April 24, 1928. 1,667,440

A. T. SCANNELL

MAST ERECTING APPARATUS

Filed Dec. 31, 1925 2 Sheets-Sheet 1

Fig. 1

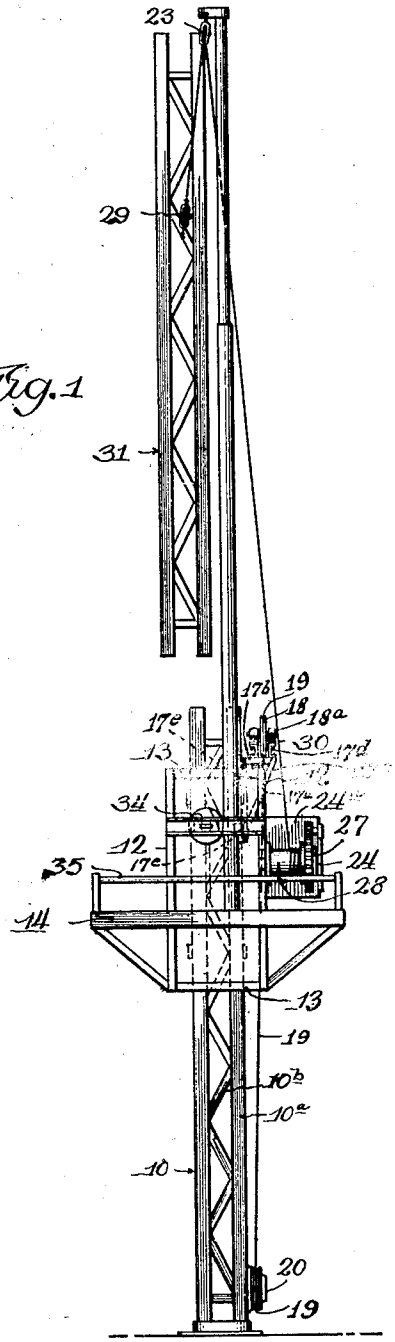
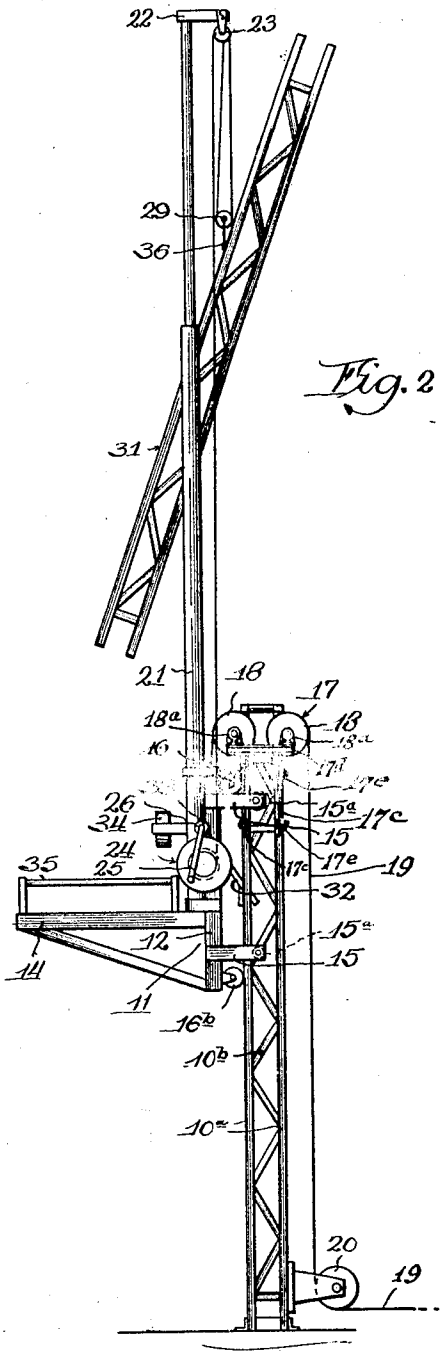


