Aug. 21, 1951 W. J. BIELSTEIN 2,565,345

DEVICE FOR SPINNING PIPES

Filed Oct. 21, 1949 3 Sheets-Sheet 1

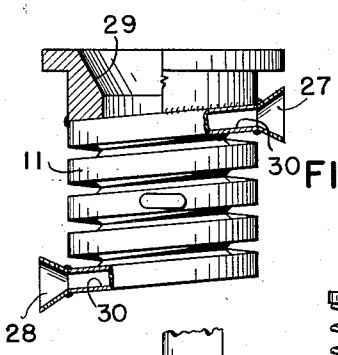


FIG. 4.

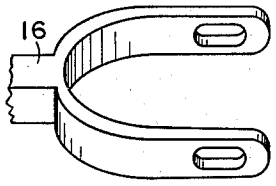


FIG. 7

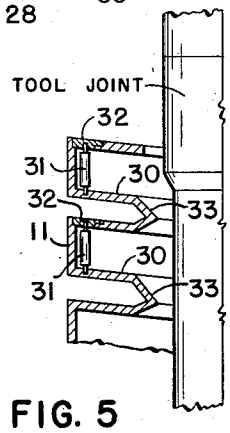


FIG. 5

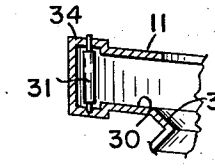


FIG. 6

FIG. 1.

INVENTOR.
Walter J. Bielstein,
BY
Thomas B. McCulloch
AGENT.

Aug. 21, 1951 W. J. BIELSTEIN 2,565,345

DEVICE FOR SPINNING PIPES

Filed Oct. 21, 1949 3 Sheets-Sheet 2

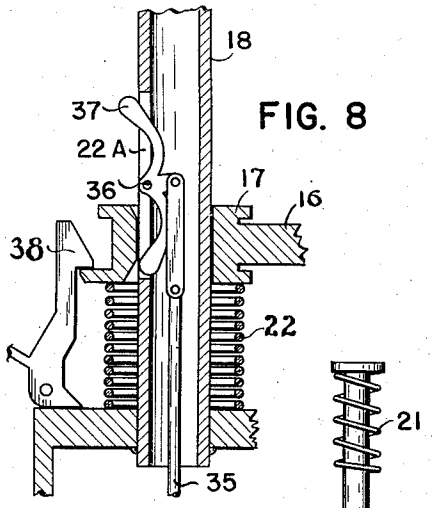


FIG. 8

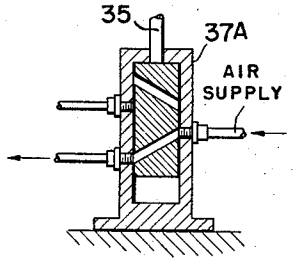


FIG. 9.

FIG. 2.

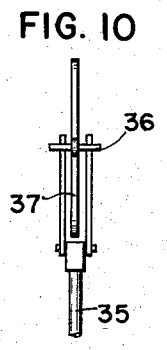


FIG. 10

INVENTOR.
Walter J. Bielstein,
BY
Thomas B. Mitchell
AGENT.

Aug. 21, 1951 W. J. BIELSTEIN 2,565,345

DEVICE FOR SPINNING PIPES

Filed Oct. 21, 1949 3 Sheets-Sheet 3

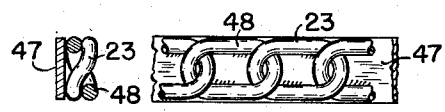


FIG. 15. FIG. 14.

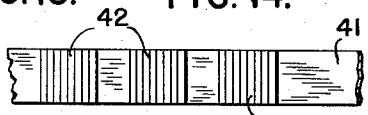


FIG. 11

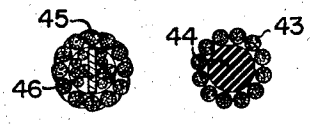


FIG. 13 FIG. 12

FIG. 3.

