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Pittoreau

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[54] **CHAIN CONVEYORS WITH STANDARDIZED ELEMENTS**

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[52] **U.S. Cl.** **198/121,** 198/139

[51] **Int. Cl.** **B65g 15/60,** B65g 41/00

[58] **Field of Search** 198/117–119, 120.5, 121, 114, 115, 126, 139, 208

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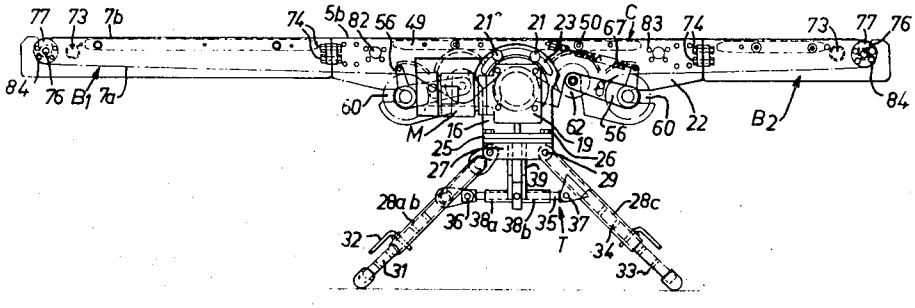
Assistant Examiner—W. Scott Carson
Attorney—Richard K. Stevens, Davidson C. Miller et al.

[57] **ABSTRACT**

This conveyor comprises standardized, interchangeable elements, namely : a motor and reduction unit, a driving shaft operatively connected to the output shaft of said unit and carrying at least one sprocket for driving a chain, a bearing supporting frame structure, a central body comprising a swivel-mounted frame structure with idler sprockets and chain tensioning devices, said central body comprising a pair of said flanges which bear across a central notch thereof upon outer housings of the frame structure, the upper portion of each flange being formed with tapped holes receiving screws for securing said frame structure which is provided with arcuate slots concentric to the driving shaft and engageable by said screws, thus permitting the adjustment of the inclination of said frame structure in relation to the axis of the driving shaft which remains constantly horizontal.

