

May 12, 1942.

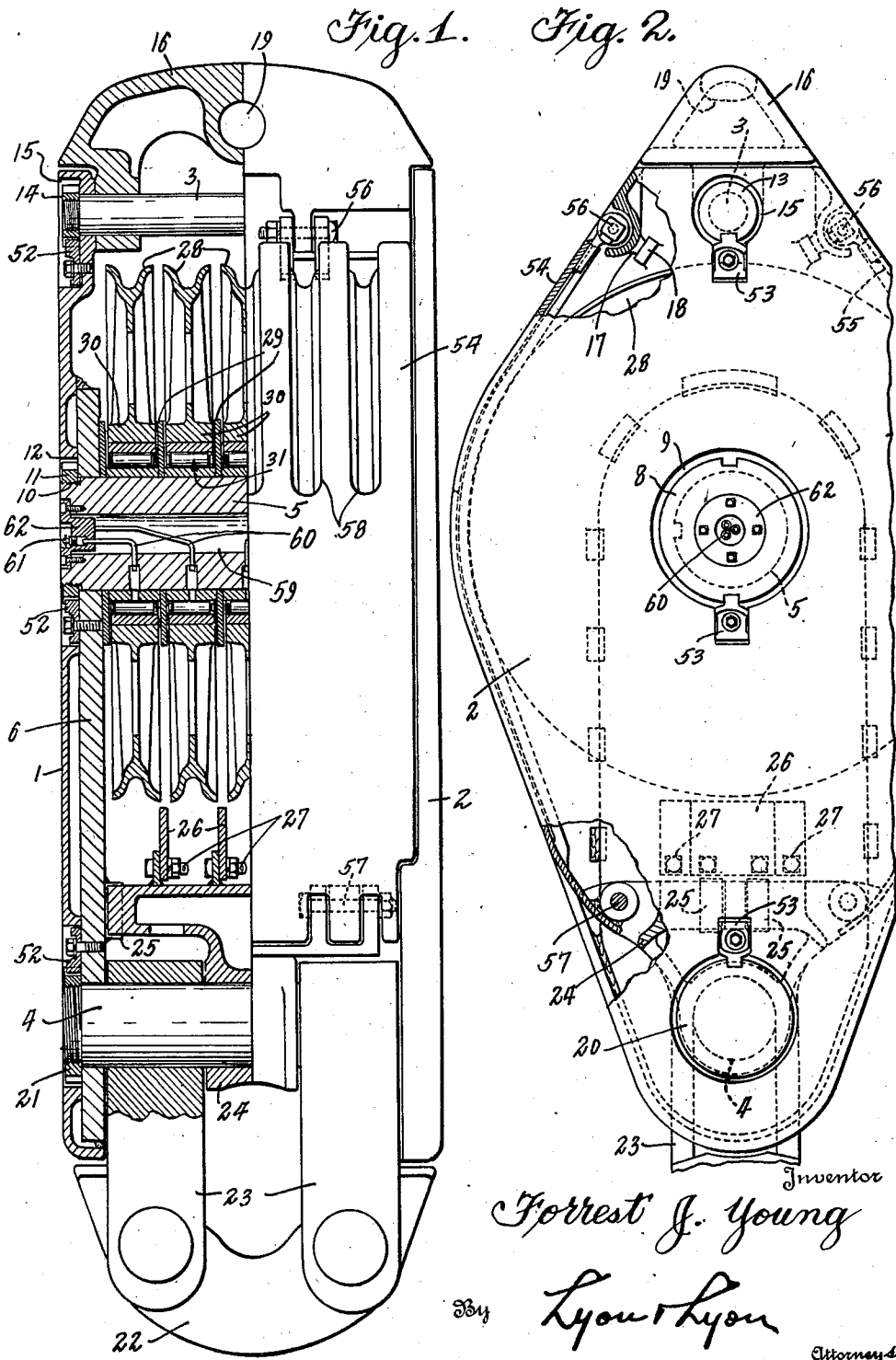
F. J. YOUNG

2,282,633

HOISTING BLOCK

Filed Feb. 7, 1940

3 Sheets-Sheet 1



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HOISTING BLOCK

