

Nov. 8, 1938.

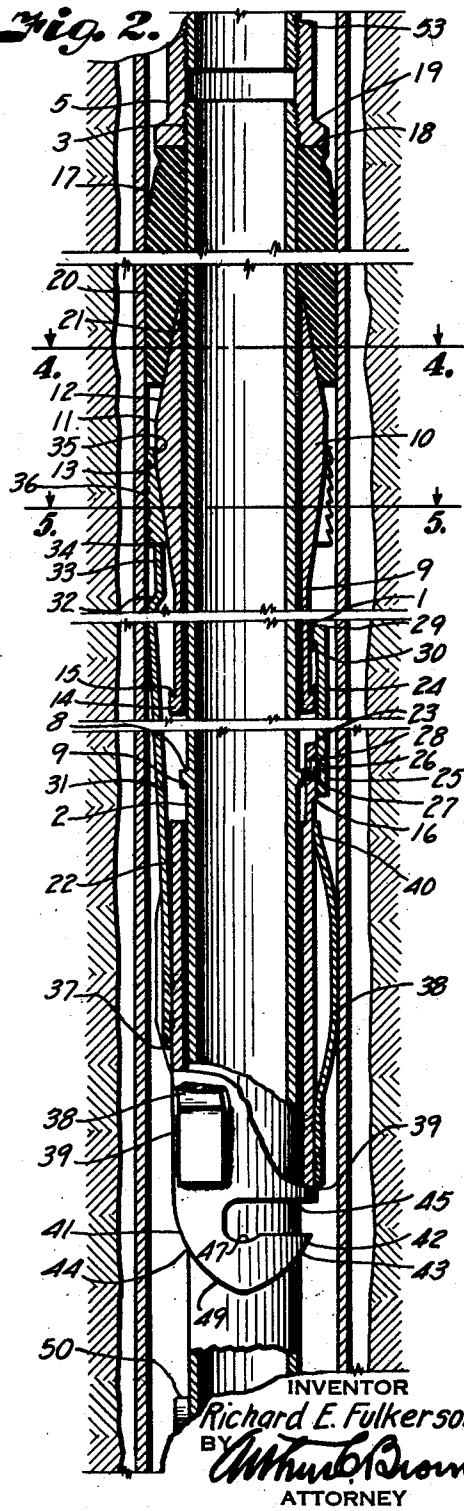
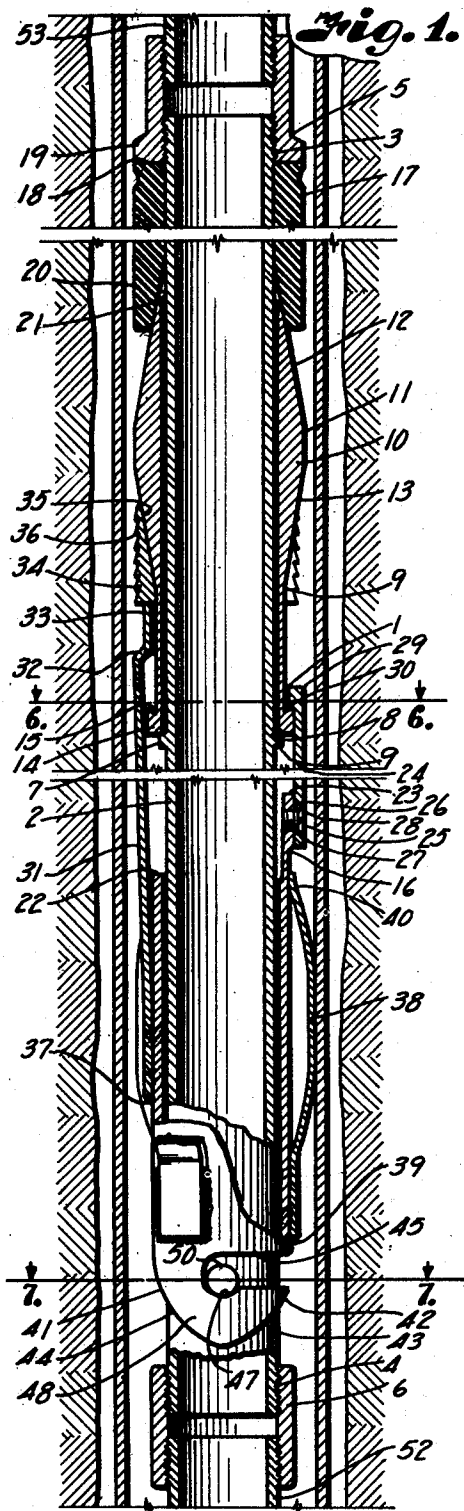
R. E. FULKERSON

