J. B. Holmes,

Derrick,

No. 10,544, Patented Feb. 21, 1854.

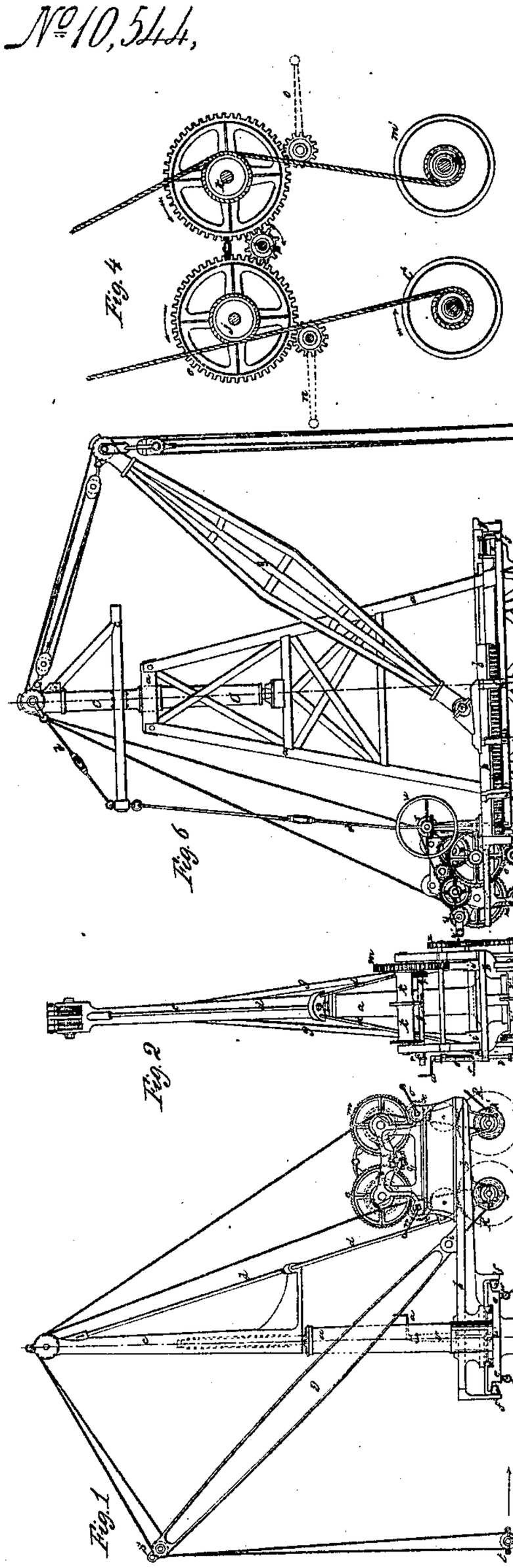
Fig. 4

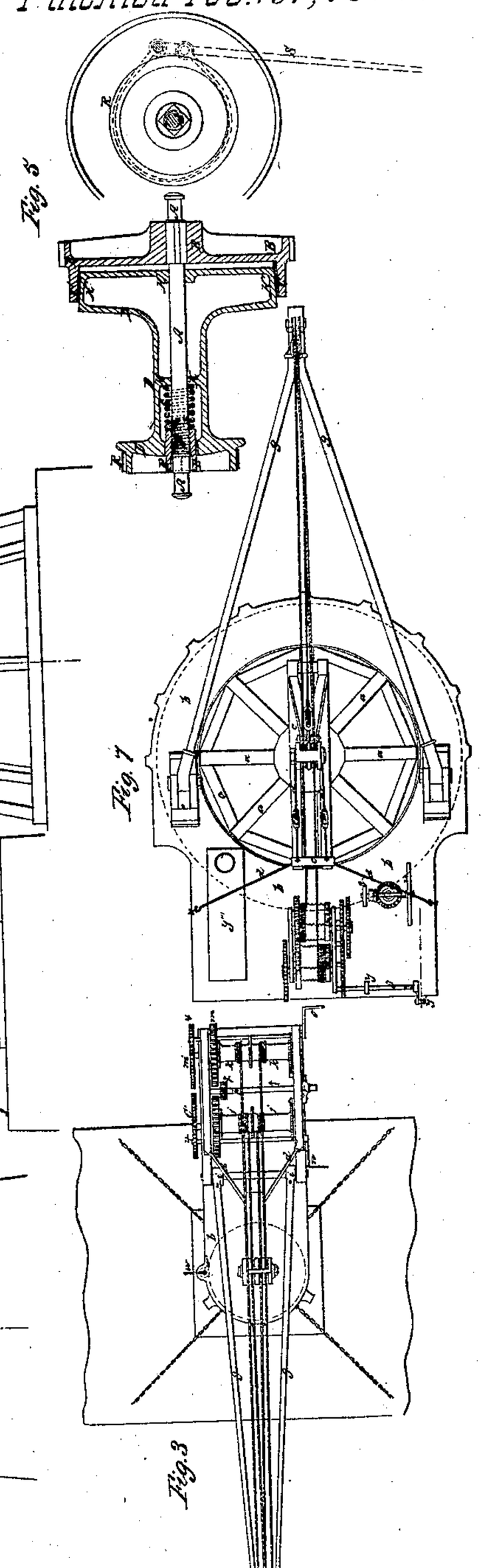
Fig. 5

Fig. 6

Fig. 7

Fig. 2

Fig. 3

Fig. 1

UNITED STATES PATENT OFFICE.

JOHN B. HOLMES, OF BOSTON, MASSACHUSETTS.

DERRICK.

Specification of Letters Patent No. 10,544, dated February 21, 1854.

To all whom it may concern:

Be it known that I, JOHN B. HOLMES, of Boston, in the State of Massachusetts, have made certain new and useful Improvements in Hoisting Apparatus, and that the following, taken in connection with the drawings thereof, is a full and clear description of the same.

In the drawings Figure 1, represents an elevation showing in part a section of the side of a boom derrick. Fig. 2 is an end elevation of the same. Fig. 3 is a top view thereof. Fig. 4, is a view of certain parts of the winch barrels and take up apparatus on a large scale. Fig. 5 is a section lengthwise through one of the take up drums showing the friction connection thereof with its shaft and the friction band or strap applied thereto. Fig. 6 is a side elevation of a boom derrick somewhat different in arrangement from the others, and Fig. 7, is a top view of the derrick represented in Fig. 6.

The nature of the first part of my invention, consists in arranging the platform which carries the winches or their equivalents in such manner that it is supported by a collar upon which it may revolve, is also held down to said collar by clamps or their equivalents and is further in connection with the revolving cap which carries the mast head blocks by means of tension braces or their equivalents, whereby I am enabled to use a very light mast and dispense with the guys from the head thereof to anchors etc. And the nature of the second part of my invention consists in attaching the heel of the boom at a point upon the platform between the mast and the winch or on that side of the mast or center of the platform which is most distant from the weight being moved.

In derricks for lifting heavy weights this boom is of necessity strong and consequently heavy, and the position of its center of gravity exercises an important influence on the stability of the whole apparatus. By my arrangement the center of gravity of this boom is thrown farther from the weight and nearer to the center of the whole apparatus whose stability is consequently materially increased.

In Figs. 1, 2 and 3 of the drawings (*a*) represents the mast of the derrick in this instance sustained in a vertical position by chains attached to bolts secured in a platform or to the top of a tower or other structure in process of construction, (*b*) is the revolving platform which carries the winches, drums, etc., as also the heel of the boom (*g*) which is in this instance forked so as to embrace the mast, and is supported at (*i*).

The revolving cap (*c*) is supported on the spindle shown in dotted lines in Fig. 1 only and is firmly attached by tension braces (*d d*) to the revolving platform. This latter rests (as clearly shown by the sectional portion of Fig. 1) on a collar (*e*) friction rollers being interposed and is confined down upon said collar by clamps (*f f*) or their equivalents, which are also provided with friction rollers. By means of this arrangement it will be perceived that the strain tending to bend or break the mast is counteracted by the rods (*d*) which in their turn are prevented from rising through their connection with the platform, which cannot lift until it breaks the clamps or the collar.

