April 3, 1928. 1,664,461

G. A. MONTGOMERY

CASING ELEVATOR

Filed Sept. 15, 1925 4 Sheets-Sheet 1

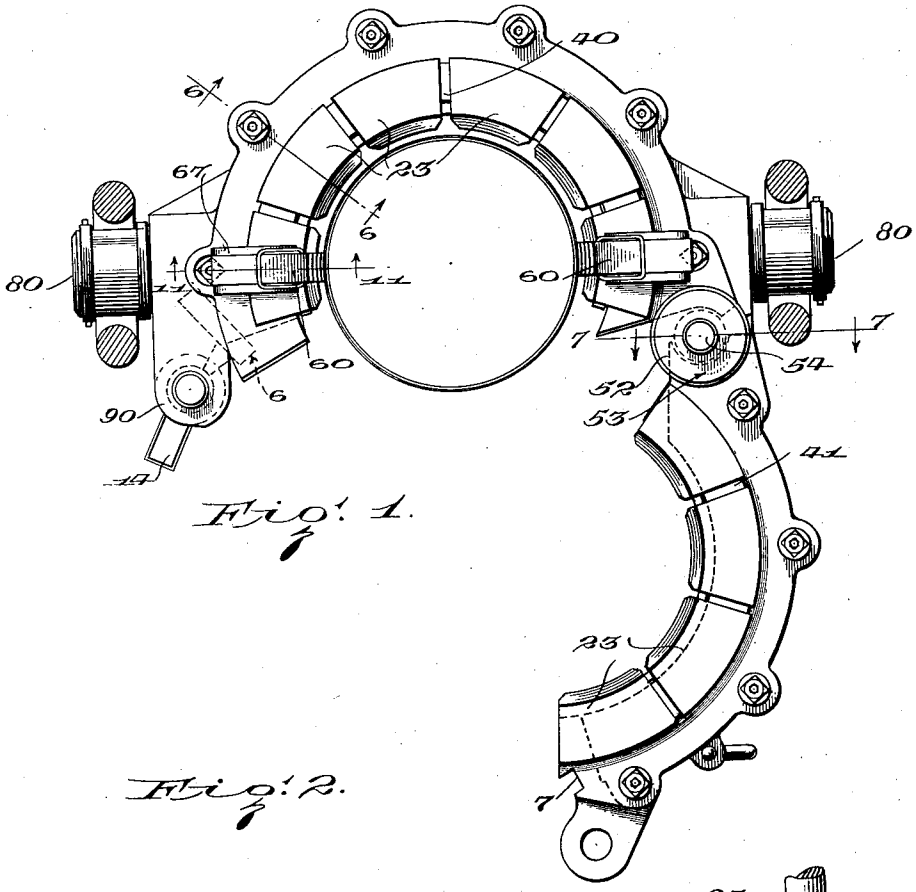
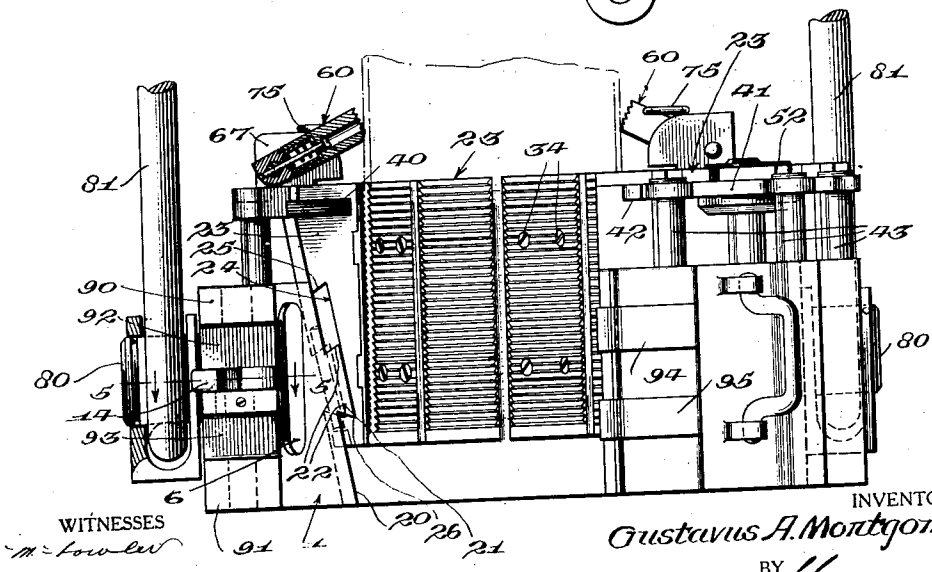


Fig. 1.

