This invention relates to oil well equipment and more particularly to header blocks for masts used for servicing deep wells such as those drilled for oil and natural gas.

In the drilling of deep wells such as those drilled for oil and natural gas with standard cable tools, the tendency has been toward the elimination of permanent drilling rigs because portable drilling machines have been found to be adequate for the work in many instances even when it is necessary to drill wells several thousand feet deep. The reason for this, of course, is that permanent rigs are expensive to build and to move.

While the adoption of portable drilling machines for the drilling of deep wells for oil and gas is economically sound, it has presented problems. As wells drilled by portable machines have become deeper, this has necessitated a design of boom adequate to carry the heavy loads of casing when the well is cased. To eliminate the necessity of an unduly heavy boom, it has been proposed to set up an additional mast over the well hole which is of fairly simple construction and adequate to serve as a mast for use in casing the well thereby permitting a smaller or lighter weight boom for the drilling machine which is adequate to carry on the drilling operation itself with the drill, drill stem and cable.

Also, in many instances, after wells have been drilled, the derrick or rig has been removed and such wells require servicing. For example, it may be desirable to pull the casing for use elsewhere or for salvage, or the well otherwise may need servicing, such as cleaning out. Such operations as this require some sort of mast to mount the necessary sheaves relatively high over the mouth of the well.

It is an object of this invention to provide a header block adapted to mount the sheaves and to connect the upper ends of the legs of a two-legged mast, such two-legged mast being herein referred to, for convenience of description, as a two-legged oil well drilling mast although it is to be understood that such a mast is usually incidental to the actual drilling operation and is more apt to be used for the casing operation or in removing the casing or for some other purpose incidental to the maintenance or servicing of deep oil or gas wells.

The header block provided by the invention comprises a pair of main cross supporting members or beams maintained in parallel spaced relation by a pair of tie plates, the tie plates lying at the ends of the cross beams and at an angle to the horizontal and carrying depending bosses adapted to telescopically engage the upper ends of the two hollow legs of the mast; these legs converging from the bottom upwardly and being conveniently made of heavy pipe. The above-mentioned cross members, which are preferably of I-beam construction, support a platform on which is mounted a plurality of upwardly extending plates having bores in which to mount the sheave shaft and to provide partitions between the plurality of sheaves which are mounted to rotate on the sheave shaft when the latter is mounted in said bores. Means are also provided to anchor the header block to simple, effective and removable manner to the upper ends of the hollow converging legs of the mast.

Although the novel features which are believed to be characteristic of the invention are pointed out in the annexed claims, the invention itself as to its objects and advantages and the manner in which it may be carried out, may be better understood by reference to the accompanying drawings forming a part hereof, in which

Fig. 1 is a side view in elevation of a two-legged oil well mast mounted over the mouth of a deep well, the mast including a header block embodying the invention and this view showing a drilling machine in conventional form in broken lines, better to illustrate the invention; Fig. 2 is a front view of the mast shown in Fig. 1 and showing a traveling block hooked to an elevator which in turn is connected to the casing represented as being lifted from the well hole; Fig. 3 is a plan view to larger scale of the header block embodying the invention; Fig. 4 is a front view in elevation and partly in section of the header block on line 4—4 of Fig. 3 and showing the manner of removably anchoring it to the converging hollow legs of the two-legged mast shown in Figs. 1 and 2, and Fig. 5 is a view on line 5—5 of Fig. 4.

Referring now to the drawings, in which like reference characters denote like parts throughout the several views, the two-legged mast comprises a pair of upstanding hollow legs 10 and 11 converging upwardly from the bottom. The hollow legs are of heavy pipe such as eight or ten inch pipe and ordinarily will be of the order of forty to fifty feet in length. The legs are removably anchored at the bottom to heavy sills 12 by suitable means, as for example, by bolts 13 and steel anchor members 14. The upper ends of the converging legs are connected by the
header block, designated generally by reference character 18, described in further detail hereinafter.

Shown conventionally in broken lines in Fig. 1 is a drilling machine 16 comprising an engine or prime mover 17, a walking beam 18, a bull wheel 19 and its winding drum 20, boom or driling mast 21 and other parts. Inasmuch as the portable drilling machine is not a part of the invention and is well known in the art in many variants, it is deemed unnecessary to describe it in further detail herein. Suffice it to say the engine is adapted to rotateably drive the bull wheel 19 through belt 22 and consequently its winding drum 20.

