

March 15, 1949.

J. HENGSTLER
HOLDER FOR USE IN RECLAIMING
BROKEN CUTTING-TOOLS

2,464,574

Original Filed Nov. 23, 1944

2 Sheets-Sheet 1

FIG. 1-

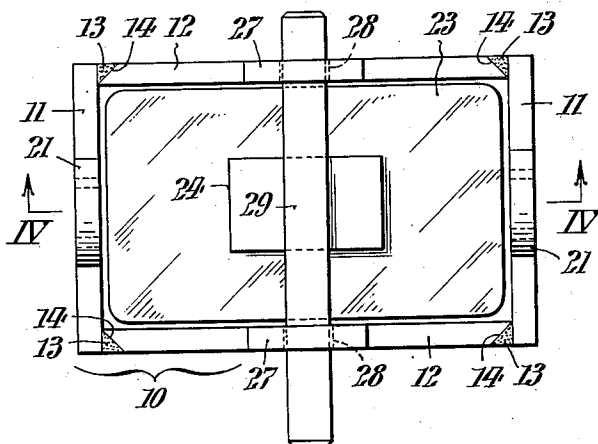
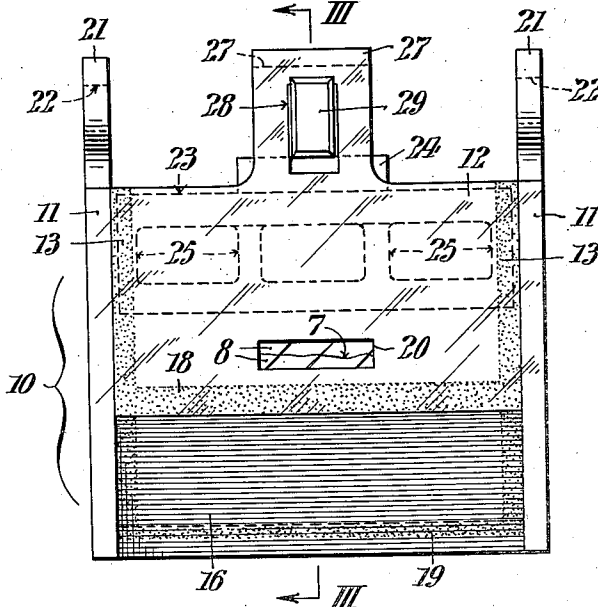


FIG. 2-



WITNESSES

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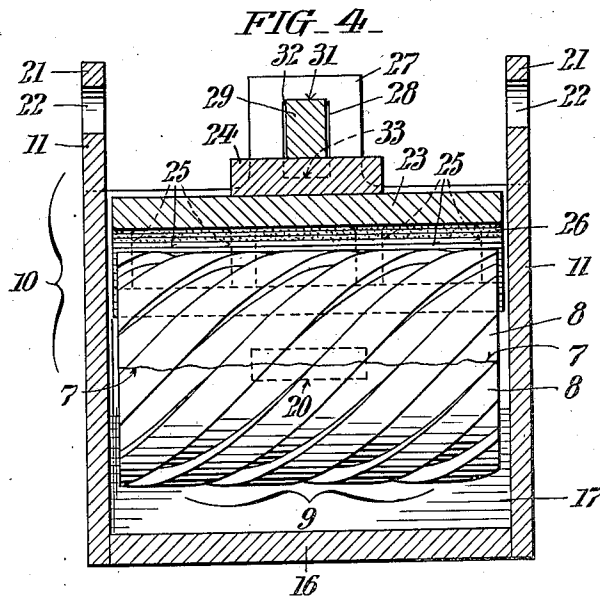
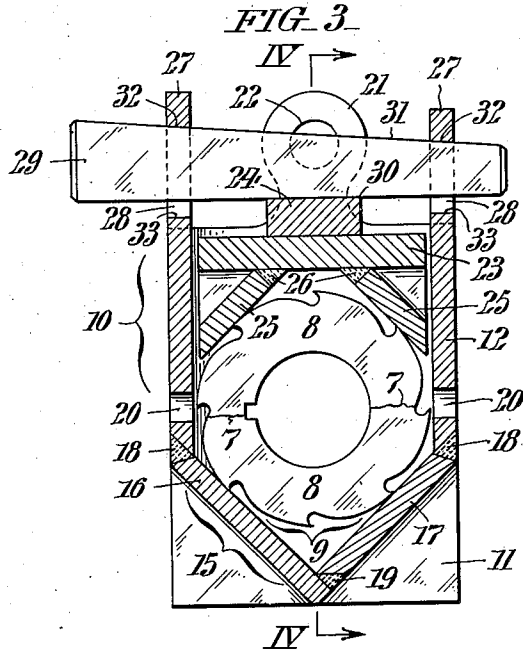
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UNITED STATES PATENT OFFICE

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HOLDER FOR USE IN RECLAIMING BROKEN CUTTING TOOLS

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2 Claims. (Cl. 113—99)

1

This invention has general reference to the restoration of broken, or otherwise damaged, metal articles to their former state or condition of usefulness; while it relates more particularly to the reclaiming of broken milling-cutters or the like and the instant case is a division of my prior application Serial Number 564,864, filed November 23, 1944.

