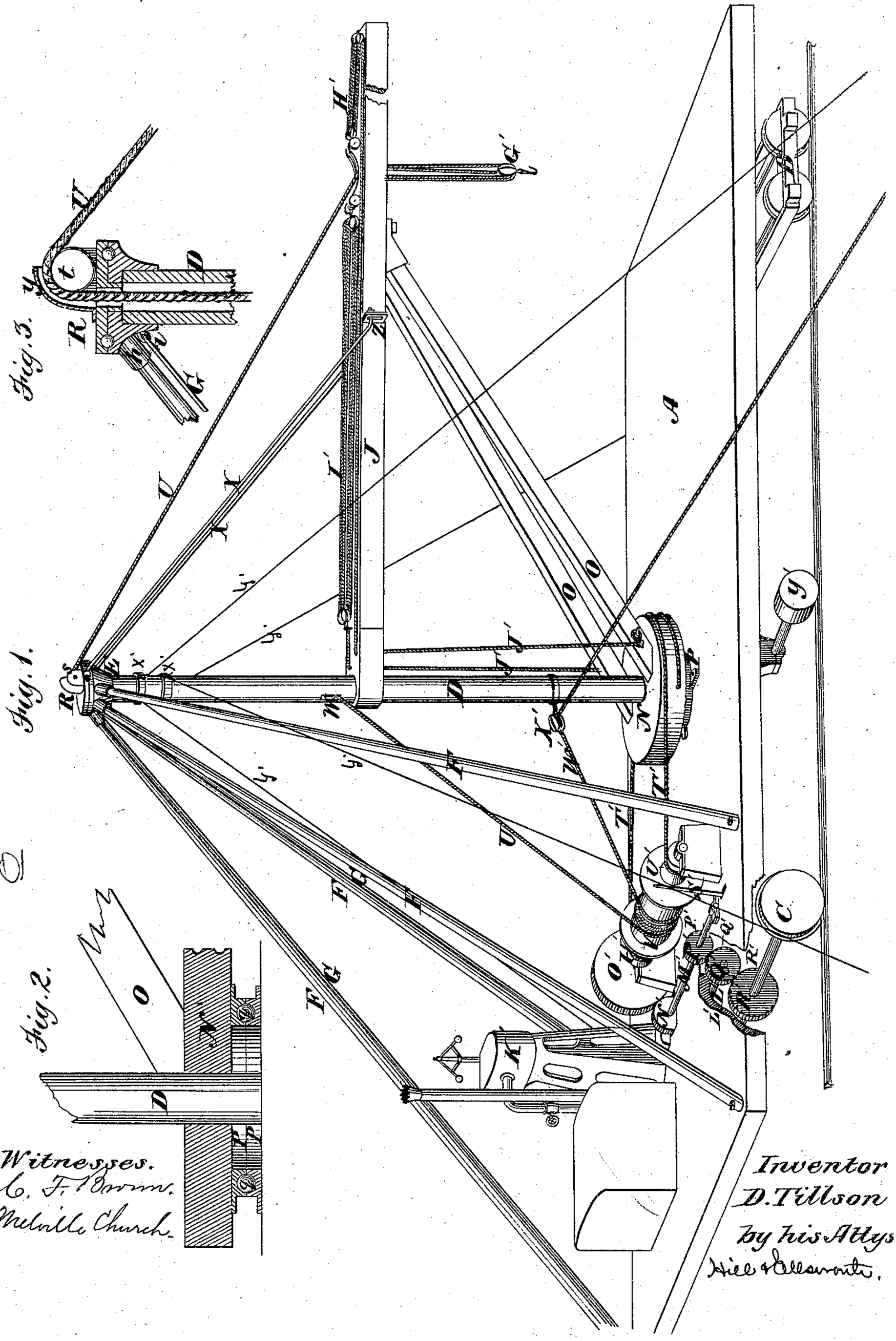
2 Sheets--Sheet 1.

D. TILLSON.

Steam Cranes.

No. 137,737. Patented April 8, 1873.



Witnesses.
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Inventor
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by his Attys
Hill & Edmonds.