2,136,047

PACKING ANCHOR

Filed Feb. 5, 1937

2 Sheets-Sheet 1



INVENTOR

Richard E. Fulkerson.

BY

Attorney

ATTORNEY

Nov. 8, 1938.

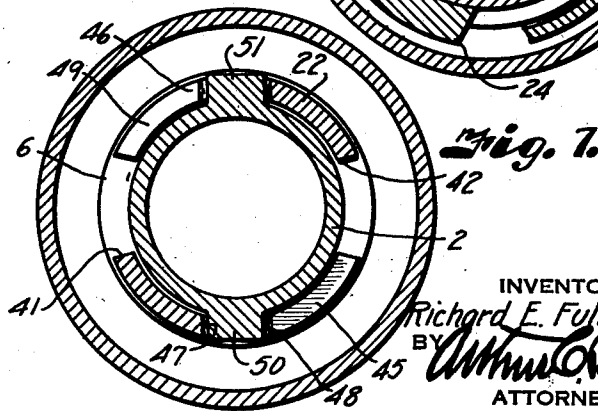
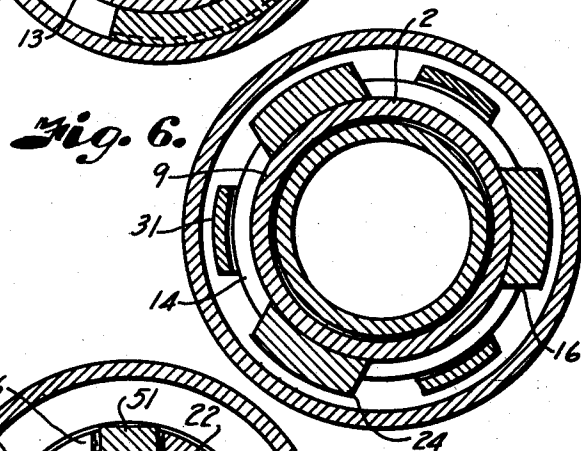
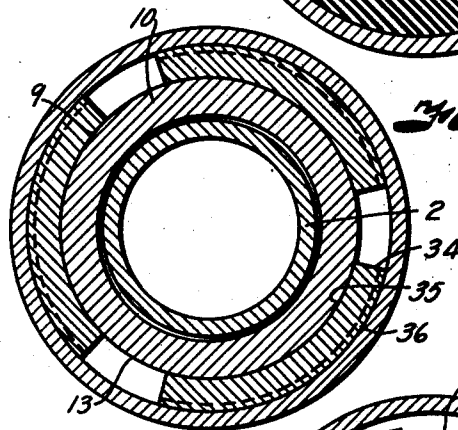
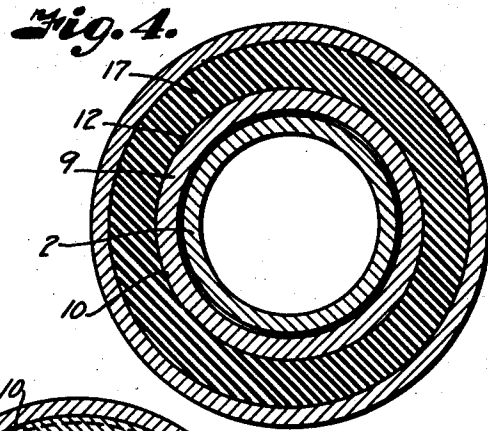
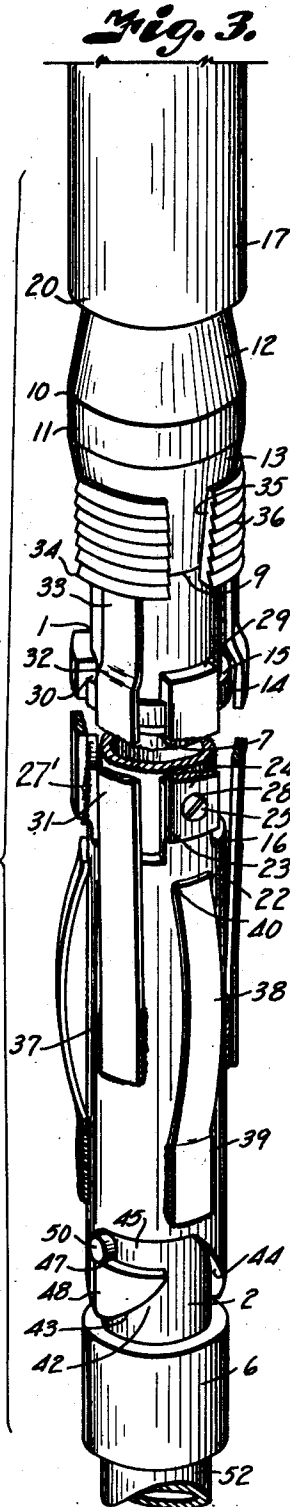
R. E. FULKERSON

