July 18, 1933. R. P. McLAUGHLIN 1,918,550

APPARATUS FOR ORIENTING SUSPENDED PIPES AND THE LIKE

Filed March 16, 1931

Fig. 1.

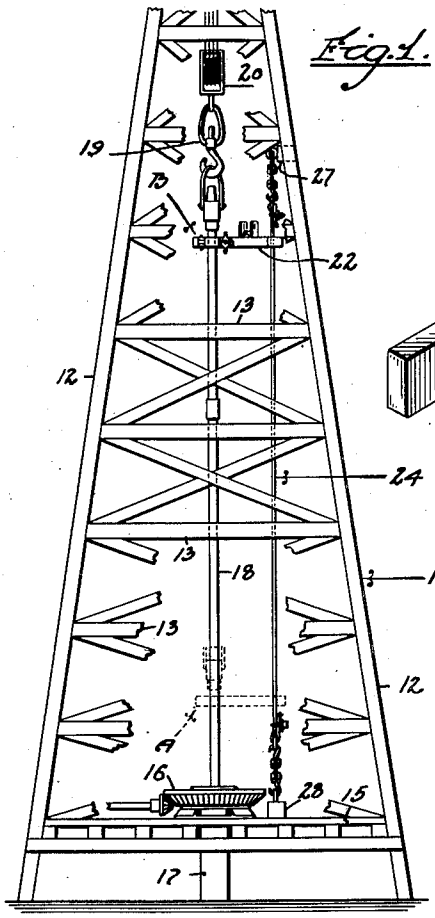


Fig. 3.

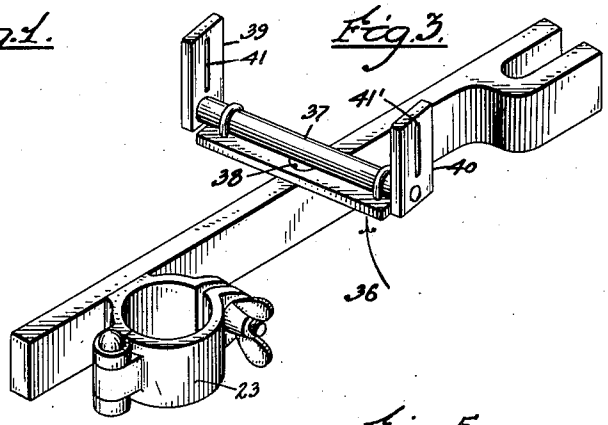


Fig. 5.

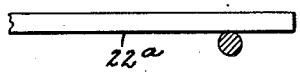
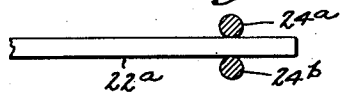


Fig. 6.



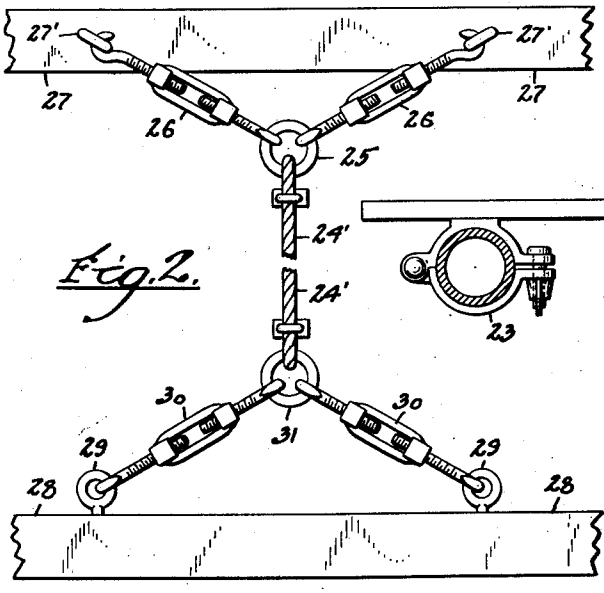


Fig. 2.

