C. SCHUMACHER.

HONING OR GRINDING MACHINE.

APPLICATION FILED APR. 20, 1914.

1,255,799.

Patented Feb. 5, 1918.

9 SHEETS—SHEET 1.

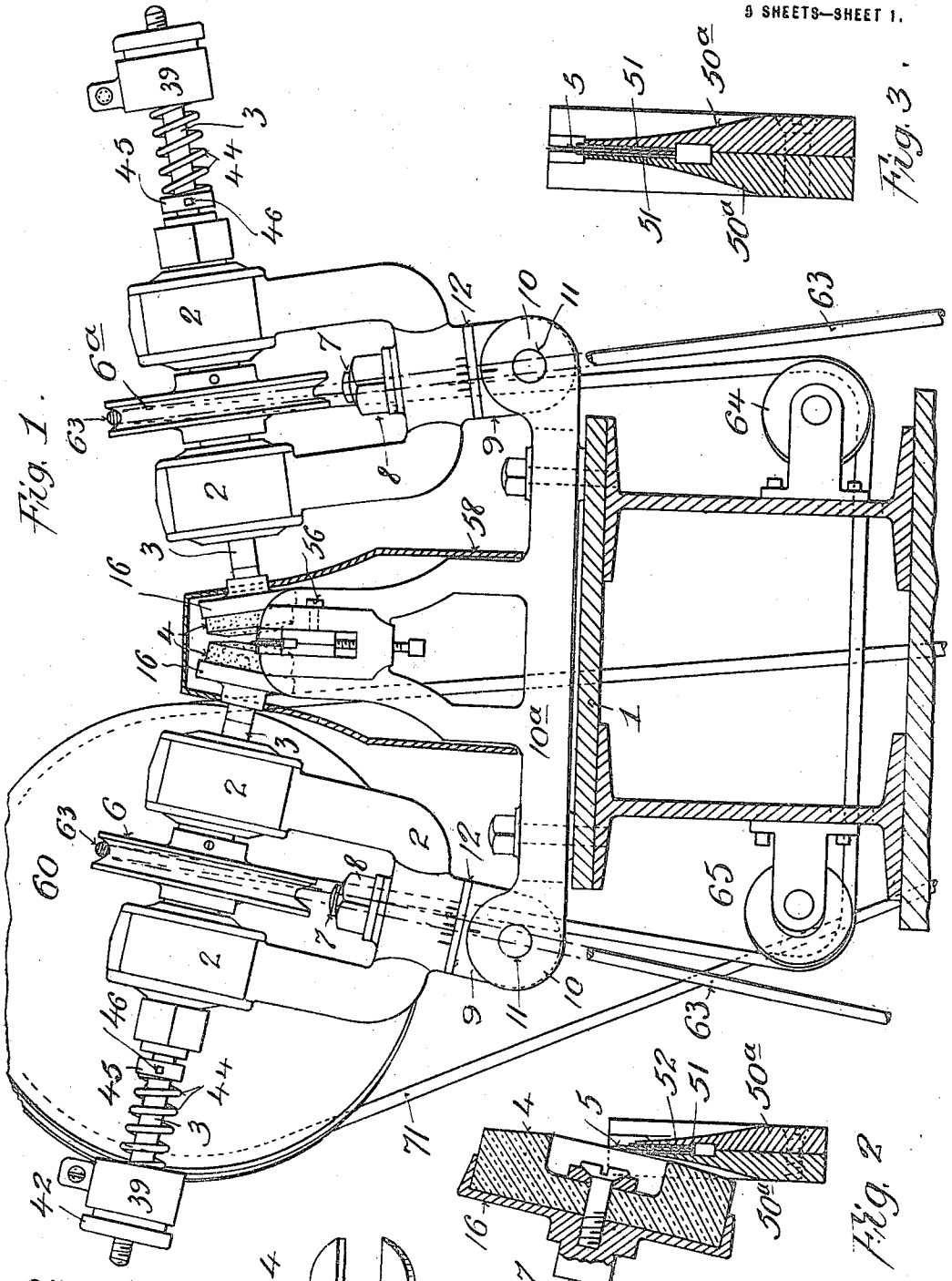


Fig. 1.



Fig. 3.



Fig. 2

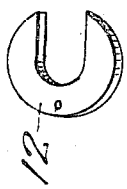


Fig. 4

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5 SHEETS—SHEET 2.

