Oct. 2, 1956 H. J. MARTIN 2,765,145

SHEAVE BLOCK FOR STRINGING ALUMINUM CABLE

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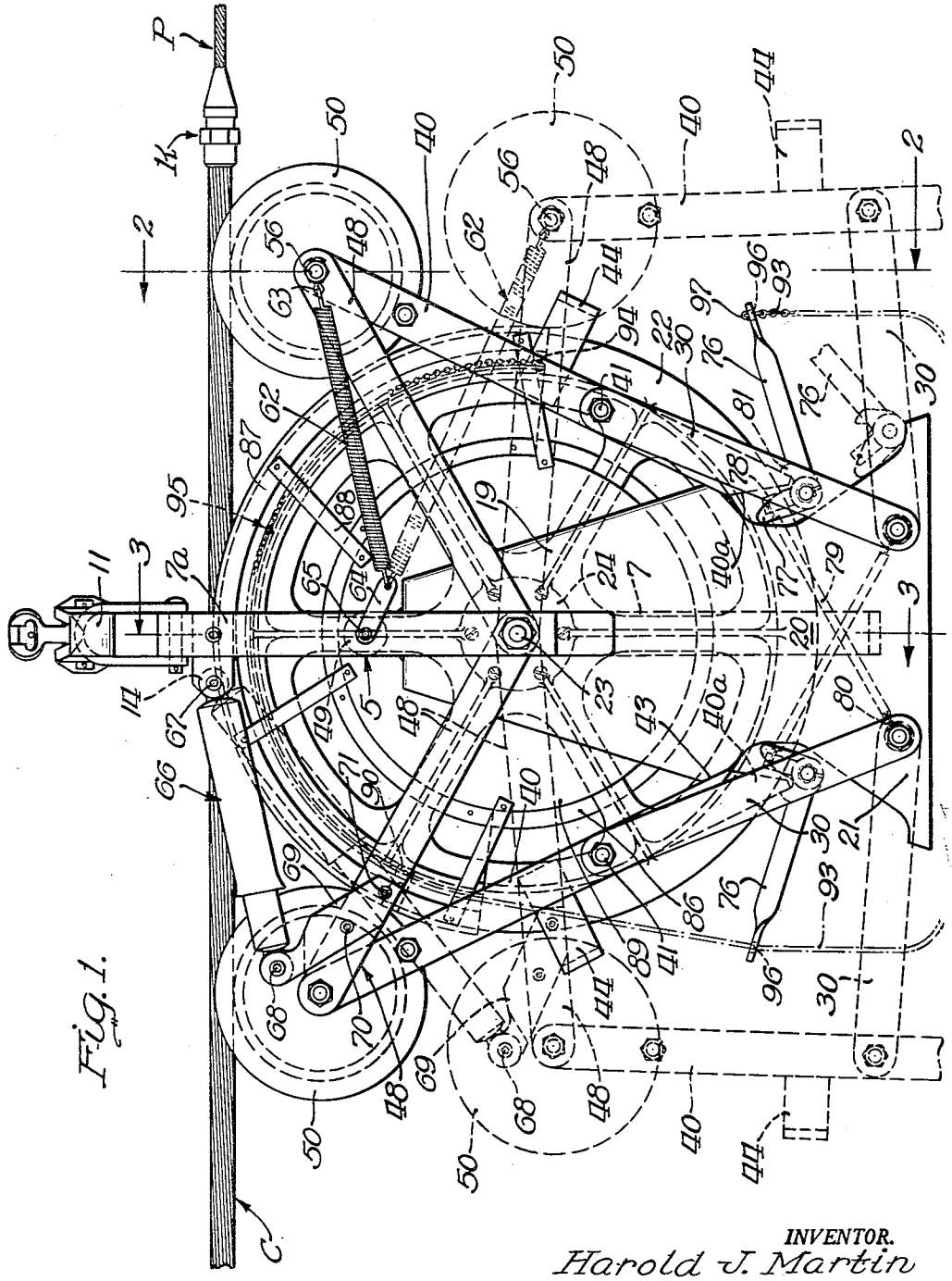


Fig. 1.

