Jan. 9, 1940. W. J. EDWARDS 2,186,720

MAST HEAD

Original Filed Jan. 10, 1931

FIG. 1

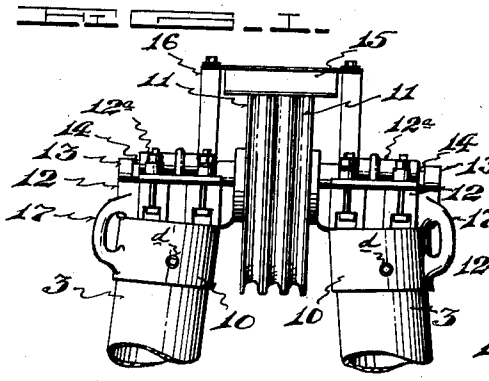


FIG. 2

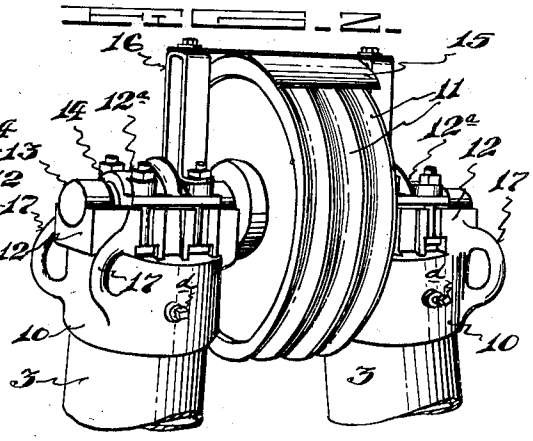


FIG. 3

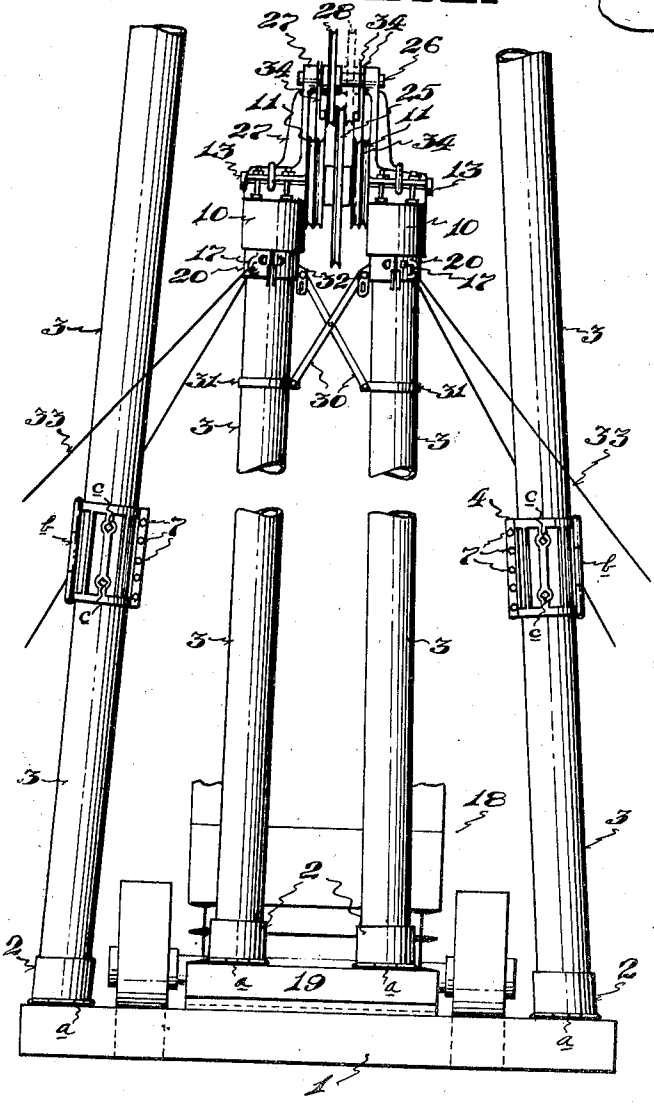


FIG. 4

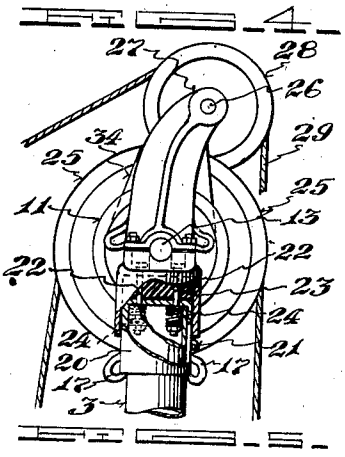
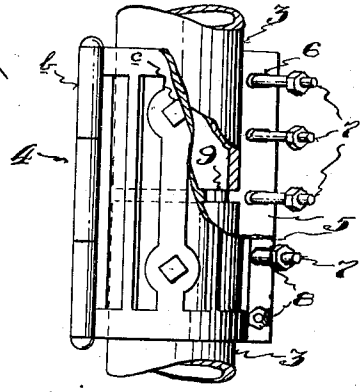


FIG. 5



William J. Edwards
INVENTOR.

