Oct. 13, 1925. 1,556,819

J. E. HIRES

CABLE OPERATED CONVEYER

Filed Oct. 9, 1924 3 Sheets-Sheet 1

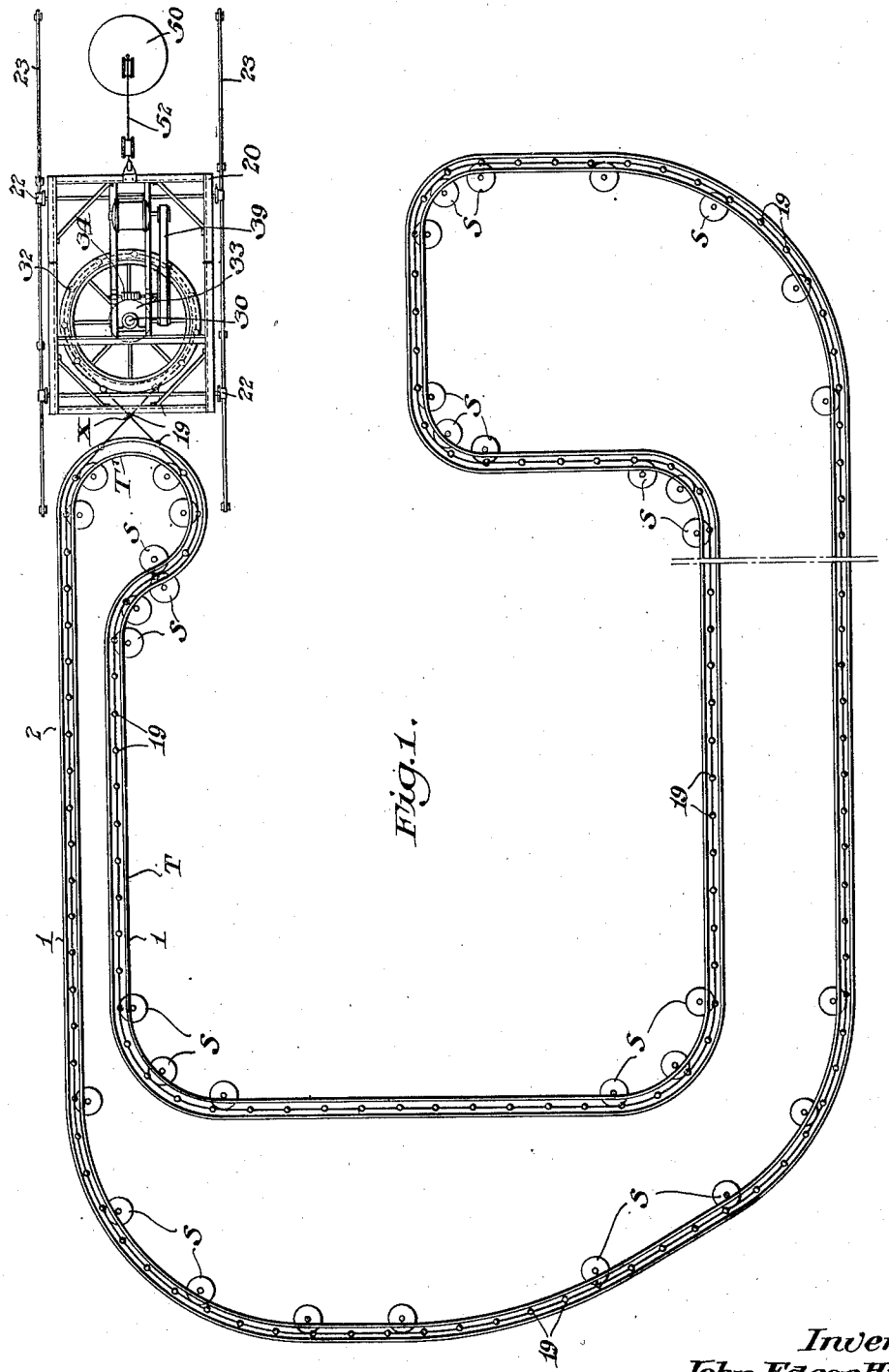


Fig. 1.