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Fig. 2.

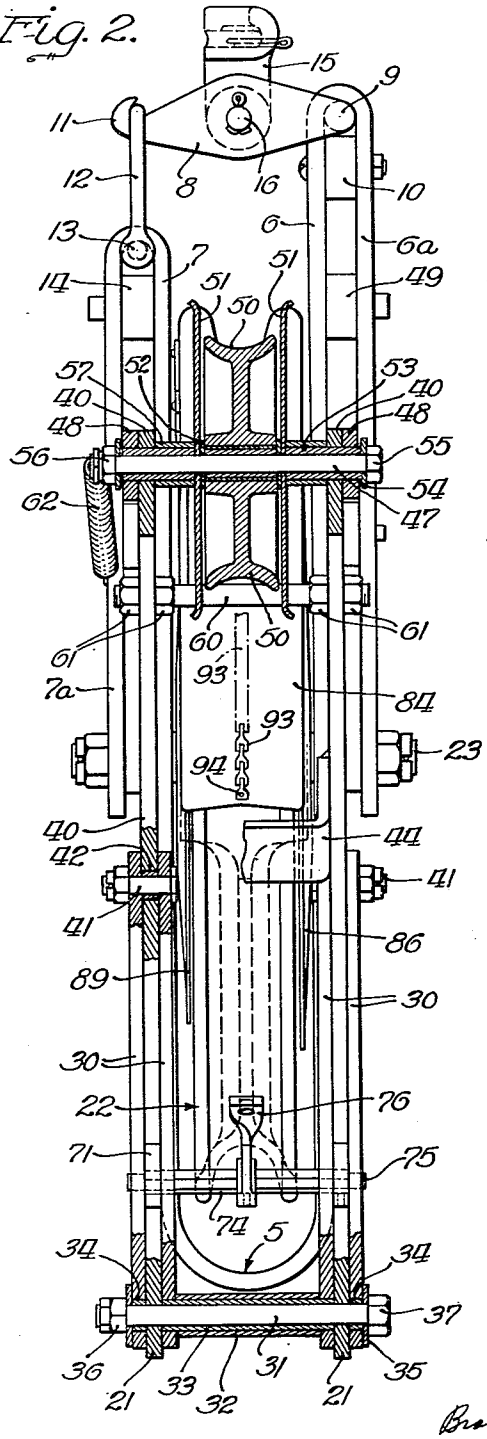
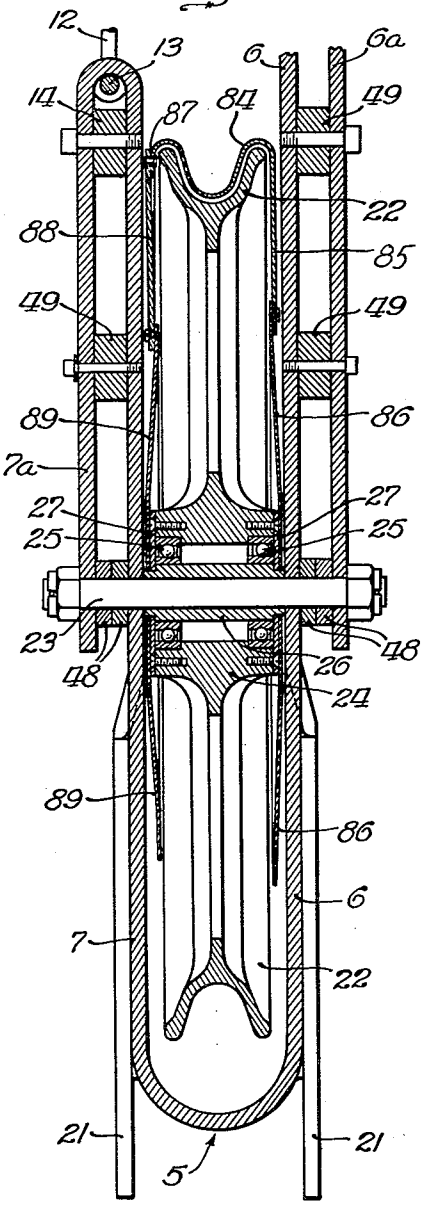


Fig. 3.



