June 9, 1959 L. W. WOOD 2,889,677

CUTTER ASSEMBLY

Filed June 11, 1956 2 Sheets-Sheet 1

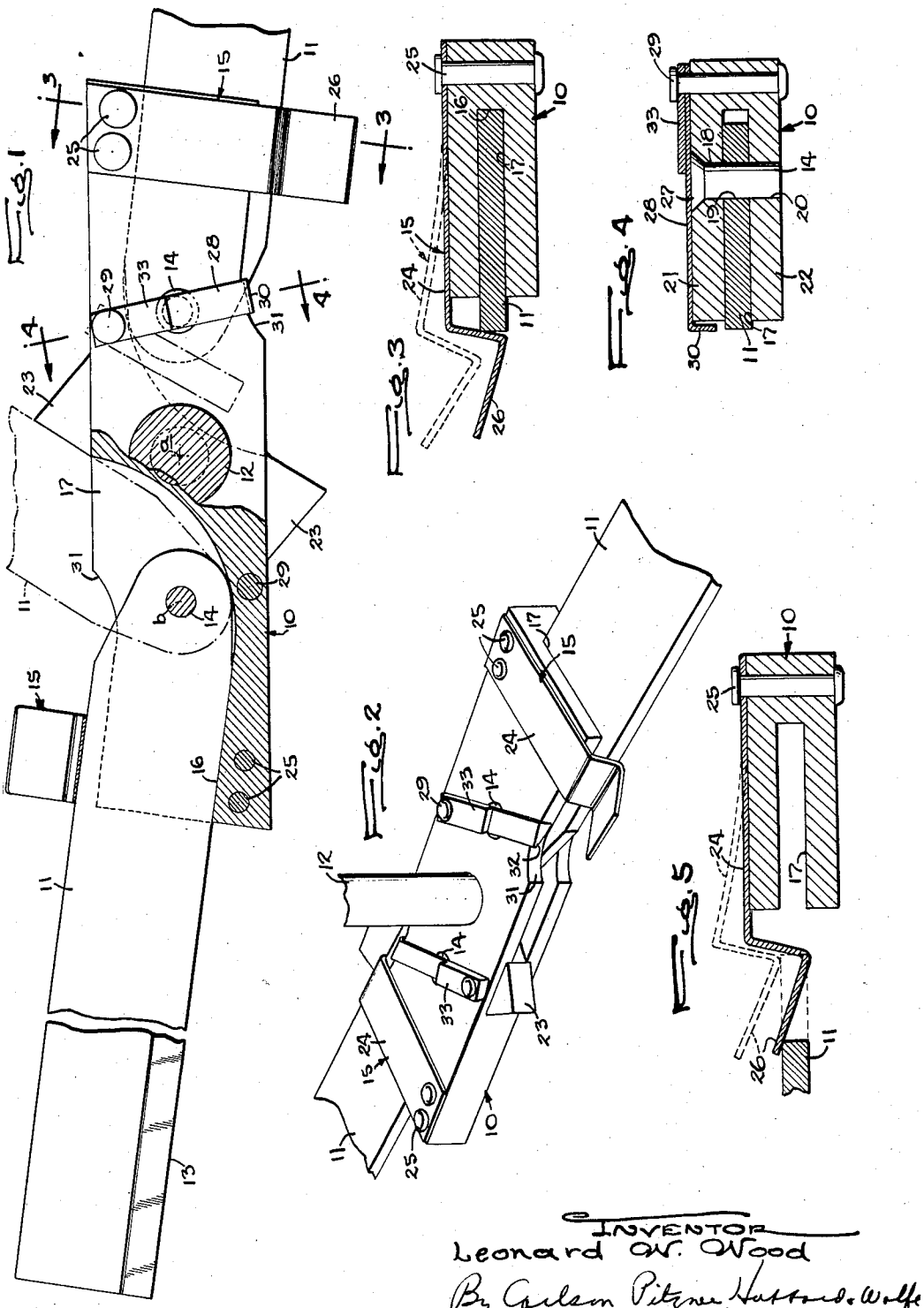


Fig. 1

Fig. 3

Fig. 4

Fig. 2

Fig. 5

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Fig. 6

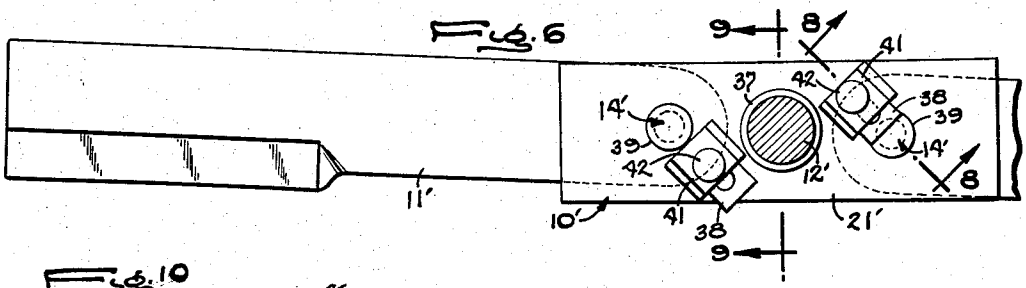


Fig. 10

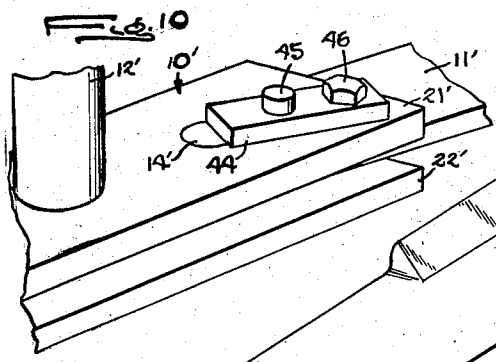


Fig. 7

Fig. 8

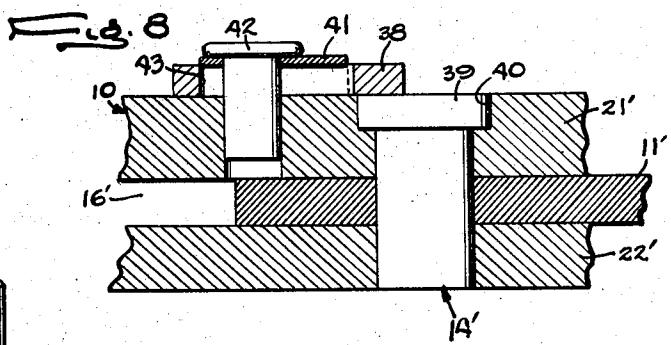
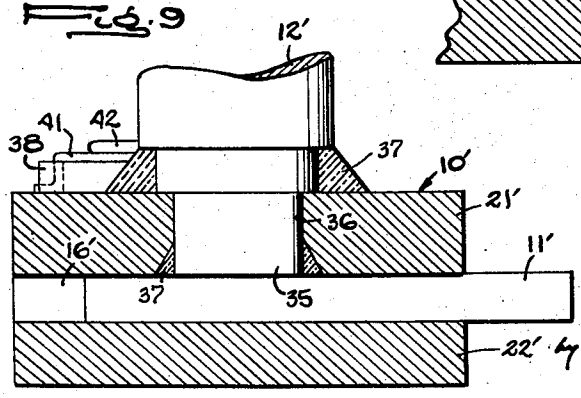


Fig. 9



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CUTTER ASSEMBLY

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Application June 11, 1956, Serial No. 590,446

5 Claims. (Cl. 56—295)

This invention relates to a cutter assembly such as is used on mowers and, more particularly, to an assembly in which one or more blades are carried by a rotating support. In such an assembly, each blade projects laterally outwardly from the axis of rotation and is pivotally connected to the support to swing back when it strikes an obstruction thus reducing the possibility of damage to the blade. During the normal operation, the blade is maintained in an active position and swing back only in the case of an obstruction.

