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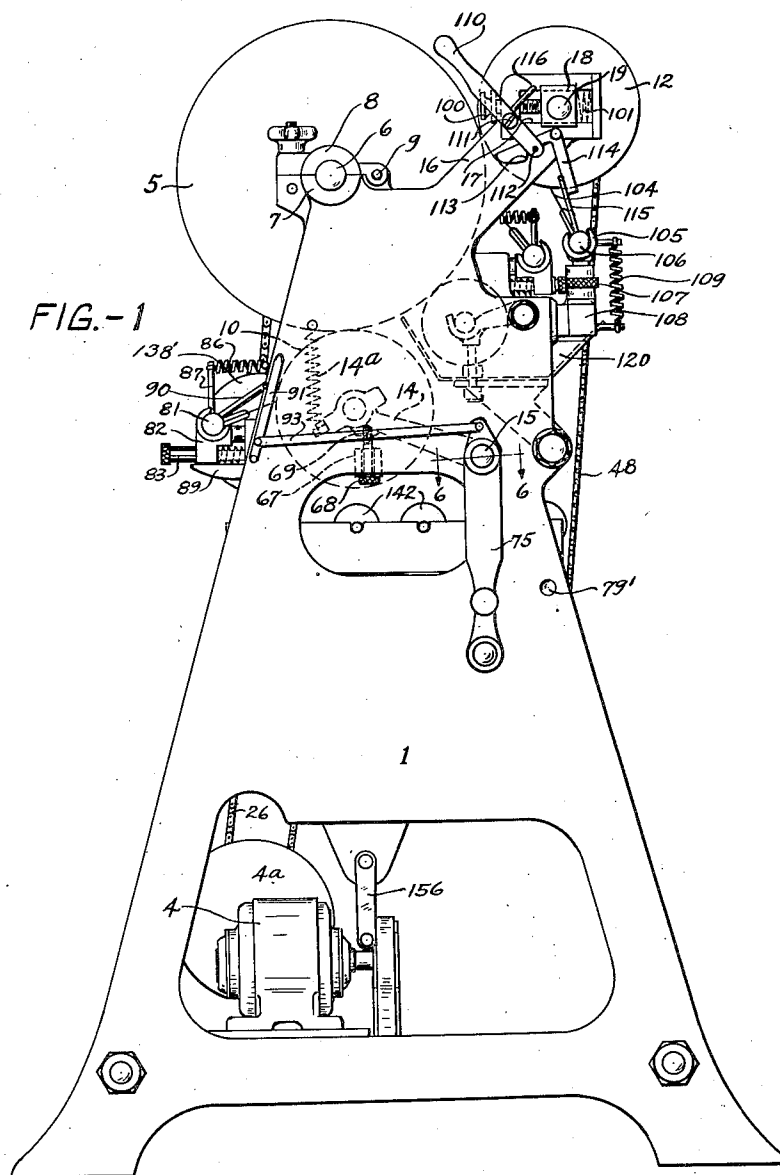
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1,836,241

