Aug. 1, 1944. F. G. VOLKEL 2,354,970

WORK HOLDER

Filed Nov. 10, 1943

Fig. 1

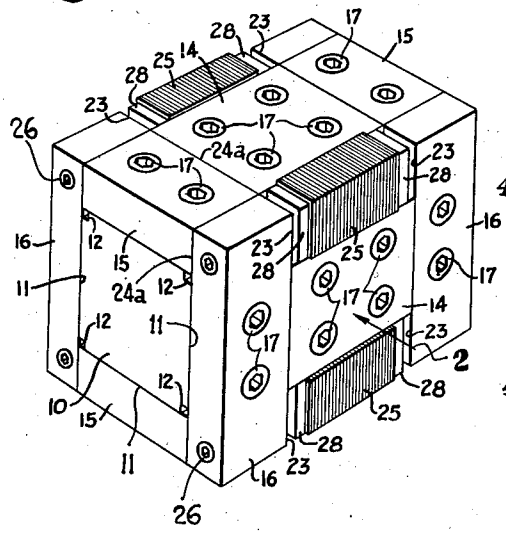


Fig. 3

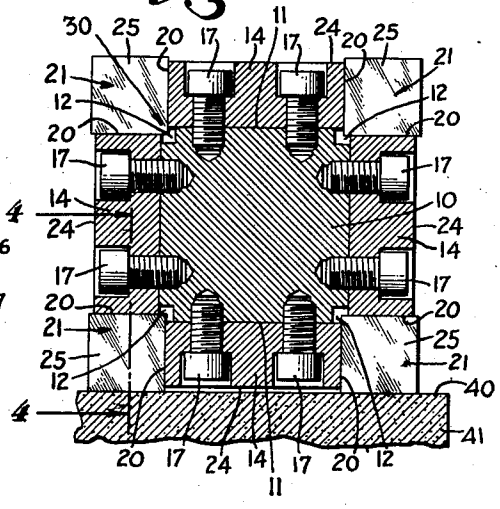


Fig. 2

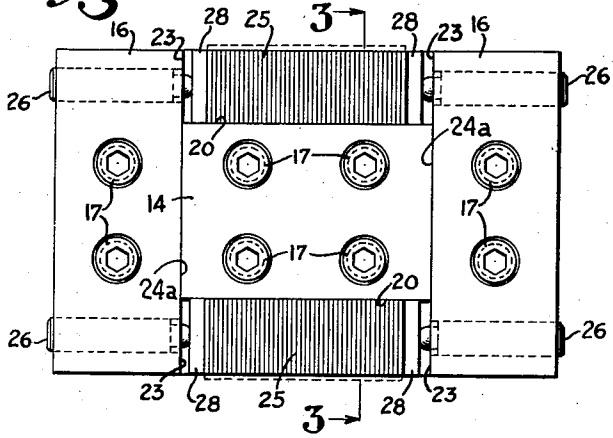


Fig. 4

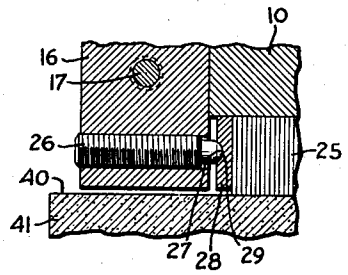


Fig. 5

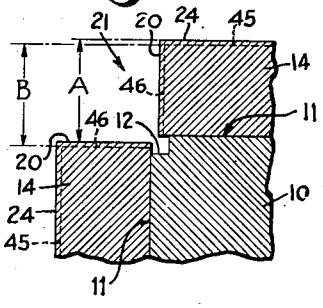
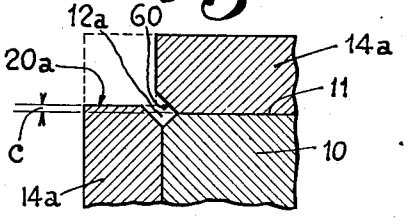


Fig. 6



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UNITED STATES PATENT OFFICE

2,354,970

WORK HOLDER

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Application November 10, 1943, Serial No. 509,683

7 Claims. (Cl. 51—217)

My invention relates to a work holder, and the embodiment disclosed herein is a work holder and size gage particularly adapted for holding radio crystals while they are being ground, lapped, or otherwise abraded to size.

