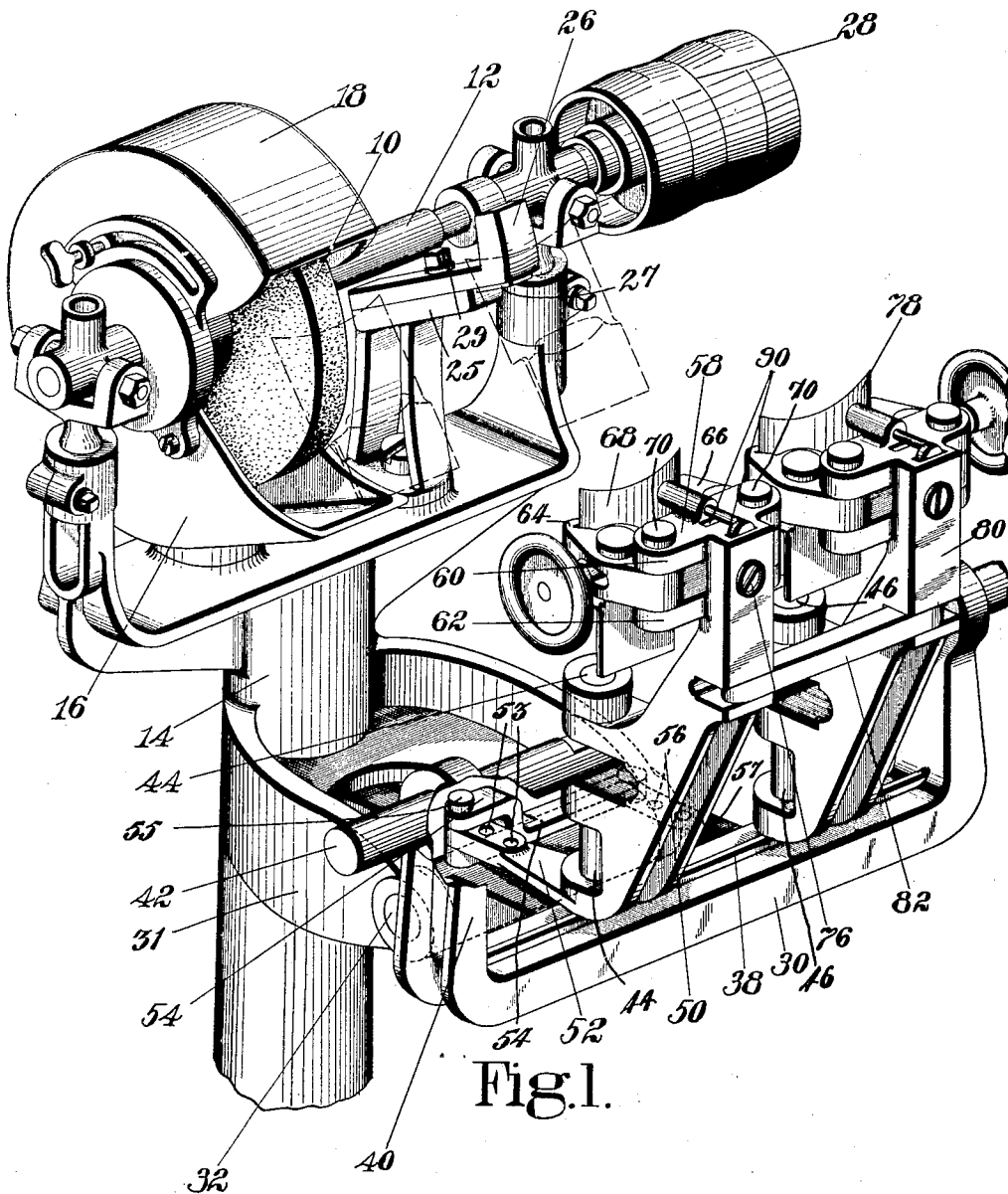


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GRINDING MACHINE.
APPLICATION FILED DEC. 2, 1916.

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3 SHEETS—SHEET 1.



