A. G. A. SCHMIDT.

DERRICK.

APPLICATION FILED APR. 6, 1908.

1,008,564.

Patented Nov 14, 1911.

4 SHEETS—SHEET 1.

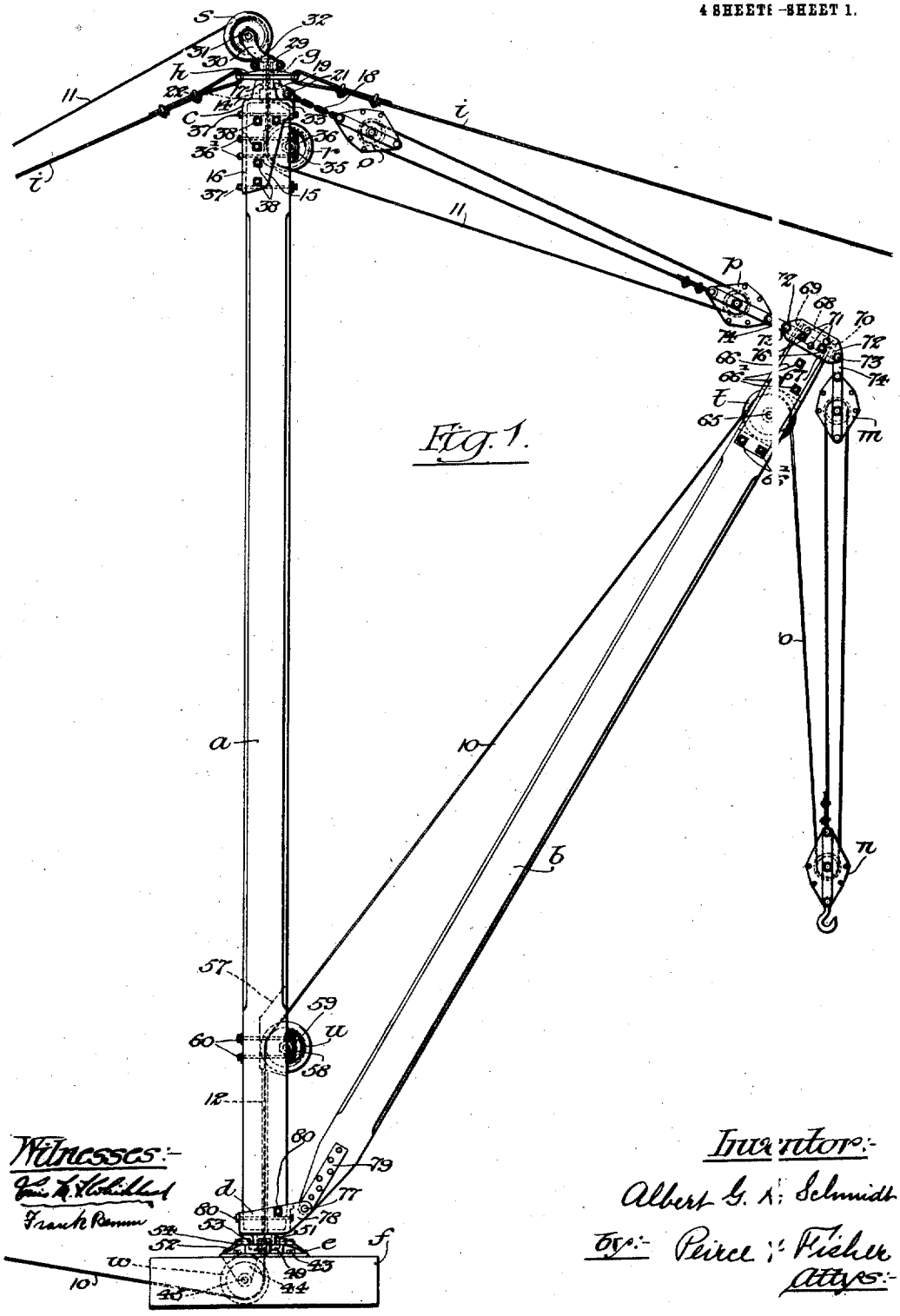

Fig. 1.

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2 SHEETS—SHEET 2.