2 Claims, 8 Drawing Figures



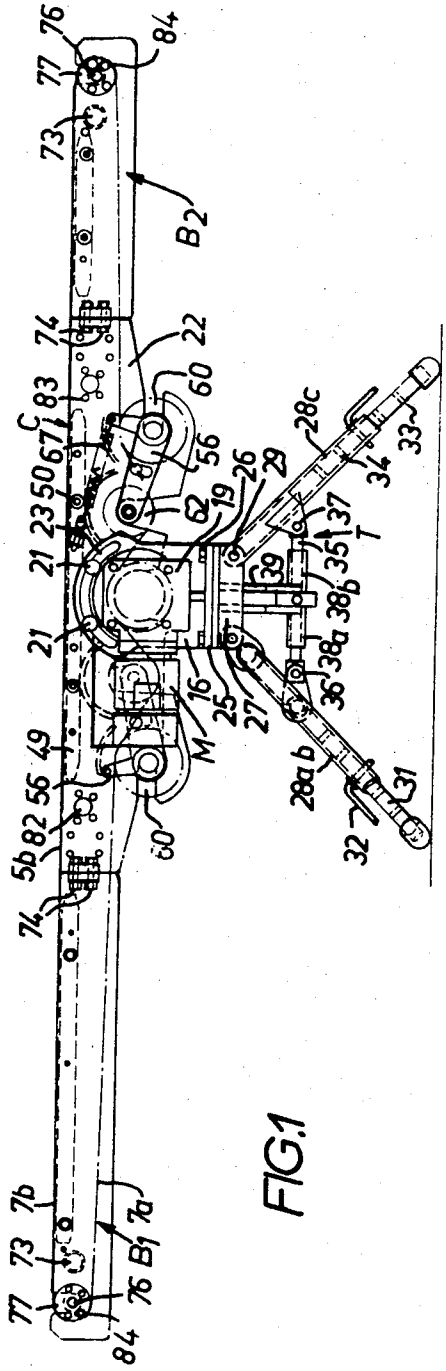


FIG.1

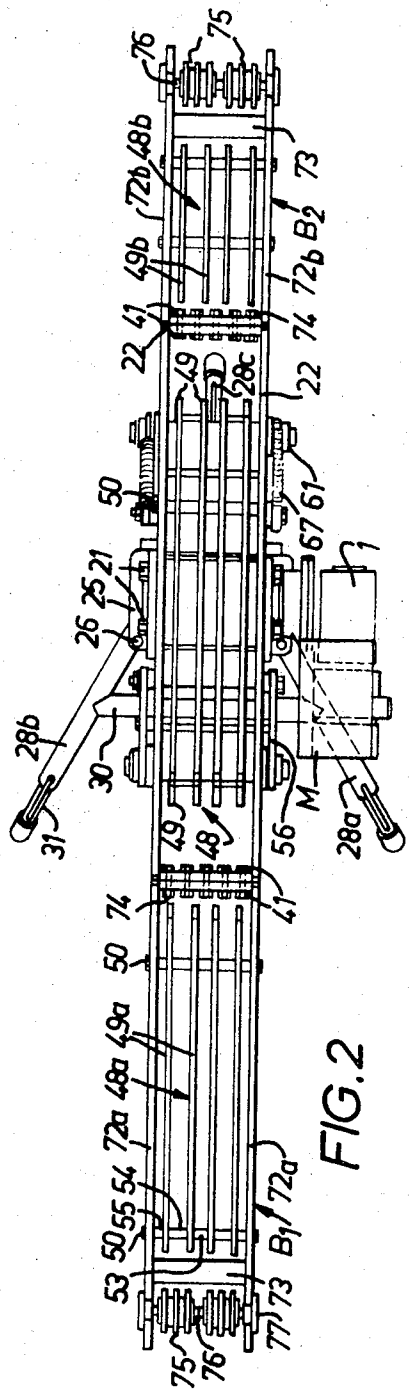
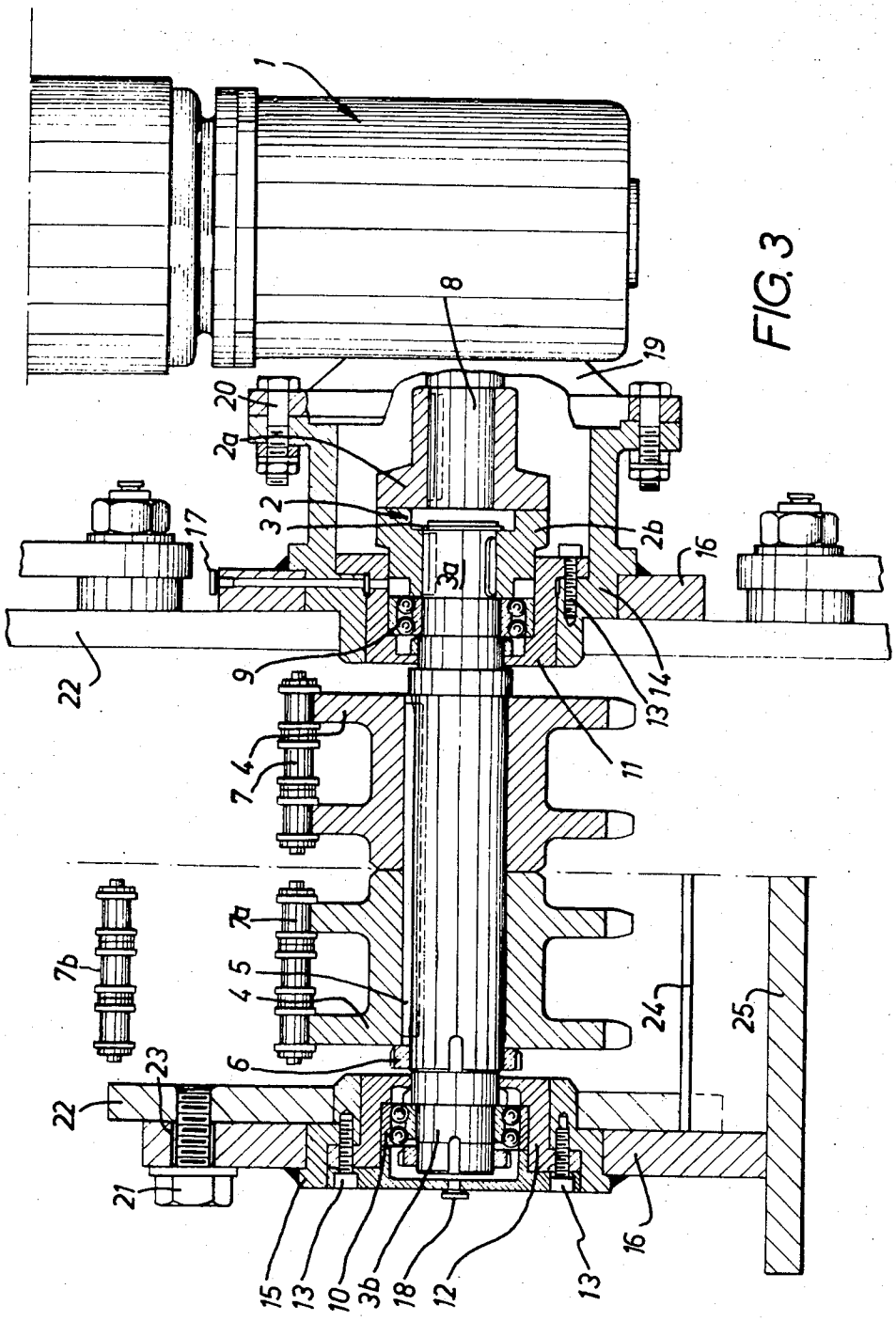