In order that the utility and features and advantages of my invention may be readily understood, brief reference will be made to the requirements of certain crystals used in radio. Certain radio equipment requires crystals of rectangular shape and about 15 to 40/1000 of an inch thick. The four perimetric edges of the crystals must be accurately to size within 2 to 4/1000 of an inch. The form of my invention disclosed herein is designed to hold a multiplicity or stack of crystals while the edges are being abraded to size.

It is an object of my invention to provide a work holder and size gage in the general shape of a rectangular prism having work receiving slots or cavities at the corners in which the work to be abraded is secured in such a manner that two edges of the work project outwardly at the corners of the rectangular prism on two sides thereof, and the work holder has side walls which constitute gaging surfaces. In using the work holder and size gage of my invention, the work, which may be radio crystals or other pieces to be abraded to size, is supported in the slots or cavities formed at the corners of the work holder and is applied to the abrading wheel with one side or gaging surface of the holder parallel to the surface of the abrading wheel. The work is abraded away until the side or gaging surface of the holder touches the abrading wheel. The work holder is then repositioned so that another side is adjacent the abrading wheel and the work projecting from this other side is abraded in the same manner as previously described. When all work in the work holder has been properly abraded the work is then removed from the work receiving slot and the two ground edges placed in the work receiving slot of a finishing work holder against the wall thereof, this leaving two unabraded edges projecting outwardly from the work holder.

It is another object of my invention to provide a work holder which has a support body and blocks removably secured thereto to form work receiving slots, the support body and blocks being so shaped that all surfaces may be ground accurately to size, and in which those surfaces which take the wear may be hardened so as to be wear resistant.

It is another object of my invention to provide a work support in which there is a central support body which supports all other parts in accurate alignment.

It is a still further object of my invention to provide a work support comprising a support body and removable blocks which form work receiving slots, which blocks may be readily removed, replaced, or resized to vary the size of the work receiving slot and thus vary the size to which the work will be ground.

By virtue of the preceding object of my invention, it is possible to readily adapt a work support to different sizes of work merely by replacing or resizing certain of the blocks. It is possible to adapt the work support to hold larger or smaller work, as desired. Also, when wear occurs, such as by the gaging surfaces being worn away due to repeated contact with the abrading device, it is possible to remove to resize and replace the blocks, thus salvaging the work holder which might otherwise be useless.

It is another object of my invention to provide a work holder comprising a body and blocks secured thereto in which the blocks have accurately formed coengaging faces whereby a plurality of blocks mutually cooperate or interlock in order to prevent displacement of any one block. By virtue of this arrangement, any force tending to displace or disalign any one block is not only resisted by the securing means which secures the block to the body, but due to coengagement or interlocking with other blocks it is also resisted by these other blocks. This arrangement gives a very rigid and strong structure which does not require the use of dowel pins.

It is a still further object of my invention to provide a work holder of the general character pointed out in the preceding paragraph in which the work receiving slot has a recess or groove formed at the bottom, which recess or groove receives the inner corner of the work. This allows the work to be better fitted in the work receiving slot and to fit more closely to the walls of the slot should the work be uneven or have a burr at the corner or be of lozenge shape instead of rectangular.

Other objects and advantages of my invention will be brought out during the course of the following detailed description of the work holder and size gage for supporting radio crystals during the abrading process, which embodiment I have chosen solely for the purpose of illustrating my invention, its utility, and various features and advantages.

Fig. 1 is a perspective view showing the work

holder with the work supported in place therein ready to be abraded.

Fig. 2 is a side view taken as indicated by the arrow 2 of Fig. 1.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2 and illustrating the manner in which the work is abraded.

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 3 showing the clamping means for removably securing the work in the work receiving slot.