2,136,047

PACKING ANCHOR

Filed Feb. 5, 1937

2 Sheets-Sheet 2



INVENTOR
Richard E. Fulkerson.
BY *Arthur C. Brown*
ATTORNEY

UNITED STATES PATENT OFFICE

2,136,047

PACKING ANCHOR

Richard E. Fulkerson, Coffeyville, Kans., assignor
to The Exner-Dodge Packer Company, Coffey-
ville, Kans., a corporation of Kansas

Application February 5, 1937, Serial No. 124,222

10 Claims. (Cl. 166—12)

This invention relates to packers, particularly to those of the anchor type as used in general oil field practice for packing off and supporting a pump, tubing, casing, or other appliance at a selected position within a well, and has for its principal object to provide a device of this character which may be selectively released and reset at any desired point within a well without necessitating complete withdrawal from the well.

For example, oil wells frequently flow under formation pressure for a period of time after they have been brought in, but the formation pressure usually drops off until it is insufficient to raise the well fluid to the top of the well. It then becomes necessary to install a pump within the tubing to lift the oil from the point where the hydrostatic pressure tends to balance the formation pressures. It is also necessary that the pump be lowered from time to time as the fluid level gradually recedes. In order to install the pump, the well tubing must be provided with a seating nipple on which the pump is supported. This seating nipple is ordinarily not coupled into the well tubing until it is necessary to pump the well for the reason that the seating nipple constricts the natural flow through the tubing during the initial flowing period. It therefore becomes necessary to pull the string of well tubing so that the seating nipple may be inserted in the string after which the string is rerun into the well, and the pump inserted. Pulling of the tubing is not only an expensive operation but it is sometimes dangerous for the reason that the well might become agitated by the motion of the tubing to the extent that it may start to flow, thereby creating a dangerous hazard for the crew and equipment, as well as making the work disagreeable because of the open flowing well. Another disadvantage is that it is necessary to provide a derrick with which the tubing must be handled in cases where the original drilling derrick has been removed during the flow period. Then after the pump has been installed, it is frequently necessary to relocate the pump at a lower point in the tubing to follow the recession of the fluid level, thus again necessitating withdrawal of the tubing in order to relocate the seating nipple. However, with a packing anchor constructed in accordance with the present invention the pump packer and necessary equipment can be lowered by the sucker rods into the well tubing for setting at any desired point, later released, and reset at another point without withdrawing and rerunning the apparatus.

