(No Model.) 3 Sheets—Sheet 1.

H. B. ARDEN.

DEVICE FOR TURNING THE ARMS OF DERRICKS.

No. 424,530. Patented Apr. 1, 1890.

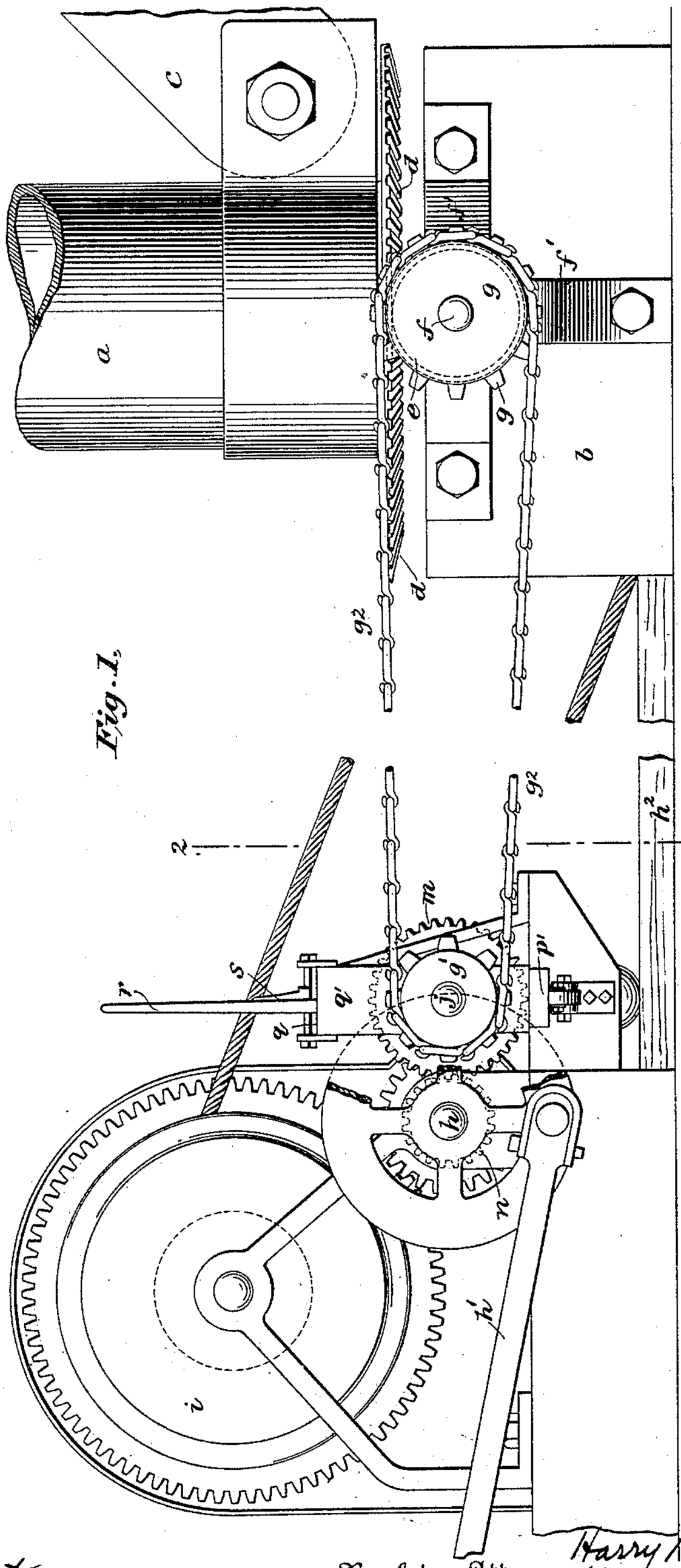


Fig. 1.

Witnesses
Geo. W. Breck.
Henry W. Lloyd.

Inventor,
Harry Baker Arden,
By his Attorneys
Witter Mowyan.

(No Model.) 3 Sheets—Sheet 2.

H. B. ARDEN.

DEVICE FOR TURNING THE ARMS OF DERRICKS.

No. 424,530. Patented Apr. 1, 1890.

Fig. 2.

