No. 895,776. PATENTED AUG. 11, 1908.

W. K. LIGGETT.

CONVEYER.

APPLICATION FILED NOV. 29, 1905.

3 SHEETS—SHEET 1.

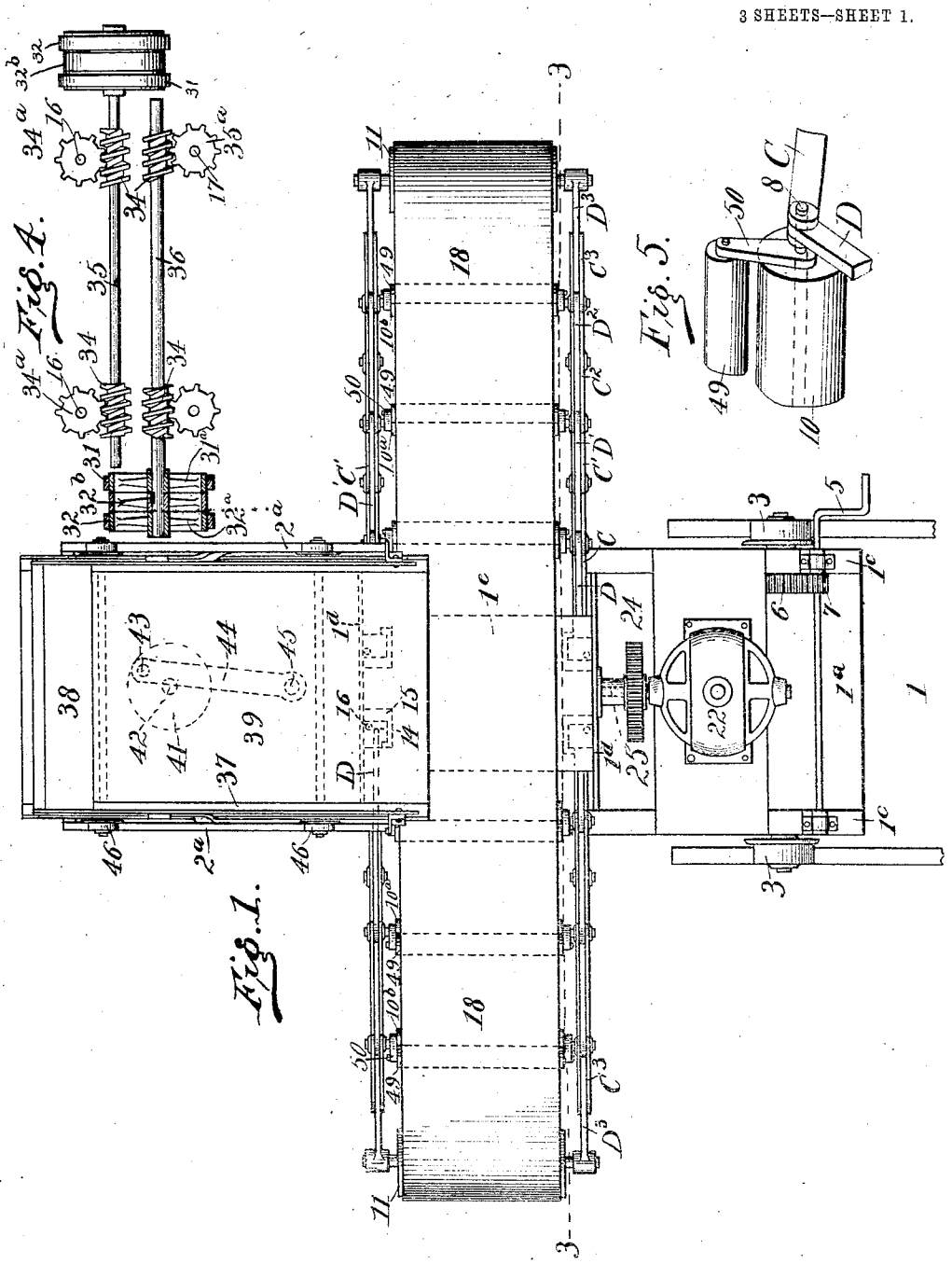

Fig. 1.

Fig. 4.

Fig. 5.