Another important object of the present in-

vention is to effect a positive wedge of the packing element against its supporting surface so as to prevent accidental movement of the packing when in use.

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

Fig. 1 is a vertical section through a well equipped with well tubing and illustrating the application of my packing anchor in use for packing off and supporting a pump, the packing anchor being illustrated prior to setting of the slips and wedging expansion of the packing element.

Fig. 2 is a similar section showing the packing anchor in set condition.

Fig. 3 is a perspective view of the packing anchor prior to its insertion in a well tubing.

Fig. 4 is a horizontal section on the line 4—4 of Fig. 2.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 2.

Fig. 6 is a horizontal section on the line 6—6 of Fig. 1.

Fig. 7 is a horizontal section on the line 7—7 of Fig. 1.

Referring more in detail to the drawings:

1 designates a packing anchor constructed in accordance with the present invention and which includes a tubular body 2 preferably formed of a section of pipe having threaded ends 3 and 4 to connect, in the illustrated instance, an adaptor coupling 5 and a flow pipe coupling 6 respectively. Formed on the tubular body and extending circumferentially thereof is an annular flange 7 forming upper and lower stop shoulders 8 and 9. Sleeved over the upper end of the tubular body 2 and normally seating upon the stop shoulder 8 is a packing and slip expander 9. The expander 9 consists of a sleeve of suitable inner diameter to freely slide upon the tubular body of the packing anchor, and formed on the upper end thereof is a head 10 tapering from the center 11 toward the upper and lower ends thereof to form opposed cone-shaped packing and slip expanding or wedging surfaces 12 and 13 respectively. The lower end of the sleeve is provided with an annular hook engaging flange 14 having an annular V-shaped groove 15 to be engaged by the hooks of an anchoring element 16 later described.

Sleeved over the end of the tubular body is a packing sleeve 17 formed of expandable material and having its upper end 18 engaging against

a seating flange 19 that is formed in the upper coupling 5, and its lower end provided with a skirt portion 20 having a cone-shaped recess 21 conforming to the conical taper 12 of the expander. The relative lengths of the expander sleeve and packing element to the spacing between the seating flange 7 and the flange 18 of the coupling 5 is such that the smaller end of the taper 12 partly engages within the tapered recess of the packing element as clearly shown in Fig. 1, when the lower end of the expander sleeve is engaged with the shoulder 8 of the flange 7.

The anchoring element 16 includes a sleeve-like body 22 of suitable inner diameter to freely slide and rotate upon the lower end of the tubular body incidental to setting and release of the anchoring slips as later described. Formed on the upper end of the sleeve-like body 22 are circumferentially spaced ears 23 for attaching hooks 24. To facilitate assembly at least one of the hooks is secured by a screw 25 that extends through a suitable opening 26 in the hook and into a threaded opening 27 in the ear to which the hook is attached, the head of the screw being countersunk as at 28. The other hooks are preferably permanently attached to the ears which support them as by welding, as shown at 27'. The hooks extend upwardly over the peripheral edge of the hook flange and have heads 29 provided with downwardly protruding lips 30 adapted to engage within the groove 15 of the hook flange for intercoupling the anchoring element with the expander and limiting the relative movements thereof. These hooks also perform the important function of pulling the wedging sleeve from the packing sleeve when unseating the packer as later described.

Fixed in lapping relation with the sleeve 22 at points between the hooks are spring reins or arms 31 having their upper ends projecting above the hook flange where they are inset as at 32, to bring the terminal ends 33 thereof in relatively close contact with the skirt portion of the expander, the ends 33 being of sufficient length to extend to a point adjacent the smaller end of the conical taper 13 of the expander head. Fixed on the terminal ends of the reins are slips 34 having wedge-shaped backs 35 corresponding to the taper of the expander head and which have outer faces provided with wickers or teeth 36 adapted to grip the inner surface of the well tubing upon setting of the packer as later described. The spring reins have their lower ends preferably welded on the slip carrying sleeve 22 as indicated at 37.