The header block 15 (see Figs. 3, 4 and 5) comprises a pair of oppositely disposed cross-supporting members or beams 25 and 26 maintained in parallel spaced relation and braced by a pair of relatively thick steel tie plates 27 and 28. It will be noted that tie plates 27 and 28 do not lie horizontally but they lie in planes which are at an angle to horizontal. The plane of plate 27 is perpendicular to the axis of converging hollow leg 19 and the plane of plate 28 is perpendicular to the axis of converging hollow leg 14. The cross beams are made conveniently from standard I-beam stock. To form them to the shape desired, and as shown, the webs 29 and 30 of the I-beams after cutting to proper length are cut so as to remove a sector or V-shaped piece out of web of the web at the bottom flange, the splices of the sector or V-shape cuts terminating at 31 and 32, as illustrated in Fig. 4. Then the flange at the cut-out portion is forced into engagement with the opposite side of the V cut in the web and welded thereto at each end of the beam, this producing the shape illustrated in Fig. 4. The remaining part of the flange 35 between the points 31 and 32, being left undisturbed, lies horizontally, whereas the outer ends at 27 and 28 of the flanges lie in planes extending upwardly from the points 31 and 32. Each of cross beams 25 and 26 is of like shape and construction.

The top flanges 36 and 37 of the cross beams 25 and 26 are connected with a top tie plate 38 and secured thereto by welding. In fact, all the various parts which are fixedly secured to other parts in the header block are joined by welding to produce a rigid and rugged structure adequate to withstand the forces and strains of rough usage to which equipment of this kind is usually subjected.

The top tie plate 38 forms a supporting platform for mounting a plurality of upstanding plates 40, 41, 42 and 43 which are welded at their bottom ends to platform 38. The plates of this group of plates are spaced apart to accommodate sheaves 44, 45 and 46 between adjacent plates, the outer plates 40 and 43 serving as guard plates and the inner plates 41 and 42 serving as spacer plates between adjacent sheaves. All of said plates have registering or aligned bores 47, 48, 49 and 50 therethrough to receive a sheave shaft 51 on which the sheaves are mounted for rotation, it being noted that the sheave shaft lies parallel to beams 25 and 26.

The sheave shaft is removably secured in said bores by a removable screw nut 52 which is prevented from turning or loosening by a cotter pin 53 despite its tendency to do so by reason of vibration or rotation of the sheaves. The outer plates 40 and 43 are reinforced by gusset plates 54, 55, 56 and 57 which are mounted in oppositely disposed pairs, these plates being mounted so that they lie in planes at right angles to the planes of plates 40 and 41 and platform plate 35.

The group of sheave plates 40, 41, 42 and 43 also has a series of aligned bores 58, 59, 60 and 61 through which extends a removable ball pin 62 held in place by a threaded nut 53 which is prevented from unwanted turning by cotter pin 64. A ball 65 having eyes at its opposite ends through which the ball pin 62 extends, provides means for connection to mechanical lifting device for readily and easily handling the heavy header when mounting on or dismounting it from the legs of the mast or for other purposes generally from place to place. The eye ends 66 and 67 of the ball serve as spacers between adjacent upstanding plates on the platform 38 and a sleeve 58 serves as a spacer between plates 41 and 42.

Welded to and depending from bottom tie plates 27 and 28 (see Fig. 4) are hollow cylindrical neck pieces 70 and 71, providing bosses, the axis of each of these bosses being perpendicular to the plane of its attached tie plate, it being noted that the axes of these bosses 70 and 71 are in axis with the three hollow legs 10 and 11 which the bosses telescopically engage, when the header is in place, connecting the upper ends of the legs of the mast.

The tie plates 27 and 28 and their fixedly secured depending bosses 70 and 71 are securely but removably fastened to the legs of the mast by adjustable anchoring means. Consequently, the header block as a whole may be securely mounted on the legs of the mast. The anchoring means comprise anchor bolts 72 and 73, one for each leg of the mast, and cross bolts 74 and 75. It will suffice to describe the anchoring means for one leg as both are the same. Bolt 74 is adapted to extend through aligned holes in the cylindrical wall of the pipe 10 and is removably secured by a threaded nut 76. This bolt extends through an eye 77 on the lower end of the anchor bolt 78. The upper threaded end of bolt 72 extends through a bore 73 in tie plate 27 and is removably and adjustably secured in place by a threaded nut 76. Thus the anchor bolts 72 and 73 may be put under ample tension by the threaded nuts 76 to hold the legs and header block securely fastened together.