GRAINING MACHINE

Filed June 27, 1929

6 Sheets-Sheet 1



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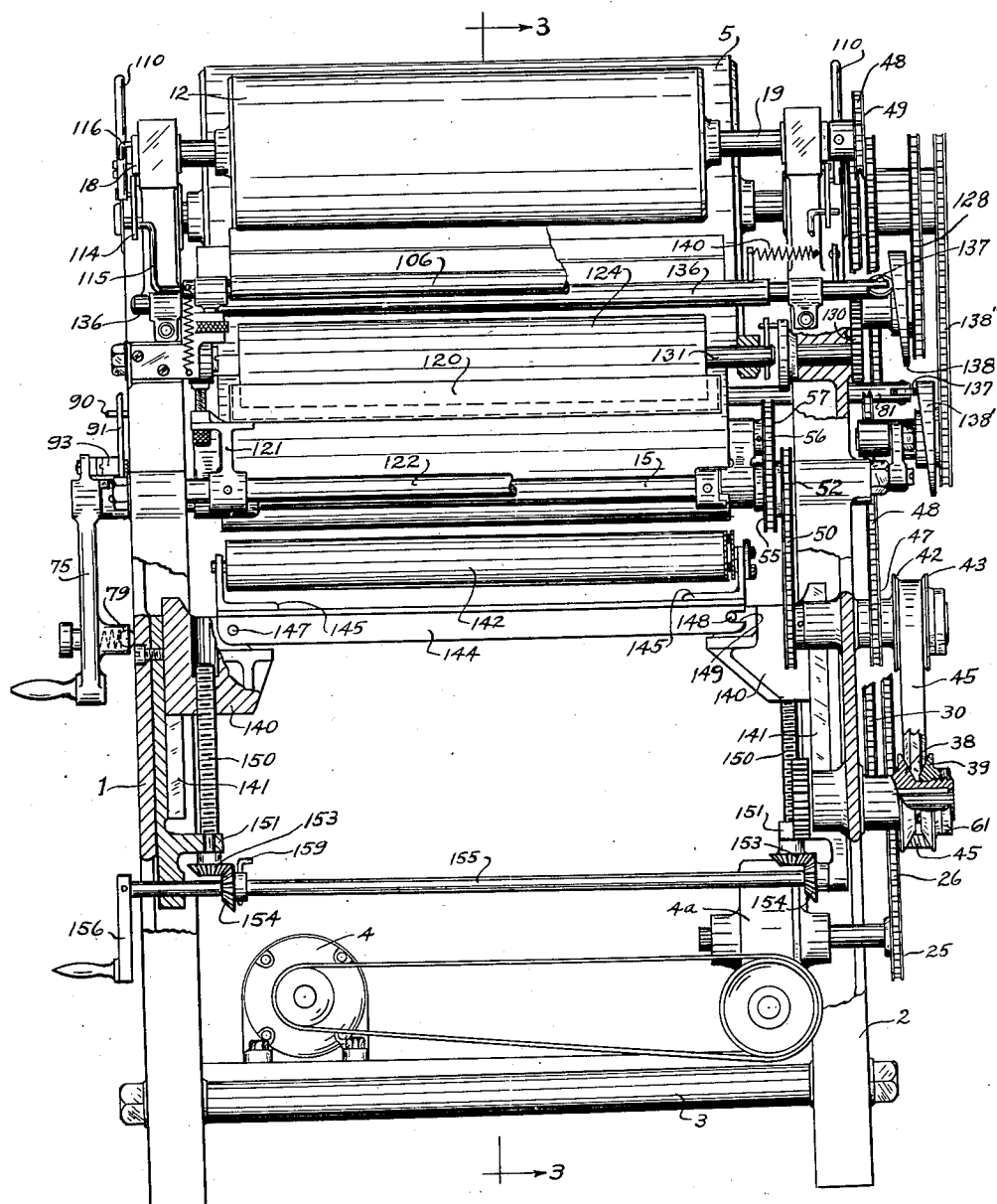
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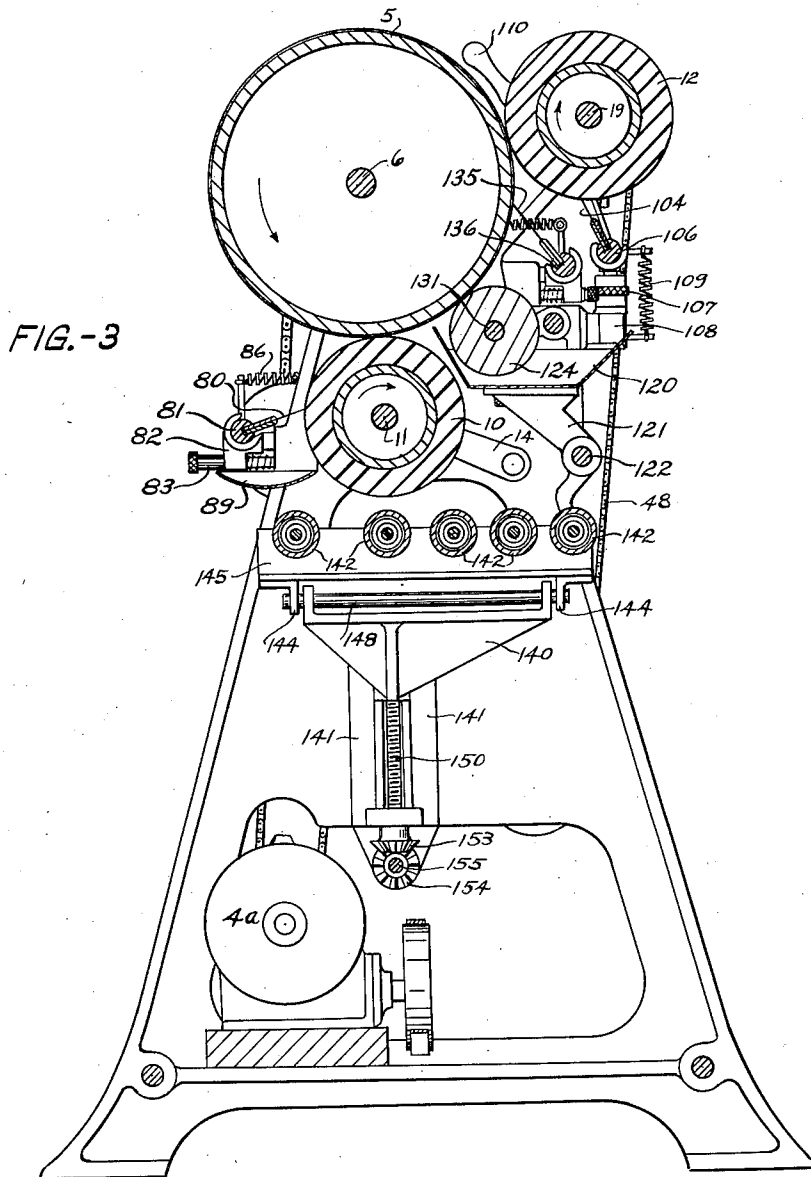
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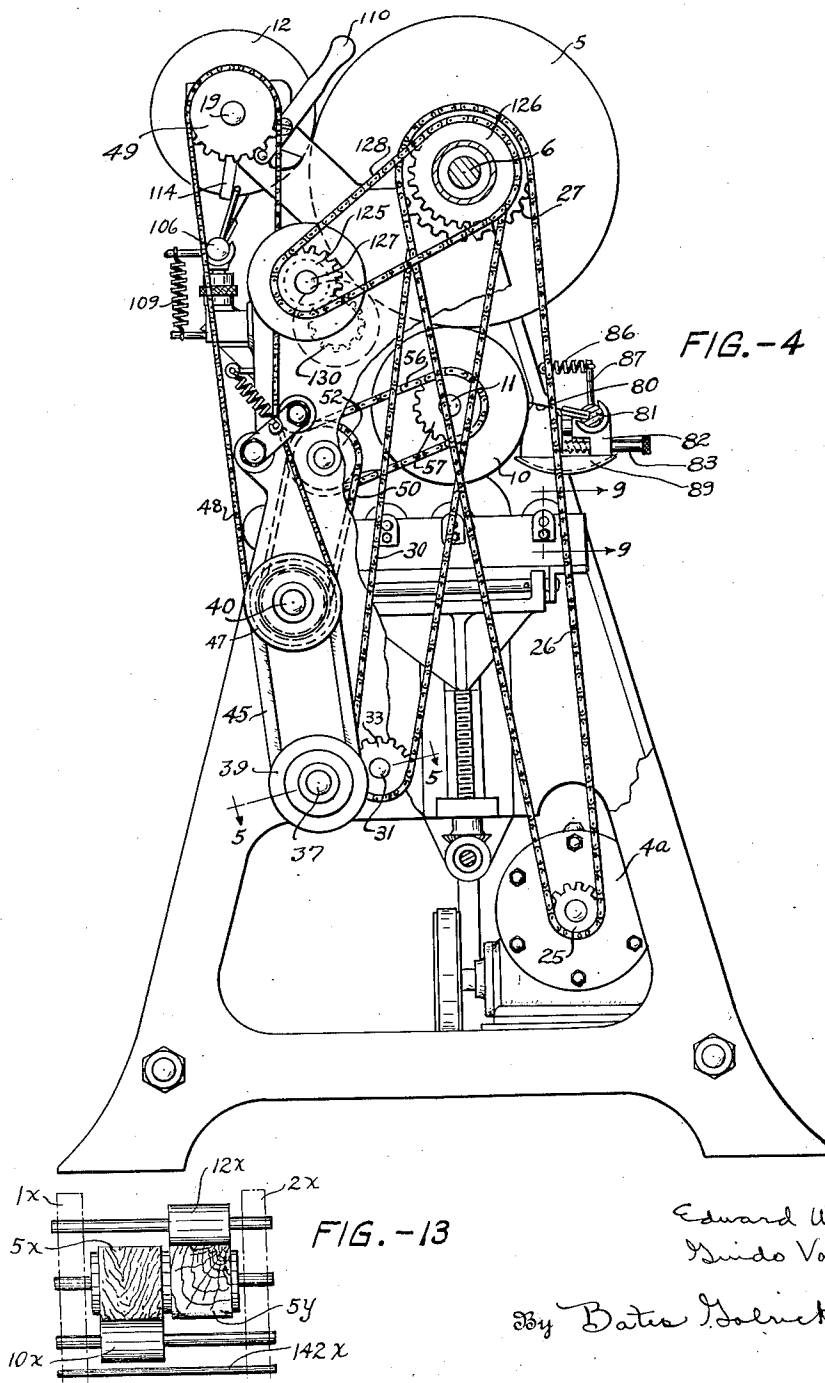


