Aug. 27, 1963 C. L. FOX 3,101,816

DRILLING AND SERVICING MAST

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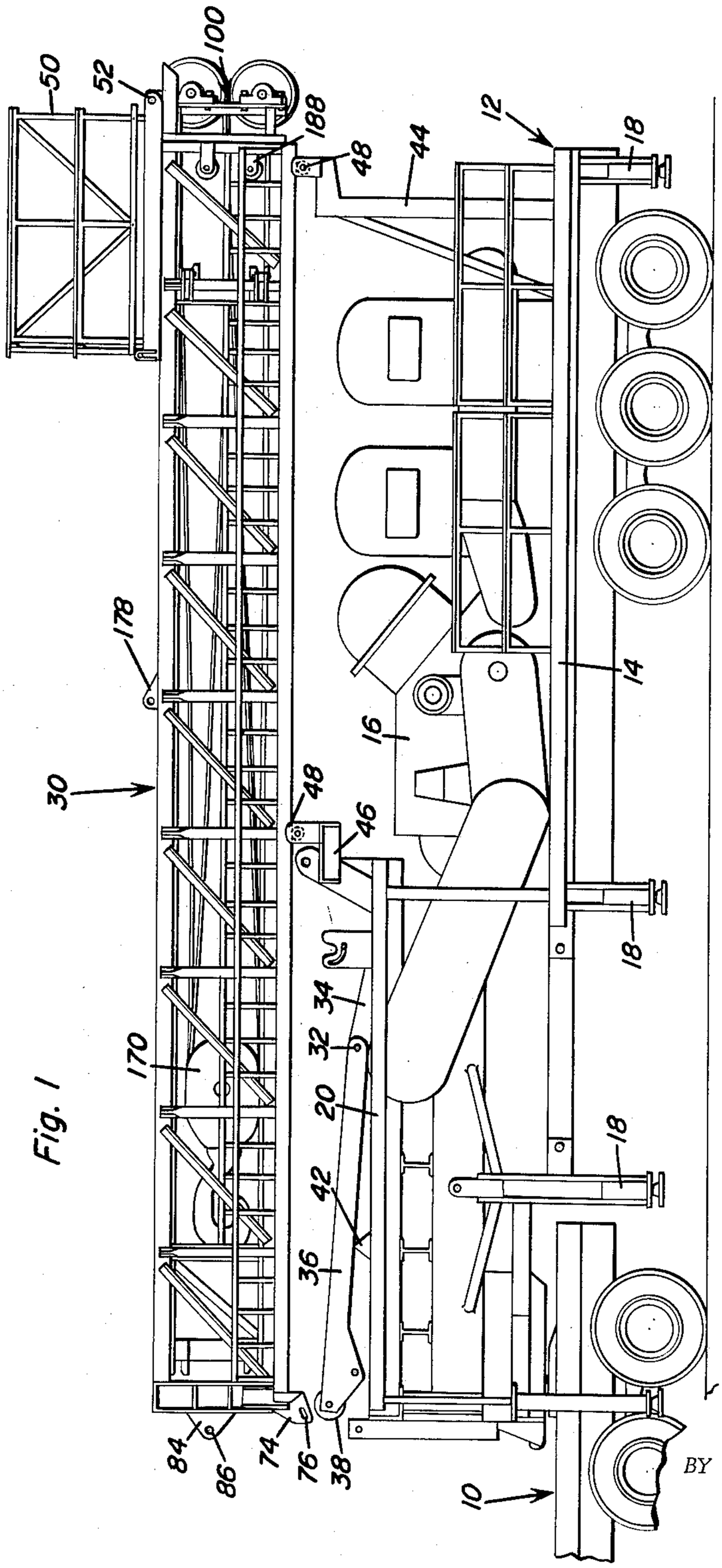

Fig. 1

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DRILLING AND SERVICING MAST

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Fig. 2

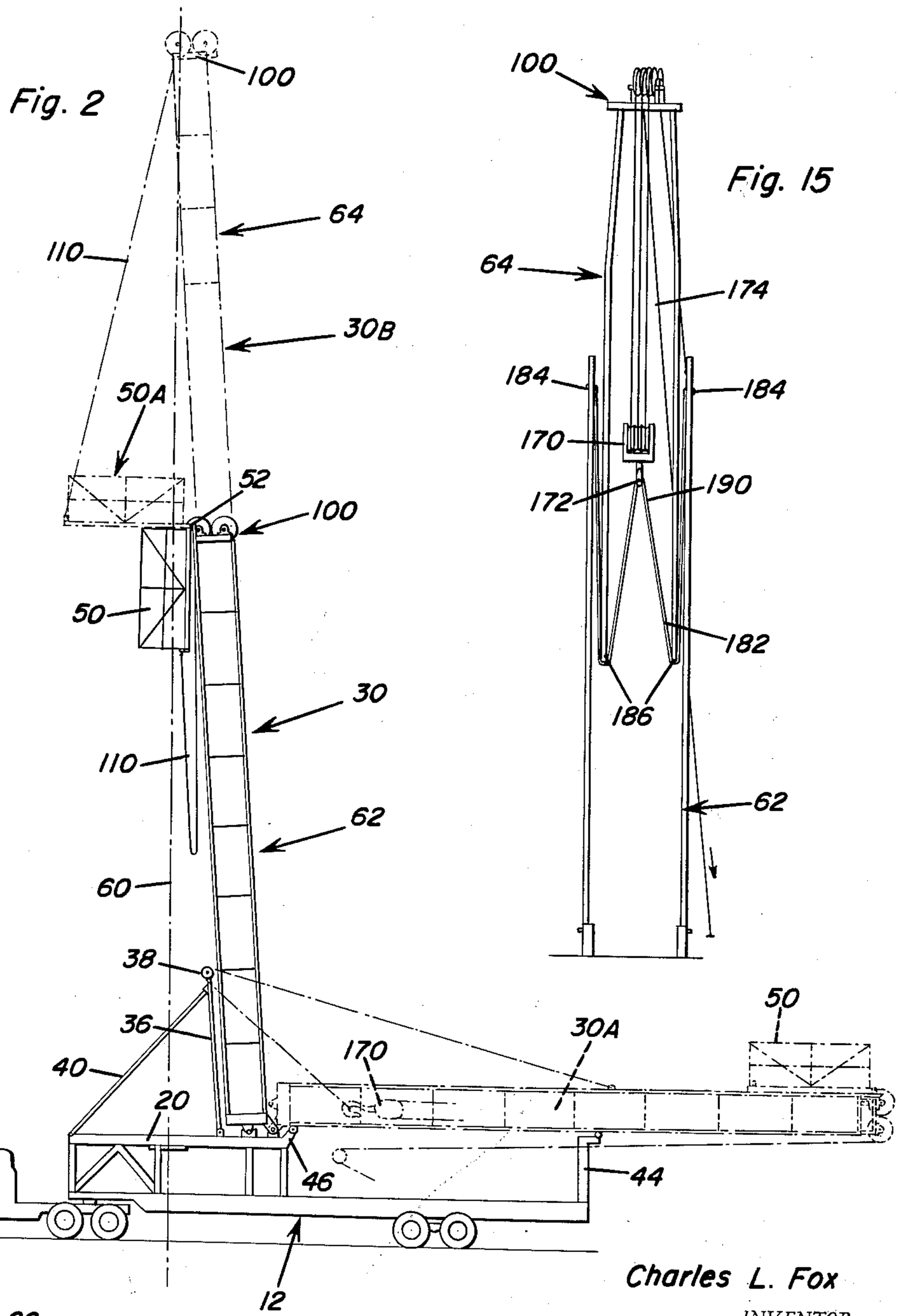
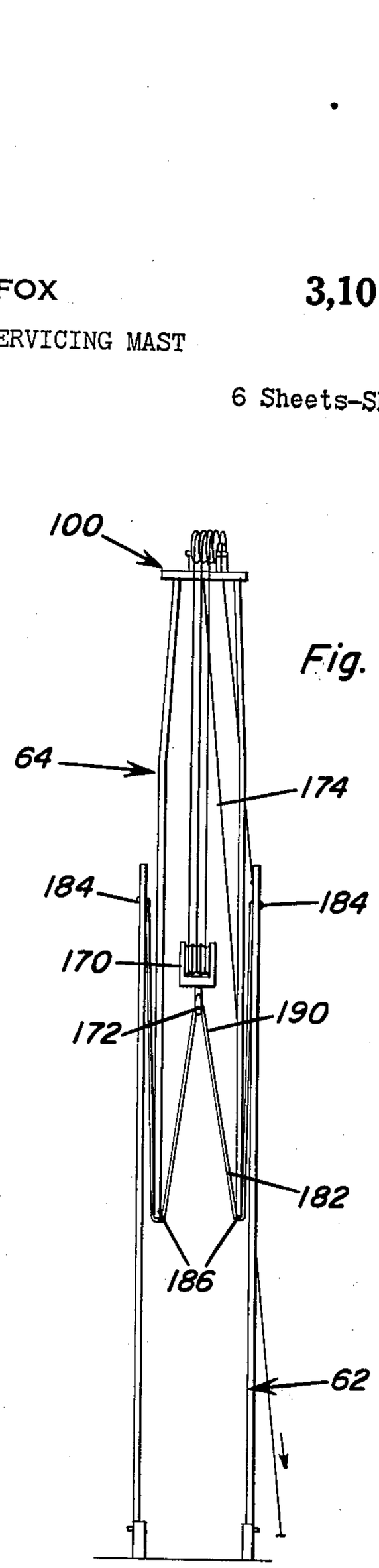