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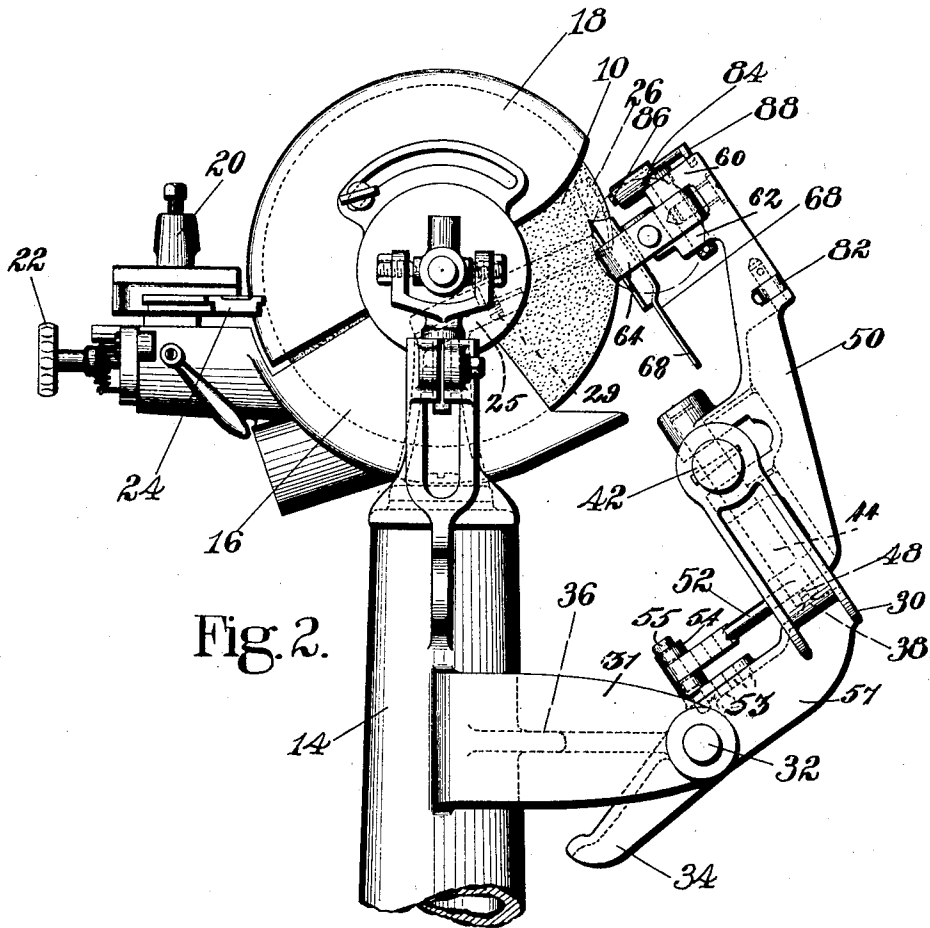


Fig. 2.

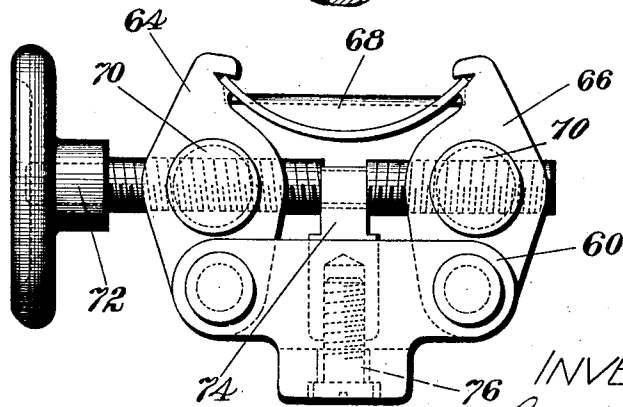


Fig. 3.

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3 SHEETS--SHEET 3.

