

Feb. 17, 1942.

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2,273,456

MACHINE FOR GRINDING THIN METAL STRIPS

Filed May 6, 1939

2 Sheets-Sheet 1

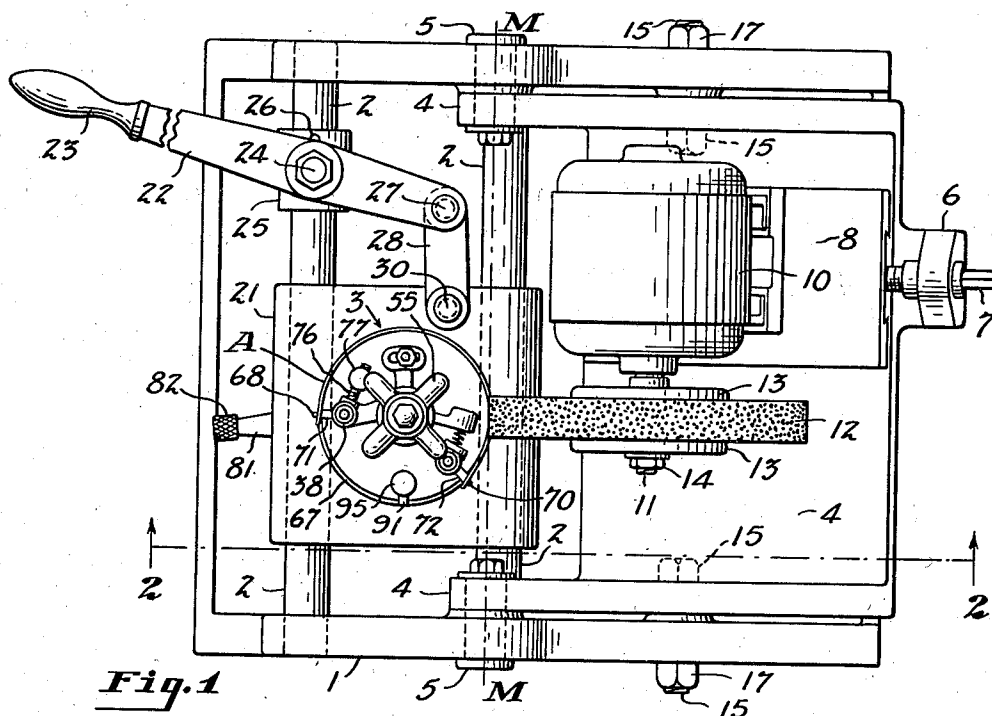


Fig. 1

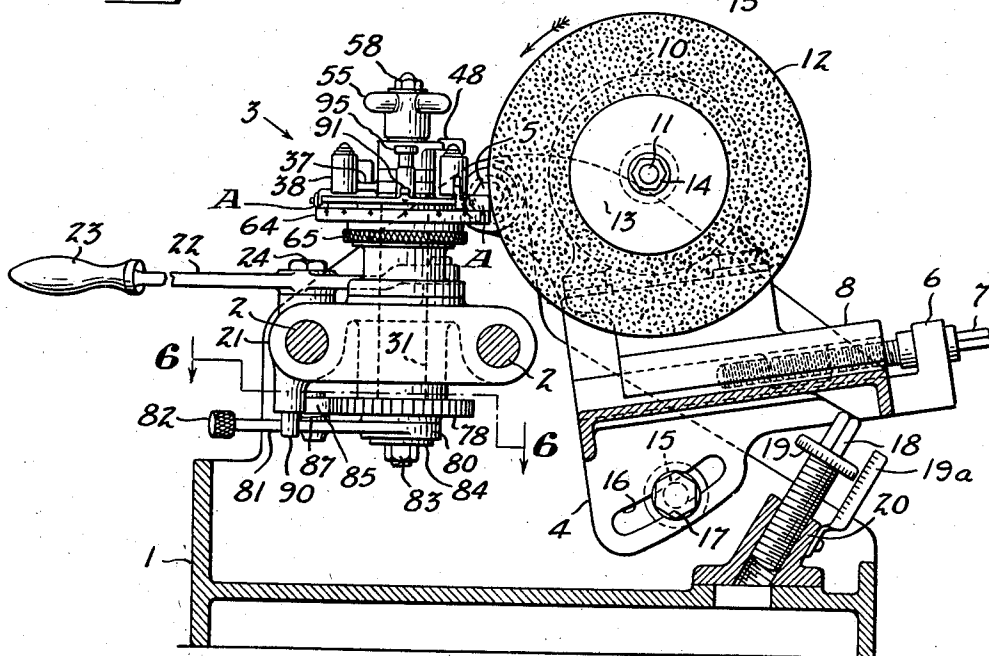


Fig. 2

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2 Sheets-Sheet 2

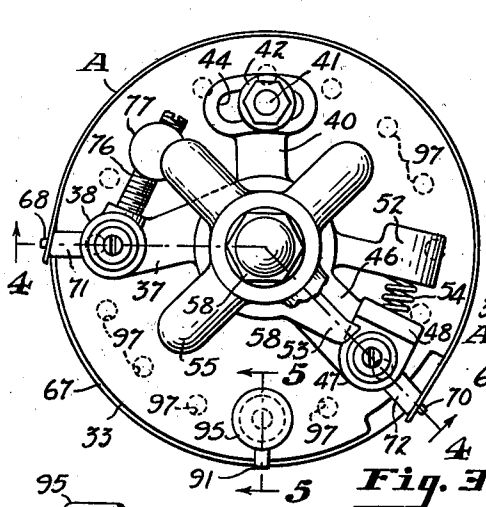


Fig. 3

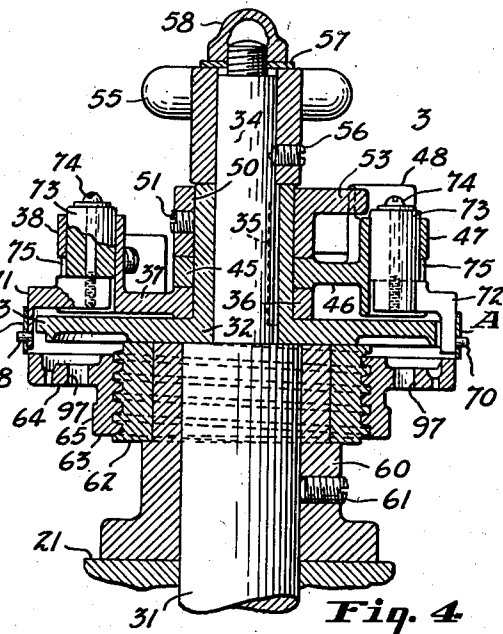


Fig. 4

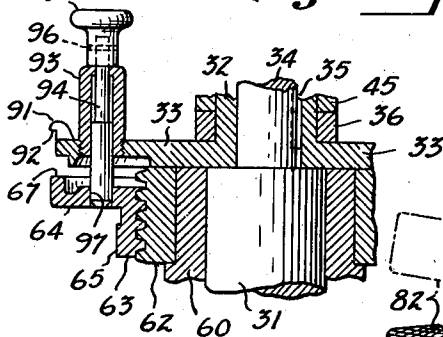


Fig. 5

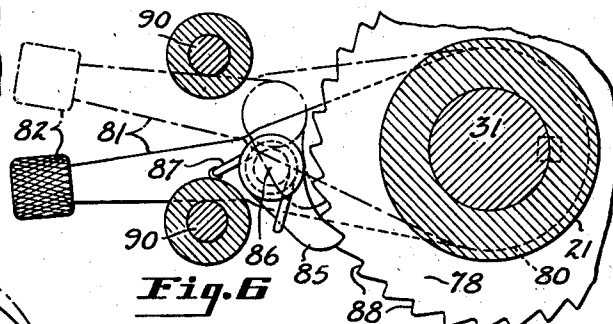


Fig. 6

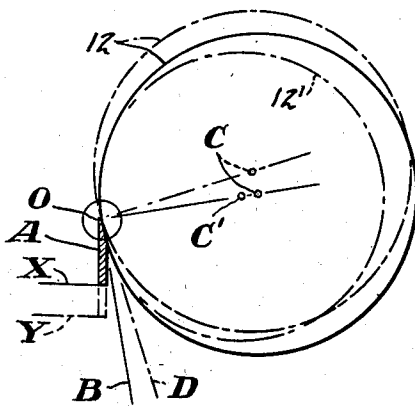


Fig. 7

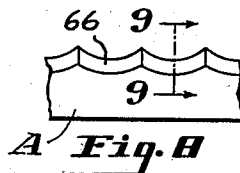


Fig. 8

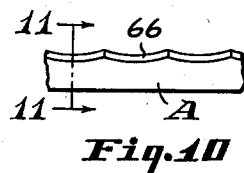


Fig. 9



Fig. 10



Fig. 11

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2,273,456

MACHINE FOR GRINDING THIN METAL STRIPS

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Application May 6, 1939, Serial No. 272,263

11 Claims. (Cl. 51—92)

This invention relates to grinding machines, and in particular to machines of the type used to produce cutter blades, such as, for example, those suitable for use in slicing loaves of bread and other products of commercial bakeries.

