May 12, 1942. C. J. GALLAGHER 2,282,758

SPIDER FOR OIL AND GAS WELLS

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FIG. 1

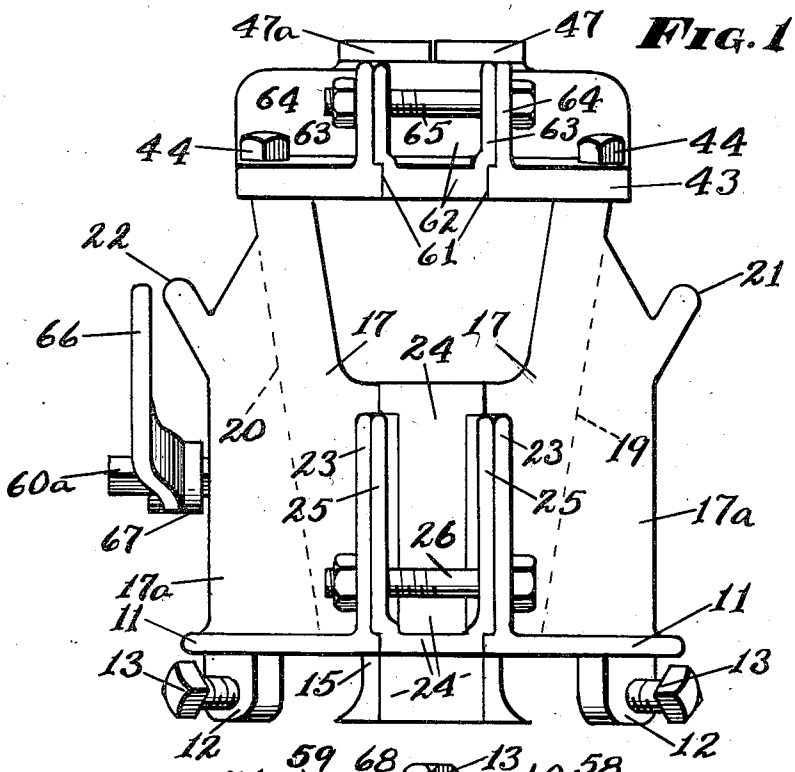
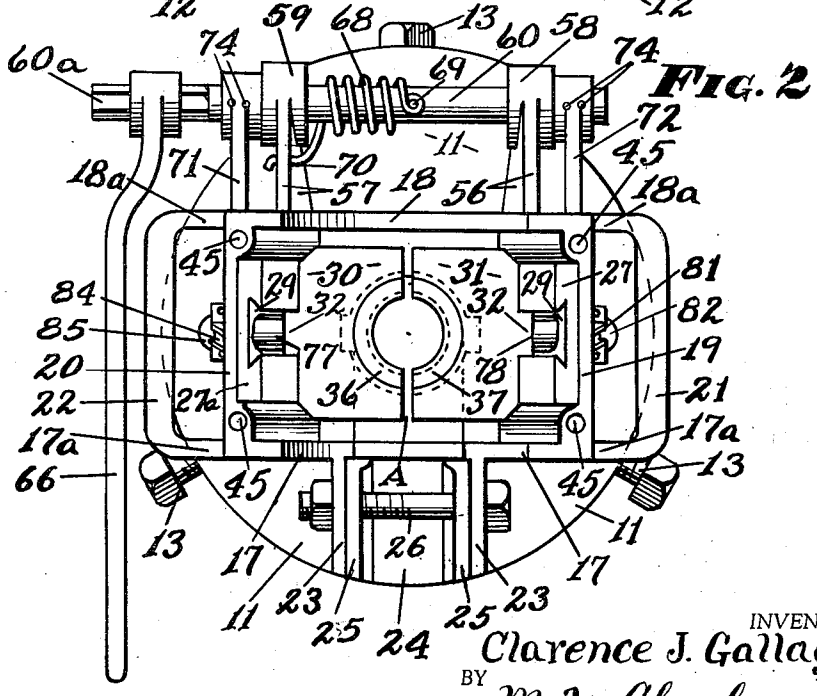