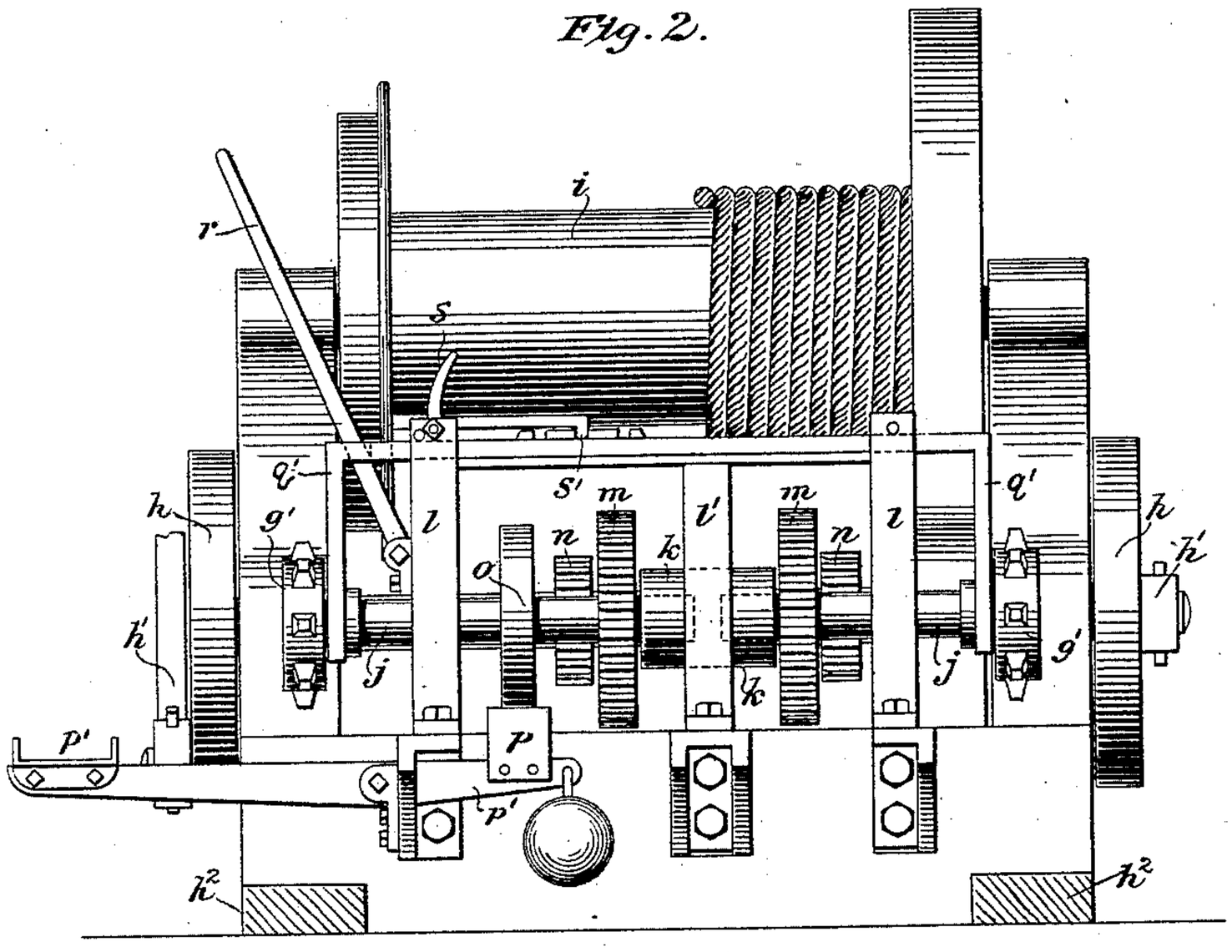
