Aug. 1, 1961 M. R. BOWERMAN ET AL 2,994,513

DUAL HOOK BLOCK HOISTS

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Fig. 2.

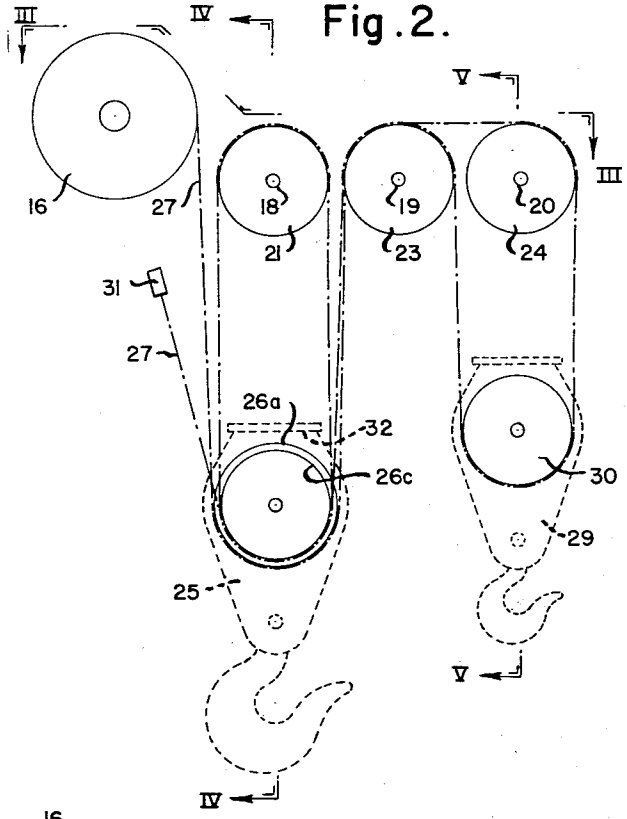


Fig. 4.

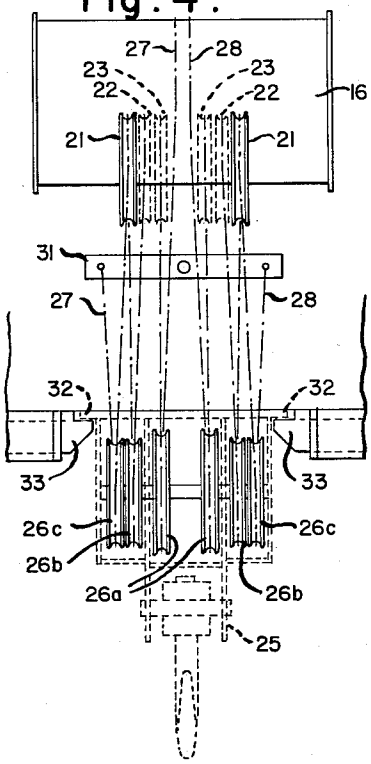


Fig. 3.

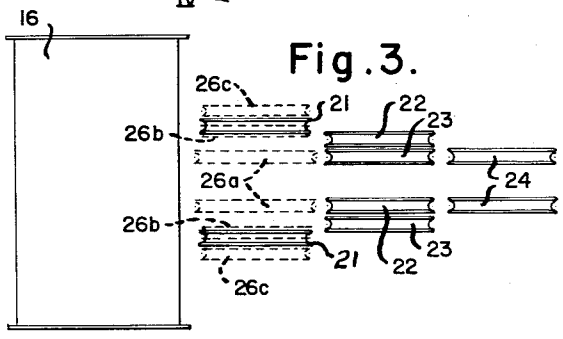
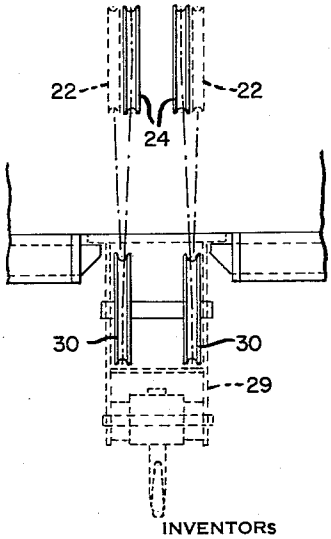


Fig. 5.