The general object of the invention is to provide a new and improved cutter assembly of the above character in which the blade, after striking an obstruction, is automatically returned to the active position in the continued operation of the cutter and in which the blade is positively held in the active position during normal operation.

A more detailed object is to arrange the parts so as to utilize centrifugal force for swinging the blade back to a positively determined active position whereby the cutter is reconditioned for operation automatically and without being stopped.

The invention also resides in the novel construction used to pivot the blade on the rotating support and in the particular manner of holding the blade in the active position.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a fragmentary plan view of one form of cutter assembly embodying the novel features of the present invention, parts being broken away and shown in section.

Fig. 2 is a fragmentary perspective view of the assembly.

Fig. 3 is a sectional view taken along the line 3—3 in Fig. 1.

Fig. 4 is a sectional view taken along the line 4—4 in Fig. 1.

Fig. 5 is a view similar to Fig. 3 but shows the parts in a different position.

Fig. 6 is a fragmentary plan view of a modified form of the invention.

Fig. 7 is a view similar to Fig. 6 but with parts broken away showing one blade in the inactive position.

Fig. 8 is a fragmentary sectional view taken along the line 8—8 in Fig. 6.

Fig. 9 is a fragmentary sectional view taken along the line 9—9 in Fig. 6.

Fig. 10 is a fragmentary perspective view of another form of the invention.

As shown in Figs. 1 through 5 of the drawings, the invention in one of its forms may be embodied in a cutter assembly comprising a support member 10 rotatable about a generally vertical axis *a* and carrying a plurality of elongated blades 11 projecting laterally from and generally radiating with respect to the axis *a*. Herein, the support 10 is a flat plate disposed horizontally and

pressed onto the lower end of an upright shaft 12 which is turned by a suitable power actuator (not shown). The blades 11, which in this case are two in number, are in the form of elongated flat bars disposed on opposite sides of the shaft 12 in a plane normal to the axis *a* and mounted on the support plate 10 to turn bodily therewith. The bars extend outwardly from the support and, along their outer end portions, the bars are sharpened on the leading edge as indicated at 13 in Fig. 1.

To prevent damage to the blades 11, each blade is mounted on the plate 10 for movement relative thereto when the blade strikes an obstruction so that, in such an event, the blade yields instead of breaking. In the present instance, each blade is pivotally connected at its inner end to the plate 10 by means of a pin 14 which projects through the plate and the blade so that the blade swings relative to the plate about an axis *b* (Fig. 4) parallel to the axis *a*. Thus, the blade normally is disposed in the active position shown in full in Fig. 1 but, when it hits an obstruction such as a stone or a stump, it swings back toward the inactive position (illustrated in broken lines in Fig. 1) until it passes clear of the obstruction.

In accordance with the present invention, the parts are arranged in a novel manner to utilize centrifugal force to return the blade 11 to the active position automatically as soon as the blade passes clear of the obstruction and, additionally, to hold the blade positively against a rigid stop 16 when the blade is in the active position. This is achieved by permitting the blade to swing freely in the direction opposite its direction of rotation and by locating the stop so that it holds the blade back of the radial position. With this arrangement, the blade may swing back when it strikes an obstruction and then, after it passes clear of the obstruction, the centrifugal force swings the blade forward and holds it in the active position against the stop.

In the present instance, the inner end portion of each blade 11 is disposed within a horizontal slot 17 cut in the plate 10 and opening outwardly and rearwardly to permit swinging of the blade. The pin 14, therefore, projects through holes 18, 19 and 20 (Fig. 4) in the upper leg portion 21 of the plate (see Fig. 4), the blade, and the lower leg portion 22 respectively. When in the active position, the blade abuts against the forward wall of the slot and, thus, this wall constitutes the stop 16. A projection 23 on the side edge of the plate forms a second stop which limits the rearward swinging of the blade.