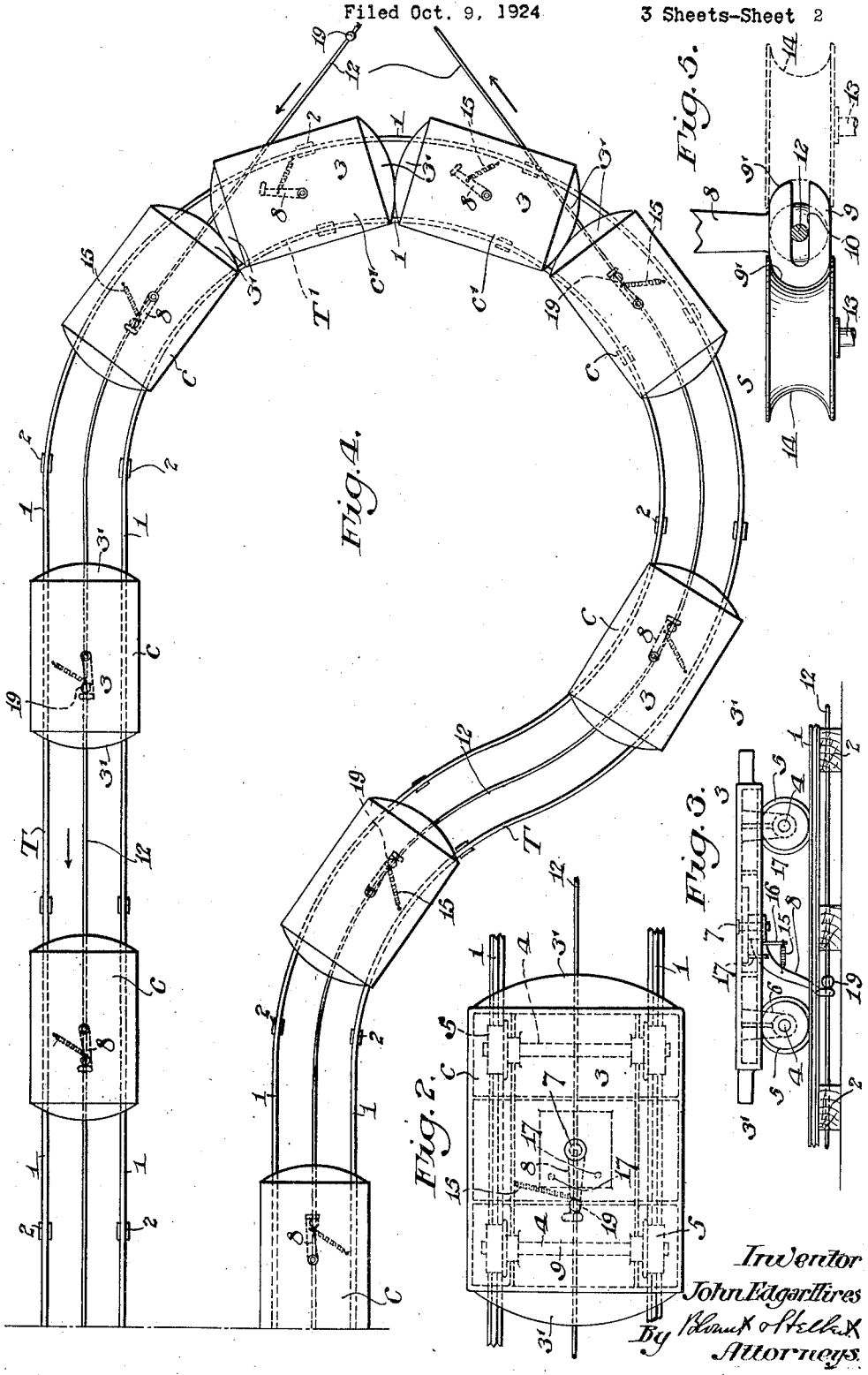
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CABLE OPERATED CONVEYER

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Fig. 6.

