Jan. 28, 1941.

H. J. CRINER

2,229,918

BLADE GRINDING MACHINE

Filed May 3, 1939

2 Sheets-Sheet 1

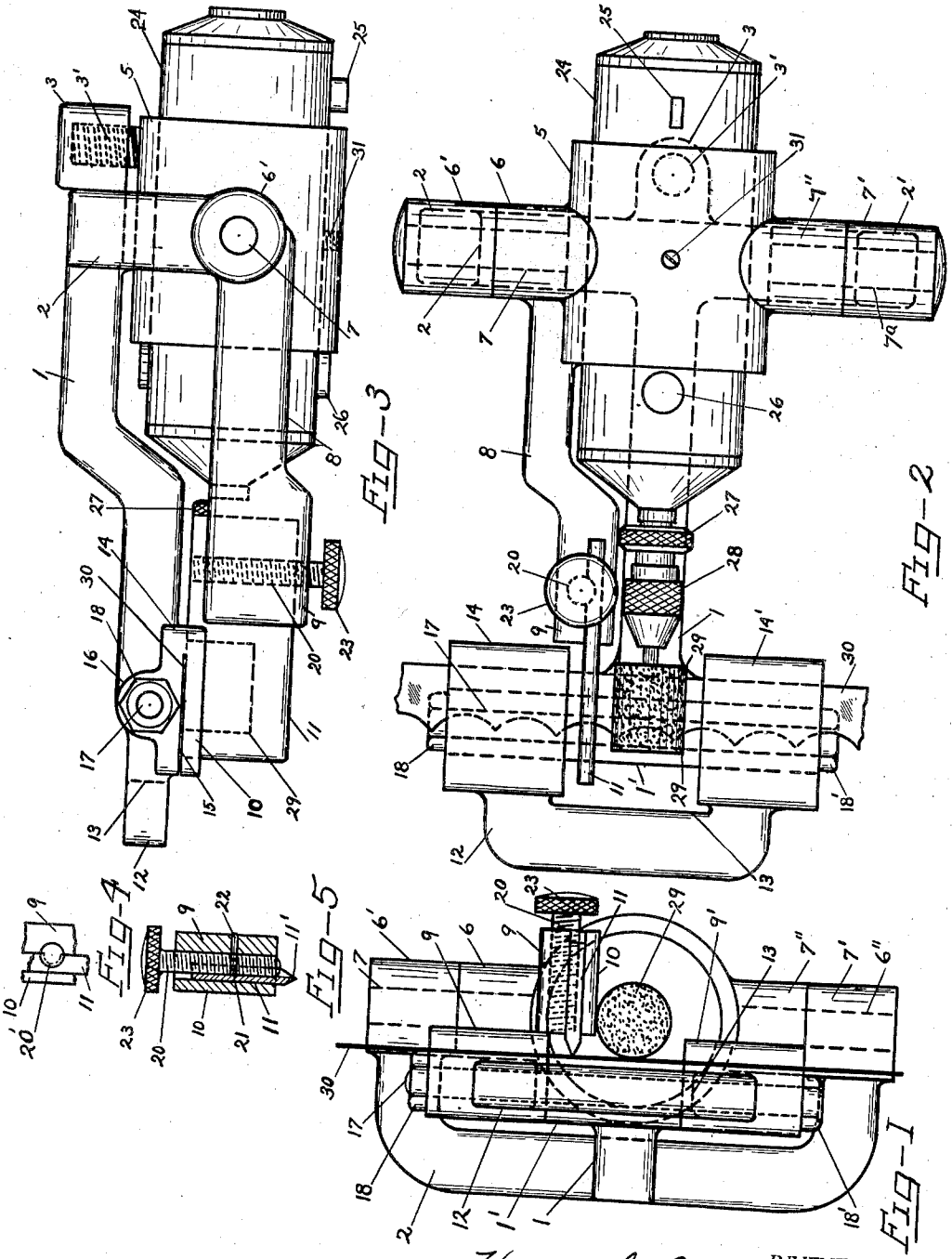


Fig-3

Fig-2

Fig-4

Fig-5

Fig-1

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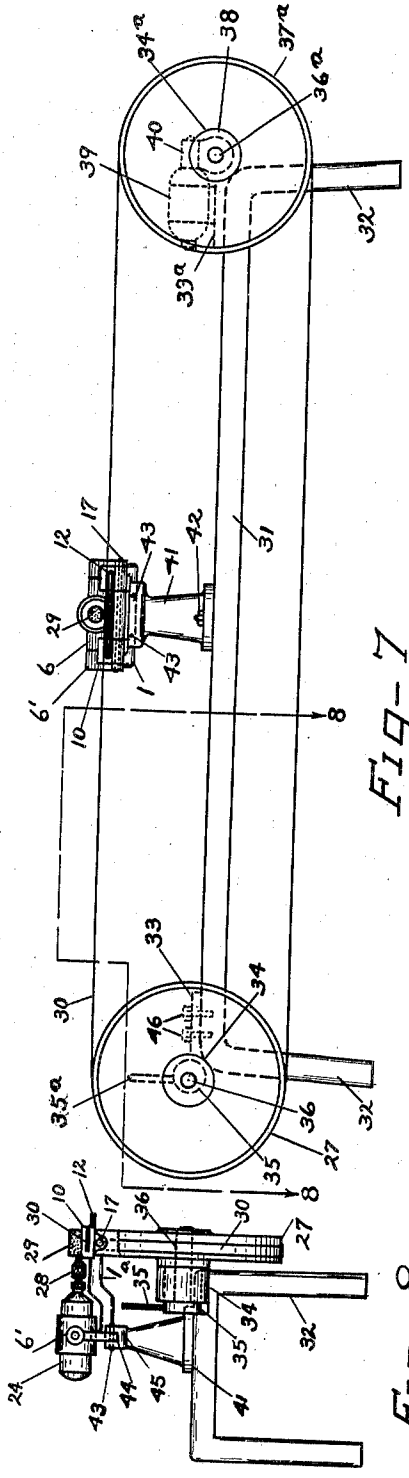


FIG-7



FIG-6

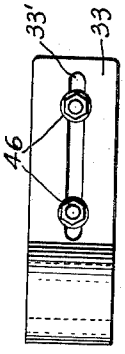


FIG-9

FIG-8

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2,229,918

BLADE GRINDING MACHINE

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Application May 3, 1939, Serial No. 271,492

8 Claims. (Cl. 51—33)

My invention relates to machines for grinding band-blades having a scalloped or sinuous cutting edge for bread slicing machines and similar purposes.

The objects of my invention are:

1. To provide a machine for sharpening band-blades on or off the slicing machine;

2. To provide a machine that can be utilized either for the original grinding of band-blades to form a cutting edge thereon or to sharpen the blades;

3. To provide a machine which will grind scalloped band-blades with a steeper bevel at the depth of the scallops than at the points of the scallops so as to provide thinner teeth than if the bevels mentioned were uniform. Other objects will appear from the description and claims.

I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a full size front elevation of one form of my machine for manual application;

Figure 2 is a side elevation of the same;

Figure 3 is a top or plan view thereof;

Figure 4 is a detail to show the threading of the guide plate;

