Dec. 5, 1933. T. C. SHEEHAN 1,937,795

ROUGH HONING MACHINE FOR RAZOR BLADES

Filed July 26, 1928 5 Sheets-Sheet 1

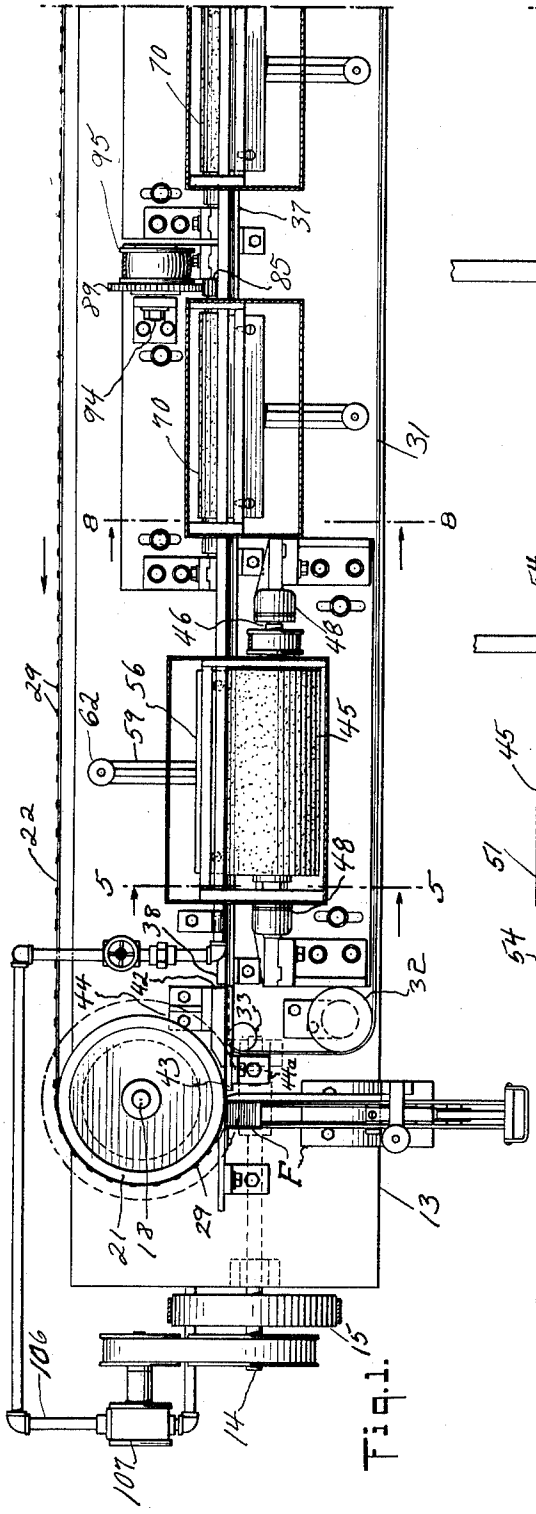


Fig. 1.