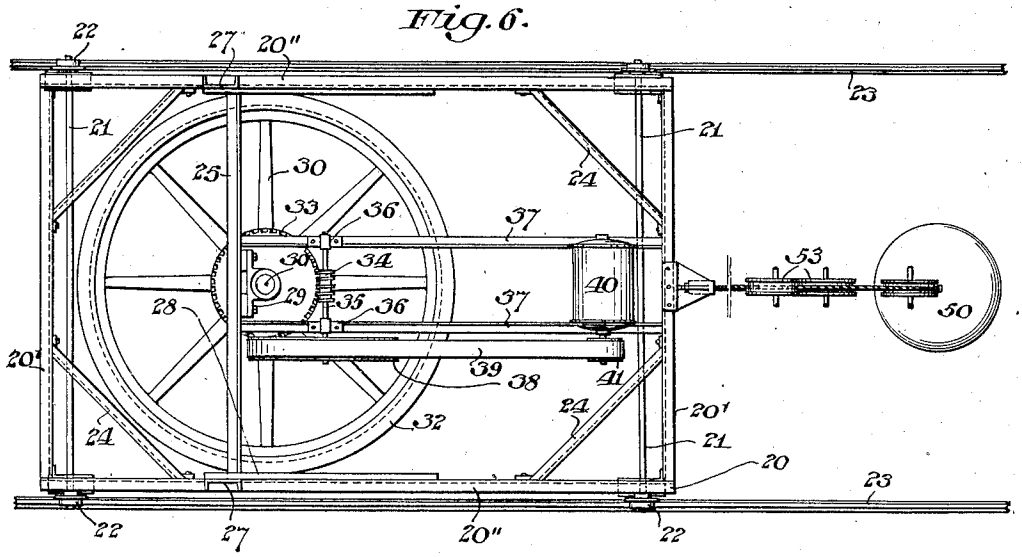
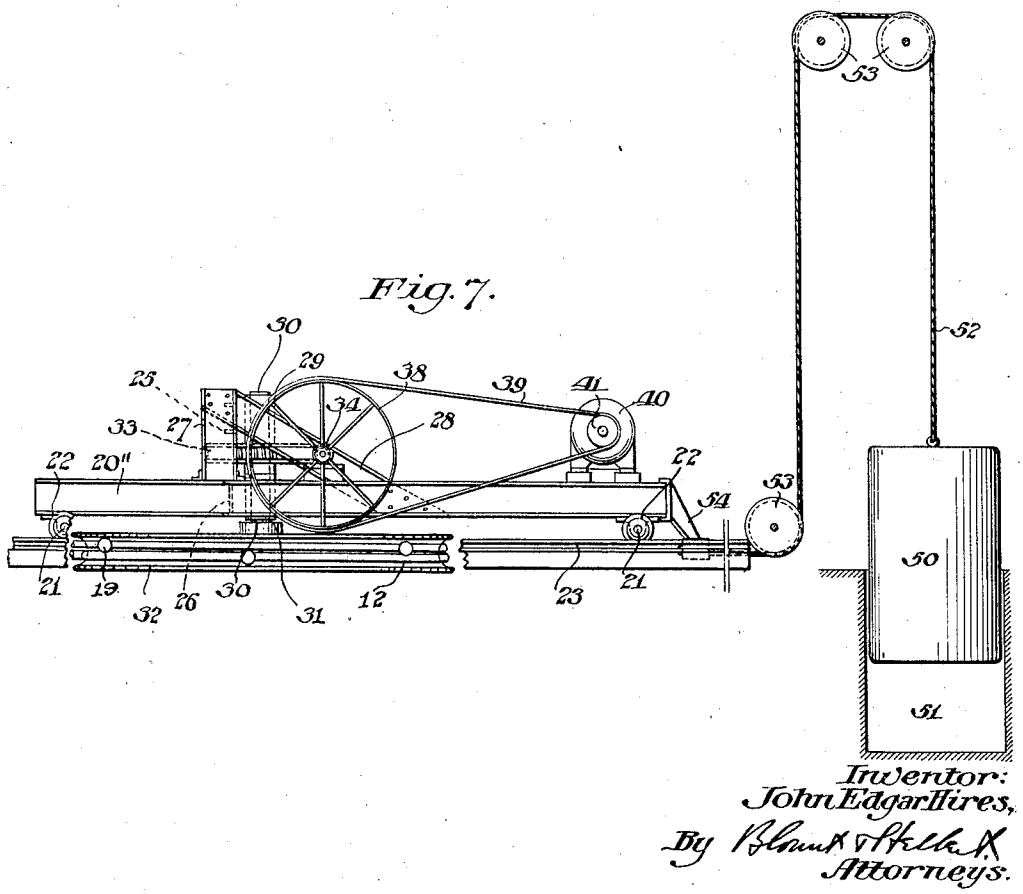