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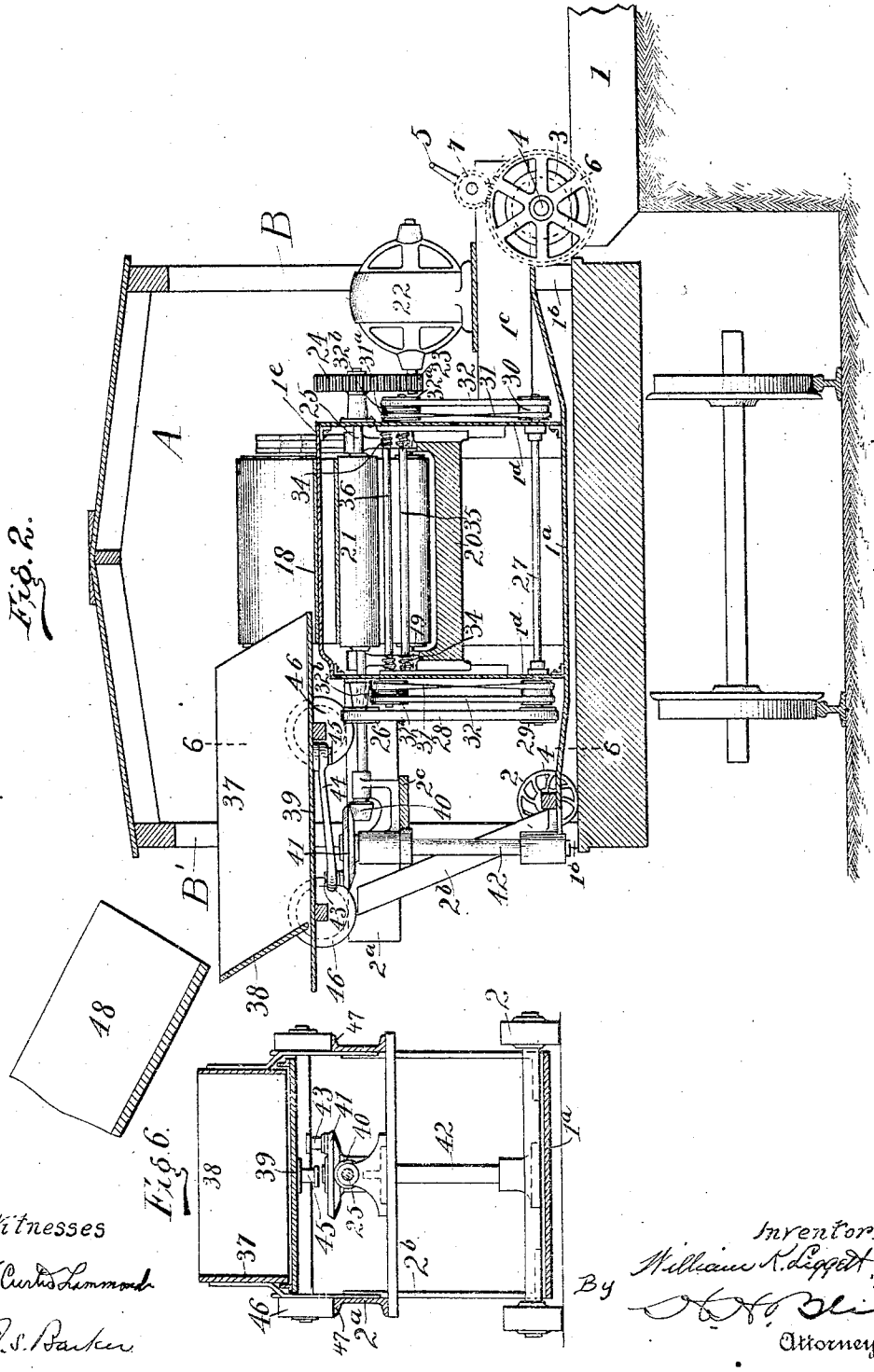

Fig. 2.

Fig. 6.