FIG. -4

FIG. -13

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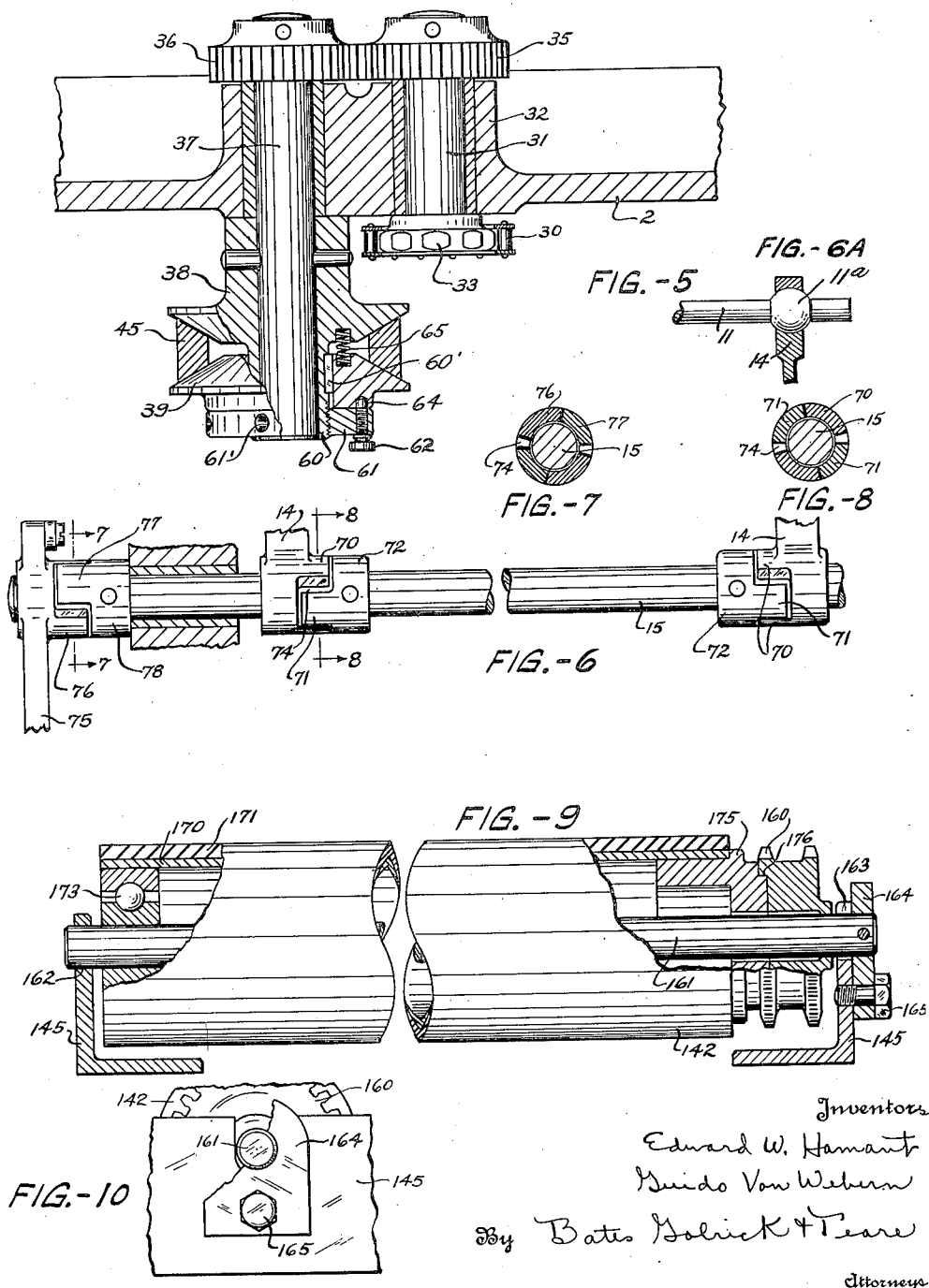
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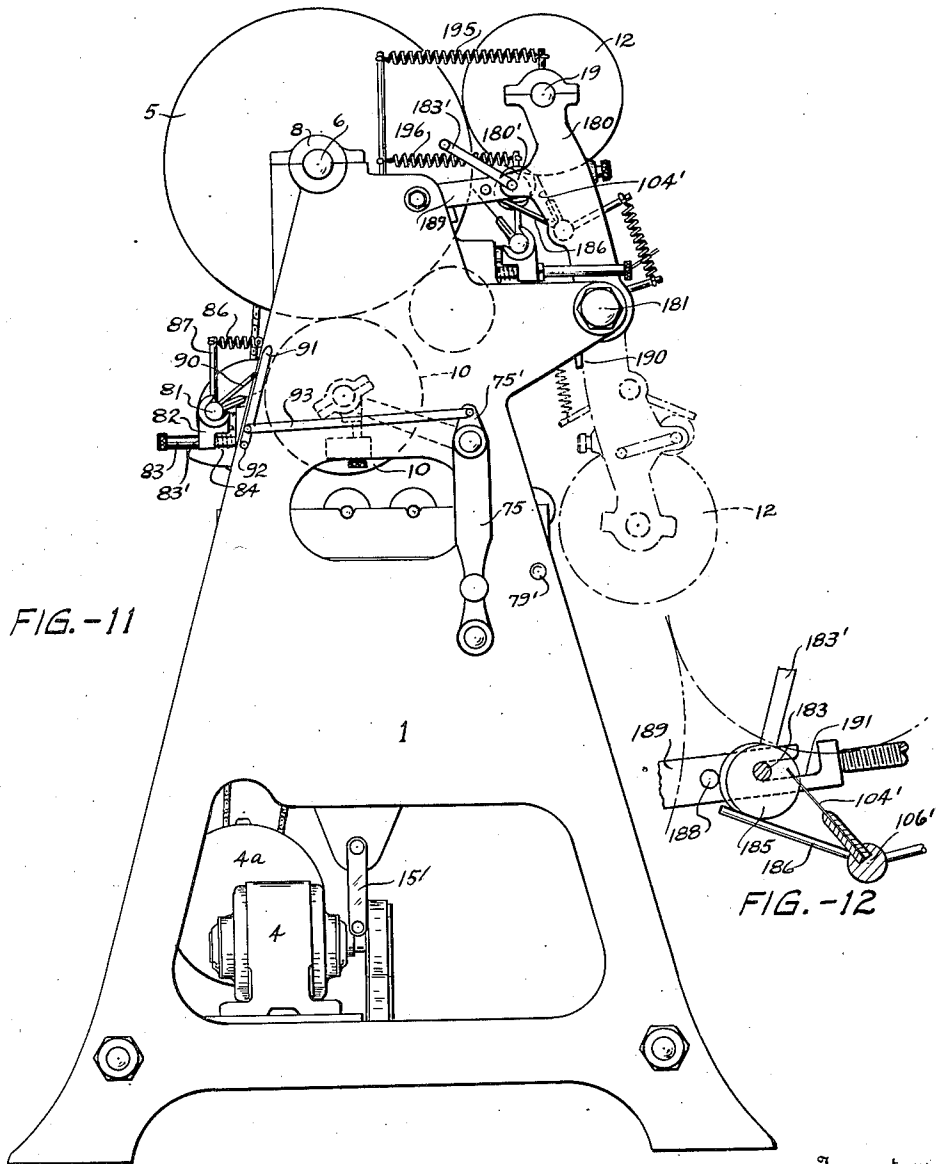


FIG. -11

FIG. -12

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GRAINING MACHINE

Application filed June 27, 1929. Serial No. 374,100.

This invention relates to graining machines of the type wherein an etched roll is arranged to have copies of the pattern thereon transferred to suitable subjects, such as panels, moldings and the like, adapted to form parts of furniture, building interiors, etc.

An object of the invention is to provide a simple graining machine which shall be adapted and arranged to operate efficiently on subjects to be grained which vary widely in size and character. By way of example, the larger subjects to be grained require very adequate support and accurate alignment with the graining rolls; whereas, other subjects, small strips and the like, may be more efficiently grained when supported by hand. More specifically stated, an object is to provide a machine so arranged that, by simple adjustment thereof, the subjects more adaptable for manual support while graining may be supported and grained in the same machine which operates to grain the subjects requiring such accurate alignment and more adequate support.