FIG. 2



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FIG. 3

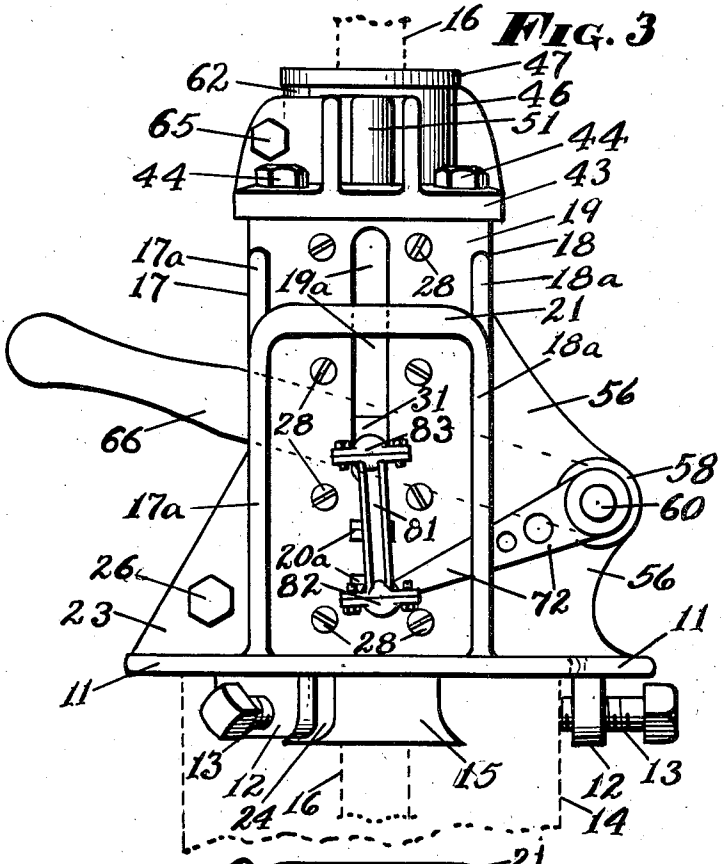
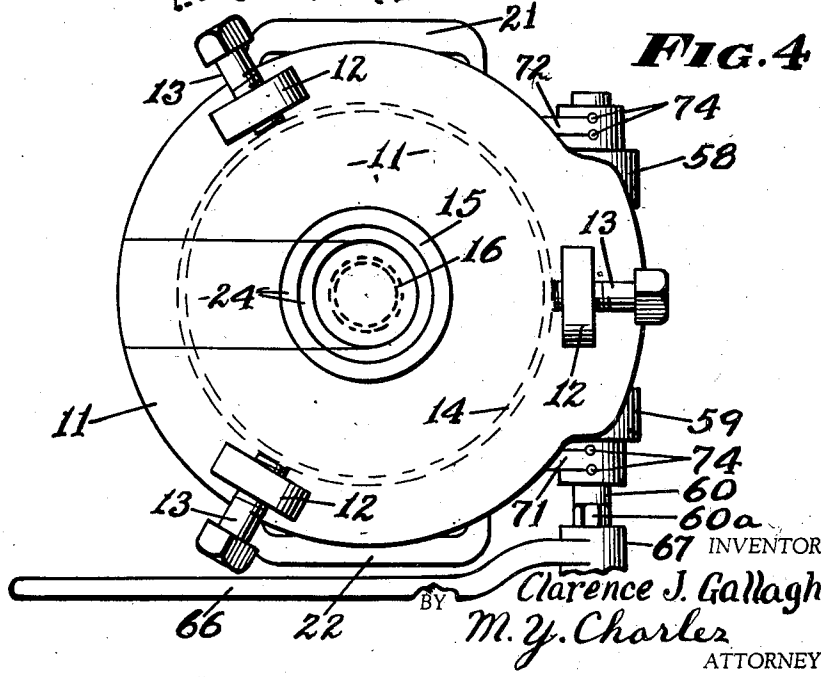


FIG. 4



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SPIDER FOR OIL AND GAS WELLS

