Feb. 12, 1935. J. SHIFFMAN 1,991,231

MACHINE FOR CUTTING, SHAPING, AND BEVELING WATCH CRYSTALS AND THE LIKE

Original Filed July 15, 1932 4 Sheets-Sheet 1

Fig. 1.

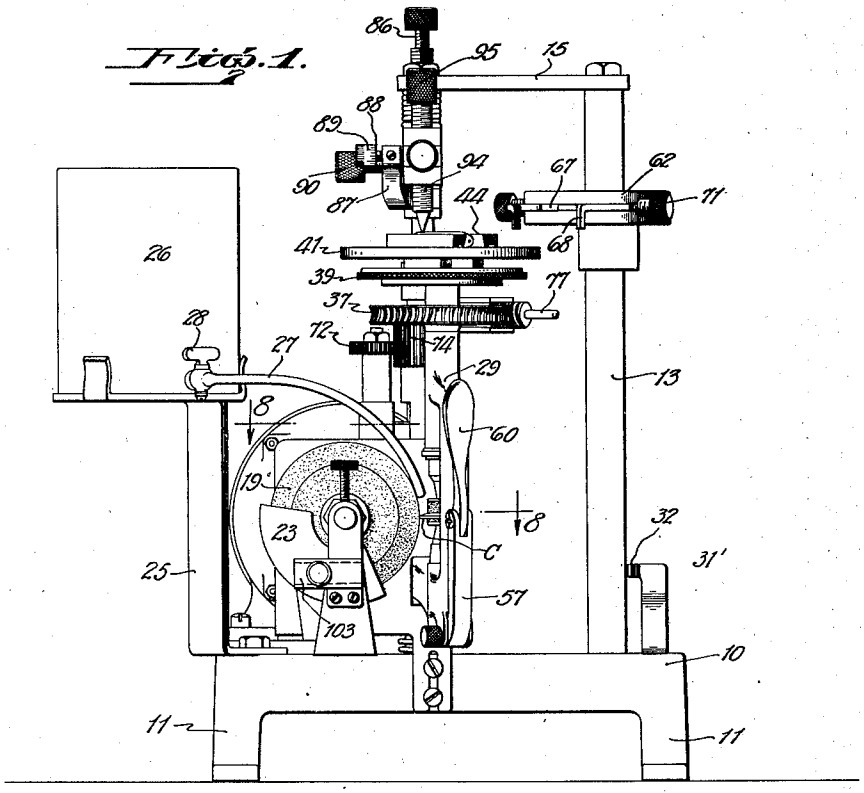

Fig. 2.

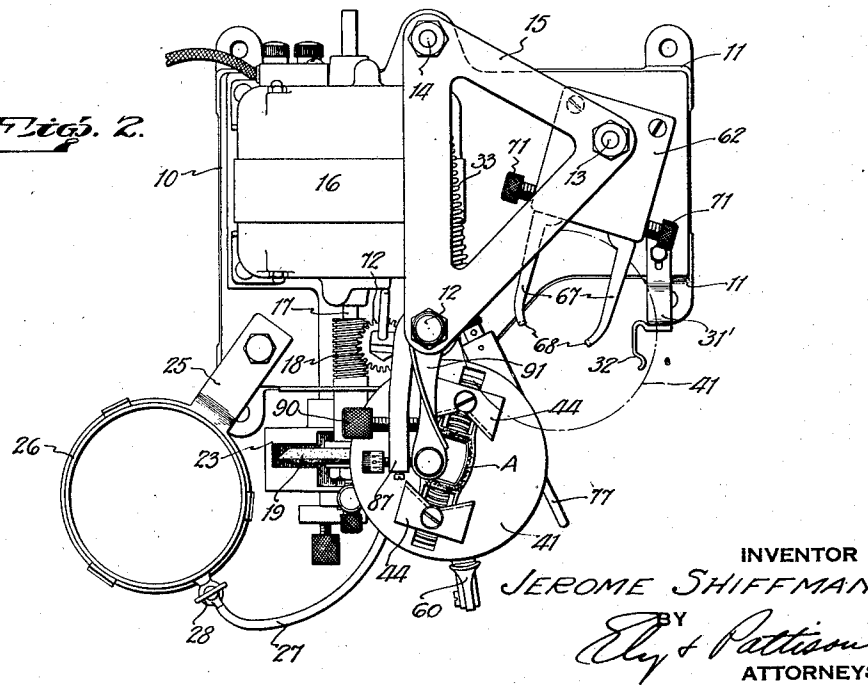

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Fig. 3.

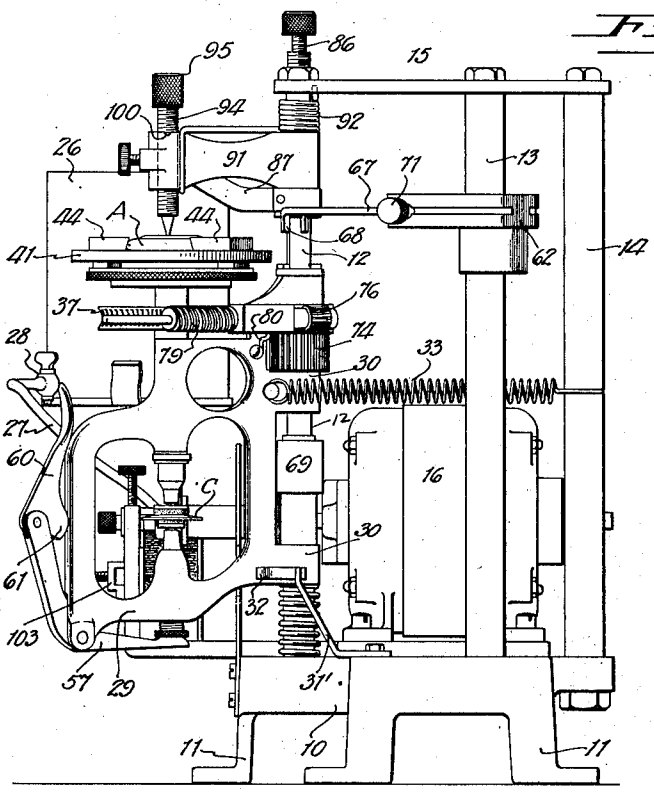

Fig. 5.