Figure 5 is a detail partly in section to show the arrangement of the guide plate adjusting screw and locking pin;

Figure 6 is a greatly enlarged sectional detail of a band-blade to illustrate the variation in the angle of the bevels mentioned above, said variation being exaggerated for clearness;

Figure 7 is an elevation showing an alternate form of machine with a fixed base; and

Figure 8 is an end elevation with part of one carrying wheel broken away on the line 8—8 of Figure 7.

Figure 9 is a detail plan view of the bracket 33 showing a longitudinal slot 33′ to permit longitudinal adjustment thereof.

Similar numerals refer to similar parts throughout the several views.

My machine comprises a supporting frame 1 having formed integral therewith a yoke or fork 2 the ends of which have united thereto bearing blocks 6′ and 7′ respectively. Through these bearing blocks the pins 7 and 7a extend, their inner ends forming pivots upon which the motor frame is mounted as hereafter described.

The motor frame comprises an arm 8 cast integral with the motor housing 5 and with bearing blocks 6 and 7″. The bearing blocks 6 and 7″ are provided with bores for the insertion of the pivot pins 7 and 7a and are pivoted to swing upon these pins for a limited distance.

Within the housing 5 a motor 24 is mounted having a central shaft one end of which extends forwardly from the motor and is provided with a small knurled wheel 27 rigidly mounted thereon by which it can be manually held for the purpose of adjusting the chuck 26 which is threaded upon the extended end of the motor shaft.

