C. B. LARSON.

GRINDING, POLISHING, OR BUFFING MACHINE.

APPLICATION FILED JAN. 8, 1915

1,158,136.

Patented Oct. 26, 1915.

4 SHEETS—SHEET 1.

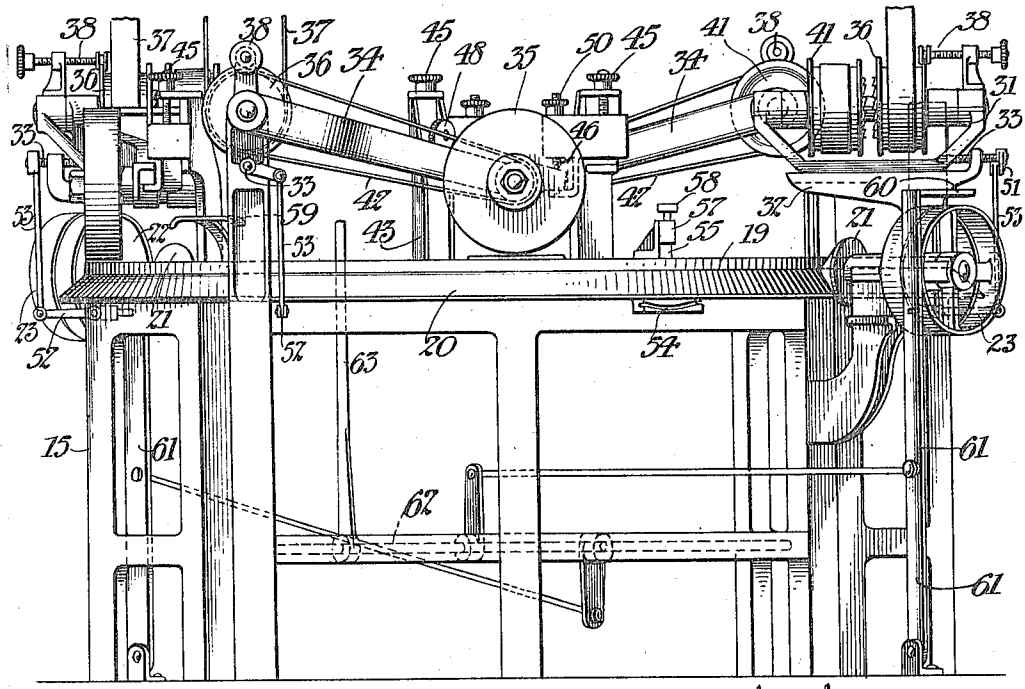


Fig. 1.

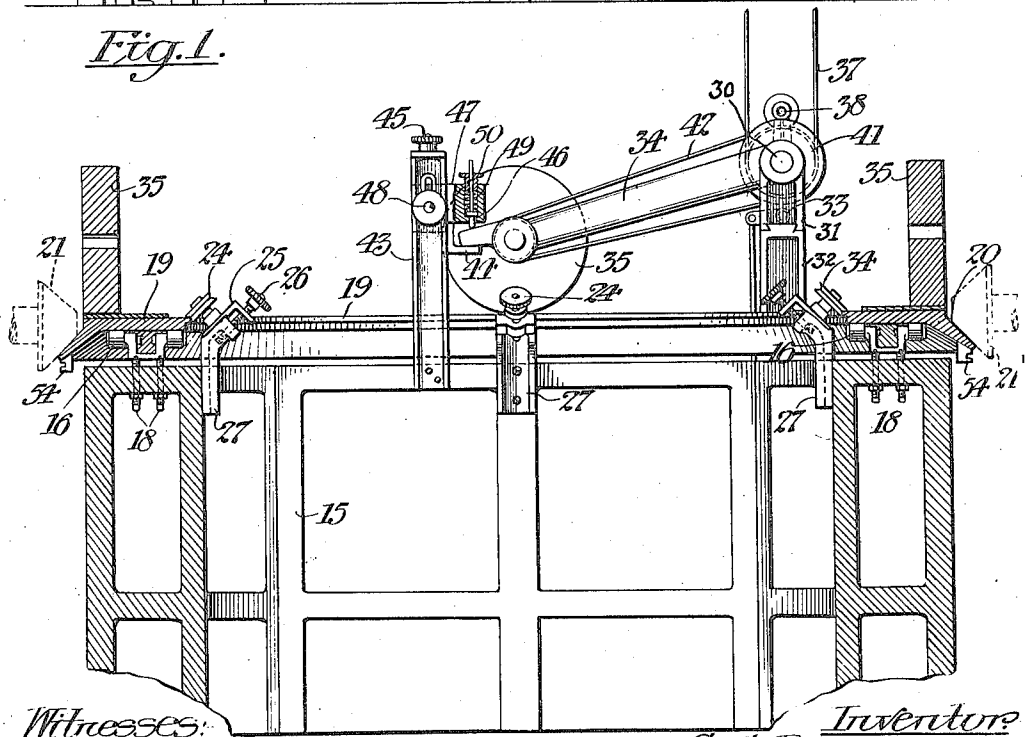


Fig. 3.