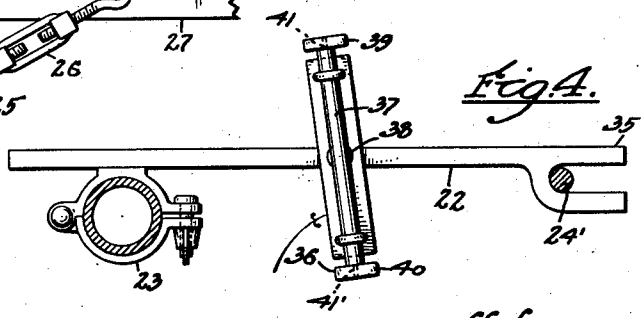


Fig. 4.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR ORIENTING SUSPENDED PIPES AND THE LIKE

Application filed March 16, 1931. Serial No. 522,977.

This invention has to do in a general way with well drilling and surveying operations and is more particularly related to an apparatus for holding a pipe, rod, or the like, against rotation while it is being moved vertically into or out of a well.

This invention has been developed primarily for use in setting whip stock, handling well surveying instruments, such as inclinometers, also core drills, impression blocks and the like, and has as its primary object the development of a process of the class described which is simple in operation, and the development of an apparatus which is of simple form and construction and may be easily manipulated.

It has become a recent practice in the petroleum industry to survey the wells for the purpose of determining the general course and the location of the bottom portion of the well or bore hole. Various types of surveying instruments have been developed for accomplishing this, the most satisfactory of such instruments being dependent for their results upon pendulum members which are supported by gimbals. The gimbals for supporting the pendulum members are secured in a suitable casing in substantially fixed relation thereto so that it is necessary in finally determining the course of the well from the data accumulated through the use of such an instrument, to have some means of orienting the readings as they are taken, or to provide some means for holding the casing in a substantially fixed and predetermined oriented position at all times during its movement into or out of the well.

The most common practice followed in the use of surveying instruments of this nature is to permit the casing to rotate as it may during its movement into the well and to obtain at predetermined intervals a measurement of the degree of rotation of the casing. This is obtained by measuring the rotation of the tubing upon which the casing is mounted as it is lowered into the well in a step by step manner. This procedure has met with considerable criticism in view of the fact that the measurements taken are very small and the slightest error may be accumulative so that the results are not always dependable; it requires the presence of an operator who has more skill than the average workman engaged in oil well drilling practice; and the procedure of taking readings or measurements and making computations consumes considerable time.

The process and apparatus contemplated by this invention is distinguished from that described above in that the tubing is held against rotation during its vertical movement through the derrick.

My invention is also useful in setting whip stock, which will be recognized by those familiar with the art as comprising a member which is placed in the well at a point at which the well may be deviating from its course, for the purpose of turning the course of the drill bit in a predetermined direction. The upper surface of the whip stock is ordinarily tapered so as to throw the drill bit into the predetermined course, and it is important that the tapered face be positioned in a predetermined relation to the general course of the bore hole. The positioning of the whip stock is ordinarily carried out by guess work, but it will be apparent from the following description that the method and apparatus contemplated by this invention has a marked value in orienting and positioning devices of this character.

My invention is also useful in determining the orientation of a rock sample taken at the bottom of a well by means of a core bit. After the core has been cut it can be removed without revolving.

The general construction of the apparatus contemplated by this invention comprises an upright guide member which is adjustably secured in the derrick and is positioned so as to be slidably engaged by the end portion of an arm which is rigidly attached to the tubing or rod that is to be vertically moved through the derrick. It has been my observation in the development of the device contemplated by this invention, that the manipulation of the blocks whereby the pipe or tubing is supported and moved through the derrick, has a tendency to subject the pipe or tubing to a partial rotation in a predetermined direction. Where this is the case it is only necessary to employ a substantially straight arm which engages the upright guide member on the side toward which the pipe tends to rotate. In other cases there is no material rotation in the pipe and under these conditions I have found it advisable to employ an arm which has a forked outer end adapted to engage the upright guide member or to employ two horizontally spaced guide

members and a single arm adapted to project between these two guide members.