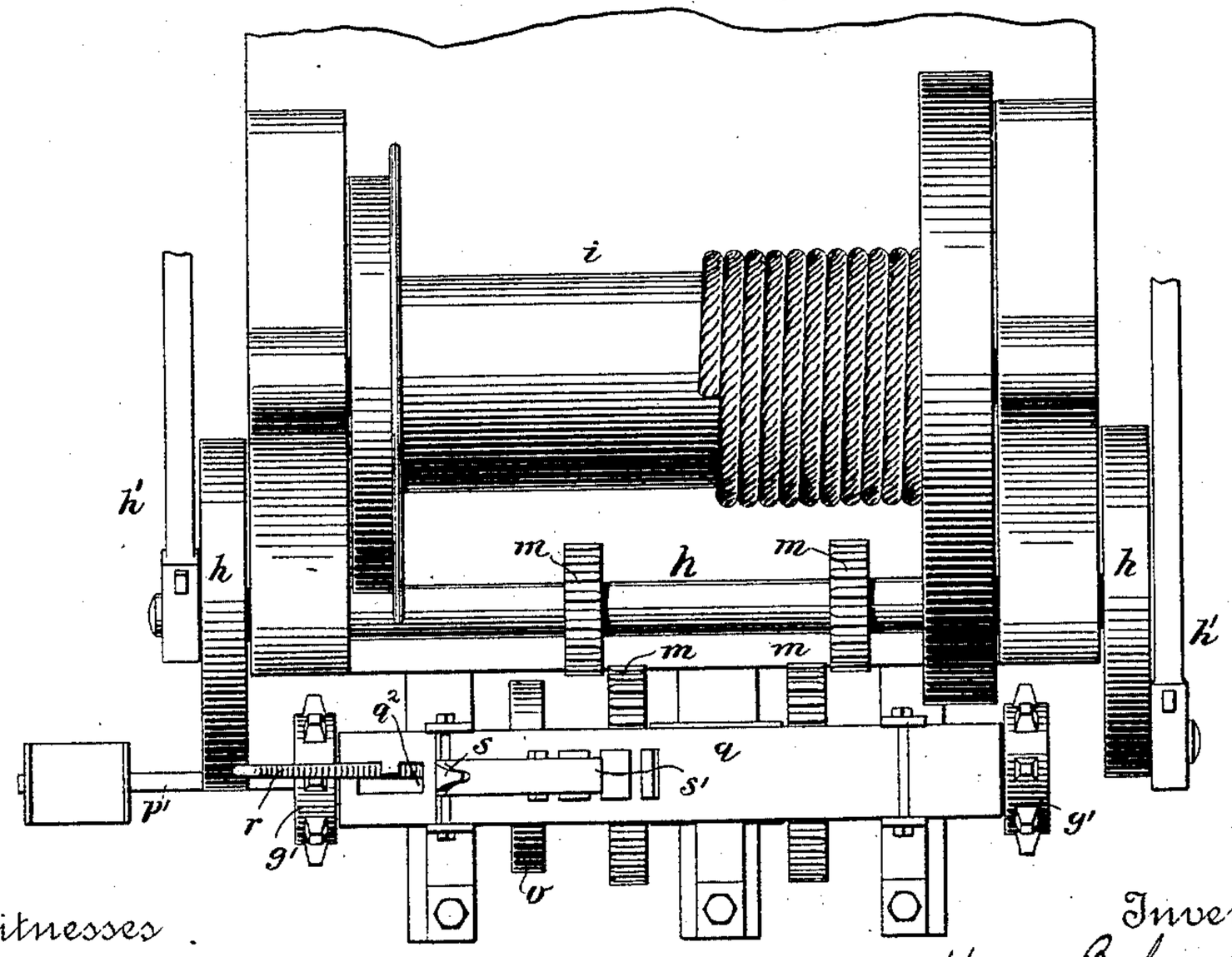


