Oct. 25, 1966 C. JENKINS ETAL 3,281,122

TRAVELING BLOCK DOLLY

Filed July 15, 1965 2 Sheets-Sheet 1

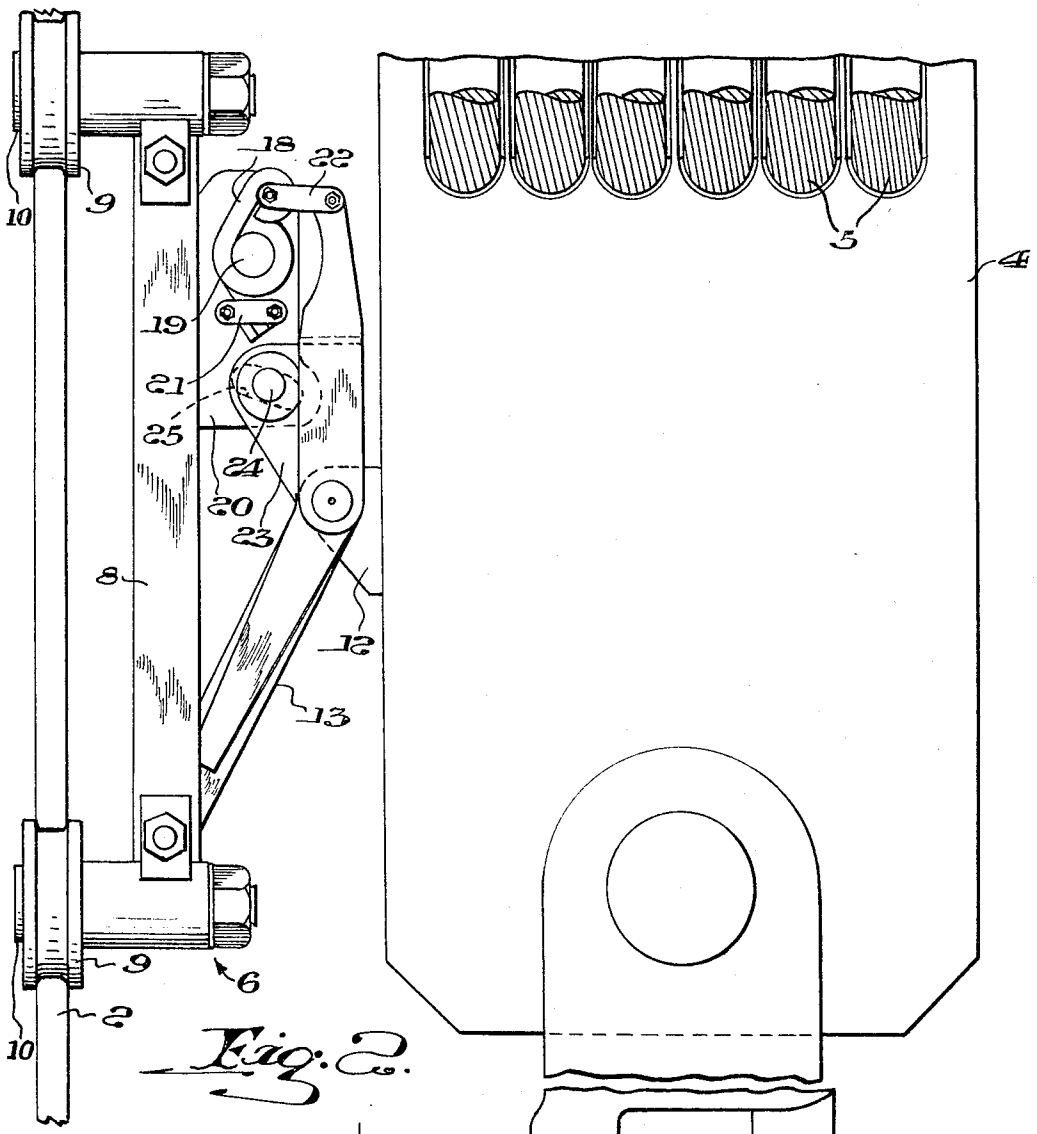

Fig. 2.

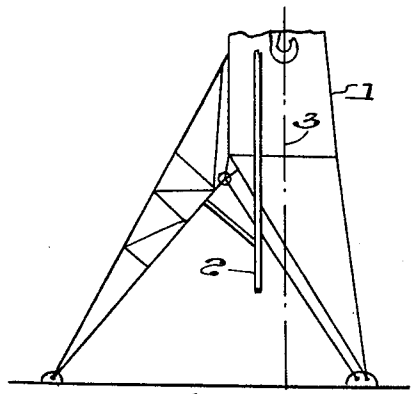

Fig. 1.

