

July 5, 1955

LE ROY R. VALETTE

2,712,205

ABRADING ROLL

Filed June 20, 1952

2 Sheets-Sheet 1

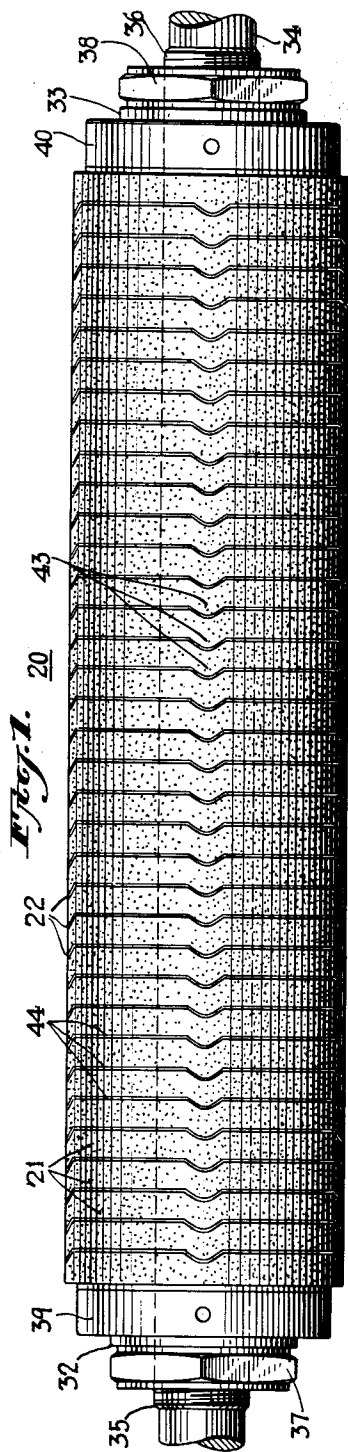


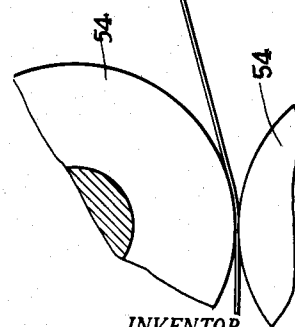
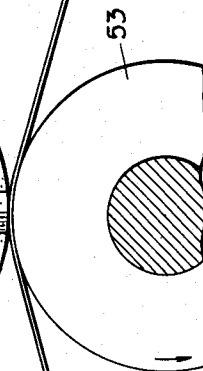
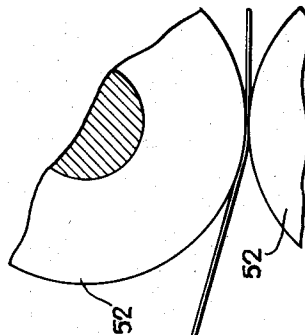
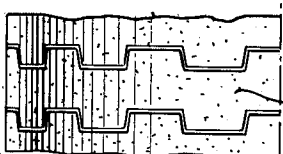
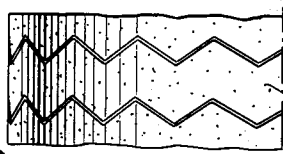
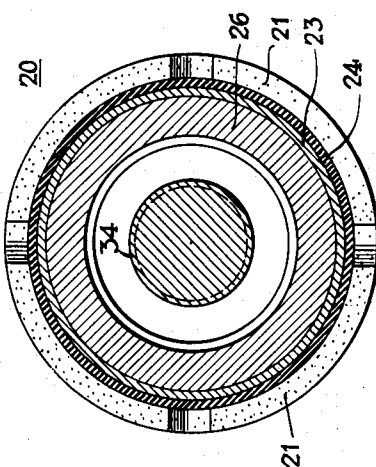
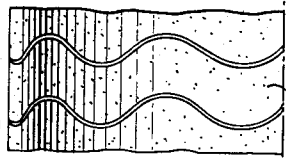
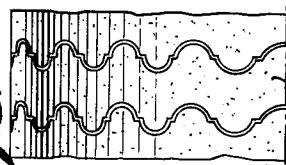
Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.



