Jan. 15, 1929. 1,699,510

H. J. GAISMAN ET AL

METAL SHARPENING MACHINE

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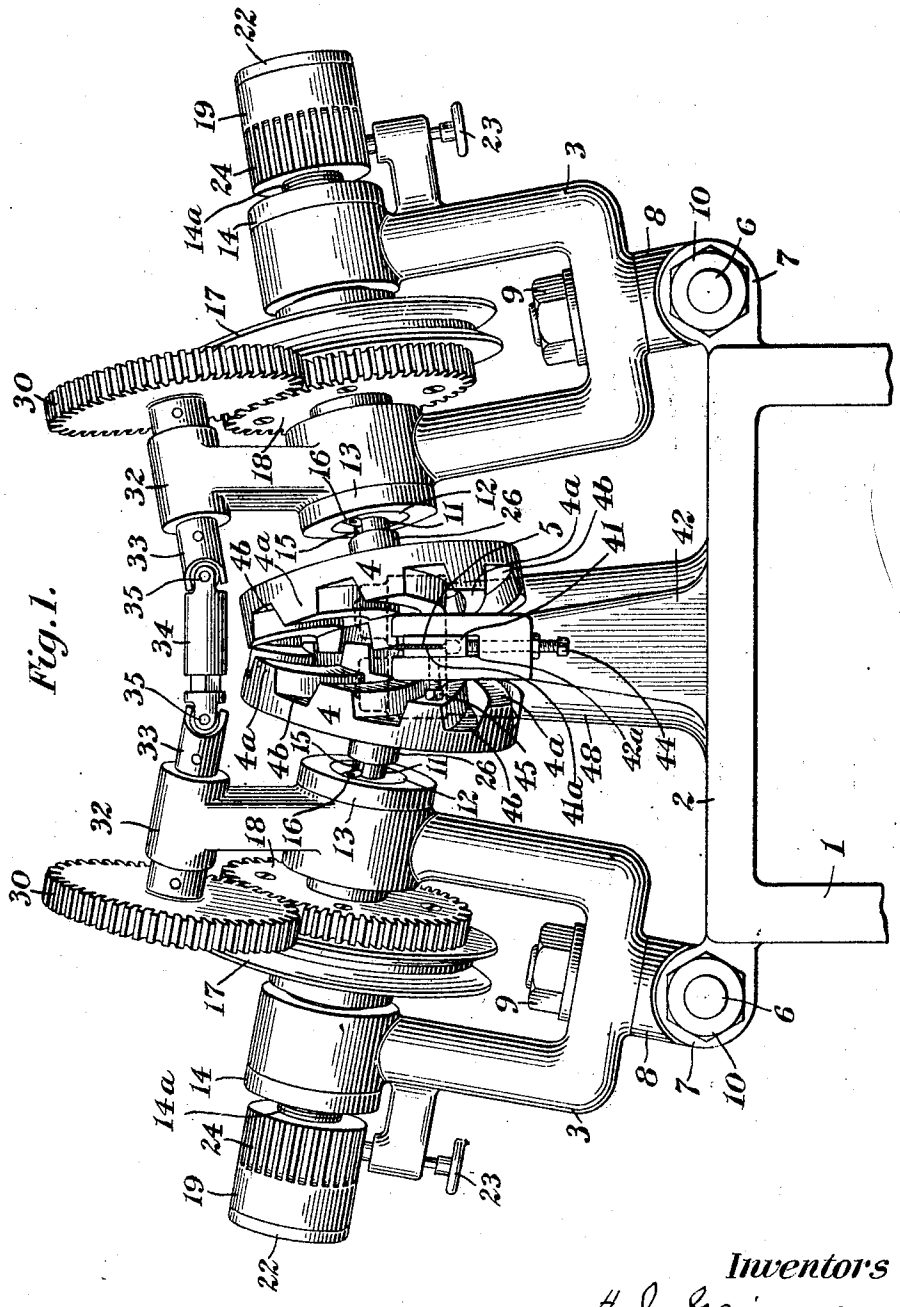


Fig. 1.

