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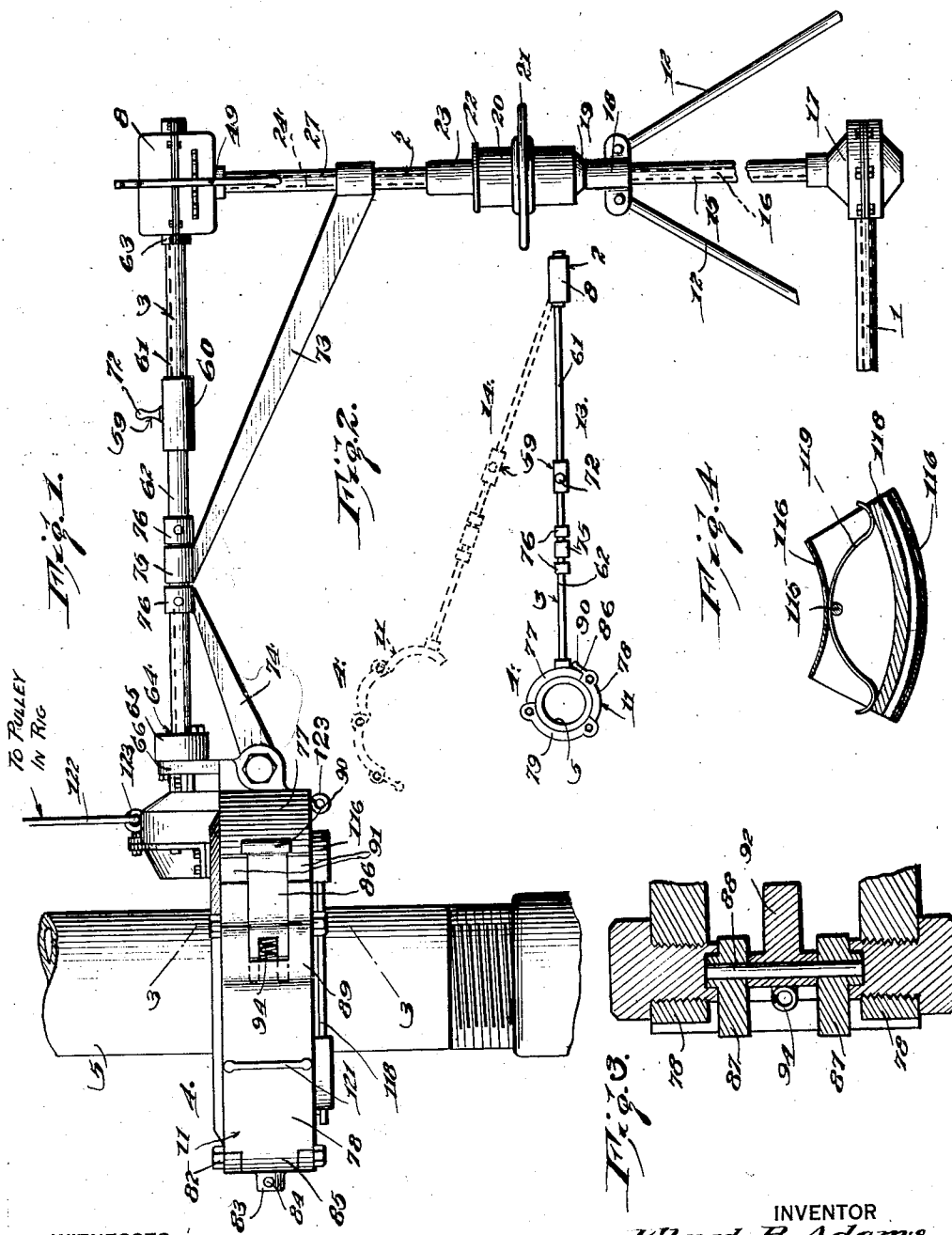
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1,955,727

ROTARY TONGS

Filed Aug. 3, 1929

3 Sheets-Sheet 1



WITNESSES

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Fig. 4

Fig. 2.

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April 24, 1934.

