

Dec. 11, 1962

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3,067,551

GRINDING METHOD

Filed Sept. 22, 1958

Fig. 1

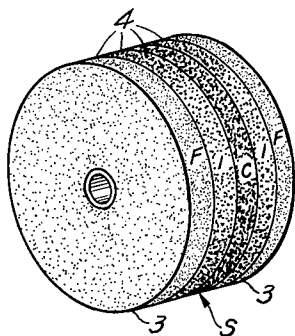
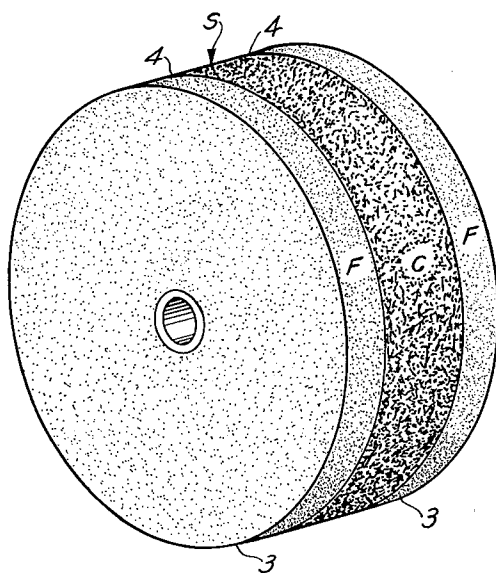


Fig. 2

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GRINDING METHOD

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Filed Sept. 22, 1958, Ser. No. 762,583
7 Claims. (Cl. 51—281)

This invention relates to a method of grinding, particularly a method for grinding cylindrical smooth surfaced rolls.

Although the method of this invention may be used to grind any type of roll, it is particularly directed to the grinding of chilled cast iron or alloy steel rolls used in steel mill operations to roll strip, sheet or foil, said rolls usually being cylindrical and smooth surfaced.

Rolls used in such operations rapidly lose their desired shape and finish due to the great pressures exerted upon them and the hardness of the material being rolled, and must be frequently reground to restore their shape and finish.

This method of restoration is accomplished by grinding with an abrasive wheel or wheels. The grinding wheels are cylindrical, with a flat peripheral grinding surface which grinds the roll as the wheel traverses back and forth across the roll surface from one end to the other.

Good grinding practice calls for the use of large coarse grained abrasive material to reshape the rolls, and small, fine grained abrasive material to supply the desired smoothness of finish. This need for both coarse grain and fine grain abrasive material to reground rolls makes necessary the use of two or more grinding wheels of varying grain size ranging from coarse to fine, to get the shape and finish desired. However, the use of a multiple number of wheels involves halting of the grinding operation in order to change wheels, thus increasing the grinding costs and lowering production rates. To speed up the grinding operation, a common practice is to use a single wheel of intermediate grain size. This procedure increases production rates, but produces a poorer quality finish.

The object of this invention is a method of grinding rolls whereby the high quality finish obtained by the use of multiple wheels can be accomplished at the high production rates achieved by the use of a single wheel of intermediate grain size.

I have found that this object can be accomplished by using a sandwich or segmental type wheel whose grinding surface consists of adjacent parallel sections or segments of varying grain size so arranged that rough grinding and polishing of the roll is accomplished in each pass of the wheel across the roll surface. Such a wheel is, in effect, several abrasive cylindrical discs bonded together at their radial surfaces.

Thus, the peripheral grinding face of the wheel used in the method of my invention is comprised of side sections of fine grain abrasive, with coarser grained abrasive sandwiched between the two fine grain sections.

The grinding area lying between the two fine grain side sections may consist of coarser material of a uniform grain size, or it may be divided into adjacent, parallel sections of different grain size, provided that all of the abrasive material is coarser than the fine grained side sections.

The sections of varying grain size must be so arranged that in each pass of the wheel across the roll surface the grinding action progresses successively from fine to coarse and back to fine again.

FIGURES 1 and 2 illustrate two examples of wheels than can be used to practice my invention. S is the flat peripheral grinding surface, consisting of fine grained

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sections F and coarse grained central portion C in FIGURE 1, and consisting of fine section F, intermediate grain size sections I, and coarse section C in FIGURE 2. 3 indicates the point at which the sides and grinding face meet, and 4 shows the point at which the sections having different grain sizes are bonded together.

The wheels are cylindrical in shape, with the sections of varying grain size providing a straight, flat, continuous grinding surface or face. The side section F should be of the same grain size. The grain sizes of the different sections may be varied to suit the particular grinding operation involved.

Any kind of abrasive material can be used, depending on the material to be ground, and the wheels can be made by any of the well known methods of manufacture.

My method not only permits reshaping and polishing to be accomplished in a single operation, but also effects a saving in wheel costs due to reduced wear on the wheels since the strain on the coarse material is reduced by the preceding grinding action of the fine material as the wheel passes back and forth across the roll surface.

An example of my grinding wheel used in my method is a silicon carbide wheel for grinding nickel grain iron mill rolls with an 80-85 Shore hardness. This wheel had a 3" peripheral grinding face, with a 2" center section of coarse 46 grain size silicon carbide, and two side sections of fine 100 grain size silicon carbide, each section being 1/2" wide.

The fine section were bonded to the coarse center section at their radial surfaces. My method of grinding produced a 6 micro finish on the roll, and produced a wheel life of about 200 rolls per wheel, whereas a standard 3" wide wheel of intermediate 54 grain size silicon carbide used previously had a wheel life of only 120 rolls per wheel, and produced a poorer quality finish.

Although the grain size of the various sections or segments will vary according to the type of material to be ground and the type of finish desired, wheels used to grind iron or steel rolls should have a grain size not coarser than 100 in the finest sections, and a grain size not substantially finer than 50 in the coarsest section.

The width of each abrasive section will also vary according to the particular grinding operation involved.

I claim:

1. A surface grinding method which comprises the sequential steps of traversing the surface to be ground from one end to the other with a fine grained abrasive disc, traversing said surface in the same direction with a coarse grained abrasive disc and traversing said surface in the same direction with another fine grained abrasive disc.

2. The method of claim 1 in which each of said fine grain discs is bonded to a radial surface of said coarse grained disc.

3. A surface grinding method which comprises the sequential steps of traversing the surface to be ground from one end to the other with a fine grained abrasive disc, traversing said surface in the same direction with a coarse grained abrasive disc, traversing said surface in the same direction with another fine grained abrasive disc, and then repeating said traversing steps in the opposite direction.

4. The method of claim 3 in which each of said fine grained discs is bonded to a radial surface of said coarse grained disc.

5. A surface grinding method which comprises the sequential steps of traversing the surface to be ground from one end to the other with a fine grained abrasive disc, traversing said surface in the same direction with an intermediate grained abrasive disc, traversing said surface in the same direction with a coarse abrasive disc

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traversing said surface in the same direction with another intermediate grained abrasive disc, traversing said surface in the same direction with another fine grained abrasive disc.

6. The method of claim 5 followed by repeating said sequential steps in the opposite direction.

7. The method of claim 5 in which each of said fine grained discs is bonded to the outer radial surfaces of each of said intermediate grained discs and said coarse

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grained disc is bonded to the inner radial surfaces of each of said intermediate grained discs.

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