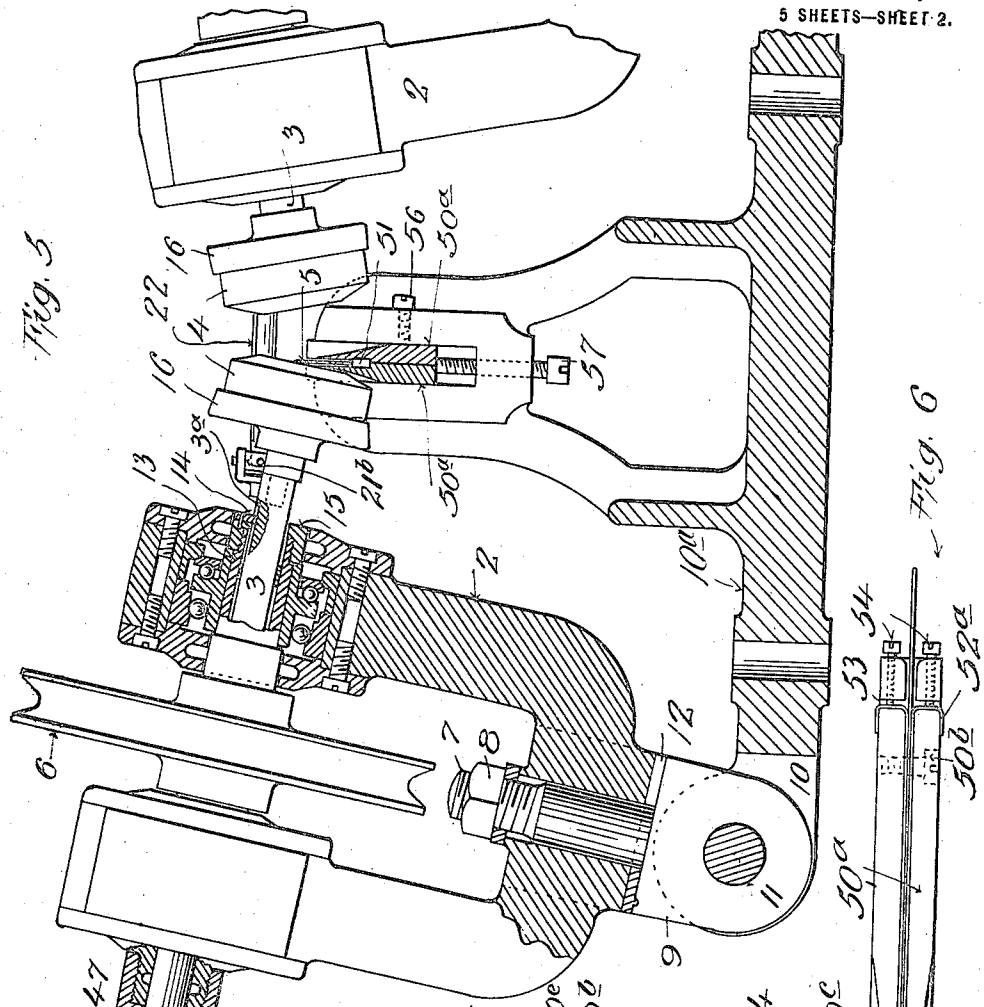
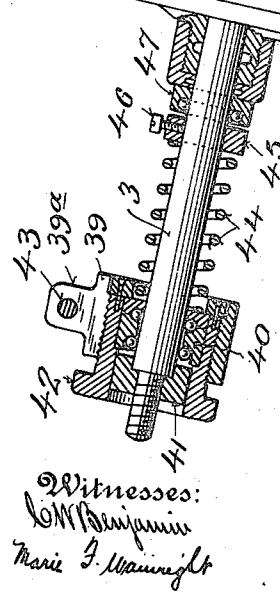


Fig. 5



Fig. 6



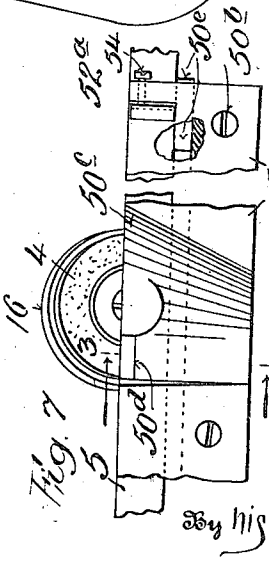


Fig. 7

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5 SHEETS—SHEET 3.

