Dec. 19, 1939. H. C. JOHANSEN 2,183,867

ADJUSTABLE SUPPORT

Filed Aug. 12, 1937 3 Sheets-Sheet 1

Fig. 1.

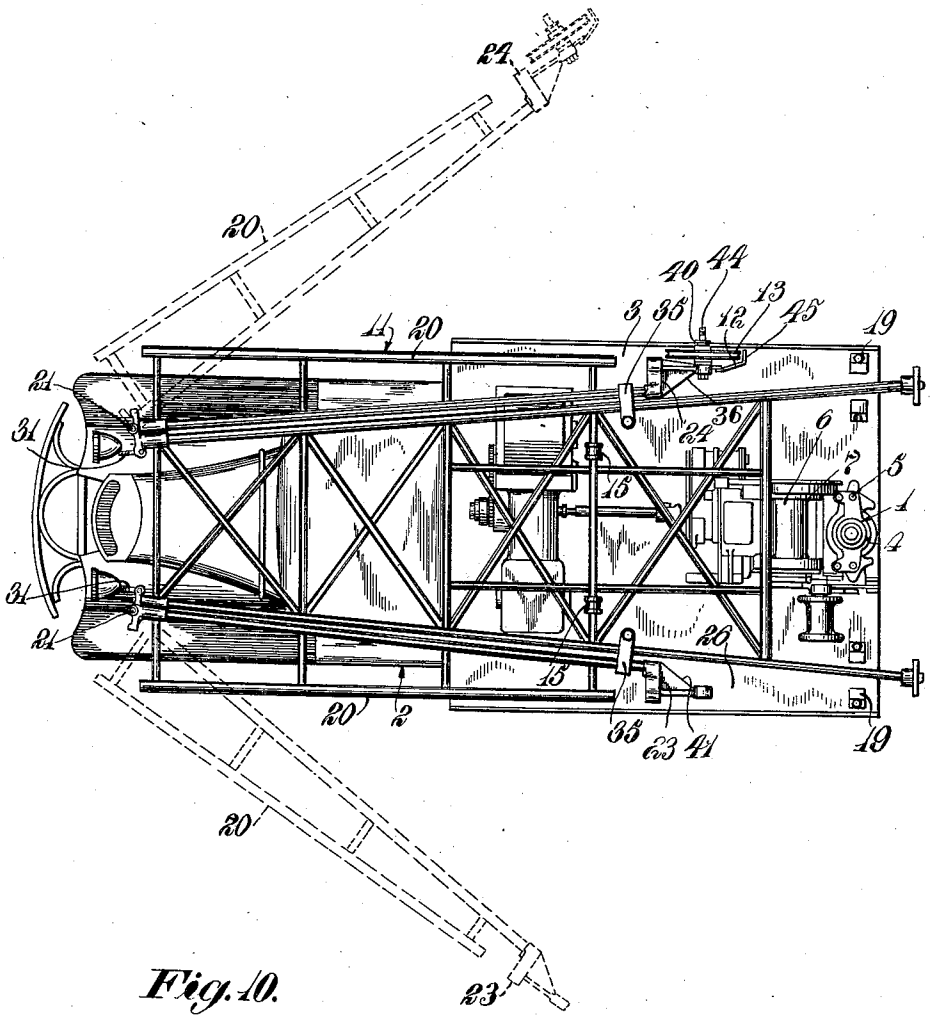

Fig. 10.

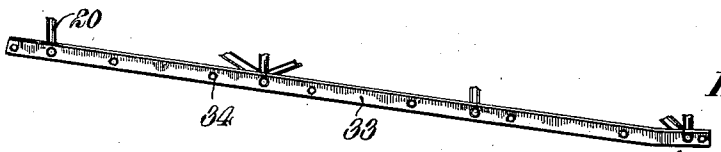

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Fig. 8.

