



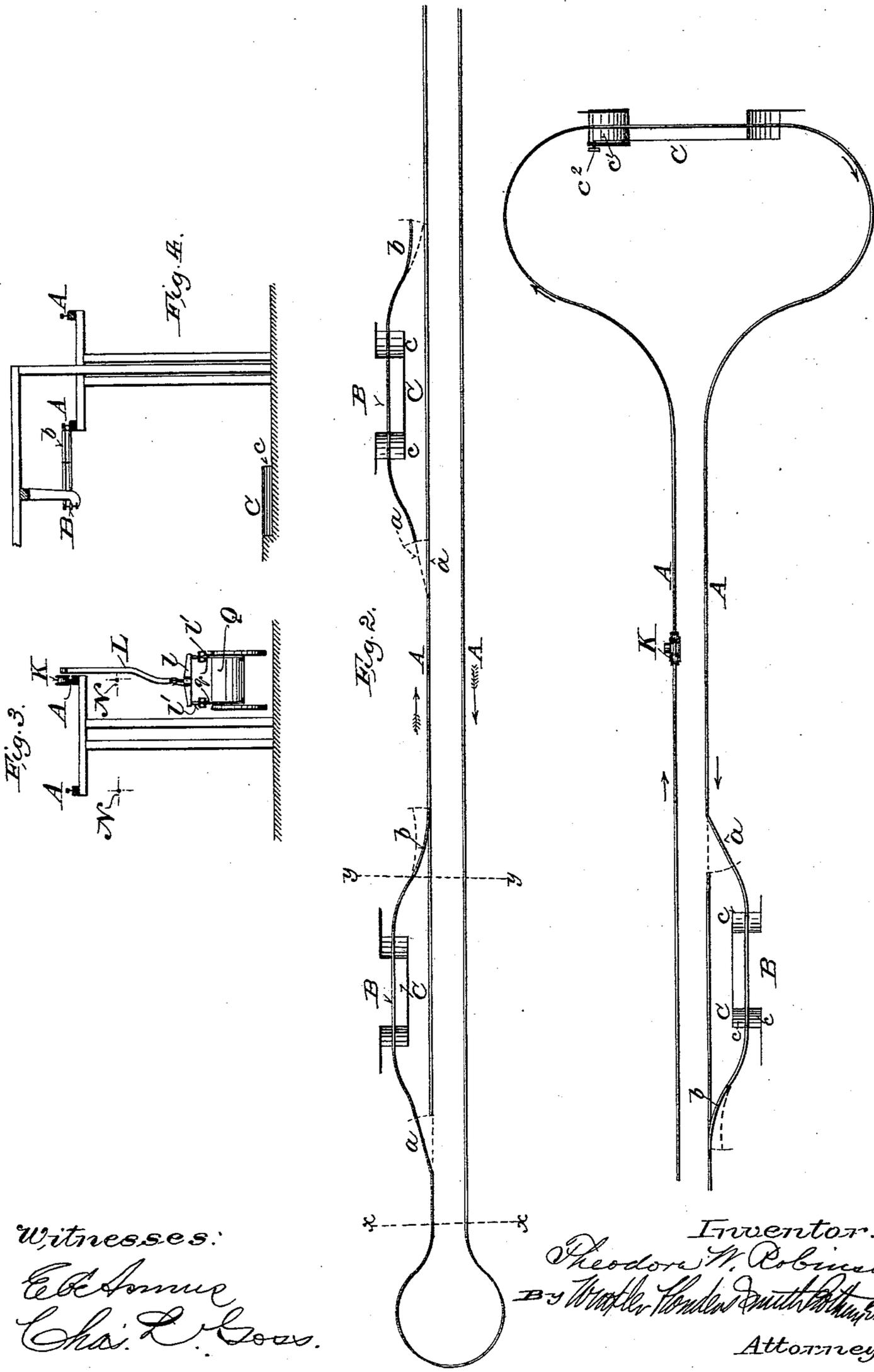
(No Model.)

5 Sheets—Sheet 2.

T. W. ROBINSON.  
CONVEYER FOR ORE, &c.

No. 560,232.

Patented May 19, 1896.



Witnesses:

*E. C. Ammer*  
*Chas. D. Sears.*

Inventor:

*Theodore W. Robinson*  
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(No Model.)