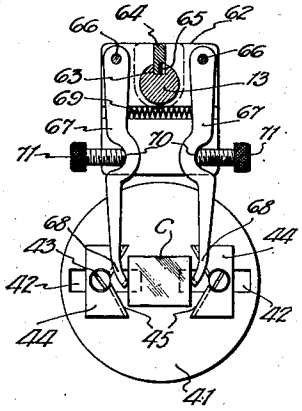

Fig. 4.

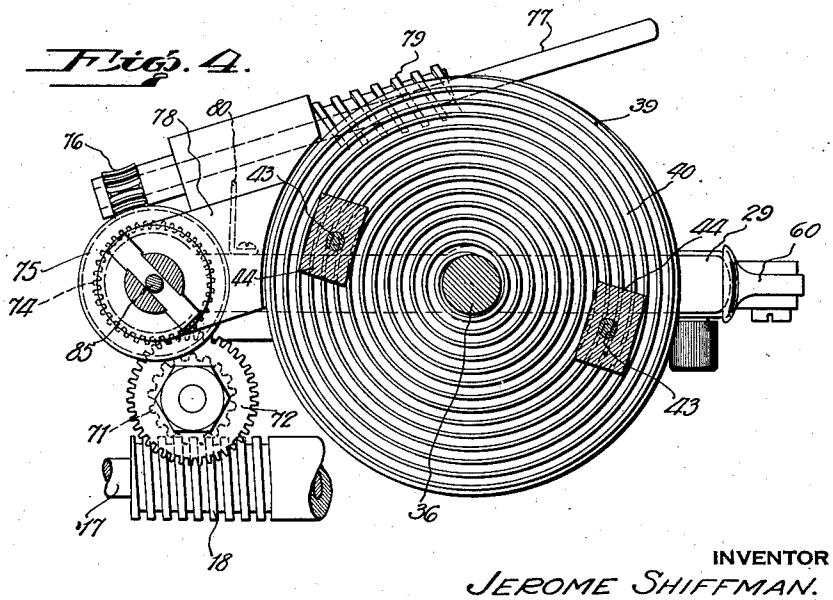

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Fig. 6.

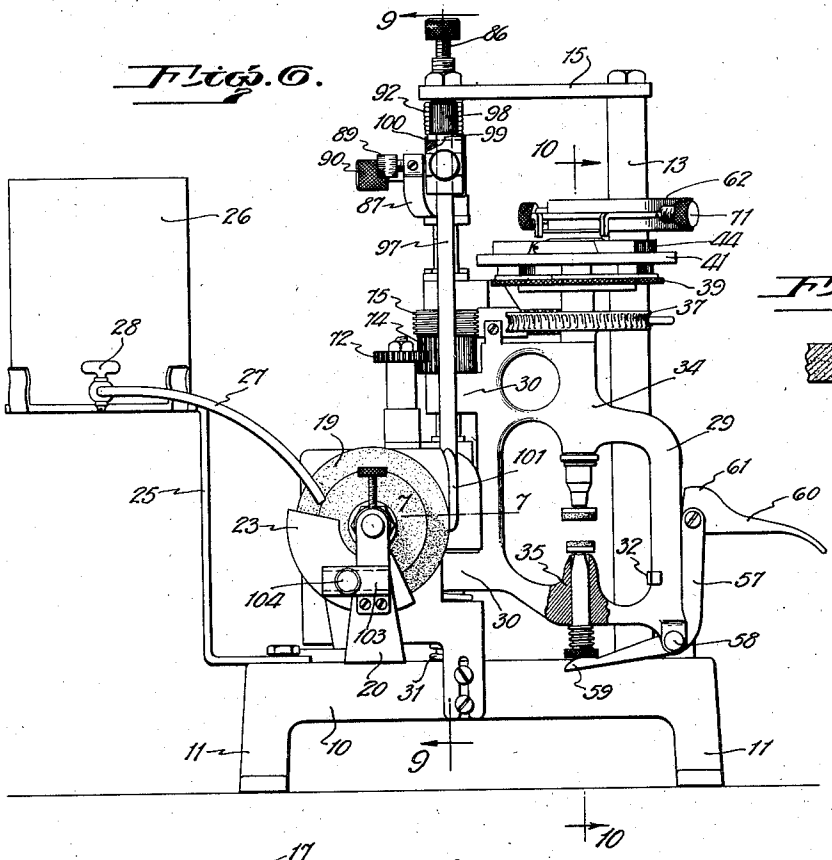

Fig. 7.

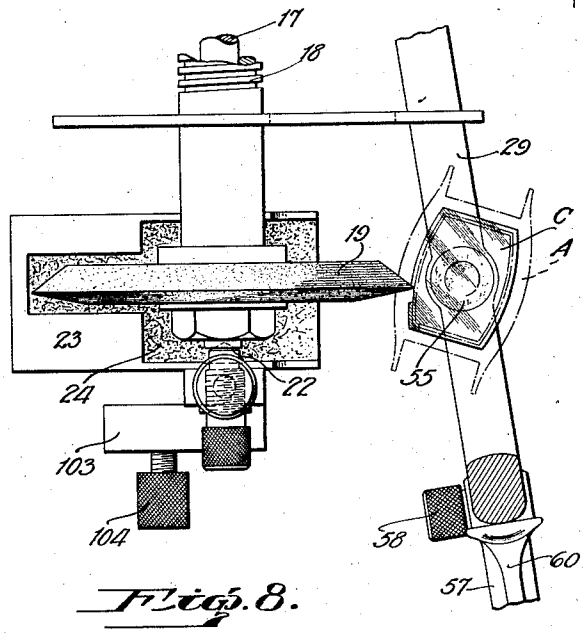

Fig. 8.

