March 29, 1932. J. E. HOFFOSS 1,851,009

SLIP OPERATING DEVICE

Filed Oct. 17, 1929 2 Sheets-Sheet 1

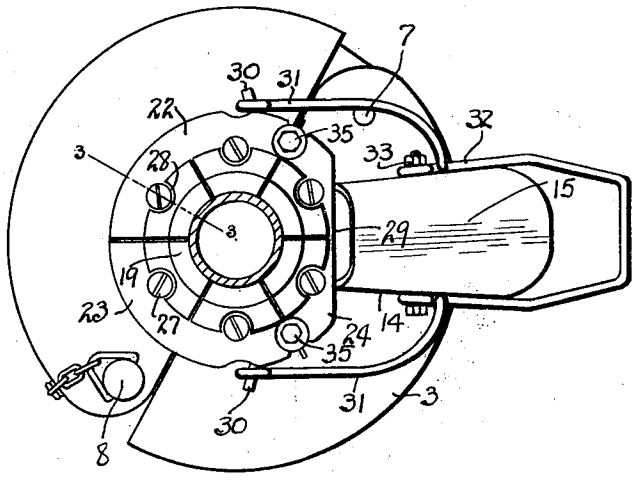

Fig 1

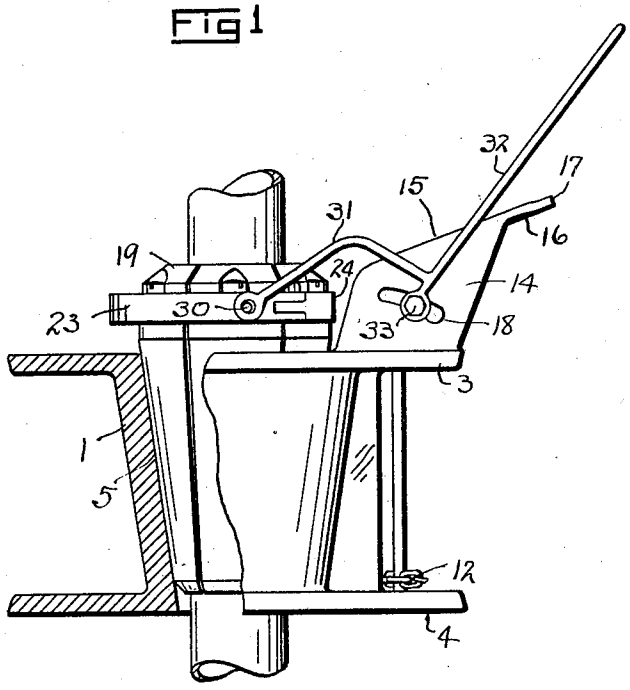

Fig 2

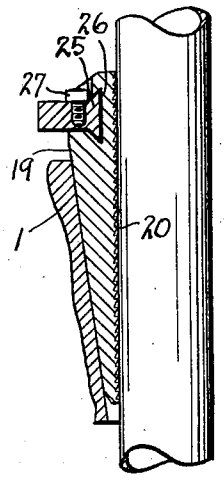

Fig 3

John E. Hoffoss Inventor

By Jesse P. Stone

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SLIP OPERATING DEVICE

Filed Oct. 17, 1929 2 Sheets-Sheet 2

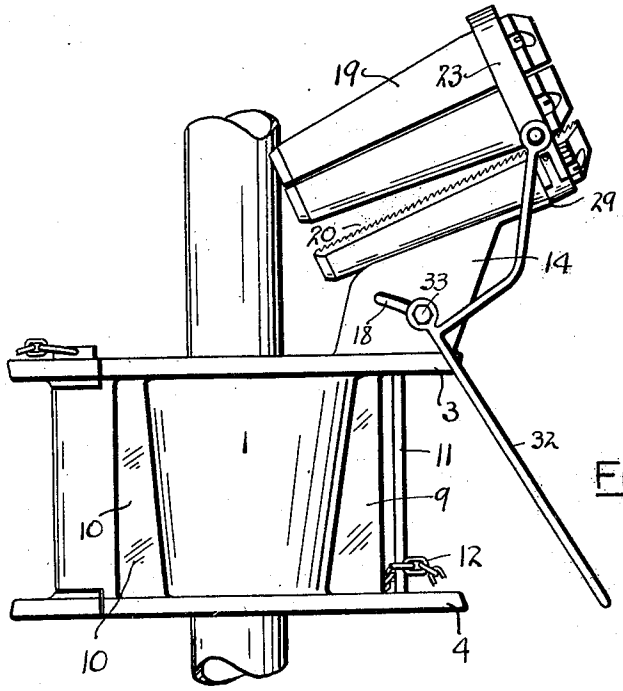

Fig 4

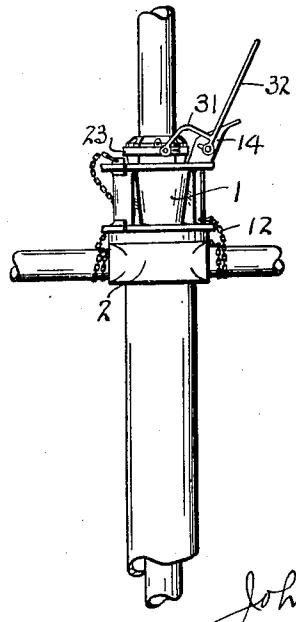

Fig 5

John E. Hoffoss Inventor

By Jesse R. Stone

His Attorney

Patented Mar. 29, 1932 1,851,009

UNITED STATES PATENT OFFICE

JOHN E. HOFFOSS, OF HOUSTON, TEXAS, ASSIGNOR TO W-K-M COMPANY, OF HOUSTON, TEXAS, A CORPORATION

SLIP OPERATING DEVICE

Application filed October 17, 1929. Serial No. 400,193.

My invention relates to pipe engaging slips such as are employed in holding pipe in wells during the operation of drilling or pumping the well.

In the use of pipe in wells, particularly in deep wells such as oil and gas wells, the pipe which is employed in the wells is coupled together in sections and in removing the pipe from the well or inserting it into the well the pipe is held temporarily in position with the coupling exposed for screwing or unscrewing. The holding means employed in thus supporting the pipe are broadly termed a slip or slips and a plurality of slip sections or jaws are ordinarily used to make up the slips.

I have shown my invention as employed particularly with slips for holding tubing while it is being operated upon in the well, it being understood, however, that it is not limited to this use.

It is an object of my invention to provide a means for holding a plurality of slip sections in position to be operated simultaneously, the holding means serving to connect the jaws of the slips loosely together so as to allow a flexibility or limited freedom of movement of each jaw relative the adjacent jaws.

