April 5, 1966 J. E. PARKER 3,244,489

RETAINER BLOCK AND METHOD OF MAKING

Filed Feb. 24, 1964

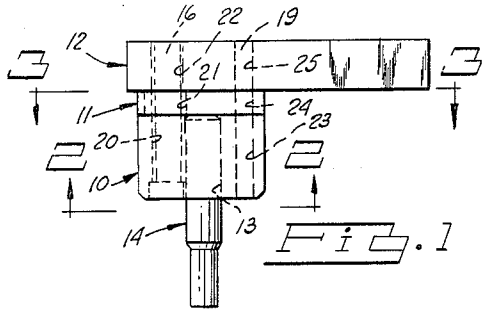


Fig. 1

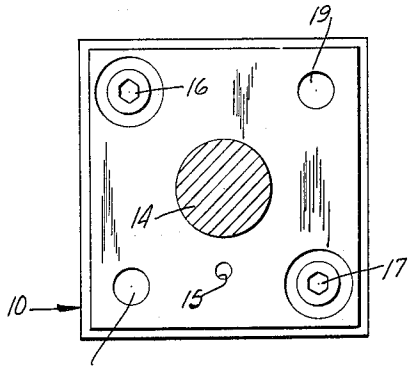


Fig. 2

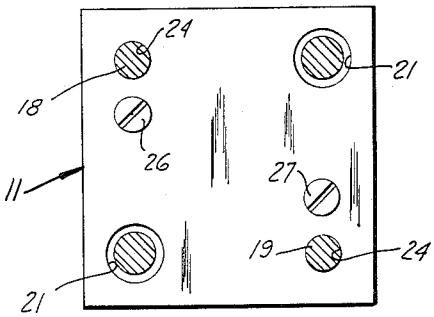


Fig. 3

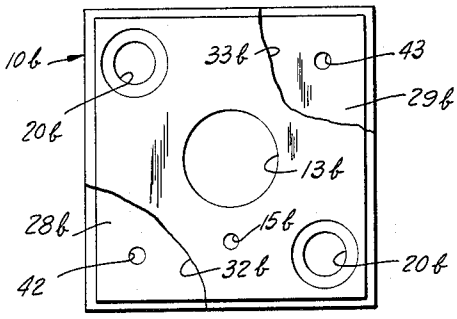


Fig. 6

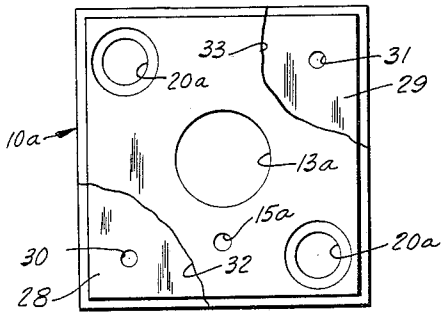


Fig. 4

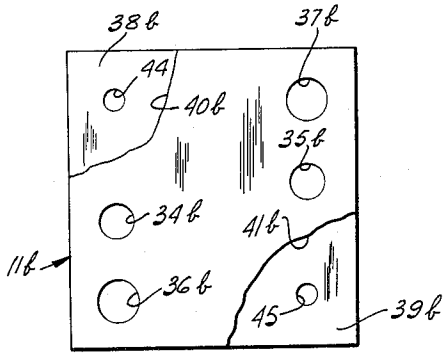


Fig. 7

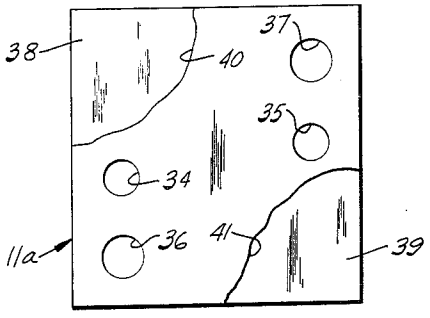


Fig. 5

INVENTOR.
JAMES E. PARKER

BY
Donnelly, Mentag & Herrington
ATTORNEYS

United States Patent Office 3,244,489 Patented Apr. 5, 1966

3,244,489

RETAINER BLOCK AND METHOD OF MAKING

James E. Parker, 18230 Valade, Wyandotte, Mich.