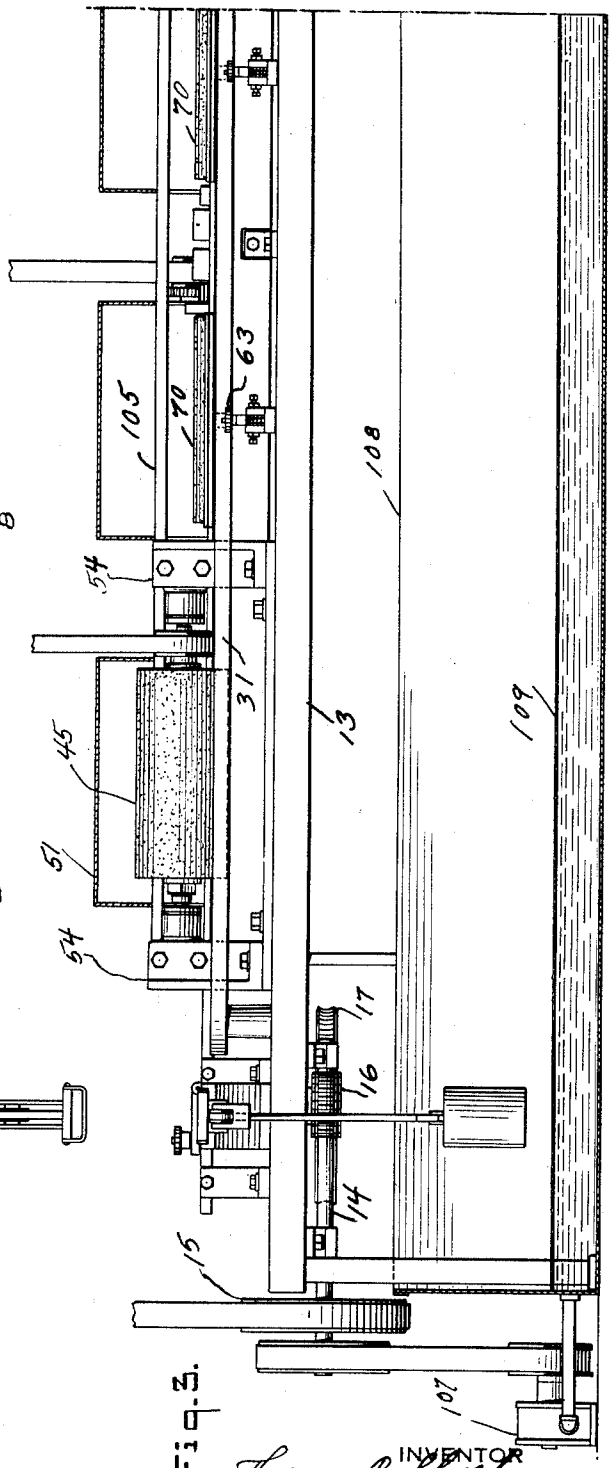


Fig. 2.

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ROUGH HONING MACHINE FOR RAZOR BLADES

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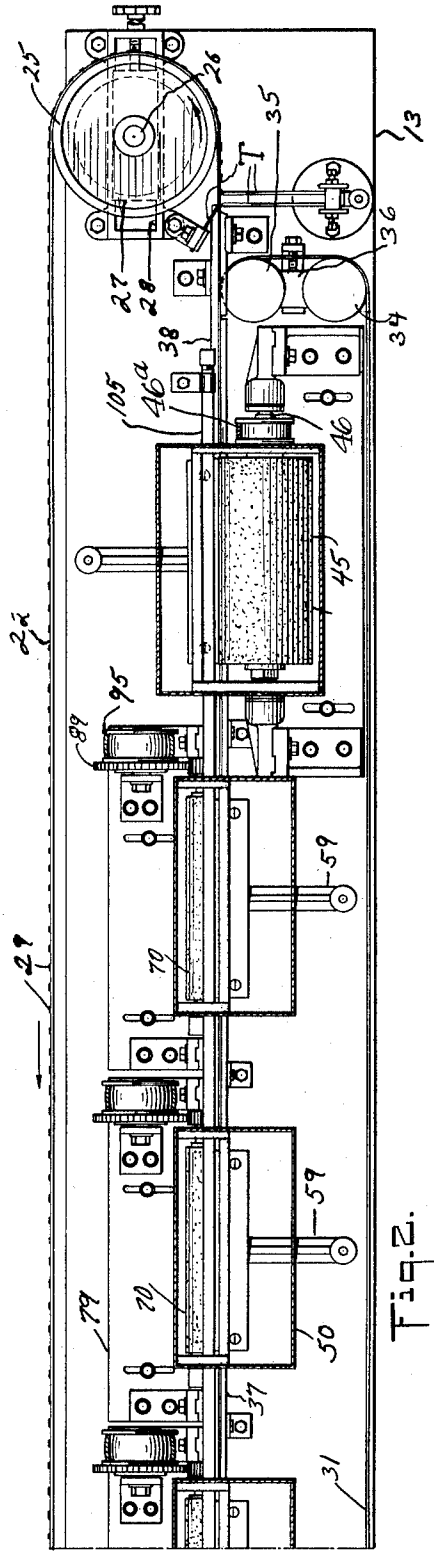


Fig. 2.