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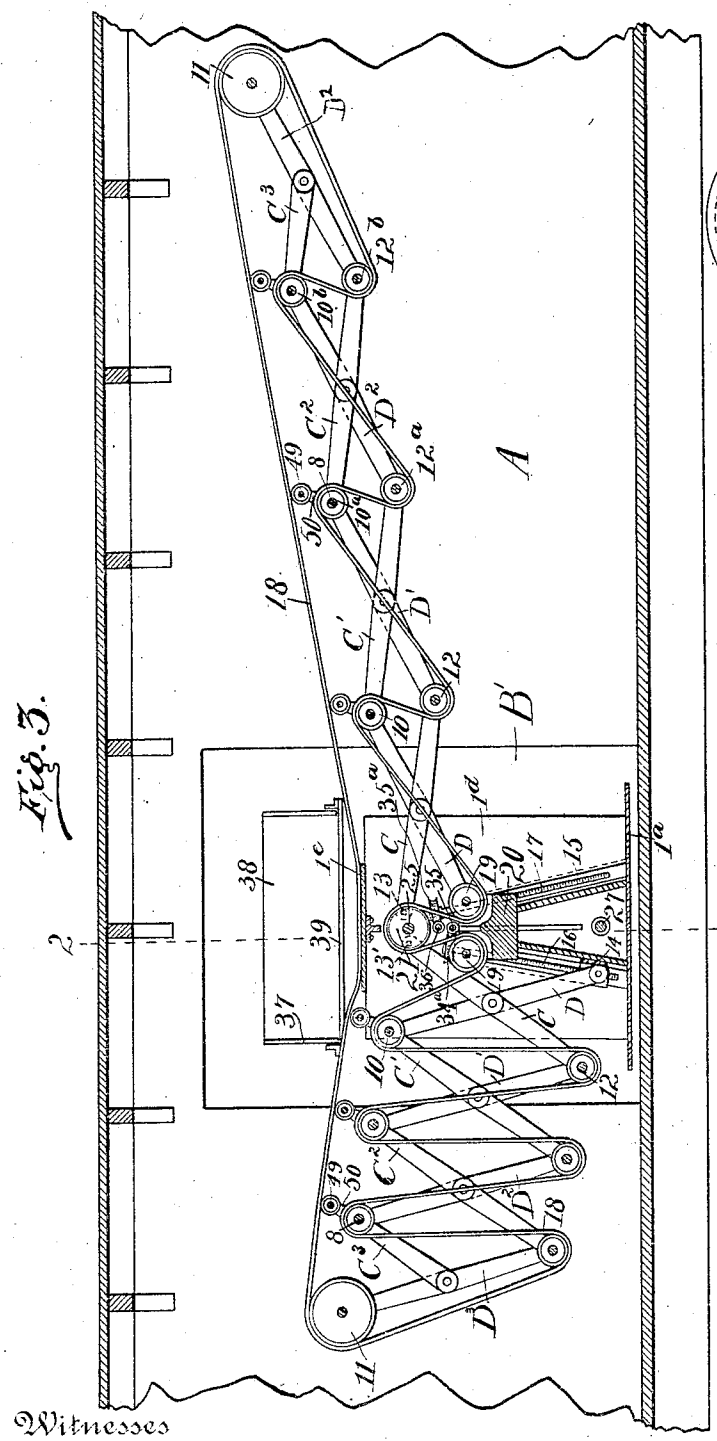

Fig. 3.

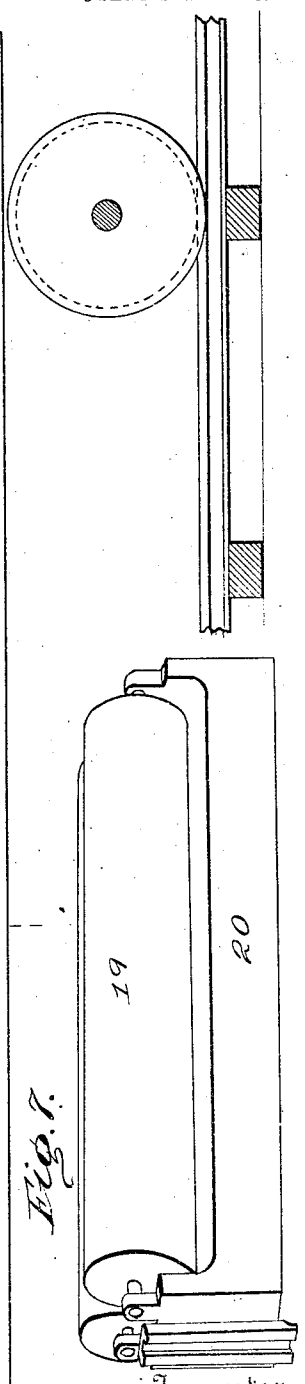

Fig. 7.

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UNITED STATES PATENT OFFICE.

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CONVEYER.

No. 895,776. Specification of Letters Patent. Patented Aug. 11, 1908.

Application filed November 29, 1905. Serial No. 289,631.

To all whom it may concern:

Be it known that I, WILLIAM K. LIGGETT, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Conveyers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in conveyers, particularly conveyers of the class used for loading cars.

The object of the invention is to provide a support for the conveyer element proper such that it can be readily put into small compass and carried from one point to another, and can as readily be elongated or extended in any desired direction so that it can be utilized for delivering material at either of several points.

