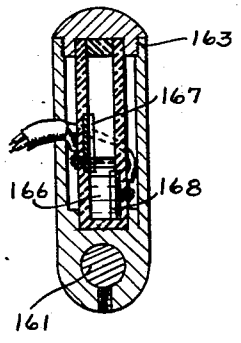
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GRAINING MACHINE

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FIG. 8



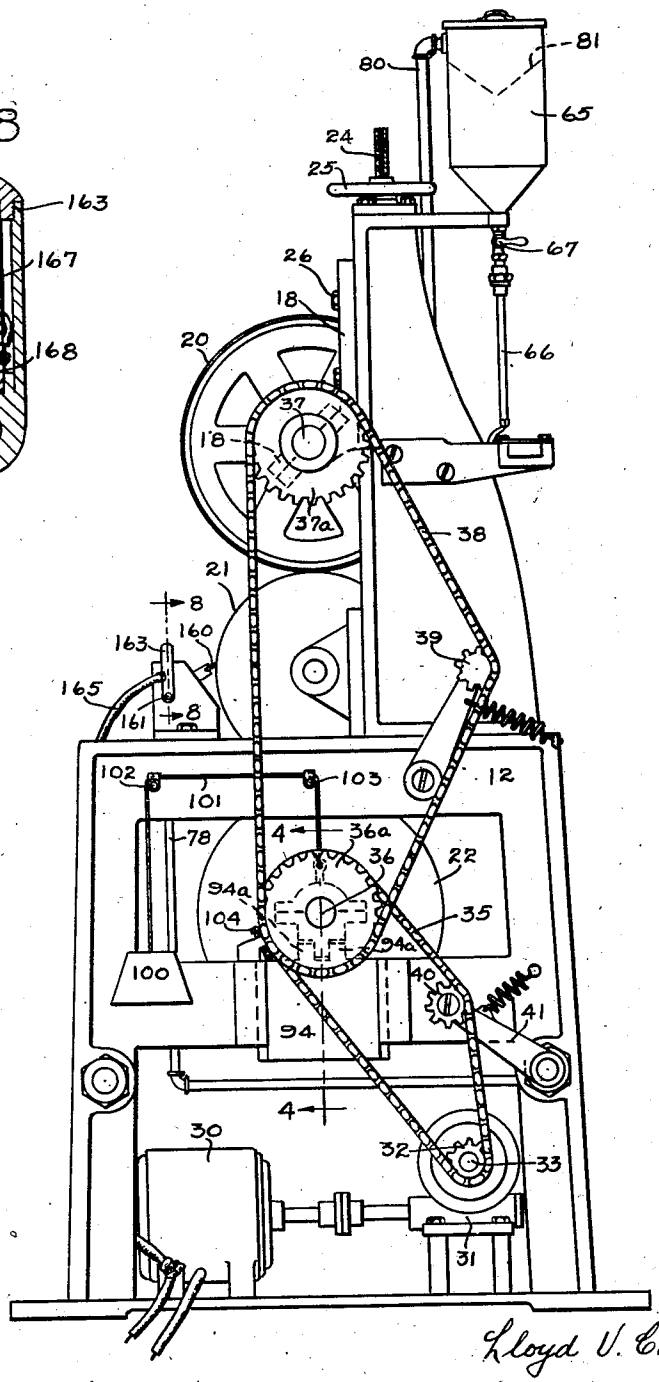


FIG. 1

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GRAINING MACHINE

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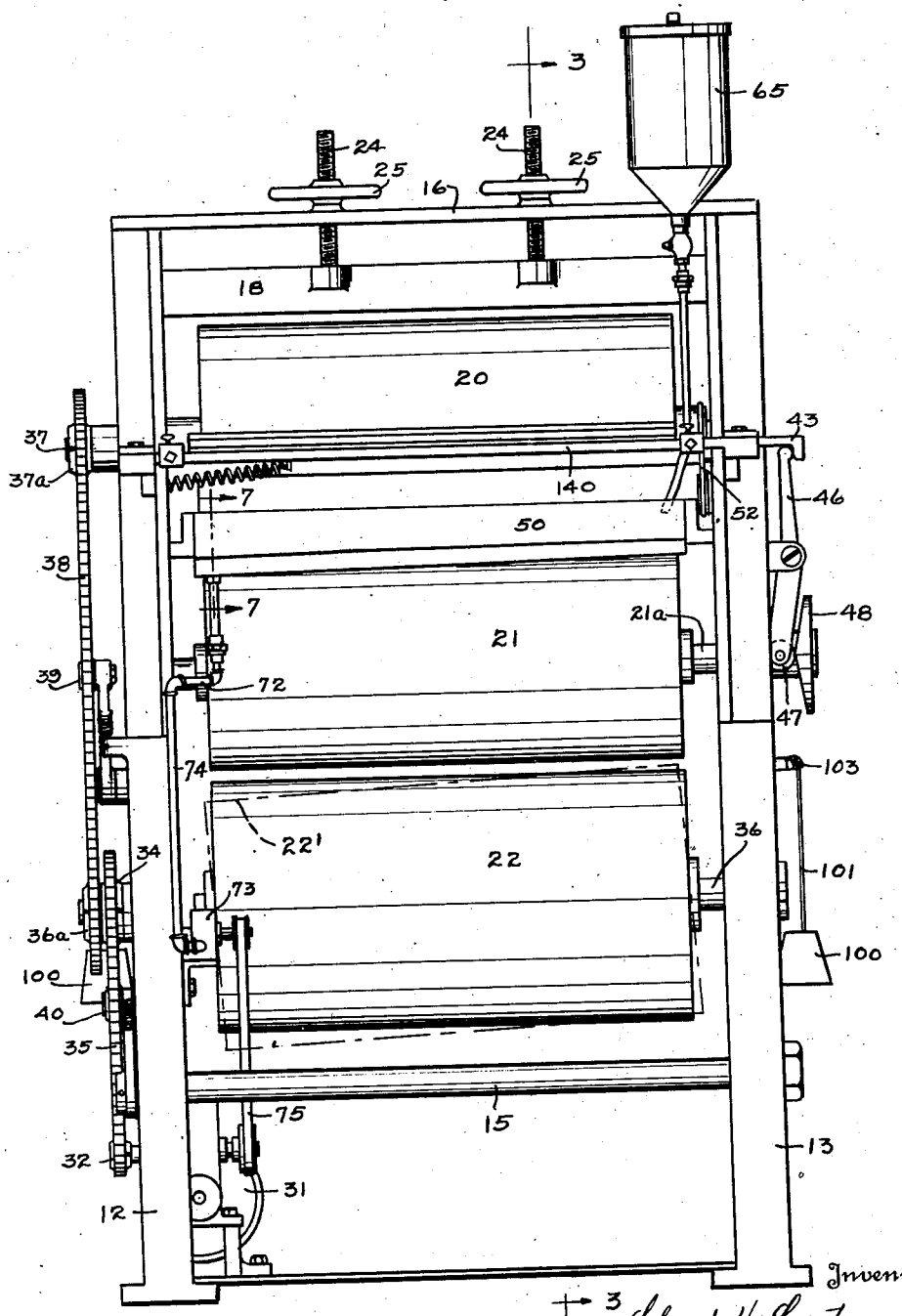


