Dec. 22, 1931. N. D. LEVIN 1,837,276

CAR UNLOADER

Filed June 30, 1927 3 Sheets-Sheet 1

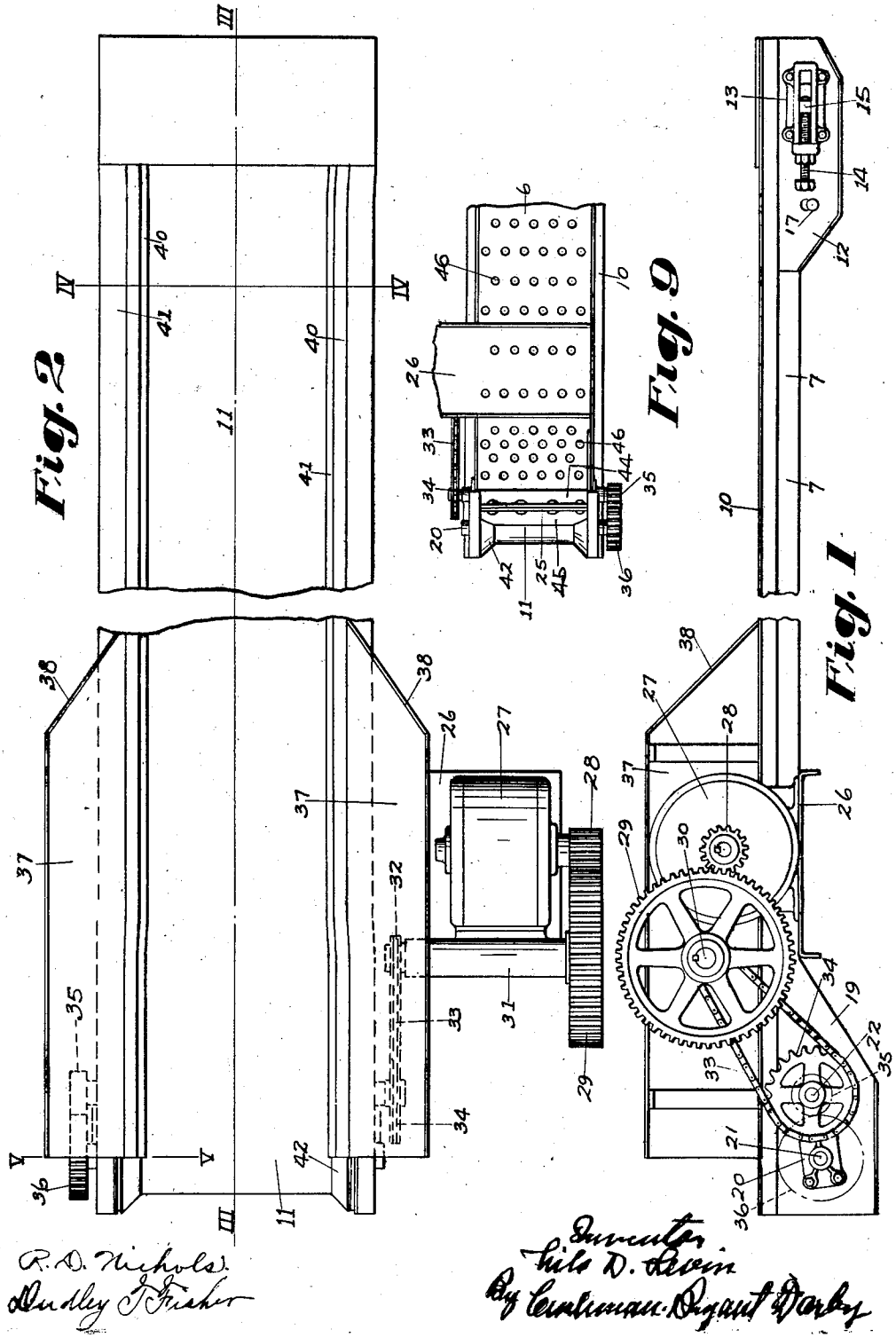


Fig. 2

Fig. 9

Fig. 1

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CAR UNLOADER

Filed June 30, 1927 3 Sheets-Sheet 2

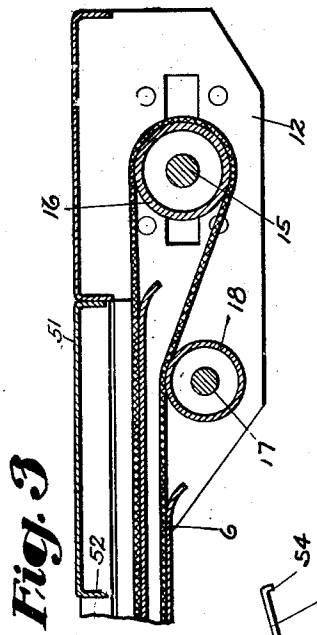


