Sept. 12, 1939. J. F. MOODY 2,173,079

SPIDER

Filed April 9, 1937 2 Sheets-Sheet 1

Fig. 1.

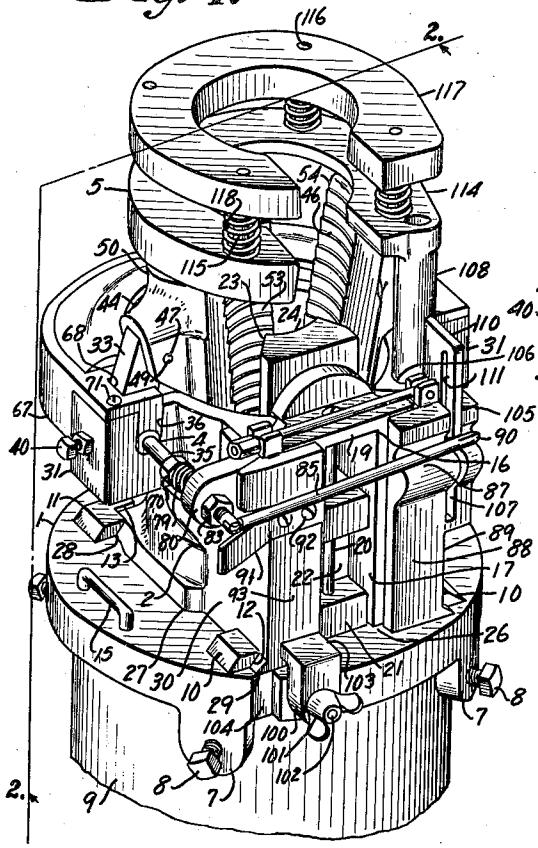


Fig. 2.

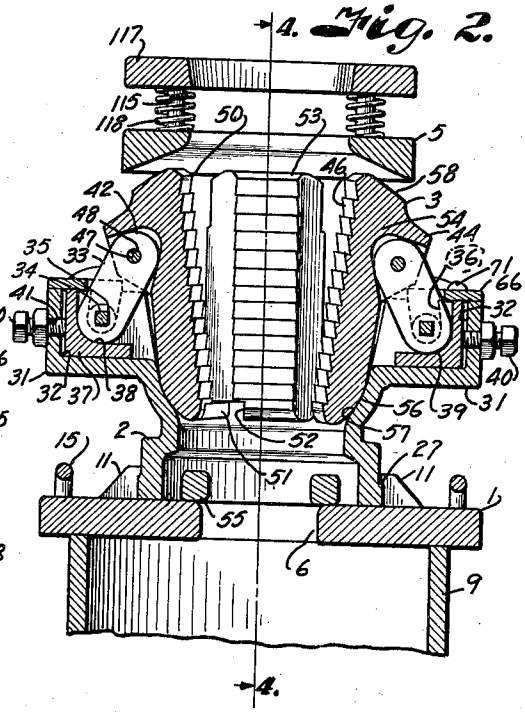


Fig. 4.

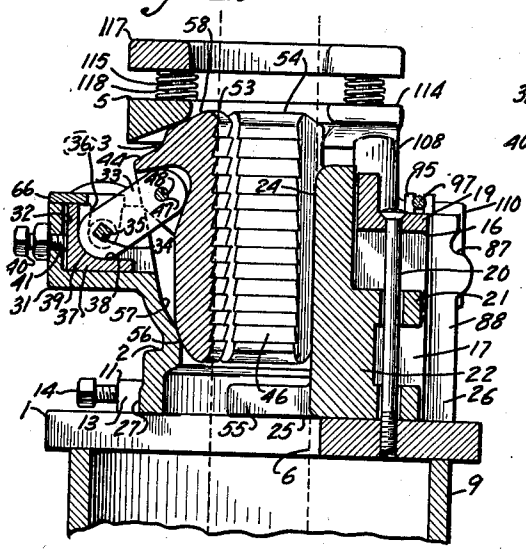
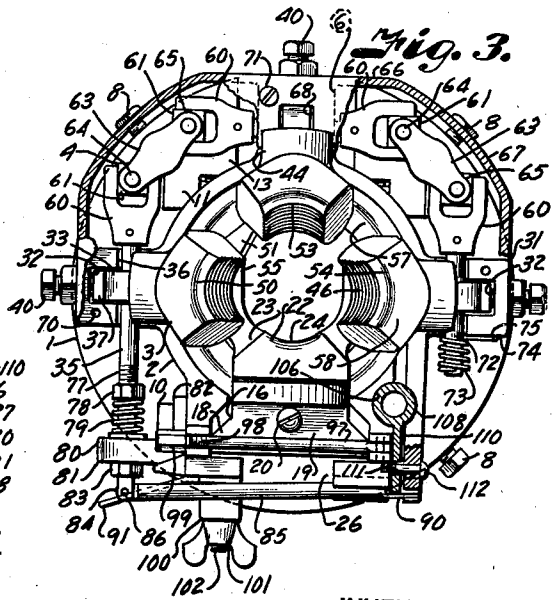


