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F. P. MILLER

2,134,140

INSERTED CUTTER BLADE AND MOUNTING THEREFOR

Filed May 27, 1937

Fig. 1.

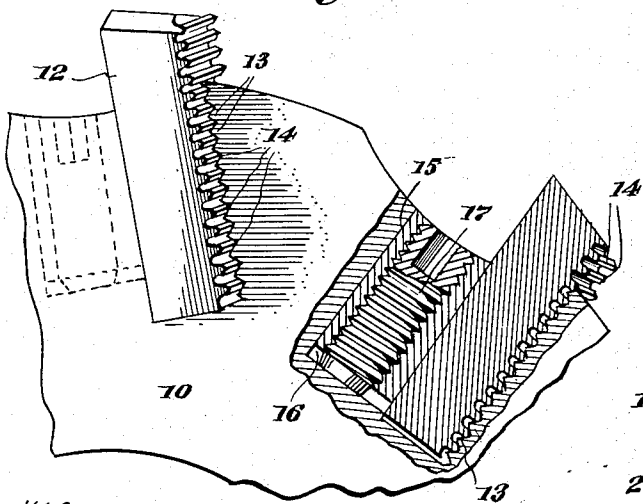


Fig. 5.

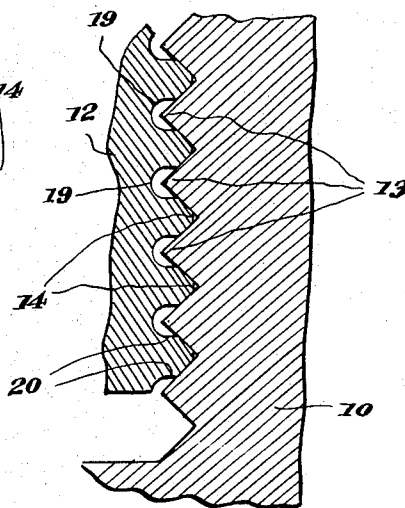


Fig. 2.

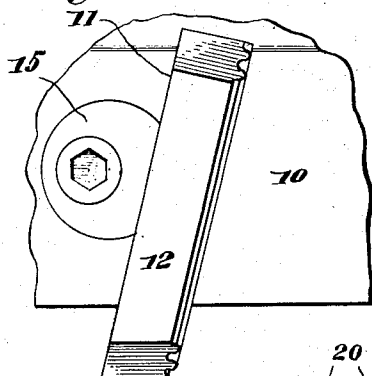


Fig. 6.

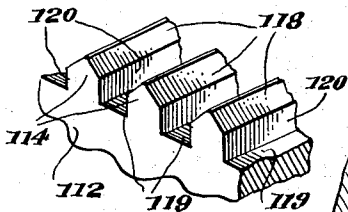


Fig. 7.

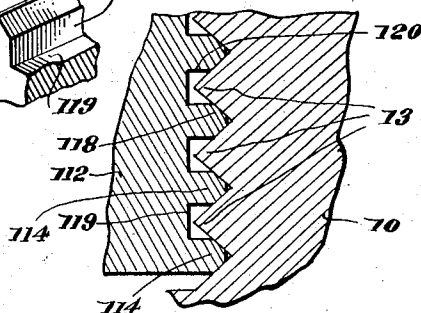


Fig. 3.

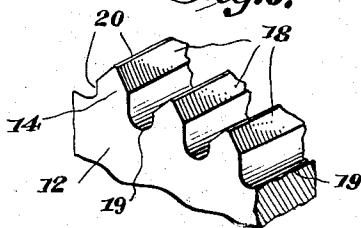


Fig. 4.

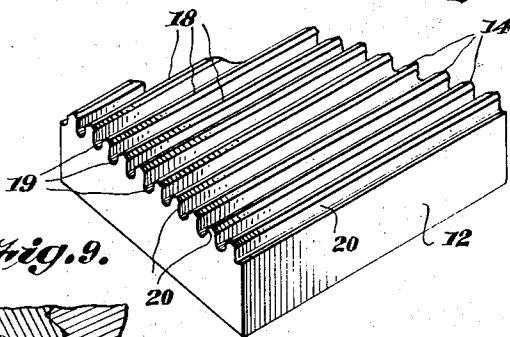


Fig. 8.

