

No. 864,407.

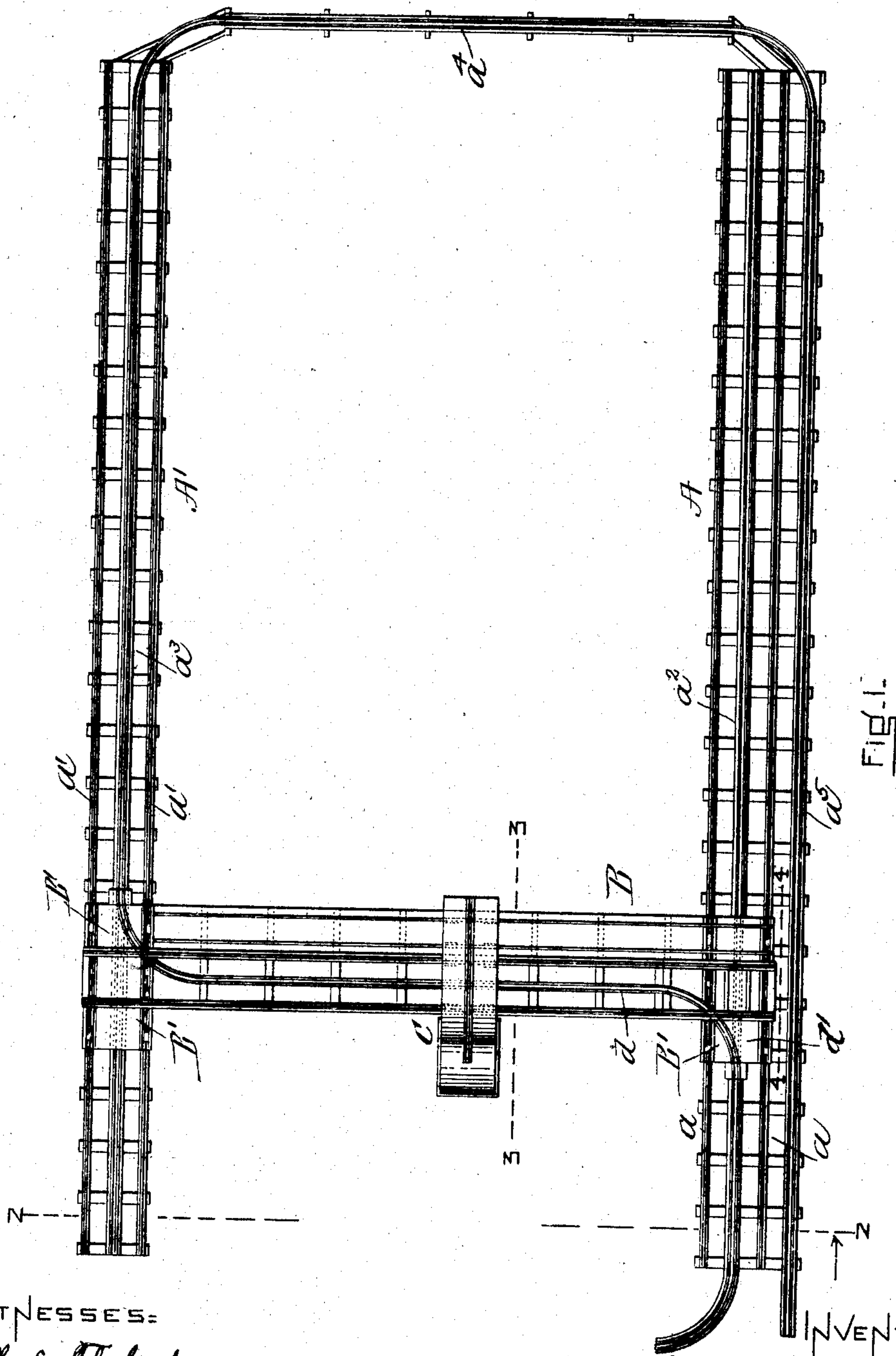
PATENTED AUG. 27, 1907.

