Feb. 21, 1933. R. BERGMANN 1,898,810

EXCAVATOR

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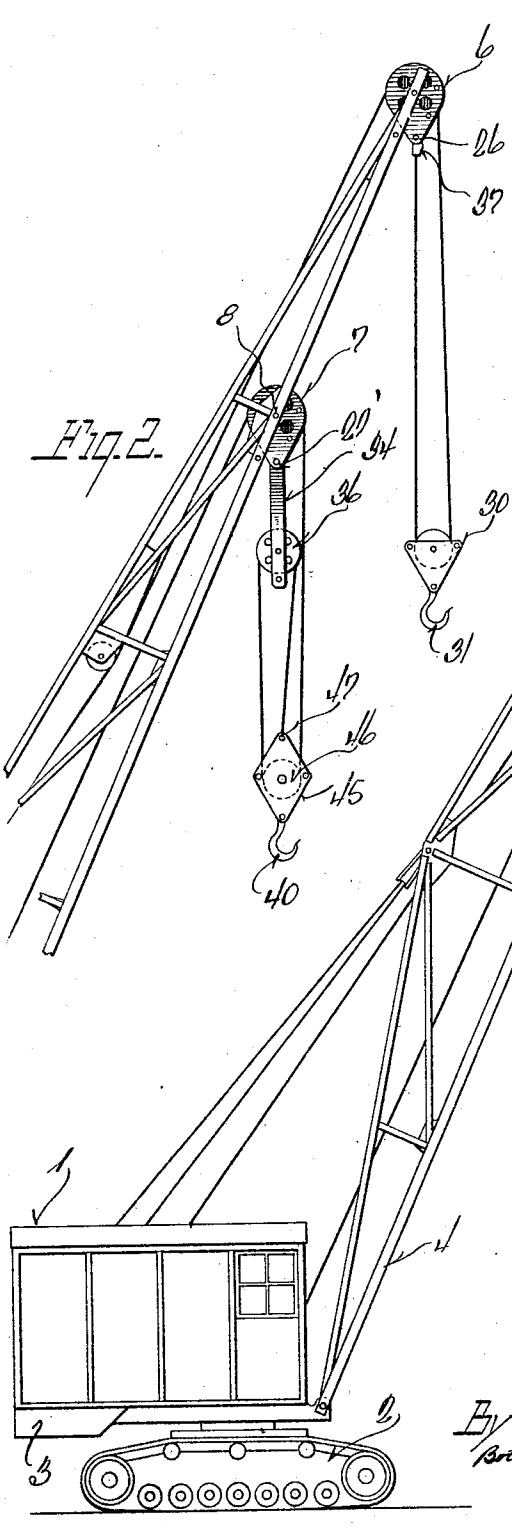



Fig. 2.

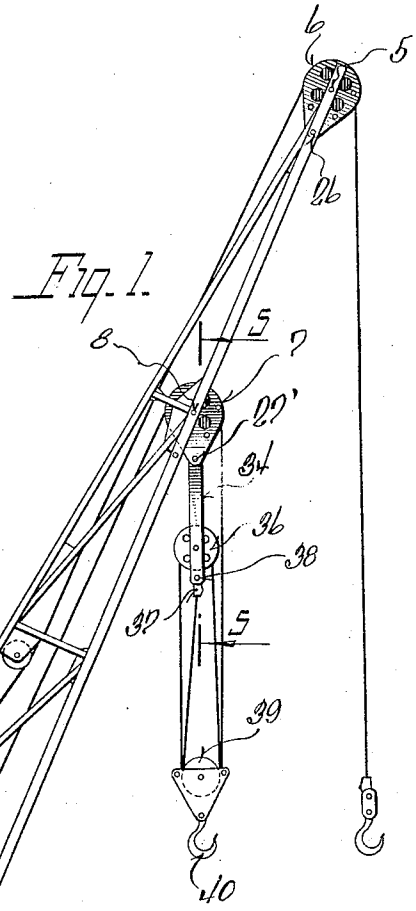



Fig. 1.

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Fig. 3.