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4 SHEETS—SHEET 2.

Fig. 2.

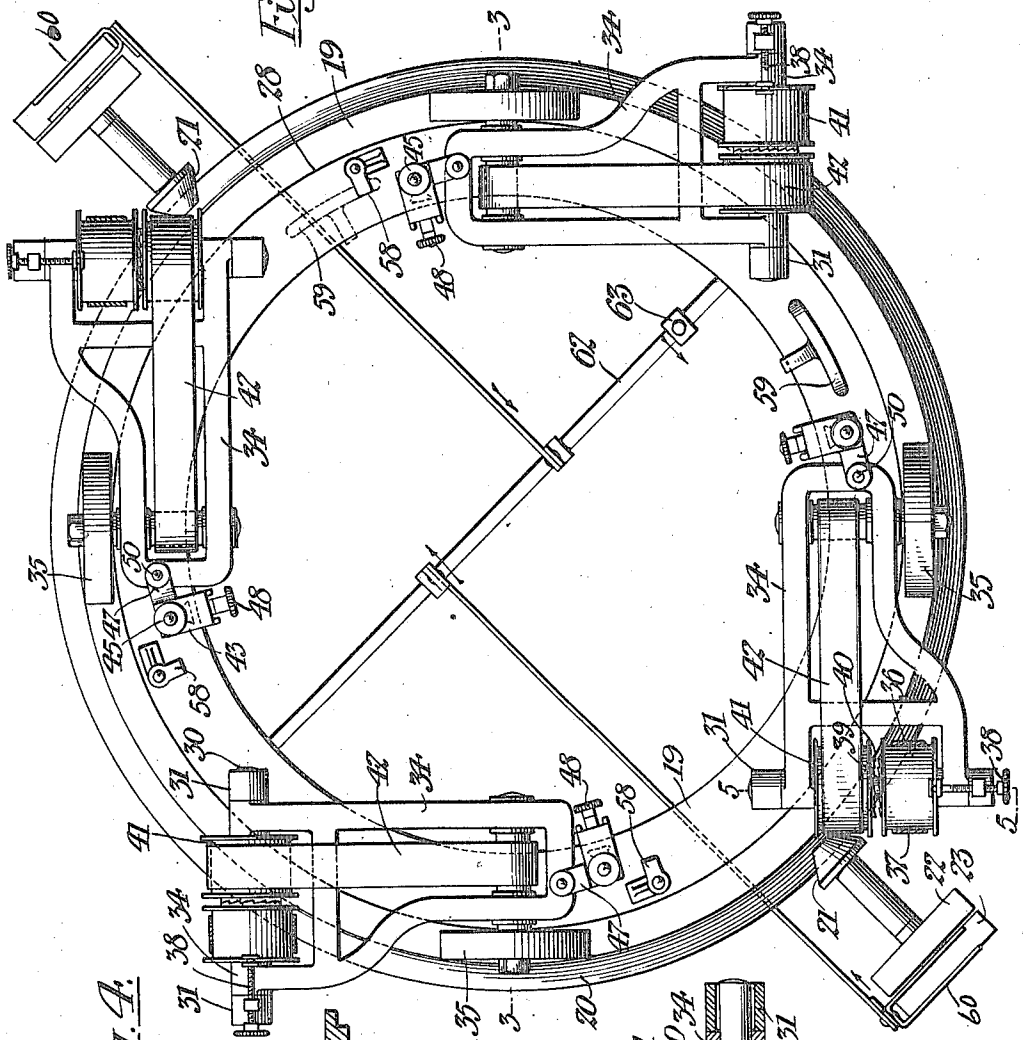


Fig. 4.

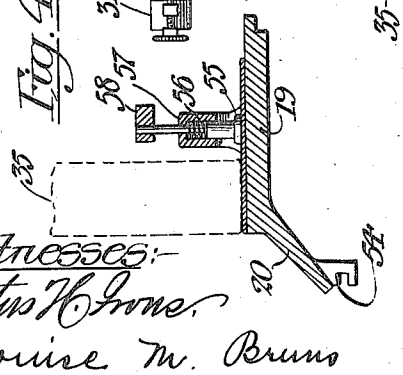


Fig. 5.

