June 2, 1931. G. E. LANG ET AL 1,807,921

TRANSFER MACHINE

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FIG-10.

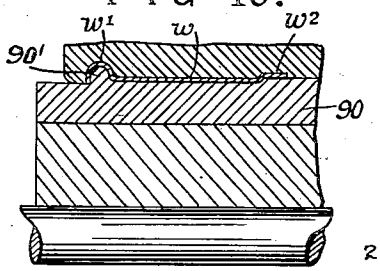


FIG.-1

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TRANSFER MACHINE

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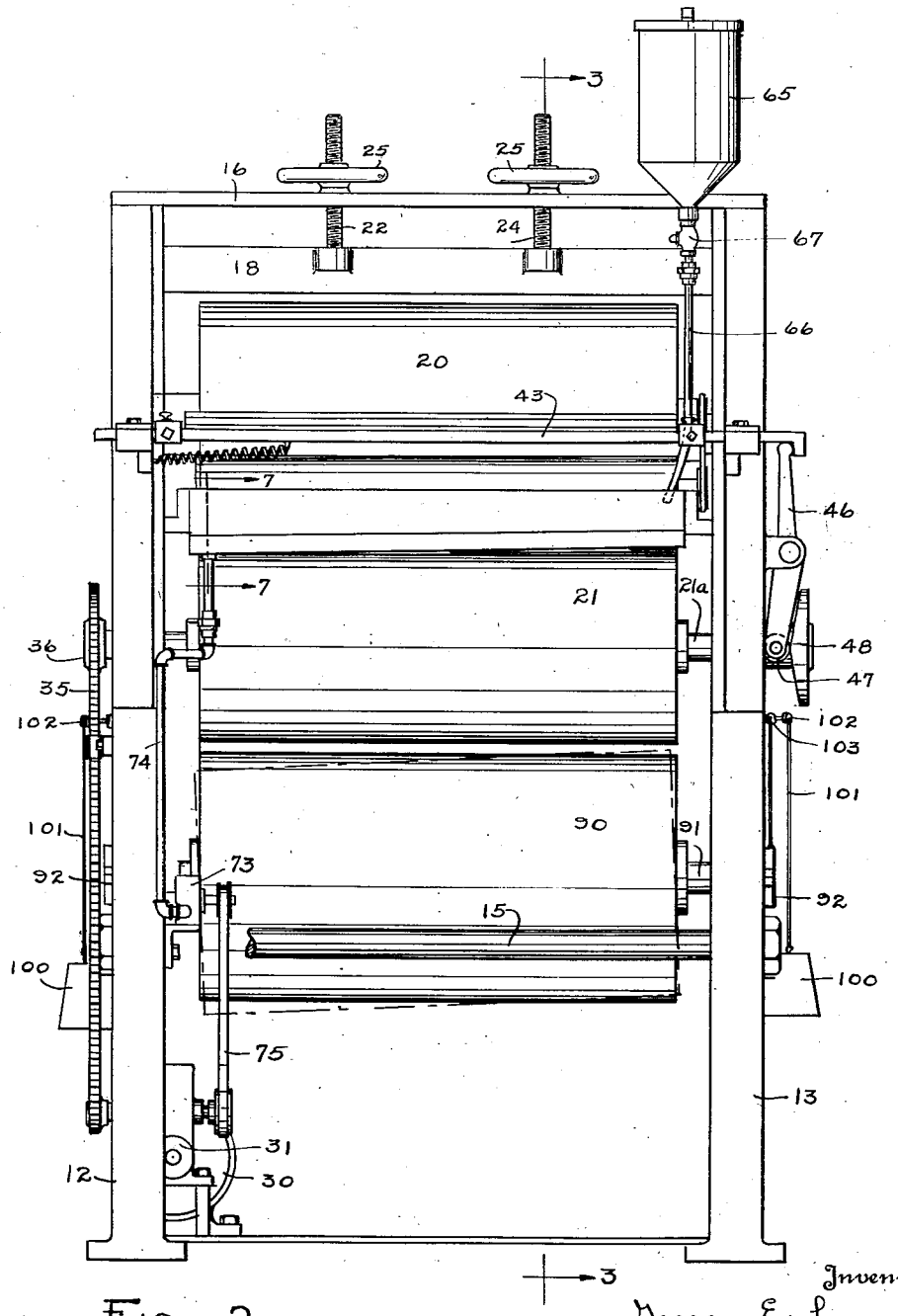


FIG.-2.

