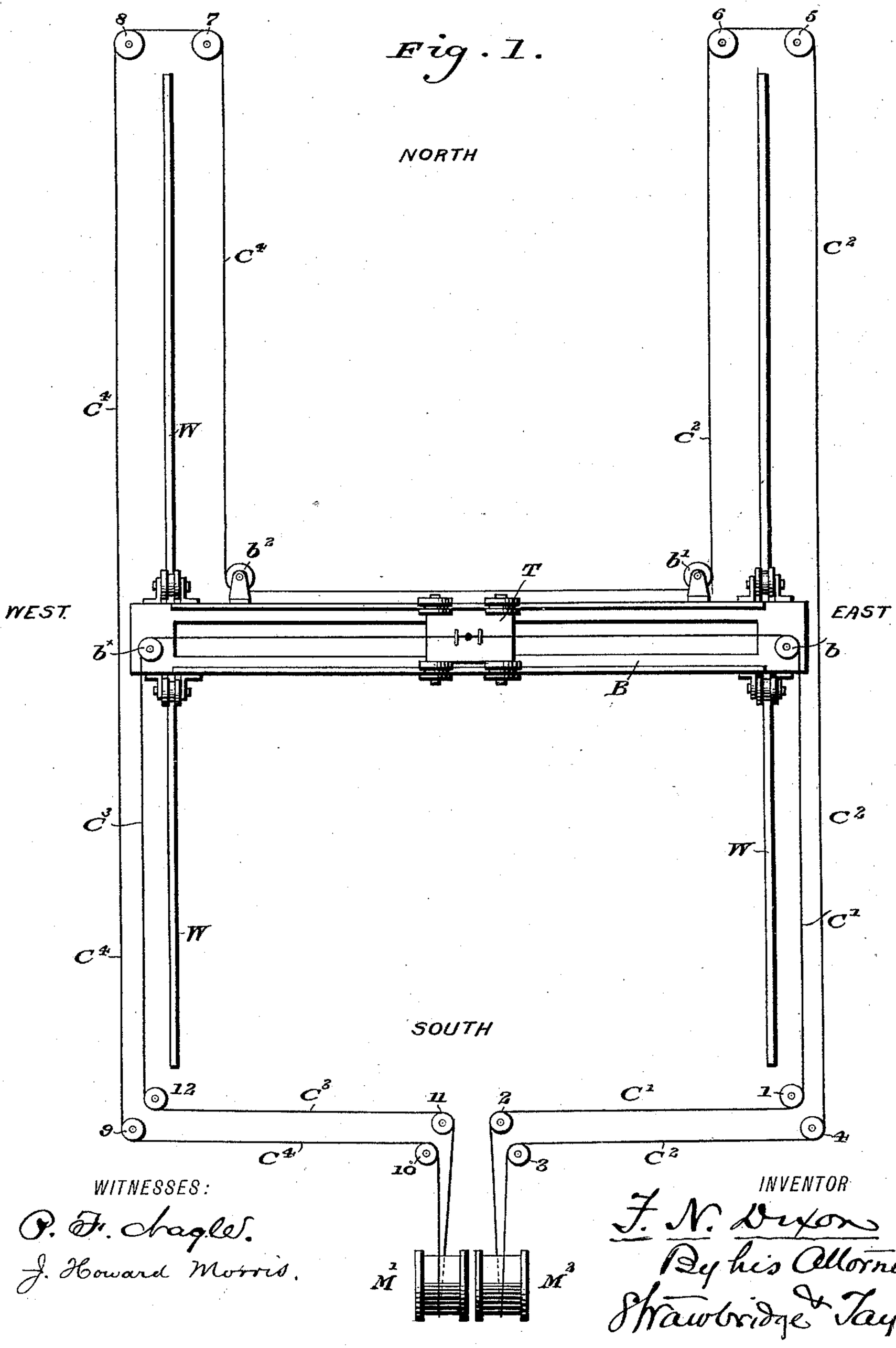
(No Model.) 2 Sheets—Sheet 1.

F. N. DIXON.

TRAVELING CRANE.