Fig. 15



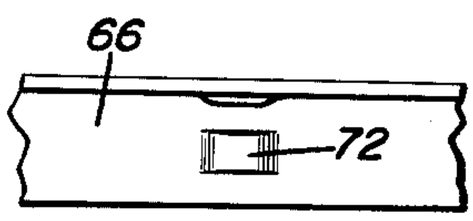


Fig. 11

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DRILLING AND SERVICING MAST

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Fig. 3

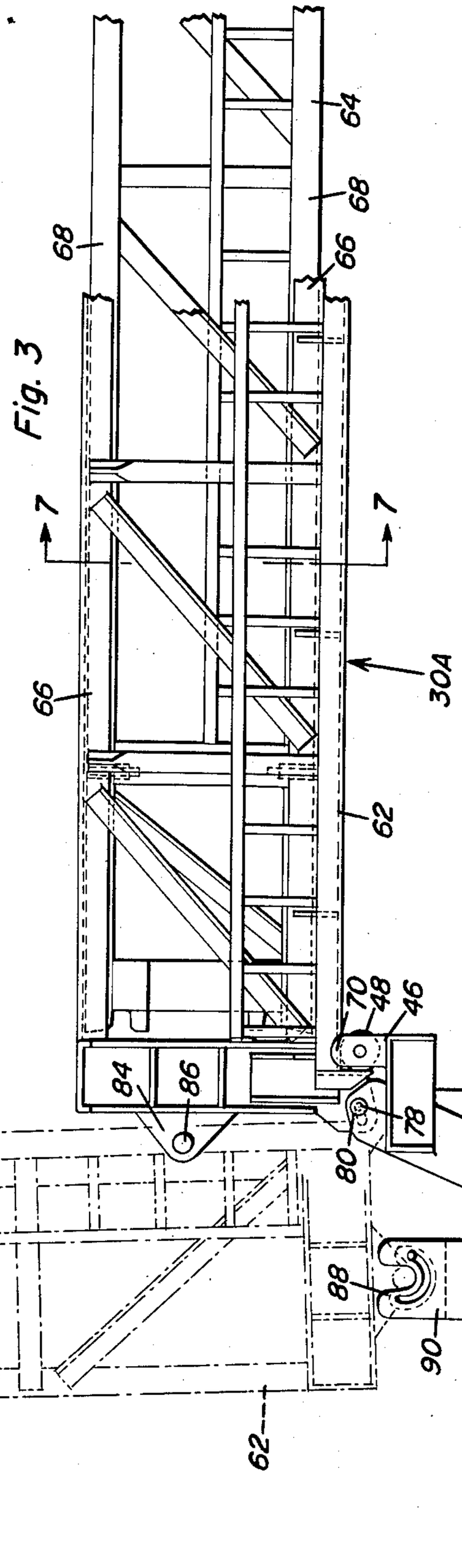
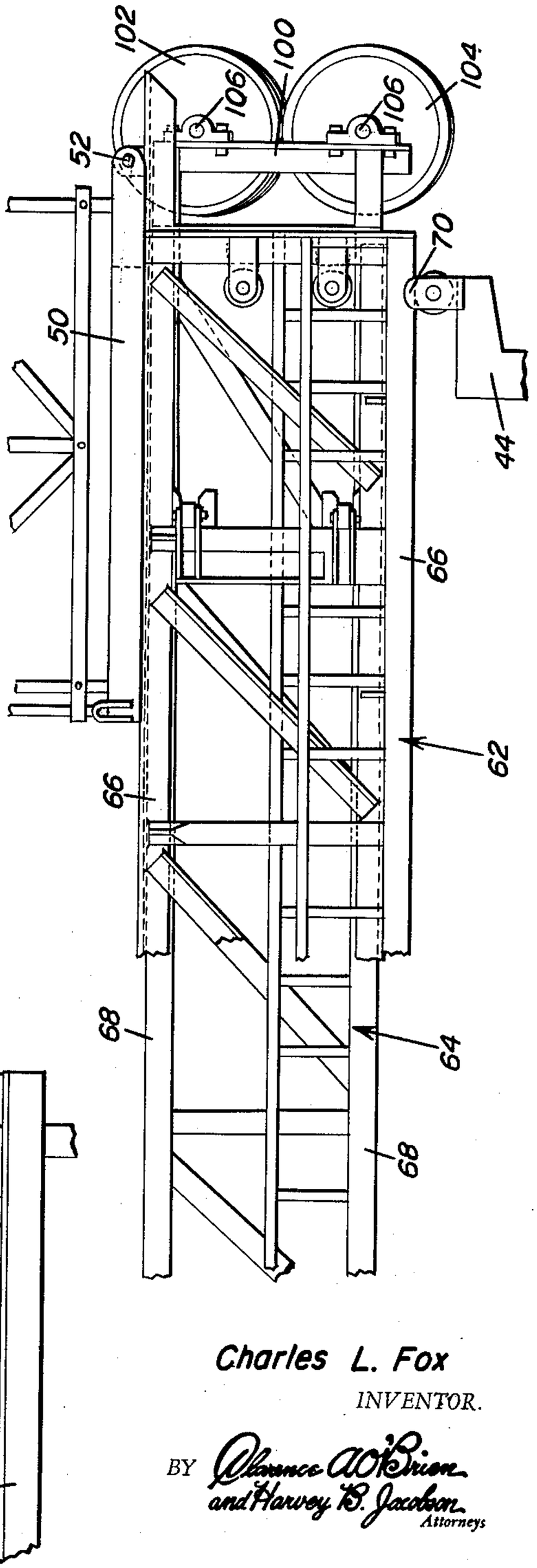