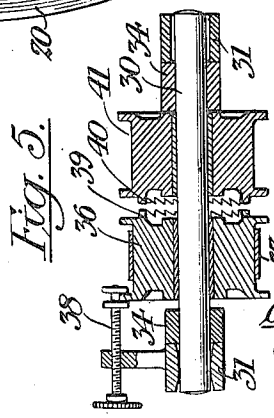
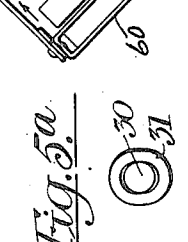


Fig. 5a.



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4 SHEETS—SHEET 3.

Fig. 7.

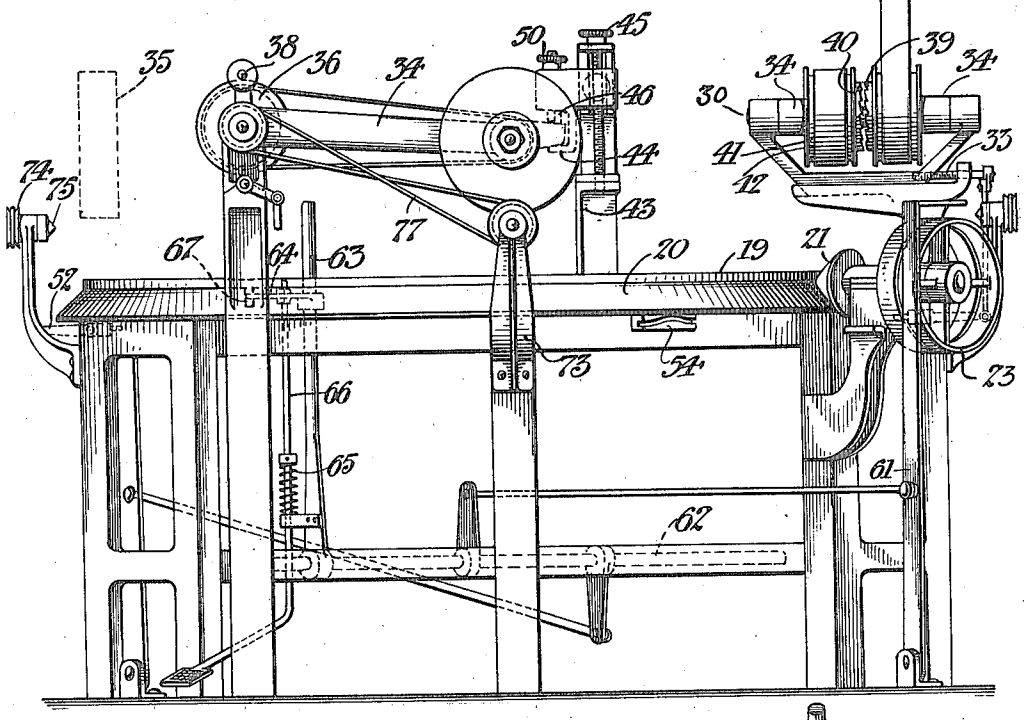


Fig. 6.

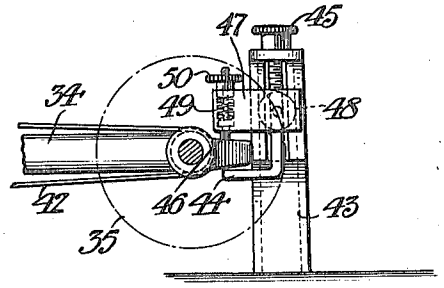
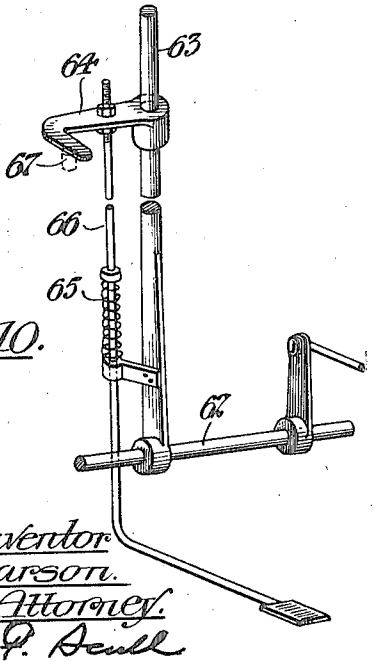


Fig. 10.