J. CAMPBELL.

MACHINERY FOR HANDLING COAL, ORE, AND THE LIKE.

APPLICATION FILED APR. 19, 1906.

5 SHEETS—SHEET 1.



WITNESSES:

*W. E. Staherty*  
*M. V. Foley*

INVENTOR

*J. Campbell*  
*of handling coal and ore*  
*in attests—*

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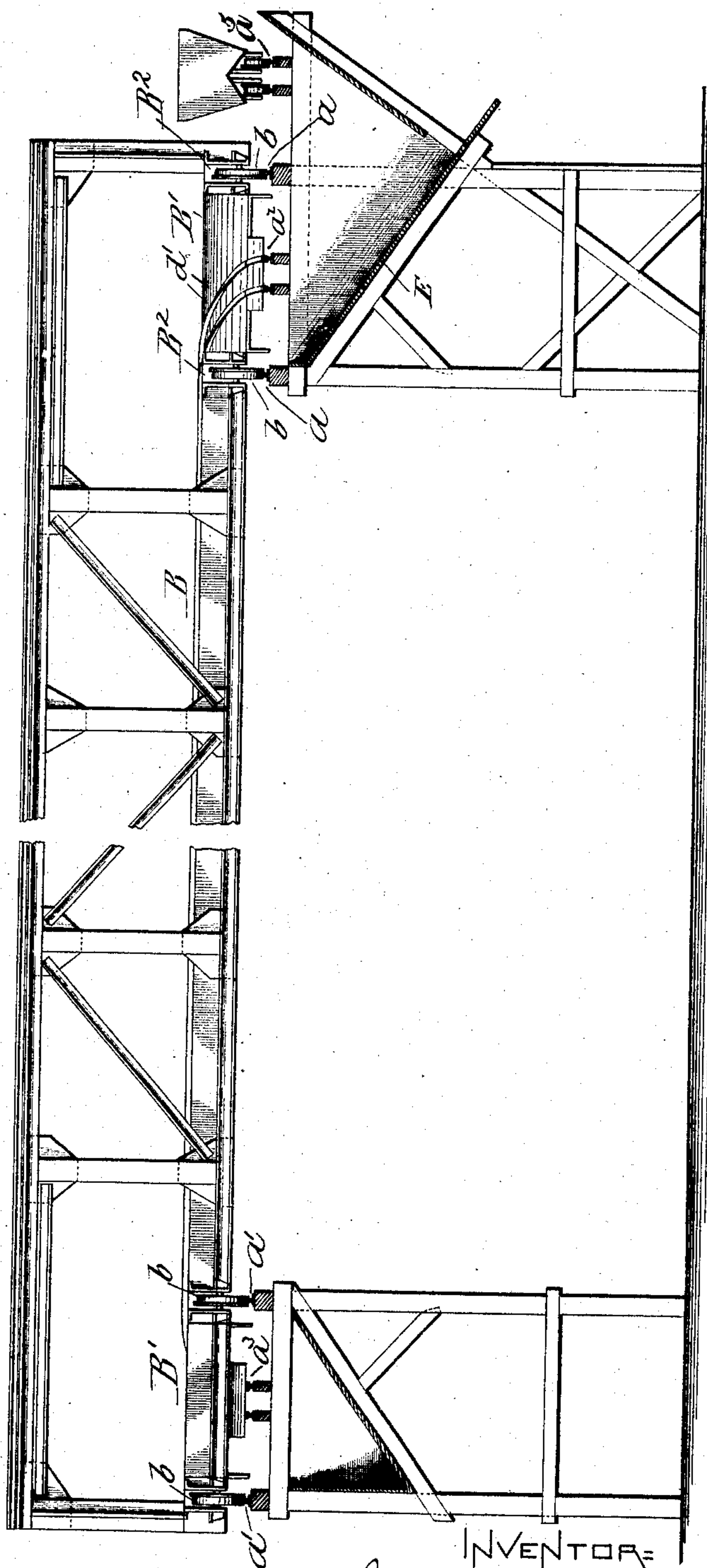