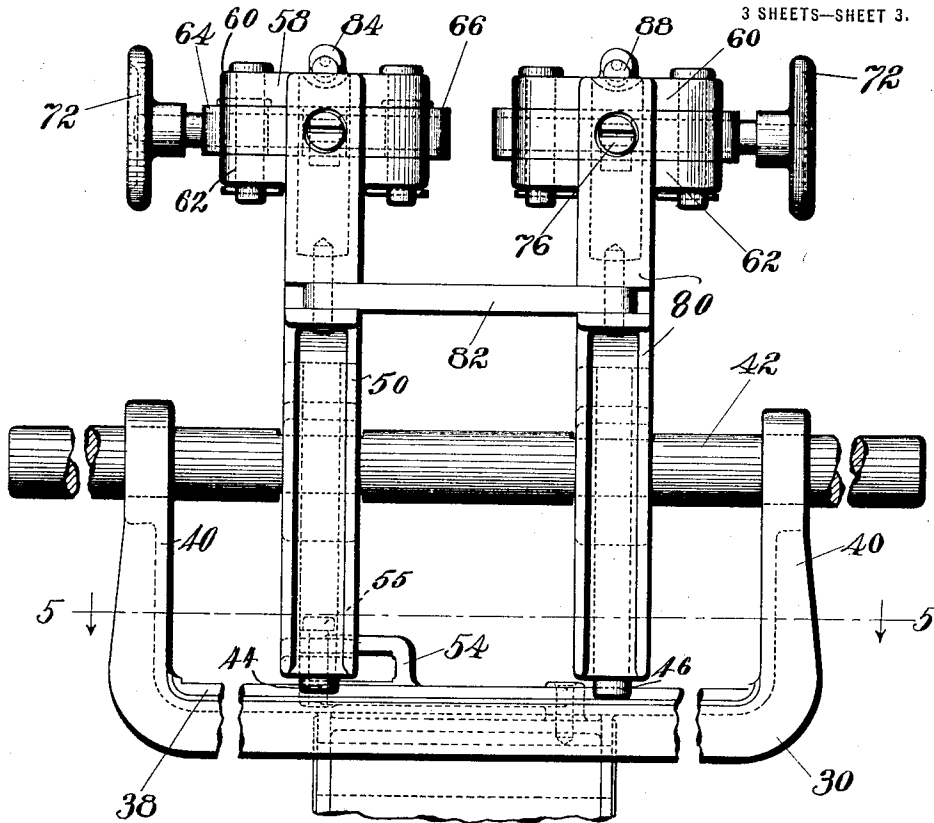


Fig. 4.

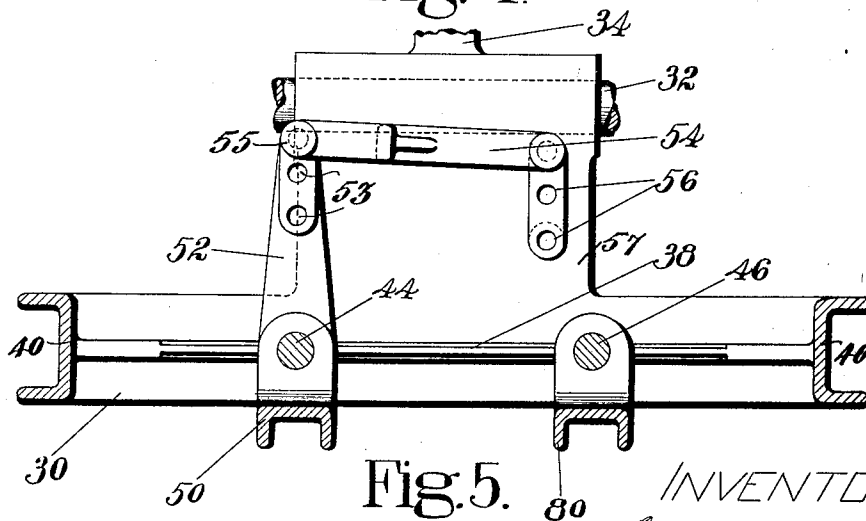


Fig.5.

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UNITED STATES PATENT OFFICE.

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GRINDING-MACHINE.

1,386,080.

Specification of Letters Patent.