Fig. 3.



INVENTOR
Joseph F. Moody.
BY
Arthur C. Brown
ATTORNEY

Sept. 12, 1939. J. F. MOODY 2,173,079

SPIDER

Filed April 9, 1937 2 Sheets-Sheet 2

Fig. 5.

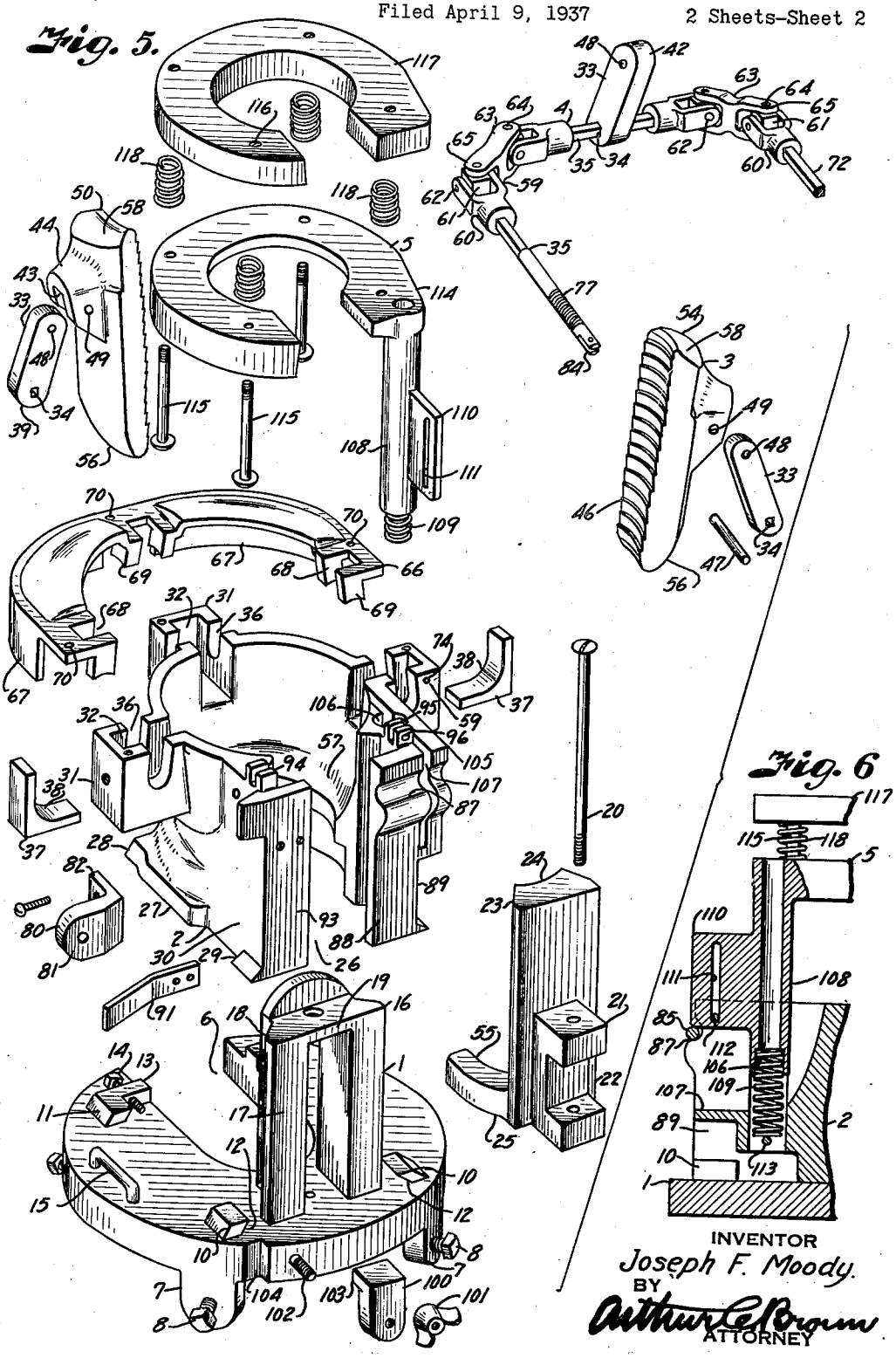


Fig. 6



INVENTOR
Joseph F. Moody.
BY
Arthur L. Brown
ATTORNEY

Patented Sept. 12, 1939 2,173,079

# UNITED STATES PATENT OFFICE

2,173,079

## SPIDER

Joseph F. Moody, Tulsa, Okla.; Gertia Opal Moody administratrix of Joseph F. Moody, deceased, assignor to Gertia Opal Moody, Tulsa, Okla.

Application April 9, 1937, Serial No. 135,962

11 Claims. (Cl. 24—263)

This invention relates to pipe or rod spiders such as are used for raising and lowering casing, tubing, rods and the like out of and into oil wells, and more particularly to an apparatus for alternately engaging and disengaging pipe or rod sections incidental to said raising or lowering operations.

The principal objects of the present invention are to provide a spider mountable on a casing head, parts of which are separable to make its application to tubing, for example, quick, facile and efficient; to provide an apparatus of this type which is considerably stronger than devices heretofore available for this purpose; to provide an apparatus which is compact in construction; to provide an apparatus of this nature which is positive and semi-automatic in action; and to provide means in connection with the apparatus for protecting both the apparatus and tubing.

In accomplishing these and other objects of the present invention I have provided details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a spider embodying the features of the present invention applied over a well hole.

Fig. 2 is a vertical cross section on the line 2—2, Fig. 1.

Fig. 3 is a plan view of my improved spider with the jam ring removed, showing the toggle housing in section to better illustrate the toggle connection of the serrated slips.

Fig. 4 is a vertical cross section on the line 4—4 of Fig. 2, particularly illustrating the friction slip.

