July 2, 1957 E. A. LABENZ 2,797,598

CLOCK REBUSHING TOOL

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FIG. 1

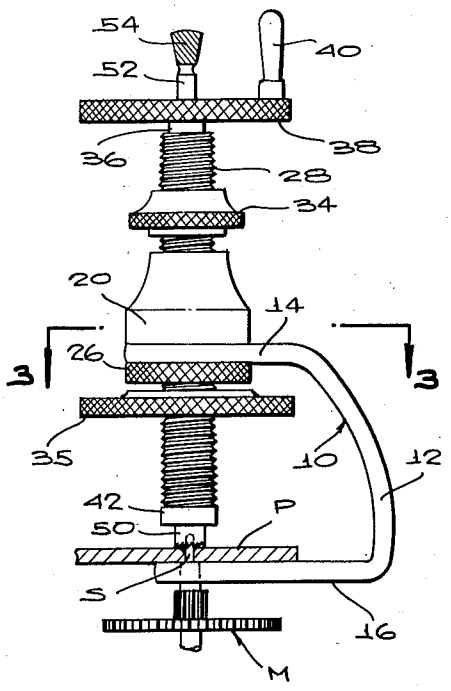


FIG. 2

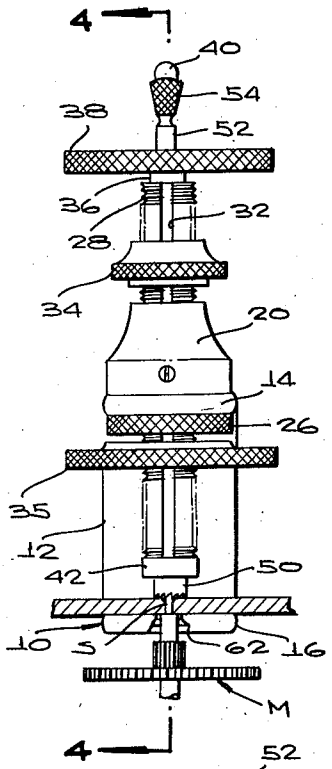


FIG. 3

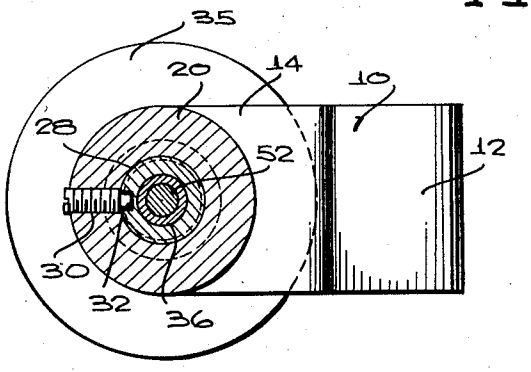
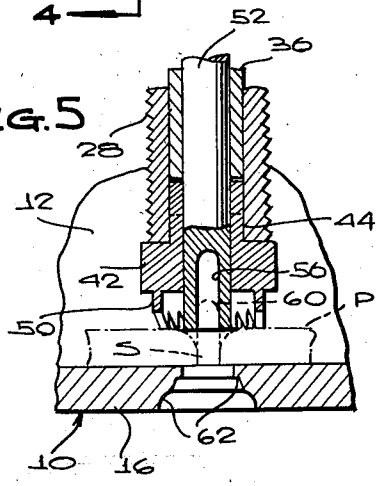