On account of the variations in blade sizes, particularly as to width which is the result of successive resharpening or regrinding, a grinding machine suitable for resharpening one blade may not be suitable for regrinding other blades without considerable adjustment.

It is, therefore, an object of the present invention to provide a grinding machine which will readily accommodate blades having considerable variance in width. A more specific object is to provide a grinding machine which may be readily adjusted to accommodate blades of varying width without making any adjustment of the grinding wheel.

Another object is to provide a grinding machine which is provided with simple adjustments for accommodating cutter blades having differing angles of cut or having varying configurations of the cutting edges.

Generally the grinding wheels of present day blade grinding machines have a vertical and horizontal adjustment to move the wheel closer to the work as the grinding wheel diameter decreases due to wear. Since, however, the usual practice is to have the blade contact the grinding machine at a point below the axis thereof, two adjustments of the grinding wheel are necessary to move it closer to the work when the grinding wheel diameter has decreased. Another difficulty encountered in the operation of the present day machines is the adjustment for changing the angle of cut which determines the angle between the cutting edges of the blade. It usually requires a vertical and a horizontal movement of the grinding wheel and motor and it may be difficult to obtain the identical setting once it has been disturbed.

A rather specific object of the present invention is to produce a grinding machine in which grinding wheels of reduced diameter may be moved into contact with the work by a single, relatively simple adjustment.

A further object is to provide a blade grinding machine in which the angle of cut may be readily changed as desired and may be easily reproduced at any time.

Another object is to provide a grinding machine of the type mentioned which is simple in design and construction and relatively inexpensive to manufacture.

Other objects and advantages of the present invention will become apparent from the following detailed description accompanied by the drawings, in which:

5 Figure 1 is a plan view of a grinding machine embodying the present invention;

Fig. 2 is a sectional view in elevation taken substantially on the line 2—2 of Fig. 1, illustrating details of the machine;

10 Fig. 3 is an enlarged plan view of the blade holding mechanism for use in the machine shown in Fig. 1;

Fig. 4 is an elevational sectional view taken substantially on the line 4—4 of Fig. 3, showing how the blade holding mechanism may be mounted;

15 Fig. 5 is a fragmentary sectional view in elevation taken substantially on the line 5—5 of Fig. 3;

20 Fig. 6 is a fragmentary plan view taken substantially on the line 6—6 of Fig. 2 showing a suitable indexing mechanism;

Fig. 7 is a diagrammatic view illustrating several principles of operation utilized in the present invention;

25 Fig. 8 is a fragmentary elevational view of a cutter blade which may be produced by the machine shown in the drawings;

30 Fig. 9 is a cross-sectional view of the blade shown in Fig. 8 taken substantially on the line 9—9 of Fig. 8;

Fig. 10 is a fragmentary elevational view of another blade which may be produced on a machine embodying the present invention; and

35 Fig. 11 is a fragmentary cross-sectional view of the blade shown in Fig. 10 taken substantially on the line 11—11 of Fig. 10.

40 Since cutter blades having configured cutting edges such as the scalloped or serrated blades shown in Figs. 10 and 8 are popularly used in the bread slicing industry, the description of the present invention is made in connection therewith. However, it can readily be seen that the present invention can be applied to cutter blades of many other types, including blades having plain, unconfigured cutting edges. Furthermore, it is to be understood that the present machine is capable of use equally well as a machine for sharpening unused blades or blade blanks as well as for resharpening blades which have been in use.

45 Briefly, the present invention involves making the point of contact, that is, the point at which the top edge of the blade engages the grinding wheel, the focal point of all the adjustments of

both the blade holding means and the grinding wheel and motor support.

With reference to the accompanying drawings, in which like parts throughout the several views are indicated by the same reference numerals, Figs. 1 and 2 show the machine mounted on a suitable base or frame 1. The frame is shown in plan view as approximately rectangular and is provided with a pair of parallel bars or rods 2 which extend between the two opposed sides of the base and serve as a slide for a blade holding means, indicated generally by the numeral 3.