Fig. 5 is a perspective view of my improved spider, the several parts thereof being shown in disassembled spaced relation.

Fig. 6 is a vertical cross section through the jam ring mounting of the spider head, particularly illustrating the fin for releasing the toggle lock bar from its seat on the head shelf.

Referring more in detail to the drawings:

The invention generally includes a base 1 on which is mounted a frictionally operated slip, a head 2 provided with slips 3 which are operated by a toggle mechanism 4, and a jam ring 5 mounted on the head for semi-automatically springing the slips to contracted condition.

More particularly the base 1 consists of a disk-shaped body member having a U-shaped cut-out portion or passage 6 of a size suitable to adapt the base to be engaged about the sides of a conventional casing, tubing, rod, or the like, indicated by dotted lines in Fig. 4. Preferably integrally mounted in spaced relation on the lower face of the base 1 are lugs 7 of suitable shape provided with holes in which the set screws 8 are threaded for mounting the base 1 on a conventional casing head or the like 9. Lugs 10 and 11 preferably opposite the lugs 7 and preferably formed integrally with the base 1 are mounted on the upper face of the head, the lugs being directed toward each other in pairs to provide recesses 12 between the upper face of the base and the under-side faces of the lugs. The lugs 11 are additionally provided with stop portions 13 for a purpose later described and have holes for the threaded insertion of head centering set screws 14.

The upper surface of the base portion 1 is also provided with hand holds 15 at opposite sides thereof for facilitating application of the base portion upon a casing head and about a section of tubing or the like adapted for placement in a well hole.

Preferably integrally mounted on the upper face of the base 1 in aligned relation to the cut-out portion 6 is a slip mounting 16 comprising spaced uprights 17 having beveled outwardly extending flanges 18 and a cap portion 19 connecting the upper ends of the uprights.

