

[54] **METHOD OF GRINDING ROLLS** 3,391,497 7/1968 Parrella..... 51/49 X
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 1,792,043 2/1931 Scusa..... 51/165.74 X
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 773,983 11/1904 Reisner..... 51/165.74 X

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Related U.S. Application Data

[62] Division of Ser. No. 10,136, Feb. 10, 1970, Pat. No. 3,651,605.

[57] **ABSTRACT**

[30] **Foreign Application Priority Data**

Feb. 11, 1969 Great Britain..... 7,276/69

A method in which the diameters of two rolls are matched by grinding one roll, measuring the position of the surface of the ground roll relative to a datum position using a probe, and grinding the second roll until the surface thereof is in the same position relative to the datum position as was the surface of the first roll.

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[51] Int. Cl..... **B24b 1/00, B24b 5/04**

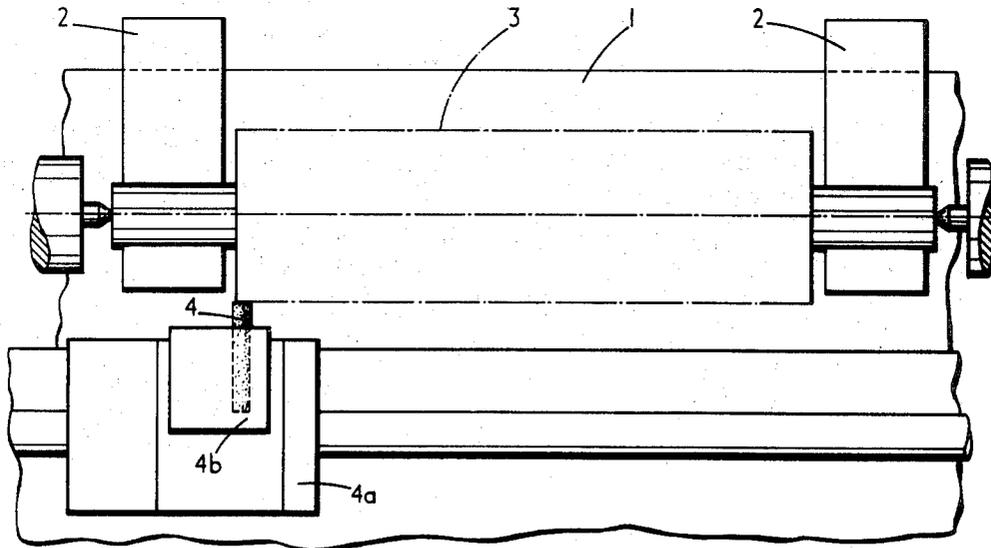
[58] Field of Search..... 51/49, 209 R, 165.74, 51/165.76

