 welded to axle tube 107 which forms the main member of base 19.

Cylinder 102 is of a two-piston, double-acting design so that it functions as two double-acting cylinders with a common fluid supply. Nipple 109 in FIG. 11 leads to the center of cylinder 102. Nipple 110 leads through connections 111 to each end of cylinder 102. A piston rod projects from each end, carrying head 112. Each piston rod head 112 is secured in a substantially solid end block 113 which is firmly secured as by driving and welding in a sleeve 114 which slides within tube 107. Block 113 has a substantially vertical bore 116 to receive a stub shaft for the wheel-supporting unit. This bore 116 is intersected by a bore 117 which is tapped to receive a screw 118 which will extend into a groove around the stub shaft in bore 116. A flat bottomed saddle plate 119 is welded to the bottom of block 113.

The manner of operation is as follows: Remove pins 123 on jacked-up side, leaving the other pins in to prevent undesired movement. Fluid pressure is applied to nipple 109, the piston and head 112 on the jacked-up side will be extended, sliding its associated sleeve 114 and block or head 113 outwardly. At the limit of movement permitted by the cylinder 102, or other stop, a pair of oppositely disposed holes 121 in sleeve 114 will lie in the plane of corresponding opposed holes 122 in tube 107, and will be aligned with them when sleeve 114 is turned to the correct angularity. Pins 123 (FIG. 12) may then be reinserted to lock the sleeve 114 and its head 113 in the proper extended position.

The first side is now lowered and the other side jacked up. Repeating the sequence of operations just described extends and locks sleeve 114 on that side.

For retracting, the operation is essentially reversed, with fluid pressure being applied this time to nipple 110. The pistons and heads 112 will be successively retracted, each sliding its associated sleeve 114 and block or head assembly 113 inwardly. Second pairs of opposed holes 124 are suitably located in sleeve 114 extending also into block 113, for insertion of the pins 123 therein to retain sleeve 114 in its proper retracted position. The diametric plane on which holes 121 are located may be different from that of holes 124, to position the wheels differently when each set is pinned.

WHEEL-SHIFTING FEATURES

As seen in FIG. 8, the pivoted yoke 126 extends downwardly from saddle 119, and a horizontal beam 127 is pivoted to this yoke about a horizontal axis. At opposite ends of this beam, the wheels 21 are carried by suitable spindles, one such spindle 128 being seen in FIG. 9.

Yoke 126 is provided with an upwardly extending spindle 131 extending into bore 116. This enables the yoke 126 to be turned by hand to position the wheels either for road travel or for radial swing of the conveyor. Securing means are provided for the wheel in both positions. Thus a wing plate 133 extends outwardly from saddle 119 to which it is welded, and a plate 134 welded to yoke 126 swings under the plate 133. With the wheels in the radial swing position shown in FIG. 9, the plate 134 may be locked in this position by a pin 136 extending vertically through both plates 133 and 134. For the road travel position, upstanding blocks 138 and 139 may be bolted together, one being secured to plate 133 and one to plate 134. A bolt 141 extends through plate 138 and is threaded therein and provided with a locknut to form an adjustable alignment stop so that the wheels may be accurately aligned, for road travel, to avoid excessive wear on the tires and so that the conveyor will follow the truck tractor in proper alignment.

GEOMETRIC ACCOMMODATION UPON LIFTING

While the wheels are in the radial swing position, they swing along a fixed radius from the pedestal 17. However, as the standard is extended and retracted for raising and lowering the conveyor, the geometry requires some accommodation. Thus if the conveyor were raised and lowered by swinging about a fixed axis in pedestal 17, the wheels 21 would tend to move a few inches toward and from the pedestal 17. Since the position of wheels 21 does not permit this movement, a shifting horizontal axis for the vertical swinging of the conveyor is provided.

FIG. 15 shows the main element for accomplishing this. On each side of pedestal 17 an axis shifting plate 146 is provided. Each plate has a horizontal slot 142 and a somewhat vertically extending curved guide slot 143. Rods extend through these slots and through the side frames of lower end section 13. The rod through slots 142 comprises the shifting axis rod, and the rod through slots 143 comprises the axis-shifting rod. Thus as the conveyor is raised from its lowermost position, slot 143 first allows the entire conveyor to shift rearward somewhat and then allows it to shift forward, this movement being permitted by the slot 142 while retaining the loading point on the conveyor at substantially a constant position. Either or both rods may be threaded to permit clamping the parts against relative movement when an adjustment of the slope of the conveyor has been completed.

SAFETY BLOCKS ON HYDRAULIC STANDARDS

Inasmuch as the hydraulic standard will usually be at one height for long periods of time, perhaps a matter of days, it is desirable not to depend on the hydraulic system for holding the standard at a given elevation. Accordingly, the lower or inner struts 76 are provided (along the outer sides) with a series of apertures 151 into any two of which a specially

designed block 152 can be secured. Preferably the block 152 has a latch or hook device 153 at its upper end, as well as a lug extending into the hole at its lower end. In any event, block 152 has a lug extending through each of the holes which it covers, and when the intermediate strut 74 is lowered against the upper end of block 152, a retaining lug 154 slips outside of the block 152 to hole it in place beyond question.