Filed Feb. 24, 1964, Ser. No. 346,736
6 Claims. (Cl. 29—190)

This invention relates generally to the construction of tool retainers for metal punching and forming tools, and more particularly to a novel and improved tool retainer construction and method of making the same.

Heretofore in order to mount a tool retainer block on the punch shoe of a press, it has been common practice to remove the tool retainer block from its backing plate in order to use the retainer block alone for mounting the retainer block on the die shoe in alignment with the die. In accordance with such prior practice the retainer block is attached to the punch shoe with the usual mounting screws, and the dowel holes which have been previously formed through the retainer block are used as a guide for a drill to form mating dowel holes in the punch shoe. The retainer block is then removed from the punch shoe and re-assembled with the backing plate in place between the punch shoe and the retainer block. A disadvantage of such practice is that in many instances, due to the drill not being disposed perfectly square with the punch shoe, when the backing plate is put in position on top of the retainer block there will be slight differences in the dimensions of the dowel holes in the backing plate and retainer block so as to shift the location of the punch or tool and the retainer block relative to the backing plate. Another disadvantage of the prior art tool retainer constructions is that when a tool retainer is found to be slightly off position on a punch shoe and one side of the punch is being sheared by the die button, the retainer block must be removed from the punch shoe and the dowel holes in the punch shoe plugged up and the entire tool retainer construction relocated in a new position on the punch shoe. The relocation of the tool retainer construction is time consuming and costly. In view of the foregoing disadvantages of the prior art tool retainer constructions, is is an important object of the present invention to provide a novel and improved tool retainer construction which overcomes said disadvantages.

It is another object of the present invention to provide a novel and cheap method of manufacturing a tool retainer construction.

It is a further object of the present invention to provide a novel and improved tool retainer construction in which the dowel hole areas in the retainer block and backing plate are maintained in a soft condition, and the other retainer block and backing plate portions are hardened so as to permit the tool retainer construction to be mounted on a punch shoe before the dowel holes are drilled and reamed through the tool retainer block and the backing plate, so as to permit these operations to be performed after the tool retainer block and backing plate have been secured to the punch shoe and the punch accurately aligned with the die.

It is still another object of the present invention to provide a novel and improved tool retainer construction wherein the dowel hole areas of the tool retainer block and backing plate are maintained in a soft condition during the hardening of the other portion of these members, and wherein the dowel holes are pre-centered by drilling undersize or center holes in the tool retainer block and backing plate or by making punch marks or center points in the tool retainer block and backing plate.

It is still a further object of the present invention to provide a novel and improved method of mounting a tool retainer construction on a punch shoe comprising forming a tool retainer block and backing plate with soft dowel hole areas, fixedly securing the tool retainer block and backing plate to the punch shoe, drilling and reaming

dowel holes through the soft dowel areas of the tool retainer block and backing plate and punch shoe, and mounting dowels in the drilled and reamed dowel holes.

Other objects, features and advantages of this invention will be apparent from the following detailed description, appended claims, and the accompanying drawing, wherein:

FIG. 1 is a side elevational view of a tool retainer construction of the type which may be made in accordance with the principles of the present invention;

FIG. 2 is a bottom view of the structure illustrated in FIG. 1, with parts removed, taken along the line 2—2 thereof, and looking in the direction of the arrows;

FIG. 3 is a top plan view of the tool retainer construction illustrated in FIG. 1, taken along the line 3—3 thereof, and looking in the direction of the arrows;

FIG. 4 is a bottom plan view, similar to FIG. 2, and showing a tool retainer block made in accordance with the principles of the present invention;

FIG. 5 is a top plan view of a backing plate for a tool retainer construction made in accordance with the principles of the present invention;

FIG. 6 is a bottom plan view, similar to FIG. 4, but showing a second embodiment of a tool retainer block made in accordance with the principles of the present invention; and,

FIG. 7 is a top plan view, similar to FIG. 5, but showing a second backing plate embodiment made in accordance with the principles of the present invention.