Also fixed on the sleeve 22 in alignment with the hooks 24 are bow-shaped friction springs 38 having their lower ends welded to the lower end of the sleeve as shown at 39. The upper ends 40 of the springs loosely bear upon the upper end of the sleeve, as clearly shown in Fig. 1. The lower end of the sleeve 22 is notched on the opposite diametric sides thereof, as indicated at 41 and 42, to form converging cam surfaces 43 and 44 leading to horizontally arranged slots 45 and 46 terminating in diametrically opposed safety notches 47. The notched and slotted end of the sleeve thus forms hooks 48 and 49 to engage gudgeons 50 and 51 that project from the tubular body, the gudgeons being located relatively to the seating flange 7 so that when the hooks are engaged therewith the upper hooks 24 are engaged with the hook flange of the expander as shown in Fig. 1.

In assembling a packing anchor as above de-

scribed, the expander 9 is sleeved over the upper end of the tubular body so that the hook flange 14 thereof engages the shoulder 8 of the seating flange 7. The packing sleeve 17 is then slipped over the tubular body so that the recessed end thereof engages over the smaller end of the taper 12. The coupling 5 is then screwed upon the threads 2 of the tubular body to seat against the upper end of the packing. The slip carrying sleeve, without the removable hook in place, is then sleeved over the lower end of the tubular body, after which the sleeve is rocked slightly on the tubular body so that the fixed hooks 24 pass over the flange 14 and engage the groove 15. During placement of the sleeve the spring reins 31 are sufficiently flexible to allow the slips to ride over the flange 14 and slide upon the lower wedging surface 13. The removable hook 24 is then attached by applying its fastening device 25. The gudgeons are then applied in their proper position on the tubular body so that they enter the slots 45 and 56 of the hooks. When the sleeve 22 is rotated, the gudgeons enter the safety notches 47 to retain the anchoring sleeve 22 from sliding movement on the tubular body and the slips in contracted position. The lower coupling 6 may then be applied to the threads 4 to complete the assembly.

The packer anchor as above described may be constructed in different sizes to conform to the inner diameter of the standard sized tubings so that when they are inserted therein the friction springs frictionally engage the inner walls of the tubing while the slips and packing element freely slide therein, but which are of sufficient diameter to engage the walls of the tubing when the packing anchor is to be set.

In using a packing anchor assembled as described in connection with a pump, the coupling 6 is secured to a flow pipe 52 while the adaptor coupling 5 is secured to the pump fitting 53. This assembly is then lowered through the well tubing 54 by means of the pump sucker rods until it arrives at the point where it is to be set. The rods are then rotated from the top of the well to cause sufficient rotation of the tubular body to uncouple the gudgeons from the hooks. This is effected by reason of the friction springs which prevent relative movement of the sleeve 22, consequently when the tubular body is rotated in the proper direction, the gudgeons will move out of the safety notches and through the slots to freedom from the hooks. The packing anchor is then lowered so that the tubular body moves through the sleeve 22 which remains substantially stationary because of the friction engagement of the springs 38 with the walls of the tubing. The hooks 29 will, therefore, leave their hooked engagement with the hook flange and the lower conical taper of the expander head will ride downwardly and urge the slips into gripping engagement with the wall of the tubing, thereby supporting the expander head in fixed position. Further lowering of the tubular body causes the upper conical taper of the sleeve to expand the packing sleeve and wedge it into sealing contact with the tubing. This wedging action of the upper conical taper holds the packing sleeve firmly in position to prevent weaving of the packer and separation of the packing element 70 from the tubing wall to thereby hold the entire pump and anchor assembly firmly at the desired setting point during actuation of the rods.