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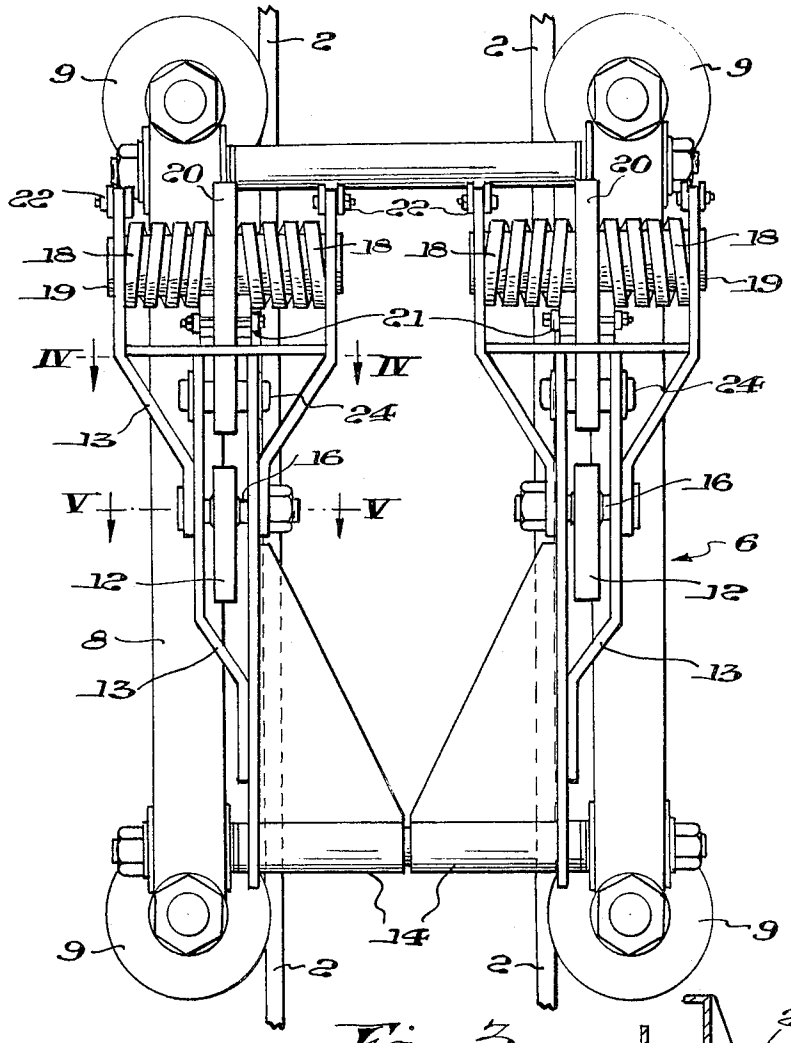

Fig. 3

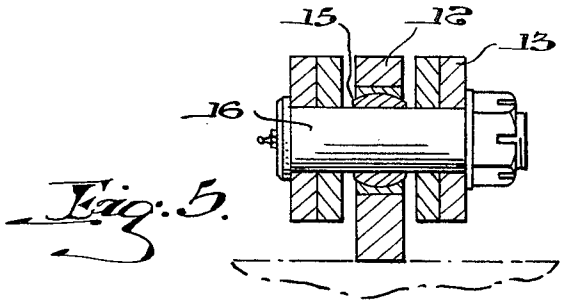

Fig. 5.

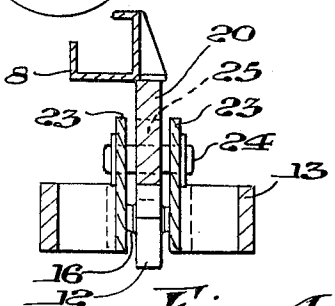

Fig. 4.

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United States Patent Office 3,281,122 Patented Oct. 25, 1966

3,281,122

TRAVELING BLOCK DOLLY

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Filed July 15, 1965, Ser. No. 472,152
14 Claims. (Cl. 254—190)

This invention relates to oil well drilling, and more particularly to apparatus for guiding and controlling the traveling block in an upright drilling mast or derrick.

In oil well drilling rigs a guide sometimes is used to prevent lateral motion of the traveling block in high winds or when mounted on a ship or barge. The guide frequently takes the form of a vertical track formed from taut cables or rigid rails mounted inside the mast and engaged by a dolly or other means connected to the traveling block or other part of the moving tackle, such as the swivel or power sub. The traveling block generally has from four to six sheaves and the differential friction from the first sheave to the last tends to move the center of force off the center of the block and thereby cause the block to move laterally to align itself with its load. This movement, plus pitch, roll, and yaw of the traveling block that occur under certain conditions, are small and are unobjectionable if the block is not restrained by a guide. However, when the traveling block is restrained by a guide, the otherwise unobjectional movements result in the application of objectionable forces to the guide, particularly when the load is being taken off the slips and an impact occurs. This causes wear on the block and guide and possible damage to the guide.

