April 23, 1935. O. L. GIFFIN 1,998,755

GRINDING MACHINE

Filed March 30, 1934 2 Sheets-Sheet 1

Fig. 1.

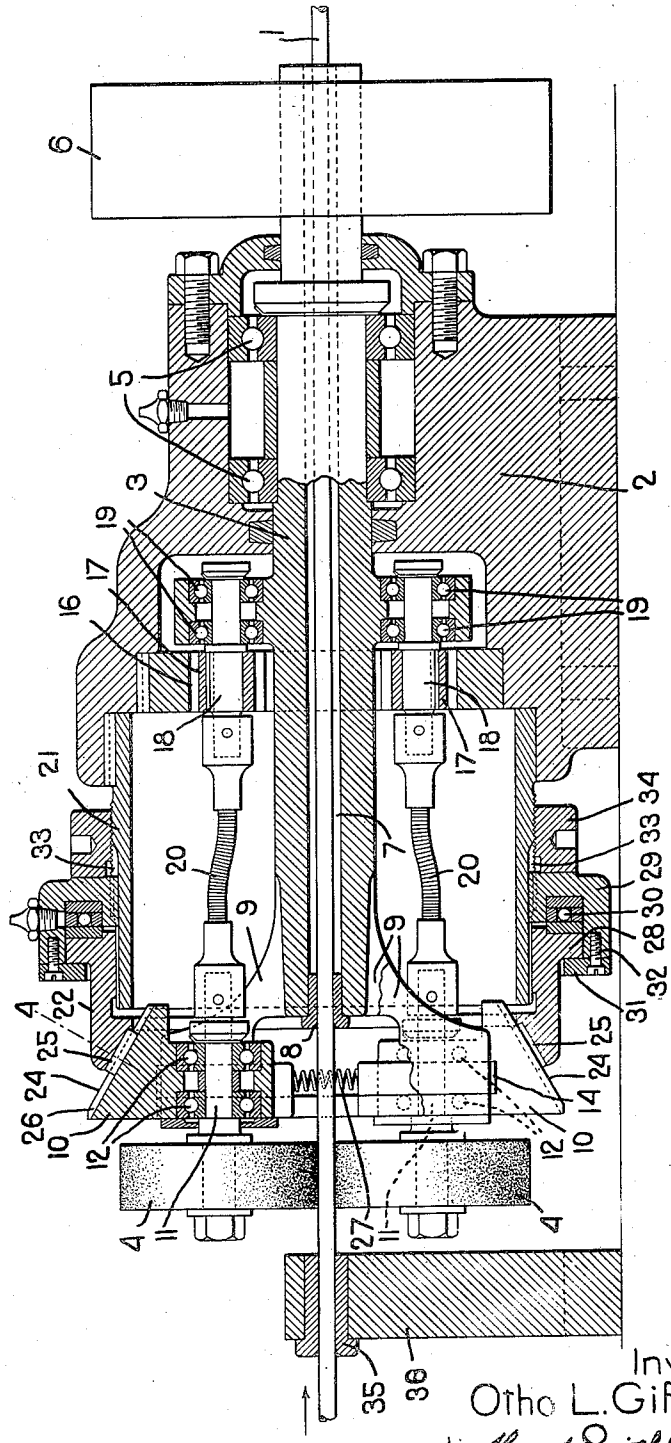

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Fig.2.

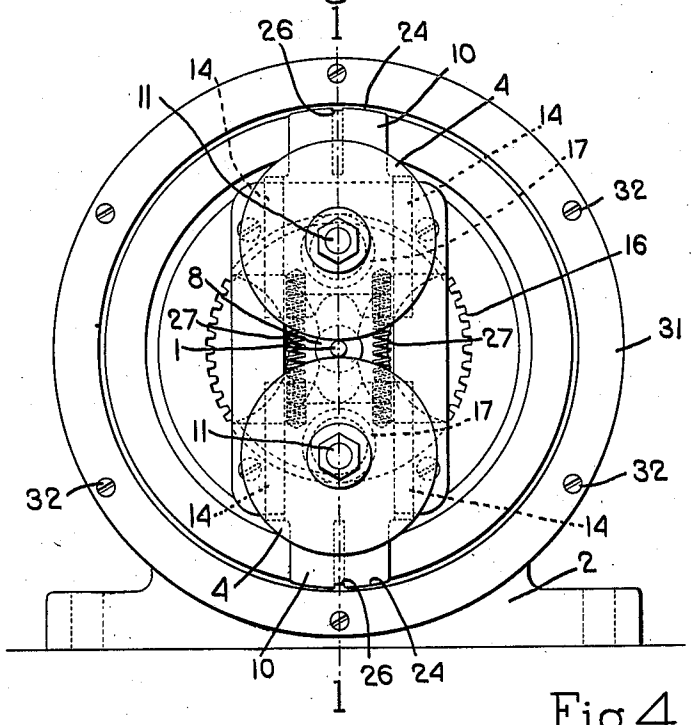


Fig.4.

