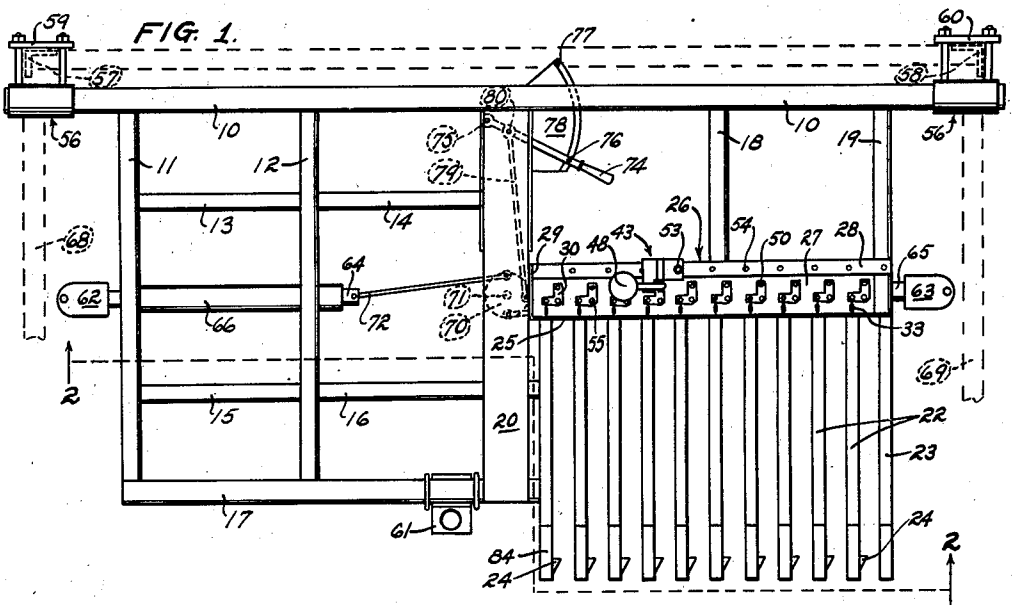
July 7, 1942. C. A. SHOPE 2,289,217

TUBING RACK FOR DERRICKS

Filed April 16, 1941

FIG. 1.



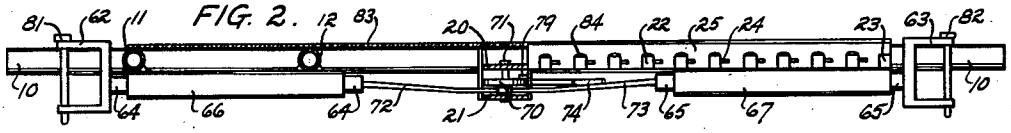


FIG. 2.

FIG. 3.

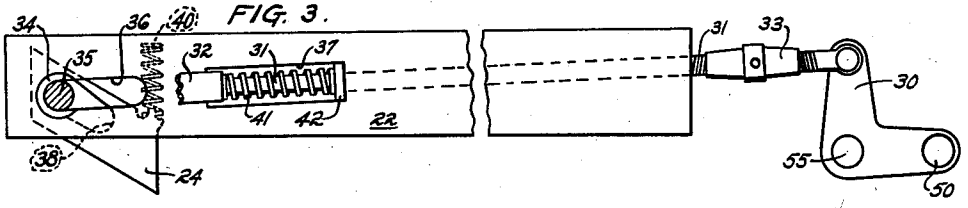


FIG. 4.

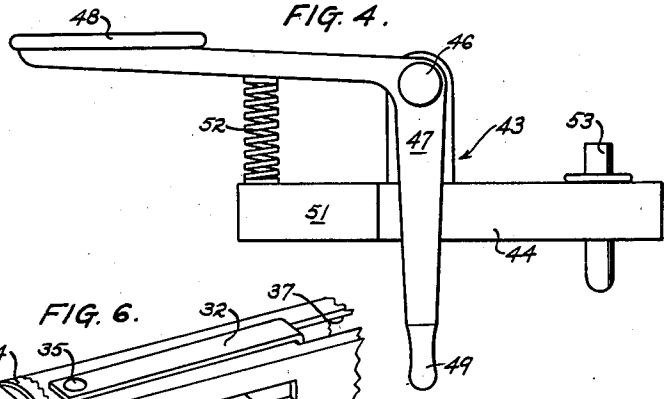


FIG. 5.

