ABSTRACT

A lower guard for circular saws having an adjustable base plate carrying a fixed stop continuously to engage the lower guard prior to the introduction of a workpiece, thus, to prevent complete closure of the lower guard. The stop and a cam surface of the leading edge of the lower guard caus[es] increasingly to shift a front portion of the leading edge below the base plate as the same is lowered relative to the lower guard.

2 Claims, 8 Drawing Figures
LOWER GUARD FOR CIRCULAR SAWS

BACKGROUND OF THE INVENTION

Heretofore, the lower guards of the prior art were mounted to pivot about an axis coincident with the axis of the drive spindle to which the saw blade was mounted. Removal or replacement of the saw blade could only be done in an inconvenient manner, using special tools or limited access ports specially made in the lower guard mounting. In either event, the solution resulted in added cost. If a stop for the lower guard were used, it may have taken the form of a roller, housing abutment or some other element not always in contact with the lower guard.

SUMMARY OF THE INVENTION

In the present invention, the novel lower guard for circular saws is pivotally connected to the fixed upper guard of the housing at a point about the axis of the drive spindle and telescopes externally of the upper guard. In this configuration, blade changes are simple. The lower guard is swung manually to an open position, to fully expose the screw connection of the saw blade to the drive spindle, which screw is removed to remove below blade. In order to keep the size of the lower guard as small as possible, a fixed stop is connected to the base plate which fixed stop with contacting the leading edge of the lower guard. Upon the base plate being lowered, the fixed stop will cause the lower guard increasingly to be shifted open to prevent complete closure of the lower guard below the base plate. The leading edge of the lower guard is inclined and coacts with the stop continuously to extend below the base plate. In the absence of the stop, the incline of the leading edge either would have to be set at an angle so large as to be objectionable for safety reasons, or the lower guard would have had to be made excessively large.

It is therefore an object of the present invention to provide an improved lower guard for circular saws which overcomes the prior art disadvantages; which is simple, economical and reliable; which has the lower guard pivotally mounted at an axis offset from the axis of the drive spindle and saw blade; which has a fixed stop coacting with the leading edge of the lower guard to shift the saw blade upon adjustment of the base plate; and which has a base plate having a vertical block adjustably connected to the housing, and the fixed stop connected to the vertical block.

Other objects and advantages will be apparent from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention is illustrated in the accompanying drawings in which:

FIG. 1 is an elevational view, from the guard side of a circular saw embodying the present invention.

FIG. 2 is an elevational view from the motor side of the circular saw.

FIG. 3 is a front elevational view of the circular saw.

FIG. 4 is a view taken along line 4—4 of FIG. 3 showing the fixed stop connected to the vertical block tightened to the housing in adjusted position.

FIG. 4a is a modified view of FIG. 4, showing the vertical block in loosened position with respect to the housing.

FIG. 5 is a view taken along line 5—5 of FIG. 3 showing an enlarged side elevational view, partly broken away, of the circular saw.

FIG. 6 is a perspective view of the circular saw embodying the present invention.

FIG. 7 is an enlarged elevational view from the motor side of the circular saw showing the maximum depth of cut in the solid line representation and the minimum depth of cut in the dotted line representation.

DESCRIPTION OF THE INVENTION

In the illustrated embodiment of the invention, a circular saw 10 is shown in FIGS. 1, 2 and 3, having a housing 12 in which is mounted a conventional universal motor 14, shown in phantom in FIG. 3. The drive pinion 15 of the motor 14 is connected through a reduction gear 16 to rotate a drive spindle 18 having an axis 20. A saw blade 22 is fixedly mounted by a clamp screw 24 to the drive spindle 18 to rotate therewith about the axis 20.

The housing 12 carries a front handle 26 and a rear handle 28 shown in FIGS. 1, 2, 6 and 7. A trigger switch 30 is mounted adjacent to the rear handle 28 so that when the operator depresses switch 30, the motor 14, and consequently the saw blade 22 will be activated in the usual manner.

An upper stationary guard 32 illustrated in FIGS. 1, 2, 3 and 6 is formed at the blade end of the housing 12 to surround the upper portion of the saw blade 22. Viewing the circular saw 10 in the position shown in FIG. 1, the rotation of the saw blade 22 during cutting will be counterclockwise. A sawdust outlet 34 is formed in the upper right-hand corner of the guard 32 to permit ejection of the sawdust, and has a hood 36 illustrated in FIG. 6 to prevent the sawdust from being blown in the direction of the operator. A boss 38 is formed on the outer face of the upper guard 32 intermediate the front and rear thereof, a short distance above the clamping screw 24. The boss 38 has an inner hub 40 which has a central tapped hole 42 defining an axis 44. An axially extending groove 46 is formed in the outer circumference of the hub 40.