The cap portion is flattened between the flanges on the uprights and is provided with a hole located substantially centrally thereof aligned with a similar hole in the base portion between the spaced uprights for receiving a headed bolt 20 inserted therethrough and through aligned holes in the laterally extending lug portions 21 of a friction slip member 22. The lugs 21 are of substantially similar shape and are of a width to slidably engage between the uprights 17 to a height limited by the cross member 19 of the slip mounting.

The slip member 22 is of generally rectangular shape having beveled side portions 23 and an arcuately curved groove 24 extending throughout the length thereof for partially engaging the annular surface of a section of tubing. The slip member 22 is also provided at its lower end with a substantially semi-circular yoke portion 25 of slightly less diameter than the U-shaped cut-out portion 6 of the base 1 for engaging under the adjacent serrated slips 3 to raise and spread same, as later described.

Mounted on the upper face of the base portion 1 is the slip carrying head 2 which comprises a body portion having substantially upwardly extending walls bounding a cup shaped interior for receiving the slip sections and having an open end 26 forming a passage adapting the head for engagement about a section of tubing, in operation from a direction opposite that of the base cut-out portion 6. The head 2 is provided at its lower end with an outwardly extending flange 27 for increasing the bearing surface of the head 2 on the base 1 and the flange 27 is beveled, as at 28, to engage under the bevels 12 of the lugs 11 on the base member 1 for retaining the separable

sections of the device together. Outwardly extended beveled flanges 29 are also provided at the lower ends of the walls 30 bounding the open side of the head 2 for engagement in the recesses 12 of the lug portions 10 adjacent the slip mounting 16.

Preferably integrally formed in spaced relation around the closed sides of the head portion 2 are lugs 31 extending outwardly from the head portion and provided with pockets 32 for seating slip operating links 33 each of which is provided at one end with preferably square shaped apertures 34 for gripping engagement with a squared bar portion or shaft 35 of the toggle mechanism 4. Aligned substantially U-shaped cut-out portions 36 are provided in the side walls of the lugs for seating the bar portions of the toggle mechanism which extend outwardly at either side of the links 33. Angle shaped shoes 37 having substantially arcuate shaped inner faces 38 are mounted in the outer angled ends of the pockets 32 for engagement under the rounded ends 39 of the links 33 and are adapted to be moved inwardly to engage the adjacent ends of the links, upon actuation of set screws 40 engageable in the threaded holes 41 of the outer end walls of the pockets. The shoes 37 form the principal bearing portions for the slip links and in fact are the main support for the tubing held by the slips. The upper ends 42 of the links 33 are mounted in recesses 43 of outwardly extending lugs 44 preferably integrally formed on the slips 3 having spaced serrations 46 on the inner arcuate shaped faces thereof, pivotal connection therebetween being had by a pin 47 extending through aligned holes 48 and 49 formed in the links and slip members.

One of the slips 50 is provided with a hook-like extension 51, as shown in Figs. 2 and 3, which is engageable in a recess 52 at the lower end and one side of the adjacent connected slip 53 for simultaneously moving the slip 53 incidental to movement of the slip 50. The slip 50 and its opposite slip 54 are also moved by the arms 55 of the yoke portion 25 engaging therebelow incidental to frictional engagement of the unserrated slip with a section of tubing being raised. The lower rear ends of the serrated slip sections are preferably chamfered, as at 56, in such a manner that snug engagement is had in the cup shaped bottom 57 of the head 2 to form a secure seat for the slips and to cam the slips toward each other to grip a section of tubing extending therebetween. The rear upper ends of the serrated slip sections are also chamfered, as at 58, for engagement by a similarly chamfered lower face of the jam ring 5 for a purpose later described.

In order to operably connect the serrated slip members 3 together, the squared shafts 35 are each provided with flexible connections 59 suitably mounted thereon and preferably provided with yokes 60 having a block 61 swivelly mounted between the arms thereof by the trunnions 62 extending through aligned holes in the arms of the yokes 60. A double connecting link 63 is provided having forked ends 64 engageable, at right angles to the arms of the yokes 60, with the block 61 by trunnions 65 extending through aligned holes in the forked ends of the link.

A casing 66, Fig. 5, is also preferably provided to protect the toggle mechanism for the slips which consists of a covering having a downwardly extending skirt 67 for housing the flexible connections and having U-shaped cut-out portions 68 through which the links 33 extend. The casing is further provided with down-set ears 69 for seating on the shafts 35, as shown in Fig. 1, to maintain the curved ends of the links in bearing engagement with the shoes 37. Holes 70 are provided in the casing for alignment with similar holes in the lugs for the insertion of screws 71 to mount and retain the casing on the head.