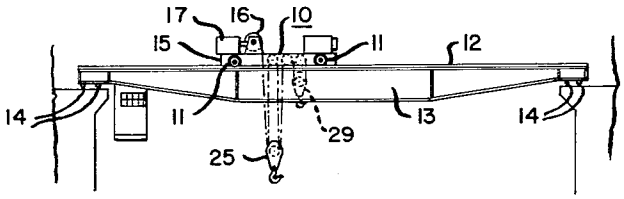


Fig. 1.

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Fig. 7.

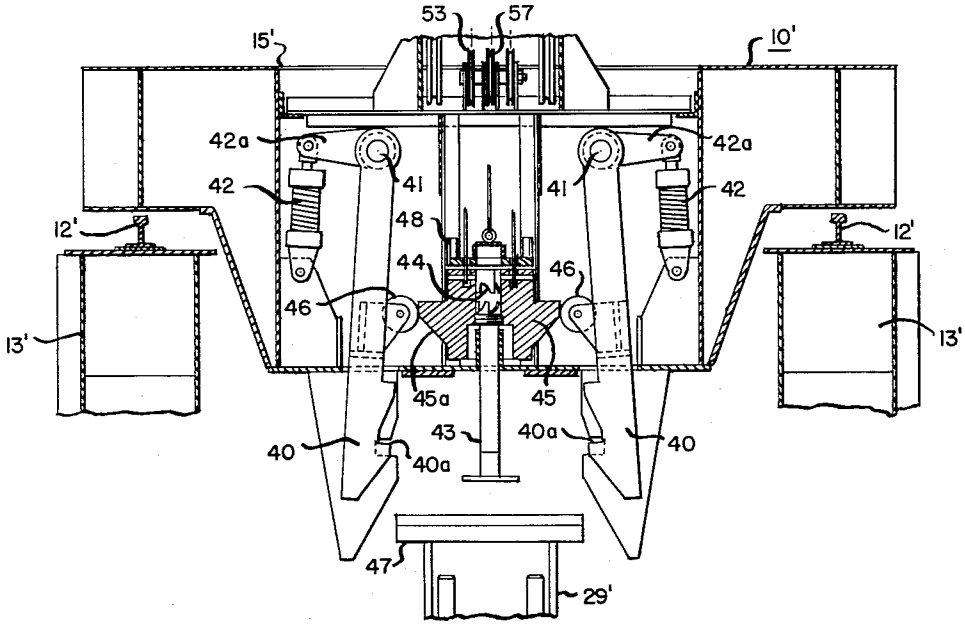
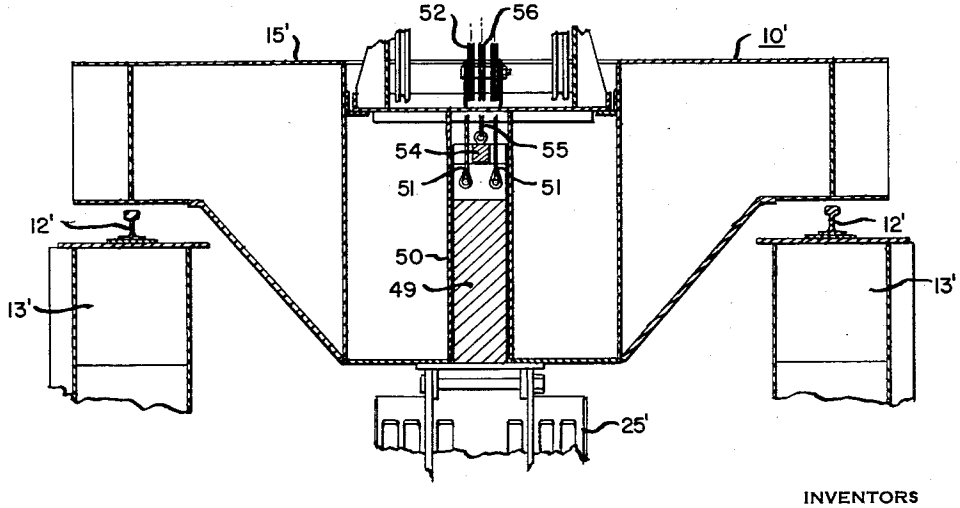


Fig. 6.



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DUAL HOOK BLOCK HOISTS

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7 Claims. (Cl. 254—168)

This invention relates to dual hook block hoists and particularly to a dual hook block operable as two separate parts from a single drive.