Fig. 8

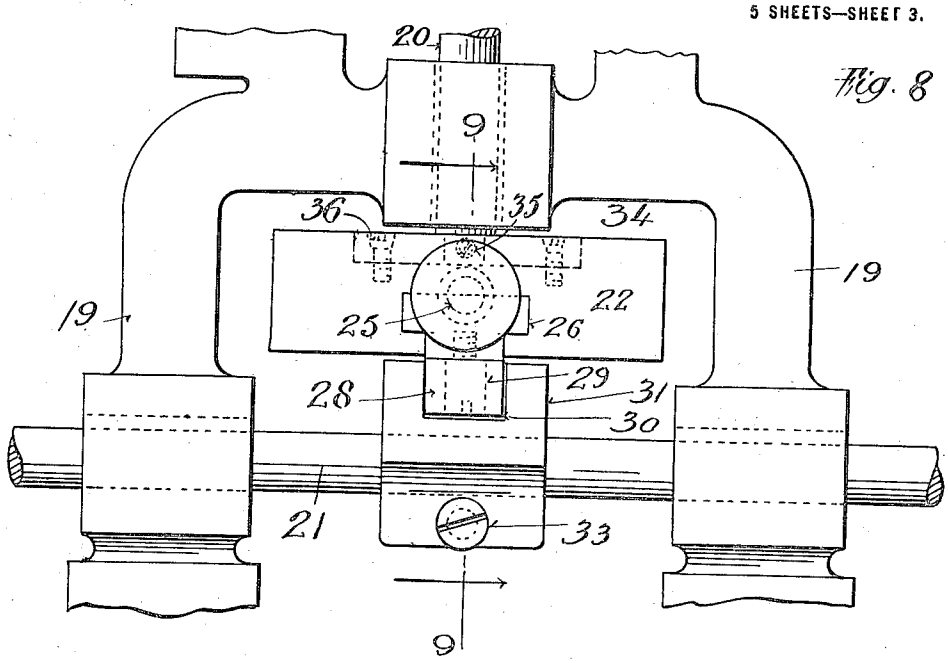



Fig. 9

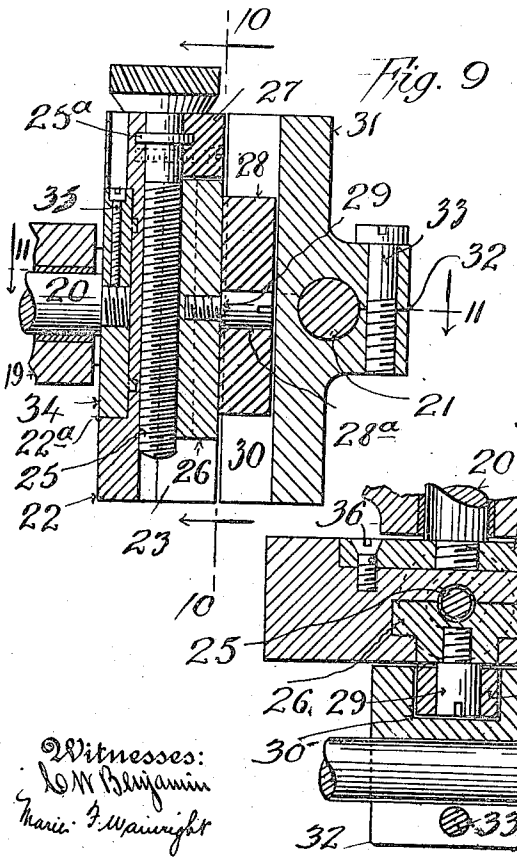



Fig. 10.

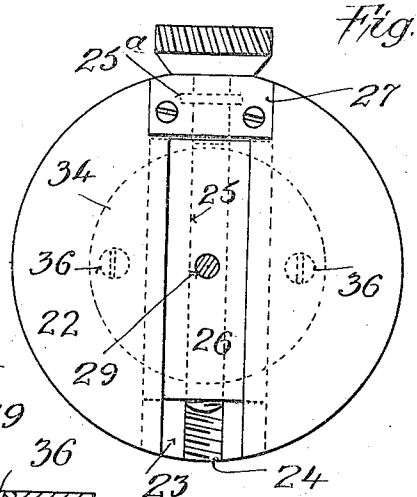






Fig. 11.

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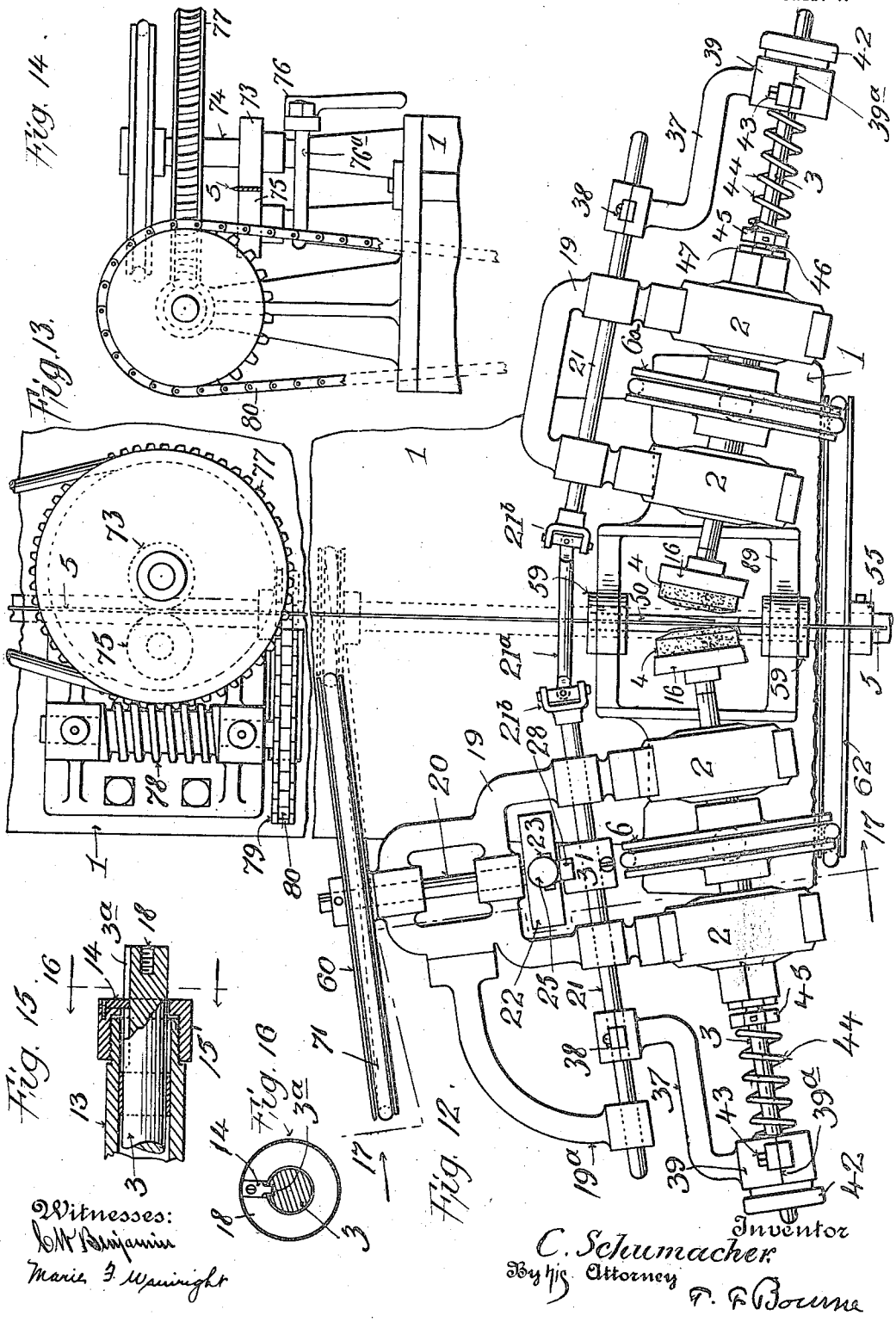
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5 SHEETS—SHEET 4.