A further object is to provide a graining machine having a pattern roll and transfer roll adapted for mutual contact to transfer the pattern, in which machine the relative peripheral speeds of the two rolls may be progressively varied for absolute synchronization.

In explanation of the last above stated object, it may be here mentioned that to drive one roll from the other by mutual contact, and thus synchronize the surface speeds, is impractical for higher grade work. The main reason for this is that to frictionally drive one roll from another requires considerably greater contact pressure than is desirable to transfer the pigment from the pattern roll to the transfer roll, and when the desired condition for pigment pickup obtains, then the inadequate contact pressure produces blurring of line by reason of relative roll slippage.

It has been previously proposed to drive both rolls positively, so that there can be no slippage between the roll surfaces, but this gives rise to a number of difficulties which

heretofore, as far as we know, have not been effectively overcome. The main difficulty incident to positively driving the two rolls results from roll size variation. Transfer rolls commonly used are made from gum material which is very sensitive to heat variations, the roll becoming larger or smaller with changes in operating temperatures. Further difficulties arise by reason of the fact that the transfer rolls must frequently be taken out, for cleaning, etc. and replaced by other rolls in order not to hold up the machine, and the new roll may be of different diameter than the one replaced. The difficulty arising where two transfer rolls are to be used selectively is obvious, since these may vary with relation to each other. All the difficulties may be overcome if the rolls are, in effect, positively driven in such manner that the peripheral speeds of the pattern and transfer rolls may be easily and accurately synchronized.

In line with the above, an object is to provide a graining machine in which the pattern and transfer rolls are, in operative effect positively driven, yet in which the angular velocities of the two rolls may be varied by continuous progression for accurate synchronization of peripheral speeds.

A further object is to provide a simple and convenient arrangement by which the removal of scraper or doctor blades from the transfer roll or rolls will be effected before it is possible to separate the transfer roll or rolls from the pattern roll. In connection with the above object, it is to be noted that by reason of the semi-plastic character of the transfer roll material, it may result in the destruction of the transfer roll to leave it in standing contact with the pattern roll or in contact with a scraper blade, as when the machine is shut down after a graining operation is completed. The operator naturally withdraws the transfer roll from contact with the pattern roll before shutting off the power, and a feature of the invention is that, prior to so withdrawing the roll he must, with the present arrangement, necessarily withdraw the scraper blade from the transfer roll.

A further object is to provide an arrange-

ment of bearings and supports for a transfer roll whereby this roll may move relative to the cooperating pattern roll, either into or out of parallelism therewith when necessary due to variations in roll structure, unequal wear, etc., or to adjust for and maintain an equal printing pressure throughout the whole area of the pattern.

A further object is to provide a supporting arrangement for bodies such as a panel to be grained by which all portions of the support may be raised simultaneously, or different portions may be raised with respect to other portions for accommodating panels varying in transverse cross section, and to equalize the printing pressure on the work in the event of transfer roll variations.

A further object is to provide an improved and simple mechanism for supporting work, such as a panel to be grained, adjacent and in contact with a transfer roll or other printing member by which the various supporting elements may be readily removed and replaced as units.

Further objects and features will become apparent from the following description relating to the accompanying drawings showing the preferred construction. The essential novel characteristics of the invention will be summarized in the claims.

Referring briefly to the drawings, Fig. 1 is a side elevation of a graining machine embodying my invention; Fig. 2 is a front elevation thereof partly broken away to show details of the work support; Fig. 3 is a substantially central longitudinal cross sectional view taken along the line 3—3 on Fig. 2; Fig. 4 is a side elevation of the machine shown in Fig. 1 taken from a direction opposite to that of Fig. 1; Fig. 5 is a cross sectional detail view showing parts of the mechanism whereby one roll is driven from another at minutely variable speeds; Fig. 6 is a detail view showing portions of the mechanism for separating a transfer roll from the pattern roll and in the same operation separating the scraper blade from the transfer roll; Fig. 6A is a cross-section of one of the transfer roll bearings; Figs. 7 and 8 are detail cross-sectional views taken along the lines 7—7 and 8—8 on Fig. 6 respectively; Fig. 9 is a fragmentary cross sectional view taken substantially along the line 9—9 in Fig. 4, showing the detailed construction of a preferred work supporting arrangement; Fig. 10 is an end elevation of the parts shown in Fig. 9; Fig. 11 is a modified form of machine showing particularly a manual adjustment for one of the transfer rolls; Fig. 12 is a detail view of the modification, and Fig. 13 is a diagram illustrating the modification with respect to the pattern and transfer rolls.

Referring in detail to the drawings and first to Figs. 1 to 10, the general support for the machine comprises suitable side frame

members 1 and 2, which frame members are suitably braced and connected by cross members, such for example as shown at 3 in Fig. 2 as well as by various shafts which form parts of the graining mechanism, as will be later described. One of the connecting members is arranged to support a suitable power device such as an electric motor 4.

The pattern roll, indicated at 5, is shown as suitably supported on a shaft 6 which rests in brackets 7 at the top of the side frame members and is removably secured by means of swingable bearing members 8 pivoted as at 9 to the frame members.

As shown there are two transfer rolls. The transfer roll which operates to transfer the pattern to work presenting fairly large areas to be grained is designated 10. The roll which is used for graining smaller objects, supported by hand, is designated 12. The supports for the transfer rolls are essentially similar but we prefer to support the roll 10 on individually movable arms 14, one at each side of the machine, the arms being carried on a rock shaft 15 having its ends extending into the respective side frame members. Details in connection with the supporting arms 14, rock shaft 15 and attendant mechanism will be hereinafter described.

The support for the roll 12 includes a pair of rigid arms 16 extending upwardly and forwardly from the top of the side frame members and provided with substantially horizontal guideways 17 and bearing blocks 18, one block for each end of the shaft 19 of the roll 12. This bearing support for the roll 12 will also be hereinafter more fully explained in connection with the mechanism for moving the roll 12 out of contact with the pattern roll and for separating the respective scraper blade from the transfer roll in the same operation.

The drive for both transfer rolls is effected by the same power system, including the motor 4, which drives the pattern roll. The driving arrangement from the pattern roll to the two transfer rolls shown is such that both these transfer rolls may move away from the pattern roll so as to compensate for any inequalities as to size and shape of the respective transfer rolls.

As shown, the motor 4 has a reduction gearing associated therewith designated generally 4a which terminates in a driving sprocket pinion 25. The sprocket is connected by means of a suitable chain 26 to a driving sprocket 27 rigid on the pattern roll shaft 6. Axially displaced from the latter sprocket and also rigid on the pattern roll shaft 6 is another sprocket, not shown but the position of which may be seen in Fig. 2, which through the intermediacy of a suitable sprocket chain 30 drives a shaft 31 located near the base of the machine and supported in a suitable boss formation 32 on the frame

part 2. The shaft 31 has a sprocket wheel 33 at one end thereof, over which the chain 30 passes, and at the other end has a spur gear 35 meshing with a similar spur gear 36 on a lay-shaft 37.

