Dec. 29, 1970 D. W. KENYON ET AL 3,550,320

GRAINING APPARATUS

Filed Dec. 5, 1968 2 Sheets-Sheet 1

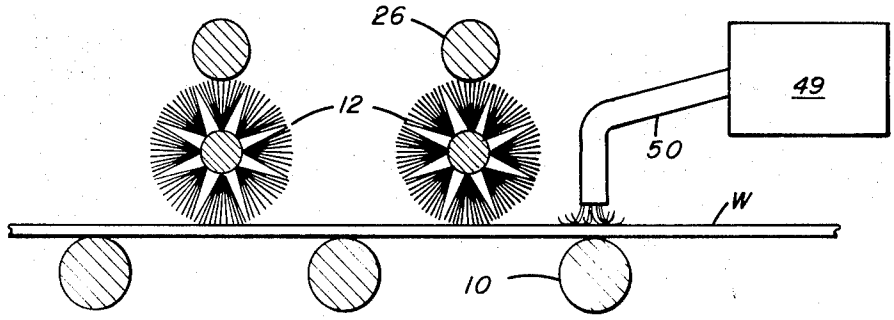


FIG. 1

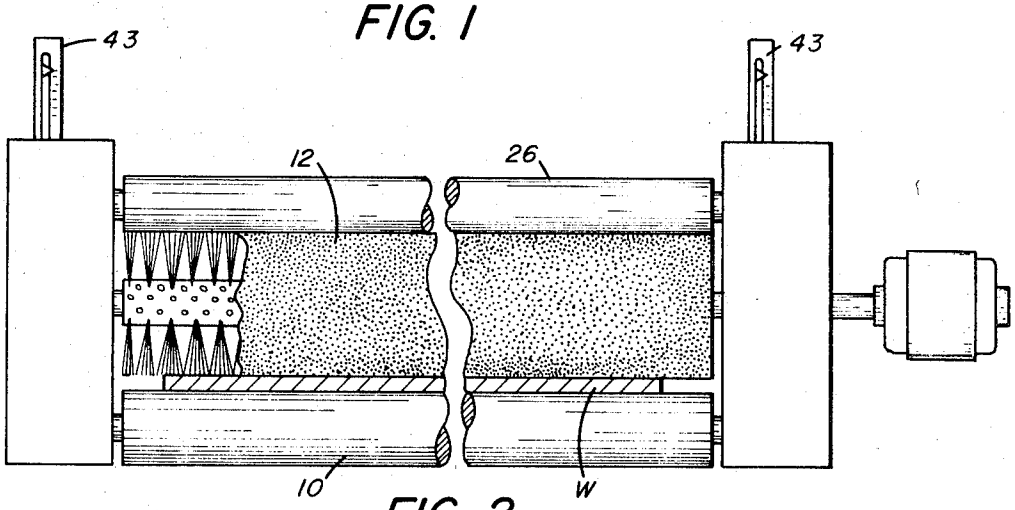


FIG. 2

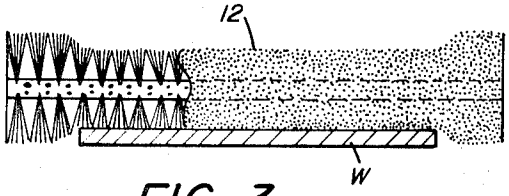


FIG. 3

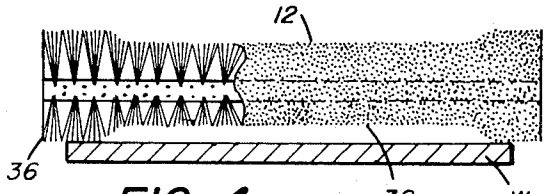


FIG. 4

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GRAINING APPARATUS

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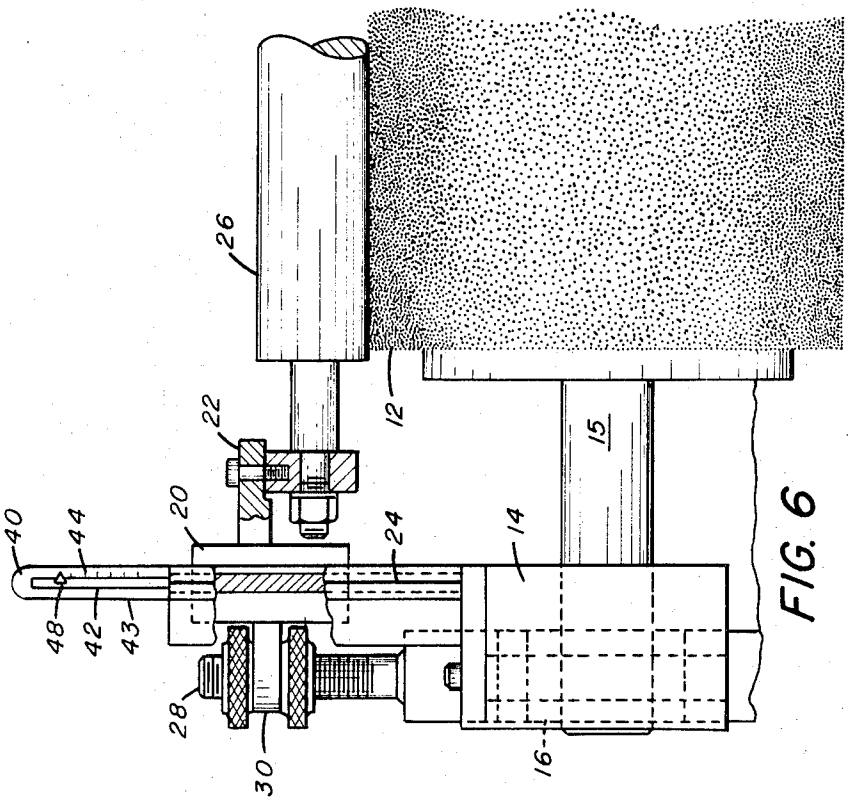


FIG. 6

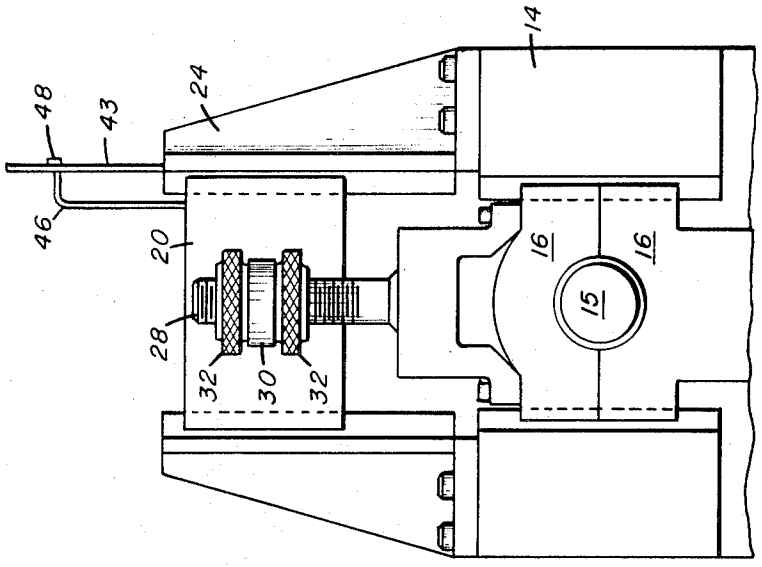


FIG. 5

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GRAINING APPARATUS

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Int. Cl. B24b 7/00, 53/04
U.S. Cl. 51—3 7 Claims

ABSTRACT OF THE DISCLOSURE

A wear bar is placed against the surface of a grainer brush to cause uniform wearing of the brush surface so that the brush can be used to grain a variety of web widths without regard to sequencing the webs in order of diminishing width.

BACKGROUND OF THE INVENTION

This invention relates to an improved apparatus for graining a metal plate or web. More particularly this invention relates to an apparatus for graining planographic or lithographic plate and web materials of various widths.