INVENTOR.
Walter J. Bielstein,
BY
Thomas B. McCulloch
AGENT.

Patented Aug. 21, 1951

2,565,345

UNITED STATES PATENT OFFICE

2,565,345

DEVICE FOR SPINNING PIPE

Walter J. Bielstein, Houston, Tex., assignor, by mesne assignments, to Standard Oil Development Company, Elizabeth, N. J., a corporation of Delaware

Application October 21, 1949, Serial No. 122,767

11 Claims. (Cl. 255—35)

1

The present invention is directed to a device for rotating a cylindrical member about its longitudinal axis. More particularly, the invention is directed to an improved device for spinning pipe.

Heretofore the practice has been, when making up and spinning pipe to be used in well boring operations, to employ a spinning chain which is given several turns around a tool joint of the pipe stands to be made up. The spinning chain is ordinarily attached to a wire line or cable running to a cathead which takes up the slack and exerts tension thereon. As a result, the spinning chain which is wrapped around the pipe stand to be made up into the tool joint thereof is rotated and spun up preparatory to the tonging action. The spinning chain employed in prior art practices requires the services of at least two men to stab the pipe in the joint and to engage the spinning chain with the pipe to be spun into position. Besides the requirement of manpower, use of spinning chains as employed in the industry prior to this invention was exceedingly hazardous due to the necessity of a man tailing the chain during spin-up operations. This often results in mashed or amputated fingers, and body injuries when the tail end of the chain is pulled off of the pipe. The action of the cathead in taking up slack and causing the pipe to be spun up into position also frequently caused the chain to whip across the derrick floor, which could easily result in decapitation or serious injury to personnel engaged in tasks on the derrick floor where such operations were usually conducted.

It is, therefore, the main object of the present invention to provide an improved spinning device which dispenses with the major part of manpower requirements.

A still further object of the present invention is to provide an improved spinning device which eliminates the hazardous features of the prior art practice.

Still another object of the present invention is to provide an improved spinning apparatus which is automatically set in position.

A still further object of the present invention is to provide an improved spinning chain having the property of expanding when tension thereon is released.

A still further object of the present invention is to provide an apparatus for rotating pipe and other longitudinal members which is set automatically.

Other objects of the invention will be illustrated by reference to the drawing in which

Fig. 1 is a view of the apparatus of the present invention as a stand of pipe is being lowered into the hole with slips in a raised position;

2

Fig. 2 is another view of the apparatus of Fig. 1 preparatory to stabbing a stand into a tool joint with the slips in a locked position;

Fig. 3 is a view of the apparatus of Fig. 1 with the device arranged on a pipe stand spun into a tool joint with the slips in a locked position;

Fig. 4 is a detail of the spiral cage or housing of Figs. 1 to 3;

Fig. 5 is a detail of the helical housing of Fig. 4 and a provision of rollers therein;

Fig. 6 is a variation of Fig. 5 showing a different roller installation;

Fig. 7 is a detail of an arrangement attaching the housing to an alignment arm;

Fig. 8 is a cross-sectional view of the locking and actuating mechanism of Figures 1 to 3;

Fig. 9 is a cross-sectional view of the air valve of Figs. 1 to 3;

Fig. 10 is a front view of the actuating mechanism of Fig. 8;

Fig. 11 is a detail of a die equipped spring which may be used in lieu of the spring loaded chain of Figs. 1 to 3;

Fig. 12 is a cross section of a rubber cored cable which may be used in lieu of the spring loaded chain of Figs. 1 to 3;

Fig. 13 is a cross-sectional view of a wire cable with a spring strip imbedded therein at its core for use in lieu of the chain of Figs. 1 to 3;

Fig. 14 is a front view of a detail of the spring loaded chain employed in the apparatus of Figs. 1 to 3; and

Fig. 15 is an end view of the chain of Fig. 14.

