Nov. 1, 1927. 1,647,130

L. R. HEIM

ART OF GRINDING

Filed May 26, 1922

Fig. 1.

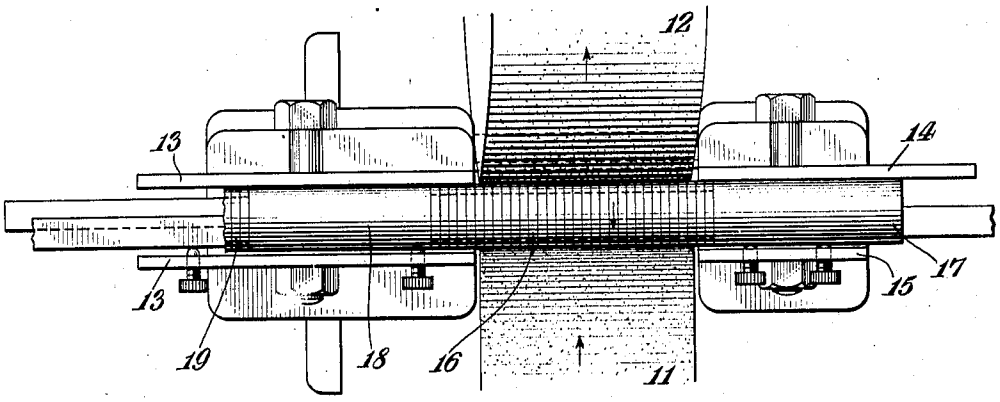
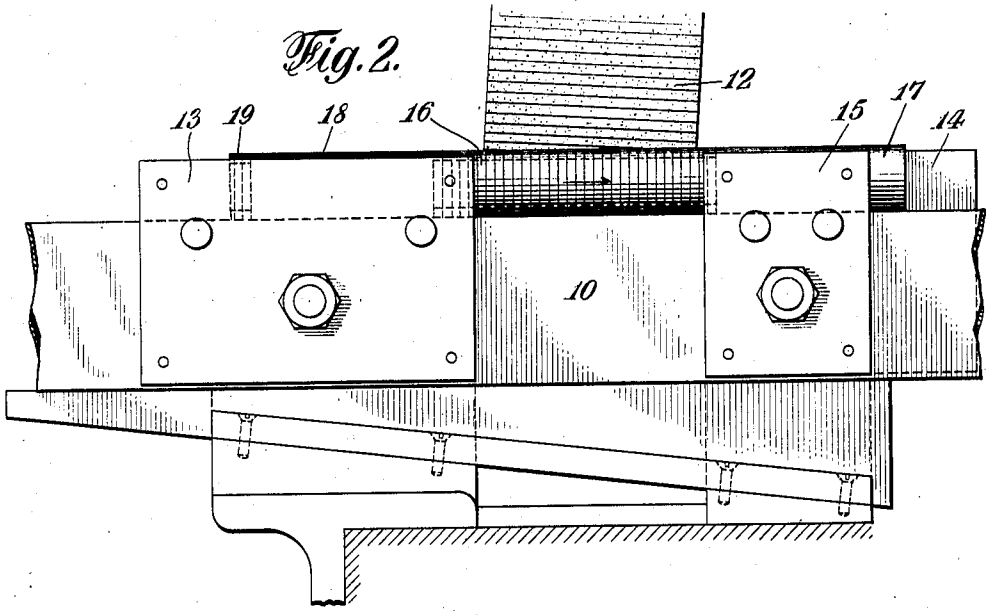


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ART OF GRINDING.

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This invention relates to grinding and more particularly to an art of centerless grinding. One of the objects thereof is to provide a practical art of the above nature which can be rapidly carried on and which will be dependable in its results. Another object is to provide an art of the above nature in which the required apparatus is simple and a high degree of accuracy maintained. Another object is to provide an art of the above nature especially adapted to handle rapidly and efficiently articles of short length relative to their diameter. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the several steps, combinations of steps and relation of one or more of the same to other steps, all as will be illustratively herein described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is illustrated one of various possible methods of carrying on my invention,

Figure 1 is a plan view; and

Figure 2 is a side elevation with one of the wheels removed.