One end 72 of the shaft 35, which operates the toggle for the slip 54, is provided with a torsion spring 73, as shown in Fig. 3, having one end suitably engaged therewith while the other end of the spring is suitably mounted in the side wall 74 of the lug 31 supporting the slip 54, as shown at 75, whereby the upper ends of the links 33 are normally resiliently urged toward each other to enhance gripping action of the slips relative to a joint of tubing carried therebetween.

The opposite end 76 of the composite toggle mechanism 4 is provided with a threaded extension 77 on which is mounted a nut 78, as shown in Fig. 3, and a coil spring 79 having one end engageable against the nut and its opposite end engageable against a washer or the like mounted between it and the inner wall of an angle member 80. The angle member 80 includes a flange 81 having a hole for slidably mounting the extension and a bearing portion 82 mountable on the straight wall 30 at the upper end of the head 2 preferably by means of a hole and bolt connection. A lock nut 83 is also mounted on the extension 77 for maintaining the extension in position and the outer end of the extension is forked, as at 84, to mount the end of the lever lock bar 85 which is swivelly mounted in the fork by a pin 86 extending through aligned holes in the fork and a reduced end of the bar.

A shelf 87 is provided on the outer face of a flange 88 projecting inwardly from the forward end of the wall 89 substantially at the upper end thereof, as shown in Figs. 1 and 5, for engagement therein by the end 90 of the lock bar, a suitable stop 91 also being mounted by screws 92 on the face of a flange 93 projecting inwardly from the outer end of the head wall 30 to direct swivelling movement of the lock bar away from the device when it is displaced from the shelf.

Spaced lugs 94 and 95 are also provided on the upper edge of the walls 30 and 89, one pair of which is provided with aligned holes for mounting a pin 96 therethrough and through the flattened end of an auxiliary lock bar 97, the outer threaded end 98 of which is provided with a lock nut 99 engageable with the outer edges of the lugs 94 for holding the lock bar in position in such a manner as to selectively retain the head 2 about a section of tubing and to reinforce the open end of the head.

In order to maintain the fixed mounting of the head 2 on the base 1, I provide an angle clamp 100, as shown in Fig. 1, having one end mounted on the edge of the disk portion of the base 1 preferably by means of the thumb nut 101 and a bolt 102 extending through the angle clamp and into the edge of the disk portion, it being apparent that the thumb nut may be loosened and the lug 103 of the clamp pivoted downwardly into the notch 104 formed in the edge wall of the disk portion to permit the head to be moved outwardly relative to the base 1 for removing the head from the base.

Formed integrally with the wall 89 is a jam ring mounting 105 which consists of a cylindrical bore 106 having a slotted opening 107 which communicates the cylindrical bore 106 with the shelf portion 87 on the outer edge of the end wall 88. The bore 106 is for the purpose of mounting

the stem 108 of the jam ring 5, the stem being provided with a coil spring 109 at its lower end for normally maintaining the ring 5 in raised position. A fin 110 having a slot 111 is also provided preferably integrally with the stem member which extends through the slotted opening 107 in the wall 88 for dislodging the lever lock bar 85 from its seat on the shelf 87 incidental to downward movement of the jam ring against tension of its raising spring and contact of the beveled corner on the lower portion of the fin with mating edge of the lock bar. A suitable screw 112 is mounted in the wall 89 and extends through the slot of the ring fin for limiting upward and downward movement of the ring relative to the head to the length of the slot. The lower end of the bore 106 is closed by a pin 113 on which the spring 109 rests to support the jam ring 5.

The jam ring 5 is of substantially horseshoe shape, the open end of which extends in the same direction as the open end of the head 2 for sleeving the ring about a section of tubing or the like. The ring stem 108 is mounted on the arm 114 of the ring, and spaced about the remaining surface of the ring are holes for receiving the threaded shanks of bolts 115 which extend upwardly for engagement in threaded holes 116 in an auxiliary protecting ring 117 of a shape substantially similar to the jam ring. Coil springs 118 are mounted between the rings on the bolts for normally maintaining the protecting ring in upwardly spaced relation to the jam ring.

