Sept. 1, 1959 R. J. STODDARD ET AL 2,902,177

BLOCK STOWAGE MEANS FOR DERRICKS

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FIG. 2

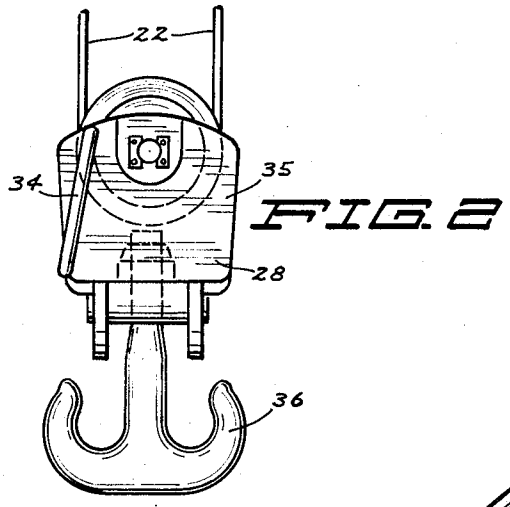


FIG. 1

FIG. 6

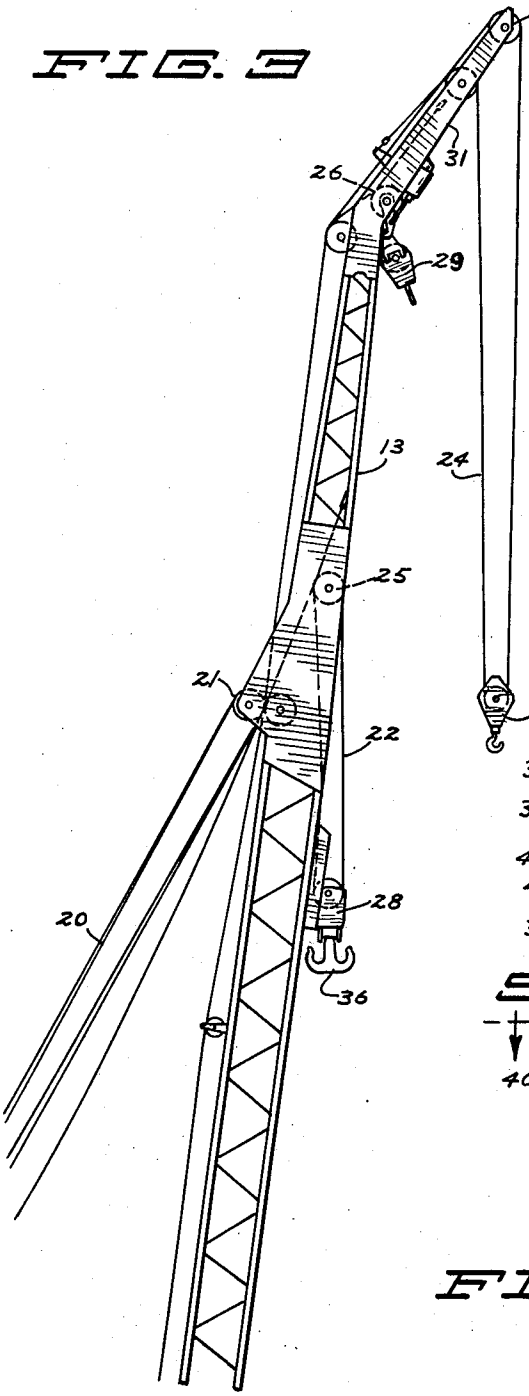
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FIG. 3