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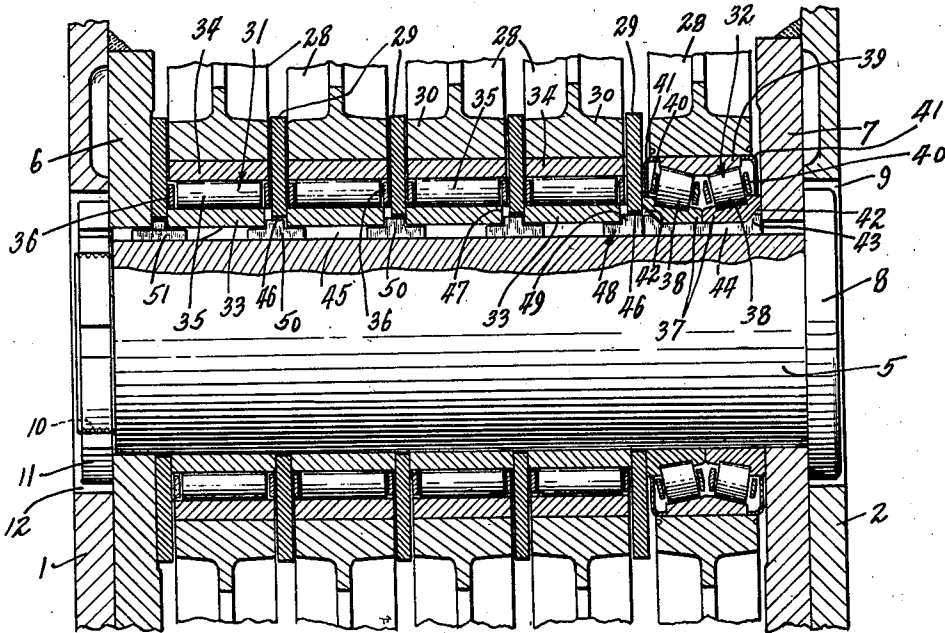


Fig. 3.

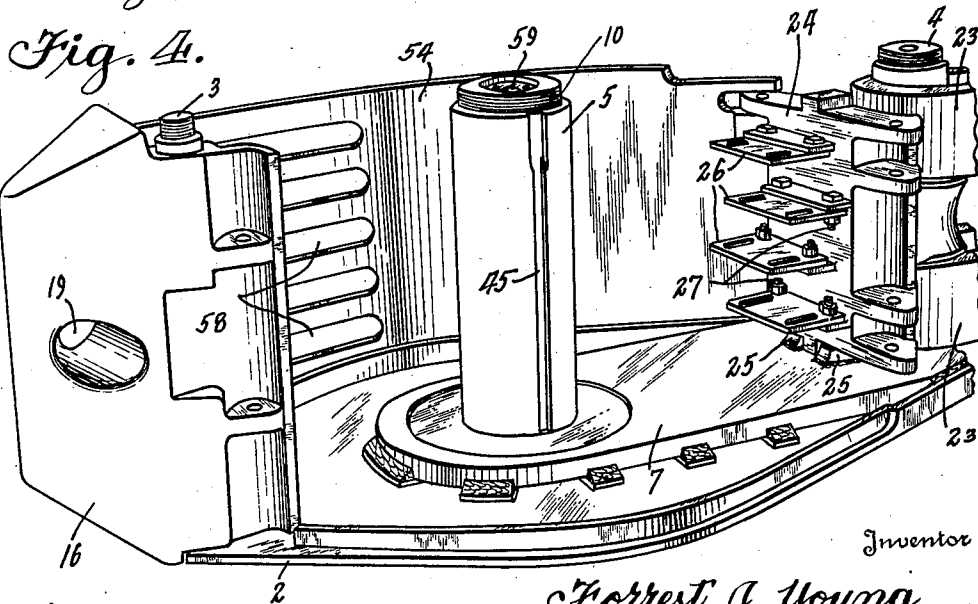


Fig. 4.