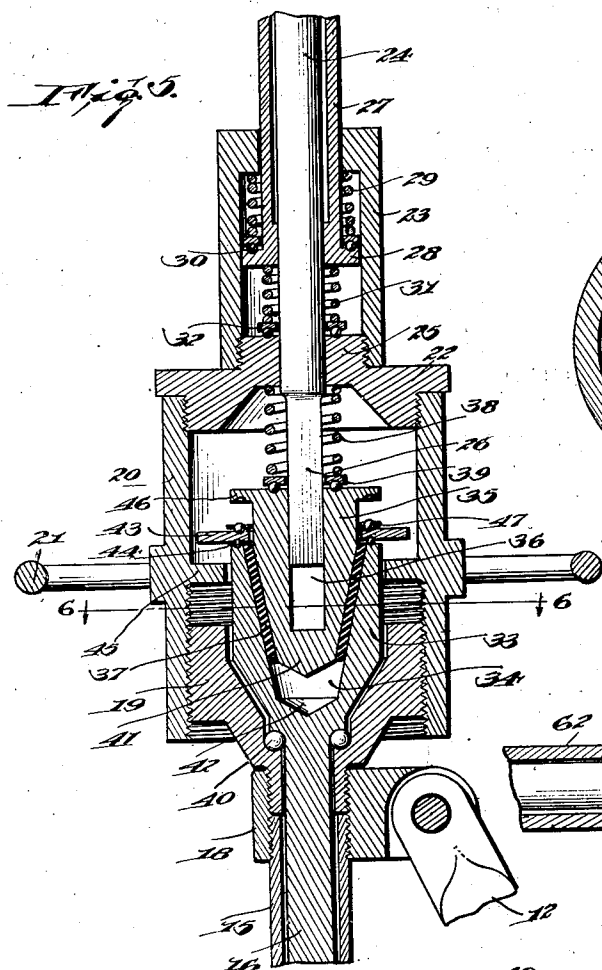
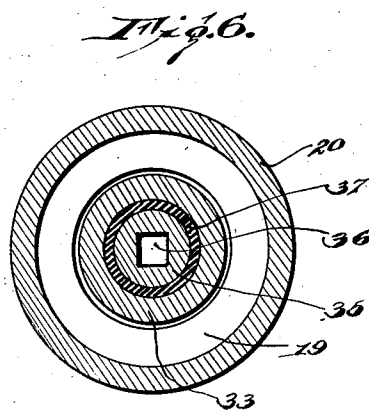
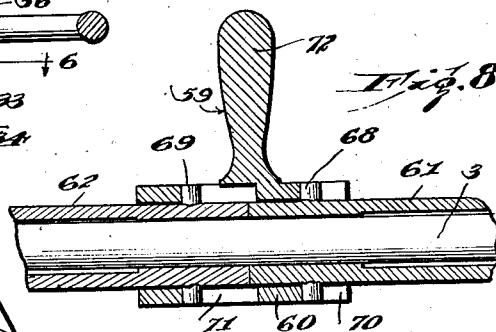
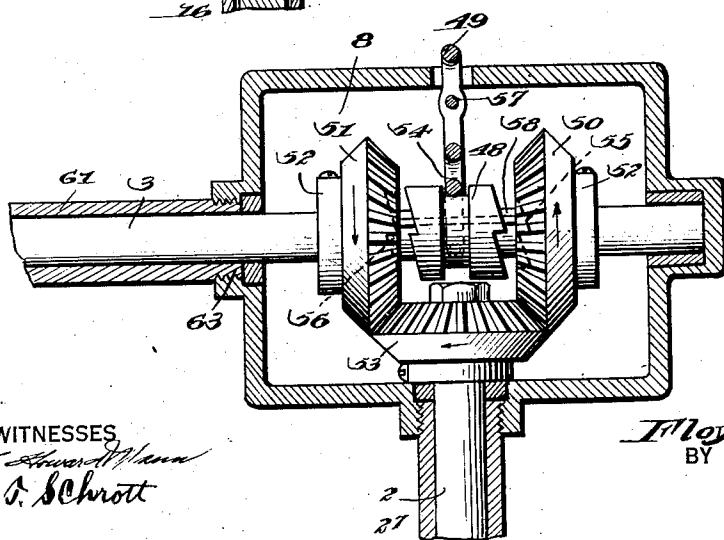
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ROTARY TONGS

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3 Sheets-Sheet 2



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April 24, 1934.

