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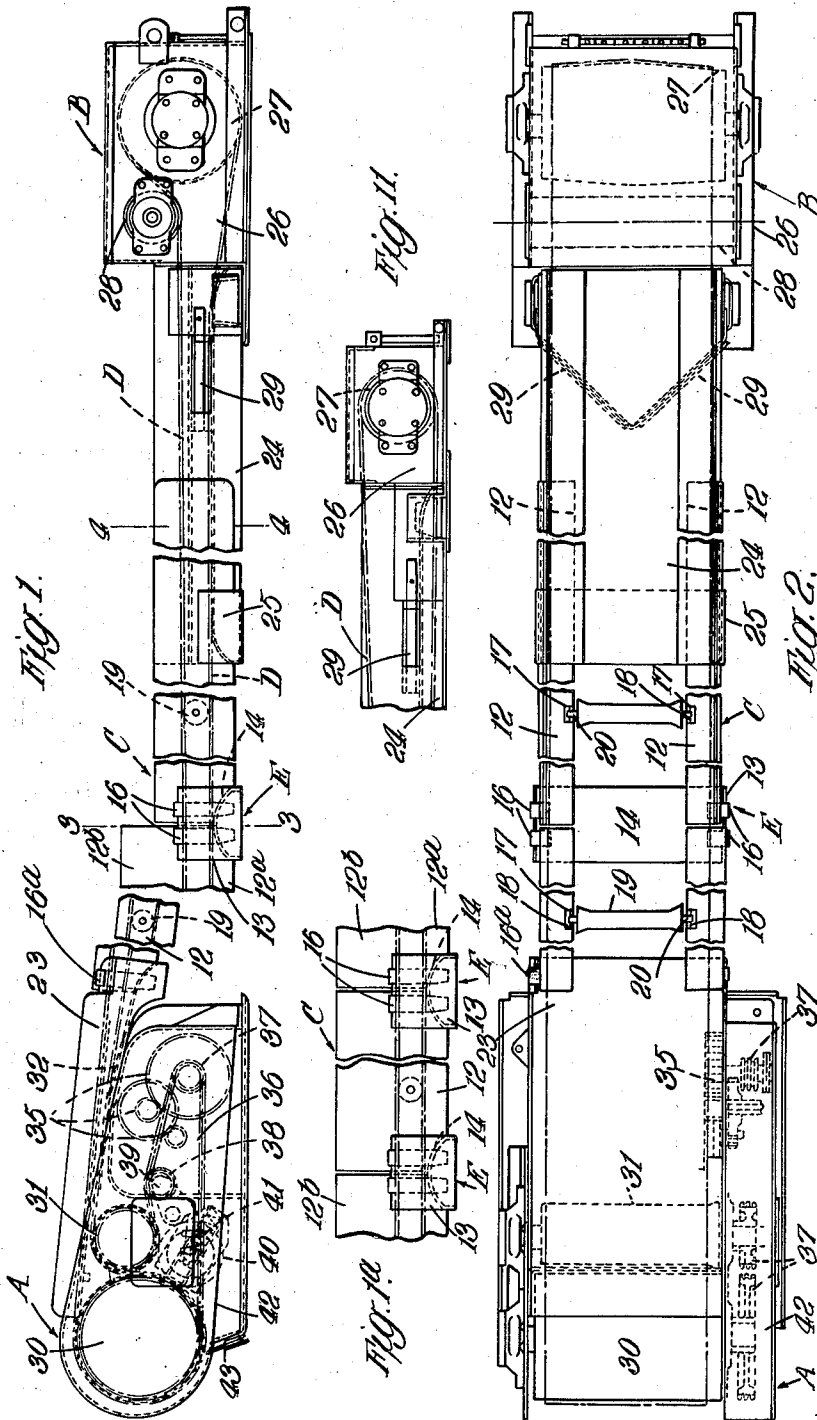
H. TINSLEY

2,094,728

BELT CONVEYER

Filed July 25, 1934

4 Sheets-Sheet 1



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Oct. 5, 1937.