There are frequently instances where it is desirable to have a fast moving light hook block operable on the same crane with a heavy duty, heavy load carry hook. In the past this has necessitated two separate drive systems and two separate hoisting drums. Generally, these two hoisting drums and drive units were spaced apart on the crane frame, requiring heavier load bearing members as well as the additional expense of the second hoisting system.

We have invented a double block hoist structure which provides both a light duty fast operating hook block independently operable on the same hoisting mechanism as the main heavy duty block. We preferably provide a crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoisting drum, a cable on said drum extensible and retractable by rotation of said drum, spaced sheave means on the main frame on parallel axes, a main hook block, a main hook on said block, sheave means in said hook block receiving said cable in multiple reeving with the sheave, means on the main frame whereby said main hook block depends from said main frame, a secondary hook block spaced from the main hook block and receiving said cable from one of said spaced shaves, means on the frame whereby said secondary hook block depends from the main frame, locking means on the main frame releasably locking the main hook block thereto whereby to selectively hold said main hook block against movement relative to the main frame and permit independent movement of the secondary hook block.

In a preferred form of our invention we provide two cables on the drum fixed at one end to the drum, reeved over the sheaves on the frame and on the main and secondary hook blocks and fixed at the other end to an equalizing bar on the main frame.

In the foregoing general description we have set out certain objects, advantages and purposes of our invention. Other objects, advantages and purposes will be apparent from a consideration of the following description and the accompanying drawings in which

FIGURE 1 is a side elevation of a crane embodying the dual hook block structure of this invention;

FIGURE 2 is a schematic view of the sheave arrangement of the structure shown in FIGURE 1;

FIGURE 3 is a top plan view of the sheave arrangement shown in FIGURE 2 on the line III—III;

FIGURE 4 is a section on the line IV—IV of FIGURE 2;

FIGURE 5 is a section on the line V—V of FIGURE 3;

FIGURE 6 is a transverse section through the main hoist block of a second embodiment of our invention; and

FIGURE 7 is a transverse section through the secondary hoist block of the embodiment of FIGURE 6.

Referring to the drawings, we have illustrated a conventional crane trolley **10** movable on wheels **11** on tracks **12** of crane girders **13**. The crane girders **13** are in turn movable on tracks **14** on the main building frame. The trolley **10** is provided with a main frame **15** carrying a hoisting drum **16** driven by a drive motor **17** in conventional fashion. Three sets of sheaves are provided on the main frame on spaced parallel shafts **18**, **19** and **20** parallel to the axis of the hoist drum **16**. Two sheaves **21** are provided on shaft **18**. Two pairs of sheaves **22**, **23** are provided on the intermediate shaft **19** and two sheaves **24** are provided on shaft **20**. A main hook block **25** carrying sheaves **26***a*, **26***b* and **26***c* depends from hoisting cables **27**, **28**. A secondary hook block **29** depends on sheaves **30** from the same cable but on a spaced apart axis. The cables **27**, **28** are reeved under sheaves **26***a* on the main hook block. From sheaves **26***a* they pass over sheaves **23** on the main frame, from sheaves **23** under sheaves **30** on the secondary block. From sheaves **30** the cables are returned over sheaves **24** on the main frame and thence over sheaves **22** then over sheaves **26***b* on the main hook block **25**, then over sheave **21** on the main frame, under sheaves **26***c* on the main hook block **25** and are fixed at their free ends to the equalizer **31** which is pivotally attached to the main frame. The main hook block **25** is provided with lugs **32** extending outwardly from each side. These lugs **32** are engaged by latches **33** movable on the main trolley frame by means of solenoids (not shown) or similar actuating mechanisms. These latches may be operated pneumatically, manually, electrically or by any other suitable well known means.

When it is desired to operate the secondary hook block **29** the main hook block **25** is raised to the point where the latches **33** engage and hold the lugs **32**. Rotation of the drum **16** to pay out cables **27** and **28** through sheaves **26***a*, **23** and **24** and **30** will then lower the secondary hook block **29** without movement of the main hook block. When it is desired to use the main hook block **25** the secondary hook block **29** is raised into contact with the trolley frame, the latches **33** are released and the weight of the main hook block holds the secondary hook block in position.