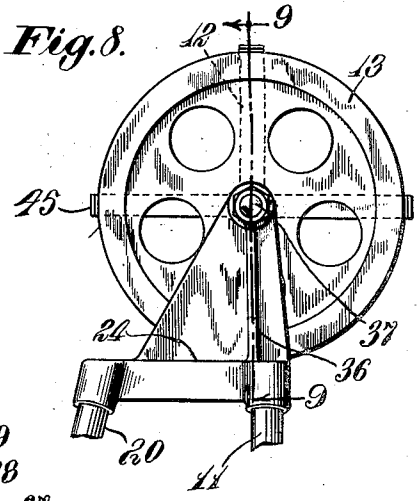

Fig. 9.

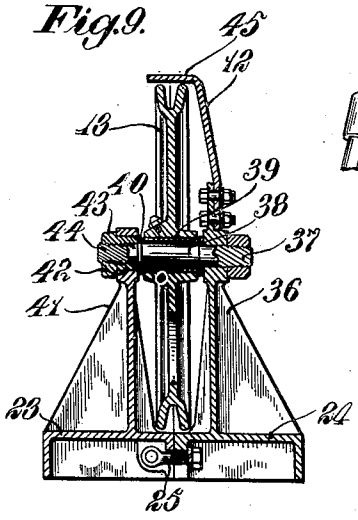

Fig. 2.

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ADJUSTABLE SUPPORT

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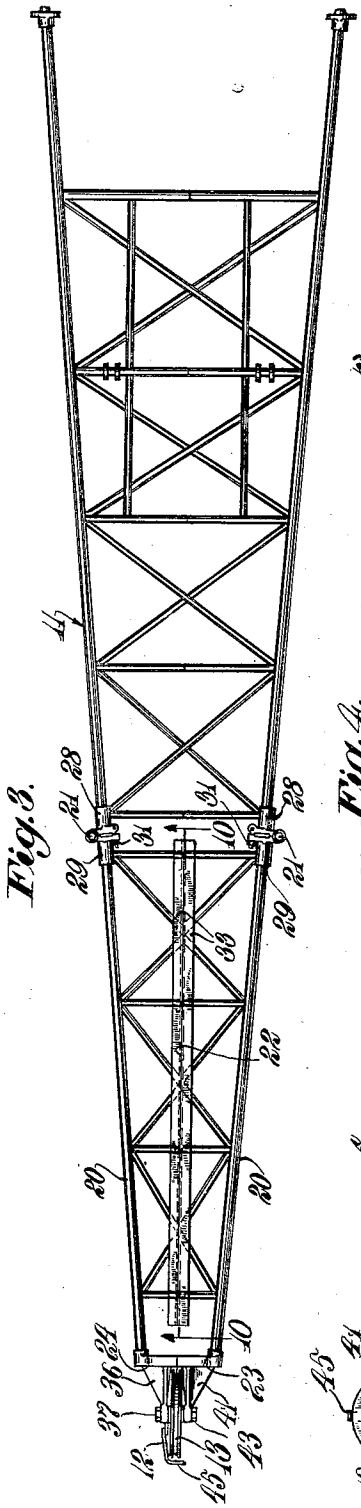

Fig. 3.

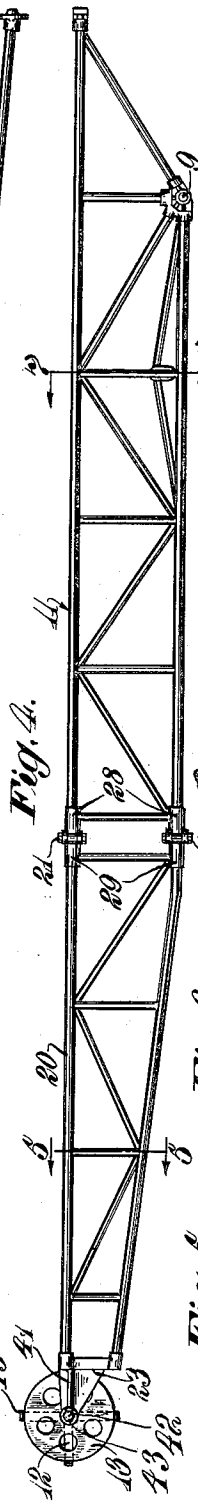

Fig. 4.