FIG. 2

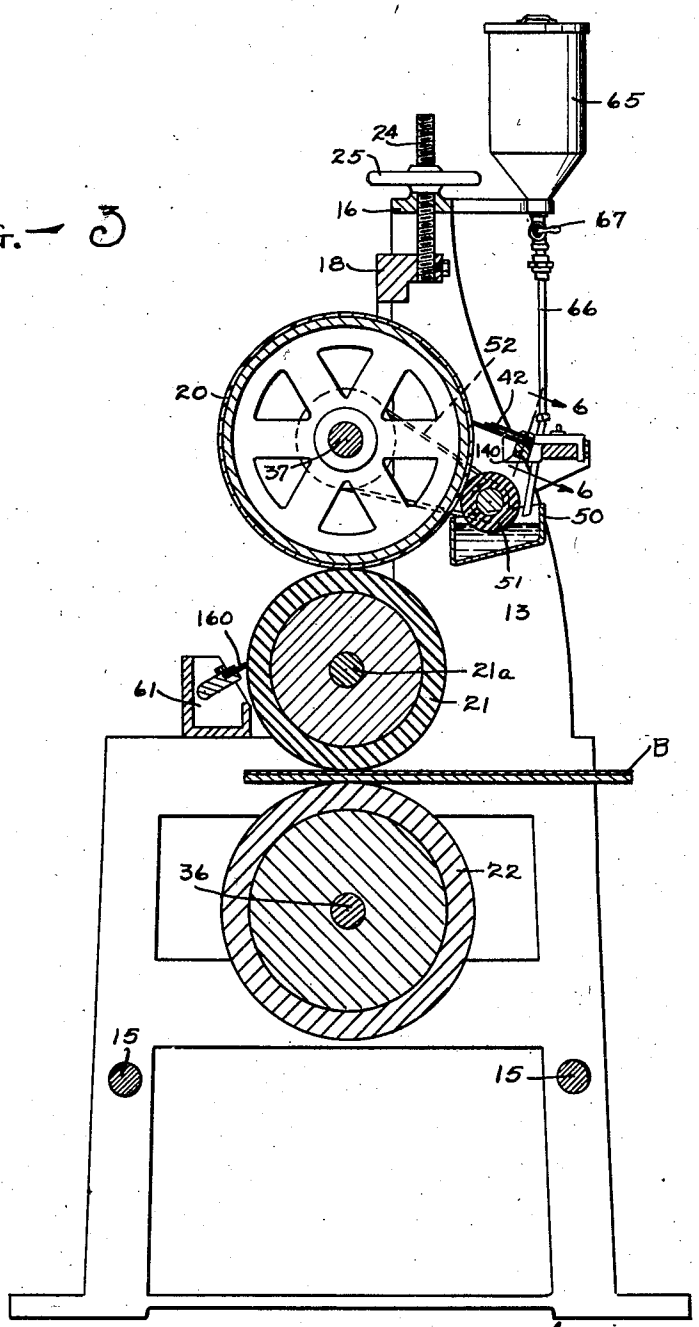
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FIG. 3



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GRAINING MACHINE

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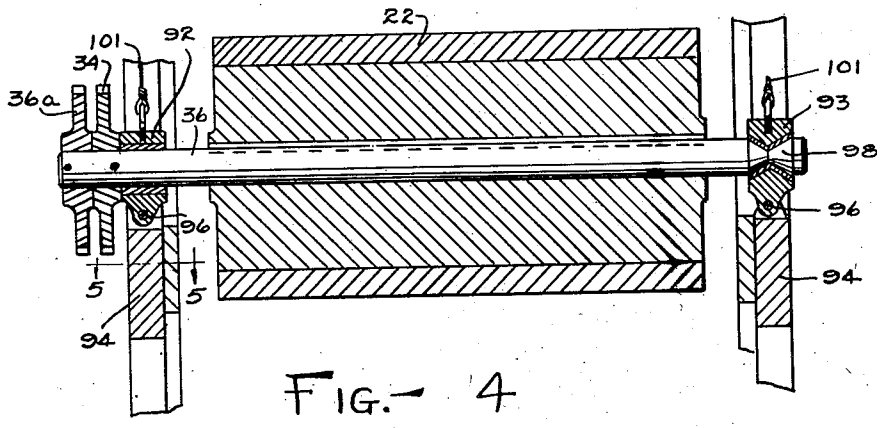