Fig. 2.



WITNESSES

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CASING ELEVATOR

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4 Sheets-Sheet 2

Fig. 5.

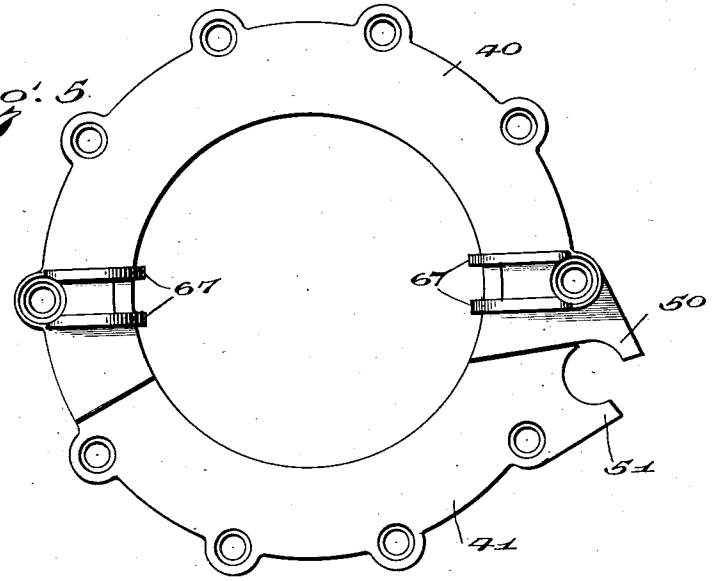


Fig. 3.

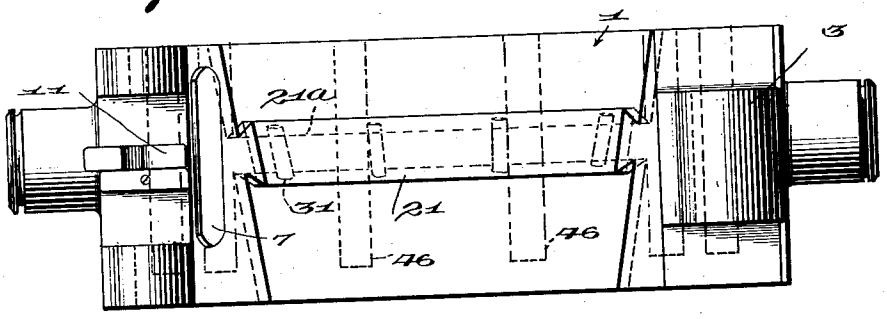
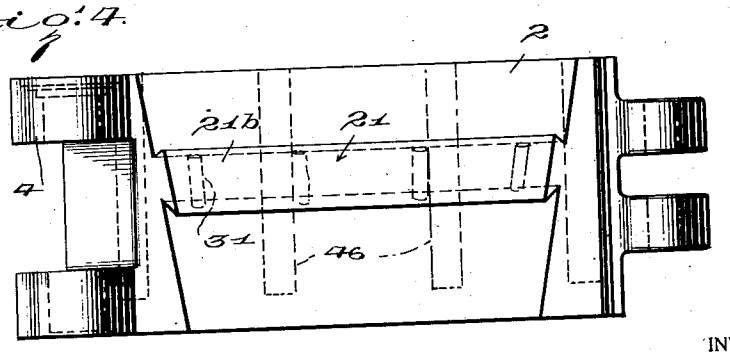


Fig. 4.



WITNESSES

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Fig. 6.

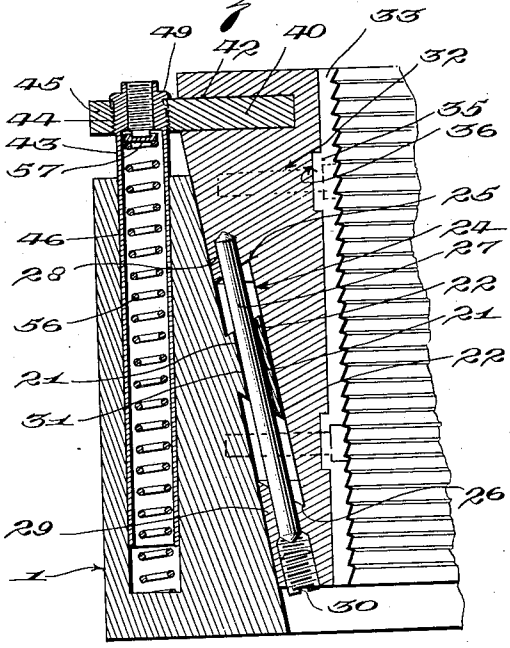


Fig. 7.