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SHEAVE BLOCK FOR STRINGING ALUMINUM CABLE

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13 Claims. (Cl. 254—134.3)

This invention relates to sheave blocks and has to do with a sheave block particularly suitable for stringing stranded soft aluminum high tension electric cables, though it may be used for other purposes.

Aluminum cable to be used in high tension electric lines is given a smooth and highly polished finish. Any scratches or roughness in the cable produces a strong corona effect when the cable is energized with resultant loss of energy and serious electric and magnetic interference with telephone, telegraph, radio and television on communication networks. It is important in stringing aluminum cable that it be kept in a thoroughly clean condition and guarded against contact with the ground or with materials, such as dirt or abrasives, of a character to scratch or otherwise mar the smooth and polished surface of the cable.

My invention is directed to a sheave block for stringing aluminum cable and which effectively guards the cable against contact with foreign substances such as would scratch or mar its surface. The sheave block comprises members over which the pull rope passes, for stringing the cable, and a cable sheave which receives the cable only and is not contacted by the pull rope. That prevents depositing of dirt and abrasives on the cable sheave by the pull rope thereby assuring that the cable sheave is maintained in a clean condition and guarding against marring or scratching of the cable. The members which receive the pull rope preferably also are sheaves and normally are supported at radially opposite sides of the main or cable sheave in position extending above the latter. The pull rope sheaves so supported receive the pull rope attached to one end of the cable for pulling the latter into position overlying the cable sheave. I also provide a guard normally extending about the upper portion of the cable sheave, between the latter and the pull rope sheaves, effective for preventing dirt, abrasives or other foreign materials from dropping off of the pull rope onto the cable sheave. The guard is moved from its normal operative position to an inoperative position clear of the upper portion of the cable sheave, by means effective for releasing the pull rope sheaves and thereby lowering the cable onto the cable sheave, after the guard is moved to inoperative position. Further objects and advantages of my invention will appear from the detail description.

In the drawings:

Figure 1 is a side view of a sheave block embodying my invention, showing a cable pulled into position above the cable sheave by a pull rope passed over the pull rope sheaves.

Figure 2 is a sectional view taken substantially on line 2—2 of Figure 1, certain parts being shown broken away and in section and certain other parts being shown in elevation; and

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 1, certain parts being shown in elevation.

The sheave block comprises a frame 5 of elongated U-shape, one arm 6 of which is of appreciably greater

length or height than the other arm 7. Arm 6 is bent downward to provide a supplementary arm 6*a* spaced a short distance outward from and paralleling arm 6, and arm 7 is also bent downward and outward to provide a supplementary arm 7*a* parallel with and spaced outwardly from arm 7. A hook 8 is pivoted at one end, at 9, in the loop connecting the upper ends of the arm 6 and the supplementary arm 6*a* and is there restrained against downward movement by a spacer 10 secured in position between the arm 6 and the supplementary arm 6*a*. Hook 8 is provided at its other end with a curved bill 11 which engages about the bight portion of a clevis 12 pivoted at its lower end, at 13, in the loop connecting the upper ends of the arm 7 and supplementary arm 7*a*, downward movement of the clevis being limited by a spacer 14 secured between arm 7 and supplementary arm 7*a*. A hook carrier 15 is pivoted at its lower end, at 16, to hook 8 at the midlength thereof. The hook 8 and associated parts provide means for suspending the frame 5 from a suspension tower in position for stringing of the cable.

