

March 24, 1931.

S. L. CAMPBELL

1,797,494

SLIP RING ELEVATOR

Filed April 20, 1929

2 Sheets-Sheet 1

Fig. 1.

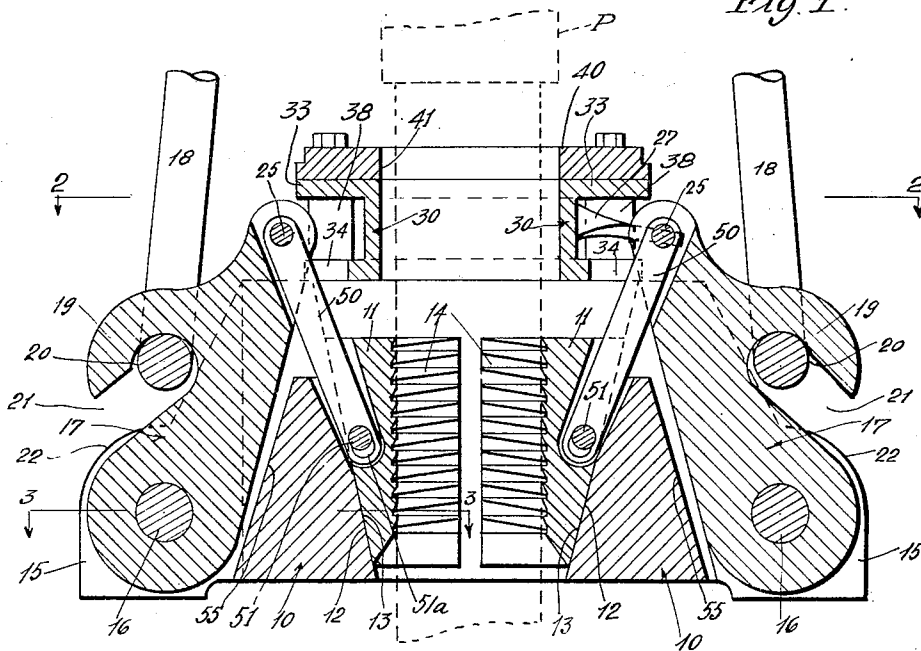


Fig. 2.

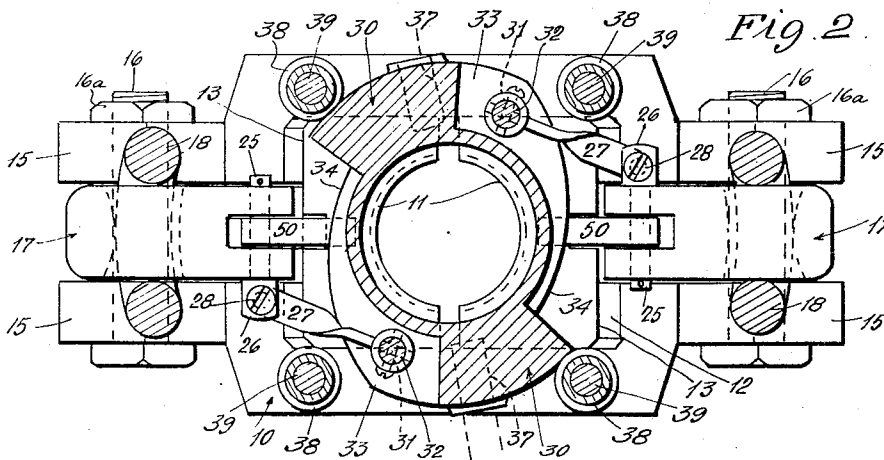
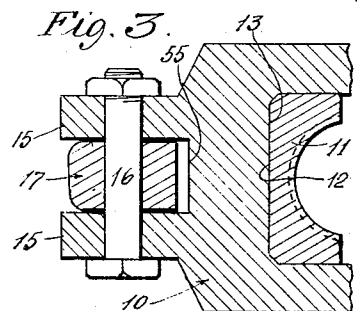