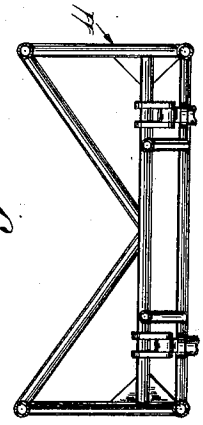

Fig. 2.

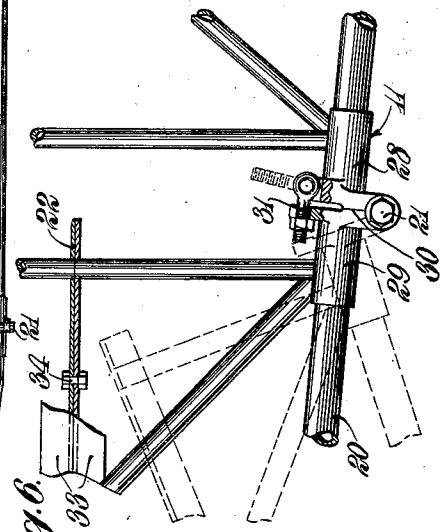

Fig. 6.

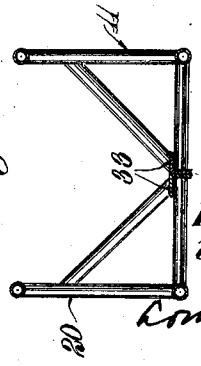

Fig. 5.

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2,183,867

UNITED STATES PATENT OFFICE

2,183,867

ADJUSTABLE SUPPORT

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Application August 12, 1937, Serial No. 158,726

14 Claims. (Cl. 254—139)

This invention relates to adjustable supports, and more particularly, but not exclusively, to an improved collapsible derrick mast for a portable oil well drilling apparatus.

An object of this invention is to provide an improved derrick mast especially designed for use with an oil well drill of the portable type having embodied therein an improved collapsible structure, whereby the length of the mast may be reduced for transport. A further object is to provide an improved collapsible derrick mast having its upper portion formed by a pair of laterally adjustable parts rigidly secured together when the mast is in extended position, and adjustable into collapsed position whereby the overall length of the derrick mast may be decreased when the mast is lowered into its transport position on the drill base. Still another object of the invention is to provide an improved split mast construction in which the pulley is supported by one of the parts in the separated relation of the mast parts and by both when the mast is in working position. Other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Fig. 1 is a plan view of an oil well drilling apparatus having embodied therein an illustrative form of the improved derrick mast structure.

Fig. 2 is a side elevational view of the drilling apparatus shown in Fig. 1, with the mast shown in collapsed transport position, the raised operative position of the derrick mast being indicated in dotted lines.

Fig. 3 is a plan view of the derrick mast structure showing the same in its extended position.

Fig. 4 is a side elevational view of the derrick mast shown in Fig. 3.

Fig. 5 is a cross sectional view taken substantially on line 5—5 of Fig. 4.

Fig. 6 is a detail view of a portion of the mast structure showing the means for connecting the relatively adjustable parts together, parts being shown in section to illustrate structural details.

Fig. 7 is a cross sectional view taken substantially on line 7—7 of Fig. 4.

Fig. 8 is an enlarged elevational view of the crown block.

Fig. 9 is a sectional view taken on line 9—9 of Fig. 8.

Fig. 10 is a fragmentary view in longitudinal vertical section taken substantially on line 10—10 of Fig. 3.