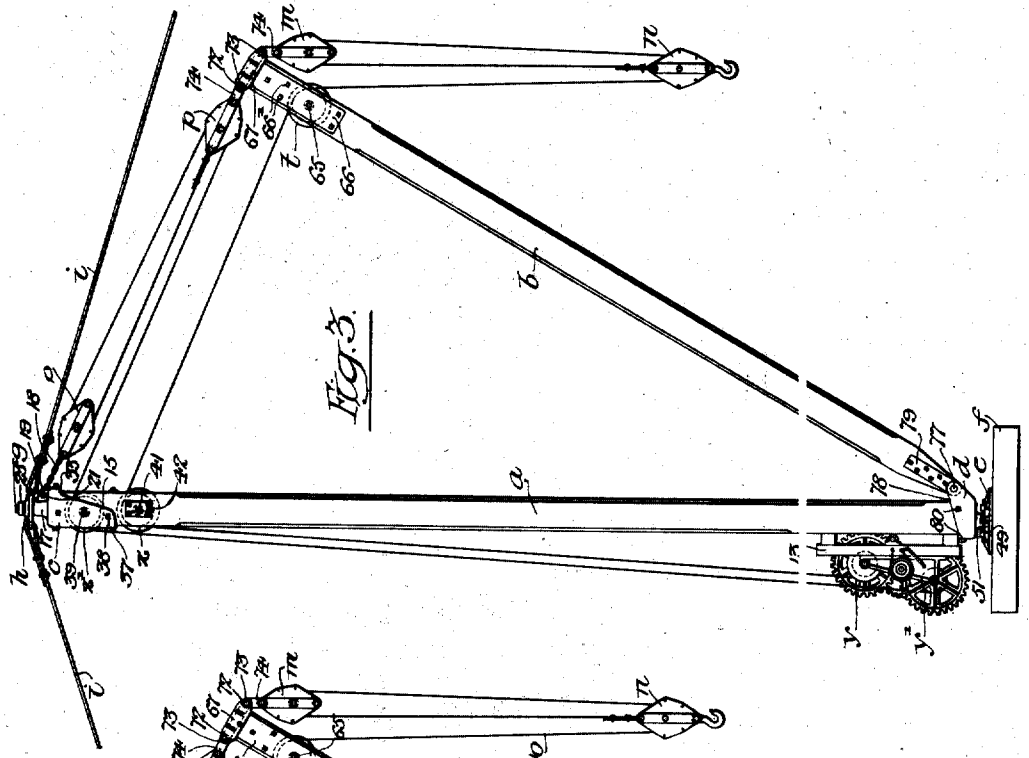

Fig. 2.

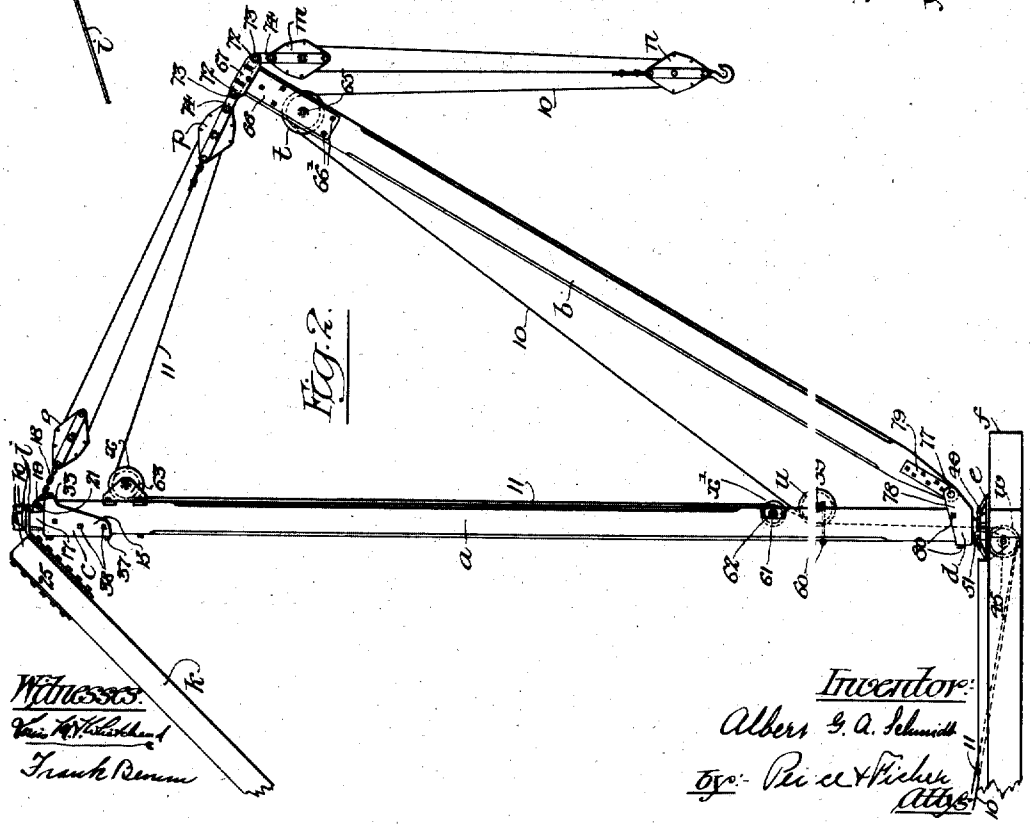

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Fig. 5.

