April 20, 1965 J. P. BOTTEN 3,179,376

ASSEMBLY, SUCH AS A CRANE HOOK

Filed Sept. 19, 1962 2 Sheets-Sheet 1

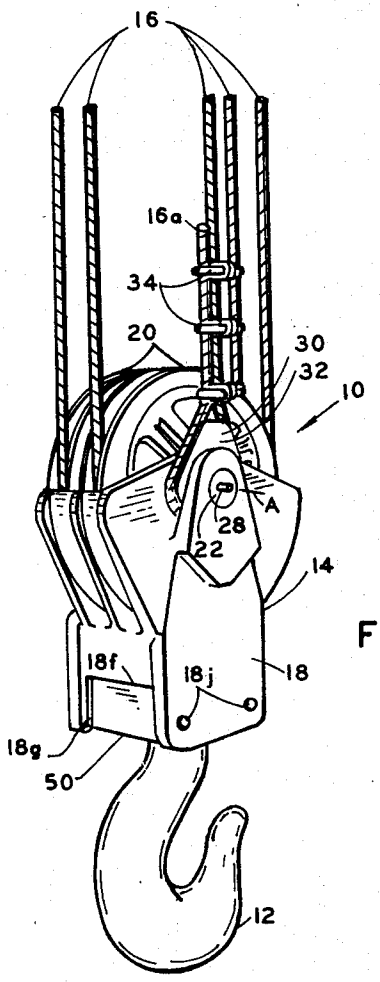


FIG. 1

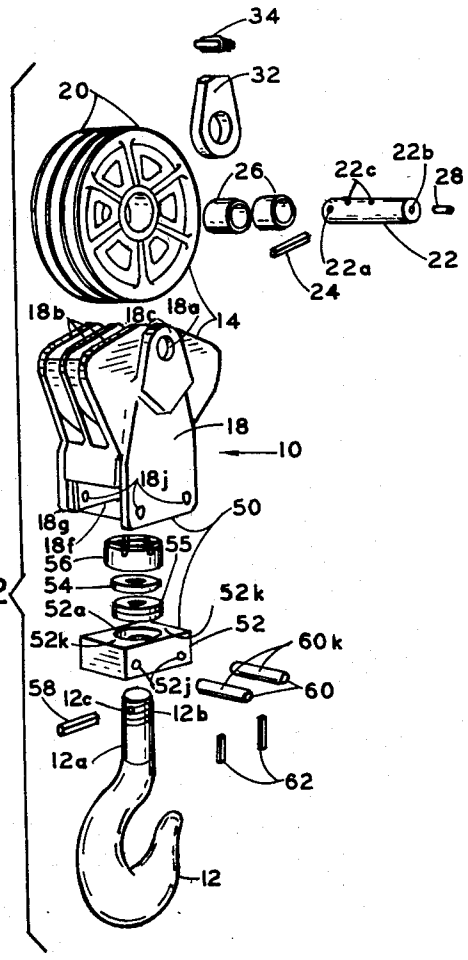


FIG. 2

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FIG. 3

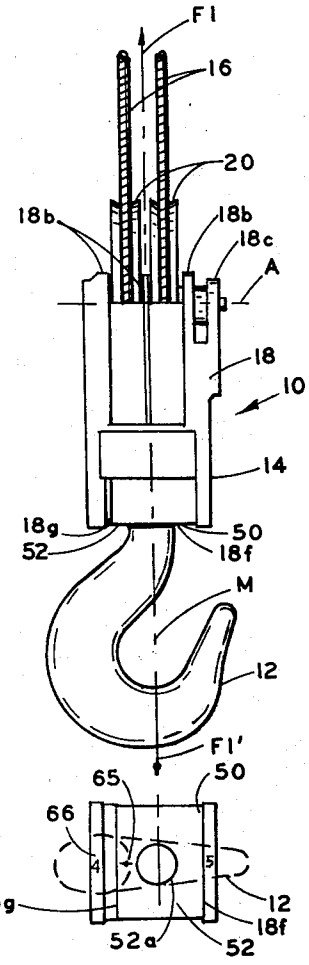


FIG. 5

FIG. 4

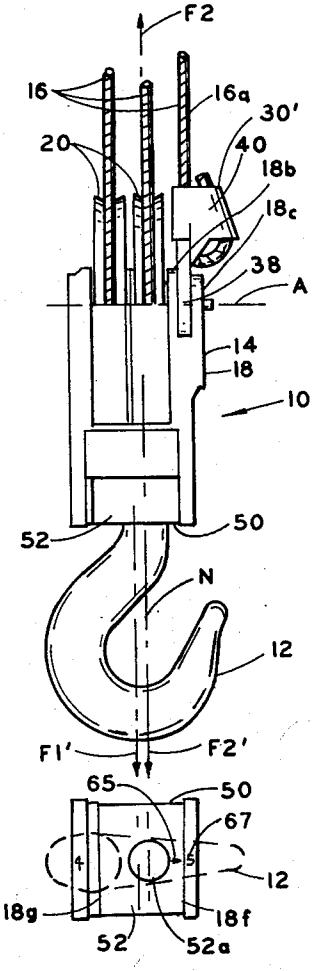


FIG. 6

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3,179,376

ASSEMBLY, SUCH AS A CRANE HOOK

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Filed Sept. 19, 1962, Ser. No. 224,809
10 Claims. (Cl. 254—192)

The present invention relates to an assembly for exerting a pulling force, such as a crane hook.

An object of the present invention is to provide a sheave block having a cable reeved thereover with said cable adapted to be dead-ended either on or off said block and constructed so that the pulling forces exerted thereon will always be coaxially aligned.

A further object of the present invention is to provide a sheave block for exerting a pulling force and constructed to prevent unnecessary wear on the sheaves or on the cable reeved thereover.

A further object of the present invention is to provide a sheave block wherein one portion thereof is easily shifted between two different positions for always centering the pulling forces thereon whether the cable reeved over the sheave is dead-ended on or off the block.

A further object of the present invention is to provide a sheave block for a crane hook (or similar pulling force exerting mechanism) characterized by its inexpensive manufacturing cost, ease of assembly of its component parts, structural simplicity, strong and sturdy nature, long wear life, ease of operation, and low operating cost.

These and other objects of the present invention will become more fully apparent by reference to the appended claims as the following detailed description proceeds in reference to the accompanying drawings wherein:

FIG. 1 is a perspective view of the assembly with the cable dead-ended on the sheave block frame;

FIG. 2 is an exploded and disassembled view of the component parts of the assembly with the cable removed therefrom;

FIG. 3 is a side elevation view of the assembly in FIG. 1 with the cable dead-ended off the sheave block;

FIG. 4 is a side elevation view of an assembly with the cable dead-ended on the sheave block, similar to the assembly shown in FIG. 1;