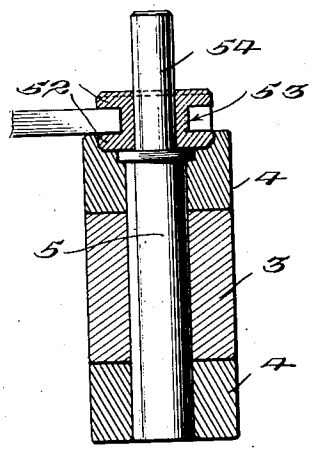


Fig. 9.

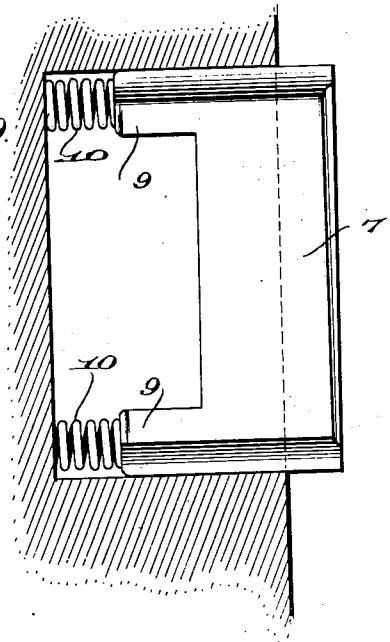
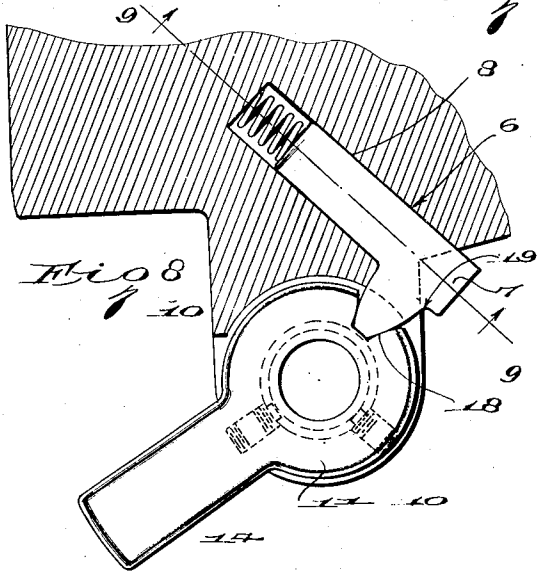


Fig. 8.



WITNESSES

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CASING ELEVATOR

Filed Sept. 15, 1925 4 Sheets-Sheet 4

Fig. 10.

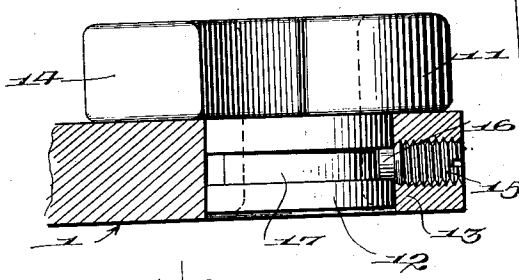


Fig. 13.

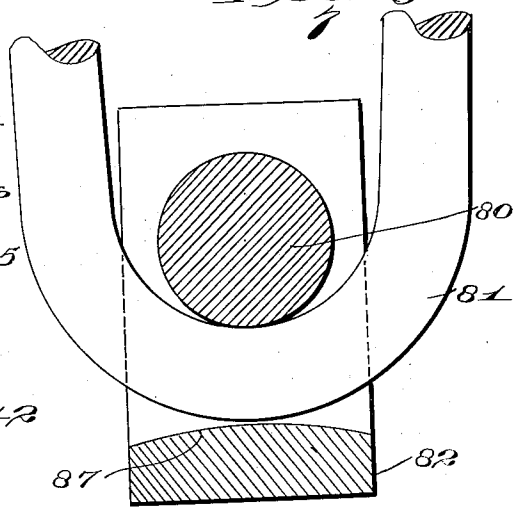


Fig. 12.