Fig. 11.

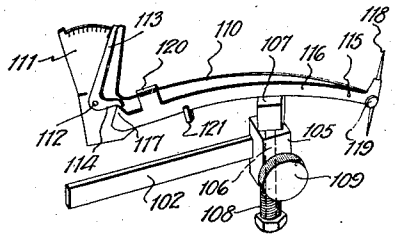

Fig. 12.

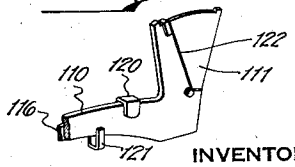

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Fig. 9.

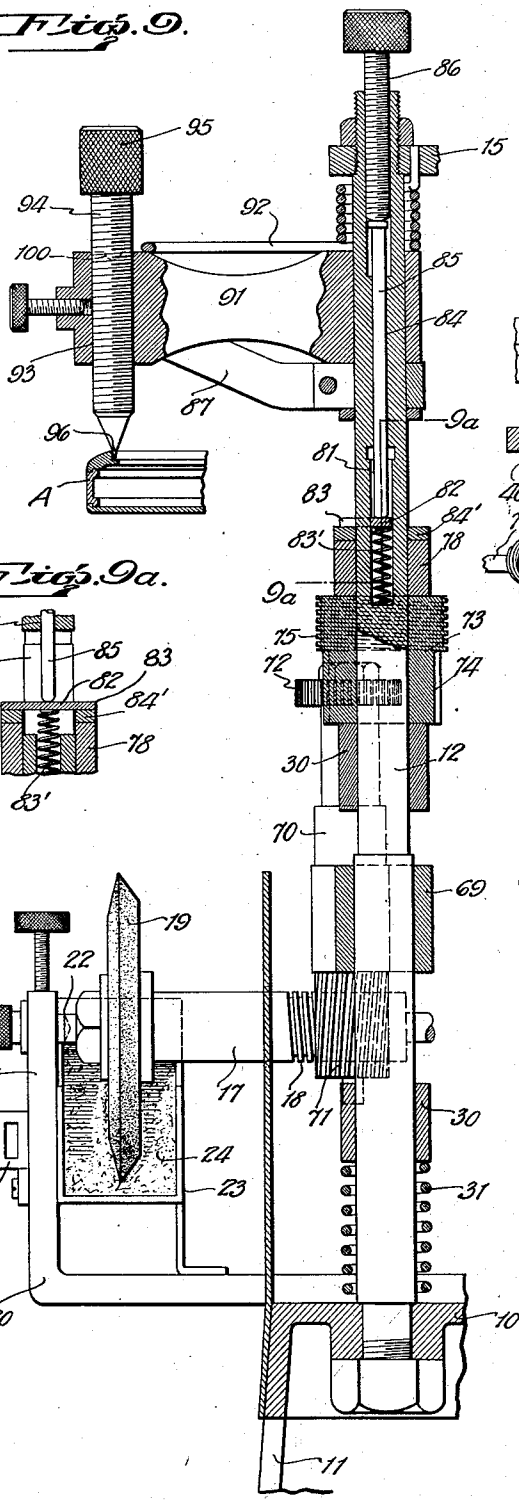
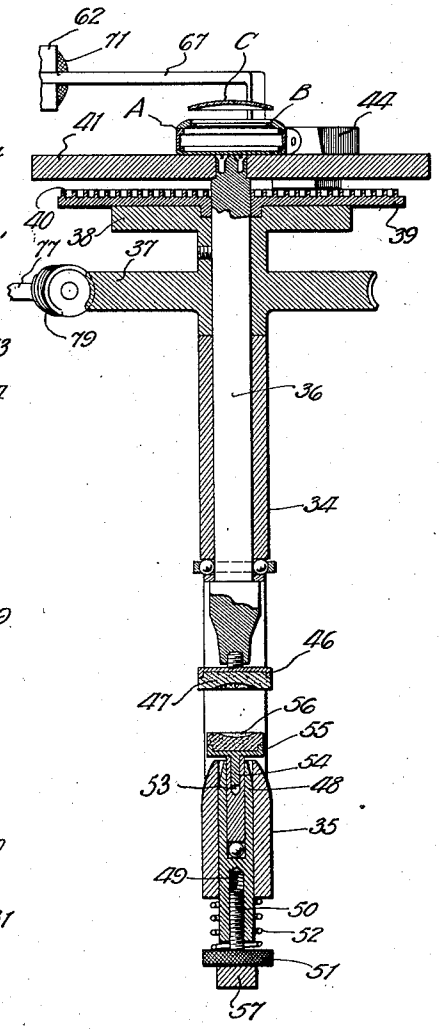


Fig. 9a.

Fig. 10.



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Patented Feb. 12, 1935 1,991,231

UNITED STATES PATENT OFFICE

1,991,231

MACHINE FOR CUTTING, SHAPING, AND BEVELING WATCH CRYSTALS AND THE LIKE

Jerome Shiffman, New York, N. Y.

Substitute for application Serial No. 622,620, July 15, 1932. This application December 3, 1934, Serial No. 755,783

16 Claims. (Cl. 51—101)

This application is a substitute application filed in lieu of applicant's forfeited application, Serial No. 622,620, filed July 15, 1932, and relates to improvements in grinding machines, and more particularly to that type of machine for the grinding and shaping of watch crystals and lenses made of transparent material such as glass or celluloid as set forth in my prior forfeited application.

The principal object of the invention is to provide a simple machine which embodies novel means for cutting watch crystals to fit any given watch bezel or frame irrespective of its shape.

