

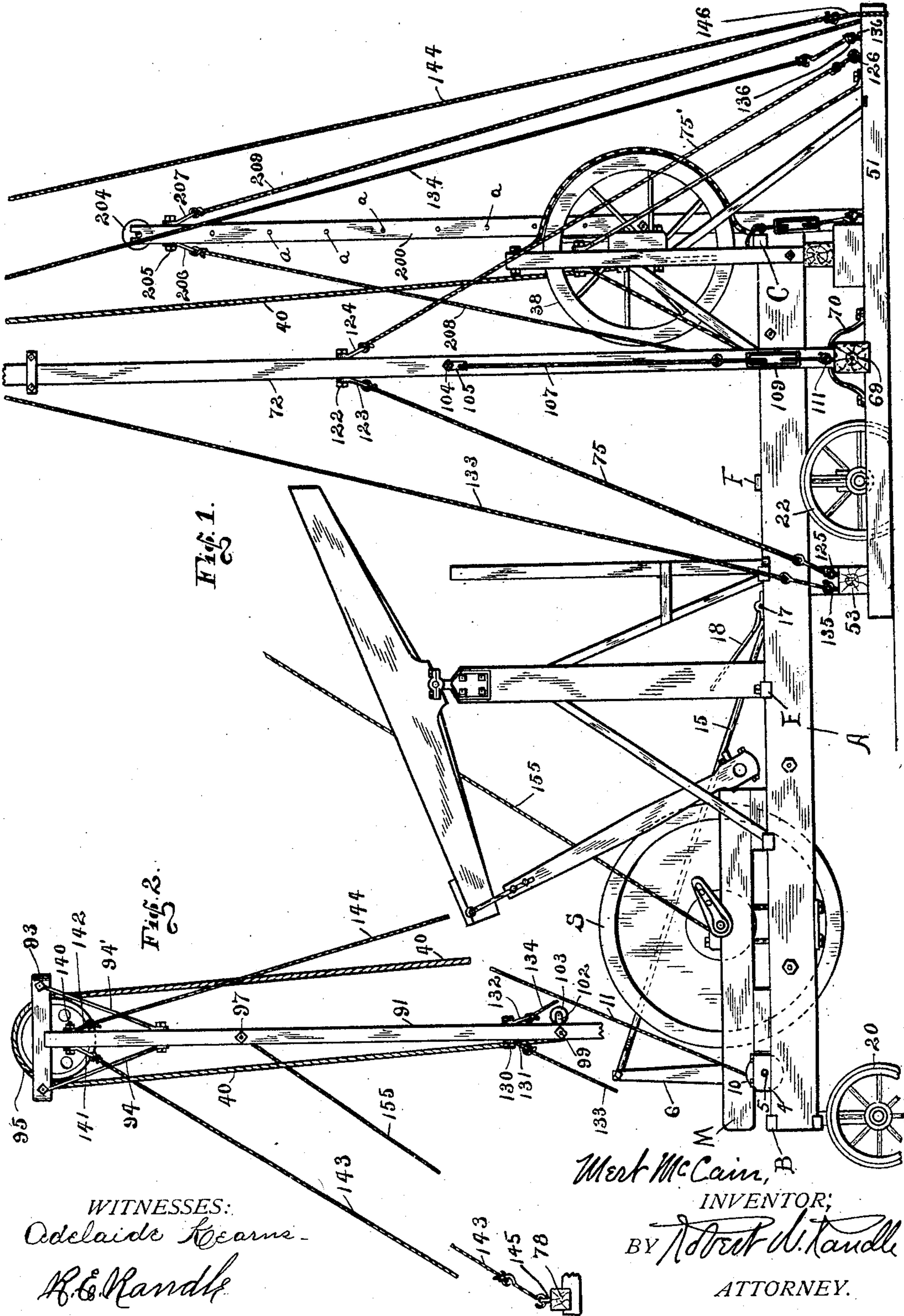
No. 836,985.

PATENTED NOV. 27, 1906.

M. McCAIN.
MAST FOR WELL DRILLING MACHINES.

APPLICATION FILED APR. 5, 1906.