In the drawings—Figure 1 is a plan view of a mechanism embodying my improvements. Fig. 2 is a vertical section on the line 2—2 of Fig. 3. Fig. 3 is a view showing the supporting frame in section and showing the conveyer element proper in side elevation, the section being taken on the line 3—3 of Fig. 1, and the elevator being extended to the right. Fig. 4 is a plan view of the shafting and gearing by which the elongating and shortening of the conveyer element is accomplished. Fig. 5 is a detail perspective view showing the supporting rollers for the outgoing run of the conveyer. Fig. 6 is a vertical section, taken on the line 6—6 of Fig. 2.

In the drawings I have shown the conveying apparatus as arranged for the loading of box cars with coal or other material; but it will be understood that many of the novel features characteristic of the invention may be employed in conveyer mechanisms of other sorts.

A car of the sort referred to is indicated by A, it having a doorway on each side, of the usual nature, one being shown at B and the other at B′. The conveying apparatus can be introduced into the car through one of these doorways and the material, such as coal, to be loaded into the car can be introduced through the opposite door.

At the side of the railway track system there is erected a platform or scaffolding of suitable sort as indicated at 1. This is adapted to support a wheeled structure the wheels 2, 3, of which may rest directly upon the floor of the platform or may be carried and guided by tracks. Preferably I employ flat-rimmed wheels 2 at the front end and flanged wheels 3 at the rear, the latter being secured to the axle 4. The machine can be moved forward or backward by means of the gear wheels 6, 7 (the former secured rigidly to the axle 4 and the latter being provided with a hand crank 5). By having the front wheels 2 with flat or unflanged peripheries the conveyer structure can be readily moved along upon the surface of the car floor, and by having the rear wheels 3 flanged and fitted to a track means are provided for holding the movable structure from displacement when it is withdrawn from the car. The frame of this structure comprises a bar or plate 1^a, which extends from the forward wheels 2 to those at 3 at the rear, cross girths of a suitable number, as at 1^b, upper sills 1^c, uprights 1^d, and top connected bar or plate 1^e. The framework is also extended beyond the parts just mentioned, there being elevated longitudinal bars 2^a, inclined brace bars 2^b and one or more cross bars 2^c.

Upon the framework above described, or one of suitable sort substantially similar thereto, are supported the operative parts of the mechanism. The principal element of this is an endless belt held by devices of such nature that they can be either arranged as a compact holder for the belt or can be extended in such way as to serve as an elongated frame. In order to attain the ends aimed at, I prefer to combine with the endless belt part a mechanism of the "lazy tongs" class.

In order to have the conveyer element adapted to be extended in either of two directions I employ two systems of these lazy tongs bars, one being opposite to the other, and so relate them that the belt can be supported in part upon one system of bars and in part upon the other, and all so related that as the conveyer may be elongated in one direction or the other at will, and in a manner such that there shall be maintained along the entire apron or belt a uniform tension. To accomplish these and other ends the following parts can be used: C, C′, C^2, C^3 are bars arranged in series and parallel to each other. D, D′, D^2, D^3, are similar bars arranged and serving as companions, respectively, to those at C, C′, C^2, C^3 in the way followed in constructing a lazy tongs system. The bar C is pivoted to the main frame, for instance, by

hinge pins 13 connected to the upright bars 1^a. The companion bars D have their lower ends vertically adjustable in any suitable way, preferably by attaching them to vertically sliding blocks, as will be more fully described. There are two series of bars C, C′, C^2, C^3 and two series of the bars D, D′, D^2, D^3, one series of each being arranged in vertical planes at the rear side of the conveyer, and the other series being similarly arranged at the front side. 10, 10^a, 10^b are belt rollers, each mounted at each end in the upper ends of two of the bars above described. 12, 12^a, 12^b are belt rollers, each similarly mounted in the lower ends of two of the bars. 11 is a belt roller at the upper end of the outermost bars D^2.

As above noted, I prefer to have two systems of lazy tongs bars. The essential features of one of them have been described and the other is constructed and has its parts correlated in substantially the way set forth. The upper end of the innermost bar C of this second system is pivoted at 13′ to the main frame and the lower end of its companion bar D is pivotally connected to a vertically adjustable carrier. One way for effecting the vertical movements of the lower ends of the innermost bars of these systems is illustrated.

14 is a nut fitted to and traveling in a way in a guide 15 secured to the vertical part of the frame work. In each of the guides 15 there is mounted a screw shaft 16, or 17. Upon each shaft there is a nut 14 which as the shaft rotates can be moved upward or downward as desired.

