F. K. LENKER.

MEANS FOR LOCKING THE BLADES OF REAMERS OR CUTTERS.

APPLICATION FILED APR. 26, 1918.

1,320,482. Patented Nov. 4, 1919.

Fig. 1.

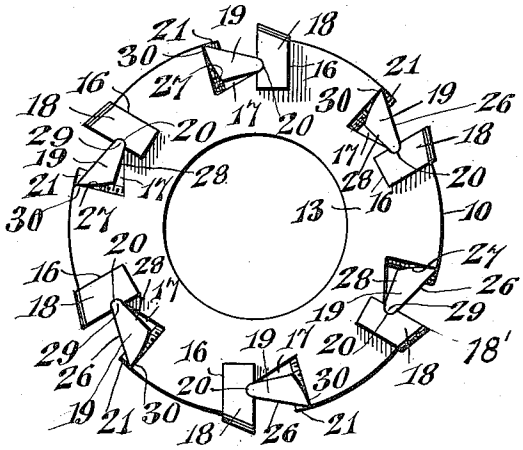


Fig. 2.

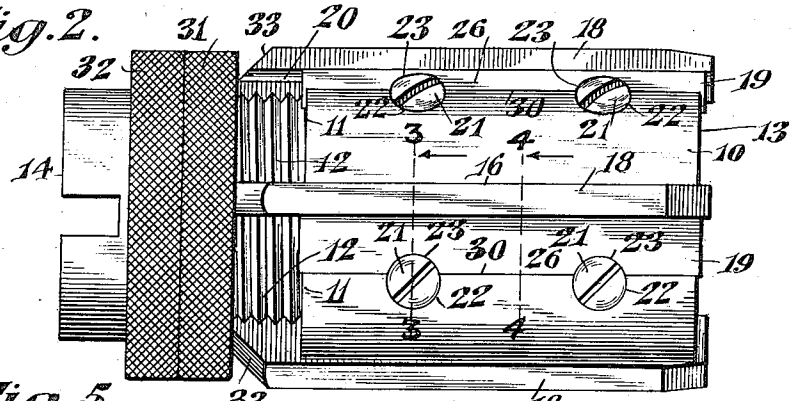


Fig. 5.

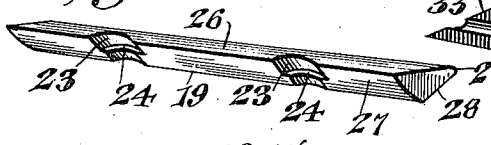


Fig. 6.

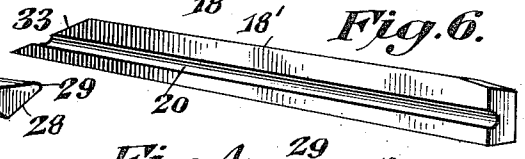


Fig. 3.

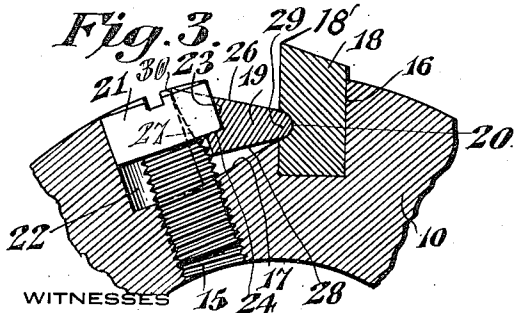
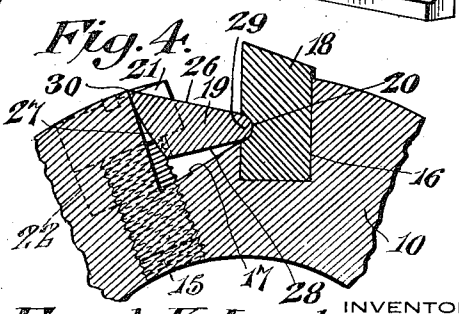


Fig. 4.



WITNESSES

Jas. E. McCathran

F. C. Smith.

INVENTOR

Frank K. Lenker,

BY

E. G. Siggers

ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK K. LENKER, OF MILLERSBURG, PENNSYLVANIA.

MEANS FOR LOCKING THE BLADES OF REAMERS OR CUTTERS.

1,320,482. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed April 26, 1918. Serial No. 230,940.

To all whom it may concern:

Be it known that I, FRANK K. LENKER, a citizen of the United States, residing at Millersburg, in the county of Dauphin and State of Pennsylvania, have invented a new and useful Means for Locking the Blades of Reamers or Cutters, of which the following is a specification.