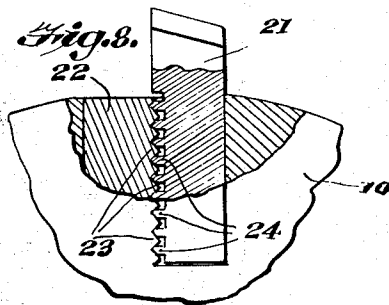
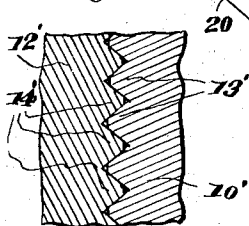


Fig. 9.



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INSERTED CUTTER BLADE AND MOUNTING
THEREFOR

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Application May 27, 1937, Serial No. 145,148

13 Claims. (Cl. 29—105)

This invention relates to cutting tools, particularly to blades for inserted blade cutters and to their mounting. The present application is a continuation as to all that common subject-matter disclosed in my prior copending applications Serial No. 50,584, filed November 19, 1935, and Serial No. 97,076, filed August 20, 1936, the instant disclosure being a development of the inventions embodied in said applications.

It is customary in the inserted blade cutter art to provide one or more blade receiving slots in the supporting body of the tool and to provide on at least one side face of each blade a series of parallel serrations arranged to interengage with a complementary series of parallel serrations formed on some element of the supporting body, such as a wall of the slot or on a face of a wedge or other blade locking element positioned in the slot; the serrations affording means for adjusting the blade in relation to the support and for assisting in anchoring it against movement under the impulse of forces tending to dislodge the blade in service operation of the tool.

Prior to the advent of this invention and those described in my aforementioned prior copending applications it has been universal practice to employ corresponding or identical serrations on the blade and the support element, utilizing the conventional V-shaped serrations in which, when intermeshed, the V-shaped grooves of one member are occupied by the V-shaped serrations of the other with the apices of the serrations extending almost to the groove bottoms and with the angular walls of the grooves and serrations being in full face contact. It is obvious that where irregularities and imperfections exist in the serrations there will inevitably be incomplete meshing, a serious defect in the seating of blades in high speed and heavy duty cutters.

It is well known to those versed in the art that the formation of conventional V-shaped serrations in stellite, and other unmachinable alloys which are highly desirable in the manufacture of cutter blades, presents serious difficulties; it being necessary to grind the serrations in such materials as they are not susceptible to milling operations. The conventional thin tapered edge grinding wheels which form the serrations require constant redressing and replacement, and as they are worn down the serrations produced thereby develop irregularities which cause imperfect meshing with consequent detrimental results in service.

Also, in the case of serrated blades made from

high speed steel and similar ferrous metals it is very desirable to form the serrations by the grinding method after hardening to avoid the warpage and distortion that are inevitable from the high temperatures necessary to the heat treatment or hardening process. The usual procedure is to form the serrations by hobbing or broaching while the steel is in an annealed condition, but the subsequent heat treatment warps and distorts the blade and leaves a scale on the serrations, thus destroying the accuracy and trueness of the serrated surface.

The manufacturing problems involved in the commercial production of serrations by grinding in hard or hardened cutter blades have been solved by practice of the inventions disclosed in my aforementioned prior applications, wherein by a special grinding process alternate serrations are omitted. I have found it desirable in some instances, such as in producing coarse serrations which run 16 or less to the inch, not to omit serrations in order to avoid the creation of too wide a gap between the meshed bearing surfaces. By providing a specially designed tooth or serration as herein disclosed it has been made possible to grind coarse serrations in hard tool blades without the use of V-shaped grinding wheels and without eliminating any serrations.

It is to be understood that the term "coarse" as used herein refers to serrations of the number of 16 or less to the lineal inch, this being a standard pitch. Other standard pitches are known to the art as "fine" serrations, these being 32, 24 and 20 to the inch. At the present time, however, the standard 16 pitch serration is perhaps more widely used than any other.