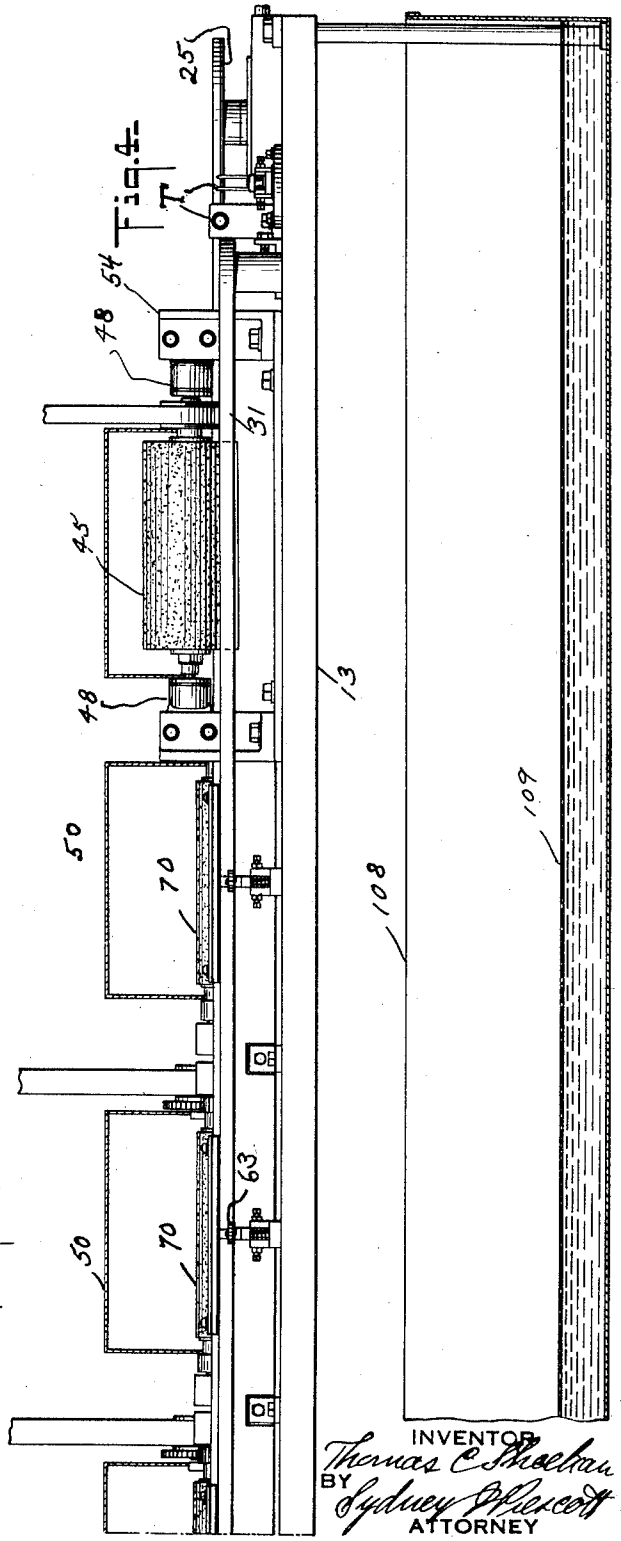


Fig. 4.

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ROUGH HONING MACHINE FOR RAZOR BLADES

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Fig. 7.

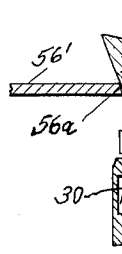


Fig. 5.

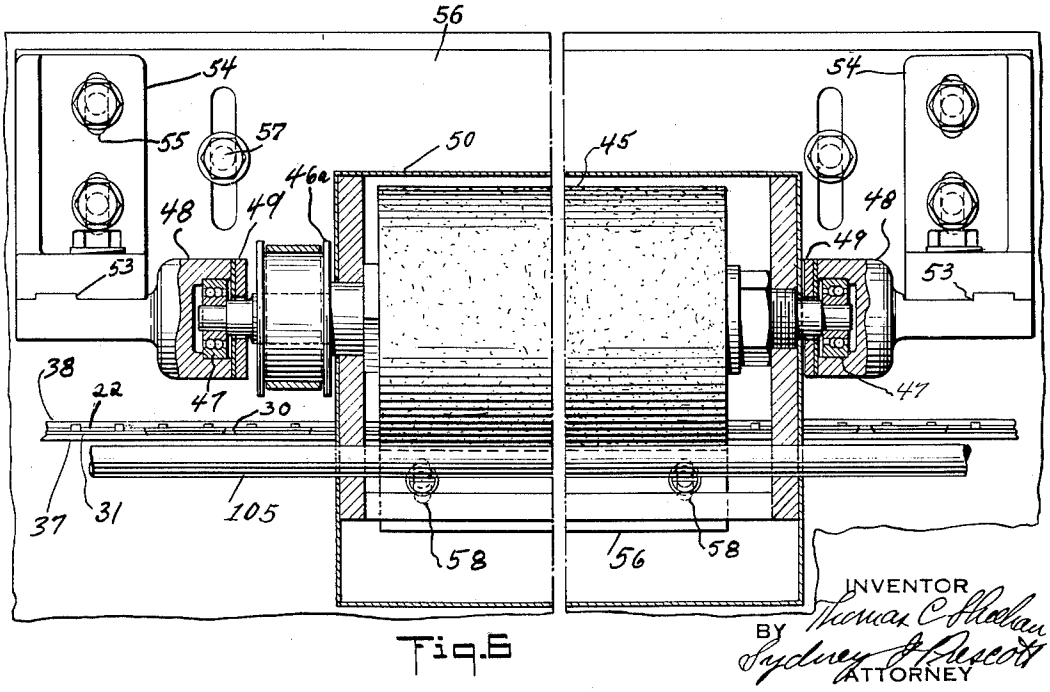


Fig. 6

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ROUGH HONING MACHINE FOR RAZOR BLADES

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Fig. 8.

