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GRINDING APPARATUS AND METHOD

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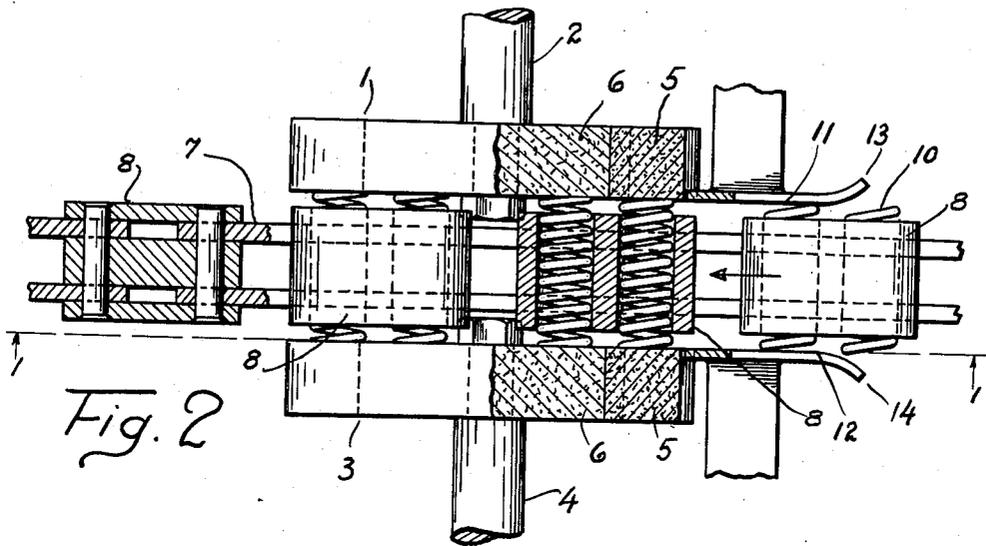


Fig. 2

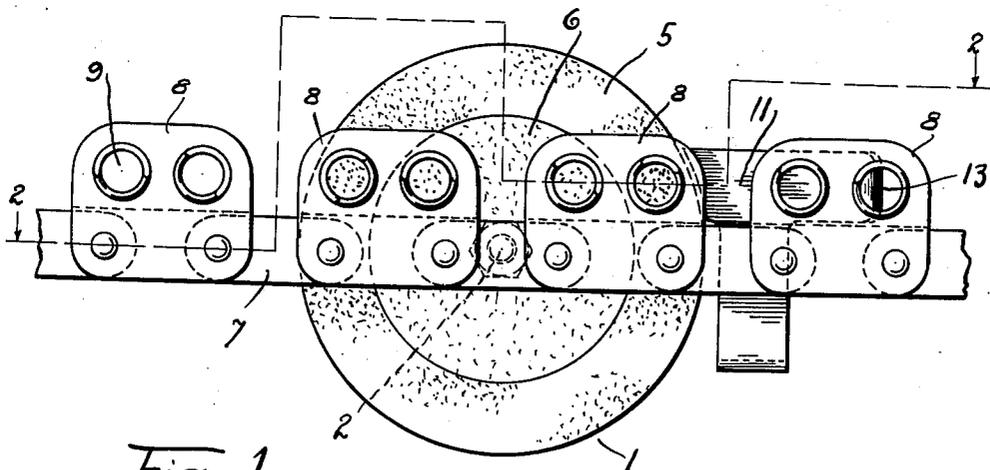


Fig. 1

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GRINDING APPARATUS AND METHOD

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This invention relates to the art of grinding and has to do especially with the grinding of sharp edges from articles of manufacture such as coil springs, which grinding is in the nature of a finishing process.

The invention has as an object the obtaining of an increased rate of production in the grinding of such articles by utilizing soft material which has a relatively rapid grinding action. Such grinding material however is subject to relatively rapid wear, and the invention contemplates protecting this grinding material to prevent unduly rapid wearing away of the material.

In this regard other grinding material is provided which is relatively hard and which does not rapidly wear away. The hard material does not grind so fact as the soft material, but this material is used to form an initial grinding action which removes burrs or sharp points from the article so that these sharp points will not dig into and unduly wear away the relatively soft grinding material.

It is known that soft grinding material effects a grinding action more rapid than a hard grinding material, but that the soft material wears away much more rapidly. The theory of this is that a softer binder is used in the soft grinding material which wears away and exposes the abrasive element, whereas in the hard grinding material a hard binder is used which does not wear away so rapidly and which does not expose the abrasive element to such a high degree.

In the accompanying drawings:

Fig. 1 is a side elevational view of a grinding apparatus constructed for carrying out the invention.

Fig. 2 is a composite section and plan taken on the line 2-2 of Fig. 1

In these drawings there is shown a grinding wheel 1 mounted upon shaft 2, and an opposed grinding wheel 3 on shaft 4. These grinding wheels are rotated preferably at uniform speeds by any suitable power mechanism (not shown) operably connected to their respective shafts. Each grinding wheel is made up of a plurality of sections or zones of different grades of grinding material.

The grinding wheels may advantageously consist of two kinds of grinding material, one of which is disposed near the periphery of the wheel, as shown at 5, and the other of which is disposed centrally of the wheel, as at 6.

The articles to be ground are fed through the two opposed grinding wheels so that the two wheels may act simultaneously upon opposite sides or ends of the articles. For this purpose there is a power driven conveyor which moves the articles between the grinding wheels, and this conveyor is shown as being in the form of an endless chain 7, which moves over suitable sprockets (not shown). Some of the links of the chain are enlarged, as at 8, and provided with openings 9 for receiving and holding the articles. The articles are shown as coil springs 10. This conveyor moves from right to left in the operation of the apparatus and there may be guide devices 11 and 12 each formed with flared portions 13 and 14 for engaging the ends of the springs to center the same and guide them in between the grinding wheels.

