

Oct. 10, 1944.

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2,360,132

WHEEL BUSHING MACHINE

Filed April 18, 1942

Fig. 1

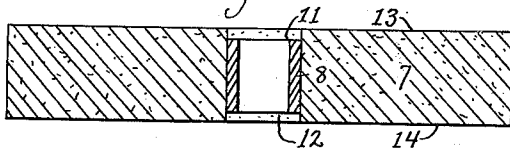


Fig. 2

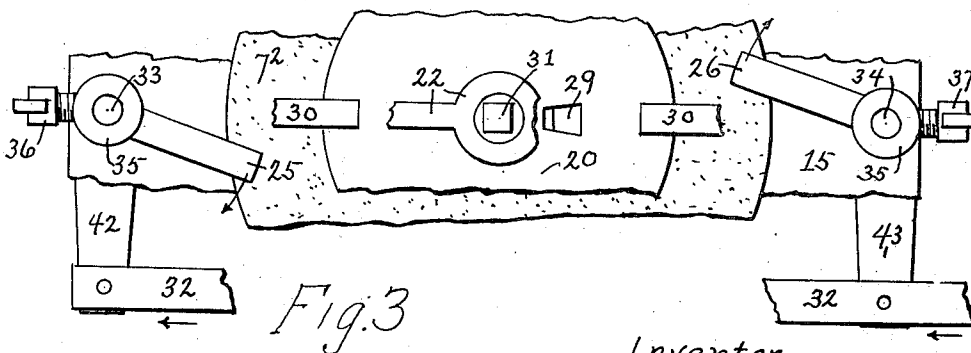
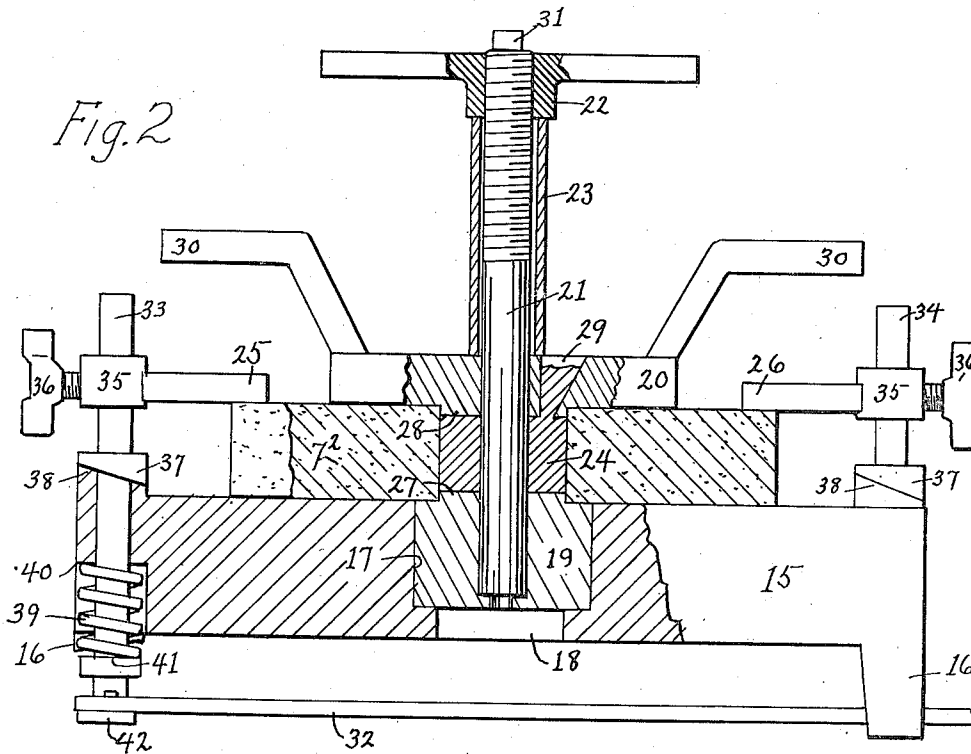


Fig. 3

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2,360,132

WHEEL-BUSHING MACHINE

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Application April 18, 1942, Serial No. 439,496

2 Claims. (Cl. 22—58)

My present invention relates to a grinding wheel having a molded spindle-bushing, and in particular it relates to a grinding wheel having a spindle-bushing countersunk in the molding process on either or both sides of the wheel, and the invention relates also to a device for molding the bushing to place.

