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2,503,604

MAST STRUCTURE

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2 Sheets-Sheet 1

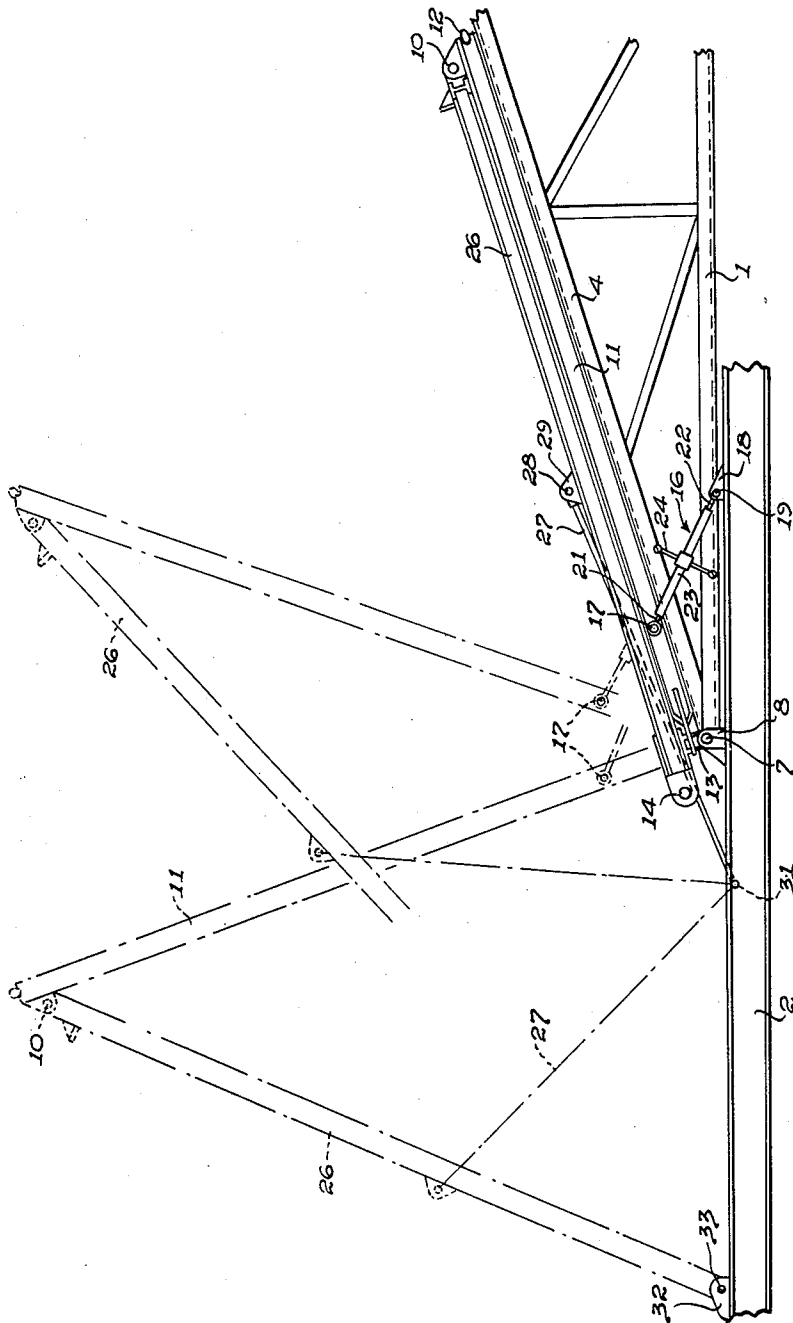


Fig. 1.