Other objects of the invention are first, to provide novel means by which the machine may be adjusted to cut the edges of a watch crystal in either the form of a straight edge or a beveled edge; second, to provide novel means by which the machine may be adjusted to cut the edges of a watch crystal to bevels of different angles; third, to provide means for moving the watch crystal holder away from the cutting element when the crystal has been completely cut for removing the same from the holder; fourth, to provide means of rotating the crystal at the proper rate with respect to the rotating grinding element; fifth, to provide means for gradually feeding the watch crystal blank to the cutting element at the start of the operation so as to prevent chipping; sixth, to design and arrange a machine so as the same may accomplish similar results when used on lenses or other objects of similar sizes, shapes and materials; seventh, to provide suitable means for centering the blanks of crystals or lenses in the blank holder.

With these and other objects in view, the invention resides in the certain novel construction, combination and arrangement of parts, the essential features of which are hereinafter fully described, are particularly pointed out in the appended claims, and are illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevational view of my improved cutting machine showing the parts in operative position,

Figure 2 is a top plan view, but showing in dotted lines the position of the template and work holding frame when it is desired to position a piece of work in the work holding means,

Figure 3 is a side elevational view,

Figure 4 is a horizontal sectional view through the pattern or template clamping jaw adjusting mechanism,

Figure 5 is a detail horizontal sectional view showing in top plan, the turntable and the work blank positioning means,

Figure 6 is a front elevational view with the carriage in position to receive a blank to be cut and illustrating the cutting wheel liner rod in operative position,

Figure 7 is an enlarged detail horizontal sectional view on the line 7—7 of Figure 6,

Figure 8 is an enlarged detail horizontal sectional view on the line 8—8 of Figure 1,

Figure 9 is a vertical sectional view on the line 9—9 of Figure 6, but showing the follower member in position instead of the grinding wheel liner,

Figure 9a is a detail horizontal sectional view on the line 9a—9a of Figure 9,

Figure 10 is a vertical sectional view on the line 10—10 of Figure 6,

Figure 11 is a detail perspective view of an attachment for reducing vibration of the work during a cutting operation and for indicating the vibrations thereof,

Figure 12 is a detail fragmentary perspective view of the opposite side of the attachment.

Referring to the drawings by reference characters, the numeral 10 designates a base provided with downwardly extending legs 11 which may be screwed or bolted to a permanent support. Fixedly secured to the base 10 and rising upwardly therefrom are three round rods or posts 12, 13 and 14, the same being arranged in triangular formation as best seen in Figure 2 of the drawings for supporting at their top a triangular shaped bracing frame 15. The posts 12 and 14 are arranged in alinement when looking from the front of the machine while the post 13 is offset or disposed to the right of the same.

Fixedly or adjustably supported upon the base 10 is an electric motor 16, the armature shaft 17 of which extends forwardly and fixedly supports a worm 18, while fixed to the extreme outer end of the shaft 17 is a knife edge cutting wheel 19. Extending forwardly of the base 10 and secured thereto is an L-shaped bracket 20, the upstanding arm 21 of which supports a bearing 22 for the outer end of the armature shaft. Enclosing a portion of the cutting wheel 19 is a segmental shaped guard or casing 23 which contains a sponge or other like wiping element 24 for maintaining the cutting edge of the wheel 19 in a clean condition during use. A bracket 25 is pivotally mounted upon the base 10 for supporting a water can or tank 26 from which a tube or pipe 27 leads to a point adjacent the cutting edge of the wheel 19. The sponge or wiper 24 also

serves to absorb the water from the tank 26 to maintain the cutting edge in moistened condition. A valve 28 is arranged in the pipe 27 for controlling the flow of water therethrough.

Swingingly mounted upon the rod 12 is a frame 29, the same being provided with knuckles or bearing portions 30 through which the rod 12 extends. An expansion coil spring 31 is interposed between the lower knuckle 30 and the base 10 for normally urging the frame 29 upwardly upon the rod 12, although the said frame may be adjusted to a lower level against the action of the spring 31 in a manner and for the purpose hereinafter explained. The frame 29 is swingable from a position against a stop 31' fixed to the base 10 to a position in the direction toward the cutting wheel 19 and carried by the stop 31' is a spring clip 32 which engages the frame 29 to releasably hold the frame against the stop 31'. For the purpose of tending to normally move the frame 29 toward the stop 31', a coil spring 33 is provided, one end being fixedly connected to the post 14 while the opposite end is connected to the frame 29 at a point adjacent its axis. It will thus be seen that in order to swing the frame 29 in a direction toward the cutting wheel, it is necessary to do so against the action of the spring 33.

The same 29 includes upper and lower alined bearings 34 and 35 respectively, while journaled in the bearing 34 is a shaft 36. Fixed to the shaft 36 directly above the bearing 34 is a gear wheel 37 while fixed to and disposed above the gear 37 is an annular flange 38 which supports a disc plate 39, the top of which is provided with a spiral rib or wall 40. The disc 39 is freely turnable with respect to the shaft 36 and the flange 38, but fixed to the shaft 36 and disposed above the disc 39 is a turn table or work support 41. The turn table or work support 41 is provided with diametrically opposed elongated slots 42 through which screws 43 pass, and which screws also extend through threaded openings in coacting gripping or holding jaws 44. The tops of the jaws 44 rest upon the top of the turn table 41 and portions of the same extend through the slots 42, for the purpose of preventing turning of the jaws in order that gripping faces of the same will at all times remain in opposed relation. The free ends of the screws or bolts 43 extend into the spiral channel formed by the spiral rib or wall 40. From the description just mentioned, it will be noted that by imparting rotation to the disc 39, the jaws 44 may be simultaneously moved either toward or away from each other depending upon the direction of rotation of the disc 39. The inner facing sides of the jaws 44 are provided with V-shaped notches or recesses 45 to receive the template or pattern which in the present instance is shown as a watch casing A provided with the usual bezel B for receiving and retaining a crystal. When the watch casing B is positioned upon the table 41, the jaws may be moved to clamping position to securely hold the casing in axial alinement with respect to the shaft 36 which is essential to the operation of the device as will be hereinafter appreciated. The periphery of the disc 39 is knurled to enable the firm gripping of the same during the adjustment of the jaws 44.