Fig. 2



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Filed Dec. 31 1925 2 Sheets-Sheet 2

Fig. 4

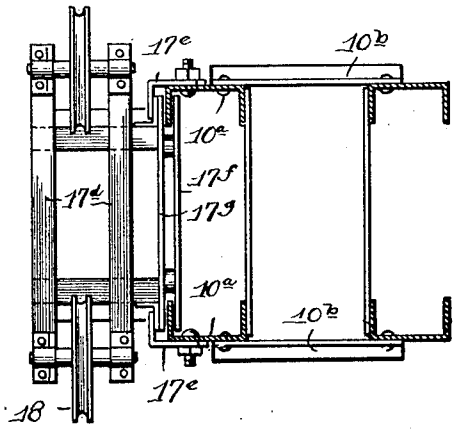
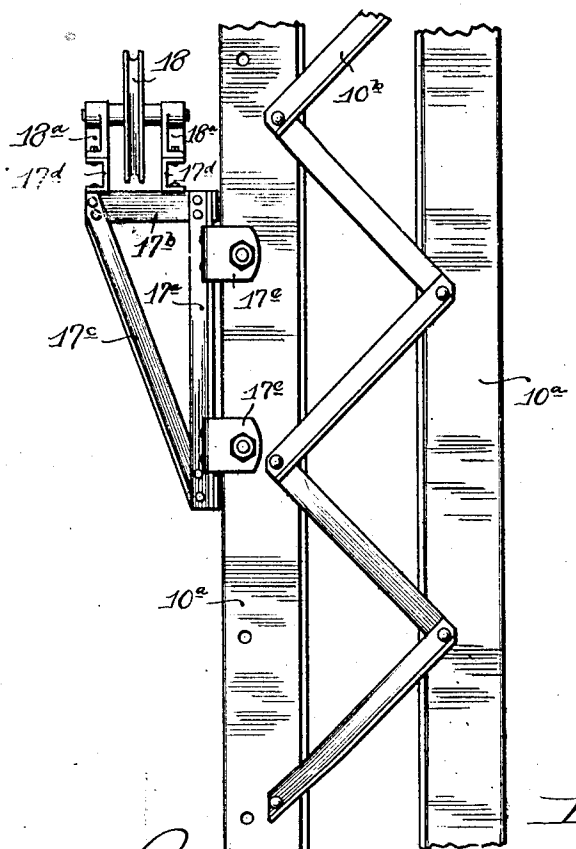


Fig. 3



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by
Atty

Patented Apr. 24, 1928. 1,667,440

UNITED STATES PATENT OFFICE.

ALBERT T. SCANNELL, OF CHICAGO, ILLINOIS.

MAST-ERECTING APPARATUS.

Application filed December 31, 1925. Serial No. 78,713.

This invention relates to improvements in mast erecting apparatus and methods.

The principal object of the invention is to provide improved apparatus and methods whereby the upper sections of steel masts, such as are now commonly used in concrete spouting apparatus, for example, can be positioned more expeditiously and with less danger to the workmen than by the means and methods at present used.

Other objects relate to various features of construction and arrangement of parts, which will become apparent from a consideration of the following specification and accompanying drawings, wherein

Figure 1 is a front elevation illustrating one embodiment of the invention.

Fig. 2 is a side elevation thereof.

Fig. 3 is a detail side elevation of a part of the apparatus, and

Fig. 4 is a plan view thereof.