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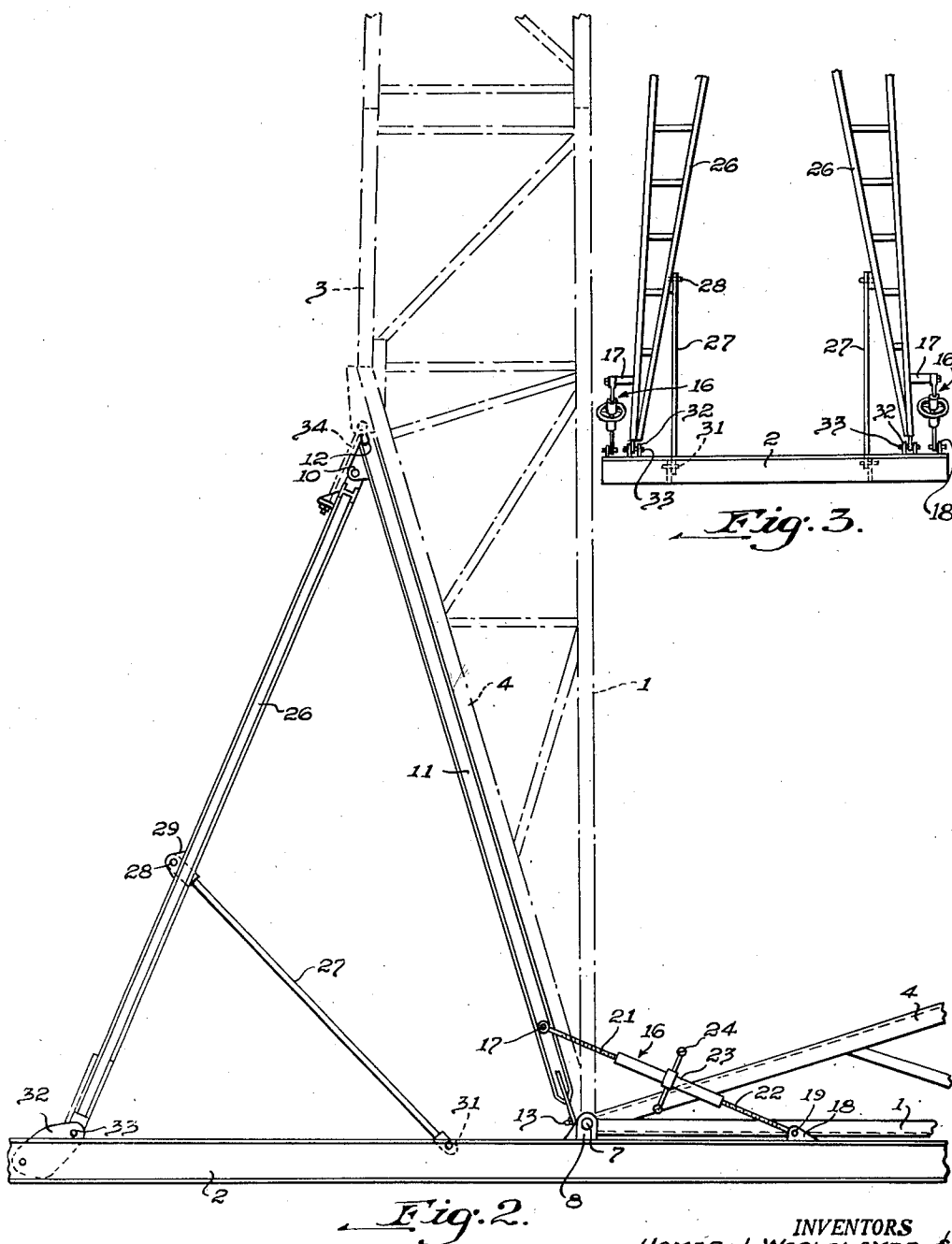


Fig. 2.

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2,503,604

MAST STRUCTURE

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5 Claims. (Cl. 189—15)

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This invention relates to mast structures, and more particularly to those in which a mast is assembled along the ground is swung up into upright position with the help of a gin pole that first must be swung up from a reclining position into an upright operative position.

In Patent No. 2,271,578 there are shown a mast and a gin pole both of which are hinged to a base so that they can be swung from reclining position along the ground up into an erect position. The folded gin pole is raised first and opened, and then lines are connected to it for raising the mast. The present practice for raising such a gin pole is to attach a line from a truck winch to the upper end of the reclining gin pole and then to hoist it as far as the balance point. As the center of gravity of the pole crosses its pivot point, the pole must be snubbed to retard its movement toward seating position on the base, and at the same time the free gin pole legs must be swung out to meet their seats on the base. This requires a great deal of manual work, and is not very practical with the larger and heavier masts that are being built.

It is among the objects of this invention to provide a mast structure of the character just described in which a reclining gin pole of any size can be swung up into operative position with much less effort than heretofore, in which there is no necessity for snubbing the pole as it passes over center, in which the free legs of a folded gin pole are automatically swung away from the pivoted legs as the pole is raised, and in which the pole-raising and leg-positioning means can readily be removed while the mast is being used.