Patented Aug. 2, 1921.

Application filed December 2, 1916. Serial No. 134,686.

To all whom it may concern:

Be it known that I, RALPH C. SIMMONS, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Grinding-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to a grinding machine and particularly to a machine arranged for automatically grinding knives with curved blades in a predetermined shape.

It is obviously important that, having once determined the desired shape of the edge of a curved blade knife, it should be possible to duplicate exactly this shape without depending upon the skill of the workman. Machines have been devised for this purpose in which the blade has been given a rotating movement relatively to the grinding wheel about a fixed center. Such machines are not wholly satisfactory, however, and they may or may not, according to the setting of the blade holder, grind the blade with an even bevel. A skilled workman will commonly move the blade across the grinding wheel with a combined sliding and rotating movement which results in presenting the blade near the center of the grinding edge and in giving the blade a uniform bevel. Machines of the type mentioned sometimes employ a templet intended to represent the shape of the edge of the blade which it is desired to produce and may include a former operatively associated with the templet and intended to represent the shape of the portion of the grinding element to which the blade is to be applied.

It is one of the objects of this invention to provide a grinding machine of the type specified in which a knife will be ground in a predetermined shape by giving to the knife holder a combined sliding and rotating movement. Another object of the invention is to provide, in this type of machine, means for determining the proper position of the former with relation to the grinding element and for setting the blade and the templet in their respective holders.

The invention, the scope of which may

be determined from the appended claims, is more fully described in the following specification and shown in the accompanying drawings, in which,—

Figure 1 is a perspective view of the grinding machine with the blade and templet holders moved to inoperative position;

Fig. 2 is an end view of the machine with the blade holder moved to operative position;

Fig. 3 is a detailed plan view of the blade holder, certain parts being omitted for the sake of clearness;

Fig. 4 is a front elevation of the carriage serving as a support for the blade and templet holders; and

Fig. 5 is a section on the line 5—5 of Fig. 4.

A rotary grinding element 10 of the disk type is mounted on a shaft 12 which is journaled in a bracket formed at the top of a supporting column 14. The grinding element is provided with a guard cover 16 whose upper portion 18 is adapted to be rotated through a small angle so that an emery wheel dressing tool may be presented to the back face of the grinding wheel to true the wheel and give its face the desired shape. To this end there is illustrated in Fig. 2 the usual arrangement, more fully shown and described in the patent to Glidden *et al.* No. 543,647, comprising a carriage 20 slidable along a curved track 24 and adjustable toward and away from the wheel by means of a hand screw 22. Adjustably mounted upon the inclined arm of an upright post attached to the supporting column 14 is a former 26 which is slidable in a direction parallel to a radius of the grinding wheel so that it may be adjusted as the wheel wears away to represent the portion of the wheel to which the blade to be ground is presented. As indicated by comparing Figs. 1 and 2, the base member of the former 26 is formed with a rib 27 engaging a guide groove in the upper face of the arm 25 to provide for the slidable adjustment referred to, a screw or bolt 29 being employed to hold the former in adjusted position. Suitable means such as fixed and loose pulleys 28 are provided for the rotation of the grinding element. All this is well known in the art.

A carriage 30 is pivotally attached to a

bracket 31 of the support 14 by means of a pin 32 and is provided with an extension 34 which coöperates with a lip 36 (Fig. 2) upon the support 14 to limit the movement of the carriage away from the grinding element. This carriage is provided with an upstanding rib 38 (Figs. 1, 4 and 5) arranged parallel to the axis of the grinding element and with two arms 40 in which a member 42 is slidable. Pivot posts 44 and 46 are then pinned to spaced points of said member and are each provided at their lower end with slots 48 coöperating with the rib 38, whereby said posts are guided along the carriage when the member 42 is slid lengthwise as hereinafter explained. A knife holder 50 is pivotally attached to the post 44. This knife holder is provided with a forward extension 52 having a series of apertures 53 for adjustable connection to a link 54 by means of a pin 55. The other end of said link is provided with a pin to engage either one of a series of sockets 56 in a base portion 57 of the carriage. The knife holder extends rearwardly and upwardly from the post 44 and carries at its upper end a blade holder 58 shown in detail in Fig. 3. This blade holder comprises brackets 60 and 62 here shown as formed integrally with the upper end of the knife holder and adapted to pivotally support the inner ends of clamping arms 64 and 66. These arms are notched to receive the edges of the blade 68 and are each provided with a swivel post 70 adapted to coöperate with a right and left hand-screw 72 whose position relative to the knife holder is fixed by a stud 74 held to the upper end of the knife holder by a screw 76.