In the art of preparing metal webbing and plates for anodization, it is the customary procedure to roughen or grain the web or plate surface. "Graining" as the process is most commonly called is accomplished by abrading or roughening the web surface to increase the surface area.

Graining can be accomplished by a variety of methods such as blasting the surface with an abrasive material or by impinging metal or glass balls or chips on the metal surface. A preferred method of graining a metal web or plate comprises brushing an abrasive slurry into the metal surface by means of a grainer brush. In many modern, high-speed machines, the metal is in a web form, and the web is moved in a path past a graining station prior to anodization. An abrasive slurry is directed onto the web surface prior to or simultaneous with contact of the web by the grainer brush. The brushing action of the grainer brush usually a revolving brush combined with the abrasive action of the slurry causes the graining effect on the metal surface.

After large quantities of plates or metal webbing have passed through the graining station, the brush shows signs of wear, and a groove, which conforms to the width of the web, appears in the brush surface. This groove causes a series limitation on the flexibility of the use of the brush. If the brush is used to grain a web that is wider than the groove, the brush will not uniformly grain the web surface, residual edge patterns appear on the edge of the web because of the uneven engagement of the grainer brush. Conversely, if the brush is used to grain a web that is narrower than the groove width, then another groove corresponding to the narrower width will be worn in the brush surface.

Because of the tendency of a brush to groove to the width of the web being grained, it becomes difficult to process a web of another width without changing the grainer brush. Unless the brushes are changed, the production runs must be coordinated relative to the brush groove width otherwise the effectiveness of the graining unit is greatly reduced. Therefore if the production schedule of a machine calls for graining a wider web, the brush must be changed to accommodate the wider web.

The time needed to change a brush results in an overall reduced effectiveness of an anodizing machine. Accordingly, there has been a need for a grainer brush which can be used interchangeably with a variety of web widths.

SUMMARY OF THE INVENTION

The present invention provides a device for purposely wearing and abrading the surface of a grainer brush to eliminate the wear groove and to maintain the brush surface in an even uniform condition so that it can be used to uniformly grain a variety of web widths.

The present invention provides an improved apparatus for graining surfaces. The apparatus includes suitable means for supporting and conveying the surface through a predetermined path. A cylindrical grainer brush is mounted so that it is contiguous the surface in a position that is transverse the path thereof. Means for wearing the brush bristles are mounted along the length of the brush for engagement with a portion of the periphery of the brush surface. Further means are provided for holding the wear means in operative engagement with the brush surface, to cause uniform wearing along the length of the brush so that it can be used to uniformly grain various widths of surfaces without regard to sequencing the surfaces in order of diminishing width.

The present invention is particularly adaptable for use in an apparatus that grains metal webs. In such an apparatus means are provided for transporting the web through a predetermined path at the graining station in an anodizing machine. A cylindrical grainer brush is mounted contiguous at least one surface of the web and transverse the web path for graining the web surface. Suitable wear means are mounted along the length of the brush for engagement therewith and for uniformly wearing the brush so that the brush can be used to grain metal webs of various widths.

In one embodiment of the invention, the means for transporting the web are a plurality of cylindrical rollers arranged so that the web is conveyed in a planar path past the graining unit.

In the preferred embodiment of the present invention the wear means is fabricated from a material which causes the abrasive wearing of the brush bristles. In one embodiment the wear means is a ceramic bar which extends along the length of the brush surface.

The present invention is adaptable for use in the graining station of an apparatus wherein an abrasive slurry is continually pumped on the web surface to assist in uniformly graining the web.

Furthermore, the present invention provides means for adjusting the position of the wear means relative to the grainer brush surface. Further means are provided for indicating the degree of engagement of said wear means with the grainer brush surface.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of the specification. For a better understanding of the invention, the operating advantages and the objectives obtained by its use, reference should be had to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention has been illustrated.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a graining station showing a preferred embodiment of the present invention.

FIG. 2 is a section view through a graining station.

FIG. 3 shows in section, a graining brush that has been worn from graining a web.

