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J. S. TAYLOR

SAFETY CASING SPIDER

Filed April 29, 1927

2 Sheets-Sheet 2

Fig. 3.

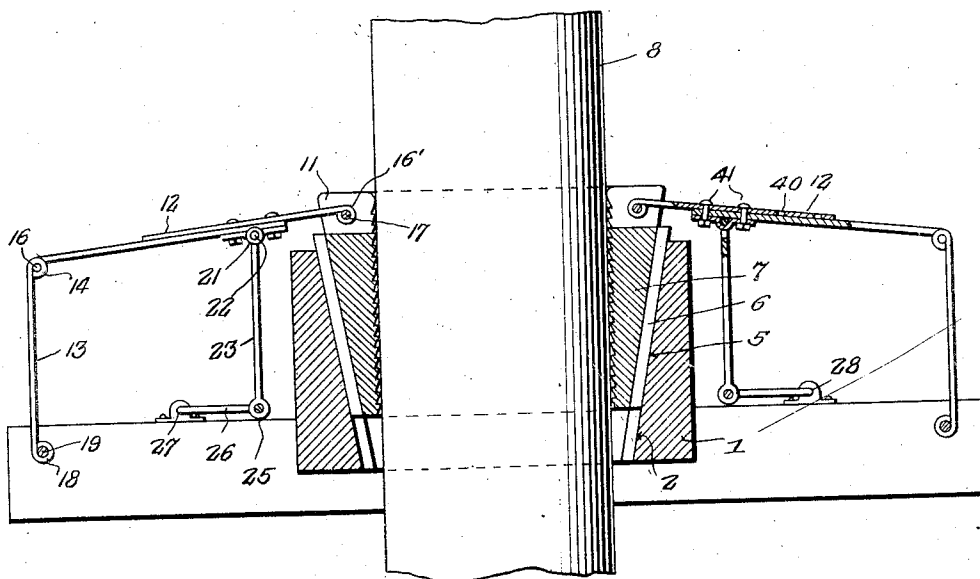
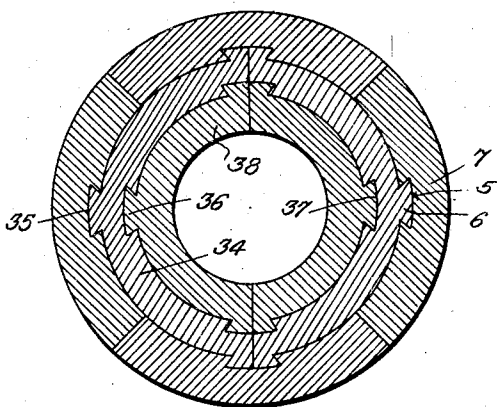


Fig. 4.

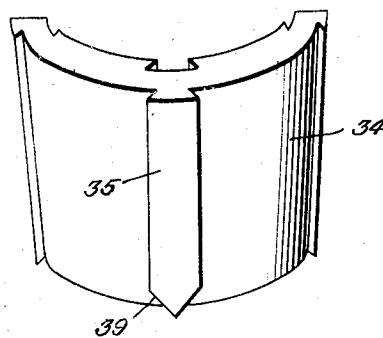


Fig. 5.

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UNITED STATES PATENT OFFICE.

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SAFETY CASING SPIDER.

Application filed April 29, 1927. Serial No. 187,885.

The invention relates to a safety casing spider.

The object of the present invention is to improve the construction of casing spiders and to provide a simple, practical and efficient safety casing spider of strong, durable and comparatively inexpensive construction designed for use in lowering casing into a hole and in hoisting casing out of the same and adapted to be held by an operator in an expanded condition to provide an opening of sufficient size to permit the couplings of a well casing to pass readily through it and capable of being instantly released by the operator and of automatically gripping and holding a casing without liability of bending, cushioning or otherwise injuring the same.

A further object of the invention is to provide a safety casing spider equipped with means for enabling the size of the casing receiving opening to be readily varied for operating on casings of different diameters.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—

Figure 1 is a side elevation of a safety casing spider constructed in accordance with this invention.

Fig. 2 is a plan view.

Fig. 3 is a central vertical sectional view.

Fig. 4 is a horizontal sectional view showing one of the auxiliary liners in position for reducing the size of the opening to accommodate a smaller casing.

Fig. 5 is a detail perspective view of one of the sections of the liner.