Fixedly attached to the lower end of the shaft 36 is a non-slidable work clamping jaw 46, the clamping face of which is provided with a cushion member 47 of felt or the like provided with a concavity in its working side. Being fixed to the shaft 36, the jaw 46 will of course rotate therewith. Slidably mounted in the bearing 35 which is disposed in axial alinement with the shaft 36 is an elongated member 48, the lower end of which is provided with an internally screw threaded bore 49 which threadedly receives a screw 50 having an outer knurled head 51. The coil spring 52 is interposed between the head 51 and the lower end of the bearing 35 so that the screw is at all times under tension and will be prevented against accidental unscrewing. The upper end of the tubular member 48 is provided with a socket 53 which receives the shank 54 of a clamping jaw 55, the same having a resilient cushion member 56 similar to the cushion member 47 of the jaw 46 and is likewise provided with a concavity. The jaw 55 may be termed a vertically movable or slidable jaw which coacts with the jaw 46 for supporting the work or blank C during a cutting operation and which in this instance is in the form of a glass, celluloid or like transparent crystal for the watch casing A.

For the purpose of imparting sliding movement to the jaw 55 so as to move the same into clamping engagement with the jaw 46 and to a position away from the jaw to release the blank, I provide a bell crank lever 57 which is pivoted to the frame 29 as at 58, one arm of the said lever extending beneath the frame 29 and terminating in a cam portion 59 which engages the head 51 of the screw 50. In addition to the aforementioned function of the spring 52, the same also acts to move the jaw 55 and its correlated parts to released position as shown in Figure 6 of the drawings. Pivotally connected to the other arm of the bell crank 57 is an actuating cam lever 60, the cam portion 61 being engageable with the side of the frame 29 when the said lever is swung upward in order to cause the said lever to slide the jaw 55 to clamping position. The clamping position of the actuating cam lever is clearly illustrated in Figure 3 of the drawings.

When gripping the blank C between the jaws 46 and 55, it is desired that the pressure be sufficient to securely hold the same without breaking, and therefore it may be necessary to adjust the sliding jaw 55 which may be accomplished by the manual manipulation of the head 51 of the screw 50 so that the member 48 may be slid relatively to its bearings 35.

It is most essential that the blank C be accurately positioned within the work holding jaws 46 and 55 and axially with respect to the shaft 36. For this purpose, a work carrier mechanism is provided for transferring the blank C from a position after the same has been centered with respect to the watch casing A (see Figure 10) to the work holding jaws 46 and 55. The carrier comprises a bifurcated body 62 which is slidably mounted upon the rod or post 13, but is held against turning movement with respect thereto. For this purpose, a groove or channel 63 is formed in the post 13 lengthwise thereof in which a key or rib 64 formed on the carriage 62 extends, there being a flat spring 65 carried by the key or rib for engagement with one of the walls of the slot 63 in order that the carriage may be manually slid lengthwise of the rod, but will be supported against accidental sliding movement. In other words, it is essential that a slight tension be provided between the body 62 of the carriage and the rod 13, otherwise the carrier would drop by gravity.

Pivotally mounted in the bifurcated portion of the body 62 as at 66, are a pair of arms 67, which

extend outwardly from the body and terminate in inwardly curved fingers 68. An expansion coil spring 69 abuts the inner side of the arms 67 and tends to normally move the same away from each other whereas the said arms are provided with recessed portions 70 for engagement by the inner ends of adjusting screws 71, the same being threadedly mounted in the bifurcated body 62. It will be seen that by turning the screws 71 in one direction, the arms may be moved toward each other against the action of the spring 69 whereas turning of the screws in an opposite direction will enable the said spring to move the arms away from each other, or to an expanded position. By reference to Figures 5 and 10 of the drawings it will be seen that the finger ends 68 of the arms 67 grip the blank C and by the turning of the screws 71 the said blank may be properly positioned over the bezel B of the watch casing A to assure that the proper size blank has been chosen, and the said blank is transferred from this position to the work holding jaws 46 and 55 by swinging the frame 29 toward the cutting wheel 19 so as to be disposed out of the path of the carrier. When the carrier has been slid downwardly so that the blank C is on the proper horizontal plane with respect to the work holding jaws, the frame 29 is swung back to engage the stop 31 whereby the blank is in the same axial alinement with respect to the axis of the work holding jaws as it was when disposed in an elevated position with the blank over the watch casing A. By swinging the cam lever 60 upwardly, the jaw 55 will move upwardly into clamping engagement with the jaw 46 and the blank will be held in working position as illustrated in Figures 1 and 3 of the drawings. After the working jaws receive the blank, the screws 71 are turned to cause the arms 67 to release the blank, thus the frame 29 is free to be swung to a position wherein the blank is engaged by the cutting wheel 19.

It is essential that the turn table 41 be rotated at a very slow rate of speed, thus it is necessary that a reduction drive be provided between the motor 16 and the shaft 36.