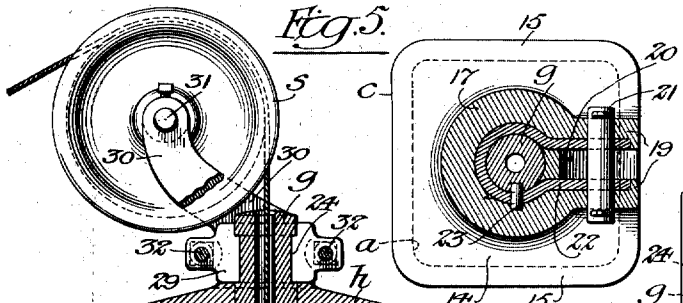


Fig. 6.

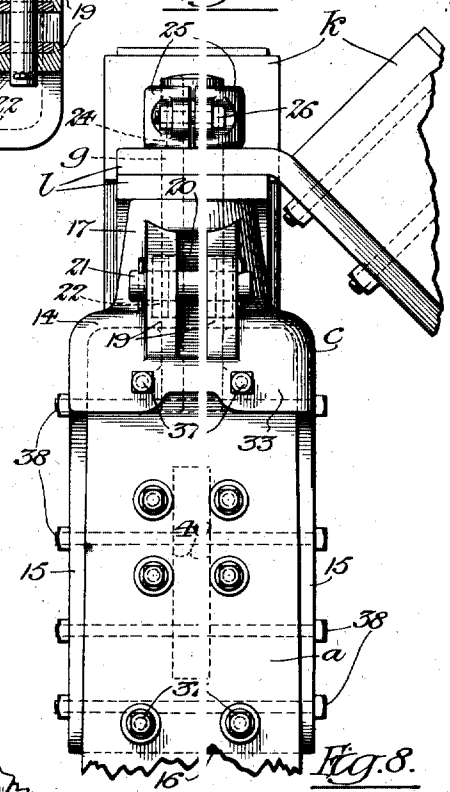


Fig. 4.

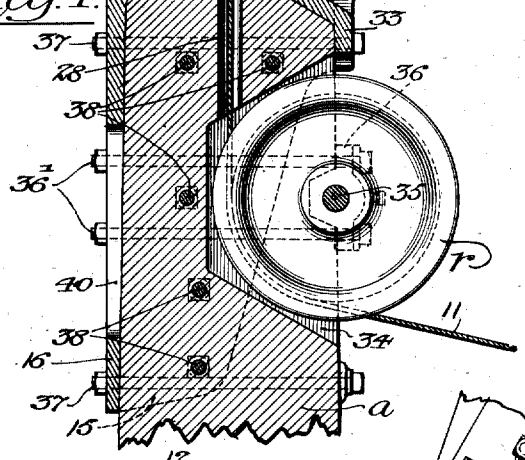


Fig. 8.

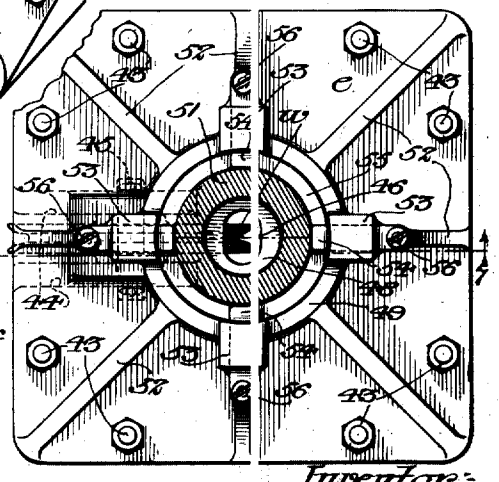
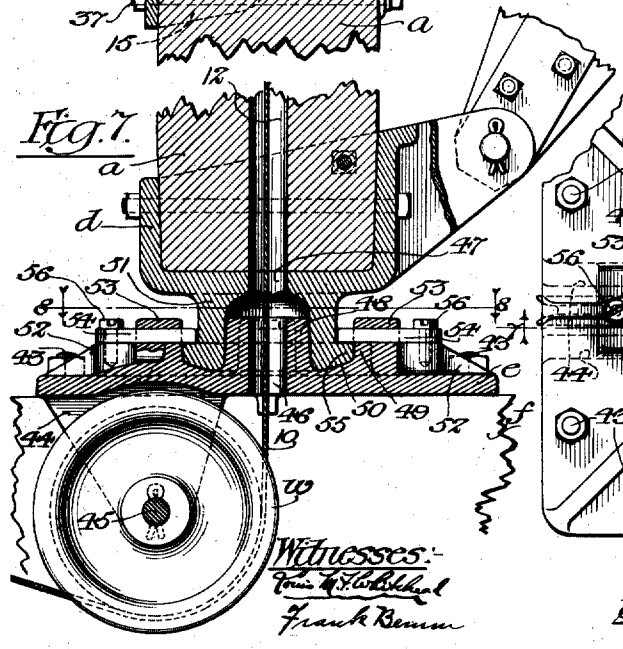


Fig. 7.