In the accompanying drawings in which is illustrated the preferred embodiment of the invention, the safety casing spider comprises in its construction a heavy metallic ring 1 having an interior taper 2 and provided at opposite sides of its exterior with integral lugs or extensions 3 which are bolted or otherwise secured upon blocks 4 forming a

base for the safety casing spider and designed in practice to be suitably secured upon the floor of the derrick (not shown). The interiorly tapered ring 1 which gradually decreases in diameter interiorly from its upper to its lower edge is provided with diametrically disposed dovetailed grooves 5 forming guides or ways for the reception of dovetailed ribs 6 of sections 7 of an expandible slip movable upwardly and downwardly and adapted to spread and close in such upward and downward movements for releasing and gripping a casing 8. The slip 7 is composed of four sections provided with inner gripping faces preferably formed by corrugating the inner face of the slip as clearly illustrated in Fig. 3 of the drawing, but any other suitable form of casing gripping surface may, of course, be employed as will be readily understood. The sections of the slip have vertical side edges and the ribs are located intermediate of the side edges of the sections and interlock the sections with the ring 1 to prevent relative rotary movement while permitting free upward and downward movement. The slip is tapered from top to bottom as shown and the sections are caused to move in unison in their upward and downward movements by means of horizontally disposed dowel guiding pins 9 mounted in aligned openings 10 in the vertical edges of the slip and tapered laterally toward one end to facilitate free movement of the pins in the openings while the sections of the slip are closing or spreading. The tapered end of each guiding dowel pin is relatively loose in one of the openings and its other end is preferably secured in the other opening. The guiding dowel pins beside securing a uniform opening and closing action of the sections of the slip also support two of the sections and move the same upwardly and downwardly when the other two sections are raised and lowered by the operating means hereinafter described or by the action of a casing when the operating mechanism is released to permit the sections of the slip to engage the casing automatically.

The two sections on which the guiding dowel pins are preferably fixed are provided at their upper edges with recesses 11 in which are hinged the upper ends of inclined upper arms 12 which are hinged at their lower ends to the upper terminals of

lower arms 13. The adjacent ends of the arms 12 and 13 are provided with registering eyes 14 and 15 through which passes a pintle 16 whereby the arms are hinged together. The upper ends of the upper arms are provided with suitable eyes 16' which are mounted on pivots 17 carried by the slip and extending across the recesses 11. The lower hinged arms are provided at their lower ends with eyes 18 which are mounted on horizontal pivots 19 consisting of rods or bolts extending across the space between the blocks 4 and piercing the end portions thereof and suitably secured to the same. The blocks 4 which support and form a base for the safety casing spider are spaced apart by the lower portion of the ring 1 which fits between the blocks 4, the lateral extensions or lugs 3 being located intermediate the upper and lower ends of the ring 1. The lower hinged arms 13 are maintained in a central position on the transverse pivots 19 by spacing sleeves 20 located at opposite sides of the arms as clearly shown in Fig. 2 of the drawings.

The upper hinged arms 12 are provided intermediate of their ends at their upper portions with transverse eyes 21 which receive pivots 22 for connecting the upper hinged arms to the upper ends of links 23. The links 23 have their upper ends bifurcated and provided at opposite sides of the bifurcation with eyes 24 which receive the said pivots. The lower ends of the links are reduced and provided with eyes 25 which receive crank bends 26 of transverse rocking shafts 27 and 28 journaled in suitable bearings on the blocks 4 and provided at one side of the safety casing spider with crank arms 29 and 30. The crank arms 29 and 30 are reversely arranged, the crank arm 29 extending upwardly and the crank arm 30 extending downwardly. These crank arms are connected by a connecting rod 31 and are caused to move in unison to raise and lower the crank bends simultaneously. The crank arm 29 is also connected by a link 32 with an operating lever 33 arranged in an upright position at one end of the safety casing spider and pivoted at its lower end on the adjacent transverse pivot 19 and adapted to be held by the operator for maintaining the crank bends, the links and the hinged arms 12 and 13 and the slip in an elevated position. The slip is spread or expanded when in such elevated position and is adapted to permit the casing and its couplings to be lowered through it. Should, however, anything happen requiring the casing to be gripped and held it is only necessary for the operator to release the operating lever and the weight of the slip will cause the same to automatically engage and grip the casing

and the heavier the casing and the greater the pressure exerted by the casing on the device the more securely will the casing be held by the slip. The guiding dowel pins cause a uniform movement of the sections 70 of the slip in their automatic engagement with the casing and the latter will be securely gripped and held without liability of bending, cushioning or otherwise injuring the casing and when the safety casing spider operates automatically and engages the casing it will be impossible for the casing to be accidentally or intentionally released through any operation of the mechanism of the device. In order to release the casing it will be necessary to lift the same and thereby permit the slip to expand and be returned to its normal or initial position.