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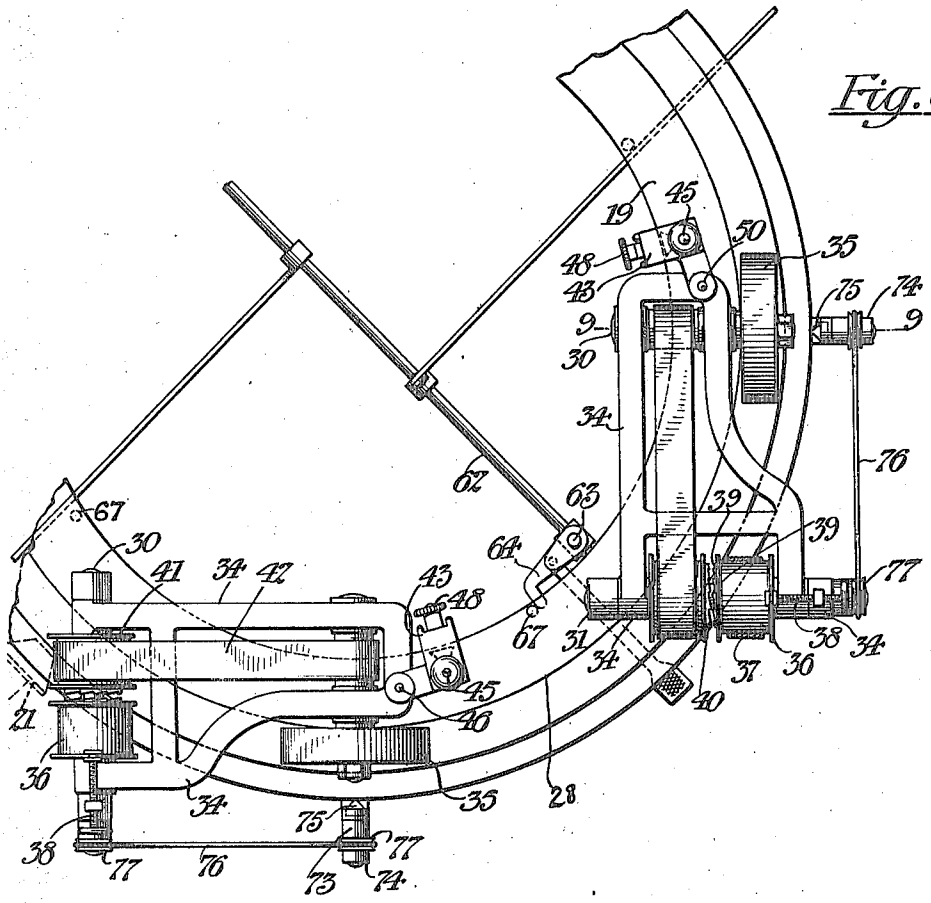
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4 SHEETS—SHEET 4.

Fig. 8.



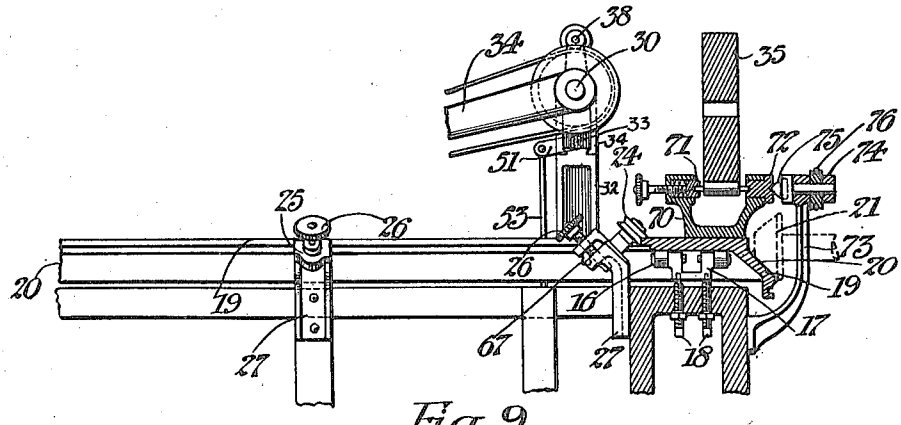


Fig. 9.

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GRINDING, POLISHING, OR BUFFING MACHINE.

1,158,136. Specification of Letters Patent. Patented Oct. 26, 1915.

Application filed January 8, 1915. Serial No. 1,073.

To all whom it may concern:

Be it known that I, CARL B. LARSON, a citizen of the United States, residing at Irvington, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Grinding, Polishing, or Buffing Machines; and I declare the following to be a full, true, and exact description of said invention, such as will enable others skilled in the art to which it appertains to make use of the same.

My invention has for its object the provision of simple and effective means by which metal pieces may be ground, polished or buffed or otherwise worked.

A further object of my invention is to provide a device by which a large quantity of small articles may be ground, polished or the like with the minimum expenditure of labor, and at a high rate of production.