FIG.2


1
8
19
20
2a
3 2
2b
16
17
3a
22
9
13 14
11
7 4
7a
7b
4 5
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24
25
23
22
21
15
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3b
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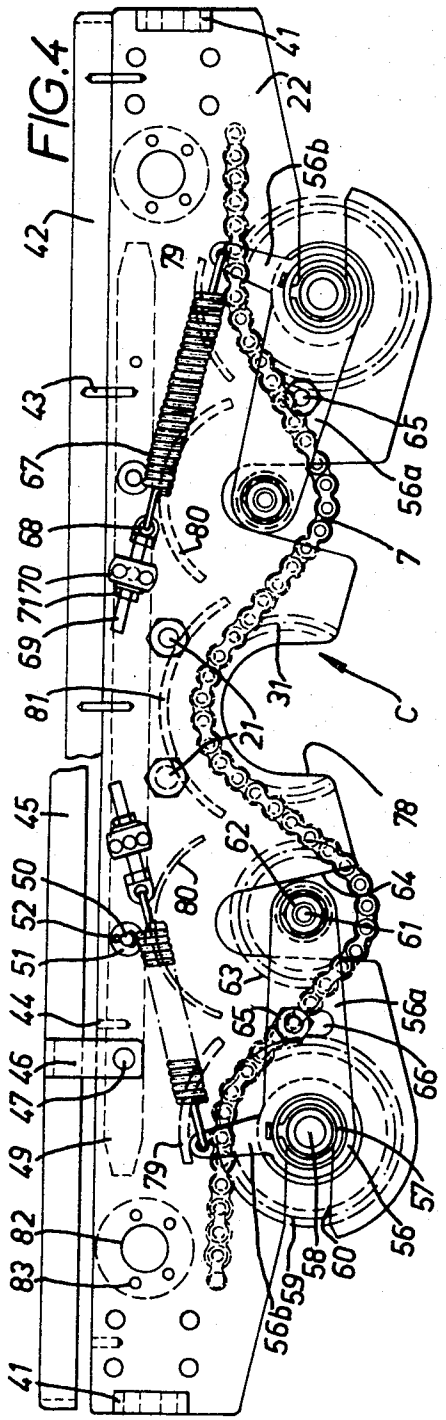
FIG. 3

FIG.4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22
56b
42
79
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68
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56a
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71
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31
C
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45
62
50
52
80
64
61
51
63
44
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56a
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66
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82
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83
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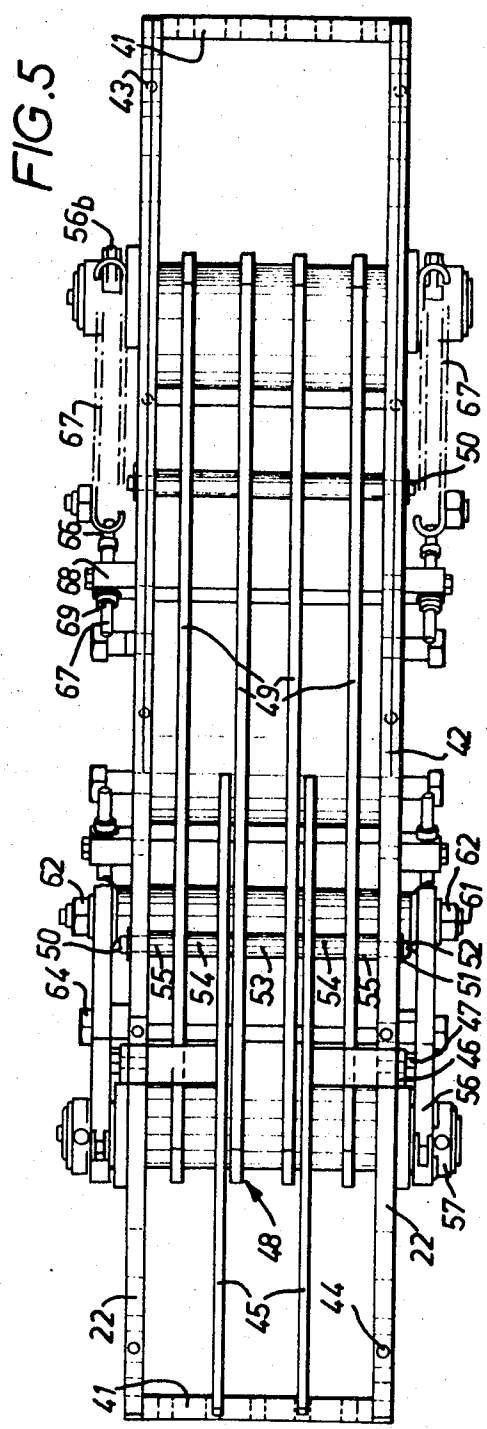
60
59
56b
41