The principal parts of the apparatus of the present invention comprise a cylindrical housing defining a helical or spiral runway adapted to be mounted on the periphery of a cylindrical member, a vertical tubular member with a sliding collar arranged thereon and an alignment arm operably connecting the sliding collar with the spiral or helical runway. The apparatus of the present invention is particularly adapted to be employed with air operated slips.

Referring now to the drawing and particularly to Figs. 1 to 3 numeral 11 designates a spiral cage or housing defining with its interior surface a helical runway which is adapted to be mounted on a cylindrical member such as a pipe stand 12, shown in Fig. 3, which is engaged with tool joint 13 and a second pipe stand 14. The housing 11 is provided with a cover plate 15 to protect same from distortion and is attached by alignment

arm 16 to a sliding collar 17 which is slidably arranged on a polish rod or tubular member 18. Polish rod 18 may be mounted on air slips 19, which are conventional to the art, arranged on derrick floor 20. Sliding collar 17 is spring loaded above and below by springs 21 and 22, the former being employed to cushion the sliding collar and the latter to cause the sliding collar to spring back into position as will be described. The polish rod 18 is provided with a slot 22*a* for a valve actuating mechanism 25 which is shown in detail in Figs. 8 and 9, as indicated schematically herein. Arranged in the spiral cage or housing 11 defining a helical runway is a twisted flat length chain 23 with a thin strip of spring steel rigidly attached thereto on the outside thereof such as by welding to give the chain 23 the property of expanding when tension is released. Chain 23 is shown in detail in Figs. 14 and 15. The twisted flat length chain 23 with the thin strip of spring steel welded thereto is attached at one end to a cable 24 operatively connected to a cathead and by the other end by a wire line or cable 25 which connects it by sheave 26 to a conventional spring loaded drum or weight box 26*a* well known to the art.

Referring now to Fig. 4, it will be seen that the spiral cage or housing 11 is provided with welded round throat guides 27 and 28 to guide the spring loaded chain therethrough and also defines a guide throat 29 for guiding the cage 11 over tool joints such as tool joint 13. It is to be understood that the cage 11 has a sufficient internal diameter to allow it to slide easily over tool joints such as illustrated in Figs. 1 to 3. It will be further seen that the housing 11 comprises a plurality of runway members 30 defining a helical runway. In Fig. 4 five runway members are shown, but this may be a lesser or greater number as desired. A larger number of runway members will lessen the chances of slippage of the chain and also will cause the pipe to be gripped tightly.

Referring now to Fig. 5 it will be seen that runway member 30 is provided with rollers 31 which are inset therein by inserts 32. The rollers may be located approximately 4" apart to cause the spring loaded chain to move easily therearound. It will be further seen by referring to Fig. 5 that runway members 30 are connected to each other by tapers 33 which act as guides for the spring loaded coil or chain.

In Fig. 6 another embodiment of the roller installation is shown where the packing housing for the rollers is provided outside of the runway member 30. In this embodiment of Fig. 5 an offset 34 defines a housing in which the rollers may rotate.

A detail of the alignment arm 16 attachment to housing 11 is shown in Fig. 7.

Referring now to Fig. 8, the polish rod or tubular member 18 is provided with a valve actuating arm 55 which is locked on the interior thereof and communicates with the exterior of the polish rod 18 by slot 22A also shown in Figs. 1 to 3 and 10. Projecting through slot 22A and attached to a pivot 36 to valve actuating arm 35 is an actuating member 37 which through pivot 36 and valve arm 35 serves to operate a piston type valve 37A which connects to the air operated slips 19 and causes operation thereof. Fig. 8 also shows a locking member 38 which is provided with a releasing hand-operated lever 39 and is attached by a spring loaded attachment 40 to air slips 19 adjacent the polish rod 18 so that it may lock the sliding collar 17 when the latter engages therewith.