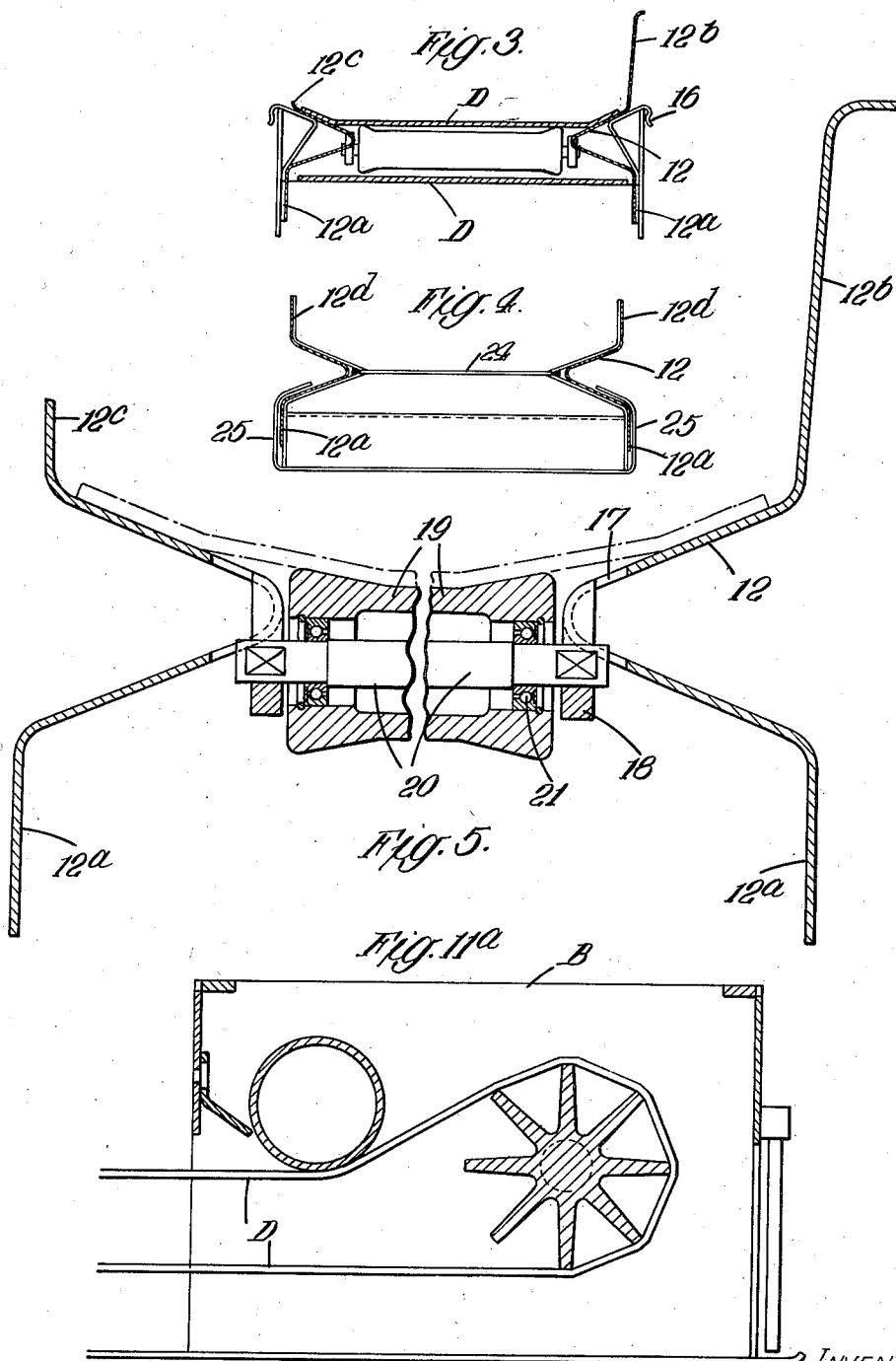
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4 Sheets-Sheet 2



