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LOAD SUPPORT FOR WELL CASING

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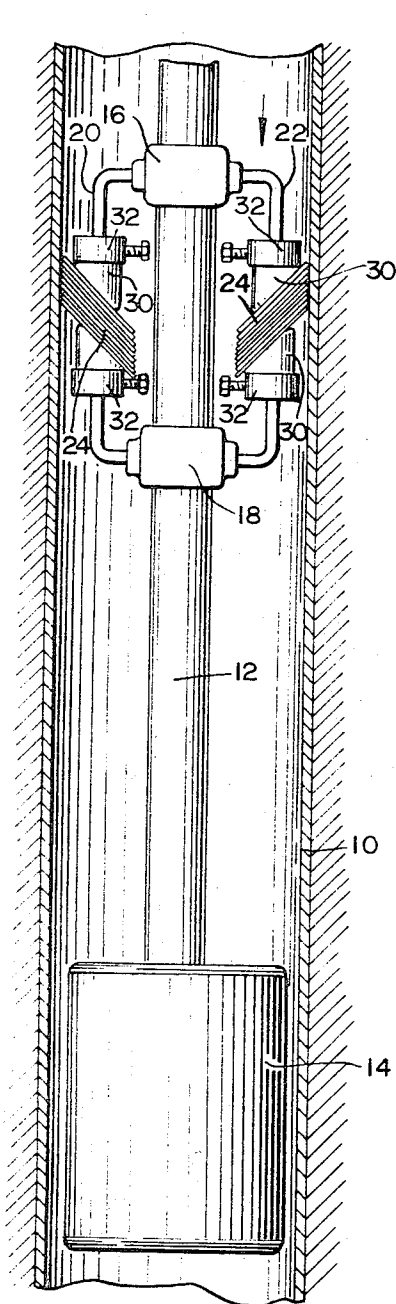


FIG. 1

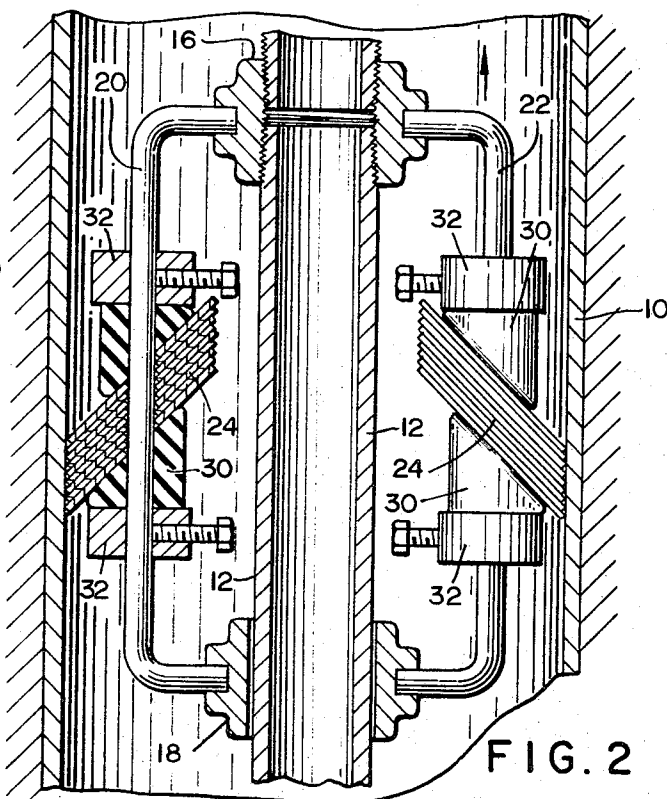


FIG. 2

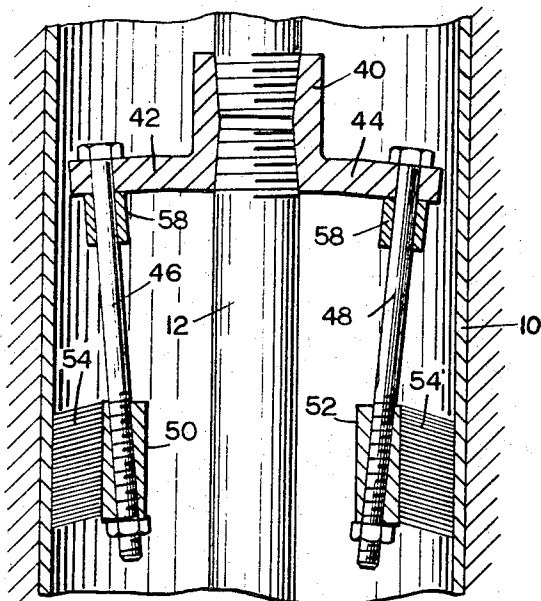


FIG. 3

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LOAD SUPPORT FOR WELL CASING

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4 Claims. (Cl. 166—216)

This invention relates to means for supporting a load in a vertical tube such as a well casing or rock bore hole. When inserting equipment such as a pump into a well or when removing it from the well, it is often desirable or convenient to have the equipment supported while the rigging is being changed or simply for a rest period. Supporting means as hereinafter described operate to resist a change direction of movement and to prevent such change of direction until the force applied is sufficient to overcome the force of resistance. A device for this purpose includes a number of elements adapted to extend horizontally in opposite directions and when so extending to give the device a diameter somewhat greater than the interior of the casing or rock bore hole in which the device is to operate. These elements are resilient or are resiliently maintained extending horizontally when unstressed so that when the device is inserted in a tube or bore and the elements are necessarily rocked or flexed to meet the wall of the tube at an acute angle, the elements press against the wall and act like ratchet pawls. If the entering movement of the device into a tube is downward, the elements thus oppose upward movement, the inclination of the elements being outward and upward. However, the elements are yielding or yieldingly mounted so that the resistance to upward movement of the device and whatever is attached to and supported by it can be overcome by the application of sufficient additional upward force. This causes the elements to snap past center and to assume an outward and downward inclination, thus opposing downward movement of the device. If this opposition is greater than the gravitational force acting on the device and whatever is attached to it, the device alone supports the objects attached to it.