Similar reference characters refer to similar parts throughout both views of the drawing.

Considering first the structure of the apparatus, there is shown at 10 a support on which the work rests while traveling through the machine. Positioned at one side of this support, as shown in Fig. 1 of the drawings, is a grinding wheel 11 driven, as indicated by the arrow, at a high rate of speed in such direction that its operative face will move downwardly or toward the support. On the opposite side of the support is a regulating wheel 12 which travels in the opposite direction, that is, its active surface moves upwardly or away from the support. This regulating wheel moves at a slow rate of speed, preferably at such a rate that there will be no material slip between its surface and the work which it contacts. It may also be noted that the regulating wheel is set at an angle, as indicated in the drawing, with respect to the supporting surface of the work support so that there will be a component of its action lengthwise of the support tending to feed the work in the direction indicated by the arrow in Fig. 2. The regulating wheel thus not only feeds the work but causes it to rotate about its axis at the desired rate of speed while the grinding wheel, driven at the best peripheral speed for grinding action, does its work on the material which is rotated and fed past it.

As herein shown, these wheels are of the so-called peripheral type as certain advantages are inherent in that type, but it may be noted that many features of this invention comprehend the use of apparatus in which grinding wheels of other form are employed.

At each side of the entering end of the work support are positioned guides 13 which tend to hold the work in proper position to enter into the grip of the wheels. In similar manner, at the discharge end of the work support are positioned on opposite sides guides 14 and 15, the latter being preferably shorter, as shown in the drawings, to permit the work to be laterally removed, if desired.

The precise construction, adjustments and mounting of these devices will not be herein set forth as these features in themselves form no part of the present invention. It may be noted, however, that the above apparatus is capable of receiving objects of round cross-section and automatically moving them along between the grip of the wheels, rotating them, and grinding their outer surface into true form.

When apparatus of this nature is used in grinding objects of extremely short axial length with respect to their diameter, there is sometimes experienced a tendency of the objects to tilt while in the grip of the wheels with a resulting inaccuracy of grinding. In grinding objects of this nature illustratively indicated by the pile of rings 16, in accordance with the preferred method of carrying on my invention, I follow the following procedure:—

There is first fed along the work support and between the wheels a cylindrical part 17 of such length that it has no tendency to tilt. Following this are the objects to be ground, such as the rings 16, a number of them being preferably placed end to end. These in turn are followed by a member 18 similar to the member 17 and, as indicated by the rings 19, the work may be continu-

ous, the elongated members being alternated with the work.

The members 17 and 18 may be of such diameter that they will be ground and automatically fed as they pass through the wheels, but in accordance with the broader aspects of my invention they may be of somewhat less diameter so long as they are of such size and shape that they prevent substantial tilting of the work. It may also be noted that, although I prefer to precede and follow the work with these parts 17 and 18, nevertheless certain advantageous results may be attained with either of them used separately. For example, the part 17 provides an abutment against which the work may rest and be fed and in and of itself is of beneficial action. Also, the use of a following member, such as the part 18, properly manipulated to rest snugly against the rear end of the work is of itself highly beneficial. In this last action, that is, assuming that the following member only be employed, it should be so shaped as to provide an end abutment against which the rear end of the work may rest evenly when in its desired position and should be urged forward as the rings feed through the machine so as to maintain this relation.

It will thus be seen that there is herein provided an art in which the several objects of the invention are achieved and which is well adapted to meet the conditions of practical use. It will also be seen that articles of short length relative to their diameter may be rapidly, effectively and efficiently ground, and that the art provided by this invention may be carried on with great saving in time and hence with high speed of production.