A plate 19 of generally triangular shape and provided with a reduced neck 20 extending upward from a widened base 21 is suitably secured, conveniently by welding, to each side of the frame 5. A main or cable sheave 22 is rotatably mounted in frame 5 on a pin or axle 23 suitably secured through the arms of the frame. Hub 24 of the main or cable sheave 22 is mounted by ball bearings 25 on a shouldered sleeve 26 rotatably mounted on axle pin 23, the bearings 25 being retained in position by annular retainers 27 suitably secured to the ends of hub 24. The main or cable sheave 22 is thus mounted for rotation in frame 5 for support thereby on a suspension tower by suitable means.

Two pairs of lower toggle links 30 are provided at each side of frame 5 and are disposed at opposite sides of and equidistant from the vertical plane of the axis of the main sheave 22. The links 30 of each of the two pairs at opposite sides of the frame are pivoted at their lower ends on a pivot pin or bolt 31 passing through bases 21 of plates 19 and through the lower ends of links 30, suitably disposed spacing sleeves 32 and 33 of appropriate lengths being mounted on pin 31 for spacing the lower ends of the inner links 30 and the lower ends of the bases 21 apart, spacing collars 34 being mounted on pin 31 between bases 21 and washers 35 mounted on pin 31 at the outer faces of bases 21, collars 34 fitting snugly through corresponding openings in the lower ends of the outer links 30 and being clamped between the washers 35 and bases 21. A castellated nut 36 is screwed on one end of pin 31 and in cooperation with head 37 of pin or bolt 31 holds the washers 35 seated on the outer ends of collars 34, which guards against binding of the outer links 30 so as to assure ease of turning thereof. The pairs of lower links 30 are thus pivoted on the bolt 31 for free swinging movement thereabout.

An upper toggle link 40 is pivoted, remote from its lower end, between the upper ends of each pair of lower links 30, by means of a pivot pin secured through the links 30 and 40 and a spacing collar 42 mounted on pin 41 and extending through a corresponding opening in link 40 for holding the upper ends of the links 30 spaced apart effective for preventing binding between the links 30 and 40. The link 40 extends downward a substantial distance beyond pivot pin 41 and, when the toggle comprising the links 30 and 40 is extended as in Figure 1, contacts at its inner edge a shoulder 43 of plate 19 effective for preventing inward movement of the lower end of link 40 and thus maintaining the toggle in its extended condition. The upper links 40 at the axially opposite sides of the main sheave 22 and

at the same side of the axis thereof are connected by a U-shaped bracket 44 welded or otherwise suitably secured thereto a short distance above the pivot pin 41 and extending radially outward beyond the main sheave 22.

The upper links 40 at each side of the axis of the main sheave 22 are pivotally connected by a pivot bolt 47 to the outer ends of two supporting arms 48 pivoted at their inner ends on the outer portions of the axle pin 23, one pair of the arms 48 being disposed between arm 6 and supplementary arm 6a of frame 5 and the other pair of arms 48 being disposed between arm 7 and supplementary arm 7a of frame 5. As is shown more clearly in Figure 3, the upper portion of each plate 19 is slotted to receive the corresponding arm of frame 5 and is offset inward into the plane of that arm, in order to accommodate the lower end portions of the supporting arms 48 and permit freedom of turning thereof about the axle pin 23, as will appear more fully presently. The arms 48 also serve as spacers for holding the main and supplementary arms of frame 5 spaced apart at their lower ends, and additional spacers 49 may be provided between those arms if desired, and as shown more clearly in Figure 3. A sheave 50 is rotatably mounted on the pivot pin or bolt 47 midway between the upper toggle links 40 and in the plane of the main sheave 22. Sheave guards or discs 51 are mounted on pivot bolts 47 adjacent the sides of sheave 50 and spaced a short distance therefrom by washers 52. Spacing sleeves 53 are mounted on pivot bolt 47 and confined between the outer faces of the sheave guards 51 and washers 54 mounted on pivot bolt 47 and clamped between head 55 of bolt 47 and a castellated nut 56 screwed on the other end of bolt 47, the sleeves 53 passing through corresponding openings in arms 48 and links 40. Spacing collars 57 are mounted on the sleeves 53 and confined between the sheave guards 51 and the inner faces of the links 40. The spacing sleeves 53 extend outward a slight distance beyond the outer faces of the arms 48 and in cooperation with the collars 57 and associated parts assure proper spacing of the links 40 and arms 48 relative to the sheave guards 51 while also assuring ready turning of links 40 and arms 48 about the pivot bolt 47, as will be understood.