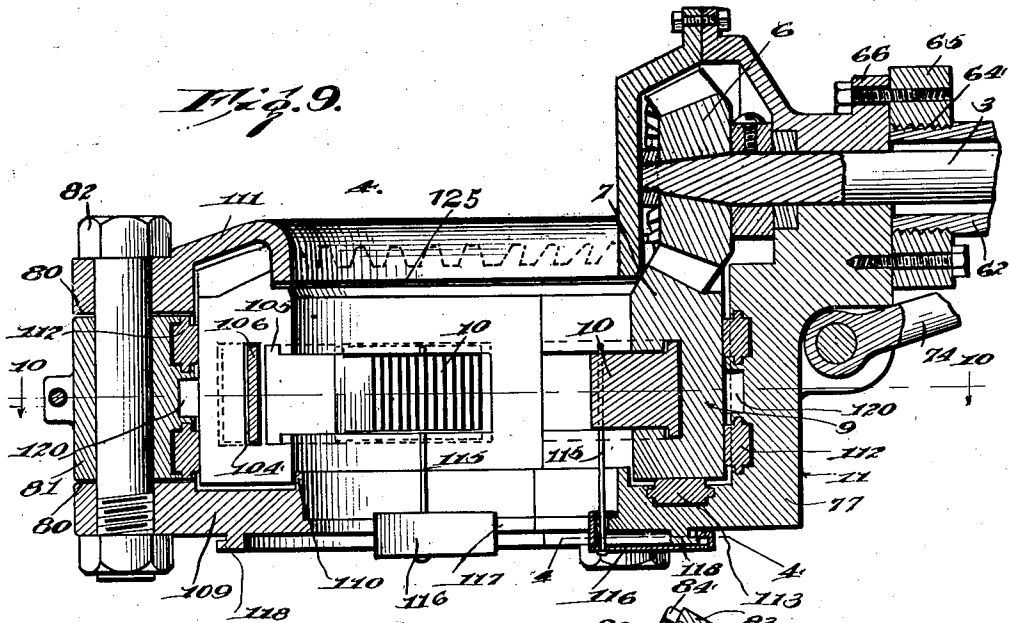
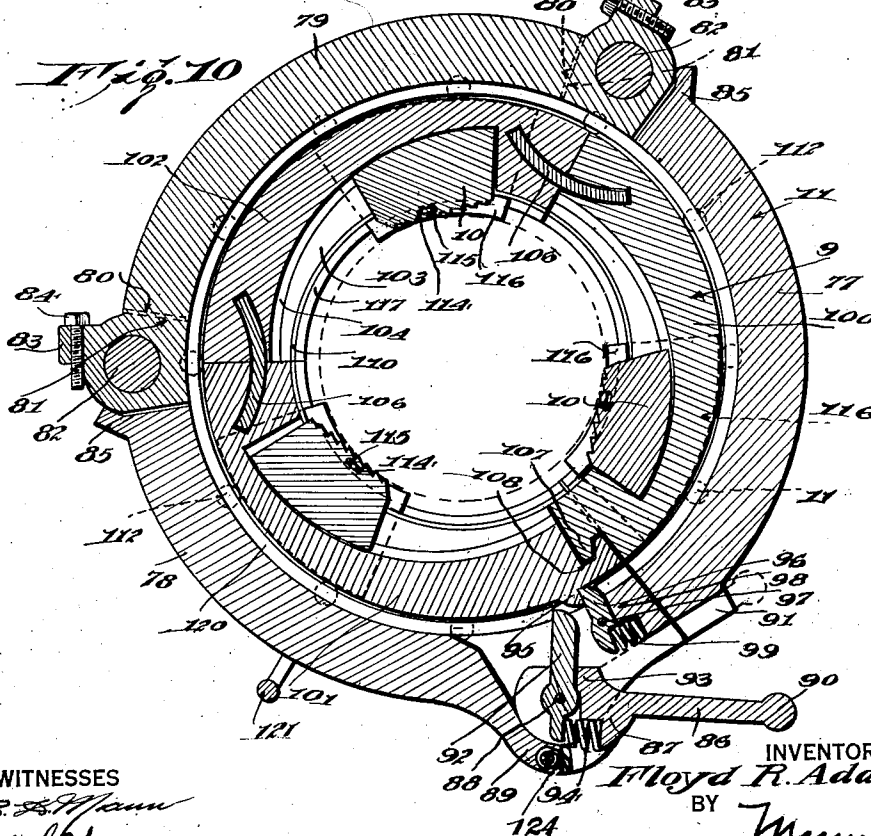
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1,955,727

ROTARY TONGS

Filed Aug. 3, 1929

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,955,727

ROTARY TONGS

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Application August 3, 1929, Serial No. 383,379

22 Claims. (Cl. 81—57)

This invention relates to improvements in rotary tongs and it consists of the construction, combinations, and arrangements herein described and claimed.

5 An object of the invention is to provide an apparatus for rapidly screwing up or unscrewing sections of well tubing or casing particularly while in the well bore, so that the work of drilling the well in the first instance and of dismantling it in the other instance may be expedited.

10 Another object of the invention is to provide a tongs which can be used either for the foregoing purpose and also for revolving the pipe stem of a rotary drill.

15 A further object of the invention is to provide a power regulator for especial use with said tongs, having the attribute of making possible the finest control of the power applied to the tongs.

20 A still further object of the invention is to provide a position reverser by the use of which the position of the tongs in reference to a tube or casing section can be reversed almost instantly from a screwing position, for example, should it be desired to unscrew a section.

25 A still further object of the invention is to provide a latch which is mechanically releasable preparatory to the aforesaid reversal of the tongs, or the removal thereof of the tubing or casing string.

30 Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation illustrating the complete apparatus for handling well tubing and casing sections,

35 Figure 2 is a diagram particularly illustrating how the tongs can be swung away from the tubing or casing string when opened.

40 Figure 3 is a detail cross section of the latch taken on the line 3—3 of Figure 1.

Figure 4 is a detail cross section taken on the line 4—4 of Figure 9.

45 Figure 5 is a vertical section of the power regulator at the right of Figure 1.

Figure 6 is a cross section taken on the line 6—6 of Figure 5.

Figure 7 is a section of the drive reverser shown at the right of Figure 1.

50 Figure 8 is a longitudinal section of the position reverser presently described in connection with Figure 1.

Figure 9 is a vertical section of the tongs.

Figure 10 is a cross section of the tongs taken on the line 10—10 of Figure 9.

55 As already indicated in the foregoing brief

statements of the objects of the invention, the purpose of the apparatus is to speed the screwing up and unscrewing of sections of tubing and casing as well as to make possible the operation of a rotary drill if by any chance the usual mechanism for that purpose has become disabled or not be available. Although the tongs is adapted to a variety of purposes, the particular use herein adopted for illustration is that of screwing up sections of tubing in constructing a tubing string during the drilling of a well.