A templet holder 80, mounted upon the pivot post 46, is of essentially similar construction to the knife holder 50 and carries the templet 78. The outer portions of the knife and templet holders are connected by means of a link 82 whose length is equal to the distance between the centers of pivot posts 44 and 46. It will be noted that the knife holder and the templet holder together with the member 42 and the link 82 form a parallelogram slidable relatively to the grinding element so that its sides 42 and 82 are parallel to the axis of the grinding element. At the same time, the knife holder and the templet holder are oscillatable in similar curves determined by the position of the link 54.

On the upper end of the knife holder a guide 84 is provided in which is slidably mounted a gage point 86. This gage point is the outer end of a rod whose rear end is provided with an eccentrically mounted disk 88 adapted to enter either one of two slots 90 formed on the upper end of the knife holder so that the gage point may be moved to certain definite operative and inopera-

tive positions. A similar gage is provided on the upper end of the templet holder.

When it is desired to use the machine described above, the gage points 86 will be moved to their forward position and the carriage 30 tipped forward until one of these points touches the grinding wheel 10. The former 26 will then be adjusted in accordance with the indication of the other gage point so as to truly represent the radius of the corresponding portion of the grinding wheel. This done, the knife to be ground and a corresponding templet will be inserted in their respective holders and clamped in position by manipulation of the hand wheels 72. With the aid of the gage points which may or may not be in their forward position, the blade and templet may be accurately set in corresponding positions. It will be noted that it is not necessary that the blade 68 should be set in exactly the same position as the templet for the reason that it may be desired to grind away a considerable portion of the blade. The carriage 30 will then be moved forward, supposing that the link 54 has been placed in its desired position, until the blade and templet contact with the grinding wheel and former, respectively.

The operator will now cause the blade to traverse the grinding wheel by grasping some convenient portion of the knife holder, for example the link 82, and because of the pivotal connection of the knife holder to the supporting carriage, the blade will be given a combined sliding and rotating movement. This will cause the blade to be always presented to the central portion of the face of the grinding wheel so that a tangent to the portion of the blade being ground will be substantially perpendicular to the plane of the grinding wheel. This insures that the level of the blade will be kept the same throughout its width and causes the cutting to be done by that portion of the grinding wheel it is intended shall do the cutting. If now the blade should be provided with a concave or convex edge, that is to say an edge which does not lie in a plane perpendicular to the axis of the blade, then the templet which has already been given the desired curve causes the blade to be moved across the grinding wheel in such a fashion that its edge will duplicate the edge of the templet. Obviously, the accuracy of this action will be greatly improved by the fact of the proper setting of the former 26 and the relative positions of the blade 68 and templet 78. If it is desired to grind a blade having a shorter radius of curve than the one shown in the drawing, then the link 54 will be moved in toward the pivot post 44 so as to alter the turning movement of the knife holder.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a machine of the type described, a support, a rotary grinding element, a former adjustably mounted on said support and movable radially of the grinding element, a gage for determining the relative positions of said former and grinding member having two contact points associated with said former and grinding member respectively, said gage being movably mounted to assume a plurality of positions parallel to the axis of said grinding element.

2. In a machine of the type described, a support, a rotary grinding element mounted on the shaft journaled in said support, a former adjustably mounted on said support and movable radially of the grinding element, a carriage pivotally mounted for movement toward and away from the grinding element, a knife holder and a templet holder movably mounted upon said carriage and adapted to hold a knife and templet in operative relation with the grinding element and said former respectively, and gage points upon said carriage arranged to assist in determining the proper position of said former as well as the proper relative position of the knife and the templet.