In accordance with this invention a gin pole, provided with front and rear sides, has the lower end of one side hinged to a base to permit the pole to be swung from a reclining position to upright position where the lower end of the opposite side of the pole also will be supported by the base. For convenience of description only, the side of the gin pole that is hinged to the base will be referred to herein as the front side. Supported directly or indirectly from the base is apparatus that is connected to the front side of the gin pole for raising it to swing the pole up into upright position. This apparatus is formed to lower the gin pole slowly to its seat when the center of gravity of the pole reaches a point where it tends to swing the pole rearwardly by gravity. The pole-elevating apparatus most suitably consists of one or more jacks pivotally connected to the front side of the gin pole and to a support, such as the base or a reclining mast. In the latter

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case, the jacks must be disconnected from the mast before the mast can be raised. When the rear side of the gin pole is hinged to the upper end of the front side, as is the usual case, means is connected to the base or other suitable support and to the rear side of the pole for swinging the rear side away from the front side as the pole is raised. This means preferably includes a link the opposite ends of which are pivotally connected to the members just mentioned. The link is of such a length and is so positioned that as the foot of the rear side of the gin pole moves down toward the base, the foot is moved into a position where it will seat properly on the base.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a fragmentary side view of a mast structure showing a gin pole folded against a reclining mast; Fig. 2 is a similar view showing the gin pole standing erect in operative position; and Fig. 3 is a fragmentary view of the rear side of the upright gin pole.

Referring to the drawings, the lower ends of the front legs 1 of a reclining skeleton mast are hinged to a base 2 that can be transported from one oil well or the like to another. The lower ends of the rear legs 3 (Fig. 2) of the mast terminate a considerable distance from the base and are connected to the lower ends of the front legs by diagonal braces 4. To hinge the front legs to the base, their feet are provided with aligned openings through which extend pivot pins 7 that are mounted in vertical shoe plates 8 secured to the base.

Lying against the diagonal braces 4 of the reclining mast in Fig. 1 is a folded gin pole which has front and rear sides formed by legs hinged together at pivot 10 near the upper end of the pole. The upper ends of the front legs 11 are connected rigidly by a cross member 12. Extending through holes in the feet of the gin pole's front legs are U-bolts 13 that extend around pivot pins 7. The rear legs of the folded gin pole rest on its front legs and are provided with feet in which there are transverse openings.

It is a feature of this invention that the gin pole, even though very large, can be swung up into operative position with comparatively little manual effort. Accordingly, the upper end of an inclined jack 16 is pivotally connected to the lower portion of each front leg 11 of the gin pole by pivotally mounting the jack on the end of a short horizontal stud 17 projecting from the outside of the leg. Although the lower ends of the jacks may be detachably connected to the reclining

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mast, it is preferred to support them directly from the base by pivotally connecting them to brackets 18 mounted on the base at opposite sides of the mast. The pins 19 by which the jacks are fastened to the brackets are removable. Any suitable type of jack may be used, but for hand operation it is preferred to use screw jacks. Each jack may consist of a pair of heavy screws 21 and 22, one provided with a left hand thread and the other with a right hand thread and registering with corresponding threads in opposite ends of a rotatable sleeve 23. On the center of the sleeve a hand wheel 24 or the like is mounted for turning it, whereby the two screws are either forced apart or are drawn together, depending upon the direction of rotation of the sleeve.

When it is desired to raise the gin pole, the jack sleeves are turned in a direction to force the adjoining screws apart. Until the gin pole is raised far enough to balance it on its front legs, compression forces act on the jacks because they are supporting the pole. Then, as the center of gravity of the pole crosses above its hinge connections to the base, tensile forces act on the jacks, because the weight of the pole attempts to pull it away from the jacks. Being screw jacks, however, these tensile forces cannot affect the jacks, so the workmen who are operating them have complete control over lowering of the raised gin pole into seating position on the base. The jacks can be removed from the erected gin pole by removing the pins 19 by which their lower ends are connected to base brackets 18, and removing the upper ends of the jacks from leg studs 17. When it is desired to swing the gin pole back to reclining position, ready for transportation to a new location, operation of the jacks is reversed so that they will pull on the pole until its center of gravity passes over center, and then will control the rate at which the pole can descend toward the reclining mast.