5 Sheets—Sheet 3.

# T. W. ROBINSON. CONVEYER FOR ORE, &c.

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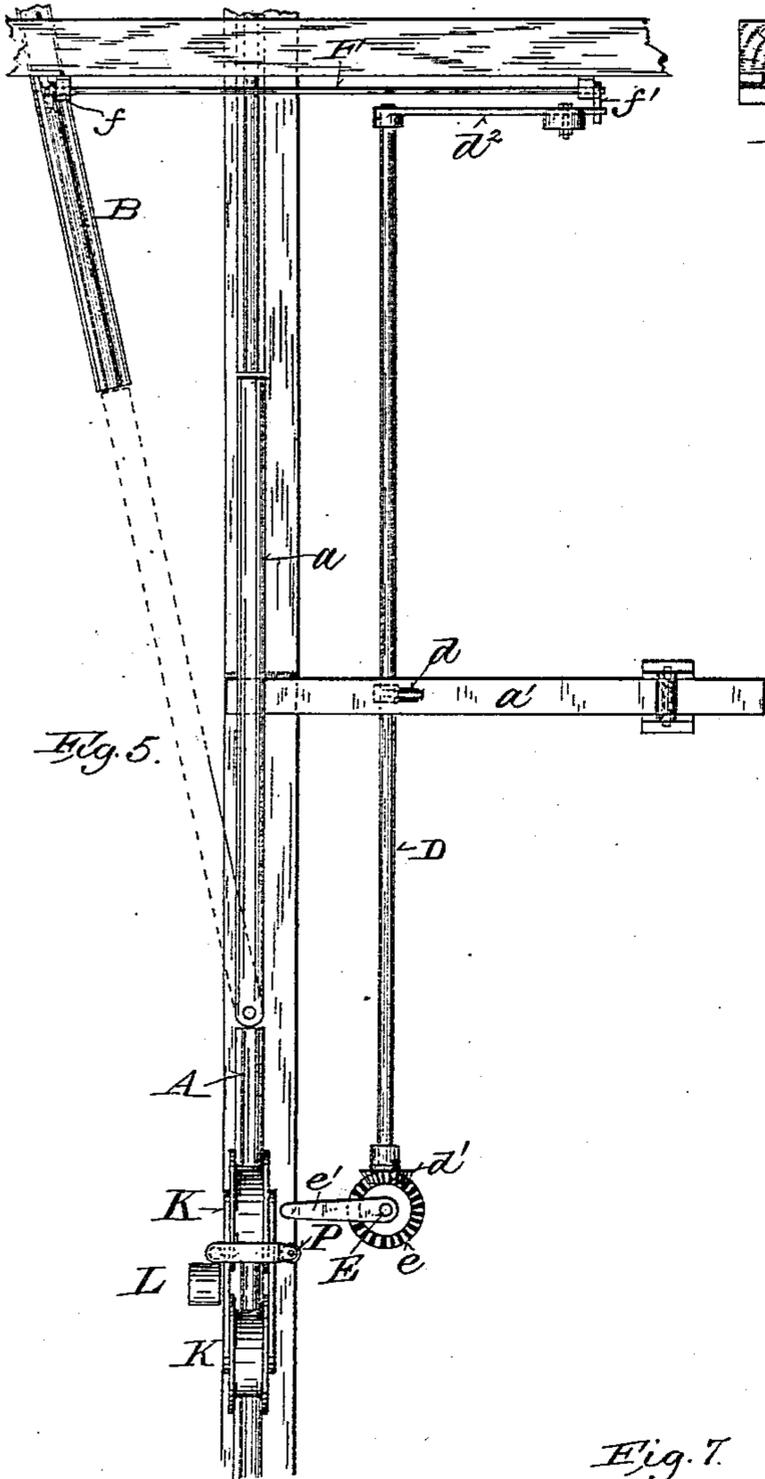


Fig. 5.

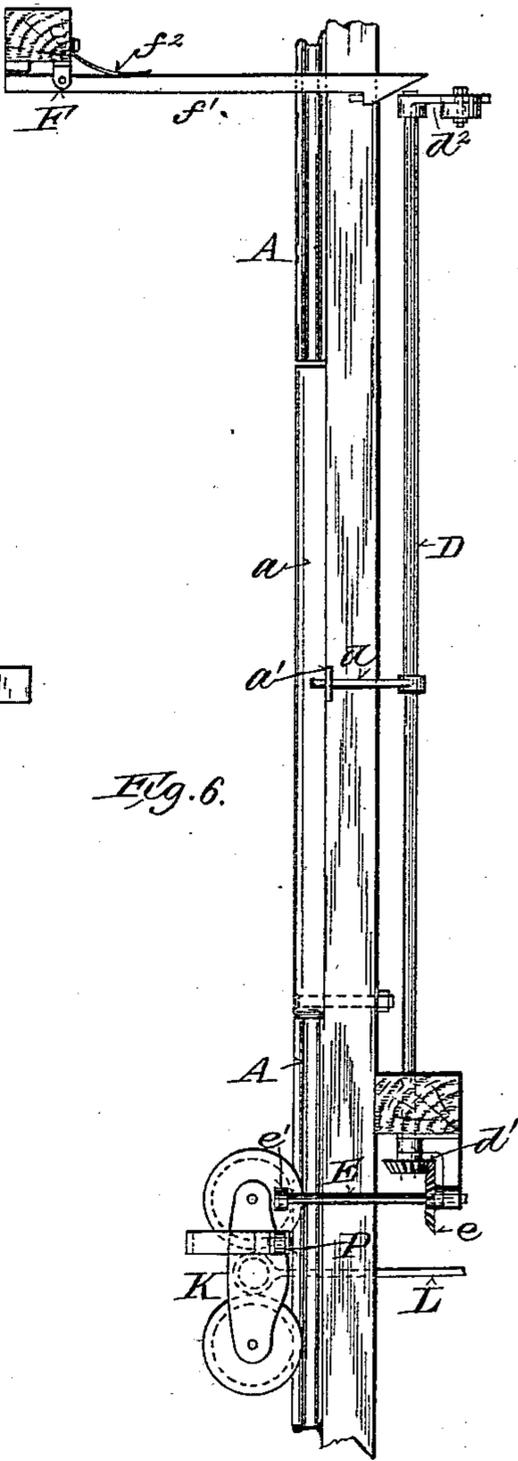


Fig. 6.