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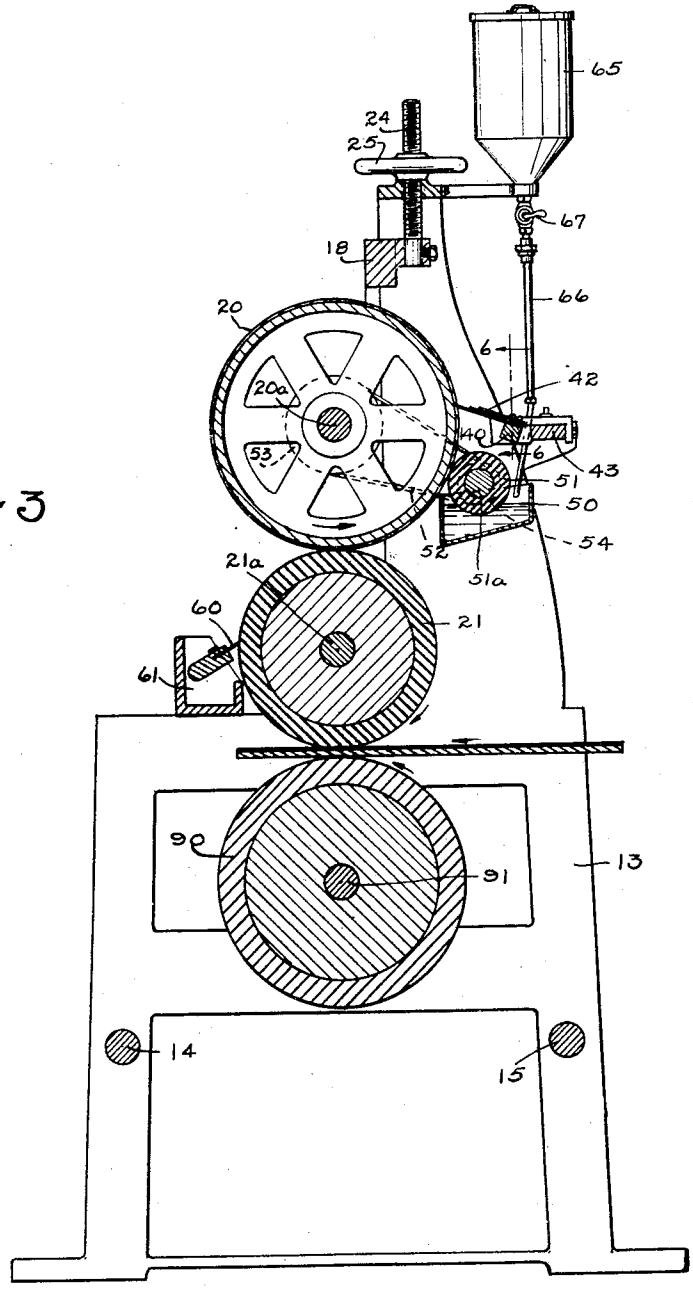
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TRANSFER MACHINE

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FIG.-3



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TRANSFER MACHINE

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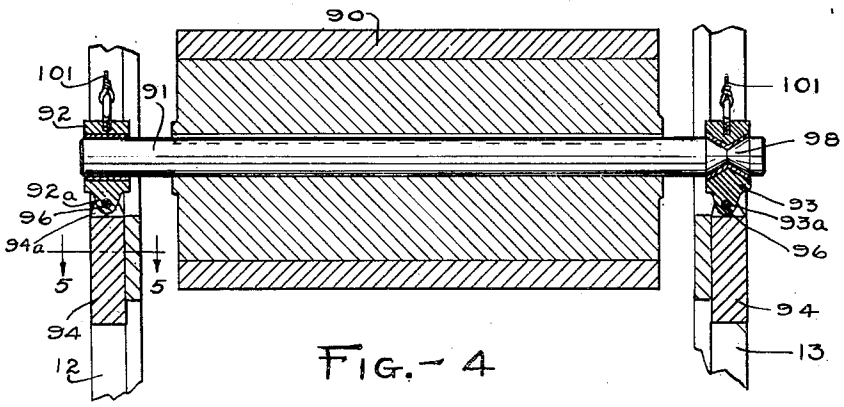