4 SHEETS—SHEET 1.



WITNESSES:
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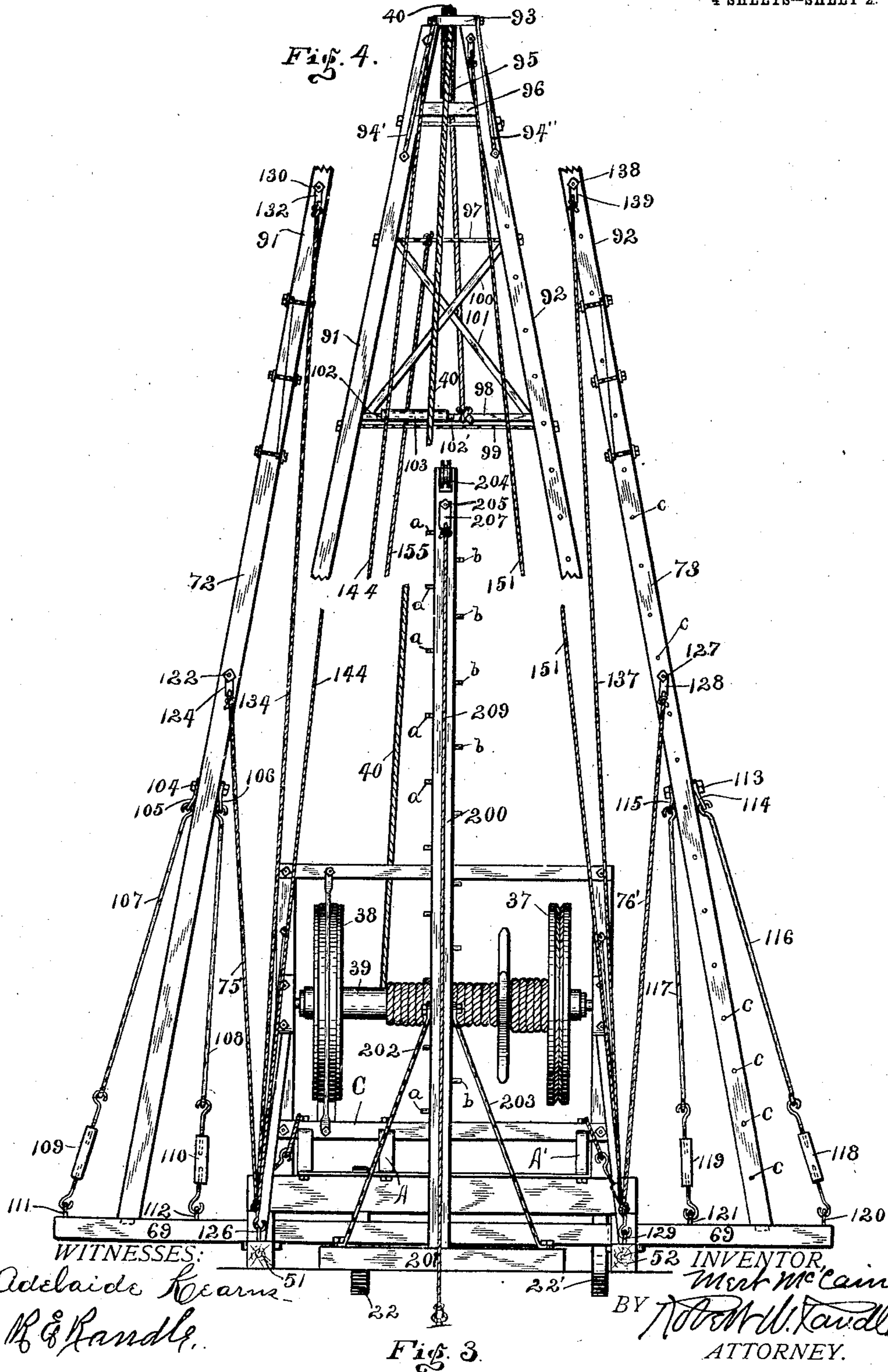