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FIG. 6

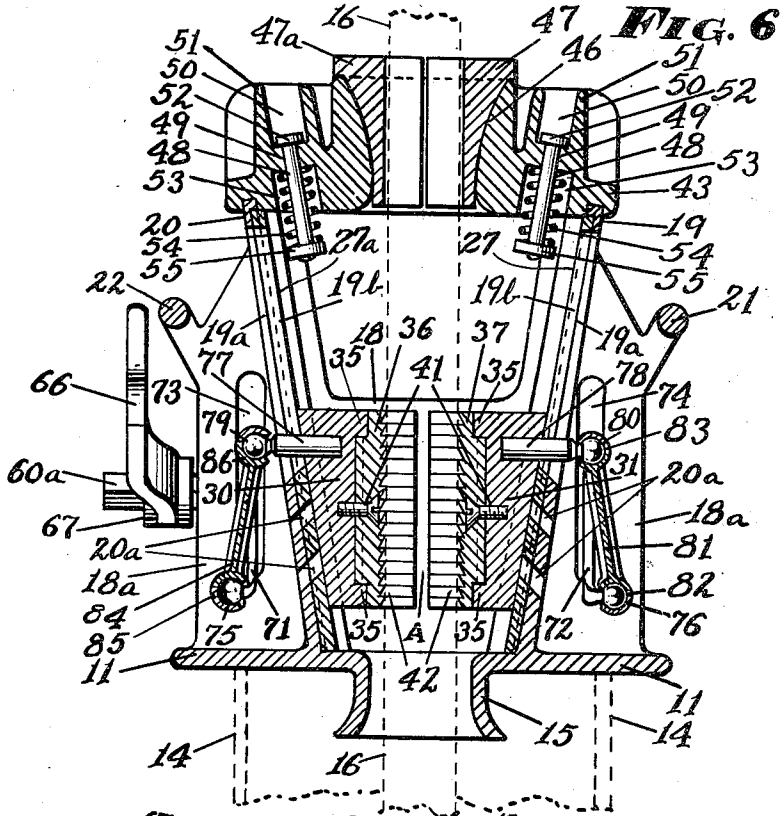
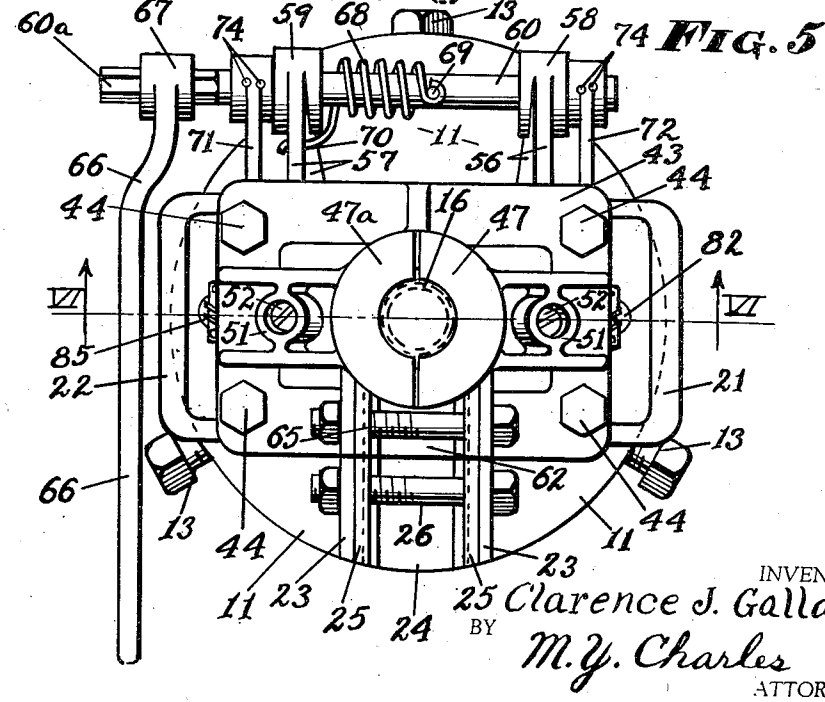


FIG. 5



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SPIDER FOR OIL AND GAS WELLS