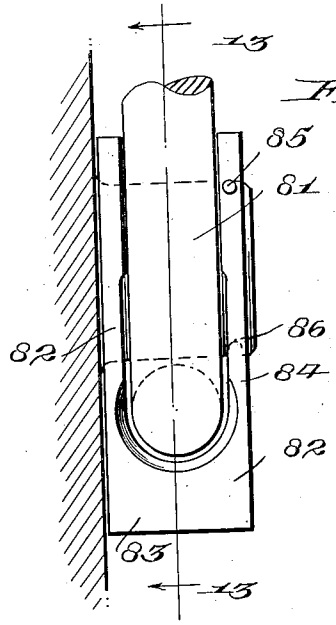
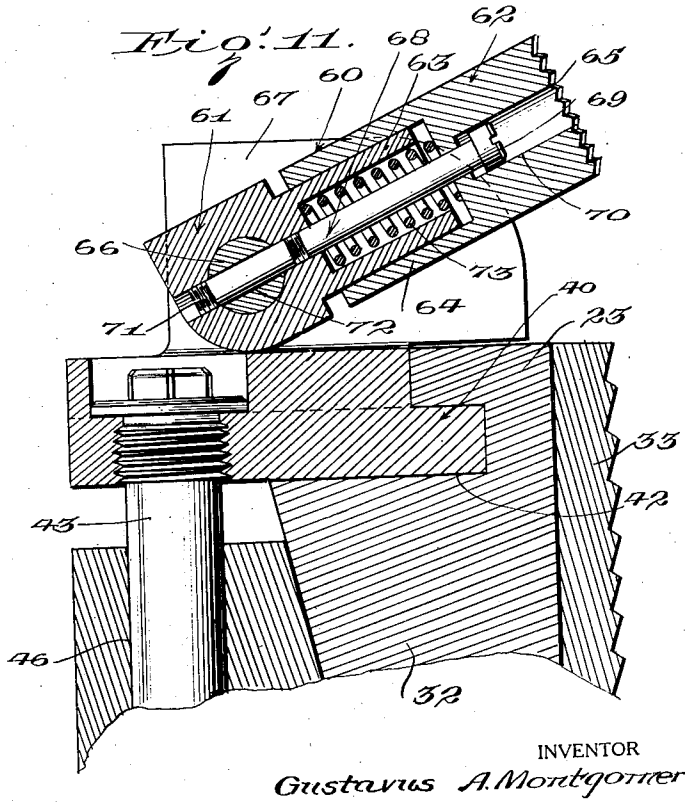


Fig. 11.



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Patented Apr. 3, 1928. 1,664,461

UNITED STATES PATENT OFFICE.

GUSTAVUS A. MONTGOMERY, OF TITUSVILLE, PENNSYLVANIA.

CASING ELEVATOR.

Application filed September 15, 1925. Serial No. 56,527.

This invention relates to a casing elevator adapted for general use and especially well adapted for use in handling oil well casing in long vertically standing strings.

The present invention aims to provide a casing elevator which may be used with facility and safety to handle inserted joint casing as well as casing with standard collars.

One of the principal objects of the invention resides in the provision of a casing elevator of this character which embodies a laterally swinging side door so as to be capable of being moved laterally onto the casing, thereby eliminating the necessity of slipping the elevator over the end of the casing and which while having this advantage is also so constructed and organized as to firmly and securely grip and support the casing in such manner as to preclude the possibility of damaging or injuring the casing in any way. This latter feature is largely brought about by the uniform gripping and holding action exerted by the elements of the elevator at uniformly spaced points around the entire periphery of the casing so that the casing is supported plumb and will not twist or bend.

Another object is to provide an elevator having these advantages and capacities and which is automatically engageable with the casing to properly support and carry the same and which when engaged with the casing exerts its gripping action independent of the shoulders presented by the collars or the bulge presented by the bell of the inserted joint.

A still further object is to provide a casing elevator of the character specified which is of simple and durable construction, reliable and efficient in operation and easy and comparatively inexpensive to manufacture.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:—

Figure 1 is a plan view showing a casing elevator constructed in accordance with the present invention,

Figure 2 is a view in side elevation showing the casing elevator as illustrated in Figure 1,

Figure 3 is a detail view of the elevation illustrating the main section of the body of the elevator,

Figure 4 is a similar view showing the door section thereof,

Figure 5 is a top plan view of the ring carrier employed for the slips,

Figure 6 is a detail sectional view on the line 6—6 of Figure 1,

Figure 7 is a similar view on the line 7—7 of Fig. 1,

Figure 8 is a detail view of the latch mechanism showing the same partly in top plan and partly in horizontal section,

Figure 9 is a sectional view on the line 9—9 of Figure 8,

Figure 10 is a view partly in section and partly in elevation on the line 10—10 of Figure 8,

Figure 11 is a view in section taken on the line 11—11 of Figure 1,

Figure 12 is a view in side elevation of one of the supporting trunnions and its associated parts, and

Figure 13 is a sectional view on the line 13—13 of Figure 12.

Referring to the drawings it will be seen that the elevator constituting the present invention comprises a sectional body of substantially annular form and having a main section 1 and a door section 2 which when closed coacts with the main section to complete the substantially annular body of the element. The main section 1 has an angular extent greater than 180° but the opening provided when the door section is swung to open position is sufficient to permit the elevator to be assembled laterally onto the casing.