FIG. 4

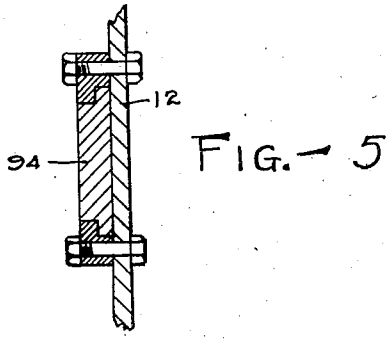


FIG. 5

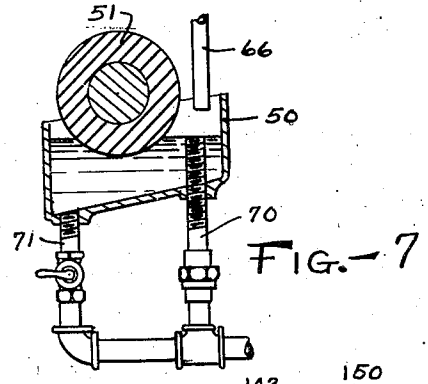


FIG. 7

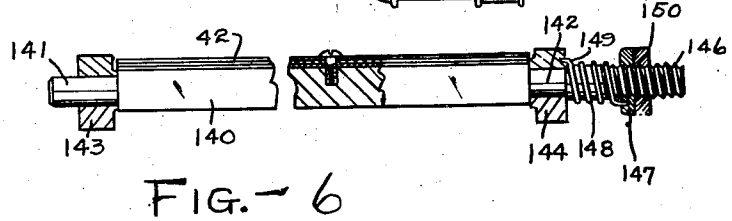


FIG. 6

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UNITED STATES PATENT OFFICE

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GRAINING MACHINE

Original application filed September 11, 1926, Serial No. 134,807. Divided and this application filed April 20, 1928. Serial No. 271,532.

This invention is concerned with a transfer machine suitable as a graining machine, wherein a pattern roll carrying an arcuate etched plate, cooperates with a transfer roll and work supporting roll to effect an impression on a blank, simulating wood or other graining. The process used is similar to the well known photogravure process. The present application is a division of our prior application, Serial No. 134,807, filed September 11, 1926.

The general object is to provide a machine by which the transfer of the pattern from the pattern roll to the blank may be expeditiously effected irrespective of variations in the cross section of the blank. More specifically the invention contemplates the provision of an improved and simplified graining machine using a noncontinuous design pattern roll.

A further object is to provide a machine wherein two of the rolls may be synchronously driven to insure accurate printing on the blank irrespective of radial displacement of one of the rolls with reference to an adjacent roll.

Further objects and features of the invention will become apparent from the following description relating to the accompanying drawings, wherein we show our preferred form. The essential novel characteristics are summarized in the claims.

In the drawings, Fig. 1 is a side elevation of a machine embodying the novel features of the present invention; Fig. 2 is a front elevation thereof; Fig. 3 is a cross sectional view of the machine as indicated by the line 3—3 on Fig. 2; Fig. 4 is a fragmentary vertical cross sectional view as indicated by the line 4—4 on Fig. 1; Fig. 5 is a sectional detail as indicated by the line 5—5 on Fig. 4; Fig. 6 is a cross sectional detail showing portions of a doctor blade associated with the pattern roll, as indicated by the line 6—6 on Fig. 3; Fig. 7 is a vertical fragmentary cross sectional view as indicated by the line 7—7 on Fig. 2; and Fig. 8 is a cross sectional detail as indicated by the line 8—8 on Fig. 1.

In the parent application there is shown a similar arrangement of rolls suitable but not essential for the present machine, which arrangement comprises a pattern roll at the top; a transfer roll in contact therewith beneath the pattern roll; and a backing roll or blank supporting roll in spaced relation to the transfer roll and mounted therebeneath.

In the parent case the transfer roll is positively driven from a motor and suitable reduction gearing. In the present case the backing roll is the positively driven roll, while the pattern roll and backing roll are both driven in synchronism, the drive being such that the backing roll may be mounted to move away from the transfer roll, while maintaining the axes of these rolls parallel, or allowing the axes to be relatively inclined as for operating on a blank which varies in cross section, that is to say, being thicker at one side than the other.

The distinctive advantage of the present arrangement over the art in general is that the machine is particularly adapted for use with a pattern roll having a non-continuous design thereon. In case of such non-continuous design, it is important that a definite relationship of the pattern roll and supporting roll surfaces be positively maintained.

In Figs. 1, 2 and 3, we show our machine as comprising upright frame members 12 and 13 secured in spaced relation by cross frame members 14 and 15, and a top cross bridge member 16. Suspended from the cross bridge member 16 is a bearing frame 18 upon which is rotatably mounted in suitable bearings the etched pattern roll 20. Beneath the etched pattern roll is a transfer roll 21 formed of suitable resilient transfer material and supported by bearing blocks secured to the frame members 12 and 13. Below the transfer roll and in spaced relation thereto is a backing or work supporting roll 22 supported as will be hereinafter described.