For a more complete understanding of the invention, reference may be had to the following description thereof, and to the drawing, of which

FIGURE 1 is an elevational view of a device embodying the invention, with a load attached;

FIGURE 2 is an elevation of the device on a larger scale, parts being shown in section; and

FIGURE 3 is an elevation, partly in section, of a modified form of the invention.

A tubular well casing 10 is indicated in FIGURE 1. A pipe 12 extends down in the casing with a load 14 at its lower end. Fixed on the pipe 12 is an upper collar 16. A lower collar 18 is slidably fitted on the pipe. Two, or more, resilient rods 20, 22 extend from one collar to the other, the ends of each of these rods being attached to the respective collars. Loosely threaded on each rod are a number of disks 24 with central holes of sufficient size to permit the disks to rock with respect to the rod on which they are threaded. The dimension of the parts and the location of the rods 20, 22 with respect to the pipe 12 are such that the minimum distance from the outer edge of one set of disks 24 to the outer edge of the other set is a little greater than the inner diameter of the casing 10 when the disks are horizontally disposed, that is, in planes perpendicular to the axis of the casing. It follows that when the device is inserted in the casing, the disks must tilt as indicated in FIGURE 1. To bias the disks toward the horizontal position, rubber cylinders 30 are mounted on the rods 20, 22 above and below the sets of disks 24 and are held in place by stop-rings 32 adjustably mounted on the rods 20, 22 above and below the rubber cylinders 30. Any tilting of the disks 24 distorts the rubber cylinders 30.

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After the device has been inserted in the casing 10 or rock bore hole, it moves downward easily as the edges of the disks drag on the wall of the casing or hole. Upward movement, however, is strongly resisted until sufficient upward force is exerted to flip the disks 24 past center to the position shown in FIGURE 2 wherein the disks tilt outward and downward. The disks now oppose downward movement so that if the pipe 12 and load 14 are not too heavy, the device will support the load. If one device is not sufficient for this purpose, two or more similar devices can be employed. When the disks snap past center to change their tilt, they must yield inward toward the axis as must also the rods 20, 22. The freedom of the collar 18 to slide on the pipe facilitates the yielding of the rods for this purpose.

When the disks are tilted as illustrated in FIGURE 2, they offer slight opposition to upward movement of the device and its load, but the disks can be flipped back to the position shown in FIGURE 1 by exerting sufficient downward force thereon in addition to the downward gravitational pull on the device and load.

When a pump or other apparatus is being lowered into the well, the device keeps it centered in the casing and thus minimizes chafing of the apparatus on the walls of the casing. It also prevents rotation of the pump when operating.

An alternative structure is shown in FIGURE 3. A fitting 40 is secured to the pipe 12. The fitting has oppositely extending arms 42, 44 from which bolts 46, 48 project downward with a slight inward slant. Slidable on these bolts are spools 50, 52 from which project stiffly resilient elements 54 such as spring wires, bristles, loosely fitted disks, or an equivalent. The length of the wires or bristles 54 is such that those in contact with the wall of the casing 10 are inclined slightly when the spools are near the lower ends of the bolts 46, 48. When the elements 54 are as shown in FIGURE 3, if the pipe and load start to move downward, the inclination of the bolts will move the spools 50, 52 toward the wall of the casing, thus giving the elements 54 a firmer grip on the casing wall. Stop elements 58 are provided on the bolts to prevent the spools moving too far up on the bolts. The elements 54 oppose any change of direction of movement of the device and its load until sufficient force is brought to bear to flip the elements 54 from one angle of tilt to the other as described. The wires or bristles 54 project radially from all or a part of the circumference of each of the spools 50, 52, thus serving effectively to center the load 14 in the casing.

I claim:

1. Load supporting means for use in a well casing, comprising a device having elements extending, when unstressed, in opposite directions to an overall distance slightly greater than the interior diameter of the casing in which the device is to be used, said elements being resiliently deflectable to be inclined with respect to the axis of a casing when the device is inserted therein, said elements being capable of yielding toward the axis of the casing to reverse the inclination thereof when sufficient force is applied to the device in an axial direction, said device comprising a frame including two parallel stiffly resilient rods, a number of disks of equal size loosely threaded on each of said rods, and means on each said rod resiliently maintaining said disks at right angles to said rods when unstressed.

2. Load supporting means as described in claim 1, said frame also including an upper collar adapted to be secured to a vertical pipe and a lower collar adapted to slide on said pipe, the ends of each said rod being permanently secured to the respective collars.

3. Load supporting means as described in claim 2, said means for maintaining the disks yieldingly at right angles

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to the rods comprising rubber cylinders on each rod immediately above and below the disks on said rod, an upper stop element adjustably fixed on each rod at the upper end of the upper rubber cylinder, and a lower stop element adjustably fixed on each rod at the lower end of the lower rubber cylinder thereon.

4. Load supporting means as described in claim 3 in combination with a pipe to which said upper collar is secured and on which said lower collar is slidable, and a load secured to the lower end of said pipe.

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References Cited

UNITED STATES PATENTS

3,112,794	12/1963	Chenoweth	-----	166—206
3,177,941	4/1965	Conrad	-----	166—206

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U.S. Cl. X.R.

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