Fig. 4



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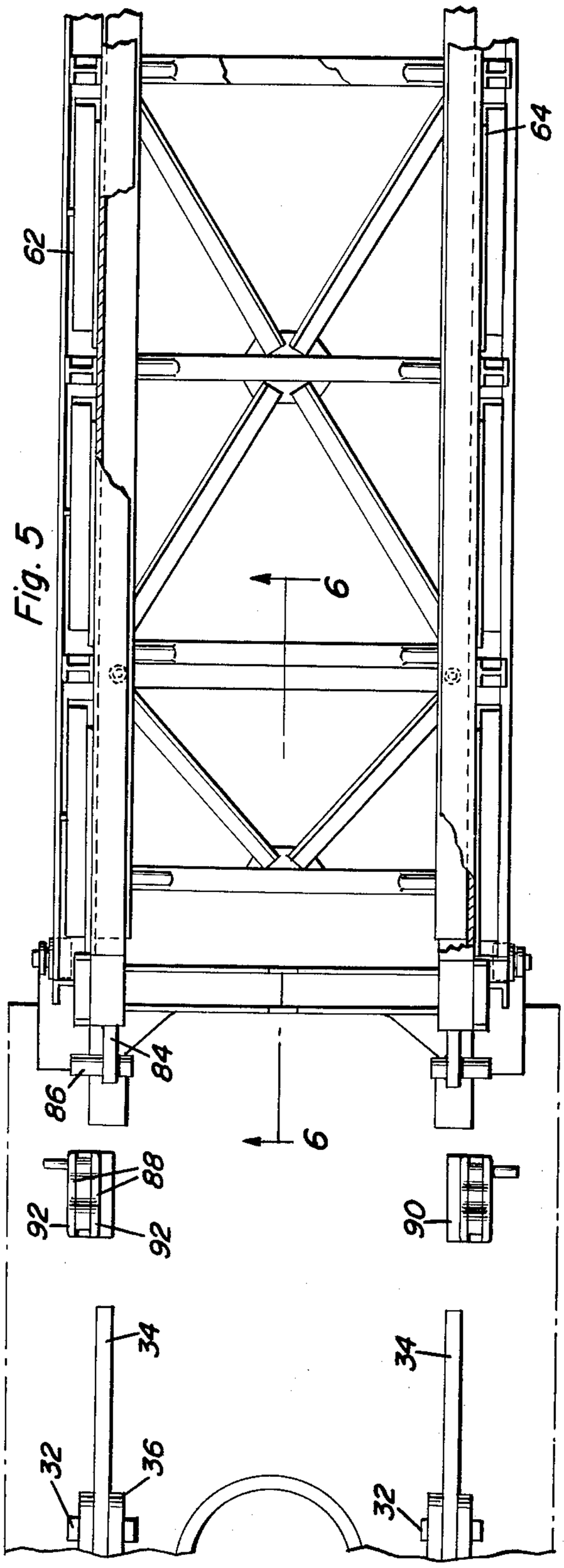

Fig. 5

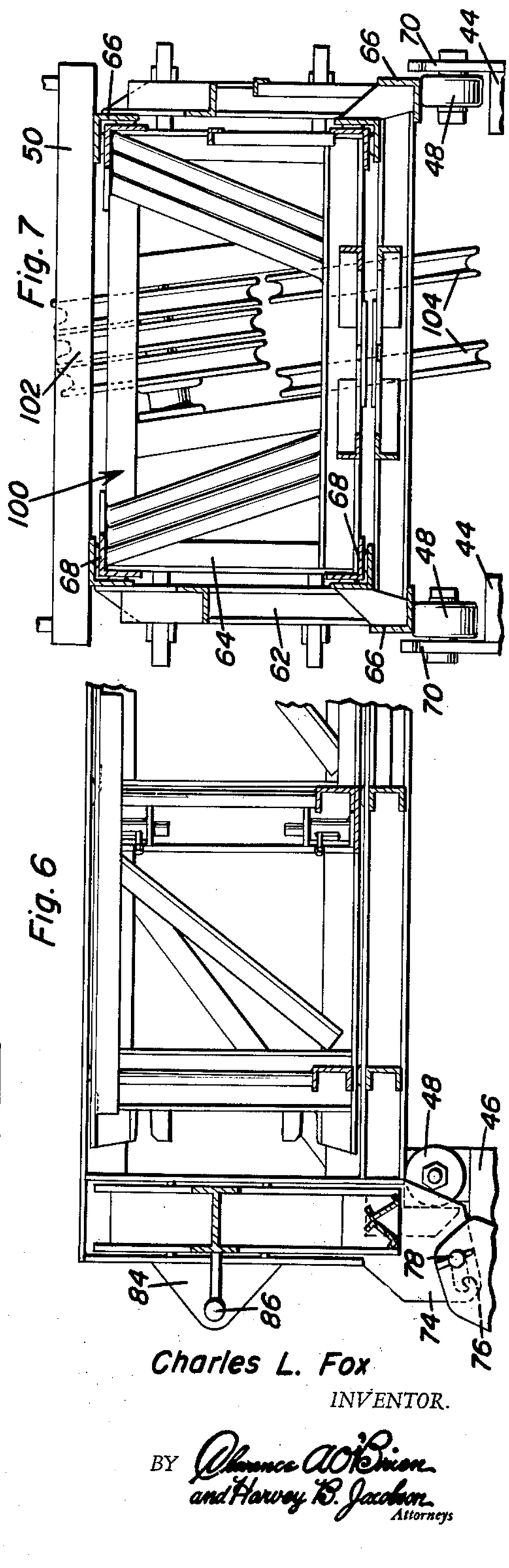

Fig. 7

Fig. 6

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DRILLING AND SERVICING MAST

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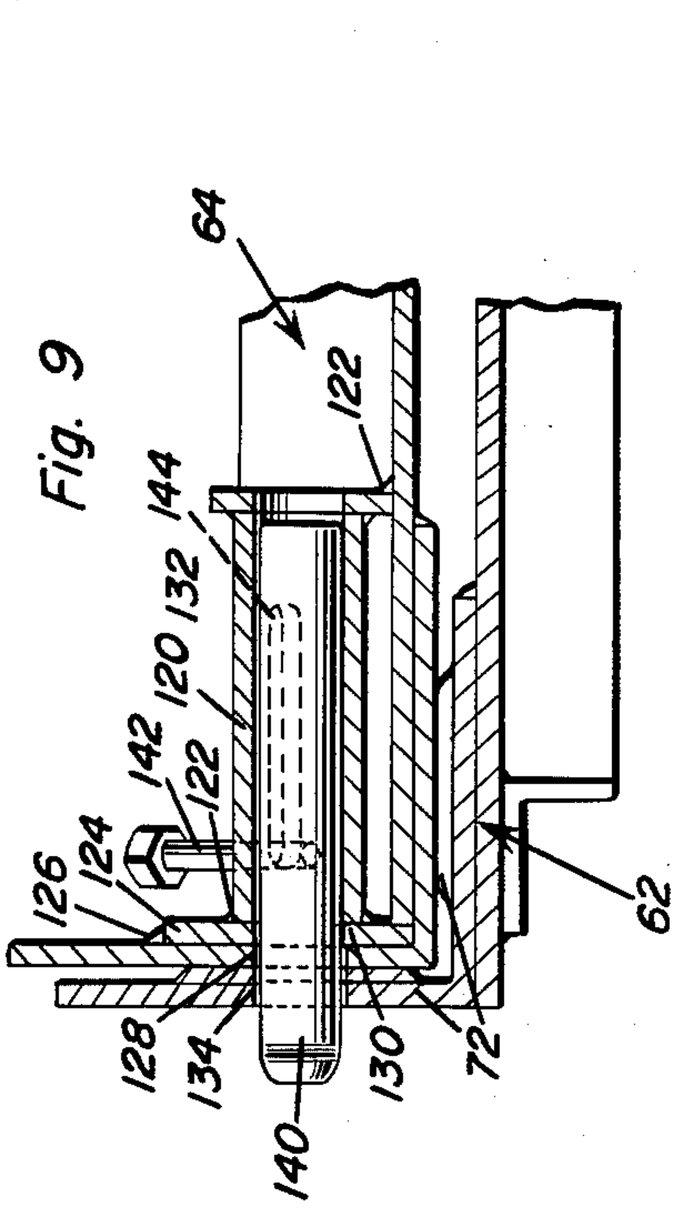