[56] **References Cited**

1 Claim, 2 Drawing Figures

UNITED STATES PATENTS

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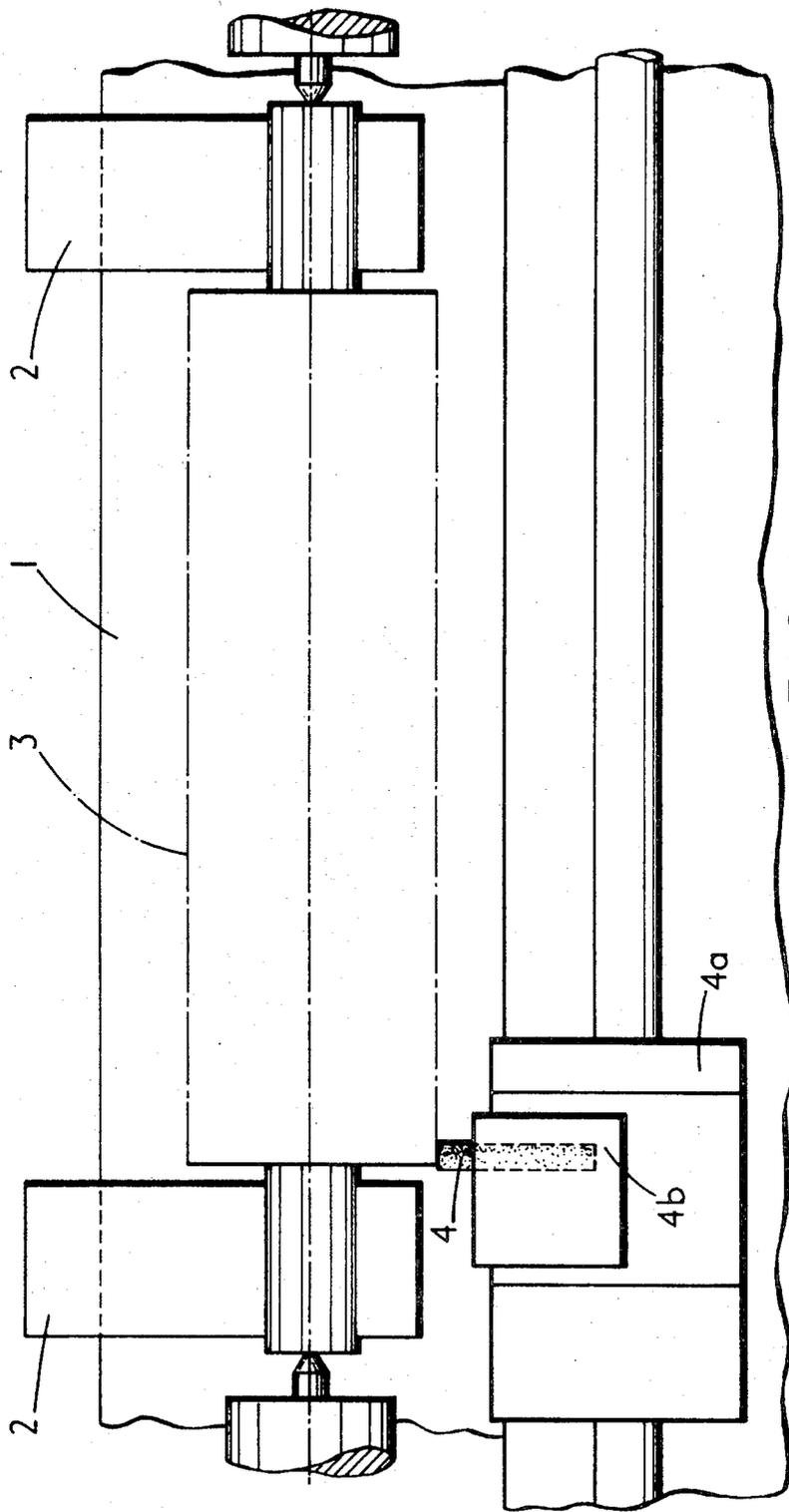
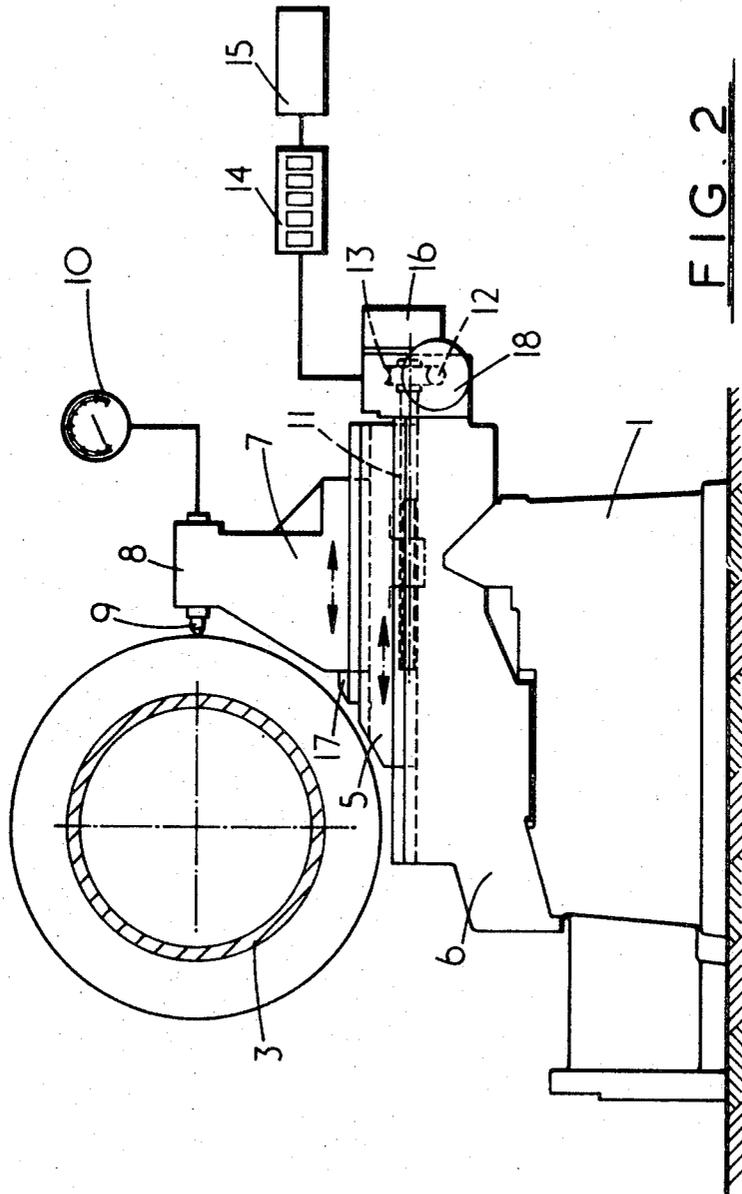


