March 16, 1926. **1,577,404**

L. E. ZERBE ET AL

CROWN BLOCK CONSTRUCTION

Filed May 17, 1924 2 Sheets-Sheet 1

FIG. 1.

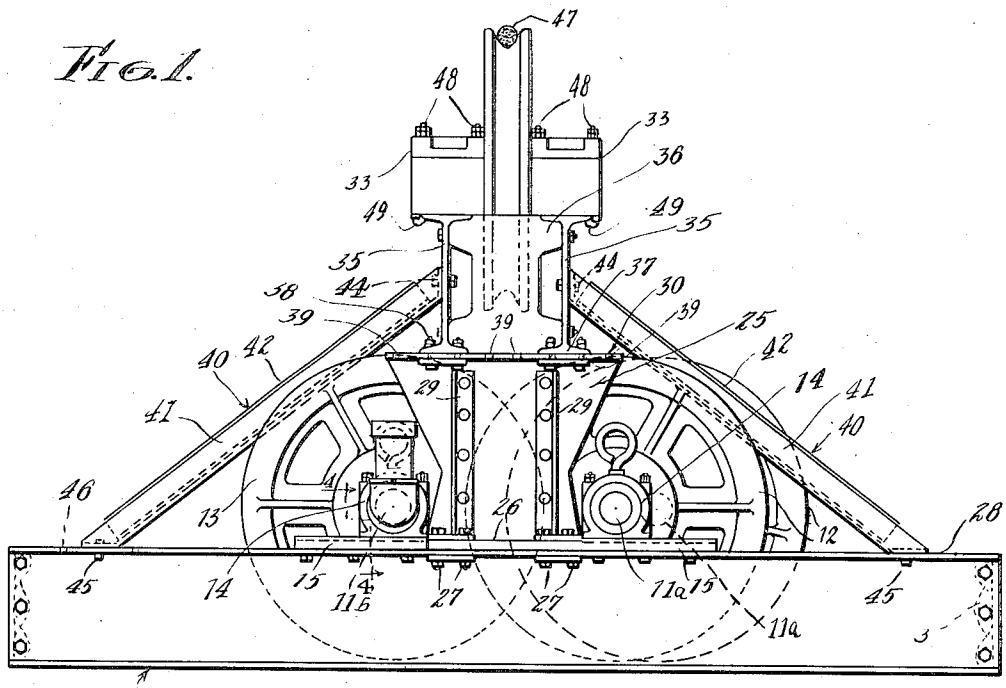
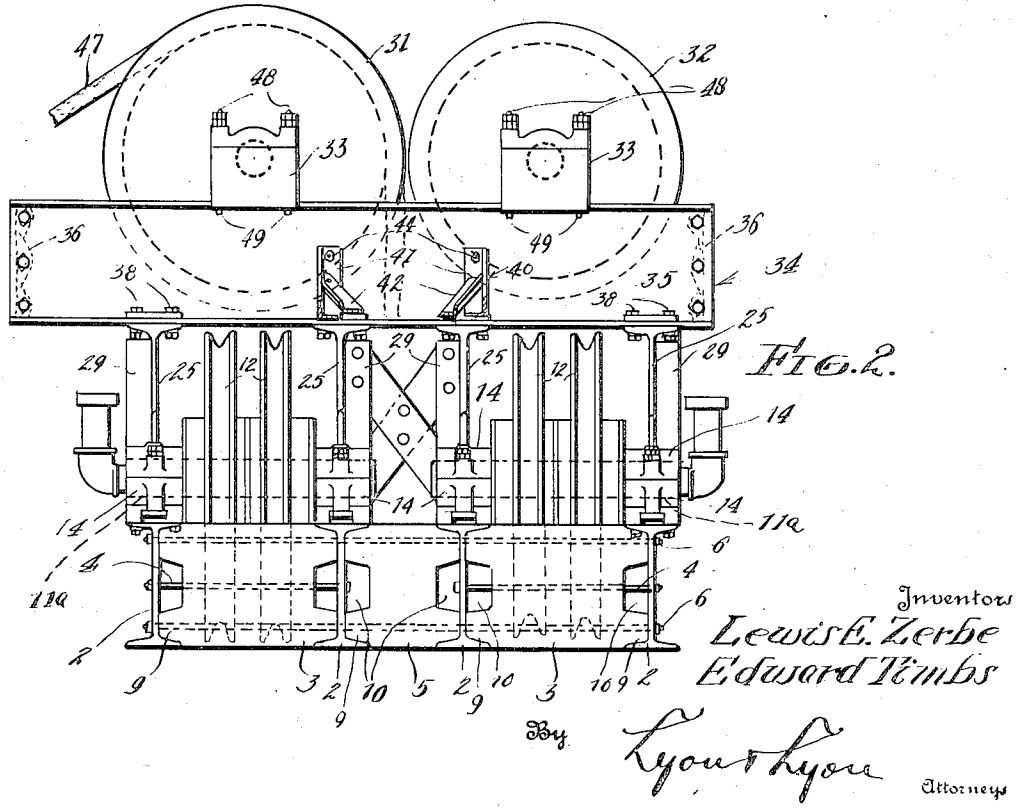