Centrifugal force alone may be used to hold the blade in the active position or this may be supplemented by additional means which holds each blade 11 in the normal or active position but permits the blade to swing back to the inactive position when it strikes an obstruction. According to the present invention, this means, when employed, is constructed in a novel manner to permit the blade to be returned to the active position simply and easily and without removing or replacing any parts. For this purpose, this means comprises a yieldable detent 15 which, when the blade is in the active position, engages a trailing edge of the blade urging the latter forward against the stop 16. When an obstruction is encountered, the detent yields permitting the blade to swing back away from the active position. Similarly, the detent yields as the blade is returned so that the cutter is reconditioned for operation simply by swinging the blade back to the active position.

Each detent may, as illustrated, be in the end portion of a strip 24 of resilient material such as spring steel anchored at one end near the leading edge of the plate 10 as by rivets 25 and extending across the top of the plate with a portion near the free end of the strip bent down to project it behind the trailing edge of the blade

11 and form the detent 15. The latter resiliently bears against the blade to urge the latter against the stop 16 as shown in full lines in Fig. 3. When the blade strikes an obstruction, the blade starts to swing back relative to the plate 10 and the strip 24 and cams the detent 15 and the strip upwardly as shown in broken lines, the detent being inclined slightly to facilitate this action. The blade then is free to move past the detent and swing toward the inactive position.

To permit the blade 11 to be returned to the active position, the strip 24 is formed with a cam 26 which, when engaged by the blade, lifts the detent 15 and permits the blade to enter the slot 17. As the blade reaches the active position, the detent snaps black behind the blade to hold the latter against the stop 16. Herein, the cam 26 is an extension of the strip 24 and projects outwardly and upwardly from the lower end of the detent portion of the strip. Due to the inclining of the free end portion of the strip, the blade 11 as it is returned to the slot cams the strip upwardly as shown in Fig. 5 so that the blade passes under the detent 15.

In order to take advantage of centrifugal force to return the blades 11 to the active position, the blades generally radiate from the axis *a* when in the cutting position. Since centrifugal force tends to move the blades radially, this force urges the blades toward the active position. As soon as a blade passes around the obstruction, therefore, it swings forward under the action of centrifugal force and enters the slot 17, the detent 15 snapping in behind the blade. Preferably, the slots 17 and hence the blades 11 are inclined slightly rearwardly from a true radial position so that they are urged continuously against the stops 16 by centrifugal force and thus are positively located and firmly held in the active cutting position.

According to another aspect of the invention, the pivot pin 14 is arranged and held in place in a novel manner so that it may be taken out easily when it is desired to replace a blade or remove one for sharpening. To this end, the head 27 (Fig. 4) of the pin is countersunk in the leg 21 of the plate 10 so as to be flush with the latter and is loosely received in the holes 18, 19 and 20. The pin is held down in the latter by a member 28 which herein is a flat strip of spring steel overlying the pin. The retaining strip 28 turns on a rivet 29 extending through the plate 10 adjacent the leading edge thereof. This permits the strip to be moved so as to expose the pin 14 for removal.

Normally, the strip 28 is held in position over the pin 14 and this is achieved by bending down the free end portion 30 of the strip to project the same into a notch 31 cut in the trailing edge of the plate 10. The notch is curved and the bent portion 30 normally projects into the deepest part of the notch. Thus, both sides of the portion 30 engage the edge of the plate 10 and this holds the strip 28 against turning in normal service use. In order that the strip may be turned manually, however, the end portion is cut diagonally to form a cam surface 32 along the lower edge thereof. The cam surface acts when the strip is turned (clockwise as viewed in Fig. 1) to lift the strip end and permit the strip to be turned away from the pin 14 to the position shown in broken lines in Fig. 1.