FIG.5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56b
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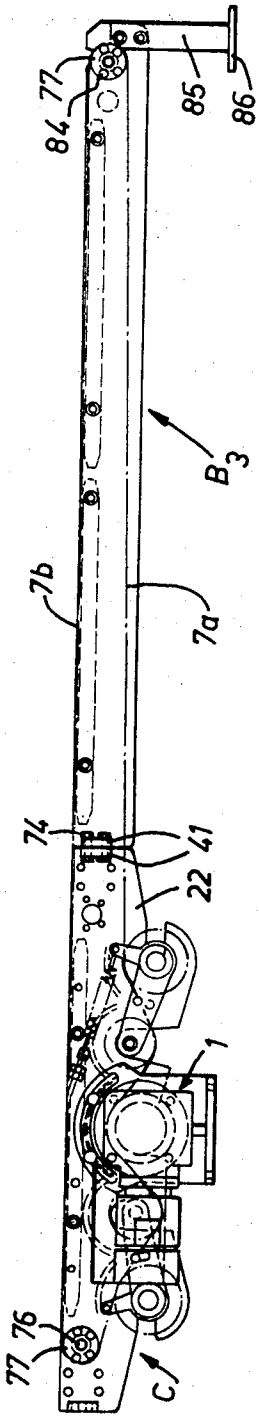

FIG.6

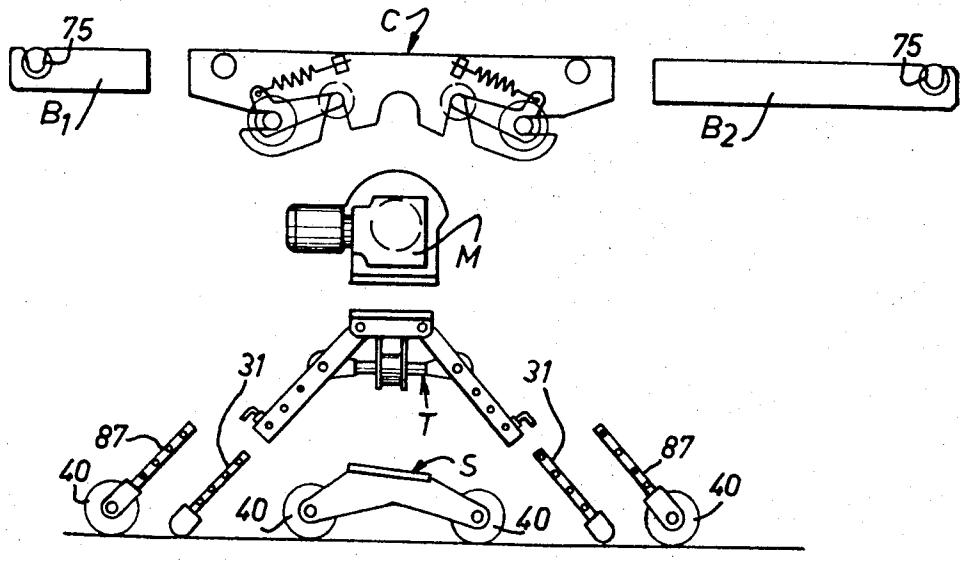
75
C
75
B1
B2
M
31
31
T
87
87
40
S
40
40
40