This invention relates to reamers, or cutters, and particularly to means for locking the blades of an "expanding" reamer or cutter.

The object of the invention is to provide an improved and superior locking device for reamer or cutter blades, which will be strong, simple of construction, easy to work, and which will permit ready adjustment of the blades.

In order to attain this object, a clamping bar, substantially triangular in cross-section, is provided. This clamping bar extends longitudinally with each blade, and fits at one corner or angle into a groove in the blade. Screws bear down upon shoulders formed in the material of the clamping bar, and when tightened they impart a rocking movement to wedge the corner tightly into its groove, thereby locking the blade. The strength, simplicity and ease of operation of the locking device is largely due to the fact that but two parts are needed to make up the device, viz: the clamping bar and the screw or screws.

In the drawings:—

Figure 1 is an end elevation of a reamer constructed in accordance with my invention, the end selected being the working or cutting end;

Fig. 2 is a plan view of the same;

Fig. 3 is an enlarged detail in section on the line 3—3 of Fig. 2, looking in the indicated direction;

Fig. 4 is a similar view on the line 4—4, same figure, looking in the same direction;

Fig. 5 is a detail perspective view of the clamping bar detached; and

Fig. 6 is a similar view of the cutter or blade used in the present invention.

The numeral 10 designates generally the body of the reamer, and being of conventional design, except as hereinafter noted, needs no further description. This reamer has the usual reduced end, common to most "expanding" reamers, as 11 indicates, and the screw threads 12. Numerals 13 and 14 indicate, respectively, the cutting or working end of the reamer and the locking end by which it is fixed to a spindle or the like. As 15 shows, the body of the reamer is tapped to provide threads at the desired points for the reception of adjusting screws to be presently described.

At suitable intervals about the periphery of the reamer substantially rectangular longitudinal slots 16 are provided, which slots have three sides or walls and are designed to receive and hold therein blades 18. Adjacent and parallel to slots 16 are companion slots 17 which are triangular in outline and are designed to receive clamping bars 19. These slots, 16 and 17, join each other as shown in Figs. 3 and 4, thus forming an irregular shaped double slot for the joint reception of a blade and its clamping bar. The bottom wall of the slot 17 inclines inwardly, the highest point being where it joins with the low wall of the slot 18. The other wall of the slot 17 is substantially radial to the axis of the reamer.

Machine screws 21 preferably having fillister heads are provided for adjusting the clamping bars 19. In the drawing each bar is shown provided with two of these screws, but a single screw or a number greater than two will accomplish the same clamping result, the preferable number depending upon the size of the reamer. In order to make room for the fillister heads of the screws, radially extending bores 22 have been provided deep enough so that the tops of the heads may conform to the curvature of the reamer body when the screws have been sunk into the taps 15. Figs. 3 and 4 show how the screw heads form substantially a continuation of the reamer surface, thus offering no projections where metal shavings might lodge.

The radial bores 22 are not complete cylinders but are divided longitudinally by the triangular slot 17, as the drawing clearly illustrates. Thus when the screws are in place, their heads overhang the slot 17. The reason for this is that the heads of the screws are designed to engage with shoulders 24 formed in the clamping bars 19. These shoulders are preferably made by drilling partway down along one face of the triangular bar, as Fig. 5 shows. Each clamping bar 19 thus has a bore 23 which might be said to be complemental to the bore 22 because the same screw head is received by the two bores together.

As has been intimated, the clamping bar 19 presents its shoulders 24 to the underside of the fillister heads of the screws 21. Thus when the screws are driven in, the heads thereof engage said shoulders and tend to carry the clamping bar down with them. It is this tendency of the screws which brings about a peculiar result as will be described below.

In general outline, the clamping bars 19 have a triangular section. This triangle of their section is scalene, that is to say, one angle is obtuse and the other two are acute. This necessarily results in having one face 26, of the bar, longer than either of the others. It is this face which is presented to the outside of the reamer. The face which is provided with the drilled shoulders 24, as described above, designated by 27 in the drawing, has its opposite acute angle rounded off as 29 indicates and is itself slightly rounded or made convex for a purpose to be explained. That is to say, the material at the angle between faces 26 and 28 is cut away and smoothed off so as to form a convexed surface 29. This fits into a concave seat or groove 20 formed longitudinally in one face of the blade 18. The face of the blade selected is the one which also carries the cutting edge 18′.