As various changes might be made in the art herein described and as my invention might be carried on with other apparatus, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. The herein described art of grinding cylindrical work of short axial length relative to its diameter, which consists in placing the work in position for entrance axially into a passage therefor between a grinding wheel and a regulating wheel, the regulating wheel being adapted to engage the periphery of the work to rotate the work about its axis and to exert a feeding component tending to feed the work along said passage, the grinding wheel being adapted to grind the periphery of the work as it is thus rotated and fed, positioning against an end surface of said short work a surface adapted to support said short work against tilting out of its proper position for grinding, and moving the work thus supported and accompanied by said supporting surface into said passage between the wheels.

2. The herein described art of grinding cylindrical work of short axial length relative to its diameter, which consists in placing the work in position for entrance axially into a passage therefor between a grinding wheel and a regulating wheel, the regulating wheel being adapted to engage the periphery of the work to rotate the work about its axis and to feed the work along said passage, the grinding wheel being adapted to grind the periphery of the work as it is thus rotated and fed, placing loosely against the rear end surface of said work an elongated supporting member having no tendency to tilt and having its work-engaging surface at right angles to the longitudinal axis of the work, and urging the work thus supported axially into said passage between the wheels.

3. The herein described art of grinding cylindrical work of short axial length relative to its diameter, which consists in placing the work in position for entrance axially into a passage therefor between a grinding wheel and a regulating wheel, the regulating wheel being adapted to engage the periphery of the work to rotate the work about its axis and to feed the work along said passage, the grinding wheel being adapted to grind the periphery of the work as it is thus rotated and fed, placing at the rear of said work thus positioned a member of greater axial length than its diameter and of a lesser diameter than the work, said member having a forward face in a plane at right angles to the axis of the work and loosely engaging the rear end surface of the work to support the work against tilting, and then urging said member forwardly to push the work thus supported and followed thereby into and through said passage between the wheels.

4. The herein described art of grinding cylindrical work of short axial length relative to its diameter, which consists in placing the work in position for entrance axially into a passage therefor between a grinding wheel and a regulating wheel, the regulating wheel being adapted to engage the periphery of the work to rotate the work about its axis and to feed the work axially along said passage, the grinding wheel being adapted to grind the periphery of the work as it is thus rotated and fed, and feeding said work into said passage between the wheels accompanied by a member having a surface in a plane at right angles to the axis of the work and loosely engaging an end surface of the work to support the work against tilting and in its proper relation to the wheels for operation thereon by the wheels.

5. The herein described art of grinding which consists in feeding between grinding

and regulating wheels a succession of groups of articles to be ground, each of which is of small length with respect to its diameter, and interposing between such groups in the line of feed members of substantially greater length with respect to their diameter to support said articles against tilting as they enter the throat of the grinding and regulating wheels.

6. The herein described art of grinding which consists in feeding between grinding and regulating wheels of the peripheral type a succession of articles to be ground of short length relative to their diameter and preceding such articles by an elongated member provided with a supporting surface against which the articles loosely rest and by which they are supported against tilting.

7. The herein described art of grinding which consists in feeding between grinding and regulating wheels a succession of articles of small length with respect to their diameter and pressing against the rearmost article a member of substantially greater length with respect to its diameter and provided with a transverse end face fitting snugly against the rear article with the latter in proper position for grinding thereby to support the articles against tilting out of said position.

8. The herein described art of grinding which consists in feeding between grinding and regulating wheels a succession of articles of small length with respect to their diameter, pressing against the rearmost article a member of substantially greater length with respect to its diameter and provided with a transverse end face fitting snugly against the rear article with the latter in proper position for grinding, and following the articles by said member throughout the entire grip of the wheels thereby to continuously support said small articles against tilting out of said proper position.

9. The herein described art of grinding which consists in placing work of small length relative to its diameter between the operative faces of grinding and regulating wheels, said work being ground by said grinding wheel and rotated by said regulating wheel as it is ground, and holding against said work a member of greater length than said work and having an end face resting snugly against an end face of the work to support said short work against tilting and to hold said work in proper position for engagement by said wheels as said work is rotated and ground thereby.

In testimony whereof, I have signed my name to this specification this sixteenth day of May, 1922.

LEWIS R. HEIM.