The lay-shaft is also supported by the boss formation 32 and extends outwardly from the boss formation and carries a double-cone pulley having elements designated 38 and 39. The double-cone pulley is part of the surface synchronizing arrangement for the pattern and transfer rolls which will now be described.

Above the shaft 37 and journaled in suitable bearings in the frame member 2 is a shaft 40. This extends outwardly from the frame member 2 and carries a double-cone pulley having elements 42 and 43 corresponding in shape and position to the pulley elements 38 and 39 on the shaft 37, detailed in Fig. 5. The two double-cone pulleys may be adjusted to displace the belt shown at 45 connecting the two pulleys in such manner as to always keep the belt taut and in such manner as to variably change the angular velocity of the shafts 37 and 40 in minute steps, to thereby synchronize the peripheral speeds of the two rolls.

It will be understood that if the cone element 39 is moved inwardly toward the element 38 and the element 43 moved outwardly from the element 42 that the driving effect of the belt will be changed so that the shaft 40 in one instance is rotated faster than in another, by reason of the adjustment. We make use of this variability of the angular velocities of the shafts 37 and 40 to vary the drive of both transfer roll shafts 11 and 19, independently with relation to the pattern roll which is common to both transfer rolls.

The drive from the shaft 40 to the two transfer rolls is essentially similar. The roll 12 is driven by a sprocket 47 on the shaft 40, a chain 48 and a sprocket 49 on the roll shaft 19. In the case of the roll 10 the drive consists of a sprocket chain 50 leading from a sprocket wheel 51 fixed on the shaft 40 to an idler sprocket wheel 52 on the rock shaft 15 previously mentioned, about the axis of which the movable arms 14 for carrying the roll shaft 11 pivot. The purpose of the idler sprocket is to carry the drive from the shaft 40 first to the axis about which the arms rock, so as not to disturb the drive when the roll shaft moves up and down. The sprocket 52 is rigid with another sprocket 55 which in turn drives a chain 56 passing over a sprocket 57 on one end of the shaft 11 and rigid therewith. The relationship between the various sprocket and chain elements is originally adjusted by reason of the double-cone pulley drive in such manner that the peripheral speed of the transfer roll will be exactly the same as the peripheral speed of the plate supported on

the pattern roll. The adjustment for the roll 10 is of course independent of the roll 12, since only one of these rolls function at one time.

Now, in the event that the pattern roll becomes undersize by reason of wear, or in the event the diameter of either transfer roll varies as by shrinkage, temperature changes etc., previously discussed, it will be seen that the variations may be compensated for by reason of the adjustment of the elements 39 and 43 of the variable speed drive device.

The detailed construction of the variable speed device may of course be modified but, as shown, this consists of a tubular extension 60 on the pulley element 38 which carries at its end a flange 61 threaded thereon and having an adjustment screw 62 threadingly carried by the flange and having its inner end adapted to engage a number of arcuately positioned recesses 64 in the pulley element 39. The two pulley elements may be keyed together as by the key 60'. The pulley element 39 is normally pressed outwardly along the extension 60 by means of a suitable number of compression springs 65 seated in suitable inwardly facing recesses in the elements 38 and 39.

When it is desired to adjust the drive device, the screw 62 is removed and the flange 61 turned as by means of a spanner wrench engaging openings 61, in the periphery of the flange to carry the elements 38 and 39 toward or away from each other as required, and after the proper relations have been secured between the pulley elements, the screw 62 is seated in a new recess 64, thereby locking the two pulley elements in adjusted position. The construction and relative adjustment between the pulley elements 42 and 43 are essentially the same as above described in connection with the elements 38 and 39.

As previously mentioned, it is desirable that the transfer roll be adjustable toward and away from the pattern roll to compensate for variations in plate thickness, transfer roll size, etc. It has been found, however, that such adjustment alone is insufficient under all conditions that may arise in transfer printing, for graining work. One reason for this is that transfer rolls are sometimes non-cylindrical, due to various causes, immaterial here. In case of a roll which for example is large at one end, the line contact between the pattern and transfer rolls may be preserved, if the transfer roll is so supported that it may move out of parallelism with the pattern roll.

With the above in view, we have provided an arrangement including the relatively movable arms 14 supported on the shaft 15, previously mentioned. The arms have lost motion connections with the rock shaft 15, as shown best in Figs. 6 to 8, wherein it will be seen that each of the arms have jaw ele-

ments 70 positioned in such manner as to contact with jaw elements 71 on collars 72 pinned or otherwise fixedly secured to the shaft 15. Lost motion is provided between the jaw elements at 74. The rock shaft 15 is arranged to be turned by a manually adjustable arm 75 on one end of the rock shaft which is also loose on the shaft, but arranged to pick up the shaft after a slight angular movement, by reason of a jaw arrangement essentially similar to that described in connection with the arms 14. The arm has jaw elements 76 which are arranged to contact with cooperating jaw elements 77 on a collar 78, pinned or otherwise secured to the shaft 15.

The arms 14 carrying the transfer roll may be normally urged toward the pattern roll by suitable springs such as 14a (Fig. 1) one being shown, and in order to limit the upward movement of the arms 14 to thereby adjust the contact pressure between the transfer roll 10 and the pattern roll, we preferably provide devices such as shown in Fig. 1, one for each arm 14. Only one of these devices is illustrated. As shown, the arrangement comprises apertured blocks 67 suitably secured to the machine frame members 1 and 2, and adjusting studs 68 which pass loosely through the apertures in the blocks and which at their ends are threaded as at 69 into the respective arms 14. The enlarged heads on the studs abut the lower surfaces of the blocks 67 to limit the upward movement of the arms, and thereby the contact pressure of the roll 10. Adjustment is effected by turning the studs, thereby, in effect, lengthening and shortening them as required.

In order to hold the arm 75 in its two operating positions, the arm is provided with yielding detent members shown as spring pressed balls 79 adapted to seat in recess 79', shown in Fig. 1 on the side frame member 1.

The manual adjustment of the arm 75 also effects the separation of the scraper blade from the roll 10, which mechanism will now be described. Referring particularly to Figs. 1, 3 and 4, I show a scraper blade 80 supported on a shaft 81 for rotary movement toward and away from the transfer roll 10. The shaft 81 is suitably held on the frame by adjustable bracket members which are essentially similar in construction and indicated at 82. The bracket members have slotted bearing portions at their top sides embracing the shaft ends and allowing the shafts to be removed when required for servicing the blades. The bracket members 82 are supported on adjustable guide pins 83 having reduced portions slidably engaging suitable bores in the bracket members 82, the reduced portions having their ends threaded into the respective frame members 1 and 2. The bracket members 82 are normally held in engagement with shoulders

83' on the pins 83 by compression springs 84 embracing the reduced portions of the pins. By this arrangement, perfect line contact between the blade and scraper roll may be maintained by simple adjustment of the bars 83.

The blade 80 is maintained in yielding contact with the roll 10 by means of a spring 86 secured to the frame member 1 at one end, and to an arm 87 rigid with the shaft 81, the spring maintaining sufficient contact between the blade and roll to keep the roll clean. A suitable pan is placed beneath the scraper assembly as at 89 (see Fig. 3) to catch all pigment material scraped from the roll.