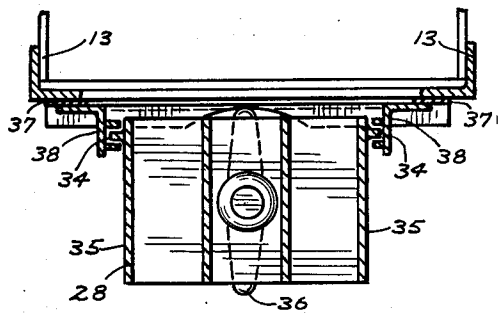


FIG. 5

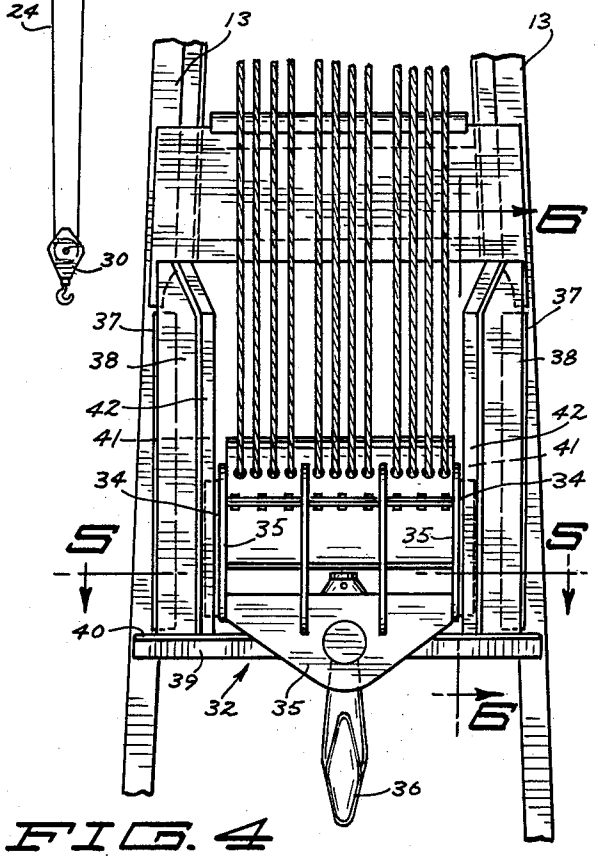


FIG. 4

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FIG. 9

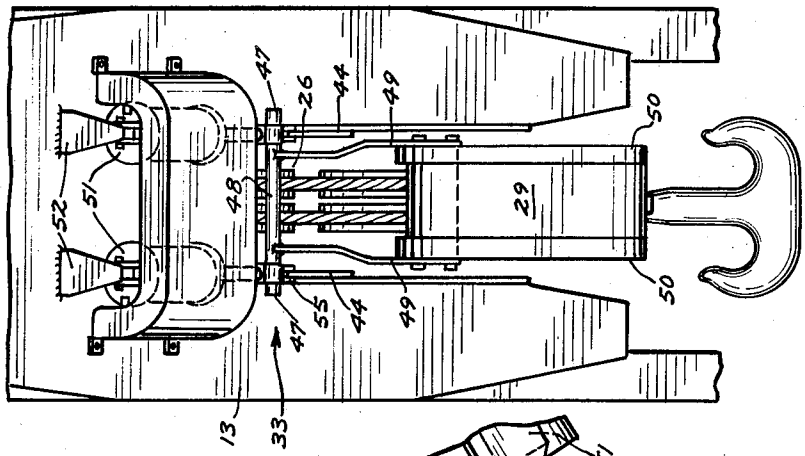


FIG. 8

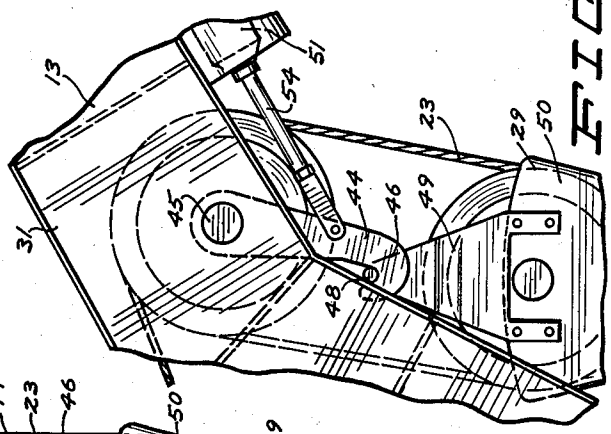
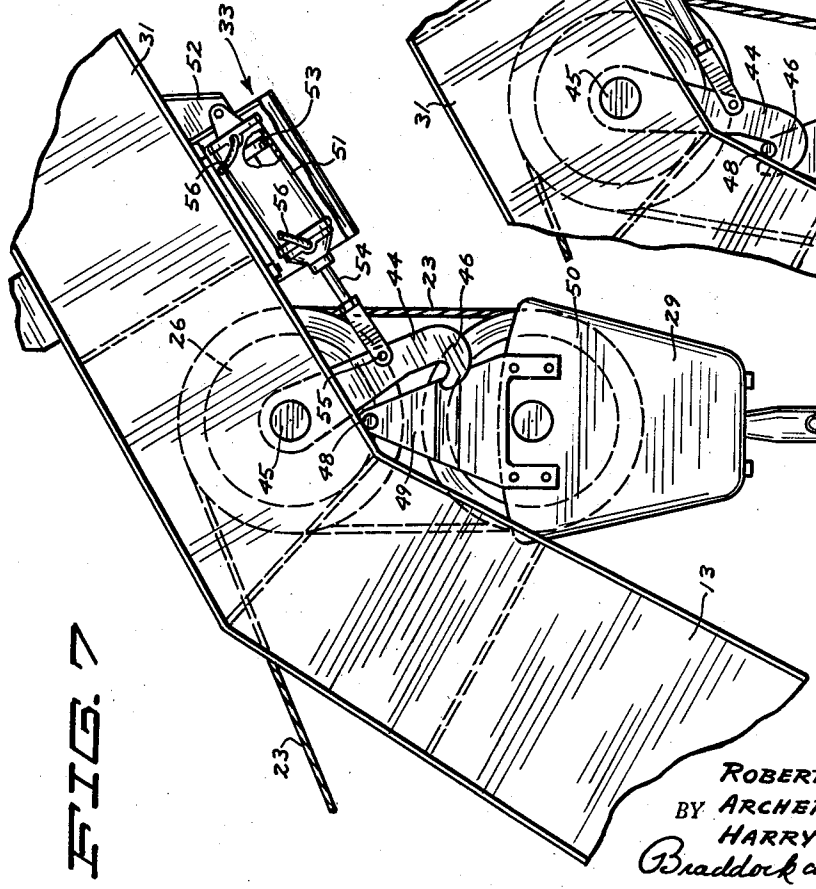


FIG. 7



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BLOCK STOWAGE MEANS FOR DERRICKS

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Application October 8, 1956, Serial No. 614,745

6 Claims. (Cl. 212—58)

The invention herein has relation to block stowage means for derricks.

Derricks heretofore known have employed a plurality of blocks suspended independently of each other by cables riding sheaves on booms of the derricks. A type of derrick at present in use incorporates a main fall or load block, an auxiliary block and a whip block independently supported by cables ridable over lower, intermediate and upper sheaves, respectively, on the boom of the derrick. It is not unusual to provide a derrick with a main fall or load block weighing as much as ten tons, to have a lifting capacity as great as 250 tons. And, too, auxiliary blocks of derricks may be quite massive and heavy. Inasmuch as heavy blocks suspended on the booms of derricks are swung through considerable arcs, as the booms are swung between minimum radius position and maximum radius position and laterally, and are liable to, and have been known to, strike and knock to pieces the booms, it is common practice either to lash heavy blocks, when not supporting loads, to the booms, or to run them up and support them in adjacent relation to the sheaves over which their cables are ridable. Lashing the blocks is an unsatisfactory procedure because requiring the expenditure of time and labor. Suspending the blocks at their highest possible positions, where adjacent to the boom, does not prevent their swinging, and possibly striking a boom, for the reason that the sheaves on a boom upon which block suspending cables are ridable move closer to the operating drums as the boom is swung toward minimum radius position and farther away from said operating drum as the boom is swung toward maximum radius position. In short, out of use blocks suspended from a boom are required to be in sufficiently spaced relation to the boom to be free to have downward and upward movement relative thereto occasioned by reason of swinging of the boom between minimum radius and maximum radius positions.