A purpose of the invention is to eliminate the need for tool finishing operations upon the molded spindle bushing of a grinding wheel.

A further purpose is to secure for the wheel a more desirable commercial appearance by eliminating underflow and overflow of the molten bushing metal at either side of the wheel.

A further purpose is to lessen the bushing length and thereby to lessen the amount of bushing metal in the wheel.

A further purpose is to mold a spindle-bushing with ends countersunk with respect to the sides of the wheel, as distinguished from molding the bushing to extend from one side of the wheel to the other.

A further purpose is to mold a spindle-bushing to place within a grinding wheel between bottom and top adapters surrounding a molding pin of spindle size and the adapters presenting their opposing molding faces inward from the sides of the wheel.

A further purpose is to avoid the need for reaming by using a molding pin without taper and to withdraw the pin from the molded bushing without stressing the bonding between the bushing and the wheel interior.

Further purposes will appear in the specification and in the claims.

I have elected to illustrate a grinding wheel of the present invention along side of a fragment of a wheel of the prior art and to illustrate two forms only of the molding device, selecting forms however that are practical and efficient in operation and which well illustrate the principles involved.

Figure 1 is a sectional elevation of a bushed grinding wheel of the present invention.

Figures 2 and 3 illustrate one embodiment of my device for molding spindle-bushings to place in grinding wheels, Figure 2 being a broken sectional elevation and Figure 3 a broken top plan of Figure 2.

Like numerals refer to like parts in all figures.

Describing in illustration and not in limitation and referring to the drawing:

The term "grinding wheel" as used herein applies to unbushed abrasive wheels, and it will be understood that usually wheels having the same

interior diameter may need to be bushed to different sizes of spindle, for example bushing wheels of the same interior diameter selectively for $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ " and $\frac{7}{8}$ " spindles.

Grinding wheels have hitherto in common practice been bushed by open molding in the wheel on a horizontal molding plate.

This plate has been downwardly bored at intervals with holes part way through and of different diameter to receive and seat short molding pins of corresponding different diameters, with a pin for each size of spindle.

To bush a wheel the pin for the desired size of spindle has been placed upright in its hole in the molding plate, the unbushed wheel then placed over the pin on the plate, interiorly centered with respect to the pin and molten bushing metal, usually lead, then poured from a hand ladle into the annular space between the pin and wheel interior.

While this open molding prior art method of bushing commercial grinding wheels has had the advantages of simplicity and of an apparent easy performance it has been yet accompanied by significant secondary disadvantages that are intended to be cured wholly or partially in the present invention.

Usually or frequently during this open molding the molten bushing metal has seeped under the wheel to an extent that has made it necessary to machine or chisel finish the bottom end of the bushing and that even with this tool finishing has often left a commercially undesirable coating of metal in the interstices of the abrasive for some little distance outwardly from the wheel interior periphery; and the molten metal, poured in from a small hand ladle, has usually or frequently overflowed or bulged upward to an extent making it needful to tool finish the top of the bushing, often leaving the undesirable metal coating for some little distance outwardly from the wheel interior.

In addition, for its more easy removal from the molded bushing, the molding pin has more usually been provided with a taper which has necessitated reaming the molded hole to spindle size; or, when to avoid the need for reaming, a molding pin without taper has been used, the pin has been removed by driving it out of the molded bushing, often with injury to or loosening of the bonding between the bushing and wheel.

In Figure 1 a conventional grinding wheel 7 has been provided with a metal bushing 8 molded to place in the wheel interior.

In the prior art structure the bushing extends

through the wheel for the full thickness thereof and the undesirable outward lappings of the tool-finished metal will often extend from some portions of the inner periphery of the wheel on to the flats of the wheel.

In my wheel 7 the bushing 8 has been molded to its finish dimensions, its inner diameter without taper and its molded ends 11 and 12 recessed inward from the opposite sides 13 and 14 of the wheel. I bush wheels of the same interior diameter for use respectively with spindles of different diameter by using selectively different sets of molding members, comprising different sizes of molding pins of the desired spindle diameters and corresponding bottom and top adapters surrounding the pins and presenting inward bosses across the ends of the molding bushing. Each adapter set thus comprises a molding pin of a selected spindle diameter and two adapters axially bored to pass the pin and oppositely bossed to fit into opposite sides of the wheel interior.