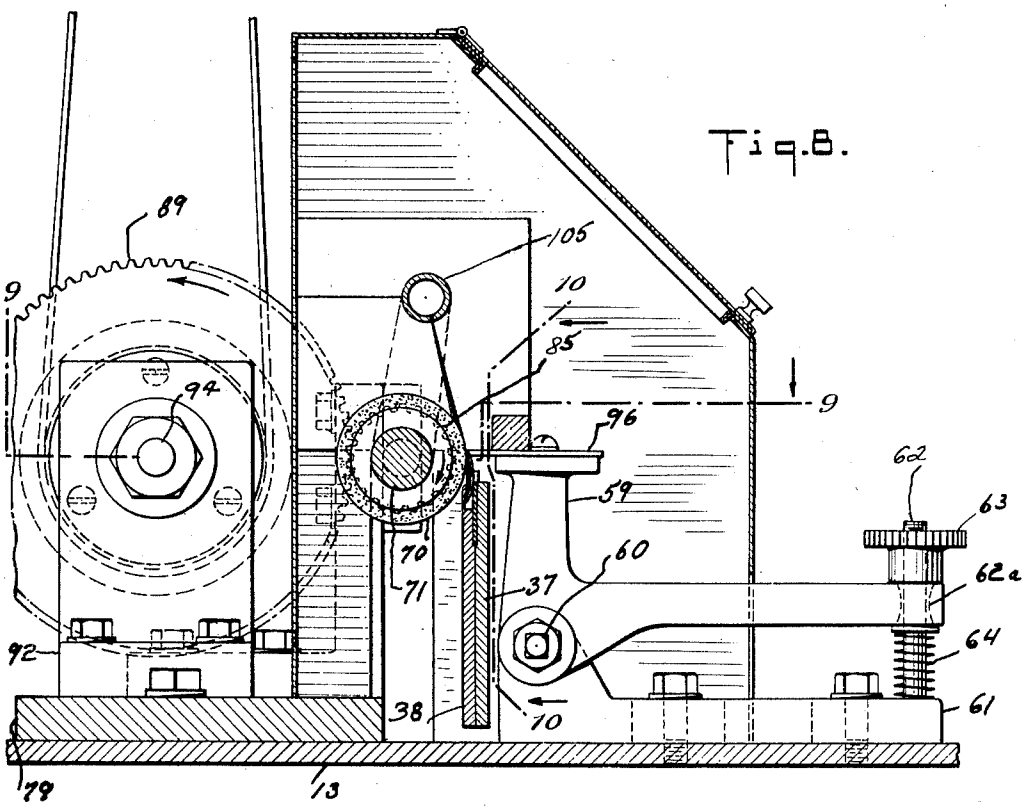


Fig. 10.

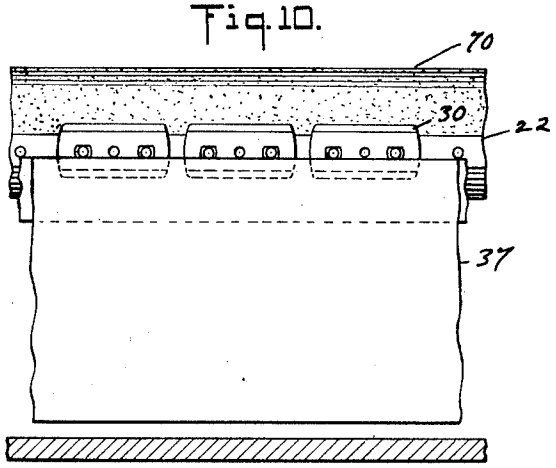
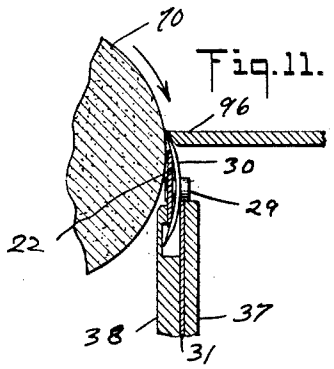


Fig. 11.



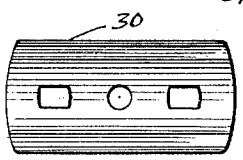


Fig. 12.

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ROUGH HONING MACHINE FOR RAZOR BLADES