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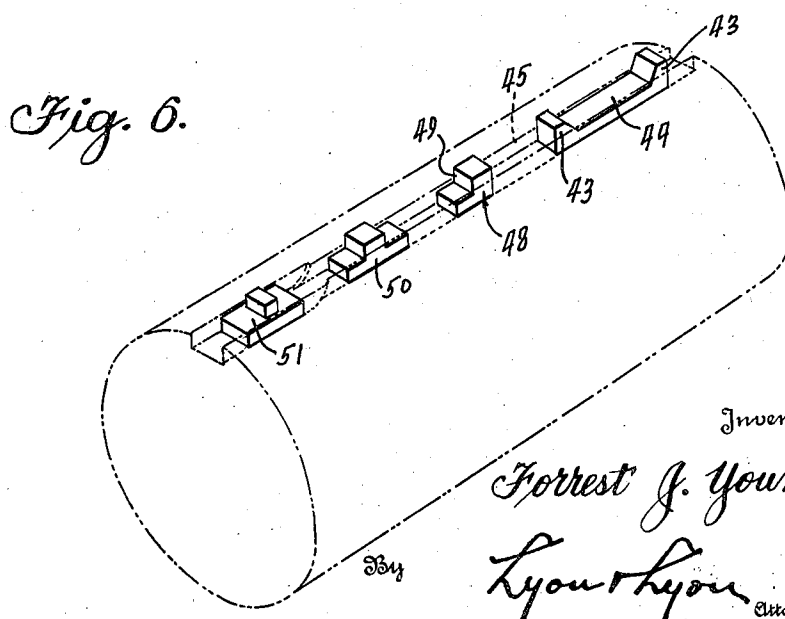
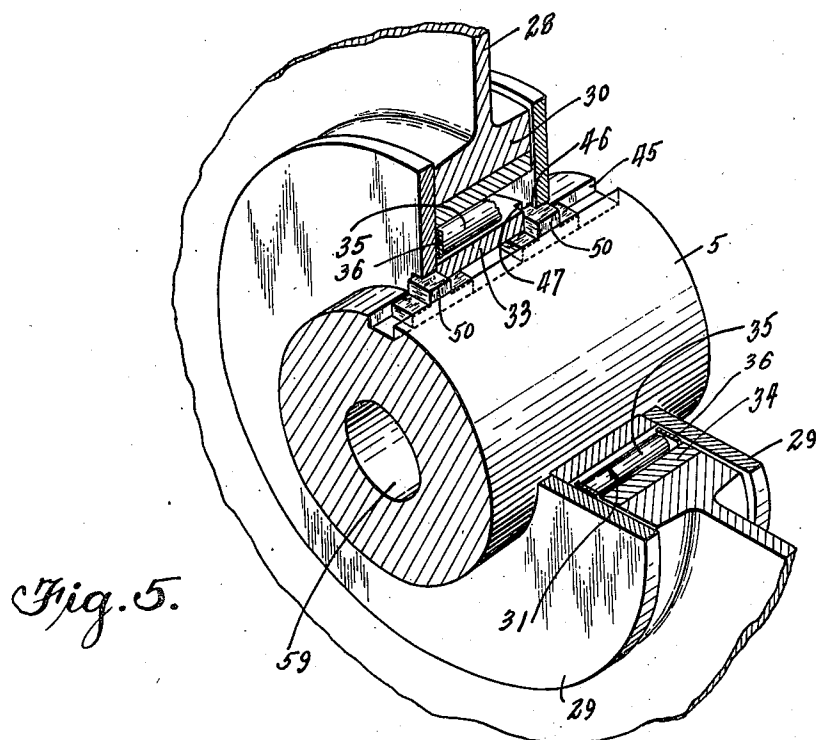
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,282,633

HOISTING BLOCK

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14 Claims. (Cl. 254—192)

This invention relates to hoisting blocks, and is more particularly directed to an improved mounting of the sheaves in such block and to improvements in the load-carrying structure thereof. This invention is particularly applicable for the construction of traveling blocks of the type used in well drilling operations but it will be apparent from the hereinafter contained description that the invention is also applicable to stationary or crown blocks and to hoisting blocks in general.