The door section 2 has one end hingedly connected to one end of the main section 1, and for this purpose the sections 1 and 2 are formed with interfitting ears 3 and 4, respectively, there being one ear 3 and two ears 4 (see Figs. 3, 4 and 7) and the ear 3 being fitted in between the ears 4. The ears 3 and 4 are apertured and through the aligned apertures a pivot pin 5 is inserted and held to constrain the door sections to swinging movement.

The opposite end of the door section from its hinged connection to the main section is releasably secured to the other end of the main section and for this purpose a spring-pressed latch 6 is provided on the main section and is engageable with a slot 7 formed in the door section for the purpose of re-

leasably securing the door section closed. As illustrated in Figure 1 the latch mechanism is inclined so as to provide for a more secure latching action. The latch proper is designated at 6 and has a vertical extent only slightly less than the vertical extent of the body in which it is mounted. The latch 6 is a sliding fit in the slot 8 of the main section and at its upper and lower ends has rearwardly directed tubular legs 9 with which coil springs 10 co-act. The coil springs 10 engage the legs 9 and the inner wall of the slot 8 and are under compression to force the latch 6 to latching position.

In order to facilitate the release of the latch a disc 11 is provided and has a reduced cylindrical section 12 rotatably mounted in a bearing 13 provided therefor on the main section 1 (see Fig. 10). A radially extending handle 14 is integrally formed with or otherwise connected to the disc 11 to facilitate the turning of the disc. The circular extension 12 of the disc 11 is prevented from accidental displacement from its bearing by means of screws 15 threaded into the main section 1 and having reduced inner ends 16 which are fitted in an annular peripheral groove 17 formed in the extension 12. The disc 11 has a notch 18 in its periphery and with this notch 18 a single tooth 19 formed on the latch 6 co-acts (see Fig. 8). The notch 18 and tooth 19 illustrate one form of motion transmission means that may be provided between the disc 11 and the latch 6 for the purpose of permitting the person operating the elevator to retract the latch at will.

The sectional body made up of the sections 1 and 2 is provided with a downwardly tapering bore or opening 20 between the upper and lower ends of which an internal peripheral rib 21 is arranged, the rib 21 being integrally formed with or otherwise suitably secured to the sections of the body, the section 1 having a section 21^a of the rib 21 thereon and the section 2 having a section 21^b of the rib 21 and both the sections 21^a and 21^b serve to make up the rib 21 in the closed position of the door.

The upper and lower faces of the rib 21 are beveled or undercut, as indicated at 22. Slips 23 are slidably fitted on the wall of the bore or opening of the hollow body and each slip has a recess 24 in its underface which accommodates the rib 21. The upper and lower walls of each recess 24 present beveled shoulders 25 and 26 which are engageable with the faces 22 to limit the movement of the slips in either direction. Each slip is constrained to proper movement by means of a guide pin 27 having its ends fitted in openings 28 and 29 provided therefor in the slip, each pin 27 being held in position by a set screw 30 threaded into the slip below the same. As illustrated to advantage in Fig. 6 the pins 27 extend across the recesses 24 and are slidably fitted in openings 31 formed in the rib 21.

Each slip 23 includes a body portion 32 and a serrated or toothed face 33 applied to the body portion and held thereto by the action of screws or other fastening elements 34 and by the action of interfitting ribs and grooves, designated at 35 and 36, respectively. As will be understood from an inspection of Figures 1 and 2 some of the slips are carried on the main section 1 and some are carried on the door section 2. In the embodiment illustrated six clips are slidably fitted on the main section 1 and four slips are slidably fitted on the door section 2, but of course any suitable number of slips may be used.

A sectional carrier is provided for controlling the slips and constraining them to partake of corresponding movement, this carrier including a section 40 associated with the main section and the section 41 associated with the door section. The joints of the carrier are staggered with respect to the joints of the sectional body. The carrier is substantially in the form of a ring and has a sliding fit in slots 42 formed in the backs of the slips, as shown in Figure 6. A plurality of tubular guides 43 are associated with each section of the carrier. The guides 43 have externally threaded portions 44 which co-act with threaded openings 45 formed in the section of the carrier on which they are mounted. Below the externally threaded portions 45 the guides are elongated and have smooth peripheries so as to be adapted to have a smooth sliding fit in the guide opening 46 with which they are assembled. These guide openings 46 are provided both in the main section 1 and door section 2 of the body. In order to permit the guides to tightly engage with the carrier they are provided with annular flanges 49 at the upper ends of their threaded portions 45, said flanges 49 engaging the section of the carrier on which the guide is mounted when the guide is threaded into the said section as far as it may be. These guides constrain the sections of the carrier to true vertical movement and they also serve to hold the sections of the guide in proper position.