To permit easy turning of the strip 28 by a conventional tool, a part 33 is secured to the strip 28 and is adapted to be engaged by the tool. Herein, the part 33 is a narrow plate welded to the top of the pivoted end portion of the strip 28. The end of the plate 33 forms, in effect, three sides of a square nut concentric with the rivet 29 so that this end may be gripped and turned by an ordinary wrench thus turning the strip 28.

Figs. 6 through 9 illustrate a form of the invention in which the centrifugal force alone holds the blades 11' in the active position. In this case, the cutter support 10' is formed by two horizontal rectangular plates 21' and 22' (Figs. 8 and 9) held apart and joined together by narrow spacers 34. The latter are disposed at the two leading corners of the plates and extend inwardly along the leading edge of the support to points alongside the pivots 14' for the blades. The inside surfaces of the spacers are inclined to hold the blades slightly behind the radial position, the same as in the embodiment shown in Figs. 1 through 5.

With the foregoing arrangement, the blades 11' are free to swing back since the space or slot 16' (Fig. 8) between the plates 21' and 22' is clear along the trailing edge portions of the support 10'. By employing a novel connection between the shaft 12' and the support 10', the amount the blades can swing back is increased, the blades in the present instance being free to swing through approximately 120 degrees. This permits the blades to pass obstructions more easily and is achieved by stopping the shaft 12' short of the space between the plates 21' and 22' so that the blades can swing in under the shaft. Herein, the connection is formed by reducing the lower end portion 35 of the shaft and by projecting this reduced portion into a hole 36 in the upper plate 21', the end of the shaft being flush with the underside of this plate. The shaft is welded to the plate as indicated at 37 in Fig. 9. Thus, the blades may swing back until they strike the opposite spacer 34. In this way, the inside or trailing surface of each spacer acts as a stop to hold the adjacent blade in the projected or active position and the inner end acts as a stop to limit backward swinging of the other blade.

Figs. 6 through 9 also illustrate another form of means for pivoting the blades 11' to the support 10' while permitting the blades to be removed quickly and easily. This means comprises a pivot pin 14' which extends through both plates 21' and 22' and a blade 11' and a member 38 which slides over the top of the pin and prevents the latter from coming out. The pin 14' has a head 39 which is received in a counterbore 40 in the plate 21' and keeps the pin from dropping out. The head is flush with the top of the upper plate and the member 38 is a short bar which slides on this plate into a position in which one end portion overlies the head of the pivot pin as shown in Fig. 8.

Herein, the bars 38 are arranged so that they are held in the active position shown in Fig. 8 by centrifugal force and, for this purpose, the bars are disposed inwardly of the pivot pins 14' and, in moving to the active position, slide outwardly. The bars may, as illustrated in the drawings, slide in inverted U-shaped brackets 41 welded to the upper bar to define channels inclined to the radius of the cutter assembly. The bars slide back and forth in these channels and the movement of each is limited by a pin 42 which projects through the bracket 41, an elongated slot 43 in the bar and into the upper plate. The slot permits the bar to move back to the inactive position shown at the left in Fig. 6 and forward to the active position shown at the right of that figure.

The parts may be arranged so that the bars 38 slide rather freely in the brackets 41. In this way, the blades 11' may easily be removed simply by sliding the appropriate bar back and taking out the pivot pin 14'. When the blade and pin have been replaced, the bar is moved back to its active position. Because the bar moves generally radially outwardly to the active position, centrifugal force holds it in this position and it will even move the bar to the active position if the operator should neglect to do this.

Another form of retaining means is illustrated in Fig. 10 and as in the case of Fig. 6 this means is responsive to a centrifugal force which holds the means in the position to prevent the pivot pin 14' from being removed. In this instance, the retaining means is in the form of a short bar 44 which is pivotally connected intermediate its ends to the support 10' on top of the upper plate 21'. The bar is pivoted by means of a pin 45 which is spaced radi-

ally outwardly from the main pivot pin 14'. The bar 44 is located so that, when it is in a generally radial position as illustrated in Fig. 10, its inner end overlaps the head of the pin 14' and thus holds the latter in place. By turning the bar to a transverse position, the pin 14' may be removed.