The purpose of the present invention is to provide a derrick equipped with new and improved devices for the stowage of blocks on the booms of derricks in novel and improved manner.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a side elevational view of a derrick equipped with block stowage means incorporating the features and characteristics of the invention;

Fig. 2 is an enlarged side elevational view of a main fall or load block of the derrick and parts associated therewith;

Fig. 3 is an enlarged fragmentary side elevational view of a boom of the derrick and block stowage means made according to the invention supported upon said boom;

Fig. 4 is an enlarged front elevational view of a first device constituting means for stowage of a main fall or load block of the derrick upon the boom thereof;

Fig. 5 is a transverse sectional view, taken on line 5—5 in Fig. 4;

Fig. 6 is a longitudinal sectional view, taken on line 6—6 in Fig. 4;

Fig. 7 is an enlarged side elevational view, partially broken away, of a second device constituting means for stowage of an auxiliary block of the derrick upon the boom thereof;

Fig. 8 is a view corresponding generally with the disclosure of Fig. 7 showing parts in different positions; and

Fig. 9 is a front elevational view of the disclosure of Fig. 7.

A derrick body **10** is mounted upon a barge **11** in the disclosure as made, and a turntable **12** is supported upon the derrick body to be rotatable in a horizontal plane in a manner which as such forms no part of the present invention.

A boom **13** is rotatably mounted, as at **14**, upon the turntable **12** for rotative movement between maximum and minimum radius positions, and a mast upon the turntable is denoted **15**. The boom **13** and the mast **15** can be of ordinary or preferred construction.

Operating drums on the turntable, represented **16**, **17**, **18** and **19**, respectively, can be driven and controlled in any ordinary or preferred manner, as may in a particular instance be appropriate or desirable.

The operating drum **16** supports a cable **20** which rides sheaves on the mast and sheaves **21** on an upper portion of the boom **13**. Rotation of the operating drum **16** in one direction will permit the boom to swing toward maximum radius position and rotation of said operating drum **16** in opposite direction will cause said boom to be swung toward minimum radius position.

The operating drums **17**, **18** and **19** support cables, indicated **22**, **23** and **24**, respectively, which ride sheaves on the mast and innermost, intermediate and outermost sheaves, denoted **25**, **26** and **27** respectively, on the boom and support a main fall or load block, an auxiliary block and a whip block, designated **28**, **29** and **30**, respectively, suspended from the boom. As disclosed, the sheaves **21** are at a location below the innermost sheaves **25**, the intermediate sheaves **26** are at a location along the length of the boom where an upper portion **31** thereof, in angular relation to a straight body portion of said boom, meets said straight body portion, and the outermost sheaves **27** are mounted on said upper portion of the boom.

In Figs. 4, 5 and 6 of the drawings there is disclosed a first device **32** constituting means for stowage of the main fall or load block **28**, and in Fig. 1 and 3 said first stowage device is shown as when secured upon the straight body portion of the boom **13**, at a location below and in adjacent relation to the innermost sheaves **25**.

In Figs. 7, 8 and 9 there is disclosed a second device **33** constituting means for stowage of the auxiliary block **29**, and in Figs. 1 and 3 said second stowage device is shown as when secured upon the upper portion **31** of the boom **13**, at a location above and in adjacent relation to the intermediate sheaves **26**.

The first stowage device **32** is constituted as a frame providing a pocket, open at its upper end, for receiving duplicate elongated side bars **34** upon and extending exteriorly from parallel, oppositely disposed side plates **35** of the main fall or load block **28**. The cable **22** maintains said main fall or load block in the vertical plane of the boom **13** and also maintains the widths of said oppositely disposed side plates in parallel relation to a vertical plane passed centrally through the first stowage device **32** and the main fall or load block. The elongated side bars **34** are on inner edge portions of the oppositely disposed side plates **35** and extend downwardly and inwardly to lie substantially in parallel relation to the boom.

13 when in minimum radius position. Also, said elongated side bars are in the same horizontal plane, as well as in a single plane passed through the main fall or load block in perpendicular relation to said oppositely disposed side plates. A twin hook **36** is rotatably supported upon and extends downwardly from said main fall or load block.