FIG. 4 shows the grainer brush from FIG. 4 being used to grain a web that is wider than the groove worn in the brush.

FIG. 5 shows a section view of the brackets on one side of the apparatus for mounting the grainer brush and wear bar.

FIG. 6 is an end view of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. 1 shows a preferred embodiment of a graining station into which the device of the present invention has been incorporated. The graining station can be incorporated into a standard anodizing machine (not shown) in which the metal web W is passed from a storage roll, cleaned, grained, anodized and rewound.

The graining station shown in FIG. 2 of the drawings includes a roller **10** to support the web W; a grainer brush **12** mounted adjacent the web and a wear bar **26** mounted adjacent the brush. These components are mounted in cooperative arrangement as described in detail hereinafter. Also shown in FIG. 2 is the web W supported and transported on a roller **10** beneath a grainer brush **12**. The grainer brush **12** in the preferred embodiment is rotatably mounted and supported in brackets **14** such as shown in FIG. 5. The brush **12** is adjustably mounted in the brackets **14** so that the degree of engagement of the brush **12** with the web W can be varied to meet changing conditions, such as the brush wearing or a change in type of abrasive slurry or web material.

The rollers are rotatably mounted in suitable brackets which may or may not be formed as part of the bracket which supports the grainer brush. The rollers may be adjustably mounted such as the brush is mounted, however, this is optional and depends upon the particular arrangement of the apparatus.

In a preferred embodiment such as shown in FIGS. 5 and 6 the brush shaft ends **15** are mounted in bearing blocks **16** which are positioned at both ends of the brush **12**. The blocks **16** have slots formed in both sides thereof so that they can be slidably mounted on the brackets **14**.

The wear bar **26** is also mounted from a block **20** which is similarly slotted so that the bar can be slidably adjusted in relation to the brush on a bar bracket **24**. A bracket **22** is provided so that the bar **26** can be suitably attached to the block **20**. The bar bracket **24** is mounted on the brackets **14** that support the brush.

To further support the wear bar **26**, a threaded pin **28** is mounted on the brush block **16**. A collar **30** which is attached to the bar block **20** is positioned on the pin **28** and can be slidably moved relative to the bearing block **16** by adjusting the locknuts **32** above and below the collar. Once positioned, the locknuts **32** are tightened so that wear bar can be held in the desired position. Also, the bar is then in locked relationship with the brush so that if the brush is moved, the bar moves with it. It must be realized that the wear bar could be supported by any suitable bracket device which would hold it in correct operational engagement with the grainer brush.

The wear bar in the preferred embodiment is mounted in vertical alignment with the shaft of the grainer brush. The position of the wear bar on the outer periphery of the grainer brush is optional. However, space is saved when the bar is mounted in vertical alignment with the shaft.

In the preferred embodiment of the present invention the wear bar is a metal bar having a ceramic coating. However, it is well within the spirit and scope of the present invention to fabricate bars from different types of materials. So long as the bar is formed from a material which is hard enough to cause abrasion and wearing of the brush ends then the spirit of the invention is utilized.

FIGS. 5 and 6 show a sight indicator **43** which is used by the operator to determine the degree of engagement of the wear bar **26** with the brush bristles **12** and to insure that the bar **26** engages the bristles evenly across the brush surface. FIGS. 5 and 6 show a useful embodiment of the sight indicator **43** wherein **40** is a flat plate having an elongated slot **42** cut along the length of the center portion thereof. Bench marks **44** are embossed along the edges of the slot **42** into the plate surface **40**. The plate **40** is suitably mounted on the bar bracket **24**. An indicator needle **46** is mounted on the bar block **20** so that the indicator end **48** can be seen in the slot of the sight indicator. With this arrangement the position of the wear bar **26** relative to the grainer brush **12** can be visualized. Furthermore, by placing the indicators adjacent to the adjustment brackets at both ends of the wear bar **26**, the wear bar can be adjusted so that an operator can be assured of uniform engagement of the bar **26** with the brush surface **12**.