FIG.7

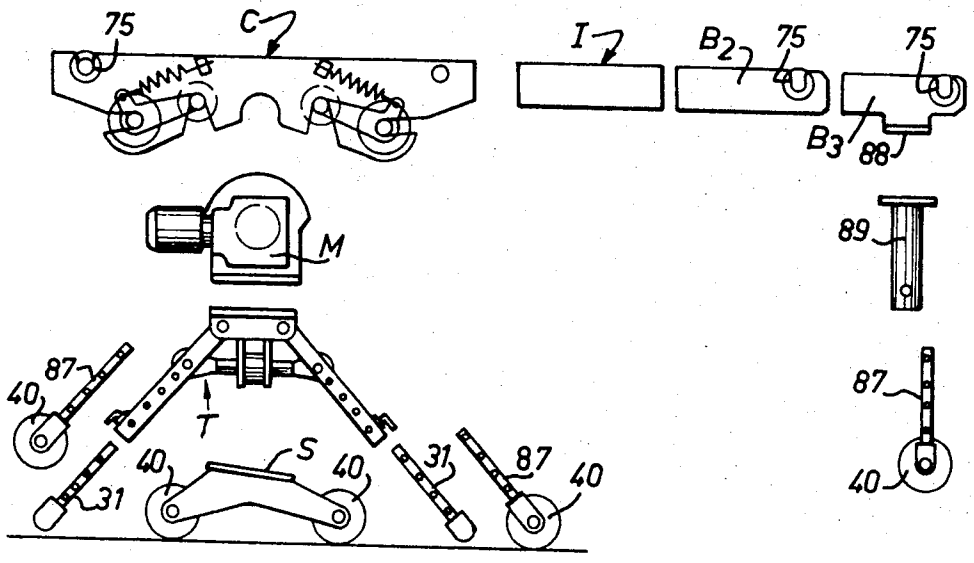
75
C
I
B2
75
75
B3
88
M
89
87
40
T
87
40
S
40
40
31
31
87
40

FIG.8

CHAIN CONVEYORS WITH STANDARDIZED ELEMENTS

The present invention relates to a chain conveyor comprising standardized elements intended for handling more particularly but not exclusively hot-forged pieces, said conveyor comprising strictly standardized, easily interchangeable elements, adaptable to various types of chain systems for supplying or discharging pieces or parts in a manufacturing workshop.

Conveyor-elevators of the endless belt or chain type are already known, these apparatus comprising a pair of pivoted, castered legs permitting the variation, through hydraulic cylinder-and-piston control actuators, the height and inclination of the carrier chest.

On the other hand, twin-chain telescopic stationary conveyors are also known, on which rollers are mounted, these chains being provided with longitudinal translation means permitting the horizontal extension of a branch element on one side of the conveyor.

Each one of the above-mentioned conveyors is characterized by a limited versatility; the first type permits a vertical and angular variation, and the second type a longitudinal variation, of its general arrangement.

It is the essential object of the present invention to provide a stationary or movable conveyor capable of combining the two above-defined functions by utilizing standardized interchangeable elements permitting various mounting combinations with longitudinal variations on a single side or on both sides, as well as vertical variations.

This conveyor comprising standardized interchangeable elements swivel mounted to a central carrier body is characterized in that said central carrier body incorporates a motor and reduction-gearing unit, a driving shaft coupled to said unit and having keyed thereon at least one conveyor-chain driving sprocket, a bearing-supporting frame structure pivotally mounted to said driving shaft and supporting said shaft and said motor and reduction-gearing unit, idler sprockets and devices for tensioning at least one chain which are mounted symmetrically on either side of said driving shaft, interchangeable extension elements of said frame structure of the central carrier body to permit various mounting combinations or arrangements, and a variable-type support for said motor and reducing-gearing unit and the extension elements thereof.

Other features and advantages of this invention will appear as the following description proceeds with reference to the accompanying drawings illustrating diagrammatically by way of example two different forms of embodiment of a chain conveyor, given by way of example. In the drawings :

FIG. 1 is an elevational view of a conventionally mounted two-armed conveyor comprising one or two chains ;

FIG. 2 is a plan view from above of a double-chain conveyor ;

FIG. 3 shows on a larger scale, in vertical axial section in the left-hand half *a* and in horizontal section in the right-hand portion *b* the coupling of the motor and reduction-gearing unit with the central carrier body of the conveyor, the motor and reduction-gearing unit being shown in plan view ;

FIG. 4 is an elevational view of the central carrier body of a conveyor comprising one or two chains ;

FIG. 5 is a plan view from above of a central body with two chains ;

FIG. 6 is an elevational view of a flat-type conveyor, with the asymmetric mounting of one arm, and

FIGS. 7 and 8 are exploded views illustrating diagrammatically various possible mountings of the conveyor, i.e. in the case of a conventional mounting and in the case of an asymmetric mounting, respectively.