Another feature of this invention is that as the pole is raised, its rear legs 26 are swung rearwardly automatically into a position where their feet will seat in proper position on the base. This is accomplished by pivotally connecting the opposite ends of a pair of inclined links 27 to the base behind shoe plates 8 and to the rear legs of the gin pole some distance from their lower ends. The upper end of each link is detachably connected by a removable pin 28 to a bracket 29 projecting from the back of a rear leg of the gin pole, while the lower end of the link is detachably connected to the base by another pivot pin 31. The length of the links and the points at which they are connected to the base and the gin pole are calculated to give the correct position for the rear side of the pole when it is upright in operative position. It will be seen from the broken line portions of the gin pole in Fig. 1 that as the folded gin pole is swung upwardly by the jacks, the two links 27 start to swing the rear legs away from the front legs until, by the time the front legs are in proper position, the feet on the rear legs are disposed between rear shoe plates 32 mounted on the base. Pins or bolts 33 are inserted in these plates and the holes 14 in the feet to connect them together. The guide links then can be removed by removing pins 28 and 31, until it is desired to lower the gin pole again.

After the gin pole has been erected, the usual line and sling are connected to it for swinging the mast from its full line reclining position to

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its broken line upright position in Fig. 2. The heel of the mast is connected to the head of the gin pole by long eye bolts 34, and the mast is ready to perform its duties.

With this structure the gin pole movements always are controlled by the jacks and the guide links, and there is no necessity for snubbing the pole nor for making separate provision for guiding its back feet into place on the base. Although manually operated screw jacks have been shown, it is obvious that they could be operated mechanically, and that hydraulic jacks could be used.

According to the provisions of the patent statutes, we have explained the principle and construction of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. In a mast structure, a base, a gin pole provided with front and rear sides hinged together at the top, means hinging the lower end of the front side to said base to permit the gin pole to be swung from a reclining position to upright position with the lower end of said rear side supported by said base at a predetermined point behind said means, means supported from said base and connected to said front side of the reclining folded gin pole for pushing it up to swing the pole into upright position, and a link pivotally connected at its opposite ends to said base between said hinging means and rear support point and to said rear side of the gin pole for swinging the rear side away from the front side as the pole is swung up into upright position.

2. In a mast structure, a base, a gin pole provided with a pair of front legs and a pair of rear legs, shoes mounted on the base for supporting the lower ends of said rear legs, means hinging the upper end of the pair of front legs to the upper end of the pair of rear legs, means hinging the lower ends of the front legs to said base to permit the gin pole to be swung from a reclining position to upright position with the lower ends of said rear legs supported by said shoes, and a link pivotally connected to each rear leg of the gin pole and to the base between said last-mentioned hinging means and said shoes for swinging the lower ends of said rear legs away from the front legs and to said shoes as the pole is swung up into upright position.

3. In a mast structure, a base, a gin pole provided with front and rear sides pivoted together at the top to permit them to be folded together, means hinging the lower end of the front side to said base to permit the gin pole to be swung from a folded reclining position to upright position with the lower end of said rear side supported by said base at a predetermined point behind said means, and link means pivotally connected to said rear side of the gin pole and to said base between said hinging means and rear support point for swinging the rear side of the pole away from the front side as the pole is swung up into upright position.

4. In a mast structure, a base, a gin pole provided with a pair of front legs and a pair of rear legs, means hinging the upper end of the pair of front legs to the upper end of the pair of rear legs, means hinging the lower ends of the front legs to said base to permit the gin pole to be

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swung from a reclining position to upright position with the lower ends of said rear legs supported by said base at predetermined points behind said last-mentioned means, a jack pivotally connected to each of said front legs of the gin pole and to the base for swinging the pole up into upright position, and a link pivotally connected to each rear leg of the gin pole and to the base between said last-mentioned hinging means and said rear support points for swinging said rear legs away from the front legs as the pole is swung up into upright position.

5. In a mast structure, a base, a gin pole provided with front and rear sides pivoted together at the top, means hinging the lower end of the front side to said base to permit the gin pole to be swung from a reclining position to upright position with the lower end of said rear side supported by said base at a predetermined point behind said means, a jack, removable means for pivotally connecting the opposite ends of said jack to said base and said front side of the reclining gin pole for pushing it up to swing the pole into upright position, a link, removable

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means connecting the opposite ends of said link to said base between said hinging means and rear support point and to said rear side of the gin pole for swinging the rear side away from the front side as the pole is swung up into upright position, and means for detachably connecting the lower end of said rear side to the base when the gin pole is upright.

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