Fig. 3

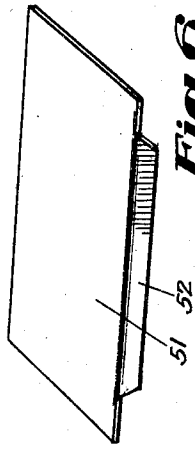


Fig. 6

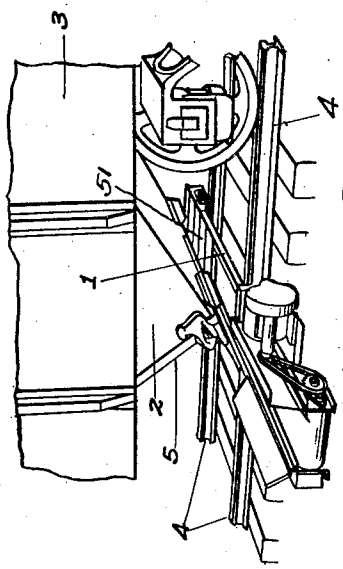


Fig. 8



Fig. 7

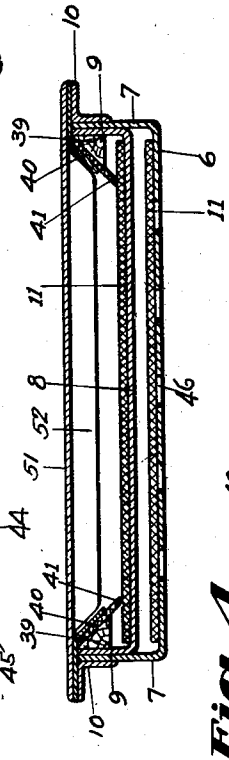


Fig. 4

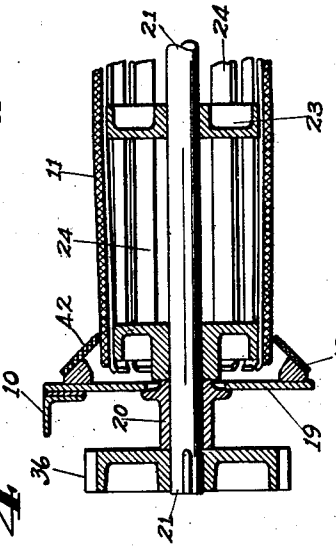


Fig. 5

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Filed June 30, 1927 3 Sheets-Sheet 3