Fig. 9

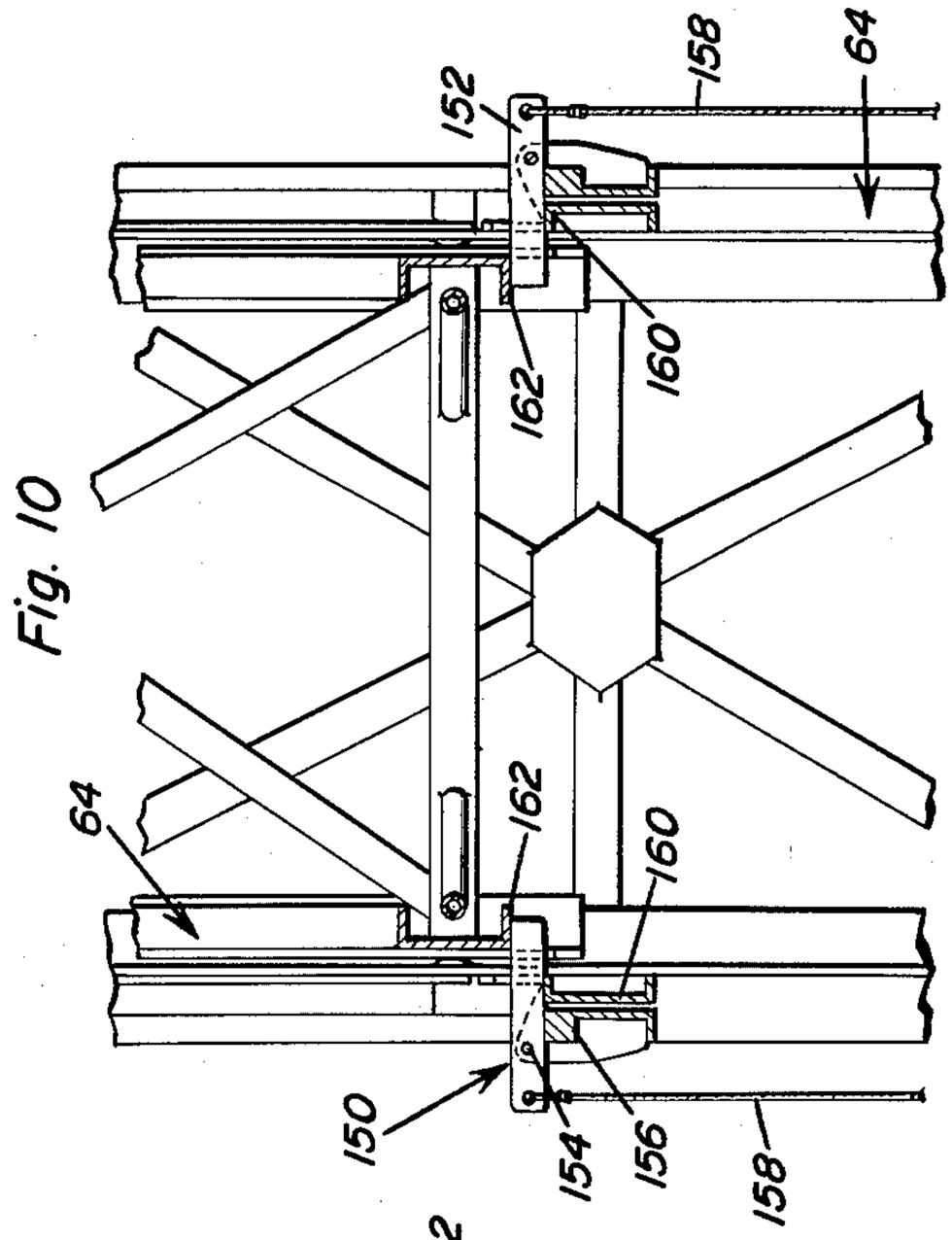

Fig. 10

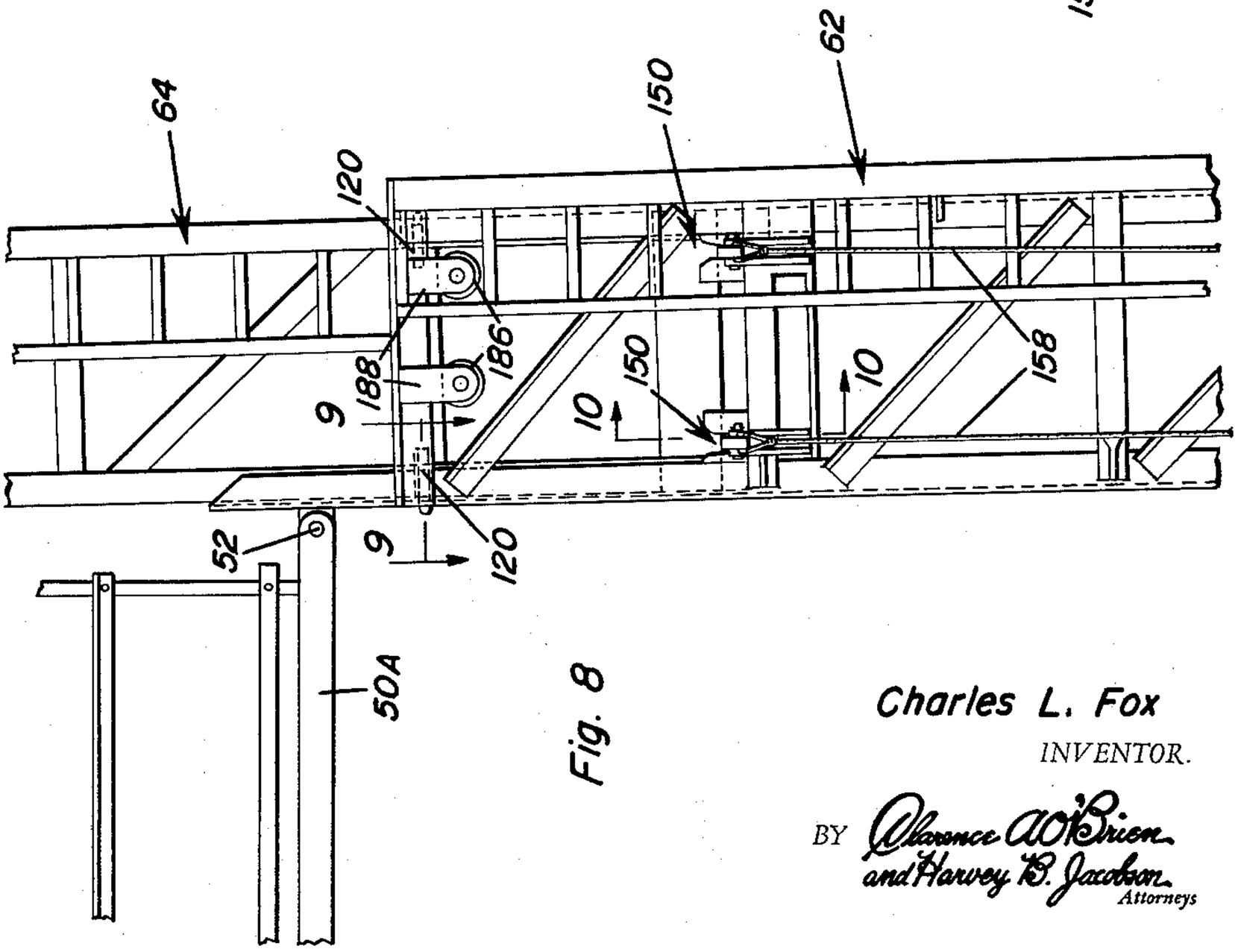

Fig. 8

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DRILLING AND SERVICING MAST

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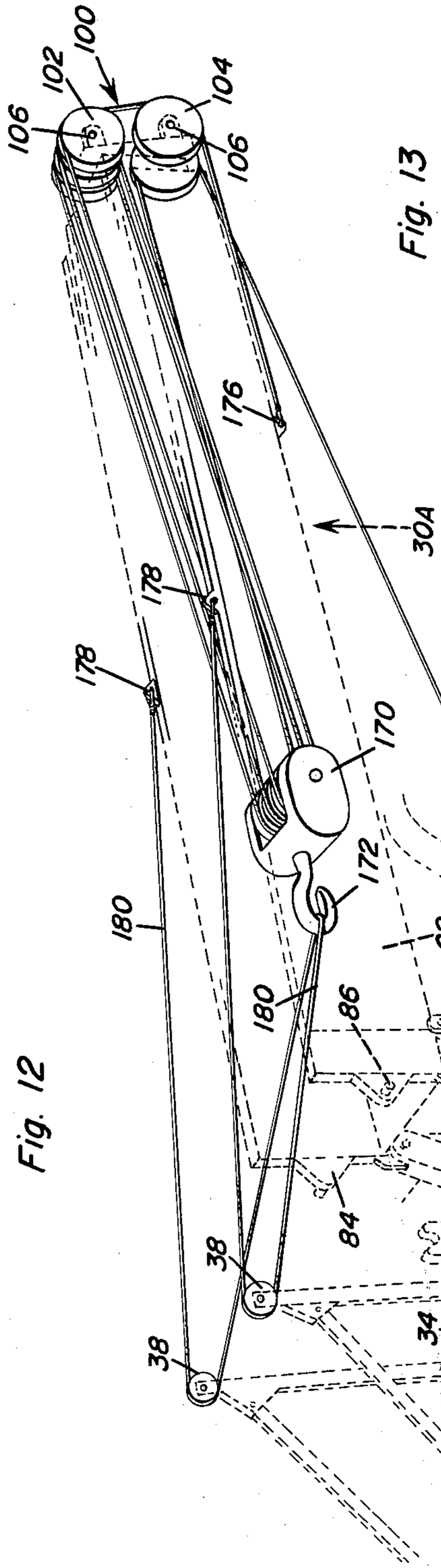