Filed July 26, 1928 5 Sheets-Sheet 5

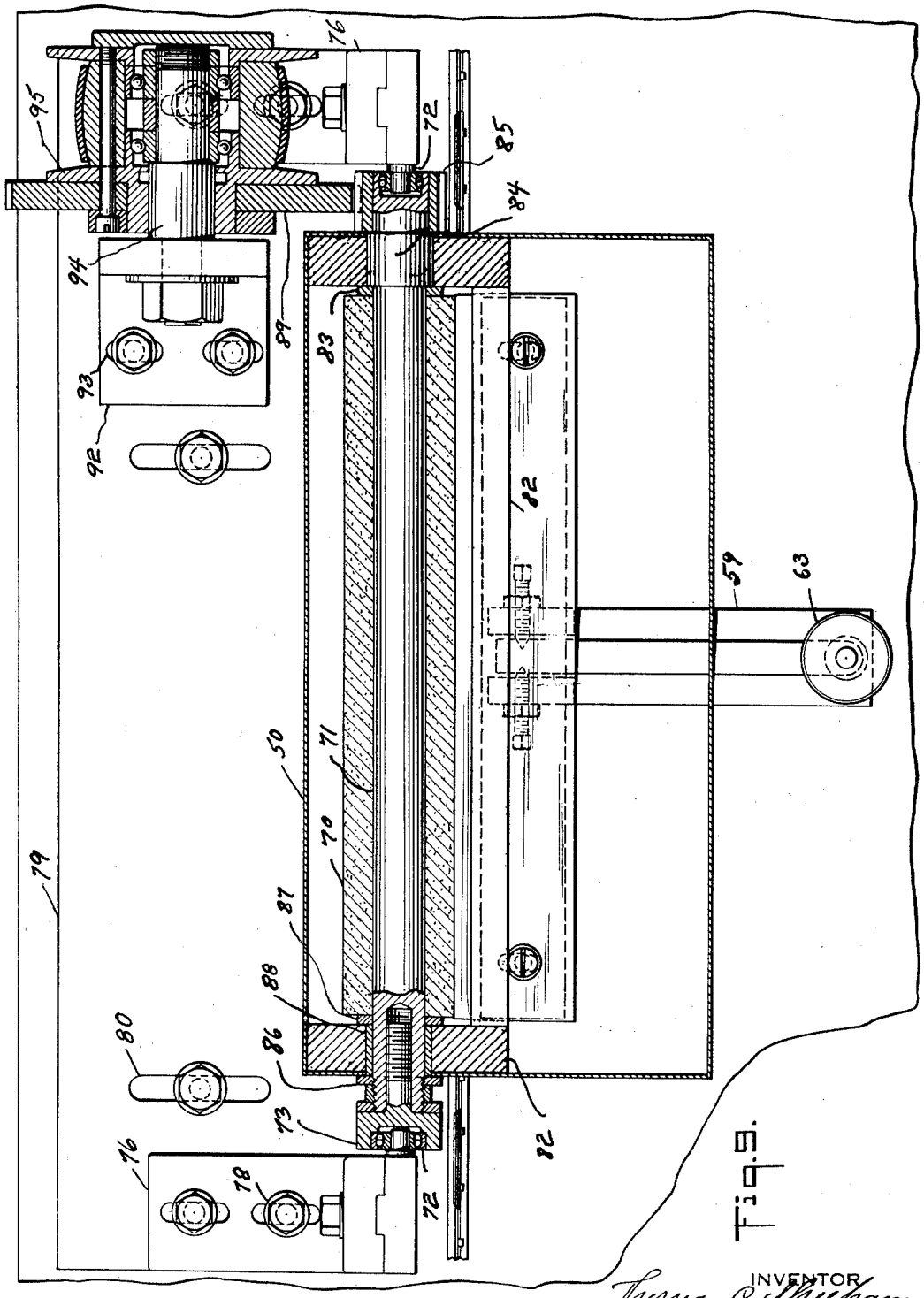


Fig. 5.

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UNITED STATES PATENT OFFICE

1,937,795

ROUGH HONING MACHINE FOR RAZOR BLADES

Thomas Cornelius Sheehan, Upper Montclair, N. J., assignor to Wade & Butcher Corporation, a corporation of New Jersey

Application July 26, 1928. Serial No. 295,594

7 Claims. (Cl. 51—80)

This invention relates to a honing machine for razor blades, particularly for rough honing blades of the replaceable type used in certain safety razors, in which the blades are automatically and uniformly honed by forwarding the blades past a suitable hone or fine grinding surface.

One important object of the invention is to produce a machine of this type which will satisfactorily hone the new curved blades, which are concave on one side and convex on the other.

Another important object is to provide a machine of this type in which the blades will be firmly guided in a fixed path, during the honing, to obviate vibration of the forwarding means and to insure perfectly straight and aligned edges on the blade by preventing tilting of the blade or yielding of the delicate ground edge. Hitherto a great difficulty has been experienced in so guiding the blades, particularly in guiding the curved razor blades in which the honing means must be close to the edge of the blade in order to grind the concave edge surface.

One of the objects of the invention is to obviate these difficulties, in part, by so shaping and relating the hone to the edge, that the hone itself serves as a guide for the edge of the blade and, in part, by guiding the other edge of the blade in a predetermined path.

Another object of the invention is to improve the honing of the blades by providing hones of relatively great length compared with the length of the blade, and having a large honing surface, whereby the honing is gradual though rapid and wear per unit of surface correspondingly small, thus rendering adjustment for wear infrequent. This is highly important because of the difficulty of maintaining the proper angle of the hone surface to the blade, when adjusting for wear.