The sheaves 50 are of small diameter relative to the main or cable sheave 22, as shown, and are intended primarily for reception of a pull rope for pulling the cable into position overlying the main sheave, as will be explained in more detail presently. A spacer rod extends through each pair of links 40 below the corresponding sheave 50 and receives inner and outer nuts 61 screwed thereon in clamping engagement with the opposite faces of the respective links 40, effective for maintaining them in proper spaced apart relation. The rod 60 also passes through the sheave guards 51 effective for holding them against rotation. The arms 48 are of such length that when they are held in their raised operative position shown in Figure 1, with the toggles comprising the links 30 and 40 in operative or extended position, the sheaves 50 are disposed at radially opposite sides of the main sheave 22 a short distance outward therebeyond and extending a short distance thereabove. A tension spring 62 is anchored at its outer end, by a cotter pin 63, to the castellated nut 56 and pivot bolt 47, and is anchored at its inner end to a clip 64 secured by a socket headed cap screw 65 to supplementary arm 7a of frame 5, this cap screw 65 also serving to secure one of the spacers 49 in position. A shock absorber 66, of known type, is pivotally secured at one end, at 67, to spacer 14, which is extended beyond one side of arm 7a for that purpose, and is pivotally secured at its other end, at 68, to the upper end of a bracket 69 secured by set screws 70 and 71 to the outer portion of the other supporting arm 48 at the same axial side of the main sheave 22 as the arm 48 to which

tension spring 62 is connected. When the toggles are broken or released, by means to be described, the arms 48 swing downward about the axle pin 23 and the pull rope sheaves 50 and associated parts drop into their positions indicated in broken lines in Figure 1. The tension spring 62 and the shock absorber 66 provide means for cushioning such downward movement of the pull rope sheaves and associated parts, as will be understood.

Hexagonal shaft 74 extends through the inner links 30 of the two pairs of such links at the opposite sides of the axis of the main or cable sheave 22. The ends of shaft 74 are reduced to provide cylindrical studs 75 which are rotatably mounted in the outer ones of the links 30 a short distance from the lower ends thereof and spaced a short distance below the main sheave 22. A release lever 76 is secured on shaft 74 at the midlength thereof and extends outward therefrom. A cam 77 is secured on shaft 74 between the links 30 and adjacent the lower inclined end 40a of the corresponding link 40. A finger 78 projects upwardly from the inner end of lever 76 and has anchored thereto the upper end of a tension spring 79 the lower end of which is anchored at 80 to sleeve 32 associated with the two pairs of links 30 at the other side of the vertical plane of the axis of the main sheave 22. Each of the release levers 76 is further provided with a second finger 81 spaced outwardly from finger 78 and disposed to contact the outer edge of the lower end of link 40 when the toggle comprising that link and the lower links 30 is in extended position. The tension springs 79 normally hold the release levers 76 in their raised or normal position with the fingers 79 in pressure contact with the outer edges of the lower ends of the links 40 effective for restraining them against outward movement.