In hoisting blocks of the type where a plurality of sheaves are rotatably mounted upon a common shaft or pintle, it has been found that the sheaves tend to crowd at one end of the shaft, thereby disturbing the balance of the block and causing wear on the hubs of the sheaves due to accumulated end thrust.

It is therefore an object of my invention to provide a structure of hoisting block wherein the crowding of the sheaves at one end of the shaft is prevented.

Another object of my invention is to provide a hoisting block having a plurality of sheaves mounted upon a common shaft or pintle and between which sheaves there is positioned thrust-receiving washers fixed in position to limit the axial movement of the sheaves.

Another object of my invention is to provide an improved structure of hoisting block where the sheaves are separated by fixed thrust-receiving washers and means are provided for holding the washers from rotation.

Another object of my invention is to provide an improved form of hoisting block having a plurality of sheaves mounted upon a single pintle, which sheaves are mounted upon bearings, the inner races of which bearings are separated by thrust-receiving washers and wherein there is provided an improved form of means for preventing rotation of the washers and the inner bearing races of the bearings, providing a structure which may be readily assembled and disassembled as may be required.

Another object of this invention is to provide a traveling block including an improved supporting structure incorporating tension members through which the pintle or shaft is connected with the clevis-carrying lower pin.

Other objects and advantages of this invention it is believed will be apparent from the following detailed description of a preferred embodiment thereof as illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevation partly in vertical midsection of a hoisting block embodying my invention.

Figure 2 is a front elevation thereof partly

broken away and with parts thereof illustrated in section.

Figure 3 is an enlarged fragmental section of the stationary shaft or pintle and sheave assembly of the hoisting block embodying my invention.

Figure 4 is a perspective view of a portion of the hoisting block embodying my invention illustrating the parts as assembled preparatory to receiving the sheaves.

Figure 5 is a fragmental perspective view partly in section illustrating the mounting of one of the sheaves upon the pintle or stationary shaft.

Figure 6 is a perspective view in schematic form illustrating the assembly of keys employed for preventing rotation of certain of the parts and illustrating their relationship upon the shaft or pintle.

In the preferred embodiment of my invention as illustrated in the accompanying drawings, the hoisting block of my invention is illustrated as including spaced cover members 1 and 2 connected together by upper and lower pins 3 and 4 and between which there is positioned a stationary shaft or pintle 5. Securely affixed to each cover 1 and 2 are load-carrying plates 6 and 7 formed of rolled steel of relatively high tensile strength. The plates 6 and 7 are adapted to receive through openings formed therein the pintle 5 and the lower supporting pin 4 and the plates 6 and 7 thus provide the tension supporting members which connect the pintle 5 and the lower load-supporting pin 4.

On one end of the pintle 5 there is formed the enlarged head 8 which fits within a recess 9 formed in the cover member 2 and this enlarged head 8 forms an abutment to contact the outer face of the load-carrying plate 7. The opposite end of the pintle 5 is threaded as indicated at 10 to receive a nut 11 within a recess 12 formed in the cover member 1. The nut 11 thus contacts the outer face of the supporting plate 6. As hereinafter will be set forth, the tightening of the nut 11 acts to clamp the plates 6 and 7 together against the sheave assembly supported upon the pintle 5. It will be apparent that the width of this sheave assembly determines the spacing of the plates 6 and 7 and hence of the cover members 1 and 2. The upper pin 3 is secured in position between the covers 1 and 2 by the head 13 and nut 14 which are thus positioned within the offset recesses 15 of the cover members 1 and 2 respectively.

Carried upon the pin 3 is an upper bracket 16 comprising the top of the traveling block. This bracket 16 is, as illustrated, prevented from turning upon the pin 3 by means of complementary lugs 17 and 18 formed on the bracket 16 and cover members 1 and 2 respectively. The bracket 16 is provided with an opening 19 for convenient handling of the block. The lower load-support-

ing pin 4 is likewise secured in position in a similar manner by its head 20 and nut 21 engaging within recesses in the covers 1 and 2 in engagement with the plates 6 and 7.