2 Sheets--Sheet 2.

D. TILLSON.

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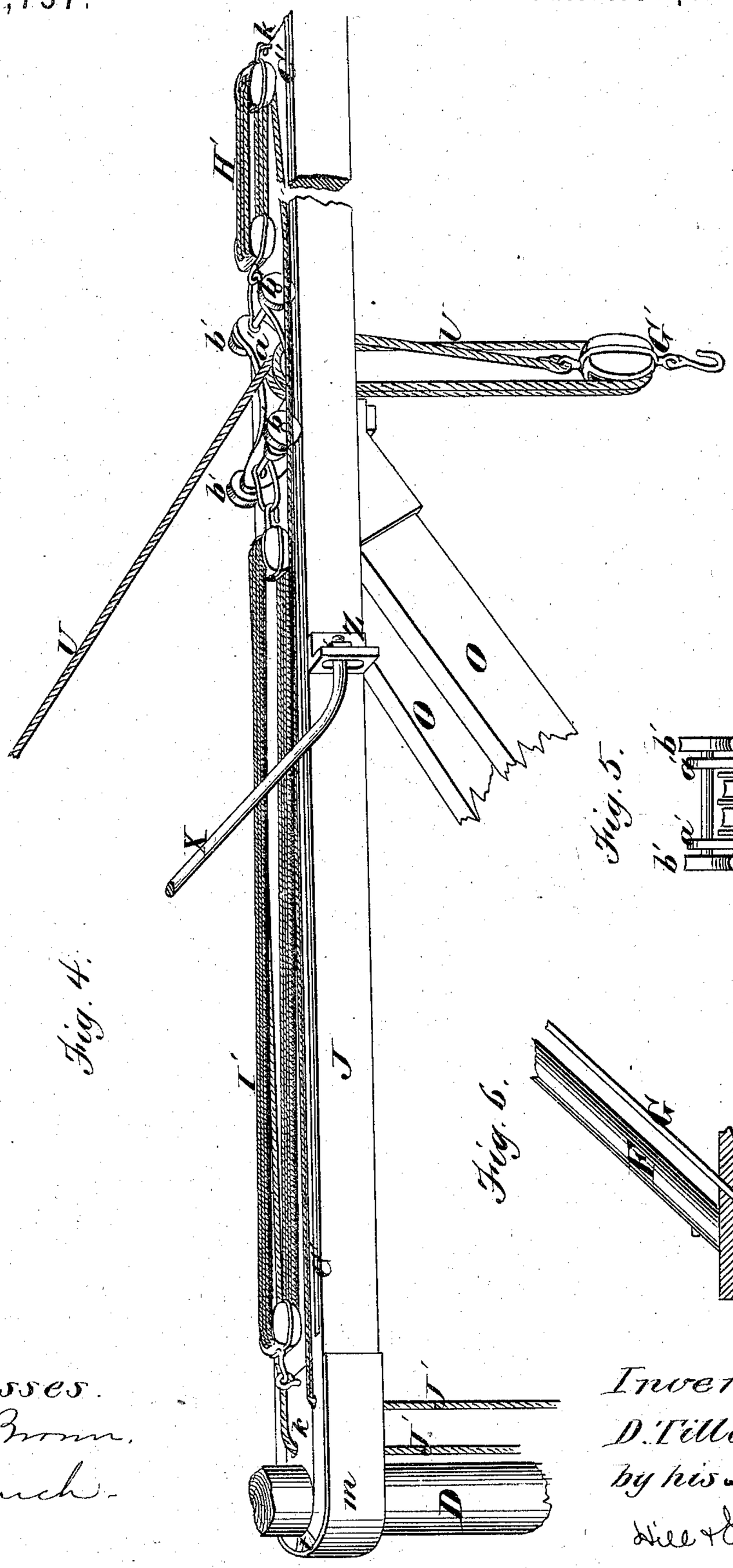

Fig. 4.

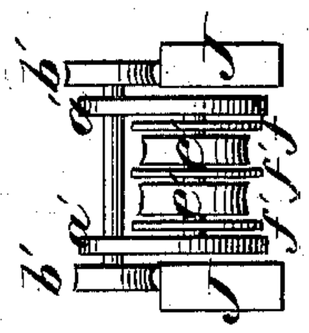

Fig. 5.

Fig. 6.

Witnesses.
C. F. Brown.
M. Church.