It is important for the proper operation of a device of this character that the upright guide member be adjustable so that it may be positioned in the same plane in which the upper end of the tubing travels. One advantage of my invention is that the tubing is not required to be moved along an absolutely vertical line. Frequently the derrick and hoisting cables are so constructed that the movement is not exactly vertical or plumb. I have found it an advantageous procedure to follow in the operation of the invention to provide the arm with a sighting device or alidade which can be used to determine the angular relation to a fixed object when it is first clamped onto the pipe, the arm of course being in sliding engagement with the upright guide member. When the pipe has been moved through its course in the derrick the arm is again adjusted without detaching it from the pipe so that it bears the same angular relation to the fixed object, such adjustment being effected by adjustably varying the position of the upright guide member. This procedure is carried out at the initiation of lowering the pipe into or withdrawing it from the well, and in this manner each section of pipe or rod which has been attached to, or is about to be removed from, the main portion going into or coming out of the well is oriented at both ends with respect to a predetermined vertical plane.

In the preferred form of my invention I propose to use a cable for the upright guide member. This cable has its end portions attached to adjustable means whereby it is secured to the derrick structure. For the purposes explained above, it is preferable that the adjustable means be constructed so as to subject the ends of the cable to horizontal movement and in order that the cable may be placed under sufficient tension to provide a substantially rigid member, it is important that the adjustable means be also adapted for vertical movement.

The details in the construction of a preferred form of my invention, together with other objects attending its production, will be best understood from the following description of the accompanying drawing which is chosen for illustrative purposes only, and in which—

Fig. 1 is an elevational view partly broken away showing an oil well derrick with an embodiment of my invention suspended therein;

Fig. 2 is an enlarged elevational view showing the details in the construction of a preferred form of upright guide member;

Fig. 3 is a perspective view illustrating a preferred form of clamp and arm which is adapted to be secured to the pipe or rod and to slidably engage the upright guide member;

Fig. 4 is a plan view of the mechanism shown in Fig. 3; and

Figs. 5 and 6 are partial plan views illustrating modifications in the device contemplated by this invention.

Referring to the drawing, reference numeral 11 indicates an oil well derrick of the usual type consisting of standards 12 and cross members 13, and having a floor indicated by reference numeral 15. Reference numeral 16 indicates a so-called rotary table which is mounted upon the derrick floor at the head of the well casing 17. It will be understood that the rotatable table 16 forms no part of the present invention and in the use of the invention this member is not in operation.

Reference numeral 18 indicates a pipe or rod which may have a whip stock or inclinometer secured to its lower end and is shown as being suspended in the derrick by the usual hook and block mechanism indicated by reference numerals 19 and 20.

It will be understood that the procedure of lowering pipe or tubing into the well is followed in a step by step manner, the tubing being lowered from the position shown in Fig. 1 to the dotted line position indicated by reference letter A, after which the tubing is locked in position by means of slips associated with the rotary table and another section of tubing is secured to the upper end of the main portion which has entered the well. This section is then lowered in the same manner described above and so on until the entire length of tubing has been lowered into the well.

For the purpose of holding the tubing against rotation while it is being lowered in the manner described above, I provide the upper end portion of the topmost section of the tubing with an arm member generally indicated by reference numeral 22. This arm member is rigidly secured to the tubing or rod by means of a clamp 23 and has its outer end portion in sliding engagement with an upright guide member 24.

The upright guide member 24 is shown as comprising a cable 24′, the upper end portion of which is secured to a ring 25 which in turn receives a pair of turnbuckles 26. These turn buckles have their upper ends secured to a transverse beam 27 by means of eyes 27′.

It will be understood, of course, that various means may be employed for securing the upper end portion of the cable in the upper end of the derrick, but it is important in accomplishing the objects contemplated by this invention, that such means be adjustable, and I have found that the turn buckles arranged in the manner shown are particularly advantageous in that they permit both

a vertical and horizontal adjustment of the cable.