Fig. 7.



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Patented Oct. 13, 1925. 1,556,819

UNITED STATES PATENT OFFICE.

JOHN EDGAR HIRES, OF LANGHORNE, PENNSYLVANIA, ASSIGNOR TO COOK POTTERY COMPANY, A CORPORATION OF NEW JERSEY.

CABLE-OPERATED CONVEYER.

Application filed October 9, 1924. Serial No. 742,527.

To all whom it may concern:

Be it known that I, JOHN EDGAR HIRES, a citizen of the United States, and a resident of Langhorne, county of Bucks, and State of Pennsylvania, have invented certain new and useful Improvements in Cable-Operated Conveyers, of which the following is a specification, reference being had to the accompanying drawings.

A principal object of my invention is to provide a cable operated conveyer comprising a plurality of separate trucks or cars arranged to move along an endless track and which is adapted for installation in factories and the like where it is desired to transport goods or other articles from one point to another.

A further object of the invention is to provide a conveyer of the character aforesaid and embodying an endless cable by means of which the trucks or cars are carried along the track, in combination with automatically operative means for maintaining the requisite tension on the cable so that, irrespective of variations in the load to which it is subjected or expansion or contraction in its length due to variations in temperature or the gradual stretching of the cable, a uniform tension will be maintained thereon.

A still further object of the invention is the provision of means whereby the individual trucks or cars will be automatically disengaged from the cable at a given point on the track and re-engaged with the cable at another point thereon so as to enable the cable between said points to be carried away from the track and passed over a suitable cable driving sheave.

A still further object of the invention is to provide a cable operated conveyer in which the cable, save where it passes over the driving sheave, is supported entirely by the cars or trucks thus avoiding the necessity of employing any means such as sheaves or the like to afford vertical support to the cable.

A still further object of the invention is to provide a cable operated conveyer employing a plurality of trucks or cars adapted to be carried along a circuitous closed track by means of a moving cable and in which the cars, save at a single point in the track, are maintained in spaced relation with each other at suitable intervals, thus avoiding any bumping or jostling of the cars with each other throughout the length of the track and embodying means whereby a uniform tension may be maintained on the cable irrespective of the sinuosities of the track, the conveyer thus readily lending itself to installation under conditions in which it is requisite to carry the track around sharp corners and the like.

My invention further includes other objects, advantages and novel features of construction and arrangement hereinafter referred to more specifically or which will be apparent from the following description of one embodiment of the invention which is illustrated in the accompanying drawings.

In the said drawings Fig. 1 is a top plan view showing the track and the cable tensioning and driving means but with the trucks or cars omitted; Fig. 2 is a top plan view of one of the cars in position on the track rails which, together with the driving cable, are shown fragmentarily, and Fig. 3 is a side elevation thereof. Fig. 4 is a fragmentary top plan view of a portion of the track adjacent the cable tensioning and driving mechanism with some of the cars in position on the track and illustrating the manner in which the cars are automatically disengaged from and re-engaged with the cable so as to enable the latter to pass over the driving sheave, the cable guiding sheaves being omitted in this view for the sake of clearness. Fig. 5 is an enlarged fragmentary end view showing a portion of the cable gripper in conjunction with two of the cable guiding sheaves and illustrating the coaction of these parts. Fig. 6 is an enlarged top plan view of the cable tensioning and driving mechanism and Fig. 7 is a side elevation thereof. The same symbols are used to designate like parts in the several figures.