Pivoted about an axis M—M, which is a line parallel to the bars 2, and passing through the point of contact 0, is a suitable C-shaped support 4 upon which the grinding wheel and its driving motor may be mounted. The ends of the C-shaped member 4 are pivoted to the frame by suitable bolts 5 passing through apertures in the frame and support member. Extending through a lug 6 on the support member 4 is a screw 7 which threadedly engages a support member 8 upon which a suitable motor 10 may be mounted. The motor 10 may be of any suitable type provided with a shaft 11 which carries a suitable abrasive wheel 12 secured to the shaft by being held between collars 13, one of which is engaged by a suitable nut 14 threaded on the end of the shaft 11. To hold the support 4 against movement, suitable bolts 15 project through elongated arcuate apertures 16 in the support member 8 and through apertures in the upstanding sides of the base 1 and cooperate with nuts 17 carried by the bolts to clamp the support 4 with respect to the base 1. The support 4 is further held by an adjustable screw 18 upon which the support 4 rests, the screw 18 being threadedly mounted in a socket 20 secured to the base 1. If desired, a calibrated disc 19 may be secured to the screw 18 and an indicating scale 19a may be fastened to the socket 20 so that the positions of the support 4 may be readily reproduced at any time.

The blade holding means 3 is carried on a member 21 slidably mounted on both the bars 2. Movement of the member 21 is obtained by a lever 22 provided with a handle 23 and pivoted at 24 to a collar 25 which is keyed to one of the bars 2, as indicated at 26. The end of the lever 22 opposite the handle 23 is pivotally mounted at 27 to one end of a link 28, the other end of which is pivotally mounted to the member 21 at 30, as may be seen in Fig. 1. Thus, downward movement of the handle, looking at Fig. 1, rotates the lever 22 about its pivotal mounting 24 to the collar 25 in a counter-clockwise direction and slides the member 21 along the bars 2 toward the collar 25 to pass the blade across the peripheral face of the grinding wheel. By returning the handle 23 to the position shown in Fig. 1, the member 21 will be slid away from the collar 25 and the blade will be passed across the peripheral face of the grinding wheel in the opposite direction.

Journalled in a central vertical aperture through the member 21 is a spindle 31 upon which the individual units of the blade holding mechanism are mounted. A hub 32 of a backing disc 33 is carried by a reduced portion 34 of the spindle 31 and is keyed thereto, as indicated by the numeral 35. The external surface of the hub 32 carries adjacent the backing disc 33 a collar 36 having a locating arm 37 projecting therefrom, which arm terminates in a cylindrical portion 38. The collar 36 also has extending therefrom an arm 40. The collar 36 and locating arm 37

may be locked to the backing disc 33 by means of a tightening stud bolt 41 and washer 42 which stud bolt passes through an elongated arcuate aperture 44 disposed in the end of the arm 40 and is threadedly received in the backing disc 33. Above the collar 36 is a similar collar 45 embracing the hub 32 and having a locating arm 46 projecting therefrom, which locating arm terminates in a cylindrical portion 47 having a stop member 48 projecting upwardly therefrom. Disposed on the hub 32 above the collar 45 is a collar 50 secured to the hub 32 by set screw 51 and having stops 52 and 53 projecting therefrom. The locating arm 46 is urged toward the stop 53 by a suitable coil spring 54 disposed in a recessed portion of the stop member 48 of the locating arm 46 and in a recessed portion in the stop 52. The stop member 48 limits the rotational movement of the locating arm 46 in a clockwise direction, looking at Fig. 3, by engagement with the stop 53, and the locating arm 46 may be moved in a counter-clockwise direction, looking at Fig. 3, against the compressive strength of the spring 54 until the stop member 48 contacts the stop 52.

The end of the reduced portion 34 of the spindle 31 carries a star wheel 55 secured to the portion 34 by a set screw 56 and held against endwise movement with respect to the spindle by washer 57 and nut 58 which threadedly engages the reduced portion 34 of the spindle 31.

Between the member 21 and the reduced portion 34 the spindle 31 carries a collar 60 secured to the spindle by a set screw 61. The collar 60 has secured thereto a bushing 62 threaded on its outer circumferential surface. Threadedly engaging the bushing 62 is a collar 63 which carries a supporting disc portion 64 radially extending therefrom. The collar 63 is also provided with a knurled ring 65 in order that the disc 64 may be moved axially of the spindle for a purpose to be described later.