Another object of my invention is to provide a means by which work may be readily placed in and taken out of the fixtures for holding it without thereby decreasing the production of finished work.

A further object of my invention is to provide means by which a grinding wheel or the like may be made to conform to the surface being ground so as to produce undue depth of cut on some portions thereof, and also to provide means by which a piece of metal may be ground or otherwise worked regardless of its shape.

With these and other objects in view, my invention consists of certain novel features of construction, combination and arrangement of parts as will be more fully described and pointed out in the appended claims.

In the drawings, Figure 1 represents a side elevation of one form of apparatus which I have chosen for purposes of illustration of my invention; Fig. 2 is a plan view of Fig. 1; Fig. 3 is a sectional elevation of Fig. 2 generally on the line 3—3; Fig. 4 shows a section of one form of the work-holder attached to the work table; Fig. 5 is a section through the driving pulleys on the line 5—5 of Fig. 2; and 5^a is an end view of Fig. 5. Fig. 6 is an enlarged side elevation of an arrangement which I provide for adjusting the position of a grinding wheel; Fig. 7 is a side elevation of the machine shown in Figs. 1 and 2 with such alterations as are necessary to finish round work therein; Fig. 8 is a portion of the plan view of Fig. 7; Fig. 9 is a section on the line 9—9 of Fig. 8; and Fig. 10 is a perspective view of a portion of the mechanism used in Figs. 7 and 8.

The corresponding parts are referred to both in the specification and in the drawings by similar reference characters.

In the accompanying drawings 15 represents generally a base, which in the form which I have chosen for purposes of illustration, is circular in outline. Preferably at the top thereof is placed a series of supporting rollers 16 mounted in a yoke 17 which may be adjusted in height by the screws 18. On these rollers 16 I mount a work-table 19, which in the form which I have illustrated is circular in plan view. Also, as illustrated, this table 19 is a ring so that the center portion thereof, being open, may be used for various purposes, such as the operation of the driving devices for the work-table, or in other forms, so that the operator may be placed therein in a position to place work on the table without interfering with other operators who may be working around the machine. Preferably this ring-like or annular work-table is rotated by means of driving devices which will be arranged so as to exert a minimum amount of pressure to move the work-table in its own plane. It will be noted that except for the mechanism hereafter to be described, this table 19 is free to be moved in its own plane, the rollers 16 running simply on the plane bottom surface of the table. As a preferred form of driving mechanism, I provide an extension 20 on the table 19 and arrange to engage this extension, conical friction wheels 21 driven in any suitable manner, as by the pulley 22, operated in the usual manner by a belt and a loose pulley 23 being provided adjacent to the tight pulley 22. Two of these conical wheels 21 will be arranged on the same diameter through the center of the annular work-table 19, so that the pressure in the plane of the work-table will be nearly balanced.

In order to center the work-table, and to compel it to travel in a path which will carry work placed thereon in a certain predetermined relation with the tools, I provide guides, which in the preferred form I have illustrated, are friction wheels 24 grooved

as shown in Figs. 3 and 9 to bear on an inner edge of the work-table 19 so as to prevent motion in the plane of the work-table, and also so as to hold the work-table down on the rollers 16. Preferably these guiding rollers 24 are made adjustable by mounting them in the slides 25 controlled by the hand wheels 26 in a manner which will be readily understood. It will also be understood that the roller 24 is supported in a bracket 27 attached to the support 15. As many of these guiding rollers as are necessary will be provided, and preferably they will be arranged adjacent the positions of the tools which operate on the work placed on the work-table 19, so that at that particular time the table will be truly guided so as to be maintained in a predetermined relation to the tool. In order that the table shall be centered, I preferably provide at least four of these guide rollers 24. The table 19 is also provided with a circular gage mark 28 turned in its face.

The mechanism so far described constitutes a flat rotatable work-table particularly adapted for supporting work to be presented to grinding, polishing or buffing wheels or the like. It will be seen that after the work-table 19 is placed on the rollers 16, the latter may be adjusted vertically until the upper surface of the table 19 is level. Then with the friction driving cones 21 in operation, the rollers 24 may be adjusted until each of these rollers is bearing against the table and the latter is positioned so that the gage mark 28 rotates in a circle.

While, for some purposes, my device can be used with tools other than buffing, polishing or grinding wheels, it is particularly adapted for the latter, and I have provided novel means by which such wheels may be utilized in connection with my novel work-table. It will be understood that when, for the sake of brevity, in the description hereinafter and in the claims, I use the expression "grinding wheel" alone, such expression is intended to cover all forms of abrading wheels or the like.

