Apr. 3, 1923. 1,450,853

C. L. HAWES

MACHINE FOR POLISHING AND GRINDING

Filed Nov. 26, 1919 4 sheets-sheet 1

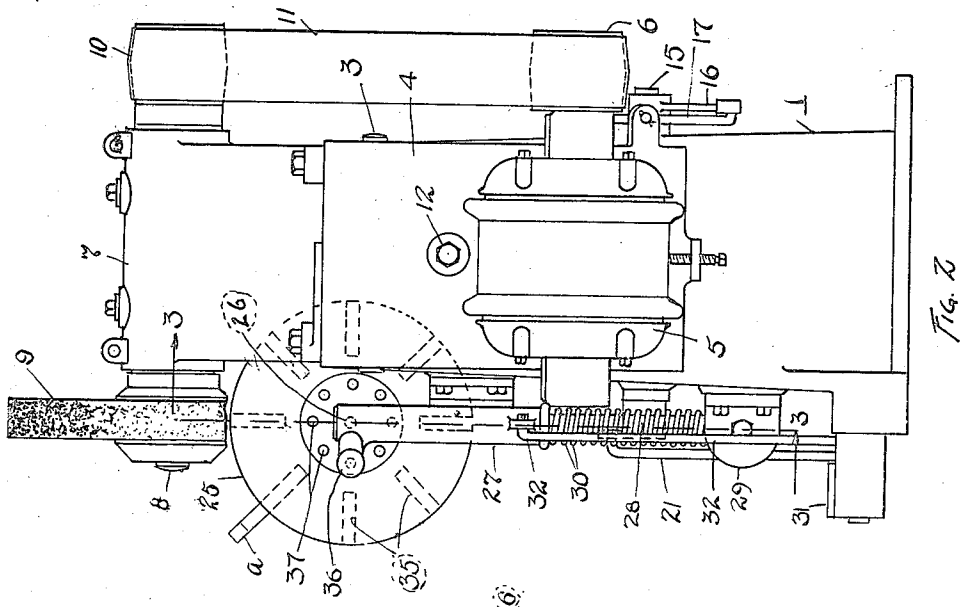

Fig. 2

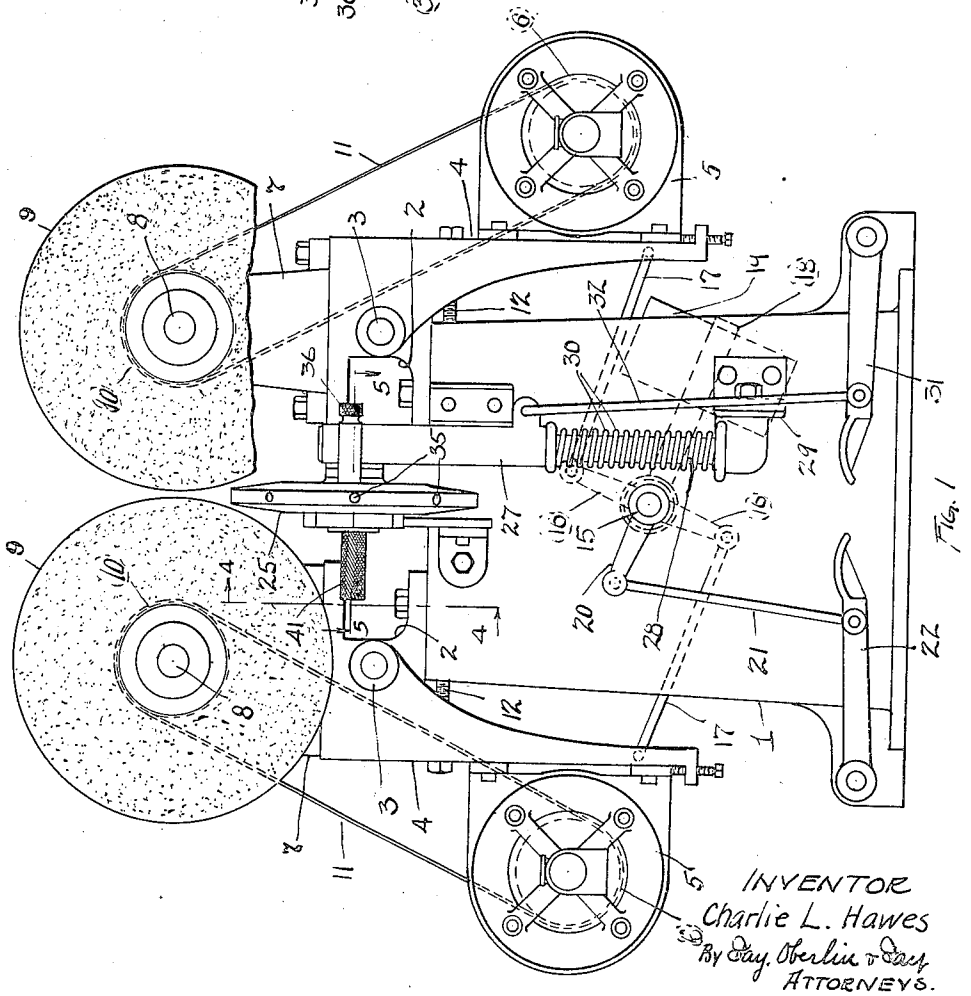

Fig. 1

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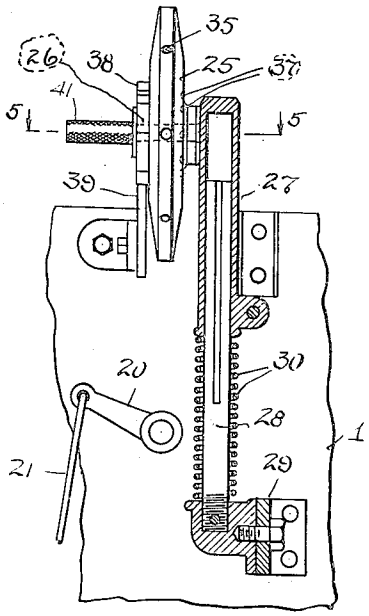