Cutter blades A are usually formed of relatively hard spring steel and when deformed or bent they normally tend to return to their flat straight-line shape. However, in order to grind curved scallops or serrations 66 in the blades A, the latter are deformed into an arcuate shape and while held against the peripheral surface of the backing disc 33 successive portions of their cutting edges are presented to the peripheral surface of the abrasive wheel 12. To provide a suitable angle between opposite sides of the cutting edge the blade when being ground is held below the axis of the grinding wheel. In the present machine the blade to be ground is retained in a curved position by pins 68 and 70 which are received in suitable holes adjacent the ends of the blades. The blade A, when mounted on the pins 68 and 70, is backed by the peripheral edge of the backing disc 33 and has its bottom or non-cutting edge supported by a shoulder 67 of the movable supporting disc 64.

The pins 68 and 70 are carried by depending portions of adjustable fittings 71 and 72, respectively. These fittings are received in transverse slots formed in the lower ends of friction pistons 73 slidably received in the cylindrical portions 38 and 47 of the locating arms 37 and 46, respectively. The axis of each of the pistons 73 is substantially vertical and parallel to the axis of the spindle 31. The fittings 71 and 72 are retained in the transverse slots of the pistons 73 by screws 74 extending longitudinally through the pistons and having threaded engagement with the fit-

tings. The fittings 71 and 72 extend through vertical slots 75 in the cylindrical portions 38 and 47 of the locating arms 37 and 46. Engagement of the fittings with the sides of the slots 75 prevents twisting movement of the pistons in their bores and retains the blade holding elements in radial positions with respect to the spindle 31.

In applying a blade to the blade holding means the blade is grasped at each end with its cutting edge uppermost and the hole in the left hand end is hooked over the pin 68 of the locating arm 37. While maintaining a slight tension in the blade, it is bent around the periphery of the backing disc 33 and the hole in the right hand end is hooked over the pin 70 of the spring pressed locating arm 46. The locating arms 37 and 48 which hold the fittings 71 and 72, respectively, have been previously adjusted so that the circumferential distance around the backing disc 33 between the pins is substantially equal to the distance between the locating holes in the ends of the blade.

Adjustment of the stationary locating arm 37 is accomplished by loosening the stud 41, manually rotating the arm 37 to a position which appears to be correct, and measuring with the blade to see whether the hole in the right hand end of the blade is disposed within the arc defined between the stops 52 and 53. Small or fine adjustments of the stationary locating arm may be readily made by turning an adjusting screw 76 threadedly mounted through a post 77 mounted on the backing disc 33 and engaging a flat surface of the cylindrical portion 38 of the arm 37. When the stationary locating arm is in its approximately correct location, the bolt 41 is tightened to hold the locating arm 37 stationary, the left end of the blade is hooked over the pin 68 and the right end of the blade is hooked over the pin 70 of the adjustable locating arm 46, the arm 46 being movable between the stops 52 and 53 in order that the pin 70 may register with the hole in the blade.

The spring 54 has sufficient strength to hold the blade under a slight tension during the grinding to prevent movement thereof which would tend to cause misalignment of the scallops or serrations 66 in the cutting edge of the blade. The position of the locating arm 46 necessary to produce the desired tension in the blade should be considered in adjusting the stationary locating arm 37.

It is desirable that an indexing mechanism be provided to rotate the blade holding mechanism as a whole in equal increments so that uniform scallops or serrations may be formed in the cutting edges of the blade. The indexing mechanism is shown in Figs. 2 and 6 and comprises a ratchet wheel 78 mounted on and keyed to the spindle 31 directly beneath the sliding member 21 and adjacent thereto. Disposed beneath the ratchet wheel is a collar 80 freely mounted on the spindle 31 and carrying a projecting lever 81 terminating in a knurled handle portion 82. A nut 83 threadedly mounted on a reduced portion of the spindle 31 retains the collar 80 onto the spindle 31 with the aid of a washer 84 interposed between the nut and collar 80.