The lower end portion of the cable 24′ is shown as being secured to the derrick floor in much the same manner as the upper end is secured in the upper end of the derrick. In this form of my invention I have shown a transverse beam 28 as being secured to the derrick floor. This beam is provided with eye bolts 29 to which turnbuckles 30 are attached, the turnbuckles being secured to a ring member 31 which is connected to the lower end portion of the cable 24′.

In the form of my invention shown in Figs. 3 and 4, I show the outer end portion of the arm 22 as being provided with a fork 35 which is adapted to receive the cable 24′.

It has been my observation that in many cases the movement of the block through the derrick tends to rotate the pipe or rod in a predetermined direction, and when this is the case I find it advantageous to employ an arm of the type shown in Fig. 5 where the end portion of the arm 22*a* is shown as being straight and is positioned so that the side toward which the pipe is rotating engages the upright guide member.

As a modification of the form of the invention shown in Fig. 5, I shown in Fig. 6 an arm similar to the arm 22*a* in Fig 5, which is associated with a pair of horizontally spaced guide members 24*a* and 24*b*. This arm is positioned with its end portion between these two guide members so that it is held against movement in either direction. As a means for determining whether or not the pipe has rotated during its downward movement from the position B to the position A in Fig. 1, and further for the purpose of effecting a proper adjustment of the upright guide members so that the possibility of such movement is prevented, I provide the arm 22 with a sighting member or alidade, indicated by reference numeral 36. This member is shown as comprising a bar 37 which is adjustably secured to the arm by means of the bolt or screw 38, and has upright members 39 and 40 formed on or secured to its opposite ends. These upright members are provided with slots 41 and 41′. In using this device the arm 22 is secured to the upper end of the tubing 18 by means of the clamp 23 in a position such that the upright guide member 24′ is received in the fork 35. The alidade 36 is then set in alignment with a predetermined fixed object such as an adjacent derrick or the like, the slots 41 and 41′ being adjusted so as to be vertical, and the tubing is lowered to the position A, shown in Fig. 1. The adjustment of the apparatus is then checked by sighting through the alidade towards the predetermined fixed object and if any adjustment must be made to properly orient the arm, such adjustment is made by means of the turnbuckles at the lower end of the cable so that after the adjustment is made the cable or upright guide member is positioned so that the arm 22 bears the same predetermined relation to the fixed object when it reaches the lower end of its movement as it did at the beginning of its movement. This procedure may be followed from time to time to determine whether or not the guide member has become out of adjustment but in general practice it has been found that one setting of the guide member holds the pipe so that each section as it is lowered into the well bears the same position with respect to a predetermined vertical plane as does the preceding section. It will be readily seen that the operation may also be performed while the tubing is being raised out of the well.

It will be understood that while I have herein described and illustrated one preferred form of my invention, the invention is not limited to the precise construction described above, but includes within its scope whatever changes fairly come within the spirit of the appended claims.

I claim as my invention:

1. In combination with a derrick structure, means for holding a pipe or the like against rotation during vertical movement thereof through said derrick structure embodying: an upright guide member; adjustable means for securing the upper and lower portions of said guide member to said derrick; and an arm secured to said pipe and slidably engaging said guide member, said guide member being of a nature such as to hold said pipe and said arm against rotation.

2. In combination with a derrick structure, means for holding a pipe or the like against rotation during vertical movement thereof through said derrick structure embodying: a vertical guide member adjustably secured in said derrick; a clamp secured to said pipe; an arm mounted on said clamp with its outer end in sliding engagement with said guide member; and a sighting member mounted on said arm for use in adjusting the alignment of said guide member, said guide member being of a nature such as to hold said pipe and said arm against rotation.

3. In combination with a derrick structure, means for holding a pipe or the like against rotation during vertical movement thereof through said derrick structure embodying: a pair of turnbuckles pivotally attached to the derrick floor and having their free ends attached to a ring member; a second pair of turnbuckles attached to said derrick in vertically spaced relation with the first pair of turnbuckles and having their free ends attached to a ring member; a cable attached to said ring members and drawn tight by said turnbuckles; and an arm secured to said pipe with its outer end in sliding engagement with said cable.

ROY P. McLAUGHLIN.