Jan. 16, 1962 K. S. PONDEXTER 3,016,658

SHARPENER AND DRIVING MEANS THEREFOR

Filed Feb. 14, 1961 2 Sheets-Sheet 1

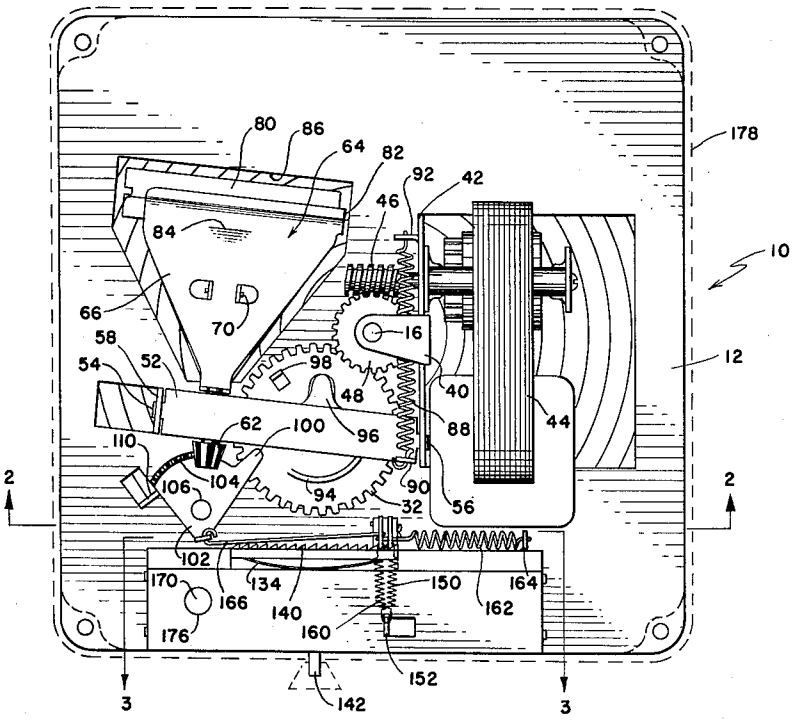


FIG 1

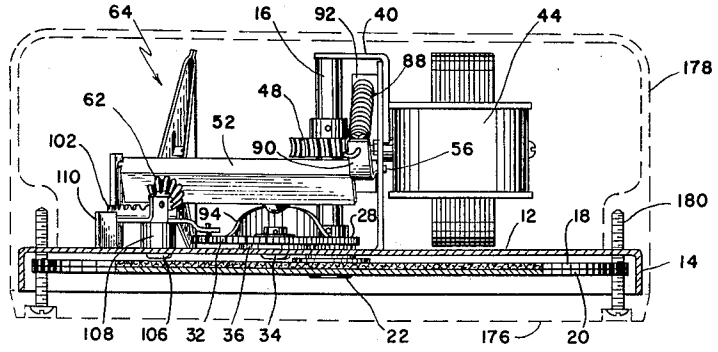


FIG 2

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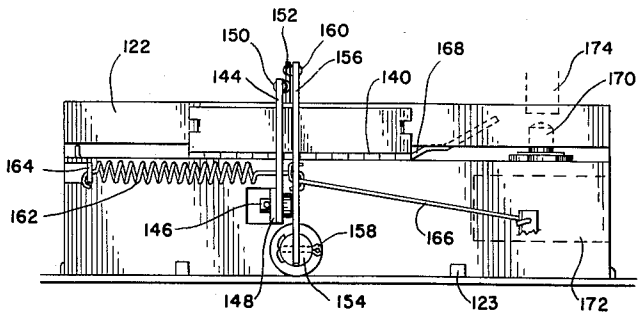