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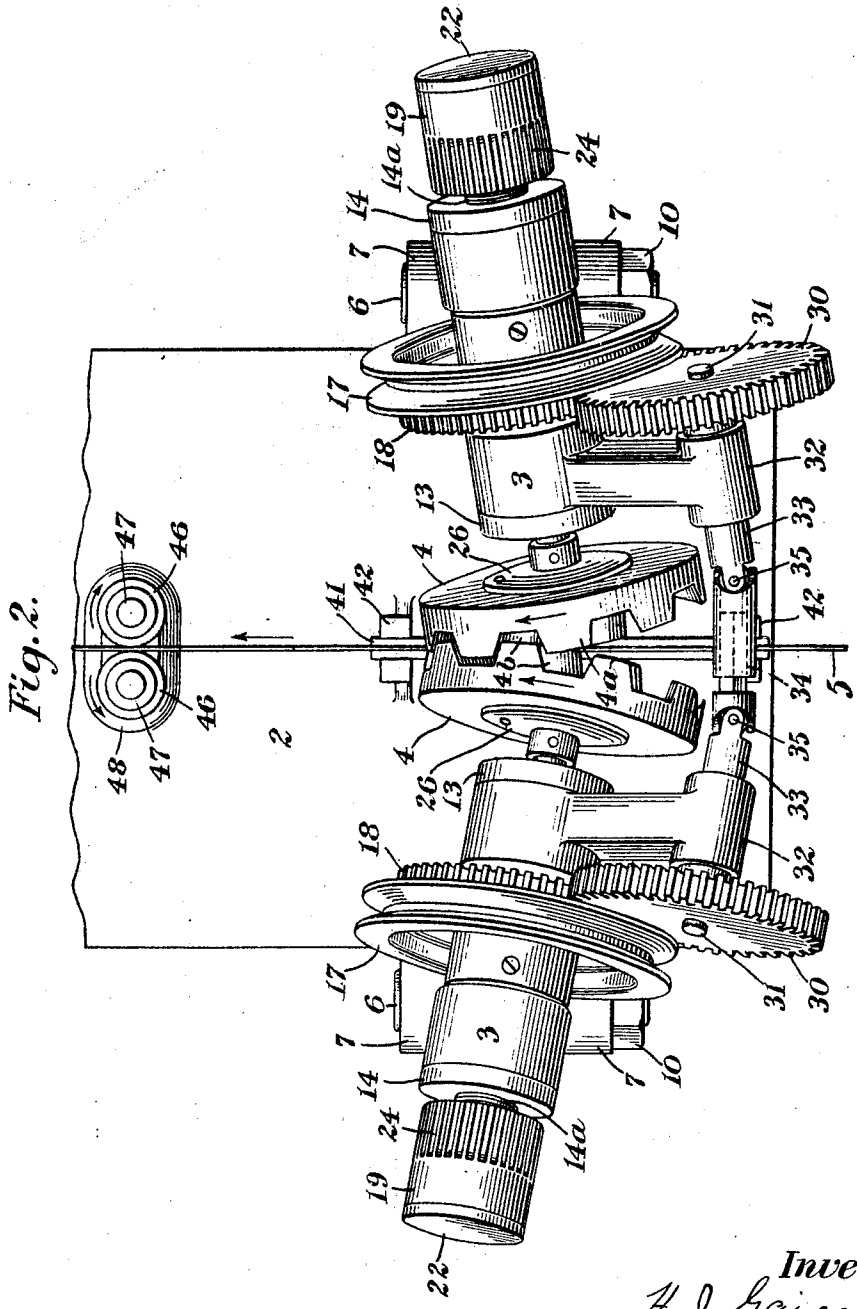
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Fig. 2.



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Fig. 4.