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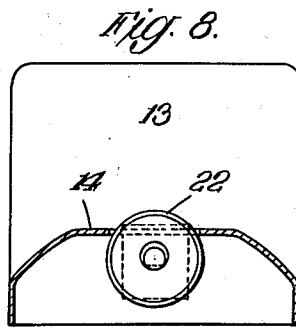
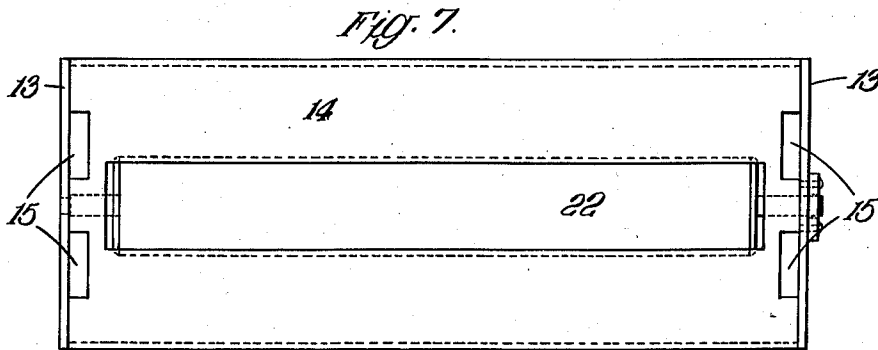
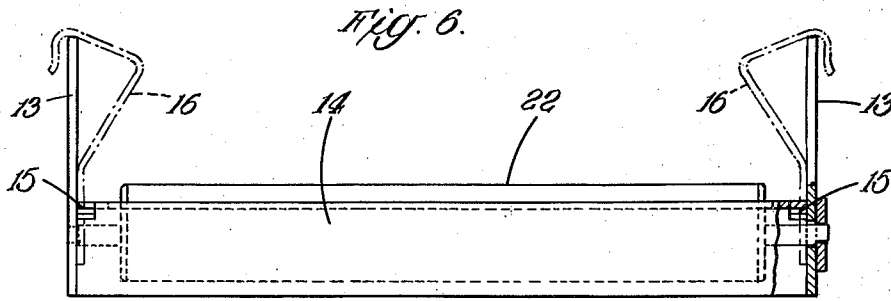
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

Fig. 9.