The axis of the motor shaft may be parallel to the longitudinal axis of the arm 8 and is approximately parallel to the longitudinal axis of the frame 1, but the pivoted mounting of the motor frame including the arm 8 and housing 5 permits a limited angular movement of the motor shaft relative to the frame 1.

The front end of the frame 1 has a bearing block 1′ united thereto having a transverse bore in which is rigidly mounted a pivot bolt 17, the outer ends of which are fitted with lock nuts 18 and 18′. A yoke 12 has a pair of spaced hubs 14 and 14′ mounted upon the bolt 17. The hubs 14 and 14′ are provided with vertical slots 15 adapted to receive and guide the saw blades 30.

When the lock nuts 18 and 18′ are loosened, the yoke 12 and hubs 14 and 14′ may be rotated sufficiently to cause the saw 30 to stand at any desired angle to the periphery of the grinding wheel 29.

In order to guide the grinding wheel 29 in its contact with the scalloped edge of the blade as shown in Figure 2, I provide a slot in the forward end of the arm 8 in which one end of a hardened steel plate 11 fits with a snug sliding fit. This plate 11 projects slightly below the slotted branches 9 and 10 of the arm 8 as shown in Figure 5.

A smooth bore is formed in the arm 8 adjacent the plate 11 in which a machine screw 20 is fitted having a knurled head 23 by which it can be freely manually revolved. The plate 11 has a semicircular bore formed therein which is threaded to correspond to the threads of the machine screw 20.

A groove 21 is cut in the periphery of the screw 20 and a pin 22 mounted in a suitable bore in the branch 9 of the arm 8 has its inner end extending into the groove 21 to prevent vertical movement of the screw 20. As so mounted, it is obvious that when the head 23 is rotated it will turn the bolt 20, and the threads of the bolt 20 acting upon the threads of the plate 11 will cause the plate 11 to move up and down relative to the arm 8.

The lower end of the plate 11 is preferably formed with a dull edge 11′ adapted to contact the beveled portion of a saw blade to be sharpened. This edge 11′ is spaced from the middle line of the bottom of the periphery of the grinding wheel 29 a distance equal to the length of any single scallop of the blade, the scallops being of uniform length and depth.

In sharpening blades it is only necessary to grind off approximately one thousandth of an inch of metal and the edge 11′ of the plate is

preferably set at a height one thousandth of an inch higher than the middle line of the bottom of the grinding wheel 29 so that the grinding wheel cannot take off more than one thousandth of an inch of metal but it may be set to take off more or less metal as desired.

The axes of the motor shaft and grinding wheel being in fixed parallelism with the axis of the arm 8 and with the lower edge 11' of the plate 11, it is obvious that when the edge 11' is raised or lowered, the depth to which the grinding wheel may act will be varied accordingly.

The adjusting screw 20 permits the edge 11' to be adjusted to any height desired relative to the grinding wheel so as to take off more than one thousandth of an inch if the condition of the blade is such as to require it.

The drawings are designed to show my apparatus approximately full size and as shown, the housing 5 of the motor is a convenient size to be grasped in the hand of the operator, and the blocks 6' and 7' may be utilized as handles if desired. The housing 5, the frame 1, the arm 8, the yoke 12, and other parts of the structure are preferably made of aluminum or other very light metal and when so made, the hand of the operator will easily grasp the housing 5 and can hold the machine in contact with the blades of either a band-blade or a reciprocating blade machine.

It is thus a simple matter to apply this grinder to the blades of a band-blade machine and the machine can be operated slowly and cause the blades to travel lengthwise in contact with the grinding wheel 29 to be sharpened.

In order to hold the grinding wheel in contact with the scalloped portion of the blade which is beveled to form a cutting edge, I form a socket in an extension 3 of the frame 1 to the rear of the pivot pins 7 and 7a, and mount within that socket a compression spring 3', one end of which bears against the housing 5 so as to exert a pressure against the housing which will act to hold the grinder 29 resiliently in contact with the beveled edge of the blade 30, but which will permit the guide plate 11 to move up and down carrying the grinder 29 up and down with it as the guide plate passes from scallop to scallop of the blade.

It is likewise obvious that as the edge 11' of the guide plate 11 will be raised slightly as the points of the blade pass under it and will be lowered slightly as it contacts the tapered portions of the scallops, the grinding wheel 29 will be correspondingly raised and lowered. This movement of the grinding wheel will necessarily change slightly the angle of the bevel of the points of the blade as compared to the angle of the bevel of the deeper part of the scallops.