In this illustrative embodiment of the invention, the improved adjustable support, herein in the form of a derrick mast, is shown embodied in an oil well drilling apparatus of the portable automobile type. The drill, generally designated 1, is of the type commonly known as a "diamond core drill" and is mounted on a conventional automobile truck chassis, generally designated 2; and the drill and derrick mast structure are supported by a platform 3 mounted on the truck chassis. The drill 1 comprises drill rod rotating means 4, drill rod feeding means 5 and drill rod hoisting means 6, the drill rod rotating means and the hoisting means being driven through conventional transmission connections from the engine of the automobile. The drill rod hoisting means is employed to raise and lower the rod line of the drill and comprises a hoisting drum 7 having wound thereon a usual hoisting cable 8.

In this illustrative construction, pivotally mounted on a horizontal axis at 9 on standards 10 supported at the sides of the drill platform 3 is a derrick mast, generally designated 11, carrying at its upper end, when the derrick mast is in its raised operative position as indicated in dotted lines in Fig. 2, a crown block 12; and the hoisting cable 8 is adapted to be extended from the hoisting drum 7 around the pulley 13 of the crown block at the upper end of the derrick mast.

The means for swinging the derrick mast about its pivot from its full line transport position shown in Fig. 2 to the raised dotted line position shown in that figure, comprises a pair of hydraulic lifting cylinders 14 pivotally mounted at the sides of the truck platform on alined horizontal axes parallel with the mast pivot axis 9. These cylinders contain usual reciprocable pistons having the upper ends of their piston rods pivotally connected at 15 to the sides of the derrick mast. When the derrick mast is in its lowered transport position, as indicated in full lines in Fig. 2, it rests upon a transverse support 16 mounted on a vertical framework 17 at the front end of the truck platform, and the mast is adapted to be locked in its lowered position on this support by adjustable locking means, such as locking clips 18. When the locking clips are released and hydraulic pressure is supplied to the lower ends of the mast lifting cylinders, the pistons thereof move upwardly to swing the mast in a vertical direction about its pivot 9 from the full line position shown in Fig. 2 to the dotted

line position shown in that figure. When the derrick mast is in its operative upright position, as indicated in dotted lines in Fig. 2, it may be rigidly clamped in such position on the truck platform by suitable clamping means 19 engaging the lower portion of the mast structure.

The derrick mast 11 is of an improved collapsible construction and herein comprises a rigid bottom frame portion of a fabricated welded construction, pivotally mounted at 9 on the standards 10 as heretofore described. The outer portion of the derrick mast comprises a pair of similar frame parts 20, 20, likewise of welded fabricated construction, pivotally mounted at 21 on the sides of the rigid bottom frame portion of the derrick mast and split vertically at 22 at the longitudinal vertical center of the mast, as shown in Fig. 3. The crown block 12 is likewise composed of separable parts, and, in this instance, has separable brackets 23 and 24 connectible together by a pivoted clamping bolt 25. The pivotal mountings at 21 for the collapsible mast frame portions each comprises a bracket 28 secured to the inner mast frame portion of the mast and a bracket 29 secured to each mast part 20, and these brackets have plane abutting surfaces movable into abutting engagement, as at 30, when the mast parts 20 are in their extended position. Pivoted clamping bolts 31 are provided for clamping the brackets 28 and 29 together with the plane surfaces thereof in abutting relation. The adjustable mast frame parts 20 have secured thereto along the adjacent sides thereof angle members 33 having inner plane surfaces adapted to abut one another at the longitudinal vertical center of the mast, when the parts 20 are in their extended position, and clamping bolts 34 are adapted to be inserted through openings in these angle members, when the surfaces thereof are in abutting relation, to clamp firmly the parts together.