In order to guard against dropping of dirt and foreign materials onto the main or cable sheave 22 from the pull rope, I provide a guard 84 shaped conformably to the rim of sheave 22 and normally positioned to extend over and about the upper portion thereof. Guard 84 is provided at one side with a comparatively wide flange 85 which is secured to a disc 86 mounted on one end of sleeve 26 for turning movement therewith about the axle pin 23. The guard 84 is provided at its other side with a relatively narrow flange 87 secured by connecting strips 88 to a disc 89 mounted on the other end of sleeve 26 for turning movement therewith about the axle 23 of sheave 22. A stop member 90 is secured to flange 87 a short distance from the left hand end, as viewed in Figure 1, of guard 84. In the normal position of guard 84 shown in Figure 1, stop member 90 contacts cap screw 71 and limits turning of guard 84 in clockwise direction. In that connection, it will be noted that guard 84 extends to the right beyond the vertical plane of the axis of sheave 22 a greater distance than it extends to the left of that plane, so that guard 84 normally is held by gravity in its operative position shown in Figure 1. Obviously, if desired, the right hand end, as viewed in Figure 1, of guard 84 may be weighted for normally maintaining it in operative position.

A flexible pull member, conveniently a chain 93, extends within and about the guard 84 and is secured to the right hand end thereof as viewed in Figure 1, at 94. A cross pin 95 is carried by chain 93 and is spaced from the right hand end of guard 84 a distance somewhat less than one-half the length of the guard. The chain 93 passes downward from guard 84 through an opening or eye 96 in the outer end of the release lever at that side of sheave 22 and extends to and through an eye 96 in the other release lever 76, the other end of the chain having a cross pin 97 therein which bridges eye 96 and rests upon the lever 76.

As previously noted, it is important that the aluminum cable be guarded against marring or scratching. The

cable sheave **22** and the pull rope sheaves **50** and the shields **51** therefore are of aluminum so as to guard against marring thereby of the cable. The sheave block is appropriately mounted on a suspension tower for the cable, with the supporting arms **48** in raised position and the pull rope sheaves **50** extending above the cable sheave **22**, the guard **84** being in its normal position overlying the upper portion of sheave **22**. A pull rope P, attached to one end of the cable C by means of a cable clamp K of suitable known type, is led over the pull rope sheaves **50**. The cable C is pulled from its reel, by means of the pull rope and associated power means for exerting pull thereon, into position with its leading end portion extending between the sheaves **50** and overlying cable sheave **22** and guard **84** therefore, as shown in Figure 1. As the cable is pulled from the reel it is thoroughly brushed and cleaned and is kept out of contact with the ground by suitable means which need not be described here. As the leading end of the cable approaches the first pull rope sheave, the left hand one as viewed in Figure 1, that sheave and the portion of the pull rope adjacent thereto are brushed off to remove any dirt or other foreign materials. During the pulling operation any dirt or foreign materials which may drop from the pull rope are caught by the guard **84** which effectively prevents dirt or foreign materials from dropping onto the cable sheave **22**. When the leading end portion of the cable has been pulled into the position shown in Figure 1, the pulling operation is interrupted. Thereafter the guard **84** is moved into its lowered or inoperative position extending about the lower portion of sheave **22**, by pulling downward on the chain **93** until the pin **95** contacts the outer end of the left hand release lever **76**. That uncovers the upper portion of sheave **22** with the leading end portion of the cable C then disposed in overlying relation thereto. The portion of the chain **93** extending between the levers **76** is then grasped at its midpoint and pulled downward so as to swing the levers **76** downward and outward. During such movement of the levers, the cams contact the lower inclined ends **40***a* of the upper toggle links **40** and force them outward thus breaking or releasing the toggles. The pull rope sheaves **50** then drop by gravity into their lowered or inoperative positions indicated in Figure 1, the toggles and associated parts assuming the inoperative positions indicated, downward movement of the sheaves **50** and associated parts being cushioned by the spring **62** and the shock absorber **66**, as previously noted. The release of the sheaves **50** and the downward movement thereof lowers the cable onto the then uncovered upper portion of the sheave **22**, and the cable is then pulled over that sheave by means of the pull rope to proper extent and is secured to the string of insulators on the suspension tower in a known manner. Thereafter the sheave block is removed from the suspension tower and placed on another tower for use in the continued stringing of the cable.