BY Ernest A. Hood

ATTORNEY.

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MAST HEAD

William John Edwards, Wichita Falls, Tex.

Refiled for abandoned application Serial No. 507,909, January 10, 1931. This application May 18, 1937, Serial No. 143,394

5 Claims. (Cl. 254—139)

This application is a substitute for prior abandoned application, Serial No. 507,909, filed January 10, 1931.

This invention relates to improvements in mast heads that are used in connection with masts of well drilling equipment.

The primary object of this invention is to provide for alignment of depending operating elements from sheaves of a mast head approximately over the center of the well.

Another object of this invention is to arrange the sheaves so that either drilling, bailing, or the use of the casing block may be accomplished without the necessity of using an auxiliary shear pole or mast.

An important feature of this invention is the provision of a mast head having a shaft upon which a majority of the sheaves are carried, and the ends of which rest directly on the upper ends of the supporting poles. Another feature of this invention is the provision of a secondary shaft above and slightly to the fore of the primary shaft.

Another object of the invention resides in the provision of clamping crown block casting which may be quickly adjusted to the casing carrying a multiplicity of sheaves and pulleys over which cables may be passed in much the same manner as may be done with the ordinary derrick construction, yet with only a portion of the attendant expense necessary in providing the conventional type of derrick which requires four uprights as well as many braces and struts, requiring considerable manual labor in its erection.

Still another object of the invention resides in the manner in which it may be adapted to use in connection with a conventional type of spudding machine, replacing the ordinary mast which is carried by the machine, making it more cumbersome and unwieldy, it be necessary to carry only the crown block and base castings on the machine, using the well casing for the uprights when the machine is to be placed in operation.

With the foregoing objects as paramount, the invention has further reference to other and lesser objects and to its salient features of construction which will become manifest as the description proceeds, taken in connection with the appended drawing in which:

Fig. 1 is a side elevation of one form of crown block assembly used in this invention;

Fig. 2 is a perspective view of the same;

Fig. 3 is a fragmentary end view of a conventional spudding machine, showing the invention attached, also showing the portion of the invention as used as a derrick, and illustrating a modified form of crown block assembly;

Fig. 4 is a right side elevation of the crown block assembly shown in Fig. 3, having portions cut away and in section showing the shock absorbing means thereof; and

Fig. 5 is a detail view of the coupling clamp attached to sections of the casing, portions of which clamp are cut away to show the manner in which it is applied to the casing sections.

While many unsuccessful attempts have been made to depart from the ordinary type of derrick, the present invention is believed to be a complete departure from the common type of oil field drilling rig in that it will not only save the operator considerable expense in material as well as in transportation and labor, but will also consume less space than the ordinary derrick. A derrick of the type herein described may be assembled and raised by only a portion of the crew ordinarily required for the erection of the conventional type of derrick.

As will be presently brought out in the following description of the present invention, unlike the ordinary derrick of the demountable type, the sheaves can be arranged directly above the point of operation, allowing a straight, unhampered operation of the lines into the well. The casing or traveling block when in operating position also will hang approximately over the center of the well.

Proceeding now with the description, 1 is a timber upon which is bolted hinged base castings 2, each of which castings has a collar integral therewith into which a section of casing 3 is inserted, as shown in Fig. 3, which latter may lie horizontally upon the ground by virtue of the hinge arrangement at *a* whereupon other sections may be added by use of a clamp 4, which is illustrated in Fig. 5.

The clamp 4 is in two sections hinged together at *b* to expedite its application to the casing sections 3, and said clamp sections have flanges 5, one of which is provided with elongated apertures 6, having bolts 7 pivoted therein for insertion into slots 8 of the other section, whereupon the nuts upon the bolts 7 may be screwed down, securing the clamp upon the ends of the casing sections 3, as shown in Fig. 5. The clamps 4 are held against displacement upon the joints by means of a boss 9 which is provided midway of the ends of the clamp sections 4, against which boss the ends of the casing sections 3 abut while

in an upright position in the manner shown in Fig. 3. Further means for preventing the displacement of the clamp 4 is provided in the form of set screws *c* which engage the casing sections.

