Oct. 25, 1966 R. R. ALEXANDER 3,280,865

KNIFE MOUNTING

Filed Feb. 12, 1964 2 Sheets-Sheet 1

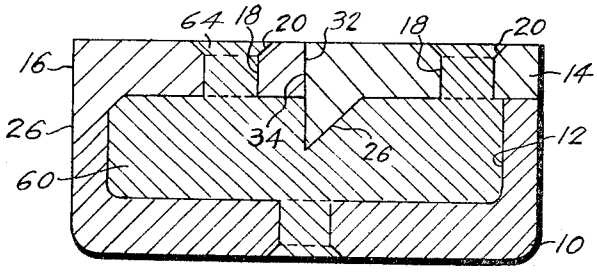


Fig. 1

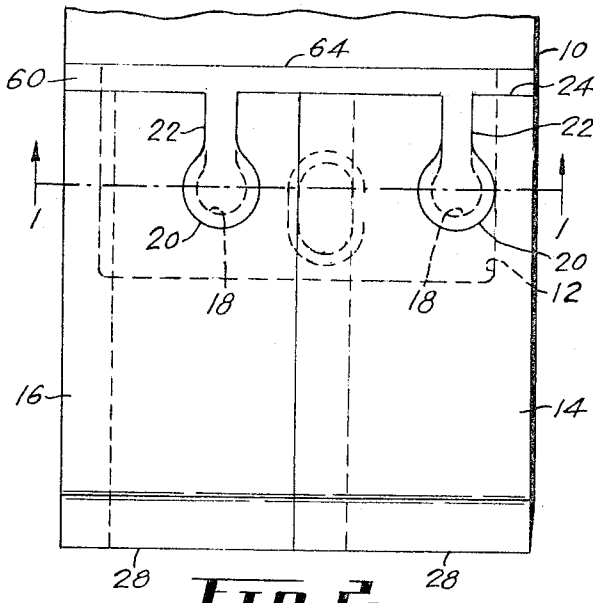


Fig. 2

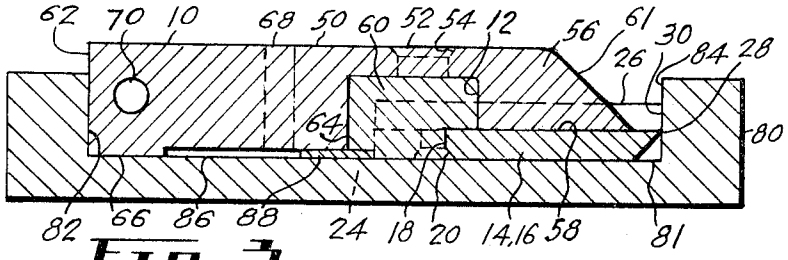


Fig. 3

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Oct. 25, 1966 R. R. ALEXANDER 3,280,865

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Filed Feb. 12, 1964 2 Sheets-Sheet 2