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4 SHEETS—SHEET 4.

Fig. 9.

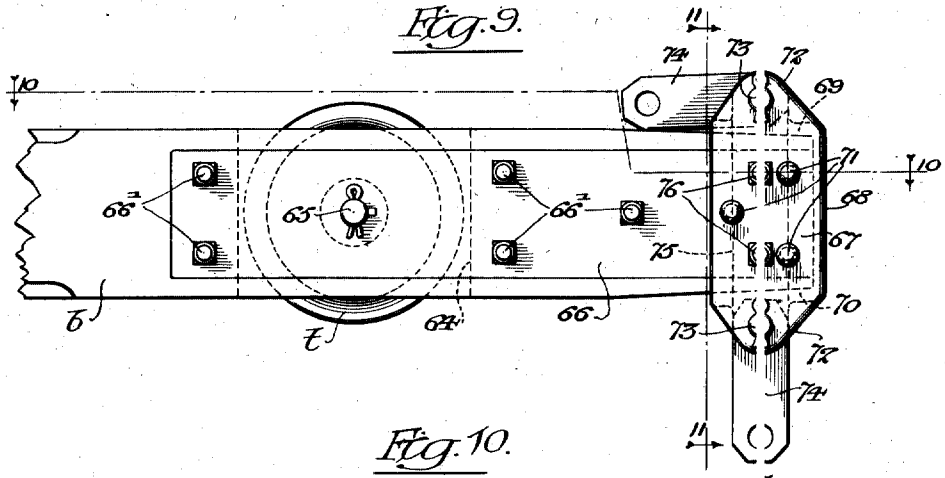


Fig. 10.

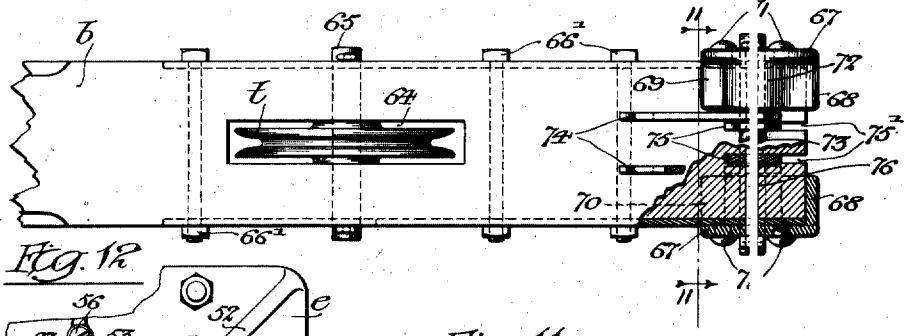


Fig. 12.

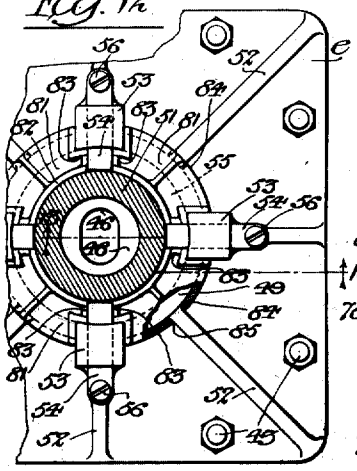


Fig. 11.

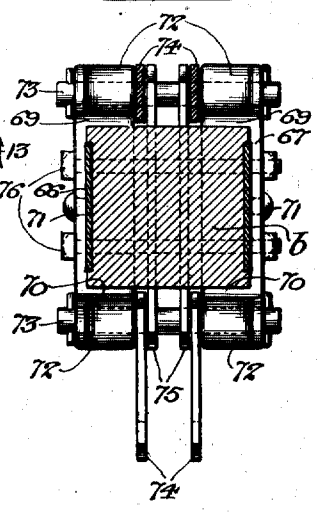
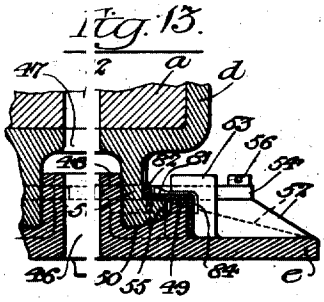


Fig. 13.



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1,008,564. Specification of Letters Patent. Patented Nov. 14, 1911.

Application filed April 6, 1908. Serial No. 425,393.

To all whom it may concern:

Be it known that I, ALBERT G. A. SCHMIDT, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Derricks, of which the following is a specification.

The invention relates to derricks of the type having a rotatable mast, suitably supported and braced, with a boom mounted thereon and with boom tackle and hoisting tackle, and more particularly to the irons that are mounted at the ends of the wooden mast and boom, although certain features of the invention may be employed in connection with derricks in which the mast and boom are not formed of wood.