Referring first to FIGS. 1 and 2 illustrating diagrammatically by way of example a two-chain conveyor, it will be seen that this conveyor comprises a motor and reduction-gearing unit M, a central carrier body C mounted to said motor and reduction unit, arms B_1 and B_2 constituting the opposite extensions of said central body C, and a tripod structure T supporting the motor and reduction unit M.

As shown in FIG. 3, the motor and reduction gearing unit M comprises a power unit with reduction gearing 1 connected through a coupling 2 to a driving shaft 3 carrying driving sprocket 4 secured to this shaft by means of a key 5 and locked by a nut 6 against axial translation in relation to said shaft. Each sprocket drives a chain 7 of the conveyor, which comprises a lower or driving span 7_a and an upper or driven span 7_b. The coupling comprises two halves of which a first half 2_a is keyed to the end portion of the output shaft 8 of the reduction gearing, the other half 2_b being keyed to the end portion 3_a of shaft 3. This shaft 3 has its two ends rotatably supported by a pair of rolling-contact bearings 9, 10 enclosed in bearing cases 11, 12 secured by screws 13 to outer housings 14, 15 rigid with the frame structure 16. Grease nipples 17, 18 are provided for lubricating these bearings.

The base plate 19 of motor and reduction-gearing unit 1 is secured by means of bolts 20 to outer housing 14 of bearing case 11, and screws 21 are provided for securing flanges constituting the longitudinal members 22 of the frame of said central body C of the conveyor to the upper portion of said frame structure 16 ; furthermore, these flanges bear against the upper protions of housings 14 and 15, as illustrated in FIGS. 1 and 2. The screws 21 extend through arcuate slots 23 formed in said frame 16 coaxially to the shaft 3, thus permitting a proper setting of the angular position of the motor unit 1 in relation to the central body C of the conveyor.

A rib 24 parallel to a base plate 25 interconnects the two sides of frame structure 16; this base plate 25 is secured by means of screws 26 to the head plate 27 of tripod T. This tripod T comprises three telescopic tubular legs 28_a, 28_b and 28_c pivoted at 29 to the head plate 27; two legs 28_a and 28_b are interconnected by a cross member 30 and the third leg 28_c lies on the bisectrix of the angle formed by the first pair of legs. Props 31 engaging the tubular legs 28 permit of elongating these legs.

Angle rods 32 extend through spaced transverse holes 33, 34 formed in the legs and props, respectively, for locking their relative axial position and therefore the vertical position of the tripod. A complementary adjustment is obtained by setting the relative spacing between the leg 28_c and the tubular cross member 30 interconnecting legs 28_a and 28_b.

This last-mentioned adjustment is obtained by means of a screw rod 35 formed with opposed left-hand and right-hand pitch threads, and having its ends pivotally connected to the tubular cross member 30 and leg 28_c through universal joints 36, 37; these screw rods en-

gage tapped sockets 38_a, 38_b rigid with a vertical column 39 secured to the tripod head plate 27.

The props 31 may be provided with casters 40, as illustrated in FIGS. 7 and 8, in case it is desired to facilitate the transfer of the conveyor as a whole.

The central body C of the conveyor, illustrated in detail in FIGS. 4 and 5, comprises a frame structure consisting essentially of a pair of flanges 22 in the form of longitudinal members having their ends interconnected by cross members 41. The ends of these cross members 41 are engaged in notches formed in said longitudinal members and welded thereto. Mounted on edge to each flange 22 is a flat guide member 42 provided for example with studs 43 engaging lined holes 44 formed in said flange. The guide member 42 may also be secured by means of straight lugs (not shown) welded to this member and fastened to the flange by means of screws. The frame structure further comprises flat inner guide members 45 rigid with bent lugs 46 secured by screws 47 to the outer face of said flanges 22 and overlying the plane containing the upper surfaces of this flange to permit the passage of the upper span 7_b of the conveyor chain of which the axis is substantially level with the upper plane of flanges 22, as illustrated in FIG. 3.

A set of plates 48 comprising a number of pairs of guide shoes 49 (this number corresponding to the number of chains 7 constituting the conveyor device) is disposed slightly below the top plane of flanges 22. These guide shoes 49 parallel to the flanges 22 and mounted on edges on a pair of transverse bars 50 have their ends engaged in holes of said flanges 22 and held in position by washers 51 and cross pins 52 externally of each flange. Tubular distance-pieces 53, 54, 55 surrounding each bar 50 separate the pairs of guide shoes 49, the shoes of a same pair and the endmost shoes from the flanges.