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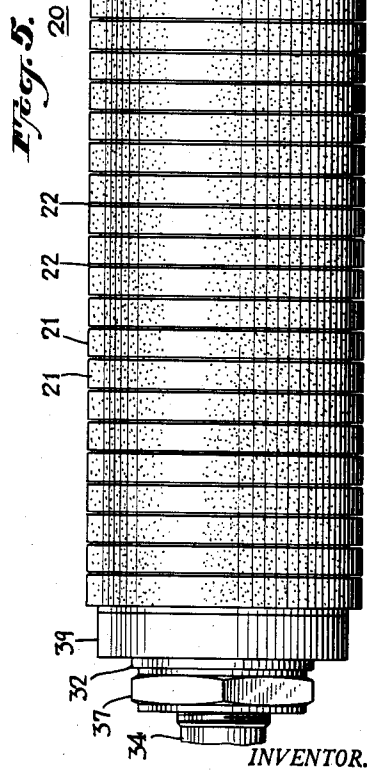
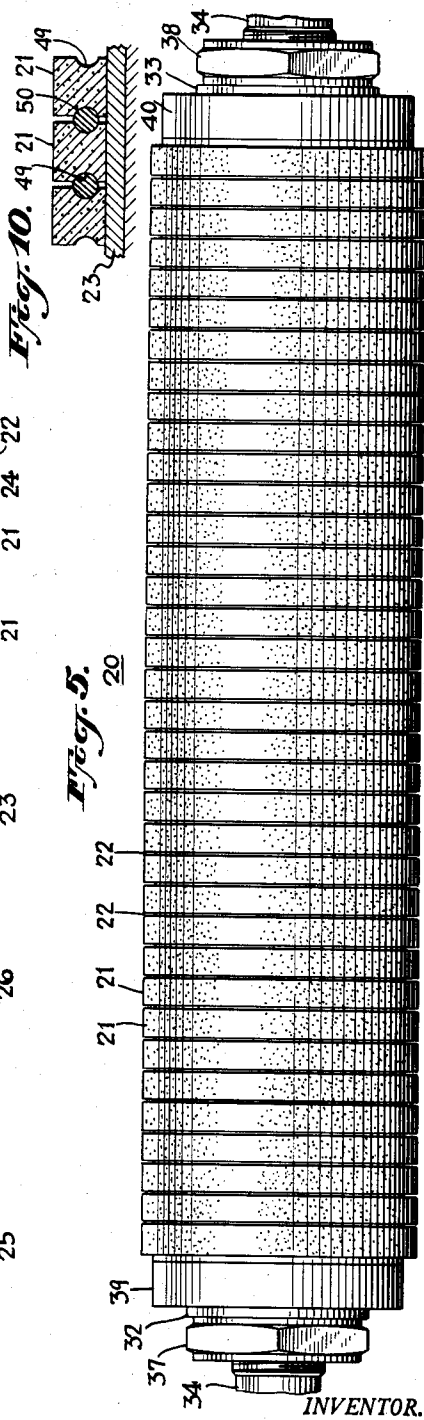
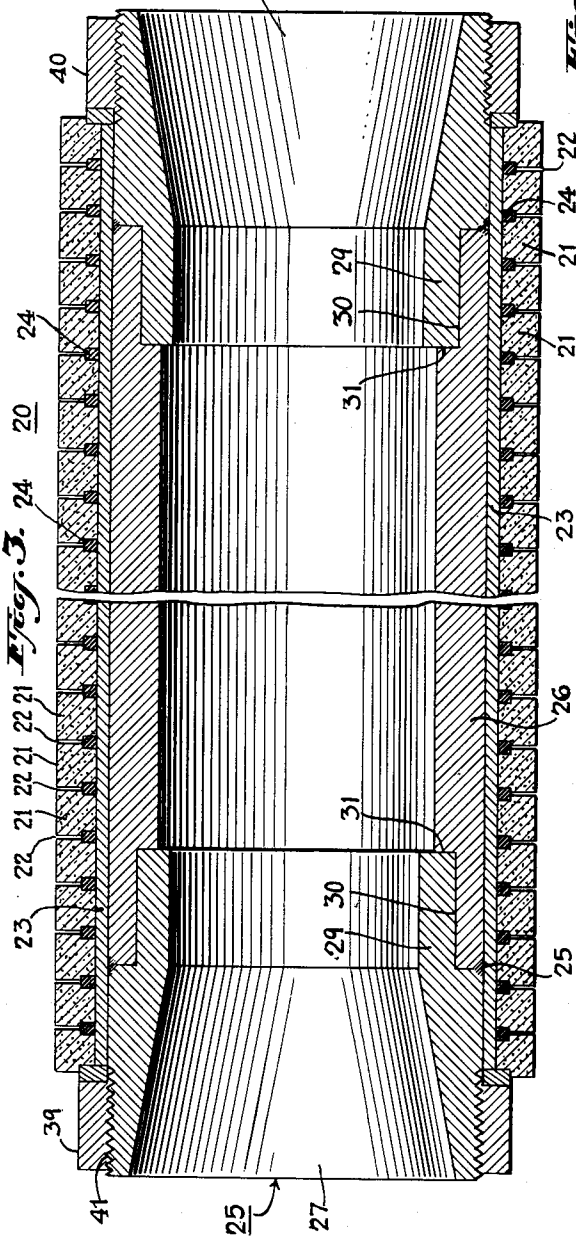
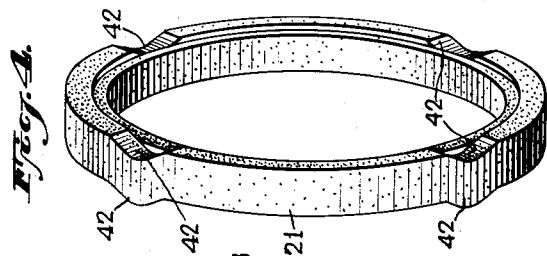
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ABRADING ROLL