This operation is very laborious to say the least, for tubing sections of even a relatively small diameter are quite heavy. When these sections are screwed into each other manually considerable time is lost and effort is expended. By having the improved tongs available it is only necessary to swing it into position around the tubing section, clamp it in place, and apply the power. The section having been screwed home, a quick reversal of the drive will automatically release the latch preparatory to swinging the tongs back for the next section.

A necessary adjunct to the tongs is a power regulator which is introduced in the line shaft. This line shaft has several components, but ultimately terminates at the tongs where the power is applied. The regulator makes it possible to control the applied power to very fine degrees so that the tubing section can be screwed down to any speed within the range of the apparatus.

Attention is directed to the drawings. The line shaft which was just alluded to, is illustrated as comprising components 1, 2 and 3, the latter of which terminates at the tongs generally denoted 4, and shown assembled around the section 5 of tubing. At the point of connection of the line shaft with the tongs, the component 3 has a beveled pinion 6 (Fig. 9) which meshes with and drives a gear 7 either in a clockwise or a counterclockwise movement, depending upon the adjustment of the reverser 8 (Figs. 1 and 7).

The gear 7 is part of a grip element 9 which is capable of being opened so as to admit the tubing section 5. It carries slips 10 which grip the section. The gripping element is contained by a master band or collar 11 which has hinges so that it can be opened, and when the collar is opened the gripping element 9 is naturally opened also.

The component 2 is in the nature of a standard. It is supported in the erect position shown in Figure 1 by braces 12 of any suitable number and design, which extend to the floor or other base. The component 3 assumes the horizontal position

shown. It is capable of being swung from the full-line position 13 in Figure 2 to the dotted line position 14. The tongs 4 must be opened before the latter position can be assumed. The purpose of thus swinging the component 3 and the tongs 4 is to enable placing a new section 5 in line to be screwed into the tubing string.

With these general statements the specific structure can now be introduced. A tubular housing 15 (Figs. 1 and 5) encases the lower end 16 of the vertical drive component. The ends of the housing are affixed to a bevelled gear case 17 and to a bracket 18 to which the braces 12 are attached. Secured in the same bracket is a head 19 which is screwed into the threaded lower end of a cylindrical housing 20.

The latter housing is revoluble. It carries a hand wheel 21, or its equivalent, by which the housing 20 is manually revolved. The purpose of revolving the cylindrical housing 20 is to increase or decrease the power applied to the gear 7 of the tongs 4. A cap 22, fitted in the upper end of the housing 20, provides both a closure and a mounting for a spring case 23. The upper end 24 of the shaft component 2 occupies the center of the spring case, passes through the hub 25 of the cap which thus forms a bearing, and enters the housing 20 where it terminates in a square or non-circular end 26.

A tubular housing 27, which, in effect, is a continuation of the housing 15, as far as its protecting function of the component 2 is concerned, slidably enters the spring case 23 and has a flange 28 upon the upper side of which a spring 29 presses through an interposed bearing 30. A second spring 31 presses on the underside of the tubing 27, this having a flange 28 against which the upper end of the spring bears. The remote ends of the springs 29 and 31, respectively, press against an upper wall of the case 23 and against a bearing 32 which rides upon the hub 25.

A cup 33 with a tapered, cross-sectionally circular bore 34, constitutes the upper terminal of the lower shaft end 16. A plug 35, tapered to agree with the bore 34, indirectly constitutes the lower terminal of the shaft end 24. The plug has a bore 36 cross-sectionally shaped to match the end 26 into which the latter fits. The plug 35 is received by the bore 34, a fiber or other friction sleeve 37 being interposed.

There is room enough in the space in the cup 33 below the plug 35 for the accumulation of any of the substance of the sleeve 37 that may wear off. This powder will compose a pad at the bottom, upon which the plug will bear should the sleeve ever wear away to such an extent.

A spring 38, pressing against the under side of the hub 25 and against a bearing 39 riding on top of the plug 35, tends to keep the plug in position with the bore and serves as the flexible medium by which pressure is applied to the plug 35 when the housing 20 is revolved in the clockwise direction by means of the hand wheel 21. As the housing 20 is thus turned, it advances upon the head 19 and produces the pressure. The latter can be adjusted within fine degrees. The spring case 23 follows the housing. The springs 29 and 31 have an equalizing effect. The head 19 is permanently stationary in reference to adjoining parts of the apparatus by virtue of being secured in the bracket 18.

The motion of the housing 20 occurs in reference to the housings 15 and 27, especially in reference to the latter, because it is over the flanged end of this that the spring case 23 is

slidably fitted, as shown. Ball bearings 40 are lodged between the head 19 and the base of the cup 33. The bore 34 of the latter is shaped to conform with the tapering part of the plug 35, as previously indicated, but the form is also such that the sides of the plug and of the cup will not come into contact should the sleeve 37 ever wear entirely away. At such time, the contact would be confined to a conical point 41 of the plug and a corresponding concavity 42 in the base of the cup.

A washer 43 resting upon a bearing 44 which is interposed between it and the upper edge of the cup 33, is intended to unclutch the plug 35 upon turning the housing 20 through a requisite number of revolutions in the counterclockwise direction. For this purpose, the housing has an internal flange 45 which will lift the washer from its seat and thrust it against a flange 46 outstanding from the plug 35. A bearing 47 rides on the washer and will contact the flange 46.