Fig. 5 is an enlarged fragmentary sectional view illustrating the manner in which the blocks may be reground to resize or salvage the work holder.

Fig. 6 is a fragmentary sectional view showing bevel blocks which are employed where a relatively small size work receiving slot is to be provided.

Referring to the drawing in detail, the numeral 10 is a support block having the shape of a rectangular prism which has four sides 11 which are ground accurately to size but need not be hardened. At each corner of the body 10 there is formed a longitudinal groove or recess 12.

Removably secured to the sides 11 are blocks in the shape of rectangular prisms, which blocks are accurately ground to size and are preferably hardened. These blocks are indicated as intermediate blocks 14 and end blocks 15 and 16. These blocks are removably secured to the body 10 by any suitable securing means, such as Allen head cap screws 17.

In the form of work holder illustrated there is one intermediate block removably secured to each side of the body 10. Each block has edge walls 20, and these edge walls terminate adjacent the corners of the body 10, as illustrated best in Figs. 3 and 5. The adjacent edge walls of adjacent intermediate blocks cooperate to form work receiving cavities or slots at the corners of the body 10, these work receiving slots being indicated by the numeral 21. The work holder illustrated herein is intended to enable the work or crystals 25 to be ground to square shape, and therefore the edge walls 20 defining the sides of the work receiving slots 21 are positioned at right angles to each other.

The end blocks 15 are short blocks of a length substantially the width of the sides 11, while the end blocks 16 are of a length equivalent to the width of the sides of the body and the thickness of the two end blocks 15. The end block 16 forms end walls 23 of the work receiving slots 21.

The outer surfaces of either the intermediate or end blocks, and preferably the outer surfaces of both, constitute gaging surfaces 24; and the manner in which these gaging surfaces 24 are employed to control the dimensions to which the work is abraded will be pointed out when the operation of the work holder is described.

The blocks 14, 15, and 16 have coengaging faces 24*a* which cause what I term an interlocking of the blocks. It will be seen that the blocks are each separately secured to the body and that the faces 24*a* of adjacent blocks mutually coengage. Any tendency for one block to be moved or displaced is resisted not only by the securing screws 17 of that particular block, but also by the securing screws of adjacent blocks. Therefore, notwithstanding the fact that each of the blocks is an individual part, each block is, nevertheless, held in position not only by its particular securing screws, but also by adjacent blocks and their securing screws.

For the purpose of securing the work 25 in the work receiving slots, I provide clamping screws 26 which are supported at each end of each work receiving slot by the end blocks 16, the clamping screws 26 being threadedly supported in openings thereof. Although the clamping screws may have flat ends, I prefer that they be provided with spherical inner ends 27, as shown best in Fig. 4, which engage pads 28 which in turn have spherical seats 29, the pads 28 being adapted to engage the work, and when the screws are advanced inwardly the work is clamped in place.

As explained heretofore, the form of my invention shown in the drawing is intended to support radio crystals 25 during the grinding process. Therefore, in explaining the operation of my invention I will refer to its use in this connection. As previously pointed out, the radio crystals 25 are of general rectangular shape and are usually between 5 and 40/10000 of an inch thick. The crystals 25 are stacked and are placed in the work receiving slots, as illustrated in the drawing, and, as shown in Fig. 3, the crystals 25 are so positioned that the two inner walls thereof engage the walls 20 defining the work receiving slots, whereafter the clamping screws 26 are then adjusted inwardly to clamp the crystals firmly in the position described. In view of the ball and socket joint between the clamping screws 26 and the pads 28, the pads while being pressed against the crystals can adjust themselves to the surfaces of the crystals and breakage from misalignment is eliminated.

It will be noted in Fig. 3 that the inner corners of the crystals, which I will designate by the numeral 30, extend into the recesses 12 formed at the bottom of the work receiving slots. By providing these work receiving slots, any unevenness or burrs at the corners of the crystals are given adequate clearance and will not interfere with the crystals, being caused to contact the walls 20. Also, if the crystals are not exactly rectangular in shape but slightly lozenge shape, the clearance or relief at the inner corners or bottoms of the work receiving slots enables the crystals to be extended into the work receiving slots to a greater distance than there would be if there were no recess at the bottoms of the slots, and in this way better fitting of the crystals and less wastage of material are effected.