The bearing bracket 18 which carries the etched pattern roll 20 is suspended on suitable screw members 24 which extend through suitable openings formed in the top 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 vertical slots (not

shown) formed in the bearing bracket 18, serve to secure the latter in adjusted position on the machine frame.

The rolls may be driven from a motor 30 through a worm gear shown conventionally at 31. As shown, a sprocket wheel 32 is mounted on the worm gear shaft 33, which drives a chain 35 extending over a sprocket 34 drivingly rigid on one end of the backing roll shaft 36. An idler roll 40 carried by a yieldably mounted bracket 41 secured to the side member 12 serves to take up the slack in the chain 35.

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 the backing or work supporting roll 22 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 if desired to provide for irregular back surfaces.

As shown in Figs. 1, 4 and 5, the shaft 36 which carries the roll 22 is supported by a bearing member 92 at one end thereof, and a bearing member 93 at the other end, 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 axes of the roll shaft 36, and the bearing members 92 and 93 are suitably formed on their lower sides to have downwardly extending portions which accurately fit between upwardly extending ears 94*a* on the slide blocks 94, whereby the axis of the work supporting roll 22 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 36 to float in a vertical plane. One of the bearings (93, as shown) is formed to engage the shaft 36 in a V-groove as at 98 (see Fig. 4) whereby longitudinal shifting of the roll 22 and its supporting shaft relative to the bearings is prevented.

The work supporting roll 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 may extend over pulleys 102 and 103 (see Fig. 1). We also provide an adjusting means in the form of screw members 104 in threaded engagement with ears on respective frame members 12 and 13. These screws adjustably limit the upward movement of the slide 94 so as to leave a space between the transfer and backing rolls sufficient to permit the insertion of work of a given size. This prevents the roll 22 from contacting with the roll 21 and deforming it when no work is being passed through the machine.

The slack in the chain 35 due to varying movement of the roll shaft 36 is taken up by the idler roll 40, whereby the positive drive of the roll 20 from the motor is not disturbed. As above mentioned, when the plate on the pattern roll presents a non-continuous pattern it is highly 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. This is because in such case the design on the pattern roll has a definite beginning and ending which necessitates that the blank be fed into contact with the transfer roll in such manner as to begin taking the imprint at the beginning of the transferred design. The backing roll is a permanent part of the machine and may be marked or deformed to enable the operator to know at a glance where to position the blank, provided the backing roll and pattern are positively correlated, whereas such marking, etc. on the transfer roll is impractical mainly because of its impermanence. Also because of its inadaptability for such marking.

In order to positively synchronize the pattern and backing rolls, we provide a sprocket chain drive from the roll shaft 36 to the pattern roll shaft 37. The drive includes a sprocket chain 38 passing over sprocket wheels 36*a* and 37*a* drivingly rigid on respective shafts 36 and 37. The chain is maintained taut by an idler supporting arrangement similar to that for supporting the idler 40, the idler in this case being designated 39.

It will be seen that when a blank of somewhat greater thickness at one side than the other is passed between the rolls 21 and 22 the roll 22 will be forced downwardly at one side, for example, as indicated by the broken lines 22′, this simply causing a movement inwardly toward the plane of the roll shafts on part of the idler 39, but not disturbing the synchronous drive of the rolls 20 and 22. The roll 21 being in frictional contact with the roll 20 preserves the pattern and blank relationships.

Suitable means for applying pigment to the pattern roll is shown in Figs. 3, 6 and 7. This includes a fountain tray 50 and a fountain roll 51 arranged adjacent the pattern roll 20. The fountain roll dips into liquid pigment and transfers this to the pattern roll, there being a suitable drive shown as a belt 52 for causing the fountain roll to be rotated from the pattern roll shaft. Above the fountain roll is a doctor blade 42 contacting with the surface of the pattern roll. This is

mounted upon an oscillating member or bar 43 movably supported by the machine frame and arranged to be actuated by a lever member 46 pivotally mounted on the frame member 13. The lower end of the lever is provided with a cam roller 47 which is engaged by a face cam 48 which may be mounted on one end of the transfer roll shaft 21*a*.