FIG 3

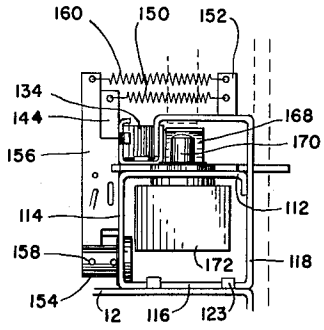


FIG 4

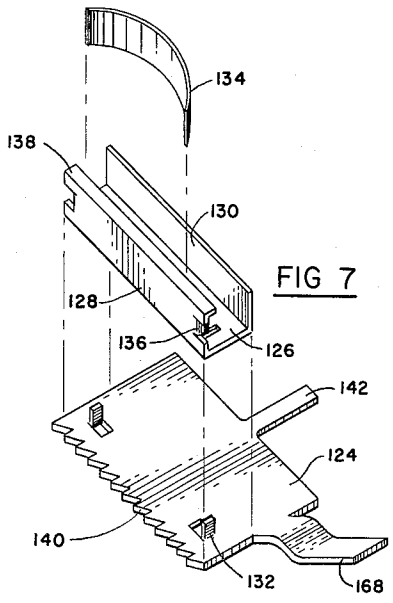


FIG 7

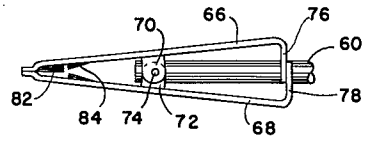


FIG 5

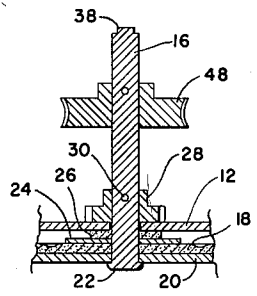


FIG 6

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United States Patent Office 3,016,658 Patented Jan. 16, 1962

3,016,658

SHARPENER AND DRIVING MEANS THEREFOR

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Filed Feb. 14, 1961, Ser. No. 89,236
11 Claims. (Cl. 51—159)

The present invention relates to new and useful improvements in the cycle-limiting-control and drive of cyclically-operative mechanisms, and more particularly pertains to a control and drive of such character wherein the mechanism includes a rotating shaft as applied to a rotary blade sharpening or stropping device.

The primary aim of the invention is to provide a drive for a cyclically-operating mechanism in which the drive is so controlled that, upon completion of a predetermined number of cycles by the mechanism, the drive will be stopped, with the number of cycles optionally (though preferably) being selectable within limits at the will of the user.

An ancillary aim of the invention, in accordance with the primary aim, is to provide a mechanical blade sharpener or stropper, of the type wherein the opposite sides of the blade are alternately dressed, with a drive such that the resulting device will be self-operating for a predetermined number of blade dressing operations.

These and other important aims and objects of the invention will become obvious in the light of the following description thereof.

Broadly, the invention involves a cyclically-operative mechanism, an electric motor drivingly connected to said mechanism, an electric switch means for controlling energization of said motor, and a mechanical means connected to said mechanism for actuating the switch means to deenergize said motor upon the occurrence of a predetermined number of cyclic operations of said mechanism, said mechanical means comprising a slide mounted for movement toward and away from the switch means and being operatively engageable with said switch means, a set of ratchet teeth on said slide, and advancing means operatively responsive to each cyclic operation of said mechanism to engage the ratchet teeth and thereby to advance the slide toward operative engagement with said switch means by an amount dependent upon the spacing of the ratchet teeth.

The cyclically-operative mechanism can be quite varied in nature, as for example, the same can be a part of or carried by a rotating shaft, which shaft in itself can be a functional part of a conventional machine (making a direct contribution to the desired end result of the machine), or such shaft can be driven in some fixed ratio by the machine as an adjunct thereof having as its sole purpose a contribution to the control effected by the practice of this invention. In other words, the cyclically-operative mechanism can be eseentially a part of a machine driven by the motor or a take-off from said motor.

Another broad aspect of the invention involves providing a blade sharpener or stropper of the type including a rotatable disc with a self-operating means for rotating the disc and alternately contacting the opposite sides of the edge of a blade against a side of the disc for a predetermined number of times.

The invention primarily resides in a control means in combination with a sharpening or stropping device of the general character given above, wherein said control means serves to deenergize an electric motor powering the device and a cyclically-operative mechanism connected to the device upon a predetermined number of cycles of the mechanism operation. The invention also resides in the control means per se and the structure

thereof enabling selection of the predetermined number of cycles.

The invention has special applicability for use in combination with devices of the type such as shown in U.S. Patent No. 1,382,794 issued June 28, 1921 to Luebben, entitled "Machine for Sharpening Safety Razor Blades," and U.S. Patent Nos. 1,468,923 and 1,614,492 issued September 25, 1923 and January 18, 1927, respectively, to Rhodes, each entitled "Razor-Stropping Device."