Fig. 3

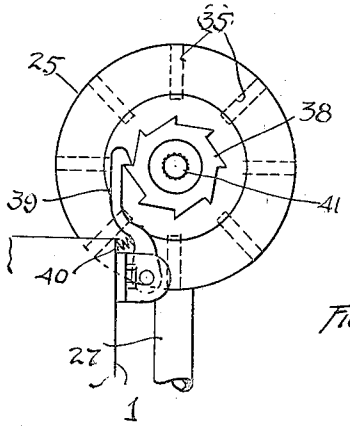

Fig. 4

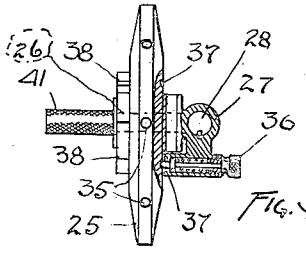

Fig. 5

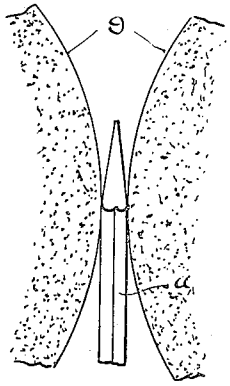

Fig. 6

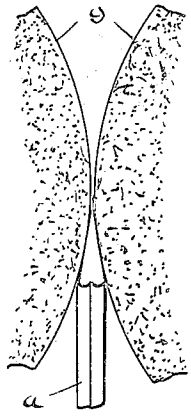

Fig. 6a

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MACHINE FOR POLISHING AND GRINDING