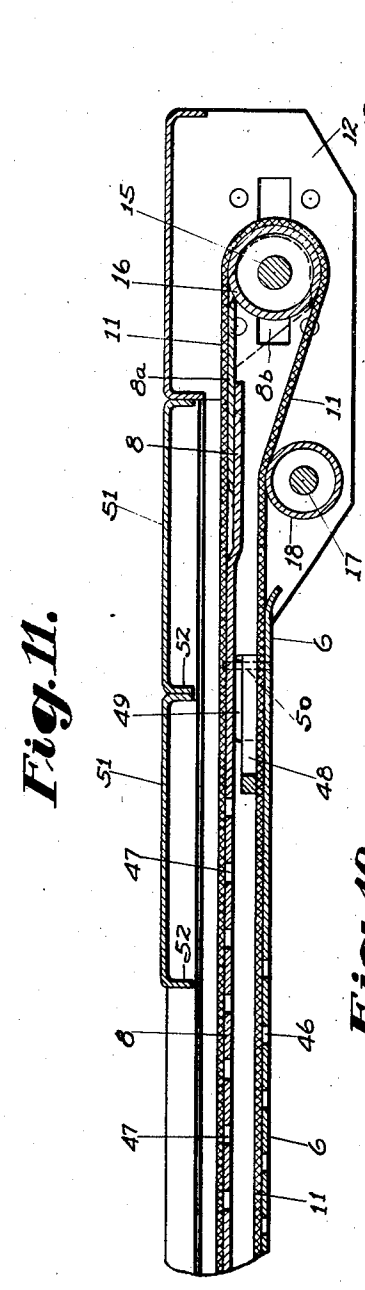


Fig. 11.

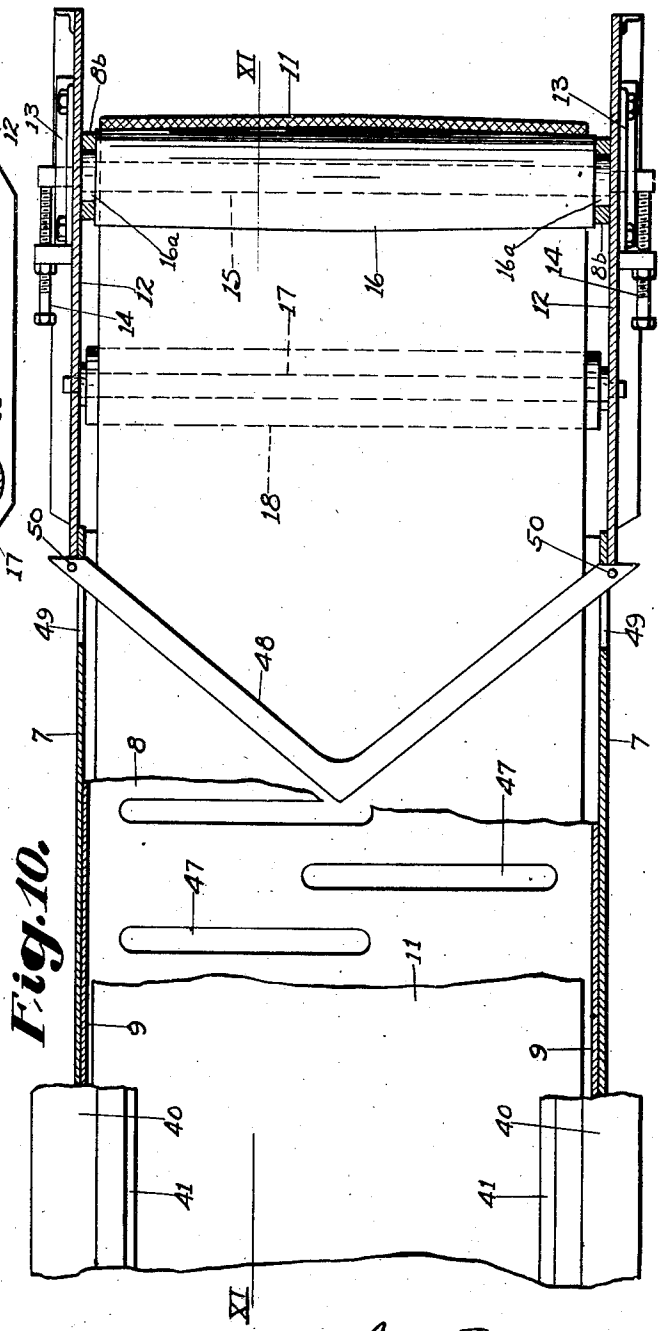


Fig. 10.

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UNITED STATES PATENT OFFICE

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CAR UNLOADER

Application filed June 30, 1927. Serial No. 202,628.

The present invention relates to certain new and useful improvements in car unloaders of the type adapted to be placed beneath the hopper bottom of a gondola car to receive material discharged therefrom and remove it transversely of the track upon which the car stands.