When it becomes necessary to relocate the pump, the tubular body is raised within the tub-

ing. Since the springs 38 engage the tubing and are supplemented by the grip of the slips; the sleeve 22 tends to remain stationary. Consequently the flange 14, which moves upwardly with the tubular body by reason of the wedging engagement of the upper conical taper with the packing sleeve, will engage the hooks 24 arresting upward travel of the expander 9, whereupon continued pull upon the tubular body will jerk the packing sleeve from engagement with the expander 9. If the packing anchor is to be set at a higher level, it is not necessary to reengage the gudgeons in the safety notches, but if the packing anchor is to be lowered it is necessary to reengage the gudgeons in the slots 45 so that upon rotation of the tubular body the gudgeons will engage the safety notches. The device is then free to be moved to a lower location, whereupon the packer is again set as above described. A packer as described may be produced in various sizes and adapted to be inserted in any well flowing pipe. The specific mention of tubing is, therefore, not intended to limit adaptation of the invention to any specific size pipe. From the foregoing it is obvious that I have provided a simple packing anchor which may be supported in any selected position within a well or reset at other positions, as desired.

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

1. A device of the character described including a body member, a packing sleeve on the body member for packingly engaging a pipe in which said body member is inserted, anchoring slips, means slidably mounting the anchoring slips on the body member, means on the slip mounting means for frictionally engaging the pipe, an expander sleeve slidable on the body member and having opposed conical ends for wedgingly expanding and setting the packing sleeve and said slips respectively responsive to relative movement of the expander sleeve and body member, means releasably connecting the slip mounting means with the body member, and a lost motion connection between said slip mounting means and the expander sleeve separate from the slips to limit relative movement of the slip mounting means and the expander sleeve and to effect withdrawal of the packing sleeve from wedging engagement with the pipe.

2. A device of the character described including a body member, a packing sleeve on the body member, anchoring slips, means slidably mounting the anchoring slips on the body member, an expander sleeve slidable on the body member and having opposed conical ends for wedgingly expanding and setting the packing sleeve and said slips respectively responsive to relative movement of the expander sleeve and body member, and a lost motion connection between said slip mounting means and the expander sleeve to limit relative movement of the slip mounting means and the expander sleeve and to effect withdrawal of the packing sleeve from said wedging engagement, said lost motion connection being separate from the slips.

3. A packer of the character described including a body member, a packing sleeve on the body member for packingly engaging a pipe in which the packer is inserted, an anchoring sleeve slidably mounted on the body member, an expander sleeve slidably mounted on the body member and having a conical end for wedging the packing sleeve in contact with the pipe, slips carried by the anchoring sleeve and engaging the expander

sleeve, means on the anchoring sleeve for frictionally engaging the pipe, means for releasably connecting the anchoring sleeve with the body member whereby the body member is movable relatively to the anchoring sleeve to effect setting of the slips and wedging of the packing sleeve, and a lost motion connection between the expander and anchoring sleeves to limit relative movement of the expander and anchoring sleeves and to effect withdrawal of the packing sleeve from wedging engagement with the conical end of the expander sleeve, said lost motion connection being separate from the slips.

4. A device of the character described including a body member, a packing sleeve on the body member for packingly engaging a tubing in which said body member is inserted, an anchoring sleeve slidably mounted on the body member, a wedging sleeve slidably mounted on the body member and having a conical end for wedgingly expanding the packing sleeve into contact with the tubing and having a slip expanding portion, slips carried by the anchoring sleeve for engaging the slip expanding portion of the wedging sleeve, means on the anchoring sleeve for frictionally engaging the tubing, means for releasably connecting the anchoring sleeve with the body member whereby the body member is adapted to move relatively to the anchoring sleeve to effect expansion of the slips and wedging expansion of the packing sleeve, and hooks on the anchoring sleeve and engageable with the wedging sleeve to limit relative movement between the wedging and anchoring sleeves and to effect withdrawal of the packing sleeve from wedging engagement with the wedging sleeve.

