April 10, 1951 J. W. SHERWOOD 2,548,401

CLAMPING DEVICE

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Fig. 1

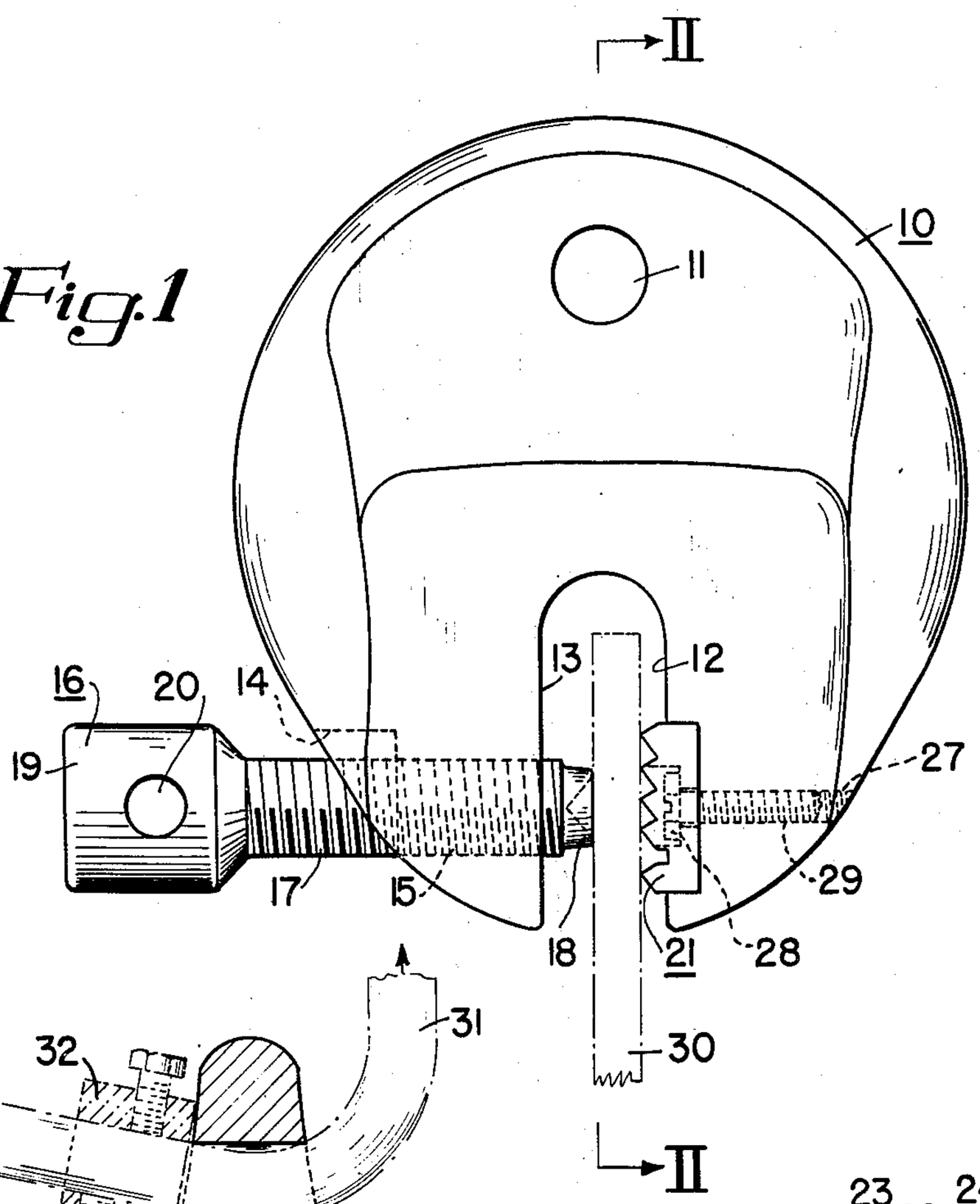

Fig. 2

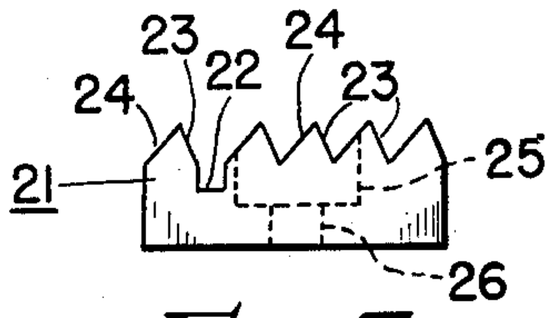

Fig. 3

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CLAMPING DEVICE

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The invention pertains to a device for positively gripping structural or work members such as plates, sheets, beams, channels, etc., and particularly, to an improved hoisting clamp or grapple for raising structural members and placing them at a desired location.