The purpose of the above-described construction can now be made clear. When the blades have been placed in their slots, with their cutting edges outermost, the groove 20 lies alongside of and immediately above the shoulder formed at the junction of the slots 17 and 18, as Figs. 3 and 4 show. The clamping bar 19 is now slipped into its slot 17. Owing to the shape of its slot and to the width of the face 26, the clamping bar 19 does not go all the way down to the bottom of the slot 17, but rests with its convexed edge 29 lying in groove 20 and the other acute angle (that between faces 26 and 27) lying at the edge 30 formed by the radial wall of the slot 17 and the outer surface of the reamer. When the screws 21 are now put in place and screwed down, the undersides of their fillister heads will engage with shoulders 24 and bear down upon the same. This forces the clamping bar to turn slightly about or rock downwardly, its convexed edge 29 acting as an axis and also turning slightly in the groove 20. The reason for the convexity of face 27 and of edge 29 will now be apparent.

The clamping bar before it is screwed in rests at two points viz: against the radial wall of the slot 17 and the groove 20. The action of the screws amounts both to a wedging and a rocking of the clamping member. The slight roundness imparted the face 27 adds greatly to the strength with which the bar may be held; and the fact that the edge 29 is rounded to conform exactly to groove 20 not only aids the slight rocking which must take place but also adds to the firmness with which the blade is necessarily held.

The principle upon which my locking device works will now be made clear. I employ a triangularly-shaped clamping bar, which acts as a wedge; one corner or angle fitting in a groove of the blade, a second corner or angle bearing against the body of the reamer at a greater distance from the center of the reamer than the first-mentioned angle or corner, while the third corner or angle is located nearer the center of the reamer, but has no contact therewith at any time. By this construction, a wedging action is imparted to the clamping bar to wedge the blade firmly in its seat.

The clamping parts being placed upon the same side of the blade as the cutting edge, it follows that nearly all the strain on the blade will be dissipated upon the body of the reamer and not upon said parts.

It will be readily understood that the use of a screw forcing down a bar shaped as described so as to wedge the same between the reamer body and the blade affords a great mechanical advantage and positively locks the blade with great strength and yet with ease.

In order to adjust the position of the blades when loosened in their slots, an adjusting sleeve 31 is provided together with a locking sleeve 32, both of which are threaded internally and mounted upon the threaded portion 12 of the reamer. Beveled ends 33 are formed on each blade so that the adjusting sleeve 31 may easily force the blades forward to the desired position. All of this construction is old to the art and needs no further description.

The invention has been described as an improvement in reamers, but as the improvement resides solely in the locking device for the blades of the reamer, it is obvious that the same locking means may be employed for holding the blades on milling cutters for cutting iron, or in a cylindrical cutterhead for surfacing or forming wood. In other words, my invention is to be understood as a device for locking the blades of reamers or cylindrical cutters for working in metal or wood.

While the present invention has been described with much attention to detail, it is not to be supposed that my invention is confined to a precise realization of the above description. I wish to depart therefrom in many minor particulars, and desire to be limited in spirit and in terms only by the following claims.

What is claimed is—

1. In a reamer, a body member, longitudinal slots therein opening out on the periphery thereof, grooved blades seated in said slots, longitudinal rockable clamping bars

for said blades, said bars being substantially triangular in cross section and having one edge thereof fitted and turning in the grooves of the blades, and radially acting means for actuating the bars and forcing them inwardly in contacting relation with the body and the blades, while retaining the interfitting relation of the bars with said blades.

2. In a reamer, a body member, slots longitudinally disposed on the periphery thereof, grooved blades seated in said slots, clamping bars for said blades, the bars each having a cross-section substantially triangular and having one corner or angle thereof fitted into the groove of the blades and the face opposite said corner or angle bearing against the wall of the slot, and means for wedging said bars between the body and the blades.

3. In a reamer, a body member, slots in the periphery of said member, blades seated in said slots, rockable clamping members for said blades fitted in said slots, said members being substantially triangular in cross section and interposed between said blades and said body member, and having a bearing against both of said elements, the engagement of said members with said blades being a rocking one, and radially disposed means engaging said members at a point remote from said blades for actuating said members and forcing them inwardly while retaining said members in rocking engagement with said blades.

4. In a reamer, a body member, a plurality of longitudinal slots provided on the periphery thereof, blades fitted in said slots, grooves provided on one face of the blades, clamping bars for the blades, said bars being of a substantially triangular shape in cross section and received in said slots, each blade having one edge fitted and turning in the groove of the blade and having the face opposite said edge convexed and bearing against a wall of the slot, and means for actuating the bars inwardly to wedge them between the body member and the blades.