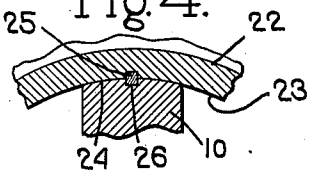


Fig.3.

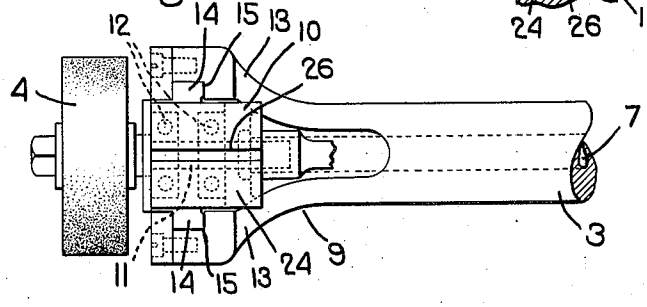
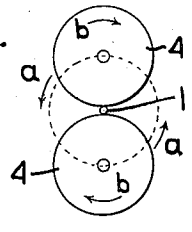


Fig.5.



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UNITED STATES PATENT OFFICE

1,998,755

GRINDING MACHINE

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Application March 30, 1934, Serial No. 718,231

6 Claims. (Cl. 51—80)

This invention relates to grinding machines and has for its general object to remove from rods or wire in rod form surface defects that are liable to be retained in the rod or wire as it is being subsequently drawn down to some predetermined size.

In the process of treating ingots or blooms to reduce them to rods or wire in rod form, surface defects, such as miniature cracks or folds in the surface of the wire or rod, are apt to develop as the rod is being passed through the successive drawing rolls, such defects probably resulting from the fact that during the transforming of the red hot ingot to wire formation by passing through successive pairs of reducing rolls, the exterior surface of the wire cools faster than the interior thereof.

In the making of wire by a cold-drawing process from wire in rod form, such as above referred to, it is found that surface defects, such as miniature cracks or folds in the skin or surface of the rod are not always eliminated as the wire passes through successive drawing dies, but on the other hand are frequently retained in the wire so that the completed wire in its reduced size will still have such surface defects. The presence of these surface defects renders wire unsuitable for many uses, among which may be mentioned that of wire for valve springs.

As stated above it is an object of my present invention to provide a novel device for treating the wire in rod form to remove the surface defects so that when wire in rod form is to be subjected to the cold-drawing operation to reduce it to commercial wire of a predetermined size, it will be free from these suurface defects with the result that the completed wire will also be free from such defects.

In accordance with my invention these surface defects are removed from the wire in rod form by a grinding operation which serves to grind off from the surface of the wire an amount which can be predetermined, and which leaves the surface of the rod free from the surface defects above referred to.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a vertical sectional view of a grinding machine embodying my invention on the line 1—1, Fig. 2.

Fig. 2 is an end view looking from the left hand end of Fig. 1;

Fig. 3 is a plan view of one of the grinding wheels and the adjustable bearing block in which it is mounted;

Fig. 4 is a section on the line 4, Fig. 1;

Fig. 5 is a diagrammatic view illustrating the operation of the grinding device.

In the drawings 1 indicates the rod or wire in rod form which is to be treated by the grinding machine to remove the surface defects. The grinding machine comprises a main frame 2 in which is rotatably mounted a rotor or rotary member 3 which carries the grinding wheels 4 that act on the surface of the rod 1. The rotor or rotary member 3 is shown as supported in roller bearings 5 and as provided with a pulley or its equivalent 6 by which it may be rotated. Said rotary element is formed with an axial bore 7 through which the rod 1 extends and this bore can conveniently be provided with a guiding sleeve 8 which holds the rod 1 accurately in its axial position.