FIG. 5 is a partial bottom view of FIG. 3 with the lift hook shown in dashed lines for clarity of illustration; and

FIG. 6 is a partial bottom view of FIG. 4 with the lift hook shown in dashed lines for clarity of illustration.

The invention disclosed herein may be used on any assembly for exerting a pulling force but is especially adapted for use in an assembly 10 having a crane hook 12, such as found on any conventional crane or other lifting mechanism.

Although a load engageable crane hook 12 is specifically shown herein, it should be readily apparent that there may be substituted for hook 12 any force exerting attachment for transmitting any force exerted by block 14 from cable 16. Such attachment would include not only hook 12 but an eye for receiving a lift chain, etc.

In the construction illustrated, block 14 includes block frame 18 having two sheaves 20, 20 mounted on frame 18 for rotation about an axis of rotation A. Axle 22 is inserted into coaxially aligned holes 18*a* in block frame 18, is locked therein by lock pin 24 inserted radially through an aligned hole in block frame 18 and diametrical hole 22*a* in axle 22 to lock axle 22 against endwise and rotational movement relative to frame 18, and has two bearings 26 with each located between adjacent divider walls 18*b* of block frame 18 and rotatably mounting one of the sheaves 20. Grease fitting 28, screwed into axial hole 22*b* in the end of axle 22, lubricates bearings 26 by

grease supplied through grease fitting 28, axial hole 22*b*, and connected radial holes 22*c* in axle 22.

One end 16*a* of cable 16 may be connected to and dead-ended in a dead-end connector on block frame 18. Any suitable type cable dead-ended connector may be rotatably mounted on block frame 18 on axis of rotation A coaxially with sheaves 20. Here, two different forms of connectors 30 in FIG. 1 and 30 in FIG. 4 are shown. Connector 30 in FIGS. 1 and 2 has thimble 32 telescoped over axle 22 between right hand divider wall 18*b* and end wall 18*c* of block frame 18 and having grooved periphery receiving cable 16. Cable end 16*a* is locked against the vertical run of the cable by one or more screw-type rope clamps 34. In FIG. 4, different type connector 30′ has ring shape 38 at its lower end telescoped over axle 22 and located between right hand divider wall 18*b* and end wall 18*c*, and has wedge-type rope lock 40 (shown in outside view in FIG. 4 of the drawings) receiving the lower, dead-end 16*a* of cable 16.