18 indicates the endless belt or apron arranged to be supported upon and to travel around the rollers of the systems above described. At the center it rests upon, and engages with, a driving pulley 21. On each side of the latter it extends downward a suitable distance and travels around rollers 19, which can be utilized to take up the slack in the belt and also utilized to regulate its tension. These rollers 19 are supported in suitable standards which are carried by a cross bar 20 which is made sufficiently heavy. It hangs freely from the rollers 19, 19 and they in turn are suspended freely in the bends of the belt. Power is applied to the belt by the motor 22 mounted suitably on the rear part of the frame. Its armature pinion 23 engages with a master wheel 24 on the main line shaft 25, to which is secured the belt driving roller 21. From this shaft 25 power is taken for adjusting the belt supporting bars.

26 is a pulley on the shaft with which engages a belt 28 that in turn engages with a pulley 29 on a countershaft 27. This shaft 27 has at each end a wide pulley 30, each pulley having fitted to it a straight belt 31 and a crossed belt 31. These belts extend up to and respectively engage with loose pulleys 32^a and 31^a, between which there is a pulley 32^b keyed to a shaft. One pair of belts 31, 32 is connected to the shaft 35 and the other pair to the shaft 36. By means of suitable belt shifters it will be seen that the shaft 35 can be turned first in one direction and then in the other by first connecting the belt 31 to the pulley 32^b and then disengaging that belt and connecting the belt 32. When both wheels are disconnected from the wheel 32^b the shaft 35 is stationary. And in similar way the shaft 36 may be rotated in one direction or the other. Each of these shafts 35, 36 is provided with worms 34, one at each end of the shaft. Worms 34 on shaft 35 engage with worm wheels 34^a, one secured to the upper end of the rear screw shaft 16 and the other secured to the upper end of the front screw shaft. The worms 34 on the shaft 36 are similarly geared by worm wheels 35^a to the screw shafts 17.

It will now be seen that the operator can at any time by proper shifting of the belts cause either pair of screw shafts to rotate. When they are rotated in one direction the nuts 14 are drawn upward toward the hinges 13 and in consequence the bars of the lazy tongs system are caused to approach horizontalism and the belt support is elongated; and, vice versa, if the belts be reversed and the screw shaft 16 turned in the opposite direction the nuts 14 will travel downward and the bars of the belt-carrying system will be caused to approach vertical position and the belt supporting system will be shortened.

In order to bring both of the bar systems into as small a compass as possible the nuts 14 can all be lowered to their utmost limit and then all of the bars C, C′, C^2, C^3 and D, D′, D^2, D^3 of the left hand system will be drawn close together, as will also all of the bars of the right hand system. When they are in this most compact relationship the dimension of this part of the apparatus measured on the longitudinal lines of the car is less than the cross dimension of the car door, and consequently the portable frame and both halves of the belt supporting mechanism can be passed into or drawn out from the car without striking the edges of the doorway.

In order to properly support the upper or operative length of the belt use is made of the rollers 49 interposed between the rollers 10 and the said upper part of the belt. These rollers 49 are supported from the journal parts or shafts at the upper ends of the lazy tongs bars, there being crank arms 50 employed for this purpose. These crank arms 50 are rigidly attached to one of the two sets of cross rods pivoted at 8, preferably the set indicated by the letters D—D′ etc. The angle between each crank arm and the cross rod to which it is secured is such that the

roller carried by two opposite crank arms is always outside of the lines of the lazy tongs, in this case always above the rollers 10—10ª etc. These rollers 19 oscillate through an angle equal to the change in angular position relative to the vertical of the rod to which they are attached, each half of the angle of oscillation lying upon one side of the vertical. It is thus evident that the crank arms 50 maintain a fairly constant angle relative to the truss system irrespective of whether the system of bars is in its extended or contracted position of adjustment.

The rollers 10—10ª etc., and 12—12ª etc., are so mounted upon the bars of the lazy tongs system that the total length of the path of the endless belt conveyer, about each extensible frame, is constant in all the positions of adjustment of the latter, irrespective of the position of adjustment of the opposite extensible frame. In the drawings, I have shown one method of accomplishing this, the rollers being mounted upon the end pivot axes of the cross rod C—C′ etc., and D—D′ etc. The distance from one of the pulleys 12 to the next pulley 10 beyond it is constant, while the distance between one of the pulleys 12 and the nearest pulley 10 above it decreases as the truss system, as a whole, is projected longitudinally outward. This latter variation in the distance from roller to roller quite closely approximates the variation in the length of the belt from the main frame to the roller 11, in the various positions of adjustment of the truss system.

When the conveyer (constructed, mounted and actuated in the way described) is used for the loading of cars I so arrange the parts of the belt support that there shall be between the ends a depression at the region where the coal or other material is deposited upon it. The pivot points 13 and the lines of travel of the nuts 14 are so selected that the outer end or delivery part of the belt or apron will be elevated in relation to the central part.