FIG.-4

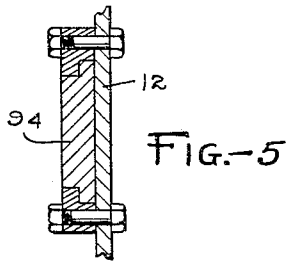


FIG.-5

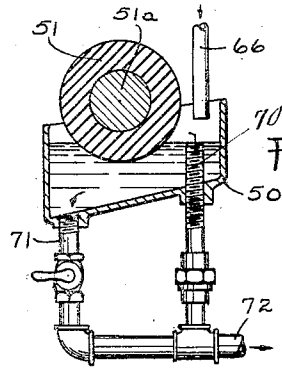


FIG.-7

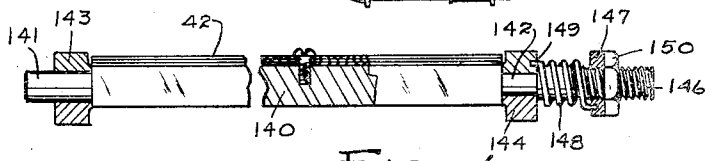


FIG.-6

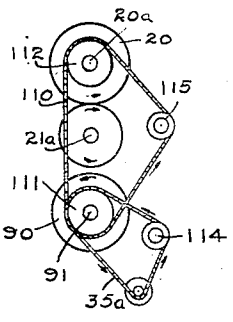


FIG.-8

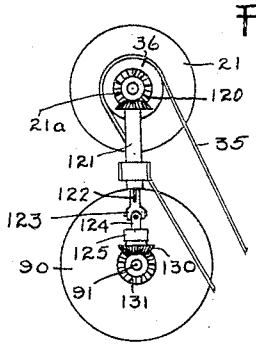


FIG.-9

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1,807,921

UNITED STATES PATENT OFFICE

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TRANSFER MACHINE

Application filed September 11, 1926. Serial No. 134,807.

This invention is concerned with a transfer machine wherein a pattern roll (such as an etched roll) is embodied and the pattern of which may be formed by the well known photogravure process. The general object of our present invention is the provision of a machine for effecting the transfer of the pattern from the pattern roll to the hard surface of articles to be decorated or finished.

More specifically our invention is directed to improvements in graining machines and particularly in graining machines of the type disclosed in our application filed August 16, Serial No. 129,443.

A further object of our invention is the provision of a novel graining machine adaptable to the reproduction of wood grain effects on hard surfaces of articles which are irregular in cross-section. A still further object of the present invention is the provision of a machine which will yieldingly support the work as the work passes therethrough and thus cause the surface of the work to be decorated to be intimately presented to the transfer roll of the machine.

Other objects of our invention will hereinafter become apparent from the following description which refers to the accompanying drawings illustrating a preferred form thereof. The essential characteristics are summarized in the claims.

In the drawings Fig. 1 is a side elevation of a surface finishing machine embodying novel features of our invention; Fig. 2 is a front elevation thereof; Fig. 3 is a cross-sectional elevation taken through the machine substantially along the line 3—3 of Fig. 1; Fig. 4 is a cross-sectional detail taken along the line 4—4 of Fig. 1; Fig. 5 is a fragmentary cross-sectional detail taken substantially along the line 5—5 of Fig. 4; Fig. 6 is an enlarged cross-sectional detail taken along the line 6—6 of Fig. 3; Fig. 7 is a cross-sectional detail taken through a pigment fountain of the machine substantially along the line 7—7 of Fig. 2; Fig. 8 is a diagrammatic representation of a modified form of roll drive for the machine; Fig. 9 is another form of roll drive, and Fig. 10 is a view showing a modified arrangement of work supporting or backing roll, and a portion of the adjacent transfer roll.

The graining machine disclosed in our copending application hereinbefore referred to embodies a duplex drive arrangement whereby two sets of graining rolls are provided, one set being disposed at each side of the machine, and exteriorly of the frame thereof. Each set of rolls comprises a top metallic roll carrying the etched pattern to be reproduced or transferred to a surface of the work to be finished and the transfer roll is positively driven from a source of power and drives the pattern roll through frictional contact therewith. A conveyor mechanism is provided for transporting the work to and from the machine. In the present machine, an arrangement of rolls is provided for effecting the decorating or graining of work having large surface areas to be finished. The character of the roll drive is such that a pattern roll with either a continuous design or a non-continuous design may be used and the rolls are maintained in proper rotary registration whereby the reproduced design on the surfaces of numerous pieces of work will be uniform and we provide a third roll in the nature of a work supporting medium which is mounted upon floating bearings whereby the surface of the work to be finished will be uniformly urged firmly into contact with the transfer roll and we incorporate other novel features in the machine as will be hereinafter set forth in detail.

