INVENTOR.

ATTORNEYS.
My invention relates to a supporting anchor for use in wells to engage with the casing of the well and support an operating tool within the casing.

It is an object of the invention to provide an anchor which may be placed adjacent the lower end of the pipe or tool which is being used and adapted to be expanded at the desired point in the well so as to grip the casing and support the tool or pipe.

It is an object to provide in a tool of this character a means for releasing the pipe gripping elements upon the anchor which may be positively released to expand the gripping elements at any desired point in the well.

The device is adapted particularly for use in supporting a rotating element such as a pipe cutter while the tool is being operated and the invention resides in the particular construction and arrangement of the parts whereby the tool is made simple and strong in construction and adapted to withstand the heavy usage to which such tool is subjected.

Referring to the drawing herewith, Fig. 1 is a central longitudinal section through an anchoring device embodying my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a side view partly in elevation and partly in section illustrating the parts in a position different from that shown in Fig. 1. Fig. 4 is a transverse section on the plane 4—4 of Fig. 3. Fig. 5 is a transverse section on the plane 5—5 of Fig. 1. Like numerals of reference are employed to designate like parts in all the views. My device is adapted to be attached at the lower end of a pipe or tool having the lower end thereof threaded to engage with my anchor. The upper end of my improvement is therefore equipped with a coupling or joint 1 threaded at its upper end 2 for engagement with the tool or pipe. The lower end of the coupling is reduced in diameter and threaded externally at 3 for engagement with a sleeve or housing 4. The lower end of the coupling 1 has a squared opening 5 longitudinally thereof leading to a cylindrical passage 6 through the coupling. The squared opening is therefore adapted to slideably receive a shaft 7, the purpose of which will be later described.

The lower end of the housing 4 is extended inwardly to form a shoulder 8 on its interior to engage below the head 9 of a block 10. Said block is shaped to fit within the housing and is separated from the lower end of the coupling 1 by packing rings 11. The lower end of the block 10 is threaded at 12 for connection with a mandrel 13. The interior of the block has a central passage 14 therethrough within which the shaft 7 previously noted may rotate.

The mandrel 13 is cylindrical at its upper end and has on opposite sides thereof recesses 15 to receive slips or jaws 16. The said recesses have the interior sides formed with mortises 17 of a dovetailed form to engage with keys on the slips. Slots 18 are formed in the sides of the mandrel adjacent the slips, said slots having a vertical portion in which pins 20 upon the shaft 7 may slide, the upper ends of the vertical portions connecting with a horizontal extension allowing the pins to rotate out of line with the vertical arm of the slot to prevent longitudinal movement of the pins 20 therein.

The pins 20 extend diametrically through a head 21 upon the shaft 7. The interior of the mandrel is of sufficient width to receive a tension spring 22 which bears at its lower end against the head 21 of the shaft and at its upper end against the lower end of the block 10. The spring thus tends to hold the shaft downwardly when the pins 20 are rotated into alignment with the vertical arms of the slots 19. The spring will force the shaft from the position shown in Fig. 1 to the position shown in Fig. 3.

The jaws 16 are toothed on their outer surfaces to engage with the interior wall of
the casing of the well. The lower ends are fitted within notches 23 in the upper end of a collar 24 which extends downwardly away from the jaws.

The collar 24 is slidable upon a shaft or body member 25, the upper end of which has a reduced tapered shank 26 which is screwed within the lower end of the mandrel 13. Below the shank is formed a shoulder 27 limiting the downward movement of the slips or jaws 16. The collar bearing against the lower ends of said jaws 16 is held resiliently upward toward said jaws by a spring 28 which rests at its lower end upon a ring 29 screwed upon the lower threaded end 30 of the shaft 25. Below the ring or nut 29 is a guide member 31 which has a threaded socket engaging with the lower threaded end of the shaft. Below the socket the guide member is formed with a diametrical opening 32 cylindrical in outline and adapted to receive slidable blocks 33 therein. Said blocks are held resiliently apart by a spiral spring 34 fitted between said blocks and tending to hold them outwardly toward the wall of the casing. The said blocks have outer slots 35 therein in which are mounted wheels 36, the peripheries of which are serrated to engage with the casing when the device is introduced into the well. Said wheels rotate upon pins 37 transversely of slots 35 and the blocks within which said wheels are mounted are prevented from rotation in the openings by means of pins 38 mounted within the wall of the guide member and projecting into slots 39 longitudinally of said blocks and permitting the sliding of said blocks as will be obvious from Fig. 5.

In the operation of this device the tool which is to be operated will be connected with the upper end of the anchoring means assembled in the manner just described. The jaws 16 will then be in their lower collapsed condition shown in Fig. 1 and will be held in that position by the pin 20, at the lower end of the squared shaft 7, said pin being rotated out of alignment with the vertical arm of the slot 19. The device will then be introduced into the well to the desired point where the tool is to be operated. As the device is moved downwardly in the well the blocks 33 will be held outwardly against the inner wall of the casing by the spring 34 and the wheels 36 will rotate as the device is lowered. When the proper point is reached in the well the drill stem and the tool above the anchor will be rotated, thus transmitting a rotating motion to the coupling 1. This rotation will not be communicated to the mandrel 13 due to the swivel connection formed by engagement between the sleeve 4 and the block 10. The rotation of the coupling 1 will however rotate the shaft 7 through the engagement of the squared opening 5 with the shaft. This will rotate the shaft to throw the pins 20 into the vertical portion of the slot 19 and the spring 22 will then cause the shaft to drop downwardly bringing the pins 20 into the lower ends of the slots 19. This will remove the shaft 7 from the squared opening 5 in the upper collar 1.