I have shown a mechanism for delivering coal to the central part of the belt and it consists of a reciprocating box or hopper having the vertical sides 37, the rear wall 38 and the bottom 39. It is mounted upon truck wheels 46 which are fitted to guide rails 47 these latter being preferably formed of the flanged upper parts of the longitudinal bars 2ª. The bottom 39 extends over the apron or belt 18 a suitable distance and it is moved forward and back as follows: The shaft 25 at its forward end has a beveled gear 40 which engages with the bevel wheel 41 of the vertical shaft 42. 43 is an eccentric pin, or wrist pin, carried by these parts and connected to the bottom of the hopper car by connecting rod 4 pivotally secured at 45. 48 is a stationary chute so placed as to deliver material either in a stream or in charges to the hopper car 37, the chute being shown stationary and situated outside of the car.

The mode of using a mechanism of the sort described and the manner in which it operates will be readily understood from the drawings and the description above given. If, for instance, it be desired to load a car with coal, it is first brought into proper position relative to the side structure or platfrom 1, that is, brought so that the doorways at B, B′ shall be in alinement with the portable structure. The latter is then, by the crank and gear or other suitable mechanism, caused to advance through the car door and across its floor to the position shown in Fig. 2. At this time the two truss systems are in their innermost folded positions and readily pass through the car door. If it be desired to first load the right hand end of the car, the proper belt-throwing device is utilized and the shafts 17 caused to so rotate that their nuts 14 will be drawn up so as to cause the lazy tongs bars or truss system at the right to be elongated. If now coal be delivered from chute 48 to the car hopper the latter will, because of its reciprocating movements, cause the delivery of the coal in a stream or uniform charges to the central part of the belt. The latter taking it up carries it to the end and delivers it near the end of the car. After that end of the car has been loaded to the extent desired the motor is reversed and the proper clutches or belt-throwing devices are brought into action and the nuts 14 at the left hand side of the machine are moved upward along their shafts 17, this resulting in an elongation of the left hand truss system.

After left-hand system has been put into requisite position the coal will be carried toward the left until the left hand end of the car is filled. After both ends have received their supplies of coal and the truss systems have been again put into their compacted positions the loader can be withdrawn from the car and the central region of the car can be loaded by direct delivery from the chute 48, or by an extension thereof, as is ordinarily done in the loading of box cars.

What I claim is:—

1. In a conveying apparatus, the combination of a supporting frame, an endless carrying apron or belt, an extensible frame therefor adjustably connected to the main frame and adapted to be lengthened or shortened to carry a longer or shorter operative portion of the belt and means for holding the extensible frame in a horizontally projected position.

2. In a conveying apparatus, the combination of a main frame, a carrier apron or belt, an extensible frame for the belt supported on the main frame, means supplemental to said extensible frame for taking up the surplus portion of the belt when the extensible frame is shortened and means for holding

the extensible frame in a horizontally projected position, substantially as set forth.

3. In a conveying apparatus, the combination of the main frame, the carrier apron or belt, the extensible frame therefor adjustably secured to the main frame, and a second extensible main frame adapted to support that portion of the belt or carrier not sustained by the first aforesaid extensible frame, substantially as set forth.

4. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the extensible frame arranged to be projected outward from the main frame, the carrier or belt supported at one end upon the main frame, and having its other end adjustable to points at different distances therefrom, means supplemental to the extensible frame for supporting that part of the belt not carried by the said extensible frame and means for holding the extensible frame in an outwardly projected position, substantially as set forth.

5. In a conveying apparatus the combination of the main frame, the endless carrier or belt, a frame composed of bars of the lazy tongs class for carrying the belt, one end of the said system being supported upon the main frame and the other end being adjustable to points of differing distances therefrom, means supplemental to said supporting system for carrying more or less of the length of the belt and means for applying power to the end of the said system of bars that is connected with the main frame for adjusting the said system, substantially as set forth.

6. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the longitudinally extensible frame for holding the carrier connected to the main frame, the automatic tension device for the belt and means for holding the extensible frame in a horizontally projected position, substantially as set forth.

7. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the longitudinally extensible frame for the carrier or belt, the stationary driving pulley on the main frame for the belt, and the automatic tension device adapted to maintain the engagement of the belt with the driving pulley, substantially as set forth.

8. In a conveying apparatus, the combination with the main frame, of the endless carrier or belt, the belt-holding frame composed of a lazy-tongs system of bars, said system being longitudinally extensible and having two of said bars adjustable relatively to each other and positively connected to the main frame, substantially as set forth.

9. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the belt-holding frame comprising a lazy tongs system of bars supported from the main frame, and which system can be lengthened or shortened, an upper set of belt supports on the said system for that part of the belt moving in one direction, and also a set of belt supports on said system for that part of the belt moving in the opposite direction, and means for driving the said belt, substantially as set forth.

10. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the belt-holding frame comprising a lazy tongs system or bars, two of which are adjustable to each other and which are supported on the main frame, a series of belt supports on said system for that part of the belt moving in one direction, and two series of belt supports on said system for carrying that part of the belt which is moving in the opposite direction, substantially as set forth.

11. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the longitudinally extensible outwardly projecting belt-supporting frame supported on the main frame, the engine or motor, power-transmitting devices for driving the belt, power-transmitting devices driven by the engine or motor for lengthening or shortening the extensible frame and means for holding the said extensible frame in a horizontally projected position, substantially as set forth.

12. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the horizontally extensible belt-holding frame supported on the main frame, the engine or motor, the belt-driving device actuated from the engine, means for lengthening or shortening the belt-holding frame adapted to be actuated from the engine, and the reversing mechanism for the said means, substantially as set forth.

13. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the longitudinally extensible belt-holding frame supported on the main frame, the engine or motor, the power-transmitting devices for actuating the belt, the power-transmitting devices for lengthening or shortening the belt-holding frame, and the automatically acting tension devices for the belt independent of the power transmitting devices, substantially as set forth.

14. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the belt-holding frame comprising a lazy tongs system of bars, which system is horizontally extensible, and is supported from the main frame, the adjustable carrier on the main frame for one of the said bars, the engine or motor, and means driven by the engine or motor for moving the said carrier to one position or another to extend or shorten the belt-supporting frame, substantially as set forth.

15. In a conveying apparatus, the combi-

nation of the main frame, the endless carrier or belt, a belt-supporting frame comprising a series of pairs of bars, the bars of each pair being pivoted together at a point intermediate of their ends, and having their ends pivoted to the ends of the bars of the adjacent pair, the inner ends of the inner pair of bars being supported upon the main frame, and adjustable toward and from each other, substantially as set forth.

16. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, the belt-supporting frame comprising a lazy tongs system of bars at one side of the belt, a supplemental system of lazy tongs bars at the other side of the belt, belt supports extending from one of said systems to the other, and both systems being respectively adjustably connected to the main frame, substantially as set forth.

17. In a conveying apparatus, the combination of the main frame, the endless carrier or belt, a longitudinally extensible belt-holding frame extended in one direction from the main frame, and an independent longitudinally extensible belt-holding frame extending in the other direction from the main frame, substantially as set forth.

18. In a conveying apparatus, the combination of the main frame, a longitudinally extensible belt-supporting frame supported on the main frame and adapted to be extended in one direction therefrom, a second longitudinally extensible belt-holding frame adapted to be extended in the opposite direction from the main frame and supported thereon, an endless carrier or belt supported partly upon one and partly upon the other of the said belt-holding frames, and means for lengthening the said frames, substantially as set forth.

19. In a conveying apparatus, the combination of the main frame, an endless carrier or belt, a longitudinally extensible belt-holding frame adapted to be extended in one direction from the main frame and to support one portion of the said belt or carrier, and a second longitudinally extensible frame adapted to be extended in the other direction from the frame and to support the other part of the belt, and a driving device on the main frame for driving both parts of the belt.

20. In a conveying apparatus the combination of the main frame, the longitudinally extensible belt-holding frame adapted to be extended in one direction from the main frame, and a second longitudinally extensible belt-holding frame adapted to be extended from the main frame in the opposite direction, and an endless carrier or belt supported upon one and partly upon the other of said frames, in such a manner that each of the frames can be adjusted to any one of its several positions independently of the other.

21. In a conveying apparatus the combination of the main frame, the endless carrier or belt and two oppositely extensible belt holding frames supported on the main frame, both adapted to support the belt or carrier, substantially as set forth.

22. In a conveying apparatus, the combination of the main frame, the endless belt or carrier, and two oppositely and longitudinally extensible belt holding frames, each comprising a lazy tong system of bars, each system being adapted to be lengthened or shortened independently of the other, substantially as set forth.

23. In a conveying apparatus, the combination of the main frame, the endless belt or carrier, the two oppositely arranged and oppositely and longitudinally extensible belt holding frames, each being provided with a series of belt supports for the outward moving or operative part of the belt, and each being provided with two series of belt supports for the inward moving or returning part of the belt, substantially as set forth.