Fig. 12

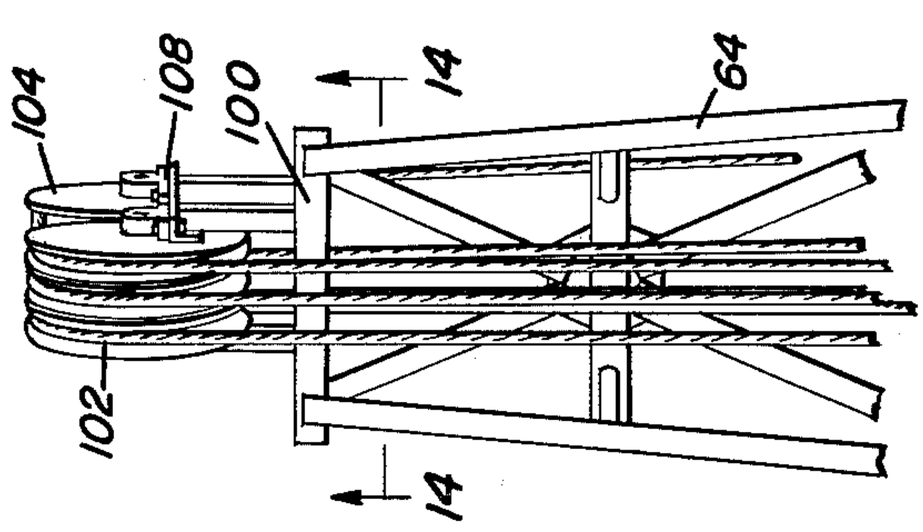

Fig. 13

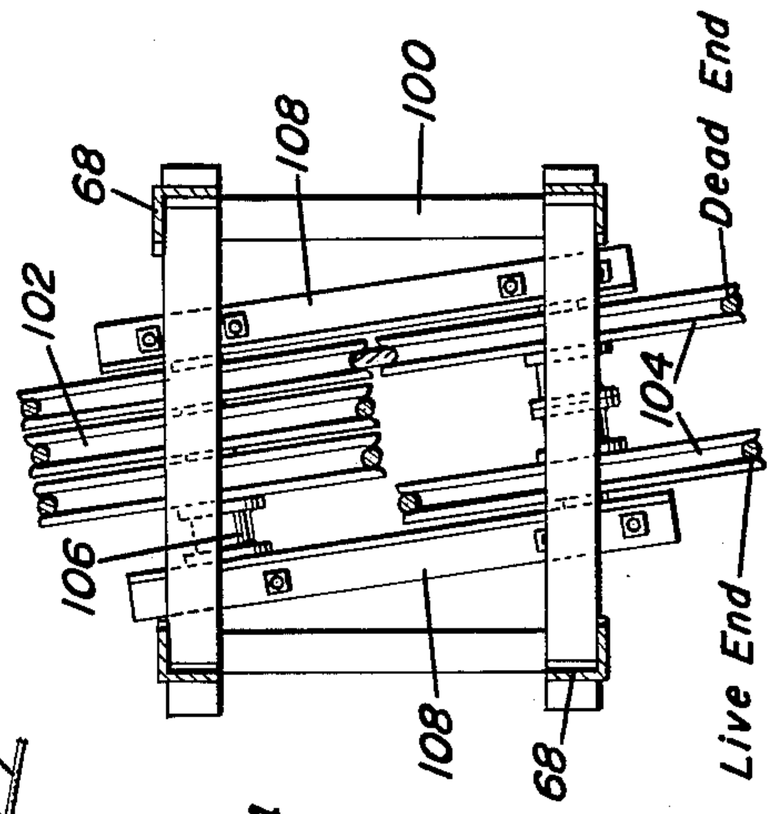

Fig. 14

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United States Patent Office

3,101,816

Patented Aug. 27, 1963

3,101,816
DRILLING AND SERVICING MAST

Charles L. Fox, Fort Worth, Tex., assignor of one-fourth to James A. Wood, Mission, Tex.

Filed May 20, 1960, Ser. No. 30,606
11 Claims. (Cl. 189—15)

This invention comprises a novel and useful drilling and servicing mast and more particularly relates to a mobile, foldable but sturdy easily erected and collapsed mast particularly adapted for servicing and drilling operations of oil wells and the like.

The primary object of this invention is to provide a mobile drilling mast and rig with all of the equipment thereof mounted upon and carried by a single automobile trailer in a highly compact and convenient manner.

A further object of the invention is to provide a mobile drilling mast construction wherein an extensible mast is movably mounted upon a single trailer vehicle in such a manner as to be movable longitudinally upon the trailer to enable the mast to be positioned at the most effective position upon erection to perform a drilling or servicing operation upon a well and to position the mast most effectively upon the trailer to thereby shorten the over-all length of the tractor and trailer and otherwise improve the transporting characteristics of the apparatus.

A further object of the invention is to provide a mobile drilling and servicing mast and rig construction in accordance with the foregoing objects wherein the entire substructure of the drilling rig is permanently mounted upon a single trailer in an improved manner such as to facilitate its use in the erected position of the mast for drilling operations.

Still another important object of the invention in accordance with the preceding objects is to provide a mobile drilling apparatus in which the trailer construction is such as to enable it to provide vertical clearance with the well head assembly when the well is completed to thereby facilitate the removal of the trailer and the collapsed drilling mast and rig thereon from the completed well.

Another very important object of the invention is to provide a drilling mast and rig having an improved and more advantageous relationship of the crown block and traveling block assemblies with respect to each other to thereby reduce wear and strain upon the cable system and to effect a substantial increase in the trouble free life and service of the same.

Still another important object of the invention is to provide a collapsible and extensible mast assembly having improved latching and locking means for maintaining the telescoping mast sections in their erected and extended positions.

Still another object of the invention is to provide a portable collapsible and extensible trailer mounted mast assembly together with all the requisite elements of a drilling rig therefor and including means enabling effective use of the draw works of the drilling rigs to facilitate the movement of the mast in its horizontal position from a compact transportation position to a shifted position in readiness for the erecting operation of the mast together with means facilitating the use of the draw works for the erection of the mast to its vertical operative position.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevational view of a preferred form of apparatus in accordance with this invention and

showing the position of the collapsed mast when shifted upon the trailer into a position for transportation;

FIGURE 2 is an elevational view, somewhat diagrammatic and showing a tractor trailer combination there being shown in dotted lines and in the horizontal position, the collapsed mast after it is shifted into a position in preparation for erection of the mast, and showing in full lines the erected position of the collapsed mast, while in vertical dotted lines is shown the extensible section of the mast moved into its final erected position in preparation for a drilling operation;

FIGURE 3 is a fragmentary view in side elevation and taken upon an enlarged scale and showing in full lines the position of the rear portion of the collapsed mast when shifted into erecting position, and showing in dotted lines the position of the collapsed mast and the supporting of the same when the mast is tilted into its vertical position;

FIGURE 4 is a fragmentary view showing the crown portion of the extensible mast, this being the position shown in FIGURE 1;