The especial object of this invention is to provide a self-contained conveyor mechanism adapted to be interposed between the top of the track rails and the lowermost portion of the hopper bottom of a gondola car, and provided with readily removable protecting devices adapted to protect the material moving element from contact with the mass of material discharged from the car hopper.

A further object is to provide a conveyor, such as aforesaid, with means to prevent the obstruction of the material moving element by accumulations of material within the casing of the machine.

A further object is to provide inexpensive, simple, durable and efficient mechanism adapted to be conveniently manipulated to effect the objects above described.

These and other objects will be fully set forth in the following specifications and illustrated in the accompanying drawings of which

Fig. 1 is a side elevation of the preferred embodiment of my invention.

Fig. 2 is a plan view of the mechanism disclosed in Fig. 1.

Fig. 3 is a longitudinal section taken along the line III—III of Fig. 2.

Fig. 4 is a transverse section taken along the line IV—IV of Fig. 2.

Fig. 5 is a fragmentary transverse sectional view taken along the line V—V of Fig. 2.

Fig. 6 is a perspective detail of one of the removable protective cover plates.

Fig. 7 is a detail of an implement adapted for the convenient manipulation of the cover plates.

Fig. 8 is a perspective view of my improved car unloader in operative position beneath the hopper bottom of a gondola car.

Fig. 9 is an inverted plan view of the driving end of the machine.

Fig. 10 is a fragmentary plan view showing the cleaning devices associated with the lower runway of the conveyor frame and the foot pulley.

Fig. 11 is a sectional view taken along the line XI—XI of Fig. 10.

Like numerals refer to similar parts in the several figures.

In the drawings I have shown one embodiment of my invention especially adapted to unload sand, crushed stone, coal, or similar material from hopper bottom gondola cars, consisting of an elongated, relatively thin, self-contained conveyor 1 adapted to be positioned beneath the hopper bottom 2 of a gondola car 3, and to be supported in that position by the track rails 4 upon which said car stands. When the conveyor 1 is in operative position, as shown in Fig. 8, and the doors 5 of the hopper 2 are released, the sand, or other material, discharged from the hopper 2 flows directly upon the material engaging element of the conveyor 1, to be removed thereby transversely of the track and discharged into suitably placed auxiliary conveyor mechanism, or to be otherwise disposed of as may be most convenient under the conditions of use.

As shown particularly in Fig. 4 of the drawings, the numeral 6 refers to a sheet metal plate, the lateral edges 7 of which are upturned to form a pan or trough adapted to rest upon the tops of the track rails 4. The numeral 8 refers to a second plate the lateral edges 9 of which are turned up to form a similar trough which is inserted between the flanges 7, its bottom spaced from the bottom of the first mentioned trough. These lateral flanges are reinforced by the longitudinally extending angle bars 10 and are secured to-

gether by rivets, or other suitable means, to form a rigid supporting frame the vertical dimensions of which are such that it may be interposed between the track rails 4 and the lowermost portion of the hopper bottom 2 of a gondola car 3 standing upon said track rails.

In the space between the plates 6 and 8 travels the return strand of an endless conveyor belt 11 the carrying strand of which slides upon the upper surface of the plate 8 in position to receive and transport material deposited thereon. At one end of the frame thus formed are attached downwardly projecting extension side plates 12 to which are fixed the journal boxes 13 of the well known take-up type adapted to be moved longitudinally of the conveyor frame by manipulation of the screws 14. Journaled in the boxes 13 is a foot shaft 15 upon which is mounted the foot wheel 16 around which the conveyor belt 11 travels from the lower to the upper runway of the conveyor frame. By manipulation of the screws 14 the foot wheel 16 may be moved longitudinally of the conveyor frame to tension the conveyor belt in the manner which is well understood in the conveyor art. Attached to the extension side plates 12, forwardly of the foot shaft 15, is a shaft 17 upon which is mounted for free rotation an idler pulley 18 which engages the under surface of the conveyor belt 11 to guide it from the lower runway to the foot wheel 16.