FIG-2-

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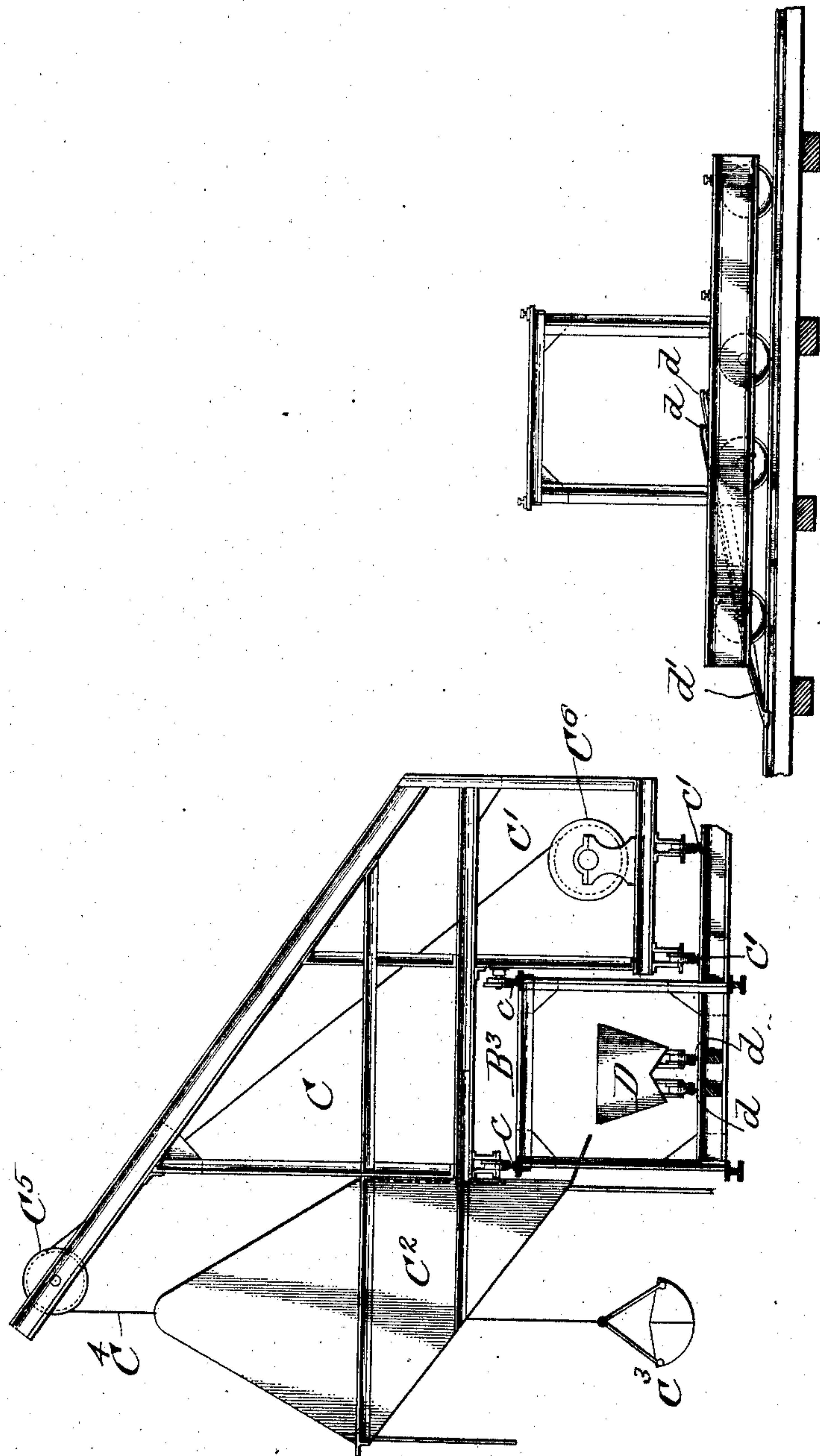


Fig. 4.