No. 465,109. Patented Dec. 15, 1891.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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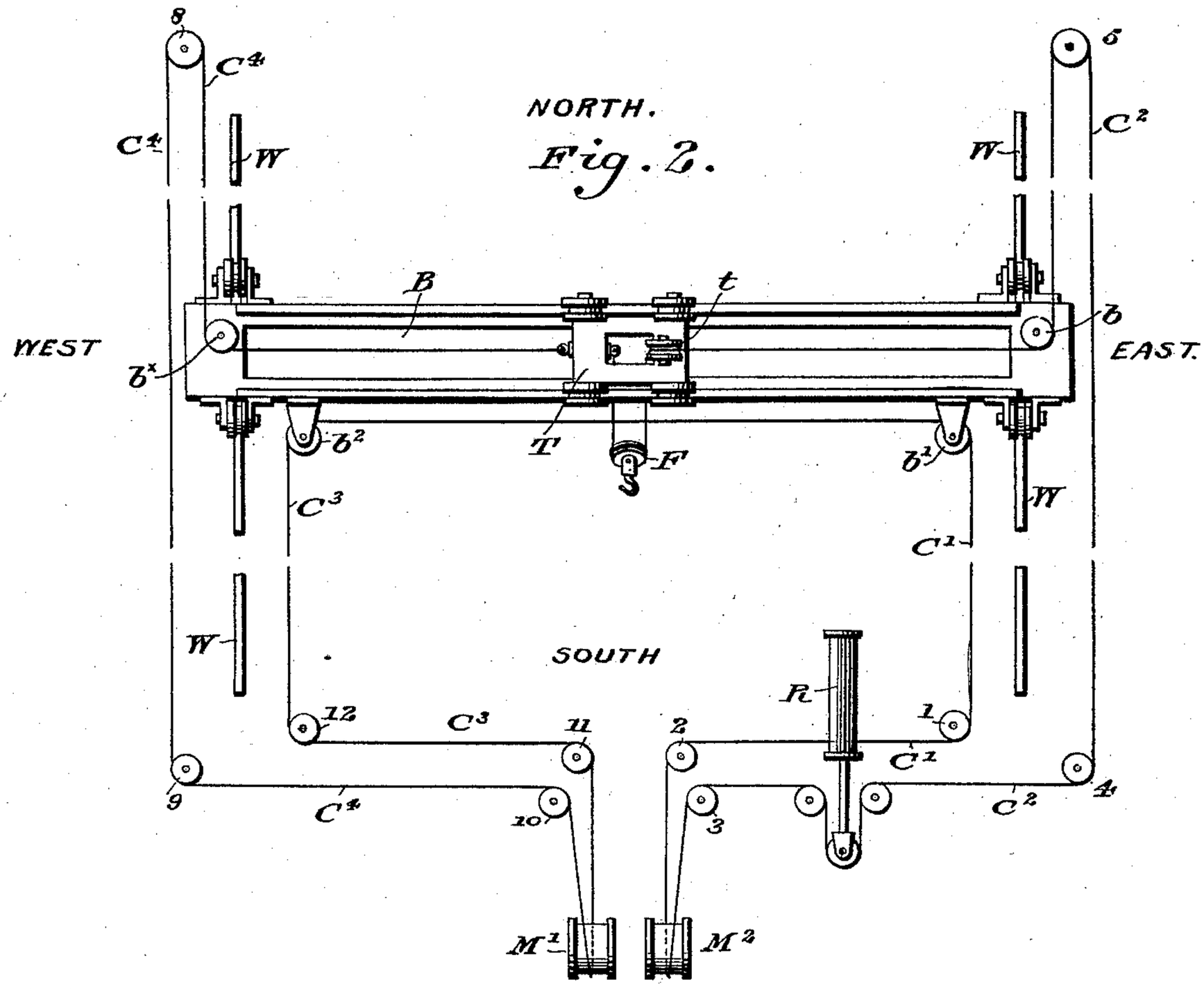

Fig. 2.