The preferred embodiment of the invention as applied to include features of the device of the last-mentioned patent is hereinafter described in connection with the accompanying drawings, wherein:

FIGURE 1 is a top plan view of a device according to the invention, such view being with the cover being shown only in dashed outline;

FIGURE 2 is a vertical sectional view taken upon the broken section line 2—2 in FIGURE 1, the bottom and cover being shown in dashed outline, and with the blade holder being shown rotated 90° from the position shown thereof in FIGURE 1;

FIGURE 3 is another vertical sectional view taken upon the broken section line 3—3 in FIGURE 1;

FIGURE 4 is an end view of the structure shown in FIGURE 3;

FIGURE 5 is an enlarged detail view of the blade holder;

FIGURE 6 is an enlarged sectional detail view of the main driving shaft; and

FIGURE 7 is an enlarged exploded isometric view of the slide and associated structure.

Referring now to the drawings, wherein similar reference numerals designate similar parts throughout, and with initial specific attention to FIGURES 1 and 2, the numeral 10 designates the sharpener or stropping device generally. The sharpener 10 comprises a rectangular metal base p'ate 12 having an integral depending peripheral skirt or flange 14.

A vertical main driving shaft 16 is journaled or rotatably pases through a central opening in the base plate 12. A composite blade sharpening or stropping disc is mounted on the shaft 16 below the plate 12. The disc is preferably composed of leather disc 18 (though any suitable blade sharpening or stropping material or composition can be used if desired), and the disc 18 rests upon and preferably fixed by a suitable adhesive (not shown) to a metal supporting disc 20. The discs 18 and 20 are retained on the shaft 16 by an enlargement 22 of the lower end of the latter, and are restrained against rotation thereon by conventional means not shown. A spacing gasket 24 and a resilient gasket 26 are interposed on the shaft 16 between the disc 18 and the plate 12, as shown. A pinion 28 is fixed to the shaft 16 by a pin 30 in a position to retain the discs 18 and 20, and the gaskets 24 and 26 in the positions relative to the plate 12 shown in FIGURE 6. Though not shown, a suitable lubricating washer or the like can be interposed between the pinion and the plate 16 if deemed necessary or expedient.

The pinion 28 is meshed with a spur wheel 32 carried by a short shaft 34 extending through the plate 12 (see FIGURE 2). A spacing or lubricating washer is positioned on the shaft 34 and is interposed between the spur wheel 32 and the plate 12.

The upper end of the shaft 16 is reduced as shown at 38 (see FIGURE 6) and is journaled in a suitable opening in a horizontally extending flange 40 that is fixed, as by spot welding or the like, to an upstruck, integral portion of the plate 12 constituting a vertical mounting plate or wall 42. A fractional horsepower electric motor 44 of any type suitable to available power supplies (A.-C. or D.-C., possibly a battery supply) is mounted on the wall 42. A shaded pole electric motor such as are com-

monly used to power turntables of phonographs is deemed preferable for use as motor 44. The output shaft of the motor 44 projects through a suitable opening in the wall 42 and is provided with a worm 46 that meshes with a worm wheel 48 fixed on the shaft 16 by a pin 50.

As thus far described, it will be clear that, during operation of the motor 44, the shaft 16 will be rotated as will the discs 18 and 20, and in addition the spur wheel 32 will be rotated by reason of its mesh with pinion 28. It is to be understood that the arrangement of the foregoing is such that the spur wheel 32 rotates in a counterclockwise direction as viewed from above or in FIGURE 1.

As best shown in FIGURES 1 and 2, a horizontally-disposed elongated beam 52 is spaced above the spur wheel 32. The beam 52 is adapted to oscillate about its longitudinal axis by virtue of being provided with integral trunnions 56 and 58 received respectively in suitable openings in an ear 58 upstruck from the plate 16 and the wall 42.

A shaft 60 (see FIGURES 1, 2 and 5) is journaled transversely through the beam 52, one end of the same being provided with a bevel gear 62, and the other end being provided with a blade holder indicated generally at 64. The blade holder 64 is comprised of a pair of generally triangular-shaped metal plates 66 and 68 (see FIGURES 1 and 5). The plates 66 and 68 are provided with integral spaced pairs of ears 70 and 72 struck out from the plates 66 and 68 between which the shaft 60 is received, with a pin 74 extending through all the ears 70 and 72 and the shaft 60 to secure the blade holder 64 to the shaft 60. The apex portions of the plates 66 and 68 are bent towards the shaft 60 as at 76 and 78 to bear against the shaft 60 so as to bias the bases or blade engaging parts of plates 66 and 68 toward each other. As clear in the drawings, a conventional single edge blade 80 having the reinforced back, such as commonly used for cosmetic or hair styling purposes can be easily inserted lengthwise between the plates 66 and 68. Proper and safe positioning is assured by longitudinal movement being limited by a tab 82 struck from the plate 66, and by lateral movement being prevented by opposed projections on adjacent faces of the plates 66 and 68 as the one indicated at 84 instruck in the plate 66.

Rocking or oscillation of the beam 52 about its longitudinal axis enables the blade 80 to be moved into and away from a slanting contact with the upper surface of the disc 18 through an opening 86 in the plate 12. In fact, the blade holder 64 can be rotated about the axis of the shaft 60 upon sufficient oscillation of the beam 52. A tension spring 88 acting between a raised integral ear 90 on the beam 52 and an outstruck ear 92 on the wall 42 yieldingly urges the blade holder 64 toward the opening 86.

Means is provided for rocking the beam 52 and rotating the shaft 180° during each revolution of the spur wheel 32. Such means comprise an upstanding barrel cam 94 on the spur wheel 32 that coacts with a cam follower 96 fixed to the beam to rock the beam 52 to raise the blade holder 64 during a predetermined portion of each rotation of the spur wheel 32. The cam follower need not and preferably does not contact any portion of the spur wheel 32 except the cam carried thereby. An upstanding projection 98 is carried by the spur wheel 32 and can simply be upstruck therefrom, such projection 98 being positioned to engage a finger 100 fixed to a sector gear 102 having an arcuate row of upstanding teeth 104. The sector gear 102 is mounted for oscillation on a shaft 106 carried by the plate 12, being spaced above the latter by a spacer 108. As seen in FIGURE 1, counterclockwise rotation of the sector gear 102 is limited by a tab 110 upstruck from the plate 12. The bevel gear 62 coacts with the sector gear 102 to rotate the shaft upon oscillation of the gear 102 when the beam 52 is rocked to raise the blade holder through the action of the cam 94.

The cycle of events in the order of their occurrence is as follows assuming as on initial condition the situation shown in FIGURE 1. Counterwise rotation of spur wheel eventually results the cam 94 coacting with cam follower 96 to rock the beam 52 against the spring 88 so as to mesh the bevel gear 62 with the teeth 104 on the sector gear 102, with such meshing being preferably followed (though somewhat earlier action is obviously permissible) by the projection 98 engaging the finger 100 to cause clockwise oscillation of the sector gear with such oscillation continuing until the shaft 60 has rotated about 180° (this does not have to be anywhere near exact), whereupon the cam 94 can coact with the cam follower 96 to lower the blade 80 into contact with the disc 18 and to take the gears 62 and 102 out of mesh. The sector gear 102 is then returned to its original position by means presently to be described.

It will be apparent to those skilled in the art that a very substantial latitude of choice exists as to details of the structure thus far described, especially as to gear ratios and the two cams (essentially) and their coacting elements, namely, elements 94 and 96, and elements 98 and 100. The attendant flexibility places a wide range of speeds, relative speeds, not to mention the time proportion of the duty cycle at the election of those apprised of the foregoing. Further elaboration on the structure thus far described is not deemed to be necessary.

Means will now be described whereby the number of cycles of operation of the device can be predetermined at which time the motor 44 will be automatically deenergized. Attention is directed to FIGURES 1, 3 and 4, wherein it will be seen that a single-piece housing structure is provided comprising top, front, bottom and rear walls 112, 114, 116 and 118, respectively, with the rear wall 118 extending above the top wall 112 and thence extending horizontally and thence downwardly to define, respectively, upper and front walls 120 and 122. The bottom wall 116 is fixed to the plate 12 by upstruck tabs 123 of the plate 12 being clinched in suitable openings in the bottom wall 116.

A slide structure is provided comprising a substantially flat flat slide body (see FIGURE 7) to which is secured a channel-shaped guide comprising a web 126, a front 128 and a back 130. When assembled, tabs 132 of the slide are received through appropriate opening in the web 126 and clinched to make a secure assembly. A leaf spring 134 is received in the channel-shaped guide and has its ends retained between tabs 136 on the front 128 of the guide. The spring is further retained by a lip 138 on the front 128 of the guide. The slide structure is assembled as best shown in FIGURE 4 with the front wall 122 being frictionally engaged between the spring 134 and the back 130 of the guide. The slide 124 is provided with ratchet teeth 140 that normally project over the front of the front wall 114; however the slide 124 has an arm 142 that projects through a slot (not shown) in the rear wall 118 by means of which the slide 124 can be pulled against the action of the spring 134 to move the slide 124 transversely and to retract the teeth 140, and by means of which arm 142, slide 124 can also be moved longitudinally.