A device such as herein contemplated is needed to hoist structural members to a suitable level or height of a derrick, building, tank, or other construction, in order that the members may be made available at the proper position and location needed. Heretofore, it has been customary in the present art to employ grapples or hoisting tongs which are provided with a pair of slips for gripping the member to be hoisted. These devices have a number of disadvantageous features.

In the first place, slips are customarily mounted in wedge-shaped jaws in such a manner that their gripping action is dependent upon a constant application of the weight of the member being lifted. From a safety standpoint, they are thus very dangerous. That is, back lash may be encountered in the cable line, or the cable or device may run into a projection in such a manner that the weight of the member being carried is at least momentarily made ineffective.

Another disadvantageous feature arises from the complexity of the construction of these devices. They have heretofore been expensive from the standpoint of their initial manufactured cost, as well as from a maintenance standpoint.

One investigator endeavored to avoid a release of the structural members by providing his device with a pair of dogs to engage the slips, but this further complicated the device and made it more difficult to insert and remove the structural members.

The prior methods employed in mounting a device on the hoisting cable or winch line are also rather complex and present certain disadvantageous features. For example, the general practice has been to secure the lower end of the cable by a closed loop to a balance frame carrying a pair of devices, to a pair of clamping levers which depend upon the tension of the cable for the gripping action exerted on jaws or slips, or to the body of a device, itself. It is thus apparent that such devices have little flexibility in their utilization, and as to a desired location along the length of a cable or winch line.

It has thus been an object of my invention to provide a new and improved form of hoisting clamp or grapple device;

Another object has been to devise a solution to the problems heretofore presented in the art

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in question, and to incorporate such solution into an improved hoisting clamp;

A further object of my invention has been to provide an inexpensive, practical, simple, and efficient new type of hoisting device which can be mounted along any portion of the length of a cable or winch line;

A still further object of my invention has been to provide a hoisting device that will positively grip a structural member without depending upon the tension of the hoisting line or the weight of the member to maintain its gripping action;

These and many other objects of my invention will appear to those skilled in the art from the illustrated embodiment of my invention as well as from appended claims.

In the drawings, Figure 1 is a top plan view of a device constructed in accordance with my invention; it also shows the position of the device when it is being vertically suspended from a winch line or cable and while carrying a structural member;

Figure 2 is a sectional view of the device taken along the line II—II of Figure 1 and also illustrates its position when it is vertically suspended from a cable;

Figure 3 is an enlarged view in elevation of a tooth insert or gripping element of the device shown in Figures 1 and 2.

As illustrated particularly in Figures 1 and 2, my device is provided with a yolk or main body 10 which may be a casting of a suitable metal, such as high tensile steel. As shown particularly in Figure 2, the body 10 has a substantially heavier construction of rectangular cross-section towards its outer, member-gripping, or bottom end (when suspended). It also has an inclined, tapered, or upwardly-converging portion (when suspended) that is provided with a line or cable-receiving hole or opening 11 therethrough.

In Figures 1 and 2, for the purpose of more clearly illustrating a utilization of my device, I have shown a structural or work member 30, a cable or winch line 31, and an adjustable cable clamp or lock 32. As shown in Figure 2, the cable 31 is loosely threaded through the hole or bore 11 and the device is held in a desired position on the cable by the clamp 32 which may be of any suitable construction. To distinguish from the device, the member 30, the cable 31, and the clamp 32 are shown by dot and dash lines.

Referring particularly to Figure 1, the body 10 is bifurcated or forked at its outer or lower end to provide a slotted opening to receive the work

member 30 which is to be raised. Such slot or opening is defined by opposite mouth or fork walls 12 and 13. The fork wall 13 is, as shown particularly in Figure 1, provided with a counterbore 14 and a tapped bore 15 to threadably receive a capstan-headed, adjustable clamping screw 16 transversely or endwise therethrough. The capstan screw 16 is provided with male threads 17 and a tapered clamping or member-gripping end portion 18 which, as shown by the dotted lines of Figure 1, has a concave, cone-like depression therein to provide a circular or annular peripheral grip edge thereabout. The outer end of the capstan screw 16 is provided with a head 19 through which a transverse hole 20 extends to receive a turn bar or rod, so that it may be tightened down and loosened with respect to a structural or work member, such as 30.

The other fork wall 12 of the body 10 is provided with a removable, serrated or grip element 21 which is inset within a depressed portion thereof. A tapped bore 27 extends transversely through the fork wall 12 and in substantial axial alignment with the bore 15 of the opposite fork wall 13. The bore 27 is adapted to receive a threaded stem 29 of a setscrew. The setscrew is also provided with a slotted head portion 28 adapted to fit within a counterbore 25 of the element 21, see Figures 2 and 3. The stem 29 extends through bore 26 of the element 21, and with the depressed or inset wall portion of the fork wall 12, securely and positively mounts or holds the jaw or grip element 21 in position within the fork wall 12.