It is among the objects of this invention to provide a dolly for connecting a traveling block with a vertical guide track inside an oil well mast, which will permit the block to have sufficient freedom of movement to avoid the above-mentioned objectionable forces and yet restrain the block from undesirable excessive lateral motion.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a diagrammatic side view of the lower part of an oil well drilling mast;

FIG. 2 is an enlarged side view of our travelling block dolly supported by a traveling block;

FIG. 3 is a view of the inner side of the dolly;

FIG. 4 is a fragmentary horizontal section taken on the line IV—IV of FIG. 3; and

FIG. 5 is an enlarged fragmentary horizontal section taken on the line V—V of FIG. 3.

Referring to FIG. 1 of the drawings, an oil well drilling mast **1** is shown equipped internally with a vertical track **2** extending from near the crown block (not shown) down to a point near the base of the mast. The track may be formed from rigid rails. They are secured to the back of the mast in any suitable manner in back of and parallel to the center line **3** of the well, over which a traveling block **4** (FIG. 2) is suspended by lines **5** from the crown block. In accordance with this invention, a dolly **6** that can run up and down the guide track is connected to the back side of the traveling block in order to restrain lateral motion of the block in every direction due to high winds, ship roll or other causes. The dolly is supported by the traveling block and moves up and down in the mast with it.

As shown in FIGS. 2 and 3, the body of the dolly is formed from a vertical frame **8**, preferably rectangular, which is provided with means that run on the guide rails to connect the frame to them. Preferably, wheels **9** are used for this purpose. They may be mounted on the rear ends of short horizontal shafts **10** extending rearwardly from the four corners of the frame. The wheels

are shaped to interengage with the rails, such as being provided with peripheral grooves that receive the rails. The wheels may be either between the rails, or outside of them as shown.

Attachment means are provided for connection to the back side of the traveling block. The attachment means may be a pair of laterally spaced vertical plates **12** welded or otherwise rigidly connected to the block. These plates are connected to supporting means movably connected to frame **8** in such a manner as to allow the plates to move inwardly or forward away from the dolly frame. The supporting means preferably are a pair of laterally spaced arms **13** that are in a generally upright position with one end pivotally connected to the frame on a horizontal axis extending transversely of it. It is preferred that it be the lower ends of the arms that are pivoted to the frame, which can be done by securing them to separate horizontal sleeves **14** (FIG. 3) rotatably mounted on the lower cross member of the dolly frame. Consequently, the upper ends of the arms can swing inwardly away from the frame for a purpose that will become apparent.

It is desirable that the lower parts of arms **13** be inclined upwardly and inwardly from the bottom of the frame and that their upper parts be substantially vertical. The most suitable place to connect attachment plates **12** to the arms is where the inclined and vertical portions of the arms join, which is about midway of the height of the frame. Each attachment plate is provided with an opening through it, in which a self-aligning ball bushing **15** is mounted as shown in FIG. 5. This bushing is slidably and rotatably mounted on a short shaft **16** extending through the adjoining arm, which is bifurcated to receive the ends of the shaft. The attachment plate and bushing normally may be spaced from both forks of the arm so that the plate can move horizontally in either direction a slight distance. It will be seen that the traveling block supports the dolly frame through these attachment plates and arms.

The normal position of the arms is with their upper parts substantially vertical, as shown in FIG. 2. In this position the traveling block can hang in the mast with its center of gravity on the center line of the well, but the block can move forward and backward to some extent because the arms can swing on their pivoted lower ends. To restrain such movement of the traveling block, swinging of the arms is controlled by yieldable restraining means connecting their upper ends with the dolly frame. The restraining means may take various forms, such as hydraulic snubbers or shock absorbers or, as shown in the drawings, springs **18**. These springs resist swinging of the arms in either direction, but do not prevent it if sufficient force is applied to them by the traveling block to overcome the resistance of the springs. The springs preferably are torsion springs arranged in pairs coiled around horizontal shafts **19** extending through and rigidly mounted in vertical plates **20** secured to the side members of the dolly frame near its upper end. The inner end of each spring is secured by a clamp **21** to the adjoining plate, while the outer end of the spring is pivotally connected by a link **22** to the upper end of one side of the forked adjoining arm. To relieve the springs of the full force required to restrain movements of the traveling block, rearwardly projecting portions **23** of each arm straddle the adjoining plate **20** as shown in FIG. 4 and are connected by a pin **24** extending through a slot **25** or an enlarged hole in the plate. Engagement of this pin with either end of the slot will positively limit the distance the arm can be swung in that direction. Within the limits thus defined, the traveling block can move toward and away form the dolly frame.