In order that the sections 40 and 41 of the carrier may be held in the same plane at all times and yet provide for the swinging of the section 41 with the door section 2 on which it is mounted, the sections 40 and 41 are provided with flat angular ears 50 and 51 which in the assembly fit in between the flanges 52 (see Figs. 2 and 7) of a spool, designated generally at 53. The spool 53 is rotatably and slidably fitted on a projection or extension 54 of a hinge pin 5. Springs 56 are provided for elevating

the carrier and the slips, and these springs are housed in the guides 43 and in the openings 46, the springs abutting the lower ends of the openings at their lower ends and washer plates 57 at their upper ends, the washer plates being controlled by tensioning plugs 58 threaded into the upper ends of the guides and socketed so as to be conveniently turned from the exterior to set up the proper tension in the springs.

The springs 56 normally elevate the slips until the beveled shoulders 26 engage the lower face 22 of the rib 21 which positively limits the upward movement of the springs and which takes the strain off of the guides due to the engagement of the beveled shoulder and undercut face. Similarly when the springs have been depressed as far as they may be in order to firmly engage the casing, the upper shoulder 25 engages the upper beveled face 22 to positively limit the downward movement of the slips and take a major portion of the strain.

Means is provided for moving the slips into engagement with the casing and comprises a pair of dogs, designated generally at 60. Each dog 60 comprises a mounting section 61 and a gripping section 62. The mounting section 61 has a reduced extension 63 over which a hollow cylindrical portion 64 of the section 62 telescopes. The section 62 is provided with a curved and toothed gripping face 65. Each dog 60 is positively and pivotally connected to the carrier by means of a pivot bolt 66 inserted through an opening provided therefor in the section 51 of each dog and carried by lugs 67 provided on the carrier rim. The sections 61 and 62 are held against disassembly by means of a screw bolt 68 having its head 69 received in an opening 70 provided in the section 62 and having its shank 71 threadedly engaged with an opening 72 provided in the pivot bolt 66. A compression coil spring 73 is disposed between the sections 61 and 62 and tends to urge the section 62 outwardly and into engagement with the casing. Rings 75 are provided to facilitate handling of the dogs. When the dogs are drawn over to the position shown in Figure 1 and the elevator is pulled up along the casing the dogs will be swung down to a horizontal position and will then carry the carrier and the slips downwardly to advance the slips inwardly into engagement with the casing. When the slips are engaged with the casing the weight of the casing tends to increase the firmness of the engagement of the slips with the casing.

The main section 1 of the body is provided with diametrically opposite supporting members which preferably take the form of trunnions 80 with which any type of conventional links 81 may be employed. The links 81 encircle the trunnions 80, as shown in Fig. 13. Retaining members 82 are provided for retaining the links 81 and trunnions operatively engaged with each other and yet permit the elevator to be used effectively in any angular adjustment relative to its supporting means. The retaining members 82 are of U-shaped form and have body portions 83 and sides 84, the sides 84 having transverse openings which receive the trunnions 80. Each retaining member 82 is held against axial displacement relative to its trunnion by means of a pin 85 which is driven through an opening in one of the sides of its retaining member 82 and which is disposed tangentially with respect to the trunnion and lies in part in an annular groove 86 formed in the trunnion. In this way the pin does not interfere with the complete rotary movement of the retaining member and yet prevents accidental displacement thereof. The links are received between the trunnions and the body portions 83 of the retaining members 82. Each body portion has a curved wall 87 which is gradually reduced from its center toward its ends.

In assembling the casing elevator with a casing it is only necessary to release the latch and swing open the door section and then move the elevator laterally on the casing, after which the door section is thrown back to closed position where the latch automatically snaps in place. Then if the dogs 60 have been positioned as shown in Figure 1 it is only necessary to apply the hoisting power to the elevator to cause the same to effectively engage the casing and properly support the same.

It may be desirable to supplement the action of the latch under some conditions and in order that this may be done with facility the main section 1 is provided with ears 90 and 91 between which spaces 92 and 93 are formed. The door section 2 is provided with ears 94 and 95. In the closed position of the door section the ears 94 and 95 are disposed in the spaces 92 and 93 and between the ears 90 and 91. The ears 90, 91, 94 and 95 have registering openings which taper toward their lower ends to adapt them to receive a fastening pin or other securing element. If the fastening pin is used it is tapered correspondingly with the openings of the ears.