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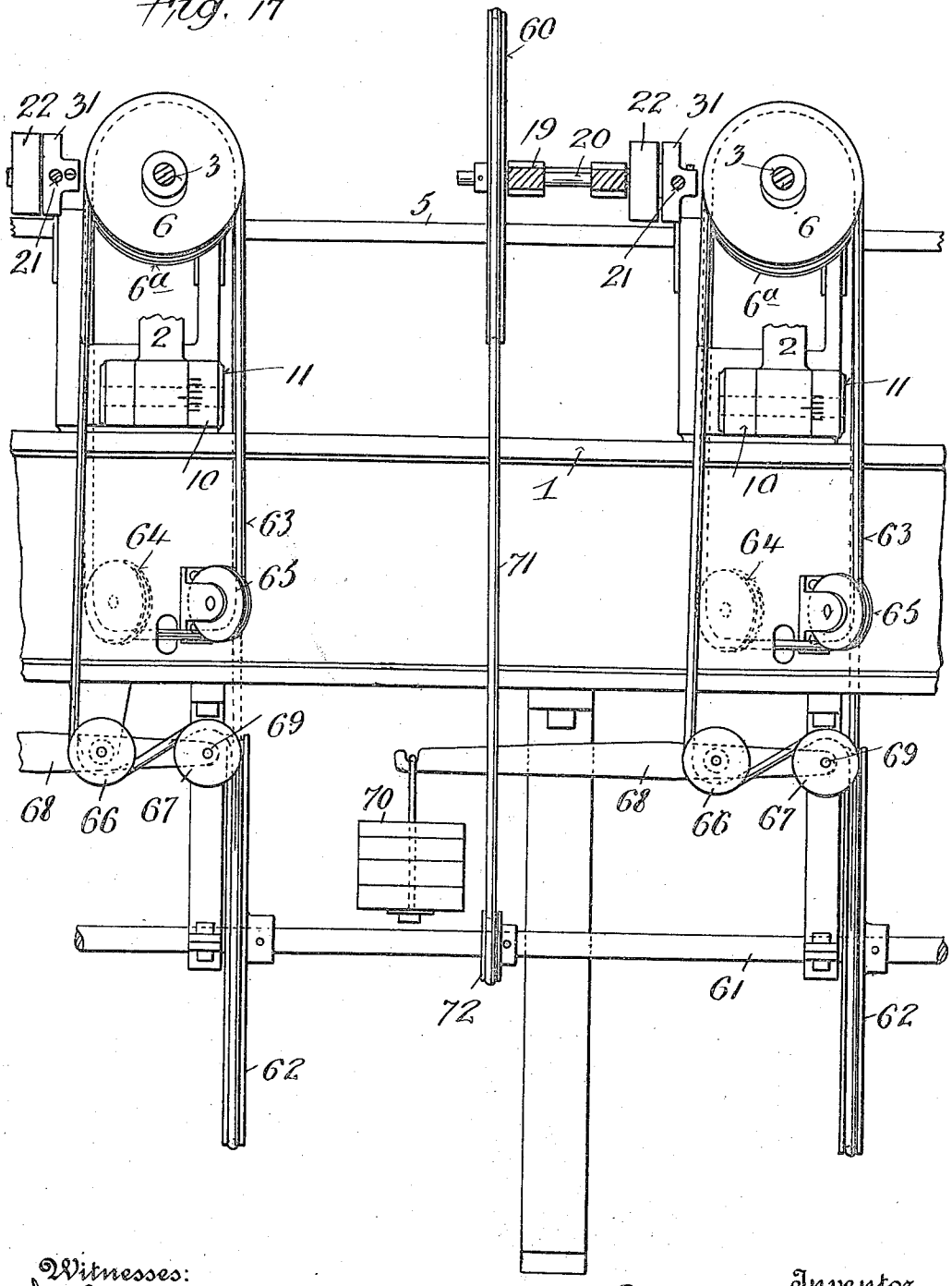
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5 SHEETS—SHEET 5.

Fig. 17




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# UNITED STATES PATENT OFFICE.

CONRAD SCHUMACHER, OF LYNNBROOK, NEW YORK, ASSIGNOR TO AUTO STROP COMPANY, A CORPORATION OF NEW YORK.

## HONING OR GRINDING MACHINE.

1,255,799. Specification of Letters Patent. Patented Feb. 5, 1918.

Application filed April 20, 1914. Serial No. 833,030.

*To all whom it may concern:*

Be it known that I, CONRAD SCHUMACHER, a citizen of the United States, and resident of Lynnbrook, in the county of Nassau and State of New York, have invented certain new and useful Improvements in Honing or Grinding Machines, of which the following is a specification.

My invention pertains to improvements in machines for automatically honing or grinding the edge of a metal strip, which strip may be moved substantially continuously along the working face of a honing or grinding disk or disks.

An object of my invention is to provide improved means to enable opposite sides of an edge of a metal strip, that is drawn continuously through the machine, to be alternately acted upon by honing or grinding disks; a further object of the invention is to enable the honing or grinding disk or disks to be held against the edge of the strip in a resilient manner, so as not to bear too rigidly thereon, and also to enable such resilient pressure to be regulated at will.

Further objects and characteristics of my invention will be more fully hereinafter set forth and then pointed out in the claims.

