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SHARPENING UNIT FOR MOWER BLADES

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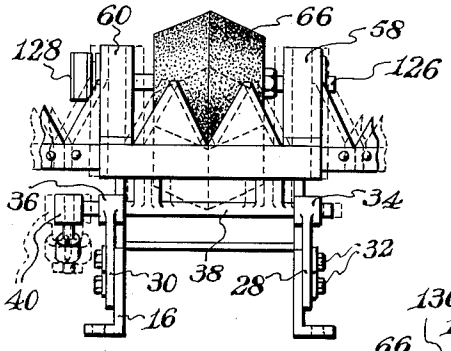


Fig. 2

Fig. 1

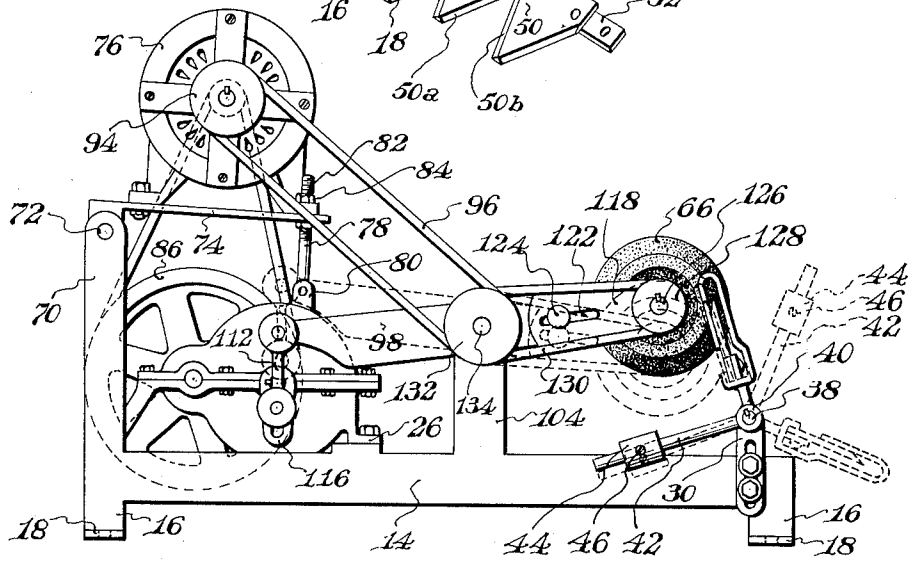


Fig. 3

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SHARPENING UNIT FOR MOWER BLADES

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2 Claims. (Cl. 51—33)

This invention relates to improvements in sharpening units for blades and particularly to improvements in sharpening devices for mower blades of the reciprocating sickle type.

A primary object of this invention is to provide a mower blade sharpening unit which embodies a blade support and a grinding wheel, which is rotatable about its axis in sharpening engagement of the teeth of a blade and is bodily movable relative to the teeth to contact the entire cutting surfaces of the teeth, the blade support being mounted to cooperate with the grinding wheel by moving the blade held thereby slightly relative to the grinding wheel to compensate for the bodily movement of the grinding wheel.

A further object of this invention is to provide means for rotating the grinding wheel and means for reciprocating the grinding wheel as it is rotated, both of said means being powered by a single prime mover through belt transmission means, which are adjustable by means of an adjustable support for the prime mover.

Another object of this invention is to provide means for supporting a mower blade, such means being movable in an arc relative to the reciprocable arc of bodily movement of the grinding wheel and also being movable rectilinearly in a plane paralleling the axis of rotation of the grinding wheel so as to more accurately center the teeth of the blade against the grinding wheel in a floating fashion.

These and ancillary objects, including the provision of a compact and easily operated mower blade sharpening unit, are attained by this invention, the preferred embodiment of which is set forth in the following description and illustrated in the accompanying drawings, wherein:

Figure 1 is a perspective view of the sharpening unit, showing the same in association with a conventional sickle blade;

Figure 2 is a fragmentary front elevational view thereof; and,

Figure 3 is a side elevational view thereof.

Referring now more particularly to the drawing, the numeral **10** designates a frame, which includes a pair of upright longitudinally extending side members **12** and **14**. Each of the side members is provided at its ends with depending legs **16** that terminate in longitudinal mounting feet **18**, which are apertured as at **20**, to receive suitable fasteners for mounting the feet on a suitable supporting surface. The side members are connected at their upper edges by a transversely disposed frame member **22**, which also serves as a support for a reduction gearing housing **24**, such housing having a mounting flange **26** bolted on the frame member **22**.