It will be understood that changes in detail may be resorted to without departing from the field and scope of my invention, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred form only of my invention has been disclosed.

I claim:

1. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, two pull rope members at radially opposite sides of said cable sheave substantially in radial alignment therewith and adapted for reception of a pull rope passing thereover and of a cable pulled over one of said members into position overlying said cable sheave, and means for supporting said pull rope members in position extending above said cable sheave and for releasing said pull rope members for downward movement and thereby lowering the cable onto said cable sheave.

2. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, two pull rope sheaves at radially opposite sides of said cable sheave substantially in radial alignment therewith, and means for supporting said pull rope sheaves in position extending above said cable sheave for receiving and supporting a cable above said cable sheave and for releasing said pull rope sheaves for downward movement and thereby lowering the cable onto said cable sheave.

3. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame extending radially outward beyond said sheave, pull rope sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, and means for holding said arms in raised position with said pull rope sheaves extending above said cable sheave and for releasing said arms for downward movement and thereby lowering onto said cable sheave a cable supported thereabove by said pull rope sheaves.

4. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame extending radially outward beyond said sheave, pull rope sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, toggle means connecting said arms to said frame said toggle means in one position holding said arms in raised position with said pull rope sheaves extending above said cable sheave, and trip means for releasing said toggle means, said toggle means when released accommodating downward movement of said arms, whereby a cable supported above said cable sheave by said pull rope sheaves is lowered onto said cable sheave.

5. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame and extending radially outward beyond said sheave, pull rope sheaves rotatably mounted on said arms at opposite sides of and radially outward beyond said cable sheave in substantial alignment therewith, toggle means connecting said arms to said frame, said toggle means in one position holding said arms in raised position with said pull rope sheaves extending above said cable sheave, trip means for releasing said toggle means, said toggle means when released accommodating downward movement of said arms whereby a cable supported above said cable sheave by said pull rope sheaves is lowered onto said cable sheave, and means for cushioning downward movement of said arms.

6. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame extending radially outward beyond said sheave, pull rope sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, toggle means connecting said arms to said frame effective for holding said arms in raised position with said pull rope sheaves extending above said cable sheave, means for releasing said toggle means and thereby releasing said arms for downward movement and lowering onto said cable sheave a cable supported thereabove by said pull rope sheaves, and yielding means connecting said arms to said frame effective for cushioning downward movement of said arms.

7. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame extending radially outward beyond said sheave, pull rope sheaves rotatably mounted on said arms at opposite sides of and radially outward beyond said cable sheave in substantial alignment therewith, toggles comprising upper toggle links respectively pivoted at their upper ends to the outer ends of said arms and lower toggle links pivoted at their lower ends on said frame and respectively pivoted to said upper links, means for holding said toggles extended to hold said

arms in raised position with said pull rope sheaves extending above said cable sheave, and means for breaking said toggles to release said arms for downward movement thereby to lower onto said cable sheave a cable supported thereabove by said pull rope sheaves.

8. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame extending radially outward beyond said sheave, pull rope sheaves rotatably mounted on said arms at opposite sides of and radially outward beyond said cable sheave in substantial alignment therewith, toggles comprising upper toggle links respectively pivoted at their upper ends to the outer ends of said arms and lower toggle links pivoted at their lower ends on said frame and respectively pivoted to said upper links remote from the lower ends thereof, abutments on said frame limiting inward movement of the lower ends of said lower links and thereby maintaining said toggles extended to hold said arms in raised position with said pull rope sheaves extending above said cable sheave, and means for breaking said toggles and thereby releasing said arms for downward movement to lower onto said cable sheave a cable supported thereabove by said pull rope sheaves.

9. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame for said swinging movement about the axis of said sheave, pull rope sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, means for holding said arms in raised position with said pull rope sheaves extending above said cable sheave, a guard movable about the axis of said cable sheave between the latter and said pull rope sheaves and having a normal operative position overlying the upper portion of said cable sheave substantially concentric therewith and an inoperative position clear of the upper portion of said cable sheave, and means for moving said guard from operative position to inoperative position and thereafter releasing said arms for downward movement to lower onto said cable sheave a cable supported thereabove by said pull rope sheaves.

10. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame for swinging movement about the axis of said sheave, pull rope sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, toggle means for holding said arms in raised position with said pull rope sheaves extending above said cable sheave, a guard movable about the axis of said cable sheave between the latter and said pull rope sheaves and having a normal operative position overlying the upper portion of said cable sheave substantially concentric therewith and an inoperative position clear of the upper portion of said cable sheave, toggle release means, and means for moving said guard from operative position to inoperative position and thereafter actuating said toggle release means to release said arms for downward movement thereby to lower onto said cable sheave a cable supported thereabove by said pull rope sheaves.

11. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supporting arms pivotally mounted on said frame for swinging movement about the axis of said sheave, pull ropes sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, toggles comprising upper toggle links respectively pivoted at their upper ends to the outer ends of said arms and lower toggle links pivoted at their lower ends on said frame and respectively pivoted to said upper

links remote from the lower ends thereof, abutments on said frame limiting inward movement of the lower ends of said lower links and thereby maintaining said toggles extended to hold said arms in raised position with said pull rope sheaves extending above said cable sheave, toggle release levers pivoted on said lower links having cam elements disposed to contact the lower ends of said upper links and force the latter outward to release said toggles upon movement of said levers from inoperative to operative position, yielding means normally holding said levers in inoperative position, a guard movable about the axis of said cable sheave between the latter and said pull rope sheaves and having a normal operative position overlying the upper portion of said cable sheave substantially concentric therewith and an inoperative position clear of the upper portion of said cable sheave, and means for moving said guard from operative position to inoperative position and thereafter moving said levers from inoperative position to operative position.

12. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted in said frame, supoprting arms pivotally mounted on said frame for swinging movement about the axis of said sheave, pull rope sheaves rotatably mounted on said arms at radially opposite sides of and outwardly beyond said cable sheave in substantial alignment therewith, toggles comprising upper toggle links respectively pivoted at their upper ends to the outer ends of said arms and lower toggle links pivoted at their lower ends on said frame and respectively pivoted to said upper links remote from the lower ends thereof, abutments on said frame limiting inward movement of the lower ends of said lower links and thereby maintaining said toggles extended effective for holding said arms in raised position with said pull rope sheaves extending above said cable sheave, toggle release levers pivoted on said lower links and extending outward therebeyond, said levers having cam elements disposed to contact the lower ends of said upper links and force the latter outward to release said toggles, upon downward movement of said levers, yielding means normally holding said levers raised, a guard movable about the axis of said cable sheave between the latter and said pull rope sheaves and having a normal operative position overlying the upper portion of said cable sheave substantially concentric therewith and an inoperative position clear of the upper portion of said cable sheave, and means for moving said guard from operative position to inoperative position and thereafter moving said levers downward.

13. In a sheave block for stringing cables, a frame, a cable sheave rotatably mounted on said frame, two pull rope members movably mounted on said frame to opposite sides of said sheave, and releasable means supporting said pull rope members in a normal position extending above said sheave, said means upon release accommodating downward movement of said pull rope members to a position below the upper portion of said sheave, said pull rope members in the normal position thereof supporting a pull rope and cable in upwardly spaced relation from said sheave to protect said sheave from engagement with the pull rope, said means being releasable when the cable is positioned above said sheave to lower the cable onto said sheave.

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