In erecting steel masts at the present time, it is common practice for workmen to climb to the top of the first section of the mast, after the second section has been raised above the first section by means of a block and tackle suspended from a gin pole bolted to the first section, and bolt the bottom of the second section to the top of the first section. After the gin pole has been removed from the lower section and bolted to the upper or second section, the latter must then be climbed in order to fasten the third section in place and so on as the mast becomes higher. It will be appreciated that this is a hazardous undertaking, requiring considerable skill on the part of the workman. In my apparatus, I eliminate, in a large measure, the dangers incident to erecting steel masts, by the provision of an elevator which may travel up and down on the erected sections of the mast, carrying with it on its upward trip not only the additional mast section to be mounted on top of those already erected but also the workmen who secure it in place. In the preferred form of equipment selected to illustrate the invention, the elevator frame is provided with a long vertical member or gin pole projecting well above that part of the elevator on which the workmen stand. When the elevator is at the ground level, the new section is lifted by block and tackle hung from the top of the gin pole and may rest with its lower end on a horizontal support carried by the elevator such as a platform. The workmen also stand on the platform and may thus be raised to a convenient point near the top of the mast where the new section, suspended from the gin pole, is moved into vertical alinement with the mast, above its top section and bolted in place. The workmen therefore can stand in a comparatively safe place while attaching the upper section of the mast to the previously erected section, and descend for next section with equal safety.

In the drawings, 10 is a base or lower section of a typical mast which has been erected and to one side of which is removably attached a vertically slidable frame, indicated generally by numeral 11. The mast is preferably constructed of channel shaped uprights 10^a and reinforced by lacings 10^b. The frame 11 may comprise vertical side members 12 and horizontal upper and lower members 13. It constitutes an elevator, having means thereon on which the workmen may ride up and down with comparative safety, for example a platform 14. The frame is locked to a track or guides on one side of the mast section 10 by means of arms 15 having rollers 15^a which engage the insides of the flanges of two of the channel members 10^a, as will be seen. Interposed between the frame 11 and the said uprights of the mast are rollers 16, shown clearly in Fig. 2.

In order to raise and lower the elevator, a cable, passing over a pulley at or near the top of the mast, is employed. After each new section of mast is added the pulley must be raised. For this purpose a vertically adjustable cat-head is provided adjacent the upright end of the mast section 10 and indicated generally by numeral 17. The cat-head is shown in detail in Figs. 3 and 4, and comprises vertical members 17^a, horizontal members 17^b and diagonal braces 17^c, or other suitable frame. Transverse members 17^d are secured to the horizontal members 17^b by bolts or the like and to the said members 17^d are secured the journals 18^a of pulleys 18. Plates 17^e are attached to vertical members 17^a of the cathead and con-

stitute means by which the cat-head is removably bolted to the mast. An inner plate 17^f is bolted in spaced relation with reference to the inner member 17^g which, as shown in Fig. 3, provides a sliding connection with the outer flanges of the channel posts 10^a of the mast.

The cable 19, for raising and lowering the elevator 11 is secured to the upper portion thereof, such as to the horizontal member 13, and passes over the pulleys 18 of the cat-head and down and under the pulley 20 to any suitable hoisting engine, not shown. By this arrangement, it will be seen that the frame 11 and platform 14 are freely slidable on the side of the mast section 10. Secured to the frame 11 is a gin pole 21, the upper end of which may be provided with a short beam or arm 22 from which depends the block 23. A winch, indicated generally by numeral 24, is also mounted on plate 24^a secured to the frame 11. This winch may be of standard construction and is provided with a crank 25 for rotating a pinion 26 which meshes with gear 27 actuating a winding drum 28 for winding thereon the cable 30 which passes through previously mentioned block 23 and block 29, the end of the cable being secured to the block 23.

Assuming that the elevator, comprising the frame 11, platform 14 and gin pole 21 are resting at the bottom of section 10 near the ground level, the second section of the mast 31 may be lifted onto the platform 14 by means of the hand operated lifting mechanism comprising the winch 24, gin pole 21 and a block and tackle arrangement, previously described, or by any suitable source of power after which the hoisting engine may be used to lift the frame, platform, gin pole, etc., together with the necessary workmen to the elevated position shown in the figures at or near the top of the mast. The workmen can then, by working the winch 24, lift the second section 31 upwardly and lower it onto the upper end of mast section 10 and bolt it or otherwise secure it thereto. The platform 14 will be at such a distance from the upper end of said section 10 that this operation can be performed with safety and convenience.