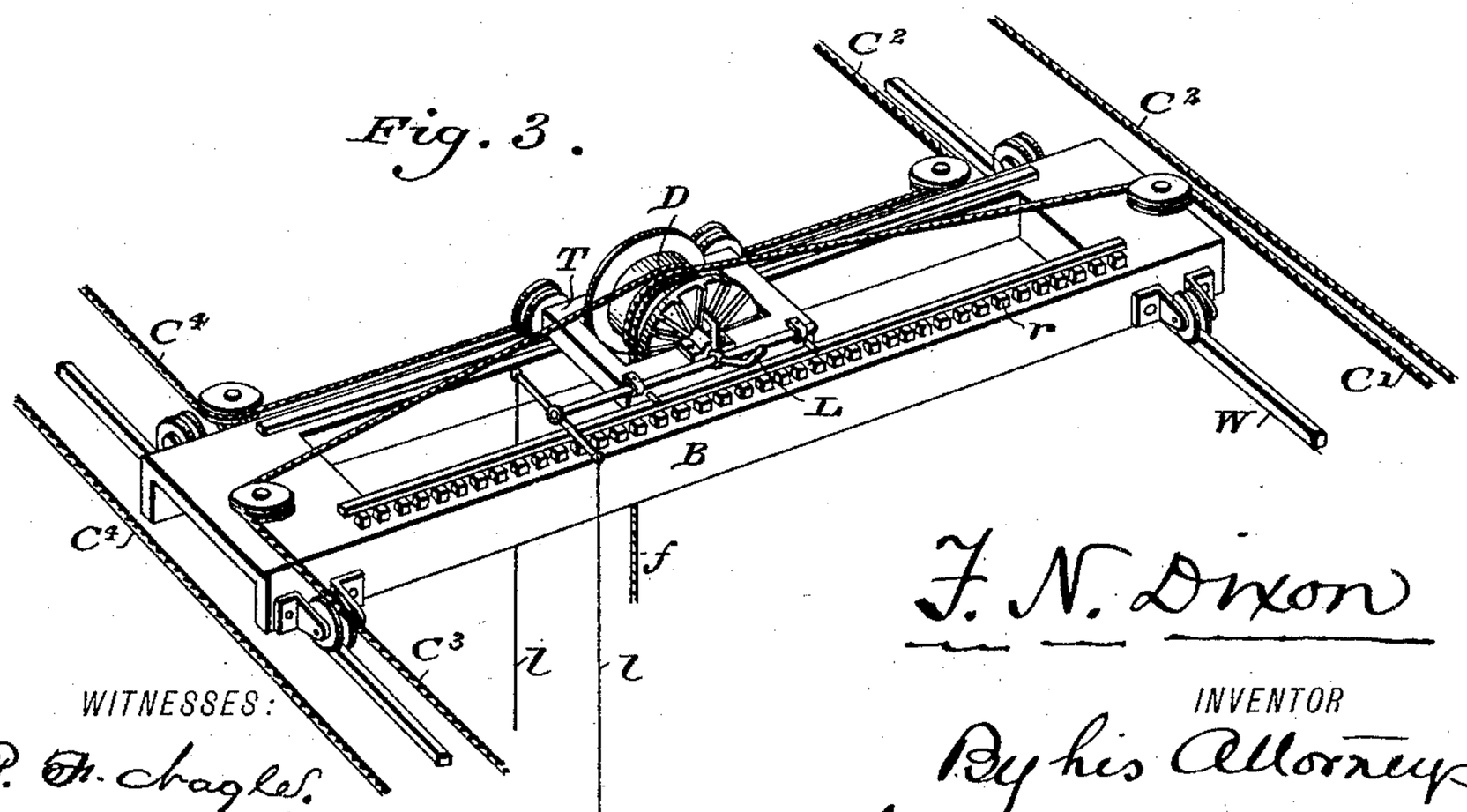

Fig. 3.

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UNITED STATES PATENT OFFICE.

FREDERIC NORMAN DIXON, OF PHILADELPHIA, PENNSYLVANIA.

TRAVELING CRANE.

SPECIFICATION forming part of Letters Patent No. 465,109, dated December 15, 1891.

Application filed June 10, 1891. Serial No. 395,748. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC NORMAN DIXON, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Traveling Cranes, of which the following is a specification.

My invention relates to double-track traveling cranes of the movable-cable type, that is to say cranes in which the movement of the bridge and trolley is occasioned by cables which act to positively pull them in the desired directions,—and further relates to cranes of the aforesaid type in which the actuating mechanism is located at a point independent of the crane structure.