FIG. 1



METHOD OF GRINDING ROLLS

This is a Divisional application of application Ser. No. 10,136, filed Feb. 10, 1970 now U.S. Pat. No. 3,651,605 dated Mar. 28, 1972.

BACKGROUND OF THE INVENTION

This invention relates to grinding methods and more particularly to the matching of the diameters of two rolls or other cylindrical workpieces ground consecutively on a grinding machine.

There is a requirement in rolling mills for pairs of rolls in the individual mill stands to have accurately matched diameters, the actual diameters being unimportant. As the rolls have to be reground at frequent intervals much time is spent measuring the rolls in order that each pair can be matched.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a grinding method by which the matching operation is simplified.

According to the present invention, there is provided a method of matching the diameters of two cylindrical workpieces on a grinding machine, comprising the steps of placing a first workpiece into a grinding machine for rotation about a known axis, applying a depressible probe against the circumference of the first workpiece, moving the probe towards the first workpiece to a desired stationary reference position so as to depress the probe, providing an indicator, indicating on the indicator the extent of depression of the probe to give a first reading commensurate with the amount of metal it is desired to remove, grinding the first workpiece until the indicator gives a second reading indicating no depression of the probe, stopping the grinding of the workpiece, moving the probe away from the ground workpiece removing the first workpiece from the grinding machine, placing a second workpiece into the grinding machine for rotation about said known axis, moving the probe to the stationary reference position, and grinding the surface of the second workpiece until the indicator gives the second reading again.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic plan view of a grinding machine suitable for use in the present invention, and

FIG. 2 is a view showing part of a grinding machine according to the present invention of the type shown in FIG. 1 fitted with measuring means.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, the grinding machine for matching the diameter of a pair of rolls, comprises a bed 1, a pair of roll journal rests 2 adapted to support a roll 3 about a known axis. On the bed 1 is mounted, in known manner, a grinding wheel 4 for longitudinal and in-feed movement relative to the roll 3 in known manner on slides 4a and 4b, respectively.

A bottom in-feed slide 5 mounted on a carriage 6 on the bed 1 carries a top in-feed slide 7 upon which is mounted a support 8 carrying a gauge measuring head 9 or probe which is connected with an indicator 10 for

measuring axial movement of the probe relative to the support.