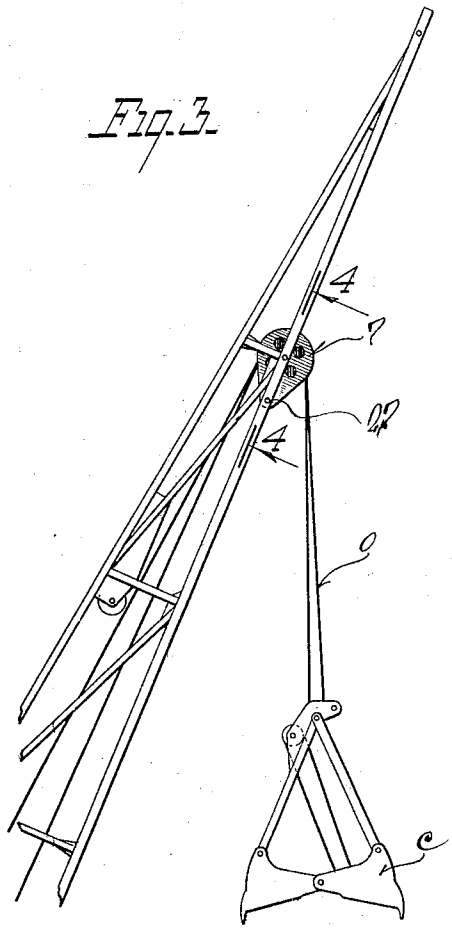
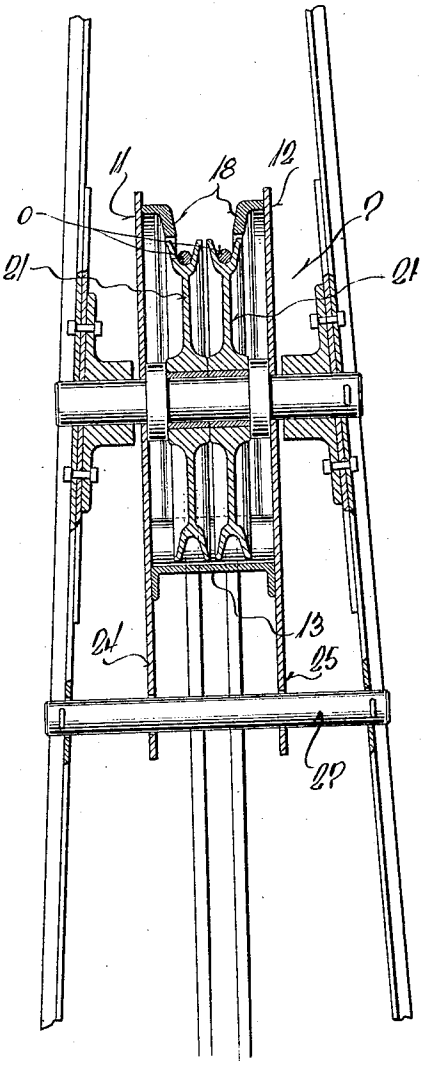



Fig. 4.




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Fig. 5.