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

Figure 1 is a front elevation, partly in section, illustrating means for supporting and actuating the honing or grinding disks;

Fig. 2 is an enlarged section substantially on the line 2, 2, in Fig. 6;

Fig. 3 is an enlarged section substantially on the line 3, 3, in Fig. 7;

Fig. 4 is a detail of a spacer hereinafter referred to;

Fig. 5 is an enlarged view, partly in section, of parts shown in Fig. 1;

Fig. 6 is an enlarged detail plan view, illustrating a honing or grinding disk in operative relation to the strip and its guide;

Fig. 7 is a detail side view of Fig. 6, reduced;

Fig. 8 is a detail plan view of part of the means for reciprocating the honing or grinding disks;

Fig. 9 is a section on the line 9, 9, in Fig. 8, but showing the parts centrally disposed;

Fig. 10 is a section on the line 10, 10, in Fig. 9;

Fig. 11 is a section substantially on the line 11, 11, in Fig. 10;

Fig. 12 is a plan view of a portion of the machine;

Fig. 13 is a detail of devices for moving the strips to be honed or ground;

Fig. 14 is an edge view thereof;

Fig. 15 is a sectional detail, enlarged, of means for rotating the hone carrying shaft;

Fig. 16 is a section on the line 16, 16, in Fig. 15; and

Fig. 17 is a section substantially on the line 17, 17, in Fig. 12.

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

In the accompanying drawings the numeral 1 indicates any suitable frame or base upon which members 2 are universally mounted, which members carry shafts 3 that are equipped with suitable honing or grinding disks 4 shown opposed to each other, and between which the strip of metal or the like 5 to be sharpened passes. Members 2 are shown forked and provided with bearings for shafts 3, which shafts are adapted to rotate and slide, the shafts being shown provided with pulleys 6, $6^a$ for rotating them. Members 2 are shown swiveled upon studs 7, (Figs. 1 and 5), having lock nuts 8 to secure the said members in positions of adjustment around said studs. The studs 7 project from blocks 9 that are shown located in eyes 10 on support $10^a$ secured on frame 1, bolts 11 passing through said blocks and eyes for holding said blocks in set positions of adjustment. By this means members 2 may be set to bring the disks 4 in desired angular relation to the strip 5 to be honed or sharpened. The members 2 may be raised and lowered by means of interchangeable spacers or shims 12 adapted to be placed between members 2 and blocks 9, (Figs. 1, 4 and 5). The pulleys 6, $6^a$ have sleeves or tubular extensions 13 in bearings on members 2 and slidably receiving shafts 3, said sleeves having projections or keys 14 adapted to enter slots $3^a$ in shafts

3 (Figs. 5, 15 and 16). The projections 14 are shown secured by screws to collars 15 detachably secured upon extensions 13, whereby shaft 3 may be rotated by and with pulleys 6, 6ª and may slide therethrough.

The grinding disks 4 are shown secured in suitable socket members 16 having threaded studs 17 to screw into threaded sockets 18, in the ends of shafts 3, for detachably securing said parts together. The members 2 are shown provided with forked rearward extensions 19, one of which extensions is shown provided with bearings for a driving shaft 20, (Fig. 12). Said extensions are also shown provided with bearings for reciprocative rods or shafts 21, which rods or shafts are shown coupled together by a rod 21ª and universal joints 21ᵇ, whereby one of the rods 21 may reciprocate the other while in angular relation thereto. An arm 19ª aids in guiding a rod 21. Shaft 20 is shown provided with means for reciprocating rods 21. I have shown shaft 20 provided with disk 22, having a guideway 23, receiving a screw 25 (Figs. 9, 10 and 11). At 26 is a block or crank pin guided for vertical adjustment in guideway 23 and having threads meshing with screw 25 whereby said block may be adjusted relatively to the axis of shaft 20 and be retained in set position. Screw 25 is shown provided with a flange 25ª fitted to rotate in recesses in block 22 and in a clamping piece 27, shown secured to disk 22, whereby said screw may be clamped in set position. At 28 is indicated a block (Figs. 9 and 11) shown provided with a bore 28ª freely receiving a crank pin 29 secured to block 26, the block 28 being adapted to reciprocate in a vertical guideway 30 in a block 31 secured upon one of the rods 21. Said block 31 is shown split or divided at 32, so as to be clamped tightly by screw 33 on rod 21. Disk 22 may be detachably secured to shaft 20 in any suitable manner. I have shown a disk 34 (Figs. 9 and 11), secured upon the threaded end of shaft 20 by a screw 35, and entering a recess 22ª in the face of disk 22, screws 36 serving to secure disks 22 and 34 together. By the means described the crank piece 26 and crank pin 29 may be adjusted radially and eccentrically with respect to the axis of shaft 20, whereby when said shaft rotates, the rods 21 will be reciprocated to the desired extent. The crank pin 29, although shown substantially centrally disposed in Fig. 9, is to be adjusted eccentrically according to the movement desired to be imparted to rods 21. An arm 19ª having a hole receiving rod 21 serves to aid in guiding the latter (Fig. 12).