Suitable connecting means 50 connects block frame 18 and attachment or hook 12. This means 50 includes an attachment mounting member, here shown as rectangular plate 52, having hole 52*a* eccentrically located therein within which is mounted hook element 12. Hook 12 has shank 12*a* extending up into hole 52*a*, a washer 54 and thrust bearing 55 telescoped over shank 12*a*, castellated nut 56 screwed onto threads 12*b* on shank 12*a*, and lock pin 58 telescoped through diametrically aligned grooves in nut 56 and hole 12*c* in shank 12*a*. Plate 52 is located in rectangular, member-mounting recess 18*f* in block frame 18. Block frame 18 has shim strip 18*g* located along one side of recess 18*f* so as to displace recess 18*f* off center with respect to the vertically extending center line of block frame 18 in FIGS. 3, 4, 5 and 6.

Connecting means 50 also includes a connection between plate 52 and block frame 18. Two, parallel, spaced apart pins 60 are provided with each pin being located and assembled in axially aligned pin holes 18*j* and 52*j* respectively in block frame 18 and plate 52, as shown in FIG. 1, to lock rectangular plate 52 in recess 18*f*. In this assembled position, lock pins 62 are driven vertically through aligned holes 52*k* and 60*k* respectively in plate 52 and in each pin 60 so as to lock pins 60 against axial removal.

Cable end 16*a* of cable 16 may be dead-ended in either of two positions: (1) on cable dead-end connector 30 or 30′ on block frame 18, as shown in FIGS. 1 and 4; or (2) off block 14, as shown in FIG. 3, at another location, such as on the distal end of the crane boom. However, these two different cable dead-ended positions on and off block 14 cause different forces to be exerted on blocks 14 by cable 16. For example, the runs of cable 16 exert resultant force F1 halfway between sheaves 20 in FIG. 3 but exert resultant force F2 in FIG. 4. Note that force F2 is displaced to the right relative to force F1 by dead-end 16*a* so as to exert a force F2 on block frame 18 axially displaced along axis of rotation A from force F1. Force F1′ in FIG. 4 is exerted on block frame 18 by hook 12. In FIG. 3, forces F1 and F1′ are aligned coaxially and vertically on vertical pull-line M. This alignment is necessary and desirable to eliminate unnecessary wear on sheaves 20, cable 16 and on other component parts of assembly 10; to eliminate any tendency to tip block 14; and to provide ease of pulling operation by assembly 10 by minimizing lateral or horizontal forces exerted thereon. However, if cable end 16*a* is dead-ended on block frame 18, as shown in FIG. 4, without changing the location of hook 12 on this frame 18, force F2 will be exerted on vertical pull-line N but force F1′ (located in the same position in FIGS. 3 and 4) will be laterally displaced relative thereto but in parallel relationship to force

F2 because force F2 has been displaced to the right in FIG. 4 relative to force F1. If this lateral displacement of forces F1′ and F2 in FIG. 4 is not corrected, unnecessary wear, difficult operation, and tipping of block 18 by force couple F1′, F 2 will be experienced.