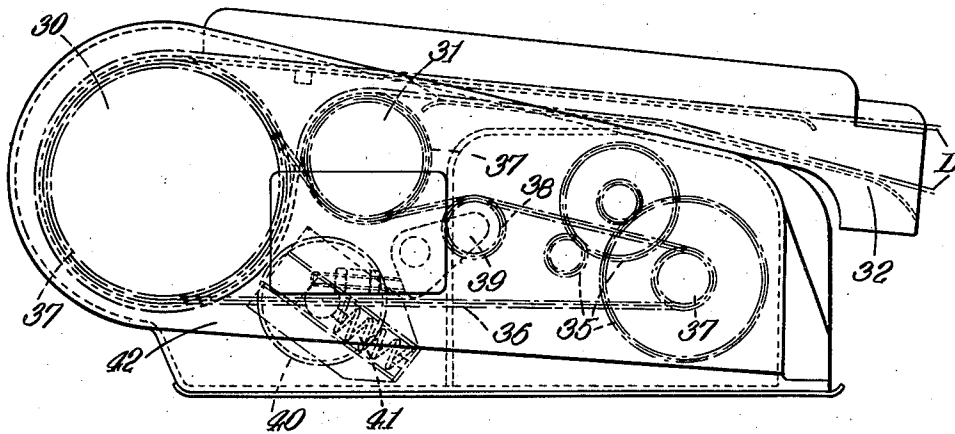
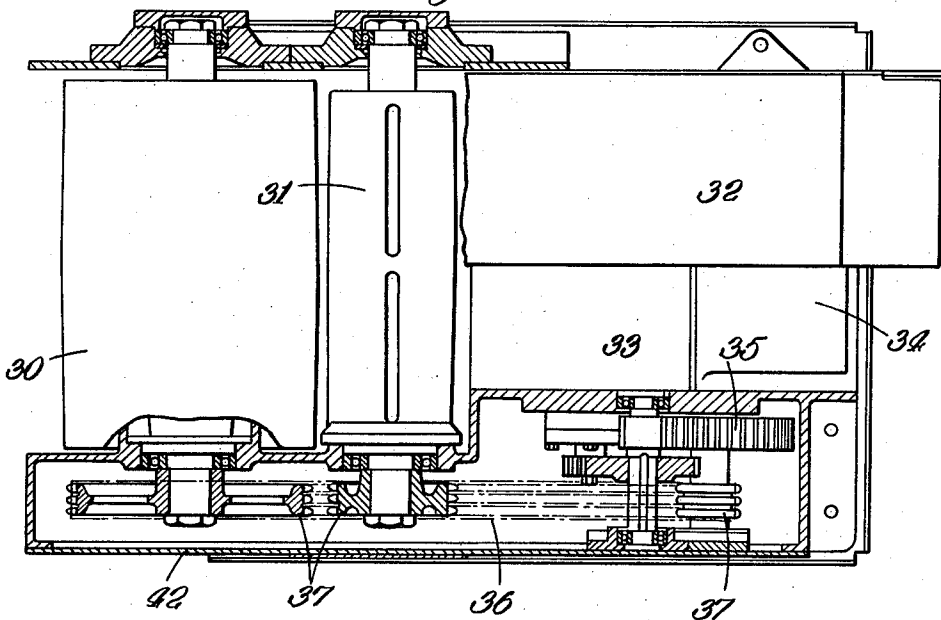


Fig. 10.



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UNITED STATES PATENT OFFICE

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BELT CONVEYER

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In Great Britain July 28, 1933

11 Claims. (Cl. 198—191)

This invention relates to belt conveyers and has more particular though not exclusive reference to face belt conveyers for use in coal mines. The chief object of the present invention is to provide an improved construction of belt conveyer which has many advantages over the usual type of such conveyer. The invention comprises a number of improvements in connection with different parts of the conveyer, which latter generally may be constituted by three main sections, namely, a driving head or section, a tail section or tension end and a series of intermediate adjoining sections which can be arranged end to end and in suitable disposition with regard to the driving head or section and the tail section or tension end to provide the complete conveyer.

According to one feature of the invention the conveyer comprises V-shaped or similarly shaped side members which are so constructed and arranged that they impart a shallow trough-like formation to the upper portion of the belt. Such V-shaped side members are also disposed or formed to protect or cover the lower portion of the belt. The arrangement is such that the apex ends of the V-shaped members project inwardly towards each other, the upper parts of the said members forming inclined faces or seatings upon which the outer parts or edges of the upper portion of the belt rest, whilst the said members project inwardly to such an extent as to cover or protect the outer parts or edges of the lower belt portion. The said side members may be provided with upstanding walls or flanges, and preferably the arrangement is such that the upstanding walls or flanges on the side members at one side of the conveyer are higher than the walls or flanges on the opposite members. The opposite side members, however, may be interchangeable so that either the higher or the lower walls or flanges may be provided at either or both sides of the conveyer. By means of this construction the use of loose "spill" plates generally employed in this class of conveyer can be avoided owing to the "goaf" and "face" side members being interchangeable. The ends of the said side members can be connected together or supported in any appropriate manner and the side members are preferably so formed as to provide supports or lugs for carrying idler rollers which support the middle part of the belt. The idler rollers may have spindles that are slotted to fit in lugs provided in the aforesaid side members or plates, the slots preventing rotation of the spindles and providing lateral register for the side