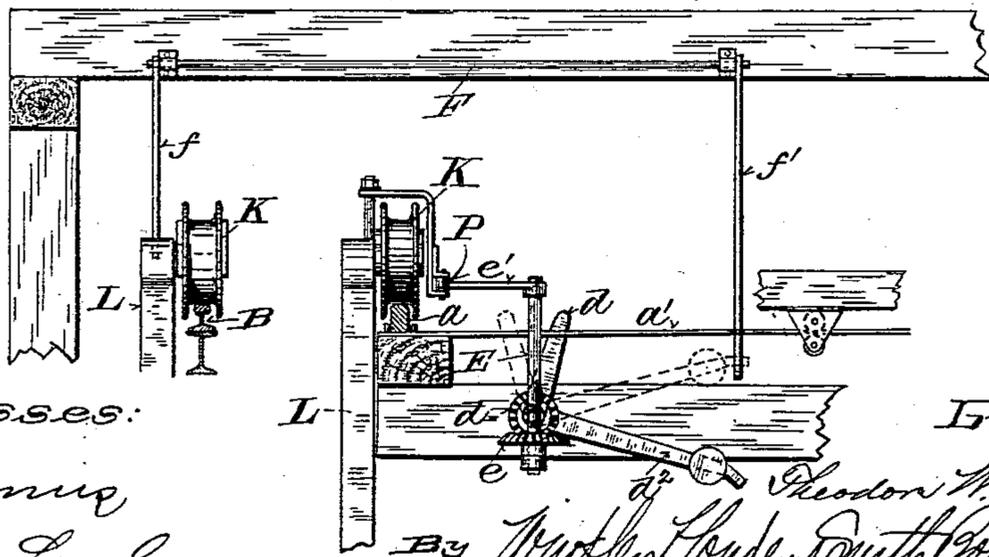


Fig. 7.

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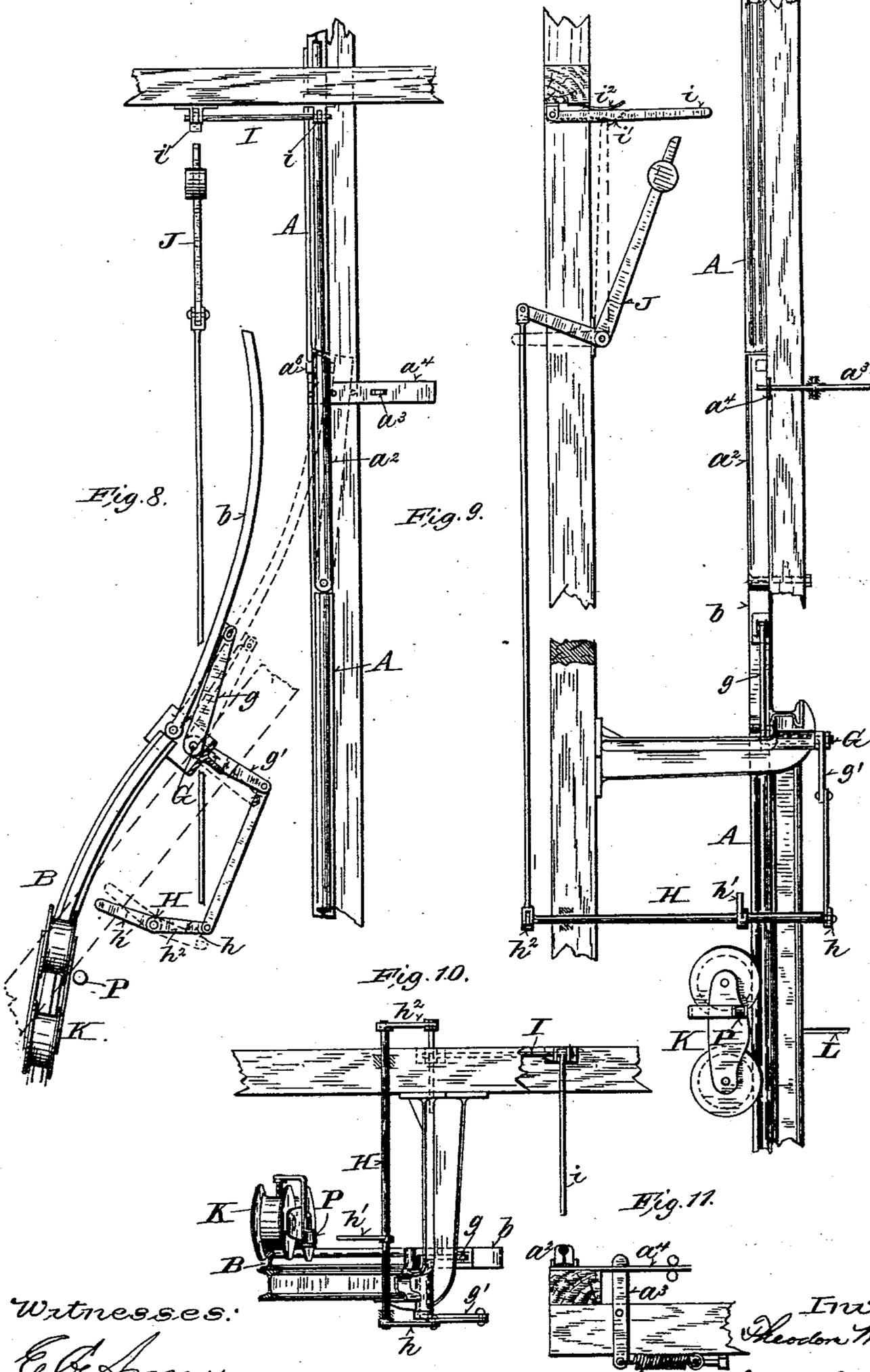
(No Model.)