An object of the present invention is to provide a blade for inserted blade cutters having a serrated blade holder, and the blade itself serrated in a manner to engage the holder, with the blade serrations contacting the holder serrations near their bases only, that is, near the bottoms of the intervening grooves between the holder serrations and with the holder serrations disposed in the grooves between the blade serrations in spaced relation to the groove bottoms and in spaced relation to the groove walls adjacent to the groove bottoms.

An additional object is to provide a hard or hardened cutter blade ground with serrations or teeth that are spaced sufficiently to allow of the use of a grinding wheel having wide blunt grooving portions, thereby avoiding the need for frequent redressing of the grinding wheel, and at

the same time allowing heavier feeds and higher speeds, all of which quickens production and decreases the cost of manufacture.

A further object is to provide an insertable cutter blade serrated to mesh with a serrated blade holder element in bearing contact with only the inner end or bottom wall areas of the holder element grooves between the holder element serrations.

Other objects will be apparent from the description.

The present disclosure is illustrative of practical embodiments of the invention, and it is to be understood that the structural details thereof may be varied as desired in any manner not inconsistent with the scope of the invention as claimed.

In the drawing—

Figure 1 is a fragmentary front elevation of a rotary cutter equipped with a blade in accordance with the invention, parts being shown in section.

Figure 2 is a fragmentary plan view of the cutter.

Figure 3 is an enlarged fragmentary perspective detail of one form of serrations on a cutter blade.

Figure 4 is a perspective view of a blade as serrated in the form shown in Figure 3.

Figure 5 is a fragmentary sectional view illustrating the meshing engagement between a cutter blade and a serrated wall of the holder slot, the blade being serrated as shown in Figures 3 and 4.

Figure 6 is an enlarged fragmentary perspective detail of an alternative form of cutter blade serration.

Figure 7 is a sectional view similar to Figure 5 but illustrating the meshed engagement of blade and holder with the blade serrated as in Figure 6.

Figure 8 is a fragmentary section illustrating the meshed engagement between a serrated cutter blade and a serrated wedge element of the holder.

Figure 9 is a fragmentary sectional view illustrating the conventional meshing between a conventionally serrated blade and holder wall.

As shown in Figures 1 and 2, a tool body, here shown as a rotary cutter head 10, is provided with one or more slots 11 for the reception of blades 12, one wall of each slot being provided with a plurality of parallel V-shaped serrations 13 of conventional design. The serrations of the holder are closely grouped and coact with complementary serrations 14 formed on a face of the blade, meshing therewith to assist in holding the blade in adjusted position in its slot.

The blade of any particular slot is anchored in place by a segmental wedge 15 positioned in a receiving socket recess 16 opening at one side into the slot 11 and having an axially disposed internally threaded bore in which operates a lifting screw 17. The recess 16 has a side wall inclined toward the adjacent blade to impart a camming action to the complementary wedge member 15 which is formed with a flat portion bearing against the adjacent face of the blade. The cylindrical form of the wedge over that portion which is within its socket permits the wedge to turn about its axis so that its flat portion enters into full bearing contact against the opposed flat face of the blade. By this arrangement the blade is firmly locked against shifting movement under the influence of stress arising in service.

It has heretofore been customary in the art to employ the universally used V-shaped type of serration on both blade and slot wall, the respective serrations being complementary and meshing as illustrated in Figure 9 in which the serrations 14' of the blade 12' extend in full face contact entirely into and substantially fill the V-shaped grooves between the serrations 13' of the holder element 10'. This arrangement is entirely unsuited to the mounting of exceedingly hard blades for as previously stated, V-shaped serrations cannot be formed in such blades in any practical manner other than by grinding, and in grinding this type of serrations the thin tapered edge grinding wheel is constantly sloughed off so that the serrations and grooves are improperly formed, preventing proper face contact between the meshing elements.