The work holders are of such a size that they may be manually handled by the workman. In using the work holder it is manually positioned adjacent the abrading surface 40 of an abrading wheel 41 so that the gaging surface 24 is substantially parallel to the abrading surface 40. It will be seen that two stacks of work 25 at two adjacent corners of the work holder have edges which engage the abrading surface. The operator applies the necessary pressure to cause the edges of the stacks of work to be abraded away. The workman watches the abrading action very carefully, and when the adjacent gaging surface 24 contacts the abrading surface 40 the workman removes the assembly from contact with the abrading surface. Since the blocks 14 to 16 inclusive are hardened, they will not be worn away very rapidly, and if the operator is very careful during the grinding operation the gaging surfaces will remain substantially to size or within satisfactory tolerances over a period of time.

After grinding the edges of the stacks of work along one side of the work holder, the work holder is then turned 90° and the abrading process

is repeated at this other side. The operator repeats this process until the edges of all four stacks of crystals 25 have been abraded.

The clamping screws are then released, the work removed, and the stacks of crystals are then positioned in work receiving slots of a work holder which is used for finishing and therefore has slots which are slightly smaller in size. The stacks of crystals are positioned in the work receiving slots of the finishing work holder so that the accurately ground edges engage the walls 20 of the slots leaving the two rough edges of each crystal projecting outwardly beyond the gaging surfaces. After clamping the stacks of crystals in place the operator then abrades the extending edges of the crystals, and when the operation has been completed the crystals are accurately to size within 1 to 2/1000 of an inch.

As a specific example of the use of my invention in grinding a specific size of crystal, I give the following. The crystals to be ground are .575 inch square. The first holder in which the crystals are placed has slots which have a depth of .535 inch. The crystals project outwardly .035 inch on two sides, and when ground these two sides are ground flush with the sides of the work holder. The second work holder or finishing work holder has slots .515 inch in depth. When the crystals are placed in this finishing work holder two edges project outwardly .020 inch which, when ground away, leave a final finished crystal which is .515 inch square.

From continued use of the work holder of my invention, the gaging surfaces 24, being at instances brought into contact with the abrading wheel, will be worn. In my invention, however, this wearing may be readily compensated for, as illustrated in Fig. 5. For example, when the surface 24 wears down to a level indicated by dotted lines 45, which may be a distance determined as the distance at which the work holder should be resized, it will be seen that the distance A has been reduced so that the crystals will be ground to a smaller size than before, the difference depending on the distance between the surface 24 and the surface indicated by the numeral 45. To compensate for this wear, the intermediate blocks 14 are removed and the edge walls 20 are ground away to a plane indicated by the dotted line 46 so that the distance between the dotted lines 45 and 46, indicated as B, will be the same as the original distance A between the surface 24 and the end wall 20. When the reground intermediate blocks 14 are reinstalled on the body the slots 21 will then have their original size and wear on the gaging surfaces 24 will have been compensated for. It will be seen that the recess 12 formed in each corner of the body 10 permits this salvage operation without requiring the body to be ground, machined, or otherwise varied in size.

The work holder of my invention may be changed in size to accommodate crystals to be ground of a larger or smaller size. This may be done in two ways. First, thicker or thinner blocks 14 to 16 inclusive may be used or the blocks may be narrower or wider, as desired, to change the effective distances A shown in Fig. 5 between the gaging surfaces 24 and the walls 20. It will be seen that the changes in the width of the intermediate blocks 14 may be made without making a change in the body 10 due to the presence of the recesses 12.