In the winches exhibited in these drawings the ordinary surging barrel is employed; two barrels on each shaft, one for each end of a fall. The barrels nearest the mast being those which govern the fall for raising and lowering the end of the boom, and the drums farthest from the mast being those which control the ends of the fall for raising and lowering the weight. These drums are lettered (*j j*, *k k*) and their connection with the mast head leading blocks with the sheaves in the end of the boom and with the running block which carries the weight, is so clearly shown in the drawings that further description thereof is deemed unnecessary.

Each drum shaft is provided with a toothed wheel (*l*, *m*) which receives motion from smaller wheels attached to the shafts on which are mounted the cranks (*n*, *o*). Each set of drums is also provided with appropriate ratchets, ratchet wheels, etc., and between them is appropriately supported a small shaft (*p*) on which is mounted the cog wheel (*q*). This shaft can be moved endwise at will and its wheel thereby engaged with both of the large wheels (*l* and *m*) see Fig. 4, and is provided with a latch box (*r* Figs. 1, 2 and 3) by means of which it can be held in any required position.

When a weight has been raised to the position indicated in Fig. 1, and it is desired without further elevating it to move it in toward the center of the derrick, the

small shaft (p) is moved in the direction of the arrows and its cog (q) engages with both l and m as in Fig. 4. One of the ratchets is now thrown out of gear and one of the cranks (n) is turned in the direction indicated by the arrow Fig. 4. Motion is therefore communicated to all the barrels and shafts as shown by arrows in Fig. 4, and while the drum (j) winds up both ends of its fall attached to the boom end (s) the drum (k) slacks off both ends of its fall attached to the running block (t). The weight will therefore move in nearly a horizontal line toward the center of the apparatus. If these motions be reversed a motion in the contrary direction will be imparted to the weight.

In cranes, derricks, etc., not provided with this method of connecting the operation of the boom end purchase with that which operates on the weight, two gangs of hands one tending each winch must be employed to give these motions in a horizontal direction to the suspended weight, and each gang must be of sufficient force to control or raise the weight, whereas by my plan only one gang is needed, and that one may be comparatively weak, as it needs only to control such proportion of the whole weight as is due to the short distance it rises or falls when compared with the distance it moves in a horizontal direction. It is obvious further that the power may be applied to the other winch in the proper direction and that the same effect will follow.

At (u, v, u') Figs. 1, 2 and 3 is exhibited a crank attached to a vertical shaft mounted on the revolving platform and provided with a small cog which engages with the large cog (w Fig. 2) secured to the collar (e). By turning the handle the platform can be revolved in either direction.

Below each set of drums Figs. 1, 2, 3 and 4 are arranged take up drums (j', k',) which receive motion through gearing driven by the winch shafts, see cog wheels (x, m', l') in some instances represented merely by a circle. These take up drums may be driven by any other appropriate gearing or mechanical devices for conveying rotary motion, and are driven at such speed that any point on their periphery may be moved at least as fast as any point on the peripheries of the main drums to which they are secondaries. The ends of the falls after taking one or more turns around the main drums are led to the secondary or take up drums and firmly attached to their peripheries. It is evident however that when the rope had been wound up so as to cover the whole surface of the secondary drum, and commenced to envelop it with a second layer, that it would then be wound upon a cylinder whose effective diameter would be the original size of the drum plus twice the diameter of the rope. If no provision were made for obviating this difficulty, the revolution of the apparatus must cease or the fall must part between the main and secondary drums. In order to remedy this defect I have so constructed the latter drums, that they may be free to slip on their shafts and thus accommodate themselves to the precise amount of motion required no matter how many layers of rope are wound upon them.

By reference to Fig. 5 my method of thus attaching the drum to its shaft will be clearly perceived. The secondary drum shaft (A A) receives motion from any other shaft connected with the main drum shaft or directly from the latter shaft, and upon it is firmly keyed a disk or rather short cylinder (B B) bored out conically (at C C) and if necessary lined with leather or wood.