FIGURE 5 is a fragmentary plan view, parts being broken away and parts shown in horizontal section of the construction and mounting upon the trailer of the base portion of the collapsible mast and with the telescoping crown portion thereof in collapsed position therein in readiness for the erecting of the mast from its horizontal to its vertical position while the two sections of the mast are in telescoped relation;

FIGURE 6 is a vertical longitudinal sectional detail view taken substantially upon the plane indicated by the section line 6—6 of FIGURE 5 and showing further details of the structural arrangement of the telescoped lower portions of the base and crown sections of the mast;

FIGURE 7 is a vertical transverse sectional view taken substantially upon the plane indicated by the section line 7—7 of FIGURE 3 and showing the underside of the crown portion of the upper telescoping section of the mast;

FIGURE 8 is a fragmentary view in elevation of the lower and upper end portions respectively of the telescoping upper and lower sections of the mast in its erected position;

FIGURE 9 is a detail view taken upon an enlarged scale in horizontal section substantially upon the plane indicated by the section line 9—9 of FIGURE 8 and showing one of the means for securing the telescoping sections in longitudinally extended position;

FIGURE 10 is a further detail view taken upon an enlarged scale in vertical transverse section substantially upon the plane indicated by the section line 10—10 of FIGURE 8 and showing further details of the latching means for securing the telescoping sections of the mast in their extended position;

FIGURE 11 is a detail view showing the supporting rollers which facilitate telescoping sliding movement of the upper and lower sections of the mast;

FIGURE 12 is a diagrammatic view illustrating the cable rigging by which the mast is moved and tilted from its horizontal traveling position to its erected position by the use of the draw works of the drilling rig;

FIGURE 13 is a perspective view of the upper or crown portion of the top or crown section of the extensible mast and showing the canted position of the crown block assembly thereon in accordance with this invention;

FIGURE 14 is a horizontal sectional view taken upon an enlarged scale substantially upon the plane indicated by the section line 14—14 of FIGURE 13 and showing from underneath the canted position of the crown block assembly of the rigging of the mast; and

FIGURE 15 is a view somewhat diagrammatic showing in elevation the manner in which the rigging and draw works are employed to effect longitudinal extension of the mast sections after the mast is in its erected position.

In the drilling of oil wells, and in the servicing of wells for various reasons, it is necessary to provide a mast or derrick in order to support the crown block employed for various purposes in handling equipment and the like, and also provide a sub-structure upon which is mounted the various equipment required in the drilling and servicing of a well such as the power source including a draw works, the rotary table for rotary drilling and the like. Considerable time is required for the erection of the mast and the mounting of the various equipment on the site upon which they are to be used, and considerable expense is involved. Moreover, after the well is completed if a drilling operation is being performed a further relatively great expense is required to disassemble or dismantle this equipment and remove it from the well site. It is therefore a growing trend in the industry to provide a mobile apparatus which can be conveniently moved to a different site, can then drill or service a well and thereafter be removed and transported conveniently to another site. It is with equipment of this nature that the present invention is primarily concerned.

More specifically, the present invention relates to a portable or mobile drilling rig and service mast equipment in which the entire mast and all of the components of the drilling apparatus and equipment are conveniently and compactly mounted upon a single automobile trailer in a permanent manner such that all the necessary equipment including the mast can be readily transported from one location to another as required, and when placed in position the tractor can be removed for other purposes until it is again required for transporting the equipment. The apparatus includes on a single trailer all of the necessary equipment incident to the complete operation of a drilling or well servicing rig including the power source and draw works, the rotary table by whch the rotary drilling operation is performed, the mast and the crown and traveling block assemblies required to facilitate the raising or lowering of casing, pipe, drilling, string and the like. In accordance with the present invention the trailer itself is so designed as to faciiltate its removal from a completed well site and the casing head thereon after the servicing or the drilling operations have been completed, with a minimum of effort; and to permanently mount thereon in a compact manner all the necessary equipment pertaining to the servicing and drilling of oil wells. Further mounted upon the trailer is an extensible mast which is capable of being longitudinally extended to provide the complete desired height of the mast for the drilling or servicing operations, and may be telescoped to its smallest size for convenience in transportation and storage of the mast with the trailer. There is further provided means to effect the sliding movement of the collapsed mast upon the trailer to one compact position during transportation and storage of the device, and to a relatively horizontally extended position in preparation for erection of the mast into a vertical position.

In collapsible and extensible masts, considerable rigidity of the mast is required in order that it may provide a trouble free life during the many collapsing and extending operations performed upon the telescoping sections thereof, and the many erecting and lowering operations. At the same time, it is essential that the sections shall be capable of relatively easy sliding movement with respect to each other to facilitate their handling in the erecting or collapsing of the mast while easily applied and released latching and locking means are also necessary to afford a secure and safe retention of the mast sections in the collapsed or in the extended positions.

Referring first to FIGURES 1 and 2 of the accompnaying drawings, it will be observed that the numeral **10** designates generally any suitable form of tractor to which is attachably coupled in the usual manner a trailer indicated generally by the numeral **12**. The trailer includes a suitable supporting framework having a bed **14** upon which is mounted all of the equipment required for the drilling and servicing of a well including the draw works **16**, the usual power plant, any desired accessories, and the usual stabilizing jacks and supports such as those indicated by the numeral **18** in FIGURE 1. However, the trailer departs from the usual construction in that the forward end of the trailer is provided with a vertically elevated platform portion as at **20** of sufficient height to clear the casing head of a completed well so that the trailer may be readily moved from the same with a minimum of difficulty.

A telescoping or collapsible mast designated generally by the numeral **30** is movably supported upon the top portion of the trailer **12** in a manner and for a purpose to be subsequently set forth.

Mounted upon the raised forward portion **20** of the trailer as by meains of a pivot **32** carried by a bracket **34**, is one end of a gin pole **36** having a pulley or pulley assembly **38** at its other end. As will be seen from a comparison of FIGURES 1 and 2 this gin pole is adapted to be folded flat upon the portion **20** in the stored position of the mast but is adapted to be erected and secured as by suitable brace rods or guy lines **40** in a substantially vertical position to assist in the erecting of the mast.

It will be observed that in the collapsed position of the gin pole **36**, it may rest upon a supporting bracket **42** and is disposed above the portion **20** and below the collapsible mast **30** as shown in FIGURE 1.

With continued reference to FIGURE 1 it will be observed that there is provided a rear support structure **44** and a forward support structure **46** secured to the trailer **12** and projecting upwardly above the equipment mounted thereon and also above the forward raised portion **20**. Carried by this support structure are rollers each indicated by the numeral **48** upon which the collapsed mast **30** is supported for horizontal sliding movement in the horizontal position of the mast. It is to be understood that when the mast is in its stored and lowered position its telescoping sections will be fully collapsed and the collapsed mast, supported by the rollers **48** and resting in a horizontal position is capable of sliding movement longitudinally of the trailer between the position of the mast shown in FIGURE 1 and the rearwardly shifted position of the mast as shown in dotted lines at **30A** in FIGURE 2.

The purpose of this slidable mounting of the mast is to reduce the over-all length of the trailer when the same is to be transported from place to place or stored. Thus preferably the collapsed mast has an over-all length substantially equal to that of the trailer and thus reduces the over-all length of the latter to a minimum as shown in FIGURE 1. However, in this position the mast is not in proper position for erection since it would not be properly located with respect to the rotary table forming a part of the drilling apparatus, not shown. When the mast is properly positioned with respect to the rotary table, it is necessary to rearwardly displace the mast from the position shown in FIGURE 1 to the position **30A** of FIGURE 2. This will result in greatly increasing the over-all length of the trailer, which, while permissible for use in the drilling area will be extremely undesirable when it is necessary to transport the device on a roadway or the like.

Before describing the detailed structure of the telescoping mast and the means for effecting the telescoping movement as well as the erection of the mast, it is deemed advisable to refer now to the series of steps involved in the moving of the mast from its stored position to its fully erected and drilling position.

During transportation the apparatus is in the position shown in FIGURE 1 with the sectional mast telescoped, and shifted to its traveling position upon the trailer, and with the platform **50** which is pivotally mounted upon the upper end of the lower or base section of the mast as at **52** being folded flat upon the top of the horizontally disposed mast.