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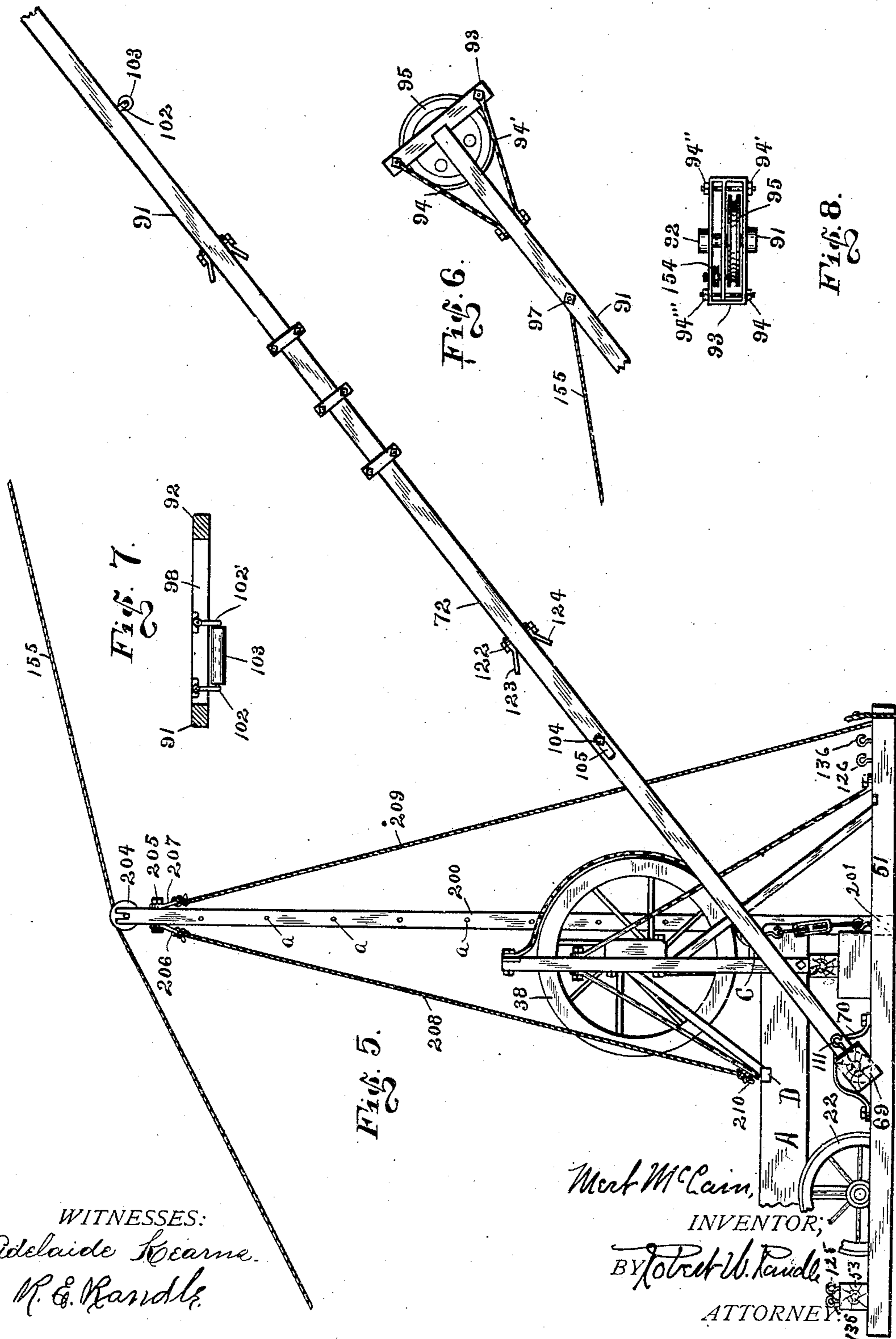
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4 SHEETS—SHEET 3.