In Figures 2 and 3 a base 15 on suitable legs 16 is downwardly recessed at 17 and through bored at 18 to seat selectively bottom adapters 19 and 20 for respectively different sizes of spindle.

A wheel 7² is shown assembled with a selected set of adapters; these adapters include the bottom and top adapters 19 and 20, the molding pin 21 and nut and sleeve members 22 and 23 for pulling out the pin without stressing the bonding between the wheel and a freshly molded bushing 24, and the wheel 7² is downwardly clamped to the base at 25 and 26, suitably on diametrically opposite sides of the wheel.

The bottom and top adapters, bored to upwardly pass the molding pin 21, present flat surfaces around the wheel interior to opposite sides of the wheel and fit shallow concentric bosses 27 and 28 into the wheel interior.

The molten bushing metal is poured through an opening 29 in the top adapter, usually until it fills the molding space and partially fills the opening 29. After the bushing 24 hardens the top adapter is angularly turned, conveniently by means of handles 30, to shear off the bushing metal within the opening 29.

The pin 21 is then pulled out of the molded bushing up through the top adapter by downwardly threading the nut 22 upon the sleeve 23, if necessary concurrently preventing or controlling any rotation of the pin on its own axis by means of a suitable wrench on the non-circular end 31 of the pin. It will be seen that the pulling out of the pin is effected in a manner that does not stress the bonding between the wheel and bushing.

After the pin and top adapter members 20, 21, 22 and 23 have been lifted away the wheel is released, in the illustration by longitudinally shifting an operating link 32 in the direction of the arrow to throw the clamp 25 and 26 diagonally upward in the directions of the respective arrows.

The clamp bars 25 and 26 are presented from upright rods 33 and 34 and may be set at any needed positions on these rods to accommodate different thicknesses of wheel. Hub portions 35 of the clamp bars surround the rods and are provided with set screws 36 for vertically shifting the set positions of the clamp bars.

The upright rods 33 and 34 have journal support in the base 15 and are movable therein both angularly and vertically. They carry downward face cams 37 against cooperating upward cams 38 of the base, are surrounded by compression springs 39 between downward and upward abutments 40 and 41 of the base and rods (shown only on one rod) and at their lower ends carry cranks 42 and 43 operatively connected by the link 32.

In Figure 2 the rods 33 and 34 are in low position in that the opposing cam surfaces at 37 and 38 are mating throughout their slope and the cooperating cams raise the rods when the rods 15 are angularly turned by longitudinally shifting the link 32.

After an unbushed wheel 7² has been placed on the bottom adapter 19, centered by fitting it over the upward boss 27, assuming the clamp bars 25 and 26 with high settings on the rods 33 and 34 and these rods in their high position, the shift bar is moved to or near its position in Figures 2 and 3, the set screws 36 are loosened, the clamp bars placed with their ends on the wheel, preferably near the wheel periphery at diametrically opposite sides of the wheel, the clamp bars are pressed into firm engagement with the wheel and set at the set screws while being firmly pressed against the wheel.

Shifting the bar 32 to the left will now lift the rods at the cams 37, 38 and concurrently move the clamp bars upward and outward beyond the periphery of the wheel.

In view of my invention and disclosure, variations and modifications to meet particular need or individual whim will doubtless become evident to others skilled in the art and I therefore claim all such in so far as they fall within the reasonable spirit and scope of the invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a device for molding spindle bushings to place in grinding wheels, a molding pin for the interior of the bushing and bottom and top molds perforated to surround and peripherally fit the pin, dimensioned to outwardly lap the sides of the wheel around the inner periphery thereof, one of the molds having an inward shoulder to fit the wheel interior to countersink the bushing and means concurrently threading the pin and downwardly engaging the top mold for removing the pin longitudinally upwardly through the top mold.

2. In a device for molding spindle bushings to place in grinding wheels, a molding pin for the interior of the bushing and bottom and top molds perforated to surround and peripherally fit the pin, dimensioned to outwardly lap the sides of the wheel around the inner periphery thereof, one of the molds having an inward shoulder to fit the wheel interior to countersink the bushing, means for clamping the wheel downwardly upon the bottom mold and means concurrently threading the pin and downwardly engaging the top mold for removing the pin longitudinally upwardly through the top mold.

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