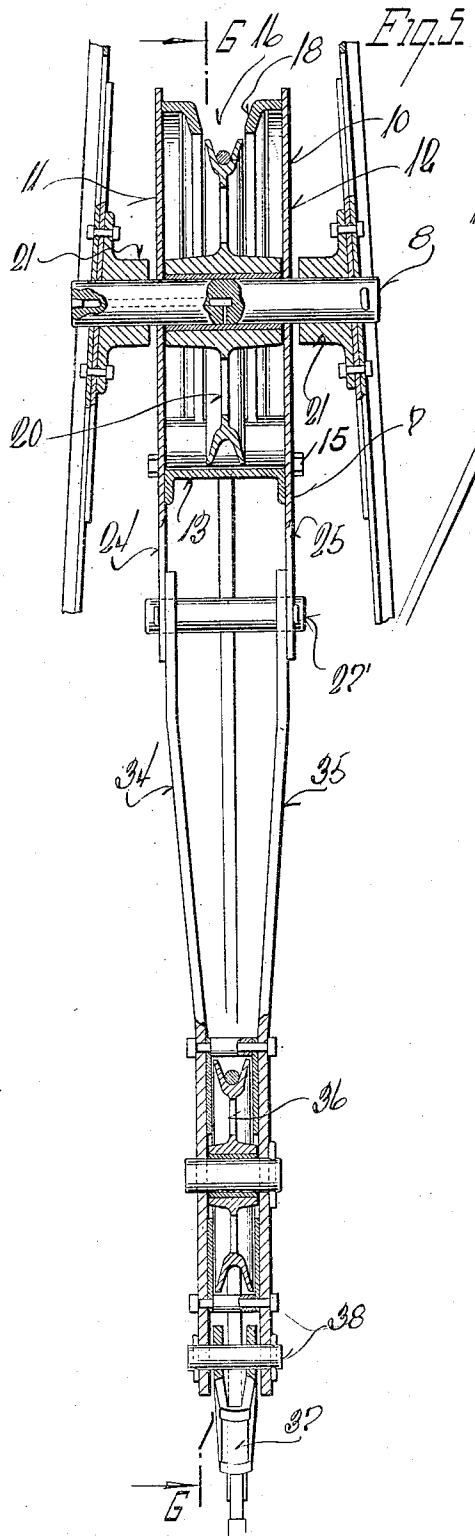
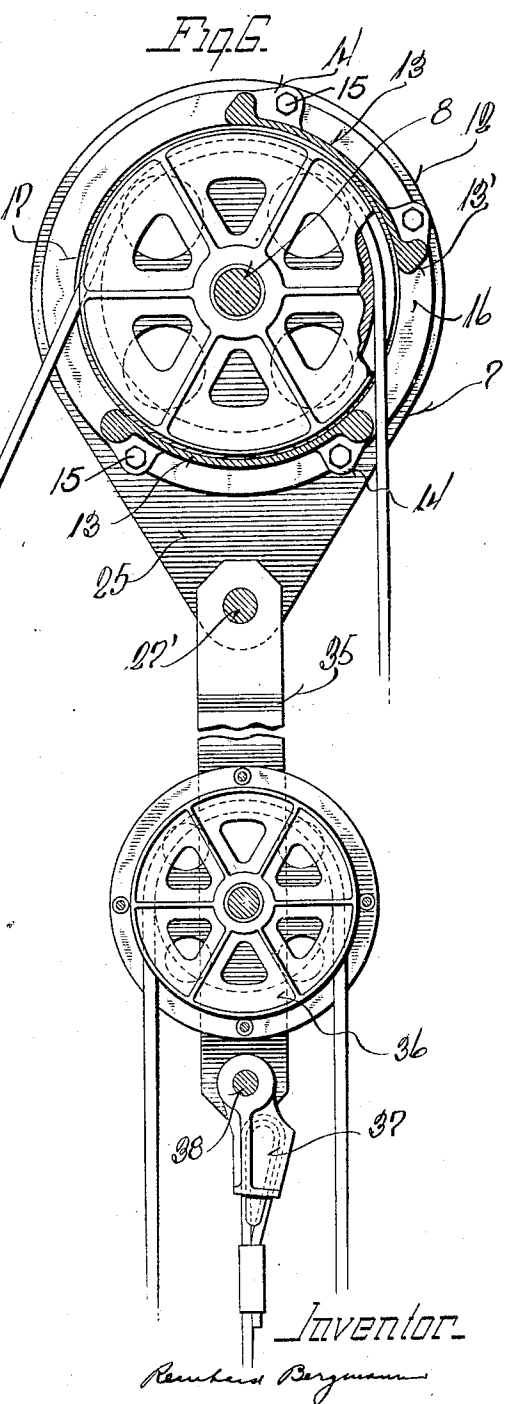



Fig. 6.




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# UNITED STATES PATENT OFFICE

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## EXCAVATOR

Application filed May 9, 1930. Serial No. 450,927.

This invention relates in general to excavating machines designed particularly for use as an excavator crane or as a clam shell although also adapted for other uses.

One of the principal objects of the present invention is to provide an excavating machine of this character having a novel sheave organization and suspension which provides for the use of either a single, double, three or four part line with the same boom sheave and which with the double, three or four part line sets up a straight compression in the boom, all bending stresses being eliminated.

A further advantage resides in the feature of having a more complete guard for the boom sheave and all of this with a construction which is simple, durable and reliable in operation and easy and comparatively inexpensive to manufacture and use. Another advantage resides in the fact that, although the boom sheaves are more completely guarded, the construction is such that any interference or scraping engagement between the guard structure and the cables is precluded.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, and in which:

Figure 1 is a view in side elevation showing an excavating machine embodying the present invention and equipped with a single and a four part line, both lines being associated with a boom sheave embodying the present invention.

Figure 2 is a fragmentary view similar to Figure 1, but showing the lines arranged to provide a two part line and a three part line, respectively;

Figure 3 is a view similar to Figure 2 but illustrating the lower boom sheave only and showing the lower boom sheave releasably locked in position for use with the operating lines of a clam shell bucket;

Figure 4 is a view in section taken on line 4—4 of Figure 3;

Figure 5 is a section view taken on line 5—5 of Figure 1; and

Figure 6 is a view in section taken on line 6—6 of Figure 5.