Mounted on the pin 4 is a clevis 22 carried by the clevis links 23 journaled on the pin 4. A lower bracket 24 is also mounted upon the lower pin 4 and is likewise held from rotation by means of spaced stops 25 carried by the plates 6 and 7. The lower bracket 24 carries line spacers 26 upon bolts 27 which removably position the spacers 26 to prevent the block line from jumping from one sheave to the next.

The sheave assembly includes a plurality of sheaves 28 which are journaled upon bearings positioned upon the pintle 5. The sheaves 28 are positioned between the load-carrying plates 6 and 7 and are held in their respective positions by means of fixed thrust washers 29. Each of the sheaves 28 is provided with a grooved periphery to receive a cable (not shown) and is also provided with a hub portion 30 within which the supporting bearings are positioned.

In accordance with the particular design of traveling block, two forms of bearings illustrated at 31 and 32, respectively, are utilized. The form of bearing 31 is of the plain roller type while the form of bearing 32 is of the tapered roller type. The tapered roller type of bearing is found particularly applicable for use where the sheave 28 supported thereby is of high speed rotation and is therefore employed advantageously for supporting the high speed sheave.

The straight roller type of bearing 31 is found to be entirely satisfactory for moderate or low rotation speeds and of course is considerably less expensive and therefore the majority of the sheaves 28 are illustrated as being supported upon this type of bearing. It will of course be obvious that in some cases it will be found entirely satisfactory to use straight roller bearings of the type illustrated at 31 for all the sheaves and in other cases two bearings of the type illustrated at 32 may be used, one on each side of the block, in order that after a period of service the block may be turned side for side to present a relatively new bearing for use in connection with the high speed line.

Each of the bearings 31 includes an inner race 33, an outer race 34, rollers 35, and a retainer 36. The bearing 32 includes a split inner race 37, tapered rollers 38, an outer race 39, retainer 40, and the closing guards 41. The inner races 33 and 37 have a slip-fit on the pintle 5 so that they can be easily installed or replaced. The outer races 34 and 39 are press-fitted into the hub 30 of the particular sheave 28.

In order to prevent rotation of the inner race 37 upon the pintle 5, end notches 42 are formed in the race 37 to receive the end 43 of the double-ended key 44 which is slip-fitted into the keyway 45 of the pintle 5. By preventing separation of the split inner race 37, the double ended key 44 maintains the bearing 32 assembled as a unit, thereby facilitating assembly or disassembly of the sheave 28 and bearing 32 on the pintle 5. It should be noted that the keyway 45 is located in a neutral axis of the pintle, so that the bending strength of the pintle is not materially affected.

A series of keys are slip-fitted into the keyway 45 to retain the inner races 33 of the bearings 31 from rotation and also to hold the thrust washers 29 from rotation. These keys fit into recesses 46

formed in the thrust washers 29 and into recesses 47 formed in the inner races 33.

As illustrated in Figure 3, the inner end key 48 is provided with an engaging portion 49 which engages within the thrust washer recess 46 and the inner race recess 47. The keys 50 likewise engage both within the thrust washer recesses and the inner race recesses. The outer key 51 is wider than the other keys and it is used only to lock or hold from rotation the last thrust washer 29, and it does not engage the plate 6. It is made wider to prevent inadvertent use of the wrong key at this position. It will be noted in this respect that each of the keys 50 and 48 operates to hold both the inner races 33 and the thrust washers 29 from rotation.

The assembly upon the pintle 5 is a metal to metal contact between the head 8 and the nut 11, thereby preventing endwise movement of the thrust washers 29 along the pintle 5. As will be apparent from Figures 3 and 4, the assembly of the sheaves 28 upon the pintle 5 is accomplished as follows:

With the cover member 2 resting on the floor and the pintle 5 projecting vertically upwardly, the sheave 28 carrying the high speed bearing assembly is first lowered onto the pintle 5. The split inner race 37 slides freely along the pintle 5, as does the key 44 along the keyway 45. The first thrust washer 29 is then dropped in place and the single-ended key 48 is slid along the keyway 45 to hold this thrust washer 29 from rotation. Each of the other bearing assembly parts is then successively installed in place with the corresponding sheave 28. This is accomplished by first sliding the inner race 33 into place together with the rollers 35 and retainer 36, taking care to register the recesses 47 with the head of the keys 50. The sheave 28 carrying the outer race 34 is then lowered into position upon the rollers 35. The next thrust washer 29 is then lowered into position and the process is repeated until the entire number of sheaves is mounted upon the pintle 5. When the last thrust washer 29 is placed and the outer key 51 is inserted the side member comprising the cover member 1 and plate 6 is lowered into position over the end of the shaft 5. The nut 11 clamps the side members together and clamps the thrust washers 29 between the inner races 33 and 37 and hence prevents axial movement of the inner races and the thrust washers. Nuts 14 and 21 are then threaded into position upon the pins 3 and 4, respectively.

Locking keys 52 are provided for holding each of the nuts 11, 14 and 21 in proper position, and similar lock keys 53 are provided on the other side of the block to prevent rotation of the pins 3 and 4 and pintle 5. It will be apparent from Figure 2 that the lock 53 for the pintle head 8 may be used to secure the pintle in either of two angular positions spaced approximately 180° apart. This permits the races 33 to be inverted to present a new wearing surface for the rollers.

Guard means are provided which extend over the sheaves 28 and include guards 54 and 55. The guards 54 and 55 are each pivotally attached to the upper bracket 16 upon pivot bolts 56. The guards are also pivotally secured to the lower bracket 24 upon pivot bolts 57. Removal of the pivot bolts 56 permits pivotal movement of the guard around the bolts 57, thereby exposing the sheaves 28 for easy stringing of the cable. Vertically extending slots 58 are provided in the

upper portion of each guard adjacent the sheaves 28 to establish a clearance around the cable.

In the lining of the block, if only four of the five sheaves are to be used, it may be found necessary to transfer the line from one sheave to another. Removal of the spacer plates 26 permits this operation to be accomplished without restringing the entire block.

Means are provided for introducing lubricant into each of the bearings 31 and 32 and as illustrated, this means includes the longitudinal bore 59 formed through the pintle 5 through which lubricant conduits 60 extend to each respective bearing assembly. Each of the conduits 60 is provided with a pressure fitting 61 mounted in an adapter 62 at the end of the bore 59.

It will be apparent from the foregoing that the load carried by the block of my invention as suspended from the clevis 22 is carried through the clevis links 23 to the tension plates 6 and 7 which are in turn suspended from the pintle 5. The load thus transmitted to the pintle 5 is carried by the sheaves 28 through the medium of the bearings 31 and 32. The cover members 1 and 2 do not form a material part of the load-transmitting system and their main function is that of a shield into which otherwise projecting parts can be recessed and in order to provide smooth outer surfaces for the sides of the block.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. In a sheave mounting, the combination of a stationary shaft, means positioned at the ends of said shaft comprising the sole supports for said shaft, a plurality of sheaves positioned side by side on said shaft intermediate said supports, individual bearing means adapted to support each of said sheaves for rotation upon said shaft, each of said bearing means including a sleeve element having a slip fit on said shaft, a plurality of annular washers arranged on said shaft in alternate relation with said sheaves and adapted to receive axial thrust imparted by said sheaves, a continuous keyway in the shaft extending axially along a neutral axis thereof, keys positioned in said keyway adapted to prevent rotation of said annular washers and said sleeve elements, means associated with the shaft adapted to clamp said annular washers between said sleeve elements to prevent axial movement of said annular washers, and means associated with the supporting means and independent of said keys adapted to secure the shaft, sleeve elements and annular washers as a unit in either of two angularly spaced positions.

2. In a sheave mounting, the combination of a stationary shaft, a pair of sleeve elements mounted on said shaft, a pair of sheaves rotatably mounted on said sleeve elements, an annular washer encircling a portion of said shaft and interposed between said sheaves to limit axial movement of each sheave toward the other, a continuous axially extending keyway formed in the shaft along a neutral axis thereof, a key in said keyway provided with a head portion adapted to contact the washer and one of said sleeve elements to prevent rotation thereof, means associated with the shaft adapted to clamp said annular washer between said sleeve elements to prevent axial movement of the washer relative to the sleeve elements, and means to secure the

shaft, sleeve elements, washer and key as a unit in either of two angularly spaced positions.