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MERT McCAIN, OF PORTLAND, INDIANA.

MAST FOR WELL-DRILLING MACHINES.

No. 836,985.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed April 5, 1906. Serial No. 309,962.

To all whom it may concern:

Be it known that I, MERT McCAIN, a citizen of the United States, residing in the city of Portland, in the county of Jay, and in the State of Indiana, have invented a new and useful Mast for Well-Drilling Machines, of which the following is a complete and lucid specification, being such as will enable others skilled in the art to which the invention relates to make and use the same.

In the present invention my objects are to provide a new and useful mast or derrick for deep-well-drilling machines, to provide a mast which will be light in construction and easily managed, to provide a mast which may be easily and quickly placed in position or as easily dismounted and easily transported, to provide means for raising and lowering the mast by power, to provide for properly securing and retaining the mast in its operative position, and to provide means whereby the mast may be dismembered or assembled when desired.

Other particular objects and advantages will present themselves in the course of the ensuing specification.

With the above-enumerated objects in view my invention consists in the form, proportion, the indispensable requisites, and the relations of the several parts and the means for accomplishing the several correlated objects, all of which will be described in concrete detail and with absolute exactitude in the ensuing specification.

The preferred construction of my invention and that which in actual practice I have found to give the most satisfactory results is shown most clearly in the accompanying drawings, in which—

Figure 1 is a left-hand side elevation of the lower portion of my invention in operative position and as applied to a well-drilling machine. Fig. 2 is a view similar to the above, but showing the upper portion of the invention. Fig. 3 shows a rear elevation of the lower portion of the mast in operative position. Fig. 4 is similar to the last, but showing the upper portion of the mast. Fig. 5 is a left-hand side elevation of a portion of a machine, showing the lower portion of the mast as suspended at an angle, as in the act of being raised or lowered. Fig. 6 is a side elevation of the upper portion of the mast in the position shown in Fig. 5. Fig. 7 is a detail view of the contact-roller for the main cable. Fig. 8 is a top plan-view of the upper

end of the mast. Fig. 9 is a right-hand side elevation of the lower portion of the invention. Fig. 10 is a right-hand side elevation of the upper portion of the invention, and Fig. 11 is a top plan view of the reel mechanism for raising and lowering the mast by power.

Like reference characters denote like parts throughout the several views of the four sheets of drawings.

In order to render the construction and operation of my invention still more facile, I will now take up the description in detail and will refer to the various essential elements as briefly and as compactly as I may and in simple and concise terms.

In the drawings, the letters A and A' denote the main sills of a well-drilling machine in connection with which my invention is intended to be employed. The letter B denotes the front cross-frame, and the letter C denotes the cross-beam in the rear. The letter D denotes a cross-beam located toward the rear, and the letter E denotes the cross-beam located near the center, while the letter F denotes the cross-beam located over the rear wheel. All of said parts are suitably braced and secured together and collectively form the main frame of the machine. The main frame thus formed is mounted on suitable ground-wheels, (designated by the indices 20, 20', 22, and 22', as shown.)

The above and other parts of the machine are incorporated herein simply to show the relations of my invention with reference thereto; the machine proper being specifically described and claimed in an application filed concurrent herewith.

The numeral 69 denotes the horizontal base of the mast, which is adapted to be disposed across underneath the main frame of the machine and to rest on the mudsills 51 and 52, which are disposed on either side. At the points where the base 69 rests on the mudsills it is formed rounding, as indicated by the dotted line in Fig. 1, in order that it may rotate on said sills, as will presently be set forth. Said base 69 is adapted to be retained in place on the mudsills 51 and 52 by the straps 70 and 71, respectively, whereby the base may not move forward and backward, but may turn revolvably, as will presently be explained. Said straps extend over the rounded portions of the base, and their ends are secured to the mudsill by bolts or the like, substantially as shown.

The numerals 72 and 73 denote the lower left and right posts, respectively, of the mast, which posts are mortised into the outer portions of the base 69 and thence extend upward convergently, as indicated.