Referring to the drawings and more particularly to Figure 1, the numeral 1 designates generally an excavating machine having a truck 2 and a revolving platform 3 supporting the usual power-driven drums (not shown) for operating the instrumentalities of the machine. At the forward end of the truck 3 a boom 4 is supported for vertical swinging movement and may embody the trussed construction shown.

In accordance with the present invention, the outer end of the boom is bifurcated or else has spaced extensions which receive the transverse pivot pin 5 of a boom sheave assembly designated at 6. In addition to the boom sheave assembly 6, a second boom sheave assembly 7 is provided lower down on the boom and is pivotally supported on pivot pin 8 supported upon the structure of the boom. The boom sheave assembly 8 is accommodated in a recess or pocket provided therefor in the boom structure.

As the boom sheave assemblies 6 and 7 are of identical construction a single description will serve for both. As shown in Figures 5 and 6, each boom sheave assembly comprises a housing designated generally at 10 and including spaced slide plates 11 and 12. In between the side plates 11 and 12 a guard structure designated generally at 13 is provided and has attaching lugs 14 bolted or otherwise suitably secured to the side plates 11 and 12, as indicated at 15. For a substantial portion of its circumferential extent the guard structure 13 presents a complete and closed arcuate or segmental wall between the side plates 11 and 12 but at angularly spaced points this guard structure is cut away to provide openings 16 and 17 through which the operating lines extend. Adjacent these openings the guard structure is flanged as indicated at 18 in Figure 5. At the ends of the openings 16 and 17 the guard structure is formed with thickened and rounded portions designated at 13'. Within the housing 10 a sheave or sheaves are mounted.

Thus, as illustrated in Figures 5 and 6, a single grooved sheave or pulley 20 may be rotatably mounted within the housing 10 by means of the supporting pin 5 or 8, as the case may be, the supporting pin being mounted in bearings designated at 21 in Figure 5 and securely bolted to the structure of the boom. The hub of the pulley or sheave 20 is rotatably mounted on its supporting pin and the same is true of the side plates of the housing which have bearing openings in which the supporting pin is a snug working fit. As illustrated in Figure 4, two pulleys 21 may be mounted in the housing 10 to accommodate the operating lines O of a clam shell bucket C (see Figure 3). In all other respects, however, the boom sheave structure shown in Figures 3 and 4 is identical with that shown in Figure 5.

As shown in Figures 1, 2, 3, 4 and 6, the side plates 11 and 12 are formed with tapering extensions or wings designated at 24 and 25 and these extensions or wings have apertures adjacent their lower ends designed to coact with a releasable locking pin, or with the supporting pin of the auxiliary sheave assembly, or with the anchoring pin of a dead-ending attachment. Thus, as shown in Figure 1, the outer or upper boom sheave 6 has its housing releasably held against rotary movement on its supporting pin 5 by means of a locking pin 26 extending through openings in the side members of the boom and through the openings in the extensions 24 and 25 of the side plates of the housing and releasably held in place by cotter pins or other similar means. By so releasably securing the housing against rotation, interference between the guard structure of the housing and the operating or hoisting line is prevented under the influence of the pull of the cable or line or under the influence of swinging or other causes.

A similar arrangement is shown in connection with the lower boom sheave in Figures 3 and 4, the boom sheave housing 10 being held against rotation by means of a locking pin 27 similar in structure and function to the locking pin 26.

In Figure 2, the outer boom sheave 6 is shown as having its housing free to rotate on its pin 5, the locking pin 26 or a similar pin being utilized at this time as an anchoring pin and serving as an anchor or dead-end for the rope socket 37 provided at the outer end of the hoist line. It this way the hoist line may be used as a double line, there being tackle block 30 supported in the bight of the double line and carrying a hook or other hoisting attachment designated at 31.

In Figures 1 and 2 the inner boom sheave 7 is illustrated as associated with an auxiliary tackle or sheave arrangement providing for a four and three part line reeving, respectively. In both of these figures the locking pin 27 employed in Figures 3 and 4 for maintaining the housing of the boom sheave against rotation on its supporting pin is released and a similar but somewhat shorter pin 27′ is employed for interconnecting the wings or extensions of the boom sheave housing with the upper end of hanger bars, designated at 34 and 35, respectively. An intermediate pulley 36 is pivotally supported adjacent the lower ends of the hanger bars 34 and 35. In the reeving shown in Figure 1 the rope socket 37 at the outer end of the line or cable is connected to the lower ends of the hanger bars 34 and 35 as indicated at 38 and intermediate portions of the cable are reeved about the intermediate pulley 36 and about the pulleys of a hoisting block or tackle 39 carrying a hook or other hoisting means 40. More specifically in the reeving shown in Figure 1 the cable extends over the pulley 20 of the boom sheave down, around and under one of the pulleys 39 of the hoisting tackle, up, around and over the intermediate pulley 36, and then down, around and under the other pulley of the hoisting tackle 39, and finally up to the lower ends of the hanger bars to which it is dead-ended.