A lower blade guard 50 has a boss 52 with an internal hub 54 having a central aperture through which extends a shoulder screw 56 to threadedly engage the hole 42 and pivotally mount the lower guard 50 to the upper guard 32, whereby the lower guard 50 will telescope externally of the fixed upper guard 32 upon introduction of the work, and thus pivot about the axis 44. The boss 52 is counterbored about the screw 56 with the screw 56 enclosed by a cover plate 58. An axially-extending groove 60 is formed on the outer circumference of the hub 54. A coil spring 62 having a bent finger 64 at each end to extend into the respective grooves 46 and 60, is disposed within the hollow chamber 66 formed between the bosses 38 and 52, so as to urge the lower guard 50 as viewed in FIG. 1 in the counterclockwise direction substantially to enclose the lower portion of the saw blade 22.

The lower guard 50 is substantially U-shaped and has an inside leg 68, an outside leg 70, each leg 68 and 70 is connected to the other by a base 72 as is best shown in FIG. 6. The leading edge 74 is inclined forwardly and downwardly to define a cam surface 76 along the inside leg 68 for purposes more fully explained hereinafter. A front lip 78 is formed along the leading edge 74 at the base 72.
The housing 12 is supported by a base plate 80 having a horizontal plate 82 to which is affixed a vertical block 84, as illustrated in FIGS. 3, 5 and 6. The vertical block 84 is detachably clamped by a bolt 86 within a T-slotted vertical member 88 formed on the housing 12. The base plate 80 may be raised or lowered with respect to the housing 12 to change the depth of cut within a range of 0 to 2½ inches as indicated by the gauge 90 affixed to the side of the vertical member 88, with the pointer 92 attached to the side of the vertical block 84 to indicate the adjusted depth of cut position. In FIG. 7, the largest depth of cut is indicated as over 2½ inches as shown in the solid line representation thereof, and the shallowest cut is shown in phantom adjacent hte "O" mark. A handle 94 has a socket therein fixedly connected to the head 96 of the bolt 86 by a screw 98, so that turning of the handle 94 will simultaneously turn the bolt 86. The bolt 86 extends through the vertical block 84 and into the slot of the vertical member 88 to threadedly engage an entrapped nut 100 within the slot therein. Turning the handle 94 in the clockwise direction as viewed in FIG. 3 will tighten the bolt 86 and nut 100 to clamp the vertical member 88 to the vertical block 84 and lock the same in adjusted position as shown in FIG. 4. Whenever it is desired to adjust the depth of cut, the handle 94 will be turned in a counterclockwise direction as viewed in FIG. 3 to loosen the bolt 86 and the respective and 88-a block 84, so that one may be slid relative to the other.

A stop 102 engages the inside leg 68 of the leading edge 74 of the lower guard 50. The stop 102 has a bent rod 104 which has an inner end 206 which is connected by screws 108 to the inner side of the vertical block 84. The outer end 109 of the rod 104 is disposed substantially perpendicular to the inner end 106 and carries a plastic bushing 110, which is disposed rearwardly of the vertical block 84 and held in place by a C-clip 112.

The leading edge 74 of the lower guard 50 extends below the horizontal plate 84 to permit the workpiece 114 illustrated in FIG. 1 to pivot the guard to a position shown in phantom, and thus completely expose the saw blade 22 below the horizontal plate 82. The spring 62 will bias the lower guard 50 so that the inside leg 68 of the leading edge 74 will always be in contact with the bushing 110 of the stop 102 during periods when the circular saw 10 is nonoperative. The saw blade 22 rotates about the axis 20, while the lower guard 50 pivots about the axis 44 which, though parallel, is spaced from and above the axis 20. Whenever it is desired to remove or replace the saw blade 22, it will be in a simple matter of manually pivoting the lower guard 50 to expose the clamp screw 24.