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

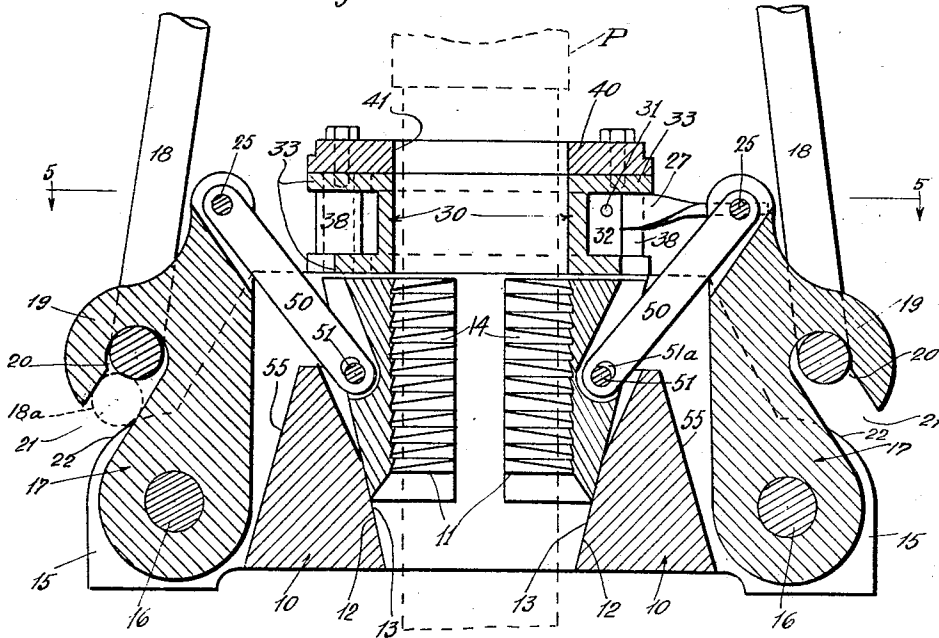
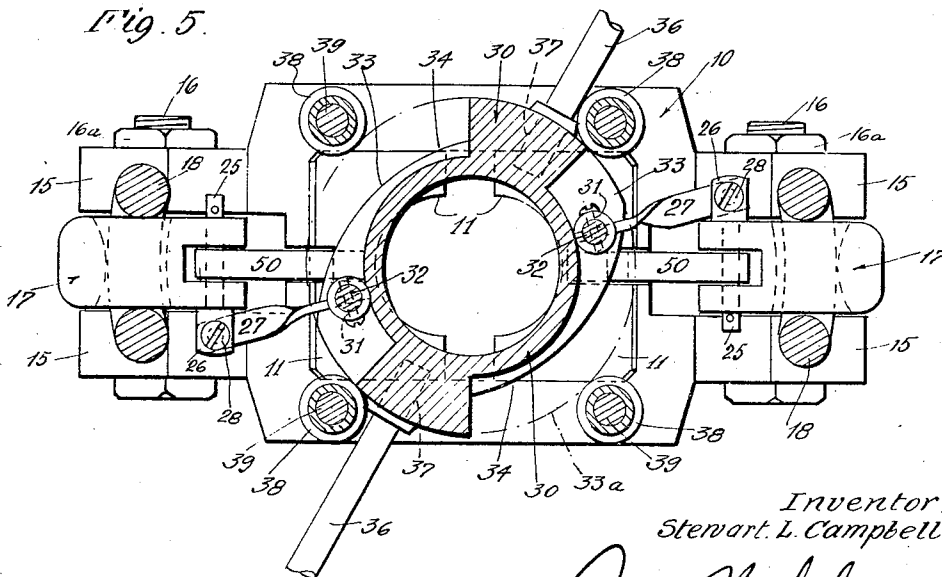


Fig. 5.



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UNITED STATES PATENT OFFICE

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SLIP-RING ELEVATOR

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This invention relates to pipe and casing elevators, supports such as are used for handling pipe and casing in deep wells, and of the wedge slip type—that is the type of elevator that utilizes wedge slips for gripping the pipe or casing at any desired point along its length. And a general object of the invention is the provision of an elevator or pipe support of the slip type, simple and strong in construction and provided with simple, convenient and effective means for operating the slips.

Although in the following description and accompanying drawings I set out a slip elevator utilizing a solid ring body, it will be readily understood from a consideration of the characteristic features that the invention is not necessarily limited, at least in its broader aspects, either to utilization of a solid ring body, or to use of an elevator. Although the specific design here preferably shown is that of an elevator, it will be readily gathered, from consideration of the operative characteristics that the invention is useful as a support or spider—without bails, as well as with bails.