The reservoir for the ink fountain tray is preferably a tank shown at 65 (see Fig. 3) 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 the valve 67 in the pipe line 66. A predetermined level of the pigment relative to the fountain roll may be maintained in the fountain tray by a vertically adjustable outlet pipe 70 (Fig. 7) which extends upwardly from the bottom wall of the fountain tray. The bottom wall of the fountain tray is formed to slope from end to end and from side to side downwardly toward a discharge outlet in communication with a discharge pipe 71, and the overflow pipe 70 and discharge pipe 71 may be connected to a pipe line 72 which drops to a pump 73 through a line 74. The pump 73 may be driven by the worm gearing reduction mechanism 31 through a belt 75, and the pump serves to force the pigment upwardly through a line 80 to discharge it into the top of the reservoir 65 wherein it is screened as by a screen 81 before it can flow downwardly again to the fountain tray 50.

The machine herein shown is designed to operate with rolls of considerable length and diameter. When the pattern roll is of considerable length, it is important that the means for supporting the doctor blades be sufficiently precise to insure a uniform scraping action of the doctor blades 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 scraping rolls of unusual length. This construction may comprise a doctor blade formed of several laminations of metal which are of various widths to impart to the doctor blade construction proper, the characteristics of resiliency. The blades are rigidly secured to a bar 140 shown as square. 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 bearing member is secured to the reciprocating bar 43 (Fig. 2). The end 142 of the bearing member 140 is threaded at 146 to receive a collar 147 which engages one end of a spring 148, and the other end of the spring is attached to the bearing member 144, as at 149. 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.

The transfer roll 21 may be cleaned during each revolution thereof by a scraper blade 160, shown as pivotally mounted on a shaft 161 yieldingly urged into engagement with the surface of the transfer roll by any suitable means, for example, gravity. The pigment scraped or removed by this plate 160 may be collected in a trough or tray 61, cleaned and used over again. A pipe line 78 (Fig. 1) serves to permit the pump to collect the pigment in the trough and force it upwardly to the reservoir 65.

It is important that the scraper blade 160 be removed from contact with the roll 21 whenever the machine is standing idle, because otherwise the blade will force itself into the soft body of the transfer roll and leave a groove which would subsequently leave an imprint on the work blank, spoiling the design. To insure that the blade will be removed whenever the machine is stopped, we associate the control for the motor with a handle 163 by which the scraper blade is rocked out of contact with the transfer roll. The handle is shown as rigidly attached to the shaft 161. As shown in Figs. 1 and 8, there is a conduit 165 leading from the motor to within the handle which is hollow. The handle contains a suitable switch which, when the handle is upright, makes electric contact as through a body of mercury 166 between a pair of contact members 167 and 168. These are attached to respective conductor wires contained in the conduit 165, the wires being suitably connected for controlling the motor. The operation of the switch to control the motor to stop the machine necessarily includes the rotation of the handle downwardly from the position shown in Fig. 1, thus carrying the body of mercury from contact with the member 168 and simultaneously carrying the scraper blade 160 out of contact with the roll 21.

We claim:

1. In a machine of the class described, a pattern roll, a transfer roll and a backing roll for holding a blank in contact with the transfer roll, individually movable bearings for the backing roll, yielding means for acting on the bearings to force the backing roll to permit the backing roll axis to be angularly displaced relative to the transfer roll yieldingly toward the transfer roll, and a positive

driving connection between the pattern roll and backing roll, said connection comprising a sprocket chain and cooperating sprockets respectively connected to the pattern roll and backing roll, there being an adjustable idler device for the chain arranged to permit relative movement between the axes of said positively connected rolls.

2. In a machine of the class described, an intaglio roll carrying a non-continuous pattern, a transfer roll and a backing roll for carrying a blank into contact with the transfer roll, sprocket wheels carried by the intaglio roll and the backing roll, a chain connecting said wheels, there being individual yielding supports for the ends of the backing roll arranged to allow radial displacement of this roll toward and away from the transfer roll, and resilient means acting on the chain to hold the same uniformly taut during such displacement.

3. In a machine of the class described, a pattern roll, a transfer roll and a backing roll, the latter having a resilient surface arranged to hold a blank in contact with the transfer roll, a shaft for the backing roll, a bearing for the shaft, a slidable member on which the bearing is pivoted, means for slidably supporting the slidable member, yielding means connected to the bearing and acting thereon to urge the shaft axis toward the axis of the transfer roll, and means positively connecting the backing roll and pattern roll for synchronous rotation.

4. In a machine of the class described, a frame, a plurality of printing rolls including a pattern roll, a transfer roll and a backing roll or platen, said platen having individually yielding supports at both ends carried by the frame, means acting on the supports individually to force the platen toward the transfer roll, a flexible positive driving connection between the pattern roll and platen including means to take up the slack in said connection, and means for driving said rolls including a motor and driving chain, the latter being directly connected to one of the first and third mentioned rolls.

5. In a machine of the class described, a pattern roll, a transfer roll and a backing roll for forcing a blank into contact with the transfer roll, a pair of movable bearing members and a device pivotally carrying said bearing members, there being means associated with one of the bearing members for preventing axial movement of the backing roll, and means positively connecting the backing roll with the pattern roll for driving the same in synchronism.

6. In a machine of the character described, an etched pattern roll, a pigment applying means therefor, a transfer roll contacting with the etched pattern roll, a doctor blade acting on the transfer roll means for driving said rolls including a motor, a circuit connecting said motor to a source of energy including a switch, and means for shifting the doctor blade out of contact with the transfer roll including means for operating said switch.

7. In a machine of the character described, an intaglio roll, a pigment applying means therefor including a transfer roll contacting with the intaglio roll, a doctor blade for cleaning the transfer roll, means for driving said rolls including a motor, a circuit connecting said motor to a source of energy including a switch, and means for manually shifting the doctor blade out of contact with the transfer roll and for simultaneously operating said switch.

8. In a machine of the character described, an intaglio roll, a transfer roll, means for applying pigment to the interstices of the intaglio roll, means for removing pigment from the surface of the transfer roll, including a doctor blade yieldingly urged into contact with the surface of the transfer roll, means for driving said roll including a motor, a circuit connecting said motor to a source of energy including a switch, manually operated means for simultaneously shifting the doctor blade out of contact with the surface of the transfer roll and for operating said switch whereby movement of the machine cannot be arrested by operating the switch without shifting the doctor blade out of contact with the surface of the transfer roll.

9. In a graining machine, a pattern roll, a transfer roll and a backing roll, power means for driving one of said rolls, a doctor blade adapted to contact with the transfer roll to scrape it and arranged to be withdrawn from this roll, and means for controlling the power and adapted to assume a power starting and stopping position, there being a mechanical connection between said control means and the doctor blade whereby when the control means is moved to stopping position, the doctor blade is withdrawn from the transfer roll.

10. In a machine of the class described, the combination of a pattern roll, means to apply pigment thereto, and means to effect a transfer of the pigment pattern to work in the machine, a work supporting roll for carrying work into cooperative relation to said last named means, there being a mounting for one of said rolls arranged in such manner that the rolls may tilt with relation to each other, and a sprocket chain for drivingly connecting the rolls, including an idler and a yielding mounting therefor, whereby the surface speed relationships of the rolls will be maintained notwithstanding relative tilting thereof.

11. In a machine of the class described, pattern applying mechanism, including a pattern carrying member, means to apply pigment thereto, for subsequent transfer to work in the machine, a rotary support for work and

an adjustable mounting therefor arranged to carry the work supporting roll in various inclined positions with reference to the aforesaid mechanism, whereby work varying in transverse cross section may be printed with substantially uniform printing pressure on different portions of its surface, there being a positively acting flexible driving connection between the pattern member and work supporting roll, whereby said inclination of the roll will not disturb the surface speed relationship of said roll and member.

In testimony whereof, we affix our signatures.

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LLOYD V. CASTO.