5 Sheets—Sheet 4.

T. W. ROBINSON.  
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Patented May 19, 1896.



Witnesses:  
*E. A. ...*  
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(No Model.)

5 Sheets—Sheet 5.

T. W. ROBINSON.  
CONVEYER FOR ORE, &c.

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Patented May 19, 1896.

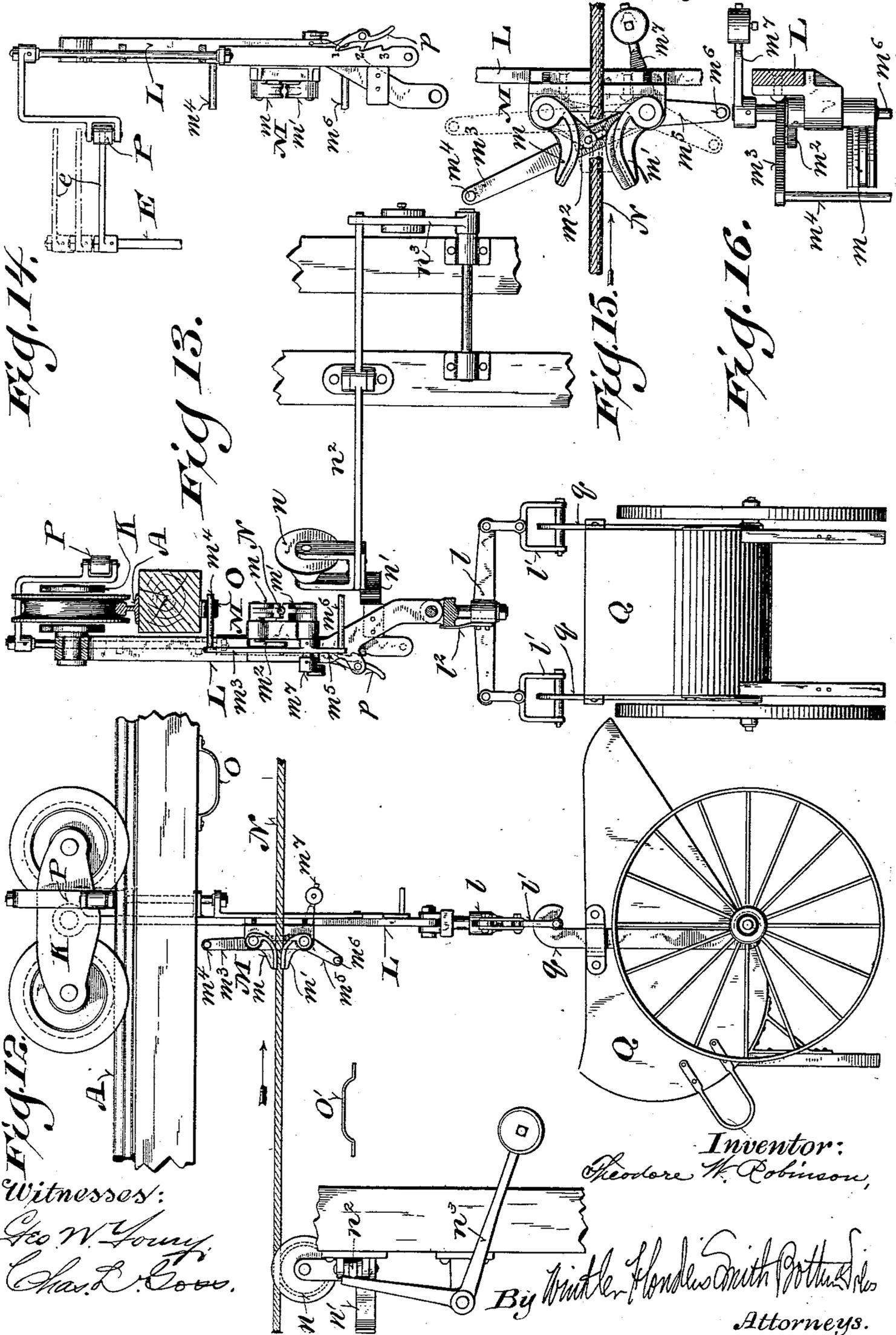


Fig. 12.

Fig. 13.

Fig. 14.

Fig. 15.

Fig. 16.

Witnesses:  
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# UNITED STATES PATENT OFFICE.

THEODORE W. ROBINSON, OF MILWAUKEE, WISCONSIN.

## CONVEYER FOR ORE, &c.

SPECIFICATION forming part of Letters Patent No. 560,232, dated May 19, 1896.

Application filed August 18, 1892. Serial No. 443,388. (No model.)

*To all whom it may concern:*

Be it known that I, THEODORE W. ROBINSON, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Conveyers for Ore and other Materials; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main object of my invention is to automatically detach and shunt any carrier from the main line at any desired point, so that it may be stopped or removed from the main line at such point, for the purpose of loading or unloading without interrupting or interfering with the operation of other carriers on the main line.

