Dec. 22, 1931. G. R. MAUPIN 1,837,624

HOLE ROLLING TOOL

Filed March 23, 1931

FIG. 2

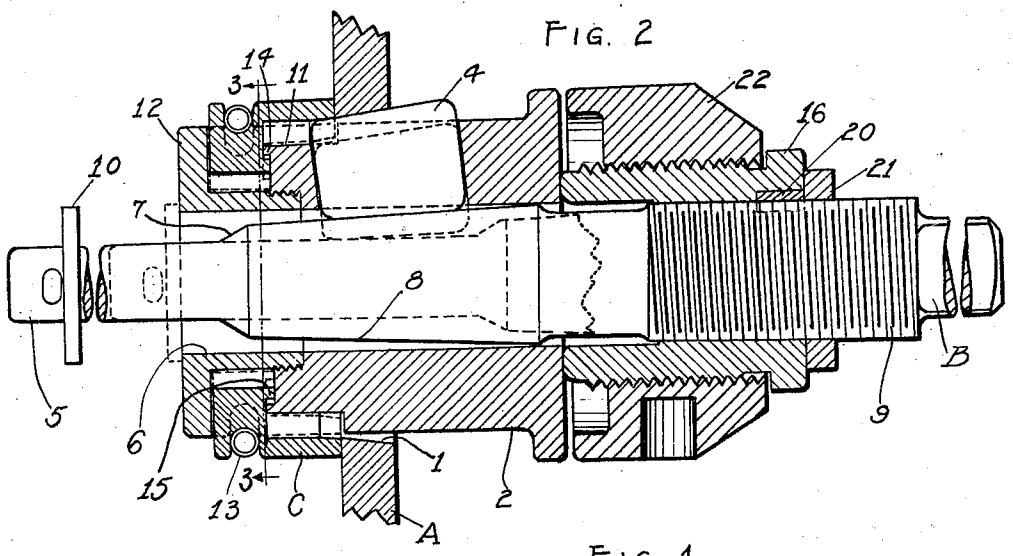
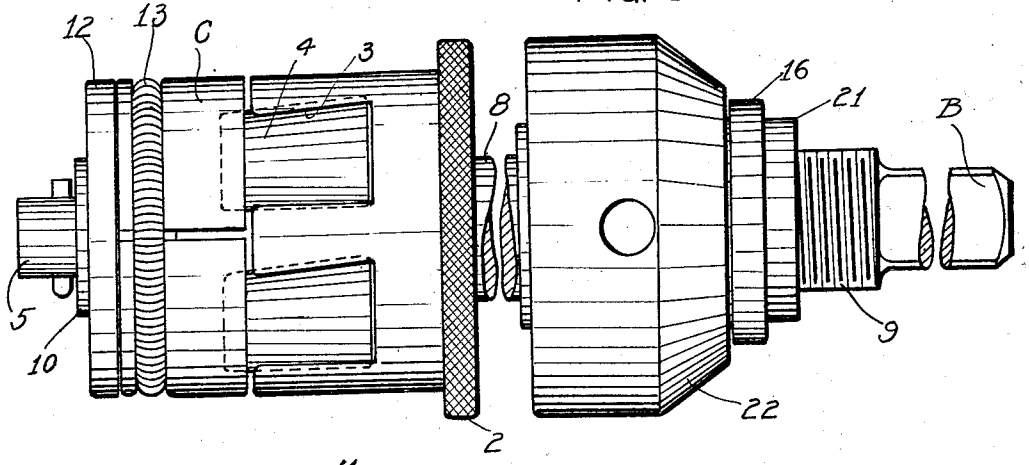


FIG. 1



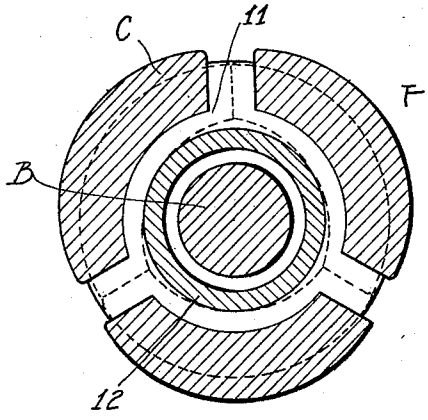


FIG. 3

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UNITED STATES PATENT OFFICE

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HOLE ROLLING TOOL

Application filed March 23, 1931. Serial No. 524,480.

The invention relates to a hole rolling tool, and has among its objects the production of such a device which will be simple in construction, easy of operations, sturdy, and satisfactory and efficient for use wherever found applicable.

When using a tool for rolling the peripheral wall surface of tapered openings, there is a tendency for the rollers to back out of said opening, especially in those places where the taper of said opening is more than a relatively small degree.

One of the objects of my invention is to provide a tool of the kind described, which can be used for rolling a tapered opening without the danger of the tool backing out therefrom.