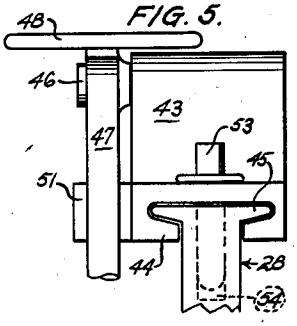
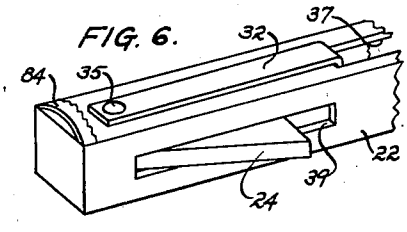


FIG. 6.



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TUBING RACK FOR DERRICKS

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Application April 16, 1941, Serial No. 388,848

6 Claims. (Cl. 211—60)

This invention relates to tubing racks for derricks although it will be apparent from the following description that if made to the proper size it would serve equally well in racking sucker-rods and the like.

Serious accidents occur frequently during the pulling and stacking of tubing sections in a derrick due primarily to the lack of a suitable rack for maintaining the tubing sections in position during and after the stacking operation.

It is therefore the chief object of my invention to provide a tubing rack, adapted to be installed in a derrick at the proper height above the derrick floor, which will hold the upper ends of the various sections of tubing in fixed position after they have been stacked therein.

Another object is to provide a rack which offers no interference to the free entry of tubing during stacking, yet which positively prevents the removal of tubing sections therefrom until each section is released.

A still further object is to provide a rack which is attached to the derrick in such manner that it may be moved from horizontal operative position to a vertical out of the way position easily and quickly, so that it allows proper clearance throughout the height of the derrick when not in actual use.

The details in the construction of one preferred form of the invention together with other objects attending its production, will be better understood from the following description when read in connection with the accompanying drawing, which is chosen for illustrative purposes only, and in which:

Figure 1 is a top plan view of a rack embodying the invention with the floor plate removed for the sake of clarity;

Fig. 2 is a front view of the rack, partially in section, the view being taken along the line 2—2 of Fig. 1, and with the floor plate in its proper position;

Fig. 3 is an enlarged plan view of one of the rack teeth and shows details in the construction of the tube retaining dog and a portion of its operating mechanism;

Fig. 4 is an enlarged side view of an additional portion of the dog operating mechanism;

Fig. 5 is a fragmentary front or end view of the mechanism shown in Fig. 4; and,

Fig. 6 is a fragmentary perspective view of one of the rack teeth showing additional details in the construction of the dog and its operating mechanism.

Referring to Fig. 1, it will be seen that the rack is made up of one relatively long section of tubing 10, and a plurality of shorter sections 11 to 19, inclusive, the ends of which are welded together as shown to form a rigid frame. The remaining portion of the rack frame includes a pair of spaced parallel plates 20 and 21 (Fig. 2), and a plurality of elongated spaced, parallel teeth 22, each of which, save the outermost one 23, is provided near its outer end with a pivoted dog 24 which permits free entry of tubing sections into the space between the adjacent teeth, yet positively prevents the egress of the tubing sections from that space until the dog is positively pivoted into the interior of its respective tooth. Each of these teeth is hollow and is preferably either square or round in cross-section. The base of each tooth is preferably welded to the outer surface of an elongated plate 25, which plate forms one side wall of an elongated control box, designated as a whole by the numeral 26. The remaining portion of this control box is made up of a bottom plate 27, the opposite side wall being in the form of an I-beam 28 (also see Fig. 5), and an end wall 29. The plate 25 is provided with a plurality of through perforations affording communication between the interior of this control box 26 and the interior of the respective teeth 22.