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FIG. 7

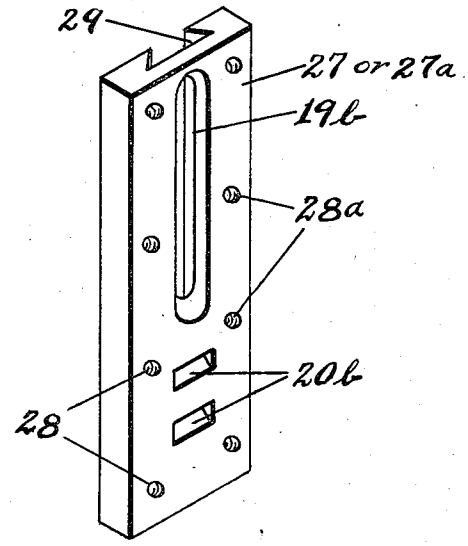


FIG. 8

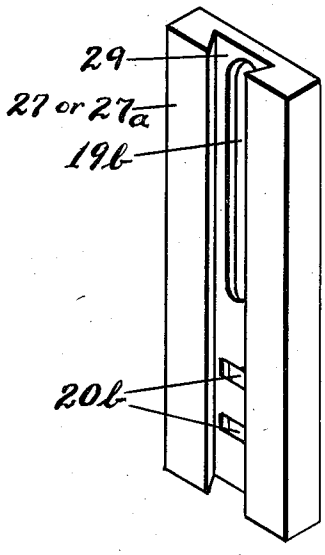


FIG. 10

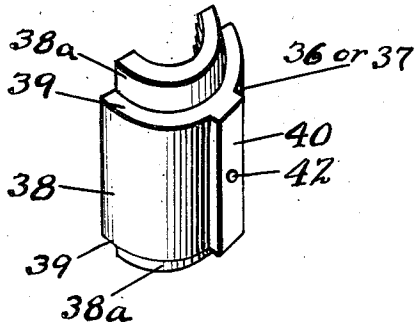
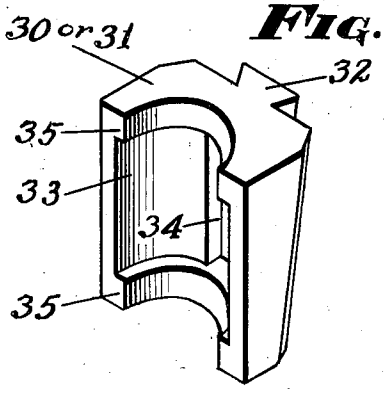


FIG. 9



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2,282,758

UNITED STATES PATENT OFFICE

2,282,758

SPIDER FOR OIL AND GAS WELLS

Clarence J. Gallagher, Gridley, Kans.

Application April 8, 1940, Serial No. 328,429

4 Claims. (Cl. 24—263)

My invention relates to an improvement in spiders for oil well tubing and casing. An object of my invention is to provide a spider that will hold pipe tubing as it is lowered into or withdrawn from oil or gas wells; or the device may be used to drill pipe or casing that is pulled or lowered in drilling or abandoned wells.

Another object is to provide a spider that may be definitely centered on the center axis of the well so that all work done by the spider will be in perfect alignment with the well.

A further object is to provide a spider of the kind mentioned that is light in weight, yet having plenty of strength to easily withstand all loads imposed thereon.

A still further object is to provide a spider of the kind mentioned that is provided with an opening in the side thereof so as to permit the spider to be moved side ways on or off the pipe on which the spider is used.

A still further object is to provide a spider of the kind mentioned that has engaging jaws therein that operate simultaneously so that regardless of the size pipe being worked with the jaws will always hold the pipe on the center axis of the well.

A still further object is to provide a spider of the kind mentioned in which all the working parts are easily removable and replaceable should any of the parts become worn or damaged.

A still further object is to provide a spider of the kind mentioned that can be built and sold at a cheap price and still embody all of the above mentioned objects and features of convenience.

These and other objects will be more fully explained as this description progresses.

Now referring to the accompanying drawings;

Fig. 1 represents a front view of my improved spider.

Fig. 2 is a plan view of the spider, the top plate thereof being removed for purposes of illustration.

Fig. 3 is a side view of my improved spider device.

Fig. 4 is a bottom plan view of my improved spider device.

Fig. 5 is a top plan view of my improved spider device.

Fig. 6 is a vertical detail sectional view through my improved spider device; the view being taken along the line VI—VI in Fig. 5 and looking in the direction of the arrows.

Fig. 7 is a perspective view showing the back side, edge, and top of one of the jaw track elements.

Fig. 8 is a perspective view showing the front side, edge, and top of one of the jaw track elements.

Fig. 9 is a perspective view showing the front, top, and side of one of the slip jaw elements.

Fig. 10 is a perspective view showing the rear, side, and top of one of the jaw liner elements.

Throughout the above described figures similar numerals of reference designate the same part.