If by chance the secondary hook block is in the lowered position when the main hook block is released the weight of the main hook block will immediately raise the secondary hook block into contact with the main frame. In order to prevent this an interlock system may be used in conjunction with latches on the secondary hook block. We have illustrated such a device in FIGURES 6 and 7. In FIGURES 6 and 7, we have shown a secondary hook block **29′** depending below the main frame. Parts corresponding to those of the first embodiment are given the same reference characters but with a prime added thereto. Latches **40** are pivoted on shafts **41** on the frame and are urged toward the closed position by springs **42** acting on crank arms **42***a*. When the block **29′** is raised, it contacts plunger **43** which rises until it indexes itself in notches **44** of weight block **45**. As block **29′** continues to rise it raises the weight block **45** and permits rollers **46** to run down inclined surfaces **45***a* on block **45** until the notches **40***a*, in the latches **40**, engage flanges **47** on block **29′**. At the same time, limit switch weight **48** is raised and the limit switch (not shown) is tripped. When the drum is next rotated to pay out the lowering cables, block **29′** is prevented from lowering by latches **40**. The main hoist block **25′** is lowered, at the same time, weight **49** moving in housing **50**, is lowered. Weight **49** is connected to weight **45** by cables **51** which pass over sheaves **52** and **53** on the frame, thus causing weight **45** to rise to its highest position allowing the plunger **43** to index itself to the next position. As the weight **49** lowers, the limit switch weight **54** is also lowered and acts to reset the limit switch. Weight **54** is connected to the switch by means of cable **55** passing over sheaves **56** and **57** on the frame. When the main block **25′** is returned, it will engage the counter-weight **49** raising it and lowering weight **45** until the plunger **43** engages the top of auxiliary

block 29. Further lowering of weight 45 causes the plunger 43 to turn so that the weight 45 lowers around it. As the weight 49 nears the top of its stroke it raises the switch-weight 54 tripping the limit switch. By this time the weight 45 will have reached the bottom of its stroke and will open the latches 40. The auxiliary block 29' will then drop, taking up slack cable until the main hoist block 25' is tight to the frame. As the drum pays out rope, the secondary block 29' is lowered allowing the plunger 43 to drop to its lowermost position at which time the limit switch weight 48 drops, resetting the limit switch.

The present arrangement of main and secondary hook blocks makes it possible to operate the secondary hook block with the minimum of sheave movement in the main hook block and with a minimum of cable movement through the main hook block. This sheaving arrangement is important for the reason that it reduces the wear on the cables as well as the resistance to movement and therefore the loss of energy occurring when all of the sheaves move in both hook blocks on the main frame.

While we have illustrated and described a presently preferred embodiment of our invention it will be understood that this invention may be otherwise embodied within the scope of the following claims.

We claim:

1. A dual block hoist structure comprising a main crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoist drum, a cable on said drum extensible and retractable by rotation of said drum, spaced sheave means on said main frame on three parallel axes on one side of the drum, one axis adjacent the drum, one axis remote from the drum and one axis intermediate the adjacent and the remote axes, a main hook block, a main hook on said block, sheave means on said main hook block receiving said cable in multiple reeving with said sheave means on said main frame whereby said main hook block depends from said main frame, a secondary hook block spaced from said main hook block and receiving said cable from one of said spaced sheave means on said frame whereby said secondary hook block depends from said main frame, locking means on said main frame releasably holding said main hook block thereto whereby to selectively hold said main block against movement relative to said frame, and means selectively operating said locking means whereby main hook block is released and said secondary hook block is held against movement relative to said frame by the weight of said main block.

2. A dual block hoist structure comprising a main crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoist drum, a cable on said drum extensible and retractable by rotation of said drum, spaced sheave means on the main frame on three parallel axes on one side of the drum, one axis adjacent the drum, one axis remote from the drum and one axis intermediate the adjacent and the remote axes, a main hook block, a main hook on said block, sheave means in said main hook block receiving said cable from said drum, and passing it to sheave means on said intermediate sheave axis on said main frame whereby said main hook block depends from said main frame, said cable passing therefrom to a sheave on said axis remote from said drum, a secondary hook block spaced from said main hook block and receiving said cable from said sheave means on said remote axis and returning it to a second sheave on said intermediate axis whereby said secondary hook block depends from said main frame, said cable passing from said second sheave to a sheave on said main hook block and in multiple reeving with said block and sheave means on said axis adjacent said drum to an equalizer means on said frame, locking means on said main frame releasably holding said main hook block thereto whereby to selectively hold said main block against movement relative to the frame, and means selectively operating said locking means.