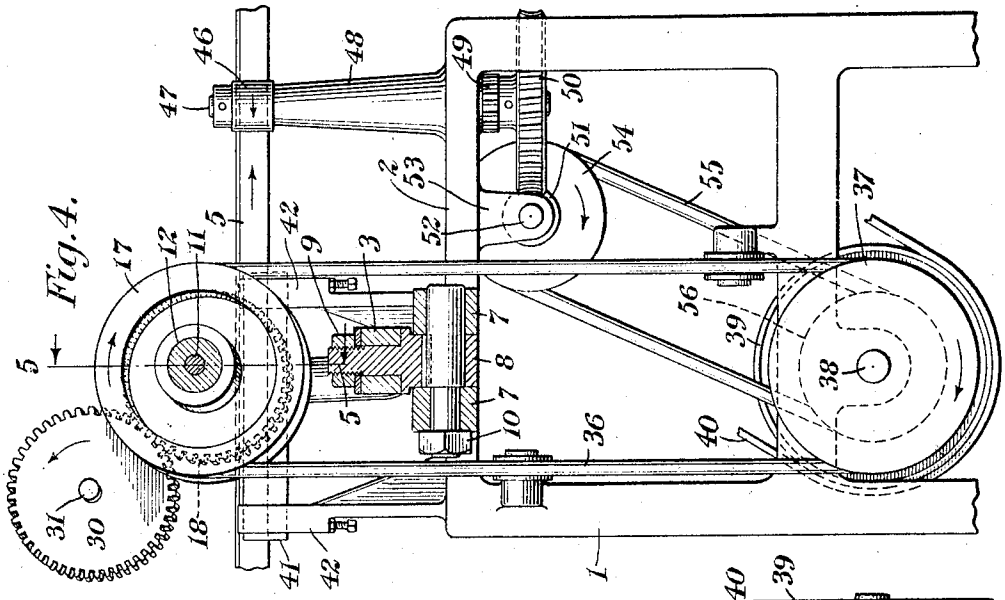
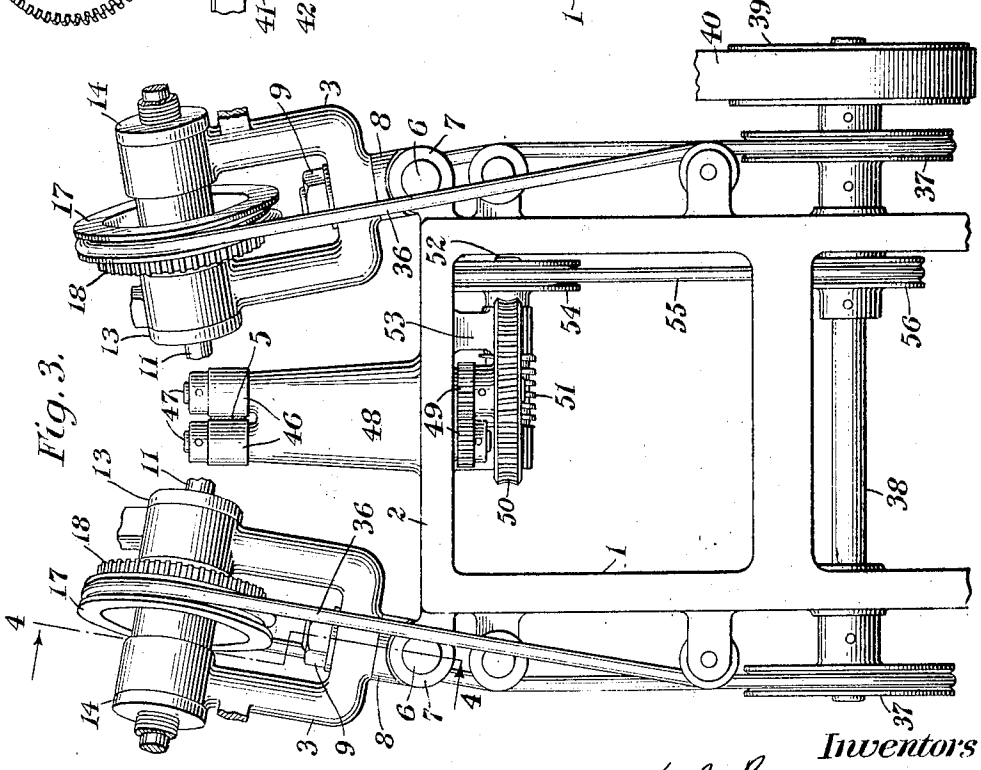


Fig. 3.



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Fig. 5.

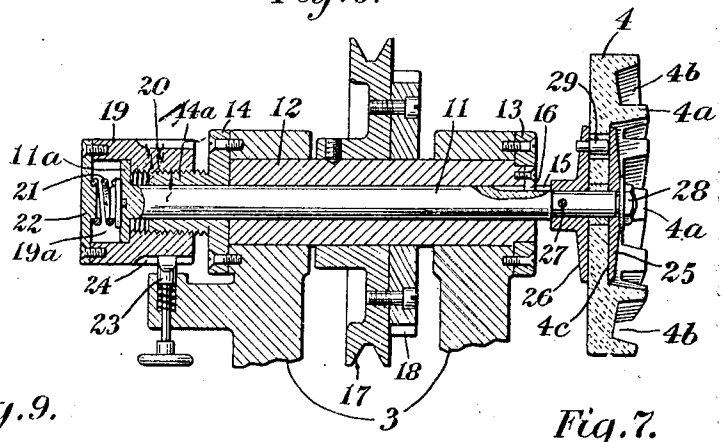


Fig. 9.