A feed screw 11 rotatable through a worm 12 and worm wheel 13 is provided for moving the bottom slide 5 to cause in-feed or out-feed thereof, and thus the probe 9, relative to the roll 3. A print-out 14 and a digital read-out 15 are connected with a rotary resolver 16 connected with the feed screw 11 and are set to read twice the distance between the probe 9 and the axis of rotation of the roll 3 when the indicator 10 connected with the probe measures zero. The indicator 10 is arranged to read zero when the probe 9 is fully extended relative to its support 8.

A fixed stop 17 is carried by the bottom slide 5 and serves to limit in-feed movement of the top slide 7 relative to the bottom slide 5.

In use, a first roll 3 is mounted in the roll journal rests 2 for rotation about the above-mentioned known axis. With the top slide 7 abutting the stop 17 on the bottom slide 5, the latter is advanced towards the roll 3 until the probe 9 just touches the surface of the roll 3 to be ground. In this position, the print-out 15 and the read-out 14 indicate the diameter of the unground roll 3. The bottom slide 5 is then advanced further so that the probe 9 is depressed and the indicator 10 measures the distance by which it is depressed. The advance or in-feed of the bottom slide 5 is continued until the indicator 10 reads a distance equivalent to the amount of metal to be removed from the roll 3 with, said amount being predetermined for the condition of the pair of rolls being matched. In this position, the read-out 14 and the print-out 15 measure twice the distance between the probe and the axis of rotation of the roll when the grinding operation on that roll is complete i.e. the diameter of the roll after grinding.

The grinding operation is then commenced and is continued until the indicator 10 reads zero again i.e. until the actual diameter of the roll 3 equals the value given by the print-out 15 and read-out 14. One or more finishing passes of the grinding wheel 4 may be required subsequently.

Then, without moving the bottom slide 5, the top slide 7 is moved away from the fixed stop 17 to enable the ground first roll to be replaced by a second roll whose diameter is to be matched to that of the first roll. The second roll is mounted accurately for rotation about the same known axis as the first roll. The top slide 7 is then moved against the fixed stop 17 thus causing the probe 9 to contact the surface of the second roll and to be depressed relative to the support 8. The distance of depression is shown on the indicator 10 and is a measure of the amount of metal to be removed from the second roll to reduce it to the same diameter as the ground first roll.

The grinding operation is commenced and continued until the indicator 10 reads zero. Thus, the diameters of the two rolls are accurately matched.

It will be manifest that the top slide 7 is not an essential part of a grinding machine according to the present invention, since the bottom slide 5 could carry the probe support 8 directly and could be retracted to allow the second roll to be loaded into the machine and then advanced until the read-out 14 and print-out 15 showed the same value as that before retraction.

Absolute measurements can be taken by fixing a linear measuring device (not shown) to the bottom slide

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5 and having the datum for this measuring device fixed relative to the center of rotation of the workpiece.

By using output signals given by the measuring head at discrete points the amount of metal removed and the grinding process can be automatically controlled.

The rolls may be aligned on the grinding machine in the manner described in Ser. No. 10,135 filed Feb. 10, 1970, now U.S. Pat. No. 3,660,944 dated May 9, 1972.

Instead of measuring the distance between the surface of the cylindrical workpiece and its axis of rotation, a double probe, arranged to measure the diameter directly, could be employed.

The movement of the probe relative to the workpiece may be effected manually but preferably it is effected automatically by a motor 18.

What is claimed is:

1. A method of matching the diameter of one or more cylindrical workpieces, including the steps of placing a

first workpiece into a grinding machine for rotation about a known axis, applying a depressible probe against the circumference of the first workpiece, moving the probe towards the first workpiece to a desired stationary reference position so as to depress the probe, providing an indicator, indicating on the indicator the extent of depression of the probe to give a first reading commensurate with the amount of metal it is desired to remove, grinding the first workpiece until the indicator gives a second reading indicator no depression of the probe, stopping the grinding of the workpiece, moving the probe away from the ground first workpiece removing the first workpiece from the machine, placing a second workpiece into the machine for rotation about the known axis, moving the probe to the stationary reference position, and grinding the second workpiece until the indicator gives the second reading again.

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