Fig. 3.

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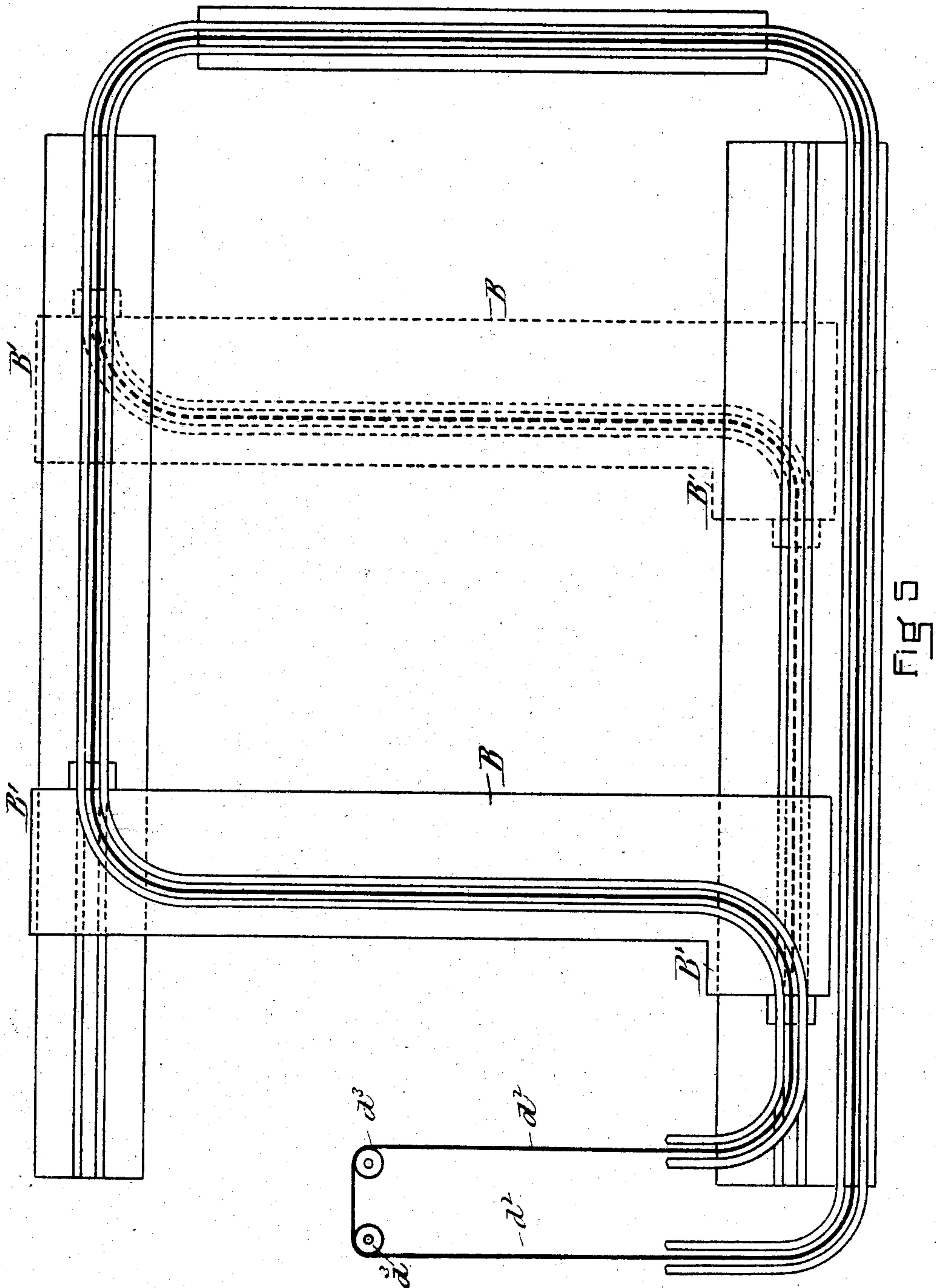
PATENTED AUG. 27, 1907.