5. In a reamer, a body member, a plurality of longitudinal slots formed on the periphery thereof, blades fitted in said slots, other slots formed in said body member adjacent each of the longitudinal slots, clamping bars fitted in the last-mentioned slots, said bars having one edge engaging the blades and having the face opposite said engaging edge made convex, said convex face bearing against the body of the reamer, and means acting upon the bars to force the convex face inwardly along one side wall of the second-mentioned slots and to force the engaging edge against the blades, whereby the bars are wedged between the body and the blades.

6. In a reamer, a body member, slots disposed longitudinally on the periphery thereof, grooved blades received by said slots, longitudinal clamping bars for said blades, said bars extending along the blades and each having a substantially triangular cross-section, one face of each of said bars being slightly convexed, shoulders cut into said face, the edge opposite said face being rounded and fitting into the groove of the blade, and screws fitting into the body member and bearing down upon said shoulders.

7. In a reamer, a body member, longitudinal slots formed on the periphery thereof, each of said slots comprising two portions, blades held in one of said portions, clamping bars held in the other of said portions, said blades having grooves extending longitudinally along one face thereof, said grooves being positioned immediately above the meeting edges of the two slot portions when the blades are in place, said bars having bearing in said grooves, and means acting against the bars remote from their bearing connections with said blades for forcing the bars inwardly and causing said bars to turn in said grooves and bear against the walls of the slots.

8. In a reamer, a body member, longitudinal slots formed in the periphery thereof, blades received by said slots, clamping bars holding said blades in the slots, said bars also being received in the slots and each having a cross-section substantially that of a scalene triangle, one angle of said bar engaging with a groove formed in said blade, the widest face of said bar facing outwardly, the other two faces of the bar facing inwardly and being spaced from the opposite walls of the slot, said bar contacting with one wall of the slot at the outer end thereof, and means adapted to force the bars inwardly to clamp the blades by wedging action between the body and the blades.

9. In a reamer, a body member, longitudinal slots formed in the periphery thereof, blades received to said slots, clamping bars holding the blades in the slots and being themselves received in the slots, said bars each having a cross-section substantially that of a scalene triangle, a groove formed in each of the blades, one angle of the bar fitting into the groove, the two narrower faces of the bar facing inwardly toward the slot and being spaced from the opposite walls of the same, and means adapted to change the angles between the bar faces and the slot sides whereby the blades are locked within their slots.

10. In a reamer, a body member having longitudinal slots formed in its periphery, said slots comprising a portion with three sides or walls and another portion adjacent thereto and communicating therewith and having two sides or walls, blades received in

the three-sided portions of the slots, longitudinal clamping bars fitted in the two-sided portions of said slots, each of said clamping bars being triangular in cross-section with one angle or corner engaging said blade, a second angle or corner adapted to bear against the body of the reamer at a greater distance from the center of the reamer body than the first-mentioned angle or corner, the remaining angle or corner of the bar being spaced from the reamer body, and screws fitting in the reamer and engaging the clamping bars to wedge the blades in place.

11. A body member provided with two longitudinal slots, one being substantially rectangular with three sides or walls and the other being substantially triangular with two sides or walls, one of the last-mentioned walls being radial to the body member, the two slots joining in a shoulder above the bottom of the rectangular slot, a blade fitted in the rectangular slot, a triangular-shaped clamping bar fitted in the triangular slot, one corner or angle of said bar being adapted to engage said blade, that face of the bar remote from said angle being convex, the second corner or angle bearing against the radial wall of the triangular slot, and the third corner or angle spaced from the bottom of the triangular slot, and a screw fitting in the body member and engaging the clamping bar, whereby a wedging action is imparted to the clamping bar to wedge the blade firmly in its slot.

12. In a reamer, a body member, longitudinal slots provided in said body member and consisting of two portions, a series of blades each fitted in one of the portions of said slots, a series of triangular-shaped clamping bars each fitted in the other portion of said slots, with one of its corners or angles rounded and engaging said blade, a second corner or angle bearing against the body of the reamer at a greater distance from the center of the reamer than the first-mentioned corner or angle, the third corner or angle being located nearer the center of the reamer but out of contact therewith, screws fitted in the reamer, and shoulders provided on the face of the bars remote from the first-mentioned angle, said shoulders being engaged by the heads of the screws, whereby a wedging action is imparted to the clamping bars to wedge the blades firmly in place.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FRANK K. LENKER.

Witnesses:
T. F. BRADENBAUGH,
JOHN J. DITTY.