Referring now to the drawing, and in particular to FIGS. 1, 2 and 3, numeral 10 generally indicates a conventional tool retainer block which is mounted on a punch shoe generally indicated by the numeral 12 and which is spaced therefrom by the usual backing plate generally indicated by the numeral 11. The tool retainer block 10 is provided with the usual punch hole 13 in which is operatively mounted in the usual manner the punch 14. The punch 14 may be held in the hole 13 by any suitable means, as for example, by the use of a conventional automatic ball locking means of the type shown in U.S. Patent No. 2,662,773, or any other form of locking device. As shown in FIG. 2, the numeral 15 indicates a hole which extends into the retainer block 10 and into which is inserted a tool for releasing a conventional automatic ball locking means.

As shown in FIGS. 1, 2 and 3, the retainer block 10 and backing plate 11 are secured to the punch shoe 12 by means of the usual screws 16 and 17. The retainer block 10 and backing plate 11 are maintained in a proper position on the punch shoe 12 by means of the usual dowels 18 and 19 so as to hold the punch 14 in alignment with its mating die. These screws 16 and 17 are mounted through suitable holes formed in the retainer block 10, the backing plate 11 and the punch shoe 12. For example, as shown in FIG. 1, the screw 16 is mounted in the stepped hole 20 in the retainer block 10, and it extends upwardly through the enlarged hole 21 formed in the backing plate 11. The screw 16 then extends upwardly into threadable engagement with the threaded hole 22 formed in the punch shoe 12 for securing the retainer block 10 and backing plate 11 to the punch shoe 12. The dowels 18 and 19 are mounted by means of the usual press fit in suitable holes in the retainer block 10, the backing plate 11 and the punch shoe 12. For example, as shown in FIG. 1, the retainer block 10 is provided with a dowel hole 23 which is aligned with the holes 24 and 25 in the backing plate 11 and the punch shoe 12, respectively. As shown in FIG. 3, the backing plate 11 is secured to the retainer block 10 by means of the usual pair of retainer screws 26 and 27.

The aforedescribed tool retainer construction is illustrative of the type which can be made in accordance with the principles of the present invention. It will be under-

stood that the invention may be used on any type of tool retainer construction, as for example, the square type as shown in FIGS. 1 through 3, the end type, as well as b oth light and heavy duty tool retainer constructions.

FIGURES 4 and 5 illustrate a tool retainer block **10***a* and a backing plate **11***a* which have been made in accordance with the principles of the present invention. In accordance with the invention, the retainer block **10***a* would be provided with the usual punch hole **13***a*, and the hole **15***a* for inserting a tool for releasing the punch locking means. The retainer block **10***a* would also be provided with the usual holes **20***a* in which the usual mounting screws **16** and **17** are mounted. The dowel holes, as **23** and **24**, would not be made in the retainer block **10***a* and the backing plate **11***a* before they are hardened. The retainer block **10***a* and backing plate **11***a* are made of a conventional machine steel or tool steel of a low carbon content and which can be machined easily. It is the prior practice to drill the dowel holes **23** and **24** in the retainer block **10***a* and the backing plate **11***a* after the screw holes **20***a* and the punch holes **13***a* and the lock releasing hole **15***a* have been formed to the proper size. However, in accordance with the principles of the present invention, the dowel hole areas on the retainer block **10***a* are indicated by the numerals **28** and **29** and they are not hardened when the rest of the retainer block **10***a* is carburized and hardened by any suitable conventional heat-treat process.

As shown in FIG. 4, the dowel hole corner areas **28** and **29** are illustrated as extending inwardly into the retainer block **10***a* up to the lines indicated by the numerals **32** and **33**, respectively. The dowel holes are precentered at the points **30** and **31** in the dowel areas **28** and **29**, respectively, before the retainer block **10***a* is mounted on the punch shoe **12**. The precenter points **30** and **31** may be made either before or after the remaining portion of the retainer block **10***a* is hardened. It will be understood that any suitable conventional heat-treat process may be used for hardening the tool retainer block **10***a* while maintaining the dowel hole corner areas **28** and **29** in a soft, machinable condition.

