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P. GODLEY, 2ND., ET AL
 PRODUCTION OF METAL-FREE STRIPES ON
 METAL-COATED SHEET MATERIAL
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2,569,414

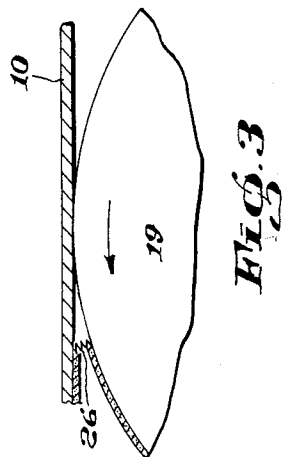


Fig. 3

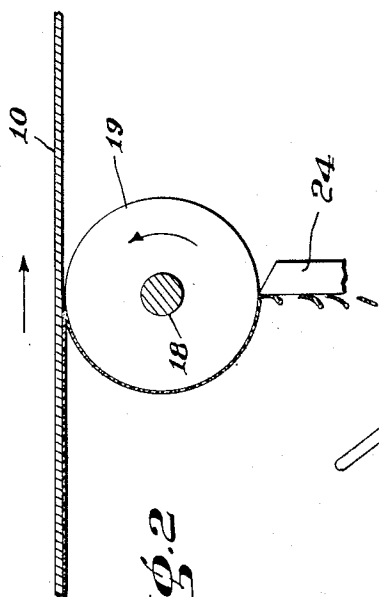


Fig. 2

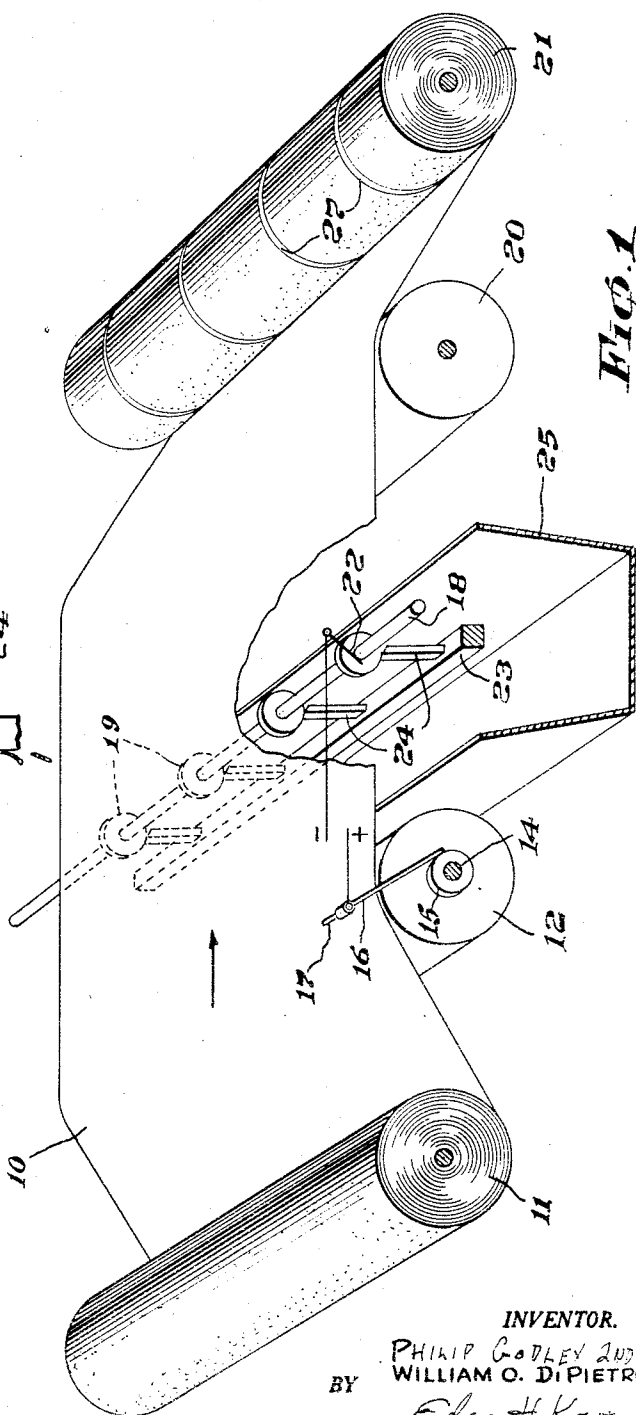


Fig. 1

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PRODUCTION OF METAL-FREE STRIPES ON
METAL-COATED SHEET MATERIAL

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2 Claims. (Cl. 219—19)

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This invention relates to the removal of bands or stripes of metal coating from metal-coated sheet material and is particularly useful as applied in the manufacture of electrical condensers.

In the fabrication of electrical condensers from metallized paper, it is necessary that the metallized strips which are to be interleaved, these strips ordinarily being slit from a wide web of the metal coated paper, be free of metal coating in a band along one edge. While the metal-free bands can be produced as an incident of the metal coating of the paper, it is more practical to apply the metal as an unbroken film and to subsequently form the bands by removal of stripes of metal of appropriate width. The metal-removing operation is customarily carried out before the metallized paper is slit to produce the condenser strips.

Our invention has as its principal object to provide a process whereby the metal stripes may be more rapidly removed than by processes heretofore proposed and with less likelihood of damage to the paper base. The invention includes a system of apparatus suitable for the practice of the process.