When the mast is to be erected, the mast is shifted longitudinally of the trailer upon the support rollers 48 rearwardly of the trailer to the position 30A shown in FIGURE 2 at which position the upper end of the lower section of the mast overhangs by a considerable distance the rear of the trailer while the base end of the mast is now positioned closely adjacent to the forward support 46. By the use of the gin pole 36 the mast is then tilted from the position 30A of FIGURE 2 to the full line position of FIGURE 2. Thereafter, the telescoping sections of the mast are extended to their maximum extent until the upper or crown block section of the mast has moved to the dotted line fully erected position shown at 30B in FIGURE 2. During this positioning, the platform 50 has automatically moved from its collapsed position shown in full lines in FIGURE 2 to its fully erected position shown at 50A in FIGURE 2. In this fully erected position, the mast is not vertical but is slightly inclined to the vertical as will be apparent from FIGURE 2, so that as indicated by the vertical line 60, the drilling string or the equipment being raised or lowered by the mast will pass through or adjacent the platform 50A for convenient access by the workmen, through the rotary table not shown and along the vertical axis of the well bore.

In order to collapse the mast from its operative position to its transporting position of FIGURE 1, after a well has been completed, it is necessary merely to release the latching and locking means which retain the sections of the mast in their extended position, and then lower the upper section into its fully retracted position. This will automatically allow the platform 50A to move from the position of 50A to the position 50 shown in FIGURE 2. The mast 30 is then pivoted from the full line position of FIGURE 2 to the position 30A. At this point the collapsed and lowered mast is then shifted forwardly of the trailer into the full line position shown in FIGURE 1 and the device is ready for transportation to another location.

Referring now more specifically to FIGURES 3–10, it will be now understood that the mast 30 includes a lower or base section 62 within which is telescopingly and slidably received an upper or crown block section 64.

Each section of the mast is rectangular in cross section consisting of corner structural members 66 for the lower section and 68 for the upper section, which members may conveniently comprise angle irons or the like. Suitable cross bracing is provided to rigidly connect these corner members into a rigid framework.

As will be understood from FIGURE 7, in the horizontal or lowered position of the mast, the corner member 66 of the lower section 62 will rest upon the support rollers 48 and will be guided and retained thereon for sliding movement by the upwardly projecting flanges 70 of the front and rear supports 46 and 44.

In order to facilitate the ease of the sliding movement of the telescoping sections with respect to each other, as shown in FIGURE 11, the corner angle members 66 of the base section 62 are provided with longitudinally spaced lateral projections, lugs or ribs 72 which project from their inner faces and have preferably convex surfaces engaging the exterior surfaces of the corner members 68 of the upper section 64 to thus facilitate sliding movement of these corner members with respect to each other.

At its base end, the lower section 62 is provided with a pair of rearwardly and laterally projecting support brackets or lugs 74 having therein elongated slots 76, see FIGURE 6, which in the horizontal position of the mast are inclined slightly with respect to the horizontal plane. Replaceable pivot pins 78 are removably inserted through these slots and through alignable apertures 80 formed in a pyramidal support structure 82 upon which the forward support 46, previously mentioned, is carried. The arrangement is such that when the apertures 80 in the pyramidal support 82 are aligned with the slots 76, the pins 78 may be inserted in place thereby pivotally securing the lower end of the mast to a fixed support with a slight limited movement relative thereto permissible by virtue of the inclined slot.

There is also provided a releasable fastening for the lower end of the lower section of the mast consisting of a pair of brackets or supporting lugs 84, having projecting therefrom trunnions 86 as will be readily apparent from FIGURE 5. These trunnions are adapted to seat, in the erected position of the mast as shown in dotted lines in FIGURE 3, in an open recess or seat 88 provided in support legs 90 carried by the trailer portion 20. As will be seen from FIGURE 5, the support leg 90 preferably is bifurcated to provide a pair of upstanding flanges each indicated at 92 in which is formed the recesses 88, so that the lugs 84 can be received between the flanges 92 when the trunnions are received in the recesses 88.

As so far described it will thus be apparent that due to its inclined position as shown in FIGURE 2, the weight of the mast and the load carried thereby retains the trunnions 86 in the recesses or sockets 88, while the pivot pins 78 serve to firmly anchor the mast to the trailer.

It will be understood, of course that suitable guy wires and braces, not shown, are provided to provide the necessary lateral stability to the mast to withstand the loads to which it is subjected. It may be noted at this point that the form of mast disclosed is one which is specifically adapted to handle 200,000 lb. loads and has successfully performed in the drilling and completing of 6500 ft. wells.

At its upper or outermost end, the upper section 64 has a suitable supporting framework as indicated generally by the numeral 100 which constitutes a cap or crown block assembly. This assembly consists of two sets of pulleys or sheaves at 102 and 104, each set of pulleys being journaled on axles 106 which in turn are carried by parallel support beams 108. As shown particularly in FIGURE 14, the support beams 108 are parallel to each other but are tilted or canted with respect to the sides of the crown block assembly 100 and of the upper mast section 64. The purpose of this canting will be hereinafter set forth.

In order to provide for automatic raising and lowering of the platform 50 as the upper mast section is projected or retracted with respect to the lower mast section, there is provided a cable 110 having its upper end fixedly secured at any convenient portion to the crown block assembly 100 and having its lower end secured to the outermost end of the platform 50 or 50A from the pivotal connection 52 thereof. The arrangement is such that as the upper section 64 completes its upward longitudinally extending movement, the cable 110 will be tautened thereby lifting the platform to its horizontal position of FIGURE 2 at 50A and support it in that position; while when the upper section is lowered or is not in its uppermost position, sufficient slack will be imparted to the cable 110 to permit gravity to urge the platform from its raised position of 50A to its lowered position of 50.

Attention is next directed more specifically to FIGURES 6, 8–10 for a description of the means for selectively but releasably locking the sections of the mast in their extended positions. As will be seen best by reference to FIGURE 9, at a convenient portion upon the sides or corner posts of the upper section 64 there are secured sleeves 120 as by welding at 122, these sleeves being abutted against reinforcing plates 124 which in turn are welded as at 126 to the corner posts of the upper mast section. Aligned bores as at 128 and 130 are formed in the corner posts and in the plates 124 registering with the internal bore 132 extending through the sleeve 120. A similar bore 134 is formed in the corner post of the lower or base section of the extensible mast and a locking bolt 140 is slidably received in the bore 132 of the sleeve 120, being provided with a laterally

projecting pin **142** by which the bolt may be slid into and out of engagement with the series of openings **128**, **130** and **134**. This pin in turn is slidably received through an elongated longitudinally extending slot **144** which is provided in the sleeve **120**. The arrangement is such that when the upper mast section **64** is in the desired raised position, the openings **128**, **130** and **134** will be in alignment and the bolt **140** can then be slid into the same to thereby lock the sections together. It is contemplated that further bores or openings similar to the opening **134** and formed in the corner posts of the base section of the mast will be appropriately positioned to enable the top section of the mast to be locked in the retracted position as during storage as in FIGURE 1 or during the tilting of the mast into vertical position which is shown in full lines in FIGURE 2 and before the supper section **64** has been extended into the position of **30**B therefrom.

In addition to the lock sleeves shown at **120** in FIGURE 9 and FIGURE 8, there is also provided a releasable latch means indicated generally by the numeral **150** positioned as shown in FIGURE 8 and shown in detail in FIGURE 10. The releasable latch means **150** consist each of a latch lever **152** pivoted as at **154** to a suitable portion **156** of the lower base section **62** and to a corner post thereof. A cable **158** is secured to each latch lever, these cables extending downwardly to a convenient location adjacent the lower end of the lower section where they may be readily manually operated to effect pivoting movement of the latch levers into an unlatched position.