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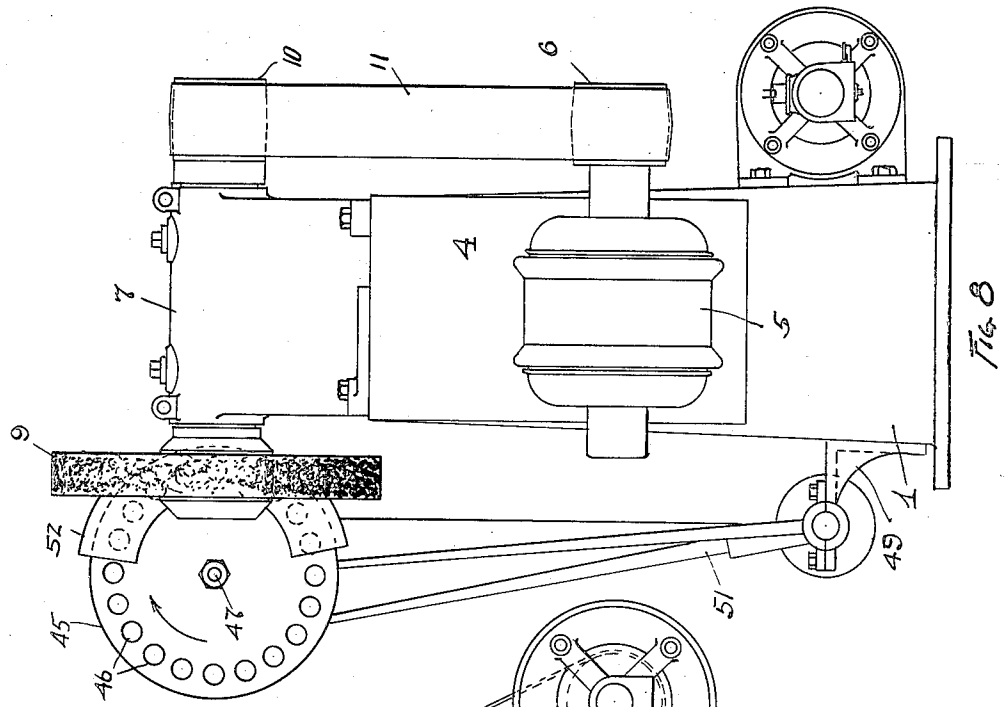