I have found that by providing the cutter blade with grooves between the serrations having a bottom and bottom side wall clearance for the entrant serrations of a conventionally serrated holder element the serrations may be ground in the blade by grinding means having a blunt or obtuse groove forming portion that will retain its form over a very long period of use as compared to the life of a tapered edge grinding element for producing a V-shaped groove. Also, in grooving to provide such clearance the contacting face area of the cutter blade serrations is reduced so that in meshing, the apices of the holder serrations and an adjacent area of their apex portions are not contacted by the serrations of the blade.

The blades herein shown are serrated by the forming process disclosed in my copending application filed concurrently herewith and entitled Method and apparatus for making cutter blades.

In the form illustrated in Figures 3, 4 and 5, the serrations 14 of the blade 12 have conventional V-shaped crests with sloping faces 18 separated by grooves 19 having rounded bottoms and parallel side walls 20 which extend outwardly to merge with the sloping crest faces 18 in obtuse angles at points occupying a common plane passed transversely through the serrations at substantially the midpoint between the apex and base of each. The rounded bottom of each groove 19 curves inwardly of the blade body so that the resultant grooves provide ample housing clearance for the entrant apices of the holder element serrations 13 as shown best in Figure 5 when the blade is seated in its holder slot with the serrations meshing.

In the embodiment illustrated particularly in Figures 6 and 7, the blade body, here designated as 112 is identical with that of the blade 12 except that the bottoms of the grooves 119 are flat and the side walls 120 extend outwardly at right angles therefrom in parallel relation to merge at obtuse angles with the sloping faces 118 of the V-shaped crests of the serrations 114 at points occupying a common plane passed transversely through the serrations at substantially the midpoint between the apex and base of each but somewhat outwardly thereof, so that when the blade is mounted in the holder 10, as shown in Figure 7, the apices of the holder serrations 13 are housed in the grooves out of contact with their bottoms and side walls adjacent the bottoms.

Figure 8 is illustrative of a blade mounting wherein a blade 21 is seated in a slot provided in the holder 10 and is retained therein by a wedge member 22 having its blade engaging face conventionally serrated to provide the serrations 23

which mesh with serrations 24 on the opposed face of the blade, the serrations 24 being of the form shown in either Figure 3 or 6 as desired.

In all embodiments of the invention the sloping contact faces of the blade serrations exist only over their apex portions and do not extend to the groove bottoms. In consequence, when a blade is positioned in its holder the serrations mesh with the serrations of the holder element, either slot wall or wedge, in bearing contact against only the bottom portions of the inclined walls which form the conventional V-shaped grooves of the holder element serrations so that bearing contact is restricted to surfaces where there is the least likelihood of irregularities occurring in formation of the serrations, thus assuring maximum efficiency in the meshing engagement of the blade and holder element.

In the formation of the serrations as shown in Figure 6, the sharp corners at the bottoms of the grooves will gradually become rounded as the corners of the grinding wheel wear away, so that the angles of the corners change in time to curved surfaces which approach in form the curved groove bottoms of the embodiment shown in Figure 3. In either event, the purpose of the invention will be carried out successfully.

Having thus described the invention, what is claimed is:

1. A blade for inserted blade cutters, comprising a body having a face portion thereof formed with a plurality of parallel serrations, said serrations being spaced apart by grooves, and the serrations having V-shaped crests providing sloping bearing faces merging with the sides of the grooves at obtuse angles.

2. A blade for inserted blade cutters, comprising a body having a face portion thereof formed with a plurality of parallel serrations, said serrations being spaced apart by grooves, the serrations having V-shaped crests providing sloping bearing faces merging with the sides of the grooves at obtuse angles and being of a height substantially greater than the height of a conventional serration of the same pitch.

3. A blade for inserted blade cutters having conventionally serrated blade holder means, comprising a body having a face portion thereof formed with a plurality of serrations of the same pitch as the serrations of the holder means, said blade serrations having V-shaped crests and being spaced apart by grooves having substantially parallel side walls merging with the sloping bearing faces of the crests at obtuse angles, the height of the blade serrations being substantially greater than the height of a conventional serration.