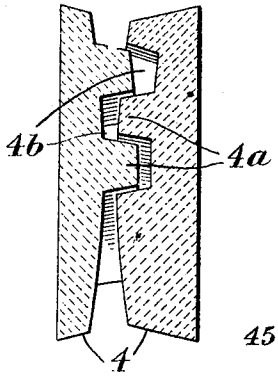


Fig. 7.

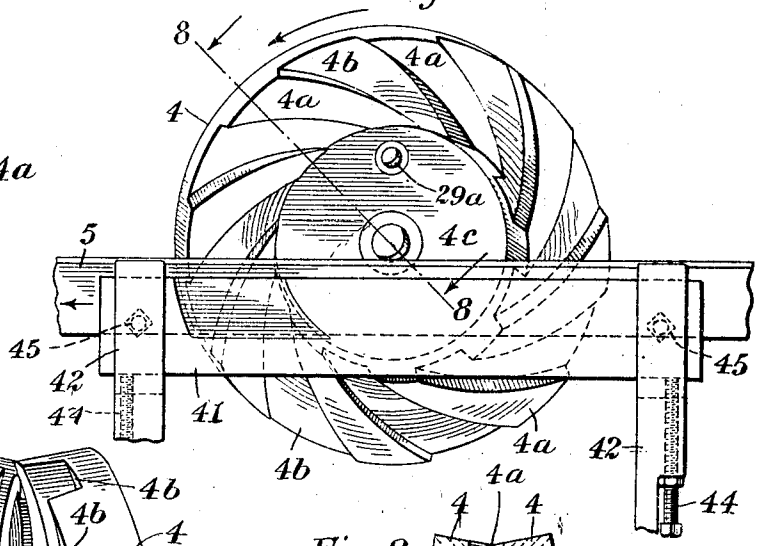


Fig. 6.

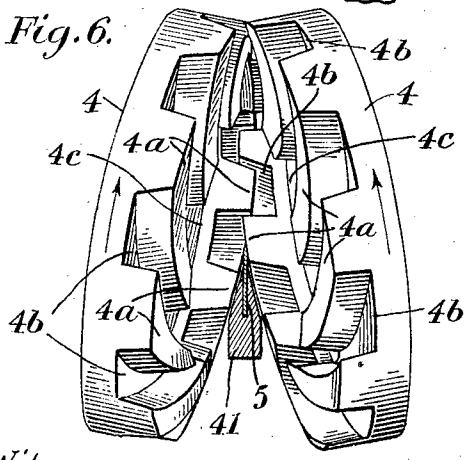
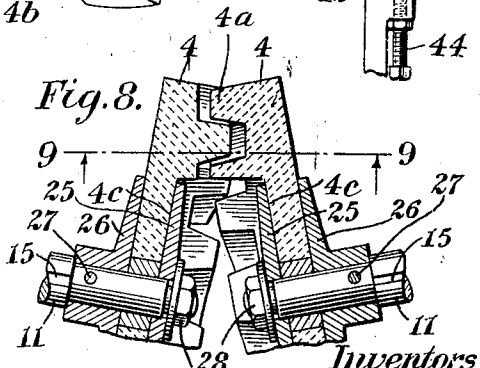


Fig. 8.



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UNITED STATES PATENT OFFICE.

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METAL-SHARPENING MACHINE.

Application filed August 14, 1925. Serial No. 50,227.

This invention relates to improvements in machines for sharpening and honing metal, such as strips of metal continuously fed, and the invention has for its object to provide means for grinding or honing the sides or edges of metal strips or pieces as fed. The invention is particularly adapted for producing a sharp edge upon a metal strip adapted to be cut into desired lengths for use as razor blades, and for other purposes.

