

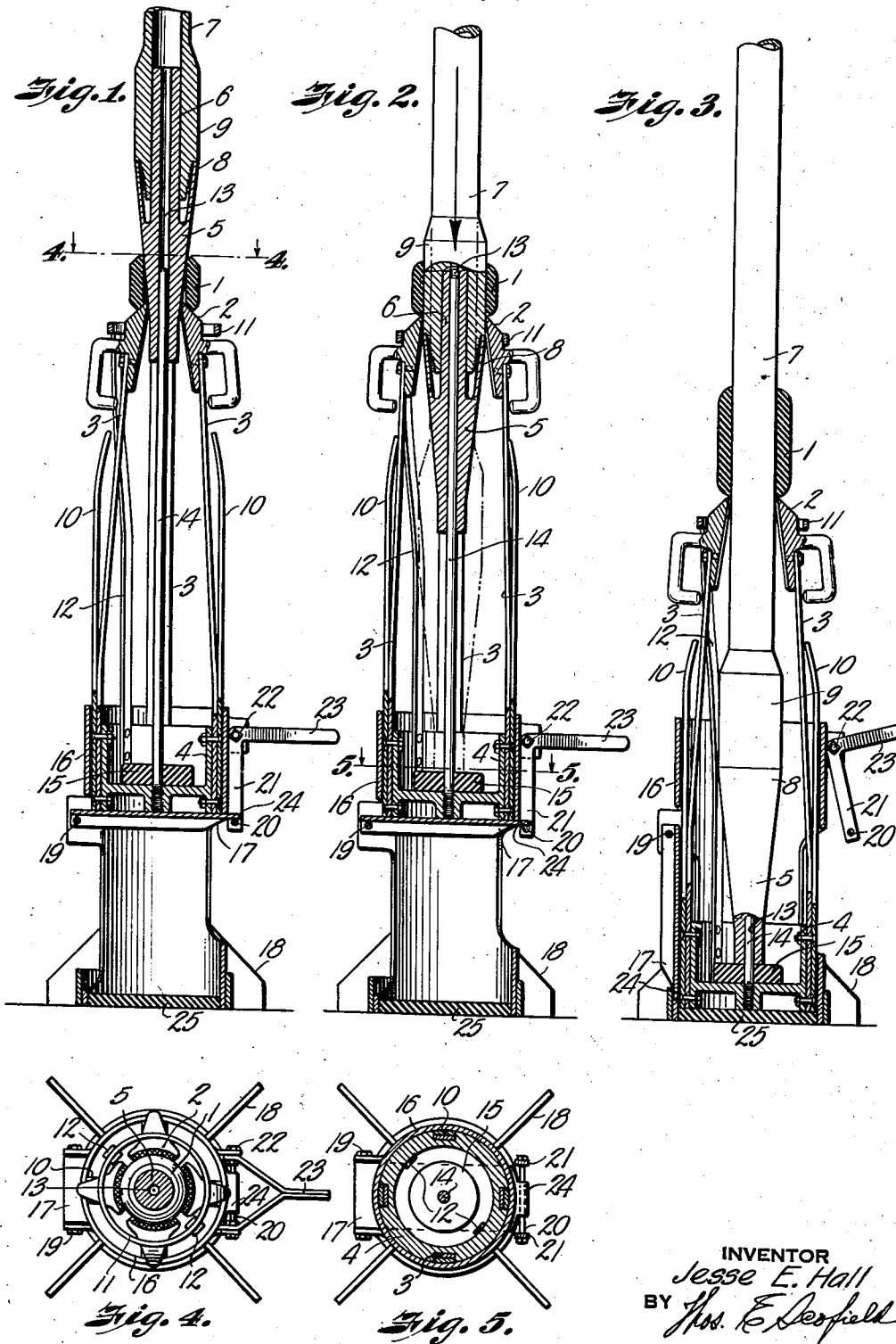
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J. E. HALL

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APPLICATOR FOR ELASTIC RINGS

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INVENTOR
Jesse E. Hall
BY *H. E. Desfield*
ATTORNEY

UNITED STATES PATENT OFFICE

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APPLICATOR FOR ELASTIC RINGS

Jesse E. Hall, Bakersfield, Calif., assignor to
Gustin-Bacon Manufacturing Company, Kan-
sas City, Mo., a corporation of Missouri

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My invention relates to an applicator for elastic rings, and more particularly to a means and method for applying elastic angular bands to pipes, tubes, rods, shafts and the like.

In the rotary method of drilling oil wells, the drilling string comprises a plurality of sections made up of lengths of drill pipe connected by couplings and tool joints. As the hole progresses in depth, casings are set and drilling proceeds through a casing which has been cemented in place. When the drilling string is rotated the tool joints will engage the well casing with the result that the couplings and joints in the string become worn and the well casing frequently damaged even to the extent of being punctured. After a casing has been set and cemented, damage to the casing may result in the loss of a well.