In Figs. 1, 2 and 3, of the drawings we show our machine as comprising upright frame members 12 and 13 secured in spaced apart relation by cross frame members 14 and 15 and a top cross or bridge member 16 connecting the top portions of the frame members 12 and 13. Suspended from the top frame member 16 is a bearing frame 18 upon which is rotatably mounted, in suitable bearing, an etched pattern roll 20, and beneath the etched pattern roll is a transfer roll 21 formed of resilient material and supported by bearing blocks secured to said frame members 12 and 13. The bearing bracket 18 which carries the etched pattern roll 20, is suspended on adjustable screw members 22

and 24 which extend through suitable openings formed in the top frame member 16 and the screw members are engaged by adjusting wheels 25 whereby the pattern roll may be adjusted relative to the transfer roll 21. Suitable securing means such as bolts 26 extending through slots formed in the bearing bracket 18, serve to secure the latter in adjusted position on the machine frame.

The transfer roll may be positively driven from a motor 30 through a worm gear reduction shown at 31. A sprocket 34 mounted on the worm gear shaft 32, drives a chain 35 which extends over a sprocket 36 mounted on one end of the transfer roll shaft 21*a*. An idler roll 40 carried by an adjustable bracket 41 secured to the side member frame 12 serves to take up slack in the chain 35.

A doctor blade 42 hereinafter described in detail, contacts with the surface of the pattern roll 20 and is mounted upon an oscillating member or bar 43 movably supported by the machine frame to be actuated by a lever member 46 mounted on the machine frame member 13. The lower end of the lever 46 is provided with a cam roller 47 which is engaged by a cam 48 which may be mounted on one end of the transfer roll shaft 21*a*. A pigment fountain 50 is suitably suspended between the side members of the machine frame to support a fountain roll 51 in contact with the surface of the pattern roll 20 and this fountain roll may be driven at a different speed than the linear speed of the pattern roll 20 by any suitable means such as a belt 52 extending over pulleys 53 and 54 mounted respectively upon the pattern roll shaft 20*a* and fountain roll shaft 51*a*.

The transfer roll may be cleaned during each revolution thereof by a scraper blade 60 yieldably urged into engagement with the surface of the transfer roll by any suitable means and the pigment scraped or retrieved from the surface of the transfer roll is collected in a trough or tray 61.

A reservoir for supplying pigment to the fountain tray 50 by gravity flow is provided as shown at 65 (see Fig. 2) from which depends a conduit or pipe 66 which permits the pigment to flow from the reservoir to the fountain tray as determined by the adjustment of a valve 67 in the pipe line 66. A predetermined level of the pigment (relative to the fountain roll 51) may be maintained in the fountain tray 50 by a vertically adjustable outlet pipe 70 which extends upwardly through the bottom wall of the fountain tray 50. The bottom wall of the fountain tray is formed to slope from end to end and from side to side downwardly to a discharge outlet in communication with a discharge pipe 71 and the overflow pipe 70 and discharge pipe 71 may be connected to a downwardly extending pipe line 72 which drops to a pump 73 through line 74. The pump 73 is driven by the worm gear reduction mechanism 31 through a belt 75 and serves to force the pigment upwardly through a line 80 to discharge it into the top of the reservoir 65 wherein it is screened before it can flow downwardly again to the fountain tray 50. A second pipe line 78 serves to permit the pump to collect the pigment therein and force it upwardly to the reservoir 65.

It is desired frequently to transfer the pattern or grain effect to work which is irregular in cross section, such as metal panels having unequal flanges along the edges thereof and work constructed of metal and having surfaces which are not flat. To properly support such work as it passes through the machine and to maintain it in uniform contact with the transfer roll throughout the width of the roll, we provide a backing or work supporting roll 90 which is mounted upon floating bearings carried by the side frame members 12 and 13. This roll may have a resilient body with reliefs or indentations as shown in Fig. 10 if desired to provide for irregular back surfaces. A piece of work having an irregular back surface is shown in Fig. 10 at *w*. This work has a bead at *w*1 and a flange formation at *w*2, the intermediate portions of the piece being substantially straight. Such a piece of work is shown in our copending application Serial No. 129,443, filed August 16, 1926. In order to effectively support this piece, as above suggested, relief formations or indentations are made on the backing or work supporting roll by moulding. For example, there is a relief formation 90′ formed on the resilient body 90 of the backing roll adapted to enter the bead *w*1 on the back of the piece. The particular section of the work blank shown is by way of example only.