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2 Sheets-Sheet 2



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2,712,205

ABRADING ROLL

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Application June 20, 1952, Serial No. 294,572

4 Claims. (Cl. 51—168)

This invention pertains to an abrading roll for the surface grinding of metal strip and the like, such for example, as hot rolled steel strip, although the invention has a wide field of application to the surface grinding of relatively wide flat surfaces in general.

The abrading roll of the invention is characterized in comprising a series of similar, annular grinding elements, resiliently mounted in axially spaced relation on a flexible sleeve of rubber or the like, which latter in turn is mounted upon a rigid metal sleeve or shaft, for example, of steel. Only a slight spacing is employed between adjacent abrading elements, as provided, for example, by interposed flexible gasket rings of rubber or the like. As a result of this construction, the individual abrading elements may be depressed relative to each other and may move laterally or tilt slightly relative to each other, thus to follow slight elevations or depressions of a surface being ground, such as the surface of a relatively wide steel strip, in this way uniformly to grind all surface portions.

The abrading roll of the invention is motor driven by a motor coupled to the metal shaft or sleeve thereof, and may operate in conjunction with a suitable backup roll, between which and the abrading roll the metal strip being ground is fed. Metal plates, sheets or other stock may be similarly ground. Alternatively abrading rolls may be employed on both sides of the stock being ground, thus concurrently to surface grind both sides thereof.

The conventional method of surface grinding metal strip is to employ so-called "belt grinders," comprising an abrasive belt passing about a series of spaced rolls or pulleys, usually three in number, one of which is motor driven, and another of which has the shaft flexibly mounted for suitably tensioning the belt. To this end, the axes of the rolls or pulleys are disposed at the vertices of a triangle viewed in side elevation. A backup roll of flexible material, such as rubber or the like, is employed to hold the surface of the strip being ground against the abrading belt as it passes under the driven roll.

A serious objection to the belt grinder is that the abrading material is rapidly worn off the belt, requiring either re-surfacing with the abrading material suitably bonded to the belt, or complete replacement of the belt. Another objection is that the abrading efficiency of the grinding belt falls off extremely rapidly after being first put into use, so that if a long strip of steel or the like is being ground, the grinding action is apt to vary appreciably throughout the length of the strip.