Pivoted on the bottom plate 27 of the control box are a plurality of dog controlling triggers 30, one being provided for each of the dogs 24. Each trigger 30 is connected with its respective dog 24 by means of a rod 31 which rigidly carries on its outer end a yoke 32. Length adjustment for the rod 31 is provided by a turn-buckle 33.

As will be seen in Fig. 3, each dog is pivoted on a short length of small diameter tubing 34, the ends of which are welded or otherwise rigidly secured to the opposite walls of the tooth 22. This short length of tubing 34 is slotted longitudinally to permit the entrance and removal of a cross-pin 35 which is rigidly carried between the outer ends of the yoke 32. The opposite side walls of the teeth 22 are slotted as at 36 to permit longitudinal movement of the pin 35. The slots 36 also serve as guides for the movement of this pin. The two sides of the yoke 32 straddle the teeth 22, as shown clearly in Fig. 6, and additional oppositely positioned slots 37 are provided in the opposite walls of the tooth 22 to permit longitudinal travel of the yoke 32. Each of the dogs 24 is provided with an elongated slot 38 one end of which is relatively large to snugly fit the slotted tube 34. With such an arrangement

it will be clearly seen that the dog 24 is free to pivot about the tube 34 without encountering any interference whatever from the pin 35 or the yoke 32. As seen in Fig. 6 each dog protrudes from its respective tooth through a slot 39 cut through the side wall of the tooth. A spring 40, bearing against the dog 24, and against the inner surface of the wall of the tooth 22, serves to normally maintain each dog in the position shown in Fig. 3.

As a means of normally maintaining the yoke 32 and its pin 35 in the positions shown in Fig. 3, I provide a spring 41 which encircles the rod 31 and bears against the yoke and against a cross-bar 42, which is seated at one end of the slot 37. With the construction described it will be readily seen that as the rod 31 is moved toward the base of the tooth, the yoke 32 and its pin 35 travel in like direction. The pin 35 contacts one side edge of the slot 38 in the dog 34, and since the travel of the pin is guided by the slots 36 the pin pulls the lower end of the dog 24 inward against the action of the spring 40, and into the interior of the tooth 22. When the rod is released and the yoke returns to the positions shown in Fig. 3, the dog is again free to pivot outward under the influence of the spring 40.

As a means of imparting pivotal motion to each of the triggers 30, and to thus retract the dogs 24 into a position within their respective teeth, I provide a traveling trigger control illustrated in Figs. 4 and 5, and designated as a whole by the numeral 43. This trigger control is made up of a base plate 44, the cross sectional shape of which is shown clearly in Fig. 5 and which is adapted to slide along the upper flange 45 of the I-beam 28. Pivotally mounted at 46, the control carries a foot-operated lever 47, one end of which is provided with a foot plate 48 and the other end of which is in the form of an elongated pin 49 for insertion into a perforation 50 in a selected one of the triggers 30. Near its rear end the control base plate 44 is provided with a short laterally projecting portion 51 which not only serves as a seat for a spring 52, but also serves as a stop to limit the movement of the lever 47 in one direction. This spring 52 serves to normally maintain the trigger in the position shown in Fig. 4. At its front end the base plate 44 is perforated to receive a locking pin 53, which pin is adapted to pass through the base and into suitably spaced holes 54 drilled into the upper surface of the I-beam 28.