In the drawings is shown my improved spider device comprising a base plate **11** that is provided with depending ear like elements **12** that are equally spaced around the bottom of the plate **11**, and are provided with screws **13** that are threaded therethrough so that the plate **11** may be placed on top of a casing pipe indicated by the dotted lines **14**, and be screwed thereagainst as a means of adjustably centering the spider thereover and also as a means of rigidly attaching the spider thereto.

Integrally on the bottom of the plate **11** is a depending hollow neck like element **15** that serves as a guide for tubing indicated by the dotted lines **16** that may be passed therethrough.

Integrally formed on the plate **11** is a four sided housing in which the opposite sides **17** and **18** are spaced apart and stand in parallel vertical positions, and the other two sides **19** and **20** are spaced apart and stand in a converging position from top to bottom.

The side walls **17** and **18** extend beyond the converging walls **19** and **20** as web like elements **17***a* and **18***a* and are integral with the base plate **11** and their adjacent wall plates **17**, **18**, **19** and **20**.

In the plates **19** and **20** is vertically positioned slot elements **19***a*, and additional downward sloping holes **20***a*, the object of which will later be made obvious.

At **21** and **22** are handle elements spanning between outwardly projecting portions of the plates **17***a* and **18***a* by which the handle may be handled.

The wall **17**, plate **11**, and neck **15** is provided with an opening through which the pipe **16** may pass sideways, so as to be centrally positioned between the plates **17**, **18**, **19** and **20**.

Along the sides of this opening and joining the base plate **11** and the side wall **17** are web like elements **23**, and at **24** is a filler element adapted to fit within the said opening and having flanges **25** thereon that fit against the flanges **23** whereupon a bolt **26** may be passed through the flanges **23** and **25** as a means of holding the filler element **24** in place so as to complete the continuous

formation of the plate 11, neck element 15 and the side wall 17.

Seated in the inner faces of the sloping side walls 19 and 20 is a pair of guide elements 27 and 27a that are rigidly held in place by means of screws 28 that pass through the side walls 19 and 20 and into threaded holes 28a in the plates 27 and 27a.

In the opposing faces of the plates 27 and 27a are dovetailed grooves 29 that run the full length of the plates 27 and 27a and in each of the plates 27 and 27a is an elongated slot 19b that registers with the slot 19a in the side walls 19 and 20. Also in the plates 27 and 27a is a plurality of downwardly sloping holes 20b that register with the downwardly sloping holes 20a in the sloping side walls 19 and 20. The object of these holes and slots will later be made obvious.

At 30 and 31 is shown slidable jaw elements having dovetailed tongue elements 32 on the back side thereof and fitting within the dovetail grooves 29 in the guide plates 27 and 27a so as to hold the jaws 30 and 31 in a vertically slidable position on the guide plates 27 and 27a. The face of the jaws 30 and 31 is hollow as illustrated at 33 and in the back side thereof is a recessed portion 34, the object of which will later be explained. Around the top and bottom of hollow portion 33 and in the back side thereof is a recessed portion 34 the object of which will later be explained. Around the top and bottom of hollow portion 33 is an inwardly extending flange like portion 35, the object of which will later be made obvious.

At 36 and 37 is shown toothed liner elements having curved backs 38, shoulders 39, a tongue element 40 and extension portions 38a of such size and shape that the liners 36 and 37 will fit into the hollow portions 33, 34, 35 of the jaws 30 and 31 so as to be solidly seated therein, and at 41 is shown screws that pass through holes 42 in the liner elements 36 and 37 in the jaws 30 and 31. The opposed concave faces of the liners 36 and 37 are provided with sharp teeth 42 for gripping a pipe 16 as will readily be understood.

While the particular form of liners 36 and 37 shown may be the preferable form, it is to be understood that these forms may be varied to suit the desires of the designer or manufacturer and of course the shape of the jaws 30 and 31 will also have to conform to the adjoining form of the liners 36 and 37.

It will also be understood that varying shapes and sizes of the teeth of the liners may be employed and the top and bottom edges of the liners may be curved or rounded off as desired to form guide portions for entering the pipe 16 between the liners 36 and 37, as will readily be understood.

The corner portions of the side plates 17 and 18 extend upwardly and join the plates 19 and 20 and support a top plate 43 which is rigidly held thereon by means of bolts 44, that pass through the plate 43 and are threaded into holes 45 in the adjoining corners of the plates 17—19, 19—18, 18—20 and 20—17. The plate 43 is provided with a flared opening or throat 46 that is positioned in axial alignment with the opening in the neck element 14, and functions as a guiding element for a pipe 16 that may be passed through the throat 46 and between the liners 36 and 37 and through the opening in the neck element 15.