In Fig. 11 a view is shown of a portion of a flat spring member 41 equipped with pipe dies 42 which may be used in lieu of the spring loaded chain 23.

Fig. 12 shows a cross sectional view of a wire cable 43 provided with a core of rubber 44 to provide resiliency thereof and allow it to be expanded.

Fig. 13 shows a view of a cable 45 in which is imbedded a flat spring 46 to provide the characteristics of expansibility to the cable 45 to be used in lieu of the spring load chain 23.

Figs. 14 and 15 show the spring loaded chain 23 comprising a strip of spring steel 47 with a twisted flat length chain 48 welded thereto such as used in the embodiments described with respect to Figures 1–8 inclusive.

The device of the present invention illustrated in the several figures may be operated as follows: For purposes of description it may be assumed that the device is best used in connection with oil well drilling operations where large numbers of pipe stands are employed and are lowered in the borehole during the course of such operations. When pipe is lowered into the hole the elevators coming down contact the spiral case or housing 11 which is protected by plate 15 causing the cage 11 to be pushed downwardly and as the collar 17 engages with valve actuating member 37 causes the latter to be compressed inwardly through slot 22A. As a result, air valve 37A connected to valve actuating arm 35 causes the slips 19 to be set. Thus when the slips take the load of the pipe, the spiral cage is locked near the top of the slips by collar 17, engaging with locking member 38 which is spring loaded and urged forward, thus holding collar 17 and the cage 11 near the top of the slips. The elevators are then brought up in the derrick and another thribble or pipe stand is picked up and stabbed into the pipe joint 13 as shown in Fig. 2. The floor man then presses the lever 39 of locking member 38 and releases locking member 38 from collar 17 which travels upwardly on tubular member 18 by virtue of being urged upwardly by the spring member 22. As the collar 17 travels upwardly the slips are released by the collar again actuating the valve arm 35. The slips while released are still held in position due to the pipe load thereon.

The driller then causes the cathead, not shown in the drawing but connected to cable 24, to operate which exerts tension on the spring loaded chain 23. The spring loaded chain 23 then contracts against the pipe and spins it into position as shown in Fig. 3. By this time the tongs have been latched around the pipe and the pipe is tightened up in the tool joint. The drum or weight bucket is released and the expanded chain is returned to position as the driller elevates the pipes to unset the slips. Another pipe is lowered, stabbed into position and the procedure may then be again repeated.

From the foregoing description taken with the drawing it will be seen that the apparatus of the present invention consists primarily of a spiral cage or housing having rollers on the inside thereof for the reduction of friction and a flat chain with a welded strip on the outside thereof to impart the property of uncoiling when tension is released. Each spiral or housing member of the cage may be interconnected by an inverted V arrangement for guiding the flat chain into position. Each end of the spiral has circular throated line guides welded into the cage.

The top circle of the cage or housing is provided with a guide throat for centering the spiral as the pipe is lowered.

In operating the device one end of the chain is fastened to the spin-up cable on the cathead of the drilling rig while the other end of the chain is attached to a lighter cable that extends through a pulley arrangement to a spring loaded drum or weight box. If a weight box is employed, the cable and pulley arrangement may be extended to the first girt of the derrick. A brake or check may be provided to allow slack for tightening joints after spinning up. The brake or lock may be operated by foot by the floor man operating the make-up tongs.

The spiral housing or cage may be constructed of either round or angular members and equipped with rollers. For simplicity in installing rollers, an angular spiral may be more desirable. In lieu of rollers, ball bearings may be employed, but the former is preferred to the latter.

While the device of the present invention has been shown arranged on air slips, the apparatus may be employed without air slips and if desired the upright member 18 may be arranged on the derrick floor. When the apparatus of the present invention is employed without the employment of air operated slips, the valve arrangement including slot 22A, a valve actuating arm 35 and the actuating member 37 may be omitted.