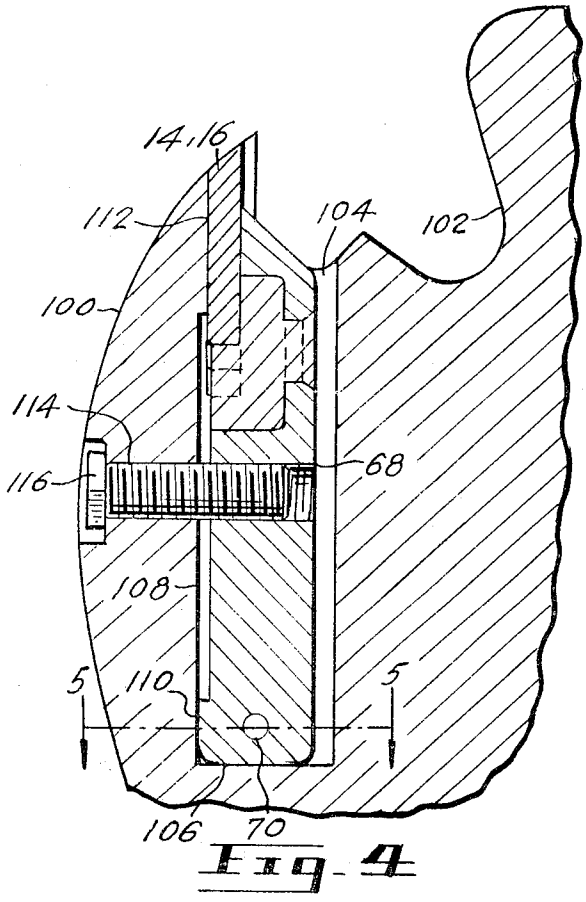


Fig. 4

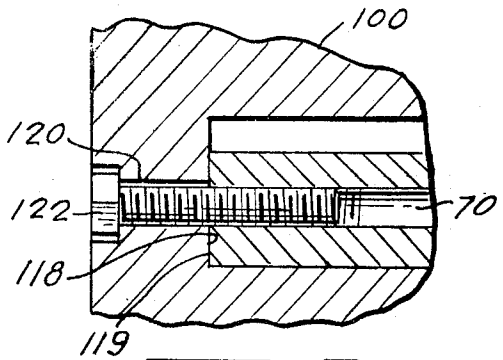


Fig. 5

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KNIFE MOUNTING

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19 Claims. (Cl. 144—218)

This invention relates to a new method and system of mounting knives. More particularly, there is disclosed a system of mounting individual knives into preset clusters.

When it is desired to produce good quality chips and to produce each chip of required length in the fibre direction by individual knives, a problem arises in mounting of these individual knives. Where a plurality of chips are to be cut across the face of the chipping head it is sometimes desirable to mount a plurality of descrete knives in a cluster in accurate relationship to one another across the chipper head. Prior to this invention no easy and efficient method of so mounting a plurality of individual knives was available.

It is therefore an object of this invention to provide a system of mounting knives into a holder.

A further object is to provide a knife holder and a system of mounting these holders together with knives located thereon into a chipper head.

Furthermore, applicant's mounting system provides means whereby the balance of the head is effectively maintained.

The present invention applies the property of shrinkage of material to force and hold the knives in the desired relationship. Applicant uses a material such as babbit that shrinks as it solidifies. By filling suitably shaped interconnected cavities in a holder and the knife or knives with babbit or the like in molten state and allowing this material to solidify, the knife and holder may be tightly and accurately held together. Furthermore, applicant has found that one can maintain the balance of the chipper by keeping the weights of the assemblies of knives and babbit equal. The knives, holder and babbit assemblies may readily be reduced so that all the assemblies weigh the same by removal of excess solidified babbit from the pouring sprue or the like.

Further feature advantages and objects will be apparaent from the following detailed description of the accompanying drawings in which

FIG. 1 is a section along the line **1—1** of FIG. 2.

FIG. 2 is a plan view of a two knife holder with knives mounted thereon.

FIG. 3 is a sectional view illustrating the blade and holder positioned in a jig.

FIG. 4 is a partial sectional view of a chipper head showing a knife and holder mounted in position.

FIG. 5 is a partial section on the line **5—5** of FIG. 4 illustrating one end mounting of the knife holder in the head.

Like reference numerals designate like parts throughout the respective views.

This disclosure refers to the use of winged knives in particular, a pair of knives **14** and **16** each having wing sections **26**. Each knife has cutting edges **28** and **30** with edge **28** being the main cutting edge of the blade and edge **30** the edge of wing section **26**. While these winged knives are preferred, applicant's mounting system will operate with other types of knives, in fact, even single knives extending across the face of the chipper may be mounted using applicant's system.

The essential elements of the knives for mounting purposes include a groove or slot, preferably a hole **18** as illustrated, and a slot **22** connecting said hole **18** to the rear face **24** of the knife. The hole **18** should be countersunk as indicated at **20** and have a diameter longer than the width of the slot **22**. The counter-sunk portion **20** and the difference in a size between the hole **18** and slot **22** serves as a means of keying the knife in desired relationship on the holder as will be more fully described hereinafter.