The assembly and operation of an apparatus constructed as described is as follows:

The base 1 is sleeved over a section of tubing or the like at the top of a well for mounting on the casing or head 9 of the well by the set screws in the downwardly extending lugs of the case. The connected slips with their operating links are then mounted in the link lugs 31 within the cup-shaped head 2 and the cover plate 66 attached thereto by the screws therefor, after which the joined jam and protecting rings may be applied to the head 2 by inserting the stem of the jam ring into the cylindrical bore of the head 2 and fixing its position with the screw for the fin slot. The unserrated slip 22 is then applied to the slip mounting, as shown in Fig. 4, and the assembled head 2 sleeved over the flanges of the slip mounting 16. The head 2 is then pushed in the direction of the U-shaped cut-out portion of the base for engagement of the head flanges in the recessed lugs of the base, centering of the head 2 over the well hole being accomplished by means of the clamping lug 100 and the set screws 14. The auxiliary lock bar is then lowered and engaged by the lugs and the lever lock bar 85 is raised into engagement with the shelf 87 and below the fin of the jam ring. Raising of the lever lock bar raises the serrated slip portions through the toggle mechanism therebetween for spreading the slip sections into condition to receive a joint of tubing, which position of the slips may be held by tightening the lock nut 78 on the toggle mechanism regardless of the position of the lock lever 85.

Downward pressure on the protection and jam rings against tension of the springs 109 and 118 lowers the jam ring to engage the upper ends of the slips, the mating chamfered edges thereof forcing the slips downwardly and inwardly to engage a section of tubing inserted therebetween for holding the section of tubing rigidly in position.

When the lock lever bar is on the shelf, the edge thereof is engaged by the matingly beveled edge on the jam ring fin to dislodge the bar from the shelf for contracting the slips.

Raising of the inserted section of tubing causes frictional engagement between the section of tubing and the unserrated slip 22 to raise the slip within the limits of its mounting 16. In this case, the arms of the yoke 25 engage with the adjacent serrated slips for raising same, the slip 53 opposite the friction slip being raised through engagement thereof with the outwardly extending lug on the slip 50 adjacent thereto.

The apparatus embodying the features of my invention is formed in sizes adapted to operate on various standard diameters of tubing, casing and the like and minor adjustments are had through the shoes 37 in the lug pockets 32 by set screws engaging therewith.

It is apparent that the serrated slips are raised outwardly as well as upwardly due to their pivotal link connection with the toggle mechanism to completely disengage themselves from contact with the tubing, thereby avoiding unnecessary wear on the slips and tubing.

When it is desired to manually operate the apparatus embodying the features of my invention, the slips may be raised and/or lowered by actuation of the lock lever bar 85 to release or clamp the tubing being handled.

It is apparent that I have provided numerous advantages in my invention over apparatuses heretofore available for this purpose by simplifying the assembly of the spider about a string of tubing and in reducing the labor of applying the spider by making the parts separable. It is also apparent that the device is safer than ordinary spiders due to the semi-automatic springing of the slips into tubing contacting position incidental to downward pressure thereon, thereby avoiding accidental loss of tubing in the well, and that maintenance of the device is simplified and the life thereof prolonged due to the shock absorbing protecting and jam rings above the slip sections and the housing for the slip operating toggle mechanism.

What I claim and desire to secure by Letters Patent is:

1. In a spider of the character described, a base member having a cut-out portion, an upright member on the base member, a slip movably mounted on the upright member having a yoke, a head member mounted on the base member having a cupped interior and an opening alignable with said cut-out portion, a portion of the head member fitting about the upright member and over the yoked slip, and slips in the head member seating upon said yoke, the slips in the head member being movable in response to upward movement of the yoked slip.

2. In a spider of the character described, a base member having a cut-out portion, an upright member on the base member, a slip movably mounted on the upright member having a yoke, a head member mounted on the base member having a cupped interior and an opening alignable with said cut-out portion, a portion of the head member fitting about the upright member and over the yoked slip, slips in the head member seating upon said yoke, the slips in the head member being movable in response to upward movement of the yoke, and means on the head member connected with the head mem-

ber slips, the head member slips being movable by said means independently of upward movement of the yoked slip.