The connections from the roll adjusting arm 75 associated with the rock shaft 15 comprise an arm 90 fixed to the end of the shaft 81 adjacent the frame member 1 and having its end bent over to engage an upstanding lever 91 pivoted as at 92 to the frame member 1, the lever 91 being connected to an extension 75' of the arm 75 by a link 93. In operation it will be seen that the connections from the arm 75 to the scraper blade are such that upon counterclockwise movement of the arm 75 from the position shown in Fig. 1, it will immediately move the blade from engagement with the transfer roll 10. Subsequently, the lost motion between the jaw elements 76 and 77 is taken up and afterward the lost motion between the rock shaft 15 and the arms 14, so that eventually and before the arm has been moved to the position indicated by the detent recess 79', shown in Fig. 1, the roll 10 will be bodily moved downwardly out of contact with the pattern roll 5.

The advantages of separating the scraper blade from the transfer roll prior to separating the two rolls are as follows. The operator, before shutting down the power, naturally withdraws the transfer roll from contact with the scraper roll, as a matter of training. Now, assuming a connection between the roll moving means and scraper blade withdrawing means, which incidentally is old in the art, complete actuation of such roll and blade moving means will of course separate the transfer roll from both the pattern roll and blade.

However, the operator may not, with ordinary connections such as stated, operate the connections far enough to be certain to move the scraper blade out of contact with the roll, and the roll will be damaged by the blade leaving a groove therein. With the arrangement described, however, since the blade is moved first, the operator must necessarily break contact between the blade and transfer roll, if he is to break contact between the transfer roll and pattern roll, which he invariably does.

There is a further advantage in the arrangement shown in that if the roll were

moved first, this would tend to carry the roll toward the blade and either crease it or break the blade; whereas, if the blade is moved first there is no such danger.

5 An advantage of the double lost motion connection between the arms 14 and the rock shaft will be easily seen when it is considered that in the event of non-parallelism between the pattern and transfer rolls, the line contact between the rolls would inevitably be broken at one end were both arms 14 fixed to the shaft or so connected thereto that movement of one of the arms would move the other. In order that there will be no binding at the bearings for the shaft 11 of the roll 10, we may provide self aligning bearing arrangements of known construction between the free ends of the arms 14 and the shaft such as that shown in Fig. 6A wherein the arm 14 is provided with a concave surface which is adapted to engage the convex bushing 11a on the shaft 11.

Referring to Figs. 1 to 4, the supporting arrangements for the roll 12, some parts of which have been previously mentioned, is in detailed construction as follows. The bearing blocks 18 which support the ends of the shaft 19 of the roll 12 are normally held in position to allow an adjustable contact pressure between the roll 12 and pattern roll by reason of adjusting screws 100, the ends of which are arranged to abut the blocks 18. Only one of the screws is illustrated. The screws may be locked by suitable lock nuts threaded on the shanks of the screws. Opposite the adjusting screws and seated in the slideway opening for the blocks 18 are compression springs 101 which resiliently maintain the line contact between the rolls.

The mounting for the scraper blade 104, which cleans the roll 12 of used pigment, is substantially similar to the construction previously described with reference to the blade 80 for the roll 10. There are bracket members 105 with slotted bearing portions receiving the blade supporting shaft 106 and there are adjustment collars 107 suitably threaded to the lower portions of the brackets 105 and bearing against supports 108 secured to the respective frame members 1 and 2. The blade is held in yielding contact with the roll by means of a tension spring 109.

To move the scraper blade from contact with the transfer roll, prior to separating the roll 12 from the pattern roll, we provide a lever 110 pivoted as at 111 to the frame member 1, and the lever has a pin 112 at its free end adapted to engage a cam surface 113 on a bell crank 114, the bell crank having a downwardly extending arm engaging an arm 115 fixed to the shaft 106 of the scraper blade. Initial clockwise movement of the lever 100 from the position shown in Fig. 1 causes the clockwise movement of the bell crank to thereby withdraw the blade from the trans-

fer roll, and subsequent movement by reason of an extension 116 of the lever causes withdrawal of the transfer roll by contact with the block 18.

There are two levers 110 with extensions 116 for moving the bearing blocks 18 and, as a matter of course, the operator grasps both of these levers and moves the ends of the roll shaft simultaneously away from the pattern roll upon stopping the machine. Obviously, however, the free ends of the levers 110 could be connected by a cross bar so that no matter how the operator manipulates the levers, both will move.

Situated between the two rolls, we have shown a pigment applying mechanism, including a container 120 for fluid pigment, suitably supported as on brackets 121 which are in turn supported by a cross shaft 122 extending at its two ends into the side frame members. The mechanism further includes a pigment conveying roll 124. This is preferably driven, as shown in Fig. 4, by means of sprocket wheels 125 and 126, on a lay shaft 127 and the pattern roll shaft 6 respectively, a suitable driving chain 128 connecting the sprockets, and a set of spur gears, one being shown at 130, Figs. 2 and 4, drivingly connected to the pigment conveying roll shaft 131. The gear 130 meshes with a gear, not shown, fast on the lay shaft 127. The supports for the shafts 127 and 131 are not shown in detail, but these may be of any convenient supporting arrangements carried on the frame members 1 and 2. The pattern roll is provided with a reciprocable doctor blade 135 which may be supported in bearings similar to those for the scraper blades previously described and the supporting shaft of which, indicated at 136, may extend to one side of the machine and support a cam follower roller 137 contacting with a face cam 138 arranged to be driven by an ordinary sprocket gearing, including a chain 128 from the pattern roll. A tension spring 140 connected between the side frame member 2 and the shaft 136 holds the cam follower always in contact with the cam.

It is to be understood that we may provide for reciprocating any of the blades shown, that is to say, both the scraper blades for the transfer rolls and the doctor blade for the pattern roll. As an illustration of suitable means for reciprocating the scraper blade for a transfer roll, we have shown in Figs. 1 and 2 a cam 138' driven from a suitable chain 138'' shown in Fig. 2 only, the cam being arranged to operate on a follower roller 137' on the shaft which supports the doctor blade 80.

The arrangement of a single pigment supply and doctor roll mechanism which furnishes the pattern roll with pigment to supply both transfer rolls is important from the standpoint of economy in construction and

in servicing the machine. The pigment supplying mechanism is disposed between the two transfer rolls in such manner that it does not interfere with the graining operation, using either transfer roll, nor does it interfere in any way with dismounting the pattern roll when it is desirable or necessary to change the pattern plate thereon.

The transfer rolls and pigment supply mechanism are arranged about the pattern roll, preferably in an angular space of materially less than 180° , wherefore it is unnecessary to move either transfer roll any substantial distance, or to disturb the pigment supply mechanism, in order to remove the pattern roll from its supporting bearings 7 and 8 previously described. Moreover, the whole arrangement is such that the two transfer rolls 10 and 12 are in respective positions which are practically ideal for graining subjects supported by hand and/or by a table or conveyor.

It will be understood that whenever the subjects are being grained by the transfer roll 10, the work support for which will be presently described, the roll 12 may be simply moved out of contact with the pattern roll by means of the levers 110 and associated mechanisms. Likewise, when graining by means of the transfer roll 12, the arm 75 may be actuated to carry the roll 10 out of contact with the pattern roll. However, where there is a plate and roll arrangement, such as shown in Fig. 13, and which will be later described, the two transfer rolls may both remain in contact with the pattern roll all the time the machine is running.