To the opposite end of the conveyor frame is attached downwardly projecting extension side plates 19 to which are fixed the castings 20. Formed in each of the castings 20 are two journal bearings which support the head shaft 21 and the snubbing shaft 22. Fixed to the head shaft 21 is the head pulley wheel 23 around which the conveyor belt 11 travels from the upper to the lower runway of the conveyor frame. The head wheel 23 may be of any preferred type suitable to the conditions of service. For purposes of illustration I have here shown a slat pulley of well known design, the periphery of which is formed of a plurality of spaced apart slats 24 adapted to engage the conveyor belt 11 to drive it. The slats 24 also act to dislodge material adhering to the under surface of the belt, which dislodged material falls between the slats 24 and escapes from the machine thus avoiding the formation of accretions upon the surface of the pulley 23. A snubbing pulley 25 mounted upon the snubbing shaft 22 engages the under surface of the conveyor belt 11 to hold it in contact with the head wheel 23 and to guide it therefrom into the lower runway of the conveyor frame.

Fixed to the conveyor frame, and projecting laterally therefrom, is a platform 26 upon which is mounted the power mechanism whereby the conveyor belt is actuated. The actuating motor may be of any preferred type suitable to the conditions under which the machine is operated. For purposes of illustration I have here shown an electric motor 27 adapted to receive its actuating current from any suitable source of current supply through any suitable and convenient conductor, and to be controlled by any suitable controlling mechanism, but as such devices are well understood in the conveyor art, their illustration and description is not thought to be required at this time. The motor 27 is provided with an armature pinion 28 which engages a spur gear 29 fixed to the countershaft 30 supported in suitable bearings 31 attached to the motor frame. To the countershaft 30 is fixed a sprocket wheel 32 which is connected by a suitable endless chain 33 with a sprocket wheel 34 attached to the projecting end of the snubbing shaft 22. At the opposite end of the snubbing shaft 22 is fixed a spur gear 35 which engages the spur gear 36 fixed to the projecting end of the head shaft 21. The proportion of these gears is such that the head wheel 23 and snubbing wheel 25 revolve at the same peripheral speed, thereby multiplying the driving effects upon the conveyor belt. The extension plates 19 are extended upwardly to form the flaring side boards 37 adapted to protect the power devices from material spilling over the sides of the trough, and the rearward ends 38 of the side boards 37 are upwardly and forwardly inclined for a purpose which will hereinafter appear.

Under the conditions of service for which this machine is especially designed, fragments of sand, or other material carried upon the surface of the conveyor belt, tends to spill over its lateral edges and to work in between the belt 11 and the plate 8, thereby producing excessive friction which tends to the rapid deterioration of both belt and trough. To overcome this tendency I have attached to the side walls 9 of the conveyor trough longitudinally extending rails 39 of triangular cross section, to which are secured by the clamping flanges 40, flexible guard strips 41. The guard strips 41 are preferably formed of fabric, or other material not likely to abrade the surface of the conveyor belt, and they extend into contact with its upper surface, completely closing off the means of lateral escape for material carried thereon. A semi-circular guard flange 42 similar to the guard flanges 41 is attached to the side plates 19, and forms a continuation of the guard strip 41 around the forward half of the head pulley 23 to prevent sand, or similar granular material falling between the ends of the head pulley 23 and the side plates 19.

When handling wet sand, finely crushed stone, coal or other similar material, there is a tendency for fragments to adhere to the surface of the belt 11, and be carried thereby

into the return runway of the conveyor frame. The presence of such material between the belt 11 and the bottom plate 6 produces excessive friction, tending to the rapid deterioration of the belt. The pressure exerted by the belt 11 upon such material tends to build up accretions upon the plate 6, and these accretions choke the apparatus and contribute to the rapid destruction of the conveyor belt. I have therefore extended the plate 6 forwardly and downwardly into close proximity with the head pulley 23, and have secured its forward end in place by a transversely extending angle bar 44. To the angle bar 44 I have attached a scraper element 45, composed of the same flexible fabric material of which the guard strips 41 are formed, and this scraper by its contact with the surface of the conveyor belt removes adhering fragments therefrom. As a further precaution against the accumulation of loose material between the belt 11 and the plate 6 I have provided in the plate 6 a plurality of apertures 46 arranged in transverse rows, and offset relative to the apertures in adjacent rows. As the belt 11 passes over these apertures 46 material adhering to the belt will be engaged by the edges of the plate 6 and dislodged from the belt escaping through the apertures 46, thereby preventing undue friction and the formation of accretions in the runway.