On each flange 22 a pair of chain tensioning devices are mounted symmetrically to the transverse centre line of central body C. Each chain tensioning device comprises a bell-crank lever 56 having unequal arms, pivotally mounted on a bearing 57 rigid with flanges 22; these bearings 57 receive the ends of a pivot shaft 58 supporting the idler sprockets 59 of shains 70. A substantially horizontal notch 60 is formed on either side of flanges 22 to permit the passage of said shafts 58.

One end of a transverse shaft 61 is received in each free end of the major arm 56_a of each bell-crank lever 56 and secured to this shaft 61 by means of nuts 62; mounted for loose rotation on these shafts are idler sprockets 63. Substantially vertical notches 64 formed in flanges 22 permit the passage of said shafts 61 when they pivot with the lever arm 56_a about the pivot shaft 58. A screw 65 extending through a slot 66 of lever arm 56_a and engaging a tapped hole in flange 22 permits of locking the bell-crank lever 56 in the desired angular position.

The free end of the minor arm 56_b of said bell-crank lever has attached thereto one end of a traction coil spring 67 having its other end anchored to the strap 68 of an adjustment rod 69 housed in a supporting block 70 secured to the flange 22. A nut 71 is provided for locking the adjustment screw 69 in the desired position.

The central body C may be designed for an endless conveyor comprising one, two or four chains 7. These chains may be provided with catches or like pick-up legs in case the pieces to be handled did not adhere sufficiently to the conveyor surface.

The number of idler sprockets 59, 63 mounted on each shaft 58, 61 corresponds to the number of chains. The number of driving sprockets 4 on driving shaft 3 (FIG. 3) corresponds likewise to the number of chains, and the length of the driving shaft 3 varies according to the number of sprockets.

The central body C has longitudinal extensions in the form of arms B_1, B_2 having the desired length. Each arm comprises a frame structure consisting of a pair of parallel longitudinal members of suitable length, as shown by way of example at 72_1 and 72_2, of a cross member 41 at one end and a tubular distance-piece 73 adjacent the other end of said extension arm. A set of plates 48_a, 48_b consisting of guide shoes 49_1 and 49_2 is secured to the longitudinal members of each extension arm B_1 and B_2, as in the case of the central body, by means of bars 50 extending through distance-pieces 53, 54 and 55.

The cross member 41 of each arm B_1, B_2 is secured by means of bolts 74 to an end cross member 41 of central body C. Idler sprockets 75 are rotatably carried by a shaft 76 fitted in bearings 77 at the free end of each extension arm, to permit the return of the lower span 7_a of the chain and thus constitute the upper span 7_b therefor, and vice versa.

The central body C and extension arms B_1, B_2 in their assembled condition, constitute a complete structure on which the chains 7 are adjustably mounted. This structure is adapted to be easily laid through the medium of suitable semi-circular notches 78 into the central portion of flanges 22 of said central body C, to afford an easy access to the bearings of shaft 3, to the external housing 14, 15 of said bearings, which are rigid with the frame structure 16 of motor and reduction-gearing unit 1, as already explained in the foregoing, the chains 7 being supported by the driving sprockets 4. Then the selected inclination of the assembly is adjusted, this inclination varying for example from 0° to 30° on either side of the horizontal, whereafter the lock screws 21 are tightened. housings

Separate deflector plates 79, 80 and 81 of curved configuration, secured to the flanges 22 of said central body, are provided for protecting the various idler sprockets 59, 63 and driving sprockets 4.

As an alternative, as shown in FIG. 6, the conveyor may have an asymmetric mounting. In this case it comprises a central body C, the same as that shown in FIGS. 1 and 2, but having only one extension arm B_3 of adequate length, on one side. The idler sprockets 75 are mounted in this case adjacent the frame structure of the central body C which is opposite to this extension arm B_3, the flanges 22 being formed to this end with holes 82 (FIG. 1) for receiving the bearings 77 of shaft 76 supporting the idler sprockets, and also tapped holes 83 for the screws 84 by which the bearings 77 are fastened.

In this last-described modified form of embodiment the conveyor is of the flat type, wherein the base plate of unit M is secured directly to the floor. The free end of said extension arm B_3 is supported by a leg 85 comprising a shoe 86 secured to the floor surface.

The various assemblies, namely the motor and reduction-gearing unit M, central body C, lateral or end extension arms B, tripod T, and tripod props, constitute standard, easily interchangeable elements affording different combinations in the mounting of the conveyors,

in order to meet a wide range of practical requirements.