It will also force the pins 20 out of engagement with the jaws 16 allowing the spring 28 to force the collar 24 and the jaws 16 upwardly along the mandrel 17 and expanding the jaws into contact with the casing. The wheels 36 will tend to prevent rotation of the guide member and the tool below the swivel so that the positive rotation of the shaft 7 relative to the body of the tool may be accomplished.

It will be obvious that when the jaws are thus expanded the weight of the operated tool above the anchor may rest upon the support thus provided and may be rotated or operated in any manner upon the support. It may be noted here that the squared shaft 7 has passed out of the opening 5 so that it is not rotated after the slips have been expanded. If it is thereafter desired to raise the tool in the well the upward movement of the device will be possible due to the fact that the jaws will slide downwardly on the mandrel when the mandrel is elevated and allow this upward movement.

The advantages of my construction lie in the simplicity of the device and the positive manner in which it may be operated; it will not fail to expand at the proper point in the well and will furnish a substantial and solid support for the tool which is to be operated thereon.

The further advantages of the device will be obvious to those skilled in the art.

What I claim as new and desire to protect by Letters Patent is:

1. In a device of the character described, a mandrel, a coupling, a swivel connection between said mandrel and coupling, a downwardly-tapered sideway on said mandrel, a jaw slidable on said sideway, means tending to force said jaw upwardly, means to retain said jaw from upward movement, said retaining means being releasable by the rotation of said coupling, and means to resist rotation of said mandrel.

2. In a device of the character described, a mandrel, a coupling, a swivel connection between said mandrel and coupling, a downwardly-tapered sideway on said mandrel, a jaw slidable on said sideway, means tending to force said jaw upwardly, means to retain said jaw from upward movement, said retaining means being releasable by the rotation of said coupling, and a guide member connected with said mandrel having lateral recesses therein and guide wheels slidable outwardly in said recesses to bear against the side wall of a well.

3. In a device of the character described,
a mandrel, downwardly tapered slideways thereon, toothed jaws on said slideway, a coupling having a central channel squared at the lower end thereof, a swivel connection between said mandrel and said coupling, said mandrel having an angular slot therein, a shaft in said mandrel, a squared end thereon in said channel, a pin on said shaft projecting through said slot to engage above said jaws means to move said pin and shaft downwardly when said shaft is rotated through said coupling to release said jaws, and means to force said jaws upwardly.

4. In a device of the character described, a mandrel, downwardly tapered slideways thereon, toothed jaws on said slideway, a coupling having a central channel squared at the lower end thereof, a swivel connection between said mandrel and said coupling, said mandrel having an angular slot therein, a shaft in said mandrel, a squared end thereon in said channel, a pin on said shaft projecting through said slot to engage above said jaws, a spring tending to force said shaft downwardly, said shaft being rotatable through said coupling to release said jaws and allow said shaft to move downwardly out of said channel, means to expand said jaws and means to resist rotation of said mandrel.

5. In a device of the character described, a guide member, means to resist rotation of said member, a mandrel on said member, a set of pipe engaging jaws on said mandrel, means to hold said jaws releasably in collapsed position, a spring tending to force said jaws into expanded pipe-engaging position, and means rotatable relative to said mandrel to release said jaws.

6. In a device of the character described, a tubular mandrel means to resist rotation of said mandrel, a coupling, a swivel connection between said coupling and mandrel, jaws slidable on said mandrel to and from pipe engaging position, means slidable in said mandrel to hold said jaws from pipe-engaging position, means tending to force the said jaws into pipe-engaging position, and means actuated by the relative rotation of said coupling to release said jaw holding means.

7. An anchor for wells including a coupling, a mandrel carried by but rotatably connected to said coupling, pipe engaging jaws slidably carried by said mandrel, means longitudinally slidable in said mandrel upon rotation of said coupling to release said pipe engaging jaws, and means to normally prevent rotation of said mandrel.

8. An anchor for wells including a coupling, a mandrel carried by but rotatably connected to said coupling, pipe engaging jaws slidably carried by said mandrel, means longitudinally slidable in said mandrel upon rotation of said coupling to release said pipe engaging jaws, said means including pins projecting from said mandrel to engage the upper ends of said jaws but adapted to pass between said jaws when in released position, and means to normally prevent rotation of said mandrel.

9. A tool anchor including pipe engaging jaws, a mandrel therefor, a swivel connection means between said mandrel and said tool, and additional means rotatable by said tool to release said jaws, and a spring acting on said additional means to move it to jaw releasing position.

In testimony whereof I hereunto affix my signature this 24th day of June, A. D. 1927.

JAMES S. ABERCROMBIE.