The present invention eliminates this problem by permitting hook 12 to be easily displaced to the right in FIG. 4 so that force F2′ exerted by hook 12 in the new position will be aligned coaxially and vertically on vertical pull-line N with force F2 exerted by cable 16. The connecting means 50 permits selective locating of hook 12 into any of two different positions shown in FIGS. 3 and 4 during head-ending cable 16 either on block frame 18 (FIG. 4) or off block frame 18 (FIG. 3) so that force F1′ or F2′ exerted by hook 12 will always be selectively aligned coaxially on vertical pull-line M or N with force F1 or F2 exerted by cable 16 located in either of these cable dead-ended positions. This selective location of hook 12 is accomplished here by sequentially axially removing lock pins 62, axially removing pins 60, downwardly removing plate 52 from recess 18*f*, rotating plate 52 180° about the vertical axis determined by pull-line M or N, raising and reinserting plate 52 into recess 18*f*, and sequentially axially reassembling pins 60 and 62 into plate 52 in this new location. FIGS. 4 and 5 show that plate 52 has been stamped with arrow 65 and block frame 18 has been stamped with reeving numbers 66 and 67 (No. 4 in FIG. 5 corresponding to the four runs of cable 16 in FIG. 3; No. 5 in FIG. 6 corresponding to the five runs of cable 16 in FIG. 4) to indicate by their alignment the proper position of plate 52 in recess 18*f*. When the pins 60 and 62 and the plate 52 are removed, plate 52 can be rotated through a 180° arc (as aforedescribed) so that arrow 65 is turned to No. 4 (reeving number 66) for four runs of cable as in FIG. 5 and to No. 5 (reeving number 67) for five runs of cable as in FIG. 6. Hook 12 is laterally shifted in this desirable manner because of not only the eccentric location of hole 52*a* in plate 52 but also the location of shim strip 18*g* causing recess 18*f* to be laterally offset. This construction provides ease of pulling operation by assembly 10 with cable end 16*a* in either the FIG. 3 or the FIG. 4 dead-end position; eliminates any force couple tending to tip block 18; eliminates unnecessary wear on the component parts of assembly 10 commonly found to occur when hook 12 is fixed in a given location on its sheave block frame; permits easy removal of pins 60; and permits easy relocation of plate 52 for either cable dead-ended position.

In either position, hook 12 is easy to use and freely pivots in hole 52*a*. Hole 52*a* is always located on vertical pull-line M or N corresponding with the existing cable dead-end position. This hole 52*a* provides a pivot so that hook 12 can be pivoted freely on this pull-line as an axis relative to block frame 18 by the load on hook 12.

Block 14 is also free to be swung on cable 16 by the load on hook 12. This is true because sheaves 20 rotate about axis of rotation A extending perpendicular with respect to pull-line M or N through which the load on hook 12 acts.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive with the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by U.S. Letters Patent is:

1. An assembly for exerting a pulling force, comprising

(*a*) a block including
  (1) a block frame, and
  (2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,
(*b*) a cable reeved around said sheave,
(*c*) one end of said cable being dead-ended
  (1) either off said block
  (2) or on a cable dead-end connector on said block frame with said cable exerting a force on said block frame axially displaced along said axis of rotation,
(*d*) a force exerting attachment for transmitting any force exerted by said block from said cable, and
(*e*) connecting means between said block frame and said attachment selectively locating said attachment in different positions during dead-ending said cable on or off said block so that the force exerted by said attachment will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in any cable dead-ended position,
(*f*) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,
(*g*) said connecting means including an attachment mounting member,
(*h*) said attachment mounting member having an element hole eccentrically located therein,
(*i*) one of the component elements, including said block frame and said attachment, being secured in said element hole to said member,
(*j*) said member being a rectangular plate,
(*k*) said attachment being said element mounted in said element hole in said plate,
(*l*) said connecting means including a rectangular, member mounting recess in said block frame for receiving said rectangular plate, and
(*m*) said connecting means including a pair of parallel, spaced apart pins and axially aligned pin holes for each pin in said plate and block frame assembled together to lock said rectangular plate in said recess in either of two different positions for aligning said force exerted by said attachment coaxially on said pull-line with the force exerted by said cable located in either cable dead-ended position,
(*n*) so as to permit easy removal of the pins and relocation of the plate for either cable dead-ended position.

2. As assembly for exerting a pulling force, comprising

(*a*) a block including
  (1) a block frame, and
  (2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,
(*b*) a cable reeved around said sheave,
(*c*) one end of said cable being dead-ended
  (1) either off said block
  (2) or on a cable dead-end connector on said block frame with said cable exerting a force on said block frame axially displaced along said axis of rotation,
(*d*) a force exerting attachment for transmitting any force exerted by said block from said cable, and
(*e*) connecting means between said block frame and said attachment selectively locating said attachment in different positions during dead-ending said cable on or off said block so that the force exerted by said attachment will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in any cable dead-ended position,
(*f*) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,
(*g*) said connecting means including an attachment mounting member,
(*h*) said attachment mounting member having an element hole eccentrically located therein,
(*i*) one of the component elements, including said block frame and said attachment, being secured in said element hole to said member,

(j) said element hole being located on said pull-line to provide a pivot with the element located therein,

(k) so that said force exerting attachment can pivot on the pull-line as an axis relative to said block frame.