In order to enable the safety casing spider to operate on casings of different diameters the device is provided with liners preferably composed of approximately semi-cylindrical sections 34 tapered downwardly and provided on their exterior with dovetailed ribs 35 to fit in dovetailed grooves of the ring 1 and provided at their inner faces with dovetailed grooves 36 and 37 to receive dovetailed ribs of a smaller slip 38 as clearly illustrated in Fig. 4 of the drawings. While only one liner and one slip are illustrated in Fig. 4 of the drawings the number of liners may be varied as will be readily understood to equip the safety casing spider with a slip of the desired size to receive the casing to be handled. The dovetailed grooves 37 of the liners are preferably formed by recessing the inner faces of the sections of the liner at the side edges thereof as shown and the dovetailed ribs are preferably tapered at their lower ends 39 to facilitate their ready insertion in the dovetailed grooves.

In order to enable the operating mechanism to be connected with slips of different diameters the upper hinged arms are composed of separate overlapping sections each having a plurality of perforations 40 to receive one or more bolts 41 for securing the sections of the upper hinged arms in their adjustment. By this construction the upper hinged arms are adapted to be varied in length to arrange the eyes of their upper ends in proper position to receive the pivots of slips of different diameters. When the slip is in its elevated position and spread to provide an opening of sufficient size to permit the casing and its couplings to pass through the device the parts are in position to permit the slip to engage the casing automatically as soon as the operating lever is released and the device is entirely fool-proof as the casing cannot be accidentally or intentionally released until

it is secured and lifted sufficiently to permit an expansion of the slip.

What is claimed is:

1. A safety casing spider including a base, 5
an interiorly tapered ring, a tapered slip
composed of sections slidably interlocked
with the ring and movable upwardly and
downwardly to spread and close the slip
and operating means comprising upper and
10 lower arms hinged together at their adjacent
ends, the upper ends of the upper arms
being connected to the slip at diametrically
opposite points and the lower ends of the
lower arms being hinged to the base, rock
15 shafts supported by the base located below
the upper arms and provided with crank
elements, links connecting the crank elements
with the upper arms, and operating
means mounted on the base connected with
20 the rock shafts for simultaneously rotating
the same to raise or lower the slip.

2. A safety casing spider including a base,
an interiorly tapered ring, a tapered slip
composed of sections slidably interlocked
25 with the ring and movable upwardly and
downwardly to spread and close the slip
and operating means comprising upper and
lower arms hinged together at their adjacent
ends, the upper ends of the upper arms
30 being connected to the slip at diametrically
opposite points and the lower ends of the
lower arms being hinged to the base, rock
shafts supported by the base arranged below
the upper arms and provided with crank
35 bends and having terminal crank arms, one
of the crank arms being extended upwardly
and the other downwardly, links connecting
the crank bends with the upper hinged
arms, a rod connecting the terminal crank
40 arms of the rock shafts, and an operating
lever mounted on the base connected with
the terminal arm of one of the rock shafts.

3. A safety casing spider including a support,
a slip composed of sections movable
45 upwardly and downwardly to spread and
close the same, means for guiding the sections,
operating mechanism connected with the
sections for raising and lowering the same,
said operating mechanism comprising
50 upper and lower arms hinged together at
their adjacent ends, the upper ends of the
upper arms being connected to the slip and

the lower ends of the lower arms being
hinged to the support, crank elements carried
by the support and located below the 55
upper arms and connected with the same,
and a manually operable member mounted
on the support and connected with the crank
elements for simultaneously operating the
same to raise and lower the slip. 60

4. A safety casing spider including a support,
a slip composed of sections movable
upwardly and downwardly to spread and
close the same, means for guiding the sections,
operating mechanism connected with 65
the sections for raising and lowering the same,
said operating mechanism comprising upper
and lower arms hinged together at their adjacent
ends, the upper ends of the upper arms being
connected to the slip and 70
the lower ends of the lower arms being
hinged to the support, rock shafts mounted
on the supports and located below the upper
arms and provided with crank elements,
links connecting the crank elements with the 75
upper arms, and operating means mounted
on the support and connected with the rock
shafts to simultaneously rotate the same to
raise or lower the slip.

5. A safety casing spider including a support,
a slip composed of sections movable
80 upwardly and downwardly to spread and
close the same, means for guiding the sections,
operating mechanism connected with the sections
for raising and lowering the same, said operating
mechanism comprising upper and lower arms
hinged together at their adjacent ends, the upper
ends of the upper arms being connected to the slip
and the lower ends of the lower arms being 90
hinged to the support, rock shafts mounted
on the supports and arranged below the upper
arms and provided with the crank bends and
having terminal crank arms, one of the crank
arms being extended upwardly and 95
the other downwardly, links connecting the
crank bends with the upper arms, a rod connecting
the terminal crank arms of the rock shafts, and
an operating lever mounted on the support and
connected with the 100
terminal arm of one of the rock shafts.

In testimony whereof I have hereunto set
my hand.

JAMES S. TAYLOR.