The take up drum proper (D D) is free to turn on the shaft and upon the periphery of a nut (E E) which may by means of a wrench be caused to traverse along a screw (F) and thereby compress or permit to expand a spiral spring (G) one end of which abuts against the nut, while the other end rests against an interior flange (H) or may be extended and abut directly against the drum head (H′). This drum head is turned off conically on its outer periphery and fits closely with the part C C of the desk B, being pressed with some force into the cavity by means of the spiral spring whose tension is regulated by the nut (E). It is evident that the whole arrangement forms a species of friction coupling and that the drum will revolve as fast as its shaft unless the former be retarded by a force sufficient to overcome the friction of the two parts of the conical coupling. When this force comes into operation, this drum will slip on its shaft; and it comes into effect when the fall commences to envelop the take up drum proper with its second layer of rope; when (if the friction be less than can be overcome by the strength of the rope) the said take up drum will slip, its periphery will be retarded and it will in consequence take up the fall just as fast as it is delivered to it by its primary drum.

If but one layer of rope be wound upon the take up drum while hoisting, it is obvious that said rope will be delivered precisely at the proper rate while lowering; but if more than one layer of rope be wound upon the take up drum, then will the said drum when the lowering is commenced deliver the fall at too great a rate of speed to its primary or main drum. The fall would therefore surge around the main drum, letting the weight fall too fast by a series of jerks and endangering the whole apparatus. To remedy this inconvenience I have provided each take up drum with a friction

band (any known kind of brake would answer the same purpose) in such manner that when brought into action, it will force the take up drum to move slower than its shaft during the operation of lowering, slipping according to the judgment of the brakesman to just such a degree, as is necessary to deliver the fall to the main drum at the proper speed. The friction band is provided with an actuating lever, and may be used in case of accident from breakage, to hold the weight in any position to which it may have arrived. It is hardly necessary to state that such a brake is in practice applied to each take up drum. One of these brakes is clearly represented at letter R, in Fig. 5, with its handle S, and two of these brakes in their proper position are represented at (R R) Fig. 1.

In Figs. 6 and 7 I have exhibited a crane or derrick in which are embodied all the points of my invention save one under a somewhat different form and arrangement. Instead of the mast I there employ a strong framing (*a a*) firmly held together by diagonal bracing on a platform attached to which is secured a revolving cap (*c*). The boom (*g*) is pivoted on that side of the platform most distant from the weight, and the latter surrounds the whole frame and traverses on friction rollers mounted on a collar (*e*) shown in Fig. 6 where the platform is shown as partially broken away. This platform (*b*) is connected by braces (*d d*) provided with appropriate screw buckles, to the revolving cap. The winches, winch drums, gearing, etc., are all mounted in their appropriate place, but instead of the ordinary single surging drum, I have here exhibited as applied to a derrick my double barreled capstan or winch which was secured to me by Letters Patent in June 1841. I have also exhibited purchase blocks, containing a greater number of sheaves, and have so arranged the tackles that I hoist from one end of the falls only. The clamps (*f*, *f*, *f*,) for securing the platform underneath the collar are exhibited in Fig. 6 only, and the apparatus for revolving the platform seen at (*w v u'*) is arranged with a hand wheel and bevel gearing, and is also provided with a pulley (*z*) which may be driven by a belt from a pulley (*y*) on the crank shaft (*y'*) the crank of which (*y''*) is fitted to be driven by a small engine located on the red center line Fig. 7. This engine if used will drive the whole machinery, proper gearing being exhibited on the drawing and its boiler may be located as shown upon the drawing.

Many methods of making a friction connection between a drum and its shaft are now in use and well known to mechanics, and it is evident that any such device may be employed in lieu of those shown by me without altering the character of my invention and further that any known method of communicating rotary motion, may be employed for making the connection between the main drums and the take up drums.

Having thus clearly described my invention and the apparatus for carrying it into effect, I claim as of my own invention and desire to secure by Letters Patent of the United States.

1. The combined arrangement of the collar upon the mast; the revolving platform supported upon it and clamped below it, and the tension rods from said platform to the revolving-mast-head-cap in the manner and for the purposes described.

2. Pivoting the heel of the derrick-boom upon the revolving platform in the locality substantially such as is herein represented and described, that is upon that portion of the platform which is beyond the center of the platform when measuring from the point of suspension of the weight.

In witness whereof I have hereto set my hand in the presence of two subscribing witnesses this 17th day of February 1853.

JOHN B. HOLMES.

Witnesses:
D. D. WINANT,
PHILIP MILSPAUGH.