As shown in FIG. 3, the holder **10** has a cavity **12** which is connected to the bottom face **50** of the holder by a sprue **52**. This sprue **52** may be counter-sunk at **54** for the same reason as the hole **18** is counter-sunk as will be more fully explained hereinbelow. The front extension of the holder **10** has an accurate top face **58** which rests on the inner face of the knives when the knives and holder are positioned in a jig as shown. Face **61** which angles rearwardly from face **58** serves as a doctor means when the blades and holder are mounted in position.

As shown, the cavity **12** has a rear wall **64** longer than its front wall by a distance slightly less than the thickness of the blade **14** or **16**. Thus, when the blades and holder are assembled in the jig the blades fit snugly between accurate face **58** of the holder and the bottom of a cavity in the jig.

The holder **10** is further provided with a rear locating surface **62** and a bottom section **66** which aid in accurately positioning the holder in the jig and similarly to locate the holder on the chipper head itself. Other locating and anchoring means on the holder **10** include a hole or holes **68** and a hole **70** each of which is threaded and extends through the holder. The function of the holes **68** and **70** will be explained in greater detail hereinafter.

A suitable jig for accurately setting up the holder and knives is indicated at **80** in FIG. 3. This jig **80** is provided with a cavity **81** having longitudinally spaced apart accurate end walls **82** and **84** which serve to position the holder **10** and the knife edges respectively. The bottom **86** of the cavity serves as a rest for the backs of the knives **14** and **16** and the surface **66** at the rear of the holder. The cavity **81** is also provided with one accurate side wall (not indicated) which aligns the knives and holder laterally.

In operation, to assemble the knives on the holder, the knives **14** an **16** are placed into the jig **80** with the cutting edges **28** flush against the face **84** and the wings **26** extending upwardly from the cavity. A shim **88** of suitable thickness and width is abutted against the rear faces of knives and extends under the end of wall **64** to seal cavity **12**. Next, the holder **10** is placed into the jig **80** so that the back face **62** of the holder is tight against the wall **82** of the jig while the face **66** rests on the bottom **86**. The wings **26** of the knives are accommodated in suitable grooves (not shown) in the front extension **56**. The knives and holder are then held against the accurate side wall of the jig.

With the holder and knives positioned as above described, the holes **18** and slots **22** of the knives are in communication with the cavity **12** in the holder **10**. Liquid babbit or material with similar characteristics is now poured via sprue **52** to fill the cavity **12**, hole **18**, counter-sunk **20**, slot **22** and finally the sprue **52** itself and its counter-sunk portion **54** (if provided) as illustrated at **60** in FIGS. 1, 2 and 3. As the babbit solidifies, it shrinks and this shrinking action pulls the faces **32** and **34** (see FIG. 1) of knives **14** and **16** into intimate relationship and holds the knives so orientated. In view of the counter-sunk portion **20** and shrinkage, the knives are held firmly against the holder **10**. The space between the faces **24** and **64** is also filled with babbit which maintains the location of the cutting edges of the knives.

Thus, once the babbit has solidified, there is an integral combination of knives in a holder with the knives firmly held in their desired location and ready for insertion into the chipper head.

It is important that the counter-sinks **20** and **54** (if provided) be properly designed for ease of handling to allow the knives, babbit and holder to be separated. To obtain this effect, the counter-sink must not be too deep and should only be deep enough to cause the knives to be firmly held but not be deep enough to prevent severing of the babbit at the counter-sings **20** or **54** to permit separation of the babbit from the knives and holder by an impact force.

If desired, the cavity may extend completely through the holder and sprue **52** be eliminated. In this case, the cavity **12** may be provided with tapering side and end walls to provide a wedging action as the babbit shrinks.

It will be noted that no shims etc. are required in the field as applicant's holders and knives may be removed as a unit for sharpening and then be returned and mounted as a unit onto the chipper.