Now, two main types of standard conveyors may be contemplated, that is :

a. a conventional-mounting conveyor as illustrated by way of example in FIGS. **1** and **2**, and shown diagrammatically in exploded view in FIG. **7** ;

b. the asymmetric mounting conveyor as illustrated by way of example in FIG. **6** and shown diagrammatically in exploded view in FIG. **8.**

In either types each designed for one, two or four chains, various linear speeds may be obtained by substituting a different reduction gearing for the one associated with the power unit M.

The tripods may be designed to comprise two main types, one for a single- or twin-chain conveyor, the other for a four-chain conveyor.

The tripod props may be either of the so-called fixed type **31** illustrated in FIG. **1**, or of the movable type **87** comprising a caster **40**, as illustrated in FIGS. **7** and **8.**

A low movable truck S, mounted on casters **40**, may be substituted for the tripod T, as shown in FIGS. **7** and **8.** The length of extension arms B_1 and B_2 may range from about 0.50 m to about 2 m. The attached table 1 illustrates the various possible combinations of the multifarious conveyor of this invention, in the case of a conventional structure.

In conveyors of the asymmetric type as shown by way of example in FIG. **8** either the set of extension arms B_2, or special arms B_3 of a length ranging in general from about 0.50 m to about 2 m, and supporting idler sprockets **75** at their free ends, may be used. These special arms B_3 are provided at their ends with a flange or lug **88** adapted to be secured to an end leg **89** provided if desired with a telescopic extension **87** carrying a caster **40** at its lower end. If an extension arm B_2 or B_3 having a length of about 0.50 m is used, an intermediate arm **1** of same structure but without any idler sprocket may be added between this extension arm and the central body C. The other table **2** hereinafter illustrates the various possible combinations in the case of a conveyor having an asymmetric mounting.

Although various forms of embodiment of this invention have been described, illustrated and suggested herein, it will readily occur to those skilled in the art that many other modifications and variations may be brought thereto without departing from the spirit and scope of the invention as set forth in the appended claims.

TABLE 1

Number of chains	Central body C length (m)		Normal arms B_1 length (m)				B_2 length (m)			
	1.50	1.75	0.50	1.00	1.50	1.75	0.50	1.00	1.50	1.75
1	x			x	x	x		x	x	x
2	x			x	x			x	x	
4		x	x	x	x	x	x	x	x	x

TABLE 2

Number of chains	Length (m) of NORMAL ARMS B_2				Length of SPECIAL ARMS B_3 (m)						
	0.50	1.00	1.50	1.75	0.50	0.75	1.00	1.25	1.50	1.75	2.00
1		x	x	x	x	x	x	x	x	x	x
2		x	x		x		x	x	x	x	x
4	x	x	x	x	x	x	x	x	x	x	x

TABLE 2

Number of chains	Intermediate arms (2m25) (with 0.50 m B_2 and B_3)
1	x
2	
4	x

What is claimed as new is :

1. Chain conveyor with interchangeable standardized elements swivel mounted to a central body, comprising a motor and reduction-gearing unit carried by said central body, a driving shaft coupled to said motor and reduction-gearing unit and supporting at least one driving sprocket associated with a conveyor chain, a bearing-supporting frame structure adapted to pivot about said driving shaft, supporting said shaft and said motor and reduction-gearing unit and being rigid on either side with an outer housing enclosing bearing cases of said driving shaft, idler sprockets and chain tensioning devices for at least one conveyor chain, said central body further comprising a pair of said side flanges consisting of longitudinal members assembled at their ends by cross members, each flange comprising in its central portion a notch of substantially semi-circular configuration which is centered to the median line of the flange, wherein said flanges bear with their lower edge, across said central notch, upon said outer housings of the frame structure, each flange having an upper portion formed with tapped holes receiving screws for securing said frame structure, said frame structure being provided to this end with arcuate slots concentric to the driving shaft and engageable by said screws, thus permitting the adjustment of the inclination of said frame structure in relation to the axis of the driving shaft which remains constantly horizontal.

2. Conveyor according to claim **1**, wherein two chain tensioning devices are mounted symmetrically on either side of said driving shaft to each of said flanges, each tensioning device comprising a bell-crank lever having a major arm and a minor arm and being pivotally mounted on a bearing of a shaft extending through a horizontal notch foreseen on either side of said median line of said flange, said shaft supporting a first idler sprocket for each chain, the free end of said major arm of the bell-crank lever being rigid with a transverse rod extending through a vertical notch foreseen between said central notch and horizontal notch on said flange, said rod supporting a second idler sprocket for each chain, the device further comprising a coil tension spring having its one end attached to said minor arm of the bell crank lever and its other end anchored to an adjustment screw associated with said flange, said major are being formed with a slot permitting the passage of a screw for locking same to said flange.

* * * * *