Heretofore attempts have been made to reclaim broken "slab" milling-cutters, but such attempts have proven unsatisfactory owing to the reduction in the requisite hardness, so vital to successful usage of such cutters, and their inability to hold a good cutting edge. More specifically slab milling-cutters frequently break into two, or more, pieces during milling of the active face, and I have endeavored to repair the same with low temperature melting alloy welding wire and flux, in the manner prescribed by manufacturers thereof, with the result that the cutter became softened during the reclamation process to such an extent that it would not hold a good cutting edge when re-sharpened.

The primary aim of this invention is to provide a novel holder means whereby the above noted disadvantages are positively overcome. Another aim is to effect reclamation of broken milling-cutters, and other ferrous articles, which can be carried out with pre-assurance the said cutter, or other article, will be definitely restored to serviceable condition.

A further aim of this invention is to provide a novel holder or "jig" for use in the reclamation of the broken parts of a high speed steel milling-cutter by heat-treatment and welding, whereby said parts are effectively and evenly integrated together at the junctures.

While the foregoing stated aims are indicative of the objects of this invention, others with ancillary advantages will be evident to those skilled in the art upon a full understanding of the holder means hereinafter disclosed; but it is to be likewise appreciated that said invention is susceptible of variation and modification coming equally within the terms and scope of the concluding claims.

In the accompanying drawings:

Fig. 1 is a top plan view of a convenient means or "jig," preferably adapted for holding the broken parts of a spiral milling-cutter together during re-integration of said broken parts into unified assembly.

Fig. 2 is an elevation of the same, or as viewed from below Fig. 1.

Fig. 3 is a vertical section, taken approximately as indicated by the angled arrows III—III in Fig. 2; and,

2

Fig. 4 is a similar section taken on the plane IV—IV of Figs. 1 and 3.

In describing the form of this invention exemplified in the two sheets of drawings herewith, specific terms will be employed for the sake of clarity, but it is to be understood the scope of said invention is not thereby limited; each such term being intended to embrace all reasonable equivalents which perform the same function for an analogous purpose.

In carrying out my invention as adapted for the reclamation of broken slab milling-cutters, which it is here remarked usually split lengthwise into two or three parts. As a concrete example, and assuming that a conventional steel milling-cutter eight and one-quarter inches long, having an outside diameter of five inches with a bore of two and one-half inches diameter, to have been split lengthwise at approximately diametrically-opposed points, indicated by irregular lines to define fracture surfaces 7, 7, Figs. 3 and 4, into two parts 8, 8. I first take the two parts 8, 8 and remove all grease and other foreign substances therefrom; and then apply or coat the fracture surfaces 7, 7 only with a suitable flux, and place said two parts in a gas furnace, for example, such furnace having a heat about 1200° F. After being in the furnace for about twenty minutes, to volatilize the flux, the two parts 8, 8 are withdrawn and an appropriate welding deposit heat applied entirely over the fracture faces 7, with incidental driving of the volatilized flux from off said fracture surfaces; whereupon the two parts 8, 8 are placed with the respective fracture surfaces 7, 7, in mutual confronting engagement, and tack welded together, preferably at the ends, to prevent relative separation or movement out of registration; all as set forth in my hereinbefore referred to prior application Serial No. 564,864.

The re-assembled cutter, hereinafter comprehensively designated 9, is now placed in the "jig," referred to generally as 10, now to be described. This "jig" 10 conveniently, although not essentially, comprises a box-like structure including end and side walls 11, 12 respectively, all of rectangular contour. The end walls 11 are vertically spaced with the rectangularly-related side walls 12 united thereto by fillet-welds 13 intermediate the oppositely-beveled edges 14 of the walls 12 and the relatively confronting vertical side edges of the end walls 11, as best understood on an examination of Figs. 1 and 2. The "jig" 10 also includes a bottom 15, Fig. 3, consisting of two plate elements 16, 17, preferably disposed at an angle of ninety-degrees to insure the cutter 9 being properly centralized when placed therein

and said plate elements are respectively united to the lower edges of the side walls 11 by fillet welds 18, as well as to one another by a similar weld 19. Opposed apertures or peep-holes 20 are provided in the side walls 12. In addition, it will be seen the "jig" end walls 11 are each formed with an upward projection or lug 21, having an aperture 22 therethrough, and whereby the jig 10 can be lifted, carried or otherwise manipulated, when in use.