FIG. 5



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FIG. 4

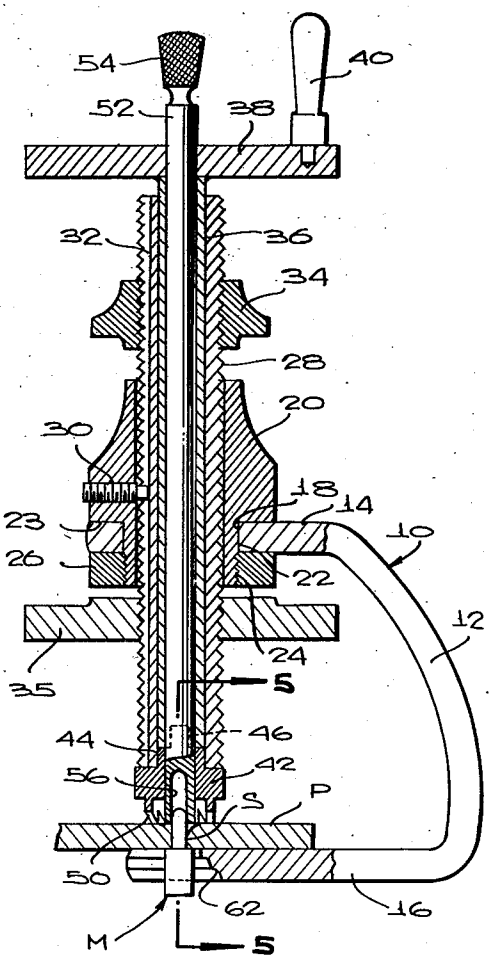


FIG. 6

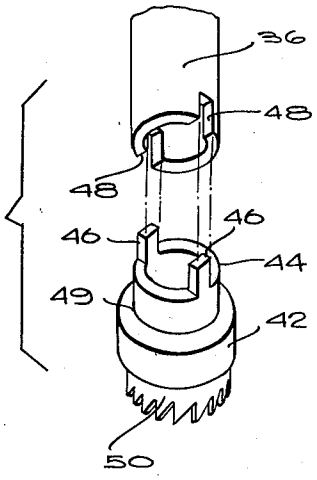


FIG. 8

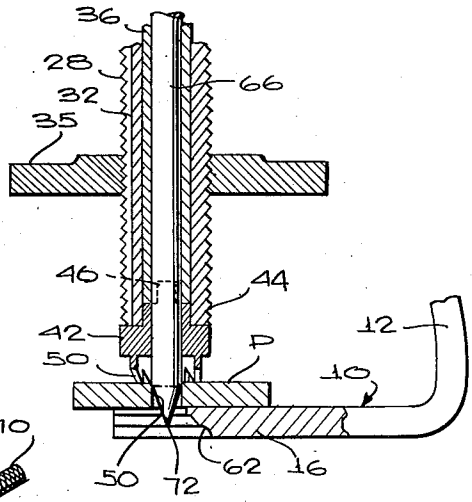
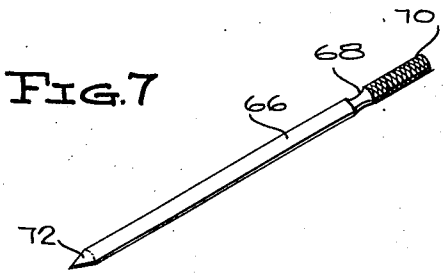


FIG. 7



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CLOCK REBUSHING TOOL

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4 Claims. (Cl. 81—6)

Summarized briefly, the present invention is a tool for the purpose of rebushing and repairing worn pivot holes in a clock, without the necessity of wholly or partially disassembling the clock. The tool devised for this purpose includes a generally C-shaped frame, having a foot adapted to receive wheel shafts of clocks. Assembled with the upper leg of the frame is a vertically disposed crown and adjustable vertically within the crown and lockable in selected positions to which it is so adjusted, is a tubular shaft, keyed to the crown against rotation relative thereto. A cutting bar, having a hand wheel for rotating the same, is journaled in the tubular shaft, and is also of tubular formation. The cutting bar is adapted at its lower end, adjacent the foot of the frame, to receive various types of rotary cutters adapted for cutting out worn pivot holds in a plate of a clock to permit the insertion of new bushings or the cutting of bushings from pieces of plate stock. Vertically shiftable within the cutter bar is any one of a plurality of punches for lining up the tool for making new bushings and for lining up the tool with pivot holes made in bushings that are being cut.

Heretofore, the general practice among clock makers, when rebushing a clock, is to disassembly the movement, either wholly or partially, due to the necessity of removing and working on various wheel shafts or the like that may need rebushing due to worn pivot holes. Separate tools are required for reaming worn holes for the insertion of new bushings, and separate tools are further required for making new bushings. In addition, it has been generally necessary to purchase bushing plate material for the purpose of making the new bushings. All in all, the general practices followed involve an excessive consumption of time so far as the clock maker is concerned, as well as the expenditure of considerable effort and funds.

The main object of the present invention is to provide, in a single tool, means for simplifying the task that has heretofore been involved in clock rebushing work, so that all operations can be performed in minimum time, and with minimum effort, without the necessity of wholly or partially disassembling the clock.

Another object is to provide a tool of the type described which is so designed as to facilitate the making of new bushings from the plate of the movement being worked on, if desired, to eliminate the cost of having to buy bushing plate material or new bushings.