24. In a conveying apparatus, the combination of the main frame, the longitudinally extensible belt holding frame comprising a lazy tong system of bars or supports on the main frame, a series of projections extending upward from the lazy tong system of bars, and an endless carrier or apron having its outwardly moving parts supported on the said upward extensions, and an inwardly moving part supported on the lazy tong system of bars, proper, substantially as set forth.

25. In a conveying apparatus, the combination of the main frame, the longitudinally extensible belt holding frame comprising a system of lazy tong bars supported on the main frame, a series of projections extending upwardly from the lazy tong system of bars, each of said projections being adapted to maintain its position above the lazy tongs system of bars in each of all of the positions of the system of bars, and the endless apron having the part traveling in one direction supported upon the said projections and the part traveling in the other direction supported by the lazy tong bars, substantially as set forth.

26. In a conveying apparatus, the combination of the main frame, the longitudinally extensible belt holding frame, comprising two bars pivoted to each other and having their inner ends pivotally and adjustably connected to the main frame, a projecting belt support extending upward from the said bars, supplemental belt supports on the said bars, and an endless carrier or belt passing in one direction over the said upwardly extending belt supports and traveling in the opposite direction over the said supplemental belt support or supports, substantially as set forth.

27. In a conveying apparatus, the combination of the main frame, the belt holding

frame having two bars pivoted together, the pivot devices connecting one of said bars to the main frame and the vertically adjustable pivoting devices connecting the other bar with the main frame, the belt supports carried by the said bars and the endless belt or carrier traveling around the said belt supports, substantially as set forth.

28. In a conveying apparatus, the combination of the main frame, the endless carrier adapted to be extended in either or both of two opposite directions in relation to the main frame, the power devices, and the feeding mechanism actuated by the power devices for feeding material to the carrier or apron, substantially as set forth.

29. In a conveying apparatus, the combination of the main frame, the means for carrying material first in one direction relative to the main frame, and then in the opposite direction, the power devices, and the feeding mechanism supported on the main frame and adapted to be actuated by the power devices to deliver material to the carrying means, substantially as set forth.

30. In a conveying apparatus, the combination of the means for carrying the material first in one direction relatively to the main frame and then in the opposite direction in relation thereto, the power devices, the reciprocating hopper or feeder supported on the main frame, and the transmitting devices driven by the power devices for actuating the hopper or feeder, substantially as set forth.

31. In a conveying apparatus, the combination of a main supporting frame, an endless carrier mounted on the said frame, and extending outward therefrom in opposite directions and arranged to deliver material from either of its opposite ends, a movable feeder mounted on the main frame and arranged to deliver to the endless carrier intermediate its ends, and power devices on the main frame for driving both the feeder and the endless carrier, substantially as set forth.

32. In a conveying apparatus, the combination of a supporting frame, an endless carrying belt, an extensible frame therefor, and means for extending the said belt-carrying frame laterally relative to the supporting frame in a plane approximating the horizontal, substantially as set forth.

33. In a conveying apparatus, the combination of a main supporting frame, an endless carrying-belt, a frame in which the belt is mounted, and means for projecting the said belt-carrying frame laterally relative to the main frame and for maintaining the carrying portion of the belt in approximately the same plane relative to the horizontal in its different positions of adjustment, substantially as set forth.

34. In a conveying apparatus, the combination of a main supporting frame, an endless carrying belt, an extensible frame in which the belt is mounted, means for projecting the said belt-carrying frame laterally and for maintaining the carrying portion of the belt in approximately the same plane relative to the horizontal in the different positions of adjustment, and means for maintaining tension upon the belt, substantially as set forth.

35. In a conveying apparatus, the combination of a main supporting frame, an endless carrying belt, an extensible frame in which the belt is mounted, and take-up means upon said extensible frame for maintaining the length of belt carried thereby substantially constant, substantially as set forth.

36. In a conveying apparatus, the combination of a main supporting frame, an endless carrying belt, an extensible frame having mounted thereon guiding devices for said belt, said guiding devices being arranged to maintain the path of travel of the belt constant in length for all positions of adjustment of the extensible frame, substantially as set forth.

37. In a conveying apparatus, the combination of the main frame, the endless belt or carrier, the extensible belt-holding frame of the lazy tongs type provided with a series of belt supports for the outwardly moving part of the belt, and provided with two series of belt supports for the inward moving or returning part of the belt, the latter being so arranged upon the lazy tong rods as to approach each other with consequent shortening of the return path of the belt as the frame, as a whole, is extended outward, and vice versa, substantially as set forth.

In testimony whereof I affix my signature, in presence of two witnesses.

WILLIAM K. LIGGETT.

Witnesses:

F. R. WILLSON, Jr.,

J. WEBSTER.