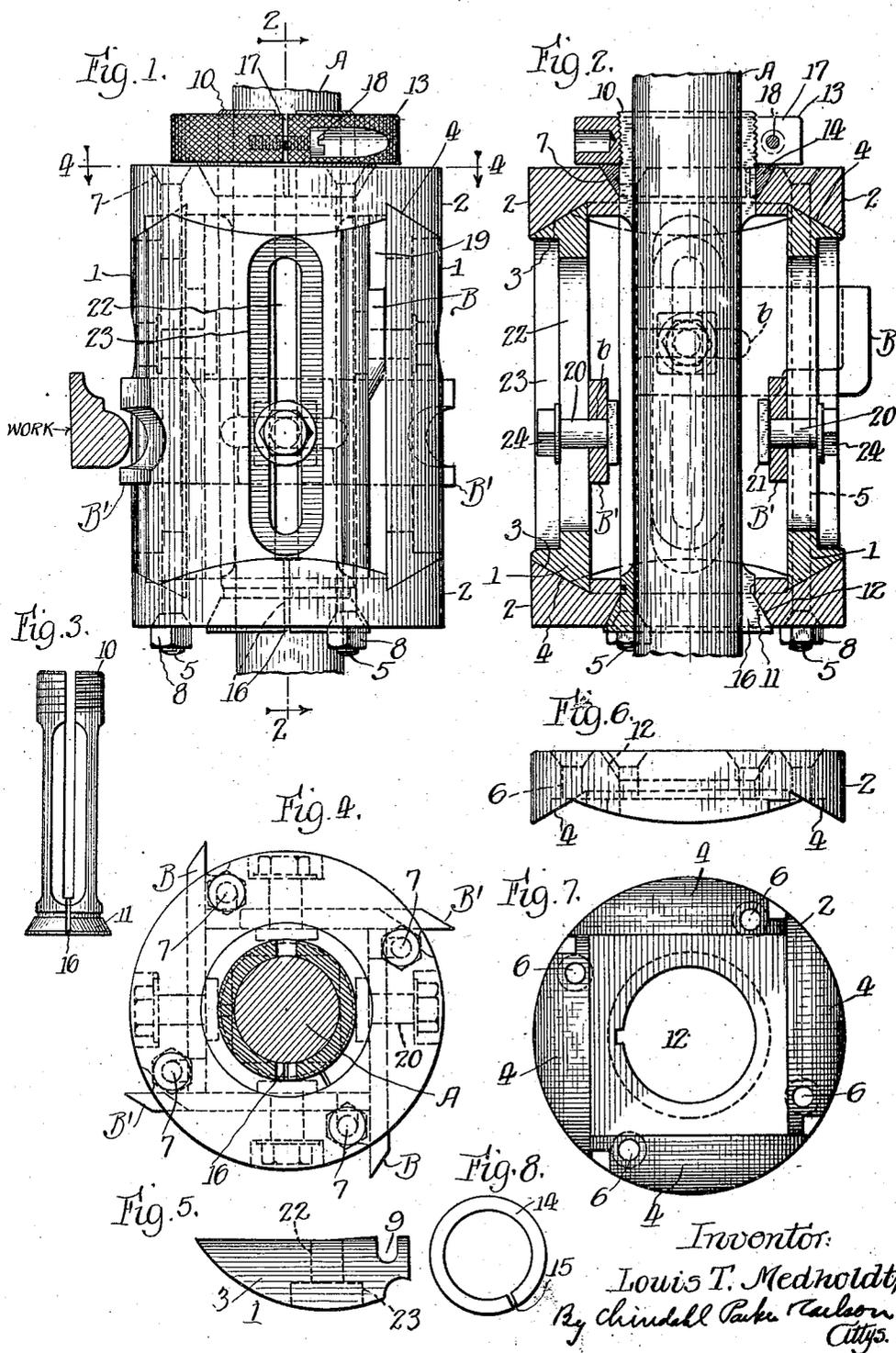


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L. T. MEDHOLDT
HIGH SPEED SAFETY CUTTER HEAD

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Inventor:
Louis T. Medholdt,
By Chindell Park Carlson
Attys.

UNITED STATES PATENT OFFICE.

LOUIS T. MEDHOLDT, OF ROCKFORD, ILLINOIS, ASSIGNOR TO MATTISON MACHINE WORKS, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

HIGH-SPEED SAFETY CUTTER HEAD.

Application filed February 24, 1925. Serial No. 11,059.

This invention relates to cutter heads for use on straight or variety molders. The common form of cutter head used on such machines carries a plurality of knives secured to the outer sides of the cutter head by means of bolts. In the rotation of the cutter head centrifugal force and the pressure due to contact of the knife with the work tend to swing or bend the knives away from the cutter head, these forces being resisted by the before-mentioned bolts.

At present the ordinary speed of operation of such machines is 3600 revolutions of the cutter head per minute, but there is an insistent demand for much higher speed. Cutter heads having securing means of the type alluded to can not be safely rotated at speeds much in excess of 3600 R. P. M.