Still another object is to provide hones of sufficiently small diameter compared with their length, so that they may hollow hone the edge of the blade without sacrificing long wear.

Hitherto it has been found difficult to maintain the surfaces of the hones or grinding elements in machines of this general type in proper relation to the edge due to wear of the bearings, which has resulted from the persistence with which the gritty liquid from the honing or grinding element works into the bearings. It is an object of the invention to provide effective means for eliminating this difficulty.

With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations which will be hereinafter fully described and then set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification and in which like characters of reference indicate the same or like parts:

Figs. 1 and 2 are respectively the left and right halves of a complete plan view of a machine in accordance with the invention;

Figs. 3 and 4 are respectively the left and right halves of a complete front elevation of the machine shown in Figs. 1 and 2;

Fig. 5 is a vertical cross section on an enlarged scale taken on the line 5—5 of Fig. 1;

Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged sectional view of a detail shown in Fig. 5;

Fig. 8 is a sectional view on the line 8—8 of Fig. 1;

Fig. 9 is a horizontal section taken on line 9—9 of Fig. 8;

Fig. 10 is a section taken on line 10—10 of Fig. 8;

Fig. 11 is an enlarged sectional view of a detail shown in Fig. 8; and

Fig. 12 is a side view showing the concave side of the blade.

In the best constructions, there is provided a rotating hone of elongated cylindrical shape and of greater length than the length of the blades and means for forwarding the blades lengthwise of said hone with an entire edge of each blade bearing at one time on the cylindrical surface of said hone. In the best constructions, the forwarding means will include a moving belt and a stationary belt between which the blades are forwarded. In the best constructions also, there will be provided in combination with the means for forwarding the blades, a plurality of rotating cylindrical hones of greater length than the blades, arranged on either side of the path of the blades with their cylindrical surfaces in the path of the edges of the forwarded blades, the hones on each side of the path of the blades being coaxially arranged on axes parallel to said path. The means above referred may be widely varied in construction within the scope of the claims, for the particular machine selected to illustrate the invention is but one of many possible embodiments of the same. The invention, there-

fore, is not to be restricted to the precise details of the structure shown and described.

Referring to Figs. 1, 2, 3 and 4 of the accompanying drawings, there is provided a rectangular table 13 on the underside of which is journalled the main drive shaft 14 having a drive pulley 15 near the outer end and a worm 16 near the inner end, the latter meshing with a worm wheel 17 mounted on a short vertical shaft 18 journalled on the table 13 and having at its upper end the horizontal pulley 21. This pulley supports the narrow steel blade-forwarding belt 22 in cooperation with a second pulley 25 at the other end of the table rotatably mounted on a stub shaft 26 secured to the slide block 27 in the slideway 28 on the table 13, whereby the second pulley may be adjusted to tension the belt. Lugs 29 on the belt support the curved blades 30 which are concave on one side and convex on the other (Fig. 12) with the two edges above and below the belt. Holding these blades on the belt 22 and guiding the same during forwarding, a stationary belt 31 of considerably greater breadth than the belt 22 is supported by fixed pulleys 32 and 33 on the table and adjustably supported pulleys 34 and 35 on the adjustable support 36 to permit tensioning of the belt 31. The stationary belt is supported along one side and its lower edge by a plate 37 having a shallow cut out portion on the upper part of the inside surface. This plate extends substantially the entire distance through which the blades are forwarded from the blade feed to the take off device. A stationary guide plate 38 guides the moving belt 22 as it forwards the blades, extending the entire length of the belt between the blade feed and the blade takeoff. This guide plate bears on the belt 22, at its upper inside surface portion 39, the inside surface of said plate below this portion being recessed to receive the lower edge of the curved blade. Below the recess, the surface of this plate also engages and holds firm the stationary belt. The lugs on the belt 22 ride on the upper edge of the belt 31. The effect of the two guide plates and the stationary belt is, it can be seen from inspection of Figs. 7 and 11, to confine the lower edge of the blade to a fixed predetermined path.

The blades are fed between the movable and stationary belts by means of an automatic blade feed F, the particular construction of which forms no part of the present application, being fully disclosed in my copending application S. N. 295597 filed July 26, 1928. From this automatic feed the blades are guided into their position between the two belts by the opposed guide bars 42 and 43 supported on the table by brackets 44 and 44*a* respectively.