FIG. 2.



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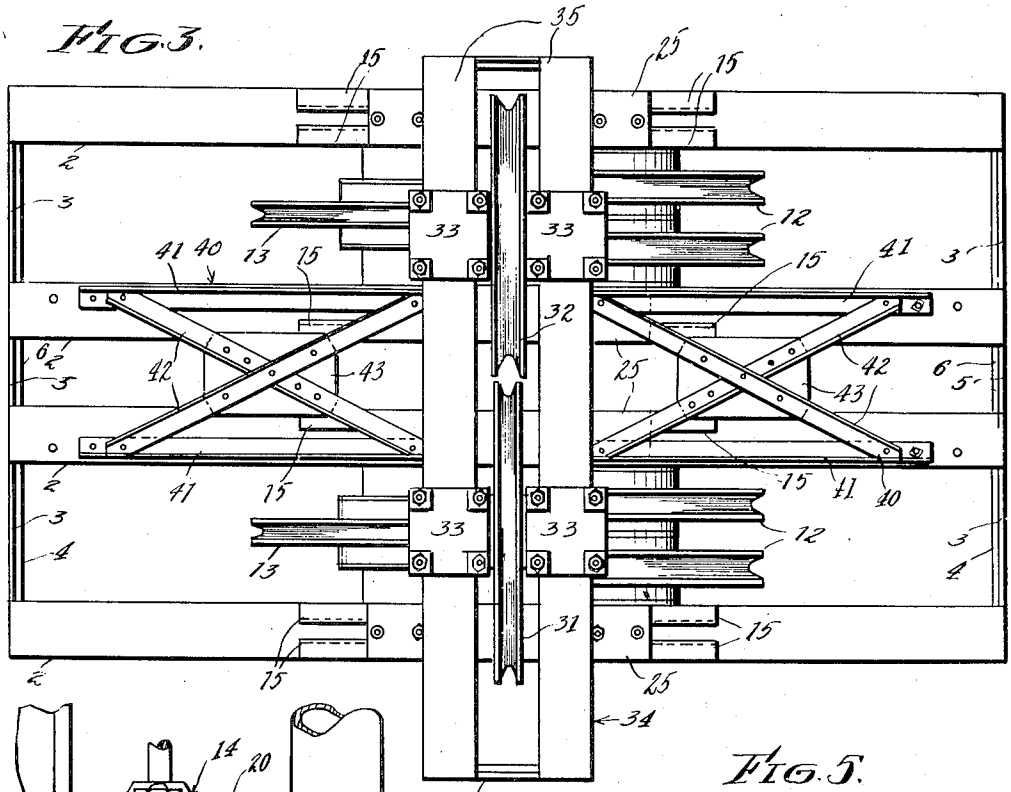
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FIG. 3.



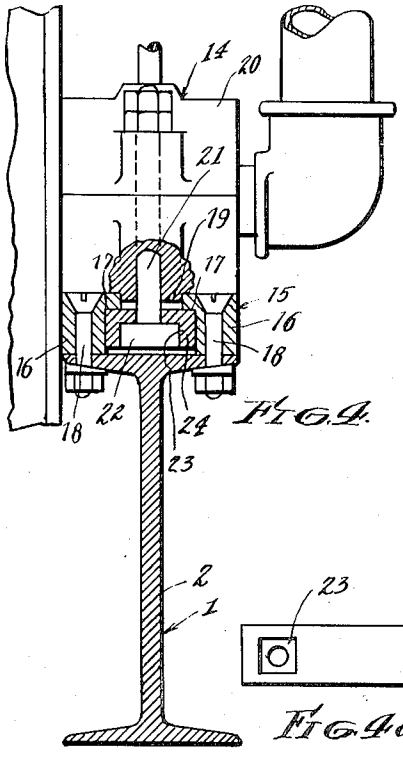


FIG. 4.