As shown in Figs. 1, 4 and 5, the shaft 91 which carries the roll 90, is supported by a bearing member 92 at one end thereof and a bearing member 93 at the other end thereof, which bearing members are pivotally mounted in vertically movable bearing blocks 94 formed to comprise slide members suitably supported by the side frame members 12 and 13. As shown in Fig. 4, the bearing members 92 and 93 are pivotally connected to the slide blocks 94 by pins 96 extending transversely of the axis of the roll shaft 91 and the bearing members 92 and 93 are suitably formed as shown at 92*a* and 93*a* to have downwardly extending portions which accurately fit between upwardly extending portions 94*a* of the slide blocks 94 whereby the axis of the work supporting roll 90 will be maintained in a plane common to the axis of the transfer roll 21, while permitting the ends of the work supporting roll shaft 91 to float in a vertical plane. One of the bearings 93 is formed to engage the shaft 91 in a V-formed groove as shown at 98 (see

Fig. 4) whereby longitudinal shifting of the roll 90 and its supporting shaft relative to the bearings is prevented. In order that this canting movment of the roll may take place, the pins 96 should be loosely fitted to connect bearings 92 and 93 to the bearing blocks 94.

The work supporting roll 90 is urged upwardly through the reaction of weight members 100 disposed at each side of the machine and attached to the bearing members 92 and 93 by cable stretches 101 which extend over small shafts or pulleys 102 and 103 (see Fig. 1). We also provide an adjusting means in the form of screw members 104 in threaded engagement with the machine frame members 12 and 13, or parts rigidly mounted thereon, for limiting the upward movement of the bearing slide blocks 94 through the influence of the weights 100, whereby the work supporting roll is maintained out of contact with the transfer roll 21 when work is not being passed through the machine.

When a pattern roll is being used which has a continuous design formed thereon, (and by continuous design we mean an etched design having the meeting ends of the pattern match in such manner that there is no beginning or ending of the pattern) it is immaterial as to just when the work begins contact with the transfer roll 21 inasmuch as the transfer pattern is also continuous.

A simple form of roll drive, such as has been herein disclosed for positively rotating the transfer roll 21, will be found to be satisfactory when the pattern is continuous. But if it is desired to use a pattern roll having a non-continuous design thereon, it is quite desirable that the rotative relationship of the pattern roll to the work supporting roll or the rotative relationship of the transfer roll to the work supporting roll, be positively maintained. As shown in Fig. 8 a satisfactory chain and sprocket drive is disclosed for effecting the synchronized driving of the pattern roll 20 and the work supporting roll 90, there being two chain strips, one strip 35*a* extending over a sprocket (not shown) and mounted on the work supporting roll shaft 91 and a second chain strip 110 which passes over sprockets 111 and 112 mounted on the pattern roll shaft 20*a* and work supporting roll shaft 91. Idler sprockets 114 and 115 are provided for the purpose of having the chain drive to clear certain other interposed parts of the machine. This drive arrangement, however, would be suitable only for driving the pattern roll and work supporting roll in synchronism when non-continuous pattern is being applied to work of uniform cross section or of only slightly varying cross section.

In Fig. 9, we show still another form of drive for maintaining the transfer roll and the work supporting roll in positive driving relation during the operation of the machine to treat work of such varying cross section, as to cause a considerable relative vertical shifting between the bearings 92 and 93. This drive may comprise a pair of bevel gears, as diagrammatically represented at 120 in Fig. 9; one of which will be attached to the transfer roll shaft 21*a* and the other to a hollow shaft 121 suitably mounted on one of the machine frame members 12 and 13. Splined to the hollow shaft 121 is a shaft 122 which is connected to a stub shaft 124 through a universal joint mechanism 123. The latter shaft is suitably supported by a bearing member 125 secured to one of the bearing members 92 and 93. The shaft 124 carries a bevel gear 130 in driving engagement with a second bevel gear 131 attached to the work supporting roll shaft 91. Any shifting out of parallelism of the axis of the shaft 91 relative to the axis of the transfer roll shaft 21*a* which may take place, will not interfere with the positive driving of the shaft 91 by the shaft 21*a*, by reason of the universal joint connection 123.