Disposed on the lever 81 radially outside of the ratchet wheel 78 is a pawl 85 pivoted to the lever at 86. A torsion spring 87 urges the pawl toward teeth 88 of the ratchet wheel 78. Movement of the lever 81 is limited by stops 90 depending from the underside of the slide mem-

ber 21. When the handle 82 of the lever 81 is moved from its full line position against one stop 90 to its dotted line position against the other stop 90, as shown in Fig. 6, the pawl 85 is rotated in a clockwise direction, moving to and engaging the next tooth of the ratchet wheel so that upon return of the handle 82 to its full line position, shown in Fig. 6, the ratchet wheel 78 is rotated in a counter-clockwise direction a distance equal to the pitch of the teeth. The pitch of the ratchet wheel teeth is made to correspond with the length of scallops desired on the blade to be ground, so that by advancing the ratchet wheel one pitch length after each scallop has been ground, the spindle 31 is rotated one scallop length so that the next scallop is ready to be ground.

It may be readily seen that the length of scallop ground on the blade may be easily changed by replacement of the ratchet wheel with a wheel having teeth of the proper pitch. Replacement of the ratchet wheel 78 may be accomplished by unscrewing the nut 83, removing the washer 84, the collar 80 of the lever 81, the ratchet wheel 78, and mounting a new ratchet wheel on the spindle 31. In reassembling the lever 81, washer 84 and nut 83, care should be taken to see that the pawl 85 properly engages the teeth of the new ratchet wheel.

In accordance with the present invention the point of contact, that is, the point 0 in Fig. 7, where the top edge of the blade blank engages the abrasive wheel 12, is made the focal point of all the movements of the blade holding means and abrasive wheel. In this manner the adjustments of the wheel with respect to the blade may be accomplished very easily.

If when the blade is mounted on the holding means it is found that it does not contact the abrasive wheel due to the fact that the blade is too narrow, it is only necessary to turn the knurled ring 65, thereby raising the blade supporting disc 64 until the top edge of the blade is in a horizontal plane passing through the point 0. Since the pins which hold the blade against the backing disc 33 are mounted on the fittings 71 and 72 carried by the floating friction pistons 73, the blade is readily adjustable relative to the backing disc 33. The blade mounting means of the present invention supports the blade for rectilinear edgewise bodily movement at a right angle to the rotational axis of the grinding wheel and spaced laterally therefrom. For example, if the blade to be ground has a width such as shown in Fig. 7 equal to the distance X—0 and the machine is set for a blade having a width equal to the distance Y—0, to sharpen the blade on the machine shown in the drawings, it is only necessary to turn the knurled ring 65 until the blade supporting disc 64 is raised through the distance Y—X. Thus, it may be seen that blades of any particular width may be mounted and readily shifted or adjusted to be ground by the present invention. In many grinding machines used commercially, to obtain the same adjustment would require both a vertical and horizontal movement of the abrasive wheel and motor support due to the fact that with the blade mounted on a sliding carriage it has not been considered practical to provide vertical adjustments therefor.

On the present machine this adjustment for the widths of blades is facilitated by the mechanism shown in Fig. 5. A gauge 91 is provided

at the peripheral edge of the stationary backing disc 33. This gauge 91 is disposed directly above the shoulder 67 of the movable blade supporting disc 64 and has its gauging surface 92 in a horizontal plane containing the point 0. In using the gauge the supporting disc 64 may be raised by the knurled ring 65 so that the top edge of a blade manually supported on the shoulder 67 just contacts the underside or gauging surface 92 of the overhanging tip of the gauge 91. To lock the blade supporting disc in its proper position relative to the stationary blade backing disc 33 a cylinder 93 is disposed on the backing disc 33 and contains therein a plunger piston 94 keyed or pinned to a suitable handle 95, as indicated at 96. The plunger 94 extends through the stationary backing disc 33 and may be selectively inserted into any one of a plurality of apertures 97 formed circumferentially around the blade supporting disc 64. The apertures 97 are spaced circumferentially to provide relatively fine adjustments.

The usual practice in grinding serrated blades is to have the blade contact the abrasive wheel at a point such as the point 0 in Fig. 7 below the axis C of rotation of the abrasive wheel 12 shown in full lines in Fig. 7. If the diameter of the abrasive wheel is reduced for any reason, such as the natural decrease due to wear, it is desirable to bring the grinding wheel closer to the blade in a line passing through the point of contact 0 and the center of rotation C. By so doing, the grinding wheel of reduced diameter may be moved into contact with the work by a single straight line adjustment. In many machines in use today it is necessary to move the wheel in both a vertical and a horizontal direction when compensating for grinding wheel wear. Otherwise, the nature of the serrations formed on the cutting edge of the blade may be changed.

