O. A. SCHMIDT.

MACHINE FOR GRINDING ROLLERS.

APPLICATION FILED FEB. 16, 1912.

**1,055,808.**

Patented Mar. 11, 1913.

3 SHEETS—SHEET 1.

*Fig. 1.*

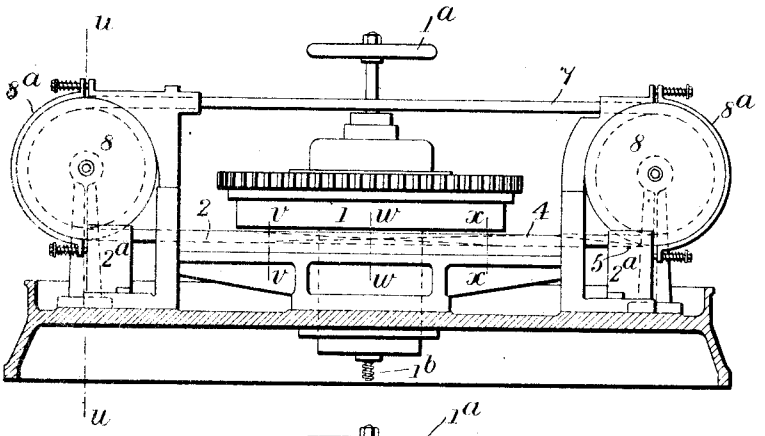
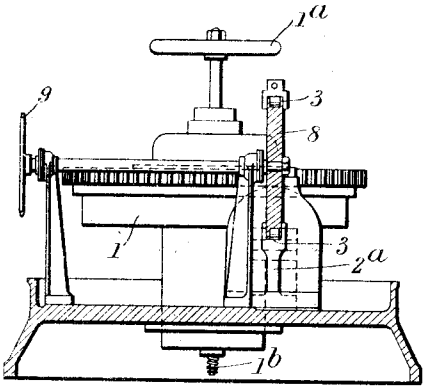



*Fig. 2.*



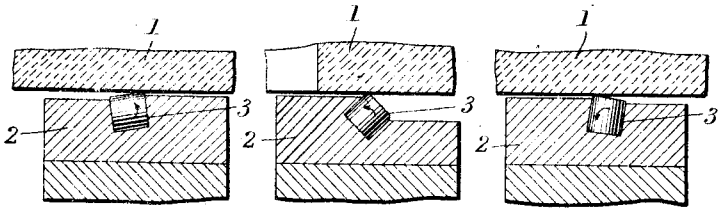




*Fig. 3.* *Fig. 4.* *Fig. 5.*

Witnesses.

Inventor.

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3 SHEETS—SHEET 2.

*Fig. 6.*

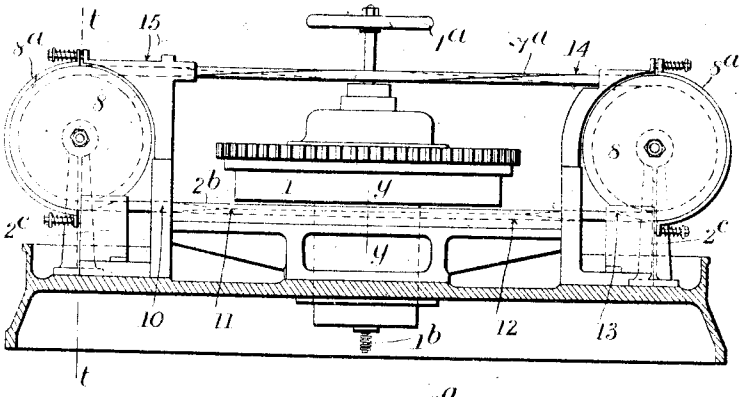
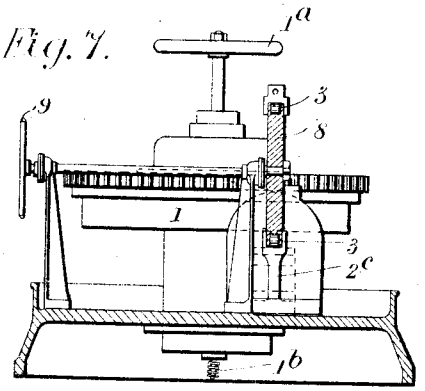



*Fig. 7.*



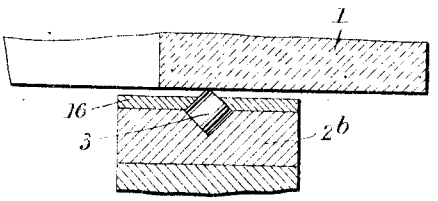




*Fig. 8*

Witnesses.