During the racking operation the various sections of tubing, as they are withdrawn from the hole, are placed on end on the derrick floor and their upper ends are then passed into the spaces between the various teeth of the rack. As they enter these spaces the respective dogs are forced into the respective teeth and the ends of the tubing section passed to position adjacent the base of the teeth. When the tubing is again to be run into the well the operator stands on the floor plate 33 which covers all the rack frame excepting the teeth, and moves trigger control 43 to a position to operate a desired one of the triggers 30. By pressing down on the foot plate 48 the pin 49 is raised sufficiently to permit its entrance into the perforation 50 of the selected trigger 30. After the entry of this pin 49 has been accomplished the pin 53 is set into the aligned hole 54 of the I-beam 28 and thus holds the trigger control 43 against longitudinal movement along the I-beam. As the crew needs a section of tubing the operator simply presses his foot against the plate 48 which pressure forces the trigger to pivot about its pivot pin 55 and to retract the respective dog 24, thus permitting one section of the tubing to be removed from the rack. Immediately after the removal of this section of tubing the operator removes pressure and the dog springs again into tube-retaining position, thus preventing the possibility of another section of tubing accidentally being withdrawn from the rack.

It will be noted from both Figs. 1 and 6 that I provide a short cover plate 64 near the outer end of each of the teeth 22. This cover plate is arcuate in cross-section and serves as a guard to prevent interference with the movement of the yoke 32.

Referring now more particularly to Figs. 1 and 2, it will be seen that the ends of the section of tubing 10 project for a considerable distance beyond each end of the tubing rack frame. These projecting ends are adapted to be housed in identical hangers 56, which are provided with a pair of spaced bolts which are adapted to straddle the spaced legs 57 and 58 of a steel derrick. Plates 59 and 60 are then placed over the ends of the bolts and the nuts screwed down as shown, the hangers 56 thus being rigidly secured to the derrick legs and serve as hinges for the pivotal movement of the entire tubing rack. Along its opposite edge the rack is provided with a hoisting eye 61 by which the entire tubing rack may be swung into a horizontal position, or may be swung from a horizontal position to a vertical position.

As a means of maintaining the entire rack in horizontal position after it has been moved to that position I provide a pair of oppositely positioned brace or girt catches 62 and 63. These catches are carried respectively on the opposite ends of a pair of elongated tubes 64 and 65 respectively, each in turn are slidably housed in sleeves 66 and 67 respectively. These sleeves 66 and 67 are welded to the under side of the frame proper in the positions shown in Fig. 2.

As a means of simultaneously moving these catches 62 and 63 outward to engage the braces or girts 68 and 69 or the derrick I provide a disc 70 pivoted on a pin 71 between the plates 20 and 21. Connectors 72 and 73 are pivotally connected at diametrically opposite points on the underside of the disc 70, while their opposite ends are pivotally connected to the slidable tubes 64 and 65 respectively, so that when the disc 70 is rotated in one direction, the girt catches 62 and 63 are drawn inward toward the center of the rack, and when the disc 70 is rotated in the opposite direction the catches are forced outward to encompass the adjacent girts or braces of the derrick. To rotate the disc 70, I provide a hand lever 74 pivoted at 75 on the rack frame, and which is provided with a pin 76 adapted to set in suitably placed perforations 77 in a plate 78, to thus lock the lever 74 against accidental movement. One end of the connector 79 is pivotally connected to the lever 74 at 80, while the other end of this connector 79 is pivotally connected to the upper surface of the disc 70 at a point substantially midway between the pivotal connections of the connectors 72 and 73. When the lever 74 is grasped and manually moved to a position adjacent the perforation 77, the disc 70 is rotated counter-clockwise and the catches 62 and 63 are forced outward into contact with the girts 68 and 69 respectively. Pins 81 and 82

are then passed thru perforations in the outer ends of the catches and serve to prevent accidental dislodgement of the catches 62 and 63 from their respective girts or braces. The entire tubing rack is thus supported in a horizontal position above the derrick floor. By removing the pins 81 and 82, and reversing the travel of the lever 74, the catches 62 and 63 move inward clear of the girts 68 and 69, and the rack may thus be lowered to a substantially vertical position along one side of the derrick.

While I have described and illustrated only one specific embodiment of the invention, I am aware that numerous alterations and changes may be made therein without transcending the inventive principle, and I do not wish to be limited except by the prior art, and by the scope of the appended claims.