One of the characteristic features involved in the invention resides in the means provided for operating the slips, and in the interconnection of the slips with movable bail engaging lugs in such fashion that the slips, if not previously lowered by hand, are automatically lowered not only by the weight of the pipe coming directly upon the slips, but also by the movement of bail lugs, (relative to the body) under the imposed or body weight, and also that the slips cannot be raised by hand or otherwise when the load is on them. Another characteristic feature lies in the construction and operation of the manual slip moving means, whereby both slips are raised or lowered simultaneously by the rotation of a single ring member connected to both slips. As specifically illustrated, this single rotatable ring member is interconnected to the slips through the movable bail lugs.

There are several other features of the invention, but needing no preliminary discussion; and all will best appear from the following detailed description of a preferred

form of elevator structure, reference for this purpose being had to the accompanying drawings, in which:

Fig. 1 is a vertical central section of the elevator with the slips in their pipe-gripping positions;

Fig. 2 is a horizontal section on line 2—2 of Fig. 1;

Fig. 3 is a horizontal section on line 3—3 of Fig. 1; and

Figs. 4 and 5 are sections similar respectively to those of Figs. 1 and 2, but showing the parts in their open or released positions.

In the drawings, the body 10 is shown preferably as a solid body, completely encompassing the slips 11. The slips are shown as preferably two in number and the body is shown as being generally rectangular in plan so as to provide flat or plane wedge faces 12 on the body against which the corresponding outer or back wedge faces 13 of the slips may ride. The invention is not at all limited to such a rectangular and plane faced construction, nor is it limited to the use of only two slips; but in a construction using two slips, the rectangular design and plane faced wedges give a very good and solid backing for the slips. Thus each slip is here shown as having a plane wedge face 13 on its back, and a substantially semi-cylindric toothed pipe engaging face 14 on its front.

The body 10 is provided with opposite pairs of pivot lugs 15 located near the lower surface of the elevator and carrying the pivots 16, which may be in the form of heavy bolts or trunnions. Preferably these pivot trunnions 16 may be so provided as to be easily removable, as by providing them with nuts 16a at one end. By removing these pivot trunnions, the swinging bail lugs 17 may then be moved to positions where the bails 18 may be removed; the bails being otherwise non-removable, as will be pointed out.

The bail receiving lugs 17 are pivoted at or near their lower ends on the pivot trunnions 16 and extend upwardly from those trunnions, and at their outer parts they have bail engaging hooks 19. These bail engaging hooks form bail receiving openings 20

with mouths 21 wide enough to pass the bails into and out of the hooks; but, when the parts are all assembled, it will be noted that the upper circular faces 22 of the pivot lugs 15 project upwardly and outwardly far enough to prevent the bails being passed out through the mouths 21. Thus, when the upward strain on the bails is relieved and the bails drop down in the hook openings, they can only drop to such a position as is indicated in dotted lines in Fig. 4 at 18a. All these provisions thus make for easy removal, replacement or substitution of bails, and at the same time render impossible any accidental disengagement of a bail.

With or without the bails, the elevator may be used as a stationary pipe support or spider, the bail lugs being utilizable at will for bail engagement and pipe hoisting. Considering, however, the device without any bails, the bail lugs become swinging members through which, by direct manual movement, the slips may be raised and lowered; and through which raising and lowering movement may be applied to all slips from the manually rotatable ring 30.

The upper ends of the bail lugs 17 are provided with transverse pivot pins 25 each having at one end a head 26. To each head 26, a connecting link 27 is pivoted on a center pin 28 arranged transversely to the axis of pin 25; so that a universal swivel connection is thus provided between each connecting link 27 and the upper end of the corresponding pivoted bail lug 17. The other ends of these connecting links 27 are likewise swivelly or universally connected with a rotatable ring 30 mounted on the upper end surface of body 10. This is done by pivoting those ends of the links on transverse pivots 31 to swivel pins 32 rotatably mounted in the ring 30.

Ring 30 is conveniently made with upper and lower flanges 33, the lower flange being cut away in part, as shown at 34, to accommodate the upper ends of the bail lugs 17 when they are swung inwardly to the positions shown in Fig. 1; and the swivel pins 32 are conveniently mounted between the two flanges.