Rods 21 are shown provided with arms 37 (Fig. 12), which may be split or divided and provided with screws 38 for clamping them in desired positions upon said rods. Said arms are provided with boxes or the like 39 containing suitable bearings 40 receiving shafts 3 respectively, stops or nuts 41 screwed upon shafts 3 coacting with said arms (Fig. 5). Said nuts and bearings are shown located within bushings or sleeves 42 secured in boxes 39. Said bushings may be externally threaded to engage internal threads on the boxes 39, as shown in Fig. 5, and said boxes may be split or divided, as at 39ª, and clamped by screws 43 tightly upon said bushings or sleeves. At 44 are shown suitable springs coiled upon shafts 3 and pressing at one end against the corresponding bearing 40 and at the other ends upon stops or collars 45 adapted to be secured in set positions upon shafts 3 by screws 46. When rods 21 move to the right in Fig. 12, shafts 3 will be correspondingly moved, and the disk 4 at the left of said figure will be moved into engagement with the strip 5 by the interposed spring 44 then pushed by left-hand arm 37 against collar 45, so that said disk will bear against strip 5 resiliently, and at such time disk 4 at the righthand side of Fig. 12 will be moved away from strip 5, because the corresponding bearing 40 acting with adjacent nut 41 moves the corresponding shaft 3 outwardly. When arm 37 at the left first starts to move in a direction away from strip 5, the corresponding disk 4 will remain temporarily in engagement with strip 5, due to the pressure of spring 44, until the corresponding shaft 3 and bearing 40 encounter nut 41, whereupon shaft 3 will be drawn to fully disengage disk 4 from strip 5. Corresponding action occurs, at the proper time, with the righthand devices. Such freedom of sliding movement of shaft 3 in boxes 39 permit disks 4 to be maintained in operating contact with strip 5, through the medium of spring pressure, without causing said disks to bear on said strip unduly, and enabling relatively light pressure of the disks upon the strip, when desired, as for honing the edge of the strip. By preference, collar 45 is spaced slightly from bearing 47 when disk 4 bears against strip 5, to insure the desired spring pressure of the disk upon said strip and yet to prevent disk 4 from being unduly pressed in the direction of strip 5 by spring 44 in case such strip should break adjacent to said disk. The parts described above may be similar on each side of the machine.

Strip 5 is adapted to be drawn through a longitudinally disposed guide 50, shown comprising a pair of opposed plates 50ª secured together by screw 50ᵇ, and having reduced inner faces 51 providing a longitudinal space through which strip 5 may be drawn (Figs. 2 and 3). In the space between the faces 51 of guide 50 are shown suitable relatively thin strips of metal 52, providing liners between which strip 5 slides. Said liners may be secured to plates 50ª by passing the ends of said liners out-

wardly through slots 53 in said plates, as shown at $52^a$, and securing said ends of the liners by screws 54 entering the end portions of said plates (Fig. 6). Adjacent the upper edges of plates $50^a$, where the disks 4 are adapted to engage the edge of strip 5, said plates are shown reduced or cut away at $50^c$ for freedom of movement of said disks (Fig. 6), and the edge portions of said plates are reduced or cut down at $50^d$ (Fig. 7), to permit disks 4 to engage the opposite sides of strip 5 at its upper edge, the liners being also suitably cut away adjacent the recesses $50^d$. Strip 5 may bear on rests $50^e$ (Fig. 7) in the space between plates $50^a$. By the means described the strip 5 will be suitably firmly retained, as it is drawn through the machine, at the part where the disks 4 operate upon the strip. The liners may be replaced as required. The guide 50 is shown supported in slotted members 55 carried by support or base $10^a$ and screws 56 (Fig. 5) carried by members 55 enable guide 50 to be secured in desired position. Screws 57 carried by members 55 enable guide 50 to be set in vertical adjustment.

The disks 4 may rotate within a suitable housing or receptacle 58 (Fig. 1) wherein a suitable lubricating or abrading solution may be retained for engagement by disks 4.

One or more sets of grinding devices described may be provided in a machine, and where two or more of such sets of grinding devices are provided, they may be arranged in tandem, substantially as illustrated in Fig. 17. Any suitable means may be provided for simultaneously rotating pulleys 6, $6^a$, in the same direction, as well as driving pulley 60 secured on shaft 20. I have shown the machine provided with a main drive shaft 61 (Fig. 17) having a suitable drive pulley 62 over which passes a belt 63. In the arrangement shown in Fig. 17 the belt passes from the far side of pulley 63 up over pulley $6^a$, down under idle pulley 64, thence under idle pulley 65, up over pulley 6, thence down under a tightening pulley 66, and thence over idle pulley 67 to the under side of pulley 62. Pulley 66 is shown mounted to rotate upon an arm 68, pivoted at 69 concentric with pulley 67 and weighted at 70, whereby the desired tension of belt 63 may be maintained, and slack in the belt will be automatically taken up. Where two or more sets of honing or grinding devices described are provided in one machine they each may be provided with driving belts and pulleys as described, and the corresponding driving pulleys 62 may be secured upon the same shaft 61 (Fig. 17). At 71 is a belt shown passing over pulley 60 and under a pulley 72 on shaft 61. The ratio of the driving pulleys will be such as to give the desired speed of rotation to disks 4 with respect to the reciprocative movements imparted through pulley 60 to said disks with respect to strip 5.

Any suitable means may be provided for feeding strip 5 through the machine as desired. For this purpose I have shown a feed disk 73 carried by a shaft 74 and adapted to bear against strip 5 which also bears against an idle disk 75, which shaft 74 and disk 75 are suitably journaled in bearings on frame 1 (see Figs. 13 and 14). By means of a suitable lever 76 operating a strap $76^a$ the disk 75 (which may be loosely mounted) may be adjusted with respect to disk 73 to provide the desired pressure between said disks against strip 5 for feeding the latter. Shaft 74 is shown provided with a worm wheel 77, shown meshing with a worm 78 provided with a sprocket wheel 79 receiving a chain 80 from a suitable drive sprocket, for causing strip 5 to be drawn between disks 4.

By means of my improvements the strip 5 may be drawn between the disks 4 at a desired speed while said disks 4 reciprocate back and forth into engagement with the same edge portion of said strip, and with the desired resilient pressure thereagainst, whereby said edge of strip 5 may be honed or ground as desired. The angles at which disks 4 are presented to strip 5 determine the bevel of the cutting edge produced upon said strip, and by means of the universal mounting of members 2 said disks may be set with respect to strip 5 in accordance with the character of the edge to be honed or ground upon said strip. The disks may be readily replaced and their angles respecting the strip 5 may be readily adjusted in accordance with the working faces of the disks.