Fixed or keyed to the rod 12 intermediate the bearings 30 of the frame 29 is a bearing member 69 which supports a vertical counter shaft 70, the lower end of which is provided with a gear 71 which is in constant mesh with the gear 18 of the motor shaft 17. The upper end of the shaft 70 carries a gear 72 which is in constant mesh with a combination worm and gear element 73. The element 73 includes an annular series of teeth 74 which are longer than the teeth of the gear wheel 72 in order to enable the gear element 73 to move vertically with respect to the gear 72 but still remain in meshing engagement therewith. The element 73 also includes a worm 75 which is in constant mesh with a small gear 76 carried on a horizontally disposed shaft 77, the said shaft having its bearing in a bearing member 78 pivoted to the rod 12 above the combination gear and worm 73. Also fixed to the shaft 77 is a worm 79 which operatively connects with the gear 37 on the shaft 36. A spring 80 has one of its ends fastened to the frame member 29 adjacent its pivotal axis, while the free end is disposed in a slot or notch in the underside of the bearing member 78. The member 78 functions as a clutch member in transmitting motion from the worm 79 to gear 37 while the spring 80 serves to hold the member 78 in an engaged and disengaged position at the will of the operator. It will thus be seen that a continuous drive is provided between the worm 18 and the gear 37, and that due to the various reducing gears and worms a relatively slow turning movement will be imparted to the turn table 41 and the work holding means.

In order that the work holding means be adjusted so that the crystal blank B held therebetween may be adjusted to a position either above or below the horizontal axis of the grinding wheel 19, or on a plane in alinement with the axis thereof, it is necessary to provide some means for securing the frame 29 in various positions of vertical adjustment. As previously mentioned, the spring 31 tends to normally force the frame 29 upwardly on the rod 12, but adjustable stop means is provided and which will now be explained.

The rod 12 is provided with an elongated slot 81 which extends therethrough and in which a stop plate 82 is slidably mounted. Interposed between the stop plate and the bottom wall of the slot 81 is an expansion coil spring 83' which tends to normally force the plate upwardly. Slidable in a bore 84 extending upwardly from the slot 81 is a pin or rod 85, the upper end of which is engageable by the inner end of an adjusting screw 86 threaded into the top of the rod 12. By turning the screw 86, the rod 85 may be moved downwardly against the action of the spring 83' to lower the horizontal position of the stop plate 82, which plate is provided with outwardly extending wings 83 disposed in the path of the collar 84 resting upon the bearing member 78. By turning the screw 86 in an opposite direction, the spring 83 will force the plate 82 upwardly whereupon the spring 31 will of course cause the frame 29 and the bearing 78 to correspondingly move upwardly. Thus by manipulating the screw 86, the horizontal plane of the blank C held in the work holding means of the frame 29 may be adjusted so that the work or blank C may be disposed above or below the horizontal axis of the grinding wheel or on a plane in alinement with the axis thereof. By positioning the work above and below the horizontal axis, opposite bevels are of course cut upon the edges of the blank whereas if the blank is brought into engagement with the cutting wheel in alinement with the axis thereof, a vertical or perpendicular edge is procured.

Fixedly secured to the rod 12 above the bearing member 78 is a stop arm 87 which extends forwardly and is offset with respect to the axis of the rod 12, as will be seen by reference to Figure 1 of the drawings. Threadedly carried by the outer end of the arm 87 is an adjusting screw 88, the head of which is provided with calibrations 89 for indicating the adjustment of the screw. Also threaded to the arm is a second stop screw 90 but the same is disposed inwardly of the screw 88. Pivoted upon the rod 12 directly above the point of attachment of the stop arm 87 is an arm 91 which is urged toward the stop arm 87 by reason of a spring 92, the said spring being of a greater tension than the tension of the spring 33 for a purpose to be hereinafter appreciated. The outer end of the arm 91 is provided with a vertical threaded bore 93 for threadedly receiving a follower pin or screw 94, the same being provided with a knurled head 95 at its upper end and with a point 96 at its opposite end. By adjusting the screw 88, the point of the follower pin 94 may be properly alined with the cutting edge of the cutting wheel 19. The screw 90 is

adjusted before starting to cut a crystal so that the arm 91 is held slightly away from the stop arm 87 and when the cutting operation is started, the screw 90 is gradually withdrawn so as to allow the arm 91 to rest directly against the arm 87. Thus, as the crystal is gradually advanced toward the grinding or cutting wheel at the start of a cutting operation, chipping of the crystal is avoided.

It has already been explained how the work is lined up with respect to the bezel B of the watch casing A and carried to a position to be received by the work holding jaws 46 and 55. With the work clamped between the said jaws, the frame 29 is swung over in a direction toward the cutting wheel 19, it being understood that the pattern or template in the form of the casing A is in position upon the turn table 41. When swung over toward the cutting wheel, the follower pin 94 is screwed down so that the point 96 seats or engages the bezel B of the watch casing which of course prevents the frame from swinging to an inoperative position. When the follower pin has been engaged with the template or casing A, the machine is ready for operating as the work C in the form of a crystal is in contact with the cutting wheel 19. When the motor 16 is turned on, the power will be transmitted through the reducing gears and worm to the shaft 36 which in turn will rotate the turn table 41 at a very slow rate of speed. During rotation the follower pin 94 being engaged with the bezel B of the watch casing A will cause the frame 29 which supports the work holder to move in a direction toward and away from the cutting wheel 19 whereby the work or crystal is cut to a shape corresponding to the shape of the bezel B.

In Figure 6 of the drawings I have illustrated an alining or turning bar 97 which is dropped through the threaded bore 93 and includes a knurled head 98 at its upper end. The bar 97 adjacent the knurled head is provided with a transversely disposed pin 99 which seats in notches or grooves 100 in the top of the stop arm 91. The lower end of the bar 97 terminates in a reduced portion 101 which is triangular shape in cross section as shown in Fig. 7, and the apex or point of this portion is adapted to be brought into vertical alinement with the cutting edge of the cutting wheel 19. This adjustment is accomplished by the manipulation of the screw 88, and after adjustment is effected, the follower pin 94 is replaced. The lower end of the bar 97 when in position is disposed just below the horizontal axis of the cutting wheel 19.

