This invention relates to pipe and casing spinning apparatus and it has reference to an apparatus adapted for use in well drilling operations.

The principal object of the invention is to provide an apparatus of the character specified, through which casing is passed into and out of the well and having means for gripping the casing, combined with means for rotating the gripping means to spin the pipe.

Another object of the invention is to afford a means for saving time in handling casing and for other uses where it is necessary to join threaded pipe sections together. Moreover, the invention effects a saving in cost of the operations as conventionally carried out inasmuch as it minimizes frictional wear upon the rope or cable employed for the purpose.

Another object of the invention is to provide means for rewinding the rope or cable automatically when the latter is unwound from the apparatus in the operation of spinning a section of pipe.

Broadly, the invention aims to supplant the hazardous and expensive practice of winding a rope about the section of pipe to be spun and exerting a pull thereon by a revolving cat-head. The invention provides a shield for the rope or cable and eliminates the possibility of entanglement therein of workmen which may result in serious bodily injury as has often been the case with the described method.

With the foregoing objects as paramount, the invention has particular reference to its salient features of construction and arrangement of parts which will become manifest as the description proceeds, taken in connection with the accompanying drawings, wherein:

Figure 1 is a plan view of a spinning device constructed according to the present invention with portions of the cover removed with parts in cross section.

Figure 2 is a side elevation.

Figure 3 is an elevation in diametrical cross section.

Figure 4 is a fragmentary detail view in perspective showing the manner in which one end of the spring is secured.

Figure 5 is a similar view showing the manner in which the opposite end of the spring is secured.

Figure 6 is a detail view of one of the work engaging elements showing its displaced or operative position in dotted lines, and

Figure 7 shows a modified form in which the spring return means is substituted by a cable having a weight suspended from one end thereof.

The present invention, while capable of independent operation, has been particularly designed to operate in conjunction with the drum and friction control apparatus described in the co-pending application of Walter W. Foster, filed April 11, 1933, Ser. No. 15,910 in which means are provided for frictionally actuating a drum for winding thereon a rope, the operating element of the present invention as will become apparent.

Continuing with a more detailed description of the drawings, 1 designates an annular housing arranged to encompass the pipe or casing 2. Superimposed upon this housing is a flanged drum 3 having a central opening 4, surrounding which is a beveled casing or pipe guide 5. The drum 3 has a depending flange 6 and the annular space defined by the housing 1 and flange 6 serve as a chamber for a spring 7, reference to which will be again made presently.

The peculiar construction of the drum 3 is such that concentric annular spaces a and b are provided, the outer serving as the drum in which a rope or cable c is coiled, as apparent in Figures 1 and 3. One end of the rope d is secured in an apertured boss e, shown in Figure 1, by means of a clamp f secured to the end of the rope. The rope surrounds the drum 3 a number of times and extends out through a slot in the side of the housing 1 and which slot is embraced by a shield g.

It is apparent that the rope extends tangentially with respect to the rotatable axis of the drum and its free end is connected to a revolving element at a suitable distance from the apparatus. Obviously, a pull exerted upon the rope or line h will rotate the drum 3 and the initial rotary action imparted to the drum will actuate collectively a multiplicity of relatively spaced and annularly disposed slips i. This is true for the reason that the slips are pivotally or rotatably mounted upon pins j, disposed vertically in the annular space b. It is apparent that each of the slips or work engaging elements i are provided with slightly arced slots or recesses k, into which extend a series of pins 12.

In Figure 3 it will be noted that the pins 12 rotate with the drum 3 while the pins l are fixed in relation to the beveled guide m and the inner shield n of the spinning device which are secured together. Accordingly, the initial pull upon the rope d will cause the pins 13 to move a predetermined extent relative to the pins k before the latter are effective in bringing the serrated elements o, carried by the slips into operative or gripping engagement with the pipe 2.
When engagement is thus effected, rotation of the drum 3 in one direction will maintain this engagement and will apply a force sufficient to rotate the pipe 2 to effect disengagement of two sections of pipe. Reverse rotation of course will relieve the pressure upon the work engaging elements 12 whereupon they return to their impervious positions within the annular space b.

During the operation explained in the foregoing, it will be understood that the housing 1 remains stationary. In Figures 1 and 2 it will be noted that a handle 18 extends at right angles to the axis of the apparatus and is provided with a boss 19 into which is threaded a rod or pipe 20 and by which the apparatus is suspended in the derrick or adjacent its point of operation. It is preferred that the weight of the handle 18 be such as to counter-balance the apparatus itself and since this handle is anchored to some suitable point in the derrick, the housing 1 is constrained against rotation.

Interposed between the inner flange 21 of the housing 1 and the flange 6 of the drum 3 is a bronze sleeve 22. This sleeve is affixed by means of a rivet 23 to the drum 3 and therefore rotated therewith. This bronze sleeve or bushing assumes the frictional wear between the two flanges 6 and 21 and may be readily replaced by a new flange should the wear thereon be such as to require it. An annular sleeve 24 surrounds the lower end of the inner shield 16 and is secured by means of set screws 25. This sleeve assumes the weight of the housing 1 as apparent in Figure 3.