In the throat 46 is a split bushing 47 and 47a, that fits within the throat 46 and somewhat closely around the pipe 16 so as to provide a more accurate guide in the plate 43 for the pipe 16.

In the plate 43 and over each jaw 35 is a spring urged shock absorbing and initial actuating device for the jaws 35. Each of these devices comprises a shaft 48 slidable longitudinally in a bearing 49, positioned at the bottom of a bore 50 in an upwardly extending boss like element 51 in which is positioned a head 52 on the shaft 48.

The plate 43 is provided with an opening 61 which opens from the side of the plate 43 into the throat 46 and is in registry over the opening in the plate 17, base plate 11 and neck element 15. The opening is provided with a closure element 62 that is provided with flange like elements 63 that fit between rib elements 64 on the plate 13, and a bolt 65 passes through the rib elements 64 and the flange elements 63 to rigidly hold the closure element 62 in place in the opening 61 in the plate 43.

At 53 is a second bore in the bottom portion of the plate 43 through which passes the shaft 48 around which is positioned a helical spring 54 that is compressible between the upper end of the bore 53 and a cap nut 55 on the lower end of the shaft 48.

Extending outwardly from the side wall 18 and upwardly from the base plate 11 and integrally formed therewith is a pair of web elements 56 and 57 in which is formed bearing portions 58 and 59 in which is revolvably mounted a shaft 60, the outer end of the shaft 60 is provided with a hexagonal formation 60a on which is removably mounted a lever handle element 66, carrying a head 67 in which is a hexagonal shaped hole to receive the hexagonal shaped end 60a of the shaft 60 in such a manner that by moving the lever 66 up or down, the shaft 60 will be revolved.

Around the shaft 60 is a helical spring element 68, one end of which is turned around a pin 69 that is rigidly fixed on or in the shaft 60, the other end of the spring 68 passing through a hole at the point 70 in the web 57. The spring 68 being so tensioned as to act as a counter balance for the lever 66 and other parts of the machine that will later be described.

On the shaft 60 is a pair of lever arms 71 and 72 that pass through slots 73 in the extensions 18a of the wall 18, one end of the rocker arms 71 and 72 being rigidly attached to the shaft 60 by means of pins 74 that pass through the ends of the rocker arms 71 and 72 and the shaft 60. The other ends of the rocker arms 71 and 72 are provided with ball formations 75 and 76 that extend in an outward direction from the levers 71 and 72.

At 77 and 78 is shown pin elements that pass through the vertically positioned slots 19a in the side walls 19 and 20 and one end of the pins 77 and 78 are threaded into the jaws 30 and 31 and the other end of the pins 77 and 78 are provided with ball formations 79 and 80. At 81 is a link element having ball sockets 82 and 83 thereon to receive the balls 80 and 76, and at 84 is a second link element having ball sockets 85 and 86 formed on the ends thereof and hold the balls 75 and 79.

The operation of the spider is as follows: The spider is set with the base plate 11 on top of the well casing 14 with the ears 12 projecting downwardly along the outside of the casing 14, then the screws 13 are screwed against the casing to center the spider over the casing and finally rigidly attach the spider to the casing 14.

The spider having been so adjusted and placed,

the bushing 47—47a may be removed from the spider and the tubing 16 may be entered endways through the throat 46, and by raising the lever 66 the levers 71 and 72 will simultaneously raise the jaws 30 and 31 upwardly along the diverging track elements 26 and 27 whereby the liners 36 and 37 are moved apart enough that the tube 16 will easily and freely pass therebetween. The tube is then passed on downwardly between the liners 36 and 37 and through the opening in the neck 15. This downward movement is continued until it is necessary to add another length of tubing to the first at which time the lever 66 is rocked downwardly thereby moving the jaws 30 and 31 and the liners 36 and 37 downwardly to a point where the teeth 42 of the liners 36 and 37 engage and hold the pipe 16 against further downward movement, whereupon the hoisting mechanism in the derrick is disconnected from the pipe 16 and a new length of pipe such as 16 is joined by means of a threaded coupling to the preceding length of pipe 16. The lowering mechanism of the derrick is then attached to the upper end of the new length of pipe 16, whereupon the lever 66 is swung upwardly to move the jaws 30 and 31 and the liners 36 and 37 therein, upwardly and outwardly so as to permit the continued downward movement of the pipe 16.