FIG. 4a.

FIG. 5.

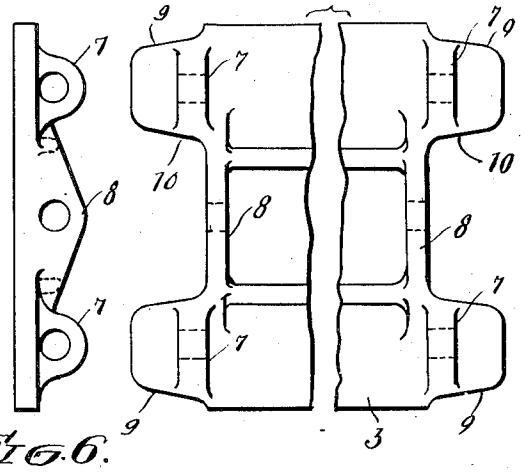


FIG. 6.

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UNITED STATES PATENT OFFICE.

LEWIS E. ZERBE, OF MONETA, AND EDWARD TIMBS, OF LOS ANGELES, CALIFORNIA, ASSIGNORS TO UNION TOOL COMPANY, OF TORRANCE, CALIFORNIA, A CORPORATION OF CALIFORNIA.

CROWN-BLOCK CONSTRUCTION.

Application filed May 17, 1924. Serial No. 713,991.

To all whom it may concern:

Be it known that we, LEWIS E. ZERBE and EDWARD TIMBS, citizens of the United States, residing at Moneta and Los Angeles, respectively, in the county of Los Angeles and State of California, have invented a new and useful Crown-Block Construction, of which the following is a specification.

This invention relates to the construction of crown-blocks such as used at the top of derricks for carrying the sheaves and cables that are employed in drilling deep wells, such as oil wells. In the type of crown-block to which my invention relates, a plurality of casing sheaves are supported below the crown sheave and sand line sheave. The casing sheaves are carried on four shafts, two of which are located on each side. It is frequently desirable to adjust the shafts of the casing sheaves with relation to each other and also to adjust the crown sheave and sand line sheaves to properly align these sheaves with the well hole. The general object of this invention is to produce a crown-block construction which will facilitate these adjustments and which will provide a rigid support for the pedestal carrying the crown sheaves and sand line sheave; also to provide a construction of this type which will be of light weight and which can be readily raised and mounted on the derrick top. A further object of the invention is to provide a compact crown block construction in which the edges of the sheaves may overlap, enabling the use of casing sheaves of relatively large diameter, the idea being that we thereby reduce the wear upon the cables because they are not being constantly bent to such a small radius as will injure them.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient crown block construction.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawings—

Figure 1 is an end elevation of a crown block construction embodying our invention.

Fig. 2 is a side elevation of the crown block shown in Figure 1.

Fig. 3 is a plan of the crown block construction.

Fig. 4 is a section upon an enlarged scale taken about on the line 4—4 of Figure 1, certain parts being broken away and shown in elevation.

Fig. 4ª is a detail of an anchor bar which constitutes a part of the adjustable construction for supporting the bearings of the casing sheave shafts.

Fig. 5 is a side elevation, broken away, and illustrating one of the spacing blocks such as employed in the construction of the crown block for separating the angle irons or I-beams from which the crown-block is constructed.

Fig. 6 is an end elevation of the spacing block shown in Figure 5.

The crown-block construction includes a base 1 which is preferably composed of steel beams of any desired structural shape; for this purpose we prefer to employ four I-beams 2, which are disposed parallel to each other. These beams are held at the desired distance apart by means of two spacing blocks 3 which separate the two intermediate or inner beams from the outer beams. In other words, the two outside beams are held apart by these spacing blocks and secured together by tie-bolts 4. Between the two inner or intermediate I-beams which constitute the base we provide a pair of spacing slabs or blocks 5, one at each end, and the parts which compose the entire base are secured together by long tie-rods 6 which pass through all of the beams (see Figure 2). These tie-bolts 4 and tie-rods 6 pass through the webs of the beams and also pass through lugs such as the lugs 7 and 8 (Figure 5) which project from the sides of the spacing blocks. The corners of the spacing blocks are cut away so as to form noses 9 which fit into the angles where the webs of the I-beams join their flanges; and between these noses the side edges of the spacing blocks are cut away so as to form gaps or openings 10 which give access to the tie-bolts and tie-bars and to their heads, and also to the nuts on the ends of the bolts.