Another object of my invention is to provide a rolling tool of the kind described, the same having a collapsible collar carried thereby and insertable through the hole to be rolled, and in which the lateral movement of the rollers themselves will actuate said collar to outermost position to form a limit stop for the tool and thus prevent the same from backing out of the opening.

Another object of my invention is to provide an expansible collar carried by such a tool, and in which means are provided for automatically collapsing said collar so that the tool may be easily withdrawn from the opening after the rolling operation is finished.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art to which this invention appertains from the disclosures herein given.

To this end, my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts throughout the views,

Figure 1 is a longitudinal plan view of the tool;

Figure 2 is a longitudinal section therethrough, with the tool inserted through the hole to be rolled; and

Figure 3 is a section taken substantially along the line 3—3 of Figure 2.

Referring more particularly to the drawings, wherein I have illustrated a preferred embodiment of my invention, A indicates any suitable object or member such as a boiler head, flue sheet, plate, or the like, the same having a tapered opening 1 previously formed therethrough in any suitable manner. In order to form a perfectly smooth surface upon the annular wall of the opening 1, the same is preferably rolled, to thereby remove any irregularities in the surface and to compact and harden the material thereat.

My improved tool comprises a cage 2 of such cross-sectional size as to permit the same to be easily inserted through the opening 1 in the member A, this cage being provided with circumferentially spaced, radially extending apertures or slots 3 through its side wall, it being understood that these apertures are preferably spaced equidistantly about the circumference of the cage so as to provide a uniform bearing and prevent wabbling of the tool after the rollers are in operation therein.

A tapered roller 4 is inserted into each of the slots 3, said rollers being freely rotatable in said slots and movable outwardly therethrough and beyond the periphery of the cage, the longitudinal axes of these slots being arranged at an angle to the longitudinal axis of the cage so that the longitudinal axes of the rollers, when in position, will be at an angle to the longitudinal axis of the cage and so that said rollers will tend to have a self-feeding action forwardly through the opening 1 in the well-known manner.

A mandrel B, having a reduced forward portion 5 is insertable through a longitudinal opening or bore 6 through said cage, said mandrel having a sharply tapered portion 7 connecting said reduced end portion 5 with a more gradually tapered portion 8 rearwardly thereof. The rear portion of said mandrel is preferably threaded as at 9 for a purpose to be more clearly hereinafter described.

This mandrel B is longitudinally insert-

able and movable through the opening 6 of the cage so that the tapered portion 8 will bear against and engage with the rollers 4 to actuate the latter radially ouwardly into contact with the peripheral surface of the hole 1 as the mandrel is pushed forwardly through the cage. A collar 10 is removably secured to the forward end 5 of the mandrel so as to prevent the accidental separation of the cage and mandrel.

An annular shoulder 11 is preferably formed about the forward end of the cage 2 and into said shoulder there is positioned a collapsible and expansible collar C, the outer periphery of the latter extending to substantially flush with the periphery of the cage thereat, when the collar is in collapsed position. The annular groove 11 may be formed in the manner shown, as by the securing of a separate flanged element 12 thereat, or if desired, said annular recess may be provided from an integral cage member which shall comprise the now separate parts 2 and 12.

The collapsible collar may be made in several arcuate sections as shown, the ends of said sections being circumferentially spaced apart when said collar is in laterally outermost position and adjacent one another when the segments are collapsed. A resilient band or spring 13 may be placed about the collar so as to retract the same to innermost or collapsed position when the outwardly exerted pressure thereagainst is removed.

In order to limit the expansion of the collar relative to the cage, I have provided a shoulder or flange 14 upon one of said members, as on the cage, said flange being engageable with an oppositely directed shoulder 15 upon the other of said members.

It is to be particularly noted that the rollers 4 extend forwardly a slight distance beneath the rear ends of the collar, or in other words, the rear portion of the collar surrounds and overhangs the forward portion of the rollers. Therefore, any radial or lateral movement of the rollers outwardly of the cage will necessarily actuate the collar to its expanded position, and the band 13 will collapse the collar when the rollers are moved inwardly.

In operation, the cage with the retracted rollers and collapsed collar thereon is inserted through the opening 1, and then the mandrel B is pushed forwardly through the cage, until the portion 7 of the mandrel passes the rollers, this action moving the rollers radially outwardly and causing the collar segments to be expanded and moved to their outermost position whereupon the same will engage against the rear wall of the plate A. In this position, the accidental withdrawal movement of the cage and rollers is prevented because the collar C forms a limit stop against the wall A.

The mandrel is operable in any suitable manner by rotation of the same, together with forward moving or feeding, this movement causing the rollers 4 to perform their smoothing action against the tapered surface of the opening 1.