Fig. 3.



Witnesses.
Geo. W. Breck.
Henry W. Lloyd.

Inventor,
Harry Baker Arden.
By his Attorneys
Witter Kenyon.

(No Model.) 3 Sheets—Sheet 3.

H. B. ARDEN.

DEVICE FOR TURNING THE ARMS OF DERRICKS.

No. 424,530. Patented Apr. 1, 1890.

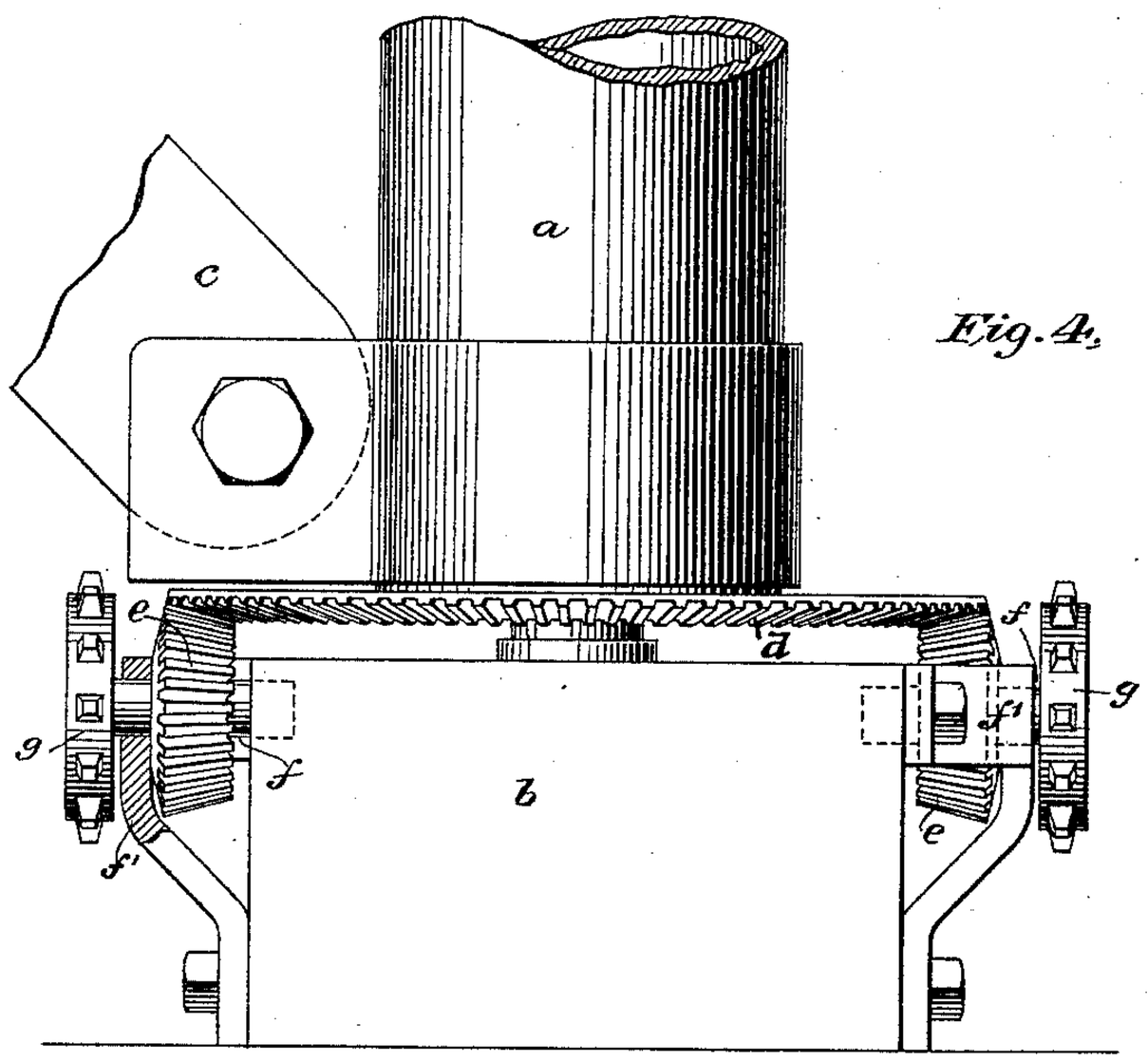


Fig. 4.

Fig. 5.

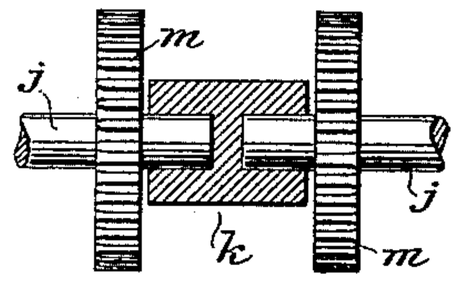


Fig. 6.

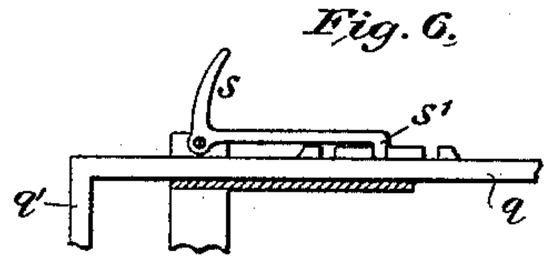
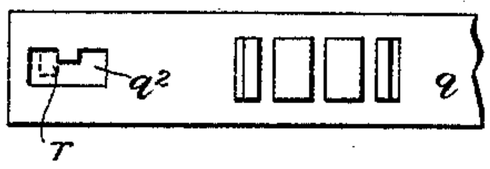


Fig. 7.