J. CAMPBELL.

MACHINERY FOR HANDLING COAL, ORE, AND THE LIKE.

APPLICATION FILED APR. 10, 1906.

5 SHEETS—SHEET 4.



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No. 864,407.

J. CAMPBELL.

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5 SHEETS—SHEET 6.

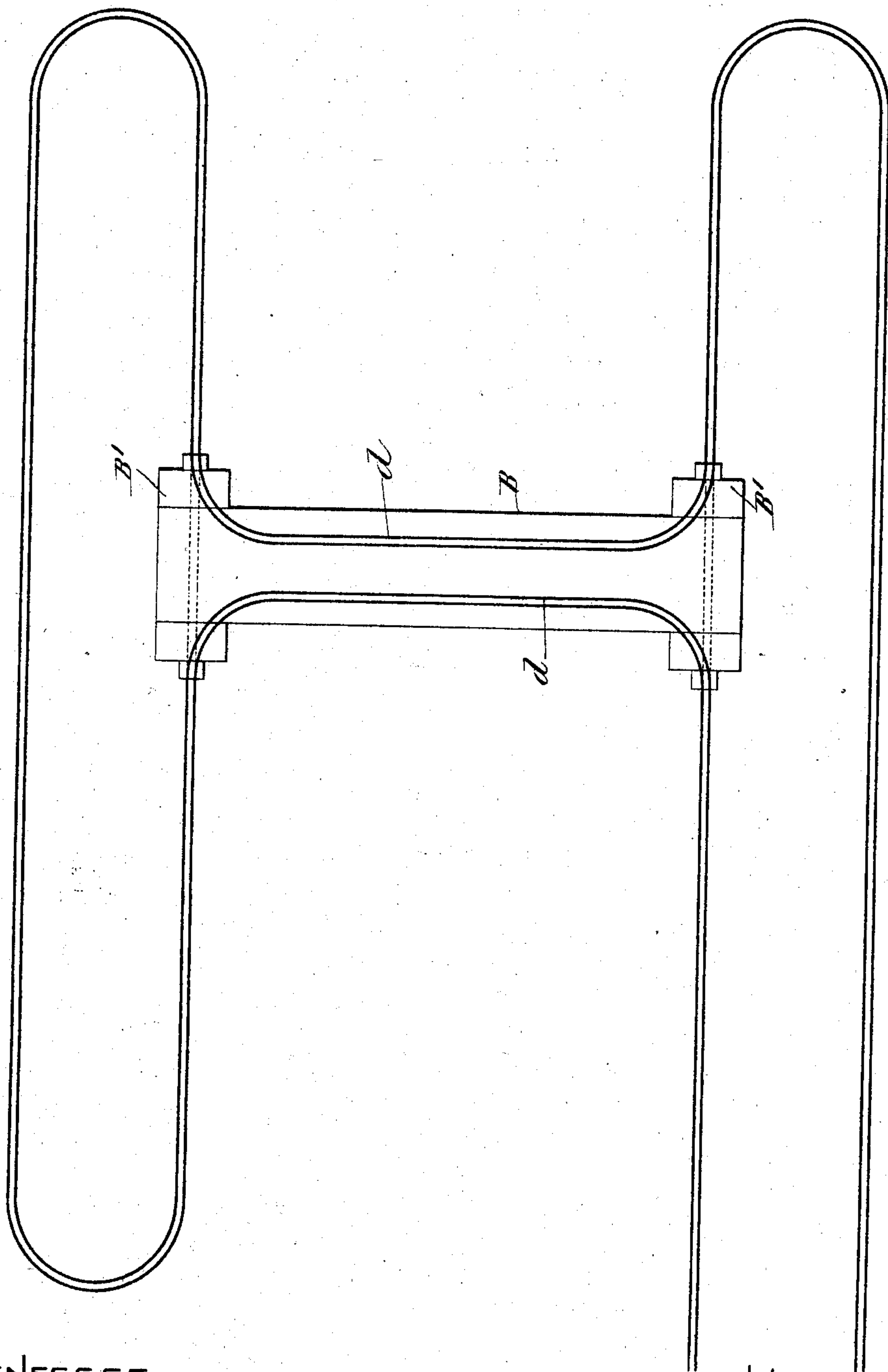


FIG. 6.

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# UNITED STATES PATENT OFFICE.

JEREMIAH CAMPBELL, OF PROVIDENCE, RHODE ISLAND.

## MACHINERY FOR HANDLING COAL, ORE, AND THE LIKE.

No. 864,407.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed April 19, 1905. Serial No. 256,475.

*To all whom it may concern:*

Be it known that I, JEREMIAH CAMPBELL, of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Machinery for Handling Coal, Ore, and the Like, of which the following is a specification.

Modern appliances for handling coal comprise among other mechanisms a grab or power operated shovel by means of which the coal may be carried from a lower to a higher level, and often a suitable hopper in which it may be temporarily retained if necessary, and from which it may be discharged into a car or other vehicle for its transportation in substantially a horizontal plane. Hitherto the grab has been hung usually from a tower by which its operating mechanism was carried, and its radius of action has been limited to points within reach of the tower which also had a movement along a track so that, within limits, its field of operations was somewhat increased. This, however, while it increased the area over which the grab could work, and served many purposes, for example, rendered possible the use of the same grab along the length of a narrow wharf or along one edge of a wharf, still restricted the area of usefulness of the grab.

My invention relates to means for still further augmenting the reach of the grab by so mounting it that it may be moved in two directions at right angles to each other and so be available for use over a considerably enlarged area.