In carrying out the invention we provide a pair of opposing rotative disks between which the strip of metal is to be fed, which disks are provided with correspondingly arranged spaced abrading surfaces located upon spaced projections on corresponding faces of the disks between intervening spaces therein, so arranged that a projection of one disk will enter a space of the other disk, and vice versa, the axes of the disks being located at an oblique angle, whereby the abrading surfaces along one edge portion of each disk will engage the strip during rotation of the disks.

The invention also comprises novel details of improvement that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part hereof, wherein

Fig. 1 is a front elevation of a machine embodying our invention;

Fig. 2 is a plan view;

Fig. 3 is a rear elevation, parts being omitted;

Fig. 4 is a section on line 4, 4, in Fig. 3;

Fig. 5 is a section substantially on the plane of line 5, 5, in Fig. 4;

Fig. 6 is an edge view of the opposing disks, showing their relation to the strip to be sharpened;

Fig. 7 is a face view illustrating the strip and one of the disks related thereto;

Fig. 8 is a section substantially on the plane of line 8, 8, in Fig. 7; and

Fig. 9 is a section on the plane of line 9, 9, in Fig. 8.

Similar numerals of reference indicate corresponding parts in the several views.

In the accompanying drawings the numeral 1 indicates a suitable frame shown provided with a table or top 2. At 3 are bearing members shown bifurcated at their upper ends, and adjustably supported at opposite sides of the frame, adapted to rotatively support the grinding or honing disks 4 between which the strip of metal 5 to be sharpened travels. The frame carries bolts or pivots 6 in eyes 7 on the frame, (Fig. 4), which bolts are keyed to studs 8 that pass through holes in the bases of the bearing members 3 and are secured by nuts 9, nuts 10 on the bolts 6 securing the latter in set position. The arrangement is such that the bearing members 3 may be adjusted toward and from each other and angularly to regulate the opposing and angular positions of the disks respecting one another. The disks 4 are secured to shafts 11 respectively carried by a bearing member 3. Shaft 11 is slidably supported in a bushing or hollow shaft 12 journaled in the bearing member 3 and retained from endwise movement by heads or disks 13 and 14 shown secured by screws to the said member, (Fig. 5). Shaft 11 is slidably adjustable in bushing 12 and is provided with a key-way 15 receiving a key 16 secured by a screw to the bushing, whereby the latter will rotate the shaft. A pulley 17 is secured to the bushing 12 for rotating the latter and the shaft 11. A gear 18 is shown secured to the pulley by screws. The shaft 11, bushing 12 and correlated parts are the same for each disk 4. Each shaft 11 is longitudinally adjustable in order that the two opposing disks 4 may be adjusted toward and from each other to regulate engagement of the disks with the strip 5 on the opposite sides thereof. A nut or finger-piece 19 is mounted upon an extension 14^a of head 14 and connected thereto by threads at 20. The shaft 11 at the outer end is provided with a head 11^a located within a recess 19^a in nut 19 and bearing against the latter, and a compression spring 21 is interposed between said shaft and a cap or disk 22 secured by screws on the outer end of nut 19 over recess 19^a, (Fig. 5). When nut 19 is screwed toward the bushing 12 the shaft 11

will be moved inwardly, since the head 11ª is maintained by spring 21 pressed against the nut, and when the nut is unscrewed the shaft will be moved outwardly by cooperation of the nut with head 11ª. The spring 21 serves to resiliently resist longitudinal outward movement of shaft 11, hence lateral play of disk 4, during operation of the disk upon strip 5. A spring pressed dog 23, carried by bearing member 3, is adapted to engage teeth 24 on nut 19 to retain the latter from rotation for maintaining the proper position of shaft 11. When the shaft is to be adjusted the dog 23 will be withdrawn from nut 19.

The shafts 11 with their corresponding disks 4 are located on opposite sides of the strip 5 to be ground or honed, and the axes of said shafts are disposed obliquely to each other whereby the inner operative faces of the disks are located at a corresponding angle to each other, (Figs. 1 and 6). The shafts 11 incline toward one another in a vertical direction, (Fig. 1), and also in a horizontal direction, (Fig. 2), so that the forward portions of the disks are spread apart where the strip 5 enters between the disks and the opposite or rearward portions of the disks approach each other where the strip is operated upon by the disks and whence the strip passes from the disks, (Fig. 2).