As the track on which the cars are arranged to run and which is generally designated as T, may be of any desired contour and of any length, the particular form of track shown in the drawings may therefore be deemed solely as typical. The track itself comprises parallel rails 1—1 conveniently supported on blocks or ties 2 and preferably somewhat elevated thereby above the surface on which the track is disposed, the track being continuous or, in other words, being

devoid of ends and in practice being ordinarily laid so as to pass adjacent a plurality of different stations in a factory or other establishment in which the conveyer is installed so that as the cars are consecutively moved around the track they may be loaded or discharged at the several stations while slowly passing them.

Upon the track are disposed a plurality of cars C of any suitable type, that shown comprising a central platform 3 having rounded ends 3′, 3′ and parallel sides. This platform is supported on axles 4 carrying flanged wheels 5 adapted to rest on the rails, the wheels being either rotatable on the axles or the latter rotatable in hangers 6 in which the axles are supported. Preferably disposed at the center of the platform of the car and pivotally secured thereto on a vertical pivot 7 so as to be capable of rotation in a horizontal plane, is a downwardly curved gripper arm 8 provided with a gripper head 9. This head, which is elongated transversely and curved or rounded on its opposite ends 9′ for a purpose hereinafter described, is provided with a horizontally disposed slot 10 extending inwardly from one of said ends and preferably terminating at some point between the center of the head and the opposite end, the width of the slot being sufficient to easily receive the cable 12 as best shown in Fig. 5. This cable, which is continuous, is disposed so as to generally extend in parallel relation with the track and midway between the rails, and in order to maintain this relation sheaves S may be disposed at suitable points, as best shown in Fig. 1; the exact location of these sheaves is in practice of course determined by the particular configuration of the track. These sheaves may be supported to revolve on vertically disposed pivots 13 in any convenient way and are provided with curved or grooved faces 14 of suitable contour to receive the curved ends 9′ of the gripper head 9 (see Fig. 5) so that when the latter is moved over the sheaves as hereinafter described, a smooth and easy engagement between the head and the sheaves is effected.

As stated, the gripper arm 8 is preferably downwardly curved from its point of pivotal support so as to bring the gripper head a little below the level of the rails 1 and yielding means are provided for constantly urging the gripper arm about its point of pivotal support in the direction in which the open end of the slot 10 is turned, said means preferably comprising a spring 15 disposed between the gripper arm and a properly located pin or other support 16 depending from the car platform 3. If desired a pair of transversely spaced stops 17 may also be arranged to depend from the platform on either side of the arm so as to limit the movement of the latter in either direction.

At suitable equidistantly spaced intervals upon the cable are positioned a plurality of stops conveniently in the form of balls 19 fixedly secured to the cable in any suitable way and in number preferably greater than the number of cars employed in the conveyer. These stops are preferably of the same or slightly less radius than the radius of curvature of the faces 14 of the guide sheaves S so that the stops can be readily carried over the sheaves during the movement of the cable but of course are of considerably greater diameter than the width of the slot 10 so that when the cable is disposed in the latter it may be freely drawn therethrough until one of the stops engages the gripper head and thereby becomes effective to communicate the motion of the cable to the car with which the head is connected through the medium of the gripper arm. Thus as the cable is moved relatively to the track by means of the driving mechanism hereinafter described, the cars are carried along at equidistantly spaced intervals through engagement of the various stops with their respective gripper heads.