Witnesses
Geo. W. Breck.
Henry W. Lloyd.

Inventor,
Harry Baker Arden,
By his Attorneys
Witter Kenyon.

UNITED STATES PATENT OFFICE.

HARRY BAKER ARDEN, OF NEW YORK, N. Y.

DEVICE FOR TURNING THE ARMS OF DERRICKS.

SPECIFICATION forming part of Letters Patent No. 424,530, dated April 1, 1890.

Application filed July 19, 1889. Serial No. 318,070. (No model.)

To all whom it may concern:

Be it known that I, HARRY BAKER ARDEN, a citizen of the United States, residing at New York city, State of New York, have invented a certain new and Improved Device for Turning the Arms of Derricks or Cranes, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

This invention relates to the operating mechanism of derricks and cranes; and it consists of an improved device adapted to be connected and disconnected at will with and from the devices supplying motion to the lifting mechanism or with and from the source of power, whereby the derrick or crane may be caused to revolve on its vertical axis and the arm turned or swung in either direction and into any desired position.

Derricks or cranes are usually held in a step or bearing, so that the vertical mast, if any be used, and the inclined arm are free to rotate as a whole on a vertical axis. I provide the lower end of such a derrick or crane with a large gear-wheel, preferably a bevel-gear, arranged concentric with the vertical center of rotation of the derrick or crane and meshing into two pinions gearing with the wheel at opposite points of its periphery. Motion is imparted to these pinions, so as to cause them and the large gear to revolve and turn the derrick or crane and arm by means of belt or chain gear separately connecting each pinion with one of two sliding shafts. These sliding shafts are adapted to be disconnected and connected at will with the driving-shaft of the lifting-gear, and are so constructed that when one sliding shaft is connected with, the other sliding shaft is disconnected therefrom. Suitable mechanism controls these sliding shafts and can be operated to connect either one or the other sliding shaft with the driving-shaft or disconnect them both from the driving-shaft. When one sliding shaft, connecting-gear, and pinion are connected to and receive motion from the driving-shaft, the derrick and arm are turned in one direction. When the other sliding shaft, connecting-gear, and pinion are connected to the driving-shaft, the derrick and arm are turned in the opposite direction, and when both shafts and connected parts are disconnected with the driving-shaft no motion is imparted to the derrick and arm.

In the drawings, Figure 1 is a side elevation showing the lower part of a derrick mast and arm and my improved arm-turning device applied thereto. Fig. 2 is a transverse section of the same on the line 2 2, Fig. 1. Fig. 3 is a plan view of the part of the device shown in Fig. 2. Fig. 4 is an end elevation showing the lower portion of the mast and arm, large gear-wheel, and pinions. Fig. 5 is a longitudinal central section showing a portion of each sliding shaft and connecting bush or bearing. Figs. 6 and 7 are respectively a detached elevation and a plan of one end of the sliding frame which shifts the sliding shaft.

The derrick to which my invention is shown applied is a portable derrick of ordinary construction, consisting of the vertical mast *a*, resting at its lower end in a step or bearing secured to the supporting-block *b*, and the arm *c*, pivoted to the mast so as to have a limited movement thereon in a vertical plane, but rigidly held thereto as regards horizontal movement. The upper end of the mast may be held by guy-ropes or in any suitable manner, and the upper portion of the arm may be connected to the mast in any suitable manner, such devices not being shown in the drawings.

The lower end of the mast *a* is provided with a large bevel-gear *d*, firmly secured to the mast. Two bevel-pinions *e e* mesh into the bevel-gear *d*, each pinion *e* being mounted on a short shaft *f*, of which there are two, one for each pinion *e*, the shafts *f* having bearings *f' f'*, secured to the supporting-block *b*. The bevel-pinions *e* and *e'* are arranged to mesh into the bevel-gear *d* at opposite points of its periphery, and the bevel-pinions are each connected to the sliding shafts, which receive motion directly from the driving-shaft by means of a chain and sprocket-wheels, as the sliding shafts preferably form part of the engine and winding-drum mechanism, which is generally not rigidly connected to derrick-support. The winding-drum mechanism shown is fitted up in a frame laid upon the ground or floor, and is held at a fixed distance from the supporting-block *b* of the derrick by beams h^2, laid between the winding-drum frame and the supporting-block *b*. The