A safety device, comprising a forked lever 32, is pivoted at 33 to the vertical frame members 12 and carries a weight 34 on its other end. The weight causes the forked end of the lever to engage one of the lacings 10^b, or other reinforcing members of the mast upon downward movement of the frame, unless a workman by lifting on the free end of lever 32 and moving the same about its pivot 33 causes the forked end of the lever to move out of engagement with said lacings 10^b. This safety device will prevent the dropping of the platform and frame should cable 19 break. It also serves as a means for locking the platform in any position on the mast, when desired. The platform may be provided with a railing 35, if desired.

When it is desired to place a third section, not shown, on the top of the last section 31, the hook 36 depending from block 29 is engaged with the cat-head 17 and the latter is then unbolted from the upper portion of section 10, and by working the winch 24 the cat-head is raised by sliding it along the guides to the upper end of the second section 31. It is necessary, of course, during this operation to slacken the hoisting cable 19 to permit the cat-head to be thus elevated. The frame and platform, however, are held in the position shown in Fig. 2 by means of the safety device, previously explained. When the cat-head 17 has been elevated, a workman climbs said section 31 and bolts the same in position, after which the platform and frame are raised slightly by means of the cable 19 to release the safety member, and the platform, frame and gin pole are lowered to the ground. The third section is then placed on the platform and elevated by means of the hoisting engine adjacent the upper end of section 31 and secured thereto in the same manner as explained with reference to section 31. Any desired number of additional sections may be added in like manner.

The new or uppermost section in each instance, while being lifted from the ground, may be suspended from the gin pole by a very short length of rope or cable, somewhat as shown in Figs. 1 and 2, whereby its tendency to swing around and strike the tower during its ascent is minimized and is readily prevented by the man or men on the platform. Said section, however, is preferably lowered sufficiently at the outset to rest on the platform, as previously explained. In either case it is prevented from striking the tower or the guy-wires during its ascent, and is under the control of the workman or workmen on the platform, and therefore may be lifted at a rapid rate without danger, whereas under the prior practice when the new section was raised from the ground by a rope or cable passing over a pulley at the upper end of a gin pole, secured temporarily to the tower near the top thereof, the section dangled from a long length of cable and had to be controlled by a workman on the ground holding on to and paying out a guide rope to prevent said section from swinging around and striking the tower, or else a workman climbed the latticed tower slowly and by taking hold of the suspended section at intervals, kept it from striking the tower. Both methods were slow and required additional labor.

The erecting apparatus described herein

is applicable to a wide variety of service, and may be used, for example, in the erection of masts of the character disclosed in my copending application No. 47,521, filed August 1, 1925.

What I claim is:

1. Apparatus of the class described comprising a mast consisting of detachable aligned portions, a frame freely slidable up and down on the erected portions throughout the height thereof, a gin pole carried by said frame, power actuated means for elevating said frame from the ground level together with workmen and another mast portion, and mechanism on said frame adapted to cooperate with said pole for supporting said other portion of said mast in position for attachment to the upper end of said erected portion.

2. Apparatus of the class described comprising a frame freely slidable up and down on an erected section of a mast throughout the height thereof for elevating another mast section, said frame having a workman supporting platform, and mechanism on said frame operable from said platform for supporting said other section of said mast in position for attachment to the upper end of said erected section.

3. Apparatus of the class described comprising a frame freely slidable up and down on an erected section of a mast throughout the height thereof for carrying another mast sections from the ground level to a position adjacent the top of the erected section, power actuated hoisting means for said frame, and manually adjustable means mounted on said frame for moving said other section of said mast into position for attachment to the upper end of said erected section.