With the foregoing arrangement, centrifugal force tends to swing the bar 44 to a position in which it lies along a radius of the cutter assembly. This is the position in which it overlies the pin 14'. Preferably the bar is pivoted somewhat behind its center so that the outer portion is larger than the inner portion. Thus, a greater portion of the mass of the bar is at one side of the pin 45 and the effect of the centrifugal force is greater on this side than it is on the other. In this way, the centrifugal force will tend to swing the bar to the radial position even though the bar initially is in a true transverse position.

If desired, the bar may be held in the active or locking position by a screw 46 which projects through the bar and is threaded into the upper plate 21'. It should be understood, however, that in most instances the screw is unnecessary and that the bar will remain in the locking position under the action of centrifugal force alone.

It will be observed that, with the cutter assembly described above, the blades 11 are returned easily to the active position after striking an obstruction. In fact, the centrifugal force due to the continued turning of the support plate 10 causes the blade to snap back into the active position as soon as the blade passes clear of the obstruction. Moreover, the entire assembly is simple in construction and comparatively inexpensive to manufacture. Additionally, either novel manner of holding the pivot pins 14 in place permits the blades to be removed quickly and easily when it is desired to sharpen or replace them.

This application is a continuation-in-part of my copending application Serial No. 479,425, filed January 3, 1955, now abandoned.

I claim as my invention:

1. A cutter assembly for a rotating blade type mower comprising a power operated shaft, an elongated plate rigidly secured to an end portion of said shaft and located in a plane normal to the axis thereof, a second elongated plate member spaced from and parallel to said first mentioned plate, spacer means interconnecting opposite terminal side edges of said respective plates, and two elongated cutter blades, one pivotally connected to each of the terminal end portions of said plate members, one side edge of each of said blades normally lying alongside of each of said spacer means.

2. A cutter assembly for a rotating blade type mower comprising a power operated shaft, an elongated plate rigidly secured to an end portion of said shaft and located in a plane normal to the axis thereof, a second elongated plate spaced from and parallel to said first mentioned plate, spacer means disposed between said plates at opposite ends thereof and along the leading edges of the plates and interconnecting the plates to form a unitary support rigid with said shaft, and two elongated cutter blades, one pivotally connected to each of the terminal end portions of said plates, one side edge of each of said blades normally lying alongside of each of said spacer means.

3. A cutter assembly as defined in claim 2 in which said spacer means holds said blades behind a true radial position.

4. A cutter assembly for a rotating blade type mower comprising a power operated shaft, an elongated plate rigidly secured to an end portion of said shaft and located in a plane normal to the axis thereof, a second elongated plate member spaced from and parallel to said first mentioned plate, two spacer means disposed between said plates at opposite ends thereof and along the leading edges of the plates and interconnecting the plates to form a unitary support rigid with said shaft, and two elongated cutter blades, one pivotally connected to each of the terminal end portions of said plate members, one side edge of each of said blades normally lying alongside the adjacent spacer means and the rearward swinging of the blade being limited by the opposite spacer means.

5. A cutter assembly for a rotating blade type mower comprising a power operated shaft, an elongated plate rigidly secured to an end portion of said shaft and located in a plane normal to the axis thereof, a second elongated plate spaced from and parallel to said first mentioned plate, spacer means disposed between said plates at opposite ends thereof and along the leading edges of the plates and interconnecting the plates to form a unitary support rigid with said shaft, two elongated cutter blades disposed at opposite ends of said plates and each having an end portion projecting in between the terminal end portions of said plates, pins projecting loosely through said plates and the inner end portions of said blades to pivotally connect the blades to said plates, said pins having exposed heads, and elements mounted on said support to move back and forth between active positions in which they overlie the heads of said pins and inactive positions alongside the heads, said elements being responsive to said centrifugal force and held in the active positions thereby.

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