If the work receiving slot 21 is of substantially smaller size for the size of the body 10 than is illustrated in Figs. 1 to 5, then a special type of intermediate block 14 is required. This is illustrated in Fig. 6. In Fig. 6 the numeral 10 represents the body and the numerals 14a represent the alternative types of blocks. It will be noted that the inner corners of the blocks 14a are bevelled, as indicated at 60, so that these inner corners of the blocks 14a do not coengage but are spaced apart in order to provide a channel or gutter 12a resembling 12 in the other figures. By cutting away the inner corners, as at 60, it is possible to have edge walls 20a which overlap or project beyond sides 11 of the body 10 a distance represented at C or a greater or lesser distance, if desired. It will therefore be seen that by virtue of my invention a great latitude in sizes of slots is possible and a greater range of work may be performed using the work holder of my invention.

Although I have illustrated herein an embodiment of my invention intended for use in supporting radio crystals during the sizing operation, it should be understood that my invention may be employed for supporting other work, and that various alterations and modifications may be made therein without departing from the spirit and scope of my invention as defined in the appended claims.

I claim as my invention:

1. In a work holder for holding work during abrading, the combination of: a support body of rectangular cross-section; blocks secured to the sides of said body, said blocks having edge walls, the adjacent edge walls forming work receiving slots at each corner of said body; wall means forming a recess in the bottom of each work receiving slot; and securing means for removably securing the work in said work receiving slots.

2. In a work holder for holding work during abrading, the combination of: a support body of rectangular cross-section; intermediate blocks secured to the sides of said body, said blocks having edge walls, the adjacent edge walls forming work receiving slots at each corner of said body; wall means forming a recess in the bottom of each work receiving slot; end blocks secured to the sides of said body, said end blocks closing the ends of said work receiving slots; and securing means carried by said end blocks for removably securing the work in said work receiving slots.

3. In a work holder for holding work during abrading, the combination of: a support body of rectangular cross-section; blocks secured to the sides of said body, said blocks having edge walls, the adjacent edge walls forming work receiving slots at each corner of said body; wall means forming a recess in the bottom of each work receiving slot; gaging surfaces provided by the outer walls of said blocks, said gaging surfaces being engageable with the abrading device to gage the dimensions to which said work is abraded; and securing means for removably securing the work in said work receiving slots.

4. In a work holder for holding work during abrading, the combination of: a support body of rectangular cross-section; blocks secured to the sides of said body, said blocks having edge walls, the adjacent edge walls forming work receiving slots at each corner of said body; gaging surfaces provided by the outer walls of said blocks, said gaging surfaces being engageable with the abrading device to gage the dimensions to which said work is abraded; and securing means for removably securing the work in said work receiving slots.

5. In a work holder for holding work during abrading, the combination of: a central support body of rectangular cross-section having the four sides formed accurately to size; blocks of rectangular cross-section secured to the sides of said body, the four walls of said blocks being formed accurately to size, edge walls of each two adjacent blocks being spaced from each other at a corner of said body and cooperating to form a work receiving slot, and outer walls of said blocks being hardened and composing gaging surfaces for engaging the abrading device and gaging the dimension to which the work is abraded; and securing means for removably securing the work in said work receiving slots.

6. In a work holder for holding work during abrading, the combination of: a central support body of rectangular cross-section having the four sides formed accurately to size; blocks of rectangular cross-section secured to the sides of said body, the four walls of said blocks being formed accurately to size, edge walls of each two adjacent blocks being spaced from each other at a corner of said body and cooperating to form a work receiving slot, there being a recess formed in the bottom of each work receiving slot into which the inner corner of said work may project; and securing means for removably securing the work in said work receiving slots.

7. In a work holder for holding work during abrading, the combination of: a support body of rectangular cross-section; blocks secured to the sides of said body, said blocks having edge walls, the adjacent edge walls forming work receiving slots at each corner of said body, said blocks having coengaging faces whereby adjacent blocks interlock and one block cooperates in resisting disalignment of an adjacent block; gaging surfaces provided by the outer walls of said blocks, said gaging surfaces being engageable with the abrading device to gage the dimensions to which said work is abraded; and securing means for removably securing the work in said work receiving slots.

FRANK G. VOLKEL.