Another object is to provide, in a single tool, interchangeable tool elements which can be selectively employed for the purpose of reaming out, that is cutting away the edges of, worn pivot holes for the insertion of new bushings, lining up the tool elements with the clock pivots or with holes formed in newly made bushings, and performing related operations, all without disassembly of the clock movement, due to the formation of the tool in such a manner that access is had to all wheel shafts that may need rebushing without such disassembly.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawings in which like reference characters designate like parth throughout the several views and wherein:

Figure 1 is a side elevational view of a clock rebushing tool formed according to the present invention, as it appears when in use;

Figure 2 is an elevational view of the tool as seen from the left of Figure 1;

Figure 3 is an enlarged section on line 3—3 of Figure 1;

Figure 4 is a longitudinal section on an enlarged scale, on line 4—4 of Figure 2;

Figure 5 is a detail sectional view through the tool head and frame, the scale being enlarged still further, on line 5—5 of Figure 4;

Figure 6 is a fragmentary, exploded perspective view on an enlarged scale showing the lower end of the tool bar and an associated cutter;

Figure 7 is a perspective view of a pivot hole line up punch per se; and

Figure 8 is an enlarged, fragmentary sectional view on the same cutting plane as Figure 4, with the punch inserted.

Referring to the drawings in detail, the tool constituting the present invention includes a frame generally designated at 10. The frame is approximately C-shaped, including a curved, inclined bight portion 12 merging at its upper end into a horizontally disposed upper leg 14, and at its lower end into a horizontally disposed lower leg or foot 16.

Referring to Figure 4, formed in the upper leg 14 is a large, smooth-walled opening 18. Supported upon the upper leg is a crown or shaft support body 20, having at its lower end a reduced, depending, axial extension 22 defining a circumferential, downwardly facing shoulder 23 contacting the top surface of leg 14. Extension 22 at its free end is threaded as at 24, for engagement with a lock nut 26, which, when threaded against the underside of leg 14, fixedly but removably mounts the crown on the frame.

The crown 20 has an end to end, smooth-walled, vertical bore and engaged slidably therein is a threaded tubular, cutter adjusting bar 28. A set screw 30, threadedly engaged in a radial opening of crown 20, has a reduced inner end slidably engaged in a longitudinal slot or keyway formed in and extending end to end from bar 28.

Threaded upon the upper portion of the bar 28 is a nut 34 for the purpose of limiting downward movement of the bar 28 within the crown to a predetermined extent, to adjust the depth of cut made by cutters carried by the tool.

For the purpose of effecting axial adjustments of the bar 28 within the crown 20, there is provided a large diameter, flat adjusting screw or disc 35 having a center opening threaded for engagement with the bar 28, said screw 35 underlying the nut 26 and being adapted to bear against the nut 26 during the making of axial adjustments of the bar 28.

Insertable in the bar 28 is an elongated, tubular shaft 36, constituting a cutter bar, and fixedly connected to the shaft is a hand wheel 38 having a handle 40.

Referring now to Figure 6, any of various cutters can be engaged with the lower end of the cutter bar 36 for rotation therewith within the cutter adjusting bar 28. The illustrated cutter in Figure 6 has been designated at 42, and is used for the purpose of cutting new bushings from a plate P.

The cutter used for this purpose includes an upwardly projecting, tubular extension 44 having an outer and inner diameter matching those of the bar 36. Projecting upwardly from the extension 44 at diametrically opposite locations thereon are locking lugs 46 engageable in cor-

respondingly disposed recesses 48 formed in the lower end of the bar 36.

In this way, the cutter 42 can be engaged with the bar 36 by insertion of extension 44 in the lower end of the shaft 28, the provision of the extension 44 defining an upwardly facing shoulder 49 bearing against the lower extremity of the bar 28.

Depending from the bight portion of the cutter 42 is an annular cutter blade 50 serrated on its lower edge for the purpose of cutting through the plate P.

Various other cutters can be selectively assembled with the bar 36, and for example, another cutter would have the same general form as that shown in Figure 6, except for having a smaller cutting blade, such other cutter being used for cutting out a pivot hole to receive a new bushing, while the cutter of Figures 4 and 6 would be used for cutting the bushing itself at its outer periphery from a piece of plate stock. The cutters used for cutting or making bushings would have blades of different sizes, and the cutters used for reaming out or enlarging worn pivot holes would also be of various sizes to fit holes of correspondingly different sizes.

Since the cutter holding bar 36 is of tubular formation, any of various line-up punches are insertable in the same. In Figure 4, there is shown one line-up punch designated at 52, comprising an elongated shank 52 the upper end of which is formed with a knurled head 54. At its lower end, the shank 52 is cut off squarely, and has a downwardly opening, axial recess 56 adapted to receive the wheel shaft S of a clock movement generally designated at M. In the foot 16 there is formed a slot opening upon the free end of the foot, said slot being increased in length and width in the direction of the bottom surface of the foot 16 through the provision of a series of steps 62. As a result, the slot is adapted for receiving shafts of various diameters.

