June 14, 1932. G. E. VANCE 1,862,813

APPARATUS FOR APPLYING BUSHINGS

Filed Aug. 24, 1931

FIG 1

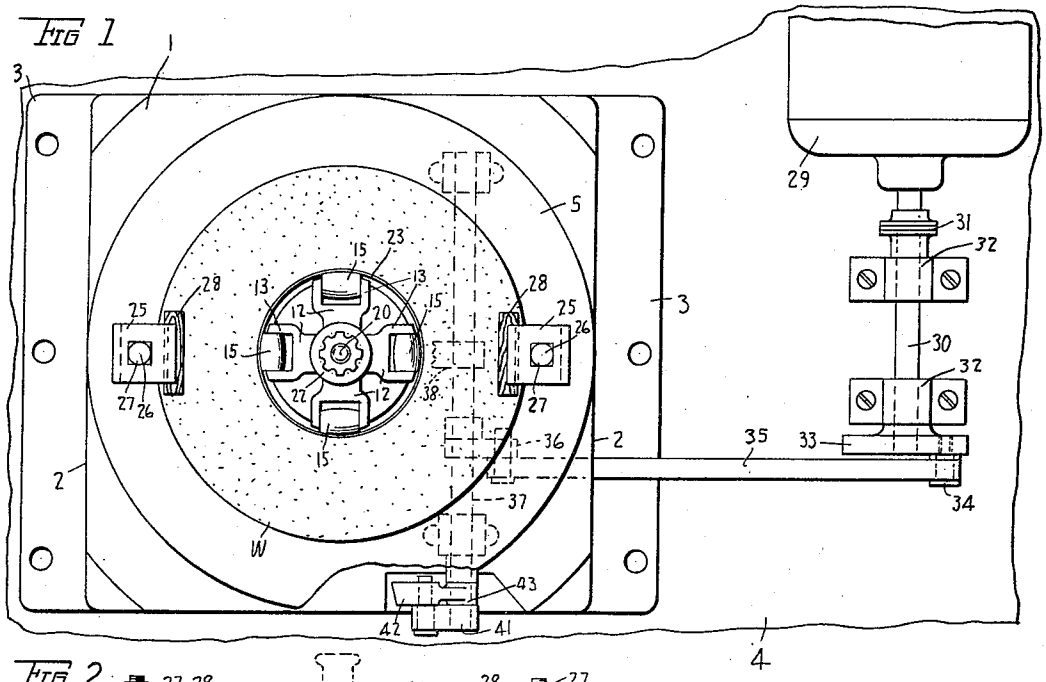


FIG 2

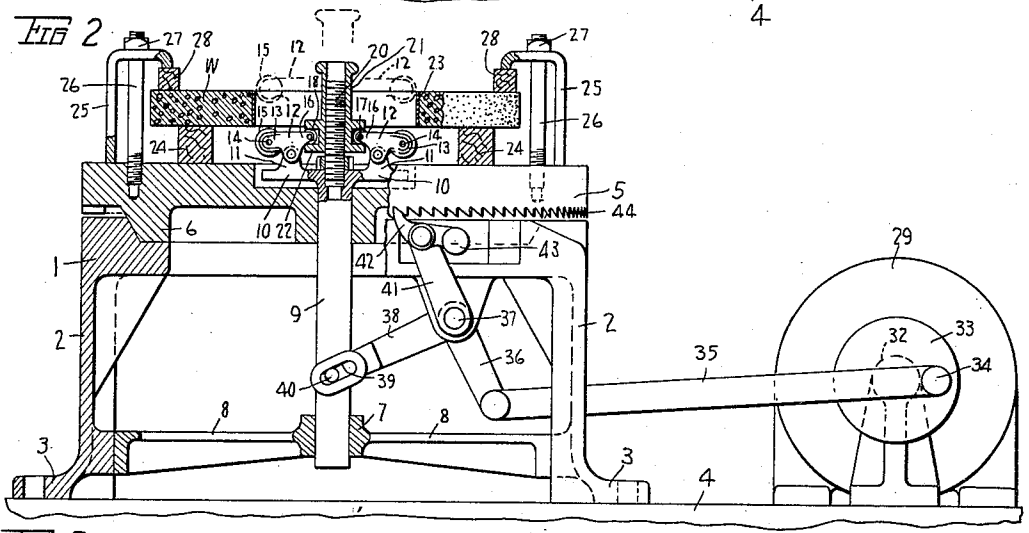
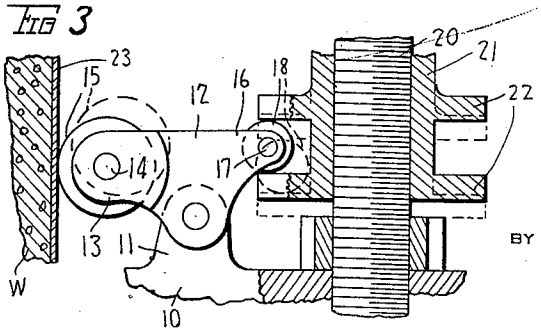


FIG 3



INVENTOR

George E. Vance

BY Staley + Welch

ATTORNEYS

Patented June 14, 1932

1,862,813

UNITED STATES PATENT OFFICE

GEORGE E. VANCE, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE SAFETY GRINDING WHEEL & MACHINE COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO

APPARATUS FOR APPLYING BUSHINGS

Application filed August 24, 1931. Serial No. 558,851.