4. Apparatus of the class described comprising a frame slidably attached to an erected section of a mast, means for elevating said frame, a gin pole and platform carried by said frame, and manually operable lifting mechanism on said frame cooperating with said pole for supporting a second section of said mast in position to be attached to the upper end of said erected section by workmen on said platform.

5. Apparatus of the class described comprising a frame slidably attached to the erected section of a mast, means for elevating said frame comprising a pulley slidably attached to the top of said erected section, and a cable attached to said frame and passing over said pulley to a suitable power hoist, and lifting mechanism comprising a gin pole on said frame for supporting a second section of said mast in position to be attached to said erected section, said lifting mechanism being adapted to raise said pulley to the upper portion of said second section for attachment thereto, and means for supporting said frame in position on said first mentioned erected section independently of said elevating means during the raising of said pulley.

6. Apparatus of the class described comprising a frame slidably attached to an erected section of a mast, a gin pole and lifting mechanism secured to said frame said mechanism being operated from said frame, means for elevating said frame, gin pole, lifting mechanism, and a second mast section adjacent the upper portion of said erected mast section, said pole and lifting mechanism being adapted for adjustably supporting said second section in position for attachment to said erected section, and means for locking said frame to said mast.

7. Apparatus of the class described comprising a frame slidably attached to an erected section of a mast, lifting mechanism comprising a gin pole said frame supporting a second section, and means for elevating said frame, said section, gin pole and mechanism as a unit from the base of said mast to a position adjacent the upper portion of said erected section.

8. Apparatus of the class described comprising a mast, a frame slidably attached to said mast by means of rollers, power actuated means for moving the frame up and down the face of the mast throughout the height thereof, and independent lifting mechanism on said frame, said lifting mechanism including a gin pole.

9. Apparatus of the class described comprising a mast, a frame slidably attached to said mast, means for moving the frame up and down the face of the mast throughout the height thereof, and lifting mechanism on said frame, said lifting mechanism comprising a gin pole and winch.

10. The combination with a sectional mast, of a frame freely slidable thereon, means carried by said frame for lifting an additional mast section from the ground, when said frame is lowered to the ground level whereby the weight of said additional section is borne by said frame, means for elevating said frame on said mast whereby said additional section is carried from the ground level to a position near the top of the section last erected and is prevented from striking said mast during its ascent, said mast having reinforcing lacings and means independent of said lifting means adapted to engage said lacings for securing said frame in elevated position.

11. The combination with a mast, of a frame slidably secured thereto, means for elevating said frame on said mast, and means independent of said elevating means for securing said frame in elevated position, said securing means comprising a lever pivoted to said frame and having one end normally in position to engage a portion of said mast.

12. Apparatus for elevating and distribut-

ing construction materials comprising a mast, an erecting platform slidably secured thereto, means for raising said platform to successively higher positions from which additional sections can be attached to said mast by workmen on said platform, and a pawl and ratchet connection between said platform and mast whereby the former may be supported in any position of vertical adjustment.

13. The combination with an erected mast section, of a frame slidably secured thereto and movable up and down thereon throughout the height thereof, a workman's supporting platform carried by said frame, and a lifting device on said frame operable from said platform, said frame being adapted to elevate workmen and an additional mast section from the base of the mast to a position adjacent the upper end of said erected mast, from which the workmen on said platform can lift said additional section to position for attachment to the upper end of said erected section, by means of said lifting device.

14. The combination with an erected sectional mast, of a frame slidably secured thereto and movable up and down thereon throughout the height thereof, a support for workmen carried by said frame, and a device on said frame for moving an additional section of the mast to position on top of said erected section after said frame has been elevated to the proper height.

15. In apparatus of the class described, a frame freely slidable up and down on an erected sectional mast, throughout the height thereof, for carrying another mast section to a position adjacent the top of said mast, hoisting means for said frame, and manually adjustable means associated with said frame for lowering said second section of said mast into position for attachment to the upper end of said mast.