The drive reverse 8 to which reference has been made, includes a clutch element 48 (Figure 7) which is shiftable by a lever 49 to drive the tongs 4 either to the right or left or to stop them entirely. To the latter end, the washer 43 described in connection with Figure 5, is an auxiliary to the drive reverse 8. It is easier to stop the apparatus with the lever 49 than with the hand wheel 21, but should it ever become necessary to unclutch the plug 35 from the cup 33 the hand wheel 21 will be pressed into service, and the same effect cannot be had with the lever 49.

Pinions 50 and 51, loosely mounted on the upper shaft component 3, are held by set collars 52 from separating, and mesh with a gear 53 on the upper end of the shaft component 2. The lever 49 has a yoke 54 by which the element 48 can be moved into engagement with the clutch faces 55 and 56 of the pinions 50 and 51. The lever is pivoted at 57. The clutch element rides on a spline 58.

Movement of the lever 49 to the right (Figures 1 and 7) will impart a clockwise rotation to the shaft component 3 (looking at it from the right end) and the tongs 4 also in the clockwise direction (looking down upon them from the top). Associated with the upper component 3 of the line shaft is a position reverser 59 (Figures 1 and 8). This has nothing to do with the driving of the tongs and it is used solely to turn the tongs upside down from either position that it is capable of assuming, so that the driving power may be applied to the tubing string 5 either in the clockwise direction for screwing the sections home, or in the counter-clockwise direction for unscrewing them. The slips 10 work only one way; that is to say, they grip the tubing in one direction only. Hence, it is necessary to reverse the tongs 4 to unscrew the tubing sections should the tongs happen to be in the position for screwing them.

The reverser 59 comprises a sleeve 60 in which the abutting ends of the upper tubular housings 61 and 62 are assembled. The housing 61 is fixed at the right end at 63 in one side of the reverse housing 8 (Figure 7). The left end of the housing 62 is fixed at 64 (Figure 9) in a collar 65 secured to a flange 66 integral with the master band 11. Upon a release of the section 61 it can be turned around the shaft component 3 and the tongs 4 will go with it, provided the latter have been swung free of the tubing 5, as indicated by position 14 in Figure 2. The ends of the housings 61 and 62 have pins 68 and 69 (Figure 8) which occupy slots 70 and 71 in the sleeve 60.

The slots 71 are closed and are longer than the slots 70. The latter are open at one end of the sleeve. The sleeve has a handle 72. When the handle 72 is pulled to the left, the sleeve will slide along the tubular housings until the slots 70 are clear of the pins 68. The fixed engagement of the sleeve 60 will now be confined to the tubular housing 62 through the pins 69 and slots 71, and the handle can be used to turn the tongs 4 in the manner already described.

Braces 73 and 74 extend from points of connection with the housing 27 and the master band 11, respectively to a sleeve 75, which affords a bearing for the revoluble tubular housing 62 (Figure 1), and one of a pair of set collars 76 are fixed to the housing 62 at each side of the sleeve 75 and tend to keep the parts in place. The braces are assisted in the support of the tongs by a cable 122 that is suspended from the rig and is attached to either ring 123 on some fixed part of the master band 11.

The master band 11 is composed of collar sectors 77, 78 and 79. The sector 79 is bifurcated at each end, as at 80, (Figures 9 and 10) to receive the hinge knuckles 81 of the sectors 77, 78. Bolts 82 constitute the hinge pins. The lugs 83 adjoining the bifurcated ends carry adjustable screws 84, the points of which are engageable by abutments 85 on the adjoining ends of the sectors 77 and 78. The sector 78 carries a handle 121 by which the tongs is manually opened after it has been mechanically unlatched.

As will be seen by a comparison of Figures 9 and 10 with Figure 1, it is the collar sector 77 that makes connection with the tubular housing 62. The sector 77 is thus stationary relatively to the housing 62, but the collar sectors 78 and 79 are capable of being swung upon their respective hinge pins to the open position 14 in Figure 2 when it is desired to free the tubing string 5 of the tongs 4. Under other circumstances, a latch lever 86, spring-pressed at 124, will hold the collar sectors closed around the tubing string. The base 87 of the latch lever is pivoted at 88 in a hollow protuberance 89 at that end of the sector 78 adjoining the sector 77. The pin 90 into which the free end of the lever is formed is engageable with lugs 91 on the adjoining end of the sector 77 to lock the master band.

A latch bar 92 is mounted on the pivot 88 in common with the lever 86. It is pressed into engagement with a heel 93 on the lever base 87 by a spring 94. The latch bar is engageable by a tooth 95 upon a reversal of the direction of turning of the gripping element 9 when it is desired to release the tongs 4 from the tubing string 5, thus bringing pressure to bear upon the heel 93 and causing the disengagement of the pin 90 from the lugs 91.

A dog 96, pivoted at 97 in the hollow protuberance 89, is intended to stop the turning of the gripping element 9. The continuous driving power supplied to the apparatus will be dissipated at such time by slipping of the plug 35 (Figure 5) within the friction sleeve 37. The operator should promptly throw the lever 49 into the neutral position so that there may be no undue heating of the power regulator. A shoulder 98 of the sector 78 forms an abutment for the dog 96 against which it is yieldably held by a spring 99.