3. In a machine of the type described, a support, a rotary grinding element journaled in said support, a former adjustably mounted on said support and movable radially of the grinding element, a carriage pivotally connected to said support upon an axis parallel to the axis of the grinding element, knife and templet holders movably connected to said carriage for simultaneous movement, a gage adjustably mounted upon said knife holder and said templet holder and arranged to be moved to and held in a plurality of definite positions whereby when said carriage is brought up to said grinding element said gages will assist in properly setting said former.

4. In a machine of the class described, a support, a rotary grinding element mounted on a shaft journaled in said support, a former, a carriage mounted upon said support for movement toward and from operative relation to said grinding element, knife and templet holders mounted on said carriage for bodily simultaneous movement transversely of the grinding surface and for equal swinging movement toward and from the grinding surface of said grinding element about axes approximately perpendicular to the axis of said element.

5. A machine for grinding transversely curved blades comprising a rotary grinding element having a curved grinding face, a blade holder, and means for bodily moving said blade holder transversely of said grinding face with a swinging component of movement about an axis approximately per-

pendicular to the axis of said rotary grinding element to move a curved blade in said holder in a predetermined path such that a tangent to the cross-sectional curve of the blade at its point of contact with the face of the grinding element will be substantially parallel to the axis of the grinding element whereby the grinding action will take place near the center.

6. A machine for grinding transversely curved blades comprising a rotary grinding element, a support, a pivot post slidably mounted on said support for straight line movement in a direction substantially parallel to the axis of the grinding element, a blade holder journaled on said pivot post for swinging movement during said straight line traverse about an axis approximately perpendicular to the axis of said grinding element and a pivotal connection between said blade holder and support arranged to direct the swinging traverse of said holder to grind the blade with a substantially uniform bevel.

7. In a machine of the type described, a support, a rotary grinding element mounted thereon, a former intended to represent a portion of the surface of the grinding element, a knife holder and a templet holder slidably mounted upon said support and adapted to be swung to and from cooperative relation to said grinding element and said former respectively, means connecting said holders to cause them to slide in unison, and means for causing said holders to be turned about axes approximately perpendicular to the axis of said grinding element as they traverse the grinding element and said former.

8. In a machine of the type described, a support, a rotary grinding element mounted thereon, a former, a carriage pivotally mounted upon said support on an axis substantially parallel to the axis of the grinding element, knife and templet holders mounted upon pivot posts and pivotally connected by a link, said pivot posts being connected and arranged for simultaneous sliding movement on said carriage transversely of the grinding face of said element, and means for causing said holders to swing in unison as they traverse the grinding element and former respectively.

9. In a machine of the type described, a support, a rotary grinding element mounted thereon, a pivot post slidably mounted upon said support for movement in a direction substantially parallel to the axis of the grinding element, a knife holder pivotally mounted upon said post, and adjustable means for pivotally connecting said knife holder to said support whereby the amount of turning movement of the knife holder for a given length of traverse may be varied.

10. In a machine of the type described, a

support, a rotary grinding element mounted thereon, a carriage pivotally mounted upon an axis substantially parallel to the axis of the grinding element, a pivot post slidably mounted upon said carriage, a knife holder pivotally mounted upon said carriage, an extension on said holder, and a link for pivotally connecting various points of said extension to corresponding points of said carriage.

11. In a machine of the type described, a support, a rotary grinding element mounted thereon, a former mounted on said support and adjustable radially of the grinding element, a carriage pivotally connected to said support upon an axis substantially parallel

to the axis of the grinding element, pivot posts slidably connected to said carriage and attached to corresponding points of a member which is slidably mounted in said carriage parallel to the path of movement of said posts, a knife holder and a templet holder pivotally mounted on said posts and connected by a link of a length corresponding to the distance on said sliding member between said posts, said knife holder having an extension, and a link pivotally and adjustably connected to the carriage and the extension.

I testimony whereof I have signed my name to this specification.

RALPH C. SIMMONS.