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Hill & Ellsworth.

UNITED STATES PATENT OFFICE.

DAVIS TILLSON, OF ROCKLAND, MAINE.

IMPROVEMENT IN STEAM-CRANES.

Specification forming part of Letters Patent No. **137,737**, dated April 8, 1873; application filed December 3, 1872.

To all whom it may concern:

Be it known that I, DAVIS TILLSON, of Rockland, in the county of Knox and State of Maine, have invented a new and Improved Steam-Crane; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1, Sheet I, is a perspective view of my improved crane. Fig. 2, Sheet I, is a detached sectional view of the mast and drum. Fig. 3, Sheet I, is a sectional view of the top of the mast and its attachments. Fig. 4, Sheet II, is a perspective view of the boom and its attachments. Fig. 5, Sheet II, is a detached view of the boom-carriage; and Fig. 6 is a detached view, showing the method of connecting the tie-rods to the car.

Similar letters of reference in the accompanying drawing indicate the same parts.

My invention has for its object to provide an improved steam crane or derrick for raising and adjusting heavy weights, but more especially adapted to handling and transporting large blocks of stone. To this end the invention consists, first, in the combination of a steam-engine and crane mounted upon a platform-car in such a manner that the engine shall operate the crane to load and unload the same car, and move the car from place to place when the crane is not in use; secondly, in the method of mounting and bracing the crane upon the platform-car, so that the boom shall turn with but little friction when raising and adjusting large blocks of stone; thirdly, in the means employed for turning the boom from the steam-engine; fourthly, in the method of holding the hoisting-rope in line with the boom when the latter is turned, so that such rope shall not be thrown from its sheave in the cap at the top of the mast; fifthly, in turning the sheave-cap with the boom by means of two rods extending from opposite sides of the cap to opposite sides of the boom, one rod acting under tension and the other under compression when the boom is turned, and each having a slight vertical movement at the boom to prevent them from being bent or twisted when the boom is depressed while lifting heavy weights; sixthly, in the construction and operation of the carriage for moving the weight along the boom; seventhly, in the method of strengthening the stays or braces; eighthly, in the arrangement of parts for hauling a stone from the quarry or other point into the requisite position to be attached to the hoisting-tackle; lastly, it consists in the construction and combination of various parts, as I will now proceed to describe.

In the accompanying drawing, A is the platform-car, made of unusual length, and properly strengthened by iron plates and braces to support the working parts of the crane. One end is mounted upon the usual truck B, while the other end is supported by the single wheels C, as shown. D is the mast of the crane, rigidly supported by any suitable means in an upright position near the center of the car, and provided with a strong metal cap, E. F are wooden stays or braces extending from the cap to one end of the car, as shown, which stays are strengthened by the iron tie-rod G, one beneath each stay. The upper ends of the stays are fitted within sockets *h* projecting from the cap, and their lower ends are bolted or otherwise secured to the car. The upper ends of the tie-rods are connected with hooks *i* under the sockets *h*, and their lower ends are secured to the car in any convenient manner, preferably extending through it, for the reception of nuts. J is the boom, composed of two parallel beams held apart by the end blocks *k* so as to leave a space between them for the passage of the carriage and hoisting-tackle. The inner block *k* is made concave to bear against the front of the mast, and the ends of the beams extend past the block nearly embracing the mast, the space between their ends being filled by the segmental piece *l*. The connection with the mast is further perfected and strengthened by the metal strap *m*, as shown. N is a drum mounted upon the mast just above the car, and O are braces extending from the drum upon opposite sides of the mast, to the under side of the beams composing the boom. By these connections the boom is supported in the strongest manner, and, together with the drum, turns freely upon the mast. P P are annular plates of metal placed concentrically around the mast, and bolted or otherwise secured, respectively, to the under side of the drum and the top of the car. The two plates are held out of contact with each