For the purpose of driving and also for maintaining a uniform and predetermined tension on the cable I provide the means now to be described and which comprise a rectangular carriage 20 having end members 20′ and side members 20″ mounted on axles 21 having rotatable wheels 22 at their extremities adapted to travel on spaced rails 23. The carriage is provided with struts or braces 24 of suitable form to insure its rigidity and with cross members 25 and 26, the former being rigidly secured a suitable distance above the side members of the carriage upon posts 27 bolted thereto and braced by diagonally disposed braces 28 and the latter disposed between the side members 20″. To the upper cross member and preferably centrally thereof is secured a suitable bracket 29 in which is journaled a shaft 30 which extends vertically downwardly to terminate preferably somewhat below the side members of the carriage, while a substantially similar journal bracket 31 is likewise secured to the lower member 20 so as to form an adequate bearing for the lower end of the shaft and insure its rigidity. On the lower end of this shaft is fixedly mounted the drive sheave or pulley 32 which is preferably provided with a grooved periphery of suitable contour to permit the cable to be wrapped around the sheave for a plurality of turns so as to insure the frictional engagement between the cable and the pulley requisite for driving the cable under the load imposed on it by the cars when loaded; in Fig. 7 the cable is shown as passing twice around the sheave but any desired

number of turns may of course be employed to attain the necessary traction.

For driving the drive sheave I may dispose at a suitable point on the shaft 30, conveniently between the journal brackets 29 and 31, a worm gear 33 adapted to mesh wich a worm 34 carried on a horizontal shaft 35 having its ends journaled in brackets 36 supported on a pair of transversely spaced longitudinally extending stringers 37 arranged between one of the end members of the frame and the cross member 26 or between any other suitable points, this shaft being supplied with a pulley 38 carrying a belt 39 through which power may be transmitted to the pulley from a motor 40 also conveniently mounted on a platform or other support secured to the stringers 37 adjacent the end of the frame. As the motor rotates at relatively high speed the ratio between the motor pulley 41 and large pulley 38 and between worm 34 and worm gear 33 is preferably such as to drive the shaft 30 at a much lower speed with consequent increase in power.

As hitherto stated, the carriage 20 is adapted to reciprocate on track rails 23 which may be disposed in proximity to a suitable portion of the track so that the carriage when supported on the rails will be more or less adjacent thereto. This said portion of the track, designated generally as T′, is preferably formed on a curve of suitable radius (see Figs. 1 and 4) and the cable 12 is led therefrom, conveniently beneath the track rails 1, and passed around the driving sheave 32, the cable being preferably crossed upon itself as at X at some point between the track and the sheave. Under operative conditions there is of course considerable variation in the load upon the cable due to variations in the loads on the cars while, additionally, changes are constantly occurring in the length of the cable on account of temperature variations and also by reason of the natural tendency of the cable to stretch, and for the purpose of compensating for these variations and changes and maintaining a uniform tension on the cable, I provide means for constantly urging the carriage 20 in a direction away from the track, said means preferably comprising a counterpoise 50 which may be suspended in a pit 51 or at some other convenient place by a cable 52 which is carried over suitably positioned sheaves 53 and secured to a bracket 54 secured to one of the end members of the carriage in such manner that a constant pull will be exerted on the latter in a direction substantially parallel to the rails 23. Thus, by properly determining the weight of the counterpoise a suitable tension may be constantly maintained on the cable 12, thereby insuring the requisite traction of the cable on the driving sheave irrespective of any elongation of the cable as well as preventing the imposition of an undue load on the parts upon any shortening of the cable, the carriage traveling back and forth on the rails 23 in correspondence with changes in length of the cable and the counterpoise exerting a constant and uniform tension on the cable at all times.

As the driving sheave is located at a point removed from the track and as the cable is led away from the latter so as to pass around the sheave and then led back to the track at a different point from that which it leaves it, it is obvious that for at least a portion of the distance between these points the cable is not in a position to coact with the gripper arms of the cars to move the latter on the track. Thus the requisite movement must, between these points, be imparted to the cars in some manner other than by the direct coaction of the cable therewith, and the same will now be explained, particular reference being had to Fig. 4.