This invention relates to an apparatus for applying bushings, such for instance as the bushings which are inserted in the spindle openings of grinding wheels; it more especially relating to means whereby a preformed metallic bushing of yieldable character, such as one formed of lead, may be forced into intimate contact with the interstices of the material forming the wall of the opening, such, as for example, by stretching the bushing by a rolling and ironing action by suitable mechanical apparatus to cause the same to firmly adhere to the material forming the wall of the opening, but leaving the interior of the bushing with a smooth surface of uniform diameter throughout.

It has been customary in the manufacture of grinding wheels, regardless of size, to line or bush the central opening or spindle hole in the wheel with suitable material, such as lead, for the purpose of preventing abrasion of the spindle or adapter collar when the wheel is being applied thereto or removed therefrom, or by slippage in operation. The usual custom heretofore has been to form the bushing by pouring melted lead into the opening of the wheel around a mandrel which is centrally positioned in the opening.

There are several disadvantages inherent to this method of applying a bushing, one of which is that in pouring molten material in the larger sized holes to form a bushing having a certain desired internal diameter, the opening provided in the wheel must be in the neighborhood of 1/4 to 3/8 inch larger in diameter than the mandrel in order to permit the metal to run freely into the space and to prevent chilling thereof, so that a bushing thus applied must be comparatively thick.

One of the objects of my invention is to provide an apparatus for applying a comparatively thin bushing to the wheel opening whereby the opening in the wheel before the application of the bushing may be made correspondingly smaller to thereby increase the strength of the wheel and its resistance to bursting; it being understood that the strength of the wheel or its resistance to bursting depends on the bond, or in other words, the radial distance from the opening to the periphery of the wheel. This enables a wheel to be used to a longer extent before being discarded due to wear reducing the distance from the opening to the periphery to a point beyond which the operation of the wheel is not considered safe.

Another object of the invention is to provide a bushing which will result in economy in the use of the metal, such as lead, which forms the bushing.

A further object of my invention is to provide a bushing which will have a greater density than one of the cast type whereby the bushing will retain its original concentricity and size and prevent distortion thereof due to shock from rough usage.

A further object of my invention is to provide an apparatus of the character referred to which will eliminate the necessity of rotating the ironing or smoothing device.

Other objects of my invention will appear from the accompanying description and statement of advantages.

In the accompanying drawing:

Fig. 1 is a top plan view of an apparatus embodying the improvements;

Fig. 2 is a view partly in side elevation and partly in vertical section.

Fig. 3 is an enlarged detail of some of the parts shown in Fig. 2.

Referring to the drawing, 1 represents a suitable supporting base having integrally formed legs 2 provided with feet 3 by which it may be secured to the floor 4. Mounted for rotation in an annular recess in this case is a table 5, the walls of the recess being preferably inclined and the under side of the table having an annular trunnion or boss 6 similarly inclined to fit the base. The table has a central bore and slidably mounted in the bore, as well as in a bearing 7 carried by a bridge piece 8 secured to the legs 2 is a vertically movable rod 9. The upper end of the rod is provided with a series of radially-extending arms 10, four in number in the present case, each provided with an upwardly-extending ear 11. Pivotally secured to each ear 11 is a holder 12, this holder having an outwardly-extending bifurcated portion 13 carrying a short spindle 14 upon

which is rotatably mounted a roller 15, the periphery of which is formed from side to side upon the arc of a circle. Projecting inwardly from the holder 12 is another bifurcated portion 16 carrying a short spindle 17 upon which is mounted a friction roller 18.

Secured in the threaded opening in the upper end of the rod 9 is a screw-threaded member 20 which forms in effect an extension of the rod, and threaded upon this member 20 is a sleeve 21 having an integrally formed grooved collar 22, the groove of which receives the friction roll 18. By turning the sleeve 21 up or down on the threaded member 20 the holders may be rocked to adjust the position of the rolls 15 for the purpose to be explained.

In the present case there is shown an abrasive wheel W to which a lead bushing 23 is to be applied. This wheel is clamped to the table, being preferably laid upon wooden blocks 24 carried by the upper surface of the table and being clamped to such blocks by clamping members 25; these clamping members being apertured to receive the upper ends of rods 26, threaded into the table, and having nuts 27 to cause the clamps to bear upon the wheel through the medium of short wooden blocks 28. The abrasive wheel, or other member to which the bushing is to be applied, is positioned on the table so that its bore will be in line with the pressing and ironing rolls 15 previously described.