Rotatable ring 30 may be manually revolved by application of a handle (such as is shown at 36 in Figs. 2 and 5) to either of two sockets 37 formed in the ring 30. Ring 30 is rotationally guided by having its upper and fully circular flange (see the showing at 33a in dotted lines in Fig. 5) engaged by four anti-friction rollers 38 which are mounted in spaced relation at the upper surface of the body on studs 39, and those portions of the lower flange which are not cut away may also engage these rollers 38. The studs 39, in addition to forming pivot pins for the anti-friction rollers, also support the upper plate 40 which serves to hold ring 30

down on the upper end face of the body. Plate 40 is provided with a central opening 41 large enough to pass the pipe collars or couplings.

Each of the pivoted bail lugs 17 is also connected with a slip 11 in such manner that, when the bail lugs are thrown out to the positions of Fig. 4, the slips are raised, and when thrown inward to the positions of Fig. 1 the slips are allowed to lower, or are pushed down if they do not move down under their own weight. These interconnections may be made in various manners, but I here show them as involving connecting links 50 pivoted at their upper ends on the pivot pins 25 and connecting at their lower ends with horizontal pins 51 in the slips. When the parts are in the position of Fig. 1, with the bail lugs 17 swung inwardly, it will readily be seen how the slips 11 are moved downwardly. This downward movement is, to a certain extent at least, a forcible downward movement of the slips, such motion being transmitted to the slips from the pivoted bail lugs 17 through the medium of links 50. However, it will be noted that the links 50 preferably include or embody a lost motion arrangement so that, although the slips may be forced downwardly by the inward swinging of bail lugs 17, the slips still can wedge on downwardly when they take the weight of the pipe, without putting a strain, or too great a strain, on links 50 and the other connective parts. Such an arrangement for some lost motion may or may not be always necessary, but I show it here as preferable. When the bail lugs 17 swing inwardly to the position of Fig. 1, they may preferably swing up against stop surfaces 55 of the body so that, under applied load, these pivoted bail lugs become solid and rigid in effect. On the other hand, the lugs 17 may take such a position under load that the vertical pull through the bails 18 is substantially in alinement with pivot trunnions 16, or just a little outside such alinement. Thus, if the bail lugs do not move inwardly against a stop surface 55, the pull of the bails on the lugs will hold the lugs in substantially the position of Fig. 1. Held thus, as last explained, substantially in those upright positions, it may not be necessary in all instances to provide lost motion in the connecting links 50, as a slight displacement of the bails from straight line pull through pivots 16 does not involve a strain on links 50 as large as the supporting strain on the bail, but substantially similar; but in any case it may be preferable to provide lost motion in order to keep all additional or unnecessary strains off the links. Thus the links are shown with elongated slots 51a at the pins 51; so that the slips 11 may wedge on down under the weight of the load without putting too great a strain on the connecting links 50 and other parts. It will be understood that the lost motion is

such as to make the elevator not only take care of the final forcible downward wedging of the slips under the load, but also to take care of varying pipe diameters. For instance, if the pipe happens to be a little large, then the lugs 17 may not quite reach the stop surface 55 when the slips engage the pipe; and the bail lugs will then move in to final position as the slips finally wedge down. With smaller pipe the bail lugs may reach final position as the slips move to pipe engagement; then the lost motion takes care of the final wedging movement of the slips.

In applying the elevator to a pipe, it is placed upon a pipe in the usual manner by passing the elevator over the top of the pipe and, having been lowered to the position where a grip is desired, application can be effected in several different manners. Ordinarily the weight of the elevator body, hanging on bails 18 through the medium of pivoted bail lug 17, may be sufficient to cause the bail lugs to throw in toward the position of Fig. 1, lowering the slips into engagement with the pipe. As the elevator moves down, the slips will slide down the pipe but will immediately grip the pipe when the elevator is moved up slightly. This type of action may be particularly utilized if, before or after having passed the elevator over the pipe collar, the rotating ring 30 be then rotated by hand somewhat from the position of Fig. 5 toward the position of Fig. 2. In the position of Fig. 5, in which the slips are fully raised and opened, the connecting links 27 may be substantially in or close to radial alinement with the center of the elevator bore and the center of rotation of ring 30, so that in such a position these links 27 virtually lock the bail lugs 17 and the slips in their opened and upper positions. By thus locking the parts in their upper open positions, provision is made that the slips cannot accidentally close on the pipe until the parts are manually operated to or toward the position of Fig. 2; but by preliminarily moving the parts toward the position of Fig. 2, the elevator may be made automatically to grip the pipe at whatever point upward movement of the elevator on the pipe is commenced. And, of course, the slips may be manually applied to the pipe at any point by manually swinging the ring 30 as lowering the slips to pipe engagement.