In the machine embodying the present invention this may readily be done by turning the screw 7 which moves the motor on the inclined slide of the motor support 8, which is constructed so as to be parallel with a line C—0 drawn through the center of rotation of the grinding wheel and the point of contact 0.

For example, Fig. 7 shows in dotted outline a grinding wheel 12' which has a reduced diameter caused by wear. To contact the work the grinding wheel 12' is moved along the line C—0 until its center of rotation is at C' where its periphery passes through the point of contact 0. Although the width of the scallop formed in the blade will be slightly changed by using the smaller grinding wheel 12', the blade is not materially affected since the radius of curvature of the grinding wheel is relatively large with respect to the width of the blade cutting edge.

To change the angle of cut which determines the angle between the cutting edges of the blade, the machine embodying the present invention has an adjustment which may be operated with ease. As previously stated, the grinding wheel support 8 is pivotally mounted by the bolts 5. The axis of rotation of these bolts, indicated by the line M—M of Fig. 1, passes through the point of contact 0 so that the center of rotation C of the grinding wheel may be rotated about the point 0. This is illustrated in Fig. 7 where it may be seen that the grinding wheel 12 shown in full lines may be rotated to its dotted line position. When the grinding wheel has been so rotated the common tangent between the blade

and the grinding wheel is changed from the line B—0 to the line D—0. It may be noted that this tangent largely determines the angle or cut of the blade. Figs. 8 to 11, inclusive, show blades having two varying angles of cut, the blades shown in Figs. 8 and 9 having a relatively small angle of cut and the blades shown in Figs. 10 and 11 having a relatively large angle of cut, both, however, being acute angles. For many purposes a blade such as shown in Figs. 8 and 9 having a long, thin cutting edge is very desirable, but in many instances a shorter and wider cutting edge such as shown in Figs. 10 and 11 is desired due to its greater inherent strength.

It is to be understood that variations and modifications of the specific devices herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

What I claim is:

1. A grinding machine for grinding thin metallic strips, which comprises means for holding the strip during grinding, a rotatable abrasive means having its axis above a line perpendicular to the strip and passing through the top edge of the strip, means for moving the strip transversely of itself, means for mounting the abrasive means so that it may be moved in a direction parallel to a line drawn through the top edge of the strip and the center of rotation of the abrasive means, and means for mounting the abrasive means so that it may be pivoted about the top edge of the strip when such strip is in contact with the abrasive means.

2. In a machine for grinding thin metal strips, having a rotatable grinding wheel, means for holding strips during grinding, and means for pivotally mounting the grinding wheel about an axis parallel to the axis of the grinding wheel and passing through the point of contact of the grinding wheel and the top edge of the strip to be ground.

3. A machine for grinding thin metal strips, which comprises a rotatable grinding wheel, a sliding carriage adapted to hold a strip while being moved past the grinding wheel, a point of contact between the top edge of the strip and the wheel, and a support member for said grinding wheel pivotally mounted about an axis parallel to the axis of rotation of the grinding wheel and passing through the point of contact.

4. A machine for grinding thin metal strips, which comprises a rotatable grinding wheel, a sliding carriage adapted to hold a strip while being moved past the grinding wheel, a point of contact between the top edge of the strip and the wheel, a support member for said grinding wheel pivotally mounted about an axis parallel to the axis of rotation of the grinding wheel and passing through the point of contact, and a grinding wheel mount carried by said support member and adapted to be moved along a line parallel to a line passing through the point of contact and the center of rotation of the grinding wheel.

5. A grinding machine for grinding serrations in one edge of thin metallic strips, which comprises a rotatable grinding wheel, a carriage adapted to reciprocate past said grinding wheel, means for retaining a strip to be ground on a carriage in a curved position, a point of contact between the strip to be ground and the grinding wheel disposed below the axis of rotation of the grinding wheel, means for moving the strip transversely of itself, a support member pivot-

ally mounted about an axis parallel to the axis of the grinding wheel and passing through the point of contact, and a grinding wheel mount carried by said support member and adapted to be moved in a line parallel to a line passing through the point of contact and the center of rotation of the grinding wheel.