It consists, essentially, of a main track or way, one or more turnouts or side-tracks adapted to be connected therewith by switches, one or more carriers adapted to run on said main track or way, and turnouts or side-tracks provided with an adjustable trip for automatically operating said switches, of a driving cable or belt, a gripping device applied to each carrier and arranged to connect it with the driving-cable, suitably-located stops arranged to automatically close or open said gripping device at the desired points, and of certain other novel features in the construction and arrangement of the system and its component parts.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a perspective view of a portion of a conveyer embodying my improvements. Fig. 2 is a plan view of the main track or way, turnouts or side-tracks, and switches, one portion being placed above the other for the purpose of showing it in condensed space. Figs. 3 and 4 are vertical cross-sections on the lines  $x x$  and  $y y$ , respectively, as viewed from the left with reference to Fig. 2. Fig. 5 is a plan view, on an enlarged scale, of one of the switches and its operating mechanism at the entrance of one of the turnouts or side-tracks. Fig. 6 is a side elevation, and Fig. 7 an end

elevation, of the same. Fig. 8 is a plan view of one of the switches and its operating mechanism at the exit end of one of the turnouts or side-tracks. Fig. 9 is a side elevation, and Fig. 10 an end elevation, of the same. Fig. 11 is a side elevation of a device for returning to and holding in its normal position the movable section of the main track adjacent to the switch at the exit end of a turnout or side-track. Fig. 12 is a side elevation, on an enlarged scale, of one of the carriers, comprising a trolley, hanger, and barrow or bucket. Fig. 13 is an end elevation of the same viewed from the left with reference to Fig. 12. Fig. 14 is a detail view, seen from the right with reference to Fig. 12, of the adjustable trip with which each carrier is provided for automatically operating the switches; and Figs. 15 and 16 are detail views of the gripping device employed for connecting the carriers with the driving-cable, Fig. 15 being a side elevation and Fig. 16 a plan view.

For the purpose of illustration I have shown and described an overhead conveyer specially constructed and adapted for the carriage of ore and other similar material; but my improvements are equally applicable to conveyers employed for a variety of other purposes, and in their practical application are susceptible of many changes in details of construction and arrangement within the spirit and intended scope of my invention.

Referring to Figs. 1 to 4, inclusive, A A represent a continuous main track elevated and supported upon suitable framework. B B are turnouts or side-tracks supported similarly to and at the same level with the main track and adapted to be temporarily connected therewith at each end by switches  $a b$ . C C are platforms located below the several turnouts or side-tracks and below any discharging or stopping point or terminal in the main track at the general floor-level where the carriers are loaded and are connected at the ends with the lower plane of the floorway underneath the main track by inclines  $c c$ , upon which the barrows are run for the purpose of connecting them with and disconnecting them from the trolley-hangers.

Referring to Figs. 5 to 7, inclusive, the main track A is provided adjacent to the entrance end of each turnout or side-track B with a

hinged or pivoted section  $a$ , constituting a switch, arranged to be turned horizontally out of line with the main track into line with the turnout or side-track. D is a horizontal rock-shaft placed parallel with the main track A and extending at each end a short distance beyond the switch  $a$ . It is provided at an intermediate point with an upwardly-projecting arm  $d$ , which engages at its upper end with a horizontal slide  $a'$ , connected with the switch  $a$  and movable transversely thereto. At its end adjacent to the pivoted or hinged end of the switch it is provided with a bevel-gear  $d'$ , which engages with a similar gear  $e$  on a vertical shaft E, carrying at its upper end an arm  $e'$ , projecting horizontally toward the track A. At its opposite end the shaft D is provided with a horizontally-projecting weighted arm  $d^2$ , by which the switch  $a$ , when released, is automatically returned to its normal position in line with the main track A. F is a horizontal rock-shaft supported transversely to and above the track A, and provided at one end with a depending arm  $f$ , the lower end of which terminates a short distance above and to one side of the turnout or side-track B. At its opposite end it is provided with a depending arm  $f'$ , having a hook at its lower end in the path of the weighted arm  $d^2$ , with which it is adapted to engage, as indicated by dotted lines in Fig. 7, when the switch A is turned into line with the side-track B. A spring  $f^2$  (shown in Fig. 6) tends to hold said hook in engagement with said arm  $d^2$ .

Referring to Figs. 8 to 11, inclusive,  $b$  is a hinged or pivoted section of a turnout or side-track at its exit end, adapted to be swung horizontally into and out of line with the main track A, which is provided adjacent thereto with a similarly pivoted or hinged and horizontally-swinging section  $a^2$ . An upright lever  $a^3$ , fulcrumed to a suitable support, engages at its upper end with a horizontal slide connected with the hinged track-section  $a^2$ , and is connected at its lower end, as shown in Fig. 11, with a spring  $a^5$ , which tends to hold said track-section in its normal position in line with the main track A. G is a vertical shaft located near the pivoted end of the switch  $b$  and provided at its upper end with a horizontally-projecting arm  $g$ , which is connected at its free end with said switch. At its lower end said shaft G is provided with an arm  $g'$ , projecting horizontally therefrom at approximately right angles with the arm  $g$  and connected with a similar arm  $h$  on the lower end of a vertical shaft H, which is provided at an intermediate point with an arm  $h'$ , projecting horizontally toward the turnout or side-track B. I is a horizontal rock-shaft supported above and a short distance beyond the switch  $b$ , and provided at one end with a depending arm  $i$  over the main track A and at the opposite end with a depending hook  $i'$  in the path of the weighted arm of a bell-crank lever J, the other arm of which is