As a further precaution against the accumulation of extraneous material beneath the upper strand of the conveyor belt 11, I have provided apertures 47 in the plate 8, through which such material may escape. Material falling through the apertures 47 drops upon the inner face of the conveyor belt 11 from which it is removed by the V-shaped scraper 48 which floats upon the surface of the belt 11. The scraper 48 is composed of a suitable steel bar the ends of which project through apertures 49 in the side plates 7, and through these apertures 49 material dislodged by said scraper escapes from the conveyor frame. To hold the scraper 48 in operative relation with the conveyor frame I have provided cotter pins 50 which extend through suitable apertures in the projecting ends of the scraper 48 outside of the flanges 7.

When the apparatus is in operative position, and the door 5 of the hopper 2 is released, the material flowing therefrom falls directly upon the belt 11 and buries it under a mass the weight of which, if not otherwise supported, would overload and choke the conveyor. To prevent such overloading I have provided a plurality of shield plates 51 adapted to rest upon the upper edges of the flanges 10 of the conveyor frame to support the mass of material above the conveyor belt and provide suitable clearance for its movement. The lateral edges of the plates 51 are bent downwardly to form stiffening flanges 52, and these stiffening flanges are adapted to engage the side walls of the conveyor trough to prevent lateral displacement of the shield plates 51.

When handling certain classes of relatively sticky material, fragments find their way to the surface of the pulley 16 and build up accretions which, after protracted service, become troublesome. To remove these accretions I have provided a scraper composed of a plate 8*a* adapted to rest upon the bottom of the trough 8 beneath the belt 11, and provided with downwardly projecting lugs 8*b* which engage the hubs 16*a* of the pulley to maintain contact between the scraper 8*a* and the surface of the pulley 16 when the journal boxes 13 are adjusted longitudinally of the conveyor frame. The material removed from the surface of the pulley 16 by the scraper 8*a* is dragged by the belt 11 along the bottom of the trough 8 and escapes through the apertures 47.

In operation my improved car unloader is positioned upon the track rails beneath the hopper of the car which is to be unloaded. The cover plates 51 are adjusted to protect the entire effective length of the conveyor belt. The door 5 of the hopper 2 is then released to allow loose material to flow from the hopper onto the cover plates 51. After the motor has been started, the first cover plate adjacent the discharge end of the conveyor is removed to permit said loose material to flow onto the belt to be transported thereby. As the mass of material above the cover plates is gradually reduced successive plates may be removed until the entire mass has been withdrawn from beneath the car.

Convenient means for the manipulation of the cover plates 51 is provided in the implement 53 the hook 54 of which is adapted to engage the flanges 52 of the cover plates. As the plate 51 moves outwardly along the conveyor frame loose material falls behind it into engagement with the moving belt, and this material carries the cover plate with it until engagement with the inclined forward edges 38 of the side boards 37 lifts the cover plate out of the loose material, facilitating its removal therefrom.

It is to be understood that I do not limit myself to the precise construction here shown since the mechanism may be subject to wide variations as to details without departure from the spirit of my invention.

What I claim is:

1. In an apparatus of the class described, the combination with a relatively thin conveyor frame comprising an upper and lower trough, of an endless belt arranged to travel in said troughs, relatively large head and foot pulleys supported at the ends of said frame and engaging said belt, auxiliary pulleys engaging the lower strand of said belt to guide it to and from the lower trough,

the lower trough being of sufficient length between the auxiliary pulleys to extend across the rails of the track with the bottom of the lower trough resting thereon, and downwardly projecting portions at each end of said frame positioned to lie at the sides of the track when the frame is supported on the latter.

2. In an apparatus of the class described, the combination with a head pulley, of a flat trough extending tangentially thereof, an endless belt arranged to travel upon the bottom of said trough and around said pulley, flexible side strips attached to the sides of the trough engaging the surface of the belt to prevent spillage of material over the lateral edges thereof, and flexible semi-circular extension side strips extending around the forward side of said pulley in contact with the surface of the belt.