two sprocket-wheels g g, one on the outer end of each shaft f, the two sprocket-wheels g' g', one on the outer end of each sliding shaft, and the two chains g^2 g^2, one running over each set of sprocket-wheels g g', form the connecting-gear for the bevel-pinions and sliding shafts. The sliding shafts are fitted in bearings in close proximity to the driving-shaft h, which is joined by a connecting-rod h' (partly shown) to a piston or other moving device, (not shown,) which imparts motion to the winding-drum i, geared to the driving-shaft h. These sliding shafts, of which there are two j j, arranged in line with each other, have a common bearing or bush k for their inner ends (see Fig. 5) and pass through the fixed bearing-standards l l, one for each shaft j, forming part of or rigidly secured to the frame of the winding-gear, and the bush k is journaled in a fixed bearing-standard l', forming part of or rigidly secured to the frame of the winding-gear. The shafts j j slide freely in the bearings in standards l l, as does the bush k in its bearing in standard l', so that the shafts and bush are free to move or slide together in one direction—that of their length or transversely of the machine. Each shaft j is provided with a gear-wheel m, adapted when its shaft is in proper position to mesh into one of the two gear-wheels n n, secured to the driving-shaft h. The teeth of these gears m and n are preferably tapered at their meeting edges, as shown, to insure proper interlocking of the respective gears when moved into operative position. One of the sliding shafts j—the left-hand one in Fig. 2—is provided with a brake-wheel o, firmly secured thereto, and a brake p, secured to the weighted brake-lever p', is arranged to bear against this brake-wheel when the sliding shafts are in central position.

The devices whereby the sliding motion is imparted to the shafts j j consist of the sliding frame q and its operating-lever r. The frame q slides in bearings on the tops of the standards l l l', and is provided at each end with a downwardly-projecting arm q', the lower end of each of which arms is yoked to embrace one of the sliding shafts j, and the sliding shafts j are each provided with a collar bearing against the inner face of the arm q', whose yoke embraces its shaft j, so that the frame q and its arms q' q' hold the sliding shafts j j together and with the sliding shafts form a connected device, all the parts of which will slide together into desired position, and motion is imparted to this sliding device by means of the operating hand-lever r. The hand-lever r is pivoted in the left-hand standard l (see Fig. 2) and extends upward, passing through a slot q^2 in the frame q. This slot q^2 is provided with a central projection dividing it into two parts, in one or the other of which the lever r works when shifting the sliding frame and shafts, as will be hereinafter described.

A locking device for the sliding frame q is provided, consisting of the spring-lever s, having a tooth s', which is adapted to fit in any one of three depressions on the frame q when the frame is in any one of its three positions.

In the drawings, as clearly shown in Fig. 2, the sliding frame and shafts are shown in central position, both gear-wheels m on shafts j are clear of their corresponding gear-wheels n on shafts h, and the tooth s' of the locking-lever fits into the central depression on frame q. When the shafts are in this position, no motion is imparted to the arm-turning device from the driving-shaft h. The brake p, when the shafts are thus placed, is in position to bear against the brake-wheel o, and, as shown in the drawings, is held up in contact with the brake-wheel o as it would be by the pressure of the foot of the operator. In using the arm-turning device the brake is only necessary when the parts of the device are in such position, and when the sliding shaft j is moved into central position and thus thrown out of gear with the driving-shaft, the brake p can be quickly and effectively applied to check the motion of the derrick and arm. When the brake p is not held up against the brake o, its weight pulls its down clear of the sliding parts.

When motion is to be imparted to the arm of the derrick, and it is to be turned in one direction, which I will call the "right-hand" direction, the locking-lever s is raised and the hand-lever r is moved toward the right until the right-hand gear m has interlocked with the right-hand gear n, in which position the tooth s' of the locking-lever will fall into the left-hand depression on sliding frame q. Then the motion of the driving-shaft h is communicated to the right-hand sliding shaft j, and through the right-hand sprocket-wheels g' g and chain g^2 to the right-hand shaft f and bevel-pinion e, and from this pinion e to the large bevel-gear d, which, with the crane and arm, is thus caused to turn in the desired direction. It will be noticed that motion is also imparted from the bevel-gear d to the left-hand bevel-pinion e and connected sliding shaft j; but these devices are not now otherwise connected to the driving-shaft, and are therefore free to rotate. When the turning of the derrick and arm in this direction has continued for a sufficient time, the turning device is disconnected from the driving-shaft by manipulating the locking-lever s and moving the hand-lever r back to central position. The brake p can then be applied if it is desired to check the motion of the derrick and arm.