POWER CENTER

The conveyor driving motor 161, drum 162 and associated parts are located in a power center in the space left between the two end sections when fully retracted. The hydraulic pump, drive motors and reservoir are also located in this power center. All controls are preferably accessible to an operator at one position.

ACHIEVEMENT

A portable conveyor according to the present invention, has proved to be extremely satisfactory. A conveyor 100 feet long when extended retracts to 58-foot length, with a low center of gravity, providing greatly improved highway portability. The time required for preparing the conveyor for operation at a new location or reconverting it for highway transportation, is quite short and highly acceptable. All of the heavy work is done in each instance hydraulically, even though there may be some manual operations such as releasing the belt tension prior to retraction and reinstating and adjusting it after extension in a new location. Although this could perhaps be avoided by a more powerful cylinder for extending the conveyor end sections, it is of little enough trouble not to be of great concern. During use the conveyor is very easily raised and lowered hydraulically, as well as being swung on a radius; and the same hydraulics can be used to couple the conveyor's tow fitting onto the "fifth wheel" of a tractor truck.

I claim:

1. A telescopic conveyor including an elongate main frame, an end section extending from each end thereof, a roller way formed by rolls along the top of the main frame and of the end sections; a power-driven drive roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end sections being movable into the main frame to shorten the length of the conveyor; a return roller for the return run of the conveyor near each end of the main frame around which the return run is drawn by the portion of the roller way on each end section as it is retracted into the main frame; the end portions of the roller way on the main frame being movable upwardly to permit passage of the end portions thereunder; movement control means interconnecting the two end sections to enforce their joint movement in retraction or extension to maintain a safe overbalance in one direction about a generally central support.

2. A telescopic conveyor including an elongate main frame, an end section extending from each end thereof, a roller way formed by rolls along the top of the main frame and of the end sections; a power-driven drive roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end sections being movable into the main frame to shorten the length of the conveyor; a return roller for the return run of the conveyor near each end of the main frame around which the return run is drawn by the portion of the roller way on each end section as it is retracted into the main frame; movement control means interconnecting the two end sections to enforce their joint movement in retraction or extension to maintain a safe overbalance in one direction about a generally central support.

3. A telescopic conveyor including an elongate main frame, an end section extending therefrom, a roller way formed by rolls along the top of the main frame and of the end section; a power-driven drive roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end section being movable into the

main frame to shorten the length of the conveyor; a return roller for the return run of the conveyor near the end of the main frame around which the return run is drawn by the portion of the roller way on the end section as it is retracted into the main frame; the end portion of the roller way on the main frame being movable upwardly to permit passage of the end portion thereunder.

4. A telescopic conveyor including an elongate main frame, an end section extending from each end thereof, a roller way formed by rolls along the top of the main frame and of the end sections; a power-driven drive roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end sections being movable into the main frame to shorten the length of the conveyor; a return roller for the return run of the conveyor near each end of the main frame around which the return run is drawn by the portion of the roller way on each end section as it is retracted into the main frame.

5. A telescopic conveyor of claim 2 which includes hydraulic means for moving the end sections in and out; and lock means for securing the end sections in extended position independently of the hydraulic means.

6. A telescopic conveyor of claim 5 which includes threaded means for accomplishing accurate positioning for locking, part of the lock being of the pin type.

7. A telescopic conveyor including an elongate main frame, an end section extending from each end thereof, a roller way formed by rolls along the top of the main frame and of the end sections; a power-driven roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end sections being movable into the main frame to shorten the length of the conveyor; a return roller for the return run of the conveyor near each end of the main frame around which the return run is drawn by the portion of the roller way on each end section as it is retracted into the main frame; hydraulic means for moving the end sections jointly in and out, and lock means for securing the end sections in extended position independently of the hydraulic means.

8. A telescopic conveyor including an elongate main frame, an end section extending from each end thereof, a roller way formed by rolls along the top of the main frame and of the end sections; a power-driven drive roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end sections being movable into the main frame to shorten the length of the conveyor; a return roller for the return run of the conveyor near each end of the main frame around which the return run is drawn by the portion of the roller way on each end section as it is retracted into the main frame; hydraulic means for moving the end section in and out, and lock means for securing the end section in extended position independently of the hydraulic means.

9. A telescopic conveyor of claim 4, said main frame having a flat top and a bottom diverging therefrom from its ends inwardly, and said end section moving away from the top as it retracts.

10. A telescopic conveyor including an elongate main frame, an end section extending from each end thereof, a roller way formed by rolls along the top of the main frame and of the end sections; a power-driven drive roll; and an endless belt extending along the tops of the rolls, returning under the rolls, and extending around the drive roll; the end sections being movable into the main frame to shorten the length of the conveyor; the end section being supported during movement by rollers adjacent the outer end of the main section and running on the under surface of tracks on the end section, and by roller pairs well spaced from said rollers in the direction of retraction, carried by the end section and running on upwardly and downwardly facing surfaces of tracks, the upwardly facing surface sloping to shed debris.