The numerals 91 and 92 designate the upper posts of the mast, which, in fact, are simply the continuations of the lower posts, the respective members being spliced together in any well-known manner. The upper ends of the posts 91 and 92 are rigidly secured together by the horizontal apex-frame 93, and the outer ends of said frame are supported and connected to the posts by braces, (designated by the indices 94, 94', 94'', and 94'''.) The numeral 95 denotes a channel wheel or pulley, which is mounted between the upper ends of the posts 91 and 92, extending up through a slot therefor in the frame 93. Immediately below the wheel 95 the posts 91 and 92 are rigidly connected by the cross-tie 96. Some distance below the tie 96 the said posts are again connected by the tie-rod 97, and below the latter the said posts are again connected by the combination of the cross-tie 98 and the rod 99, as shown. The numerals 100 and 101 denote the two crossing braces, extending crosswise between the opposing inner faces of the posts 91 and 92, extending from near the tie-rod 97 to the cross-tie 98, as shown in Fig. 4.

Extending out from the rear face of the cross-tie 98 are the two hangers 102 and 102', by and between which is mounted horizontally the relatively long free roller 103, which is parallel with the cross-tie 98. Said roller is invented for the main cable 40 to contact with in order that the cable may not be damaged by contact with the cross-tie 98 or other parts of the mast, as is usually the case when in operation. Said cable 40 extends up from the bull-wheel spindle 39 of the machine, over the wheel 95, and then extends down, where it may be connected for work in the usual well-known manner.

The lower positions of the posts 72 and 73 are braced and are held in connection with the base 69 by coupling-rods. Secured on the face and back of the post 72 by the bolt 104 are the respective eye-plates 105 and 106, in which are hooked the upper ends of the respective coupling-rods 107 and 108, said coupling-rods being connected with the respective turnbuckles 109 and 110, and the lower ends of said turnbuckles are hooked into the respective eyebolts 111 and 112, and said eyebolts are secured in the surface of the base 69 some distance apart from the post 72. Like unto the above, secured on the face and back of the post 73 by the bolt 113, are the respective eye-plates 114 and 115, in which are hooked the upper ends of the respective coupling-rods 116 and 117, said rods being connected with the respective turnbuckles 118 and 119, and the turnbuckles

are hooked into the respective eyebolts 120 and 121, said eyebolts being secured into the surface of the base 69 some distance apart from the post 73, as shown.

From the above it is evident that the posts 72 and 73 may be very rigidly secured and braced, and also allowing for the posts to be easily taken apart when desired and as easily replaced.

The numeral 53 has reference to a girder resting on the forward ends of the mudsills 51 and 52 and extending across underneath the machine, to which it should be blocked up, whereby the sills A and A' of the machine may be additionally supported, as shown.

Secured on the front and rear sides of the post 72 by the bolt 122 (a short distance above the bolt 104) are the respective eye-plates 123 and 124, in which are secured the upper ends of the guy-lines 75 and 75'. The guy-line 75 extends forward and downward and is secured in the eyebolt 125, said eyebolt being secured in the left-hand portion of the girder 53, and the guy-line 75' extends downward and to the rear, where it is secured in the eyebolt 126, the latter being secured in the rear portion of the mudsill 51. Similar unto the above are the guys for the post 73. Secured on the front and rear sides of the post 73 by the bolt 127 (a short distance above the bolt 113) are the respective eye-plates 128 and 128', in which are secured the upper ends of the guy-lines 76 and 76', the former extending downward and forward and is secured in the eyebolt 129, said eyebolt being secured in the right-hand end of the girder 53, and the guy-line 76' extends down and to the rear, where it is secured in the eyebolt 129, the latter being secured in the mudsill 52.

Secured on the front and rear sides of the lower portion of the post 91 by the bolt 130 are the respective eye-plates 131 and 132, in which are secured the upper ends of the respective guy-lines 133 and 134. The guy-rope 133 extends down and forward and is secured in the eyebolt 135, which latter is secured in the girder 53. The guy-rope 134 extends down and to the rear with its rear end secured in the eyebolt 136, which latter is secured in the rear end of the mudsill 51, as shown. Similar to the above are the guy-lines for the post 92. Secured on the front and rear sides of the lower portion of the post 92 by the bolt 138 are the respective eye-plates 139 and 139', in which are secured the upper ends of the respective guy-ropes 137 and 137'. The guy-rope 137' extends down and forward and is secured in the eyebolt 135, which latter is secured in the girder 53. The guy-rope 137 extends down and to the rear, with its rear end secured in the eyebolt 136, which latter is secured in the rear portion of the mudsill 52, as shown.