My invention consists, therefore, in mounting what, for convenience, I will call the tower, *i. e.*, the grab support and operating mechanism on a support on which it has a movement lengthwise of the support, which support also has a movement at an angle to its length. As exemplified in the drawings the support comprises a bridge mounted at each end on a pier along which it travels, the support carrying the tower which is constructed to travel along with it. Thus the grab suspended from the tower may be brought within reach of any portion of the parallelogram lying between the piers, and its load delivered to a car may be dumped at any point below the bridge or piers.

As a car drawn by a cable is often used to receive the load from a grab, either directly or through an intervening hopper I have also made provision for moving the car over various parts of the pier and also across the bridge, and hence have provided means whereby the track on which the car runs about the pier may be joined with the track running across the bridge although the latter track is on a higher level than the former.

The arrangement above outlined is practicable be-

cause movement of the bridge in either direction neither shortens nor lengthens the cable by which the car is moved, as will be described below.

My invention will be understood by reference to the drawings in which the various parts thereof are shown somewhat diagrammatically but sufficiently when taken in connection with the description to enable the invention to be practiced.

Figure 1 is a plan of a machine embodying my invention. Fig. 2 is a cross section on line 2—2 of Fig. 1, showing the bridge in elevation. Fig. 3 is a section on line 3—3 of Fig. 1. Fig. 4 is a section on line 4—4 of Fig. 1. Fig. 5 is a diagram showing an arrangement of a cable by means of which the car is drawn to any desired point. Fig. 6 shows a modification.