Applicant has found that by maintaining the weights of each assembly of knife and holder for installation on a given head equal the balance of the chipper may effectively be maintained. To accomplish this, it is merely necessary to weigh each assembly and find the lightest one. Now the other assemblies are reduced in weight to equal that of the lightest assembly by chipping excess babbit from the sprue **52** or from the babbit exposed through the holder if no sprue is used, i.e., where the cavity extends right through the holder. This method of balancing permits the use of different length knives.

With the knives and holders assembled and balanced as above described, they are mounted into a head such as that indicated at **100** in FIGS. 4 and 5. The head **100** is provided with suitable chip gullets **102** (only one shown). To the rear of each gullet **102** and extending inwardly therefrom are slots **104** of a width sufficient to allow the combination blades and holder to slide therein. The bottom **106** of each slot **104** is accurately finished to co-operate with the face **62** at the back of the holder **10** to aid in positioning the holder in the head. The holder **10** is further positioned in the head **100** by a finished surface **110** on one side wall **108** of the slot **104** co-operating with the surface **66** on the holder. End wall **118** of the slot **104** laterally locates the knives and holder by engagement of surface **119** of the holder **10** with said wall **118** (see FIG. 5).

Holes **114** and **120** are cut through the head **100** to accommodate bolts **116** and **122** respectively which engage threaded holes **68** and **70** in the holder. Tightening of the bolt **122** pulls the end wall **118** and surface **119** into intimate contact to align the knives and holder laterally of the head **100** while tightening of the bolt or bolts **116** pulls the holder and knives into clamped relationship with the head. The faces **110** and **112** within slot **104** on the head **100** co-operate with the surface **66** of the holder and the back faces of the knives respectively to firmly clamp knives into the head.

It is evident that the end wall **118** need not extend the full depth of the slot **104** in particular if the blades are to extend completely across the head, the wall **118** must terminate well below the mouth of slot **104**. In this case, a step will be provided on the holder to accommodate the shortened end wall **118** with the holder except for the stepped portion extending the full width of the head. The accurate face **119** forms a face of the step in the holder and co-operates with the shorter wall **118** in the manner described above.

Thus, applicant has disclosed a new system for mounting knives into a head using removable knife holders and a system for accurately positioning the knives in the holder and the holder in the head. Furthermore, with the disclosed system the balance of the head may easily be effectively maintained.

While babbit has been disclosed as the securing medium, it is understood that other materials having suitable characteristics may be used. Also, the disclosed embodiment utilized special knives and only two knives, applicant is not to be limited to such a particular type and number of knives. Furthermore, it is possible to use applicant's system to construct a wing knife from two separate and distinct blade sections; namely, the wing section may be located against a straight blade section by the present system.

I claim:

1. A blade holder adapted to be mounted in accurate relationship on a cutting head, said holder having a surface against which a knife blade is positioned, a cavity in said holder extending inwardly of said surface, said cavity being positioned with respect to said surface so that a portion of a knife blade to be mounted on said holder would overlap said cavity, and a passage extending through said holder and communicating with said cavity.

2. A blade holder for mounting on a cutter head, said blade holder having a stepped surface, a cavity extending inwardly of the face of the lower step of said stepped surface, a passage communicating with said cavity from the side of said holder opposite said stepped surface, said face of said lower step and said cavity adapted to accommodate a knife so that a portion of the knife will extend over at least a portion of said cavity.

3. A blade holder for mounting on a cutting head, finished surfaces on said blade holder for cooperation with finished surfaces on said cutter head to position said blade holder in said cutter head, a step on one face of said holder dividing said holder into a thin section and a thicker section, a cavity extending inwardly of said thin section from the stepped side of said holder, a passage connecting said cavity with the surface of said holder opposite said one face, said cavity and said thin section being such that when a knife is positioned on said holder at least a portion of said knife overlaps said cavity.

4. A blade holder as defined in claim **3** wherein said cavity has at least one tapering wall that increases the cross section of the cavity as the depth of the cavity is increased, said passage being an extension of said cavity through said holder.