members. The said side members are preferably connected together or supported by a number of stands or stools which may or may not be fitted with idler rollers for the return belt portion. The said supporting stands or stools which have upstanding or vertical end plates or sides may receive suitably shaped metal strips or brackets that may extend over the said end plates and also fit in slots in the stands or stools. These brackets are welded or otherwise attached to the V-shaped side members and constitute the means of readily linking up the side members to the supporting stands or stools. The ends of the various intermediate sections constituted by the inter-connected V-shaped side members may abut at positions where the supporting stands or stools are provided and they may be supported either horizontally or at a suitable inclination according to requirements. The said supporting stands or stools may, if desired, carry rollers over which the bottom portion of the belt travels, or they may be provided with suitably curved or shaped members over which the return portion of the belt may pass. The stands or stools provide for alignment of the side members horizontally whilst permitting of reasonable vertical adjustment or changes of alignment to follow the contour of the ground over which the conveyer passes. A series of the V-shaped side members connected or assembled as aforesaid, constitute the intermediate section which is suitably arranged or disposed in relation to the driving head section and the tail end section. According to a further feature of the invention provision is made whereby telescopic or longitudinal adjustment may be effected at the tail end section, for example by means of the V-shaped side members or plates as aforesaid being slidably arranged on or in a receiving trough of suitable form, the trough being connected to the tail end frame which may carry the tail end drum and which may also be provided with means for self-cleaning. The driving head or section according to this invention may comprise main and secondary driving drums driven by a single chain from the gear unit, the gear unit and the chain being preferably enclosed in a casing which may be located adjacent to the driving motor which for compactness may be disposed under the belt. A special advantage of the construction of the driving head is that the weight is disposed largely at the rear of the gear head. In order to reduce the initial tension required in the belting, a pinching roller is provided to operate against the return belt on the main or larger driving

drum, preferably at a position between the two driving drums so as to be operative when the belt is running in the reverse direction, the said roller being maintained against the belt with the requisite pressure by means of springs.

In order that the invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side view of one form of belt conveyer comprising various improvements according to this invention.

Figure 1a is a side view illustrating more particularly one method of connecting or supporting the ends of the side members of the intermediate sections.

Figure 2 is a plan view of the conveyer shown in Figure 1, the belt, however, in this figure being omitted.

Figures 3 and 4 are transverse sectional views taken on the lines 3—3 and 4—4 of Figure 1.

Figure 5 is an enlarged cross-sectional view showing more particularly one arrangement of the side supporting members with idler rollers carried thereby.

Figures 6, 7 and 8 are respectively a transverse view (partly in section), a plan and a longitudinal sectional view of one of the aforesaid stools or supporting stands.

Figures 9 and 10 are respectively a side view and a sectional plan view of the driving head or section drawn to a larger scale.

Figure 11 illustrates an alternative or modified form of the tail end section.

Figure 11a illustrates an alternative or modified form of the tail end section.

In the example shown, the conveyer comprises a driving head or section which is generally indicated at A, a tail end or tension section indicated at B and an intermediate section generally represented by C, the endless belt of the conveyer being indicated by D. The intermediate or main part of the conveyer is preferably constituted by a series of sections which are supported or connected as hereinafter described by stands or stools E. Each of these intermediate sections comprises two longitudinally disposed side members which are in the form of V-shaped plates 12, 12, the apex ends of which are directed inwardly towards each other as shown in the cross-sectional views in Figures 3, 4 and 5. The upper portions of the V-shaped plates constitute inclined faces or seatings upon which rest the outer parts or edges of the upper portion of the belt D, the said V-shaped portions projecting between the upper and lower belt portions so as to cover or protect the lower portion of the belt. The lower parts of the V-shaped plates are extended downwardly and preferably vertically to form side walls 12a, the lower or return belt portion being disposed between these side walls as shown in Figure 3. The inclined faces or seatings afforded by the V-shaped side members impart a shallow trough-like formation to the belt, and the construction is such as to minimize spillage and at the same time prevent material from being placed on or falling on the lower or return portion of the belt. The ends of the V-shaped plates or side members of the different sections adjoin or abut or are connected in any appropriate manner. In the example shown, the supporting stands or stools E are provided at the adjoining ends of the side plates or members and as shown more particularly in Figures 6, 7 and 8 these stands or stools comprise side plates 13