connected by a rod with the arm  $h^2$  on the upright shaft H. A spring  $i^2$  (shown in Fig. 9) tends to hold the hook  $i'$  in engagement with the weighted arm of lever J when it is raised into the position indicated by dotted lines in Fig. 9, and thereby hold the movable end of switch  $b$  in line with the main track A until the trolley of the carrier by which the switch is operated has passed from the side track upon the main track. When the switch  $b$  is turned to connect with the main track, it strikes a lug  $a^6$  on the adjacent side of the pivoted section  $a^2$  and moves it in the same direction out of line with the main track, with a space between it and said switch for the flanges of the trolley-wheels, as indicated by dotted lines in Fig. 8. When the switch  $b$  is released by the disengagement of the hook  $i'$  from the weighted lever J, the latter throws it out of line with the main track, while the spring  $a^5$  restores the hinged section  $a^2$  of the main track to its normal position.

Referring to Figs. 12 and 13, K represents a two-wheeled trolley adapted to run upon the track A. Pivotaly connected with one side of and suspended from said trolley is a hanger L, to the lower end of which is swiveled a cross-piece  $l$ , provided at its ends with depending stirrups  $l'$  for the reception of hooks on the barrow or bucket or other carrier. M is a gripping device attached to the hanger L below the track A, and consisting of two pivoted eccentric jaws  $m m'$ . (Shown in detail in Figs. 15 and 16.) The pivot-pin to which the upper jaw  $m$  is fixed is provided with a downwardly-projecting arm  $m^2$ , and the pivot-pin upon which the lower jaw is fixed has an upwardly-projecting arm  $m^3$ , provided at its upper end with a horizontal projection or pin  $m^4$ , and at an intermediate point with a longitudinal slot engaged by a pin on said arm  $m^2$ . To the pivot-pin of the lower jaw is also secured a downwardly-projecting arm  $m^5$ , which may be an extension of the arm  $m^3$ . It is provided with a horizontal projection or pin  $m^6$ . A weighted arm  $m^7$ , mounted upon the pivot-pin of the lower jaw, holds the jaws normally closed, as shown in Fig. 12. The driving-cable N is carried upon suitable sheaves and hangers arranged parallel with and a short distance below the main track A, and has, when the location and position of the apparatus are such that the carriers cannot be run by gravity, a suitable driving connection. (Not shown.) Adjacent to the exit end of each turnout or side-track the driving-cable is supported by a receding tapered sheave  $n$ , which carries it in proper position to be received between the jaws  $m m'$  of a carrier as it passes from the side-track upon the main track. This sheave is carried by a horizontally-swinging arm  $n^2$  and is held in normal position by a weighted bell-crank lever  $n^3$  engaging said arm, as shown in Figs. 12 and 13. It is moved out of the way to permit the passage of the grip by the engagement of the hanger L with the striking-plate  $n'$  on

the adjacent end of arm  $n^2$ , as shown in Fig. 12. Adjacent to the switches  $b$  at the exit ends of the turnouts or side-tracks I provide below the driving-cable stops, such as  $O'$ , (shown in Fig. 12,) in the path of the projections or pins  $m^6$  of the gripping devices on carriers traversing the main track, whereby the jaws  $m m'$  are automatically closed upon the driving-cable N when a carrier passes from a turnout or side-track upon the main track. The weighted arm  $m^7$  prevents the jaws from automatically opening after passing a stop  $O'$ , and the pull of the cable operates to tighten the grip of the jaws when they are once brought into engagement therewith. Adjacent to the switches  $a$  at the entrance ends of the turnouts or side-tracks, or at any stopping-point on the main line, I provide stops  $O$  above the driving-cable N, whereby the grip-jaws are automatically opened and the driving-cable is released when the carrier passes from the main track upon a turnout or side-track or arrives at such a stopping-point in the main line. The grip-opening stops at the entrance ends of turnouts or side-tracks are located at one side of the path of the projections  $m^4$  of carriers passing on the main line, and thus do not open the gripping devices, except of carriers turned upon such turnouts or side-tracks. Each trolley-hanger L is provided with a vertically-adjustable overhanging trip P, which is held in different positions by a spring-catch  $p$ , engaging with properly-spaced notches in the sliding rod carrying said trip, as shown in Fig. 14. Q represents a two-wheeled barrow such as are commonly employed in blast-furnaces for carrying ore. It is provided on each side with hooks  $q q$ , which are adapted to be inserted in the stirrups  $l' l'$  and suspend it therefrom. The wheels of the barrows suspended from the trolleys K by their hangers L clear the floorway underneath the main track A, but the height of the raised platforms C underneath the turnouts or side-tracks and any stopping-station on the main line is such that when the barrows are carried thereon up the inclines  $c c$  they will be raised sufficiently to disengage the hooks  $q q$  from the stirrups  $l' l'$  and permit of their removal for the purpose of loading or unloading at points off from the main line. The incline  $c'$  at the receiving end of any platform C, as at the discharging or stopping terminal of the main line shown in the lower portion of Fig. 2, may consist of an endless belt like or similar to the apron of an ordinary treadmill, the upper side of which is driven by a pulley  $c^2$ , having any suitable connection, (not shown,) in the direction of the movement of the carriers to assist in running the barrows up the incline upon such platform. Each hanger L is provided with a spring-catch  $l^2$  to hold the cross-bar  $l$  cross-wise of the line of travel and the suspended barrow with either end foremost, as desired.