As my preferred form of mounting and driving a grinding wheel, I provide a shaft 30 mounted in a supporting yoke 31 which in turn, is mounted on a supporting bracket 32 attached to the supporting frame 15. The yoke 31 is movable longitudinally of the shaft 30 by means of a screw 33 which may be adjusted by hand to position the grinding wheel toward or away from the gage mark 28 on the work-table 19 or it may be automatically shifted in the manner hereafter to be described; or both. On the shaft 30 is mounted a swinging yoke 34 which carries the shaft for the grinding wheel 35. Also mounted on the shaft 30 between the arms of the swinging yoke 34 is a belt pulley 36 driven by a belt 37. This pulley 36 is arranged to be moved longitudinally on the shaft 30 by a screw 38 as shown best in Fig. 5 so that the clutch teeth 39 on the side thereof may be made to engage clutch teeth 40 on the side of the belt pulley 41. This belt pulley 41 is connected by a belt 42 with a pulley on the shaft of the grinding wheel 35 as will be readily seen from an inspection of Fig. 2. The clutch teeth 39—40 and the screw 38 are provided so that the belt pulley 41 may be disconnected from the driving pulley whenever it becomes necessary to stop the driving wheel 35. With the arrangement of the grinding wheel so far described, it would be held by gravity against any work placed on the table 19. Preferably, however, I provide a means by which its vertical position may be limited, and also by which it may be held down by a force greater than its weight which at the same time will be sufficiently yielding so that in case work of unusual thickness should be passed under the wheel, nothing will be broken. To this end I provide a bracket 43 attached to the frame 15 and which has on it a vertically adjustable supporting stop 44 arranged to be controlled by a vertical screw operated by the handle 45. The adjustment of the stop 44 controlling, as it does, the toe casting on the yoke 34, obviously has the effect of limiting the downward motion of the grinding wheel 35. In order to hold this wheel 35 on the work, I provide a stop 46 on a vertically adjustable member 47 connected to the stop 44, which is locked in adjusted position by the locking screw 48. This stop 46 is spring seated as shown in Fig. 3, spring 49 holding stop pin 46 down, and the strength of this spring being controlled by the nut 50. It is obvious that with the arrangement just described, the grinding wheel 35 will be prevented from falling below the level of the work to be ground, and on the other hand will be held down to that level unless the thickness of the work is such as to crowd the wheel 35 upwardly, when the spring 49 will yield to permit this.

As a further means of relieving the grinding wheel 35, I provide an arrangement by which the axis of the wheel may be rocked. As one means of accomplishing this end I arrange the shaft 30 in the manner shown particularly in Fig. 5, in which I have shown the bearing for the shaft 30 at the left of Fig. 5, as being slightly barreled, and the bearing at the right of Fig. 5 as enlarged slightly in a vertical direction. From this it is clear that the right hand end of the shaft 30 may rise and fall to a limited extent. Since the yoke 34 is attached to this shaft 30, it will be obvious that as a result the grinding wheel 35 may be rocked slightly so that its axis will move vertically, and so that the contact line on the surface of the grinding wheel need not

remain parallel to the surface of the work-table 19. If, therefore, a piece of flat work which is higher on one side than on the other, passes under the wheel 35, the latter will shift its axis slightly so as to conform to the level of that particular piece of work.

When my preferred form of circular work-table is used, it will be obvious that any surface ground on it, unless such surface extends entirely across the top of the piece being ground, will have a circular boundary line due to the circular motion of the table 19 as it passes the grinding wheel 35. To correct this when desired, and also to provide a means by which the grinding wheel may be caused to move around over the work so as to produce any desired boundary line between the finished and unfinished surface and also to avoid upstanding projections on certain classes of work, I provide a means by which the wheel 35 may be given a motion parallel to its axis as the work is passing under it. As one form of accomplishing this I attach to the end of the screw 33 a lever 51 as shown best in Fig. 9, and I connect this lever 51 to a lever 52 as shown in Fig. 1 by a rod 53. Beneath the table 19 I provide a cam 54 which is arranged to engage the inner end of the lever 52 at the proper time to move the wheel 35 as the work is passing under it. This cam 54 will, of course, be shaped in accordance with the desired motion to be given to the wheel 35. As illustrated, the cam 54 will cause the wheel 35 to move in and out toward the center of the work-table 19 to correct the curvature which would ordinarily be produced by the rotation of this work-table past a fixed point. The lever 52 is first depressed and then lifted by the cam 54 so as to give the screw 33 a partial turn first in one direction and then in the other, thus causing the frame 31 first to move toward the center of the machine and then away from it.