3. An assembly for exerting a pulling force, comprising

(a) a block including

(1) a block frame, and

(2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,

(b) a cable reeved around said sheave,

(c) one end of said cable being dead-ended

(1) either off said block

(2) or on a cable dead-end connector on said block frame with said cable exerting a force on said block frame axially displaced along said axis of rotation,

(d) a force exerting attachment for transmitting any force exerted by said block from said cable, and

(e) connecting means between said block frame and said attachment selectively locating said attachment in different positions during dead-ending said cable on or off said block so that the force exerted by said attachment will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in any cable dead-ended position,

(f) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,

(g) said connecting means including an attachment mounting member,

(h) said attachment mounting member having an element hole eccentrically located therein,

(i) one of the component elements, including said block frame and said attachment, being secured in said element hole to said member,

(j) said force exerting attachment comprising a load engageable hook,

(k) said element hole being located on said pull-line and retaining said hook so as to provide a pivot with the hook therein,

(l) so that said hook can pivot about the pull-line as an axis relative to said block frame.

4. An assembly as set forth in claim 3, with

(a) said cable dead-end connector being rotatably mounted on said block frame on said axis of rotation coaxially with said sheave,

(b) said axis of rotation being perpendicular with respect to said pull-line,

(c) said member being a rectangular plate,

(d) said attachment being said element mounted in said element hole in said plate,

(e) said connecting means including a rectangular, member-mounting recess in said block frame for receiving said rectangular plate, and

(f) said connecting means including a pair of parallel, spaced apart pins and axially aligned pin holes for each pin in said plate and block frame assembled together to lock said rectangular plate in said recess in any of two different positions for aligning said force exerted by said attachment coaxially on said pull-line with the force exerted by said cable located in either cable dead-ended position,

(g) so as to permit easy removal of the pins and relocation of the plate for either cable dead-ended position.

5. An assembly for exerting a pulling force, comprising

(a) a block including

(1) a block frame, and

(2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,

(b) a cable reeved around said sheave,

(c) means for operatively connecting said cable in two different cable positions to said block so that said cable exerts in these positions a force on said block frame axially displaced along said axis of rotation,

(d) a force exerting attachment for transmitting any force exerted by said block from said cable,

(e) connecting means between said block frame and said attachment selectively locating said attachment in either of two different attachment positions corresponding respectively to said cable in each of said cable positions so that the force exerted by said attachment in any attachment position will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in the corresponding cable position,

(f) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,

(g) said connecting means including an attachment mounting member,

(h) said attachment mounting member having an element hole eccentrically located therein, and

(i) one of the component elements, including said block frame and said attachment, being secured in said element hole to said member,

(j) said member being a rectangular plate,

(k) said attachment being said element mounted in said element hole in said plate,

(l) said connecting means including a rectangular, member-mounting recess in said block frame for receiving said rectangular plate, and

(m) said connecting means including a pair of parallel, spaced apart pins and axially aligned pin holes for each pin in said plate and block frame assembled together to lock said rectangular plate in said recess in any of two different positions for aligning said force exerted by said attachment coaxially on said pull-line with the force exerted by said cable located in either cable position,

(n) so as to permit easy removal of the pins and relocation of the plate for either cable position.

6. An assembly for exerting a pulling force, comprising

(a) a block including

(1) a block frame, and

(2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,

(b) a cable reeved around said sheave,

(c) means for operatively connecting said cable in two different cable positions to said block so that said cable exerts in these positions a force on said block frame axially displaced along said axis of rotation,

(d) a force exerting attachment for transmitting any force exerted by said block from said cable,

(e) connecting means between said block frame and said attachment selectively locating said attachment in either of two different attachment positions corresponding respectively to said cable in each of said cable positions so that the force exerted by said attachment in any attachment position will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in the corresponding cable position,

(f) so as to provide ease of pulling operating by said assembly and to eliminate unnecessary wear on any component part thereof,

(g) said connecting means including an attachment mounting member,

(h) said attachment mounting member having an element hole eccentrically located therein, and

(i) one of the component elements, including said block frame and said attachment, being secured in said element hole to said member,

(j) said element hole being located on said pull-line to provide a pivot with the element located therein,

(k) so that said force exerting attachment can pivot on the pull-line as an axis relative to said block frame.