It is also an object to provide a holding means for all of the slips surrounding the pipe and connecting the jaws thereto so that they may automatically release from the pipe when raised from their seat in the spider or bushing, and means to retain the assembled slips in elevated position away from the pipe. It is desired that the slips when supported in inoperative position out of contact with the pipe, may be released without difficulty so that the jaws may drop automatically by gravity to pipe-engaging position.

The invention lies in the particular construction and arrangement of the operating means whereby the jaws are automatically released from the pipe as they are elevated and adapted to automatically grip the pipe when they are dropped.

This feature of novelty will be more clearly understood from the description taken in connection with the drawings herewith. Fig. 1 is a top plan view of a tubing slip and spider involving my invention. Fig. 2 is a side view largely in elevation, certain parts being broken away for greater clearness. Fig. 3 is a broken section taken approximately on the plane 3—3 of Fig. 1. Fig. 4 is a side elevation illustrating the pipe-engaging jaws in their raised or inoperative position. Fig. 5 is an assembly view illustrating the upper end of a casing with the tubing therein and my invention shown thereon.

When my device is employed in connection with a casing-head for handling tubing, I employ a spider 1, adapted to seat upon the upper end of the casing-head 2. The spider is made up of upper and lower annular plates 3 and 4 respectively connected by a downwardly tapered bowl 5. The two plates and the connecting bowl are shown as being divided diametrically into two sections as shown in Fig. 1, one side of each of these two sections being hinged together at 7, the opposite side having a releasable pin 8 therein which may be removed to allow the spider to open and make it possible to fit the same about a pipe or tubing already suspended in the casing. The plates 3 and 4 are provided with reinforcing webs 9 and 10 on opposite sides and upright rods 11 connecting the plates serve also to reinforce the same and act as an anchor to which flexible chains 12 may be secured in tying the spider to the casing-head as illustrated in Fig. 5.

