Oct. 15, 1935. H. D. HOWE ET AL 2,017,459

STENCIL PRINTING AND FLOCKING MACHINE

Filed July 16, 1932 13 Sheets-Sheet 1

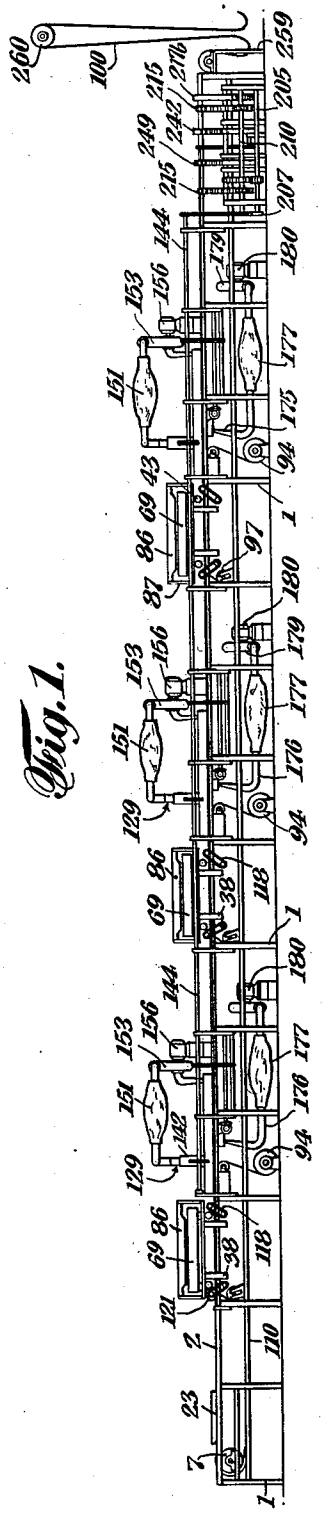

Fig. 1.

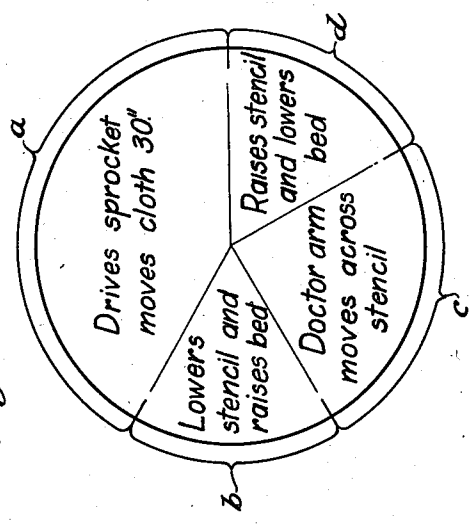

Fig. 29.

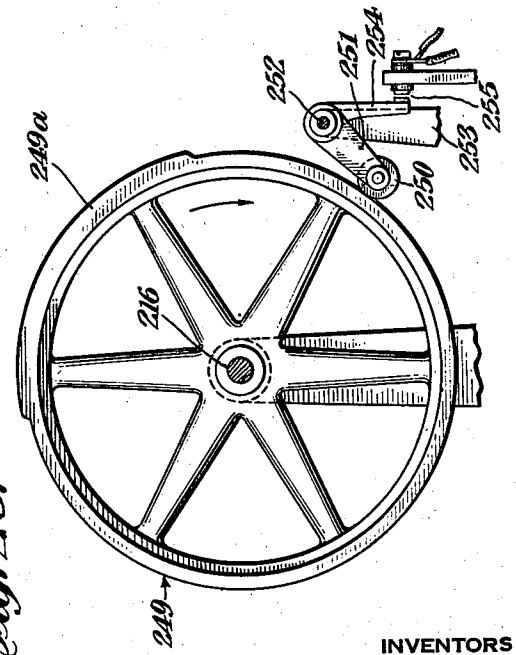

Fig. 28.

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STENCIL PRINTING AND FLOCKING MACHINE

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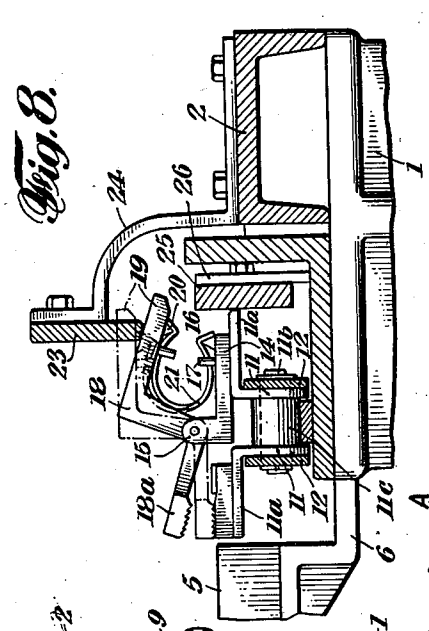

Fig. 8.