In the path of the upper exposed edge of the blades as they are forwarded by the belt 22, is a convex hone 45 mounted on a shaft 46 to engage the convex side of the blades, which shaft is supported at its opposite ends in bearings 47. These bearings are mounted within a hollow bearing block 48 which is open only at the end towards the body of the shaft and this end of the bearing block is closed by a liquid excluding cover 49, which surrounds the entering ends of the shaft to protect the bearings from the fluid used in grinding. A suitable drive pulley 46*a* connected by a belt to a suitable source of power, not shown, drives the shaft 46. The hone 45 is completely surrounded by a sheet metal casing 50 which prevents any liquid flying directly on the exterior of the bearing block and the covers, and this casing is lined at the point where the most liquid is thrown with felt which makes a substantially liquid tight contact with the shaft where it passes out through the casing and at the same time reduces splashing and reduces the noise from the grinding. As will be seen from Figs. 1, 2, 3 and 4, the hone is of elongated cylindrical shape and is supported with its axis parallel to the path of the blades, so that the entire length of the edge being ground rests flat against the cylindrical surface of the hone during the greater part of the honing operation. Thus the hone itself serves as a guide to prevent longitudinal tilting of the blade and to maintain the edge in perfect alignment, as well as to steady the same on the forwarding means.

The bearing blocks 48 are mounted in the slideways 53 in bracket 54 secured by screws through slots 55 to a base plate 56 which, in turn, is secured by screws 57 to the table 13. The slideways 53 are in a vertical plane parallel to the path of the edge of the blade and the slotted brackets are adjustable in a horizontal plane parallel to the same path, so that the hone may be adjusted horizontally and vertically in a plane parallel to the edge of the blade.

Opposite to and cooperating with the hone to hold the edge of the blade against the surface of the hone is a guide plate 56′ having its edge 56*a* inclined to engage the edge of the blade on its concave side. This edge of the blade extends substantially the entire length of the hone, thereby engaging the entire edge of the blade during its passage along the hone and in that way insuring alignment and uniform pressure of the blade edge against the hone. This blade is yieldably supported on a bell crank 59 to which it is secured by screws through slots 58, the bell crank being pivoted at 60 to a base 61, the base being adjustably secured to the table by screws through slots in the base. A stud 62 on the base projects through an opening 62*a* in the other arm of the bell crank and threaded thereon is a thumb nut 63 bearing on the top side of the bell crank and opposing the spring 64 pushing on the lower side of the arm of the bell crank, thereby yieldingly pressing the edge of the plate 56′ against the blade.

After the blade passes the hone on the convex side of the blade, it comes into the range of action of the hone 70 on the concave side of the blade, which hone is of relatively small diameter compared with the convex hone and compared with its length, for the purpose of hollow honing the blade. This hone is mounted on a shaft 71 which is journalled on bearings 72. The bearing 72 at one end of the shaft is mounted in protected position within the end block 73, hollowed out at one end and threaded into the shaft at its other end. The purpose of this is to protect the bearing as much as possible from the grinding liquid. The stationary member of the bearing 72 is slidable on a slideway in a bracket 76 secured by screws 78 to a base plate 79, in turn secured to the table by screws through slots 80. The stationary member of the bearing at the other end of the shaft is similarly mounted and by adjusting the brackets on the base plate and the stationary bearing members on the slideways respectively, the hone may be adjusted in horizontal and vertical planes parallel to the path of the blades, as already described in connection with the hone on the con-

vex side of the blade. The stationary bearing at the other or driven end of the shaft enters in a protected position into a recess in the end of the shaft. Further protection of the bearings from the liquid used in grinding is attained by encasing the hone in a sheet metal casing 50 and lining the casing with a lining of felt 82 and providing glands on the shaft at the points where the shaft passes out through the lining and the casing, about which glands the felt makes a substantially liquid tight fit. The gland at the driven end of the shaft is formed by a washer 83, an enlargement on the shaft 84 and the inner face of the driving pinion 85. The gland at the other end of the shaft is formed by a pair of washers 86 and 87 and a bushing 88.

The drive pinion 85 fixed to the shaft 71 meshes with a gear 89 secured to a pulley 95, both being journalled on a stub shaft 94 secured to the base plate 79 by means of a bracket 92 and screws in slots 93 therein.

A yieldably mounted backing-up plate 96 having an upwardly inclined edge surface extending across the surface of the hone, bears on the edge of the blade in opposition to the hone and serves to hold the edge in alignment and at the proper pressure against the hone in exactly the same alignment as the guide plate 56'. The means yieldably mounting this plate are identical with that supporting the guide plate 56' and, accordingly, further description thereof is omitted in the interest of brevity. The lower edge of the blade, as shown in Fig. 11, is guided along a fixed predetermined path by the same means, in exactly the same manner, as the same edge was guided while passing the hone on the convex side of the plate already described. During forwarding of the blade as it passes in a right line from the blade feed to the blade takeoff, there are provided three more hones on the concave side of the same edge of the blade of identical structure and position to that which has been described. Further description of these hones will, therefore, be omitted for the sake of brevity. After passing the hones on the concave side of the blade, the blades pass into the range of action of another hone on the convex side of the plate, identical in structure and its relation to the path of the blades to the hone first described. On further forwarding of the blades, they are guided by means of a takeoff guide 100 to the takeoff device T, to which blades are ejected by a spring ejector and stacked at this takeoff device, as fully described in my above mentioned copending application.

