

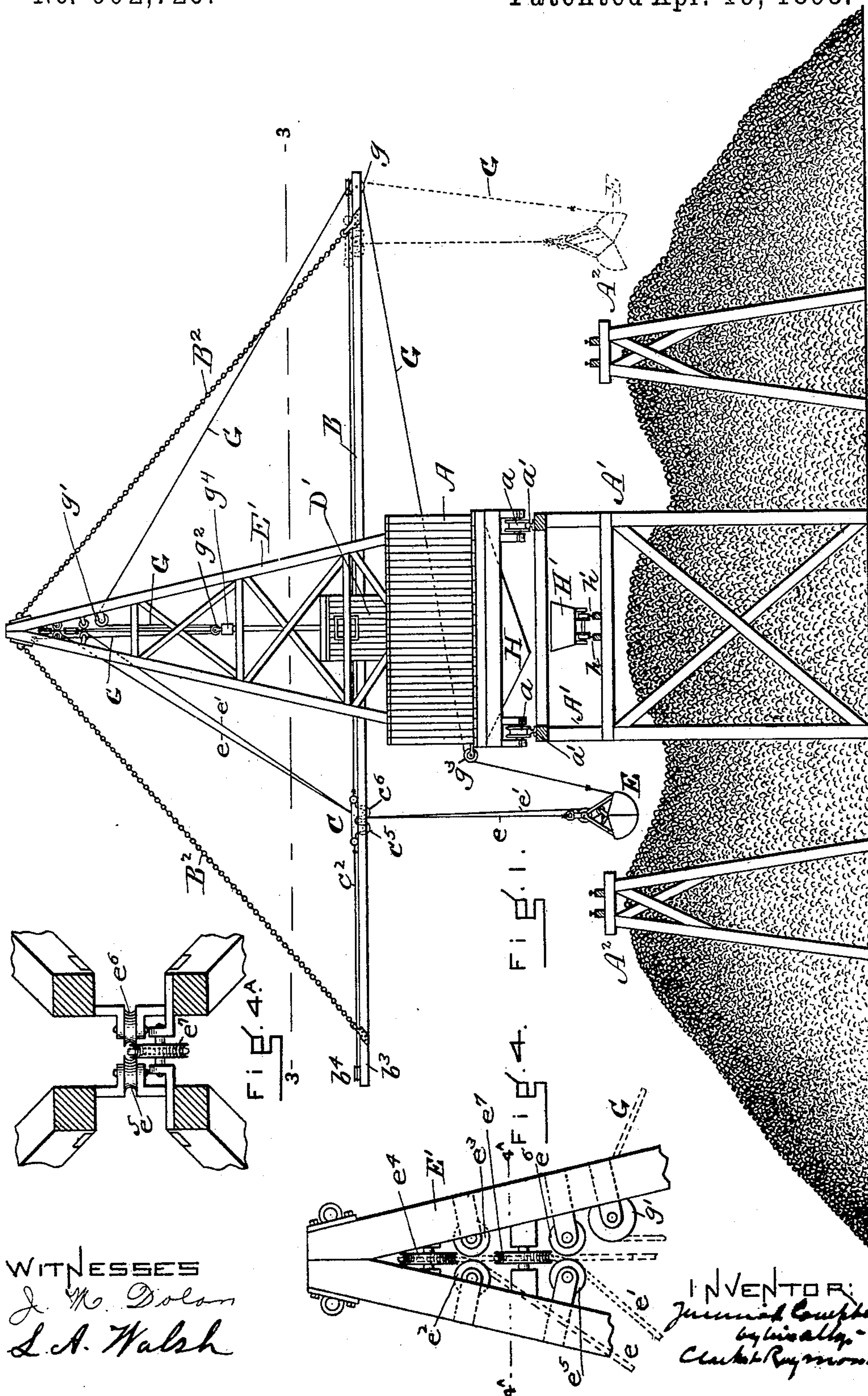
(No Model.)

5 Sheets—Sheet 1.

J. CAMPBELL.
HOISTING AND CONVEYING APPARATUS.

No. 602,726.

Patented Apr. 19, 1898.



(No Model.)