It will be understood that by a single adjustment radially or eccentrically of the crank pin 29 both disks 16 will be always moved equally and jointly to the same extent toward and from the strip. Where heavy grinding is to be done the springs 44 may be removed and the collars 45 may be adjusted along shafts 3 into firm contact with the boxes 39, so that the disks 4 will positively bear on the strip or work to be ground. The springs 44 are useful for honing and relatively light grinding.

While I have shown and described what may be termed two sets of honing or grinding devices, located on opposite sides of strip 5, it will be understood that one or both of said sets of devices may be used at one time, and also that a machine may be made having but one of said sets of grinding devices where but a single edge of a strip is to be ground. While I have referred to a strip 5, which may be of suitable metal, such as that suitable for razor blades, it will be understood that my improvements may be adapted to hone or grind other forms of material.

Changes may be made in the details of construction and arrangements of parts set forth within the scope of the appended claims, without departing from the spirit of the invention.

Having now described my invention what I claim is:—

1. The combination of a shaft, means to secure a disk thereto, means to support a strip with relation to said disk, means separate from the strip to rotate said disk positively with relation to the strip, means to slidably support said shaft for axial movement, and means to cause said disk to bear resiliently against said strip.

2. The combination of a shaft, means to slidably and rotatively support said shaft, a disk carried by said shaft, means to support a strip adjacent said disk, a spring, and means to positively push said spring to cause said spring to push said shaft and disk toward the strip to retain the disk resiliently pressed against the strip, said means serving to withdraw the shaft and disk away from the strip.

3. The combination of a shaft, means to rotatively and slidably support the shaft, a disk carried by the shaft, means to support a strip adjacent to the disk, a stop on the shaft, a spring bearing against said stop, and means coacting with said shaft and spring for moving the shaft axially by means of the spring toward the strip and for bodily retracting the shaft in a direction axially away from said strip.

4. The combination of a shaft, means to rotatively and slidably support the shaft, a disk carried by the shaft, means to support a strip adjacent to the disk, a stop on the shaft, a spring bearing against said stop, an arm having means rotatively receiving said shaft and coacting with said spring to resiliently push the shaft in one direction, means on the shaft to coact with the last named means to retract the shaft in a direction away from said strip, and means to positively rotate the shaft and disk with relation to the strip.

5. The combination of a shaft, means to rotatively and slidably support the shaft, a disk carried by the shaft, means to support a strip adjacent to the disk, a stop on the shaft, a spring bearing against said stop, an arm having a bearing receiving said shaft adapted to push said spring to slide the shaft in the direction of said strip, and a stop on said shaft to coact with said bearing to retract the shaft in a direction away from the strip.

6. The combination of a support for a strip, a shaft carrying a disk adjacent to said strip, a member carrying said shaft, means for slidably and rotatively supporting said shaft upon said member, means to reciprocate the shaft axially within said member to move the disk axially toward and from the strip, and means for universally supporting said member for adjustment of said disk and shaft in desired angular relation to said strip.

7. The combination of means for supporting a strip, disks located on opposite sides of said strip, means for supporting and rotating said disks, and means to alternately present said disks against said strip, and alternately withdraw the disks from the strip.

8. The combination of means for supporting a strip, disks located on opposite sides of said strip and opposing each other, means for supporting and rotating said disks, and means to cause said disks to bear resiliently against said strip and alternately withdraw the disks from the strip.

9. The combination of means for supporting a strip, opposing disks located on opposite sides of said strip at an angle to each other and to said strip, means for supporting and positively rotating said disks, and means to cause said disks to bear resiliently alternately on opposite sides of said strip and alternately withdraw the disks from the strip.

10. The combination of means for supporting a strip, disks on opposite sides of said strip, shafts carrying said disks, means for slidably and rotatively supporting said shafts, means for resiliently pressing said disks against said strip, and means for reciprocating said shafts simultaneously alternately in opposite directions.

11. The combination of means for supporting a strip, disks on opposite sides of said strip, shafts carrying said disks, means for slidably and rotatively supporting said shafts, stops on said shafts, springs to engage said stops, arms having means movably receiving said shafts, means to cause said arms to push said springs to cause the disks to resiliently engage the strip, stops on the shafts to be moved by said arms to withdraw the disks from the strip, means connecting said arms for operating them conjointly, and means for reciprocating said arms.

12. The combination of means for supporting a strip, disks on opposite sides of said strip, shafts carrying said disks, means for slidably and rotatively supporting said shafts, stops on said shafts, springs to engage said stops, arms having means movably receiving said shafts, means to cause said arms to push said springs to cause the disks to resiliently engage the strip, stops on the shafts to be moved by said arms to withdraw the disks from the strip, rods connected with said arms, means for universally connecting said rods, and means for reciprocating said rods.

13. The combination of means for supporting a strip, disks located on opposite sides of said strip, shafts carrying said disks and projecting therefrom in opposite directions and at an angle to each other, means to slidably and rotatively support said shafts, and means to reciprocate said shafts simultaneously and alternately in opposite directions.

14. The combination of means for supporting a strip, disks located on opposite sides of said strip, shafts carrying said disks and projecting therefrom in opposite directions and at an angle to each other, members adjustably supported and provided with means for rotatively and slidably supporting said shafts, and means to reciprocate said shafts simultaneously.

15. The combination of means for supporting a strip, disks located on opposite sides of said strip, shafts carrying said disks and projecting therefrom in opposite directions and at an angle to each other, members adjustably supported and provided with means for rotatively and slidably supporting said shafts, and means to resiliently move said shafts alternately toward said strip and alternately remove the disks from contact with the strip.

16. The combination of means for supporting a strip, disks on opposite sides of the strip, shafts carrying said disks, members on opposite sides of said strip rotatively and slidably supporting said shafts, said members having bearings, rods guided in said bearings and operatively connected together, means to reciprocate said rods, arms connected with said rods, and means for causing said arms to reciprocate said shafts.

