

tubing section 72. Tubing section 74 passes through the chuck mechanism and is engaged by movable jaws 44.

In operation, sections of tubing to be made up into a tubing string are fed to the tubing make-up device by an elevator, not shown in the drawings. While the tubing string is supported by the elevator, spider slips 20 are removed from the spider 19 and crosshead 18 is raised by means of the hydraulic cylinders to its uppermost position with respect to base plate 5. The tubing is then lowered through the central opening in the chuck mechanism and the drive quill until the coupling at the upper end of the tubing string is in a position immediately above the top drive rod plate 55. Spider slips 20 are then inserted into the spider 19 to support the tubing string. The elevator may then be unclamped and used to pick up another section of tubing. Crosshead 18 is lowered by the hydraulic cylinders, bringing tubing section 72 and its attached coupling 73 into the position shown in Figure 1. The next section of tubing 74 is lowered by the elevator through the central opening of the chuck mechanism until its threads are in position for engagement with the threads of coupling 73. The rotary table may then be started or, if desired, it may be run continuously during the operation of making up a complete tubing string. The rotation of the rotary table is in a clockwise direction. Brake operating lever 58 is moved to tighten the lined brake band 48 about the outer periphery of the lower ring gear 46. It is to be noted that, since the eccentrics 59 and 60 are oppositely disposed on the brake eccentric shaft 57, either of the lined brake bands may be tightened about its corresponding ring gear independently of the other by movement of the brake operating lever in the proper direction. The action of the brake stops rotation of the lower ring gear 46 and causes pinions 49 to roll along the ring gear, rotating pinion shafts 50 and causing movable jaws 44 to be moved toward tubing 74 by coaction of the external threads of the shafts and the internal threads of the movable jaws. The six pinions operating simultaneously force the six movable jaws into engagement with the tubing to grasp it firmly. Power transmitted to the chuck mechanism by the drive rods 37 rotates the tubing section 74 in a clockwise direction, thereby making up the coupling joint. As the threaded portion of the tubing section 74 is screwed into the in-

ternally threaded coupling 73, the chuck mechanism follows the lead of the thread. The construction of the unit is such as to allow freedom of vertical movement. When the joint is made, the brake operating lever 58 is moved to tighten the lined brake band 47 about the upper ring gear 45 to stop the rotation of the ring gear. Pinions 49 then roll along the upper ring gear 45, rotating the pinion gear shafts 50 and causing the movable jaws 44 to be retracted which releases the tubing section from the chuck mechanism. The action of the counterweights 67 and 67' then returns the chuck mechanism to its limiting position in an upward direction or to the position shown in Figure 1, after which the cycle of operations is repeated until a string of tubing of the desired length is made up.

It will be apparent to those skilled in the art that the device may be used for rotary drilling by merely removing the spider slips 20 and that it may be readily converted into a rotary drilling apparatus by substituting a chuck for spider 19 and spider slips 20 and providing slips in the drive quill to hold the kelley or grief stem.

Throughout the specification, the term tubing is intended to include casing, drill pipe, or solid rods, all of which may be readily made up into string by the use of my invention.

Various changes may be made in the size, shape, and relative position of parts without departing from the spirit of our invention as expressed in the accompanying claim forming a part of this specification.

We claim:

In a tubing make-up device, a chuck mechanism comprising a drive ring, movable jaws in said drive ring for engaging a section of tubing, pinion gears in threaded engagement with the movable jaws for moving the jaws into and out of engagement with the tubing, a ring gear engaging the pinion gears on one side, a second ring gear engaging the pinion gears on the opposite side, braking surfaces on the ring gears, braking means arranged for engagement with the braking surfaces to selectively arrest the motion of either ring gear relative to said drive ring, and driving means for imparting rotary motion to said drive ring, said drive ring being slidably connected to said driving means and free to move relative thereto along the axis of rotation.

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