

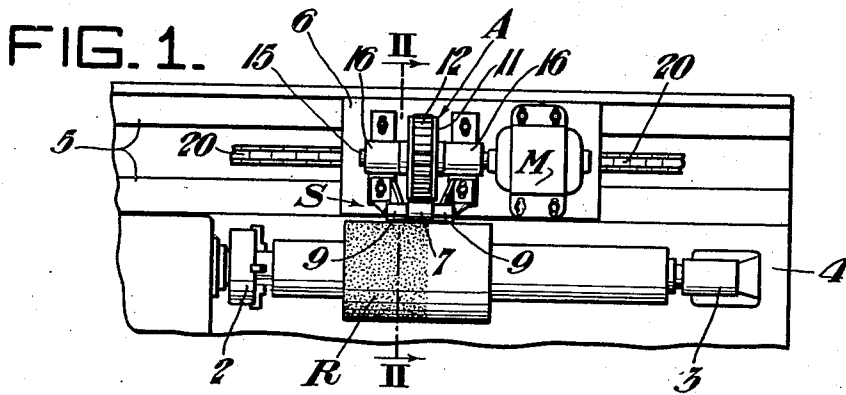
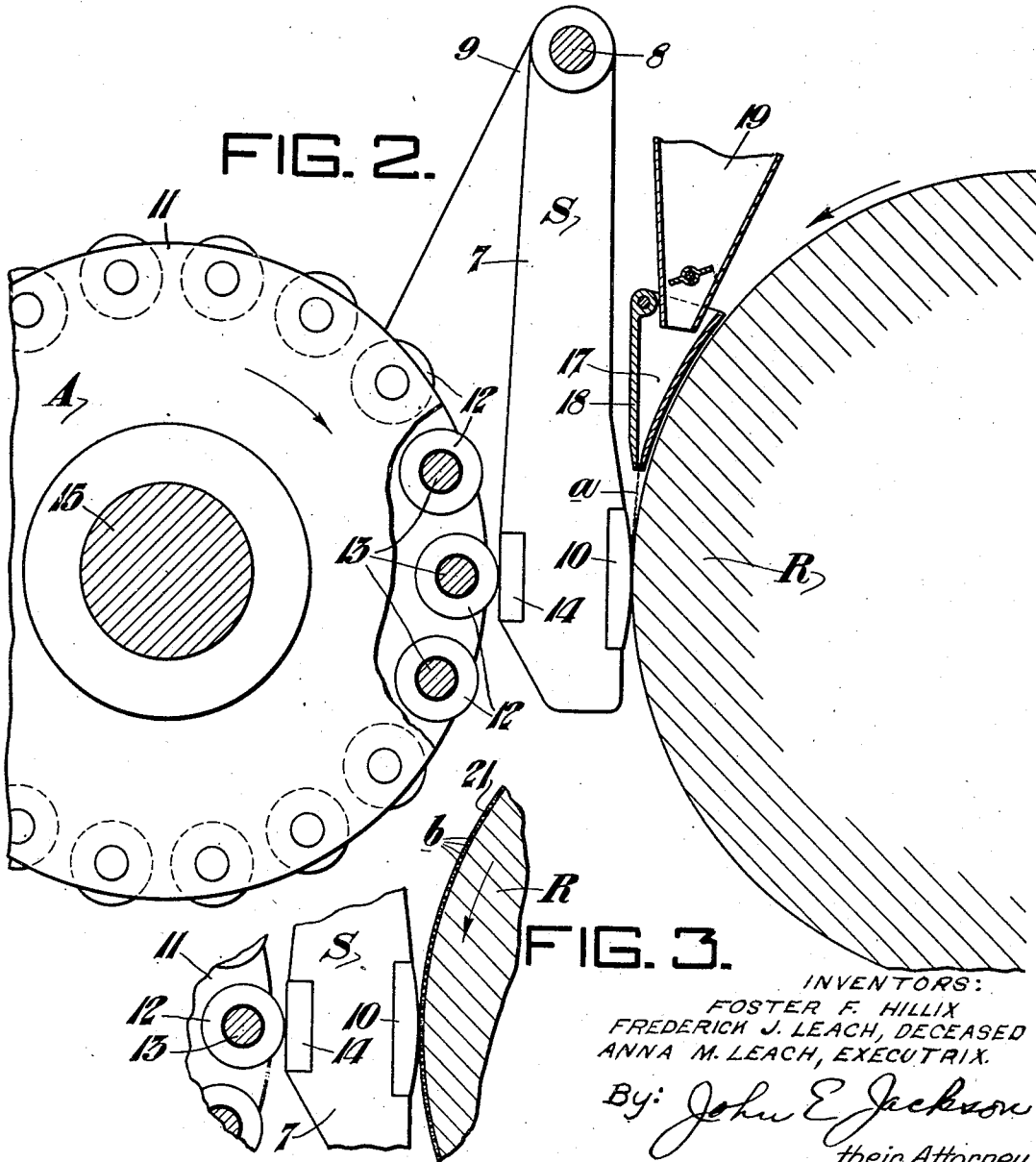
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APPARATUS FOR STIPPLING METAL ROLLS AND THE LIKE