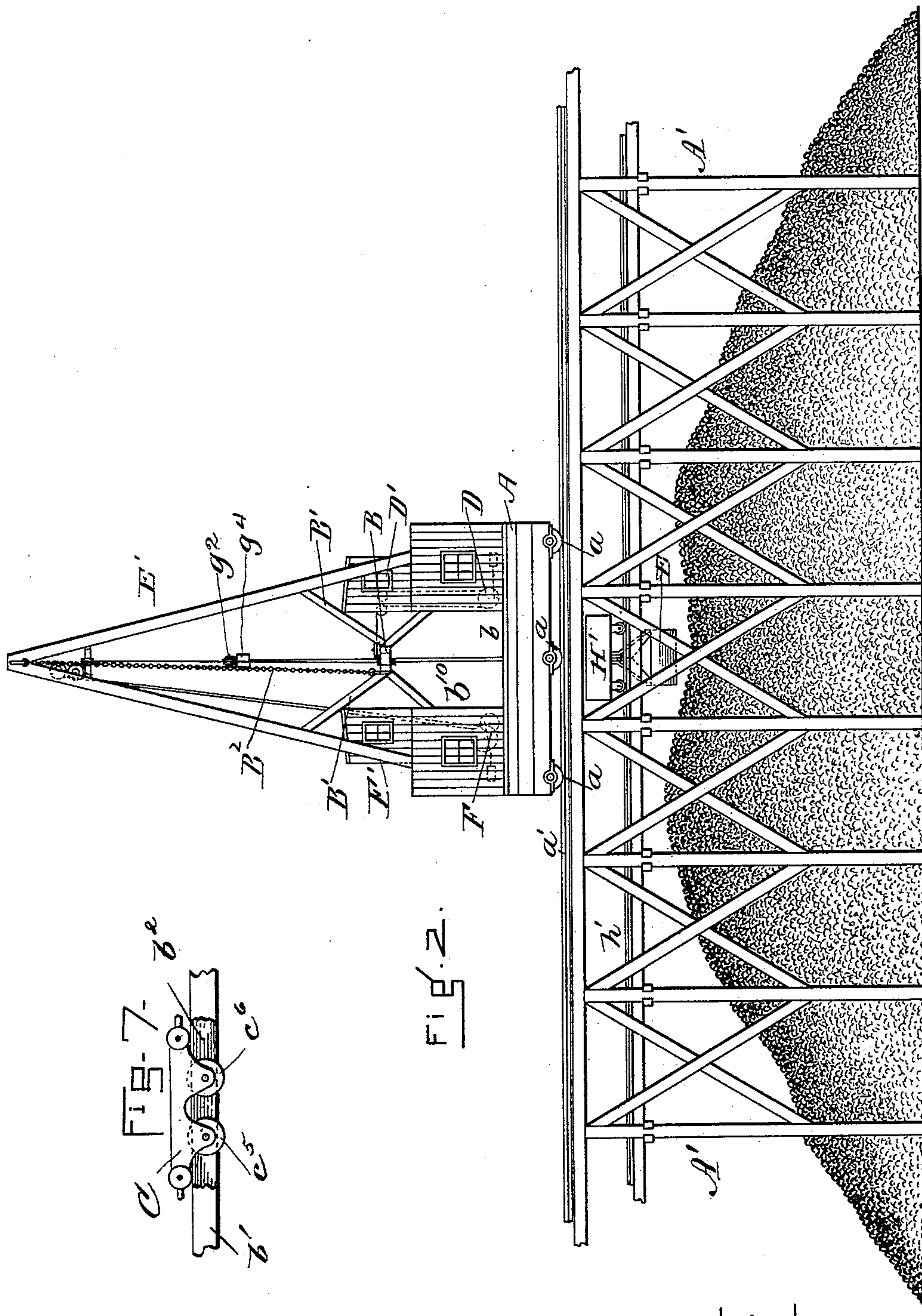
5 Sheets—Sheet 2.

J. CAMPBELL.

HOISTING AND CONVEYING APPARATUS.

No. 602,726.

Patented Apr. 19, 1898.



WITNESSES:
J. M. Dolan.
L. A. Walsh.