11. A telescopic conveyor of claim 4 including a mobile standard secured to the main section at an intermediate portion thereof and including telescopic legs.

12. A telescopic conveyor of claim 4 including a mobile standard secured to the main section at an intermediate portion thereof and including telescopic legs, each of at least three telescopic parts to retract to road travel height and extend to position the conveyor at maximum slope.

13. A telescopic portable conveyor including a main section, upper and lower end sections extending from both ends and retractable to lie substantially within the main section, a wheel-equipped telescopic standard for supporting, raising and lowering, and moving the main section, and disposed with respect to it to provide a small preponderance of the weight on the side toward the lower end section, a swivel support for the lower end section, the wheels of the standard being turnable to dispose their axes approximately to intersect the axis of the pedestal for radial swinging of the conveyor, and turnable to transverse disposition of the axes for road movement; and a "fifth wheel" type of fitting on the lower end of the main section adapted to be lowered onto the "fifth wheel" of a tractor truck; said standard being rigidly secured to the main section so that the spacing of the wheels from the pedestal changes as the conveyor is raised and lowered, said pedestal and lower end section being provided with mutually coacting means for producing relative movement between them corresponding to such changing distance.

14. A telescopic portable conveyor including a main section, upper and lower end sections extending from both ends and retractable to lie substantially within the main section, a wheel-equipped telescopic standard for supporting, raising and lowering, and moving the main section, and disposed with respect to it to provide a small preponderance of the weight on the side toward the lower end section, a swivel support for the lower end section, the wheels of the standard being turnable to dispose their axes approximately to intersect the axis of the pedestal for radial swinging of the conveyor, and turnable to transverse disposition of the axes for road movement; said standard being rigidly secured to the main section so that the spacing of the wheels from the pedestal changes as the conveyor is raised and lowered, said pedestal and lower end section being provided with mutually coacting means for producing relative movement between them corresponding to such changing distance.

15. A telescopic portable conveyor including a main section, upper and lower end sections extending from both ends and retractable to lie substantially within the main section, a wheel-equipped telescopic standard for supporting, raising and lowering and moving the main section, and disposed with respect to it to provide a small preponderance of the weight on the side toward the lower end section, a swivel support for the lower end section, the wheels of the standard being turnable to dispose their axes approximately to intersect the axis of the pedestal for radial swinging of the conveyor, and turnable to

transverse disposition of the axes for road movement; said standard being rigidly secured to the main section so that the spacing of the wheels from the pedestal changes as the conveyor is raised and lowered, said pedestal and lower end section being provided with means permitting relative movement between them corresponding to such changing distance.

16. A telescopic portable conveyor including a main section, upper and lower end sections extending from both ends and retractable to lie substantially within the main section, a wheel-equipped telescopic standard for supporting, raising and lowering, and moving the main section, and disposed with respect to it to provide a small preponderance of the weight on the side toward the lower end section, the wheels of the standard being turnable to dispose their axes approximately to intersect the axis of the pedestal for radial swinging of the conveyor, and turnable to transverse disposition of the axes for road movement; and a "fifth wheel" type of fitting on the lower end of the main section adapted to be lowered onto the "fifth wheel" of a tractor truck.

17. A telescopic portable conveyor including a main section, upper and lower end sections extending from both ends and retractable to lie substantially within the main section, a wheel-equipped telescopic standard for supporting raising and lowering, and moving the main section, and disposed with respect to it to provide a small preponderance of the weight on the side toward the lower end section, a swivel support for the lower end section, the wheels of the standard being turnable to dispose their axes approximately to intersect the axis of the pedestal for radial swinging of the conveyor, and turnable to transverse disposition of the axes for road movement; the standard carrying at each side two wheels, tandemly disposed, mounted at opposite ends of an equalization beam pivoted midway between them.

18. A telescopic portable conveyor of claim 17 in which said equalization beams are carried telescopically by the axle.

19. A telescopic portable conveyor of claim 17 in which said equalization beams are carried telescopically by the axle, and the axle includes hydraulic means for its extension.

20. A portable conveyor of the class of over 80 feet including a main section and two end sections telescopic into the main section and when extended providing a longitudinally flat roller way for a belt, a standard rigidly secured to an intermediate portion of the main section, doubly telescopic vertically, a pair of tandem wheels on each side of the standard supported by an equalizer beam pivoted for equalization and swingable between road-travel position and radial swing position; the two equalizer beams being movable apart laterally from road-travel separation to provide a support width during use of the conveyor augmented both by the moving apart and by approximately half the length of the equalizer beam.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,552,546

Dated January 5, 1971

Inventor(s) James D. Rath

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 8, line 29, after "power-driven" insert -- drive
Column 9, line 39, "coating" should be -- coacting -- .
Column 10, line 13, after "end section," insert -- a swi
support for the lower end section, -- .

Signed and sealed this 29th day of June 1971.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patent