My invention contemplates the construction of a crane in which any desired movement of the bridge or trolley may be accomplished by a single cable common to both, to which cable movement is imparted by means of two drums constituting a motor independent of the crane structure and preferably located at the "initial" end of the line, and further the provision in combination with the other elements of the crane as an entirety, of means by which the fall block may, if desired, be operated by the same motor and the same cable-connection as the bridge and trolley although, manifestly, it may be operated by an independent cable or other device.

To the foregoing ends my invention comprehends and embodies such a double-track traveling crane as is represented in the accompanying drawings and hereinafter described.

In the drawings, Figure 1 represents in "dummy" plan a crane embodying my improvements, the fall block being, for simplicity, omitted. Fig. 2 represents in dummy plan a crane of the character represented in Fig. 1, except that it is shown as provided with a fall-block suspended in a bight of the common cable connection of the bridge and trolley, and adapted to be operated by such a convenient motor as is a single hydraulic ram applied to the aforesaid cable-connection. Fig. 3 is a fragmentary perspective view of the bridge and trolley and of a portion of the cable connection shown in Fig. 1, the trolley being provided with a windlass roller engaged with and adapted to be rotated in either direction by the cable-connection, and being itself provided with an independent fall rope to which is attached a hook or other suitable load engaging device.

In all of the figures similar letters of reference indicate corresponding parts.

In the drawings, the parallel bridge ways are designated by the letter W,—the bridge by the letter B,—and the trolley by the letter T. Each of these elements is of any preferred construction and the bridge is adapted to travel in either direction longitudinally of its ways, and the trolley in either direction longitudinally of the bridge.

The motive mechanism is constituted by two drums, which are shown as located in independence of the crane structure at the initial end of the line. These two drums, which are designated M^1 and M^2 respectively, are preferably, as shown in Figs. 1 and 2, similar and of any such preferred character as are employed for the propulsion of cables. They are, moreover, by the provision of any preferred gearing of any suitable character, which for simplicity is not represented, susceptible of being rotated together in either direction, that is to say either forward or backward, or of being rotated in opposite directions, either one in either direction while the other is rotated in the opposite direction. The mechanism by which the two drums may be caused to rotate in the manner referred to, may be any drum driving or reversing gearing, which, being purely mechanical and well known, and not in itself as a gearing being of the essence of the invention, is, as stated, not represented.

The motive mechanism is operative upon the actuated or movable devices through the intervention of a cable-connection, being a single continuous cable constituting a unit intermediary of, or connective between, the actuating and actuated devices. Although a unit, I have for convenience of description considered this cable-connection as composite of four divisions C' C^2 C^3 C^4, and by such divisions the course of said cable-connection as shown in Fig. 1 may be traced in the fol-

lowing manner: From the trolley as an arbitrary starting point, the cable-connection, as division C′, runs along the bridge to a bridge sheave *b* upon the eastern end of the bridge, south to a directing sheave 1 at the initial end of the line, west to a directing sheave 2, and thence to and once or oftener around the drum M^2;—thence, as division C^2, to a directing sheave 3, thence east to a directing sheave 4, thence north to one or more directing sheaves 5 6 at the distant end of the line, thence south to a bridge sheave *b′* conveniently near the eastern end of the bridge, and thence west along the bridge to a counterpart bridge sheave b^2 conveniently near the western end of the bridge;—thence, as division C^4, north to one or more directing sheaves 7 8 at the distant end of the line; thence south to a directing sheave 9 at the initial end of the line, thence east to a directing sheave 10, and thence to and once, or oftener around the drum M′;—thence, as division C^3, to a directing sheave 11, thence west to a directing sheave 12 at the initial end of the line, thence north to a bridge sheave $b^\times$ at the western end of the bridge, and thence east to the trolley, and either through the intervention of said trolley itself, or else by its own direct continuance longitudinally across said trolley and into merger into or connection with the division C′.

Contemplation of the courses of the so-called divisions will render the literal continuity of the cable-connection and its unitary character apparent, and, except for the purpose of the foregoing description, the said cable-connection may as well be considered as commencing from the drum, from the bridge, or from any point of the line, as from the trolley.