The elevator constituting the present invention provides slips which are automatically engageable with the casing and which properly support the same at uniformly spaced points around the entire periphery thereof without depending on the engagement of such slips with a collar or the like. Along with these advantages the elevator provides a side door permitting the assembly of the elevator laterally onto the casing. Still another important advan-

tage resides in the fact that the elevator can be assembled with the casing in any desired angular position with respect to its supporting means. The slips are positively and certainly forced into position to engage the casing by the action of the dogs 60 and when engaged with the casing the slips are positively supported on the rib of the body. The tension of the springs which elevates the slips may be readily varied and, in fact, all parts of the elevator constituting the present invention are conveniently accessible for purposes of adjustment, replacement, or repair.

I claim:

1. A casing elevator comprising a sectional body, slips mounted on the sections of the body, and a sectional carrier for controlling the position and movement of the slips in all positions of the sections of the body.

2. A casing elevator comprising a body consisting of a main section and a door section, slips mounted on the sections of the body, and a carrier engaging and controlling the slips, said carrier comprising a main section and a swingable section interconnected so as to be held against any except relative angular movement, said swingable section partaking of the movements of the door section.

3. A casing elevator comprising a body consisting of a main section and a door section, slips mounted on both the main section and door section, means for pivoting one end of the door section to one end of the main section, and means for releasably securing the other end of the door section to the other end of the main section, and comprising a spring projected latch in the form of an elongated key carried by the main section, said door section having an elongated slot cooperable with the latch.

4. A casing elevator comprising a body consisting of a main section having diametrically opposite supporting members, a door section having one end hinged to one end of the main section and its other end releasably secured thereto, slips mounted on both the sections of the body, and a sectional carrier for constraining the slips to corresponding movements at all times.

5. A casing elevator comprising a body consisting of a main section, a laterally swinging door section associated with the main section, slips on both the main section and door section and positive means positively connected with all of the slips for constraining all of the slips to corresponding up and down movement.

6. A casing elevator comprising an annular body consisting of a main section having an angular extent greater than 180°, a door section completing the angular body, means for hinging one end of the door section to one end of the main section, means for releasably securing the other end of the door section to the other end of the main section, comprising an angularly disposed spring projected latch carried by the main section and having a vertical extent only slightly less than that of the body, said door section having an angularly disposed slot receiving said latch in the closed position of the door.

7. A casing elevator comprising a body consisting of a main section and a door section, slips mounted on both the main section and door section, means for pivoting one end of the door section to one end of the main section, and means for releasably securing the other end of the door section to the other end of the main section and comprising a spring projected latch carried on the main section, said door section having a slot receiving the latch, interfitting apertured ears on the main section and door section to receive a securing element.

8. A casing elevator comprising a body having an opening therethrough, a plurality of slips mounted on the body and operating in the opening thereof, means positively interengaged with the slips for positively constraining all of the slips to corresponding movement both upwardly and downwardly, and positive and unyielding means for limiting the movement of the slips in either direction.

9. A casing elevator comprising an elevator body having an opening therethrough, a plurality of slips mounted on the body and operating in the opening thereof, means for constraining the slips to corresponding movement, interengaging means between the slips and the body for limiting the movement of the slips, and comprising an inwardly directed rib rigid with the elevator body, and shoulders on the slips engageable with the upper and lower sides of the rib.

10. A casing elevator comprising a body having an opening therethrough, a plurality of slips mounted on the body and operating in the opening thereof, means for constraining the slips to corresponding movement, interengaging means between the slips and the body for limiting the movement of the slips and comprising an inwardly directed rib on the body, and shoulders on the slips engageable with the upper and lower sides of the rib, said shoulders and the upper and lower sides of the rib being correspondingly beveled.

11. A casing elevator comprising a body, slips mounted on the body, supporting means for the body permitting operative engagement of the elevator with the casing in any angular adjustment relative to its supporting means, and comprising trunnions on the body, links, and U-shaped retaining members having transverse openings receiving the trunnions, and means for preventing axial

displacement of the members from the trunnions, said links extending between the trunnions and the bottom walls of the retaining members, said bottom walls being gradually reduced from their central portions to their ends.

12. A casing elevator comprising a body consisting of a main section and a door section, a hinge between one end of the door section to one end of the main section, means for releasably securing the other end of the door section to the other end of the main section, slips mounted on the sections of the body, a carrier engaging and controlling the slips and consisting of a section associated with the main section of the body and a section associated with the door section of the body, guide means for constraining the sections of the carrier to vertical movement with respect to the sections of the body, spring means for elevating the sections of the carrier, and means for interconnecting the sections of the carrier to hold them in the same plane at all times while permitting relative angular movement in such plane.