Inventor

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3 SHEETS—SHEET 3.

*Fig. 9.*

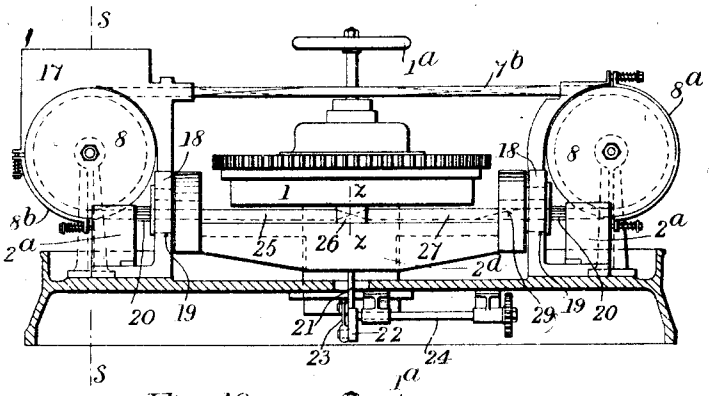
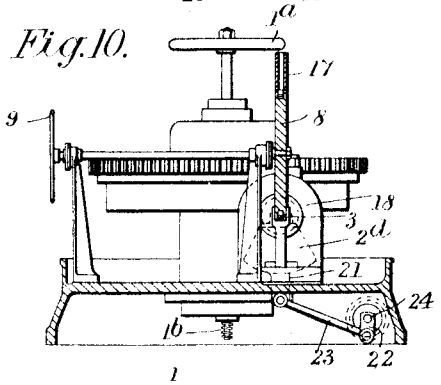



*Fig. 10.*



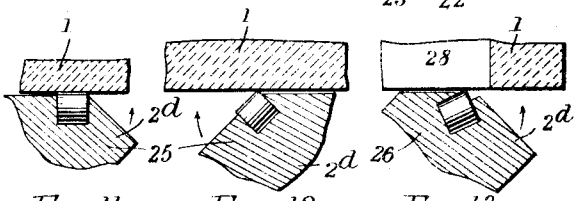




*Fig. 11.* *Fig. 12.* *Fig. 13.*

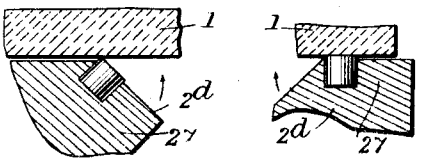



*Fig. 14* *Fig. 15.*

Witnesses.

H. W. Primm.

Inventor.

Otto Albert Schmidt

by Williamson Fisher, Whittemore & Mackay, his Attorneys

# UNITED STATES PATENT OFFICE.

OTTO ALWIN SCHMIDT, OF CHELMSFORD, ENGLAND, ASSIGNOR TO THE HOFFMANN MANUFACTURING COMPANY LIMITED, OF LONDON, ENGLAND.

## MACHINE FOR GRINDING ROLLERS.

1,055,808. Specification of Letters Patent. Patented Mar. 11, 1913.

Application filed February 16, 1912. Serial No. 678,017.

*To all whom it may concern:*

Be it known that I, OTTO ALWIN SCHMIDT, a subject of the German Emperor, residing at Chelmsford, in the county of Essex, England, have invented a certain new and useful Improvement in Machines for Grinding Rollers, of which the following is a specification.

This invention relates to a machine or device for grinding the corners of rollers such as those used in roller bearings, the object of same being to grind the corners to a radius or curve though it may be adapted to provide them with a chamfer or angle or angles at their corners while the rollers are in movement through the machine.