16. Apparatus of the class described, comprising a sectional steel mast of relatively small cross-sectional area, having flanges forming a vertical track thereon, a frame having rollers thereon providing positive engagement with said track to prevent movement away from said mast but permitting movement vertically thereon throughout the height thereof, a pulley near the top of said mast, a cable passing over the same to raise and lower said frame, and means on and extending above said frame and holding an additional mast section while said frame is being raised from the ground level to a point sufficiently high to permit said section to be lowered onto the top of said mast.

17. Apparatus of the class described, comprising a sectional steel mast of relatively small cross-sectional area, having flanges forming a vertical track thereon, a frame having positive engagement with said track to prevent movement away from said mast but movable vertically thereon throughout the height thereof, a pulley near the top of said mast, a cable passing over the same to raise and lower said frame, and means on and extending above said frame for holding an additional mast section while said frame is being raised from the ground level to a point sufficiently high to permit said section to be lowered onto the top of said mast, said frame having means for carrying workmen up with said section to a position enabling them to fasten said section on top of the section last erected.

18. Apparatus of the class described, comprising four upright corner members forming a mast of relatively small cross-sectional area, a frame located outside of said mast having sliding engagement with two adjacent corner members but locked thereto to prevent lateral movement during its up and down movement, a supporting member carried by said frame and extending well above the same, having a block and tackle secured near its upper end for supporting an additional mast section and actuated from said frame, said frame having further means thereon for supporting workmen in safety during the up and down movement of said frame, enabling them to move said new section into vertical alinement with the previously erected portion of the mast and secure said new section thereto, and means for raising and lowering said frame whereby said new section and the necessary workmen may be raised from the ground level to a convenient point near the top of the last erected section, whereby additional successive sections may be added to said mast.

19. A construction tower comprising a plurality of metal sections of relatively small cross-sectional area, said tower having a vertical guide thereon, a frame having rollers engaging said guide, bracing members secured to each section affording means for securing the tower to a fixed support to hold the same in vertical alinement, said bracing means being so located as not to interfere with the up and down movement of said frame, a gin-pole secured to said frame and extending upwardly therefrom at least half the length of each section, means secured near the top of said gin-pole for supporting an additional mast section and for lowering the same in position on top of the section last erected, said means being controlled by workmen riding on said frame, means for raising and lowering said frame on said guide from the ground to the top of the tower whereby the workmen and the new section are elevated to such a point on the last erected section that said new section may be suspended above said last section with the lower end available for securing it in final position.

20. Apparatus for building up a mast for lifting and distributing construction materials, comprising an erected portion of said mast, an erecting platform slidably secured thereto and adapted to support an additional mast section and means for raising said platform with an additional section from the ground level to successively higher positions from which the additional sections can be attached to the top of said mast by workmen on said platform.

21. The combination with a tower comprising a plurality of sections arranged to be secured in vertical alignment, of a platform having guides engaging said tower to permit it to slide freely up and down on all of said sections, an upright member secured to said platform and extending well above the same, a pulley normally secured to the upper part of the topmost section and releasable to permit it to be raised as successive sections are added, a cable secured to said platform, passing over said pulley and down to a hoisting engine, a block and tackle secured near the top of said upright member with the rope terminating at said platform and normally manipulated by workmen thereon, whereby an additional section may be suspended from said block and tackle when said platform is at the ground level, the platform and workmen lifted quickly almost to the top of the mast by power, and said additional section guided into place by the men, supported in comparative safety, on said platform.

22. The combination with a tower comprising a plurality of sections arranged to be secured in vertical alignment, of a platform having guides engaging said tower to permit it to slide freely up and down on all of said sections, an upright member secured to said platform and extending well above the same, a pulley normally secured to the upper part of the topmost section and releasable to permit it to be raised as successive sections are added, a cable secured to said platform, passing over said pulley and down to a hoisting engine, a block and tackle secured near the top of said upright member with the rope terminating at said platform and normally manipulated by workmen thereon, whereby an additional section may be suspended from said block and tackle when said platform is at the ground level, the platform and workmen lifted quickly almost to the top of the mast by power, and said additional section guided into place by the men, supported in comparative safety, on said platform and secured on top of the uppermost section, and means connected to said platform for temporarily holding it to said tower when the hoisting cable is slacked off to permit said pulley to be raised and secured to the upper part of the new section, whereby said pulley may support said hoisting cable when said platform subsequently descends for a further section and ascends with it to a position higher than its last position.