3. In a spider of the character described, a base member having a passage therethrough, a head member on the base member having a cupped interior and a passage therethrough alignable with the base passage, the head member being provided with a shelf at an outer side thereof, slip members, means on the head member pivotally mounting the slip members in the interior of the head member, a lever connected with the slip-member-mounting-means seatable on said shelf, said lever retaining the slip members in raised condition relative to said cupped interior of the head member when seated on said shelf, and means resiliently mounted in said head member engageable with said lever for dislodging the lever from the shelf to allow the slip members to move to operative position in said cupped interior of the head member.

4. In a spider of the character described, a base member having a passage therethrough, a head member on the base member having a cupped interior and a passage therethrough alignable with the base member passage, the head member being provided with a shelf at an outer side thereof, slip members, means on the head member pivotally mounting the slip members in the interior of the head member, a lever on the slip-member-mounting-means seatable on said shelf, said lever retaining the slip members in raised condition relative to said cupped interior of the head member when seated on said shelf, means resiliently mounted in said head member engageable with said lever for dislodging the lever from the shelf to allow the slip members to move to operative position in said cupped interior of the head member, and means resiliently mounted on the lever-dislodging-means initially absorbing pressure applied to the head member in a downward direction relative to the head member.

5. In a spider of the character described, a base having a cut-out portion, a substantially cup-shaped head having an end opening oppositely disposed relative to the cut-out portion of the base, interengageable means on said base and head for removably mounting the head on the base, slips mounted in said head, and means mounted on said head and connected with said slips to spread and contract said slips.

6. In a spider of the character described, a base having a cut-out portion, a substantially cup-shaped head having an end opening oppositely disposed relative to the cut-out portion of the base, interengageable means on said base and head for removably mounting the head on the base, slips mounted in said head, means mounted on said head and connected with said slips to spread and contract said slips, a lock lever on said slip-spreading-and-contracting-means engageable with the head to retain the slips in spread condition, and means resiliently mounted on said head engageable with said lock lever for disengaging the lock lever from the head to allow the slips to contract.

7. In a spider of the character described, a base having a passage therethrough, a substantially cup-shaped head mounted on the base having a passage therethrough alignable with the base passage, slips mounted in said head, means mounted on said head and connected with said slips to spread and contract said slips, and adjustable means on said slip-spreading-and-contracting-means engaged with said head and maintaining said slips in desired position relative to said head.

8. In a spider of the character described, a base having a passage therethrough, a substantially cup-shaped head mounted on the base having a passage therethrough alignable with the base passage, slips mounted in said head, means mounted on said head and connected with said slips to spread and contract said slips, and adjustable bearing shoes mounted in said head primarily supporting said slip-spreading-and-contracting-means.

9. In a spider of the character described, a base having a passage therethrough, a slip mounting on said base having spaced uprights and a cap member, a head mounted on said base and about said uprights at one side of the head, said head having a passage therethrough alignable with the base passage, slip members mounted in said head and on the slip mounting, means in the head connected with the slip members to spread and contract the slip members, and a lock bar mounted on said head exteriorly of said cap member for aiding in securing the base and head together.

10. In a spider of the character described, a base having a cutout portion at one side thereof, clamping members on said base for mounting same on a support, an upright slip mounting on said base, a substantially cup-shaped head having an end opening oppositely disposed relative to the cut-out portion of the base for mounting said head about said upright slip mounting, interengageable means on said base and head for removably mounting the head on the base, interengageable slips mounted in said head and on said base slip mounting, a toggle mechanism mounted on said head and connected with said head slips adapted for selectively spreading and contracting said head slips, a latch lever mounted on said toggle mechanism and engageable with the head to retain the head slips in spread condition, a jam ring resiliently mounted on said head having a portion thereof engageable with said latch lever for disengaging the same from the head to contract the head slips, and a protecting member resiliently mounted on said jam ring for initially absorbing pressure applied to the head in a downward direction.

11. In a spider of the character described, a base member having a passage therethrough, an upright member on the base member, a slip movably mounted on the upright member, a head member mounted on the base member having a cupper interior and having a passage therethrough alignable with the base member passage, a pair of slips movably mounted in the head member adjacent and above said base member slip, said pair of slips being movable by the base member slip in response to upward movement of the base member slip, one of said head member slips having a lateral extension, and a slip movably mounted in the head member and interposed between said other head member slips having a recess seating said extension for moving said recessed slip in response to movement of the other slips.

JOSEPH F. MOODY.