The operating faces of the disks are outwardly rounding or convex and said faces are provided with inwardly tapering arcuate abrading projections 4ª that are spaced apart by intervening recesses 4ᵇ correspondingly curved and spaced, the curved spaces and projections intermeshing in spaced relation and inclining from one end to another respecting intersecting radii, whereby the projections 4ª of one disk may enter spaces 4ᵇ of the other disk, and vice versa, at the rear portions of the disks, when the latter rotate uniformly together, at which time the projections 4ª engage the edge portions of strip 5, traveling between the disks, to grind or hone the edges on opposite sides of the strip. The disks may be of any suitable material, such as carborundum, emery or the like, adapted for grinding or honing.

The disks may be detachably connected with the shafts 11, to be rotated thereby. We have shown the disks provided with central depressions 4ᶜ, (Figs. 5, 7 and 8), in which are located plates or disks 25 mounted upon the shafts 11, (Figs. 5 and 8), the disks 4 bearing against flanges or disks 26 shown secured to the shafts by pins 27. Nuts 28 on shafts 11 detachably secure the disks 4 between the plates 25 and the flanges 26 and maintain the disks 4 in operative relation. Pins 29 carried by the flanges 26 enter bores 29ª in the disks 4 and serve to cause rotation of the latter with the shafts 11, (Figs. 5 and 7).

In order to cause the disks 4 to rotate in unison, notwithstanding their angular relation to one another, we provide gears 30 in mesh with gears 18 and connect the gears 30 by a universal connection. The gears 30 are shown carried by shafts 31, (Fig. 2), journaled in bearings 32 extending from members 3, and said shafts are connected by universal coupling members 33, 34, united by pivots 35, the parts 33 and 34 being angularly disposed relatively to one another corresponding to the angular relation of the shafts 11, (Figs. 1 and 2). The arrangement is such that the gears 18, and thereby the shafts 11 and disks 4, are caused to rotate at the same speed in the same direction, in such a way that the projections 4ª of one disk 4 will be caused to enter the opposing recesses 4ᵇ of the other disk, in proper relation, so that a projection of one disk will not engage a projection of the other disk during rotation of said disks. In the example illustrated the pulleys 17 receive belts 36 from pulleys 37 secured on drive shaft 38 journaled on frame 1, (Figs. 3 and 4). A pulley 39 on shaft 38 may be driven by a belt 40 from any suitable power source. Any other desired means may be used for rotating shaft 38. While two belts 36 and corresponding pulleys are shown for rotating the shafts 11 one of said belts and associate pulleys may be omitted, since the gearing 30, 31, 33, 34 will drive one shaft 11 from the other.

The strip 5 may be guided to travel between the disks 4 in any suitable way. We have shown a longitudinally disposed bar 41 supported in slots 42ª in standards 42 on the frame top 2, which bar has a longitudinal slot 41ª receiving strip 5, (Fig. 1). The standards 42 have screws 44 bearing against the bar 41 for adjusting the latter vertically and resisting downward thrust of strip 5. Screws 45 carried by the standards 42 engage bar 41 for retaining it in the standards, (Fig. 7). By the means described the strip 5 may be adjusted vertically and be retained for locating its edge in position between the disks for grinding or honing the edge of the strip. The edge of the strip to be sharpened is shown located on a horizontal plane approximating the axes of the disks with the operating portions of the disks at one side of such axes, (Fig. 7). The strip 5 may be propelled, in the direction of the arrow *a* in Fig. 2, by any suitable means. We have shown feed rolls 46 bearing on opposite sides of strip 5 and carried by shafts 47 journaled in standard 48 secured on frame top 2, (Figs. 2 and 3), which shafts have intermeshing gears 49 for causing the shafts to rotate at the same speed for feeding strip 5. One of the shafts 47 is provided with a worm wheel 50 in mesh with a worm 51 on shaft 52 journaled in bracket 53 depending from frame top 2, the shaft 52 being provided with a pulley 54 receiving a belt 55 from a pulley 56 secured on shaft 38, (Fig. 3). By the means described the feed rolls

46 will be driven in unison with the rotation of disks 4 for feeding strip 5 in accordance with the rotation of said disks.