To release the elevator from the pipe, it is only necessary to either raise the pipe or lower the elevator sufficiently to relieve the strain on the slips and then move the slips upwardly by rotating the ring 30 or by pulling outwardly on one or both of the bail lugs 17. Either of these operations will cause both slips to be pulled upwardly to the position of Fig. 4.

I claim:

1. In a pipe and casing elevator, the com-

bination of a body and a wedge slip therein, a body supporting member movably connected with the body, and connective means between said member and the wedge slip whereby movement of said member causes vertical movement of the wedge slip in the body, said connective means embodying a lost motion element allowing the wedge slip to move downwardly independently of movement of said supporting member.

2. In a pipe and casing elevator, the combination of a body and a wedge slip therein, a member movably connected with the body, and connective means between said member and the wedge slip whereby movement of said member causes vertical movement of the wedge slip in the body, said connective means embodying a lost motion element allowing the wedge slip to move downwardly independently of movement of said supporting member.

3. In a pipe and casing elevator, the combination of a body and a wedge slip therein, a bail receiving lug pivotally attached to the body to swing in a vertical plane, and connective means between said lug and the wedge slip such that the wedge slip is lowered when said lug is pulled to an upright position above its point of pivotal connection by imposition of weight, said connective means including a lost motion element allowing downward movement of the wedge slip independently of movement of said lug.

4. In a pipe and casing elevator, the combination of a body and a wedge slip therein, a bail receiving lug pivotally attached to the body to swing in a vertical plane, and a connective link between said lug and the wedge slip causing the wedge slip to move vertically when said lug swings to and from a position extending substantially upward from its point of pivotal connection to the body, said connecting link including a lost motion element whereby a wedge slip may move downwardly independently of swinging movement of said pivoted lug.

5. In a pipe and casing elevator, the combination of a body and a wedge slip vertically movable therein, a body supporting member movably connected with the body, a manually movable member mounted on the body, and connective means between the supporting members and each wedge slip and manually movable member, whereby movement of either member causes vertical movement of the wedge slip.

6. In a pipe and casing elevator, the combination of a body, a pair of vertically movable wedge slips therein, two opposite body supporting members movably connected with the body and connected with the wedge slips to cause vertical movement of the wedge slips by reason of movement of said supporting members relative to the body, and manually operable means mounted on the body and

acting to hold said opposite supporting members in a position to support the wedge slips.

7. In a pipe and casing elevator, the combination of a body and a wedge slip vertically movable therein, a body supporting member pivotally attached to the lower part of the body to swing in a vertical plane to and from the body, interconnection between said member and wedge slip causing raising and lowering of the wedge slip when the member swings, a manually rotatable ring mounted at the top of the body, and interconnection between the ring and said member to cause said member to swing when the ring is rotated.

8. In a pipe and casing elevator, the combination of a body and a wedge slip vertically movable therein, a member pivotally attached to the lower part of the body to swing in a vertical plane to and from the body, interconnection between said member and wedge slip causing raising and lowering of the wedge slip when the member swings, a manually rotatable ring mounted at the top of the body, and interconnection between the ring and said member to cause said member to swing when the ring is rotated.

9. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed body supporting members pivotally attached to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of swinging movement of said members, and manually operable means movably mounted on the body and connected with said members to swing them.

10. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed members pivotally attached to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of swinging movement of said members, and manually operable means movably mounted on the body and connected with said members to swing them.

11. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed body supporting members movably connected to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of relative movement of said members, and manually operable means movably mounted on the body and connected with said members to move them.

12. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed body supporting members pivotally attached to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of swinging movement of said

members, and manually operable means to swing said members and to lock said members in positions supporting said wedge slips.

13. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed members pivotally attached to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of swinging movement of said members, and manually operable means to swing said members and to lock said members in positions supporting said wedge slips.

14. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed body supporting members pivotally attached to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of swinging movement of said members, and manually operable means to swing said members, said means embodying a rotatable ring and links connecting said members to said ring.

15. In a pipe and casing elevator, the combination of a body and a pair of vertically movable wedge slips therein, a pair of opposed body supporting members pivotally attached to the body and interconnected with the wedge slips to cause vertical movement of the wedge slips by reason of swinging movement of said members, and manually operable means to swing said members and to lock said members in positions supporting said wedge slips, said means embodying a rotatable ring and links connecting said member to said ring.

16. In a pipe and casing elevator, the combination of a body, a pair of vertically movable wedge slips therein, a pair of opposed bail receiving lugs pivotally connected with the body and extending upwardly from said pivotal connections and adapted to swing in a vertical plane with reference to the body, link interconnections directly between said swinging lugs and wedge slips to cause vertical movement of the wedge slips by virtue of swinging movement of said pivoted lugs, said lugs having bail receiving parts which are pulled to a position substantially above the lug pivots when weight is applied to the elevator, and the linkage connection being such that the wedge slips are lowered when said pivot lugs stand in said specified position.

17. In a pipe and casing elevator, the combination of a body, a pair of vertically movable wedge slips therein, a pair of opposed bail receiving lugs pivotally connected with the body and extending upwardly from said pivotal connections and adapted to swing in a vertical plane with reference to the body, direct interconnections between said swinging lugs and wedge slips to cause vertical movement of the wedge slips by virtue of swinging movement of said pivoted lugs, said lugs

having bail receiving parts which are pulled to a position substantially above the lug pivots when weight is applied to the elevator, and the interconnection being such that the wedge slips are lowered when said pivoted lugs stand in said specified position.

18. In a pipe and casing elevator, the combination of a body, a pair of vertically movable wedge slips therein, a pair of opposed bail receiving lugs pivotally connected with the body and extending upwardly from said pivotal connections and adapted to swing in a vertical plane with reference to the body, interconnections between said swinging lugs and wedge slips to cause vertical movement of the wedge slips by virtue of swinging movement of said pivoted lugs, said lugs having bail receiving parts which are pulled to a position substantially above the lug pivots when weight is applied to the elevator, the interconnection being such that the wedge slips are lowered when said pivoted lugs stand in said specified position, and manually operable means to swing both said pivoted lugs about their respective pivots.

19. In a pipe and casing elevator, the combination of a body, a pair of vertically movable wedge slips therein, a pair of opposed bail receiving lugs pivotally connected with the body and extending upwardly from said pivotal connections and adapted to swing in a vertical plane with reference to the body, interconnections between said swinging lugs and wedge slips to cause vertical movement of the wedge slips by virtue of swinging movement of said pivoted lugs, said lugs having bail receiving parts which are pulled to a position substantially above the lug pivots when weight is applied to the elevator, the interconnection being such that the wedge slips are lowered when said pivoted lugs stand in said specified position, and manually operable means to swing both said pivoted lugs about their respective pivots, said last mentioned means including a rotatable ring mounted above the body and co-axial with the slips, and connections between said ring and said pivotal lugs.

20. In a pipe and casing elevator, the combination of a body, a pair of vertically movable wedge slips therein, a pair of opposed bail receiving lugs pivotally connected with the body and extending upwardly from said pivotal connections and adapted to swing in a vertical plane with reference to the body, interconnections between said swinging lugs and wedge slips to cause vertical movement of the wedge slips by virtue of swinging movement of said pivoted lugs, said lugs having bail receiving parts which are pulled to a position substantially above the lug pivots when weight is applied to the elevator, the interconnection being such that the wedge slips are lowered when said pivoted lugs stand in said specified position, and manually

operable means to swing both said pivoted lugs about their respective pivots, said last mentioned means including a rotatable ring mounted above the body and co-axial with the slips, and linkage connections between said ring and said pivoted lugs, the arrangement being such that said linkage connections stand substantially in a line radial of the center of said ring when said pivoted lugs are swung to positions raising the wedge slips.

In witness that I claim the foregoing I have hereunto subscribed my name this 11th day of April, 1929.

STEWART L. CAMPBELL.

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