The crown block is so constructed that by releasing the pivoted clamping bolt 25 and removing a single nut, the halves of the block may be separated and the pulley maintained in its supported relation to one of the block halves, herein part 24. On the upstanding bracket 36 carried by block part 24 is mounted a pivot member 37 having an enlarged portion 38 surrounded by a bearing sleeve 39 on which the pulley 13 is rotatably mounted. To the left of the pulley in Fig. 9, the member 37 is provided with a shoulder or collar 40 which prevents the pulley slipping off when the halves of the block are separated. A bracket 41 on the block part 23 receives in a bore 42 therein, a nut 43 which coacts with a threaded reduced extension 44 of the member 37 when the parts are in assembled relation to hold the parts rigidly and support member 37. Suitable rope guards 45 are mounted on block part 24.

When the derrick mast is in its lowered horizontal position, as shown in Figs. 3 and 4, and the mast frame parts 20 are in extended relation, the mast may be collapsed by removing the bolts 34, releasing the clamping bolts 31 and 25 and removing the nut 43, to release the parts 20, 20 from one another, thereby enabling lateral swinging thereof from a position in alinement with the inner frame portion into the position shown in Fig. 2, wherein the outer frame parts are in substantial parallelism with the inner frame part. A position of the outer derrick parts 20, 20 during movement thereof from their extended position to their collapsed position is indicated in dotted lines in Fig. 1. When the outer mast parts are in their collapsed position, as shown in Figs. 1 and 2, they extend rearwardly along the sides of the rigid inner frame portion of the derrick mast and may be secured in such position by suitable clamps 35. When the parts are in such collapsed position, the pulley 13 of the crown block 12 is, as will be obvious, supported by the block part 24.

The general mode of use of the improved derrick mast structure will be clearly apparent from the description given. When the drilling apparatus is moved from place to place, the derrick mast is in its lowered collapsed transport position with the mast resting on the support 16, as indicated in full lines in Fig. 2, with the outer frame portions 20, 20 of the mast structure held in their collapsed position by the clamps 35. When the drilling apparatus is in its operative drilling position, the clamps 35 may be released and the mast parts 20, 20 swung horizontally outwardly into their extended position, as shown in Figs. 3 and 4. As the parts 20, 20 are brought into their extended positions, the end 44 of member 37 passes through the opening 42 and the nut 43 is replaced, providing a rigid support for the member 37; and the mast frame parts are secured rigidly in position by the clamping bolts. When the parts are in their extended positions, as shown in Figs. 3 and 4, hydraulic pressure may be supplied to the lower ends of the lifting cylinders 14 to swing the derrick mast in a vertical direction about its pivot 9, to the position indicated in dotted lines in Fig. 2, the derrick mast thereafter being clamped in position with respect to the truck platform by means of the clamping means 19. The hoisting cable 8, wound on the hoisting drum 7 of the hoisting mechanism, is then extended upwardly around the pulley 13 of the crown block 12 at the upper end of the derrick mast, and the free end of the cable may be connected to the upper end of the rod line, thereby to lower or raise the rod line, in a well known manner. Of course, if desired, the hoisting cable may be left in reeved position over the pulley 13 even when the mast is collapsed. When it is desired to lower the derrick mast, the hydraulic pressure may be discharged from the lower ends of the cylinders 14, permitting the lowering of the pistons thereof, thereby to permit swinging of the derrick mast downwardly about its pivot to the horizontal position shown in Figs. 3 and 4. The clamping bolts may then be released, the nut 43 removed and the outer mast frame parts 20, 20 of the derrick mast swung laterally into their collapsed position along the sides of the inner frame portion of the mast structure and again clamped in such position by the clamps 35.