A dead end pin 80 mounted on gussets 54 and 55 and extending crosswise of the beams 25 and 26 serves to anchor one end of the cable 81 which may be threaded through a hole 82 in upper tie plate 38. Fenders 83 and 84 made of pipe split in two longitudinally are welded to the horizontal section of the flange 35 on each cross beam 25 and 26. These serve to prevent any obstruction on the cable from catching on the underside of the flanges.

Oppositely disposed pairs of eye members 82 and 83 are welded to the outside surfaces of the vertical webs of beams 25 and 26. These serve for attaching guy wires 85 (see Figs. 1 and 2) to the header for maintaining the mast in vertical position, the lower ends of the guy wires being anchored to "dead men" in a manner known in the art.

The operation of the header block and its manner of use may be described in connection with the operation of pulling casing from a deep well. The draw cable 81 is secured at one end to dead end pin 80 after it has been trained over the sheaves of the header block and the sheaves of a conventional traveling block, designated generally by reference character 80. The draw cable 81
is threaded in conventional block and tackle fashion and the end of the cable opposite the end secured to dead end pin 80 is wound around the bull wheel winding drum 20, in conventional fashion. The ball 91 of the traveling block 90 has a hook 92 (see Fig. 2) engaging the balls of an elevator 93 which is clamped on the upper end of the casing 94 beneath the pipe collar 95. To lift the casing out of the well the engine 11 is caused to rotate the bull wheel winding drum 20. The multiple sheaves of the header block 15 and traveling block 90 will, of course, produce a having a lever or mechanical advantage as will readily be understood by those skilled in the art.

While the header block has been illustrated as having three sheaves, it may have a greater or lesser number and, if desired, the header block as shown may be threaded so that a lesser number than three sheaves are utilized; these things being matters which will be apparent from the foregoing description to those skilled in the art.

The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention in the use of the same to exclude any equivalent of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. A header block for an oil well mast having two upwardly extending converging hollow legs which header block comprises a pair of parallel I-beams, a tie plate welded to the lower flanges of said I-beams at each end of said pair of I-beams connecting said I-beams and maintaining said I-beams in parallel relation, a boss depending from each of said tie plates, one of said bosses being adapted to telescopically engage the upper end of one of said legs and the other of said bosses being adapted to telescopically engage the upper end of said other leg, a tie plate connecting the upper flanges of said pair of I-beams providing a platform, a plurality of at least four upwardly extending plates fixedly mounted on said platform in spaced relation and in parallel planes at right angles to the webs of said parallel I-beams, each of said upstanding plates having a boss thereon and having an axis lying parallel to said I-beams, a removable sheave pin extending through said bosses, a plurality of at least three sheaves mounted for rotation on said pin, the outside plates of said upstanding plates providing guards for the two outside sheaves and the intermediate plates providing spacers for the other of said sheaves, and removable anchor bolts extending through said bosses to anchor said pair of connected I-beams to said legs.

2. A header block for an oil well mast having two upwardly converging hollow legs which comprises a pair of opposed cross I-beams the bottom flanges of which at their ends are upturned to lie in planes at an angle to horizontal, a tie plate at each end of said pair of beams connecting said beams and maintaining them in spaced parallel relation, the tie plate at one end of said pair of beams lying in a plane perpendicular to the axis of one of said converging legs and the tie plate at the other end of said pair of beams lying in a plane perpendicular to the axis of the other of said converging legs and the tie plate at each end of said pair of beams being adapted to telescopically engage the upper end of one of said hollow legs and the other of said bosses being adapted to telescopically engage the upper end of the other of said hollow legs, a removable anchor bolt extending through one of said bosses into one of said legs and a removable anchor bolt extending through the other of said bosses into the other of said legs, means for removably securing said anchor bolts to said legs for anchoring said header to said legs, means supported by said beams mounting a sheave shaft with its axis parallel to said beams, and a plurality of sheaves mounted for rotation on said sheave shaft.