FIG. 5 is the top view of a backing plate **11***a* and it is heat-treated in the same manner as the retainer block **10***a* so as to maintain the dowel hole corner areas **38** and **39** in a soft, machinable condition. The inner edges of the dowel hole areas **38** and **39** are indicated by the numerals **40** and **41**. The backing plate **11***a* is provided with the holes **34** and **35** through which is mounted the retainer screws **26** and **27** for securing the backing plate **11***a* to the retainer block **10***a*. It will be understood that the dowel hole areas **38** and **39** of the backing plate **11***a* will be disposed over the dowel hole areas **28** and **29** of the retainer block **10***a* when they are mounted in an operative position on the punch die **12** in a manner similar to the tool construction of FIG. 1. The backing plate **11***a* would be made from any suitable machine steel or tool steel, and would be heat-treated so as to maintain the dowel hole areas **38** and **39** in a soft, machinable condition.

FIGS. 6 and 7 illustrate a slight modification of the tool retainer block and backing plate structure illustrated in FIGS. 4 and 5. Accordingly, the same reference numerals have been used in FIGS. 6 and 7 for the corresponding parts shown in FIGS. 4 and 5, followed by the small letter "*b*." The only difference between the structures of FIGS. 4 and 5, and FIGS. 6 and 7, is that the dowel hole areas **28***b* and **29***b* of the retainer block **10***b* have been provided with the undersize drill center holes for the later drilled regular size dowel holes, and these holes have been indicated by the numerals **42** and **43**. The backing plate **11***b* is similarly provided with center holes or under size holes **44** and **45** in the soft dowel hole areas **38***b* and **39***b*.

In accordance with the principles of the present invention, the tool retainer block **10***a* and the backing plate **11***a* are assembled together by means of the usual retainer screws **26** and **27**. The assembled block and backing plate structure is then mounted on the punch shoe **12** by means of the usual screws **16** and **17**. The punch **14** is aligned and positioned in relation to its mating die before the screws **16** and **17** are tightened in their final positions. In accordance with the present invention, the two dowel holes are then drilled and reamed through the retainer block **10***a* and the backing plate **11***a*, and they are extended into the punch shoe **12**. It will be seen that the dowel holes can be put in after the retainer structure is set on the screws **16** and **17** and the punch located. The drill points **30** and **31** function to center the drill for drilling the dowel holes. The retainer block **10***b* and the backing plate **11***b* would be mounted in a similar manner and the lead holes **42** and **43**, and **44** and **45** function for the same purpose as the points **30** and **31** to locate the drill for drilling the dowel holes accurately through these members and into the punch shoe **12**. It will be seen that it is possible, in accordance with the present invention, to relocate at tool retainer construction in an accurate manner on a punch shoe in a minimum of time and with a minimum of labor.

An advantage of the present invention is that it is not necessary to have oversize dowel holes as **21** and **24** in the backing plate. Such oversize holes jam with drill slugs and other dirt and they can cause trouble in mounting the tool retainer constructions on a punch shoe. A further advantage is that the punch can be aligned and positioned relative to its mating die in a fast and efficient manner. For example, heretofore the backing plate would be removed and the retainer block would be secured to the punch shoe and the dowel holes drilled. If the dowel holes were not drilled prefectly square, then a slight error could develop when the backing plate was replaced so as to shift the retainer block slightly one way or the other and misalign the punch relative to its mating die. The present invention eliminates any shifting due to errors of this type and the same size hole is provided for the dowels throughout the retainer block, the backing plate and the punch shoe.