other by friction-balls *q*, within semicircular grooves formed in their proximate faces. By this provision the frictional contact of parts is reduced to the minimum, and the boom permitted to swing freely around the mast when raising the heaviest weights. R is the sheave-cap of the mast, composed of a metal plate supported upon the cap E by friction-balls in the same manner as the plates P. It is provided with two upright lugs, *s*, which afford bearings for the sheave *t* upon one side of the center. Both the plate R and sheave-cap are formed with a central opening for the passage of the hoisting-rope U, which is connected to a windlass, V, arranged upon the car in front of the mast. The top of the mast is made tubular, with a lateral opening just above the boom, containing a sheave, *w*. The hoisting-rope enters this opening from the windlass, passing under the sheave *w;* thence upward through the mast, and over the sheave *t* to the boom-carriage. X X are metal rods, connecting opposite sides of the sheave-cap with opposite sides of the boom. When the boom is swung from one side to the other these rods turn the sheave-cap with it, thereby maintaining the relative position of the sheave and hoisting-rope, so that the latter shall be held in line with the boom without being thrown from the sheave.

By this arrangement the sheave and hoisting-rope are never cramped by the movements of the boom.

As a still further protection to the rope a hood or shield, Y, may be secured to the cap R, so as to extend over the sides of the sheave in close contact therewith. If, therefore, the rope, by any accident, should pass to the sides of the sheave it would strike the hood, and be guided thereby back to its proper place.

When the boom, sustaining a heavy weight, is swung in either direction, one of the rods X is in tension and the other in compression. To prevent the rods from being bent or twisted when the boom is depressed in lifting it is necessary that their lower end shall have a slight vertical movement in order to relieve them. This I effect by passing the ends of the rods through vertically-slotted plates Z affixed to the sides of the boom. The ends of the rods are also provided with nuts, which bear against the plates, and, by adjusting these nuts, the rods are tightened or loosened with respect to the sheave-cap.

The boom-carriage is composed of the side pieces *a'*, curved downward between the beams of the boom, and mounted at each end upon the axles of the wheels *b'* which are grooved to run upon rails *c'*, secured to the upper surface of the beams. The central depressed portion of the carriage is provided with a transverse shaft, *d'*, upon which grooved pulleys *e'* are mounted, being separated from each other by the plates *f'*, as shown. The hoisting-rope passes around these pulleys, and is connected to the tackle-block G'. The plates *f'* serve to keep the parts of the rope separate from each other and guide them upon the pulleys, so that such parts cannot become cramped in any manner, nor chafed and abraded by frictional contact with each other.

The carriage is moved upon the boom to receive the load or deposit it at any desired point by the tackles H' I', the former at the outer and the latter at the inner end of such carriage, as shown. The operating-ropes J' of these tackles pass toward the mast, and thence downward through the blocks *k* to the drum N, where they are belayed a short distance from each other.

K' is a double-cylindered steam-engine, mounted upon the end of the car in the rear of the windlass, and arranged so that the rods of the piston shall be connected, in any suitable manner, with a double crank or eccentric-shaft, L', placed transversely beneath the car, and having its bearings in the frame of the engine, or in boxes secured to the car. The arrangement of these several parts may be varied to suit circumstances. M' is a shaft mounted upon the car directly in rear of the windlass, and carrying two pinions or gear-wheels, one, N', at its end, to engage with the gear-wheel O' upon the end of the windlass-shaft, and the other, P', near its center, so as to work through the platform of the car, and engage with a pinion, Q', upon the crank-shaft.

By this arrangement of gearing when the engine is put in motion the windlass will be operated to wind up the hoisting-rope, and raise any weight to which it may be attached. To lower the weight it is only necessary to reverse the engine. The car may be loaded or unloaded in this manner with the utmost facility.

When it is desired to move the car upon the track the pinions P' Q' may be disengaged by any well-known means to prevent the engine from driving the windlass, and the pinion Q' made to engage with a pinion or gear wheel, R' upon the shaft of the car-wheel C. If the engine is now set in motion the pinion Q', meshing into the wheel R', will turn its shaft and move the car, as will be readily understood.

The means for connecting and disconnecting these various gears may be varied to almost any extent. For example, the shaft M' may be moved in its bearings by a shipping-lever, S; or either of the pinions N' P' may be moved upon the shaft. The pinion upon the crank-shaft may be moved to engage or disengage the pinions P' and R', and the pinion R' may be moved to engage or disengage the pinion upon the crank-shaft. The most convenient arrangement, perhaps, would be to have the pinion Q' fixed upon the crank-shaft, and arrange the shaft M' to slide in its bearings, and the pinion R' to slide on its shaft by a spline or clutch.