In the operation of this apparatus the grinding wheels are set in motion and the conveyor moves from right to left carrying the articles through the grinding wheels. The articles may be fed to the chain by hand or suitable automatic means, and they may be removed from the chain after the grinding operation by hand or automatic means. This chain conveyor is used largely for exemplary purposes and it is to be understood that other means for conveyors can be used for moving the springs through the grinding wheels.

It will be understood that the plane of the ends of such springs, when the springs are in the rough, are at an angle to the axle of the spring, which corresponds substantially to the angle of the spiral convolutions. By grinding the ends of the springs after the manner shown, the plane of the spring ends are rendered perpendicular or substantially perpendicular to the axis of the spring so that they can be better used.

In grinding springs it has been found that ends of the springs while in the rough are quite sharp and oftentimes have rough burrs

or projections thereon. These sharp points dig into relatively soft grinding material with the result that there is an unduly rapid wear on the grinding wheel. However, it is desirable to use relatively soft grinding material because it grinds faster and the production accordingly increased.

In order to take advantage of the more rapid grinding action of the grinding material, and at the same time to eliminate the disadvantage of unduly rapid wear of this material, the invention contemplates a preliminary grinding of the springs by a hard grinding material. One way of accomplishing this is by constructing the grinding wheels with a plurality of sections made up of different grinding materials.

Accordingly the grinding material 5 is hard, and as the springs first enter between the grinding wheels the spring ends are ground by the section 5. This removes sharp burrs or corners on the ends of the springs but the grinding action is not so rapid. The springs then pass on further in between the grinding wheels where they are engaged by the sections 6 which are composed of softer material.

Thus the hard material 5 removes the sharp points or burrs and thus affords protection for the material 6. The material in section 5 being hard does not grind so rapidly, while the material in section 6 is softer but has a rapid grinding action. Accordingly, high production is obtained while at the same time the rapidly acting grinding material is not unduly worn away.

There has been shown in the drawings grinding wheels composed of an exterior strata of hard grinding material with an inner layer of soft grinding material. This perhaps shows the invention in its simplest form, but it is well within the invention to employ more than two different types of grinding material; for example, the grinding wheels may be provided with three layers arranged thusly: hard grinding material which first grinds the sharp points from the articles and which is located at the rim of the wheel, and an intermediate layer of grinding material of medium hard substance, and then an inner layer of the softer grinding substance. This is intended to be covered by the claims appended hereto.

Thus several different layers of the grinding material of different grades, the first to act upon the spring being a hard grade, the succeeding material being of softer grade. Also the grain of the grinding material can be varied, and it is preferable to have a fine grained grinding substance for first acting upon the articles with the coarser grained grinding substance later acting upon the article.

What I claim is:

1. An apparatus for grinding articles,

comprising in combination, a grinding element composed of grinding material which has relatively great resistance to wear, another grinding element composed of grinding material which has relatively low resistance to wear but which effects a grinding action relatively great as compared to the grinding action of the first element, means for carrying an article to be ground past the said grinding elements in the order named, whereby the first mentioned element removes burrs or sharp projections from the articles to prevent undue wearing away of the second named grinding element.

2. A spring grinding apparatus for grinding the ends of coil springs, comprising in combination, a pair of opposed grinding elements composed of grinding material which has relatively great resistance to wear, a second pair of opposed grinding elements composed of grinding material of relatively low resistance to wear but which effects a grinding action relatively great as compared to the grinding action of the first mentioned pair of elements, and means for carrying a spring between the pairs of grinding elements in the order in which they are named, whereby the first mentioned elements remove burrs or sharp projections from the ends of the springs to prevent undue wearing away of the second pair of grinding elements.

3. A spring grinding apparatus for grinding the end of a coil spring, which comprises a grinding wheel composed of an outer section of grinding material having relatively great resistance to wear, and an inner section composed of grinding material possessing relatively low resistance to wear but which effects a relatively rapid grinding action, means for carrying the spring past the grinding wheel so that the spring is first ground by the outer section and then by the inner section, whereby the outer section first removes burrs or sharp projections from the spring thus to prevent unduly rapid wearing away of the inner section.

4. A spring grinding apparatus for grinding the ends of coil springs, comprising in combination, a pair of opposed grinding wheels disposed in spaced relation, each grinding wheel being made up of an outer section which is composed of grinding material which possesses relatively great resistance to wear, and an inner section composed of grinding material which possesses relatively low resistance to wear, but which effects a relatively rapid grinding action, and means for passing a spring between the grinding wheels whereby the ends of the spring are first ground by the high resistant grinding material to remove burrs or sharp projections therefrom thus to prevent undue wearing away of the grinding material in the inner sections.

5. The method of expediting the production in the grinding of articles, which comprises utilizing grinding material which effects a relatively rapid grinding action but which is subject to rapid wear, and preventing unduly rapid wear of this material by first grinding the article with the grinding material, which, while effecting a relatively slow grinding action possesses high resistance to wear, to remove burrs or sharp projections from the articles before the article is acted upon by the first mentioned material.

6. The method of expediting the production in the grinding of ends of coil springs, which comprises utilizing grinding material which effects a relatively rapid grinding action but which is subject to rapid wear, and preventing unduly rapid wear of this material by first grinding the spring ends with material, which, while effecting relatively slow grinding action possesses high resistance to wear, to remove burrs and sharp points from the spring ends.

In testimony whereof I affix my signature.
HARRY RODEMEYER.

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