During the operative turning of the gripping element 9; that is to say, when it is turning a section of the tubing string 5 either for screwing or unscrewing, the tooth 95 will simply pass over the dog 96 and latch bar 92, depressing these

against the respective springs. But upon reversing the gripping element 9, as when it is desired to instantly unlock the master band 11 and stop the tongs 4 preparatory to shifting them to the position 62 in Figure 2, the tooth 95 will first act upon the latch bar 92 to release the latch lever 86, then engage the dog 96.

The gripping element 9 is composed of gripping sectors 100, 101 and 102. These have eccentric ways 103 to receive the slips 10. They are grooved at 104 to receive ribs 105 on the slips to keep the latter in place. Moon keys 106 (Figures 9 and 10) connect the sectors 100 and 101 with the sector 102, while the adjoining ends of the sectors 100 and 101 are connected by tongues and grooves 107 and 108. Upon opening the tongs, the gripping sector 101 will swing away from the sector 100 with the collar sector 78. The gripping sector 101 will slip outwardly on the end of the adjoining moon key 106. This key, as well as the other moon key, is formed on the arc of the circle through which the sector 78 swings. It is observed that the dog 96 will stop the gripping element in that position wherein the joints of the gripping sectors radially aline with the hinge pins 82 so that the foregoing swinging can be accomplished.

An internal ring 109 (Figure 9) with an upstanding flange 110 coacts with a covering flange 111 in retaining the gripping sectors 100, 101 and 102 in place within the master band 11 for which purpose the flange is directed inwardly at 125, especially when the tongs is opened for reversing. Roller bearings 112, suitably mounted at places on the inner walls of the master band, receive the radial thrust of the gripping element, while similar roller bearings 113, mounted in the ring 109, receive the downward thrust. The ring 109, being a part of the master band 11, is sectional in its nature in agreement with the sectors 77, 78 and 79 themselves.

Slots 114 in the slips 10 receive pins 115 which arise from and are integral with clips 116 (Figures 1, 4 and 9). These clips are arcuate and segmental (Figure 10). They are formed to ride upon an internal rib 117 within the ring 109 and upon a flange 118 depending from the ring. A leaf spring 119 (Figure 4) abuts the depending flange in the instance of each clip and exerts inward pressure upon the internal wall of each clip, thus tending to hold the slips 10 still against the tubing string while the grip element 9 is rotated, causing the slips to move radially inward until the tubing 5 is sufficiently gripped.

An annular groove 120 formed internally of the master band 11 accommodates the tooth 95. It is in this groove that the tooth moves when the gripping element 9 is revolved. It is also into this groove that the points of the latch bar 92 and dog 96 project so as to be accessible to the tooth 95. The slips 10 revolve with the gripping element 9 and as they do, the clips 116 travel around upon the internal rib 117 and the depending flange 118.

The operation is readily understood. The tongs 4 can be swung in the horizontal plane, as indicated by Figure 2. This is a diagram looking down upon the apparatus. The vertical shaft component 2 constitutes an upright standard upon which the horizontal shaft component 3 can swing in the manner indicated. The tongs 4 is actually connected with the section 62 of the tubings with which the component 3 is encased, but the tubular housings swing with the shaft component as one.

Assume the tongs 4 to be in the gripping posi-

tion. This is shown in Figure 1 and indicated by full lines in Figure 2. The gripping element 9 and master band 11 have been closed around one of the sections of the tubing string 5, and held by the latch 86. Driving power is applied to the gripping element 9 by the line shaft 1, 2 and 3 and by the pinion 6 (Figure 9) which meshes with the gear 7 of the gripping element. The gripping element revolves but the master band 11 remains stationary.

As the gripping element 9 is revolved in the clockwise direction (Figure 10) the slips 10 will be forced into the small ends of the ways 103, thus securing a firm grip upon the tubing section 5 at three points.

The amount of turning power delivered to the tubing section 5 depends upon the adjustment of the power regulator (Figure 5). To increase the power, one must turn the hand wheel 21 in the clockwise direction (looking down). The cylindrical housing 20 will thus advance upon the fixed head 19. The hub 25 will bear down upon the spring 38 with increasing pressure so that the pressure of the plug 35 against the sleeve 37 is increased. Any of the substance wearing from the sleeve will fall into the bottom of the bore 34. Should all of the sleeve ever wear away, the sides of the plug 35 would be prevented from contacting with the sides of the bore 34 by the prior engagement of the conical point 41 with the concavity 42. A diminution of the applied pressure is gotten by reversing the turning of the hand wheel 21.

Assume that it is desired to release and stop the tongs. One of these actions occurs immediately after the other. The object is accomplished by throwing the lever 49 (Figure 1) to the left into reverse. The clutch element 48 (Figure 7) will then be engaged with the pinion 46. Before that it was engaged with the pinion 45. In Figure 1 the lever is in neutral. The driving effort of the gear 48 is imparted to the shaft component 3 in the counter-clockwise direction (looking in from the right). The directions of the pinions 6 and gear 7 (Figure 9) are reversed, and the gripping element 9, instead of turning clockwise, will now turn counter-clockwise.