In order to protect the casing and the couplings of a string of drill pipe, protector rings of rubber have been placed upon the drill pipe in proximity to the tool joints. These protector rings are of larger external diameter than the tool joints and prevent metal to metal contact of the tool joint and the casing wall from taking place, thus preventing wear and protecting both the casing and the tool joints.

There are two general types of protectors in use—namely, the split type, which is formed of sections adapted to be secured in place by various securing means, and the elastic type. The split type has proven unsatisfactory due to the fact that it is impossible to secure them to the drill pipe sufficiently tightly to prevent them from becoming dislodged. This is especially true when drilling deep wells. In such case the weight of the drilling string is such that protectors adjacent the upper end of the string carry a very heavy load, so that when the drilling string is raised or lowered, the friction between the protectors and the casing is so great as to slide the protector rings along the drill pipe. In practice it is not uncommon to find a number of protector rings stripped from their proper places and assembled upon a single section of drill pipe permitting an extended length of the drilling string to be without protection.

The elastic type has proven to be more satisfactory in that it may be placed upon the drill pipe under heavy tension tightly gripping the pipe and remaining in place. The difficulty has been in placing a heavy annular elastic band or protector ring upon drill pipes, due to the fact that it must be expanded over the tool joints, which are always larger in diameter than the

drill pipe proper and frequently are of considerable length.

One means and method of applying protector rings to drill pipe is shown in the patent to William J. Bettis, numbered 1,965,876, and bearing date July 10, 1934. With the advent of deeper drilling, necessitating the use of longer drilling strings, it has become necessary to employ larger and heavier protector rings. The result is that the weight of a section of drilling string is insufficient to force the protector ring over the tool joint. Resort has been had to the jarring of the drill pipe in order to force the protector ring over the tool joint. This jarring has been accomplished by dropping the traveling block, the hook and the elevator of the drilling rig upon the top of the section of drill pipe, over the lower end of which the protector ring is being placed. With very heavy protector rings this jarring is not sufficient to accomplish the result, and in any event this practice damages the upper tool joint.

One object of my invention is to provide an improved applicator for elastic rings.

A further object of my invention is to provide a novel method of applying protector rings.

Other and further objects of my invention will appear from the following description.

In the accompanying drawing which forms part of the instant specification, and which are to be read in conjunction therewith, and in which like reference numerals are used to indicate like parts in the various views:

Fig. 1 is a sectional elevation of an applicator capable of carrying out the method of my invention and showing one embodiment of my invention.

Fig. 2 is a sectional elevation similar to that shown in Fig. 1, showing a light protector ring being pushed over the tool joint by the lowering of a drill pipe.

Fig. 3 shows the position of parts with a heavy or long protector ring in position upon the drill pipe.

Fig. 4 is a sectional view taken on the line 4—4, Fig. 1.

Fig. 5 is a sectional view taken on the line 5—5, Fig. 2.

Referring now to the drawing, an elastic protector ring 1 is positioned upon an expandible support comprising a plurality of members 2 secured to and supported by vertical members 3, which are light springs having their lower ends secured to a base member 4. A mandrel 5 is provided with a projection 6 adapted to fit within

the bore of the drill pipe 7. The mandrel 5 is tapered and its upper periphery 8 is equal to the diameter of the tool joint 9. If the spring supporting members 3 be too stiff, the members 2 will score or scratch the surface of the mandrel 5.

As the rubber ring is pushed along the mandrel 5 and is stretched, its tendency to contract sometimes causes the members 2 to be forced out from between the lower edge of the protector ring and the mandrel. In order to resist this tendency it is necessary, during the latter portion of the movement of the rubber ring over the mandrel and tool joint, to provide means for holding the members 2 against the mandrel more strongly than was necessary when the rubber ring was not stretched to its greatest extent. Accordingly, I position spring members 10 secured at their lower ends to the base member 4. These spring members 10 are adjacent the supporting spring members 3 and normally out of contact therewith. The arrangement is such that when the rubber ring is expanded to a predetermined diameter, the spring members 10 will contact the members 3 and reinforce them by providing additional spring power to hold the members 2 against the mandrel, as can readily be seen by reference to Fig. 2.

During the passage of the rubber ring over the tool joint, as shown in Fig. 2, the tendency for the members 2 to slip outwardly under the forces present is increased. Should the members 2 jump outwardly it is frequently very difficult, if not impossible, to move the rubber ring from the position it happens to occupy. In order to preclude this contingency I provide a limiter ring 11 carried by a pair of arms 12, the lower ends of which are secured to the base member 4. The limiter ring 11 is held in a position surrounding the members 2 by the arm 12, which can readily be seen by reference to Figs. 1 and 2. In this manner the danger of members 2 jumping outwardly from underneath the protector ring 1 being applied is obviated. The diameter of the limiter ring 11 is such that the members 2 are constrained to a position somewhat greater than the diameter of the tool joint and less than the diameter of the protector ring in its stretched position.

The mandrel 5 and its extension 6 are provided with an axial bore 13 adapted to ride upon a guide rod 14 secured to the base member 4. The provision of an elongated guide surface prevents any tendency of the mandrel to cant.