The operation of the present invention can be shown by referring to FIGS. 1 and 2. FIG. 1 shows the web W being conveyed over a series of rollers **10**. The rollers support the web beneath the grainer brushes **12**. FIG. 2 shows a motor **51** for driving the brush and conveyors through a suitable power transmission arrangement.

The abrasive slurry is placed on the web W prior to it passing beneath the brush **12**. In one arrangement well known in the art the web is passed over a trough (not shown) and the slurry is pumped from a container **49** through a pipe(s) **50** and discharged on the web as shown in FIG. 1. The slurry could also be pumped through a hollow bore in the brush core and discharged through orifices in the outer periphery of the brush core at the base of the bristles.

FIG. 3 shows a grainer brush **12** wherein a groove has been worn in the brush pile by the combined abrasive action of the metal web and the abrasive slurry.

FIG. 4 shows the same grainer brush in contact with a wider web. In FIG. 4, the highest portion **36** of the pile of the brush is shown in contact with the web W. Of course as the brush is lowered into complete operational engagement with the web, the lower portion **38** of the pile will also contact the web. However, because of the irregular nature of the brush surface in the form of a circumferential groove, it has been found that the brush does not make uniform contact with the web surface and unsatisfactory graining effects, such as irregular edge patterns, result from the use of such a brush.

By placing the wear bar so that it uniformly engages the brush surface such as is shown in FIGS. 1 and 2, the brush is evenly abraded so that all of the bristles are the same length and the brush can be used to interchangeably grain a variety of web widths.

In the operation of the apparatus provided by the present invention the ceramic covered wear bar is preferably lowered onto the pile of the grainer brush while the brush is rotating. The ceramic surface serves as a coarse abrasive surface which wears off of the ends of the brush bristles. The position of the wear bar is then determined by reference to sight gauge. As the brush wears, the bar is lowered so that the ends of the brush bristles are continuously abraded evenly across the length of the brush surface. Because the brush retains an even cylindrical surface, the graining unit can be used to grain various web widths without regard to size sequence. Furthermore, the graining pattern is uniform throughout the web surface both lengthwise and widthwise.

In addition, the present invention is applicable in many situations where a cylindrical brush is used to grain or buff a surface wherein the graining or buffing causes the brush to wear.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

We claim:

1. An improved apparatus for graining a web surface comprising:

means for transporting said web through a predetermined path;

at least one cylindrical grainer brush rotatably mounted contiguous said web surface and transverse said path for graining said web surface;

means for rotating said grainer brush;

wear means mounted contiguous said brush for longitudinal engagement with a peripheral portion of said brush; and

means for holding said wear means in engagement with said brush to uniformly wear the brush throughout its length whereby said brush will uniformly grain web surfaces of various widths.

2. An improved apparatus for graining a metal web comprising:

means for transporting said web through a predetermined path;

a cylindrical grainer brush having wearable bristles rotatably mounted contiguous one surface of said web and transverse the web path for graining said surface;

means for rotating said grainer brush;

wear means mounted contiguously to and along the length of said brush for engagement with a portion of the periphery of the brush; and

means for holding said wear means in operative engagement with said brush to cause uniform wearing of the brush whereby said brush will uniformy grain metal webs of various widths.

3. The invention according to claim 2 wherein said transporting means comprises a plurality of cylindrical rollers arranged such that the web is transported in a

planar path tangentially with respect to the brush surface.

4. The invention according to claim 2 wherein said wear means is fabricated from a material which is harder than that of the brush bristles and which causes abrasive wearing thereof.

5. The invention according to claim 2 wherein said wear means comprises a bar having a hard ceramic peripheral surface.

6. The invention according to claim 2 further comprising means for applying an abrasive slurry onto said surface prior to contact by said grainer brush to facilitate graining of the web surface.

7. The invention according to claim 2 wherein said holding means comprises:

means for adjusting the position of the wear means relative to the grainer brush surface to control the rate of wear of the grainer brush; and

means for indicating the degree of engagement by said wear means with said grainer brush surface.

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U.S. Cl. X.R.

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