It will be observed that the cable-connection, although in fixed attachment to, or engagement with, the trolley, is not in fixed but in what may be termed "running" attachment with respect to the bridge, because its connection with the bridge is solely through the bridge sheaves *b* $b^\times$ *b′* b^2, all of which are idlers.

The operation of the crane as shown in Fig. 1 will be readily understood: In order to move the bridge to the south, the two drums are rotated to the north, with the result that equal traction is exerted upon the divisions C′ C^3 of the cable-connection and corresponding equal and simultaneous release made of divisions C^2 and C^4, the trolley of course not moving but being in equilibrium, so to speak, under the equal opposite pull of the divisions C′ and C^3. In order to move the bridge to the north, the two drums are rotated to the south, with the result that equal traction is exerted upon divisions C^2 C^4 of the cable-connection and corresponding equal and simultaneous release made of divisions C′ C^3,—the trolley, of course, again not moving under the simultaneous and equal release made of the divisions C′ and C^3. In order to move the trolley to the east, the drum M^2 is rotated to the north, and the drum M′ to the south, with the result that traction is exerted upon the division C′ and simultaneous release made of the division C^3—the divisions C^2 and C^4 traveling idly with respect to their directing sheaves and the bridge sheaves *b′* b^2,—the division C^2 moving to the north and the division C^4 to the south. In order to move the trolley to the west, the drum M′ is rotated to the north, and the drum M^2 to the south, with the result that traction is exerted upon the division C^3 and simultaneous release made of the division C′,—the divisions C^4 and C^2 traveling idly with respect to their directing sheaves and the bridge sheaves b^2 and *b′*,—the division C^4 moving to the north and the division C^2 to the south. It will be observed that in either movement of the trolley, that portion of the cable-connection the course of which lies between the directing sheaves 6 and 7 and the bridge sheaves *b′* b^2, and which portion is composed of portions of the divisions C^2 and C^4—is a freely-running bight without influence upon the trolley in any of its possible positions upon the bridge, and notwithstanding the fact that in the operation of the motor to occasion the movement of the bridge to the north, the aforesaid bight becomes temporarily relatively fixed and potent to exert the requisite traction upon the bridge. It will also be apparent that in any movement of the bridge the trolley is stationary in its then position upon the bridge, and that in any movement of the trolley the bridge is at rest.

In the construction represented in Fig. 2, in which the cable-connection, while still unitary and continuous, is sufficiently prolonged to form a bight in which the sheave of the fall block F is suspended, a single hydraulic ram R of a well known character is conveniently located in adjacency to the motor drum, and is represented as operative upon the division C^2 of the cable-connection to occasion by its action upon the said cable-connection the raising or lowering of the fall block. So far as this ram is concerned it simply serves as a fall block operative mechanism or type of device adapted to take-up or pay-out a particular portion of the cable-connection in correspondence with the taking-up or paying-out of that portion of said cable-connection which forms the bight in which the fall block is suspended. It is a convenient device for the purpose but not the only one which can be employed. In practice it is often desirable to multiply the bight of the cable-connection with respect both to its application to the fall block and to the fall block ram.

In the operation of the two drums the cable-connection runs idly with respect to the sheave or sheaves of the ram, and the ram may therefore be operated contemporaneously with the operation of the said drums to raise or

lower the fall-block during the simultaneous movement of either the bridge or the trolley. This construction, apart from the provision of the fall-block operative mechanism, in all essential particulars corresponds to the construction represented in Fig. 1. In fact it is the same construction with but the formal modification that the freely running bight of the cable-connection is constituted by the divisions C′ and C³, the bridge sheaves b^2 b' being applied to the south side of the bridge, and the divisions C^2 C^4 passing over the bridge sheaves b $b^\times$. Of course in this arrangement of the cable-connection the movements of the two drums required to occasion the movement of the trolley, are the reverse of the movement described of them with reference to the construction of Fig. 1 to occasion said movement.