3. In a sheave mounting, the combination of a stationary shaft, means positioned at the ends of said shaft comprising the sole supports for said shaft, a plurality of sleeve elements mounted in axially spaced relation on said shaft intermediate said supports, a plurality of annular washers arranged on said shaft in alternate relation with said sleeve elements, a continuous axially extending keyway formed in the shaft along a neutral axis thereof, a plurality of keys in said keyway, each key being provided with a head portion adapted to contact one of said annular washers and one of said sleeve elements to prevent rotation thereof relative to the shaft, an abutment on the shaft near one end thereof, a nut threaded on the other end of said shaft and adapted to clamp the sleeve elements and annular washers in solid relation against said abutment, means associated with the supporting means adapted to secure the shaft, sleeve elements and annular washers as a unit in either of two angularly spaced positions, and a sheave rotatably mounted on each of said sleeve elements and confined against lateral movement by said annular washers.

4. In a traveling block, the combination of a stationary shaft horizontally disposed, a pin vertically spaced below said shaft and disposed parallel thereto, a plurality of sleeve elements mounted in axially spaced relation on said shaft, a plurality of annular washers arranged on said shaft in alternate relation with said sleeve elements, a sheave rotatably mounted on each of said sleeve elements and confined against lateral movement by said annular washers, a pair of parallel vertically extending plates spaced axially of said shaft and adapted to directly connect said shaft and pin, means carried on said pin between said plates adapted to support a load, an abutment on the shaft near one end thereof, a nut threaded on the other end of said shaft and adapted to clamp the sleeve elements, annular washers, and said plates in solid relation against said abutment, and a pair of cover members supported by said plates independently of said shaft and adapted to define the lateral exterior surfaces of the block, said cover members being provided with recesses adapted to receive said abutment and said nut.

5. In a traveling block, the combination of a stationary shaft horizontally disposed, a pin vertically spaced below said shaft and disposed parallel thereto, a pair of parallel vertically extending plates spaced axially of said shaft and adapted to directly connect said shaft and pin, said plates constituting substantially the sole means acting to support said pin from said shaft, means carried on said pin between said plates adapted to support a load, a plurality of sheaves rotatably mounted on said shaft between said plates and adapted to support said shaft, means forming an enclosure for said sheaves, said means including a pair of cover members supported on said load supporting plates independently of said shaft and extending upwardly above the ends of said plates, and a cross member above the upper limit of the periphery of said sheaves adapted to connect the upper ends of said cover members.

6. In a traveling block, the combination of a stationary shaft horizontally disposed, a pin vertically spaced below said shaft and disposed parallel thereto, a plurality of sleeve elements mounted in axially spaced relation on said shaft,

a plurality of annular washers arranged on said shaft in alternate relation with said sleeve elements, a sheave rotatably mounted on each of said sleeve elements and confined against lateral movement by said annular washers, means adapted to clamp said sleeve elements and said annular washers in solid end-to-end relation, said means including a pair of parallel vertically extending plates spaced axially of said shaft and adapted to directly connect said shaft and pin, means carried on said pin between said plates adapted to support a load, means forming an enclosure for said sheaves, said means including a pair of cover members carried on said load supporting plates independently of said shaft and extending upwardly above the ends of said plates, and a cross member above the upper limit of the periphery of said sheaves adapted to connect the upper ends of said cover members.

7. In a hoisting block construction, the combination of a shaft, an axially extending keyway formed in said shaft, a sheave having a hub encircling said shaft, a roller bearing assembly mounted upon said shaft and within said hub, said assembly including a plurality of roller elements and a pair of separable inner raceways, a key in said keyway adapted to prevent rotation of the inner raceways with respect to said shaft, said key being provided with projecting head portions at its opposed ends which are adapted to prevent separation of said inner raceways during assembly or disassembly of the sheave and bearing assembly axially of the shaft.