The invention seeks to provide an improved set of irons which will increase the strength and efficiency of the derrick, and which may be employed with different types of rigging.

Figures 1, 2 and 3 are views in elevation of derricks rigged in different ways with the improved irons applied thereto. Fig. 4 is a view in vertical cross section of the upper end of the derrick mast shown in Fig. 1. Fig. 5 is a detail cross section on the line 5—5 of Fig. 4. Fig. 6 is a view in elevation of the upper end of the derrick mast shown in Fig. 2. Fig. 7 is a vertical section on line 7—7 of Fig. 8 of the lower end of the derrick mast. Fig. 8 is a cross section of the lower end of the derrick mast on the line 8—8 of Fig. 7. Fig. 9 is an enlarged detail view in elevation of the end of the boom. Fig. 10 is a plan view of the end of the boom with parts shown in section on the line 10—10 of Fig. 9. Fig. 11 is a cross section on the lines 11—11 of Figs. 9 and 10. Fig. 12 is a view similar to Fig. 8 and showing the guard plates for the bearing at the bottom of the mast. Fig. 13 is a detail section on line 13—13 of Fig. 12.

Each of the derricks illustrated comprises a vertical mast *a* and a boom *b*, which are usually formed of wooden timbers. The mast *a* is provided with top and bottom irons *c* and *d* and at its lower end is rotatably mounted in a step *e*, which rests upon supporting timbers *f*. The top *c* at the upper end of the mast is provided with a gudgeon *g*, which rotatably engages the mast bracing means, which consists either of a guy-cap *h* to which a series of guy-rods *i* are connected, as shown in Figs. 1 and 3, or of bracing legs *k* having irons *l* bolted to their upper ends and engaging the gudgeon of the mast top, as shown in Figs. 2 and 6.

The boom *b* is swiveled at its lower end to the mast bottom *d* and at its upper end carries the hoisting tackle, consisting of the blocks *m* and *n* and the rope 10. The boom tackle, consisting of the blocks *o* and *p* and the rope 11, is connected to the mast top *c* and the end of the boom.

It is often desirable to vary the rigging of the lines or ropes 10 and 11 of the boom and hoisting tackles in accordance with the different kinds of work for which the derrick is employed, and in accordance as to whether or not the derrick is hand or power operated. In a power operated derrick, it is usually necessary to have the ropes lead from the derrick at points in line with the axis of the rotatable mast *a*. In the form shown in Fig. 1, which is designed to be power operated, the boom line 11 passes around a pulley *r*, journaled at the upper end of the mast *a*, through a central bore in the mast and mast top *c*, and around a rooster pulley *s* mounted on the top. In this form, the hoisting line or rope 10 passes around the pulleys *t* and *u* journaled respectively at the outer end of the boom and at the lower end of the mast, downwardly through a central bore 12 in the mast, and around a pulley *w* journaled on the under side of the step *e*.

In the form shown in Fig. 2, the hoisting line or rope 10 is rigged in the same way as in the form shown in Fig. 1. The boom line passes over a pulley *x* at the upper end of the mast, thence downwardly over a pulley *x'* at the lower end of the mast, and thence over pulleys arranged beside the pulleys *u* and *w*, and out through the central bore 12 at the lower end of the mast.

In the hand operated derrick shown in Fig. 3, the windlasses *y* and *y'* for the hoisting and boom lines 10 and 11 are mounted upon a suitable frame work 13, that is secured to the lower end of the mast. The boom line 11 extends upwardly from the windlass *y'*, over a pulley *z'* journaled at the upper end of the mast, and thence to the boom tackle. The hoisting line or rope 10 extends upwardly from the windlass *y*

over a pulley z at the upper end of the mast, and thence over the pulley t at the end of the boom to the hoisting tackle.

It is usually necessary to provide a different set of irons for each different rigging employed, or at least to provide a different mast top. The present improved mast top, shown in detail in Figs. 4, 5 and 6, is designed for use either with bracing guys or legs, and with any of the usual types of rigging. This top is in the form of a box-like casting and comprises an end portion 14 with integral connected side flanges 15 and 16, which snugly engage the end and side faces at the upper end of the mast. The end portion 14 of the top is provided with a conical boss 17 and the projecting gudgeon g, which is adapted to rotatably engage the mast bracing means. This gudgeon, for greater strength and efficiency, is formed of ductile metal, preferably of steel, and extends through the upper end portion 14 and boss 17 of the top. It is securely united to the metal body of the top by being cast therein during the process of manufacture. At one side and at its upper end the top is provided with a suitable eye to engage a chain 18, that leads from the block o of the boom tackle. This eye preferably comprises a pair of clevis lugs 19 cast in piece with the body of the top and having a recess 20 between them. A removable cross pin 21 extends through perforations in the lugs 19 and securely connects the boom tackle to the mast top. For additional strength and rigidity a U shaped clevis 22 of ductile metal, preferably of steel, is cast within the body of the boss 17 and extends around and in contact with the lower end of the gudgeon g, with its ends extending outwardly into the lugs 19 and preferably on the inner sides thereof, as shown. In the process of manufacture, the upright gudgeon and the laterally projecting clevis are preferably first connected together by a pin 23 (see Fig. 5), and the two are then cast into the metal body of the top. The holes for receiving the pin 21, of course, extend through the ends of the clevis 22, so that a strong connection is provided between the boom tackle and the upper end of the mast. In this arrangement, the ductile metal or steel clevis 22 and gudgeon tend to brace or support one another, and, even if the cast metal body of the top breaks, these parts will still hold together to prevent accident.