Fig. 8

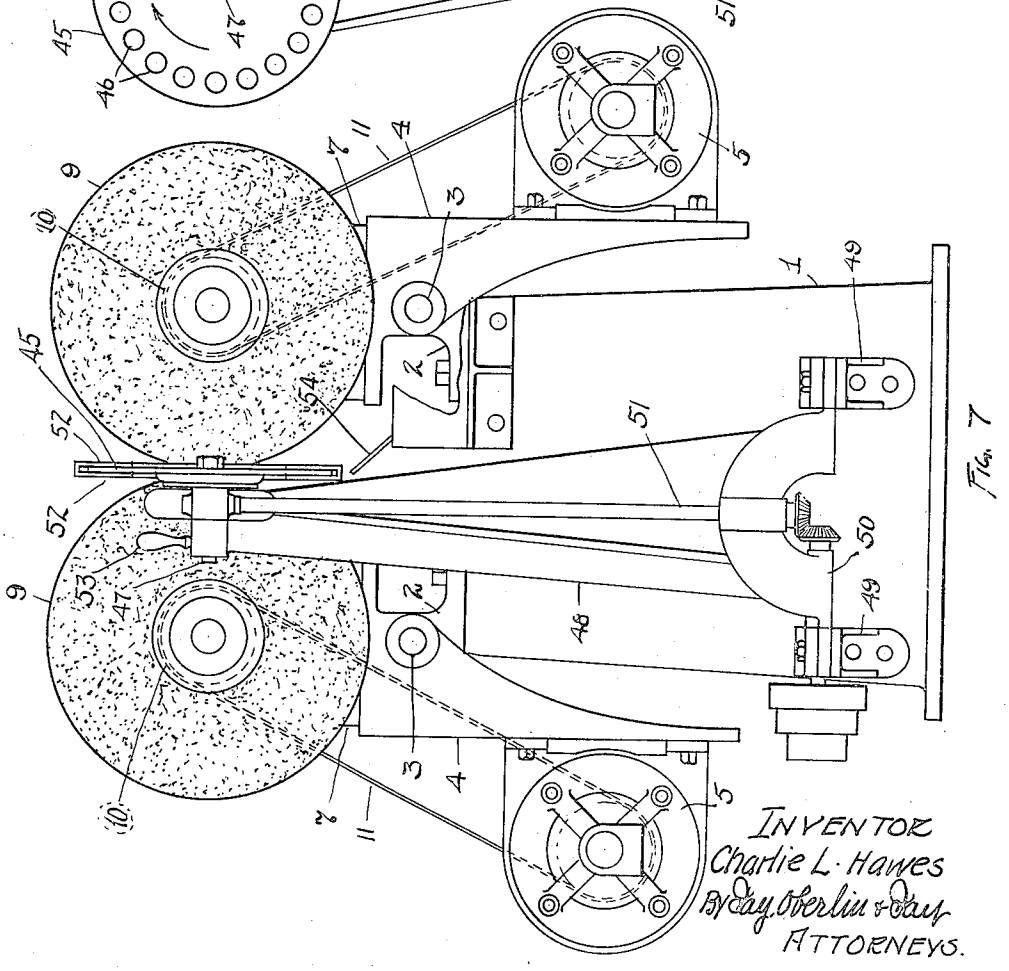

Fig. 7

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C. L. HAWES

MACHINE FOR POLISHING AND GRINDING

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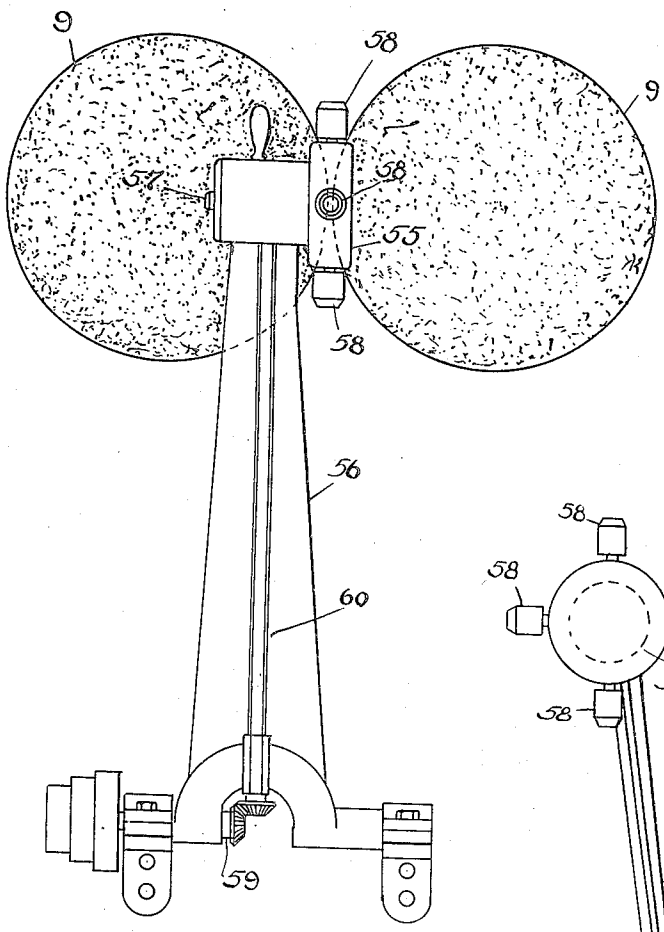

FIG. 9

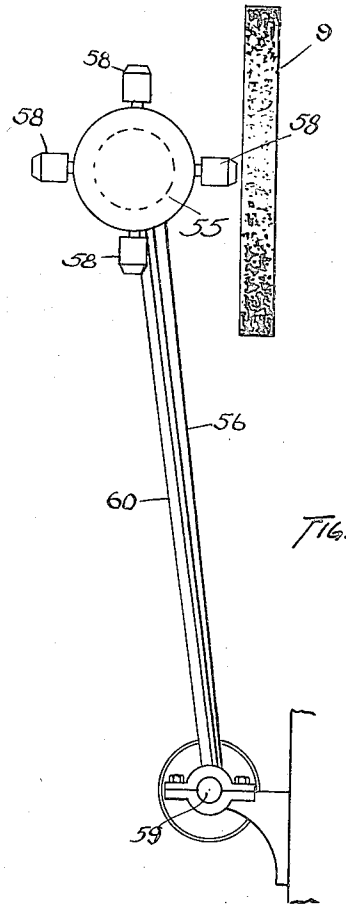

FIG. 10

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UNITED STATES PATENT OFFICE.