The frame of the first stowage device **32** includes a flat plate **37** secured up against an outer surface of the boom **13**; right and left, oppositely disposed, longitudinally extending channel pieces, each represented **38**, secured to and against the flat plate **37**, and a horizontal angle bar having an inner arm **39** thereof secured up against said flat plate and an outer arm **40** thereof spanning the distance between and engaged up against the lower ends of the channel pieces **38**. Each of the right and left channel pieces **38** includes a body member and spaced, interiorly extending inner and outer flanges, indicated **41** and **42**, respectively, providing a longitudinal slot **43** bounded at the exterior thereof by said body member, at the opposite sides thereof by said inner and outer flanges and at the bottom thereof by the arm **40**. The upper end portion of the body member of each channel piece **38** is flared exteriorly, and the upper portions of the inner and outer flanges of each channel piece are, respectively, flared inwardly and outwardly. Together, the oppositely disposed channel pieces **38** and the horizontal angle bar provide a pocket having an enlarged open upper end for reception of the elongated side bars **34** on the oppositely disposed side plates **35** of the main fall or load block **28** and bounded at the opposite sides thereof by the body members of the channel pieces **38**, at the front and rear thereof by the outer and inner flanges of said channel pieces and at the bottom thereof by the outer arm **40** of said horizontal angle bar. The inner and outer flanges **41** and **42** of the channel members **38** desirably will be spaced apart a distance greater than a measurement representing the thickness of each elongated side bar **34** so that the longitudinal slots **43**, in facing relation to each other, will loosely, slidably receive said elongated side bars. Downward movement of said elongated side bars will be limited by their engagement with the outer arm **40** of the horizontal angle bar.

The main fall or load block **28** is to be deposited into the pocket of the first stowage device **32** by swinging the boom **13** to minimum radius position, elevating said main fall or load block to position where its elongated side bars **34** are above and in alined relation to the longitudinal slots **43** and lowering said main fall or load block to cause said elongated side bars to enter said longitudinal slots, as disclosed in Figs. 3 and 6 of the drawings. Desirably, the main fall or load block **28** can be supported under tension by the cable **22**, with the elongated side bars **34** in contiguous relation to the arm **49** of the horizontal angle bar, when the boom **13** is at minimum radius position and the main fall or load block is at corresponding low elevation. The elongated side bars **34** will be caused to slide upwardly in the longitudinal slots **43** in response to movement of the boom toward maximum radius position and permitted to slide downwardly in said longitudinal slots in response to movement of said boom toward minimum radius position. The construction and arrangement will be such that when the boom is at maximum radius position and the main fall or load block is at corresponding high elevation, said elongated side bars yet will be situated in said longitudinal slots.

The second stowage device **33** includes hook members, each denoted **44**, rotatably mounted upon and extending downwardly from a transverse shaft **45** mounted in the boom **13** and rotatably supporting the intermediate sheaves **26**, having inwardly extending, upwardly facing hooks, each represented **46**, at their lower ends for receiving opposite end portions **47** of a transverse rod **48** fixed in the upper ends of duplicate triangular flat side

pieces **49** extending upwardly from parallel, oppositely disposed side plates **50** of the auxiliary block **29**. The opposite end portions **47** of the transverse rod **48** are situated exteriorly of the triangular flat side pieces **49** in the vertical planes of the hook members **44**, respectively. The cable **23** maintains said auxiliary block in the vertical plane of the boom **13** and also maintains the opposite end portions **47** of the transverse rod **48** in the vertical planes of the widths of the hook members **44**, respectively.

Cylinders **51** of the second stowage device **33** are rigidly secured, as at **52**, to an under surface of the upper portion **31** of the boom to lie in parallel relation to said upper portion and in alined relation to the hook members **44**, respectively, longitudinally of said boom upper portion. Pistons **53** longitudinally slidable in the cylinders **51**, respectively, are rigid with piston rods **54** which pass through the inner ends of the cylinders, respectively, and have their lower ends pivotally secured, as at **55**, to intermediate portions of the hook members **44**, respectively. Inlet connections **56** lead into the opposite ends of each cylinder **51** from sources (not shown) of fluid under pressure, and exhaust connections lead from said cylinders.

The construction and arrangement will be such that when the pistons **53** are adjacent the outer ends of the cylinders **51**, the right ends in Figs. 7 and 8, the hook members **44** will be out of vertical alinement with and clear of the opposite end portions **47** of the transverse rod **46**, as in said Fig. 7, and when said pistons are adjacent the inner ends of said cylinders, the left ends in Figs. 7 and 8, said hook members will be in vertical alinement with said transverse rod, as in said Fig. 8.