The base plate 80 will have its horizontal plate 82 adjusted in the horizontal plane by loosening the handle 94 to enable the vertical 84 to be shifted corresponding to the depth of cut desired. In order to always present the front lip 78 to the workpiece 114 the stop 102 engages the cam surface 76 of the inside leg 68 along the entire length thereof. As best shown in FIG. 7, when the base plate is set for the maximum cut, the stop 102 engages the cam surface 76 adjacent the upper end thereof, as shown in the solid line representation. The leading edge 74 is mostly below the horizontal plate 82, so there would never be a problem in pivoting the lower guard 50 to expose the saw blade 22. However, as the base plate 80 is lowered with respect to the saw blade 22, if the lower guard 50 remained in the same position that it assumes for the maximum setting of the depth of cut, the horizontal plate 82 would extend below the front lip 78, and thus, the saw blade 22 would be completely covered and the cutting operation would not be possible. In order to avoid this problem, as the horizontal plate 80 is lowered for the shallower cuts, the bushing 110 of the stop 102 engages the cam surface 76 of the leading edge 74 and acts to retract or open the leading edge 74, so that the front lip 78 is always below the horizontal plate 82 of the base plate 80, as shown in phantom in FIG. 7, even when the depth of cut is set at 0. In the absence of the stop 102, the incline of the leading edge 74 neither would have had to be set at an angle so large as to be objectionable for safety reasons, in that too much of the saw blade 22 would be exposed during the maximum depth of cut, or the lower blade guard would have had to be made excessively large.

An upper blade guard 120 encloses the front portion of the saw blade 22 above the horizontal plate 82, so that when the horizontal plate 82 is lowered with respect to the housing 12, only a small portion of the saw blade 22 will be exposed. The guard 120 includes a U-shaped member 122 connected by an arm 124 to be clamped in place by the connection of the inner end 106 of the rod 104 to the vertical block 84.

It will be understood that various changes in the details, materials, arrangements of parts and operating conditions which have been herein described and illustrated in order to explain the nature of the invention may be made by those skilled in the art within the principles and scope of the invention.

I claim:
1. A portable electric hand saw comprising:
   a. a housing,
   b. a motor mounted in the housing,
   c. a drive spindle journaled in the housing and operatively connected to be rotated by the motor,
   d. a circular saw blade mounted on the drive spindle,
   e. a fixed guard formed on the housing to enclose the top portion of the circular saw blade,
   f. the fixed guard defining a pivot axis in the housing about an axis spaced above the axis of the spindle,
   g. a base plate includes a horizontal plate and a vertical block extending therefrom,
   h. the vertical block adjustable connected to the housing to raise and lower the horizontal plate relative to the housing to change the depth of cut of the saw blade,
   i. a lower guard projecting below the base plate normally to enclose the portion of the saw blade disposed below the base plate,
   j. connecting means interconnecting the lower guard and the fixed guard at the pivot axis to permit the lower guard to pivot about said pivot axis,
   k. the lower guard having a leading edge defining a cam surface, whereby upon the base plate passing on a workpiece, the leading edge will be engaged thereon causing the lower guard to pivot about the fixed guard and expose the saw blade,
   l. a stop fixedly connected to the base plate normally to engage the lower guard at all adjustment levels of the base plate, and to prevent complete closure of the lower guard below the base plate,
   m. the stop and the cam surface of the leading edge cooperating increasingly to shift a front lip of the leading edge below the base plate, as the base plate is
5 lowered to decrease the depth of cut of the saw blade,
6 the lower guard pivots externally of the fixed
5 guard, and
6 spring means coiled about the connecting means,
5 and having one end affixed to the lower guard and
6 the other end affixed to the fixed guard to contin-
5uously yieldably bias the lower guard in the direction
6 of covering the lower portion of the saw blade,
5 whereby upon removing the saw from the work-
6 piece, the lower guard automatically pivots over
5 the portion of the saw blade below the base plate.
6 The combination claimed in claim 1 wherein:
5 a. the stop includes a bent rod having a plastic bush-
6 ing at the outer end thereof to contact the lower
5 guard,
5 b. screw means connect the inner end of the rod to
6 the vertical block, and
5 c. the plastic bushing is disposed rearwardly of the
6 vertical block to shift the position of the leading
5 edge of the lower guard by coacting with the cam
6 surface thereof upon the base plate being raised or
5 lowered, and
6 d. the plastic bushing being turnably mounted upon
5 the rod to compensate for wear as caused by the
6 point contact of the leading edge of the lower
5 guard upon the stop means.
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