A second line-up punch has been designated at 66, and at one end includes a reduced portion 68 merging into a knurled head 70, the other end 72 being conically tipped. This punch is shown inserted in the tool in Figure 8, in substitution for the punch 52 shown in Figure 4.

As previously pointed out, the tool permits rebushing operations, involving either the cutting out of worn pivot holes, or the making of new bushings including the formation of pivot holes in said new bushings. As shown in Figures 4 and 5, the provision of the stepped slot in the foot or lower leg 16 of the frame permits the foot to be slipped over the wheel shaft S of a clock movement generally designated at M. The crown will have been securely tightened, through the use of nut 26, to the frame so that the frame and crown constitute a stationary support means for the device.

The outer shaft or cutter adjusting bar 28 slides in an axial direction within the bore of the crown, and as previously noted, is held against rotation relative to the crown through the keyway 32 and set screw 30. This is to insure that the outer shaft will not turn when cutting tools are being used.

The nut 34 is now adjusted axially of the shaft 28 a selected distance above the upper end of the crown. This distance is the depth of the cut to be made, it being understood that initially, the outer shaft 28 would be in its uppermost position shown in Figure 4, bearing against a cutter 42. When the cutter moves downwardly through the work, the shaft 28 will slide downwardly within the crown, and ultimately, when the cutter has penetrated the work to the necessary depth, the nut 34 will engage the upper end of crown 20.

In use, as a first step one opens the gaps between the foot 16 and the lower end of the bar 28 with a cutter 42 interlocked with the cutter holding bar 36. Then, by rotating nut 34 in a direction such that it will engage the upper end of crown 20, and by further rotating nut 34 after it has so engaged the crown, the bar 28 will be elevated until ultimately the cutter will clear the pivot S of

the clock movement M that is being worked on. Then, the foot of the frame is slid into position with the pivot of the clock in the stepped slot 62. Then, the outer shaft 28 is axially adjusted through the use of the nut 34 once again, for the depth of the cut to be made. Then, the large diameter nut 35 is threaded upwardly to hold the shaft 28 against movement upwardly from the top surface of the clock plate P. Then, punch 52, selected according to the size of the diameter of the recess 56 thereof, is inserted in the bore of the cutter holder bar 36, so as to fit into the pivot S of the clock wheel. The clock wheel is then lined up in true position.

While holding the line-up punch or stem 52 down upon the pivot of the clock movement, nut 35 is tightened against the underside of the crown, after which the hand wheel is turned in a direction to cause the cutter to start cutting into the plate. As the hand wheel is turned, a slow rotation of nut 35 is effected by the user, in a direction to tighten nut 35 against the crown, and this causes the shaft 28 to move slowly downwardly as it rotates, to cause the cutter to be advanced through the clock plate.

After the cut has been completed, the outer shaft 28 is elevated by loosening nut 35. In this way, the hole for a new bushing is cut.

To replace a bushing in the clock plate one may simply press in a previously manufactured bushing or standard part. However, if there are none of these at hand, one can make a bushing from a piece of metal the same thickness as the plate P from which the old bushing or worn pivot bearing was cut from. A hole is drilled in said piece to a diameter equal to that of the pivot shaft aperture desired. Then, with line-up punch 66 (see Figure 8) inserted in the bore of holder bar 36, the tip 72 of the line-up punch or stem is inserted in the newly drilled aperture A of Figure 8.

The procedure hereinbefore described for the purpose of cutting out a hole for a bushing is now followed, except that now one uses a larger cutter, designed to provide a bushing, of a diameter of the same size as the aperture cut in the clock plate P, in the manner previously described herein. The new bushing is then pressed into place in the previously cut aperture, thus providing a new bushing for the pivot shaft S of the clock movement.

By reason of the construction illustrated and described, the tool has the desirable characteristics wherein by means of a simple series of operations, a clock can be rebushed in a relatively short time and with little work and expense so far as the clock maker is concerned. One is able to work upon the clock movement without disassembling the same, since the tool will fit in and reach any wheel shaft or the like that may need rebushing due to worn pivot holes. The operation takes comparatively little time, and with the advantage of a unitary assembly, new bushings can be made in the same simple series of operational steps required in making a hole for the new bushing. The tool can cut the new bushing, in fact, directly from the plate of the movement being worked upon, thus eliminating the cost of bushing plate material or bushings sold as separate parts to clock makers.