which are preferably vertically disposed and a transverse connecting member 14 between them. The transverse connecting member is slotted at 15 to receive brackets or supports 16 which are welded or otherwise secured to the ends of the side members 12 and are so shaped as to hook over the upper edges of the side plates 13 as shown more particularly in Figure 3, the said brackets being provided with downwardly extending portions that fit in the aforesaid slots 15 in order to locate the brackets in the proper positions for supporting the side members or plates. The adjoining ends of the side members or plates may be suitably shaped to conform with the shape of the transverse member of the supporting stand or stool, or alternatively, suitable portions of the side members may be formed to fit into slots provided in the supporting stands or stools. The V-shaped side members or plates 12 at spaced positions along their lengths are preferably provided with slots 17 and lugs 18 (see Figure 5) to receive idler rollers 19 upon which rest the main or middle part of the upper portion of the belt, for which purpose the said rollers may be rotatably mounted on spindles 20, the ends of which are slotted or formed with flats to engage with the aforesaid lugs 18 so that the spindles are retained against rotation and displacement whilst also serving to connect the side members 12 together. As shown in Figure 5, the rollers 19 may be outwardly tapered towards their extremities to assist in imparting the trough-like formation to the belt, but the rollers may be entirely cylindrical, if desired. The rollers 19, which may be hollow, may be mounted on ball bearings 21 that close the ends, the space within the rollers preferably containing lubricant. An advantage of the construction hereinbefore described is that the idler rollers may be placed or removed with the side plates in position so as to form complete units, this being contrary to the usual practice with this type of conveyer. The side members may be formed with upstanding walls or flanges at their upper parts, and as shown in Figures 3 and 5, the wall or flange 12b on one side member 12 may be considerably higher than the wall or flange 12c on the opposite side member 12. The opposite side members may be interchangeable so that the higher wall or flange 12b may be located at either side of the conveyer. By this construction loose spill plates such as are generally employed can be dispensed with owing to the "goaf" or "face" side members of the conveyer being interchangeable. The intermediate sections constituted by the aforesaid side members 12 may be supported horizontally or in inclined positions, the arrangement generally being such that most of the sections are horizontal. The aforesaid supporting stands or stools provide for alignment of the side members horizontally whilst permitting of reasonable vertical changes of alignment to follow the contour of the ground over which the conveyer extends. The supporting stands or stools may be provided with idler rollers 22 for the return or lower belt portion (as shown in Figures 6, 7 and 8) or the transverse members of these stands may be suitably shaped or curved as shown for example in Figures 1 and 1a to allow the belt to travel freely and smoothly over them. Generally only the V-shaped side members of the middle sections are provided with the walls or flanges of different heights, the side members of the end sections adjoining the driving head and/or the tail section preferably having walls of the same height

as shown at 12d in Figure 4 for example which illustrates the side members that are connected to the tail end or tension section.