As a result of this invention, it will be noted that an improved collapsible derrick mast structure is provided for a portable oil well drilling apparatus whereby the overall length of the mast structure may be materially reduced during transport of the drilling apparatus from one working place to another. It will further be noted that by forming the outer portions of the derrick mast in separable parts and mounting the parts to swing laterally into their collapsed position along the sides of the inner rigid frame portion of the derrick mast, the mast structure is rendered extremely compact. Other advantages of the improved collapsible derrick mast structure will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In an elongated collapsible support, an elongated supporting frame mounted for and confined to adjustment from a lowered inoperative position to a raised operative position and vice versa and comprising an inner frame part mounted for and confined to adjustment from a lowered inoperative position to a raised operative position and vice versa, and cooperating relatively adjustable outer frame parts and adapted to be secured together at the central longitudinal vertical plane of the support in alinement with said inner frame part to form an extension of the latter when the support is extended, and said outer frame parts when released from one another being adjustable from their extended positions laterally in opposite directions relative to said inner frame part into positions wherein they extend along the opposite sides of said inner frame part when the support is collapsed.

2. In a collapsible derrick mast, a mast frame mounted for swinging movement in a vertical direction and comprising a rigid inner frame portion and an outer frame portion mounted on said inner frame portion, said outer frame portion divided along the central longitudinal vertical plane of the mast and the divided parts thereof being swingable into positions in alinement with said inner frame portion and adapted to be secured together when the mast is extended, and said outer frame parts being swingable when released from one another into positions wherein they extend in substantial parallelism with the sides of said inner frame portion when the mast is collapsed.

3. In a collapsible derrick mast, a mast frame mounted for swinging movement in a vertical direction about a horizontal axis and comprising a rigid inner frame portion and an outer frame portion mounted on said inner frame portion and divided at the central longitudinal vertical plane of the mast, the divided parts of said outer frame portion being pivotally mounted on said inner frame portion on axes at right angles to said mast frame pivot axis and swingable into positions in alinement with said inner frame portion and adapted to be secured together when the mast is extended, and said outer frame parts being swingable when released from one another into positions wherein they extend in substantantial parallelism with the sides of said inner frame portion when the mast is collapsed.

4. In a collapsible derrick mast, an elongated mast frame mounted for swinging movement in a vertical direction about a horizontal axis and comprising an inner frame portion and relatively swingable outer frame portions adapted to be secured together at the central longitudinal vertical plane of the mast in alinement with said inner frame portion when the mast is extended, and said outer frame portions being pivotally mounted on said inner frame portion to swing laterally in opposite directions relative thereto about axes at right angles to said mast frame pivot axis, and when released from one another being swingable about their pivotal axes from their positions in alinement with said inner frame portion into folded positions wherein they extend in substantial parallelism with the opposite sides of said inner frame portion when the mast is collapsed.

5. In a collapsible derrick mast, a mast frame comprising an inner frame portion and relatively adjustable outer frame portions adapted to be secured together at the central longitudinal vertical plane of the mast in alinement with said inner frame portion to form an extension of said inner frame portion when the mast is extended, said outer frame portions when released from one another being relatively adjustable laterally in opposite directions relative to said inner frame portion into folded positions wherein they extend along the opposite sides of said inner frame portion when the mast is collapsed.

6. In a collapsible derrick mast, a mast frame comprising an inner frame portion and relatively swingable outer frame portions adapted to be secured together at the central longitudinal vertical plane of the mast in alinement with said inner frame portion to form an extension of the latter when the mast is extended, said outer frame portions being pivotally mounted at the opposite sides of said inner frame portion to swing relative to the latter about parallel axes and swingable when released from one another laterally in opposite directions about their pivots into folded positions wherein they extend along the opposite sides of said inner frame portion when the mast is collapsed.

7. In a collapsible derrick mast, a mast frame pivoted to swing in a vertical direction about a horizontal axis and comprising an inner frame portion and relatively adjustable, swingable outer frame portions adapted to be secured together at the central longitudinal vertical plane of the mast to form an extension of the latter when the mast is extended, said outer frame portions being pivotally mounted on said inner frame portion at the opposite sides of the latter to swing relative thereto about axes at right angles to said mast frame pivot axis and swingable when released from one another laterally in opposite directions about their pivots relative to said inner frame portion into positions wherein they extend along the opposite sides of said inner frame portion when the mast is collapsed.