INVENTOR:
J. Campbell
by his atty.
Clark & Raymond

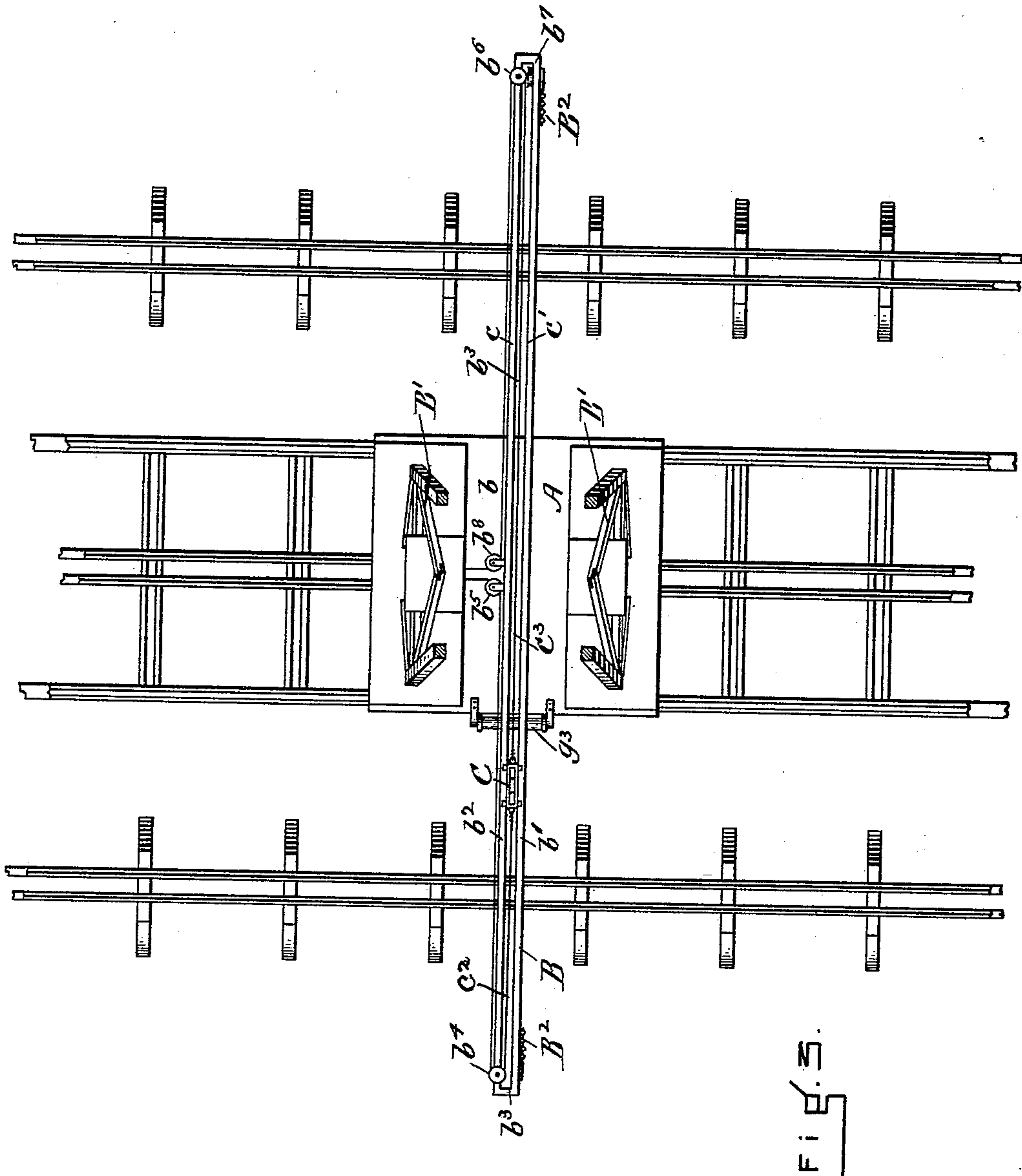
(No Model.)

5 Sheets—Sheet 3.

J. CAMPBELL.
HOISTING AND CONVEYING APPARATUS.

No. 602,726.

Patented Apr. 19, 1898.



WITNESSES:

J. W. Dolan.
L. A. Walsh.

INVENTOR:
Jesse Campbell
by his atty-
Charles Raymond

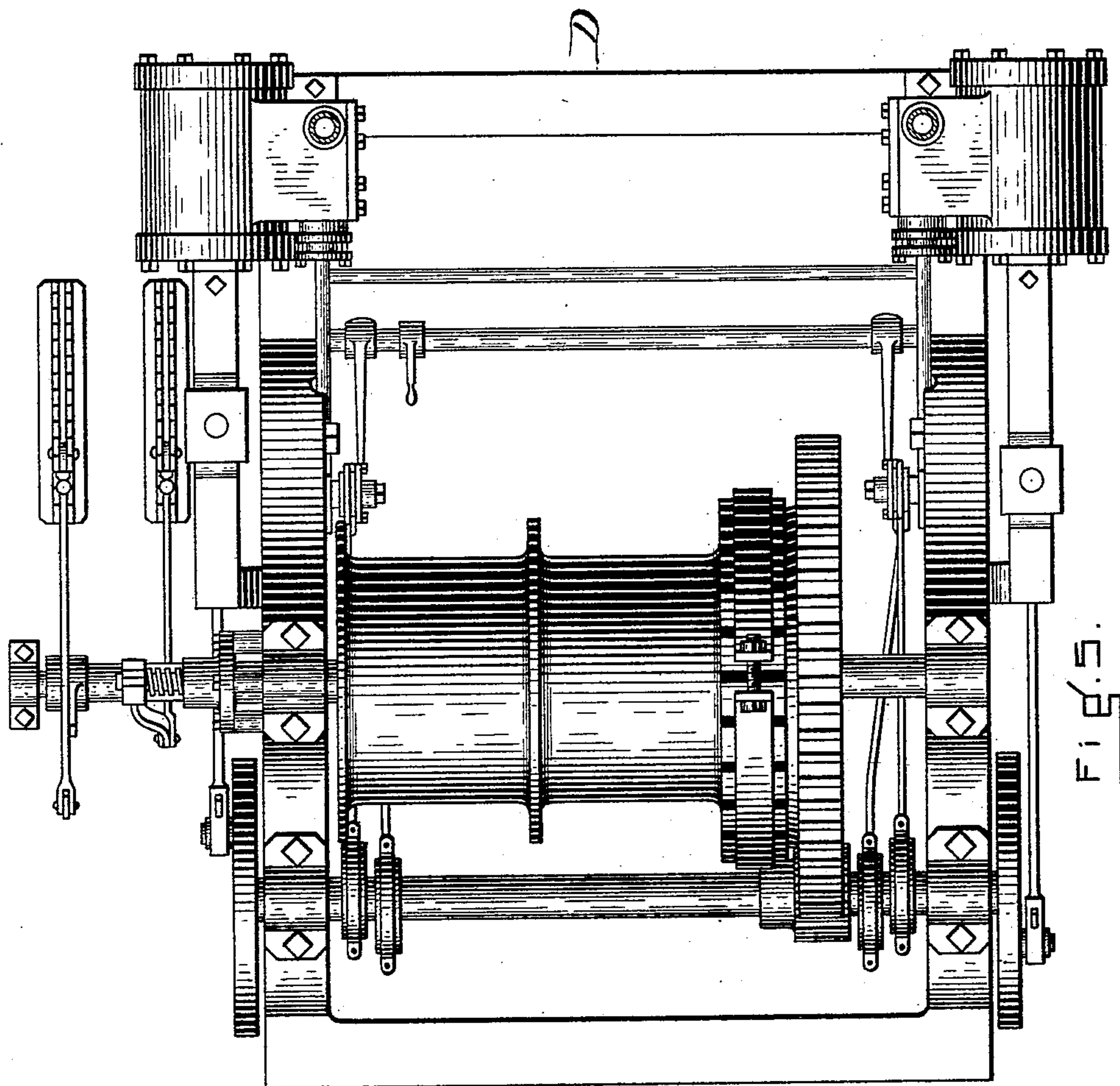
(No Model.)

5 Sheets—Sheet 4.

J. CAMPBELL.
HOISTING AND CONVEYING APPARATUS.

No. 602,726.

Patented Apr. 19, 1898.



WITNESSES:

J. H. Dolan.
L. A. Walsh.

INVENTOR:
Jeremiah Campbell
by his atty
Charles E. Raymond

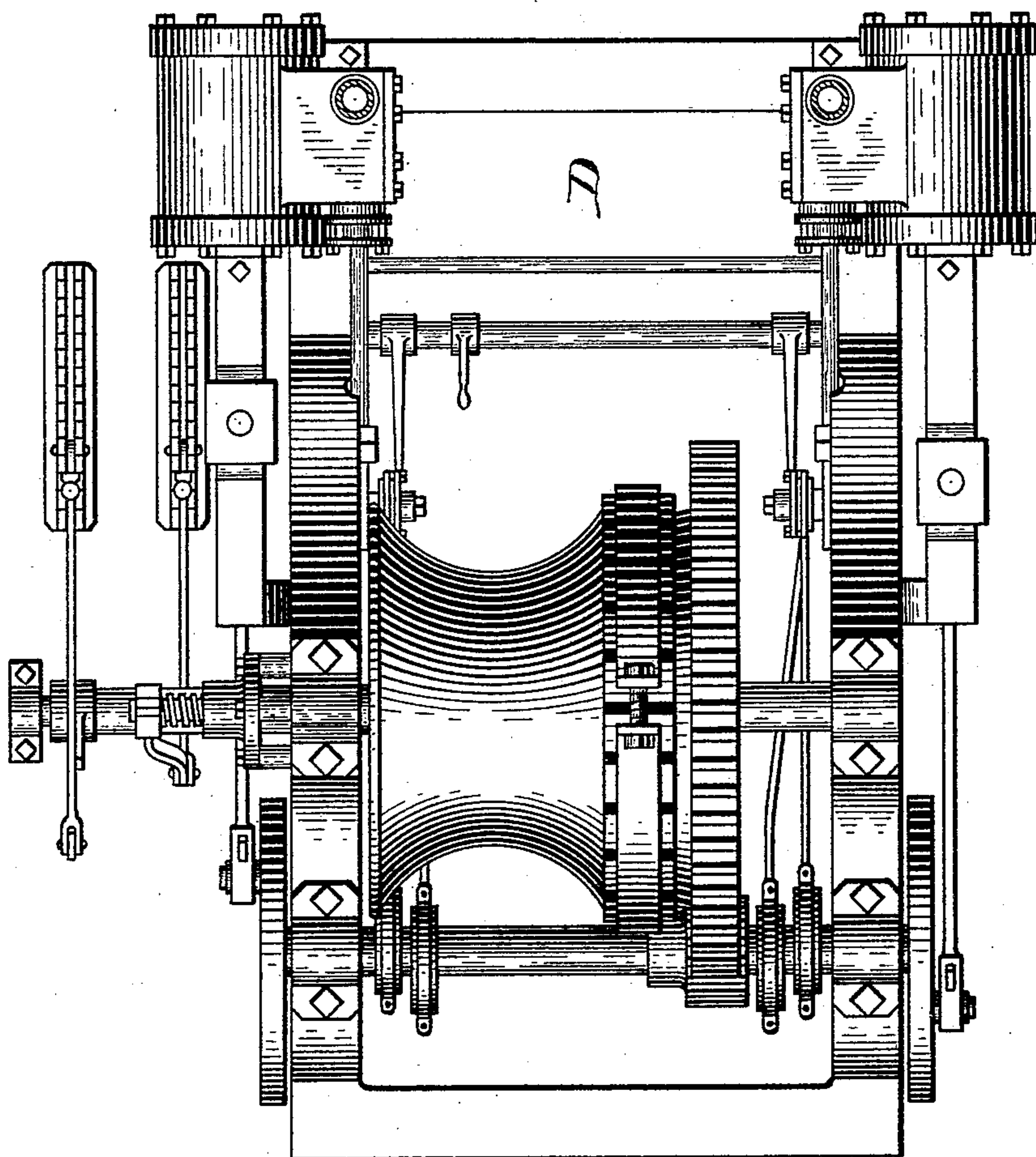
(No Model.)

5 Sheets—Sheet 5.

J. CAMPBELL.
HOISTING AND CONVEYING APPARATUS.

No. 602,726.

Patented Apr. 19, 1898.



WITNESSES:

J. W. Dolan.
L. A. Walsh.

INVENTOR:

J. Campbell
by his atty.
Clark & Raymond.

UNITED STATES PATENT OFFICE.

JEREMIAH CAMPBELL, OF CHELSEA, MASSACHUSETTS.

HOISTING AND CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 602,726, dated April 19, 1898.

Application filed December 4, 1897. Serial No. 660,823. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH CAMPBELL, a citizen of the United States, residing at Chelsea, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in an Apparatus for Hoisting and Conveying, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to a hoisting and conveying apparatus having a long continuous trolley-boom mounted upon and crosswise a car-truck or other support to extend any desired distance from each side thereof, combined with a single trolley and single steam-shovel adapted to be used at will upon the boom upon either side of its center or upon any other part or the whole length thereof and to be transferred from one side to the other or one operative position to another without disconnecting the trolley or shovel from their operating ropes or engines, the boom, trolley, and shovel being combined with a trolley-engine and a shovel-engine, both mounted upon the car truck or support in a manner to permit the movement of the trolley, shovel, engines, and operating connections simultaneously from one operative position to another.

In the drawings, Figure 1 is a view principally in side elevation of my improved apparatus. Fig. 2 is a view in end elevation thereof. Fig. 3 is a view in horizontal section upon the dotted line 3 3 of Fig. 1 and in plan of parts below said line. Fig. 4 is a view, enlarged, in side elevation of the top of the tower to show the arrangement of sheaves thereon. Fig. 4^a is a view in horizontal section upon the dotted line 4^a 4^a of Fig. 4. Fig. 5 is a view in plan, enlarged, of an engine for operating the trolley equipped with a winding-drum; and Fig. 6 is a view, enlarged, of a trolley-engine equipped with a winding-spool instead of a winding-drum. Fig. 7 is a detail side view of the trolley.