What is claimed is:

1. A clock rebushing tool comprising a frame; a crown mounted on the frame and having an axial bore; a tubular shaft slidably mounted in the bore for axial movement, said shaft having a keyway and the crown including a key engaging in the keyway to hold the shaft against rotation relative to the crown and frame; means to adjust the shaft in an axial direction, comprising a nut threaded upon the shaft below the crown to engage the crown when the nut is rotated in one direction; a tubular bar rotatably mounted in the shaft; cutter means separably connected to the bar for rotation therewith and engageable against one end of the shaft for axial adjustment with the shaft, for advancement of the cutter means toward a work piece having an aperture about which the work piece is to be cut, responsive to rotation of the bar and axial adjust-

ment of the shaft toward the work piece resulting from turning of said nut while in engagement with the crown; and a line-up stem insertable through the tubular bar for engagement in the aperture to hold the work piece with the aperture thereof centered relative to the cutter means.

2. A clock rebushing tool comprising a frame; a crown mounted on the frame and having an axial bore; a tubular shaft slidably mounted in the bore for axial movement, said shaft having a keyway and the crown including a key engaging in the keyway to hold the shaft against rotation relative to the crown and frame; means to adjust the shaft in an axial drection, comprising a nut threaded upon the shaft below the crown to engage the crown when the nut is rotated in one direction; a tubular bar rotatably mounted in the shaft; cutter means separably connected to the bar for rotation therewith and engageable against one end of the shaft for axial adjustment with the shaft, for advancement of the cutter means toward a work piece having an aperture about which the work piece is to be cut, responsive to rotation of the bar and axial adjustment of the shaft toward the work piece resulting from turning of said nut while in engagement with the crown; and a line-up stem insertable through the tubular bar for engagement in the aperture to hold the work piece with the aperture thereof centered relative to the cutter means, the cutter means comprising a rotary cutter having an annular, serrated blade.

3. A clock rebushing tool comprising a frame; a crown mounted on the frame and having an axial bore; a tubular shaft slidably mounted in the bore for axial movement, said shaft having a keyway and the crown including a key engaging in the keyway to hold the shaft against rotation relative to the crown and frame; means to adjust the shaft in an axial direction, comprising a nut threaded upon the shaft below the crown to engage the crown when the nut is rotated in one direction; a tubular bar rotatably mounted in the shaft, cutter means separably connected to the bar for rotation therewith and engageable against one end of the shaft for axial adjustment with the shaft, for advancement of the cutter means toward a work piece having an aperture about which the work piece is to be cut, responsive to rotation of the bar and axial adjustment of the shaft toward the work piece resulting from turning of said nut while in engagement with the crown; and a line-up stem insertable through the tubular bar for engagement in the aperture to hold the work piece with the aperture thereof centered relative to the cutter means, the cutter means comprising a rotary cutter having an annular, serrated blade, said cutter including lugs angularly spaced about the circumference thereof, the tubular bar having recesses in one end thereof receiving said lugs to effect the separable connection of the bar and cutter to one another while linking the same for joint rotation.

4. A clock rebushing tool comprising a frame; a crown mounted on the frame and having an axial bore; a tubular shaft slidably mounted in the bore for axial movement, said shaft having a keyway and the crown including a key engaging in the keyway to hold the shaft against rotation relative to the crown and frame; means to adjust the shaft in an axial direction, comprising a nut threaded upon the shaft below the crown to engage the crown when the nut is rotated in one direction; a tubular bar rotatably mounted in the shaft; cutter means separably connected to the bar for rotation therewith and engageable against one end of the shaft for axial adjustment with the shaft, for advancement of the cutter means toward a work piece having an aperture about which the work piece is to be cut, responsive to rotation of the bar and axial adjustment of the shaft toward the work piece resulting from turning of said nut while in engagement with the crown; a line-up stem insertable through the tubular bar for engagement in the aperture to hold the work piece with the aperture thereof centered relative to the cutter means, the cutter means comprising a rotary cutter having an annular, serrated blade, said cutter including lugs angularly spaced about the circumference thereof, the tubular bar having recesses in one end thereof receiving said lugs to effect the separable connection of the bar and cutter to one another while linking the same for joint rotation; and means for limiting the depth of penetration of the cutter into the work, comprising a second nut threaded upon the shaft above the crown and adapted to engage the upper end of the crown responsive to axial movement of the shaft toward the work through a predetermined distance.

References Cited in the file of this patent

UNITED STATES PATENTS

713,000	Ford	Nov. 4, 1902
1,449,361	Wink	Mar. 20, 1923
2,341,926	Lauby	Feb. 15, 1944
2,729,993	Preller	Jan. 10, 1956