8. In a collapsible derrick mast, a mast frame mounted for swinging movement in a vertical direction about a horizontal axis and comprising a rigid inner frame portion and laterally swingable outer frame portions adapted to be secured together at the central longitudinal vertical plane of the mast to form an extension of the latter when the mast is extended, said swingable outer frame portions being pivotally mounted on said inner frame portion at the opposite sides of the latter to swing relative thereto about axes at right angles to said mast frame pivot axis and relatively swingable when released from one another about their pivotal axes laterally in opposite directions into folded positions wherein they extend longitudinally along and in substantial parallelism with the opposite sides of said inner frame portion when the mast is collapsed.

9. In a collapsible derrick mast, a mast frame mounted for swinging movement in a vertical direction about a horizontal axis and having a rigid inner frame portion and an outer frame portion comprising separable parts divided at the central longitudinal vertical plane of the mast and adapted to be secured together to form an

extension of the latter when the mast is extended, said separable parts mounted on said inner frame portion to swing relative thereto about axes at right angles to said mast frame pivot axis and relatively swingable when released from one another about their pivotal axes laterally in opposite directions into folded positions wherein they extend longitudinally along and in substantial parallelism with the opposite sides of said inner frame portion when the mast is collapsed.

10. In a collapsible, sheave supporting derrick mast, in combination, a pair of relatively movable mast parts swingable together to form conjointly a mast and swingable apart to collapse said mast, a sheave, means for supporting said sheave on the outer extremity of one of said mast portions, and means carried by the other of said mast portions to cooperate in supporting said sheave supporting means when said mast parts are brought together.

11. In a collapsible, sheave supporting derrick mast, in combination, a pair of relatively movable mast parts swingable together to form conjointly a mast and swingable apart to collapse the mast, a sheave, means fixed at one of its ends to the outer end of one of said mast parts providing a bearing for said sheave, and means at the outer end of the other mast part for receiving the other end of said bearing-providing means in the assembled relation of said mast parts.

12. In a collapsible derrick mast, a mast frame pivotally mounted for swinging movement in a vertical direction about a horizontal axis and including cooperating frame parts adapted to be joined together when in their outer extended positions along the central longitudinal vertical plane of the mast and pivoted on axes at right angles to said mast frame pivot axis to swing in opposite directions into substantial parallelism when in their collapsed inner positions.

13. In an elongated collapsible support, a supporting frame mounted for and confined to adjustment from a lowered inoperative position to a raised operative position and vice versa, and comprising a rigid inner frame part and an outer frame part mounted on said inner frame part, said outer frame part being divided along the central longitudinal vertical plane of the support and the divided parts thereof adapted to be secured together in alinement with said inner frame part when the support is extended to form an extension of said inner frame part, and the divided parts thereof being adjustable laterally in opposite directions from their extended positions into collapsed positions wherein they extend longitudinally along the opposite sides of said inner frame part.

14. In an elongated collapsible support, a supporting frame mounted for swinging movement in a vertical direction from a lowered inoperative position to a raised operative position and vice versa, comprising an inner frame part and an outer frame part, the latter being divided along the central longitudinal vertical plane of the support and the divided parts thereof adapted to be secured together to form an extension of said inner frame part when the support is extended, said divided parts being adjustable when released from one another and when said supporting frame is in its lowered inoperative position, horizontally in opposite directions from their extended positions into collapsed positions wherein they extend longitudinally along the opposite outer sides of said inner frame portion when the support is collapsed.

HARRY C. JOHANSEN.

CERTIFICATE OF CORRECTION.

Patent No. 2,183,867. December 19, 1939.

HARRY C. JOHANSEN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, lines 15, 16, 17 and 18, claim 1, strike out the words and comma "mounted for and confined to adjustment from a lowered inoperative position to a raised operative position and vice versa,"; line 19, same claim, after "parts" insert --mounted on said inner frame part--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of July, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.