8. In a hoisting block construction, the combination of a shaft having an axially extending keyway formed therein, a sheave provided with a central bore, a roller bearing assembly for mounting the sheave upon the shaft, said assembly including two juxtapositioned inner race rings, a series of roller elements on each of said inner race rings and a common outer race ring, the inner race rings being slidable axially into position on the shaft and the outer race ring being held non-rotatably within said bore, a key in said keyway adapted to prevent rotation of the inner raceways with respect to the shaft, said key being provided with projecting head portions at its opposed ends which are adapted to prevent separation of said inner raceways during assembly or disassembly of the rotary member and roller bearing assembly axially of the shaft.

9. In a traveling block, the combination of a stationary horizontal shaft, a pin spaced below and parallel to said shaft, a pair of vertically extending side members adapted to connect the shaft and pin, a plurality of sheaves rotatably mounted on said pin between the side members, means suspended on said pin between the side members and adapted to support a load, bracket means carried on said pin, a pair of guard members extending transversely between the side members and cooperating therewith to form an enclosure for said sheaves, and means forming a pivotal connection between each of the guard members and said bracket means.

10. In a traveling block, the combination of a stationary horizontal shaft, a pin spaced below and parallel to said shaft, a pair of vertically extending side members adapted to connect the shaft and pin, a plurality of sheaves rotatably mounted on said shaft between the side members, means suspended on said pin between the side members and adapted to support a load, a bracket pivotally mounted upon said pin, cooper-

ating means on the bracket and side members adapted to prevent relative movement therebetween, a pair of guard members extending transversely between the side members and across the face of the sheaves, and means forming a pivotal connection between each of the guard members and said bracket.

11. In a traveling block, the combination of a stationary horizontal shaft, a pin spaced below and parallel to said shaft, a second pin spaced above and parallel to said shaft, a pair of vertically extending side members adapted to connect said shaft and pins, a plurality of sheaves rotatably mounted on said shaft between the side members, a bracket carried on each of said pins, a pair of guard members extending transversely across the face of the sheaves between the side members, and releasable means for securing each of said guard members to both of said brackets.

12. In a sheave mounting, the combination of a stationary shaft, means positioned at the ends of said shaft comprising the sole supports therefor, a plurality of sheaves positioned on said shaft intermediate said supports, individual bearing means adapted to support each of said sheaves for rotation upon said shaft, each of said bearing means including a sleeve element insertable axially to operative position on said shaft, a plurality of annular washers arranged on said shaft in alternate relation with said sheaves and adapted to receive axial thrust imparted by said sheaves, a keyway in the shaft, keys in the keyway adapted to prevent rotation of the annular washers, an abutment on the shaft near one end thereof, a nut threaded on the other end of the shaft and adapted to clamp the supports, sleeve elements and annular washers in solid relation against said abutment, and means associated with said supports and independent of said keys adapted to secure the shaft, sleeve elements and annular washers as a unit in either of two angular positions spaced 180° apart.

13. In a sheave mounting, the combination of a stationary shaft, a plurality of sleeve elements mounted in axially spaced relation on said shaft, a plurality of annular washers arranged on said shaft in alternate relation with said sleeve elements, an abutment on the shaft near one end thereof, a nut threaded on the other end of said shaft and adapted to clamp the sleeve elements and annular washers in solid relation against said abutment, means adapted to secure the shaft, sleeve elements and annular washers as a unit in either of two angular positions, spaced substantially one-half revolution apart.

14. In a hoisting block construction, the combination of a shaft having an axially extending keyway, a plurality of sheaves rotatably mounted upon the shaft, a roller bearing assembly for mounting one of the sheaves on the shaft, said assembly including a pair of separable inner raceways, a key in said keyway having projecting head portions at its opposed ends, said head portions being adapted to prevent rotation of the raceways relative to the shaft and to prevent separation of said inner raceways during assembly or disassembly of the sheave and bearing assembly axially of the shaft, and releasable clamping means adapted to secure the inner raceways in operative position against axial displacement along the shaft.

FORREST J. YOUNG.

CERTIFICATE OF CORRECTION.

Patent No. 2,282,633.

May 12, 1942.

FORREST J. YOUNG.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 52, for "retainer 40" read --retainers 40--; page 4, first column, line 50, claim 8, for "rotary member" read --sheave--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of August, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)