23. The combination with a tower comprising a plurality of sections arranged to be secured in vertical alignment, of a platform having guides engaging said tower to permit it to slide freely up and down on all of said sections, an upright member secured to said platform and extending well above the same, a pulley on a slidable frame normally secured to the upper part of the topmost section and releasable to permit it to be raised as successive sections are added, a cable secured to said platform, passing over said pulley and down to a hoisting engine, a block and tackle secured near the top of said upright member with the rope terminating at said platform and normally manipulated by workmen thereon, whereby an additional section may be suspended from said block and tackle when said platform is at the ground level, the platform and workmen lifted quickly almost to the top of the mast by power, and said additional section guided into place by the men, supported in comparative safety, on said platform and secured on top of the uppermost section, means connected to said platform for temporarily holding it to said tower when the hoisting cable is slacked off and means associated with said block and tackle to engage said pulley frame whereby it may be slid upwardly on the new section by the men on the platform and secured in place, and the erection of additional sections proceed by the repetition of the previous operation.

24. The method of erecting a mast composed of a plurality of aligned connected sections which consists in the following steps: erecting an initial section in a vertical position, placing thereon a vertically movable hoist carriage provided with a gin-pole having a hoisting gear at its upper end, locating a hoisting gear at the upper end of the erected mast, connecting the carriage with a power hoist through said last-mentioned gear, connecting a new mast section with the gin-pole hoisting gear, hoisting the carriage, gin-pole and new section by means of the power hoist, and incorporating the new section into the erected mast.

25. The method of erecting a mast composed of a plurality of aligned connected sections which consists in the following steps: erecting an initial section in a vertical position, placing thereon a vertically movable hoist carriage provided with a gin-pole having a hoisting gear at its upper end, locating a hoisting gear at the upper end of the erected mast, connecting the carriage with a power hoist through said last-mentioned gear, connecting a new mast section with the gin-pole block hoisting gear, hoisting the carriage gin-pole and new section by means

of the power hoist, incorporating the new section into the erected mast, transferring the second-mentioned hoisting gear by means of the gin-pole hoisting gear to the upper end of the new section, and repeating the operation.

26. The method of erecting an indefinite number of mast sections of small cross sectional area with speed and comparative safety, which consists of lifting a section of mast on to a frame slidable from the ground to the top of the erected mast sections, raising said frame, mast section and the necessary workmen rapidly from the ground almost to the top of the mast by a cable running over a pulley at the top of the mast and down to a source of power, lowering said mast section onto the top of the mast by means controlled by said workmen, temporarily securing said frame to the mast, raising said pulley to the top of the new section, raising said frame slightly by power, releasing it from said mast and lowering it to the ground to repeat the opertion with an additional section.

27. The method of erecting an indefinite number of mast sections of small cross sectional area with speed and comparative safety, which consists of lifting a section of mast on to a frame slidable from the ground to the top of the erected mast sections, raising said frame, mast section and the necessary workmen rapidly from the ground almost to the top of the mast by a cable running over a pulley at the top of the mast and down to a source of power, lowering said mast section onto the top of the mast by means controlled by said workmen, temporarily securing said frame to the mast, sliding said pulley by block and tackle, manipulated by said men, to the top of the new section and securing it thereto, raising said frame slightly by power, releasing it from said mast and lowering it to the ground to repeat the operation with an additional section.

In testimony whereof, I have subscribed my name.

ALBERT T. SCANNELL.