The hand-lever r, as shown in Fig. 2 and by dotted lines in Fig. 6, passes through the slot q^2 between the left end of the slot and the left face of the central projection therein. This is the proper place for the lever r in the slot q^2 when the lever is used to move the sliding frame q from the central to the right-hand position and from the right-hand back to the central position, as just described. When the

derrick-arm is to be turned in a left-hand direction, the hand-lever r is sprung over the central projection in the slot q^2, so that it works between the right face of this projection and the right end of the slot. The locking-lever s is then raised and the lever r is moved toward the left until the left-hand gear m meshes with the left-hand gear n, and the tooth s' of locking-lever s falls into the right-hand depression of the sliding frame q. Motion is then communicated from the driving-shaft h through the left-hand sliding shaft j to the left-hand bevel-pinion e, the bevel-gear d, and the derrick and arm. As this left-hand bevel-pinion e meshes with the bevel-gear d at a point on the periphery of the gear opposite that where the right-hand pinion e meshes therein, the rotation of the left-hand pinion in the same direction as that of the right-hand pinion in the previously-described connection imparts to the bevel-gear d a rotation in the opposite direction from that of the motion previously described—that is to say, in a left-hand direction. The motion of the large gear d is as before communicated to the mechanism on the other side of the machine; but, not being otherwise connected to the driving-shaft, such mechanism is free to rotate. When the left-hand turning of the derrick-arm has continued a sufficient time, the hand-lever r is moved and carries with it the sliding frame and shafts back to central position, and the gears m and n are thus separated. The brake p can now be applied. The hand-lever r, as shown, has a limited motion, which makes it necessary to move it to one side or the other of the projection in the slot q^2, according to the direction in which it is desired to turn the derrick-arm. This is the preferred construction, but may, it is evident, be modified.

It will be observed that as the sliding shafts j are moved to different positions the positions of the sprocket-wheels g' in relation to the sprocket-wheel g undergo a slight lateral change; but the angular movement thus caused is very slight, as the distance between the sprockets g and g' is so much greater than this lateral movement, and no perceptible difference occurs in the working of the chains and sprockets. A considerable portion of the chains g^2 and the beams h^2 is removed or broken away in Fig. 1, and the derrick and lifting-drum mechanism are thus brought much closer together than in a full-length drawing.

Although my improved device is especially adapted for portable derricks, it is obvious that it can be as readily applied to other forms of derricks and to cranes and other lifting and carrying devices, and it will be observed that the arm-turning device can be readily and quickly thrown in and out of gear, and that it therefore permits of rapid and sure performance of the work of turning or swinging the arm. The arm-turning device is both of simple construction and is strong and durable, and therefore is well adapted for the heavy work of controlling a derrick.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a derrick or crane, of a wheel secured thereto, two wheels connected with the wheel on the derrick or crane, a shaft of the operating mechanism of the derrick or crane, two shafts, each of which is provided with mechanism adapted to connect and disconnect it with and from the shaft of the derrick or crane operating mechanism, and connecting mechanism joining each of the two wheels with one of the two shafts, substantially as described.

2. The combination, with a derrick or crane, of a wheel secured thereto, two wheels connected with the wheel on the derrick or crane, two sliding shafts, connecting mechanism joining each of the wheels with one of the two sliding shafts, a shaft of the operating mechanism of the derrick or crane, provided with two wheels, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being adapted to be separately connected with and disconnected from one of the two wheels on the shaft of the derrick or crane operating mechanism, substantially as described.

3. The combination, with a derrick or crane, of a bevel gear-wheel secured thereto, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, a shaft of the operating mechanism of the derrick or crane, two shafts, each of which is provided with mechanism adapted to connect and disconnect it with and from the shaft of the derrick or crane operating mechanism, and connecting-gear joining each of the two bevel-pinions with one of the two shafts, substantially as described.