It has been found highly desirable to remove the sharp angles at the ends of the rollers when they terminate in the usual right angle faces and provide a radius because even the obtuse angles left with a chamfer if a mere angle say of 45° is removed may still operate in the bearing to effect a cutting of the roller race or to effect damage to the roller. To obtain such a radius, or a chamfer and other ends one form of machine or device for example according to the present invention is provided with a movable grinding member, preferably a disk, horizontally arranged and formed of a grinding material or capable with the addition of a suitable material of effecting the grinding and a guide or holding device for presenting the rollers to the face of same, which guide is preferably a channel having, according to requirements, two, three or four sides or portions of sides adapted to closely hold and control the rollers so that they have a rolling movement of progression or a partial rolling movement therein. The guide in question preferably presents the peripheries of the rollers in the first instance to the grinding face and then has a gradual twist given to it so that one corner only of the rollers is presented to the grinding face the twist as the rollers progress gradually tilting them until the desired radius or curve, for example a quarter twist, is attained when the rollers may pass away from the grinding face, or the twist may be reversed or continued to allow them to be further acted upon, it being desirable in any case that the rollers pass to a transferring device which takes them from the exit end of the grinding face to the entrance end again as several passes may be necessary to obtain the required reduction.

Another form of machine or device is adapted to grind a chamfer or angle on the roller after it has been given a sudden twist by the holder as long as desired after which the roller is given a further twist or twists to grind the next corner and so on. The twist may be effected in a fixed holder having a twisted channel or in a straight channel or channels carried by a holder capable of a suitable rocking or other movement or in a combined straight and twisted channel in a rocking or like holder.

Embodiments of the above and other features of the invention are illustrated in the accompanying drawings in which:—

Figure 1 is an elevation partly in section of a machine having a twisted channel which is arranged in the form shown for radius grinding. Fig. 2 is an end elevation partly in section on line *u—u* Fig. 1. Fig. 3 is a cross section on an enlarged scale of a part of Fig. 1 on line *v—v*. Fig. 4 is a cross section on an enlarged scale of a part of Fig. 1 on line *w—w*. Fig. 5 is a cross section on an enlarged scale of a part of Fig. 1 on line *x—x*. Fig. 6 is a similar view to Fig. 1 of a machine for chamfer grinding. Fig. 7 is an end elevation partly in section on line *t—t* Fig. 6. Fig. 8 is a cross section on an enlarged scale of a part of Fig. 6 on line *y—y*. Fig. 9 is a similar view to Fig. 1 of a machine having a rocking holder arranged in the form shown for radius grinding, and Fig. 10 is an end elevation partly in section on line *s—s* Fig. 9. Figs. 11 to 15 are cross sections on an enlarged scale to show different positions of the same roller in the rocking holder, Fig. 13 being a section on the central position on line *z—z* of Fig. 9 to show the holder and the section of the grinding disk at this point. The views show the same roller at different positions in the holder in order to illustrate the grinding operation, and not sectional views of the holder in the same or stationary position throughout.

Referring to Figs. 1 to 5 the grinding disk 1 is suitably supported above a channeled holder 2 by adjustable devices now well known in connection with such grinding disks a part of such adjusting devices

being shown in the handle $1^a$ and screw $1^b$. The holder 2 is shown in section at different points in Figs. 3 to 5, the channel in same having a gradual twist from the point where it enters beneath the disk to its exit point that is from a somewhat greater distance than that between the section lines $v$ to $x$ respectively the twist being approximately over a quarter of the roller 3 to be acted on. It is desirable in forming this twist in the holder that the corner of the roller to be acted upon remains in the same plane throughout. Preferably the twist is so arranged that the rollers 3 (which travel in close succession) enter an introductory part $2^a$ of the channel beneath the disk with their peripheries on the same plane as the latter as seen in the end view Fig. 2 that being the position they have in the traveling rolling movement in the transferring device hereinafter described, and immediately commence to present their corners to the action of the disk as shown in Fig. 3 and gradually turn over until they occupy the positions shown as examples in Figs. 4 and 5. At the exit point from beneath the disk the channel commences another quarter twist from about the point 4 to about the point 5 in the part $2^a$, Fig. 1, so as to bring the rollers again into their true rolling position in the channel to enable them to move easily through the transferring device. This transferring device may be either with or without a mixing device, that shown has none and consists only of a channel 7 connecting two channeled driven wheels 8 8 having spring pressed semi-circular cover plates $8^a$ $8^a$ such wheels on their lower sides communicating with the channeled holder $2^a$ 2. By this means the rollers are carried in succession around again to the entrance end of the disk where the next corners are presented to the grinding action.

The grinding disk is provided with screw means for raising and lowering it, or for exerting a spring pressure on the rollers such means being of the character employed in ball grinding machines having two grinding disks, usually vertical where one is required to exert a spring pressure and to be withdrawn and replaced. The wheels 8—8 are also suitably driven from sprocket wheels 9 and chains and gears (not shown) to provide a positive propulsion for the rollers as this is generally desirable.

The holder 2 is in the case illustrated provided with three supporting sides for the rollers as shown in Figs. 3 to 5.

The construction shown in Figs. 6 to 8 is similar as regards the main part of the machine but the twist say of 45° given to the channel in the holder $2^b$ commences at about the point 10 and ends at about the point 11 so that the corner of the roller is presented suddenly to the grinding disk across the face of which it travels without change until the exit where from about the point 12 to the point 13 in the part $2^c$ the channel has another reverse twist of 45° to bring it back into rolling position after which it has a half twist in the channel $7^a$ of the transferring device from say the point 14 to the point 15 to completely reverse its position whereby the opposite corner may be acted upon during its next pass beneath the grinding disk. The roller holder $2^b$ at the point where the roller is being acted upon by the disk is preferably provided with four sides as shown so as to fully support the roller 3, two of the sides being formed by a cover plate 16 Fig. 8.

The construction shown in Figs. 9 to 15 is similar as regards the grinding disk and transferring device except that a hopper 17 is shown in the latter for mixing the rollers in their order of progression for filling them into the channel and for other purposes, such hopper being given as an example of one which is suitable for all forms of the machine shown. The main holder $2^d$ for the rollers has in these figures a slow rocking movement given to it so that the desired complete radius at once commences to be produced while the rollers are under the action of the grinding disk. This rocking holder as shown extends outside the full diameter of the disk and is carried at each end in bearings 18, 18, by hollow gudgeons 19, 19 with which connect portions 20, 20 or continuations of said holder. These portions 20, 20 are connected with fixed parts $2^a$ and may be made of flexible tubing having internal dimensions suitable for the rollers, or of four metallic strips or wires as indicated or in other ways so that they will follow the movement of the rocking holder and receive the rollers and deliver them from and to the carrying wheels 8. The rocking motion is shown as obtained from cranks 21, 22 and connecting rod 23 from a shaft 24 which is suitably driven and the holder has in its central portion a twisted center channel 26 which can change the position of the rollers.

It is desirable to support the rollers 3 on three sides but it is also necessary to expose the periphery as well as one end so that a sufficient radius may be obtained. To this end the rocking holder is formed with a channel as shown in Fig. 11 exposing in this case the periphery and a sufficient portion of the end of the roller to allow of the corner being exposed, and such holder moves through an arc of 45° backward and forward so that referring to Figs. 11 and 12 which show the first or entering part 25 of the holder channel it will be seen that in such part a radius will be obtained commencing at the periphery of the roller and leaving off when the holder has arrived at

the end of the amount of its angular movement as above. This being done it is necessary to expose the end and grind the rest of the radius on same up to the point on the corner of the roller where the first part of the radius ceased. This is effected by providing in the holder the twisted center channel 26 Fig. 13 which can change the rollers in their travel from the position shown in Figs. 11 and 12 or the entering part 25, to that shown in Figs. 14 and 15 or leaving part 27, so that the end which was previously covered is now fully exposed.

The twist in the part 26 Fig. 13 is effected without the roller being acted upon by the disk as the part 26 is located beneath the opening or internal diameter 28 usual in grinding disks of this character. The figure shows the roller in an intermediate position, it having twisted around half of 45°. In doing this the sides of the roller groove have altered their shape as the one on the periphery is growing and the one on the end is disappearing, though the cross section of the rocking holder otherwise does not alter, it being preferably a bar throughout from the entering to the leaving end with two faces at 135°. The groove or channel is so arranged in the bar that the corners of the rollers are kept in the same plane. From the position in Fig. 14 it is necessary or desirable to turn the roller into a true rolling position again, and this is effected by a twist in the channel of the holder as indicated at 29. After being carried around by the wheel 8 at this end, the rollers are given a half twist in the channel $7^b$ of the transferring device to reverse them, so that the other corner is acted upon at the next pass. It will be understood that some of the reversals of position of the rollers required in the above construction can be effected in other ways and at other points as twist to any amount could be arranged to take place while the rollers are under the action of the grinding member as for example by dropping the holder below its normal plane so that the roller is not touched by the grinding member while being turned or reversed. Also, that according to the form or arrangement of the guide or holding device, either a corner or both corners of the roller may be ground to a radius, or the entire end, or both ends.

The machines or devices may be combined with one for grinding the peripheral faces of the rollers where the rollers have a true rolling motion of progression as in specification No. 965776—26th July 1910 the rollers while passing across one part or chord of the face of the grinding member or disk being acted upon peripherally and while passing across another part or chord being acted upon at their corners.

It is known to carry needles in a positively rotating holder adapted to carry them past the angled corner of a grinding disk so as to remove the bur from their heads and also to grind a groove in rollers near their heads by positively rotating each in a series between a driven disk and a fixed part, against the action of a rotating grinding disk.

Various modifications may be made in the invention over the constructions described such for instance as in the multiplication of the channels, or in the guiding of the freely moving rollers, the machines illustrated being examples of some suitable for acting upon the corners of rollers while having a traveling rolling or partial rolling movement through the machine.

What I claim is:—

1. A machine for grinding the corners of rollers to a radius, curve, or angle comprising in combination a framework, a holder carried by said framework, provided with a channel in which the rollers are accurately but freely held and capable of moving with a corner exposed and a rotatable grinding disk to which such roller corner is presented and which both grinds and imparts a traveling movement to the rollers.

2. A machine for grinding the corners of rollers to a radius, curve, or angle, comprising in combination, a framework, a holder carried by said framework provided with a channel in which the rollers are accurately but freely held and capable of moving with a corner exposed, means for varying the angle of such channel and exposed corner, and a grinding member to which such roller corner is presented.

3. A machine for grinding the corners of rollers to a radius, curve, or angle, comprising in combination, a holder provided with a channel in which the rollers are accurately but freely held and capable of moving with a corner exposed said holder having a twist in the channel of same to vary the angle of such exposed corner, and a grinding member to which such roller corner is presented.

4. A machine for grinding the corners of rollers to a radius, curve, or angle, comprising in combination a holder in which the rollers are accurately but freely held and capable of moving with a corner exposed, means for rocking such holder to vary the angle of the corner exposed and a grinding member to which such roller corner is presented.

5. A machine for grinding the corners of rollers to a radius, curve, or angle, comprising in combination a holder provided with a channel in which the rollers are accurately but freely held and capable of moving with a corner exposed, means for rocking such holder to vary the angle of the corner exposed, a twisted portion in the channel of such holder to fully grind the radius curve

on said corner, and a grinding member to which such roller corner is presented.

6. In a machine for grinding the corners of rollers to a radius, curve or angle, and in combination a rocking holder provided with a channel in which the rollers are accurately but freely held and capable of traveling with a corner exposed, a grinding member for acting on such corner and a device for introducing the rollers to the holder and for removing them therefrom in their travel, such device being attached to the holder and capable of moving therewith.

7. In a machine for grinding the corners of rollers to a radius, curve or angle, and in combination, a holder in which the rollers are accurately but freely held and capable of moving with a corner exposed, a grinding member to which the corner is presented and means outside of that part of the holder which presents the rollers to the grinding member for giving a twist to the roller.

8. In a machine for grinding the corners of rollers to a radius curve or angle, and in combination, a holder in which the rollers are accurately but freely held and capable of moving with a corner exposed a grinding member to which the corner is presented, means for transferring the rollers from the exit to the entrance end of such holder, and means for mixing the rollers in order of progression.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

OTTO ALWIN SCHMIDT.

Witnesses:
C. A. BARRETT,
G. F. BARRETT.