As a result of these defects, many attempts have been made to devise an abrading element for the surface grinding of metal strip or the like, which has the uniformly high grinding efficiency and the relatively long life and wearing characteristics of an ordinary grinding wheel, while at the same time possessing the requisite flexibility of the grinding belt for following elevations and depressions or other irregularities of the surface of the strip being ground, thus uniformly to surface grind all portions. But prior to the present invention no effective

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solution of this problem has ever been devised in so far as I am aware.

With the above outlined construction of the present invention, the annular grinding elements are made of the same material as a conventional grinding wheel, such as is employed for surface grinding metal articles, namely they are made of a suitable grit, such as silicon carbide, aluminum oxide or silicates, etc., bonded with a suitable synthetic resin such, for example, as a thermoset phenolic resin. Also, these annular grinding elements are made of dimensions such as to have long life wearing properties. They may, for example, range from one-half inch to an inch or more in width, and from a few inches to as much as six inches or more in radial height from the inner to the outer diameter. They thus provide continuously efficient grinding surfaces from the time of initial use until worn from their outer substantially to their inner diameters. Their flexible mountings for both vertical and lateral displacements assure that the grinding elements will follow all variations in surface irregularities of the strip, thus to assure uniform grinding of all surface portions.

In order to assure that the spacings between the abrading elements will not streak a strip or fail to grind uniformly all surface portions, the grinding roll may be axially oscillated during grinding. Preferably, however, in accordance with a modified construction, the abrading elements are provided with staggered or offset portions or are made of sinuous or staggered configuration viewed in side elevation, and are assembled with their staggered portions interlocking, so that the spacings between elements will shift laterally back and forth across the strip as the abrading roll rotates.

Having thus described the invention in general terms, reference will now be made to the accompanying drawings for a more detailed description wherein:

In the drawings—

Fig. 1 is a side elevation of a grinding roll embodying the present invention;

Fig. 2 is a transverse sectional view of the grinding roll shown in Fig. 1 in combination with a backing roll and related rolls for feeding the stock;

Fig. 3 is a longitudinal sectional view of the grinding roll shown in Fig. 1;

Fig. 4 is a perspective view of an individual grinding roll element employed in the grinding roll of Fig. 1;

Fig. 5 is a side elevation of a modification of the grinding roll shown in Fig. 1;

Figs. 6, 7, 8 and 9, inclusive, comprise fragmentary views of portions of the novel grinding roll, each showing a different type of radial interfitting corrugation which can be employed in the present invention; and

Fig. 10 is a fragmentary sectional view through a portion of a grinding roll embodying the present invention and employing grinding element spacer means different from those employed in the embodiment of Fig. 3.

Referring to the drawings, the abrading roll shown generally at 20, comprises a series of annular abrading members 21, mounted in axially spaced relation as at 22, on a sleeve 23 of resilient material, such as rubber or the like, the abrading elements being resiliently spaced from each other by means of interposed flexible gasket rings as at 24. The rubber sleeve 23 is in turn mounted upon and backed by a rigid metal sleeve 25 of steel or the like, and consisting of a cylindrical central portion 26 and flared end members 27, 28, the latter having formed on their inner ends, collar portions, as at 29, which slide within recessed portions as at 30 of the central member 26, and which abut shoulders, as at 31 thereof. The flared portions 27, 28 are adapted for reception of conical bushings 32, 33 carried by a shaft 34, said shaft being threaded as at 35, 36, for reception of follow-up nuts as at 37, 38 for assembling the abrading roll 20 thereon.

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The abrading elements 21, interposed gaskets 24, and the rubber flexible sleeve 23 are mounted in assembled relation on the steel shaft or sleeve 25 by means of end bushings 39, 40, threaded on to the steel sleeve members 27, 28, as at 41.

Referring to Fig. 5, the abrading elements 21, may take the form of simple annulae or rings as shown having rectilinear sides viewed in side elevation. With this modification, the roll is preferably oscillated axially throughout the grinding operation to assure that the spaces 22 between adjacent grinding rings do not always follow the same path along the strip and thus prevent grinding of these strip portions.