It therefore will be seen that when sufficient force is applied, movements of the traveling block in a straight line toward and away from the dolly frame are permitted within limits by arms 13 swinging in unison on their lower ends. Some movement of the traveling block in a direction parallel to the dolly frame is allowed by the attachment plates 12 sliding along the shafts that connect them to the arms. Twisting of the block on its vertical axis also is permitted within limits, because the attachment plates can turn laterally on the ball bushings 15 and simultaneously one arm 13 can swing inwardly and the other outwardly. Finally, the traveling block can tilt forward and backward because the attachment plates can rotate on their shafts.

It therefore will be seen that the construction of this dolly is such that it permits a small degree of freedom of motion of the traveling block in all directions, yet restrains it from greater movements which would be highly undesirable. This has the advantage of avoiding loading on the guide rails, which would be caused by absolute prevention of the movements just described.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. A traveling block dolly comprising a vertical frame having inner and outer sides, means connected to the frame adapted to run on a vertical track in a drilling mast, attachment means at the inner side of the frame for connection to one face of a traveling block, supporting means connected to said attachment means and movably connected to said frame to allow said attachment means to move inwardly away from the frame, and yieldable restraining means connected with the frame for controlling movement of said attachment means away from the frame.

2. A traveling block dolly according to claim 1, in which said yieldable restraining means are springs.

3. A traveling block dolly according to claim 1, in which said rail-running means are upper and lower pairs of wheels shaped to interengage with a track.

4. A traveling block dolly according to claim 1, including means positively limiting the distance said attachment means can move away from the frame.

5. A traveling block dolly according to claim 1, including means pivotally connecting said attachment means to said supporting means on a horizontal axis extending transversely of the frame.

6. A traveling block dolly comprising a vertical frame having inner and outer sides, means connected to the frame adapted to run on a vertical track in a drilling mast, arm means pivotally connected to the frame on a horizontal axis extending transversely of the frame so that the arm means can swing inwardly away from the frame, means carried by said arm means for attachment to one face of a traveling block, and yieldable restraining means connected with the frame for controlling swinging of the arm means away from it.

7. A traveling block dolly according to claim 6, in which the lower end of said arm means is pivotally connected to the frame, the upper end of the arm means is connected with said restraining means, and the central portion of the arm means supports said attachment means.

8. A traveling block dolly according to claim 6, in which said attachment means can pivot on an axis parallel to said horizontal axis, move laterally of said arm means in a straight line and also swing laterally.

9. A traveling block dolly comprising a vertical frame having inner and outer sides, means connected to the frame adapted to run on a vertical track in a drilling mast, a pair of generally upright parallel arms, means pivotally connecting the arms at one end to the frame independently of each other on a horizontal axis extending transversely of the frame so that the arms can swing inwardly away from the frame, means carried by each arm for attachment to one face of a traveling block, and yieldable restraining means connecting each arm with the frame for controlling swinging of the arms away from it.

10. A traveling block dolly comprising a vertical frame having inner and outer sides, means connected to the frame adapted to run on a vertical track in a drilling mast, a pair of generally upright parallel arms, means pivotally connecting the arms at one end to the frame independently of each other on a horizontal axis extending transversely of the frame so that the arms can swing inwardly away from the frame, a vertical plate projecting inwardly from each arm for attachment to one face of a traveling block, a horizontal shaft extending through each plate and mounted in the adjoining arm, said plates being rotatably mounted on said shafts, and yieldable restraining means connecting each arm with the frame for controlling swinging of the arms away from it.

11. A traveling block dolly according to claim 10, including a self-aligning bearing slidably and rotatably mounted on each of said shafts and supporting said plates thereon.

12. A traveling block dolly comprising a vertical frame having inner and outer sides, means connected to the frame adapted to run on a vertical track in a drilling mast, a pair of generally upright parallel arms, means pivotally connecting the arms at one end to the frame independently of each other on a horizontal axis extending transversely of the frame so that the arms can swing inwardly away from the frame, torsion springs connecting the opposite end of said arms to the frame for controlling swinging of the arms away from the frame, and means pivotally connected to the arms between their ends for attachment to one face of a traveling block.

13. A traveling block dolly according to claim 9, including means supported by said frame for positively limiting the distance said arms can be swung away from the frame.

14. A traveling block dolly comprising a vertical frame having inner and outer sides, means connected to the frame adapted to run on a vertical track in a drilling mast, a pair of generally upright parallel arms, means pivotally connecting the arms at one end to the frame independently of each other on a horizontal axis extending transversely of the frame so that the arms can swing inwardly away from the frame, a vertical plate secured to the frame and projecting inwardly therefrom adjacent each arm, springs connecting the arms with the plates for controlling swinging of the arms away from the frame, each plate being provided with a slot therethrough extending inwardly away from the frame, means secured to each arm and slidably disposed in the adjoining plate slot to limit swinging of the arm, and means carried by said arms for attachment to one face of a traveling block.

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