It will be noted that the base 1 comprises a pair of rails 2 disposed on one side of the middle plane of the crown block and

another pair of rails 2 disposed on the opposite side of the middle plane of the crown block. We provide a pair of shafts 11^a and 11^b supported between one of these pairs of rails on one side of the crown block, and a pair of shafts 11^a and 11^b similarly supported on the pair of rails on the other side of the crown block. In the present instance, each shaft 11^a carries two sheaves 12 disposed apart and the corresponding opposite shaft 11^b carries a single sheave 13; the sheaves 13 are disposed out of line with the sheaves carried on the opposite shaft of the pair so that they overlap the adjacent sheaves; that is to say, each single sheave 13 projects into the space between the pair of sheaves 12 adjacent to it. This produces a compact organization of parts and enables sheaves of relatively large diameter to be employed.

The four shafts 11^a and 11^b are adjustable independently of each other. This gives the crown-block great flexibility in setting the sheaves as may be required during any operation. For example, one of the shafts with its sheaves may be set out of alignment with the other shaft on the same side of the crown-block as illustrated in Figure 1. Furthermore, the shafts are interchangeable so that if desired one of the shafts 11^a with its two sheaves can be moved over and mounted on the other side of the crown-block.

We provide means for supporting the shafts 11^a and 11^b on the base which will facilitate the lateral adjustment of the shafts as suggested above. In order to accomplish this, we provide a plurality of bearings or boxes 14. In the present instance we provide two of these boxes to support each shaft, the shafts being parallel with each other and at right angles to the I-beams 2. These boxes 14 are supported on guides 15, respectively, so that they may be adjusted toward or from the middle vertical plane of the crown-block, the guides being so constructed that they give the effect of a T-slot (see Figure 4); that is to say, they are constructed of two stout bars or strips 16; each strip is provided near its upper and inner edge with a rabbet groove 17, and these strips 16 are riveted or bolted to the flanges of the I-beam of the base by rivets or bolts 18. The rabbet grooves 17 are disposed toward each other so as to produce the T-slot referred to. The underside of each box is provided with a tongue 19 which fits into the upper portion of the T-slot with a machine fit (see Figure 4) so that the T-slot operates as an effective guide for each bearing or box. Each bearing or box 14 includes a removable cap 20 the said caps being held down by through-bolts 21 disposed in pairs, one on each side of the shaft. The lower end of each bolt is formed with a large head 22 and these heads are received in square sockets 23 formed in an anchor bar 24 which lies in the T-slot below the shoulders of the rabbet, (see Figures 4 and 4^a).

The upper ends of the bolts 18 are countersunk into the upper face of the guide strips 16. By loosening up the bolts 21 it will be evident that the boxes can be slid along the guide strip 16 and clamped in any position desired. In this way the alignment of the shafts 11 may be adjusted as may be required.

Between the guides 15 we provide a bracket 25 on each I-beam. We prefer to construct each of these brackets of a deep I-beam, the lower flanges 26 of the brackets being secured by removable bolts 27 to the upper flanges 28 of the I-beams 2. Where the brackets 25 are formed of very deep beams, such as twenty inch beams, we prefer to brace the webs of these brackets by means of small angle irons or angle clips 29 riveted in place (see Figure 1). The webs of the brackets 25 are cut so that the upper flanges 30 of the brackets are much longer than the lower flanges. This enables the shafts 11^a, 11^b, to be brought relatively close together, and at the same time gives a relatively long flange at the top of the bracket, which enables the crown-block to support the crown sheave 31 and sand line sheave 32 so that their supporting pedestal may have a considerable lateral adjustment with respect to the middle vertical plane of the crown-block. The two sheaves 31 and 32 are supported on boxes 33 which are in turn supported upon the pedestal 34, said pedestal comprising a pair of separated I-beams 35 held apart by spacing blocks 36 of the same type of construction as the spacing blocks 3 already described.