The rotary member 3 is shown as having at its end two bifurcated extensions 9 in which are supported adjustable bearing blocks 10 for the grinding wheels 4. Each grinding wheel is fast on a shaft section 11 and each shaft section is mounted for rotative movement in one of the bearing blocks 10, each bearing block being provided with suitable ball bearings 12 for its shaft section. The bearing blocks 10 are adjustable radially thereby providing for adjusting the grinding wheels 4 toward and from each other.

As stated above each extension 9 is bifurcated, the two arms of each extension being indicated at 13 and receiving between them one of the bearing blocks 10. Each bearing block is shown as provided on opposite sides with two guiding wings 14 which are received in guiding grooves 15 with which the ends of the arms 13 are provided.

The rotation of the rotary member 3 carries the grinding wheels 4 bodily about the wire 1 and means are provided for causing the grinding wheels to rotate on their own axes as they are thus bodily rotated with the rotary member 3. For this purpose the frame 2 is provided with an internal gear 16, the teeth of which mesh with planetary gearing 17 that are mounted on shaft sections 18 journalled in suitable bearings 19 that are carried by the rotary element 3.

The shaft sections 18 are connected to the shaft sections 11 through flexible shaft sections 20.

As the rotor 3 is rotated about its axis, the engagement of the planetary gears 17 with the stationary internal gear 16 causes the planetary gears to rotate on their own axes while moving

bodily about the axis of the rotary member and by virtue of the flexible shaft connection between the planetary gears 17 and the grinding wheels 4, the latter will have a similar planetary motion about the rod 1.

Means are provided for controlling the adjustment of the grinding wheels 4 in a radial direction and the means I preferably employ is constructed so that a very fine and accurate adjustment of the grinding wheels radially can be made either while the machine is at rest or in operation.

The main frame 2 is provided with a sleeve extension 21 which forms a housing for the flexible shaft sections 20. Rotatively mounted on this sleeve extension is an adjusting sleeve 22 which is keyed to the two bearing blocks 10 and which, therefore, rotates with the rotary member 3. Each bearing block 10 is formed at its end with the inclined convexly-curved face 24 and the portions of the sleeves 22 which engage the faces 24 are formed with correspondingly curved concave faces 23.

The sleeve 22 is shown as having two keys 25 which fit in key ways 26 formed in the curved faces 24 of the bearing blocks. The adjusting sleeve 22 not only rotates with the rotary member 3 but can also be moved in an axial direction. It will be obvious that movement of the sleeve 22 toward the left in Fig. 1 will cause the bearing blocks to move inwardly in a radial direction because of the engagement of the inclined faces 23, 24. Movement of the sleeve 22 to the right will allow the bearing blocks to move outwardly in a radial direction.

27 indicates springs situated between the bearing blocks and which tend to force both of them outwardly and thus maintain the curved faces 24 of the bearing blocks in engagement with the curved faces 23 of the adjusting sleeve 22.

Means are provided for moving the adjusting sleeve 22 in an axial direction while allowing it free rotation. For this purpose the sleeve 22 is shown as having an exterior flange 28 which is interlocked with a stationary ring 29 mounted on the sleeve 21. The ring 29 is provided with a ball bearing 30 against which one face of the flange 28 engages, and said ring 29 is also provided with a retaining ring 31 which engages the left hand face of the flange 28, said retaining ring being detachably secured to the ring 29 by screws 32. The ring 29 is shown as keyed to the sleeve 21, the latter having the keyways 33 for this purpose. The ring 29 is thus held from rotation but is capable of moving in an axial direction.

34 indicates an adjusting ring which is screw threaded to the sleeve 28 and which serves as a backing for the ring 29. By rotating the adjusting ring 34 in one direction the ring 29 and the adjusting sleeve 22 will be moved to the left Fig. 1 thereby causing an adjustment of the grinding wheels toward the center. By turning said adjusting ring in the opposite direction the ring 29 and adjusting sleeve 22 may be moved to the right thereby allowing the bearing blocks to move outwardly and causing an adjustment of the grinding wheels 10 away from the axis of rotation. This adjusting ring 34 can be maniplated while the machine is in operation since it is mounted on a stationary part, and hence any necessary adjustment of the grinding wheels to allow for wear can be made without stopping the machine. Moreover, the construction is such that a very fine and accurate adjustment of the grinding wheels can be made.

The adjusting ring 34 is relatively large in size and small angular adjustments thereof can be readily made. An adjustment of the adjusting ring 34 through a small angle will produce a very small or minute movement in an axial direction of the ring 29 and the adjusting sleeve 22, and a correspondingly small or minute adjustment radially of the grinding wheels 4.