5. A packer of the character described including a body member, a packing sleeve on the body member for packingly engaging a pipe in which the packer is inserted, an anchoring sleeve slidably mounted on the body member, an expander sleeve slidable on the body member for wedgingly expanding the packing sleeve, slips carried by the anchoring sleeve for engaging the expander, means on the anchoring sleeve for frictionally engaging the pipe, a gudgeon on the body member, a hook on the anchoring sleeve for selectively engaging the gudgeon to connect said anchoring sleeve with the body member whereby the body member is retained from relative movement with the anchoring sleeve but releasable therefrom to effect expansion of the slips and wedging of the packing sleeve against the pipe, and a lost motion connection between the expander and anchoring sleeves separate from the slips to limit relative movement of the expander and anchoring sleeves and to effect withdrawal of the packing sleeve from wedging engagement with the expander sleeve.

6. A device of the character described including a body member, a packing sleeve on the body member for packingly engaging a pipe in which said body member is inserted, an anchoring sleeve slidably mounted on the body member, a wedging sleeve slidably mounted on the body member and having an upper conical end extending into the packing sleeve for expanding said sleeve into contact with the pipe and having a lower conical end, slips carried by the anchoring sleeve for engaging the lower conical end of the wedging sleeve, means on the anchoring sleeve for frictionally engaging the pipe, means for releasably connecting the anchoring sleeve with the body member whereby the body member is adapted to be moved relatively to the anchoring sleeve to

effect expansion of the slips and wedging expansion of the packing sleeve against the pipe, and hooks on the anchoring sleeve and engageable with the wedging sleeve to limit relative movement between said sleeves and to effect withdrawal of said packing sleeve from wedging engagement with the wedging sleeve.

7. A device of the character described including a tubular body member, a packing sleeve on the body member for packingly engaging a pipe in which said body member is inserted, an anchoring sleeve slidably mounted on the body member, a wedging sleeve slidably mounted on the body member and having a conical end extending into the packing sleeve for wedgingly expanding said packing sleeve into contact with the pipe, means on the anchoring sleeve for frictionally engaging the pipe, means for releasably connecting the anchoring sleeve with the body member whereby the body member is adapted to be moved relatively to the anchoring sleeve to effect wedging expansion of the packing sleeve, and hooks on the anchoring sleeve and engageable with the wedging sleeve to limit relative movement between said sleeves and effect withdrawal of the packing sleeve from wedging relation with the wedging sleeve.

8. A device of the character described including a body member, a packing sleeve on the body member for packingly engaging a pipe in which said body member is inserted, an anchoring sleeve slidably mounted on the body member, wedging means slidably mounted on the body member for expanding the packing sleeve into contact with the pipe, slips carried by the anchoring sleeve, means connected with the wedging means for expanding the slips to engage the pipe, means on the anchoring sleeve for frictionally engaging the pipe, means for releasably connecting the anchoring sleeve with the body member whereby the body member is adapted to be moved relatively to the anchoring sleeve to effect

expansion of the slips and packing sleeve, and a lost motion connection between the expanding means and the anchoring sleeve separate and independent from said slips.

9. A device of the character described including a body member, a packing sleeve on the body member for packingly engaging a pipe in which said body member is inserted, an anchoring sleeve slidably mounted on the body member, wedging means slidably mounted on the body member for expanding the packing sleeve into contact with the pipe, slips carried by the anchoring sleeve, wedging means for expanding the slips, means on the anchoring sleeve for frictionally engaging the pipe, means for releasably connecting the anchoring sleeve with the body member whereby the body member is adapted to move relatively to the anchoring sleeve to effect expansion of the slips and packing sleeve, and hooks on the anchoring sleeve and engageable with said wedging means to limit relative movement between the anchoring sleeve and said wedging means.

10. A device of the character described including a body member, a packing sleeve on the body member, anchoring slips, means slidably mounting the anchoring slips on the body member, a sleeve slidable on the body member for expanding said packing sleeve and having means for expanding and setting the anchoring slips responsive to relative movement of said sleeve and body member, means releasably connecting the slip mounting means with the body member, and a lost motion connection between said slip mounting means and said slidable sleeve to limit relative movement of the slip mounting means and sleeve and to effect withdrawal of the sleeve from expanding relation with the packing sleeve, said lost motion connection being separate from the slips.

RICHARD E. FULKERSON.