A pawl 144 is pivoted by a pin 146 to a tab 148 struck from the front wall 114 for swinging movement toward and into engagement with the ratchet teeth 140; a tension spring 150 connecting the pawl 144 to a tab 152 upstruck from the upper wall 120 for yieldingly urging such engagement.

A pawl 144 is pivoted by a pin 146 to a tab 148 struck from the front wall 114 for swinging movement toward and into engagement with the ratchet teeth 140; a tension spring 150 connecting the pawl 144 to a tab 152 upstruck from the upper wall 120 for yieldingly urging such engagement.

A bifurcated pivot pin 154 is journaled through the front wall 114, and the lower end of a ratchet actuating pawl 156 is pivoted to the pin 154 by a pin 158 as shown,

whereby the pawl 156 can oscillate about the horizontal axis of the pin 154 and the perpendicular horizontal axis of the pin 158. A tension spring 160 connects the pawl 156 to the tab 152 urging the pawl into engagement with the ratchet teeth 140. Additionally, a coiled tension spring 162 connects the pawl 156 to a tab 164 on the front wall 114, whereby a link 166 (preferably a wire) connected between the pawl 156 and the sector gear 102, as shown, urges the latter to the position illustrated in FIGURE 2.

As will be seen on inspection of FIGURES 3 and 7, the slide 124 is provided with an inclined end portion or cam 168 arranged for coaction with the push button 170 of a push-off-push-on type electric switch indicated at 172. It will be appreciated that the switch 172 controls the energization of the motor 44, the wiring being omitted from the drawings as no useful purpose would be served and the drawings merely made obscure. Suffice to understand that successive depressions of the push button 170 alternately open and close the circuit by which the motor is energized. It will be also noted that the push button can be depressed by action of the cam 168 or by the finger or a plunger (indiacted in dashed lines at 174) operable through an opening 176 in the upper wall 120.

The operation of the cycle-limiting control will be easily understood. It will be assumed that the switch 172 is closed and that the cam 168 is spaced from the button 170. Noting the manner in which the ratchet teeth 140 are slanted and that the pawls 144 and 156 are engaging the ratchet teeth 140, it will be seen on each actuation of the sector gear 102 by the projection 98 that the sector gear 102 will oscillate to pull on the pawl 156. The latter will then pull the slide 124 toward the button 170 by acting on one of the ratchet teeth 140. The pawl 144 will ratchet during this operation and prevent reverse movement of the slide 124. On subsequent counterclockwise oscillation of the sector gear 102, the pawl 156 will ratchet back to original position by the action of the spring 162. Such operation continues until the cam 168 depresses the button 170 to deenergize the motor 44. Of course the switch button 170 can be depressed at any time to stop the motor 44 if desired (or to start the same).

Assuming an automatic stop has been made, the blade 80 can be replaced with another blade to be treated, after which the arm 142 is pulled against the action of the spring 134 to clear the ratchet teeth 140 of the pawls 144 and 156 after which the slide 124 is moved away from the switch button 170 a distance proportional to the number of sharpening cycles (half cycles from the viewpoint of the blade 80), after which the button 170 is manually depressed to close the circuit to the motor 44. Operation will then continue until automatically stopped or manually interrupted.

Though only suggested in dashed outline, a bottom 176 and a cover 178 can be conveniently attached by four screws 180 as shown. The cover 178 would, of course, include an access opening to the holder 64 and an access opening or plunger opening for manual push button operation. Provision would also be made for access to the arm 142.

It will be evident that a safe and convenient sharpener or stropping device has been disclosed, and it will also be equally evident that the automatic stopping feature not only enables the requirement of very little effort on the part of the user, but that the sharpening operation does not have to be attended after starting. Also, unnecessary wear and tear on the machine as well as on the blade is obviated. The selectability of the number of cycles enables the operator to take advantage of his experience as to the number of cycles for optimum results considering the condition of the surface of the disc 18 and the condition of the blade 80. Also it will be appreciated that the control system can be conveniently applied to control a wide variety of machines having a cyclically-operative mechanism. In the illustrated embodiment of use, the shaft 34 or the sector gear 102 and other various components can be considered as such mechanisms.