4. A blade for inserted blade cutters comprising a body having a face portion thereof formed with a plurality of parallel serrations, said serrations being spaced apart by grooves and having V-shaped crests providing sloping bearing faces merging with the sides of the grooves at obtuse angles, the height of said serrations being substantially greater than the height of a conventional serration, whereby substantial portions of the entrant conventional serrations are housed in the blade grooves in spaced relation to the walls thereof.

5. A blade for inserted blade cutters having conventionally serrated blade holder means, comprising a body having a face portion thereof formed with a plurality of parallel serrations of the same pitch as the serrations on the holder means with which the blade serrations are intended to mesh, said blade serrations having V-

shaped bearing crests and being spaced apart by grooves of sufficient depth and width to receive out of contact with the walls thereof substantial portions of entrant conventional serrations.

6. A blade for inserted blade cutters, comprising a body having a face portion thereof formed with a plurality of parallel serrations, said serrations being spaced apart by grooves having substantially parallel side walls, said serrations having V-shaped crests providing sloping bearing faces merging with the outer ends of the side walls of the grooves at obtuse angles, the apices of the crests of said serrations and the bottoms of said grooves being disposed respectively in common planes spaced apart a distance greater than the height of a conventional serration.

7. A blade for inserted blade cutters, comprising a body having a face portion thereof formed with a plurality of parallel serrations, said serrations being spaced apart by grooves, said grooves having rounded bottoms and substantially parallel side walls extending outwardly therefrom, and each serration having a V-shaped crest providing oppositely inclined sloping bearing faces merging into the groove walls at obtuse angles, the angle of each crest being equal to the angle between the side walls of a conventional serration groove.

8. A blade for inserted blade cutters, comprising a body having a face thereof provided with a plurality of parallel serrations, said serrations being spaced apart by grooves having parallel side walls and bottoms perpendicular thereto, and said serrations being formed with V-shaped crests providing sloping bearing faces.

9. A blade for inserted blade cutters, comprising a body having a face thereof provided with a plurality of parallel serrations, said serrations being spaced apart by grooves having parallel side walls and bottoms perpendicular thereto, said serrations being formed with V-shaped crests providing sloping bearing faces, the apices of the crests of said serrations and the bottoms of said grooves being disposed respectively in common planes spaced apart a distance greater than the height of a conventional serration.

10. In combination, a slotted blade holder having an element thereof provided with conventional serrations, a cutter blade in the holder slot, a plurality of serrations in a face of the blade and in mesh with said holder element serrations, the blade serrations being V-shaped and engaging the bottom areas only of the serration grooves in the holder element, said blade serrations having intervening grooves with parallel side wall portions extending inwardly in spaced relation sufficient to receive and house the apex portions of the holder element serrations out of contact with the groove bottoms.

11. In combination, a slotted blade holder having an element thereof provided with conventional serrations, a cutter blade in the holder slot and having in one face thereof a plurality of serrations of the same pitch as the holder element serrations and meshed therewith, the crests of the blade serrations being in bearing contact only with the bottom areas of the holder element grooves, and the apex portions of the holder element serrations being housed in the blade serration grooves in spaced relation from the groove bottoms and the sides of the grooves adjacent the bottoms.

12. A blade for inserted blade cutters having blade holder means provided with conventional V-shaped serrations, comprising a body having a

face portion thereof formed with a plurality of parallel serrations of the same pitch as the serrations on the holder means with which the blade serrations are intended to mesh, said blade serrations having V-shaped bearing crests and being spaced apart by grooves of sufficient area to house out of contact therewith substantial portions of entrant conventional V-shaped serrations.

13. A blade for inserted blade cutters having a holder element formed with conventional V-

shaped serrations, comprising a body provided with a plurality of parallel serrations of the same pitch as the serrations on the holder element, said blade serrations having outer V-shaped crests providing oppositely inclined bearing faces and being spaced apart by grooves having rounded bottoms and side walls extending outwardly therefrom and merging with said V-shaped crests.

FRANK P. MILLER. 10