This variation is shown in exaggerated form in Figure 6. It is one of the elements of applicant's invention that it will provide a slicing blade with a flatter angle for the points of the blade than for the deeper parts of the scallops. This gives a thinner point and improves the slicing efficiency of the blades. The variation in angle will be dependent upon the distance between the cutting edge of the blade and the center point of the pivot 7 and may be varied by forming the frame 1 and other parts so as to lengthen or shorten that distance.

It is manifest that when used as a hand machine my grinder may be applied to one side of the blade and after that is sharpened, it may be turned over and applied to the other side of the same blade so as to sharpen both bevels.

The grinding wheel 29 may be made of any suitable abrasive, including carborundum, diamond dust, or other suitable material.

When necessary to sharpen a set of blades which have been removed from the machine, the blades may be mounted in any suitable mechanism to give them the necessary movement longitudinally. With band-blades, it is advantageous to mount them to pass over two drive wheels as shown in Figure 7, mounted in such a way as to hold the blades under approximately the same tension as that utilized in actual operation of the slicing machine.

In order to move the blades in such a machine suitable connections with the motor by belt or any conventional form of gearing may be utilized to drive the drive wheel 37a shown in Figure 7 or an additional motor 39 may be utilized for that purpose.

In Figure 7 I have shown my apparatus in the form of a stationary machine comprising a bed 31 with legs 32 to support same. A bracket 33 is united to the bed 31 and carries a hub 34 in which an eccentric bearing 35 is mounted having a handle 35a to turn it into the desired position.

A shaft 36 is mounted in the bearing 35 with one end projecting therefrom and upon the projecting end of the shaft is mounted a carrying wheel 27 having a flat periphery wide enough to conveniently carry a band-blade 30 to be ground.

Spaced from the bracket 33 is another bracket 33a, said brackets being preferably arranged at the ends of the bed. The bracket 33a carries a hub 34a in which a shaft 36a rigidly mounted upon one end thereof and a worm gear 38 mounted upon the opposite end on opposite sides of the hub 34a.

The wheel 37a has a flat periphery adapted to carry a band-blade 30. A motor 39 is mounted upon the bed 31 having a worm 40 mounted upon the extended end of the motor shaft and the worm 40 actuates the worm gear 38 upon the shaft 36a so as to carry the band 30.

The bracket 33 may be secured to the bed by stud bolts 46 and may be slotted lengthwise with the bolts extending through the slot so as to permit longitudinal adjustment and to space the wheels 37 and 37a so as to exert the proper tension upon the blade 30 or the tension may be regulated by turning the handle 35a so as to operate the eccentric 35.

Upon the bed 31 I mount a base 41 with bolts 42 or other suitable means. The upper end of the base 41 is formed with a head 45 having a groove therein in which an extension 44 of the frame 1 is fitted and secured in place by set screws 43 or other suitable means.

The motor housing, guide arm, etc., are united to the frame 1 as heretofore described.

When using the hand apparatus first described to sharpen blades upon a band-blade slicing machine, it is not necessary to remove the blades from the machine, but the grinder can be held manually in contact with the blades after adjusting the angle of the guide blocks and the motor is provided with a conveniently operated switch 25 to start and stop it.

In the stationary machine type illustrated in Figure 7, it is necessary to take the band-blades off the slicing machine and to mount them upon the carrying wheels 37 and 37a. These carrying wheels are mounted in line with the guide blocks

14 and 14' which hold the blade at the desired angle to the grinding wheel 29.

In Figure 7 I have shown an independent motor 39 to operate the carrying wheel 37a and the saw blade 30 acts as a belt to drive the wheel 37.

Various means may be utilized to adjust the angle of the blade to the angle of the grinding wheel 29. Likewise various means may be utilized to cause the grinding wheel 29 to follow the profile of the scallops.

When it is desired to sharpen short reciprocating blades with my apparatus, they may be held in any suitable form of reciprocating holder and the manual grinder applied thereto. When desired to grind such blades upon the form of machine shown in Figure 7, the blades may be held by the operator and drawn manually through the guide blocks 14 and 14', grinding them first on one side and then turning the blades over and grinding them on the opposite side.