7. An assembly for exerting a pulling force, comprising
(a) a block including
(1) a block frame, and
(2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,
(b) a cable reeved around said sheave,
(c) means for operatively connecting said cable in two different cable positions relative to said block so that said cable exerts in these positions a force on said block frame axially displaced along said axis of rotation.
(d) a force exerting attachment for transmitting any force exerted by said block from said cable,
(e) connecting means between said block frame and said attachment selectively locating said attachment in either of two different attachment positions corresponding respectively to said cable in each of said cable positions so that the force exerted by said attachment in any attachment position will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in the corresponding cable position,
(f) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,
(g) said connecting means including an attachment mounting member,
(h) said attachment mounting member having an element hole eccentrically located therein, and
(i) one of the component elements, including said block frame and said attachment, beieng secured in said element hole to said member,
(j) said force exerting attachment comprising a load engageable hook,
(k) said element hole being located on said pull-line and retaining said hook so as to provide a pivot with the hook therein,
(l) so that said hook can pivot about the pull-line as an axis relative to said block frame.

8. An assembly as set forth in claim 7, with
(a) said first mentioned means for operatively connecting said cable in two different positions including one end of said cable being dead-ended either off said block in one cable position or on a cable dead-end connector on said block in the other cable position,
(b) said cable dead-end connector being rotatably mounted on said block frame on said axis of rotation coaxially with said sheave,
(c) said axis of rotation being perpendicular with respect to said pull-line,
(d) said member being a rectangular plate,
(e) said attachment being said element mounted in said element hole in said plate,
(f) said connecting means including a rectangular, member-mounting recess in said block frame for receiving said rectangular plate, and
(g) said connecting means including a pair of parallel, spaced apart pins and axially aligned pin holes for each pin in said plate and block frame assembled together to lock said rectangular plate in said recess in any of two different positions for aligning said force exerted by said attachment coaxially on said pull-line with the force exerted by said cable located in either cable position,
(h) so as to permit easy removal of the pins and relocation of the plate for either cable position.

9. An assembly for exerting a pulling force, comprising
(a) a block including
(1) a block frame, and
(2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,
(b) a cable reeved around said sheave,
(c) means for operatively connecting said cable in two different cable positions relative to said block so that said cable exerts in these positions a force on said block frame axially displaced along said axis of rotation,
(d) a force exerting attachment for transmitting any force exerted by said block from said cable,
(e) connecting means between said block frame and said attachment selectively locating said attachment in either of two different attachment positions corresponding respectively to said cable in each of said cable positions so that the force exerted by said attachment in any attachment position will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in the corresponding cable position,
(f) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,
(g) said first mentioned means for operatively connecting said cable in two different positions including one end of said cable being dead-ended either off said block in one cable position or on a cable dead-end connector on said block in the other cable position,
(h) said cable dead-end connector being rotatably mounted on said block frame on said axis of rotation coaxially with said sheave, and
(i) said axis of rotation being perpendicular with respect to said pull-line.

10. An assembly for exerting a pulling force, comprising
(a) a block including
(1) a block frame, and
(2) at least one sheave rotatably mounted on said frame for rotation about an axis of rotation,
(b) a cable reeved around said sheave,
(c) means for operatively connecting said cable in two different cable positions to said block so that said cable exerts in these positions a force on said block frame axially displaced along said axis of rotation,
(d) a force exerting attachment for transmitting any force exerted by said block from said cable,
(e) connecting means between said block frame and said attachment selectively locating said attachment in either of two different attachment positions corresponding respectively to said cable in each of said cable positions so that the force exerted by said attachment in any attachment position will always be selectively aligned coaxially on a pull-line with the force exerted by said cable located in the corresponding cable position,
(f) so as to provide ease of pulling operation by said assembly and to eliminate unnecessary wear on any component part thereof,
(g) said connecting means including an attachment mounting member,
(h) said attachment mounting member having an element hole eccentrically located therein and extending in the same direction as one of said forces for permitting lateral movement of said attachment to establish said coaxial alignment of said forces, and
(i) one of the component elements, including said block frame and said attachment, being secured in said element hole to said member.

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SAMUEL F. COLEMAN, *Acting Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,179,376 April 20, 1965

John P. Botten

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 2, line 5, for "dead-ended" read -- dead-end --; line 8, for "30", second occurrence, read -- 30′ --; column 3, line 13, for "head-ending" read -- dead-ending --; column 4, line 44, for "As" read -- An --; column 7, line 11, for "rotation." read -- rotation, --; line 31, for "beieng" read -- being --.

Signed and sealed this 21st day of September 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents