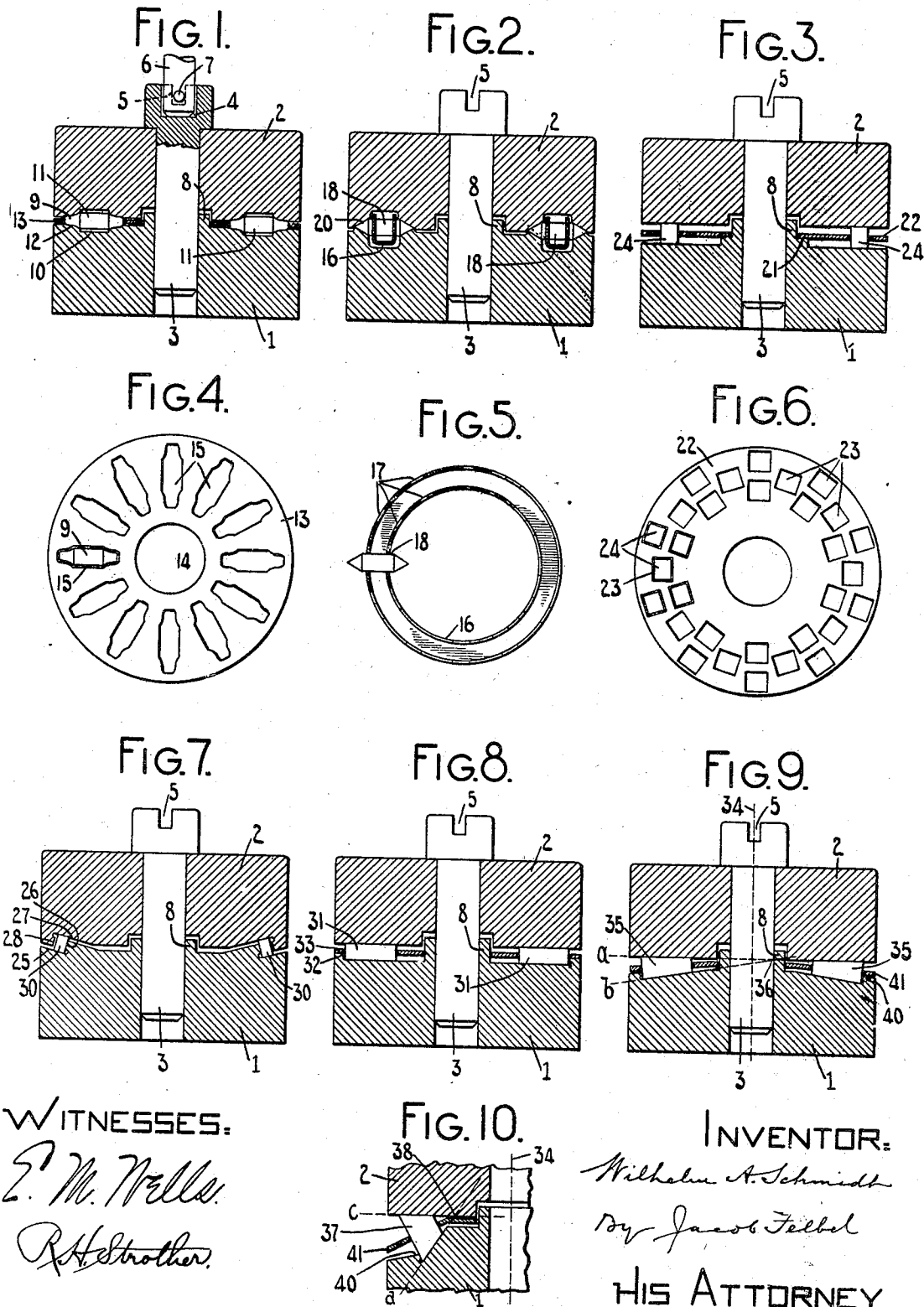


1,061,692.

Patented May 13, 1913.

2 SHEETS—SHEET 1.



1,061,692.

Patented May 13, 1913.

2 SHEETS—SHEET 2.

FIG. 12.

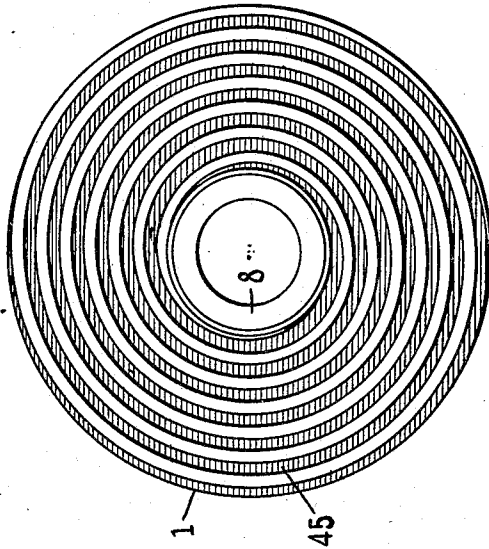
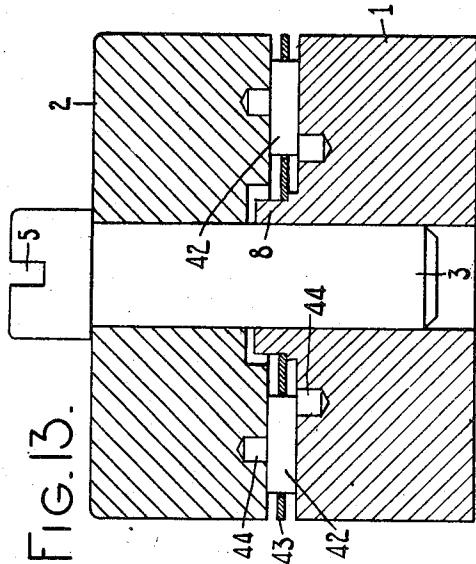
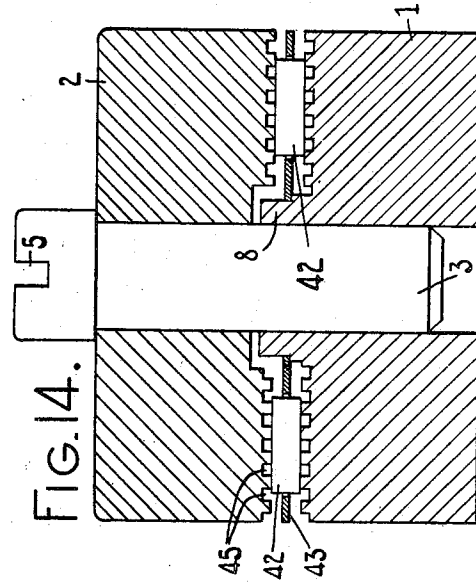
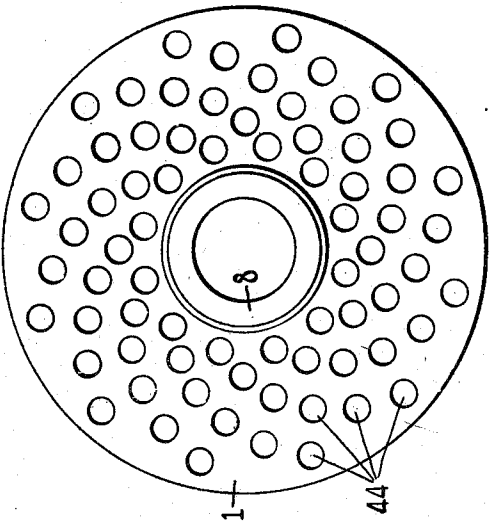


FIG. 11.



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UNITED STATES PATENT OFFICE.

WILHELM A. SCHMIDT, OF ILION, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REMINGTON TYPEWRITER COMPANY, OF ILION, NEW YORK, A CORPORATION OF NEW YORK.

GRINDING-MACHINE.

1,061,692.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed July 6, 1912. Serial No. 708,001.

To all whom it may concern:

Be it known that I, WILHELM A. SCHMIDT, citizen of the United States, and resident of Ilion, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

My invention relates to grinding or lapping devices or machines.

The principal object of the invention is to provide improved means for grinding or lapping the surfaces of articles having longitudinal axes and being circular in cross-section vertical to said axes, that is to say, for grinding articles having surfaces of revolution. Such surfaces may be cylindrical or conical or of other configuration. In some instances the elements of the surface are straight lines as in cones or cylinders, and in others they may be curved lines.

One specific use to which I contemplate applying my invention is to the grinding of the tapered pivots for the type bars of typewriting machines, and another purpose is to the grinding of the cylindrical rollers used in the bearings of the carriages of typewriters. The invention is adapted, however, for other than these specific uses.

To the above ends my invention consists in certain features of construction and combinations and arrangements of parts, all of which will be fully set forth herein and particularly pointed out in the claims.

In the accompanying drawings, Figures 1, 2 and 3 are cross sections taken axially of three sets of grinding devices having grinding surfaces of different forms. Figs. 4, 5 and 6 are face views of separating, guiding or locating devices used in connection with the respective grinding devices shown in Figs. 1, 2 and 3. Figs. 7, 8 and 9 are views like Fig. 1 but showing the devices arranged for grinding still other forms of surfaces. Fig. 10 is a fragmentary view showing a grinding device arranged for still another form of surface. Figs. 11 and 12 are face views of two grinding plates or laps, the grinding surfaces of which have been interrupted, the first with staggered holes and the latter with a spiral groove. Fig. 13 is a longitudinal section like Fig. 8 but with laps or plates of the form shown in Fig. 11,

and Fig. 14 is a similar view but showing laps of the character shown in Fig. 12.

The grinding or lapping devices consist essentially of two bodies, laps or plates arranged with coincident axes and in some instances a disk or separator is provided with suitable openings to hold a quantity of the articles to be ground, the device as a whole being like a roller bearing but of a design which, in a roller bearing, would be defective, as will be explained in detail. One of the plates may be stationary and the other may be rotated, or both plates may be rotated in opposite directions if preferred.

In the drawings there are shown two cylindrical grinding plates, a lower plate 1 and an upper plate 2, said plates being of cast iron or other suitable material. A spindle 3 passes vertically through central bores in the two plates, thus maintaining said plates with their axes coincident. Relative rotation may be imparted to the plates in any suitable manner. In one arrangement in which I have used these devices, the bottom plate 1 rests on the bed of a drill press or a machine similar to a drill press, said bottom plate being stationary. The spindle 3 has a running fit in said plate 1 and is rigidly connected with the upper plate 2. Said spindle is formed with a head having a central bore 4 in the top thereof and notches 5 cut across the opposite walls of said opening. A spindle 6, which may be a part of a drill press or a specially made spindle secured in the drill press after the fashion of a drill, or which, for that matter, may be of any suitable character, is inserted in the opening 4 and said spindle is provided with a cross pin 7 that works in the notches 5. The spindle 6 is driven or rotated in any suitable manner and is arranged so that it can be moved up and down after the fashion of the spindle of a drill press. I have used this device with a weight controlling the spindle 6 and pressing it downward with a suitable force adapted for the grinding of the articles.

The grinding takes place between the upper surface of the plate 1 and the lower surface of the plate 2, which surfaces have relative rotation co-axially with the spindle 3. The form given to these surfaces will depend upon the form of surface that it is in-

tended to grind but all of the plates 1 preferably have one feature in common, namely, a flange 8 turned up on the plate 1 and surrounding the spindle 3. The grinding is preferably done with oil and diamond dust, or some other powdered abrasive, and this flange 8 serves as a dam to keep the said abrasive out of the bearing of the spindle 3.

In Fig. 1, which shows the device arranged for grinding pivot pins 9 for type bars, such as are used in the Remington typewriter, the two plates have each turned therein an annular groove 10 of a width equal to the length of the cylindrical middle part 11 of the pivot to be ground. These grooves are cut so as not to touch the elongated pins at their middles where no grinding action is desired. On each side of this groove 10, surfaces 12 are turned, said surfaces 12 being on a taper as shown and having in cross section the double curvature shown in Fig. 1. It is contemplated that quite a number of these pivot pins 9 be placed between the grinding plates at one time. Said pins are separated, located and guided by a disk 13, Fig. 4, having a central opening 14 for the dam 8 and having a number of radial openings 15 of approximately the size and shape of the longitudinal sections of the pins 9 to be ground. In operation the spindle 6 is raised and the plate 2 is lifted off of the plate 1. The pins 9, already turned to approximately their final shape, are inserted in the disk 13, one pin being placed in each of the openings 15 and resting on the lower plate. The plates 1 and 2 are charged with diamond dust or other abrasive and a proper lubricant or cutting fluid. The plate 2 is then put in position and the spindle 6 is weighted and allowed to rest in the opening 4, and the spindle is rotated until the grinding is completed. It will be noted that these pins 9 are tapered at both ends and that they bear against the plates 1 and 2 at both their tapered end portions. One end of the pin is farther than the other from the axis of rotation of the plate 2. Said plate will move at the outer end of said pin at a higher velocity than it will at the inner end of said pin. The motion of the plate 2 will cause the pins 9 to roll around over the plate 1 somewhat after the fashion of a roller thrust bearing. This bearing is, however, defective in design for a roller bearing in the particular above mentioned, namely, that the plate 2 moves faster at the outer end of the pin 9 than it does at the inner end. The result of this so-called defect in design is that although the pin rolls on the plate 1 it cannot have a true rolling motion. Its motion is of necessity a combination of a rolling and a rubbing action. By this combination of motions the bearing ends of the pins are ground accurately and smoothly to the form predetermined by the

surfaces that have been turned or formed in the plates 1 and 2.

In the particular form of surface shown in the pins 9 in Figs. 1 and 4 the rolling action is made imperfect and is therefore combined with a rubbing action for another reason than that mentioned above. The surface to be ground on these pins is a tapered surface and the rolling motion of the pin itself against the plates 1 and 2, even at one end of the pin, could not possibly be a true rolling motion because the taper has a larger diameter at one part than it has at the other. This additional cause of rubbing action is present in the forms of the invention shown in Figs. 1, 2, 9 and 10, but is not present in those forms shown in Figs. 3, 7 and 8, which figures show the devices arranged for grinding cylindrical surfaces.

In Fig. 2 the parts are substantially like those of Fig. 1 except that in this latter figure true cones are being ground and ground down to a point, thus leaving no room for a separator of the form shown in Figs. 1 and 4. In this case a separator 16 is provided consisting of an annulus here shown as being made of sheet metal bent into a U-shaped cross section and formed with a series of holes 17, Fig. 5, for the insertion of the pins 18. In Fig. 2 it will be seen that the surfaces 20 in the plate 2 extend down past the axes of the pins 18. The device is thus adapted for grinding the cones to a sharp point.

In Figs. 3 and 6 I have shown a form of the invention adapted for grinding short cylindrical rollers such as are used for the bearings of the carriages of typewriting machines. In this case the plate 1 is turned to form a shoulder 21 to support a separator plate 22 having openings 23 therein for guiding a large number of short rollers 24. As shown in Fig. 6 these openings 23 can be staggered so as to get in quite a large number of rollers and to utilize as much as possible of the grinding surfaces of the plates 1 and 2, which grinding surfaces in this instance are flat.

In Fig. 7 I have shown another form of device for grinding short cylinders without the use of any separator disk. In this instance the plate 1 has near its periphery an inclined surface 25 and this is bounded by a guiding surface 26. The plate 2 is formed with a surface 27 at the same inclination as the surface 25 and with an outer guiding surface 28, the distance between the surfaces 26 and 28 being appropriate to guide the particular sort of roller 30 that is intended to be ground in this device. In this case a large number of these rollers can be set around the plate 1 and then when the plate 2 is put in position said rollers will all be held in place and properly guided by the surfaces 26 and 28 and the cylindrical faces

of said rollers will be ground by the surfaces 25 and 27. In practice, where an accurate cylindrical surface is desired, I prefer to use a separator disk as shown, for example, in Fig. 3.

In Fig. 8 I have shown the device arranged for grinding long cylindrical rollers 31. In this case the grinding surfaces are flat surfaces but I have shown the plate 1 formed with a guiding flange 32 for the ends of the rollers. These rollers are too long, however, to be kept in radial position solely by end flanges as in the case of Fig. 7 and a separating disk 33 is therefore provided similar to the disk 13 in Fig. 14 but with the openings 15 of a shape adapted for the rollers 31.

In Figs. 9 and 10 I have shown the devices arranged for grinding cones. In this case the grinding surface of one of the plates can be flat and that of the other plate can be conical as shown. In order to secure the so-called defective design in this instance when considered as a roller bearing, the device should be so arranged that the apex of the cone to be ground is not in the axis 34 of the spindle 3. If the cone is of a slight taper like the cone 35 in Fig. 9 the parts may be so designed that the apex 36 of said cone will come beyond the axis 34. If the cone has a greater taper like the cone 37 shown in Fig. 10 then the parts may be so designed that the apex 38 of said cone comes short of the axis 34. In either event the plate 1 is preferably formed with a guiding flange 40 to limit the motion of the cone away from the axis 34 and a disk 41 is provided similar to the disk 13 but with holes therein suitable for the devices to be ground. In the extreme case illustrated in Fig. 10 the disk 41 is shown cupped in order better to accommodate it to the shape of the cone 37.

In each of the forms of the device illustrated, it will be noted that the plates or members 1 and 2 have turned or formed therein annular surfaces, the cross sections of which are complementary in form to the longitudinal sections of the articles to be ground and it will be noted that, except in the case of the cylindrical rolls, the radii of each of said surfaces vary at different points along the axis of the article. It will also be noted in each instance that means are provided, such, for example, as the separator plate 13 of Fig. 1 and the flanges 26 and 28 of Fig. 7, for so guiding the articles to be ground that the axes of said articles when prolonged pass through the common axis of the plates 1 and 2. It is not, however, essential in all instances that the longitudinal axis of the article to be ground shall pass through the axis of rotation of the plate 2. It will also be noted that in each instance, the article to be ground makes contact at

various points with each of the plates 1 and 2, and that the distances of said points from the axis of said plates, is not proportional to the distances of the same points from the longitudinal axis of said article, so that the action between said plates and said article is partly a rolling and partly a rubbing action.

Experiment shows that in grinding cylindrical or conical rolls between plates there is a tendency for the roll to grind away at one part and leave another part of greater diameter. For example, the roll may grind away at the ends, leaving the middle of sufficiently greater diameter so that the middle of the roll has a true rolling action between the plates, the rubbing action being confined to the ends, and consequently the grinding being confined to the ends until said ends are of sensibly smaller diameter than the middle. In order to break up this tendency to the formation of a section of true rolling action and another section or sections of rubbing action, the surfaces of the plates may be interrupted by a series of staggered holes as shown in Figs. 11 and 13 or by grooves having some other direction than radial, as in Figs. 12 and 14. In these figures the construction, with the exception of said holes or grooves, is substantially the same as in other figures of the drawing, the plates 1 and 2 having flat surfaces for the grinding of cylindrical rolls 42, and said rolls being controlled by spacer plates 43. In Figs. 11 and 13 a series of holes 44 has been bored into the faces of the laps or plates and in Figs. 12 and 14 a spiral groove 45 has been cut in each of said faces. If one part of the cylinder 42 is of slightly greater diameter than another and therefore has a tendency to a true rolling motion, this particular part will frequently run over or under one of the holes 44 or else it will be for part of the time over or under one of the grooves 45 and at those times the pressure which causes true rolling action will be transferred to some other part of the cylinder and the first mentioned part will receive the rubbing action and will consequently be reduced in diameter. It will be seen that the interruption of the grinding surfaces by the holes 44 and grooves 45, tends to break up the formation of a section of larger diameter and tends to cause the roller to be ground more uniformly throughout its length.

While I have shown this device of interrupted grinding surfaces applied only to the grinding of cylinders, it will be perceived that it is equally adaptable to cones.

Various changes can be made in the details of construction and arrangement without departing from my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. The combination of two co-axial grind-

ing members having grinding surfaces facing each other, said grinding surfaces being annularly disposed about the common axis of said members and each formed with a cross-section complementary to the longitudinal sections of the articles to be ground and such that, when said two members are in position facing each other, there is an annular space between them which in cross-section has boundary lines corresponding to those of the parts of said articles that are to be ground, and means for guiding said articles so as to maintain their longitudinal axes in fixed relation to said common axis of said members, the form of the parts being suitable for grinding articles having surfaces of revolution about longitudinal axes and each of varying radii at different points along its axis.

2. In a device for grinding articles having surfaces of revolution about longitudinal axes and each of varying radii at different points along its said axis, the combination of two co-axial plates having relative rotary motion, said plates having grinding surfaces annularly disposed about the axis of such motion and which in cross section are complementary in form to the longitudinal sections of the articles to be ground, and a disk between said plates and having a series of openings to guide said articles, each of said openings being formed approximately like the longitudinal section of one of said articles.

3. In a grinding or lapping device, the combination of two plates having coincident axes and having their adjacent surfaces formed for grinding pins each having a cylindrical middle portion and two tapered

ends, and a separator disk having a series of radial openings adapted to guide said pins, each of said plates having an annular groove to clear said cylindrical middle portions.

4. In a grinding device, the combination of a lower grinding plate having an annular grinding surface and formed inside of said grinding surface with a flange which constitutes a dam, an axial hole through said plate, and an upper grinding plate having a cooperating annular grinding surface and having a spindle adapted to work in said hole, said dam acting to keep the abrasive from flowing into the bearing.

5. In a grinding or lapping device, the combination of two grinding members having coincident axes and having in their adjacent sides, annular surfaces for grinding elongated articles and having also grooves cut so as not to touch said articles at points in the length of the latter where no grinding is desired, and means for guiding said articles between said members.

6. In a grinding or lapping device, the combination of two grinding members having relative rotary motion about a common axis, said members having surfaces for grinding the two ends of pins, and means for guiding said pins so as to maintain one end of each pin nearer said axis than the other end.

Signed at Ilion, in the county of Herkimer, and State of New York, this 3rd day of July, A. D. 1912.

WILHELM A. SCHMIDT.

Witnesses:

G. H. GRIFFITH,
GUS FOLEY.