To avoid this contingency, the grinding elements are preferably provided with staggered or offset portions as at 42, Fig. 4, which are assembled in interfitting or interlocking relationship in the manner indicated at 43 of Fig. 1. Thus the offset portions 43 grind away the strip surface along the paths of the rectilinear portions 44 of the grinding elements. This staggering may assume any of the configurations illustrated in Figs. 6-9 inclusive, such as the echelon configuration 45 of Fig. 6, the sawtooth staggered configuration 46 of Fig. 7 or the sinuous paths 47, 48 of Figs. 8 and 9.

Referring to the fragmentary showing of Fig. 10, the abrading rings 21 may be provided with peripherally extending grooves as shown at 49, for reception of conforming rubber spacer rings 50, which are thus locked in place.

Referring to Fig. 2, metal strip 51 to be surface ground is fed between driven rolls 52, which may, for example, be driven pinch rolls, and thence between the grinding roll 20 and an associated backup roll 53, and thence between a second pair of driven rolls 54 on the delivery side, which again may be a pair of driven pinch rolls. The path of the strip is such as shown that it is flexed over the backup roll 53, and thus presents only a tangential line of contact with the grinding elements 21 of the grinding roll, thus to assure that the grinding elements will uniformly contact the strip throughout its entire width at the tangential line of grinding contact.

For concurrently grinding both sides of the strip, the lower roll of pair 52 or 54 may comprise a grinding roll similar to roll 20.

What is claimed is:

1. An abrading roll comprising in combination: a series of substantially annular rigid abrading elements of substantially similar shape, and means coaxially and resiliently mounting the same in axially spaced relation, said means including a rigid shaft, a resilient sleeve interposed between said shaft and abrading elements, and resilient spacer gaskets interposed between adjacent said abrading elements, respectively, the outer diameter of said spacer gaskets being less than that of said abrading elements, the peripheral surfaces of such spaced abrading elements all being in coincidence with a single surface-of-revolution formed by moving a straight line about the axis of such roll whereby all of such peripheral surfaces are all concurrently engageable over the full width thereof by a surface to be abraded thereby, the entire peripheral surface of each of such elements being movable into engagement with the surface to be abraded, in response to rotation of said roll.

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2. An abrading roll comprising in combination: a series of substantially annular and rigid abrading elements of similar configuration, said elements being composed of an abrading material bonded with a resinous material, and means coaxially and resiliently mounting said abrading elements in axially spaced relation, said means including a rigid shaft extending axially through said abrading elements, a resilient sleeve interposed between said shaft and said abrading elements, and resilient spacer gaskets interposed between adjacent said abrading elements, respectively, the peripheral surfaces of said abrading elements all being cylindrical and of a common diameter whereby the entire peripheral surfaces of said elements are movable into engagement with a surface tangent thereto in response to rotation of said roll.

3. An abrading roll comprising in combination: a series of substantially annular and relatively rigid abrading elements of similar configuration, said elements all having cylindrical peripheries of a common diameter, said elements having formed therein a series of offset portions viewed in side elevation, and means coaxially and resiliently mounting said abrading elements in axially spaced relation, with the offset portions of adjacent said elements disposed in interlocking relationship, said means including a rigid shaft extending axially through said abrading elements, and a resilient sleeve interposed between said shaft and said abrading elements, together with resilient spacer gaskets interposed between adjacent said abrading elements, respectively the outer diameter of said spacer gaskets being less than that of said abrading elements.

4. An abrading roll comprising in combination: a plurality of relatively hard and rigid, annular abrading wheels of generally similar dimension, a rigid shaft, and means resiliently mounting said wheels in spaced, axial alignment on said shaft for radial and axial displacement relative to each other, said means including a sleeve of resilient and compressible material disposed between said abrading wheels and said shaft and resilient spacer gaskets interposed between adjacent said abrading wheels, the peripheral surfaces of such spaced abrading wheels all being cylindrical and of common outer diameter whereby all of such wheels are concurrently engageable over the full width thereof by a surface to be abraded thereby.

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