The machine we herein disclose is permanent and designed to operate rolls of considerable length and diameter. When a pattern roll of considerable length is utilized, however, it is important that the means for supporting the doctor blade be sufficiently precise to assure a uniform scraping action of the doctor blade throughout the length of the roll. In Fig. 6 we show a cross sectional detail of a mounting for the doctor blade which has proved to be efficacious in the scraping of rolls of unusual length. This construction may comprise a doctor blade formed of several laminations of metal (see Figs. 3 and 6) which are of varying widths to impart to the doctor blade construction proper, the characteristic of resiliency. These blades are rigidly secured to a square member 140. The member 140 is provided with bearing portions 141 and 142 and these ends rest in suitable openings formed in bearing members 143 and 144, the latter being secured to the reciprocating bar 43. The end 142 of the bearing 140 is threaded at 146 (see Fig. 6) to receive a collar 147 which engages one end of a spring 148 and the other end of the spring 148 is attached to the bearing member 144 as shown at 149, and a lock nut 150 is provided for locking the collar 147 in adjusted position. By turning the nut 150, any desired torsional tension may be set up in the spring 148, whereby the member 140 may, by torsional reaction, urge the doctor blade into engagement with the surface of the pattern roll. This tensioning may be effected to any practical extent by proper adjustment of the collar 147. When it is desired to remove the doctor blade to clean it, the doctor blade and its support 140 may be lifted out of the bearings 143 and 144 by releasing the lock nut 150

and by turning the threaded collar 147 to release the end of the spring from engagement with the bearing member 144.

It will be apparent from the foregoing description of the illustrated embodiment of our invention, that we provide a machine for effecting the transfer of etched or engraved patterns from master rolls or pattern rolls of unusual length and diameter and these rolls may carry either a continuous or non-continuous design. And further, the machine is extremely adaptable to a variety of forms of work to be grained or decorated.

We claim:

1. In a transfer machine of the character described the combination of an intaglio or engraved roll and shaft, a transfer roll contacting therewith, an ink applying means disposed above the transfer roll and driven by the intaglio roll shaft and a resilient roll operatively spaced out of contact with the transfer roll and arranged to urge the work into contact with the transfer roll, pivotally mounted means for yieldingly rotatably supporting said resilient roll and means for positively driving the transfer roll.

2. In a transfer machine, the combination of a machine frame, an intaglio roll and shaft therefor adjustably mounted adjacent the top thereof, a positively driven inking roll contacting with the intaglio roll, a transfer roll rotatably supported on the machine frame beneath the intaglio roll and the inking roll, a yieldingly rotatably supported work supporting roll disposed beneath the transfer roll, means for driving the transfer roll, a pigment applying means including a doctor blade for applying pigment to the interstices of the intaglio roll and means for oscillating the doctor blade longitudinally of the axis of the intaglio roll.

3. In a transfer machine of the character described the combination or an intaglio or engraved roll, a transfer roll contacting therewith, a shaft supporting the transfer roll, a third roll operatively spaced out of contact with the transfer roll and arranged to urge the work into contact with the transfer roll, a pair of vertically shiftable blocks pivotally supporting bearings for yieldingly rotatably supporting said third roll, means for positively driving said transfer roll shaft and means actuated by said shaft for actuating the doctor blade.

4. In a transfer machine for decorating surfaces, the combination of an intaglio roll having a continuous pattern, a doctor blade acting on the intaglio roll, an inking roll in contact therewith, a resilient roll for transferring pigment from the intaglio roll to work to be decorated, a shaft for said resilient roll, a work supporting roll for yieldingly urging the work into contact with the transfer roll, means for driving the transfer roll positively whereby the transfer roll may drive the intaglio roll by frictional contact therewith and indirectly drive the work supporting roll when acting on the work, and means whereby the intaglio roll drives the inking roll.

5. In a machine for decorating surfaces, the combination of a resilient transfer roll, and means cooperating therewith to transfer a pigment pattern to work in the machine, a backing or work supporting roll supported adjacent the transfer roll, said work supporting roll being generally cylindrical but having a relief and indentation effect, whereby a sheet metal blank of irregular cross section will be effectively supported for engagement with the transfer roll without requiring additional supports or reinforcing members, and means for driving one of said rolls.

6. Mechanism according to claim 5, wherein the backing roll comprises a layer of resilient material, such as rubber on a relatively hard core.

In testimony whereof, we hereunto affix our signatures.

GEORGE E. LANG.
LLOYD V. CASTO.