The slips 10 are urged into the wide ends of the ways 103 and release their grip on the tubing string. The tooth 95 will first strike the latch bar 92. Pressure against heel 93 will throw the latch lever 86 to the full line position (Figure 10). The tooth next comes into engagement with the dog 96 by which the gripping element 9 is held and stopped.

Since the application of the driving power is regarded as being continuous, it is evident that something must yield. Yielding takes place within the power regulator, and occurs by a slipping of the plug 35 within the sleeve 37. In order to prevent undue heating, the operator should promptly throw the lever 49 into neutral. The operator will use the handle 121 to open the tongs and throw it back into the dotted line position 14 in Figure 2. Another tubing section is put in position and the tongs 4 is replaced and locked.

Assume that it is desired to unscrew a tubing section. Since the slips 10 work only in one direction, it becomes necessary to reverse the tongs. This is done by use of the position reverser 59. The opening and stopping of the tongs is first accomplished by the lever 49 in the manner previously described. Having freed the tongs, the handle 72 and sleeve 60 of the position reverser are slid to the left (Figure 8). This frees the

tubing section 56, but by virtue of the sleeve maintaining its grip upon the tubing section 57 the latter can be turned through 180° by pulling over and bearing down upon the handle 72.

While the construction and arrangement of the improved rotary tongs is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:—

1. A rotary tongs comprising a gripping element having slips effective to turn a well tubing section in one direction, a collar in which the gripping element is revoluble, a pair of tubular housings of which one is connected with the collar and each has adjacent pins, means upon which the other housing is swivelly mounted, and a manually operable position reverser for coupling said housings comprising a sleeve receiving the confronting ends of said housings and having slots receiving the pins, one of said slots being shorter than the other and open at one end of the sleeve for a departure of the pin from the respective slot when the sleeve is shifted in one direction.

2. A rotary tongs comprising a sectional collar, a latch for closing it, a sectional gripping element carried by the collar, means for revolving the gripping element in one or the other direction, and means for releasing the latch preparatory to opening the collar and immediately thereafter stopping the rotation of the gripping element upon a reversal of the revolution of the gripping element when the respective sections of the gripping element and collar are in registration with each other.

3. A rotary tongs comprising a sectional collar, a sectional gripping element revoluble in respect to the collar, means for revolving the gripping element in one or the other direction, and means on the collar by which the gripping element is stopped when the respective sections come into registration upon a reversal of revolution of the gripping element.

4. A rotary tongs comprising a sectional collar, a yieldable dog carried thereby, a sectional gripping element revoluble in respect to the collar, means for revolving the gripping element in either direction, and a tooth carried by the element being engageable with the dog to stop the element in respect to the collar when said sections come into registration upon revolving said element in one direction.

5. A rotary tongs comprising a collar having a hinged sector, a latch for holding the collar closed, a gripping element revolubly carried by the collar having a swingable gripping sector, means for revolving the gripping element in either direction, and means for first undoing the latch upon a reversal of the revolution of the gripping element then stopping the gripping element when said sectors come into registration for a mutual opening movement, and swiveling tongs-supporting means in reference to which the collar can be swung away from a well tube after the sectors have been opened.

6. A rotary tongs comprising a collar composed of stationary and hinged sectors, a latch lever carried by the hinged sector and a lug on the stationary sector with which the lever is engageable to close the collar, a gripping element including a swingable gripping sector revolubly carried by the collar, a latch bar being yieldable in one direction, coacting with the lever and confronting

said element, a dog carried by the collar also confronting said element and being yieldable in one direction, means for revolving the element in either direction, a tooth on said element first engaging the latch bar to displace the lever upon revolving said element in one direction, then engaging the dog to stop the revolution of the element when said sectors come into registration for a mutual opening movement, and swiveling tongs-supporting means in reference to which the collar can be swung away from a well tube after the sectors have been opened.

7. A rotary tongs comprising a collar composed of hinged sectors, a gripping element revolvably carried by the collar composed of swingable gripping sectors, and means for stopping the gripping element during revolution in one direction so that the joints of the sectors align radially preparatory to swinging them open.

8. A rotary tongs comprising a collar composed of hinged sectors, a gripping element revolvably carried by the collar being composed of gripping sectors, means for stopping said element during its revolution in one direction so that the joints of the gripping sectors radially align with the hinged joints of the collar sectors, and keys connecting the gripping sectors being struck on an arc with the hinges as centers so that the gripping sectors can swing with the collar sectors.

9. A rotary tongs comprising a gripping element having a movable slip, a collar in which the element is revolvable having an internal rib and a depending flange, a segmental clip applied to said rib and flange and being capable of radial movement, a pin connecting the slip with the clip, and a spring embodied in the clip exerting inward pressure and tending to keep the slip from rotating with the gripping element so that relative movement between the gripping element and the clip may cause the slip to move radially inward or outward.

10. A rotary tongs comprising a collar composed of a relatively stationary sector and sectors hinged to each other and to said stationary sector, a segmental gripping element carried by the collar, a line shaft having a horizontal component with gear connections to the gripping element and a vertical component, tubings by which said components are encased, one end of a tubing of the horizontal component being connected with the collar, and means at which the horizontal and vertical tubings are joined, constituting a point at which horizontal swinging of the collar and its carried parts can be accomplished.