Pipe 105 extending lengthwise of the forwarding means above the edge being ground, is perforated opposite each hone to supply the liquid for facilitating honing. This liquid is pumped through piping 106 by a pump 107 from a sump 108 having a horizontal strainer 109, which serves to strain the liquid which drops from the hones.

It is noted that by using a number of hones of relatively great length compared with the length of the blades and thus providing a very large honing surface, that wear per unit area of the hone is made very slight and, accordingly, the very troublesome operation of adjusting for wear and then at the same time readjusting to maintain the proper angle of the honing surface to the blade is very largely eliminated. Lack of proper adjustment resulting from wear on bearings caused by the gritty liquid from the hones has been eliminated by careful design and shielding of the bearings. The persistence with which this liquid works into the bearing spaces has necessitated the double precaution of protecting the bearing by a liquid proof cover at the bearing and at the same time shielding the exterior of the bearing from direct passage of the liquid from the hone.

In view of the foregoing, a detailed description of the device is deemed unnecessary and accordingly is omitted in the interest of brevity.

What is claimed is:

1. In a machine for sharpening razor blades, the combination with a rotating abrading element of elongated cylindrical shape and of greater length than the length of the blade, means for forwarding individual razor blades lengthwise of the hone, yieldingly mounted means acting on the blade near one edge to cause the entire length of that edge to bear at one time on the cylindrical surface of the abrading element, and guide means on either side of said blade positioned to engage a portion of said blade remote from said edge to maintain said portion in a predetermined fixed path during sharpening, said yieldingly mounted means including a base, a bell crank lever pivoted on said base, a guide plate mounted on one arm of said lever and adapted to engage the blades, and a spring interposed between said base and the other arm of said lever.

2. In a machine for sharpening razor blades, the combination with a rotating abrading element of elongated cylindrical shape and of greater length than the length of the blades, of means for forwarding individual razor blades lengthwise of the abrading element with an entire edge of each blade bearing at one time on the cylindrical surface of the abrading element, yielding guide means holding said edge against the element and guide means positioned to engage the central portion of the blade to maintain said portion in a predetermined fixed path, said yielding guide means including a base, a bell crank lever pivoted on said base, a guide plate mounted on one arm of said lever and adapted to engage the blades, and a spring interposed between said base and the other arm of said lever.

3. In a machine for sharpening razor blades, the combination with a rotating abrading element of elongated cylindrical shape and of greater length than the length of the blades, of means for forwarding individual razor blades lengthwise of the abrading element with an entire edge of each blade bearing at one time on the cylindrical surface of the abrading element, yielding guide means holding said edge against the element and guide means positioned to engage the central portion of the blade to maintain said portion in a predetermined fixed path, said yielding guide having a guide surface extending along substantially the length of said element, said yielding guide means including a base, a bell crank lever pivoted on said base, a guide plate mounted on one arm of said lever and adapted to engage the blades, and a spring interposed between said base and the other arm of said lever.

4. In a machine for sharpening razor blades, the combination with a rotating abrading element, of means for forwarding the blades into the range of action of said element, said forwarding means including stationary and moving belts between which the blades are forwarded, said moving belts having lugs for projection

through perforations in the blades and said stationary belt being arranged to cause said lugs to ride on its upper edge.

5. In a machine for sharpening razor blades, the combination with a rotating abrading element, a belt for forwarding the blades in contact with said element, and means for guiding said blade and belt during forwarding, including a stationary belt on the opposite side of said blade from said moving belt and opposed stationary plates engaging the outer sides of said belts, the inside surface of one of said plates being longitudinally recessed to receive the lower edge of a curved blade.

6. In a machine for sharpening razor blades, the combination with a rotating abrading element, a belt for forwarding the blades in contact with said element, and means for guiding said blade and belt during forwarding, including a stationary belt on the opposite side of said blade from said moving belt and opposed stationary plates engaging the outer sides of said belts, said plates engaging said belts at abrading position and along substantially the whole operating run of the belt.

7. In a machine for sharpening razor blades, the combination with a rotating abrading member, of a shield entirely enclosing said member and having a splash reducing lining, the ends of said shield being provided with vertical slots, a shaft supporting said member and having its ends projecting through said slots and lining and having a liquid tight contact with said lining, means for vertically adjusting said shaft in said slots, means for forwarding razor blades through said shield to bring one edge of the blades into engagement with said abrading member, and means for supplying liquid to said abrading member adjacent said edge of the blades within said shield, said liquid supplying means including a pipe projecting into said casing, and said lining being pivotally supported on said pipe.

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