The auxiliary block **29** is to be suspended from the boom **13** by swinging said boom to minimum radius position, situating the hook members **44** clear of the transverse rod **48** and its opposite end portions **47**, as in Fig. 7, elevating said auxiliary block to position where the transverse rod and its opposite end positions where the transverse rod and its opposite end portions are above the elevation of the hooks **46** of said hook members, situating the hook members in vertical alinement with said transverse rod and its opposite end portions and lowering the auxiliary block to seat the opposite end portion of the transverse rods upon and in said hooks, as in Fig. 8. Fluid under pressure will be employed in a well known manner selectively to situate and maintain the pistons **53** in either the outer or inner end portions of the cylinders **51**. The cable **23** will be slack when the auxiliary block is supported upon the hook members. The magnitude of the slack will be increased with swinging movement of the boom toward minimum radius position and decreased with swinging movement of said boom toward maximum radius position. The hook members **44** will support the whole of the weight of the auxiliary block when the opposite end portions of the transverse rod are seated upon and in the hooks **46**.

Although the first stowage device **32** provides a pocket upon the boom as the instrumentality for stowing the main fall or load block **28** and the second stowage device **33** provides hook members as the instrumentality for stowing the auxiliary block **29**, said first and second stowage devices obviously have features in common. The manner of depositing the main fall or load block into its stowing instrumentality is substantially the same as the manner of depositing the auxiliary block upon its stowing instrumentality. Evidently, either of the stowage devices can be employed to stow blocks of derricks other than main fall or load and auxiliary blocks as herein illustrated and described.

What is claimed is:

1. In combination, a boom pivotally supported for swinging movement between minimum and maximum radius positions, a cable upon said boom, a block supported by a portion of said cable suspended from the

boom for upward and downward vertical movement relative to said boom, and a device upon the boom for stowing said block providing a pocket having an open upper end for receiving the block, the cable and boom being cooperatively operable to situate said block at a position where above and in vertical alinement with said pocket, said cable being operable to permit the block to be lowered by gravity to a position where stowage in said pocket, and said boom being operable toward minimum and maximum radius positions, respectively, to permit said block to be moved downwardly by gravity and to cause the block to be moved upwardly in the pocket.

2. In combination, a boom pivotally supported for swinging movement between minimum and maximum radius positions, a cable upon said boom, a block supported by a portion of said cable suspended from the boom for upward and downward vertical movement relative to said boom, and a device upon the boom for stowing said block providing a pocket having an open upper end for receiving the block, the cable and boom being cooperatively operable, by shortening the portion of said cable supporting said block to elevate the block and swinging said boom toward minimum radius position, to situate said block at a position where above and in vertical alinement with said pocket, said cable being operable, by lengthening of said portion of the cable supporting the block, to permit said block to be lowered by gravity to a position where stowed in said pocket, and said boom being operable to permit said block to be moved downwardly by gravity in the pocket in response to swinging movement of the boom toward minimum radius position and to cause the block to be moved upwardly in the pocket in response to swinging movement of said boom toward maximum radius position.

3. In combination, a boom pivotally supported for swinging movement between minimum and maximum radius positions, a cable upon said boom, a block supported by a portion of said cable suspended from the boom for upward and downward vertical movement relative to said boom, outwardly projecting means upon and at the opposite sides, respectively, of said block in alined relation transversely of the boom, and a device upon the boom for stowing said block providing a pocket having an open upper end for receiving the block and including oppositely disposed channel pieces providing longitudinal slots in facing relation to each other for slidably receiving said outwardly projecting means, respectively, the cable and boom being cooperatively operable to situate said block and outwardly projecting means at a position where above and in vertical alinement with said pocket and longitudinal slots, said cable being operable to permit the block to be lowered by gravity to a position where stowed in said pocket with said outwardly projecting means situated in said longitudinal slots, respectively, and said boom being operable toward minimum and maximum radius positions, respectively, to permit the outwardly projecting means to slide downwardly by gravity in said longitudinal slots and to cause said outwardly projecting means to be slid upwardly in the longitudinal slots.