When the strip 5 is fed and the disks 4 rotate in unison, in the direction of the respective arrows in Fig. 7, the outer portions of the projections 4ª will first engage corresponding edge portions of the strip, and during such engagement of said projections with the strip during their progression therealong the abrading or grinding surfaces of the disks will not only operate upon the strip in a more or less transverse direction but also in a longitudinal direction as the arcuate projections change their angular relation to the edges of the strip, with what may be termed a wiping or sweeping action. According to the relation of the projections 4ª shown the wide outer portions of the projections first engage the strip 5 and as the disks rotates the narrow portions of the projections are presented gradually to the strip edge until the extreme inner portions of the projections pass from the strip, and while the latter action is occurring respecting one projection the wide portion of another projection is in engagement with the strip, and so on successively for the several projections as the disks rotate, so that all portions of the edges of the strip will be engaged by the projections and the strip will be supported at all times by a projection on one side immediately adjacent the place of sharpening of its opposite side by a projection on the other disk. Due to the angular relation of the disks to one another the rear portions only of the disks will engage the strip in what may be called a V-like relation, and in conjunction with the convex inner faces of the disks the projections will sweep along the strip edges in such a way as to produce ground or honed edges on the opposite sides of the strip having the desired bevel or angular relation along the longitudinal edge of the strip. The machine may be equipped with a single pair of the disks adapted either for grinding or honing, and the machine may have several sets of disks suitably spaced along the strip for grinding successively, or for grinding and honing successively, or for honing successively, according to the character of the finished edge desired on the strip.

The invention enables rapid and economical grinding and honing of metal strips as they travel in suitable lengths through the machine in a continuous manner, as from a reel of the strip suitably mounted. The ground or honed strip may be wound on a take-up reel, in a well known way, or may be cut off into suitable lengths as delivered from the disks, as for razor blades or for other purposes. Blades or metal pieces previously cut to the desired length may be fed through the machine to be ground or honed.

If it is desired to sharpen, (grind or hone), but one side of the strip one of the disks 4 may be omitted.

The invention is not limited to the details of construction and arrangement of parts set forth, as the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention. We use the term "sharpen" and "sharpening" to include grinding or honing or both.

Having now described our invention, what we claim is:—

1. A sharpening machine comprising means to guide a strip, means to feed the strip, sharpening disks located on opposite sides of the strip, said disks having convex faces and having spaces and curved sharpening projections between said spaces, shafts rotatively supporting said disks at angles to one another with the disks tilted respecting the strip, means to rotate said shafts and disks in the same direction and at the same speed with projections of one disk in spaces of the opposing disk and in engagement with the strip, said projections and spaces being inclined to radii which intersect them so that the strip is supported at all times on one side by a projection on one disk immediately adjacent the place of sharpening of its opposite side by a projection on the other disk.

2. A sharpening machine comprising coacting sharpening disks, each of which disks has curved spaces and projections intermeshing in spaced relation and inclined from one end to another respecting intersecting radii, and means for mounting the disks at angles to their vertical and horizontal axes and at an angle to and in engagement with a strip to be sharpened so that the strip will be supported at all times by a projection on one side immediately adjacent the place of sharpening of its opposite side by a projection on the other disk.

3. In a sharpening machine, a pair of opposing disks provided with spaced inwardly disposed curved spaces and projections, the face of each disk being convex, means rotatably mounting the disks at angles to each other with their projections intermeshing adjacent to one edge, and means to support and propel a strip to be sharpened between and in engagement with the intermeshing portions of the projections, said projections and spaces being inclined to radii which intersect them so that the strip is supported at all times on a side by a projection on one disk immediately adjacent the place of sharpening of its opposite side by a projection on the other disk.

4. A sharpening machine comprising means to guide a strip, means to feed the strip, sharpening disks located on opposite sides of the strip, said disks having spaces in one side face and curved sharpening projections between said spaces which respective-

ly enter spaces of an opposing disk and engage the strip, the disks having convex faces enabling the outer faces of the projections to successively engage opposite sides of the strip along its edge to sharpen it, said projections and spaces inclined to radii which intersect them so that the strip is supported at all times on a side by a projection on one disk immediately adjacent the place of sharpening on its opposite side by a projection on the other disk, shafts rotatively supporting said disks at an oblique angle to one another with the disks tilted respecting the strip, means to rotate said shafts and disks in the same direction and means to cause said disks to rotate at the same speed.

Signed at New York city, county and State of New York, this 11th day of August, 1925.

HENRY J. GAISMAN.
CONRAD SCHUMACHER.