A, A<sup>1</sup> are the piers and B is the bridge. The bridge B has a truck B<sup>1</sup> at each end comprising beams B<sup>2</sup> carrying suitable journals for the wheels *b* by means of which the bridge is supported upon the rails *a*, *a*<sup>1</sup>, running along the top of the piers. The bridge B has two sets of rails running its entire length, one set of rails *c*, *c*<sup>1</sup> being for the tower C and the other set *d* for the car D. The tower as shown straddles the main part of the bridge, its middle portion and one side portion being provided with wheels adapted to run upon rails on the bridge as described below. One of the side sections of the tower C comprises the engine room which balances the other section in which is the hopper C<sup>2</sup> and from which the grab is hung.

I prefer to make the bridge B with an upper deck on which are laid the rails *c* on which the middle portion of the tower runs, rails *c*<sup>1</sup> being provided on the lower level and at one side of the bridge on which the wheels run which support the section which contains the engine room C<sup>1</sup>. It is obvious, however, that the upper deck might be omitted and the rails *c* laid directly on the lower deck, for example, below their present location, the middle section of the tower being extended downward for the purpose of maintaining the tower in its proper position.

At C<sup>2</sup> I have indicated a hopper of the type having a bottom which opens downward to allow the grab to be lowered and which closes automatically when the grab is raised above it. Such a hopper is shown in an application for Letters Patent of the United States, Serial No. 241,086, filed by me January 14, 1905. C<sup>3</sup> is the grab and C<sup>4</sup> is the hoisting rope which passes over the sheave C<sup>5</sup> to the drum C<sup>6</sup> in the engine room, suitable tackle being introduced between the grab and drum if thought best. These parts are well known and need not be further described.

The rails *d* upon which the car D runs are capable of connection with the rails *a*<sup>2</sup>, *a*<sup>3</sup> on the piers A, A<sup>1</sup>.



For this purpose the trucks  $B^1$  at the ends of the bridge B where they overlap the piers are each provided with slanting supports  $d^1$ , the lower ends of which are so located as to allow the rails  $d$  carried thereon to register with the rails  $a^2$  or  $a^3$  on the pier, the rails being thinned at their ends to make an easy ascent for the cars. These supports  $d^1$  carry the rails  $d$  up on to the bridge proper and for this purpose are curved within a radius of convenient length. It will be seen that no matter in what position the bridge is with relation to the piers, as the ends of the rails  $d$  register with the rails  $a^2$ ,  $a^3$ , the cars D can always be run up on to the bridge or down therefrom. The track  $a^3$  is continued over suitable supports from the pier  $A^1$  to the pier A, this portion of the track being lettered  $a^4$  and running off to a side track  $a^5$  from which it may be switched back on to the main track again.

A suitable slanting floor E may be provided below the portion of the pier on which the tower runs, on which the coal may be dumped to be delivered into suitable carts or cars at the side of the pier.

It will be noticed that the pier A is traversed its entire length by the cars. Its entire length or any part of it may be used as a coal pocket if thought best, and with simple modifications of the cable system and the pier  $A^1$  the same use may be made of that pier.

From this description it will be seen that the tower C may be moved to any point on the bridge and the bridge to any point along the piers so that the grab may be brought over or within reach of almost any point between the piers and also that the cars may be brought under the tower.

The means for moving the car is ordinarily a cable which may be arranged as shown in Fig. 5, in which the cable is indicated at  $d^2$ . It is guided by suitable sheaves and is given movement from power moved pulleys  $d^3$ ,  $d^3$ . A consideration of Fig. 5 will show one important feature of this invention, viz.:—that in moving the bridge the total length of cable is not varied when the cable is arranged as there shown, and as a result the bridge may be moved at any time without any delay to or interference with the operation of the cable. The value of this possibility cannot be over estimated in a structure of this kind when the point to which the grab is directed is constantly changing and the location of the grab operating mechanism must be correspondingly altered, and speed or regularity of operation is material to the economical operation of the mechanism.