A represents a car or truck having wheels *a*, supported by rails *a'* upon a trestle *A'* or other suitable support. The car has mounted upon it a long boom or tramway *B* at any required distance above the floor *b* of the car.

The boom extends any desired distance from each side of the car and is preferably centrally attached to the car by any desired arrangement of stays *B'* and suspending-chains *B²*. It has two parallel sections or parts *b'* *b²*, which are separated from each other throughout the length of the boom, leaving a clear unobstructed space *b³* between them for the travel of the shovel-operating trolley and guy-ropes.

The boom must be of a sufficient height above the bottom of the car to permit the shovel to pass between it and the bottom of the car from one side to the other, either for the purposes of transferring the shovel from one operative position to another or for continuous use crosswise the car. The boom carries tracks *c c'*, upon which the trolley *C* is supported and upon which it is adapted to be moved from one end of the boom to the other. It is so moved by means of an engine having two winding-drums, one of which winds a draw-rope connected with the trolley to draw the trolley from the center toward one end of the boom, the second winding-drum meanwhile paying out rope, while the second winding-drum and rope operate to draw the trolley from the center of the boom in a reverse direction to the opposite end of the boom, the first-named winding-drum meanwhile paying out its rope. The winding-drums may be combined as represented in Fig. 5, if desired.

In lieu of two winding-drums an endless draw-rope wound about a spool and the ends of which are connected with the trolley may be employed, the spool being operated by the engine to turn in either direction to draw the trolley from the center outward to either end of the boom.

It will be understood that the weight of the shovel will always move the trolley from either end of the boom inward to or near the center of the boom.

The trolley-operating rope is lettered *c²*, and one section extends from the trolley to the end *b³* of the boom, about the sheave *b⁴* thereon, backward to the sheave *b⁵*, near the center of the boom, and thence to the trolley-engine *D*. The section *c³* of the rope extends from the trolley, about the sheave *b⁶* at the end *b⁷* of the boom, and then backward to the sheave

b^8 , near the center of the boom, and thence to the winding-drum or spool of the trolley-engine.

The trolley carries the two pairs of sheaves $c^5 c^6$, and the set c^6 is used for guiding the shovel-operating ropes $e e'$ of the shovel E when the shovel is operated upon the side of the boom to the left of the car, as represented in Fig. 1, and the set c^5 is used for guiding the said shovel-operating ropes when the shovel is operating upon the side of the car at the right hand of Fig. 1.

The shovel E preferably is of the clam-shell variety, and it is filled and discharged in the usual or in any well-known manner. Its operating-rope e is a hoisting and lowering rope, by means of which the shovel is hoisted and is lowered, and the rope e' is actuated to close the shovel and open it. These ropes extend from the shovel over one set or the other of the trolley-sheaves $c^5 c^6$, according as the trolley is at one side of the center of the boom or the other, and the hoisting-rope e passes between the sheaves $e^2 e^3$ at the top of the tower E', (see Fig. 4,) thence over the sheave e^4 to a winding-drum of the shovel-operating engine F. The opening and closing rope e' passes between the sheaves $e^5 e^6$ and the sheave e^7 to a winding-drum of the shovel-operating engine.

The shovel-engine is operated to wind or unwind the hoisting and lowering and the opening and closing ropes during the hoisting of the shovel and the transfer of the shovel according as the trolley is moved upon the boom, and where the trolley with the shovel passes the center of the boom from one side to the other upon passing said center it becomes necessary to pay out the hoisting and lowering and opening and closing ropes until the trolley has reached the position upon the boom at which it is desired the shovel shall be discharged of its contents. It is also necessary that the means for suspending the ropes in the tower shall be such that they may be moved by the trolley from one side of the center to the other side of the center of the boom and still maintain engagement with suitable sheaves and also be held separated and operated, and it is for this reason that the system of sheaves represented in Fig. 4 is used. Three sheaves for each rope are there represented. Two of them are in opposed relation to each other and only one of each of these pairs is used at one time, the ropes transferring automatically from the seat on one side to the seat upon the other side as the trolley passes the center of the boom. The ropes at all times pass over the sheaves $e^4 e^7$, each of which is arranged so that its edge is over the center of a pair of sheaves immediately below the outer edge of the sheave e^4 , being over the center between the sheaves $e^2 e^3$, which are placed closely together, so that the groove in one sheave may be in line with and receive the rope when it leaves the groove in the

other, and the sheave e^7 occupying a like relation to the sheaves $e^5 e^6$.