Another advantage of the present invention is that retainer blocks made in accordance with the present invention may be quickly and easily adjusted when the need for the same arises. Heretofore, after the prior art retainer blocks had been set in position on the punch shoe and a need for shifting or adjusting the same arose because of the fact that the retainers were set a little bit off the proper setting, or after having run some production it was found that one side of the punch was being sheared by the die button, the problem existed of resetting the retainer block in line with the button. In order to eliminate the problem of shearing the punch, the retainer block would be removed from the punch shoe and the dowel holes in the shoe plugged. Once these holes were plugged, then the retainer block was remounted on the screws and moved to where it should be with the punch in alignment with the die button and a new dowel hole would be drilled in the punch shoe by using the old dowel holes in the retainer block to guide the drill. A reamer was then run through the dowel holes to bring it to size for the reception of the new dowels. It will be seen that the present invention would eliminate the necessity of having to plug the holes in the punch shoe in such a case because it would merely be necessary to drill the old dowel holes with a larger drill to enlarge them to the next size dowel. The dowel holes in the soft areas of the retainer block and backing plate would merely be enlarged to the next size dowel. It will be seen that this resetting operation can be quickly and easily carried out with a tool retainer construction made in accordance with the present invention.

Another advantage of the retainer block made in accordance with the present invention is that the retainer block can be duplicated in a fast and efficient manner. If it is necessary to replace the retainer block for some reason, it is a simple matter to take the old block off and place it on a new block and drill and ream the dowel holes through the soft areas so as to maintain a perfect location of the dowels. The new retainer block may then be quickly and easily mounted onto the old dowels in the same exact position.

The invention provides a cheaper method of manufacturing a retainer block because there are two less holes that have to be ground to finished size. With a retainer block made in accordance with the present invention, it is merely necessary to simply drill the dowel holes and ream them at the same time that the retainer block and the backing plate are mounted on the punch shoe. Furthermore, the cost of manufacturing retainer blocks and backing plates in accordance with the present invention is reduced because the dowel holes do not have to be drilled and ground after the entire areas of these two parts are hardened.

Experience has shown that a tool retainer construction made in accordance with the principles of the present invention provides a construction of this type which is cheaper to manufacture and which may be quickly and easily mounted on a punch shoe so as to ensure a proper fit with a die and maintain a close tolerance.

While it will be apparent that the preferred embodiments of the invention herein disclosed are well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What I claim is:

1. In combination, a tool construction comprising: a tool retainer block having a tool hole for operatively mounting a tool therein; said tool retainer block being provided with mounting screw holes; said retainer block being further provided with at least a pair of dowel hole areas; and, said tool retainer block being hardened except in the dowel hole areas which are in a soft, machinable condition to permit dowel holes to be drilled and reamed through the dowel hole areas after the tool retainer block has been mounted in an operative position.

2. In combination, a tool construction comprising: a tool retainer block having a tool hole for operatively mounting a tool therein; a backing plate on said tool retainer block; said tool retainer block and backing plate each being provided with mounting screw holes; said tool retainer block and backing plate each being provided with at least a pair of dowel hole areas; the dowel hole areas in the tool retainer block being disposed adjacent the dowel hole areas in the backing plate; and, said tool retainer block and backing plate being hardened except in the dowel hole areas which are in a soft, machinable condition to permit dowel holes to be drilled and reamed through the dowel hole areas after the tool retainer block has been mounted in an operative position.

3. The tool construction defined in claim 2, wherein: said each of the dowel hole areas in the tool retainer block is provided with a center point for a dowel hole.

4. The tool construction defined in claim 2, wherein: each of the dowel hole areas in the tool retainer block is provided with a center hole.

5. A method of mounting a tool retainer construction on a punch shoe, comprising: forming a tool retainer block and backing plate with soft dowel hole areas; securing the tool retainer block and backing plate to the punch shoe; drilling and reaming dowel holes through the soft dowel areas of the tool retainer block and backing plate and punch shoe; and, mounting dowels in the drilled and reamed dowel holes.

6. A method of making a tool retainer construction which includes a tool retainer block and a backing plate, comprising the steps of: forming a tool hole in the tool retainer block; forming mounting screw holes through the tool retainer block and the backing plate; and, hardening the tool retainer block and backing plate except in the dowel hole areas on the tool retainer block and the backing plate to leave these areas in a soft, machinable condition to permit dowel holes to be drilled and reamed through the soft dowel hole areas after the tool retainer block and backing plate have been mounted in an operative position on a punch shoe.

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ANDREW R. JUHASZ, *Primary Examiner.*