6. In a grinding machine for abrading edge portions of thin metallic strips having a rotatable abrasive means and a carriage movable past the abrasive means, holding means carried by said carriage for supporting a thin metallic strip which comprises a spindle secured to said carriage, a circular member having an abutment adapted to support an edge of a strip when the strip is held in curved position, a circular backing member rigidly held to said spindle and having its periphery disposed so that it engages a face of the strip when the strip is supported by said abutment, means for moving the circular abutment member longitudinally of the spindle, and means to secure the strip in curved position with an edge supported by said abutment and a face in engagement with the periphery of said circular backing member.

7. A grinding machine for grinding thin metallic strips which comprises a rotatable abrasive means having its axis of rotation disposed above the top edge of the strip while the strip engages the abrasive means, a strip holding means which includes an abutment adapted to support an edge of the strip and a backing member engageable with a face of the strip, said abutment being movable with respect to said backing member to cause movement of the strip transversely of itself, a mount for the abrasive means which permits movement of the abrasive means in a direction parallel to a line drawn through the axis of rotation of the abrasive means and the top edge of the strip when the strip is in contact with the abrasive means, and means for moving portions of the strip across the peripheral face of the abrasive means.

8. A grinding machine for grinding thin metallic strips which comprises a rotatable abrasive means having its axis of rotation disposed above the top edge of the strip while the strip engages the abrasive means, a strip holding means which includes an abutment adapted to support an edge of the strip and a backing member engageable with a face of the strip, said abutment being movable with respect to said backing member to cause movement of the strip transversely of itself, a mount for the abrasive means which permits movement of the abrasive means in a direction parallel to a line drawn through the axis of rotation of the abrasive means and the top edge of the strip when the strip is in contact with the abrasive means, means for moving portions of the strip across the peripheral face of the abrasive means, and a pivotally mounted member carrying said mount for the abrasive means adapted to pivot the abrasive means about a line drawn parallel to the axis of rotation of the abrasive means and passing through the contact of the abrasive means and the top edge of the strip.

9. In a machine having a rotatable wheel for grinding the edges of elongated thin flexible strips of metal, a movable carriage for holding a strip and carrying the same across the wheel, said carriage including shoulder means engageable in abutting relation with one edge of the

strip and of sufficient extent to support substantially all that portion of the strip to be ground, a backing member on the carriage and engageable with one face of a strip abutting the shoulder means to stiffen the strip during grinding, means for retaining a strip on the shoulder means and against said backing member, and means for adjusting said shoulder means toward and away from the backing member simultaneously along the entire length thereof to impart edgewise rectilinear shifting movement to the strip over the backing member whereby the other edge of the strip can be brought into position for engagement with a predetermined point on the wheel and whereby strips of different widths can be supported on the shoulder and against the backing member with their edges engageable with said point of the wheel.

10. In a machine for grinding scallops in the edges of elongated thin flat sided flexible strips of resilient metal, an abrasive wheel and means rotatably mounting the same, a strip holder comprising cylindrically curved backing means for receiving a metal strip and means associated with the curved backing means for retaining the received strip flatwise against the curved backing means and bent longitudinally into substantially cylindrical shape, adjustable shoulder means engageable in abutting relation with one edge of the bent strip and along substantially all that portion of the strip to be ground to support the strip during grinding, and means for shifting the shoulder means simultaneously along the entire length thereof relative to the backing means to thereby impart bodily edgewise and rectilinear movement to a bent strip retained against the backing means, means for driving the wheel to rotate the same, and means for moving the rotating wheel and the holder relative to one another to pass a supported strip across the periphery of the wheel so that one edge only of such strip is presented to the wheel for grinding.

11. In a machine for grinding scallops in the edges of elongated thin flat sided flexible strips of resilient metal, an abrasive wheel and means rotatably mounting the same, a strip holder comprising cylindrically curved backing means for receiving a metal strip and means associated with the curved backing means for retaining the received strip flatwise against the curved backing means and bent longitudinally into substantially cylindrical shape, adjustable shoulder means engageable in abutting relation with one edge of the bent strip and along substantially all that portion of the strip to be ground to support the strip during grinding, and means for shifting the shoulder means simultaneously along the entire length thereof in a direction parallel to the plane of rotation of the wheel and relative to the backing means to thereby impart bodily edgewise and rectilinear movement to a bent strip retained against the backing means, means for driving the wheel to rotate the same, means for moving the rotating wheel and the holder relative to one another to pass a supported strip across the periphery of the wheel so that one edge only of such strip is presented to the wheel for grinding, and said wheel mounting means including adjustable means for shifting the wheel in its plane of rotation to vary the size of the scallops produced.

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