As shown the gudgeon g projects above the end boss 17 of the cap, and is adapted to extend through either a guy cap h, as shown in Figs. 1, 3 and 4, or through the irons l of bracing legs, as shown in Figs. 2 and 6. At its upper end the gudgeon is provided with an annular groove 24, which is adapted to receive the sections 25 of a split collar, which is secured in place within the groove by bolts 26, and serves to securely hold, either the guy cap h or the irons l of the bracing legs, in place as shown in Figs. 2, 3 and 6. The gudgeon g is provided with a central bore 27, which communicates with a bore 28 at the top of the mast, and through which the boom line 11 passes to the rooster pulley s in the arrangement of the rigging, shown in Figs. 1 and 5. This pulley is journaled in a bracket consisting of the sections 29 of a split clamp collar and the upwardly inclined or off-set arms 30, which carry the shaft 31 on which the pulley s rotates. When this rooster bracket and pulley are employed, the clamp collar sections 25 are removed and the collar or bracket sections 29 are secured within the groove 24 at the upper end of the gudgeon g by means of bolts 32. The sections 29 of the collar or bracket, which support the rooster pulley s, loosely and rotatably fit within the groove 24 of the gudgeon.

When the rooster pulley s and its accompanying pulley r are employed to guide the boom line 11, as shown in Figs. 1 and 5, it is desirable to locate the pulley r as closely adjacent as possible to the eye or clevis to which the boom tackle is connected. To enable this to be done, the side of the box-like, cast metal top c below and adjacent the eye or clevis, is open or cut away, as shown, and has merely a short depending lip 33 so that the pulley r may be located in a recess 34 formed in the mast and closely adjacent its upper end. The pulley r is mounted on a shaft 35 that is journaled in boxes 36, that are preferably set into the mast on opposite sides of the recess 34, and are secured in place by bolts 36′ that extend through the mast and through the depending side flange 16 of the mast top c. The cast metal top c is securely held in place by pairs of bolts 37, extending through the mast and through the flange 16. The upper pair of bolts 37 preferably extend through the short depending lip 33. A number of bolts 38 also extend transversely through the mast and through the side flanges 15 of the mast top.

In the form of hand power derrick shown in Fig. 3, the pulley z' is preferably arranged within a recess in the mast closely adjacent its upper end, and is journaled upon a cross shaft 39 extending through the side flanges 15 of the metal cap c. To enable the cap to be used with this form of rigging, the flange 16, opposite the open or cut away side, is provided with a vertical elongated slot 40, (see Figs. 4 and 6) through which the boom line 11 passes around the pulley z'. The pulley z in the form shown in Fig. 3, is arranged in a recess in the mast, just below the top c and is mounted upon a shaft 41, which extends through side plates 42 bolted on the mast.

The step *e* for the mast, shown in detail in Figs. 7 and 8, comprises a cast metal plate which may be suitably connected by bolts 43 to the supporting timbers *f*, and which is provided at its under side with depending bracket lugs 44. These lugs are adapted to receive the shaft 45 for one or more pulleys *w* over which the hoisting line 10 passes in the form shown in Fig. 1, and over which both the boom and hoisting lines pass in the form shown in Fig. 2. These lines pass upwardly through the bore 12 at the bottom of the mast and through openings 46 and 47 formed in the step *e* and mast bottom *d* in line with the bore 12. The opening 46 is preferably oblong (see Fig. 8), so as to accommodate one or two lines. The step *e* is provided on its upper face with inner and outer, upright annular flanges 48 and 49, which are cast integral therewith, and extend around the opening 46. These flanges 48 and 49 form an intermediate bearing groove or seat 50 for the annular head 51 on the lower end of the mast bottom *d*. The lower bearing face of the groove 50 and the corresponding face of the annular head 51, are preferably spherical to form a proper seat between these parts. The step *e* is provided with radial flanges 52, to strengthen the outer flange 49, and also with a series of perforated lugs 53, through which a series of gibs 54 extend into engagement with a shoulder or flange 55, upon the head 51. These gibs are removably held in place by screws 56.