High-speed operation requires, first, that the cutter head be as small in diameter as possible so as to lessen centrifugal force and reduce as much as possible the necessity for accurate balancing; second, that the strain be taken off the knife-securing bolts; and third, that the knives be supported as close to their cutting edges as possible so as to resist the tendency of centrifugal force and the pressure of the knives against the work to swing or bend the knives away from the cutter head.

It is the object of this invention, generally stated, to produce a cutter head of such construction that it may be safely operated at speeds twice as great as those now employed and at the same time render it possible for manufacturers to continue to use their present equipment of cutter knives.

Another object of the invention is to provide a head of sectional or built-up construction so designed that the user may build up a head of desired length with a minimum number of pieces.

In the accompanying drawing, Figure 1 is a side view of one form of cutter head embodying the features of my invention.

Fig. 2 is a section on line 2-2 of Fig. 1.

Fig. 3 is a detail view of an expansible bushing or sleeve.

Fig. 4 is a sectional plan view of the cutter head taken on line 4-4 of Fig. 1.

Fig. 5 is a detail end view of one of the side sections.

Fig. 6 is an edge view of one of the end sections.

Fig. 7 is an inner side view of one of the end sections.

Fig. 8 is a detail view of a contractible ring.

Cutter heads embodying the present invention are adapted for use on the top horizontal spindle, the bottom horizontal spindle, the right hand vertical side spindle, and the left hand vertical side spindle. The part A in the drawing may be taken to represent any one of said spindles or arbors.

As hereinbefore stated, the cutter head is of sectional or built-up construction. It comprises four side sections 1, two end sections 2, and means for securing said sections together. As shown in Fig. 5, each side section 1 has a generally flat inner side, the outer side being rounded to conform to the radius of the cutter head so that the cutter head shall have a substantially cylindrical form. The ends of the side sections are beveled, as shown at 3 in Fig. 2.

Each of the end sections 2 has a flat outer side. On the inner side of the end sections are formed four beveled surfaces 4 as shown in Figs. 2, 6 and 7, to engage the correspondingly beveled surface 3 of the side sections 1. The beveled or equivalent surfaces 4 are arranged in the form of a rectangle or square so as to hold the four side sections 1 in the form of a hollow square. The circumference of the end sections 2 is the same as that of the cylinder defined by the outer surfaces of the side sections 1.

The side sections 1 and the end sections 2 are rigidly secured together by means of four bolts 5 adapted to extend through openings 6 in the end sections 2. The heads 7 of said bolts are tapered upon their inner sides to conform to the tapered outer ends of the openings 6. The nuts 8 of said bolts have tapered inner sides which also conform to the tapered outer ends of the openings 6 in the end section. It will be seen that by tightening up the nuts 8 the four side sections 1 and the two end sections 2 may be tightly clamped together to form a cylindrical head. Side sections 1 of various lengths may be provided to permit of

assembling cutter heads of desired lengths. The sleeve 10 is preferably long enough to be used with heads of various lengths, filling collars being placed under the nut 13 in the case of short heads.

Each of the bolts 5 extends through a groove 9 (Fig. 5) in the inner side of one of the side sections 1. The bolts thus serve to locate the side sections properly in the operation of assembling the cutter head, and hence obviate the possibility of the operator failing to secure the side sections in proper position through inadvertence or carelessness.

The means for securing the cutter head on the spindle A includes a sleeve 10 adapted to fit upon the spindle A and having at one end a tapering shoulder 11 to engage a correspondingly tapered central opening 12 in the adjacent end section 2. The sleeve 10 is long enough to extend through the cutter head and project beyond one end thereof sufficiently far to receive a locking nut 13. Below the nut 13 is placed a self-centering clamp ring 14 which is beveled upon its outer side to correspond with the beveled opening 12 in the outer end section 2. The ring 14 surrounds the sleeve 10 and is split, as shown at 15 in Fig. 8, so that it may be contracted upon the sleeve 10. The latter is also slotted at one side, as shown at 16 in Figs. 2 and 3. It will be seen that when the nut 13 is tightened up, the pressure of the tapered surface 11 on said sleeve against the tapered wall of the opening 12 in the adjacent end section 2 will cause that end of the sleeve to be contracted into clamping engagement with the spindle A; and that the pressure of the ring 14 against the tapered wall of the opening 12 in the other section 2 will cause said ring to be contracted into clamping engagement with the sleeve 10, thus causing the latter to be contracted into engagement with the spindle A, and also giving additional pressure against end plates or discs.

If desired, the sleeve 10 may be slotted all the way through, as indicated in Fig. 3, except at one end, so that the driving pin used in connection with some spindles may extend through said sleeve.

As shown in Figs. 1 and 2, the nut 13 is slotted at 17 so that it may be contracted by means of a screw 18 and thus securely locked upon the sleeve 10.

The knives may be of any suitable form, but, as hereinbefore stated, the cutter head has been so devised that the standard slotted knives with which most manufacturers are equipped may be employed. The knives are indicated at B and B'.