4. The combination, with a derrick or crane, of a bevel gear-wheel secured thereto, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, two sliding shafts, connecting-gear joining each of the wheels with one of the two sliding shafts, a shaft of the operating mechanism of the derrick or crane, provided with two wheels, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being adapted to be separately connected with and disconnected from one of the two wheels on the shaft of the derrick or crane operating mechanism, substantially as described.

5. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two shafts adapted to be separately connected with and disconnected from the shaft of the operating mechanism of the derrick or crane and a derrick-turning mechanism connected to such two shafts, substantially as described.

6. The combination, with a derrick or crane and a shaft of the operating mechanism of

such derrick or crane, of two sliding shafts, two wheels, one on each sliding shaft, and two wheels on the shaft of the operating mechanism of the derrick or crane, each wheel on a sliding shaft being adapted to be separately connected with and disconnected from one of the two wheels on the operating-mechanism shaft, and a derrick-turning mechanism connected to the two sliding shafts, substantially as described.

7. The combination, with a derrick or crane, of a bevel gear-wheel secured thereto, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, two sprocket-wheels, one on the shaft of each bevel-pinion, two sliding shafts, each provided with a sprocket-wheel, two chains, one running over the sprocket-wheels of the bevel-pinion and sliding shaft on each side of the device, a shaft of the operating mechanism of the derrick or crane, two gear-wheels on such shaft, and two gear-wheels, one on each sliding shaft, each adapted to be separately thrown in and out of gear with one of the gear-wheels on the operating-mechanism shaft, substantially as described.

8. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately connect with one of the wheels on the shafts of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shafts will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, and a derrick-turning mechanism connected to the two sliding shafts, substantially as described.

9. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately connect with one of the wheels on the shaft of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shafts will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, a bevel gear-wheel secured to the derrick or crane, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, and connecting-gear joining each bevel-pinion with one of the sliding shafts, substantially as described.

10. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately connect with one of the wheels on the shaft of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shafts will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, a brake-wheel on one of the two sliding shafts, a brake arranged in position to bear against the brake-wheel when the sliding shafts are disconnected from the shaft of the operating mechanism, and a derrick-turning mechanism connected to the two shafts, substantially as described.

11. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately connect with one of the wheels on the shaft of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shafts will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, a brake-wheel on one of the two sliding shafts, a brake arranged in position to bear against the brake-wheel when the sliding shafts are disconnected from the shaft of the operating mechanism, a bevel gear-wheel secured to the derrick or crane, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, and connecting-gear joining each bevel-pinion with one of the sliding shafts, substantially as described.

12. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately con-

nect with one of the wheels on the shaft of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shafts will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, a hand-lever for operating the sliding frame, and a locking-lever for holding the sliding frame and shafts in the desired position, and a derrick-turning mechanism connected to the two sliding shafts, substantially as described.

13. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately connect with one of the wheels on the shaft of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shaft will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, a hand-lever for operating the sliding frame, and a locking-lever for holding the sliding frame and shafts in the desired positions, a bevel gear-wheel secured to the derrick or crane, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, and connecting-gear joining each bevel-pinion with one of the sliding shafts, substantially as described.

14. The combination, with a derrick or crane and a shaft of the operating mechanism of such derrick or crane, of two sliding shafts arranged in line, each sliding in a bearing and both having another and a common sliding bearing for their inner ends, a sliding frame provided with arms holding the two shafts together, two wheels on the shaft of the operating mechanism, and two wheels, one on each sliding shaft, each wheel on a sliding shaft being so arranged as to separately connect with one of the wheels on the shaft of the operating mechanism in one position of the sliding frame and shafts, and so that both wheels on the sliding shafts will be disconnected from the wheels on the shaft of the operating mechanism in another position of the sliding frame and shafts, a brake-wheel on one of the two sliding shafts, a brake arranged in position to bear against the brake-wheel when the sliding shafts are disconnected from the shaft of the operating mechanism, a hand-lever for operating the sliding frame, and a locking-lever for holding the sliding frame and shafts in the desired positions, a bevel gear-wheel secured to the derrick or crane, two bevel-pinions meshing with the bevel gear-wheel at opposite points of its periphery, and connecting-gear joining each bevel-pinion with one of the sliding shafts, substantially as described.

HARRY BAKER ARDEN.

Witnesses:
EDWIN SEGAR,
ROBERT N. KENYON.