On the upper plate 3 of the spider at one side thereof is mounted a supporting plate 14. Said plate is somewhat U shaped in front elevation, one side of the plate being connected to the plate 3 and the plate itself being arched over and secured to the plate 3 in the form of an inverted U with the legs thereof extending downwardly from the arched portion as will be obvious from Figs. 1 and 2. The upper side indicated at 15 of the plate is inclined from the inner side upwardly toward the outer side and is extended at 16 beyond the supporting sides of the plate and beyond the spider. This upper face 15 is slightly concave to better receive the pipe-engaging slips which will be later described. The outer edge 17 of the plate furnishes a shoulder to support the slips. The sides of

the plate 14 are cut with arcuate slots 18 within which the operating lever may be fulcrumed.

The slips are of ordinary construction, being tapered on their outer faces at 19 to fit within the tapered bowl 5. Their inner sides are vertical and toothed at 20 to engage the pipe. The jaws are arcuate in shape and are adapted to wedge between the seat and the pipe to support the pipe in use. I have shown six of these jaws making up the slips and have held these jaws flexibly together by means of three plates 22, 23 and 24. These three plates are connected with the jaws by having inner tenons 25 fit within mortised grooves 26 on the outer sides of the jaws adjacent the upper end thereof. The plates extend outwardly beyond the edges of the jaws and capscrews 27 are screwed within the upper sides of the plate sections centrally of the outer sides of the jaws and the jaws are recessed at 28 as will be understood particularly from Fig. 1, the recess being larger than the head of the screw so as to allow lateral movement of the jaws relative to the plates. It is to be understood that the fit between the plates and the jaws is sufficiently loose to allow a certain flexibility between the jaw and the plate.

The plate 24 is flattened on its outer side at 29 to allow it to more easily rest upon the upper face 15 of the supporting plate 14. The two plates 22 and 23 are formed with forwardly inclined pins 30 thereon to receive the arms 31 of the lever 32. Said lever is made up of a rod of iron or steel and the lever arm 32 is approximately U shaped, the two legs thereof connected adjacent the arms 31 to a pin 33 extending through the slots 18 in the plate 14. As will be noted from Fig. 2 the lever arm 32 is extended slightly beyond the connection of the lever arm with the branch arms 31 and is enlarged to form a bearing upon the pin 33.

Each of the plates 22 and 23 is hinged to one of the opposite ends of the plate 24. An ordinary hinge is formed to connect these two forward plates to the plate 24 by means of pivot pins 35.

In operating my slip thus formed the lever arm 32 may be depressed to raise the slips from their position in the bushing supporting the pipe and as the arm 32 is depressed it is necessary to allow the slips to move directly upward in order to release their hold upon the pipe. This upward movement is allowed through the sliding of the fulcrum 33 of the lever within the slot 18. When the jaws are free of the bowl however, the downward movement of the lever will throw them over into the position shown in Fig. 4. As the arms 31 of the lever are connected to the forward plates 22 and 23, the tendency will be to throw these plates with their supporting jaws laterally away from the pipe; this action is facilitated by the jaws being split apart by the pipe as they move away from the pipe and the movement of the lever tends to thus move them free of the pipe, swinging them to the sides. The plates 22 and 23 are enabled to spread apart relative to the arms 31 through the recessing of the plates as shown in Fig. 1, just forwardly of the inclined pivots 30. The lower edge of the plate 24 will engage over the shoulder 17 on the supporting plate and will hold the assembled jaws in their open position from sliding back into the tapered bowl. If it becomes necessary to drop the slips to engage the pipe quickly in case of emergency, the lever arm 32 may be given a slight upward movement, releasing the plate 24 from its engagement with the shoulder 17 and the force of gravity will cause the jaws to slide inwardly and close about the pipe, dropping into the tapered seat, automatically and firmly engaging the pipe.

It will be noted that the construction of this device is exceedingly simple. Its action in use is particularly positive so that the slips may be easily withdrawn from the bowl and moved into their inoperative position shown in Fig. 4. This may be done ordinarily by merely stepping upon the lever arm 32, forcing the arms 31 upwardly to raise the jaws and move them into latched position away from the pipe. The device is effective also as a tubing catcher in that the jaws may drop at a moment's notice to quickly engage the pipe and prevent its dropping if such a contingency arises.