It is obvious, of course, that any form of workholder may be applied to the work-table 19. As one form of device which I have found suitable for holding flat work on the table 19, I show a holder 55 which is in the form of a plunger held downward by a spring 56, the holder being mounted in a frame 57 attached to the top of the table 19. On the upper end of the plunger 55 I attach a wiper 58 which is arranged to contact with a fixed cam 59 supported by the frame 15. As the wiper 58 passes over the cam 59, the plunger 55 is lifted from the flat work on the table 19, thus permitting the finished work to be removed and the unfinished work to be inserted or to permit the work which is finished on one side to be turned over ready to be finished on the other side.

It will be understood that as many grinding wheels 35 as is required may be placed around the work-table 19, and that as many workholders as may be convenient may also be provided. Preferably when the workholder of the plunger type illustrated in Fig. 1 is used, the cam 59 will be arranged so as to open and close the holder between two of the grinding wheels 35. If, in the machine shown in Fig. 2, the work requires four passes under the grinding wheel before being finished, then only one cam 59 will be provided as shown. If, however, the work requires passing under two wheels only, then two such cams will be required, and if under one wheel only, then four such cams will be provided; in each case an operator being positioned adjacent each of the cams 59. In this way the quantity of work produced by the machine will be increased as the number of wheels under which it is necessary to pass each piece, is decreased. It will be understood that when grinding flat work, such as flat manicure files, door plates, or the like, each of the wheels 35 will be so adjusted in relation to the gage mark 28 that when the piece of work is laid on the table 19 so as to bring a certain portion thereof in a predetermined relation to this gage mark, it will pass under one or all of the wheels successively as the table is rotated by the action of the driving cones 21. By providing the circular gage mark 28 I provide a ready means by which all of the grinding wheels, as well as all of the workholders may be given a predetermined relation to any work laid on the table at any place, provided each piece of the work is positioned in relation to this mark in a predetermined manner. That is to say, supposing that there are four workmen working around the machine shown in Fig. 2, and eight workholders of the plunger type 55, it will be obvious that, if each of the wheels is set so as to have the same relation to the gage mark 28, thereafter, if the workmen place the work so that a certain portion thereof, as for instance the end of the file portion of a flat manicure file, is on the gage mark 28, each file will have the same amount of finished surface given to it regardless of the portion of the table on which it may be laid, and regardless of the wheel under which it passes.

When the machine is arranged as shown in Figs. 1 and 2, in which the work-table 19 rotates continuously, I provide the ordinary belt shifter fork 60 mounted on the lever 61 controlled by the shaft 62 having a handle 63.

For certain classes of work it is preferable that the work-table be moved by a step-by-step intermittent motion rather than by a continuous motion. For this purpose I provide the belt shifter handle 63 with a lever 64 vertically movable thereon and normally held in an upward position by a spring 65

operated on a pedal-controlled rod 66, all as shown best in Fig. 10. Underneath the table 19 I place one or more pins 67 arranged to contact with the lever 64 as the table 19 rotates. Such contact and rotation move the handle 63 so as to throw off the belts from the tight pulleys 22 to the loose pulleys 23, thus stopping the rotation of the table 19. In order to start the machine again, it is necessary to depress the rod 66 by stepping on the pedal thereof, which pulls the lever 64 down on the handle 63 against the pressure of the spring 65 until it is out of the path of the pin 67 when the handle 63 may be moved so as to rotate the shaft 62 to throw the belts on to the tight pulleys 22 again. The table 19 then rotates until a second pin 67 strikes the lever 64 when the machine is again stopped. This motion is particularly useful in connection with a holder which I provide for the grinding of round work. Such a holder is best illustrated in Fig. 9, in which 70 is a frame fastened to the table 19 and having a spring seated center 71 and a rotatable center 72 in the opposite arms of the yoke. It will be seen that by pulling back the center 71 a piece of round work, such as the roller shown in the holder in Fig. 9, may be inserted between the centers. 73 is a bracket fastened to the frame 15 and supporting a shaft carrying a pulley 74 and also a driving center 75 which, for purposes of illustration, I have shown as a rubber cone arranged to engage with a conical recess in the center 72 of the workholder. Any other form or means such as a spring seated center may be used in place of this rubber plug. The pulley 74 is driven by a belt 76 from a pulley 77 driven in any suitable manner. When the holder 70 on the table 19 is held stationary opposite the bracket 73, it will be obvious that any work held therein will be rotated between the live center 72 and the dead center 71. The bracket 73 is positioned opposite grinding wheel 35 and the pin 67 is located on the table 19 so as to bring the table to a stop with the workholder 70 in correct position, and to hold the work under the wheel 35. The work is rotated until it is ground when the table is again rotated to bring a second workholder like 70, in which the workman has placed a new piece of work at a point between a pair of the grinding wheels, until the work is under the grinding wheel 35. As stated before, in reference to the flat workholder, as many of these rotatable workholders as is required may be provided, so that while a piece is being ground under each of the wheels 35, the workman will be removing a piece of finished work and placing a piece of unfinished work in holders which are idle at that time.