My improved conveyer operates as follows: Each carrier or barrow, such as Q, being

loaded at or near a side-track B, is drawn on the platform C below said side-track and the trolley to which it is to be attached and the hooks  $q q$  are run into the stirrups  $l' l'$ . It is then moved forward by the operator with the trolley and hanger until the trolley passes from the side-track over the switch  $b$  upon the main track, when the lower pin  $m^6$  of the gripping device, engaging with the adjacent stop  $O'$ , closes the jaws  $m m'$  on the driving-cable, which will then, without further manipulation or attention, carry the barrow and its load to their destination on the main line, where the gripping device is automatically opened by a stop  $O$ . Just before the trolley passes upon the switch  $b$  to the main track the trip P, which has been previously adjusted to the proper level, engages with the arm  $h'$  and through its connections, hereinbefore described, turns said switch in line with the main track, where it is held by the hook  $i'$  engaging with the weighted lever J. After the trolley has passed upon the main track A and cleared the switch  $b$  it engages with the arm  $i$  and moves the hook  $i'$  out of engagement with the weighted lever J, which, descending, disconnects the switch  $b$  from the main track. The pivoted track-section  $a^2$ , being thus released, is returned to its normal position by the spring  $a^5$  and its connections. The trip P of any carrier may be adjusted at any point in the line to automatically operate the switches of any turnout or side-track, the switch-operating arms  $e'$  and  $h'$  of the different turnouts or side-tracks being placed at different levels, as indicated in Fig. 14, while the arms  $e'$  and  $h'$ , belonging to the same side-track, are placed at the same level. The trip of any carrier being thus adjusted so as to cause the trolley from which it is suspended to run upon any particular side-track, as it approaches the switch  $a$  at the entrance end of such side-track engages with the arm  $e'$  and through its connections turns said switch so as to direct the trolley from the main track upon said side-track. The switch is held in place until the trolley has passed over it by the hook  $f'$ , hereinbefore described. As the trolley passes the arm  $f$  it engages therewith and detaches said hook  $f'$  from the weighted arm  $d^2$ , which returns the switch to its normal position in line with the main track A. The trip P of a carrier may be adjusted so as to cause the carrier to turn off from the main track upon any side-track or to pass all the side-tracks and return to the starting-point.

In the system herein shown and described it is designed to load the carriers at a number of different points and to detach and unload them at a single point; but the carriers may be loaded at one or a number of places and automatically shunted at several points for unloading. A cable or any other suitable form of tramway may be used in place of the track-rail shown in the drawings, and in place of the driving-cable N a chain, belt, or any other convenient form of actuating device

may be used, and the system may be worked on an incline as well as on a level, as shown.

I claim—

1. In a conveyer, the combination with a main track, side-tracks and switches for connecting such side-tracks with the main track, of a carrier provided with an adjustable trip for operating the switch or switches of either side-track for which it may be set, substantially as and for the purposes set forth.

2. In a conveyer, the combination with a main track, side-tracks, switches for connecting the side-tracks at each end with the main track, and a driving-cable, of carriers provided with adjustable trips arranged to automatically operate the switches at both ends of any side-track for which they may be set, and with gripping devices for connecting the carriers with the cable, and stops arranged to automatically open the gripping devices when the carriers are shunted and to close said gripping devices upon the cable when the carriers pass from a side-track upon the main track, substantially as and for the purposes set forth.

3. In a conveyer, the combination with a main track, a number of side-tracks, switches for connecting the side-tracks with the main track, and a driving-cable, of carriers each provided with an adjustable trip arranged to operate the switch of any side-track for which it is set and with a gripping device for connecting the carrier with said cable, and a stop arranged to automatically open the gripping device of a carrier which is shunted upon a side-track, substantially as and for the purposes set forth.

4. In a conveyer, the combination with a main track, a number of side-tracks, switches for connecting the side-tracks with the main track and a driving-cable, of carriers each provided with an adjustable trip arranged to operate the switch of the side-track for which it is set, and with a gripping device for connecting the carrier with said cable, and opening and closing stops arranged to automatically open the gripping device of a carrier as it runs upon a side-track and to close said gripping device as the carrier runs from a side-track upon the main track, substantially as and for the purposes set forth.

5. In a conveyer, the combination with an elevated main track, a side-track leading therefrom and a driving-cable, of a trolley adapted to run on said tracks and provided with a gripping device for connecting it with said cable, a stop arranged to open said gripping device when the trolley runs from the main upon the side track, a wheeled barrow having a detachable connection with said trolley and an incline or raised way under the side-track, arranged to automatically elevate and detach the barrow from the trolley when the latter passes upon the side-track, substantially as and for the purposes set forth.

6. In a conveyer, the combination with an elevated main track, a side-track leading

therefrom, a switch for connecting said tracks and a driving-cable, of a trolley adapted to run on said tracks and provided with a gripping device for connecting it with said cable, and with a trip for automatically operating said switch, a stop arranged to open the gripping device when the trolley runs from the main upon the side track, a wheeled barrow having a detachable connection with said trolley and an incline or raised way under said side-track arranged to automatically elevate and detach the carrier from the trolley when the latter passes upon the side-track, substantially as and for the purposes set forth.