CHARLIE L. HAWES, OF ASHTABULA, OHIO.

MACHINE FOR POLISHING AND GRINDING.

Application filed November 26, 1919. Serial No. 340,710.

To all whom it may concern:

Be it known that I, CHARLIE L. HAWES, a citizen of the United States, and a resident of Ashtabula, county of Ashtabula, and State of Ohio, have invented a new and useful Improvement in Machines for Polishing and Grinding, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present improvements, relating, as indicated, to polishing or grinding machines, have more particular regard to machines of this type wherein two emery wheels are employed, such wheels being movable towards and from each other so as to operate conjointly on the article being polished. One object of the invention is to provide a mounting for such wheels whereby their positions with respect to each other, and thus to the article being operated on, may be readily adjustable without interfering with the drive, the latter being secured from electric motors that are incorporated in the machine as a part thereof. A further object of the invention is to provide a convenient and more or less automatic holder for the articles thus being operated on, so that the machine will require a minimum amount of attention from the operator in charge of the same. In its general features the machine is intended to be readily adaptable, by simply changing the holder in question, for operation on a variety of articles.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but several of the various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a front elevation of a machine specifically intended for polishing or grinding chisels; Fig. 2 is a side elevation of such machine as viewed from the right in Fig. 1; Fig. 3 is a section of a detail thereof, taken on the plane indicated by the line 3—3, Fig. 2; Fig. 4 is a section of another detail, taken on the plane indicated by the line 4—4, and showing the work-holding member in side elevation as viewed from the left in Fig. 1; Fig. 5 is still another section taken on the plane indicated by the line 5—5, Fig. 1; Figs. 6 and 6ª are more or less diagrammatic views illustrating the operation of grinder on a chisel in two different stages; Fig. 7 is a front elevati n, and Fig. 8 a side elevation, of a modified form of the machine adapting same for polishing the faces of thread-cutting dies; or other similar articles; and Figs. 9 and 10 are respectively a front elevation and a side elevation of a further modification adapting the machine for polishing or grinding small cylindrical articles which require to be rotated about their axes while being operated upon.

Referring to the form of machine illustrated in Figs. 1 to 6 inclusive, the various parts, it will be seen, are supported on a suitable upstanding frame or base 1 of substantial construction. Mounted on the top of such base are two transversely spaced bearing members 2, 2 to which are pivotally attached, about parallel axes 3, 3, a pair of oscillatory arms 4, 4, provided with rectangularly related faces, the longer of which is disposed in an approximately vertical plane, the other being approximately horizontal. Vertically adjustably secured to such longer face of each arm 4 is a suitable self-contained electric motor 5, the spindle of which carries on its rear end a belt pulley 6; while transversely adjustably mounted on the upper, approximately horizontal, face of each arm is a housing 7 wherein is journaled the spindle 8 of one of the polishing or grinding wheels 9. Such wheel is mounted on the front end of its spindle, the rear end being provided with a pulley 10 aligned with pulley 6 and connected to be driven from the latter by the belt 11.

The particular construction of the wheels 9 is a matter of indifference so far as the essential features of the invention are concerned, but for polishing chisels, for example, as in the case in hand, such wheels will be of emery.