The guy-rope G passes from the shovel over a sheave g at one end of the boom and over a sheave g' in the top portion of the tower and thence downward through a sheave g^2 on the operating-weight g^4 , and thence upward to the top of the tower, where it is fastened.

When the shovel is operating upon the opposite end of the boom from that containing the sheave g , the guy-rope then runs through the opening between the bottom of the car and the boom and over a roll g^3 on the car. (See Fig. 1.)

Preferably the trolley-operating engine D is at one side of the cross-opening b^{10} between the boom and the bottom of the truck or car, and the shovel-operating engine F is upon the other side thereof. Any suitable type of engine may be used. Each may be inclosed in a small house, and there may be a station upon the top of each one, a station D' for the operator of the trolley and trolley-engine, the other, station F', for the operator of the shovel and shovel-operating engine. The car may also have a part of its floor shaped to form a hopper H, into which coal may be dumped and through which it may be fed to a tram-car H', movable upon the tracks $h h'$ on the trestle below the car A, or the hopper may deliver into any other desired receptacle.

While I prefer that the shovel-operating ropes and guy-ropes extend to the top of the tower and from thence to their operating engine and weight, respectively, yet they may run horizontally to turning-sheaves by which their course may be directed to the engine and to a weight below the boom. I prefer, however, to use the tower.

The shovel is operated to take up and deliver coal or other material in the manner of the ordinary clam-shell shovel, and the trolley is also operated to transfer the shovel horizontally. The apparatus differs from the ordinary hoisting device in that it is so constructed and arranged that the shovel and trolley may be used upon either side or end of a long boom and worked upon that side only, and they may be transferred from working position upon one side of the boom to working position upon the other without removing or disconnecting any part of either the shovel or trolley and by simply moving the trolley and shovel from one end of the boom across the center to the other end thereof, and they may be used for transferring coal or material from one end of the boom across the center to the other end of the boom or from or near one end of the boom to its center, or, in fact, upon any part of the boom desired, and the boom and also the trolley and shovel-operating engines and devices are supported to be simultaneously moved by their supporting truck or car from one operative position to another at will. This enables coal or other material to be taken from

any position or pile within the range of the apparatus and transferred to any other position or pile or to be loaded into tram-cars or other carriers.

5 The trolley-operating engine is constructed so that it may draw the trolley by the trolley-rope in either direction at will from the center of the boom, and the trolley-rope may, as I have above stated, be operated by a drum 10 or by a spool, and in Fig. 5 I have shown a winding-drum for this purpose and in Fig. 6 a winding-spool. The winding-drum of Fig. 5 is in two parts, one of which is adapted to wind in one direction and the other in a re- 15 verse direction. The engine is constructed to drive the drum or spool in both directions and consequently has two cylinders, pistons, and driving connections with the drum or spool. It also has appropriate mechanism 20 for throwing the drum or spool into and out of connection with its operating-shaft at will and for reversing the engine at will and for holding the drum or spool locked or stationary at will.

25 Ordinarily where two engines are employed for operating the apparatus two operators are necessary, one of which controls the vertical movements of the shovel and the opening and closing thereof, and the other of which con- 30 trols the horizontal position of the shovel. These operators are stationed, preferably, over the engines, as specified, and operate their respective engines by means of suitable controlling-levers.

35 It will be noticed that the boom is so supported and its support so constructed that there is an unobstructed space below the boom and across the car or support and also above 40 the boom and across the car or support from one end of the boom to the other, and that therefore the trolley-shovels and their operating-ropes are free to be moved from one end of the boom across the car or other sup- 45 port to the other end of the boom without requiring the removal of any part of the boom, car, or support or anything above or below the boom.

In Figs. 1 and 3 there are shown upon each side of the main trestle-work A' additional 50 trestles A² for supporting the tracks upon which run tram or other cars for conveying or transferring coal or other material to either side of the hoisting and conveying apparatus.