I do not, however, confine myself to any special arrangement for the purpose, as any well-known means may be adopted with good results.

T′ T′ are horizontal ropes extending in opposite directions round the front of the drum N to the winches U′ U′ at the ends of the windlass, and passing, respectively, under and over said winches. The ropes are secured to opposite sides of the drum, and lie one above the other within horizontal grooves formed in the front thereof, as shown.

The winches are so connected with the windlass-shaft, or to separate supports, as to be driven by the gearing from the engine. When it is desired, therefore, to swing the boom of the crane the engine is put in motion, and one of the winches winds up its rope and swings the boom to that side, while the other winch, rotating in the opposite direction, unwinds its rope. By this means the boom is readily swung from side to side when sustaining the heaviest weight. W′ is an additional rope, which may be arranged to pass from the windlass through a sheave-block, X′, secured to the mast, and into the stone-quarry to be fastened to a block of stone. By starting the engine, the rope is wound upon the windlass and drags the stone from the quarry within reach of the hoisting-tackle. This may be repeated until a load for the car has been accumulated, when the rope W′ is detached from the windlass and the blocks loaded by the crane in the manner previously described. Y′ are broad wheels without flanges, mounted upon a shaft under the center of the car so that their broad treads shall bear upon the rails of the road. The absence of flanges from the wheels permit them to move laterally upon the rails when the car is passing the curves of the road, while their wide treads prevent their escape from the rails. They, therefore, form a constant support for the center of the car, whether the latter is at rest or in motion upon a straight or curved road. The car is supported upon the trucks B by plates and friction-balls in the same manner as the drum N is supported and for the same purpose.

In connecting the tie-rods G with the car, I prefer to extend them through the latter, as already stated, and through beveled washers *w′* under the car, as shown in Fig. 6 of the drawing. By this connection they can be adjusted to compensate for any variation of the wooden stays due to swelling or shrinkage.

x′ are strong iron bands secured to the mast near the top, and *y′* are wire ropes connected thereto. When not in use these ropes are coiled in any convenient manner on the car. When lifting a very heavy weight the loose ends of these ropes—which are provided with strong hooks—are fastened to iron rings placed at convenient points along the sides of the track, and the car then run forward by steam until the ropes are taut, thus making secure guys to the crane. This arrangement is much more convenient, and the operation much more readily performed, than the arrangement and operation of the tackles and falls usually adopted.

Having thus described my invention, what I claim is—

1. The mast D and horizontal drum N combined with the platform-car by means of the grooved annular plates P and friction-balls *q*, substantially as described, for the purpose specified.

2. The sheave-cap R and mast-cap E, constructed as described, and combined to operate in connection with each other, substantially as herein set forth, for the purpose specified.

3. In combination with a platform-car, supporting a steam-engine by which it is moved from place to place, a crane or derrick adapted for operation from the engine by means of the windlass, the winches, the hoisting-rope, the carriage, the mast-drum, and the turning-ropes, as herein described, for the purpose specified.

4. The mast of the derrick or crane supported upon the platform-car by means of the metal cap E, the wooden stays F, and metal tie-rods G, substantially as described, for the purpose specified.

5. The combination of the adjustable metal tie-rods G with the wooden mast-stays F, substantially as described, for the purpose specified.

6. The boom J constructed as described and supported upon the mast and drum N, substantially as set forth, for the purpose specified.

7. The derrick or crane mounted upon the platform-car and adapted to load and unload the same by means of a steam-engine mounted upon the car, substantially as described, for the purpose specified.

8. The boom of the derrick adapted for operation from the winches U′ by means of the ropes T′ and drum N, substantially as described, for the purpose specified.

9. The boom combined with the sheave-cap R by means of the adjustable rods X, substantially as described, for the purpose specified.

10. The hood Y in combination with the sheave *t* and its cap, substantially as described, for the purpose specified.

11. The boom-carriage constructed and operating as herein described, for the purpose specified.

12. The windlass and winches, together with their operating mechanism, combined with the hoisting and turning ropes in the manner described, for the purposes specified.

13. The rope W′ arranged for operation in the manner described, for the purpose specified.

Witnesses: DAVIS TILLSON.
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