The end section adjacent to the driving head may be slightly inclined upwardly towards the latter as shown in Figure 1, to which it is attached preferably to a top trough member 23, one end of which is similar to one half of the supporting stand or stool hereinbefore described, and which may receive supporting brackets 16a (see Figure 1)—similar to the brackets 16 hereinbefore referred to—for engaging with the upper edge of the trough member 23 and also fitting in slots at the lower part. The end of the intermediate section which adjoins or is adjacent to the tail end section may be telescopically or adjustably fitted in relation to this tail end section, for example, by means of the aforesaid side members 12 of the end intermediate section fitting on or in a receiving trough 24 as shown in Figure 4, the said receiving trough being such as to fit closely against the aforesaid side members 12 which at their lower parts are embraced by plates 25 having turned-over ends or edges as shown in Figure 4. By means of this construction relative longitudinal movement can be effected between the trough member 24 and the end intermediate section to permit of the necessary adjustment. The said trough 24 is connected to the tail end frame 26 which carries the tail drum around which the belt D passes. In the arrangement shown in Figure 1, the belt after passing around the tail drum is engaged by a small roller or snub pulley 28, but in the alternative construction shown in Figure 11, this roller or pulley is dispensed with and only the single tail drum is employed. In the example illustrated in Figures 1 and 2, a rubber covered scraper 29 is provided for engaging with the lower or return portion of the belt and this scraper may be of V-formation so that the material removed can be directed towards the sides of the conveyer. Alternatively, a reversible scraper may be used. The construction at this part of the conveyer provides great rigidity and strength whilst leaving all parts readily accessible for inspection or replacement.

The arrangement at the driving end or section is such that the return or lower belt portion after leaving a main driving drum 30 passes around a secondary driving drum 31 disposed in close proximity to the upper portion of the belt, the return portion of which latter preferably passes over a plate 32 forming part of the trough member 23 disposed above a driving motor 33 which may be an electric or compressed air motor. When an electric motor is used, it may have associated with it a switch 34 to form an integral unit (see Figure 10) in order to afford better protection from damage whilst providing for full and ready accessibility. Reduction gearing 35 is provided as shown and is located adjacent to the motor unit in such position as to result in concentration of the weight at the rear of the gear head which is a considerable advantage when delivering over a "canch". This also affords better protection of the gearing and provides a narrow overall width. In the example shown and as illustrated more particularly in Figure 10, a single driving chain 36 is used to transmit the drive from the gear unit to each driving drum, the said chain preferably passing over multiple sprockets 37 while chain adjusting means comprising a sprocket 38 mounted on a pivoted arm 39 may be provided so as to per-

mit of adjustment of the chain whilst employing fixed centres on all the driving or driven members. This chain may also give a differential drive action where desired. A pinching roller 40 is provided to bear against the return belt portion whilst passing around the larger driving drum, the said pinching roller being so disposed between the two driving drums as to be operative when the belt is running in either direction. The pinching roller 40 is caused to bear with the necessary pressure against the larger drum by means of springs 41 as shown in Figures 1 and 9. The driving head or section comprising the motor, reduction gearing and the driving drums may be constructed as a complete unit to which one end of the adjacent intermediate section can be readily connected, for example as hereinbefore described, the driving mechanism being completely enclosed or housed within a casing 42. Owing to the motor being disposed below the belt and constituting part of the head, greater rigidity, absence of handling and compact dimensions of the gears are permitted. The general construction of this section is also designed with a view to providing greater accessibility for inspection or renewal. A wiper 43 may be provided to bear against the outer surface of the belt, preferably at the position shown in Figure 1. As shown in Figure 11a the tail end section is provided with a paddle wheel type of pulley rather than the drum type as illustrated in Figs. 1 and 11. Although the conveyer described and illustrated comprises the particular forms of driving head or section and tail end section set forth, it will be understood that the form of conveyer comprising the V-shaped side or belt supporting members may be used in any type of belt conveyer of which the belt may be driven in any appropriate manner. Although the belt supporting members are of V-shape, they may be of any suitable shape which enables the belt to be supported as herein set forth. For instance, the members may be constituted by plates of suitably curved section or form and instead of the plates being in one piece they may be built up or assembled in any desired manner. The aforesaid driving end or section and the tail end section as hereinbefore referred to may also be employed in connection with various types of conveyers to which intermediate sections of any suitable type can be connected in any appropriate manner.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a conveyer, the combination with a trough, of a belt for moving in said trough, said trough being formed of substantially V-shaped unitary side plates the apexes of which are aligned toward each other and lie in a substantially horizontal plane, whereby the uppermost part of the V-shaped plates forms a dished trough for the upper belt run and the lower part thereof forms a protecting apron for the lower belt run.