Right and left hand crown block castings 10 are provided with cup-shaped portions or collars for attachment to the uppermost ends of the casing sections 3 to carry sheaves 11, as shown in Figs. 1 and 2. These castings, as will be seen particularly in Fig. 2, are provided with grooved bearing plates or clamps 12 in which a shaft 13 is secured and upon which the sheaves 11 rotate. The shaft 13 is provided with grooves 14 adjacent its ends which grooves receive annular bosses (not shown) in the castings 10, which arrangement prevents endwise movement of the shaft 13.

A shield 15, supported by standards 16, is provided to overhang the sheaves 11, in the manner shown in Figs. 1 and 2, to prevent the cables from becoming displaced from the respective sheaves 11 when the latter are in operation. The castings 10 are secured against displacement from the upper ends of the casing sections 3 by means of set screws *d* which protrude through the castings 10 and which are adapted to be threaded against the pipe sections 3. The castings 10 are also provided with ears 17 to which guy wires 33 may be attached to support the structure in a vertical position.

Referring now to Fig. 3, it will be seen that the invention may be readily attached, and used in connection with a conventional type of spudding machine 18 by placing the base castings 2 upon a timber 19, the latter being secured to the spudding machine 18, and the pipe sections 3 joined together by clamps 4, in the same manner as when the structure is used for a derrick.

Fig. 4 illustrates a preferred form of crown block castings and comprises sleeves 20 into which the pipe sections 3 are inserted to be secured within said sleeve 20 by means of bolts inserted through projections 21 which, when tightened, will hold the sleeve 20 securely upon the ends of the pipe sections 3. The casting 10 is placed over the sleeve 20 and secured thereto by means of bolts 22 which latter extend through a cylindrical cushion 23, of rubber or other flexible material, and the top of the sleeve 21, to pass through compression springs 24 sleeved thereon between nuts on the bolts and the top of the sleeve 21 which springs 24, together with the cushion 23, provide a shock absorbing medium for the crown block assembly when extreme weight is placed thereon, and to relieve the strain upon the wire lines and cables thereby preventing possible breakage of the parts.

The latter form of crown block assembly, illustrated in Figs. 3 and 4, is constructed, insofar as the bearing arrangement is concerned, in much the same manner as the structure shown in Figs. 1 and 2. The shaft 13 is secured against end movement or displacement by means of the coacting grooves and bosses, as previously pointed out. It will be seen, however, that various sizes of sheaves are provided in this form of the invention, the arrangement of which may be changed, when it is desired to do so to suit the conditions under which the device is to be used.

Figs. 3 and 4 illustrate an arrangement whereby a large sheave 25 is mounted between smaller sheaves 11. An auxiliary shaft 26 is mounted in castings 27, which latter form the upper portion of the bearings in which the shaft 13 rotates and extend upward, curving slightly forward at their upper ends, as shown in Fig. 4, to offset the shaft 26 with respect to the shaft 13 so that the sheave 28, which is mounted for free rotation upon the shaft 26, will extend forward sufficiently to allow the cable 29, when the latter extends downward, to clear the sheaves 11 and other parts of the structure and allow free movement of the lines into the well. As indicated in Fig. 3, the sheave 28 may be slid lengthwise on the shaft 26 to be operated on either side of the large sheave 25 which arrangement will enable the operator to arrange his cables where they will not interfere with each other in operation.

It is pointed out that an arrangement of braces 30, such as that shown in Fig. 3, may be provided to brace and support the pipe sections 3 and prevent their spreading. These braces 30 are secured to collars 31 at their lower ends and to ears 32 which are cast integral with sleeves 20.

In operation, the invention may be constructed, as pointed out in the foregoing, by assembling the pipe sections 3 upon the ground, whereupon the clamps 4 are secured at the joints of the casing sections 3 and bolted in place. As previously stated, these clamps, one-half of each being provided with elongated apertures 9 to allow the bolts free movement therein, the other half of each being slotted, permitting the operator to slip the bolts 7, which already have nuts thereon, into the slots 8 without having to remove the nuts. This arrangement provides a quicker and cheaper method of connecting the sections 3 together without the use of pipe threaders and collars.