The latch levers have their pivots adjacent one end thereof so that the force of gravity can be relied upon to urge the latch levers into the position shown in FIGURE 10, in which position they will rest across and be supported upon cross members **160** of the base section **62** with the ends of the latch levers extending inwardly of the corner posts of the base section and into a position in which they will underlie and support cross frame members **162** of the upper mast section **64**. The arrangement is such that as the upper mast section is slid upwardly it will readily lift the inward extremities of the latch levers **152** to pass the same whereupon the latch levers will drop down into their latching position and prevent return movement or downward movement by engaging an adjacent cross member **162** of the upper section **64**. Thus, when it is desired to collapse the mast, it is merely necessary to withdraw the locking bolts **140**, whereupon the latch levers will support the weight of the upper section until they are manually released by applying a pull to the lower end of their cables **158**.

In addition to the crown block assembly there is provided the usual traveling block indicated generally by the numeral **170**, including a hook **172** thereon, see FIGURE 12. The usual cable rigging is trained over the pulleys of the crown block and traveling block assemblies and is connected to the winch forming a part of and driven by the draw works **16**. In addition to its usual function the rigging and traveling block of this invention are utilized to assist in telescopingly extending the sections of the mast, shifting the mast upon the support rollers **48** of the trailer, and assist in the lifting and lowering of the mast between its horizontal and vertical positons.

In accordance with the usual rigging arrangement of a drilling rig, the cable **174** has its live end connected to the power operated winch of the draw works, is then entrained over one of the guide pulleys **104**, then is reeved about the guide pulleys **102** of the crown block assembly and the corresponding pulleys of the traveling block assembly **170**, with its dead end entrained over the other idler pulley **104** and anchored as at **176** to a suitable bracket **178** secured to the side of the base section of the mast. Use is made of this rigging and traveling block assembly in order to facilitate the previously mentioned movements of the mast sections. When it is desired to shift the collapsed mast when in the horizontal

position upon the trailer from its rearwardly shifted position **30**A of FIGURE 2 to its stored position **30** of FIGURE 1, the traveling block **170** is anchored to the forward end of the trailer and upon applying tension to the cable **174** by the winch of the draw works, the stationarily mounted traveling block will cause the crown block and thus the entire upper section of the mast which is now locked to the lower section to move towards the left or into its final position.

A suitable cat's head pulley and fast line is employed to reversely shift the collapsed mast from the stored position of FIGURE 1 to its shifted position **30**A of FIGURE 2.

With the collapsed telescoped mast in its shifted position **30**A of FIGURE 2, and with the pivot pins **78** now positioned to pivotally connect the base extremity of the base section **62** of the mast to the pyramidal support **82**, and with the gin poles **36** in their erected or vertical position shown in FIGURE 12, a sling **180** has its two ends secured to the apertured ears or brackets **170** previously mentioned, and is then entrained over the pulleys **38** of the gin poles **36**, with the looped portion **180** of the sling being engaged upon the hook **172** of the traveling block **170**. With this arrangement, upon actuation of the winch of the draw works, the cable **174** will be tensioned which in turn will apply tension to the sling **180**, thereby causing upward pivoting of the telescoped mast until the trunnions **86** of the brackets **84** are seated in the seat recesses **88** of the support members **90**. With the mast in the erected position as shown in full lines in FIGURE 2, a second sling **182** has its ends **184** anchored to the base section **62** adjacent the upper ends of the latter, has its mid-portions entrained over support pulleys **186**, carried by brackets **188**, see FIGURES 8 and 15, at the lower end of the upper section **64** and has its loop portion **190** engaged upon the hook **172** of the traveling block **170**. Again upon operation of the cable **174** by the winch and draw works, a thrust will be applied to the sling which will lift or longitudinally extend the movable section of the mast to its elevated or raised position. A reverse operation is performed to lower the mast and collapse the same.

As previously mentioned, the crown block assembly **100** is canted as shown in FIGURES 7 and 14. The purpose of this is to insure a straight line pull without effecting a twisting of the traveling block assembly **170** as the latter moves towards and from the crown block assembly **100**, and also to cause the cable **174** to lie in the vertical plane as it passes from the crown block assembly to the winch of the draw works. With the conventional arrangement in which the crown block pulleys have their axes disposed perpendicular to a side of the mast, the vertical flights of the cable as the same are entrained over the crown block pulleys **102** and over the pulleys of the traveling block **170** owing to the lateral displacement of successive pulleys of the assembly would effect a twisting of the traveling block assembly. This tendency is overcome and avoided by the canting of the crown block assembly.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A mobile, self-contained well drilling and servicing apparatus comprising a trailer, a drilling rig having all of its components including the winch and draw works fixedly mounted on said trailer, a drilling and servicing mast carried by said trailer in a horizontal position above said drilling rig components, means mounting said mast for shifting of the entire mast as a unit longitudinally of

said trailer while in a horizontal position between a retracted position in which the over-all length of the trailer is a minimum and an advanced position projecting beyond an end of the trailer and in which the over-all length of the trailer is a maximum, erecting means operable when the mast is in said advanced position for moving said mast between a horizontal position and a vertically extending erected position.

2. The combination of claim 1 including shifting means connected to said mast and trailer for effecting said longitudinal shifting of said entire mast between said retracted and advanced positions.

3. The combination of claim 1 wherein said mast includes a pair of slidably connected, telescoping longitudinally extensible upper and lower sections movable between collapsed and extended positions.

4. The combination of claim 1 including a pair of pivotal connections for said trailer and mast at one side of the latter and a pair of seat recesses on said trailer and said mast, removable pivots for said pivotal connections and about which said mast is tiltable when moved by said erecting means between said horizontal and erected positions, said mast having trunnions receivable in said seat recesses when said mast is in said erected position.

5. A mobile, self-contained well drilling and servicing apparatus comprising a trailer, a drilling rig having all of its components including the winch and draw works fixedly mounted on said trailer, a drilling and servicing mast carried by said trailer in a horizontal position above said drilling rig components, means mounting said mast for shifting longitudinally of said trailer while in a horizontal position between a retracted position in which the over-all length of the trailer is a minimum and an advanced position projecting beyond an end of the trailer and in which the over-all length of the trailer is a maximum, erecting means operable when the mast is in said advanced position for moving said mast between a horizontal position and a vertically extending erected position, said mast having at one side thereof and projecting beyond its lower end a pair of slotted lugs, said trailer having a pair of apertured supports cooperating with said lugs when said mast is in its advanced position, removable pivot means engaged in said slots and apertures and pivoting said mast to said trailer for tilting when moved by said erecting means between said horizontal and erected positions, a second pair of lugs on said mast and projecting beyond the lower end thereof, a second pair of supports on said trailer having recesses therein for receiving and supporting said second pair of lugs when said mast is in said erected position.

6. The combination of claim 1 wherein the forward end of said trailer is vertically elevated relative to the remainder thereof whereby to provide sufficient increased vertical clearance with the ground to enable the forward end of the trailer to be moved laterally from above a well casing head when the use of the apparatus is completed thereby enabling the trailer to be readily removed from a well casing head.

7. The combination of claim 1 wherein said mast includes a pair of slidably connected, telescoping longitudinally extensible upper and lower sections movable between collapsed and extended positions, a crown block assembly on said upper section, a traveling block assembly, a cable reeved through said assemblies and connected to said winch, means connected to said sections and engageable by said traveling block for effecting longitudinal extensions of said sections upon operation of said winch.

8. The combination of claim 1 wherein said erecting means includes a gin pole having one end pivoted to said trailer for folding between an erected position and a stored position beneath said mast when the latter is in its horizontal position, a pulley journaled on the other end of said gin pole, a line connected to said winch and entrained over said gin pole pulley and secured to said mast for tilting the mast upon movement of said line.

9. The combination of claim 8 wherein said mast has a crown block assembly mounted thereon and a traveling block assembly, each assembly including a set of pulleys journaled therein, a cable reeved through said pulleys and connected to said winch, said line being connected to said traveling block.

10. The combination of claim 1 wherein said mast includes a pair of slidably connected, telescoping longitudinally extensible upper and lower sections movable between collapsed and extended positions, means connecting said winch to said upper section and operative to effect longitudinal extension of said mast when the latter is in its erected position.

11. The combination of claim 10 including a platform pivoted to the upper end of said lower section and seated upon the top side thereof when said mast is in said horizontal position, a connection between said platform and the lower end of said upper section for pivoting said platform to a horizontal position when said upper section is extended longitudinally from said lower section.

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