The foregoing operation is repeated and continued until the desired string of tubing 16 has been entered into the well. The tubing may be removed from the well in the reverse manner that it was entered into the well.

It will be understood that the counterbalance spring 68 may be so tensioned that the weight of the jaws 30 and 31 and connecting operating mechanism therebetween and therefor will overpower the spring 68 and the operation of the jaws 30 and 31 engaging the pipe 16 will become semi-automatic.

There may be occasions when it may be desirable to place the spider in engaging position with the tubing 16 when the tubing cannot be entered lengthways through the spider, therefore the spider is provided with removable sections 24 and 62 which may be removed from the spider by removing the bolts 26 and 65 and then slipping the sections 24 and 62 from the spider and then by throwing the lever 66 to its extreme upward position whereupon the jaws 30 and 31 and the liners 36 and 37 therein are moved upwardly to their extreme position which increases the width of the space A to a distance greater than the diameter of the pipe 16 whereupon the spider may be slipped sideways so that the pipe 16 will pass through the opening left by the removable sections 24 and 62 into a position between the liners 36 and 37, the removable sections 34 and 62 and their respective bolts 26 and 65 may be now replaced to their original position and the process of the liners 36 and 37 engaging and disengaging the pipe 16 may be effected by the throwing of the lever 66 downwardly and upwardly the same as previously described.

If it is desired to guide the pipe 16 more accurately, through the spider the bushing 47—47a may be placed in the throat 46 to more closely guide and hold the pipe 16 on the center axis of the spider and casing 14.

When the jaws 30 and 31 are moved to their extreme upward position the upper face of the jaws 30 and 31 will engage the lower end of their respective shaft 48 and as the jaws 30 and 31 continue their upward movement the shafts 48 will be moved upwardly in their bearings 49 to a point where the springs 19 are compressed to a point where they and the nuts 55 on the end of the shafts are housed within the bores 53. This arrangement provides a shock absorber mechanism which serves to stop the upward movement of the jaws 30 and 31 and avoid the jaws 30 and 31 solidly bumping against the under side of the plate 43. The pressure of the springs 54 of course is exerted against the jaws 30 and 31 and urge the downward movement of the jaws 30 and 31 which in effect promotes the smooth and easy movement of the jaws 30 and 31 in their movement of downward travel for the purposes previously described.

Such modifications of my invention may be employed as lie within the scope of the appended claims without departing from the spirit and intention of the invention. Now having fully described my invention, I claim:

1. In a spider device for holding tubular objects; in combination, a housing element having a base thereon for the support of the spider device, track means arranged on opposite sides of, and within said housing and converging from top to bottom, said track means being detachably attached to the housing element, and a plate on the top of, and attached to the housing element, said plate and base elements having an opening therethrough, said openings being concentrically positioned about the center axis of the housing, and removable means whereby an object may be moved sideways through the housing wall, plate and base elements into the housing and between jaw elements, a pair of jaw elements for engaging said tubular object, said jaw elements being attached one to each of the said track elements and being slidable vertically thereon, and registering vertically positioned slots in said track elements and the opposite side walls of the said housing, and means on said jaws and projecting through said slots for sliding said jaws, a plurality of bearings, said bearings being carried by, and positioned outside the housing and base element, a shaft, said shaft being horizontally and removably positioned in said bearings, and removable lever means on said shaft for rocking said shaft, and a pair of lever arms rigidly mounted on said shaft and positioned one on each side of said housing, and link elements connecting between the outer end of each of said rigidly mounted lever arms and their respective means on said jaws for sliding the jaws, and counterbalance means engaging said shaft for counterbalancing said jaws and lever arms.

2. In a spider for holding tubular objects as defined in claim 1, and spring actuated means carried by said top plate for buffing the movement of said jaws at the upper end of the slidable travel thereof.

3. In a spider device for holding tubular objects as defined in claim 1, and spring actuated means carried by said top plate for buffing the movement of said jaws at the upper end of the slidable travel thereof, and removable bushing means in the opening in said top plate for holding a tubular object in said opening on the center axis thereof.

4. In a spider device for holding tubular objects as defined in claim 1, and attachable and detachable face elements on said jaws as and for the purpose set forth.

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