In Figures 11 and 12 of the drawings, I have illustrated an attachment in connection with the machine. The attachment is for indicating the variations in thickness of the crystal blank to facilitate the correct adjustment of the lower surface of the blank. For example, one blank may be slightly thicker than a preceding one for which the machine is adjusted, and which would have the plane of its lower surface disposed to the cutting wheel at a point slightly lower than that of a blank of normal thickness for which the machine is set. Thus, the cutting wheel would not cut the blank at the desired angle. The device comprises an arm 102 which is insertible in a bracket 103 secured to the arm 21 of the bracket 20 and which bracket 103 is horizontally disposed. A set screw 104 threads into the bracket 103 for clamping the arm 102 in an adjusted position. Fixed to one end of the arm 102 is a head 105 and passing upwardly through the head 105 is a pivot bolt 106 which carries at its free end a head or block 107. The lower end of the screw 106 is provided with a head while a spring 108 is interposed between the said head and the under side of the head 105. A set screw 109 is threaded in the head 105 for securing the pivot bolt 106 in an adjusted position both vertically and rotatably. Fixed to the block 107 is a curved arm 110, one end of which terminates in a segmental shaped portion 111.

Pivoted to the portion 111 as at 112 is an indicating lever 113 which is movable over the segmental shaped portion 111, the said lever being provided with an angular arm 114. Pivoted to one side of the arm 110 as at 115 is an arcuate shaped lever 116, one end of which is provided with a tooth 117 which engages the arm 114 of the lever 113, while the opposite end of the lever 116 removably and adjustably supports a pointed pin 118, the adjustment constituting a set screw 119 threaded into the end of the lever 116. A stop 120 extends from the lever 116 and overlies the top of the arm 110 while a stop 121 depends from the arm 110 into the path of downward movement of the lever 116. The stops 120 and 121 limit the movement of the lever 116 in opposite directions. A wire spring 122 is fastened to one side of the segmental portion 111 and bear against the free end of the indicating lever 113 for urging the same to a normal position whereas the indicating lever is movable over the segmental portion 111 against the action of the spring in a manner now to be explained.

In the use of the device or attachment shown in Figures 11 and 12, the same is adjusted so that the upper pointed end of the needle or pin 118 is beneath the lower end of the liner or truing bar 97, at which time the indicator 113 is in the center of the dial. When the work is brought into operative position, the pin 118 is engaged with the underside thereof, and if the work is the correct thickness, the indicator remains at neutral, but any variation in thickness will cause the movement of the indicator and visibly indicate such difference. Thus variations in thickness of glass can be detected and corrected by adjusting the plane of the lower surface of the blank through operation of the screw 86 above referred to.

From the foregoing description, it will be seen that I have provided a machine for cutting watch crystals into any desired shape to accurately fit the bezels of watch casings, and although especially designed for this purpose, the machine may also be adapted for other purposes such as the cutting of various shaped lenses.

While I have shown and described what I deem to be the most desirable embodiment of my invention, I wish it to be understood that various changes as come within the scope of the appended claims may be resorted to if desired.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a machine of the class described, a rotatable cutting wheel, a swingably mounted frame for movement toward and away from said cutting wheel, spring means tending to move said frame away from said cutting wheel, rotatable work holding means mounted in said frame, a template support rotatable with said work holding means, and disposed in axial alinement with said work holding means, means for setting a piece of work over a template, when in position

upon said template support to properly position the same relative thereto and for transferring a piece of work to the work holding means while in set position, and a follower device adapted to engage the template supported by said template support.

2. In a machine of the class described, a rotatable cutting wheel, a rotatable template support, a watch casing mounted on said template support and having a bezel rotatable work holding means axially alined with said template support, spring means acting to move said work holding means away from said cutting wheel, a follower device engaging the bezel of said watch casing, a source of power for said rotatable cuting wheel and said template support and said rotatable work holding means, and speed reducing means between said source of power and said rotatable support and work holding means.

3. In a machine of the class described, a rotatable cutting wheel, a swingable frame, spring means acting to move said frame in a direction away from said cutting wheel, a template support rotatably mounted in said frame, adjustable coacting clamping jaws on said support for axially positioning and holding a template upon said support, and releasable rotatable work clamping jaws mounted in said frame and disposed on the same axis as said template support, and a follower member adapted to be engaged with a template supported upon said template support.

4. In a machine of the class described, a rotatable cutting wheel, a swingably mounted frame for movement toward and away from said cutting wheel, spring means tending to move said frame away from said cutting wheel, rotatable work holding means mounted in said frame, a template support rotatable with said work holding means, a follower device adapted to engage the template supported by said template support, and means for vertically adjusting said frame for positioning the work holding means on a level with, or below or above the horizontal axis of said cutting wheel.

5. In a machine of the class described, a rotatable cutting wheel, a swingably mounted frame mounted for movement toward and away from said cutting wheel, spring means tending to move said frame away from cutting wheel, stop means for limiting the swinging of said frame in a direction away from said cutting wheel, releasable catch means for holding said frame against swinging movement when brought into engagement with said stop means, rotatable work holding means mounted on said frame, a template support rotatably mounted in said frame and turnable with said work holding means, a vertically slidable carrier, adjustable clamping means on said carrier for initially supporting a piece of work and for alining the same relative to a template adapted to be placed upon said template support, said carrier adapted to be moved to a position after said frame is swung clear of the same to position the piece of work for reception by said work holding means, and a follower member adapted to be engaged with a template on said template support when said frame is swung to a position under tension of said spring means.

6. In a machine of the class described, a base, a rod rising vertically from said base, a horizontal drive shaft journalled on said base, a cutting wheel carried by said drive shaft, a frame swingably supported by said rod and movable toward and away from said cutting wheel, a template support rotatably supported by said frame, means for axially positioning and holding a template upon said template support, work holding means mounted in said frame and rotatable with said template support, spring means acting upon said frame to swing the same in a direction away from said cutting wheel, reduction gearing connecting said rotatable template support with said drive shaft during swinging movements of said frame, a stop arm fixedly carried by said rod, an arm pivotally mounted on said rod and movable in the path of said stop arm, spring means acting upon said arm to move the same toward said stop arm; and a follower member threaded in said arm and to engage the template to be supported upon said template support for guiding said frame back and forth relative to said cutting wheel.