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APPARATUS FOR STIPLING METAL ROLLS
AND THE LIKE

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5 Claims. (Cl. 76-4)

Our invention relates to improvements in apparatus for stipple finishing cold rolling rolls of the character employed for producing stippled strip or sheet suitable for bonderizing, enameling or varnishing, this application being a division of our pending application Serial No. 406,933, filed August 14, 1941.

It is a prime object our invention to provide for stipple finishing cold rolling rolls, to produce throughout the surfaces thereof, minute sharply defined indentations and crests affording a proper "tooth" to impart the uniform pattern thereof to the metal rolled by said rolls.

Our invention contemplates the cutting of the roll surface by the localized application of sharp blows or impact upon a granular abrasive supplied to said surface, thereby producing the desired stippling of the roll.

It is also an object to provide for the uniform dispersion or pattern of the granular abrasive so as to insure the desired uniformity of the resulting stippling.

Additional objects and advantages will become apparent from the following description taken in connection with the accompanying drawing, wherein:

Fig. 1 is a diagrammatic plan view illustrating the apparatus of our invention;

Fig. 2 is an enlarged sectional view taken on the line II—II of Fig. 1; and

Fig. 3 is a fragmentary view of a portion of Fig. 2, showing a modification.

Referring to the drawing, the roll R to be treated in the manner and by the means of the present invention is initially finished by grinding to a high degree of smoothness with the desired crown and contour. The said roll is then placed in a lathe-like device, such as for example, the roll-grinder diagrammatically illustrated in Fig. 1, including a power driven chuck or head 2 and a tail stock 3 mounted upon a suitable bed or base 4.

At one side of the grinder or lathe, is a traverse means or ways 5 parallel with the roll axis, and slidably mounted thereon we provide a carriage 6, mounting and supporting the stippling device S of our invention, for movement thereof in a direction axially of the roll R being treated.

The stippling device S is designed and operable to apply a hard abrasive to the roll surface by localized repeated impact in such a manner as to form sharp well defined surface indentations and intervening crests in the roll surface without elongation or scratching, whereby the roll surface is efficiently and uniformly stippled throughout.

To this end, we provide an impact hammer in the form of a free pendulum 7, pivoted at its upper end by means of a jack shaft 8 mounted in bearings 9 on carriage 6, so as to swing freely toward and away from the surface of the roll R. An impact block 10 is secured to the lower end of the hammer in any suitable manner, said block being formed of an extremely hard material, as for example, tungsten carbide.

The lever arm of the hammer or pendulum is designed to bring the center portion of the block 10 into contact with the roll surface substantially normal thereto, so as to provide for localized contact with said surface. The roll contacting face of the block may be curved as shown for substantial line contact with said roll.

A rotary impact device A is also mounted on the carriage 6 in the plane of movement of the hammer 7, including an annular divided body 11 mounting an annular series of equally spaced impact rollers 12 projecting from the periphery of said body. Said rollers are loosely mounted on traverse pins 13 so as to relieve said pins during the impact of the rollers with the hammer 7. The hammer may be provided with an anvil 14 opposite the block 10 thereof for receiving the repeated blows from the rollers 12 upon rotation of the impact device.

The impact device A may be rotatably mounted on the carriage 6 by means of a suitable shaft 15 mounted in bearings 16 and connected with a motor M. The bearings 16 and motor M for the impact device, and bearings 9 for the hammer 7, are preferably adjustable in a direction toward and away from the roller R, so as to properly relate the impact device, hammer and roll to synchronize the impact blows upon the hammer and the rebound of the latter from the roll surface.