4. In combination, a boom pivotally supported for swinging movement between minimum and maximum radius positions, a cable upon said boom, a block supported by a portion of said cable suspended from the boom for upward and downward vertical movement relative to said boom, elongated elements upon and at opposite sides, respectively, of said block in alined relation transversely of the boom, and a device upon the boom for stowing said block providing a pocket having an open upper end for receiving the block and including oppositely disposed channel elements providing longitudinal slots in facing relation to each other for slidably receiving said elongated elements, respectively, the cable and boom being cooperatively operable, by shortening the portion of said cable supporting said block to elevate the

block and swinging said boom toward minimum radius position, to situate said block and elongated elements at a position where above and in vertical alinement with said pocket and longitudinal slots, said cable being operable, by lengthening of said portion of the cable supporting the block, to permit the block to be lowered by gravity to a position where stowed in said pocket with said elongated elements situated in said longitudinal slots, respectively, and said boom being operable to permit said block to be moved downwardly by gravity in said pocket and the elongated elements to slide in said longitudinal slots in response to swinging movement of the boom toward minimum radius position and to cause the block to be moved upwardly in the pocket and said elongated elements to be slid in the longitudinal slots in response to swinging movement of the boom toward maximum radius position.

5. In combination, a boom pivotally supported for swinging movement between minimum and maximum radius positions, a cable upon said boom, a block supported by a portion of said cable suspended from the boom for upward and downward vertical movement relative to said boom, a device upon the boom for stowing said block including a hook member for supporting the block, means for rendering the cable and boom cooperatively operable to situate a portion of the block at a position where above and in vertical alinement with said hook member and said cable operable to permit the block to be lowered by gravity to position where stowed upon said hook member and supported by said boom, there being slack in the cable of increasing and decreasing magnitude with swinging movement of the boom toward minimum and maximum positions, respectively, and means operable to position the hook member clear of said block when to be elevated to situate a portion thereof above said hook member and to position the hook member in vertical alinement with the block when said block is to be stowed upon said hook member and supported by the boom, said hook member being pivotally supported upon said boom to extend downwardly therefrom, and said means being constituted as a cylinder upon the boom, a piston in said cylinder and a connecting rod upon said piston and pivotally attached to an intermediate portion of said hook member actuable in response to movement of the piston in one direction in the cylinder to position the hook member clear of the block and to movement of said piston in opposite direction in said cylinder to position said hook member in vertical alinement with said block.

6. In combination, a boom pivotally supported for swinging movement between minimum and maximum radius positions, a cable upon said boom, a block supported by a portion of said cable suspended from the boom for upward and downward vertical movement relative to said boom, outwardly projecting means upon and at the opposite sides, respectively, of said block in alined relation transversely of the boom, a device upon the boom for stowing said block including hook members for supporting said outwardly projecting means, means for rendering the cable and boom cooperatively operable, by shortening the portion of said cable supporting said block to elevate the block and swinging said boom toward minimum radius position, to situate said outwardly projecting means at a position where above and in vertical alinement with said hook member and said cable operable, by lengthening of said portion of the cable supporting the block, to permit the block to be lowered by gravity to position where said outwardly projecting means are stowed upon said hook members, respectively, and said block is supported by said boom, swinging movement of said boom between minimum and maximum radius positions causing slack of increasing and decreasing magnitude to exist in the portion of said cable supporting said block with swinging movement of the boom toward minimum and maximum radius positions, respectively, and means

operable to position the hook members clear of said block and its outwardly projecting means when to be elevated to situate said outwardly projecting means at a position where above said hook members and to position the hook members in vertical alinement with the outwardly projecting means when said block is to be stowed upon said hook members and supported by the boom, said hook members being pivotally supported upon said boom to extend downwardly therefrom, and said means operable to position the hook members clear of and in vertical alinement with the block and its outwardly projecting means being constituted as spaced, parallel cylinders upon the boom, pistons in said cylinders, respectively, and connecting rods upon said pistons, respectively, and pivotally attached to intermediate portions of said hook members,

respectively, actuable in response to movement of the pistons in one direction in the cylinders to position the hook members clear of the block and its outwardly projecting means and to movement of said pistons in opposite direction in said cylinders to position said hook members in vertical alinement with said outwardly projecting means.

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