While I have described my novel machine in connection with the specific form which I have chosen for purposes of illustration, it will be understood that I do not intend to limit myself to the specific form illustrated. Many features of the invention may be applied to various forms of machines for working metals or the like.

I claim:—

1. A support, a horizontal work-table mounted thereon so as to be free to be rotated and to be moved in a horizontal plane, means to rotate said table, and guides bearing against an edge of said table and arranged to guide it as it rotates.

2. A support, a horizontal annular work-table mounted thereon so as to be free to be rotated and to be moved in a horizontal plane, means to rotate said table and guides bearing against the inner edge of said table and arranged to guide it as it rotates.

3. A support, a horizontal annular work-table mounted thereon so as to be free to be rotated and to be moved in a horizontal plane, means to rotate said table, a tool arranged to operate on work placed on said table, and guides bearing against the edge of said table and arranged to maintain said table in fixed relation to said tool as said table rotates.

4. A support, a horizontal work-table mounted thereon so as to be free to be rotated and to be moved in a horizontal plane, guides bearing against an edge of said table, friction rollers on opposite sides of the center of said table and arranged to bear against an edge thereof to rotate it, and means to drive said rollers, said rollers being constructed and arranged so that the horizontal pressures therefrom are balanced.

5. A support, a horizontal work-table mounted thereon so as to be free to be rotated and to be moved in a horizontal plane, means to rotate said table, and guides arranged to bear on an edge and on the top of said table to guide it and hold it down on said support.

6. A support, a movable work table thereon, a grinding wheel having its axis approximately parallel to the surface of said table, a mounting for said wheel constructed and arranged to permit the axis thereof to be moved toward and away from said table, a stop to limit the motion of said wheel toward said table, a yielding device to hold said wheel yieldingly in contact with work on said table, and an adjustable bracket carrying said yielding device, and said stop constructed and arranged to be shifted to permit the normal working position of said wheel to be changed.

7. A support, a movable work-table thereon, a grinding wheel arranged to be pressed against work on said table, a stop to limit its motion toward the work and a yielding device to hold it against the work, said stop and said device being adjustably mounted

and movable together to permit the normal working position of said wheel to be changed.

8. A support, a work table thereon, a grinding wheel having supports arranged to permit the active surface of said grinding wheel to lie normally in a plane parallel to the surface of said work table, said supports being constructed and arranged to permit said active surface of said wheel to be tilted out of its normal plane.

9. A rotatable work-table, means to rotate it, a grinding wheel arranged to operate on work on said table, said wheel being constructed and arranged to permit it to be moved axially and means to give said wheel a predetermined back and forth axial motion as selected portions of said work-table pass thereunder.

10. A rotatable work-table, means to rotate it, a grinding wheel arranged to operate on work on said table, said wheel being constructed and arranged to permit it to be moved axially and means connected to said work-table, to give said wheel a predetermined back and forth axial motion as selected portions of said work-table pass thereunder.

11. A rotatable work-table, means to rotate it, a workholder attached to said table and arranged to hold work thereon, and a fixed cam arranged to open said holder as it passes said cam.

12. A circular work-table having a flat top, means to rotate said table, a tool arranged to operate on flat pieces of work on the top of said table, a workholder on said table and arranged to hold such pieces against said flat top, said top having a circular gage mark thereon, and guides for said work-table, constructed and arranged to cause said table to maintain a fixed relation between said gage mark and said tool as said table is rotated.

13. A circular rotatable work-table, means to rotate it, a workholder on said table, a plurality of tools arranged to operate successively on work held by said workholder, said tools being spaced apart to permit access to said workholder as it passes from one tool to another and automatic means, located in the space between two of said tools, to release work held by said workholder.

14. A rotatable work-table, means to rotate it, and automatic means to suspend the operation of said rotating means at predetermined points, and a grinding wheel arranged to operate on work carried by said table, said automatic means being constructed and arranged to permit said table to rotate when the work is out of contact with said grinding wheel and to stop said table when the work is in position to be operated on by said grinding wheel.

15. A rotatable work-table means to rotate it, and automatic means to suspend the operation of said rotating means at predetermined points and a grinding wheel arranged to operate on work carried by said table, a workholder on said table, constructed and arranged to rotate work held in it, said automatic means being constructed and arranged to stop said table when the work in said holder is in position to be operated on by said grinding wheel and means to rotate the work in said holder as it is operated on by said grinding wheel.

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