3. A header block for an oil well mast having two upwardly converging hollow legs which comprises a pair of opposed cross I-beams the bottom flanges of which at their ends are upturned to lie in planes at an angle to horizontal, a tie plate at each end of said pair of beams connecting said beams and maintaining them in spaced parallel relation, the tie plate at one end of said pair of beams lying in a plane perpendicular to the axis of one of said converging legs and the tie plate at the other end of said pair of beams lying in a plane perpendicular to the axis of the other of said converging legs and the tie plate at each end of said pair of beams being adapted to telescopically engage the upper end of one of said hollow legs and the other of said bosses being adapted to telescopically engage the upper end of the other of said hollow legs, a removable anchor bolt extending through one of said bosses into one of said legs and a removable anchor bolt extending through the other of said bosses into the other of said legs, means for removably securing said anchor bolts to said legs for anchoring said header to said legs, means supported by said beams mounting a sheave shaft with its axis parallel to said beams, and a plurality of sheaves mounted for rotation on said sheave shaft.

4. A header block for an oil well mast having two upwardly converging hollow legs which header block comprises a pair of parallel cross I-beams the bottom flanges of which at their ends are upturned to lie in planes at an angle to horizontal, a lower tie plate at each end of said pair of beams connecting and bracing said beams, the lower tie plate lying in a plane perpendicular to the axis of one of said converging legs and the other lower tie plate lying in a plane perpendicular to the axis of the other of said converging legs, a hollow boss depending from each of said lower tie plates, one of said bosses telescopically engaging the upper end of one of said legs and the other of said bosses telescopically engaging the upper end of the other of said legs, an upper tie plate connecting the upper flanges of said pair of beams forming a platform, a group of upstanding plates mounted in spaced parallel relation on said platform, said plates having aligned bores for a sheave shaft, a sheave shaft mounted in said bores, a plurality of sheaves mounted for rotation on said shaft, the outer plates of said group serving as guard plates and the inner plates of said group serving as spacers between adjacent sheaves, a removable anchor bolt extending through one of said lower tie plates through its depending boss and a removable anchor bolt extending through the other of said lower tie plates through its depending boss, said anchor bolts
providing means for removably anchoring said header to said legs.

5. A header block for an oil well mast having two upwardly converging hollow legs which header block comprises a pair of parallel cross I-beams the bottom flanges of which at their ends are upturned to lie in planes at an angle to horizontal, a lower tie plate at each end of said pair of beams connecting and bracing said beams, the lower tie plate on one end of said pair of parallel beams lying in a plane perpendicular to the axis of one of said converging legs and the other lower tie plate lying in a plane perpendicular to the axis of the other of said converging legs, a hollow boss depending from each of said lower tie plates, one of said bosses telescopically engaging the upper end of one of said legs and the other of said bosses telescopically engaging the upper end of the other of said legs, an upper tie plate connecting the upper flanges of said pair of beams forming a platform, a group of upstanding plates mounted in spaced parallel relation on said platform, said plates having aligned bores for a sheave shaft, a sheave shaft mounted in said bores, a plurality of sheaves mounted for rotation on said shaft, the outer plates of said group serving as guard plates and the inner plates of said group serving as spacers between adjacent sheaves, and means for removably anchoring said header to said legs, said anchoring means including a pair of anchor bolts each secured at its lower end to a cross bolt adapted to be secured to one of said legs, one of said anchor bolts extending upwardly through a bore in one of said lower tie plates and through the hollow boss depending from said other tie plate and adapted to extend downwardly into the other of said lower tie plates and the other of said anchor bolts extending upwardly through a bore in the other of said lower tie plates and through the hollow boss depending from said other tie plate and adapted to extend downwardly into the other of said hollow legs.

6. A header block for an oil well mast having two upwardly converging hollow legs which header block comprises a pair of parallel I-beams hav-

ing their webs disposed vertically in parallel spaced relation and having their bottom flanges at their outer ends upturned, a tie plate connecting the upturned portions of the lower flanges of said beams at one end and a tie plate connecting the upturned portions of the lower flanges of said beams at the other end, means including an anchor bolt extending through one of said tie plates into one of said legs for removably securing one of said tie plates to the upper end of one of said legs and means including an anchor bolt extending through the other of said tie plates into the other of said legs for removably securing the other of said plates to the upper end of the other of said legs, a tie plate connecting the upper flanges of said beams providing a platform, a group of at least four upstanding plates secured at their bottom edges to said platform and disposed in spaced parallel relation, said plates mounting a sheave shaft, a group of at least three sheaves mounted for rotation on said sheave shaft, the outer plates of said group of plates serving as guard plates and the intermediate plates of said group serving as spacers for adjacent sheaves, a pair of gusset plates disposed in spaced relation secured to said platform and to one of said outer plates, a pair of gusset plates disposed in spaced relation secured to said platform and the other of said outer plates and a dead end pin connected to one pair of said gusset plates for securing the dead end of a draw cable.

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