With the arrangement of step and mast bottom set forth, the bearing between these parts may be readily lubricated, either with oil or grease, since the lubricant will be effectively retained within the bearing groove 50. With the forms heretofore employed, the oil or grease would run out through the central opening in the step provided for the tackle lines or ropes. Moreover, with the improved form shown, a larger bearing surface is provided between the mast bottom and the step.

In the form shown in Figs. 1 and 2, the pulley *u* is arranged in a suitable recess 57 formed in the mast and is mounted upon a shaft 58, carried in brackets 59 that are held in place by bolts 60. In the form shown in Fig. 2, the pulley *x'* is arranged in a suitable recess in the mast, and is mounted on a shaft 61, the ends of which extend through plates 62 that are bolted to the sides of the mast. The pulley *x*, shown in this form, is journaled in a suitable bracket 63 bolted to the face of the mast adjacent its upper end.

In all of the forms shown, the pulley *t* for the hoisting line is arranged within a recess 64, formed in the boom adjacent its end, and is journaled upon a cross shaft 65 which extends through the sides of the boom and through a pair of side plates 66. These side plates are formed of wrought iron or steel and are preferably recessed slightly into the sides of the boom and are firmly secured thereto, by cross bolts 66'. The extreme end of the boom is provided with a suitable cap to which the boom hoisting tackles are connected. This cap is preferably formed of cast metal and is box-like, or provided with suitable flanges which bear against the sides, top, bottom and end faces of the boom, to more effectively resist the strain of the boom and hoisting tackles. This cap is preferably formed of two sections, each comprising a side portion 67, an end flange 68 and top and bottom flanges 69 and 70. These sections snugly fit over the end of the boom as shown, and are secured to the wrought metal side plates 66 preferably by means of rivets 71. The top and bottom flanges 69 and 70 of the cap sections, are provided with projecting pairs of lugs 72, through which extend the cross bolts 73. The blocks *p* and *m* of the boom and hoisting tackles are respectively connected to the upper and lower cross pins 73, by means of the pairs of links 74. To increase the strength of the cap piece and prevent accident in case it should be broken, the upper and lower cross pins 73 are connected by a pair of links 75, which are properly positioned within suitable slots 75' in the end of the boom, as most clearly shown in Fig. 10. The links 74 connected to the tackle blocks *p* and *m* are conveniently held in position between the ends of the links 75 and the lugs 72, as most clearly shown in Fig. 11. Transverse fastening bolts 76 extend through the side portions 67 of the cap sections and through the side plates 66 and the end of the boom. These bolts also preferably extend through the strengthening links 75.

At its lower inner end, the boom is connected by a pivot bolt 77 to the mast bottom *d*. This bolt extends through a pair of projecting lugs 78 on the mast bottom and through a pair of straps 79 bolted to the sides of the boom. The mast bottom *d* is box-like and provided with flanges which snugly fit the foot of the mast and is secured in place by bolts 80.

The bearing between the step *e* and the head 51 on the mast bottom *d* is preferably protected against dirt by a series of segmental guard plates 81, as shown in Figs. 12 and 13. These guard plates rest upon the flange 49 of the step, and fit between the lugs 53 thereon. They project inwardly over the shoulder 55 on the head 51, and are each provided at its inner edges with an upraised edge or flange 82, which engages the shank of the head 51. The plates are also provided at their ends with projections 83, which extend into engagement with the gibs 54, and also engage the lugs 53 to hold the plates in place. At their outer edges, the guard plates 81 are each provided with a depend-

ing flange 84, which engages the outer face of the flange 49 of the step *e*, and which is notched out at 85 to fit over the diagonal flange 52 of the step.

The improved boom end forms an effective point of attachment for the tackles, and effectively distribute the strain brought thereon. The set of irons described may be employed, as is apparent, with different forms of rigging, and in particular, the improved mast top may be economically used with different forms.

It is obvious that changes may be made in the details set forth without departure from the essentials of the invention.

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

1. In a derrick, the combination with the rotatable mast, bracing means therefor, boom and boom tackle, of a cast metal top open on one side fitting over the upper end of said mast, said top having a pair of lugs with a clevis bolt above the open side thereof and an upright gudgeon rotatably engaging said mast bracing means with a central bore extending through said gudgeon, a pulley arranged in a recess in said mast at the open side of said top, journal boxes for said pulley removably bolted to said mast and said top on opposite sides of said recess, a rooster bracket removably and rotatably mounted upon the upper end of said gudgeon above said mast bracing means, and a pulley journaled in said rooster bracket, said boom tackle engaging said clevis bolt and the rope of said tackle passing around said pulleys and through the bore of said top, substantially as described.