7. In a machine of the class described, a base, a rod rising vertically from said base, a horizontal drive shaft journaled on said base, a cutting wheel carried by said drive shaft, a frame swingably supported by said rod and movable toward and away from said cutting wheel, a template support rotatably supported by said frame, means for axially positioning and holding a template upon said template support, work holding means mounted in said frame and rotatable with said template support, spring means acting upon said frame to swing the same in a direction away from said cutting wheel, reduction gearing connecting said rotatable template support with said drive shaft during swinging movements of said frame, and a follower member adapted to engage the template to be supported upon said template support for guiding said frame back and forth relative to said cutting wheel, a post rising from said base, a carrier slidable but non-rotatably supported upon said post, adjustable coacting gripping jaws mounted on said carrier adapted to receive and position a piece of work relative to a template carried by said template support preparatory to delivering the same to said work holding means.

8. In a machine of the class described, a base, a rod rising vertically from said base, a horizontal drive shaft journaled on said base, a cutting wheel carried by said drive shaft, a frame swingably supported by said rod and movable toward and away from said cutting wheel, a template support rotatably supported by said frame, means for axially positioning and holding a template upon said template support, work holding means mounted in said frame and rotatable with said template support, spring means acting upon said frame to swing the same in a direction away from said cutting wheel, reduction gearing connecting said rotatable template support with said drive shaft during swinging movements of said frame, a stop member fixedly supported upon said rod, an arm turnably mounted upon said rod, a spring acting to move said arm toward said stop member and being of a greater tension than the spring means acting upon said frame, and a follower pin threadedly carried by said arm and adapted to be engaged with a template carried by said template support.

9. In a machine of the class described, a rotatable template support, a watch casing mounted on said template support and having a bezel, a vertical rod, a horizontal swingable arm mounted on said rod, a stop member fixed to said rod and disposed in the path of swinging movement of said arm, spring means for urging said arm in a direction toward said stop member, and a fol-

lower pin threadedly mounted in said arm for engagement with the bezel of said watch casing.

10. In a machine of the class described, a rotatable template support adapted to support a watch casing having a bezel, a horizontal swingable arm, a stop member in the path of swinging movement of said arm, spring means for urging said arm in a direction toward said stop member, and a follower pin threadedly mounted in said arm for engagement with a bezel in a watch casing held by said template support, a rotatable knife edge cutting wheel, and means for adjusting the stop position of said arm to aline the follower pin with respect to the knife edge of said cutting wheel.

11. In a machine of the character described, a rotatable cutting wheel, a vertical standard, a swingable frame mounted on said standard, a rotatable template support journaled in said frame, rotatable work holding means journaled in said frame and operatively connected to said rotatable template support, a follower device pivoted on said standard and adapted to engage a template held on said template support, a stop fixed to said standard in the path of movement of said follower device, spring means acting upon said follower device to normally position the same against the stop and cause the work held by said work support to engage said cutting wheel, said spring means permitting said frame and follower device to be swung as a unit in a direction to cause the work held by said work support to be disengaged from said cutting wheel.

12. In a machine of the character described, a rotatable cutting wheel, a vertically slidable frame, spring means tending to move said frame upwardly, work holding means carried by said frame, and means for holding said frame in an adjusted position against the action of said spring means for adjusting the level of said work holding means to support a piece of work either on the same horizontal axial plane as said cutting wheel or on a horizontal plane above or below the axis of said cutting wheel.

13. In a machine of the character described, a rotatable cutting wheel, work holding means, means for adjusting the level of said work holding means to support a piece of work either on the same horizontal axial plane as said cutting wheel, or on a horizontal plane above or below the axis of said cutting wheel, and means adapted to engage the under side of a piece of work for visibly indicating the variation of thickness of the work held by said work holding means when the same is set for the cutting of a piece of work of a predetermined thickness.

14. In a machine of the class described, a rotatable cutting wheel, rotatable work holding means movable toward and away from said cutting wheel, a template support rotatable with said work holding means and movable therewith and disposed in axial alinement therewith, means for inserting a piece of work over a template when in position upon said template support to properly position the same relative thereto and for subsequently transferring a piece of work to the work holding means while in set position, and a follower device adapted to engage the template supported by said template support.

15. In a machine of the class described, a rotatable cutting wheel, a frame mounted for movement toward and away from said cutting wheel, stop means for limiting the swinging movement of said frame in a direction away from said cutting wheel, releasable means for holding said frame against swinging movement when moved into engagement with said stop means, rotatable work holding means mounted on said frame, a template support rotatably mounted on said frame and turnable with said work holding means, a carrier mounted for up and down movement, clamping means on said carrier for initially supporting a piece of work and for alining the same relative to a template adapted to be placed upon said template support, said carrier adapted to be moved to a position after said frame is swung clear of the same to position the piece of work for reception by said work holding means, and a follower device adapted to be engaged with a template on said template support when said frame is swung to an operative position toward said cutting wheel.

16. In a machine of the class described, a cutting wheel, a frame member mounted for swinging movement toward and away from said cutting wheel, work holding means mounted in said frame, a template support rotatably mounted in said frame and disposed above said work holding means, a slidable carrier member movable to a plane above said template support and movable to the plane of said work holding means, and work clamping means on said carrier for supporting a piece of work above said template support to position the same relative to the template which is adapted to be positioned thereon, said carrier adapted to be lowered to a position to the plane of said work holding means for delivering thereto the work adapted to be held by said clamping means.

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