When a sufficient number of the sections 3 have been connected together to secure the desired height, the castings 10 are placed upon the ends of the sections 3 which are to be uppermost when the device is raised, and secured thereon by means of the set screws *d* whereupon the shaft 13, upon which the sheaves 11 are mounted, is placed in the clamps 12, the under portions of which bearings are cast integral with the castings 10 while a cap 12*a* is bolted thereon as illustrated in Figs. 1 and 2.

After the structure has been assembled, it may be raised to an upright position by means of cables, or the like, and guy wires 33 are secured to the ears 17 to hold the structure in an operative position.

The five sheaves 11 and 25, that are arranged on the single large shaft 13, are the ones that have to withstand the heavy load and the severe shocks, and inasmuch as they center directly over the center of the mast poles 3, the shock is transmitted directly to the base of the mast without deflecting the mast either way. The large drilling sheave 25 in the center of the lower shaft 13 has the line of the tools passing thereover and therefore receives the shock of the tools with each stroke, while the sheaves 11 carry the casing sections for the well.

The sand line sheave 28 that is disposed on the secondary shaft 26, above the five sheaves, carries only a light load of the bailer: consequently, its being slightly off center causes no undue strain on the mast. The face of the drilling sheave and the face of the sand line sheave center approximately over the well, as the bailer and drilling tools are used constantly.

With further reference to Figs. 3 and 4, wherein several sheaves are used of varying sizes, it is obvious that unless some means be provided to prevent it, the cables are likely to become displaced from the grooves in the sheaves 11 and

25, and, therefore, plates 34 are arranged between each of the sheaves, as shown in Figs. 3 and 4, to provide an individual compartment in which the sheaves operate.

It will be evident that the mast poles or shear poles 3 are arranged in a pair with a mast head supported thereon in bridging relation therebetween, said mast head comprising the clamps 10 and their structures which support the shafts extending therebetween for supporting the sheaves.

It is to be understood that when that form of the invention, as illustrated in Fig. 4, is used as a mast for a spudding machine, the crown block assembly shown in Figs. 1 and 2 is not necessary although, at times, may be desirable and, while the two forms are shown together in Fig. 3, only that shown attached to the spudding machine 18 is required to replace the conventional mast.

The invention has been fully described heretofore, and reference has been made to the use of oil well casing, but it is to be understood that while casing may be convenient or preferred, any type of posts may be used, such as beams, timbers, or tubular posts, the tubular construction being preferred.

Though the invention has been described with great particularity, the details of the embodiment of the invention herein shown are not to be construed as being limited thereto, as changes in arrangement and substitution of equivalents may be made by those skilled in the art without departing from the invention as defined in the appended claims.

I claim:

1. A crown block including a pair of caps, a flexible cushion mounted upon each of said caps, a cylindrical casting conformably receiving said caps and cushions, bearings mounted upon said castings and carrying a shaft, a series of sheaves mounted upon said shaft, standards supported upon said bearings whose upper ends are offset relative to the axis of said shaft, a shaft carried by the upper ends of said standards, a sheave mounted upon the last-mentioned shaft, and means carried by said caps and cylindrical castings to lend to the flexibility of said cushions.

2. A mast comprising a mast head having a transverse shaft carrying one or more sheaves, a support for each end portion of said shaft including a block of non-metallic resilient material, a cap seated upon said resilient material and having a bearing for the shaft, and resilient rebound means connected with the cap.

3. A shear pole head comprising companion collar members receiving the ends of shear poles and having grooved bearing plates, a pair of arcuate members having bearing plates complementary to the plates of said collar members and disposed on the latter to embrace a shaft disposed in the grooves of said plates, said arcuate members likewise cooperating to support a second shaft whose axis is disposed above and forwardly of said first shaft.

4. In a mast, a pair of mast poles, cup-shaped caps telescoped upon the upper ends thereof, each of said cup-shaped caps having a block thereon with a groove therein, a transverse shaft seated in said grooves, a plurality of sheaves mounted upon said shaft, means of securing said shaft against endwise movement in said mast, a second transverse shaft disposed above and forwardly of the first-mentioned shaft and carrying one or more sheaves thereon and forwardly curved pedestals seated upon the blocks and carrying said second shaft.

5. A shear pole head for well drilling and spudding machines comprising collars adapted to be mounted on shear poles, grooved bearing plates carried by the collars, a body having upper and lower portions with the lower portion thereof superposed over each bearing plate, said bearing plate and body being supported on each collar, a shaft journaled in bearings provided by the grooves of the bearing plates, a series of casing sheaves on said shaft, and a second shaft mounted on the upper portion of said body above the first-mentioned shaft, and a sand line sheave mounted on said second shaft.

WILLIAM JOHN EDWARDS.