Axially slotted bars **28** and **30** are attached to the side members **12** and **14** on their outer surfaces and adjacent the forward ends thereof. The bars are adjustable by means of fasteners **32**, which extend through the axial slots in the bars and secure the bars in the vertical positions on the side members. The bars terminate at their upper ends in horizontally disposed bearing collars **34** and **36** which are axially aligned and which receive a rod **38**. The rod **38** is rotatably mounted in the bearing collars **34** and **36** and as shown in Figure 3, is also movable axially in the bearing collars, such axial movement being of a slight or limited nature. A sleeve **40** is fixedly circumposed on one of the extending ends of the rod and supports a handle **42** which extends radially from the sleeve and is provided with an axially adjustable cylindrical weight **44**. The weight is fixed in adjusted positions along the length of the handle by means of a radial set screw **46**. The rod **38** is provided to support a conventional sickle blade **48**, which is formed with side by side V-shaped or triangular teeth **50** having their base portions fixed on a connecting bar **52**. The cutting surfaces 50^a and 50^b of adjoining teeth diverge from the attached base portions of the teeth toward the outer free apices of the teeth. The rod **38** is provided with laterally projecting straps **54** and **56**, which are formed integral with the rod and extend radially therefrom at an angle of approximately 90° from the handle **42**, as shown in Figure 1. The straps **54** and **56** have their outer ends bent inwardly and downwardly to form hook portions **58** and **60** and a portion of the inner end of each strap is curved upwardly and inwardly to form cooperating smaller hooks **62** and **64**. The free ends of the hooks portions **58** and **60** are spaced from the free ends of the hooks **62** and **64** to define admittance slots whereby the sickle blade can be positioned under the hook portions and have the base portion of its teeth fitted under the hooks **62** and **64**. The straps, thus consist of attaching inner ends which are integral with the rod and strap portions proper which are connected by the inner ends and which consist of closed sides and confronting slotted sides, the slotted sides being defined by the hook portions and the hooks. The sickle blade is positioned in the straps, the hook portions and hooks together with the closed sides of which provide blade cradling members, with the apices of the teeth facing the closed ends of the hook portions **58** and **60** and the base portions of the teeth disposed under the hooks **62** and **64**. In this manner, two of the teeth, for example, the teeth 50^c and 50^d are always positioned between the hook portions **58** and **60** with their apices facing outwardly or away from the rod and their base portions facing the rod. Since there is no transverse connection between the two hook portions, the cutting surfaces of the adjoining teeth 50^c and 50^d are not covered in any way.

As can be appreciated, the purpose of the weight **44** on the handle **42** is to offset the weight of the sickle blade and to hold the blade in the position shown in Figure 3. Such operative position, indicated in full lines, insures that the cutting surfaces of the two teeth between the hook portions will be in proper position for complete contact by the grinding wheel **66**. The weight **44** holds the cradling members past the center of the pivot of the rod and prevents the blade from being shoved forwardly out of contact with the grinding surface of the grinding wheel **66** as the grinding wheel moves up and down on the cutting surface of the adjoining teeth.

Upstanding legs **68** and **70** are formed on the side members, such legs being integral upward extensions of the depending legs **16** on the rear ends of the side members. The upper ends of the legs support a pivot arrangement **72**, on which one end of a motor support **74** is pivoted. A motor **76** is bolted on the upper surface of the support **74** and, the movement of the support about the horizontal axis defined by the pivot arrangement **72** inclines the motor relative to the frame as shown in Figure 3 and for a purpose to be discussed.

The support **74** is held in fixed inclined positions by

a pin 78, which has its head pivoted between a pair of upstanding ears 80 on the top of the housing 24. The threaded end 82 of the pin extends through a suitable opening in the support and is fixed in adjusted positions by lock nuts 84.

A large pulley wheel 86 is fixedly circumposed on the extending end of the input shaft 88 with the gear reduction unit and is rotated through a connecting belt 90 which is driven by a drum 92 on the armature shaft of the motor. On the other side of the frame, a pulley 94 is fixed on the drive shaft of the motor and a drive belt 96 is entrained over the pulley. As can be seen, the hinge support 72 for the motor support 74 and the supporting pin 78 serve as a belt tightener, since the motor can be lowered or raised to tighten or loosen the drive belts 90 and 96.

A grinding wheel carrier is provided and includes a pair of parallel arms or carrier elements 98 and 100, which are retained in transverse spaced relation by a sleeve 102, which is suitably mounted for rotation between a pair of upstanding arms 104 and 106 that are on the upper edges of the side members 12 and 14. The rearward reduced ends 108, 110 of the carrier elements are connected by suitable pins to the extensions of the outer ends of connecting rods 112 and 114, the inner ends of the connecting rods being suitably connected to the cranks 116, which are rotated by the gear reduction unit.