With short protector rings, the friction is not great and the weight of the drill pipe in such cases is sufficient to cause it to move on through the protector ring supported on the members 2 which will expand as the protector ring expands.

After the drill pipe passes through the protector ring 1, it will fall to the base member upon which is positioned a rubber block 15 adapted to take the shock of the fall. When heavy protector rings which are of increased length are to be placed on the drill pipe, the friction is such that the drill pipe will not move relative to the protector ring. In order to achieve the relative motion necessary to move the drill pipe through the protector ring in these cases, it will be noted that I mount the base member 4 within the upper part of a cylinder 16 resting upon a pivoted supporting member or trap door 17. The cylinder 16 is provided with a plurality of legs 18 to form a steady support which will not be easily capsized. The trap door 17, which may be of any

suitable construction, is pivoted around pivot pin 19. The free end of the trap door 17 is supported upon a stop member 20, carried on the lower end of a bell crank lever 21 which is pivoted at 22. When the arm 23 of the bell crank lever is raised, the lever will swing about its pivot pin 22 moving the stop pin 20 from beneath the projecting end 24 of the trap door 17, permitting the trap door to swing downwardly into the position shown in Fig. 3. This permits the base member, the drill pipe (it is understood that sufficient slack has been provided in the hoisting equipment) and the upper portion of the assembly to drop together. Within the bottom of the cylinder 16 I position a shock absorber which may take the form of a rubber block 25. When the base member strikes the bottom of the cylinder it will be suddenly arrested. This will permit the inertia of the drill pipe to cause it to ride through the rubber protector ring while supported upon the members 2, thus positioning the protector ring at a desired point above the tool joint, as can be readily seen by reference to Fig. 3.

It is believed that those skilled in the art will understand the operation of my method and the use of my tool from the foregoing description.

It will be observed that I have accomplished the objects of my invention. I have provided a novel applicator tool assembly for applying protector rings to drill pipes, rods and the like, in which heavy elastic protector rings are moved to a desired position upon the drilling string. It is not necessary to uncouple the upper end of the drill pipe from the hoisting equipment. The momentum acquired by the falling drill pipe is sufficient to force the drill pipe through the protector ring while it is supported upon the expanding members 2. The limiter ring 11 prevents the members 2 from leaving a proper position enabling the application of the protector ring.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, what I claim is:

1. A ring applicator including a base member, a plurality of relatively movable members located in a substantially circular path, means for supporting said movable members from said base member, said movable members being adapted to support a ring to be expanded, an expander for expanding a ring so supported and adapted to be located within said circle of movable members, a hollow frame having a bottom, adapted to receive said members and expander for reciprocating movement within the same, releasable means for supporting said base member a predetermined distance above the bottom of said frame, means for releasing said supporting means to permit said base member, ring supporting movable members and expander to fall to the bottom of said frame whereby the kinetic energy developed during the fall may, upon stopping of said base and movable members by contact with

said bottom, cause said expander to pass through and expand said ring.

2. A ring applicator including a base member, a plurality of relatively movable members located in a substantially circular path, means for supporting said movable members from said base member, said movable members being adapted to support a ring to be expanded, an expander for expanding a ring so supported and adapted to be located within said circle of movable members, a hollow frame having a bottom, adapted to receive said members and expander for reciprocating movement within the same, releasable means for supporting said base member a predetermined distance above the bottom of said frame, means for releasing said supporting means to permit said base member, ring supporting movable members and expander to fall to the bottom of said frame, whereby the kinetic energy developed during the fall may, upon stopping of said base and movable members by contact with said bottom, cause said expander to pass through and expand said ring, said base member being formed with shock absorbing means.

3. A ring applicator including a base member, a plurality of relatively movable members located in a substantially circular path, means for supporting said movable members from said base member, said movable members being adapted to support a ring to be expanded, an expander for expanding a ring so supported and adapted to be located within said circle of movable members, a hollow frame having a bottom, adapted to receive said members and expander for reciprocating movement within the same, releasable means for supporting said base member a pre-

determined distance above the bottom of said frame, means for releasing said supporting means to permit said base member, ring supporting movable members and expander to fall to the bottom of said frame whereby the kinetic energy developed during the fall may, upon stopping of said base and movable members by contact with said bottom, cause said expander to pass through and expand said ring, said frame having shock absorbing means adjacent its bottom adapted to be connected by said base member to arrest the fall of said base member.

4. A ring applicator including a base member, a plurality of relatively movable members located in a substantially circular path, means for supporting said movable members from said base member, said movable members being adapted to support a ring to be expanded, an expander for expanding a ring so supported and adapted to be located within said circle of movable members, a hollow frame having a bottom, adapted to receive said members and expander for reciprocating movement within the same, a hinged member for supporting said base member a predetermined distance above the bottom thereof, a latch for preventing said hinged member from pivoting, means for releasing said latch to permit said base member, ring supporting movable members and expander to fall to the bottom of said frame whereby the kinetic energy developed during the fall may, upon stopping of said base and movable members by contact with said bottom, cause said expander to pass through and expand said ring.

JESSE E. HALL.