23 designates a top or closure for the jig 10, the same being of a contour for free movement into position between the end and side walls 11, 12 respectively, while it is formed with a central embossment 24, for a purpose later explained. The closure 23 is provided with dependent longitudinally-spaced chocks 25, conveniently secured thereto by fillet welds 26, for seating on the cutter 9, as readily understood from Fig. 3, more particularly.

To secure the closure 23 in effective engagement on top of the cutter 9; while the latter is in the "jig" 10, I preferably provide the side walls 12 with opposed upstanding projection 27, having rectangular slots 28 therethrough for passage of a cotter or clamping key-member 29. Attention is directed to the fact that the horizontal lower edge 30 of said member seats on the closure-embossment 24, above referred to, whereas the upper inclined edge 31 of the member 29 coacts with the complementarily sloped upper faces 32 of the rectangular slots 28. It is also to be noted the clamping member 29, in use, is free of engagement with the lower faces 33 of the slots 28, whereby the clamping pressure is longitudinally directed and evenly distributed lengthwise of the cutter 9, as readily understandable by those conversant with the art.

Having described the structural features of the jig 10, and upon placement of the tacked together broken cutter 9 therein, as hereinbefore mentioned, it is to be particularly noted that the longitudinal fracture faces 7, 7 conveniently register with the peep-holes 20, whereupon the top or closure 23 is put in place; the member 29 is next inserted through the rectangular slots 28 of the "jig" projections 27, and slightly drifted so that little or very slight clamping pressure is exerted on the pre-heated and assembled parts of the cutter 9. Incidentally this insertion of the tacked broken parts 8 into the "jig" 10 is only resorted to for the purpose of better ensuring that the fracture surfaces 7, of the respective broken parts 8, mutually register without any overlap of their respective surrounding edges.

The "jig" 10 containing the tacked cutter 9 is placed in an electric furnace heated to a temperature of 900° F., with the temperature slowly raised at determined interval periods to 1500° F., and subsequent thereto said temperature is rapidly raised to 2200° F. This temperature of 2200° F. is held for about eighteen minutes for all cutters less than three-inches in diameter, and for twenty-four minutes for all cutters three-inches or over in diameter.

Incidentally, the temperature periods, referred to in the preceding paragraph (from 900° F. upward), are governed by the thickness of the cutter metal cross-sectionally; while it is further noteworthy that at the 1850° F. heat, the weld usually commences to "knit," and the rise above said last mentioned temperature to that of 2200° F. serves to ensure the effective completion of the actual welding cycle.

The "jig" 10 is then removed from the electric

furnace and the key-member 29 driven tight to clamp, and lock, the fracture faces 7 in tight mutual registration; when said "jig" 10 with the enclosed cutter 9 is allowed to cool down to a temperature of between 400° F., and 700° F. depending on the type of the steel forming the cutter.

When the desirable cooling temperature, intervening 400° F. and 700° F., is reached the "jig" 10 and enclosed cutter 9 is again placed in the electric furnace, at a temperature of 900° F. and said temperature is then slowly raised to 1100° F. or 1300° F., for about one-hour for the purpose of drawing and tempering the cutter. When the "jig" 10 and cutter 9 are finally removed from the furnace they are preferably allowed to cool to room temperature; whereupon the cutter 9 is taken out of said "jig," and later sharpened by grinding in the known manner. Obviously, a second drawing-tempering period may be requisite to obtain the proper hardness for the reclaimed cutter. The "jig" 10 serves to retire the high heats, between 1850° F. and 2200° F., from the cutter 9; while said "jig" further holds the broken cutter 9 together when the clamping pressure is applied to "knit" the weld, due to the fact said cutter is restrained at four circumferentially-spaced or opposing points by the parts 16, 17 and 25.

While the holder or "jig" 10 has been more specifically described in connection with the reclamation of broken slab milling-cutters, certain features thereof are of more general utility, and it is therefore to be understood said invention in its broader aspect is not limited to the exact means, shown and described.

Having thus described my invention, I claim:
1. A holder for use in welding broken milling cutters comprising vertically-spaced rectangularly-related side and end walls integrated together by fillet welds intermediate the oppositely beveled edges of the side walls and the relatively confronting vertical side edges of the end walls; slotted projections on the side walls, and the end walls including apertured carrier lugs; the bottom of said holder comprising two plate elements with an intervening angle of ninety degrees, and said elements being integrated together and to the lower edges of the side walls by fillet welds; a closure for the holder in the form of a rectangular plate with an embossment on its outer face, and angularly dependent chocks integrated to its inner face; and means for clamping the closure to the holder with concurrent restraint of the cutter therein against relative movement.

2. The invention of claim 1 wherein the closure is provided with a central embossment; wherein opposed side walls of the holder have upstanding projections with vertical slots therethrough; wherein the clamp means consists of a key having an inclined upper edge; and wherein the key seats on the embossment and is arranged for operation intermediate the embossment and the upper edges of the vertical slots aforesaid.

JOHN HENGSTLER.

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The following references are of record in the file of this patent:

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