The motors 5, by reason of their weight, and disposition with respect to the pivotal axes 3 of the frames 4 to which they are attached, will tend to swing the lower ends of such frames inwardly, and such inward movement of the lower ends of the arms, however produced, will obviously swing the spindles 8, and thus the wheels 9, outwardly

or apart from each other. In order to move the wheels in a contrary direction, i. e., towards each other, a rock shaft 15 is journaled preferably centrally in the base 1, and provided with cross arms 16 connected by means of links 17 with the lower ends of the respective frames 4. Another arm 18 attached to said shaft 15 at right angles to the arms 16 is provided with a counter-weight 19 that is heavy enough to overcome the aforesaid effect of the motors, and so actually tend to force the lower ends of the arms 4 apart and move the wheels 9 towards each other. Still another arm 20 is attached to the shaft 15 projecting in a direction opposite to that of arm 18, and is connected by means of a link 21 with a foot lever 22, the result being that by depressing such lever the shaft may be rocked in a direction to move the lower ends of the arms 4 inwardly, and thus separate the wheels 9. Outward movement of the lower arm-ends under the influence of counter-weight 19 is limited by means of adjustable stops 12, whereby the wheels 9 may be allowed to approach each other as closely as desired, without actually contacting.

The holder for the work, which consists as aforesaid of chisels in the case of the specific machine in hand, comprises a disk 25 rotatably supported on a spindle 26 that is disposed transversely of the axes of wheels 9 and at a suitable distance below the same so that said disk may be moved back and forth between wheels without interfering with the latter. In addition it is desirable that the disk be capable of vertical movement in order to properly feed the work between the wheels, as will be presently described. For the purpose of such movement the spindle 26 is carried on the upper end of a sleeve 27 slidably keyed on a supporting arm 28 that is pivotally attached to a bracket 29 on the front face of the base 1 so as to be oscillatory in a plane at right angles to such face. A compression spring 30 interposed between sleeve 27 and lower end of arm 28 tends normally to raise such sleeve, while to lower same against the spring a foot pedal 31, connected with said sleeve through the medium of a link 32, is provided.

The disk 25 is formed with a plurality of radial pockets 35, adapted to receive the chisels *a* when directed forwardly, and to present the same in alignment with the wheels 9 when directed upwardly, and, subsequently, following further rotation of the disk, to discharge such chisels to the rear of the machine. The pockets 35 are equidistantly spaced about the periphery of the disk, and a spring-pressed plunger 36, best shown in Fig. 5, is provided to retain the disk with successive pockets in desired alignment with wheels 9, the inner end of such plunger engaging a corresponding series of shallow depressions 37 in the adjacent face of the disk. For the purpose of automatically indexing the disk a ratchet wheel 38 is attached to the opposite face thereof, having teeth corresponding in number and disposition with the pockets 35, and a pawl 39 pivotally attached by means of a bracket to the adjacent portion of the machine base, is actuated by a spring 40 to engage successive teeth and impart a fractional rotation to the disk, as the latter is alternately lowered and then raised through actuation of foot lever 31. A handle 41 is provided for manually swinging the disk in and out between the grinding wheels, the range of movement in this direction being limited.

The mode of operation of the machine, the construction of which has just been described, will be readily apparent. The operator stands in front of the machine and places unground chisels in the pockets 35 of the disk as fast as they are presented at the proper angle. Assuming the foot lever 31 to be depressed, the effect of the upward movement of sleeve 27, when such lever is released is to cause rotation of disk 25 due to the engagement of pawl 39 with the adjacent tooth on the ratchet. The next chisel in series is thus brought into position between the wheels, the latter being simultaneously forced apart by depressing foot-lever 22. Upon releasing such last mentioned lever, the wheels are moved towards each other under the action of weight 19 until they engage the chisel *a* as shown in Fig. 6. Thereupon, the foot-lever 31 is gradually depressed again until the chisel occupies the position shown in Fig. 6[a], the wheels following the tapered sides of the chisel. Incidentally, the operator, by grasping handle 41, swings the disk back and forth through a slight arc, so as to cause the chisel to contact with different transverse portions of the wheel faces, in order to avoid wearing a groove therein.