Referring particularly to Figure 3, I have shown details of the construction of the jaw or grip element 21. It will be noted that it is provided with a plurality of outwardly-extending teeth and that each tooth has an inclined back face 23 of relatively steep pitch and an inclined front face 24 of lesser pitch.

Referring to Figure 1, the faces 23 and 24 of each tooth meet in a work-holding wedge edge that has a backward pitch with respect to the work member 30 that is to be carried. It will also be noted that the first or lower tooth has a root 22 that is of substantially square or rectangular outline and is deeper than the pointed, or angle-shaped root edges of the following teeth.

I have determined that an improved gripping action is obtained by employing the root 22. In the first place, it provides a greater spacing between the first and second teeth; this gives an improved holding action adjacent the outer or lower end of the grip element 21, and permits a slight pivot action of the work member 30 about the gripping end portion 18 of the capstan screw 16 without permitting the work member 30 to slip. It will also be noted that the tapered grip end portion 18 is in substantial alignment with the counterbore 25 of the element 21, and tends to flex the member 30 about the counterbore and to wedge it tightly against the teeth of the element 21.

I have shown, see particularly Figure 2, that the body 10 of my device swings into a substantially vertical plane when the winch line 31 is being raised due to its shape and manner of suspension. The slope or converging upper portion of the body 10 has an inclined engagement with the clamp 32, see Figure 2, to provide the winch or cable 31 with a pronounced radius engagement with the wall of the hole 11. This also provides a simple way of mounting my device on a winch or cable line without a balancing

cradle or frame and without requiring the use of a closed cable loop. The clamp 32 may be moved to any position along the cable 31, in order that other portions of the cable may be employed for other purposes, such as to carry additional devices in a spaced relationship along its length.

My device positively grips the work member 30 which is being carried and cannot release such member until a turn bar or rod has been inserted through the hole 20 and the screw 16 loosened. It is apparent that a high degree of safety is attained. In addition, after the structural or work member 30 has been raised to a proper height, a worker can move it horizontally to a suitable position without any danger of it falling out of the device. I have thus been able to eliminate the various disadvantageous features of the prior art devices and to provide a highly improved, simplified, and less expensive and complicated clamp or grapple device.

What I claim is:

1. A grip hoisting clamp adapted to be mounted on a hoist line for positively suspending a heavy structural member regardless of whether or not its weight is effective under such suspension which comprises, a relatively heavy integral body having a pair of front and back faces representing major dimensions of said body and circumscribed by an edge wall representing the thickness of said body, said body being of heavy substantially rectangular thickness-cross-section upwardly from its lower end portion and of a converging taper-cross-section upwardly from said rectangular section to its upper end portion, a hoist line mount extending through said tapered section between the front and back faces and adjacent the upper end portion of said body to suspend said body vertically from the hoist line, a pair of jaws in said rectangular section and open upwardly from the lower end portion thereof, said jaws having a pair of opposed substantially planar clamp faces defining an open vertical slot in said body, a threaded bore extending transversely from the edge wall through one of said jaws substantially parallel to the front and back faces of said body into one of said clamp faces, a relatively heavy capstan-headed adjusting screw having a threaded stem adjustably mounted in said threaded bore to extend therealong from the edge wall, said stem terminating in a tapered clamping end portion adapted to extend inwardly from said one clamp face to abut a structural member to be gripped, a grip element, said other clamping face having a depressed portion therein in a substantially aligned relationship with respect to said threaded bore, said grip element being inset within said depressed portion and having a series of teeth in its outer face provided with a backward pitch and projecting outwardly into the open vertical slot from said other clamp face to abut against an opposite side of the structural member to be gripped, a headed set screw inset within said grip element and extending along said other jaw between the front and back faces of said body to secure said grip element in position on said other jaw, said grip element having a lower tooth positioned in a downwardly offset relationship with respect to the tapered end portion of the stem of said capstan-headed screw, said lower tooth having an enlarged root spacing with respect to the next tooth of said grip element, said capstan-headed screw being adapted to securely clamp a structural member against said grip element while the member extends

downwardly from the slot defined by the clamp faces of said pair of jaws.

2. A grip hoisting clamp as defined in claim 1 wherein, the tapered end portion of the stem of said capstan-headed screw has a cone-like depression therein defining an annular peripheral grip edge thereabout, and said enlarged root spacing is substantially rectangular and deeper than the root spacing between the other teeth of said grip element.

3. A grip hoisting clamp as defined in claim 1 wherein, the hoist line is a cable adapted to extend through said hoist line mount to suspend said body as a pendulum downwardly therefrom, and a clamp is adapted to be mounted on the line in abutment with one of the faces of said body to position said body on the line.

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