That portion of the track T′ adjacent the points where the cable leaves the track and later returns to it is preferably constructed substantially on the arc of a circle of radius such that one or more cars can be accommodated thereon between these points, conveniently two cars C′, C′ as shown in Fig. 4. Now, assuming the cable to be traveling in the direction of the arrows in said figure, as each car is carried along this curved portion T′ of the track by the coaction of its gripper arm with one of the stops 19 on the cable, the gripper arm tends, under the influence of the spring 15, to gradually swing outwardly and thus follow the cable as the latter moves away from its normal position about midway between the rails, until the cable departs so far from the direction in which the car is guided by the track that it entirely leaves the slot in the gripper head, the gripper arm having reached the limit of its outward movement, thus bringing the car momentarily to rest as the cable is now no longer effective to move it along the track. As the following car, however, is drawn along the track, its leading end is brought into contact with the rear end of the preceding car prior to the disengagement of the gripper arm of said following car from the cable, with the result that the leading car is pushed along the track until the following car is itself disengaged from the cable. In like manner the second following car is operative to push both of the leading cars still further along the track and this operation is consecutively performed until the leading car has been moved far enough for its gripper arm to re-engage the cable as it rejoins the track after coming from the driving sheave and as soon as one of the stops 19 is thereafter carried into contact with the gripper head of the leading car, the

latter is once more moved along the track by and in correspondence with the movement of the cable.

It will be obvious that the particular configuration of the curved portion T′ of the track in conjunction with the length of the cars will ordinarily determine the number of idle cars upon the track between the cars which are respectively just leaving and just re-engaging the cable; in the drawing two such idle cars C′, C′ are shown and such an arrangement is found to work well in practice but obviously the curvature of the track with respect to the length of the cars may be so determined as to provide for a greater or lesser number of idle cars at this point.

It will thus be apparent that the various cars will be carried around the track by the cable in spaced relation save at the portion T′ of the track where a certain number of the cars will be continuously in contact with each other, and also that as the gripper arms are effective to afford vertical support to the cable the use of sheaves or other means throughout the length of the track for affording such support is entirely avoided. Furthermore, through the operation of the carriage 20 and counterpoise a uniform tension is at all times maintained on the cable thus insuring the positive movement of the latter under operative conditions and irrespective of the extent to which the cars are loaded or of changes in its length, while the cars themselves are automatically disengaged from and re-engaged with the cable so as to allow the latter to be led away from the track and over the driving sheave which, with its carriage and other mechanism, may be disposed at any convenient point remote from the track and at a proper height for the sheave to receive the cable.

Additionally, it is to be noted that by reason of the rounded contour of the ends of the gripper heads, the latter can very easily pass over the guide sheaves S as they encounter them in the passage of the cars along the track, the cable being always free to move horizontally in the slots 10 should the heads swing slightly in either direction as they pass the sheaves, while the grooves in the latter, as well as in the driving sheave, are so designed as to readily permit the stops 19 to run therein as the cable passes thereover.

While I have herein described and illustrated with considerable particularity an embodiment of my invention which has given most satisfactory results under actual operative conditions I do not thereby desire or intend to specifically limit myself thereto as numerous changes and modifications may be made in the design, construction and arrangement of the different elements and the particular shape and configuration of the track may be varied to suit the particular requirements of the factory or other establishment or the like where the conveyer is installed without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A cable operated conveyer comprising an endless track, a plurality of cars adapted to travel on the track and each provided with cable gripping means, a cable having spaced stops cooperative with the gripping means of the cars and extending adjacent the track, and means, comprising a carriage movable relative to the track, a driving sheave carried thereby and a counterpoise connected to the carriage, operative to drive the cable and maintain a uniform tension thereon.

2. A cable operated conveyer comprising an endless track, a plurality of cars adapted to travel on the track and each provided with cable gripping means, a cable having spaced stops cooperative with the gripping means of the cars and extending adjacent the track, and cable driving and tensioning means disposed remote from the track and comprising a movable carriage, a driving sheave and means for driving the sheave, supported by the carriage, and a counterpoise connected with the carriage.

3. A cable operated conveyer comprising an endless track, a plurality of cars adapted to travel on the track and each provided with cable gripping means, an endless cable disposed adjacent the track and provided with a plurality of spaced stops adapted for cooperation with said gripping means, a movable carriage disposed at a point remote from the track, a cable driving sheave and means for driving said sheave supported by the carriage, and a counterpoise connected with the carriage, said cable being led from the track over the driving sheave and thence back to the track and said counterpoise being operative to continually urge the carriage in a direction to maintain a tension on the cable.