In Figures 4 and 5 is shown the preferred method of securing the ends of the spring 7 so that it will operatively return the drum 3 to its initial starting position after the rope or cable 8 has been spent. A suitable recess c is made in the outer wall of the housing 1, as shown in Figure 4 and a hook d is made in the end of the spring 7 to be received in this recess c. The plate 26 of the rope shield 11 is so shaped as to conform to the outer periphery of the housing 1 and conceals the recess c. Thus, the outer end of the spring 7 is secured. The inner end of the spring 7 is secured in the manner shown in Figure 5. A suitable slot is made in the lower end of the drum 3 to receive a hooked inner end of the spring 7, overlying which is the bronze bushing 22. With both ends of the spring fixed in the manner shown in Figures 4 and 5, rotation of the drum 3 as by withdrawing therefrom the rope 8 will cause the spring 7 to wind, which brings tension thereupon to such an extent that when the rope 8 is released through the action of the spring, the drum 3 will be rotated by the spring to such an extent as to return to the drum 3 the number of turns or coils of rope spent in the operation of uncoiling a joint of pipe. It will be remembered that the initial movement of the drum 3 caused by exerting a pull upon the line 8 actuates the slips or working engaging elements 12. The slips are continuously engaged until the pull upon the line ceases, after which the drum 3 is released to return to its initial starting position, caused by the spring 7, returns the slips 12 collectively to the retaining position within the annular chamber b.

In order to adapt the invention to pipes of varying diameters, it is simply necessary to substitute the serrated inserts 17 with inserts of different widths, i.e., should it be necessary to apply the invention in opening a pipe of a diameter less than that shown in the drawings, inserts of increased width are employed and vice versa.

In some cases, it may be desired to omit the spring 7 and substitute therefor another form of means for returning the drum 3 to its initial starting position. Such a modification is shown in Figure 6 and is comprised of the upper drum 21 and lower drum 26. The upper drum is provided with the beveled casing guide 29 and surrounding this drum is a rope or cable 30, one end of the rope being secured to the drum while the other end surrounds a rotating element 31, disposed upon a shaft 32. A line 33 surrounds the lower drum which is operatively connected to the upper drum and passes under a sheave 34 and over a similar sheave 35 and to its free end is suspended a counterbalanced weight 36. Obviously, when the spool 31 is rotated a predetermined extent, a certain amount of the line 30 is withdrawn from the drum 27 and an equal amount of the line 33 is wound upon the companion drum 26. The weight 36 is sufficient to release the engaging element 31 not shown in this figure, and to wind the line 30 on the drum 21 preparatory to entering operation. This modification operates substantially the same as the preferred embodiment described in the foregoing and illustrated in Figures 1 to 5 inclusive.

Manifestly, the construction shown is capable of considerable modification and such modification as is considered within the scope and meaning of the appended claims is also considered within the spirit and intent of the invention.

What is claimed is:

1. Apparatus for spinning pipe and casing including a housing constructed to encompass the work and a drum having inner and outer annular grooves, the outer of said grooves containing a coiled line, a casing shield and guide, slotted work gripping elements in annularly spaced relationship in the inner groove of said drum and arranged to advance upon said work when a pull is exerted on one end of said line, pins carried by said guide, entering the slots of said work gripping elements to actuate the same on their pivots to operative position, and means also within the housing to return said line and said elements to normal position when said line is spent or partially spent.

2. Casing spinning apparatus including a stationary housing and a casing guide and shield in fixed relationship, rotatably disposed in said housing, a drum having inner and outer annular grooves therein and disposed between said shield and housing, the outer grooves of said drum having wound therein a pull line, a series of casing engaging dogs pivoted to said drum in annularly spaced relationship in the inner groove of said drum, each having arcuate slots therein, pins carried by said casing guide receivable in said slots, and means interposed between said housing and drum for returning the latter to its original position after actuation by said pull line to effect operative displacement of said dogs by said pins.

3. Apparatus for imparting rotary motion to pipes and the like in threadedly assembling and disassembling joints, the apparatus including a stationary housing having a chamber containing an annularly grooved drum capable of rotation in said invention to other of varying diameters, it is simply necessary to substitute the serrated inserts 17 with inserts of different widths, i.e., should it be necessary to apply the invention in opening a pipe of a diameter less than that shown in the drawings, inserts of increased width are employed and vice versa.
when rotated, a pipe guide and shield within said drum, a plurality of slotted pipe gripping elements pivotally connected to said drum, and means carried by said guide, receivable in the slots of said elements to actuate the same when said drum is rotated to urge said pipe gripping elements against said pipe when a pull is exerted on said cable against said pipe.

4. A casing and pipe spinning apparatus including a stationary housing arranged to embrace a string of pipe and having a rotatable drum therein provided with an annular groove for receiving the coils of a cable, one end of said cable being secured in said groove and the other end to a pulling means, a casing means, a casing guide and shield, work engaging elements pivotally mounted in said drum and having slots therein, pins carried by said guide and receivable in said slots, said elements being actuated to engage said work when the drum is rotated in one direction as said cable is withdrawn from the housing, and means also within said housing for reversely rotating said drum to return said cable and move said work engaging elements to normally inoperative position.

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