In the construction represented in Fig. 3 the trolley is shown as equipped with a windlass or fall-rope drum D, journaled transversely in such manner as to be freely rotatable in either direction, and about this drum that portion of the cable connection which is constituted by the divisions C′ and C⁸, and which is single and continuous throughout its length, is wrapped or given a sufficient number of turns to fit it according to the direction of its movement to rotate the drum in either direction. L is a detent or lock of any preferred character applied to the trolley, and adapted, at will, conveniently through the operation of a depending operating cord l, or otherwise, to engage with a clutch face on the end of the windlass and lock said windlass against rotation, or to engage with a rack bar r on the bridge and lock the trolley against travel in either direction. f is an independent fall rope, the upper extremity of which is made fast to the windlass drum D so as to be adapted to be wound upon it, and the lower extremity of which is provided with a hook or load engaging device. In this embodiment of my invention, when it is desired to operate the trolley the windlass drum is of course locked against rotation to effect the temporary fixation of the divisions C′ and C³ of the cable-connection with respect to the drum D. When, upon the other hand, it is desired to raise or lower the fall-rope, the windlass drum is unlocked and the trolley locked against travel, and then any such movement of the cable-connection as would, were the windlass drum locked and the trolley unlocked, cause the travel of the trolley in one or the other direction, will occasion, as the case may be, the raising or lowering of the fall rope, because the movement of the cable-connection will then, instead of moving the trolley, simply rotate the windlass drum in the desired direction and in consequence occasion the desired movement of the fall rope. The windlass drum in this embodiment is the fall-block operative mechanism.

Having thus described my invention, I claim:—

1. In a traveling crane, in combination:—a bridge, a trolley, two drums rotatable in the same or in opposite directions, and a single cable-connection common to and operatively engaged with said bridge, trolley, and drums, substantially as set forth.

2. In a traveling crane, in combination:—a bridge adapted to run upon bridge ways, a trolley adapted for movement with respect to the bridge, two drums rotatable in the same direction or in opposite directions, and a single cable-connection, operatively engaged with the two drums, and leading from the trolley along the bridge, thence to one end of one bridge way, thence to the other end of said way, thence to and freely along the bridge, thence to one end of the second bridge way, thence to the other end of said way, thence to the bridge, and thence along said bridge to the trolley, substantially as set forth.

3. In a traveling crane, in combination:—a bridge adapted to run upon bridge ways,—a trolley adapted for movement with respect to said bridge,—a cable-connection leading from the trolley along the bridge, thence to one end of the adjacent bridge way, thence to the other end of said way, thence to and freely along the bridge, thence to one end of the second bridge way, thence to the other end of said second bridge way, thence to the bridge, and thence along said bridge to the trolley,—and two drums, one of which is engaged with the cable extending along one bridge way, and the other of which is engaged with the cable extending along the other bridge way,—substantially as set forth.

4. In a traveling crane, in combination:—a bridge, a trolley, a fall-block, fall-block operative mechanism, two drums rotatable in the same direction or in opposite directions, and a single cable-connection engaged with said drums and with the bridge, the trolley, and the fall-block-operative mechanism, substantially as set forth.

5. In a traveling crane, in combination:—a bridge,—a trolley,—a windlass drum carried by said trolley,—a lifting or fall rope engaged with said windlass drum,—an operating cable-connection common to the bridge, the trolley, and the windlass drum,—and cable-driving mechanism independent of the crane structure, substantially as set forth.

6. In a traveling crane, in combination:—a bridge, a trolley,—a windlass drum journaled in bearings in said trolley, an operating cable-connection wrapped about said windlass drum and extending in opposite directions from the trolley and common to it and to the bridge,—a lifting or fall rope engaged with said windlass drum, means for locking the trolley against travel and the windlass drum against rotation, and cable driving mechanism with which said cable-connection is operatively engaged, substantially as set forth.

7. In a traveling crane, in combination:—a bridge,—a trolley,—a load-engaging or fall-rope depending from a windless drum mounted in said trolley,—and a cable-connection

wrapped about said windlass drum, thence extending in opposite directions along the bridge, thence along the bridge ways to one end of said ways, thence to the other end of the respective ways, thence to the bridge and along the same,—and two drums one of which is engaged with that portion of the cable-connection which extends along one bridge way and the other of which is engaged with that portion of said connection which extends along the other bridge way, substantially as set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 9th day of June, A. D. 1891.

FREDERIC NORMAN DIXON.

In presence of—
J. BONSALL TAYLOR,
WM C. STRAWBRIDGE.