When it is desired to use my apparatus for the initial grinding of blades, the grinder is first applied to the blade to grind a single scallop and the plate 11 is then adjusted to travel along the beveled edge of this scallop so as to guide the grinding wheel and cause it to grind a similar scallop in the next adjoining space on the blade, and so on until the entire blade is ground.

In such cases the blades may be moved longitudinally at a slow enough speed to permit complete grinding of a scallop as the blade proceeds or the blades may move at a rate which will permit only partial grinding at each impact with the wheel and the blades then be carried by the grinding wheel and in contact with the grinding wheel a sufficient number of times to permit the successive grindings to form the completed scallops. When so arranged in series, overheating of the blades may be avoided.

When used for initial grinding of blades, the grinding wheels should be mounted upon their shafts in such a way as to permit easy removal and replacement thereof and the small size of the grinding wheels will permit replacement to be made without great expense.

It is obvious that the construction of the guide plate 11 and adjusting screw is such as to permit the guiding edge of the plate 11 to be set even with the cutting face of the grinding wheel as required for initial grinding of the blades or for sharpening blades when the grinding wheel precedes the guide plate or the guide plate may be set one-thousandth of an inch or other desired distance above the grinding face of the grinding wheel when the blades are traveling in such a direction that the successive scallops reach the guide plates before reaching the grinding wheels.

As various equivalent means may be utilized for the means shown by me to perform the various functions of the apparatus, I do not limit my claims to the precise forms shown in the drawings.

I claim:

1. In a blade grinder, the combination with a supporting frame of a motor with extended shaft pivoted in the frame for longitudinal angular adjustment of the motor shaft relative to the frame, a grinding wheel mounted upon the extended shaft, slotted blade guides adjustably pivoted upon the frame adjacent the grinding wheel, a guide arm united to the motor having a guide plate adjustably mounted therein and spaced from the grinding wheel with one edge to contact the beveled portion of a blade held in said blade guides, said guide plate and grinding wheel being united in adjustable fixed relation for simultaneously similar movement.

2. A blade grinder comprising a supporting frame, a motor with a shaft pivoted in the frame for longitudinal angular adjustment of the motor shaft relative to the frame, a grinding wheel mounted upon the shaft, slotted blade guides adjustably pivoted upon the frame, a guide arm united to the motor having a guide plate adjustably mounted therein and spaced from the grinding wheel with one edge to contact the beveled portion of a blade held in said blade guides, said guide plate and grinding wheel being united in adjustable fixed relation for simultaneous similar movement.

3. A machine as defined in claim 2, and resilient means acting in opposite directions upon the motor and the frame to continuously hold the grinding wheel in contact with a blade held in or passing through the blade guides.

4. In a blade grinder of the class described, the combination with supporting means of a motor carried thereby, a grinding wheel actuated by the motor, and means actuated by the successive scallops of a blade undergoing grinding or sharpening to raise and lower the grinding wheel in correspondence with the profile of the beveled edge of the scallop preceding or following the scallop being ground.

5. A grinder for scalloped or sinuous blades, comprising a supporting frame, a housing carrying a motor with an extended shaft, pivoted in the frame for longitudinal angular adjustment of the motor shaft relative to the frame, a grinding wheel mounted upon the extended shaft, a blade guide mounted upon the frame adjacent the grinding wheel to guide and support a blade while being ground by the periphery of the grinding wheel, and a guide arm united to the housing carrying a guide plate adjustably mounted therein spaced laterally from the grinding wheel and with one edge contacting the beveled edge of the blade at a length of one scallop from the middle line of the periphery of the grinding wheel, to regulate the depth of cut of the grinding wheel.

6. A grinder as defined in claim 5, in combination with adjustable means to secure the blade guide at various angles to the face of the grinding wheel.

7. A grinder as defined in claim 5, and resilient means to hold the grinding wheel in contact with the beveled edge of a blade in the blade guide.

8. In a grinder for grinding scalloped blades for slicing bread, the combination with a supporting frame, of a shafted motor pivoted in the frame for longitudinal angular adjustment relative to the frame, a grinding wheel mounted upon the shaft, angularly adjustable guides to direct the blade along the periphery of the grinding wheel at an acute angle to the axis thereof, and resilient means to automatically incline the grinding wheel against the portion of any given scallop intermediate the points at a greater angle to the sides of the blade than at the points of the scallops.

HARRY J. CRINER.