The carrier elements 98 and 100 have forward extensions 118 and 120 which are movable axially, for adjustment purposes, by means of axial slots 122 formed in the extensions and pins 124 carried by the carrier elements.

The grinding wheel 66 is fixed on a shaft 126 which is rotatably journaled between the outer free ends of the extensions 118 and 120, one end of the shaft extending beyond the extension 118 to receive a pulley 128 which is connected by a belt 130 to a double pulley 132, the belt 96 being connected to such double pulley 132 for rotating the shaft 126. The purpose of providing the axial adjustability of the extensions is to tighten the belt 130 so that when the belt slackens, the extensions can be moved forwardly through the pin and slot connection to tighten the belt.

The double pulley 132 is carried by the fulcrum shaft 134 for the sleeve 102. The fulcrum shaft for the sleeve thus provides intermediate support between the motor and the grinding wheel and by this drive arrangement, the belts 96 and 130 are not influenced by the oscillatory movement of the carrier elements or arms 98 and 100. When the arms are being oscillated by the connecting rods and cranks through the gear reduction unit and drive of the motor 76, the grinding wheel is being rotated by the belts 96 and 130.

In use, the sickle blade 48 is positioned in the blade support, the cradle elements of which incline downwardly and forwardly from the grinding wheel 66, in order that the blade may be properly inserted therein. The motor 76 is then put in operation through a suitable switch means (not shown) and the blade support is moved by rotating the rod 38 through the handle 42 to bring the teeth between the hook portions 58 and 60 to contact with the grinding surface of the wheel 66. In this respect, it will be noted that the grinding surface is V-shaped, that is, that the periphery slopes downwardly from the center towards the sides of the wheel. Such configuration of the grinding wheel insures that the inclined sides of the wheel will contact the cutting surfaces 50^a and 50^b of adjoining teeth of the blade.

The support through the axial adjustment of the rod 38 which is limited by the strap ends 54 and 56 can move parallel to the action of rotation of the grinding wheel in order that the support can more accurately center the cutting surfaces of adjoining teeth against the sides of the grinding wheel. The support will automatically assume its proper position, since it will float over into position under the force of the grinding surfaces of the wheel against the cutting edges of the teeth. When the blade is against the grinding surface of the wheel 66, the carrier for the grinding wheel and the blade move slightly forward and backward as shown in Figure 3 to compensate for the arc which the wheel describes about the fulcrum point 134 and the fact that the blade has the teeth arranged in V-shape, the grinding wheel reaches a little further between the adjoining teeth in its down position. Therefore, the blade support and blade move up toward the grinding wheel and back again as the grinding wheel reaches its upper position. This action together with the arcing movement of the grinding wheel keeps the cutting surface of the teeth being ground in perfect contact with the grinding surface of the wheel at all times.

While the preferred form of this invention has been described herein and illustrated in the accompanying drawing, other forms may be realized so that limitation is sought only in accordance with the appended claims.

I claim:

1. A sharpening device for sharpening the diverging cutting surfaces of the side by side V-shaped teeth of a sickle blade comprising a frame, bearing members upstanding from the frame, a rod rotatably mounted in said members transversely of the frame and movable axially of such members, a weighted handle connected to the rod and projecting angularly therefrom, cradle elements radially extending from the rod and formed to hold a mower blade which is slidable axially therein, a pair of upstanding arms on the frame spaced longitudinally from the bearing members, a shaft rotatably journalled transversely between the arms, a pair of carrier elements pivoted on the shaft intermediate their ends and extending longitudinally, parallel of the frame in transversely spaced relation, said carrier elements having forward and rearward ends, axial extensions adjustably secured to the forward ends, means securing said extensions in axially adjusted positions relative to the carrier elements, a second shaft rotatably disposed transversely between the extensions, a grinding wheel fixedly circumposed on the second shaft, a pulley fixed on the second shaft, pulley means fixed on the first shaft, a driven belt connecting the pulley to the pulley means and being adjustable by the axial adjustment of the extensions, a prime mover mounted on the frame, a drive belt connecting the pulley means to the prime mover for rotating the grinding wheel, crank means attached to the rearward ends of the carrier elements for vertically oscillating the carrier elements to move the grinding wheel up and down at it rotates, and belt drive means connected between the prime mover and the crank means.

2. A sharpening device as claimed in claim 1, wherein a supporting plate for the prime mover is hingedly mounted to the frame and overlies the frame, the prime mover being mounted on the supporting plate and means securing said plate in adjusted positions, said last means serving as a belt tightener for the drive belt and the belt drive means.

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