Provision is made for reciprocating these rolls through the bore of the abrasive wheel and imparting an intermittent rotary movement to the table 5, preferably after the rolls have left the bore of the wheel. An electric motor 29 drives a shaft 30 through universal joints 31, the shaft 30 being mounted in suitable bearings 32 and having on its outer end a disk 33 which has an eccentric pin 34. A pitman rod 35 has one end thereof journaled on the pin 34 and the other end pivotally connected to a crank arm 36 which is secured to a rock shaft 37 carried in suitable bearings on the under side of the base 1.

Connected to the rock shaft is a crank arm 38, the free end of which is provided with an elongated slot 39 to receive a pin 40 projecting from the rod 9. When the motor is in operation there will be a reciprocatory movement imparted to the rod 9 through the connections described. Also secured to the rock shaft 37 is a pawl arm 41 on the free end of which is a pivoted pawl 42 provided with a weight 43. Formed on the under side of the table is a series of annularly-extending teeth 44 with which the pawl cooperates so that upon each down stroke of the rod a movement will be imparted to the table 5 to present a new surface on the bushing to the action of the rolls 15.

The action of the rolls 15 is to stretch the bushing and force it into the interstices of the bore of the abrasive wheel and to iron the inner surface of the bushing to a true cylindrical form of the proper dimensions, the position of the rolls 15 being changed from time to time by turning the sleeve 21.

Having thus described my invention, I claim:

1. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, reciprocating stretching and ironing devices above said table, means for securing the article on said table with its bore in line with said devices, and mechanism for reciprocating said devices through the bore of said article and imparting a rotary movement to said table.

2. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, reciprocating stretching and ironing devices above said table, means for securing the article on said table with its bore in line with said devices, and mechanism for reciprocating said devices through the bore of said article and imparting an intermittent feed to said table.

3. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, reciprocating stretching and ironing devices above said table, means for securing the article on said table with its bore in line with said devices, and mechanism for reciprocating said devices through the bore of said article and imparting an intermittent feed to said table upon the return movement of said devices.

4. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, reciprocating stretching and ironing devices above said table, means for securing the article on said table with its bore in line with said devices, mechanism for reciprocating said devices through the bore of said article and imparting a rotary movement to said table, and means for adjusting said devices inwardly and outwardly.

5. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a plurality of stretching and ironing rolls above said table, and means for reciprocating said rolls through the bore of said article and imparting a rotary movement to said table.

6. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a plurality of stretching and ironing rolls above said table, and means for reciprocating said rolls through the bore of said article and imparting an intermittent feed to said table.

7. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a plurality of stretching and ironing rolls above said table, and means for reciprocating said rolls

through the bore of said article and imparting a rotary movement to said table, each of said rolls having a periphery formed on the arc of a circle from side to side substantially equal to the curvature of the inner surface of the bushing.

8. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a rod loosely mounted in a bore in said table, a plurality of stretching and ironing devices carried by the upper end of said rod, mechanism for reciprocating said rod and imparting a rotary movement to said table.

9. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a rod loosely mounted in a bore in said table, a plurality of stretching and ironing devices carried by the upper end of said rod, mechanism for reciprocating said rod and imparting an intermittent feed to said table upon the return movement of said devices.

10. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a rod mounted to reciprocate in said table, a plurality of holders pivotally mounted on said rod, a roll carried by each holder, common means for rocking said holders, and means for reciprocating said rod and imparting a rotary movement to said table.

11. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a rod mounted to reciprocate through said table, a series of pivoted holders carried at the upper end of said rod, a roll carried at the outer end of each holder, a threaded member carried by said rod, a sleeve threaded on said member having a groove, an arm on each holder projecting into said groove whereby turning movement of the sleeve rocks the holders to change the position of the rolls, and means for reciprocating said rod and imparting a rotary movement to said table.

12. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a rod mounted to reciprocate in said table, stretching and ironing devices carried by said rod above said table in line with the bore of said article, a rock shaft, an arm on said rock shaft having a slot, a pin on said rod projecting into said slot, means for rocking said shaft, and means for imparting an intermittent feed to said table from said shaft.

13. In an apparatus for applying a bushing to the bore of an article, a support, a table rotatably mounted on said support, a rod mounted to reciprocate in said table, stretching and ironing devices carried by said rod above said table in line with the bore of said article, a rock shaft, an arm on said rock shaft having a slot, a pin on said rod projecting into said slot, means for rocking said shaft, means for imparting an intermittent feed to said table from said shaft, said means including a pawl arm on said shaft, a pivoted pawl on said arm, and an annular series of ratchet teeth on said table.

In testimony whereof, I have hereunto set my hand this 21st day of August, 1931.

GEORGE E. VANCE.