For supporting work to be grained by the roll 10, we provide an adjustable table which includes vertically sliding supporting members 140 guided in suitable slideways 141 in the respective frame members 1 and 2 and work supporting rolling elements shown as independent rollers 142 carried on the slide members 140. As shown, the slide members 140 support cross frames including transversely extending bars 144 and longitudinally extending angle sections 145 which directly support the rollers 142. The connections between the cross frame members 144 and the slide members comprise pivot pins 147 and 148, the latter pins being seated in slots 149 in the cross frame members 144 to allow free relative raising and lowering movement of the slide members 140.

To raise and lower the members 140, we provide vertical screws 150, one for each slide member 140, the screws being supported in vertically fixed position on inwardly extending brackets 151 of the side frame members. At their lower ends, the screws carry beveled gears 153 which mesh with complementary beveled gears 154 on a shaft 155 adapted to be manually adjusted to drive the

gears 154 as by a crank 156 located at one side of the machine and fast on the shaft.

It will be seen that turning the shaft will raise or lower the slide members and the table rollers 142 in parallelism with the transfer roll 10. However, for graining subjects that vary in cross section or in order to compensate for inequalities of the transfer rolls, for example, one of the beveled gears 154 may be disconnectible from the shaft 155 by means of a key 159 connecting this gear with the shaft, so that the two members 140 may be unequally raised and lowered.

If desired, the rollers 142 may be driven by suitable sprocket chains connected to sprocket wheels 160 on the roll shafts 161 and gears (not shown) on the shaft 15 for example, thus preventing any possible slippage between the subject supported on the rollers 142 and the transfer roll, and consequent blurring of the design transferred thereby.

Each of the rollers 142 is preferably removable from the bearing supports 145, and for this purpose one end of each shaft 161 seats in a circular opening 162 in one of the members 145 and the other end of the shaft seats in an upwardly facing slot 163 in the other member 145. Suitable retainer members for the shaft 161 may comprise plates 164 having circular openings receiving the ends of respective shafts 161 and being provided with fastening screws such as 165 arranged to thread into the adjacent members 145, as shown in Fig. 9.

The supporting rollers 142 preferably comprise a cylindrical body member 170 having a yielding exterior coating 171, there being bearing members, such as a ball bearing assembly 173, interposed between the body 170 and the shaft 161 at one end, and if desired, a similar bearing at the other end of the roll between the body 170 and shaft. As shown, the ends of the roll opposite that which has the bearing 173 is supported by the hub of the sprocket 160 which is in turn supported as at 176 in such manner that the roller axis is determined by the sprocket hub. The arrangement described permits each of the rollers 142 to be removed from the supports 145 for repair, without removing any of the other rollers. As a matter of fact, it is not essential that all the rollers shown be used all the time and one roller may be left out of the assembly during its repair.

In the modification shown in Figs. 11 and 12, we have shown the transfer roll which is adapted for graining work supported by hand, as mounted in such manner that it may be swung clear of the machine to expose various parts thereof for inspection, etc. The roll 12 may be supported on swingable arms 180, one only being shown, but there being two, one at each end of the roll 12 and pivoted as on a cross shaft 181 supported by the side

frame members 1 and 2. The arrangement is such that the roll 12 may be swung entirely clear of the pattern roll for inspection or to expose the pigment applying mechanism and other parts.

In the modification, there is mechanism for effecting the separation of the scraper blade, designated 104' from the transfer roll, prior to separating the transfer roll from the pattern roll in the ordinary use of the machine. The mechanism comprises, as shown, a cam supporting shaft 183 rotatably mounted in ears 180' on the arms 180, which shaft has at its ends, arm members 183' by which the cams may be turned.

The cams may be circular discs fixed to the shaft. One cam, 185, engages an arm 186 fixed to the shaft 106' which supports the scraper blade. The other cams, 187, (one only being shown) arranged to engage abutment pins 188 on supporting bars 189 (one only being shown) which abutments form stops for the inward movement of the arms 180 to carry the roll 12 into contact with the pattern roll. The bars 189 are slotted as at 191, the slots being open at one end to permit the removal of the cam shaft 183 from the bars 189, when the roll is swung away from the machine, for example, to the broken line position shown in Fig. 11.

It will be seen that by virtue of the cam arrangement shown, the cam 185 will, on rotation of the shaft 183 first separate the scraper blade 104' from the transfer roll, and afterward, the cams 187, by engagement with the pins 188, will push the arms 180 outwardly from the pattern roll, to separate the two rolls a slight distance, the shaft 183 simply sliding in the slot 191 and carrying the arms 180 outwardly.

When it is desired to move the roll 12 outwardly away from the pigment conveying mechanism, as above suggested, it is, as shown, necessary to unhook a pair of springs, one of which, indicated at 195, normally holds the roll 12 in operating contact with the pattern roll, and the other of which, indicated at 196, normally holds the cam supporting shaft 183 in such position that the blade 104' is in contact with the transfer roll.

It will be seen from the above description of the modification that, by the arrangement shown, it is an easy matter to at any time move the roll 12 with its attendant adjusting and scraping mechanism entirely clear of the machine, to thus entirely expose the doctor blade 135, pigment conveying mechanism including the roll 124, the pigment supply container 120 and other parts of the machine as well. The frame member 1, as shown, carries a stop 190 for preventing damage to the roll 12 when swung down. The stop simply engages one of the arms 180 in the swung position shown in broken lines.

In the modification shown in diagram, Fig.

13, the two transfer rolls may operate for graining different subjects simultaneously or for imparting a different pattern to different subjects. The diagram shows the roll shafts supported on frame members 1x and 2x. The pattern roll has separate patterns thereon as at 5x and 5y and the two transfer rolls are axially offset from each other, the transfer roll 10x being adapted to take the pattern from the pattern 5x, and the transfer roll 12x being associated with the pattern 5y. With such an arrangement, the subjects supported on a table, conveniently indicated at 142x, may have imparted thereto the grained pattern of the roll portion 5x, and without any adjustment of the machine, the operator may hold different subjects in contact with the transfer roll 12x to impart the pattern effect 5y thereto. A further thought is that one operator might grain the subjects with the pattern at 5x and another operator grain different subjects from the pattern at 5y, all without adjustment of the machine.

We claim:—

1. In a graining machine, a pattern roll, a plurality of transfer rolls, means to separate each transfer roll from the pattern roll, a work supporting table disposed adjacent one of the transfer rolls and adapted to support work in contact with this transfer roll, a second transfer roll being adjustably supported in cooperative relation to the pattern roll for graining work adapted to be manually supported.

2. In a graining machine, a pattern roll, two transfer rolls and individually movable supports therefor arranged to carry the transfer rolls into operating contact with the pattern roll selectively, one of the transfer rolls being positioned to be easily accessible for graining work adapted to be supported by hand, there being a work supporting device associated with the other transfer roll arranged to support work in contact with the latter roll for graining over a relatively large area.

3. In a graining machine, a pattern roll and two transfer rolls, one accessible for graining work adapted to be supported by hand and one arranged for graining work adapted to be supported by a table, means to selectively move the transfer rolls into cooperation with the pattern roll, and a common drive for the pattern roll and both transfer rolls including a progressively variable speed driving connection to both transfer rolls, whereby the peripheral speed of either transfer roll may be synchronized with that of the pattern roll.