11. A rotary tongs comprising an openable gripping element to grip a well tubing, a shaft having a driving connection with said element for revolving it, a collar in which the element is revolvable, tubular housings encasing the shaft having the near ends in abutment and the remote end of one of the housings attached to the collar, means applied to said abutting housing ends for enabling turning said one housing in respect to the shaft for reversing the position of the collar and gripping element in respect to the well tubing, and swivelly mounted means to which the remote end of the other housing is attached enabling swinging of the collar and gripping element when the latter is opened.

12. A rotary tongs comprising a collar composed of openable sectors, a support for the collar on which it can be swung toward and away from as well as be reversed in respect to an object to be turned, a gripping element revolvable in the collar composed of correspondingly openable sec-

tors, means by which registration of the respective sectors is compelled prior to opening and means carried by the collar sectors insuring the retention of the gripping sectors when the collar is opened and reversed.

13. A rotary tongs comprising a member capable of being opened and closed respecting an object to be turned, a gripping element journaled upon said member and capable of gripping said object when the said member is closed, a line shaft for driving the gripping element, a jointed housing containing the line shaft and supporting the member to which end it constitutes a standard, and means at the joint in the housing enabling swinging that portion carrying the member so that the member can be swung away from the object when opened.

14. A rotary tongs comprising a member capable of being opened and closed respecting an object to be turned, a gripping element journaled upon said member arranged to grip the object when said member is closed, a line shaft for driving the gripping element being separated into horizontal and upright components, corresponding tubular housings containing said components, one of these having said member attached thereto the other constituting a supporting standard, and means arranged at the juncture of the housings enabling swinging of the horizontal component so that said member can be swung away from and toward said object when opened.

15. A rotary tongs comprising a line shaft divided into horizontal and upright components, means to grip an object and revolve it in one direction, means by which the gripping means is revolved by the line shaft, a support for the gripping means comprising tubular housings encasing the horizontal and upright components of the line shaft, the upright housing component constituting a standard movable adjacent to said object, means connecting the horizontal and upright components of both the shaft and housing enabling swinging of the gripping means toward and away from the object, and means embodied in the horizontal component of the housing enabling manual reversal of the gripping means in respect to the rest of the housing and said object to revolve the latter in the opposite direction.

16. A pipe rotator comprising a plurality of pivotally mounted jaws for encircling and clamping a pipe, means to latch said jaws in a clamping and encircling position in reference to a pipe, a sectional rotor mounted in the jaws, the jaws and the rotor having interfitting flanges and grooves to retain the sections of the rotor in position when the jaws are open, and a pipe engaging means in the rotor to engage the pipe on partial rotation of the rotor and to rotate the pipe with such rotor.

17. A pipe rotator comprising jaws to encircle a pipe, a rotor formed in sections, mounted in the jaws, and having means to engage a pipe, means to check the rotation and to align the sections of the rotor with the jaws enclosing the sections, and means to rotate the said rotor.

18. A pipe rotator having a stationary frame section with a pair of jaws pivotally connected thereto, means to clamp said jaws encircling a pipe, a split rotor mounted in the jaws and having means to engage the pipe, means to check the rotation and to position the rotor with the split sections positioned to open and close the rotor on opening and closing of the jaws.

19. A pipe rotator having clamping jaws pivotally mounted to encircle a pipe and having an

abutting face, a sectional rotor mounted in said jaws, means to retain the rotor in the jaws from radial displacement when said jaws are both closed and opened, means in the rotor to clamp a pipe, and means to rotate the rotor.

20. A pipe rotator comprising a plurality of pivotally mounted clamping jaws with means to secure said jaws in their clamped position, a sectional rotor mounted in the jaws, means to rotate the rotor, a gripping means in the rotor to engage a pipe on the rotation of the rotor in one direction, means to stop rotation of the rotor in the opposite direction, said means aligning the sections of the rotor in an opening position with the clamping jaws, the pipe gripping means releasing the pipe on the reverse rotation of the rotor.

21. A pipe rotator comprising a relatively stationary hub section having a gear mounted therein and a driving motor connected to said gear mounted thereon, a plurality of clamping jaws pivotally connected to the hub and having abutting faces, means to latch the jaws with the abutting faces together, a sectional rotor mounted in the jaws

and having a gear meshing with the gear in the hub, and pipe engaging means in the rotor, a rotation stopping means mounted on the jaws and interacting with the rotor to permit rotation of the rotor in a forward direction but to stop rotation in a reverse direction with the sections of the rotor in alignment with the abutting faces of the jaws for opening and closing.

22. In a pipe rotator, a plurality of pivotally mounted jaws with means to secure said jaws in an encircling manner in reference to a pipe, a sectional rotor mounted in the jaws and having means to engage a pipe, means to rotate the rotor in a forward direction, a pivotally mounted finger on one of the jaws, a block on the rotor engaging the said finger and shifting such finger on the forward motion of the rotor, and an abutment piece engaging the said finger when moved by the block in the reverse rotation and thereby centering the sectional rotor for opening on opening the jaws.

FLOYD R. ADAMS.

25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150