5. A blade holder as defined in claim **3** wherein the step in said stepped surface is less than the thickness of the knife to be mounted on said holder.

6. An assembly of at least one knife on a holder, said holder having a first cavity therein, said knife having a second cavity therein, said first and second cavities being in communication, a passage connecting said cavities with a surface of said holder opposite the mouth of said first cavity, said passage and said first and second cavity being filled with solidified babbit to hold said at least one knife and said holder as a unit.

7. An assembly of at least one knife on a holder, said holder having a step dividing said holder into a thin and a thick section, a cavity extending inwardly on said thin section from the stepped side of said holder, a passage extending from said cavity through said holder to the side of said holder remote from the mouth of said cavity, at least one knife resting against the thin section of said holder on the stepped side of said holder, a portion of the end of said knife overlapping the mouth of said cavity, said portion having a key hole shaped slot cut there through and opening into said cavity, at least a section of said slot being countersunk on the side of said knife remote from said holder, solidified babbit filling said slot, said cavity and said passage, said solidified babbit having shrunk during solidification to hold said at least one knife and said holder as a unit.

8. An assembly as defined in claim **7** wherein said cavity has at least one tapered side wall so that the cross section of the cavity increases with depth, said passage being a continuation of said cavity so said cavity extends completely through said holder.

9. An assembly as defined in claim **8** wherein the rear wall of said cavity coincides with said step.

10. An assembly as defined in claim 8 wherein said step is of less height than the thickness of said at least one knife.

11. An assembly of knives on a holder wherein each said knife has a keying slot therein, a cavity in said holder, a passage into said cavity from the surface of said holder remote from the mouth of said cavity, said cavity and said keying slots being in communication when said knives and holder are in assembled relationship, said cavity and said keying slots being filled with solidified babbit in stressed condition holding the knives and holder in preset relationship.

12. In a chipper a rotatable head, a plurality of assemblies of at least one knife in a holder releasably mounted in said head, each said holder having locating surfaces which cooperate with complementary surfaces in said head, means for releasably holding each said holder and releasably clamping said at least one knife in said head, a cavity within each said holder, a keying slot within each of said knives, said keying slot and said cavity being in communication, a passage through said holder connecting said cavity to the surface of said holder remote from the mouth of said cavity, said cavity and said keying slot being filled with solidified babbit to maintain each of said assemblies in assembled relationship.

13. An apparatus as defined in claim 12 wherein said babbit is present in the various assemblies in amounts to maintain the proper weights of the assemblies for balancing the said head.

14. A method of mounting at least one knife in fixed relation on a holder, said knife having a keying slot, said method including, orienting said knife and holder in preselected relationship and so that said cavity and said keying slot are in communication, filling said cavity and slot with material that shrinks on setting, setting said material to shrink same and hold said knife and holder in fixed relationship.

15. A method as defined in claim 14 wherein said material is liquid babbit which shrinks during solidification to set and fix said knife and holder.

16. A method of mounting as defined in claim 15 wherein a plurality of knives are mounted on each holder, said shrinkage, holding said knives in preselected relationship with each other.

17. A method of mounting at least one knife in fixed relationship on a holder to form an assembly, said holder having a step dividing said holder into a thin and thick section, a cavity in the thin section, a passage extending from said cavity to connect said cavity to the face of said holder remote from the mouth of said cavity, said step being less, than the thickness of said knife, said knife having a keying slot at rear face, said method including arranging said at least one knife in a jig applying said holder into said jig to overly said at least one knife filling said cavity and keying slot with liquid babbit, allowing said babbit to solidify and shrink.

18. A method as defined in claim 14 wherein a plurality of holder and knife assemblies are produced to form a set and wherein each of said assemblies are weighed and the weights of the heavier assemblies are reduced by removal of excess material so that all assemblies of said set are substantially the same weight.

19. A method as defined in claim 17 wherein a plurality of holder and knife assemblies are produced to form a set, including the further steps of weighing each assembly of said set and removing excess babbit from said passages of the heavier of said assemblies to reduce all the assemblies of said set to substantially same weight.

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