The machine illustrated in Figs. 7 and 8 is of the same general design as the one just described, except for the work-holder. In other words, the grinding or polishing wheels 9 are mounted and driven in identically the same fashion as before. In place, however, of a disk having radial pockets for the reception of chisels or like articles, the ends or points of which require to be ground, I here provide a disk 45 having transverse apertures 46 near its periphery, of the proper size to receive flat cylindrical articles, such as thread-cutting dies, or other similar articles, the opposite faces of which require to be polished. This disk is rotatably mounted about a spindle 47 carried in the upper end of a swinging frame 48 that is pivotally attached about a transverse axis-

to the machine base 1 through the medium of brackets 49. The disk is intended to be continuously driven in a clockwise direction as viewed in Fig. 8, through the medium of rectangularly related shafts 50 and 51 having bevel-gear connection as shown in Fig. 7, the latter of said shafts having worm and worm-gear connection with the spindle 47. Segmental plates 52 enclose the respective sides of the disk 45 for somewhat less than half of its inwardly directed circumference, i. e., that which lies between the grinding wheels, such plates being recessed or broken away at points directly adjacent the juxtaposed portions of the wheels so as to expose the dies or other articles held in the pockets 46 to the grinding or polishing action of the wheels. A handle 53 on the upper end of frame 48 enables the operator to swing the frame, and thus the disk, back and forth between the grinding wheels, as will be readily understood from the description of the previous machine.

The mode of operation of the special design of machine just described should be entirely clear. The articles to be ground are inserted in apertures 46 in disk 45, and as the latter rotates are carried between plates 52, and thence downwardly into position to be operated on by the wheels 9. In passing through between such wheels their opposite flat faces, which it will be understood project a sufficient distance beyond the corresponding faces of the disk, are ground or polished to the extent required, and such articles are thereupon discharged from the disk in the lower course of its travel, a chute 54 serving to guide them into a suitable receptacle.

In Figs. 9 and 10 is shown still another modified form of holder, the same being designed more particularly for grinding the cylindrical faces of cylindrically-shaped articles. Such an article obviously requires to be rotated about its axis while being ground. Accordingly, the holder 55, which is carried at the upper end of an arm 56 similar to previously described arm 48, in addition to being rotatable about its own axis 57, carries a plurality of radially projecting chucks 58. The latter are arranged to be rotated at a proper rate of speed through bevel-gear connected shafts 59 and 60. The details of the connection between shaft 60 and the individual chucks 58 of the holder 55 need not be described in detail, as they form no part of the claimed invention herein.

In operating this last described type of my improved machine, the holder may be either indexed by hand or automatically, and whenever a chuck is presented in what may be termed the three o'clock position in Fig. 2, the article carried thereby will be rotated between the juxtaposed faces of wheels 9. Upon a further fractional rotation of the holder the article in the next succeeding chuck is thus brought into operative position, while the finished article may be removed from its chuck and a fresh one inserted.

It will be understood that in both of the modified constructions illustrated in Figs. 7 and 8, and 9 and 10, respectively, the manner of mounting the wheels 9 is substantially the same as that shown in Figs. 1 and 2, and such wheels are arranged to be separated and brought together through suitable counter-weight and pedal, or other operative means, as successive articles are presented therebetween to be ground or polished. Moreover, the type of holder first described, i. e., that shown in Figs. 1 to 5 inclusive, is susceptible of use with a wide variety of articles in addition to the chisel specifically referred to. Thus, for example, said holder may be readily arranged to receive square taper reamers, flat gauges, plier handles having flat surfaces, planer knives, steel wedges, lathe tools, etc.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mounted on each arm above and parallel with its axis, adapted to receive a polishing or grinding wheel, said spindle being adjustable transversely of such axis in an approximately horizontal plane; and an electric motor mounted on each arm below its axis and connected to drive the corresponding spindle, said motor being adjustable transversely of such axis in an approximately vertical plane.

2. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mounted on each arm above and parallel with its axis, adapted to receive a polishing or grinding wheel; an electric motor mounted on each arm below its axis and connected to drive the corresponding spindle; means normally adapted to swing said arms in unison oppositely about their respective axes toward each other and exteriorly operable means adapted to swing said arms so as to move said wheels apart.

3. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mount-

ed on each arm above and parallel with its axis, adapted to receive a polishing or grinding wheel; an electric motor mounted on each arm below its axis and connected to drive the corresponding spindle; a counterweight connected to swing said arms in unison about their respective axes so as to move said wheels towards each other; and adjustable means limiting such movement.

4. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mounted on each arm above and parallel with its axis, adapted to receive a polishing or grinding wheel; an electric motor mounted on each arm below its axis and connected to drive the corresponding spindle; a counterweight connected to swing said arms in unison about their respective axes so as to move said wheels towards each other; and exteriorly operable means adapted to swing said arms so as to move said wheels apart.

5. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes, said arms having an upper and a side face lying in approximately a horizontal and a vertical plane respectively; a housing mounted on such upper face of each arm so as to be adjustable transversely of the latter's axis; a spindle mounted in such housing parallel with such axis, adapted to receive a polishing or grinding wheel; an electric motor mounted on the side face of each such arm so as to be adjustable transversely of the latter's axis and connected to drive the corresponding spindle; a rock-shaft mounted in said base and provided with cross-arms; links connecting said cross-arms with said oscillatory arms to swing the same in unison oppositely about their respective axes; means tending to turn said rock-shaft in one direction; and other exteriorly operable means adapted to turn said shaft in the opposite direction.

6. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes, said arms having an upper and a side face lying in approximately a horizontal and a vertical plane respectively; a housing mounted on such upper face of each arm so as to be adjustable transversely of the latter's axis; a spindle mounted in such housing parallel with such axis, adapted to receive a polishing or grinding wheel; an electric motor mounted on the side face of each such arm so as to be adjustable transversely of the latter's axis and connected to drive the corresponding spindle; a rock-shaft mounted in said base and provided with cross-arms; links connecting said cross-arms with said oscillatory arms to swing the same in unison oppositely about their respective axes; a counter-weight tending to turn said rock-shaft in one direction; and a foot-pedal connected with said rock-shaft adapted to turn the same in the opposite direction when desired.

7. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; and a work-holding member movable between said spindles independently in a direction parallel with and in a direction transverse of such axes.

8. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable in a plane parallel to said spindles upon oscillation of said support.

9. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable in a direction parallel with said spindles upon oscillation of said support, said member being also movable longitudinally of said support.

10. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable in a direction parallel with said spindles upon oscillation of said support, said member being also rotatable, independently of the foregoing movement, about an axis transverse of said spindles.

11. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable between said spindles in a direction parallel therewith upon oscillation of said support, said member being also ro-

tatable about an axis transverse of said spindles and movable longitudinally of said support.

12. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable between said spindles in a direction parallel therewith upon oscillation of said support, said member being also rotatable about an axis transverse of said spindles and having a plurality of work-receiving elements adapted to bring articles held thereby successively into operative relation with the wheels on said spindles.

13. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about laterally spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable between said spindles in a direction parallel therewith upon oscillation of said support, said member being also rotatable about an axis transverse of said spindles and having a plurality of radially disposed work-receiving pockets adapted to bring articles held thereby successively into operative relation with the wheels on said spindles.

14. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; and a work-holding member carried by said support and movable between said spindles in a direction parallel therewith upon oscillation of said support, said member being also rotatable about an axis transverse of said spindles and movable longitudinally of said support; and means adapted to index said member upon movement thereof thus longitudinally of said support.

15. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; a sleeve reciprocable longitudinallly of said support; and a work-holding member carried by said sleeve and rotatable about an axis parallel with that of said support; and means adapted to index said member upon reciprocation of said sleeve.

16. In a machine of the character described, the combination with a suitable base; of two arms oscillatorily supported thereon about spaced parallel axes; a spindle mounted on each such arm adapted to receive a polishing or grinding wheel; a support oscillatory about an axis transverse of the axes of said arms; a sleeve reciprocable longitudinallly of said support; and a work-holding member carried by said sleeve and rotatable about an axis parallel with that of said support; and means adapted to index said member upon reciprocation of said sleeve, said means including a ratchet on said member and a pawl attached to said base and engaging successive teeth on said ratchet.

Signed by me, this 25th day of November, 1919.

CHARLIE L. HAWES.