Having thus described my invention, what I claim as new is:

1. In a device of the character described, a spider having a tapered bowl, pipe-engaging jaws adapted to fit said bowl, a jaw holder including a plate divided into a central section and two side sections, said side sections being hinged to said central section, a flexible connection between each section and a plurality of said jaws, a lever fulcrumed on said spider and engaging said side sections, and adapted when operated to raise said plate and said jaws to one side of said bowl away from the pipe.

2. In a device of the character described, a spider having a tapered bowl, pipe engaging jaws adapted to fit within said bowl, a central plate and two side plates flexibly connected to said central plate, each of said plates fitting loosely within a morticed groove in two of said jaws, and a lever fulcrumed on said spider and connected with said two side plates, and adapted to raise said plates and jaws from said bowl and swing said side plates and jaws laterally away from the pipe.

3. In a device of the character described, a spider having a tapered bowl, pipe engaging jaws adapted to fit within said bowl, a cen-

tral plate and two side plates flexibly connected to said central plate, each of said plates fitting loosely within a morticed groove in two of said jaws, and a lever connected with said two side plates, and adapted to raise said plates and jaws from said bowl and swing said side plates and jaws laterally away from the pipe, and means to receive said central plate and retain said jaws releasably in inoperative position.

4. In a device of the character described, a spider having a tapered bowl, pipe engaging jaws adapted to fit within said bowl, a central plate and two side plates flexibly connected to said central plate, each of said plates fitting loosely within a morticed groove in two of said jaws, and a lever connected with said two side plates, and adapted to raise said plates and jaws from said bowl and swing said side plates and jaws laterally away from the pipe, and a supporting plate on said spider supporting said lever and having a shoulder to receive and retain said jaws releasably in elevated position.

5. A spider having a downwardly tapered bowl, a supporting device at one side of said spider, a holder plate including a central section and two side sections hinged to said central section, a plurality of pipe-engaging jaws flexibly supported on each of said sections, a lever fulcrumed on said supporting device, and a pivotal connection between said lever and said two side sections, whereby said jaws may be raised and swung toward said lever away from the pipe.

6. A spider having a downwardly tapered bowl, a supporting device at one side of said spider, a holder plate including a central section and two side sections hinged to said central section, a plurality of pipe-engaging jaws flexibly supported on each of said sections, a lever fulcrumed on said supporting device and a pivotal connection between said lever and said two side sections, whereby said jaws may be raised and swung toward said lever away from the pipe, and a shoulder on said supporting device adapted to receive said central plate section to retain said jaws and holder plate away from the pipe.

7. A downwardly tapered bowl, a supporting plate thereon, a plurality of pipe-engaging jaws which together entirely surround the pipe and which are adapted to fit said bowl, a holder for said jaws securing said jaws flexibly together except at one open side, and means opposite said open side and connected to said holder to raise said jaws and move them free of said pipe, and means to hold said jaws releasably upon said supporting plate.

8. A downwardly tapered bowl, a supporting plate thereon, a plurality of pipe-engaging jaws which together entirely surround the pipe and which are adapted to fit said bowl, a holder for said jaws securing said jaws flexibly together except at one open side, and means opposite said open side and connected to said holder to raise said jaws and move them free of said pipe.

9. A pipe supporting device including a spider, a tapered bowl therein, a plurality of pipe-engaging jaws adapted to fit said bowl and engage said pipe, a sectional holding plate flexibly engaging said jaws, and means connected with said plate to raise said jaws and swing them free of the pipe to one side thereof, and means to support said jaws in their raised position.

10. A spider having a downwardly tapered bowl, a holder plate including a central section and two side sections hinged to said central section, a plurality of pipe-engaging jaws on each of said sections, a supporting device on one side of said spider having arcuate slots therein, a fulcrum pin in said slots, and a lever pivoted on said fulcrum pin and engaging said side sections for the purpose described.

11. A spider having a tapered bowl, a plurality of pipe-engaging slips adapted to fit said bowl, means holding said slips flexibly together for operation as a unit, a supporting plate on one side of said spider having upright legs with arcuate slots therein, a fulcrum pin in said slots and a lever pivoted thereon and connected with said holding means to raise said slips from said bowl in the manner stated.

12. In combination with a set of slips, a lever, means connecting said lever and slips so that they may move about or be removed from a pipe, and a slotted support, a fulcrum for said lever sliding in said slotted support so that said slips may move vertically from their seat.

In testimony whereof I hereunto affix my signature this 28 day of September, A. D. 1929.

JOHN E. HOFFOSS.