4. A cable operated conveyer comprising an endless track having a curved portion, a plurality of cars adapted to run on said track each car being provided with an arm having cable receiving means, a cable extending adjacent the track in position to be received by said arms save at said curved portion of the track, and cable driving means remote from the track, said cable being arranged to pass from the track and over said driving means and thence back to the track, and said arms being adapted to give up the cable as the cars successively approach said curved portion of the track and to receive the cable as the cars approach the termination of said curved portion.

5. A cable operated conveyer comprising an endless track having a curved portion, a cable extending substantially parallel to the track save at said curved portion, cable driving means adjacent said curved portion but remote from the track and over which said cable is extended, a plurality of cars adapted to run on the track, each car being provided with an arm having a cable receiving slot and said cable being provided at spaced intervals with a plurality of stops respectively adapted to engage said arms when the cable is in the slots whereby the cars are carried along the track by the coaction of said stops with said arms save at said curved portion of the track and are propelled over said portion thereof by successive engagement with one another.

6. A cable operated conveyer comprising an endless track having a curved portion, cable driving means disposed adjacent said curved portion but spaced therefrom, an endless cable having a plurality of stops secured thereto at spaced intervals and extending over said driving means, means for maintaining the cable in substantially parallel relation with the track save at said curved portion thereof, and a plurality of cars adapted to run on the track, each car having an arm provided with a slot for normally receiving the cable and engageable by the stops when the cable is in the slot whereby each car is moved along that portion of the track which is paralleled by the cable by engagement of one of said stops with the arm of the car, said cable moving out of the slot and passing to the driving sheave as the car approaches the curved portion of the track and re-entering the slot as the cable returns to the track from the driving sheave.

7. A cable operated conveyer comprising an endless track having a curved portion, cable driving means disposed adjacent said curved portion but spaced therefrom, an endless cable having a plurality of stops secured thereto at spaced intervals and arranged to extend substantially parallel to said track save at said curved portion thereof, said cable passing out of parallelism with the track and thence to the driving sheave adjacent one end of said portion and returning to said track from the sheave and into substantial parallelism therewith adjacent the other end of said portion, and a plurality of cars adapted to run on the track and each having an arm provided with a slot operative to receive the cable when the latter is in substantially parallel relation with the track whereby each car is moved along the track by engagement of one of said stops with the arm of the car save during its passage over said curved portion of the track, the cable leaving said slot as said car approaches the beginning of said portion and re-entering said slot as the car approaches the termination of said portion and the cars being propelled over said curved portion by successive engagement with each other.

8. A cable operated conveyer comprising an endless track, cable driving means in spaced relation with the track, an endless cable having a plurality of stops attached thereto, means for maintaining the cable in substantially parallel relation with the major portion of said track, said cable passing from the track to the driving sheave and returning from the sheave to the track at spaced points and the track between said points being curved, and a plurality of cars adapted to run on the track each car being provided with an arm having a cable receiving slot and operative for engagement by said stops, whereby the car is carried around the track by such engagement save between said points and propelled around said curved portion of the track between said points by the successive engagement of the cars with one another.

9. In a cable operated conveyer, a car comprising a platform, axles and wheels, and a cable gripper arm disposed below the platform and having a head provided with a horizontally disposed slot open at one end and closed at the other and adapted to receive the cable.

10. In a cable operated conveyer, a car comprising a platform, axles and wheels, and a gripper arm vertically pivoted to and extending below the platform and capable of a limited horizontal movement, said arm being provided with a head having an open horizontally disposed slot adapted to receive the cable.

11. In a cable operated conveyer, a car comprising a platform, axles and wheels, a gripper arm disposed below the platform and pivoted for limited movement in a horizontal plane, said arm being provided with a head having an open horizontally disposed slot closed at one end and open at the other adapted to receive the cable, and means in association with the arm for yieldingly drawing the arm in a given direction.

In witness whereof, I have hereunto set my hand this 7th day of October, 1924.

JOHN EDGAR HIRES.