In accordance with the invention, the metal-free bands are produced by volatilizing the necessary metal from the metal-coated sheet or web by means of electric arcs maintained between the metal-coated face and a plurality of rotary electrodes in circuit with the face and toward which the sheet is continuously advanced. The vaporized metal, a major portion of which is converted to oxide by the heat of the arcs, condenses on the electrodes and is continuously removed therefrom. In the preferred form of our invention, the metal-coated sheet is passed over rather than under the electrodes which, in any case, do not actually contact the metal face but only the paper from which the metal has been removed.

We shall further describe our invention with the aid of the accompanying drawings in which:

Fig. 1 is a perspective view illustrating, in essentially diagrammatic fashion, a preferred form of apparatus.

Fig. 2 is an elevational view of one of the metal-removing electrodes.

Fig. 3 is a view similar to Fig. 2 but to an enlarged scale to illustrate the relationship of the electric arc to the metal-coated paper and the body of fused metal.

Referring to the drawings, the web 10 is fed from a supply roll 11 on which it is wound with its metal face outward. The web may be composed, for example, of high tensile strength paper or

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cellophane provided on one side with a thin zinc or aluminum film.

From the supply roll the web passes over a metal roll 12. The roll 12 makes contact with the metal face of the web over a substantial area as shown and serves as a part of the circuit by which the electric current is passed through the metal coating. For this purpose, the shaft 14 of the roll is provided with a slip-ring 15 electrically connected to the metallic peripheral surface of the roll and engaging with a brush 16 to which one side of the current supply is connected at terminal 17. The electric current may be direct or alternating. In the illustrative embodiment a direct current is used. When a direct current is employed, we prefer that its positive side be connected to terminal 17.

Upon leaving the contact roll 12 the web passes over a shaft 18 mounting a plurality of rotary electrodes 19 fixedly secured to the shaft and positioned to engage the web. On losing engagement with the electrodes, the web passes over a freely rotatable supporting roll 20 and thence to a take-up or rewind roll 21 which serves to advance the web through the machine.

It will be understood that the number of electrodes corresponds to the number of metal stripes to be removed and that the number will vary depending on the width of the web. Although we prefer to treat a wide web such as that illustrated and to thereafter slit the treated web into condenser strips, it is within the scope of our invention to treat single condenser strips.

Shaft 18 on which the electrodes 19 are mounted is journaled in insulating bearings, not shown, and is caused to rotate in a direction opposite the direction of travel of the web. Any suitable means for driving the shaft may be provided. Thus, a belt drive may be used, the belt passing around a pulley, not shown, keyed to the shaft.

A brush 22 rides on the revolving shaft 18 and is supported by a terminal connected to the negative side of the source of current.

Below the rotary electrodes 19 and mounted on a stationary bar 23 held by insulating supports, not shown, are scrapers 24 adapted to remove condensed metal from the electrodes. The metal cuttings fall into a trough 25, which is preferably of large capacity to the end that only infrequent emptying thereof is required. The action of the scraper elements is believed apparent from Fig. 2.

In the operation of the apparatus the electrodes are preferably caused to rotate at a rate corresponding substantially with the speed of the

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web, but in a direction opposite the direction of travel of the web, as stated. The potential impressed across the roller 12 and the electrodes may be of the order of 25 volts, for example. As the metal approaches the electrodes, a spark discharge or arc 26 (Fig. 3) is formed which is directly responsible for evaporation of the metal. There is no actual contact between the metal and the electrodes since those areas of the web engaging the electrodes have been freed of metal. The evaporated metal collects on the electrodes simply because of their proximity to the arcs, although some of the metal vapor is apparently ionized by the arcs. Tests indicate that any other member, charged or uncharged, placed close to the arc will collect substantially the same amount of metal as the electrode.

The web after passing over roll 20 is wound on roll 21 with the striped face outward. The width of the spaced metal-free bands 27 is determined by the marginal thickness of the electrodes.

It is understood that the invention will not be considered as restricted to the precise details of construction indicated in the drawings, since various changes and modifications may obviously be made without departing from the scope of the invention or sacrificing the advantages derived from its use.

We claim:

1. Apparatus for continuously removing a band of metal coating from a web of metal-coated, nonconducting sheet material, comprising means for continuously advancing the web with its metal-coated face down, a contact positioned to engage the metal face of the web, a rotary electrode wheel in the path of the web and spaced from said contact, said electrode wheel having a marginal thickness substantially corresponding to the width of the band to be removed, means for rotating said electrode wheel in a direction opposite to the direction of advancement of the web, the axis of said rotary electrode wheel being mounted below the path of travel of said web, means for impressing an electrical potential across the contact and the electrode wheel to produce an arc between the electrode wheel and the approaching metal coating serving to evaporate the necessary metal, and a scraping member positioned to engage the periphery of said rotary electrode wheel so as to remove the metal which condenses on the electrode wheel.

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orate the necessary metal, and a scraping member positioned to engage the periphery of said rotary electrode wheel so as to remove the metal which condenses on the electrode wheel.

2. Apparatus for continuously removing a band of metal coating from a web of metal-coated, nonconducting sheet material, comprising means for continuously advancing the web with its metal-coated face down, a contact positioned to engage the metal face of the web, a rotary electrode wheel in the path of the web and spaced from said contact, said electrode wheel having a marginal thickness substantially corresponding to the width of the band to be removed, means for rotating said electrode wheel in a direction opposite to the direction of advancement of the web, the axis of said rotary electrode wheel being mounted below the path of travel of said web, means for impressing an electrical potential on the order of 25 volts across the contact and the electrode wheel to produce an arc between the electrode wheel and the approaching metal coating serving to evaporate the necessary metal, said last-named means having its negative side connected to said electrode wheel, and a scraping member positioned to engage the periphery of said rotary electrode wheel so as to remove the metal which condenses on the electrode wheel.

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