The flanges 37 at the lower edges of the I-beams 35 are secured by removable bolts 38 to the upper flanges 30 of the brackets 25 and the flanges 30 are provided with a plurality of bolt-holes 39 which are the proper distance apart to enable the pedestal to be secured in a plurality of different positions, that is to say, positions in which the pedestal has been shifted to the right or to the left of the normal middle position in which it is illustrated in Figure 1.

In order to brace the pedestal 34, we provide two diagonal braces 40 which may comprise side bars 41 (see Figure 3) and cross braces 42 connected by gusset plates 43. These diagonal braces 40 are preferably built up of angle irons and their upper ends are secured by bolts 44 to the sides of the webs of the pedestal I-beams. The lower end or foot of each angle brace is secured by a removable bolt 45 to the upper flange of its corresponding I-beam of the base 1. In order to enable the braces 40 to be attached

again if the pedestal 34 has been shifted laterally as suggested, the flanges 28 of the base beams 2 are provided with extra bolt-holes 46 (see Figure 1).

The cable, such as the cable 47, which passes over the crown sheave 31 (see Figure 2) is frequently operated or driven by the well apparatus at a very high rate of speed and its movement to the high speed is sometimes suddenly stopped, or the cable may even be reversed. When this occurs, the crown sheave 31, which has acquired a very high speed of rotation, will continue to revolve due to its inertia and this produces a very great amount of wear by the rubbing of the groove of the sheave on the cable. In order to overcome this difficulty we construct the crown sheave 31 of manganese steel, which increases the strength of this sheave to such an extent that we are enabled to reduce its area of cross section; in this way we produce a crown sheave of such light weight that its inertia is greatly reduced. This of course enables the friction of the cable in the groove to stop the sheave very soon and greatly reduces the amount of wear resulting to the cable from this cause.

The boxes 33 which support the shaft of the sand line sheave and crown sheave may be secured in any desired adjusted position on the top of the pedestal. For this purpose, the bolts 48 of these boxes extend down through the lower end of the boxes and are provided with hooks 49 which hook under the side edges of the flanges of the I-beams which form the pedestal 34.

In assembling the crown-block, two of the I-beams 2 located on one side of the middle plane of the crown-block are secured together by means of the bolts 4, with the distance blocks 3 between them. The two side portions of the base are formed in this way into two side frames, one to be located on each side of the middle plane of the crown-block; these side frames are then raised to the derrick top and the distance blocks 5 are then put in place with the tie-rods passing through them and the beams. The construction illustrated greatly facilitates forming the base at the derrick top.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and we do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

What we claim is:—

1. In a crown block, the combination of a base having a pair of separated beams, a pair of shafts extending transversely to the beams, sheaves carried by the shafts, boxes for the shafts, means for adjustably securing the boxes to the beams, a bracket mounted on each beam between the adjacent boxes, means for securing the brackets on the beams, and a sheave supported on the brackets at a higher elevation than the first named sheaves.

2. In a crown-block, the combination of a base having a pair of separated beams, a pair of shafts extending transversely to the beams, casing sheaves carried by the shafts, a guide secured to each beam, boxes for the shafts fitting to and supported on said guides, and adjustable along the same, means for securing the boxes to the guides in their different adjusted positions, a bracket mounted on each beam between the adjacent boxes extending above the crown sheaves, means for securing the brackets to the beams, and a crown-sheave supported on the brackets at a higher elevation than the first named sheaves.

3. In a crown-block, the combination of a base having two pairs of separated beams, a pair of shafts extending transversely to each pair of beams, casing sheaves carried by the shafts, a guide secured to each beam, boxes for the shafts fitting to and supported on said guides, and adjustable along the same, means for securing the boxes to the guides in their different adjusted positions, a bracket mounted on each beam between the adjacent boxes, means for securing the brackets to the beams, a crown sheave, a crown sheave pedestal supported on the brackets having two upper substantially parallel beams transverse to the first named beams, boxes for supporting the crown sheave and mounted for longitudinal adjustment on the upper beams.

4. In a crown-block, the combination of a base having two pairs of separated beams, a pair of shafts extending transversely to each pair of beams, casing sheaves carried by the shafts, a guide secured to each beam, boxes for the shafts fitting to and supported on said guides, and adjustable along the same, means for securing the boxes to the guides in their different adjusted positions, a bracket mounted on each beam between the adjacent boxes, means for securing the brackets to the beams, a crown sheave, a crown sheave pedestal supported on the brackets having two upper substantially parallel beams transverse to the first named beams, boxes for supporting the crown sheave and mounted for longitudinal adjustment on the upper beams, and hook bolts for securing the crown sheave boxes to the flanges of the upper beams.