3. A dual block hoist structure comprising a main crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoist drum, a cable on said drum extensible and retractable by rotation of said drum, three spaced parallel sheave axes on said frame generally parallel to and on one side of the drum, one adjacent the drum, one remote from the drum and one intermediate the adjacent and the remote axes, a main hook block, a main hook on said block, sheave means in said main hook block, sheave means on said sheave axis adjacent said drum receiving said cable in multiple reeving with said main hook sheave whereby said main hook block depends from said main frame, a secondary hook block spaced from said main hook block and receiving said cable from one of said sheave means on both said axis remote from said drum and said intermediate axis whereby said secondary hook block depends from said main frame, locking means on said main frame releasably holding said main hook block thereto whereby to selectively hold said main block against movement relative to said frame, and means selectively operating said locking means whereby said main hook block is released against movement relative to said frame and means selectively operating said locking means.

4. A dual block hoist structure comprising a main crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoist drum, a cable on said drum extensible and retractable by rotation of said drum, three spaced parallel sheave axes on said frame generally parallel to and on one side of the drum forming an adjacent axis, an intermediate axis and a remote axis from said drum, sheave means on said adjacent axis, a main hook block, first sheave means on said main hook block receiving said cable from said drum, sheave means on said intermediate axis receiving said cable from said first sheave means, sheave means on said remote axis receiving said cable from said sheave means on said intermediate axis, a secondary hook block spaced from said main hook block, sheave means on said secondary hook block receiving said cable from said sheave means on said remote axis and returning said cable to second sheave means on said intermediate axis whereby said secondary hook block depends from said main frame, second sheave means on said main hook block receiving said cable in multiple reeving with sheave means on said adjacent axis, locking means on said main frame releasably holding said main hook block thereto whereby to selectively hold said main block against movement relative to said frame, and means selectively operating said locking means.

5. A dual block hoist structure comprising a main crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoist drum, a pair of cables on said drum extensible and retractable by rotation of said drum, three spaced parallel sheave axes on said frame generally parallel to and on one side of the drum forming an adjacent axis, an intermediate axis and a remote axis from said drum, sheave means on said adjacent axis, a main hook block, first sheave means on said main hook block receiving said cables from said drum, sheave means on said intermediate axis receiving said cables from said first sheave means, sheave means on said remote axis receiving said cables from said sheave means on said intermediate axis, a secondary hook block spaced from said main hook block, sheave means on said secondary hook block receiving said cables from said sheave means on said remote axis and returning said cables to second sheave means on said intermediate axis whereby said secondary hook block depends from said main frame, second sheave means on said main hook block receiving said cables in multiple reeving with sheave means on said adjacent axis, equalizer means on said frame engaging said ends of said cables and equalizing relative variations therein, locking means on said main frame releasably holding said main hook block thereto whereby to selectively hold said main block against

movement relative to the frame, and means selectively operating said locking means.

6. A dual block hoist structure comprising a main crane frame, a hoisting drum on said frame, drive means on the frame for driving the hoist drum, a cable on said drum extensible and retractable by rotation of said drum, three spaced parallel sheave axes on said frame generally parallel to and on one side of the drum forming an adjacent axis, an intermediate axis and a remote axis from said drum, sheave means on said adjacent axis, a main hook block, first sheave means on said main hook block receiving said cable from said drum, sheave means on said intermediate axis receiving said cable from said first sheave means, sheave means on said remote axis receiving said cable from said sheave means on said intermediate axis, a secondary hook block spaced from said main hook block, sheave means on said secondary hook block receiving said cable from said sheave means on said remote axis and returning said cable to second sheave means on said intermediate axis whereby said secondary hook block

depends from said main frame, second sheave means on said main hook block receiving said cable in multiple reeving with sheave means on said adjacent axis, locking means on said main frame releasably holding said main hook block thereto whereby to selectively hold said main block against movement relative to said frame, a second locking means on said main frame releasably locking said secondary hook block against movement relative to said frame and means selectively operating said locking means.

7. A dual hook block hoist structure as claimed in claim 6, wherein interlocking means is provided on the frame, automatically, successively releasing the latches on the hook blocks as the hook blocks are ultimately raised to the frame.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,994,513 August 1, 1961

Myron R. Bowerman et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 35, for "shaves" read -- sheaves --; column 3, line 45, before "main" insert -- said --.

Signed and sealed this 2nd day of January 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents

USCOMM-DC