While I have described the shovel as op- 55 erated by two ropes—namely, a hoisting-rope and an opening and closing rope—I would say that I do not confine myself to the manner of its operation, and it may be both hoisted and lowered and opened and closed by a sin- 60 gle rope or by more than two ropes, if desired.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

65 1. In a hoisting and conveying apparatus, the combination with the car or truck provided with a tower having an unobstructed opening through it from top to bottom, of a

boom or tramway supported on said car or truck and extending outward horizontally on both sides of the latter, a trolley running 70 on said boom or tramway, a shovel or bucket suspended from the upper part of said tower and controlled as to its horizontal position by said trolley, and means for operating said shovel and trolley; whereby the shovel or 75 bucket supporting and controlling rope or ropes are adapted to swing through said tower as the shovel or bucket is moved from one side of said tower to the other by the trolley which travels on said boom or tramway. 80

2. In a hoisting and conveying apparatus, the combination with a car or truck provided with a tower having an unobstructed opening through it from top to bottom, of a boom or tramway extending outward on both 85 sides of said car or truck, a trolley running on said boom or tramway, a shovel or bucket suspended from the upper part of said tower and controlled as to its position on said boom by said trolley, said boom being elevated 90 above the bottom of said car or truck to leave an unobstructed space beneath for the passage of said shovel between said boom and the floor of the car or truck, and means for operating said shovel, to fill and empty the same, 95 and operating mechanism for said trolley.

3. In a hoisting and conveying apparatus, the combination with a movable boom-support, of a boom extending across and on both sides of said support, a tower on said boom- 100 support and having an unobstructed opening through it from top to bottom, a bucket or shovel suspended from the upper part of said tower, a trolley running on said boom and serving to control the horizontal position of 105 said bucket or shovel, said trolley having two sets of sheaves with one of which the shovel rope or ropes are in contact when said shovel is on one side of said car or truck and with the other of which said ropes are in contact 110 when the said shovel is on the other side of said car or truck, and means for operating said shovel and trolley.

4. The combination of the boom B extending across and from both sides of a support 115 having an unobstructed space above and below the same, a trolley mounted upon said boom to be operated upon any part thereof and having the two sets of sheaves c⁵, c⁶ for alternate use with the said shovel, and its said 120 operating-ropes.

5. The combination, in a hoisting and conveying apparatus, of a boom centrally supported and having an unobstructed space 125 above it and below it, the shovel-trolley mounted thereon, the shovel, its operating-ropes and an automatic guy-rope extending from one end of the boom only to the shovel and operative upon both sides of the center of the boom, as and for the purposes set forth. 130

6. The combination, in a hoisting and conveying apparatus, of a boom centrally supported and having an unobstructed space above it and below it, the shovel-trolley

mounted thereon, the shovel, its operating-ropes, and an automatic guy-rope extending from one end of the boom only to the shovel and operative upon both sides of the center of the boom, and the guy-rope sheave or guide g^3 , as and for the purposes set forth.

7. The combination, in a hoisting and conveying apparatus, of a boom centrally supported upon a car or other movable support, said car or movable support, a trolley movable upon said boom throughout its operative length and having two sets of shovel-rope receiving and transferring sheaves, the steam-shovel, its operating-ropes, receiving and transferring sheaves therefor, the automatic guy-rope operative upon each side of the center of the boom and shovel-operating engines mounted upon said car or movable support.

8. The combination, in a hoisting and conveying apparatus, of a car or support, a tower extending therefrom, a boom extending crosswise the car or support and from each side thereof and having an unobstructed space below and above the same throughout its length, the boom-stays B' and suspending-chains B^2 , and the trolley and steam-shovel movable thereon, as specified.

9. The combination, in a hoisting and conveying apparatus, of the boom centrally supported and having an unobstructed space above and below the same throughout its length, a trolley movable thereon, the steam-shovel, its operating rope or ropes passing over the trolley and means for actuating them, and a trolley-rope, winding drum or spool, and means for positively turning said drum or spool in both directions.

10. The combination, of the boom centrally supported and having an unobstructed space above and below the same, the trolley mounted thereon having two sets of shovel-rope-transferring sheaves, the trolley-actuating rope, its sheaves b^4, b^6 , one at each end of the boom, the sheaves b^5, b^8 at or near the center of the boom and the trolley-rope-winding drum or spool, and means for positively turning it in both directions, as and for the purposes set forth.

11. The combination, in a hoisting and conveying apparatus, of a movable car or support, a boom mounted upon said car or support extending horizontally from each side thereof and having an unobstructed space above and below the same, a trolley-actuating engine at one end of said car or support, and a shovel-actuating engine at the other end of said car or support, said engines being separated from each other by an open space extending across the car, a trolley mounted upon said boom to be movable thereon throughout its operative length and governing the horizontal position of a steam-shovel, said steam-shovel and the said trolley and steam-shovel engines being connected with said trolley and with the shovel as specified.

12. The combination of the car, a boom supported by the same and extending from both sides thereof, the trolley and steam-shovel operative upon the boom as specified, and a hopper in the bottom of the car.

JEREMIAH CAMPBELL.

Witnesses:

F. F. RAYMOND, 2d,
J. M. DOLAN.