I claim:

1. A tubing rack for derricks comprising: a frame having spaced teeth for receiving a plurality of tubes between them; a longitudinally slotted yieldable dog projecting laterally from each tooth toward an adjacent tooth to normally retain tubes within the spaces between said teeth, the slots in said dogs extending at an angle to the longitudinal axis of the respective teeth; a plurality of dog retracting rods; and a cross pin connected to each rod near its outer end and operably connected by means of the slots to the respective dogs for retracting said dogs when the respective rods are moved in one direction.

2. A tubing rack for derricks comprising: a frame having spaced teeth for receiving a plurality of tubes between them; a yieldable dog projecting laterally from each tooth toward an adjacent tooth to normally retain tubes within the spaces between said teeth; a plurality of rods, one operably connected to each of said dogs, for independently retracting said dogs; a plurality of levers pivotally mounted on said frame, one connected to each of said rods, for moving the rods in a dog retracting direction; and means movable along said frame adapted for operable connection to each of said levers to move them in a dog retracting direction.

3. A tubing rack for derricks comprising: a frame having elongated spaced hollow teeth for receiving a plurality of tubes between them; a pivotally mounted spring pressed yieldable dog projecting laterally from the interior of each tooth toward an adjacent tooth to normally retain tubes within the spaces between the teeth; a plurality of longitudinally reciprocable rods, one extending along each tooth; an elongated slot in each dog, said slots normally extending at an angle to the longitudinal axis of the respective teeth; a cross pin connected to each rod near its outer end and extending slidably thru the slot in each respective dog, whereby when any rod is moved longitudinally toward the base of its tooth, its cross pin sliding in the slot of its respective dog forcibly retracts the dog from its normal position; and means on the rack frame for selectively moving said rods in dog retracting directions.

4. A tubing rack comprising: a frame having a plurality of spaced, substantially parallel planar teeth projecting rigidly therefrom for receiving a plurality of tubes between them; a ratchet type dog extending at an angle to its tooth and oscillatable in the plane of said teeth, pivotally mounted near the outer end of each tooth, said dogs being spring pressed to normally project laterally toward an adjacent tooth to normally prevent egress from but to allow entry to the space between each pair of teeth; and means located near the bases of said teeth and operably connected thereto for individually retracting selected ones of said dogs to clear the space between selected teeth; thus affording free removal of tubes from said spaces.

5. A tubing rack comprising: a frame having a plurality of spaced, substantially parallel planar teeth projecting rigidly therefrom for receiving a plurality of tubes between them; a ratchet type dog extending at an angle to the tooth, and oscillatable in the plane of said teeth, pivotally mounted near the outer end of each tooth, said dogs being spring pressed to normally project laterally toward an adjacent tooth to normally prevent egress from but to allow entry to the space between each pair of teeth; means located near the bases of said teeth and operably connected thereto for individually retracting selected ones of said dogs to clear the space between selected teeth, thus affording free removal of said tubes from said spaces; means for pivotally mounting an edge of said frame to a supporting structure; and retractable means carried by said frame in a position remote from the pivoted edge for removably contacting another portion of the supporting structure for supporting the frame in a substantially horizontal position.

6. A tubing rack for derricks comprising; a frame having spaced teeth for receiving a plurality of tubes between them; a yieldable, spring pressed dog pivotally mounted near the outer end of each tooth to project laterally therefrom toward an adjacent tooth to normally retain tubes within the spaces between adjacent teeth; an elongated longitudinally extending slot in each dog, said slots normally extending at an angle to the longitudinal axis of the respective teeth; a guide slot near the outer end of each tooth, said guide slots extending longitudinally with relation to the respective teeth; and a plurality of rods longitudinally reciprocable with relation to the respective teeth; each rod having a cross pin near its outer end, and each cross pin being adapted for guidance in its movement by the guide slot in its respective tooth, said cross pins also passing thru and being slidable in the slots in said dogs whereby when the rods are moved in one direction the respective dogs are retracted from their laterally projecting positions, and when the rods are moved in the opposite direction the dogs are released to move to their normal positions; and means near the bases of the teeth for reciprocating selected ones of said rods.

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