Secured on the front and the rear sides of

the upper portion of the post 91 by the bolt 140, Fig. 2, are the respective eye-plates 141 and 142, in which are secured the upper ends of the guy-lines 143 and 144, the former extending downward and forward and is secured in the eyebolt 145, said eyebolt being secured in the frame 78, which latter may be a part of the engine-frame to be located forward of and adjoining the machine, and the guy-line 144 extends down and to the rear, having a hook 146 on its lower end to engage around the rear portion of the mudsill 51, as shown in Fig. 1.

Secured on the front and the rear sides of the upper portion of the post 92 by the bolt 147, Fig. 10, are the respective eye-plates 148 and 149, in which are secured the upper ends of the guy-lines 150 and 151, the former extending downward and forward and is secured in the eyebolt 152, said eyebolt being secured in the frame 78, which latter may be a part of the engine-frame, and the guy-line 151 extends down and to the rear, having a hook 153 on its lower end to engage around the rear portion of the mudsill 52, as shown in Fig. 9.

Mounted in the frame 93, separate from the channel-wheel 95, as shown, is the small channel wheel or pulley 154, (shown in Fig. 8,) over which is adapted to operate the rope or cable 11 for operating the sand-pump.

Secured on the front upper edge of the sill A is a boxing 4, in which is pivoted the left-hand end of the shaft 5, from which point said shaft extends over to the right, and its right-hand end is pivoted in the lever 6. The lower end of the lever 6 is pivoted to the inner face of the sill A', from which said lever extends upward a considerable distance, as shown in Fig. 1. Mounted on the left-hand portion of the shaft 5 is the reel 10, which is adapted to have wound thereon the rope or cable 11. Said rope or cable extends up from said reel to the upper portion of the mast, passing over said pulley 154, as above referred to.

It should be understood that the shaft 5 is pivoted in the lever 6 at a point above the pivotal connection of said lever with the sill A', from which it is manifest that if the upper end of the lever 6 be moved to the rear it will cause the friction-pulley which is mounted on the shaft 5 to contact with the band-wheel S and that if the band-wheel S be revolved then the reel 10 will evidently be revolved thereby in a direction opposite to the revolution of the band-wheel, and, on the other hand, if the lever 6 be moved forward then the reel 10 and its load will be released. In order that the operation of the lever 6 may be initiated from the most advantageous point, I have provided an arm 15, having its forward end pivoted to the upper end of the lever 6 and its rear end connected eccentrically to the shaft 17, said shaft 17 being

mounted across the machine-frame and pivoted to the sills thereof. Said shaft 17 is adapted to be rotated by the lever 18, which extends up therefrom, whereby the lever 6 may be given the same movement from this point as from the front of the machine.

The means for raising and lowering the derrick or mast by power is described as follows: Referring first to Fig. 11, the letter S designates the band-wheel, operative by power located forward to the left thereof. The band-wheel frame consists of two parallel rails L and M, located directly over and parallel with the respective members A' and G of the main frame, above which they are supported by space-blocks, to which they are permanently connected to the sills aforesaid by means of bolts or the like. The front and rear ends of the rails L and M are connected by metal bands or strips—as, for instance, the one in the rear, (denoted by the letter O.) Mounted on the central portion of the rails L and M are boxings P and Q, respectively, in which is mounted the axle R, the band-wheel S being mounted centrally on said axle. Permanently secured on the right-hand side of the band-wheel S is the channel-wheel U, which is concentric with the band-wheel S and which is adapted to carry in its channeled face the cable-band V. Also mounted permanently on the axle R, to the left of the wheel S, is the reel W, adapted to have wound thereon the rope or cable 155. The cable 155 extends upward and rearward with its upper end securable to the center of the tie-rod 97, as indicated.

To assist in raising and lowering the mast, I employ a jack-post 200, (shown in Figs. 1, 3, 5, and 9,) which is adapted to be secured in a vertical position and whose function will presently be explained. The lower end of the jack-post is secured in the center of the horizontal base 201 and is braced thereto by the two braces 202 and 203. The base 201 is adapted to rest on the ground immediately in the rear of the spindle 39 and centrally thereof, as shown in Fig. 3. In the apex of the jack-post 200 is mounted the revoluble channel-pulley 204. Secured on the front and rear sides of the jack-post 200 a short distance below the pulley 204 by the bolt 205 are the respective eye-plates 206 and 207, in which are secured the upper ends of the guy-lines 208 and 209, the former extending downward and forward, with a hook 210 attached on its lower end adapted to engage around the cross-beam D, and the guy-line 209 extends forward and to the rear, where it may be secured to a stake or to some other stationary object. (Not shown.) Means for climbing the jack-post is provided for by the pins a and b, which extend out alternately from the sides of said post, as shown.

Means are provided for climbing the mast

by the employment of the pins *c* and *d*, which project out alternately from the rear and front sides of the posts 73 and 92, as shown in Figs. 3 and 9.

5 The spindle 39 and the bull-wheels 37 and 38 may be revolved in the usual manner by a cable-belt (not shown) extending around in the channel formed in the periphery of the bull-wheel 37 and then forward over a similar
10 channel-wheel (not shown) secured concentric with and on the right-hand side of the band-wheel S. Turnbuckles may also be employed in connection with the guy-lines, whereby said lines may be tightened after
15 being secured at their ends.

No reference is made herein to the material of which the various parts are formed, as I reserve the right to use the material that may be thought the best for the purpose or
20 which is the most economical.

Operation: From the above it is apparent that I have provided a mast for oil-well rigs or drilling-machines which is very easily positioned or removed when desired. Suppose,
25 for instance, that the machine is assembled and the mast is in operative position, as shown in Figs. 1, 2, and 3, in order to remove the mast I first position the jack-post 200, securing it as shown and described. I
30 now release all of the guy-ropes which support the mast and then allow the mast to tip to the rear, at same time allowing the rope 155 to pay out from the reel W, the control of which will be in the province of the
35 operator having in hand the control of the engine or the power for revolving the band-wheel S, thereby allowing the mast to turn back at the proper rate of speed for safety. When the mast is being thus lowered and
40 just before it has reached the position shown in Figs. 5 and 6, the rope 155 will engage over the pulley 204 of the jack-post, as shown in Fig. 5, with which pulley the rope 155 will engage until the mast has been allowed to
45 rest parallel with mudsills or until it has reached a support therefor. By the mediation of the jack-post it is evident that the last half of the movement of the mast in being lowered may be accomplished substantially as easily as the first half of its
50 movement; but without this mediation it would be very difficult to hold the mast, which difficulty would increase as the mast approached a horizontal position. The necessity for the intermediation of the jack-post is more essential, perhaps, in the raising of the mast, which is accomplished by a converse movement from the operation just stated; but in this latter movement, the raising of the mast, the band-wheel S is revolved
60 by power in a direction opposite to the above, thereby causing the rope 155 to wind on the reel W, and thereby raising the mast to the perpendicular, where it may be secured by
65 the guy-lines as before.

It is also apparent that the mast may be raised from the front rearward, in which instance the jack-post may be placed on the machine by resting it across the sills A and A' between the members F and D, the rope 70 155 being taken from the reel W and wound on the spindle 39 and also connecting the band V over the bull-wheel 37. Then by treading the bull-wheels by hand the mast may be thereby raised and lowered. 75

In describing this invention I wish it understood that I have not limited myself to details, that many changes and modification in the several details of construction may be made without in any manner affecting the 80 essential features of the invention, and any such changes as would come within ordinary mechanical judgment may be made without departing from the principles of the invention which are claimed as new and useful. 85

Having now fully described my present invention and its operation, what I claim, and desire to secure by Letters Patent, is—

1. A mast for well-drilling machines, comprising in combination, a pair of two-part 90 posts converging upward, a base for connecting the lower ends of the posts, a pulley-frame mounted on the upper ends of the posts, means for bracing the posts, guy-lines for supporting the mast in operative position, ties for connecting the mast-posts, a 95 jack-post having a pulley in its upper end, means for supporting the jack-post, and means for raising and lowering the mast by power, all substantially as shown and described. 100