5. In a crown-block, the combination of a base having a pair of separated I-beams, a pair of shafts extending transversely to the beams, casing-sheaves carried by the shafts, a guide secured to each beam, boxes for the shafts fitting to and supported on said guides and adjustable along the same,

means for securing the boxes to the guides in their different adjusted positions, a bracket mounted on each beam between the adjacent boxes, means for securing the brackets to the beams, a pedestal on the brackets, means for securing the pedestal to the brackets, enabling the pedestal to be adjusted laterally on the brackets, diagonal braces connected to the sides of the pedestals, and means for detachably securing the lower ends of the diagonal braces to the said beams in a plurality of different positions to correspond with shifted positions of the pedestals, and a crown-sheave supported on the pedestal.

6. In a crown block, the combination of a base having a pair of separated I-beams, a pair of shafts extending transversely of the beams, casing sheaves carried by the shafts, boxes for the shafts supported on said beams, means for securing the boxes in different adjusted positions along the beams, a bracket mounted on each beam between the adjacent boxes, means for securing the bracket to the beams, a pedestal on the brackets having a pair of I-beams with spacing blocks separating the same, means for securing the pedestal to the brackets, diagonal braces connected to the webs of the pedestal beams and secured at their lower ends to the upper sides of the first named beams, and a crown sheave supported on the pedestal.

7. In a crown-block construction, the combination of a base having four horizontal I-beams, spacing blocks disposed between the webs of said beams, tie-bolts connecting the pairs of the said beams, and tie-bolts passing completely through all of the said beams and securing the same together, a plurality of brackets seated on and secured to the upper flanges of the said beams and consisting of I-beams with their webs cut so that the upper flanges of the brackets are longer than their lower flanges and form a pedestal seat, casing sheaves disposed on each side of the brackets and having parallel shafts extending at right angles to the first named beams, boxes carrying said shafts supported on the first named beams, a pedestal seated on the upper flanges of the brackets, said pedestal having a pair of separated I-beams with distance blocks therebetween, tie-bolts connecting the last named I-beams through the last named distance blocks, removable bolts for securing the flanges of the pedestal I-beams to the flanges of the brackets, and a crown-sheave supported on the pedestal.

8. In a crown-block construction, the combination of a base having four horizontal I-beams, spacing blocks disposed between the webs of said beams, tie-bolts connecting the pairs of the said beams, and tie-bolts passing completely through all of the said beams and securing the same together, a plurality of brackets seated on and secured to the upper flanges of the said beams and consisting of I-beams with their webs cut so that the upper flanges of the brackets are longer than their lower flanges and form a pedestal seat, casing sheaves disposed on each side of the brackets and having parallel shafts extending at right angles to the first named beams, boxes carrying said shafts supported on the first named beams, a pedestal seated on the upper flanges of the brackets, said pedestal having a pair of separated I-beams with distance blocks therebetween, tie-bolts connecting the last named I-beams through the last named distance blocks, removable bolts for securing the flanges of the pedestal I-beams to the flanges of the brackets, and diagonal braces secured to the webs of the pedestal I-beams and secured at their lower ends to the flanges of the base beams.

9. In a crown block construction, the combination of a base having a pair of rails on each side of the middle plane of the crown block, a pair of shafts mounted between one pair of the rails, another pair of shafts mounted between the other pair of rails, sheaves carried respectively by the shafts, the sheaves of one shaft of each pair of shafts being out of line with those of the opposite shaft of that pair, and enabling the edges of the sheaves to overlap.

10. In a crown block construction, the combination of a base having a pair of rails on each side of the middle plane of the crown block, a pair of shafts mounted between one pair of the rails, another pair of shafts mounted between the other pair of rails, sheaves carried respectively by the shafts, the sheaves of one shaft of each pair of shafts being out of line with those of the opposite shaft of that pair, enabling the edges of the sheaves to overlap, a pair of boxes corresponding to each shaft for rotatably supporting the same on the said rails, guiding means for guiding said boxes transversely with respect to the middle plane of the crown block so that said shafts can be adjusted independently of each other, and means for securing the boxes to the rails.

Signed at Torrance, Calif., this 7th day of May 1924.

LEWIS E. ZERBE.
EDWARD TIMBS.