4. In a graining machine, a pattern roll, a transfer roll and a frame supporting said rolls in substantially parallel arrangement, a support for the transfer roll arranged to permit said roll to separate from the pattern roll, means acting on the support and manually adjustable to separate said rolls, a scraper

blade movably mounted for cooperation with the transfer roll to scrape used pigment therefrom, and a connecting device between said mounting for the transfer roll and the scraper, whereby adjustment of the transfer roll to separate it from the pattern roll will automatically and prior to such roll separation move the scraper from contact with the transfer roll.

5 5. In a graining machine, a pattern roll, a transfer roll cooperating therewith to effect a transfer of the pattern from the pattern roll, a scraper blade and a movable support therefor arranged when in one position to cause the blade to scrape used pigment from the transfer roll and in another position to cause the plate to clear the roll, a movable support for one of the rolls adapted and arranged to effect the separation of the two rolls, interconnecting means between the roll support and the blade support, including a lost motion connection, and manually operable means connected to one end of said movable supports for effecting such movement of the transfer roll away from the pattern roll, said means and lost motion connections being arranged to cause first the separation of the blade and transfer roll and then the separation of the two rolls.

30 6. In a graining machine, a pattern roll and support therefor, a transfer roll adapted to contact therewith to transfer the pattern therefrom, a frame including said support and a pair of arms pivotally mounted on the frame for movably supporting the transfer roll, a scraper blade adapted to contact with the transfer roll to scrape used pigment therefrom, a manually operated device connected to said blade and arranged to move the blade from contact with the transfer roll, and linkage connecting the mounting for the blade and said arms, including lost motion whereby the blade is withdrawn from the transfer roll prior to effecting a separation of the two rolls.

7. In a graining machine, a pattern roll and a transfer roll, a frame supporting said rolls, a blade movably mounted on the frame for scraping used pigment from the transfer roll, a rock shaft supported on the frame, and means for angularly adjusting the rock shaft, linkage between the rock shaft and the mounting for the blade, whereby movement of the shaft effects movement of the blade and transfer roll, a pair of arms on the rock shaft supporting said transfer roll in contact with the pattern roll, and a lost motion connection between the rock shaft and said pair of arms whereby the blade is moved by such angular adjustment of the rock shaft prior to movement of the said arms to separate the rolls.

8. In a graining machine, a pattern roll and a transfer roll, a frame for supporting said rolls, a swinging support for the transfer roll

permitting the same to be moved out of contact with the pattern roll, said support comprising a rock shaft and a pair of relatively movable arms supported by said shaft, a pintle for the transfer roll and bearings associated with the pintle on each of said arms arranged to permit displacement of the transfer roll axis in non-parallel relation to the pattern roll, there being lost motion connections between said rock shaft and the arms, whereby angular adjustment of the rock shaft will carry the transfer roll out of contact with the pattern roll irrespective of such non-parallel displacement and whereby such displacement is permitted without moving the rock shaft.

9. In a graining machine, a pattern roll, a transfer roll, shafts for said rolls, a frame supporting said shafts, a power driving device supported on said frame and connections therefrom to one of said roll shafts, a lay shaft supported by the frame and means to positively drivingly connect the lay shaft to one of said rolls, a second shaft on said frame, and means positively and drivingly connecting the second shaft to the other of said rolls, a belt drive from the lay shaft to said second shaft, comprising pairs of pulley elements supported by the lay shaft and said second shaft, means for changing the axial relationship of the elements of each pair, and a belt connecting said pairs and arranged to be tightened and the driving effect thereof varied by such change in axial relationship, whereby the peripheral speed of the transfer roll and pattern roll may be adjusted and synchronized, with the rolls drivingly connected substantially positively.

10. In a graining machine, a pattern roll and two transfer rolls, each adapted to cooperate with the pattern in transferring a design therefrom, there being a table device for supporting work in cooperative relation to one of the transfer rolls, the other of said rolls being accessible for transferring the pattern to work supported by hand, pigment applying mechanism located substantially between the two said transfer rolls and arranged to apply pigment to the pattern roll, a frame for supporting said rolls and table, and a mounting for the hand graining roll carried on said frame and arranged to be swung from operative position to expose said pigment applying mechanism for repair and inspection.

11. In a graining machine, a pattern roll and transfer roll, a frame supporting said rolls in cooperative relation, a pair of arms connecting the transfer roll to the frame and arranged to be swung completely clear of the frame, there being mechanism carried on said arms to support a scraper blade including a movable mounting for such blade and a manually adjustable device having an operating connection with the mounting for mov-

ing the blade out of and into contact with the transfer roll, and means associated with said manually adjustable device so arranged that, by the same manual adjustment which separates the blade from the roll, said means will separate the transfer roll and pattern roll a slight distance.

12. In a graining machine, a frame support and graining roll mechanism carried thereby, there being a pattern roll and two transfer rolls, the latter being arranged to cooperate with the pattern roll to transfer the pattern thereon to different subjects differently supported, there being a single pigment applying mechanism including a doctor roll and pigment supply arranged to supply pigment to the pattern roll for subsequent transfer to either or both of the transfer rolls.

13. In a graining machine, a pattern roll, two transfer rolls cooperatively arranged relative to the pattern roll and supporting means for the rolls, a single pigment supply mechanism for supplying pigment to both transfer rolls through the intermediacy of the pattern roll, said pattern roll being removably supported in said means, the transfer rolls and pigment supply mechanism being arcuately arranged about the pattern roll in an angular space of substantially less than 180°, with the pigment supply mechanism interposed between the two transfer rolls, whereby the removal of the pattern roll may be effected without substantial movement of the transfer rolls or displacement of the supply mechanism.

14. In a graining machine, a rotary pattern member and a coating rotary transfer member, including a resilient surface material of the usual type, a power device drivingly connected to one of said members, and mechanism for drivingly connecting the two members comprising a belt and two variable diameter pulleys over which the belt passes, each pulley being drivingly connected with a respective member whereby the peripheral speeds of the two members may be accurately synchronized, irrespective of variations in the transfer material.

15. In a graining machine, a pattern roll, a transfer roll adapted to coact therewith, a work supporting platen disposed adjacent such transfer roll and adapted to maintain work in contact with this transfer roll, a second transfer roll, and means for supporting it in cooperative relation to the pattern roll, the second mentioned transfer roll being adapted for graining work supported manually.

16. In a graining machine, a pattern roll, and two transfer rolls arranged to coact therewith, there being a work support adjacent one of the transfer rolls, arranged to maintain work in rolling contact with this transfer roll, another of said transfer rolls being adapted to grain work supported manually,

said transfer rolls being relatively spaced longitudinally of their axes in such manner that the transfer rolls coact with respectively separate pattern portions of the pattern roll, whereby the two different modes of supporting work may be employed simultaneously and work grained thereby.

17. In a graining machine, a pattern roll, having two distinct pattern portions of different designs spaced longitudinally of its axis, and a plurality of transfer rolls respectively associated with said portions, and coating therewith to transfer the respective patterns to different pieces of work.

18. In a graining machine, a pattern roll, two transfer rolls arranged to contact with separate respective portions of said pattern roll, the transfer rolls being spaced from each other circumferentially of the pattern roll whereby different modes of support for work to be grained may be employed in connection with respective transfer rolls.

In testimony whereof we hereunto affix our signatures.

EDWARD W. HAMANT.
GUIDO VON WEBERN.

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