An adjustable limit stop or depth gauge may be arranged at the rear end of the mandrel, this stop comprising a sleeve 16 threadedly engageable upon the threads 9 of the mandrel and having a keyed connection to the latter as by the key 20. A lock nut 21 is arranged upon the threaded end of the mandrel to engage against the rear end of the sleeve 16, also preventing the accidental displacement of the key 20. The mandrel is fed forwardly and rotated until the forward face of the sleeve 16 engages against the rear face of the cage 2, and at which point the hole 1 will have been rolled to its finished dimensions.

In order to back off the tool from the opening, I have arranged another sleeve 22 rotatably mounted upon the sleeve 16, with left hand threads therebetween. Therefore, a rotative movement of the outer sleeve 22 relatively of the inner sleeve 16 after the latter is in abutment with the rear end of the cage 2, will serve to force the forward face of the outer sleeve 22 against the rear face of the cage and retract the inner sleeve 16 and mandrel connected thereto to withdraw the mandrel from the cage. Of course, such withdrawal movement of the mandrel will permit the rollers to move radially inwardly toward their lowermost position, and at which time the resilient band 13 will move the collar C to collapsed position.

Having thus described my invention it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, arrangement, construction and combination of parts herein shown and described, except as limited by the state of the art to which this invention appertains, and the claims hereto appended.

Having fully described my invention, what I claim is:—

1. A tool for rolling an opening made through a member and comprising a cage; rollers carried therein and movable outwardly therethrough; a mandrel movable through said cage to operably actuate said rollers outwardly; and a radially expansible collar adapted to engage said member to prevent accidental withdrawal of said cage and operably actuated by said rollers.

2. A tool for rolling the annular wall surface of an opening provided through a member and comprising a cage insertable through said opening; rollers carried in this cage and movable radially therebeyond; a mandrel movable through said cage to actuate said

rollers; and a radially expansible collar operably controlled by the movement of said rollers when said mandrel is longitudinally moved through the cage, to form a limit stop to prevent said tool from backing out of said opening.

3. A rolling tool of the kind described comprising a cage insertable through a hole provided in a member; rotatable rollers carried by said cage and movable laterally therethrough; a mandrel insertable through said cage and moving said rollers into operative rolling engagement with said hole; and an expansible collar on said cage and having a portion surrounding said rollers so that said collar is expanded outwardly by said rollers as the latter are similarly actuated.

4. A rolling tool of the kind described comprising a cage insertable through a hole provided in a member; rollers carried by said cage and movable laterally therebeyond into rolling engagement with said hole; a tapered mandrel insertable through said cage and actuating said rollers laterally outwardly against said hole; and an expansible collar on said cage and engageable with said member to form a stop for preventing the accidental withdrawal of said cage from said opening, said collar surrounding a portion of said rollers that projects longitudinally beyond said opening, so that said collar is actuated into operative position by said rollers.

5. A tool of the kind described comprising a cage having lateral openings therethrough; tapered rollers in said openings, said cage with rollers and collar thereon being adapted to be inserted through a previously formed opening in a member; a radially separable collar on said cage beyond said rollers and adapted to be laterally actuated by said rollers, to form a limit stop to prevent said cage from backing out; and a tapered mandrel operably engageable with said rollers to force them outwardly against said opening.

6. A tool for rolling the annular wall surface of an opening provided through a member and comprising a cage; laterally movable rollers carried in this cage and insertable through said opening together with said cage; a mandrel movable longitudinally through said cage to actuate said rollers outwardly; a radially collapsible collar operably controlled by the lateral movement of said rollers, to form a limit stop against said member to prevent said tool from backing out of said opening; and means between said collar and cage to limit lateral movement therebetween.

7. A hole finishing tool comprising a cage insertable through said hole; rollers movable laterally through said cage and carried thereby; a collapsible collar on said cage and overhanging a portion of said rollers and extending therebeyond; means between said collar and cage to limit outward movement of said collar; a tapered mandrel longitudinally insertable through said cage and engageable with said rollers to actuate them radially outwardly through said cage, said movement of the rollers actuating said collar to expanded position to form a limit stop to prevent said tool from backing out of said hole; and means about said collar to actuate the latter to collapsed position when said rollers are moved to their radially innermost position.

8. A tool for rolling an opening made through a member, and comprising a cage insertable through said opening; rollers carried by said cage and engageable with the peripheral wall of said opening; and a collar carried by said cage and operably controlled by said rollers to prevent accidental withdrawal of said cage from said opening.

9. A tool for rolling an opening made through a member and comprising a roller carrier insertable into said opening; rollers carried by said carrier to engage the peripheral wall of said opening; and means controlled by the radial movement of said rollers to engage against said member to prevent withdrawal of said carrier when said rollers are in operative engagement with said opening.

In testimony whereof I have affixed my signature.

GRAVES R. MAUPIN.