2. In a conveyer, the combination with a trough, of a belt for moving in said trough, said trough being formed of substantially V-shaped unitary side plates the apexes of which are aligned toward each other and lie in a substantially horizontal plane, and belt supporting rollers between said apexes, whereby the upper part of the V-shaped plates form a dished trough for supporting the upper run of the belt and the lower part thereof forms a protecting apron for the lower belt run.

3. In a conveyer, the combination with a

trough, of a belt for moving in said trough, said trough being formed of substantially V-shaped side plates the apexes of which are aligned toward each other and lie in a substantially horizontal plane, whereby the uppermost part of the V-shaped plates forms a dished trough for the upper belt run and the lower part thereof forms a protecting apron for the lower belt run.

4. In a conveyer, the combination with a trough, of a belt for moving in said trough, said trough being formed of substantially V-shaped side plates the apexes of which are aligned toward each other and lie in a substantially horizontal plane, and belt supporting rollers between said apexes, whereby the upper part of the V-shaped plates form a dished trough for supporting the upper run of the belt and the lower part thereof forms a protecting apron for the lower belt run.

5. In a conveyer, the combination with a trough, of a belt for moving in said trough, said trough being formed of a pair of spaced plates substantially V-shaped in cross-section with their apexes aligned and extending toward each other in a substantially horizontal plane, one of said plates having an upstanding flange of greater height than the other plate whereby a baffle is formed, said plates being interchangeable on said conveyer.

6. In a conveyer, the combination with a trough, of a belt for moving in said trough, said trough being formed of a pair of spaced plates substantially V-shaped in cross-section with their apexes aligned and extending toward each other in a substantially horizontal plane, one of said plates having an upstanding flange of greater height than the other plate whereby a baffle is formed.

7. In a conveyer, the combination with a trough, of a belt for moving in said trough, said trough being formed of a pair of spaced plates substantially V-shaped in cross-section with their apexes aligned and extending toward each other in a substantially horizontal plane, slots in the apexes of said V-shaped plates, brackets positioned below said slots, a roller having an axle supported at its ends by said brackets said roller being adapted to drop between said plates with said axle moving through said slots.

8. In a conveyer, the combination with a trough, of a belt for moving in said trough, said

trough being formed of a pair of spaced plates substantially V-shaped in cross-section with their apexes aligned and extending toward each other in a substantially horizontal plane, slots in the apexes of said V-shaped plates, brackets positioned below said slots, a roller having an axle supported at its ends by said brackets.

9. In a sectional conveyer, the combination with a plurality of trough sections each formed of independently supported side plates, of means for removably attaching said sections comprising a U-shaped stand, straps on the ends of the conveyer section side plates having hooked upper ends adapted to hook over the sides of said stand, said straps having bottom portions extending downwardly into recess latch means on said stand, whereby each trough section is separately attached to and individually removable from a stand to prevent disengagement by longitudinal pulling thereof, and each side plate is independently supported.

10. In a sectional conveyer, the combination with a plurality of trough sections each formed of individual side plates, of means for removably attaching said sections comprising a U-shaped stand, cooperating means rigid with each section and stand for effecting an attachment of each section to said stand by relatively vertical movement between the section and stand, whereby longitudinal movement between sections is prevented, said cooperating means including straps on each section end adapted to engage shoulders on said stand and to hook over the tops of said stand to maintain the side plates upright.

11. In a sectional conveyer, the combination with a plurality of trough sections formed of independent side plates, of means for removably attaching said sections comprising a U-shaped stand, means for attaching the ends of contiguous side plates to said stand for ready removal by relative vertical movement but which prevents removal by longitudinal movement including means which hook over the upper edges of said stand to hold said side plates upright, webs extending inwardly of said side plates to form a support for a belt, and belt supporting rollers supported by said side plates and positioned therebetween.

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