From the foregoing it is plain that the invention is subject to numerous variations without departing from the spirit thereof, such as the inclusion of means (not shown) for progressively decreasing the contacting pressure or force applied by the spring 88, etc. Accordingly, attention is directed to the appended claims in order to ascertain the actual scope of the invention.

I claim:

1. Apparatus for driving a cyclically-operative mechanism through a predetermined number of cycles, comprising:

a cyclically-operative mechanism;

an electric motor drivingly connected to said mechanism;

an electric switch means for controlling energization of said motor;

and mechanical means connected to said mechanism for actuating the switch means to deenergize said motor upon the occurrence of a predetermined number of cyclic operations of said mechanism, comprising:

a slide mounted for movement toward and away from the switch means and being operatively engageable with said switch means;

a set of ratchet teeth on said slide;

an advancing means operatively responsive to each cyclic operation of said mechanism to engage the ratchet teeth and thereby to advance the slide toward operative engagement with said switch means by an amount dependent upon the spacing of the ratchet teeth;

a pawl biased toward engagement with the ratchet teeth;

and an oscillating member connected to said mechanism, said member being coupled to said pawl for pivoting the pawl toward said switch means once during each cycle of oscillation of said member.

2. The combination of claim 1, including:

a second pawl biased toward engagement with the ratchet teeth to prevent movement of the slide away from the switch means during such engagement.

3. The combination of claim 2, including:

said slide being mounted for transverse movement to move the ratchet teeth from engagement with said pawls;

and spring means opposing said transverse movement of the slide.

4. The combination of claim 1, including:

said slide being mounted for transverse movement to move the ratchet teeth from engagement with said pawl;

and spring means opposing said transverse movement of the slide.

5. In a blade sharpening device of the class wherein a sharpening disc is mounted on a driving shaft and a blade holder is driven from the shaft to rock cyclically the holder from and toward a position adjacent the disc with the holder being rotated when remote from the disc to present alternately the opposite sides thereof to the disc, the combination therewith of:

an electric motor drivingly connected to the shaft;

a cyclically-operative mechanism connected to the shaft for actuation thereby;

an electric switch means for controlling energization of said motor;

and mechanical means connected to said mechanism for actuating the switch means to deenergize said motor upon the occurrence of a predetermined number of cyclic operations of said mechanism, comprising:

a slide mounted for movement toward and away from

the switch means and being operatively engageable with said switch means;

a set of ratchet teeth on said slide;

and advancing means operatively responsive to each cyclic operation of said mechanism to engage the ratchet teeth and thereby to advance the slide toward operative engagement with said switch means by an amount dependent upon the spacing of the ratchet teeth.

6. The combination of claim 5, wherein said advancing means includes:

a pawl biased toward engagement with the ratchet teeth;

and an oscillating member connected to said mechanism, said member being coupled to said pawl for pivoting the pawl toward said switch means once during each cycle of oscillation of said member.

7. The combination of claim 6, including:

a second pawl biased toward engagement with the ratchet teeth to prevent movement of the slide away from the switch means during such engagement.

8. The combination of claim 7, including:

said slide being mounted for transverse movement to move the ratchet teeth from engagement with said pawls;

and spring means opposing said transverse movement of the slide.

9. The combination of claim 6, including:

said slide being mounted for transverse movement to move the ratchet teeth from engagement with said pawl;

and spring means opposing said transverse movement of the slide.

10. The combination of claim 5, including:

spring means for biasig frictional retention of the slide against sliding movement.

11. An article of manufacture, comprising:

a horizontal base carrying a vertical rotatable driving shaft;

a horizontal disc carried by said shaft;

an electric motor on said base drivingly connected to said shaft;

a beam carried by the base and mounted for rocking about an axis approximately horizontal;

a rocking shaft carried by the beam for rotation about an axis approximately perpendicular to the axis of rocking of the beam;

a blade holder carried by one end of the rocking shaft and a gear fixed to the other end;

a sector gear mounted on the base for oscillation about a vertical axis;

said rocking shaft being disposed so that rocking movement of the beam alternately places said gears in mesh and the holder in proximity of the disc;

cam means driven by said driving shaft for cyclically rocking the beam to mesh the gears and concurrently oscillate the sector gear in one direction;

and means responsive to the occurrence of a predetermined number of cycles of oscillation of the sector gear to deenergize said motor.

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