2. In a derrick, the combination with the rotatable mast, bracing means therefor, boom and boom tackle, of a cast metal top open on one side fitting over the upper end of said mast, said top having a pair of lugs with a clevis bolt above the open side thereof, and an upright gudgeon engaging said bracing means with a central bore extending through said gudgeon, a pulley arranged in a recess on said mast at the open side of said top, journal boxes for said pulley bolted to the mast and to said top, a rooster bracket having a split collar rotatably engaging a groove on the upper end of said gudgeon, and a pulley journaled in said rooster bracket, said boom tackle engaging said clevis bolt and the rope of said tackle passing around said pulleys and through the bore of said top, substantially as described.

3. In a derrick, the combination with the rotatable mast and boom connected thereto, of a cast metal top fitting over the upper end of said mast, said cast metal top having an upper end portion and a wrought metal gudgeon cast centrally therein and projecting above the end portion of said top, mast bracing means rotatably engaged by the projecting portion of said gudgeon, and boom tackle connected to said top, substantially as described.

4. In a derrick, the combination with the rotatable mast and boom connected thereto, of a cast metal top fitting over the upper end of said mast, and having a wrought metal gudgeon cast therein and projecting beyond the main body of said top, mast-bracing means rotatably engaged by said gudgeon, a split collar clamped in a groove in the upper end of said gudgeon above said mast bracing means and a boom tackle connected to said top, substantially as described.

5. In a derrick, the combination with the mast and boom connected thereto, of a cast metal top fitting over the upper end of said mast, said mast having an end portion and a U-shaped clevis of wrought metal cast therein with its end portion projecting beyond the main body of said top, the projecting ends of said clevis having bolt holes, a bolt inserted through said holes and boom tackle connected to said bolt, substantially as described.

6. In a derrick, the combination with a mast and boom connected thereto, of a cast metal top fitting over the upper end of said mast and having a wrought metal gudgeon and a wrought metal clevis cast in the body of said top, said clevis extending around said gudgeon, mast-bracing means engaging said gudgeon and boom tackle connected to said clevis, substantially as described.

7. A cast metal top for derrick masts comprising an end portion and connected, depending side flanges with one side open or cut away, said top having an upright gudgeon of wrought metal cast within its end portion and projecting therefrom for engaging the mast bracing means, and a wrought metal clevis cast within said end portion and engaging said gudgeon and arranged adjacent and above the open side of said top to engage the boom tackle, substantially as described.

8. A box-like top for derrick masts comprising an end portion and connected, depending side flanges with one cut away or open side, and an elongated slot in the side flange opposite said open side, said top having a central upright gudgeon with a bore extending therethrough and a pair of perforated clevis lugs above said open or cut away side, substantially as described.

9. A cast iron top for derrick masts comprising an end portion and depending side flanges and having an upright steel gudgeon cast within said end portion and projecting therefrom to engage the mast-bracing means, said gudgeon having a central bore and an annular groove formed in its outer surface adjacent its upper end, substantially as described.

10. A cast iron top for derrick masts comprising an end portion and depending side flanges and having a pair of integral clevis lugs at one side of said end portion, with a U-shaped clevis of wrought metal cast within the end portion of said top and having its end extending within said lugs, said lugs and the ends of said clevis being perforated to receive a fastening bolt, substantially as described.

11. A cast metal top for derrick masts having a ductile metal gudgeon and a ductile metal clevis cast therein, said clevis extending around said gudgeon, substantially as described.

12. A cast metal top for derrick masts comprising an end portion and depending side flanges and having an upright gudgeon of ductile metal and a laterally extending, U-shaped clevis of ductile metal cast within said end portion, said clevis extending around said gudgeon, substantially as described.

13. The combination of a step for derrick masts having a central opening with inner and outer, upright, annular flanges about said opening, a mast bottom having a head fitting between the flanges of said step, the outer flange of said step having perforations extending therethrough and gibs extending through said perforations and engaging a shoulder on said head, substantially as described.

14. In a derrick, the combination with the boom and tackle, of a cast metal, box-like cap fitting over the end portion of said boom and abutting against the end face thereof, said cap having upper and lower pairs of projecting lugs, cross pins extending through said lugs to which the tackle is connected, and wrought metal links extending between and connecting said cross pins, substantially as described.

15. A reinforcement for the ends of derrick booms, comprising a pair of wrought metal side plates, a box-like cap-piece of cast metal formed of two sections riveted to said side plates and having flanges fitting over the sides, top, bottom and end faces of the boom, said cap-piece sections having upper and lower pairs of projecting lugs, cross bolts extending between said lugs and wrought metal straps extending between said cross bolts, substantially as described.

16. In a derrick, the combination with the rotatable mast and with the means for bracing the upper end of the mast, of a step for the mast having an annular flange on its upper face, a head on the lower end of said mast seated within the flange, said head having an annular shoulder and said flange having a series of perforated lugs, gibs extending through said lugs into engagement with said shoulder and a series of removable notched guard plates engaging said flange and said lugs and extending inwardly over the shoulder of said head substantially as described.

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