I propose to provide the periphery of the ring 34 with graduations and to employ a suitable index mark on the ring 29. Because of the construction it will be possible to use graduations on the ring 34 corresponding to adjustments of .001 of an inch or less for the grinding wheels 4.

35 indicates a guiding sleeve for the rod 1 through which said rod passes on its travel to the grinding wheels. This guiding sleeve 35 is illustrated as supported in a suitable stand 36.

In the operation of the device the rod 1 will be fed through the apparatus in the direction of the arrow Fig. 1 by any suitable means.

If it be assumed that the member 3 is rotated in the direction of the arrows *a* in Fig. 5, it will follow that through the planetary gears 17 the grinding wheels 4 will not only have a bodily rotation about the rod as indicated by the dotted line circle in Fig. 5, but will also be rotated about their own axes in the direction of the arrows *b*, with the result that the surface of the rod or wire 1 will be ground off.

The construction herein shown provides means for accurately adjusting the grinding wheels so that the required amount may be ground off the surface of the rod to remove any surface defects. Usually these surface defects extend into the rod not over .001 of an inch so that the removal of a relatively small amount from the surface of the rod will eliminate all such defects.

Because of the manner in which these defects are ground off the resulting rod or wire is accurate in size and perfectly round and true.

It will be understood that various changes in the constructional features of the device may be employed without departing from the invention as expressed in the appended claims.

I claim.

1. In a device of the class described, a frame, a rotor member carried thereby provided with an axial bore through which the rod to be ground may be fed, radially-adjustable bearing members carried by the rotor member and each provided with an inclined face, a grinding wheel rotatively mounted in each bearing member, means to rotate the rotor member, means to cause the grinding wheels to rotate about their axes as the rotor member rotates about its axis, an element rotating with the bearing member and cooperating with said inclined faces to control the radial position of said bearing members and means carried by the frame to adjust said element and thereby adjust the radial position of the bearing members.

2. In a device of the class described, a frame, a rotor member rotatively mounted therein and provided with an axial bore through which the rod to be ground may pass, radially-adjustable bearing blocks carried by the rotor member, each bearing block having an inclined face, an adjusting sleeve encircling the bearing blocks and movably mounted on the frame axially thereof and by its movement co-operating with said inclined faces to adjust the bearing members in an axial direction.

3. In a device of the class described, a frame, a rotor member rotatively mounted therein and

provided with an axial bore through which the rod to be ground may pass, radially-adjustable bearing blocks carried by the rotor member, each bearing block having an inclined face, an adjusting sleeve rotatively mounted on the frame and engaging said inclined faces, and means for adjusting said sleeve in an axial direction thereby to adjust the bearing members radially.

4. A grinding machine comprising a frame, an internal gear stationarily carried thereby, a rotor member rotatively carried by the frame axially of said gear, planetary gears carried by the rotor member and meshing with the internal gear, radially-adjustable bearing members carried by said rotor member, a grinding wheel rotatively mounted in each bearing member, flexible shafts connecting each grinding wheel with one of the planetary gears, means to rotate the rotor member, each bearing member having an inclined surface, an adjusting sleeve mounted on the frame and engaging said inclined surfaces, and means for adjusting the adjusting sleeve in an axial direction and thereby adjusting the grinding wheels in a radial direction.

5. A grinding machine comprising a frame, a rotor member rotatively mounted therein and provided with an axial bore through which the rod to be ground may pass, radially-adjustable bearing blocks carried by the rotor member, each bearing block having an inclined outer face, an adjusting sleeve rotatively mounted on the frame and engaging said inclined faces, a ring member screw threaded to the frame and swivelled to the adjusting sleeve, whereby turning movement of the ring member will move the adjusting sleeve in an axial direction and thereby adjust the bearing members radially.

6. A grinding machine comprising a frame, a rotor member carried thereby and provided with an axial bore through which the rod to be ground may be fed, radially-adjustable bearing members carried by the rotor member and each provided with an inclined face, a grinding wheel rotatively mounted in each bearing member, means to rotate the rotor member, means to rotate the grinding wheels about their axes as the rotor member rotates about its axis, an element rotating with the bearing members and cooperating with said inclined faces to control the radial position of said bearing members and means carried by the frame and operative while the rotor is rotating to adjust said element and thereby adjust the radial position of the bearing members.

OTHO L. GIFFIN.