3. In an apparatus of the class described, the combination with a horizontally extending plate having upturned flanges along its lateral edges, of a second plate having similar upturned flanges interposed between the first mentioned flanges above the first mentioned plate, adjacent flanges being secured together to form a rigid relatively thin frame having an upper and a lower runway, an endless conveyor element adapted to travel in said runways, downwardly projecting extension side plates secured to said flanges adjacent each end of said frame, and pulleys supported by said extension side plates and engaging said conveyor element to actuate and guide it, as and for the purpose set forth.

4. In an apparatus of the class described, the combination with a relatively thin conveyor frame comprising an upper and lower trough, of an endless belt arranged to travel in said troughs, a relatively large head pulley supported at one end of said frame and engaging said belt to guide the latter in proper relation to the upper trough, an auxiliary pulley adjacent said head pulley engaging the lower strand of said belt to guide it into said lower trough, and power devices connected with said head pulley and auxiliary pulley to actuate said belt as and for the purpose set forth.

5. In an apparatus of the class described, a trough, a draft device traveling in said trough, a plurality of readily removable cover plates supported on the edges of said trough above said draft device for the initial reception of material to be conveyed, said plates being slidable successively toward the head of the conveyor to allow the material to fall behind them into said trough to be moved therealong by said draft device, said plates having depending portions adapted to be engaged by such released and moving material whereby they are bodily moved toward the conveyor head, and means at the conveyor head to remove said plates from the path of the material.

6. In an apparatus of the class described, a trough, a draft device traveling in said trough, a plurality of readily removable cover plates supported on the edges of said trough above said draft device for the initial reception of material to be conveyed, said plates being slidable successively toward the head of the conveyor to allow the material to fall behind them into said trough to be moved therealong by said draft device, and flanges on said plates adapted to be engaged by such released and moving material whereby the plates are bodily moved toward the conveyor head, the edges of said trough being upwardly inclined and diverging from the path of travel of the draft device at the conveyor head to receive and elevate the moving plates and disengage said flanges from said material.

7. A device of the class described, comprising a conveyor frame having a vertically restricted intermediate portion and downwardly expanded end portions, the intermediate portion being adapted to extend across and rest upon a car track underneath a car hopper with the end portions at each side of the track, head and foot pulleys of diameters greater than the depth of said restricted portion journalled respectively in said end portions, and an endless belt engaged by said pulleys.

8. In an apparatus of the class described, the combination with a frame comprising an upper and a lower runway, of an endless belt adapted to travel along said runways, and a scraper floating upon the lower strand of said belt to remove extraneous material therefrom, said scraper being translationally self-adjustable in a direction perpendicular to said lower strand.

9. In an apparatus of the class described, the combination with a frame comprising an upper and a lower runway, of an endless belt adapted to travel along said runways, and a V-shaped scraper floating upon the lower strand of said belt to remove extraneous material therefrom, said scraper being translationally self-adjustable in a direction perpendicular to said lower strand.

10. In an apparatus of the class described, the combination with a supporting frame, of a pulley mounted therein, a flat trough carried by the frame extending tangentially of the pulley, an endless belt adapted to travel around the pulley and along the bottom of the trough, and a scraper in contact with the pulley adapted to loosen extraneous material therefrom and conduct it into said trough as and for the purpose set forth.

11. In an apparatus of the class described, the combination with a supporting frame, of a pulley mounted for movement longitudinally thereof, a flat trough carried by the frame

extending tangentially of the pulley, an endless belt adapted to travel around the pulley and along the bottom of the trough, and a scraper carried by the trough adapted to contact with the surface of the pulley to loosen extraneous material therefrom and conduct it into said trough as and for the purpose set forth.

12. In an apparatus of the class described the combination with a supporting frame, of a pulley mounted for adjustment longitudinally thereof, a flat trough carried by the frame extending tangentially of the pulley, an endless belt adapted to travel around the pulley and along the bottom of the trough, a scraper carried by the trough adapted to contact with the surface of the pulley to loosen extraneous material therefrom and conduct it into said trough, and means to maintain contact of said scraper with said pulley at all adjusted positions of the latter as and for the purpose set forth.