With the stippling device positioned for contact of the block 10 of hammer 7 with the roll surface, the impact device is rotated by its motor M, and a free granular abrasive is fed in a thin flat stream or layer to the zone of contact of said block 10 and the roll surface. A suitable abrasive feed nozzle 17 may be employed, including an adjustable gate 18 for releasing said abrasive in the manner stated and as indicated at a in Fig. 2. Said abrasive may be fed by gravity from a suitable hopper 19.

By properly synchronizing the speed of the rotating impact device A, the rollers 12 thereof will strike the hammer 7 with uniform frequency, and upon rotating the roll R about its axis, the supplied granular abrasive will be driven into and

cut the roll surface to impart a uniform stippling to said surface. Suitable chains 20 or other means may be connected to the carriage 6, so that the stippling device S may be traversed by movement of the carriage along its ways 5 parallel with the axis of the roll R, to continue the stippling treatment throughout the axial extent of the roll.

Various types and sizes of abrasive may be employed, it being desirable to use a hard material capable of withstanding the impact of the hammer 7. We have found fused alumina to be such material, and since it is relatively inexpensive, it may be employed efficiently and economically.

Due to the fact that the metal of the block 10 is materially harder than the metal of the roll R, the impact forces are transmitted through the abrasive to the roll surface, cutting and forming indentations and producing intervening crests in the metal thereof, thereby producing the desired stippled finish on the roll. The resulting cold working of the metal of the roll is slight and produces an excellent "tooth" or roughness of the surface with the desired uniformity. The limited contact between the block 10 and the roll surface provides a desirable localization of the impact so as to uniformly force the individual abrasive particles into the roll surface during said impact. Such localization further serves to prevent overlapping as the treatment progresses over the roll surface.

By varying the size of the abrasive, the character and degree of the resulting stippling may be varied as desired, and the stippling device of our invention may be readily employed for a large range of said sizes.

For the purpose of obtaining a prearranged or selected stippling pattern, our invention contemplates the dispersion and application of the abrasive particles b upon the surface of a thin flat membranous carrier 21, such as Cellophane, by the use of a suitable adhesive. The carrier so charged with the abrasive is then applied over the roll surface with the abrasive in contact therewith, as shown in Fig. 3, and the roll is then subjected to the action of the impact hammer 7 as before. The pattern of the stippling produced in this manner is therefore dependent upon the dispersion of the abrasive on the carrier, and hence, by proper application of the abrasive to said carrier, the desired uniform stippling action is insured. Enveloping the roll with the carrier has the further advantage of retaining the abrasive particles after impact, and the carrier and abrasive may be readily removed upon the completion of the treatment.

Various changes and modifications are contemplated within the scope of the following claims.

We claim:

1. In apparatus of the character described, the combination with means for supporting a metal roll, means for rotating the roll, means for

applying a granular abrasive to the roll surface, impact means operable to strike repeated blows upon the abrasive while in contact with the roll surface and in a direction normal to the roll surface, and means for traversing said means for applying the abrasive and said impact means axially of the roll to progressively and uniformly treat its surface.

2. In apparatus of the character described, the combination with means for supporting a metal roll, a swinging hammer disposed to contact the roll surface, means for applying a thin layer of a granular abrasive between said hammer and the roll surface, and an impact device operable to strike repeated blows upon the hammer in a direction to move the latter toward the roll surface, said hammer thereby engaging the intervening abrasive and forcing the same into the roll surface.

3. In apparatus of the character described, the combination with means for supporting a metal roll, a swinging hammer disposed to contact the roll surface, means for supplying a thin stream of a free granular abrasive between said hammer and the roll surface, and an impact device operable to strike repeated blows upon the hammer in a direction to move the latter toward the roll surface, said hammer thereby engaging the intervening abrasive and forcing the same into the roll surface, and means for rotating the roll on its support.

4. In apparatus of the character described, the combination with means for supporting a metal roll, a swinging hammer disposed adjacent the roll, said hammer having a hardened block thereon located to contact the roll surface upon swinging movement of the hammer, means for applying a thin layer of granular abrasive between the said block and the roll surface, and an impact device operable to strike repeated blows on said hammer in a direction toward the roll surface, the hammer block transmitting said impact blows to said abrasive in a direction normal to the roll surface thereby forcing the abrasive into said surface.

5. In apparatus of the character described, the combination with means for supporting a metal roll, a membranous abrasive carrier enveloping the roll surface and having a granular abrasive secured to the side thereof next to the roll surface in prearranged pattern, impact means operable to strike repeated blows upon the carrier and its abrasive in a direction normal to the roll surface, and means for effecting relative movement of the roll and impact means to progressively continue the said treatment throughout said roll surface.

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