The arrangement shown in Figure 2 is substantially the same as that shown in Figure 1 except that the hoisting tackle designated at 45 has only a single pulley 46 and that the end of the line is dead-ended on this hoisting tackle 45 as indicated at 47. In other words, the hoisting line extends out over the pulley of the boom sheave assembly, down, under and around pulley 46 of the tackle block 45, up, over and around the intermediate pulley 36, and down to the tackle block 45 to which it is dead-ended.

In all forms of the invention wherever a single line is used or wherever a plurality of lines are used which function individually as single lines the boom sheave assembly has its housing releasably held against rotation so that interference between its guard structure and the hoisting or operating lines is avoided. This same boom sheave structure is adapted for cooperation with auxiliary hoisting tackle to provide for a multiplication of the power, or, in other words, the single hoisting line may be converted into a two, three or four part line, and yet in any particular arrangement or selected line reeving the points of suspension of the boom sheave, of the auxiliary sheave, and of the tackle block and the point of dead-ending of the operating line are arranged in vertical alinement. As a result, the boom is subjected to compression stresses only and there are no bending or twisting moments or strains applied to or set up in the boom structure. These advantages are had with a boom sheave organization in which the pulleys or sheaves are more com-

pletely guarded and protected than possible heretofore.

The invention claimed is:

1. A sheave assembly for use with an excavating machine of the type having a boom and comprising a housing, a sheave rotatable in the housing, a supporting pin mounted on the boom and extending through the housing and through the hub of the sheave for supporting the sheave and housing for rotation and means for releasably securing the housing to the boom to preclude rotation thereof.

2. A boom sheave assembly for use with an excavating machine of the type having a boom and comprising a housing having spaced side plates, guard structure extending between and connecting said side plates, and having spaced circumferential openings providing clearances for the operating line, a sheave rotatable in the housing, means for rotatably supporting the sheave and the housing on the boom, and means for releasably securing the housing against rotation relative to the boom.

3. A boom sheave assembly for use with an excavating machine of the type having a boom and comprising a housing having spaced side plates, guard structure extending between and connecting said side plates, and having spaced circumferential openings providing clearances for the operating line, a sheave rotatable in the housing, means for rotatably supporting the sheave and the housing on the boom, said housing having extensions provided with openings and a locking pin cooperable with the openings and with the boom for releasably securing the housing against rotation.

4. A boom sheave assembly adapted for use with an excavating machine of the type having a boom and comprising a housing having spaced side plates, guard structure extending between and connecting said side plates, and having spaced circumferential openings providing clearances for the operating line, a sheave rotatable in the housing, means for rotatably supporting the sheave and the housing on the boom, said housing having portions provided with openings, and means cooperable with said openings and selectively with the boom, with an auxiliary tackle structure and with the dead-end attachment of an operating line, whereby to adapt the machine to use a single or multipart lines.

5. A sheave assembly comprising a housing having spaced side members and an intervening guard structure extending for a substantial portion of the circumferential extent of the housing and having angularly spaced openings, a pulley rotatable within said housing, means for supporting the pulley and housing for rotation, and releasable means for securing the housing against rotation.

6. A sheave assembly for use with an excavating machine of the type having a boom and comprising a housing and a pulley therein, said housing having guard structure enclosing the pulley for a substantial portion of its circumference, means for rotatably supporting said housing and said pulley on said boom, said housing having apertured extensions adapted to be releasably secured to the boom to hold the pulley against rotation when the housing is used with a single part line, and a hanger connectible with said apertured extensions when said housing is released for free rotation, said hanger being adapted to support an intermediate pulley whereby a multipart line may be used.

7. In an excavating machine, a sheave assembly including a housing and a pulley therein, said housing having guard structure enclosing the pulley for a substantial portion of its circumference, means for rotatably supporting said housing and said pulley, said housing having apertured extensions, hanger bars pivotally connected to said apertured extensions and an intermediate pulley supported on said hanger bars between their ends, the lower ends of said hanger bars being adapted to provide an anchoring point for a cable reeved about said pulleys.

In witness whereof, I hereto affix my signature.

REINHARD BERGMANN.