13. In a conveyor, a plurality of troughs positioned in closely adjacent relation, pulleys at the ends of said troughs with their peripheries substantially tangential to the top trough but projecting largely below the bottom trough, downward flanges at the ends of said troughs in which said pulleys are journalled, and an endless belt operatively engaging said pulleys with its sections lying in respective troughs, the lower trough being of sufficient length between the pulleys to extend across the rails of the track with the bottom of the lower trough resting thereon and the flanges depending to the outside of the rails.

14. In a conveyor, a plurality of troughs superposed in closely adjacent relation, pulleys at the ends of said troughs with their peripheries substantially tangential to the top trough but projecting largely below the bottom trough, and an endless belt operatively engaging said pulleys with its sections lying in respective troughs, the lower trough at one end being downwardly bent to terminate below the pulley at that end.

15. In a conveyor, a plurality of troughs superposed in closely adjacent relation, pulleys at the ends of said troughs with their peripheries substantially tangential to the top trough but projecting largely below the bottom trough, an endless belt operatively engaging said pulleys with its sections lying in respective troughs, the lower trough at one end being downwardly bent to terminate below the pulley at that end, and a scraper secured to said downwardly bent end and bearing against the belt.

16. In a conveyor, an elongated trough, an endless belt having its active section supported on said trough, a pulley extending transversely of said trough at one end thereof, said belt engaging said pulley, said pulley being adjustable longitudinally of said trough, and a plate forming an extension of said trough and movable outwardly and inwardly relative thereto to adjust its length in accordance with the position of said pulley, said plate having a scraper edge cooperating with the periphery of said pulley.

17. In a conveyor, an elongated trough, an endless belt having its active section supported on said trough, a pulley extending transversely of said trough at one end thereof, said belt engaging said pulley, said pulley being adjustable longitudinally of said trough, and a plate forming an extension of said trough and movable outwardly and inwardly relative thereto to adjust its length in accordance with the position of said pulley, said plate being connected with said pulley to be adjusted simultaneously therewith and having a scraper edge cooperating with the periphery of said pulley.

18. In a conveyor, an endless travelling belt, horizontal head and foot shafts for said belt, supporting means for the upper belt section, said supporting means having a supporting surface extending from side to side beneath said section and substantially coextensively with the length thereof, the major length of said supporting surface being provided with mutually adjacent perforations through which loose material may fall to the lower belt section, and a scraper cooperating with the lower belt section adjacent the receiving end of the conveyor.

19. In a conveyor, an endless travelling belt, horizontal head and foot shafts for said belt, supporting means for the upper belt section, said supporting means having a supporting surface extending from side to side beneath said section and substantially coextensively with the length thereof, the major length of said supporting surface being provided with mutually adjacent perforations staggered in the longitudinal direction thereof through which loose material may fall to the lower belt section, and a scraper cooperating with the lower belt section adjacent the receiving end of the conveyor.

20. In an apparatus of the class described, the combination with a relatively thin conveyor frame comprising an upper and lower trough, of an endless belt arranged to travel in said troughs, a relatively large head pulley supported at one end of said frame and engaging said belt to guide the latter in proper relation to the upper trough, an auxiliary pulley adjacent said head pulley engaging the lower strand of said belt to guide it into said lower trough, means to drive one of said pulleys, and a gear secured to said driven pulley and engaging a gear on the other pulley to drive the latter.

21. In an apparatus of the class described, a trough, a draft device traveling in said trough, a plurality of readily removable cover plates supported on the edges of said

trough above said draft device for the initial reception of material to be conveyed, said plates being slidable successively toward the head of the conveyor to allow the material to fall behind them into said trough to be moved therealong by said draft device, said plates being adapted to be engaged by such released and moving material whereby they are bodily moved toward the conveyor head, the edges of said trough being upwardly inclined at the conveyor head and diverging from the path of travel of the draft device to receive and elevate the moving plates and disengage them from said material.

In testimony whereof I have hereunto set my hand.

NILS D. LEVIN.