I have shown in Fig. 6 another arrangement of tracks for the car D, the bridge in this case having a double track for the cars D and each truck  $B^1$  having slanting approaches at each end by which cars may run up on to the tracks  $d$  on the bridge.

It is obvious that this invention does not relate to details of construction so much as it does to the broad idea of a traveling grab by which coal can be hoisted from any point within a large area and loaded upon a car upon the bridge which carries the grab, which car can then be run off the bridge to carry the coal to the proper dump.

What I claim as my invention is:—

1. In a coal handling machine, piers, a bridge supported thereon, a tower supported on said bridge, means carried by said piers whereby said bridge may travel laterally thereon, and means carried by said bridge whereby said tower may travel longitudinally thereon the upper

level of said piers and the lower deck of said bridge being in substantially the same plane.

2. In a coal handling machine, a bridge, a tower movably carried thereby, and piers, said bridge being mounted to move on said piers, and rails mounted on said piers and on said bridge adapted to be connected whereby a car can be rolled from said bridge to said piers, and vice versa as set forth.

3. In a coal handling machine, a bridge having tracks at two levels, and a tower composed of three sections, the central section of said tower being supported upon the higher level of said bridge, one of said side sections running upon the lower level of said bridge, said side sections serving as a counterbalance for each other, as described.

4. In a coal handling machine, a double decked bridge, a tower adapted to run thereon, the lower deck of said bridge being provided with a way for the passage of cars and both decks adapted to support said tower, as set forth.

5. In a coal handling machine, a tower comprising three sections, a central section adapted to support said tower, and two side sections adapted to counterbalance each other, one carrying a hoisting mechanism and the other a grab and hopper.

6. In a coal handling machine, a bridge, piers adapted to support said bridge at each end thereof and provided with means whereby said bridge may be moved along said piers, said piers and said bridge each being provided with a car track, and means movable to conform to the position of the bridge on said piers whereby cars may be switched from the track on the piers to the track on the bridge and vice versa in combination with a tower located on said bridge and movable from one end to the other thereof.

7. In a coal handling machine, two or more piers provided with car tracks and bridge tracks running their length, a bridge provided with a truck at each end adapted to support said bridge on said piers, said bridge also having car tracks extending on to said trucks, their ends being adapted to register with the car tracks on said piers and engage therewith, whereby a car may be readily run from the pier to the bridge and vice versa, in combination with a tower located on said bridge and movable from one end thereof to the other as set forth.

8. In a coal handling machine, two piers, a bridge movable laterally thereon, a tower movable lengthwise of said bridge, means whereby a car may be moved along said piers, across said bridge, and from one pier to the other without crossing said bridge, as set forth.

9. In a coal handling machine, a bridge, supports therefor, said bridge being capable of travel along said supports, one or more cars adapted to travel along said bridge and said support, and means such as a cable for actuating said cars, said cable being arranged to maintain a constant length irrespective of the position of said bridge with relation to said supports, in combination with a tower located on said bridge carrying mechanism adapted to fill cars drawn by said cable as set forth.

10. In a coal handling machine, a bridge, supports therefor, one or more coal pockets located in said supports, car filling means located on said bridge and a car transferring means whereby cars may be moved from a filling position on the bridge to a dumping position over said pockets, as described.

11. In a coal handling machine, piers, a bridge resting on said piers and adapted to run lengthwise thereof, a tower located on said bridge and adapted to move lengthwise thereof, and cars adapted to run along said piers and said bridge under said tower, as described.

12. In a coal handling machine, piers, a bridge resting thereon and adapted to move lengthwise thereof, a coal handling mechanism located on said bridge and movable lengthwise thereof and comprising a hopper and a grab, and means for operating it to dump its load into said hopper, and cars adapted to run along said bridge within reach of the mouth of said hopper whereby they may be filled therefrom, as described.

JEREMIAH CAMPBELL.

In presence of—

FRANK L. HINCKLEY,  
WILLIAMENA COLTER,