17. The combination of means for supporting a strip, disks on opposite sides of the strip, shafts carrying said disks, members on opposite sides of said strip rotatively and slidably supporting said shafts, said members having bearings, rods guided in said bearings and operatively connected together, means to reciprocate said rods, arms connected with said rods, means for causing the arms to reciprocate said shafts, said shafts having stops, springs to push said stops, said arms having means receiving said shafts respectively and coacting with said springs to push said shafts toward said strip, and means on said shafts to be operated by said arms for sliding said shafts outwardly.

18. The combination of means for supporting a strip, disks on opposite sides of the strip, shafts carrying said disks, members on opposite sides of said strip rotatively and slidably supporting said shafts, said members having bearings, rods guided in said bearings and operatively connected together, arms connected with said rods, means to cause said arms to reciprocate said shafts in opposite directions, one of said members carrying a shaft, and means interposed between said shaft and one of said rods for reciprocating the latter.

19. The combination of means for supporting a strip, disks on opposite sides of the strip, shafts carrying said disks, members on opposite sides of said strip rotatively and slidably supporting said shafts, said members having bearings, rods guided in said bearings and operatively connected together, arms connected with said rods, means to cause said arms to reciprocate said shafts in opposite directions, one of said members carrying a shaft, a disk carried by said shaft and having a guideway, a block in said guideway, means to adjust said block radially of said disk and to hold the block in set positions, a block carried by one of said rods and provided with a guideway, a crank-piece slidable in said guideway, and means for operatively connecting said crank piece with said first named block.

20. The combination of means for supporting a strip, disks on opposite sides of the strip, shafts carrying said disks, members on opposite sides of said strip rotatively and slidably supporting said shafts, said members having bearings, rods guided in said bearings and operatively connected together, arms connected with said rods, means to cause said arms to reciprocate said shafts in opposite directions, one of said members carrying a shaft, a disk carried by said shaft and provided with a transverse guideway and threads, a block in said guideway and having threads opposed to the first named threads, a screw meshing with said threads, means to rotatively support said screw on said disk, a block secured to one of said arms and having a transverse guideway, a crank piece slidable in said guideway, and means for operatively connecting said crank-piece with the first named block.

21. The combination of means for supporting a strip, disks on opposite sides of the strip, shafts carrying said disks, members on opposite sides of said strip rotatively and slidably supporting said shafts, said members having bearings, rods guided in said bearings and operatively connected together, arms connected with said rods, means to cause said arms to reciprocate said shafts in opposite directions, one of said members carrying a shaft, a disk carried by said shaft and provided with a transverse guideway and threads, a block in said guideway and having threads opposed to the first named threads, a screw meshing with said threads, means to rotatively support said screw on said disk, a block secured to one of said arms and having a transverse guideway, a crank piece slidable in said guideway, and a stud carried by the first named block, said crank

piece having a bore freely receiving said stud.

22. The combination of a pair of disks, means to rotatively support said disks with their faces opposing and at an acute angle to each other, a guide for a strip between said disks, said guide having a longitudinally disposed space for said strip, said guide having a reduced portion opposed to said disks to expose the strip thereto, means to support said guide, and means to reciprocate said disks alternately toward and from said strip.

23. The combination of a pair of disks, means to rotatively support said disks, with their faces opposing and at an acute angle to each other, a guide for a strip between said disks, said guide having a longitudinally disposed space for said strip, said guide having a reduced portion opposed to said disks to expose the strip thereto, lining strips in said space, means adjacent to the ends of said lining strips to secure them to said guide, means to support said guide, and means to reciprocate said disks alternately toward and from said strip.

24. The combination of a pair of disks, means to rotatively support said disks, a guide for a strip between said disks, said guide having a longitudinally disposed space for said strip, said guide having a reduced portion opposed to said disks to expose the strip thereto, lining strips in said space, said guide having slots, the ends of said lining strips being bent laterally in said slots, screws carried by the guide bearing against said strips, means to support said guide, and means to move said disks toward and from said strip.

25. The combination of a support for a strip, a pair of disks, shafts carrying said disks, means to support said shafts, pulleys to rotate said shafts, a drive pulley, idle pulleys, and a belt passing under the drive pulley, thence over one of the first named pulleys, thence under one or more idle pulleys, thence over another of the first named pulleys, and thence under the drive pulley.

26. The combination of a support for a strip, a pair of disks, shafts carrying said disks, means to support said shafts, pulleys to rotate said shafts, means to reciprocate said shafts and disks simultaneously in opposite directions, and a drive pulley, idle pulleys, an arm, a pulley carried by said arm, a pulley 67, and a belt passing under the drive pulley, over one of the first named pulleys, under one or more idle pulleys, over the other first named pulley, under the pulley on said arm, over pulley 67, and under the drive pulley.

27. The combination of means for supporting a strip, disks located on opposite sides of said strip, means for supporting and rotating said disks, means to simultaneously move said disks respectively the one toward and the other away from said strip, and means to permit a single adjustment in the last named means to vary the extent of movement of said disks relatively to the strip.

28. The combination of means for supporting a strip, disks located on opposite sides of said strip, means for supporting and rotating said disks, a drive shaft, an eccentric pin, means for adjustably connecting said pin with said shaft, a rod operatively connected with said pin, and means connecting said rod with both of said disks for operating said disks together.

Signed at New York city, in the county of New York, and State of New York, this 17th day of April, A. D. 1914.

CONRAD SCHUMACHER.

Witnesses:
MARIE F. WAINWRIGHT,
T. F. BOURNE.