2. A two-post mast for well-drilling machines, comprising in combination, a base for the mast with the posts extending upwardly therefrom, means for connecting the lower 105 ends of the posts to the base, a pulley-frame carried on the apex of the posts, cross-ties for connecting the posts mediate their lengths, braces for said posts, guy-lines for supporting the posts, means for pivotally 110 mounting the posts on mudsills, a jack-post extending up in the rear of the mast, means for raising and lowering the assembled mast the same being initiated and controlled by power and assisted by the interposition of 115 the jack-post, substantially as set forth and shown.

3. In combination with a well-drilling machine having the usual cooperating elements thereon, a band-wheel operative by power, 120 an axle on which said band-wheel is mounted, a reel also mounted on said axle, a rope or cable adapted to be wound on or unwound from said reel and from thence extending upward to the upper part of the mast where it 125 may be secured, the two-post mast converging upward, a base member for the mast pivoted for rotation on the mudsills, a jack-post for supporting said rope or cable during a portion of the time when the mast is being 130

raised or lowered, and means for supporting the mast in operative position, all substantially as shown and described.

4. A construction of the class described comprising two upwardly-converging two-part posts, a horizontal base to which the lower ends of the posts are connected, means for mounting the base to turn on its supports, a frame uniting the upper ends of the posts, pulleys mounted in said frame, means for bracing said frame, ties for connecting the posts, guy-lines for retaining the mast upright, means for raising and lowering the mast by power, and a jack-post for assisting the raising and lowering means, all substantially as shown and described.

5. In combination with a well-drilling machine having a band-wheel mounted on an axle, a reel also mounted on said axle and operative concentric and revolvably with the band-wheel, a rope adapted to be wound on said reel, a two-part mast pivoted at its base to the upper end of which said rope may be attached to raise and lower the mast whereby means are provided for raising and lowering the mast by power, all substantially as shown and described.

6. In a mast for well-drilling machines, a pair of upwardly-converging posts rising over a well-drilling machine, mudsills disposed on each side of the machine, a base to which said posts are connected, means for rotatably mounting said base on the mudsills, suitable ties for connecting the posts members of the mast, a frame mounted on the upper end of the posts, a rope adapted to be secured to the upper portion of the mast and extending downward and forward and adapted to be controlled by means located on the machine, a jack-post carrying a pulley in its apex and supported in rear of the mast whereby during a portion of the movement of the mast in being raised and lowered said rope will travel over said pulley in the apex of the jack-post, all substantially as shown and described.

7. In combination with a well-drilling machine, a two-post mast extending upward

over the machine, means for raising and lowering the mast, which means are controllable and actuated by a single operator, the main cable extending parallel with the mast, a roller mounted to the mast for the cable to contact with to prevent abrasion of the cable, all substantially as shown and described.

8. A mast for well-drilling machines composed of two sets of posts, a base for said posts, means for mounting the base to rotate, a rope or the like controlled from the forward part of the machine, means for raising the mast by power, means for lowering the mast, and a jack-post over which said rope may operate to assist in raising and lowering the mast, all substantially as shown and described.

9. In connection with a well-drilling machine supported by auxiliary means, a mast rising above the machine and supported on the means by which the machine is supported, stay-rods for bracing the mast and having turnbuckles intermediate their lengths, guy-lines for retaining the mast upright, means for attaching said guy-lines to the machine, means for raising and lowering the mast by power, and means for raising and lowering the mast by hand, all substantially as described.

10. A two-post mast for well-drilling machines or the like consisting of the upwardly-converging posts each consisting of two members, a base member connecting the posts, brace-rods for securing the posts to the base, turnbuckles located intermediate said rods, braces and ties connecting said posts intermediate their lengths, means for raising and lowering the mast, and means for supporting the mast in a vertical position which means are connected to the machine.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

MERT McCAIN.

Witnesses:

R. W. RANDLE,
R. E. RANDLE.