13. A casing elevator comprising a body consisting of a main section and a door section, a hinge between one end of the door section to one end of the main section, means for releasably securing the other end of the door section to the other end of the main section, slips mounted on the sections of the body, a carrier engaging and controlling the slips and consisting of a section associated with the main section of the body and a section associated with the door section of the body, guide means for constraining the sections of the carrier to vertical movement with respect to the sections of the body, spring means for elevating the sections of the carrier, means for interconnecting the sections of the carrier to hold them in the same plane at all times while permitting relative movement in such plane and comprising a projection carried by and in axial alinement with the hinge, a flanged spool slidably and rotatably fitted on said projection, and lugs formed on the sections of the carrier and fitted in between the flanges of the spool.

14. A casing elevator comprising a body having an opening therethrough, a plurality of slips mounted on the body and operating in the opening thereof, a carrier for the slips, tubular guides fixed to the carrier, said body having openings in which the tubular guides are slidably fitted, and springs housed in the guides and in the openings of the body and engageable with the body and the guides for elevating the carrier.

15. A casing elevator having an elevator body formed with a tapered opening extending therethrough and having an internal rib rigidly connected therewith and extending around the periphery of said opening, slips having recesses in the underside accommodating the rib, and means co-operable with the rib for constraining the slips to proper movement.

16. A casing elevator having a body formed with a tapered opening extending therethrough and having an internal rib around the periphery of said opening, slips having recesses in the underside accommodating the rib, means co-operable with the rib for constraining the slips to proper movement, and comprising pins carried by the slips and extending across the recesses thereof, said rib having openings in which the pins are slidably fitted.

17. A casing elevator having a body formed with a tapered opening extending therethrough and having an internal rib around the periphery of said opening, with the upper and lower walls of the rib undercut, slips having recesses in the underside accommodating the rib, the end walls of the recesses in said slips presenting undercut shoulders engageable with the rib to positively limit the movement of the slips, and means co-operable with the rib for constraining the slips to proper movement.

18. A casing elevator comprising a body having an opening therethrough, slips mounted on the body and operating in said opening, a carrier for said slips, springs for elevating the carrier, and means for moving the slips into engagement with the casing including dogs positively and pivotally mounted on the carrier and engageable with the casing.

19. A casing elevator comprising a body having an opening therethrough, slips mounted on the body and operating in said opening, a carrier for said slips, springs for elevating the carrier, means for moving the slips into engagement with the casing including dogs positively and pivotally mounted on the carrier and engageable with the casing, each dog including telescopic section, means for holding the sections against disassembly, and a spring for resisting inward telescopic movement of the sections.

20. A casing elevator comprising a body having an opening therethrough, a plurality of slips mounted on the body and operating in the opening thereof, a carrier for the slips, tubular guides fixed to the carrier, said body having openings in which the tubular guides are slidably fitted, springs housed in the guides and in the openings of the body and engageable with the body and the guides for elevating the carrier, and adjustable spring tensioning devices carried by the outer ends of the tubular guide.

21. A casing elevator comprising an elevator body consisting of a main section and a door section, slips mounted on both the main section and the door section, means for pivoting one end of the door section to one

end of the main section, and means for releasably securing the other end of the door section to the other end of the main section and comprising a latch in the form of an elongated key slidably fitted on the main section, said door section having an elongated slot co-operable with the latch, and a plurality of springs engageable with the latch for projecting the same, there being a spring adjacent each end of the latch.

22. A casing elevator comprising a body having an opening therethrough, a plurality of slips mounted on the body and operating in the openings thereof, a carrier for the slips, tubular guides fixed to the carrier, said body having openings in which the tubular guides are slidably fitted, springs housed in the guides and in the openings of the body and engageable with the body and the guides for elevating the carrier, and means carried by the guides for varying the compression of the springs.

23. A casing elevator comprising a body, slips mounted on the body, supporting means for the body permitting operative engagement of the elevator with the casing in any angular adjustment relative to its supporting means, and comprising trunnions on the body, links, U-shaped retaining members having transverse openings receiving the trunnions, and means for preventing axial displacement of the members from the trunnions, said links extending between the trunnions and the bottom walls of the retaining members.

24. A casing elevator comprising a body having means for gripping the casing, supporting means for the body permitting operative engagement of the elevator with the casing in any angular adjustment of the body relative to the supporting means and comprising trunnions on the body, links having portions engaged with the trunnions, retaining members, means for securing the retaining members to the trunnions against axial displacement thereon while permitting relative rotation of the retaining members, said retaining members having portions embracing the links to maintain the links engaged with the trunnions and to prevent relative sliding movement between the links and the trunnions.

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