It is also desirable and preferable in some instances to employ two polish rods or tubular members 18 rather than one, as shown in Fig. 1. In such a case it would be desirable to have the housing or cage 11 connected to the two polish rods by sliding collars such as 17 and alignment arms such as 16, but in such a case only one of the tubular members or rods 18 need be provided with the actuating mechanism.

The nature and objects of the present invention having been completely described and illustrated, what I wish to claim as new and useful and secure by Letters Patent is:

1. A device for rotating a cylindrical member about its longitudinal axis which comprises, in combination, a housing defining a helical runway adapted to be mounted on the periphery of said cylindrical member, an upright member adapted to support said housing on said cylindrical member, a collar slidably mounted on said upright member, an arm operably connecting said collar and said housing, an expansible member arranged in said runway and adapted to bear frictionally with its inner surface against the periphery of said longitudinal member, and means to exert tension on said expansible member.

2. A device in accordance with claim 1 in which the expansible member is a twisted flat link chain rigidly attached on its outer surface to a strip of spring steel.

3. A device in accordance with claim 1 in which the expansible member is a flat spring defining with its inner surface a plurality of pipe dies.

4. A device in accordance with claim 1 in which the expansible member is a wire cable.

5. A device for spinning pipe which comprises, in combination, a housing defining a helical runway adapted to be mounted on the periphery of said pipe, an upright member adapted to support said housing on said pipe, a collar slidably mounted on said upright member, an alignment arm operably connecting said collar and said housing, tension means mounted on said upright member and adapted to bear against said collar, an expansible member arranged in said runway and adapted to bear frictionally with its inner surface against the periphery of said pipe, and means to exert tension on said expansible member.

6. A device for spinning pipe which comprises, in combination, a cylindrical housing defining a helical runway adapted to be mounted on the periphery of said pipe, rotatable members mounted in said runway and defining a path of travel in said runway, a tubular member rigidly mounted in an upright position and adapted to support said housing, said tubular member defining at least one vertical slot communicating with the interior thereof, said slot being located on said tubular member at a point approximating the operative position of said housing, a collar slidably mounted on said tubular member, an alignment arm operably connecting said collar and said housing, a valve arm in said tubular member projecting through said slot located at a point corresponding to the operative position of said housing and below said collar, a pair of springs mounted on said tubular member and adapted to bear upwardly and downwardly against said collar, an expansible member arranged in said runway adapted to follow said path of travel defined by said rotatable members and adapted to bear frictionally against the periphery of said pipe, a locking member located adjacent the lower end of said tubular member adapted to engage with said collar, and means to exert tension on said expansible member.

7. A device in accordance with claim 6 in which the expansible member is a twisted flat link chain rigidly attached on its outer surface to a strip of spring steel.

8. A device in accordance with claim 6 in which the expansible member is a flat spring defining with its inner surface a plurality of pipe dies.

9. A device in accordance with claim 6 in which the expansible member is a wire cable.

10. A device for rotating a cylindrical member about its longitudinal axis which comprises, in combination, a housing defining a helical runway adapted to be mounted on the periphery of said cylindrical member, a twisted flat link chain rigidly attached on its outer surface to a strip of spring steel defining an expansible member arranged in said runway adapted to bear frictionally with its inner surface against the periphery of said cylindrical member and means to exert tension on said expansible member.

11. A device for rotating a cylindrical member about its longitudinal axis which comprises, in combination, a housing defining a helical runway adapted to be mounted on the periphery of a cylindrical member, a flat metallic spring provided on an inner surface with a plurality of pipe dies defining an expansible member arranged in said runway and adapted to bear frictionally with its inner surface against the periphery of the cylindrical member and means to exert tension on said expansible member.

WALTER J. BIELSTEIN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,005,747	Peterson et al.	Oct. 10, 1911
1,415,772	Bessolo	May 9, 1922
2,089,800	Hibes	Aug. 10, 1937
2,196,141	Davis et al.	Apr. 2, 1940
2,277,500	Murray	Mar. 24, 1942