As shown in Fig. 5, one end of each side section 1 is cut away or shortened, thus providing between the adjacent side sections a slot 19 (Fig. 1) into which a cutter knife

may be inserted. The knife may be clamped against the inner side of the side section 1 against which it lies by any suitable means, as, for example, a bolt 20 adapted to extend through the conventional slot *b* (Fig. 2) of the knife, said bolt having a head 21 lying at the inner side of the knife. The bolt 20 extends through a longitudinal slot 22 formed in the side section. Said slot is widened or countersunk as at 23 so that the nut 24 on the outer end of the bolt 20 shall not project beyond the periphery of the cutter head.

The diameter of the spindle A is ordinarily one and thirteen-sixteenths inches. The cutting diameter of prior styles of cutter heads for spindles of that size is usually six and one-half inches. The present invention permits of reducing the cutting diameter of the cutter head to five and one-eighth inches on a spindle one and thirteen-sixteenths inches in diameter and in this proportion up or down the scale of spindle sizes.

It will be seen that the cutter head construction herein described is especially well adapted for high speeds. The knives lie within the cutter head, the stresses due to centrifugal force and the cutting reaction being borne by the side sections 1, which are amply strong to carry the load imposed upon them. The bolts 20 have a relatively light duty to perform. As indicated in Fig. 4, the knives are supported or backed up relatively close to their cutting edges, lessening the tendency of the cutting reaction and centrifugal force to spring or bend the knives. These several features, in conjunction with the reduction in diameter, make for safe operation at very high speeds.

It will be obvious that the sectional method herein disclosed of building up cutter heads may be employed in making two-sided and three-sided heads, the end sections 2 having a number of beveled surfaces 4 corresponding to the number of side sections.

If desired, the cutter head may be located upon and secured to the spindle by means of the form of nut shown in my copending application Serial No. 738,116, filed September 17, 1924.

I claim as my invention:

1. A sectional cutter head for wood-working machines having, in combination, two end sections and a plurality of side sections, said side sections having beveled ends and the end sections having upon their inner sides correspondingly beveled surfaces similar in number to the number of side sections; bolts extending through said end sections to clamp the end sections and side sections together, each side section having upon its inner side a groove through which one of the bolts extends, space being provided between adjacent side sections to form knife-

receiving slots; knives lying in said slots, each of said side sections being longitudinally slotted, and a bolt extending through each of the last mentioned slots and through one of said knives to hold said knife against the inner side of the adjacent side section.

2. A sectional cutter head having, in combination, two end sections and a plurality of side sections, said side sections having beveled ends and the end sections having upon their inner sides correspondingly beveled surfaces similar in number to the number of side sections; bolts extending through said end sections to clamp the end sections and side sections together, space being provided between adjacent side sections to form knife-receiving slots; knives lying in said slots; and means to secure the knives in said slots.

3. A sectional cutter head having, in combination, two end sections and a plurality of side sections; bolts extending through said end sections to clamp the end sections and side sections together, each side section having upon its inner side a groove through which one of the bolts extends, space being provided between adjacent side sections to form knife-receiving slots; knives lying in said slots; and means to secure the knives in said slots.

4. A sectional cutter head having, in combination, two end sections and a plurality of side sections, each side section having a substantially flat inner side and an outer side rounded to produce with the other side sections a cylindrical head; bolts extending through said end sections to clamp the end sections and side sections together, each side section having upon its inner side a groove through which one of the bolts extends, and a knife clamped against the inner side of each side section.

5. A sectional cutter head having, in combination, two end sections and a plurality of side sections, said side sections having beveled ends and the end sections having

upon their inner sides correspondingly beveled surfaces similar in number to the number of side sections; means to clamp the end sections and side sections together; space being provided between adjacent side sections to form knife-receiving slots; knives lying in said slots; and means to hold the knives against the inner sides of the side sections.

6. A sectional cutter head having, in combination, two end sections and a plurality of side sections; bolts extending through said end sections to clamp the end sections and side sections together; space being provided between adjacent side sections to form knife-receiving slots; knives lying in said slots; and means to hold said knives against the inner sides of the side sections.

7. In a cutter head of the character described, the combination of a pair of end sections, a plurality of side sections having end portions interengaging with said end sections, knives clamped to the inner sides of said side sections, and means to clamp the end sections to the side sections in an axial direction.

8. In a cutter head of the character described, the combination of a pair of end sections, a plurality of side sections having end portions interengaging with said end sections, knives clamped to the inner sides of said side sections, and means to clamp the end sections to the side sections.

9. In a cutter head of the character described, the combination of a pair of end sections, a plurality of side sections having beveled ends, the end sections having upon their adjacent sides correspondingly beveled surfaces, knives clamped against the inner sides of the side sections and bolts extending through said end sections to clamp the end sections and side sections together.

In testimony whereof, I have hereunto affixed my signature.

LOUIS T. MEDHOLDT.