7. In a conveyer, the combination with an overhead guiding-track, of a trolley adapted to run thereon, a carrier detachably connected with said trolley, and an upwardly-movable incline adapted to raise said carrier out of engagement with said trolley, substantially as and for the purposes set forth.

8. In a conveyer, the combination with a guiding-track, of a car or trolley adapted to run thereon, and a carrier having a reversible connection with said car or trolley whereby the carrier may be turned thereon without detaching it from the trolley so as to run either end foremost, substantially as and for the purposes set forth.

9. In a conveyer, the combination with a guiding-track of a car or trolley adapted to run thereon, and of a carrier having a reversible connection with said car or trolley and a catch for holding the carrier in the desired position with reference to the car or trolley, substantially as and for the purposes set forth.

10. In a conveyer, the combination with a main guiding-track, a side-track and a driving-cable, of a carrier provided with a gripping device, and a yielding supporting-sheave arranged to hold the cable in position to be received by the gripping device of the carrier as it passes from the side-track upon the main track, substantially as and for the purposes set forth.

11. In a conveyer, the combination with a guiding-track, a side-track and a driving-cable, of a carrier provided with a gripping device, a tapering sheave arranged to support said cable in position to receive the gripping device of the carrier as it passes from the side-track upon the main track, and movable by engagement with a carrier passing on the main track out of the way of its gripping device, substantially as and for the purposes set forth.

12. In a conveyer, the combination with a guiding-track and a driving-cable, of a carrier provided with a gripping device consisting of a pair of grooved segmental jaws eccentrically pivoted to the carrier and connected with each other, substantially as and for the purposes set forth.

13. In a conveyer, the combination with a guiding-track and a driving-cable, of a carrier provided with a gripping device consisting of a pair of eccentrically-pivoted con-

ected jaws, one provided with a closing and the other with an opening arm or projection, and stops arranged to automatically open and close said gripping device at the desired points, substantially as and for the purposes set forth.

14. In a conveyer, the combination with a main track and side-track, of a switch consisting of a pivoted section of the main track arranged to swing horizontally into line with the side-track, a part adjacent to the main track movable in the direction thereof, and connected with and arranged to throw said switch into line with the side-track, a device arranged to return said switch into line with the main track and to restore said movable part to its normal position, a catch arranged to engage said returning device and hold the switch in line with said side-track, a part adjacent to and movable in the direction of the side-track and connected with said catch, and a carrier provided with a trip arranged to engage said movable parts and automatically throw said switch into line with the side-track and to return it after the carrier has passed to its normal position in line with the main track, substantially as and for the purposes set forth.

15. In a conveyer, the combination with a main track and side-track, of a switch consisting of a pivoted section of the side-track arranged to swing horizontally into line with the main track, a part adjacent to and movable in the direction of said side-track and connected with and arranged to swing said switch into line with the main track, a device connected with and arranged to open and return said switch to its normal position, a catch arranged to engage said returning device and to hold said switch closed, a part adjacent to and movable in the direction of the main track, connected with said catch, and a carrier provided with a trip arranged to engage with said movable parts and to first close said switch with the main track and then release said catch, whereby the switch is allowed to open and return to its normal position, substantially as and for the purposes set forth.

16. In a conveyer, the combination with a main track and side-track, of a switch consisting of a pivoted section of the side-track arranged to swing horizontally into line with the main track, a part adjacent to and movable in the direction of the side-track and connected with and arranged to throw said switch into line with the main track, a pivoted section in the main track arranged to be opened by the closing of said switch with the main track, a device for automatically closing said pivoted section of the main track when it is

released by said switch, and a carrier provided with a trip arranged to engage with said movable part and to automatically close said switch and open the pivoted section of the main track simultaneously, substantially as and for the purposes set forth.

17. In a conveyer, the combination with a main track and side-track, of a switch adjacent to the entrance of the side-track consisting of a pivoted section of the main track, a part adjacent to and movable in the direction of the main track connected with and arranged to throw said switch into line with the side-track, a switch adjacent to the exit end of said side-track, consisting of a pivoted section of the side-track, arranged to swing horizontally into line with the main track, a part adjacent to and movable in the direction of the side-track and connected with and arranged to throw said switch into line with the main track, and a carrier provided with a trip arranged to engage with said movable parts and to automatically operate said switches, substantially as and for the purposes set forth.

18. In a conveyer, the combination with a main track and side-track, of a switch at the entrance end of the side-track, consisting of a pivoted section of the main track arranged to swing horizontally into line with the side-track, a part adjacent to and movable in the direction of the main track and connected with and arranged to throw said switch into line with the side-track, a switch at the exit end of said side-track consisting of a pivoted section of said side-track arranged to swing horizontally into line with the main track, a part adjacent to and movable in the direction of the side-track and connected with and arranged to throw said switch into line with the main track, devices arranged to automatically return said switches to their normal positions, and a carrier provided with a trip arranged to engage said movable parts and to automatically operate said switches, substantially as and for the purposes set forth.

19. In a conveyer the combination with a main track a side-track connected therewith and driving-cable, of a carrier provided with a gripping device for attachment to said cable, and a tapering supporting-sheave located at or near the junction of the side and main tracks and movable away from said cable to clear the gripping device of a passing carrier, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

THEODORE W. ROBINSON.

Witnesses:

CHAS. L. GOSS,  
E. G. ASMUS.