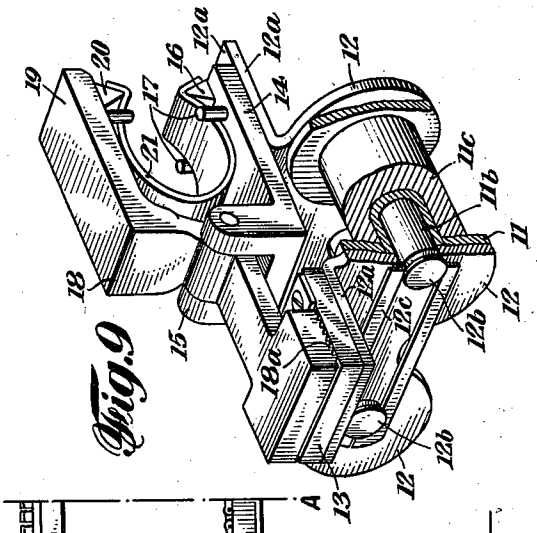

Fig. 9

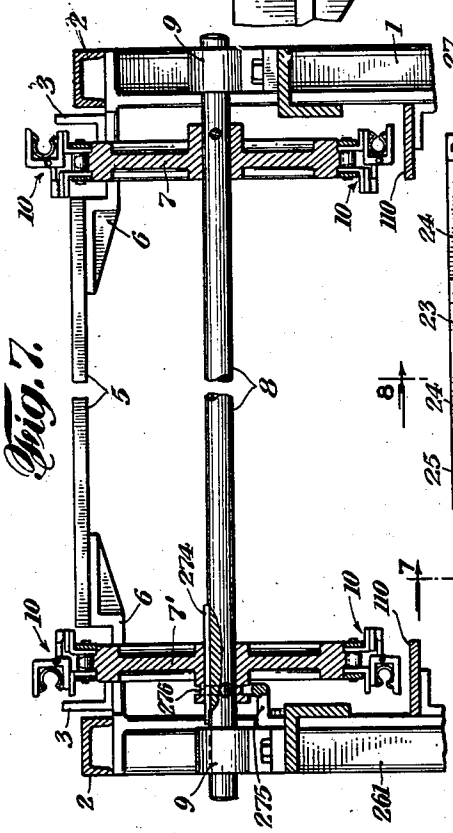

Fig. 7.

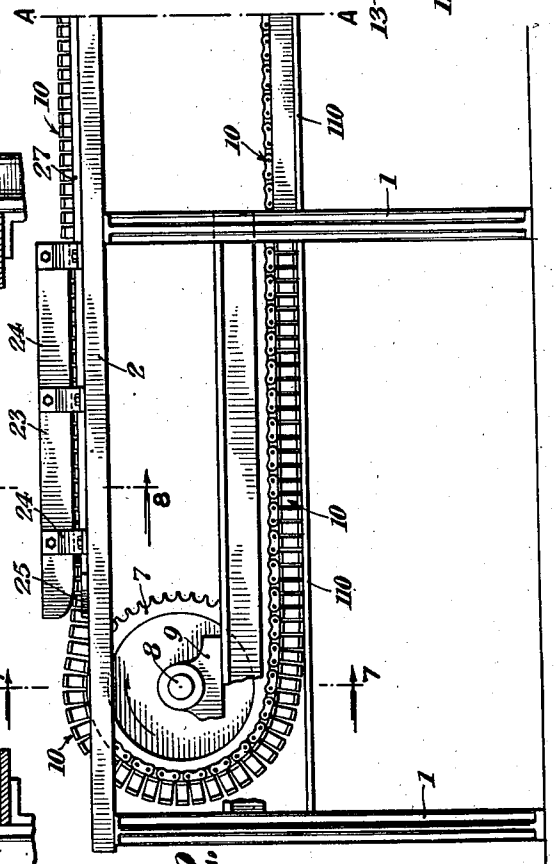

Fig. 2.

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STENCIL PRINTING AND FLOCKING MACHINE

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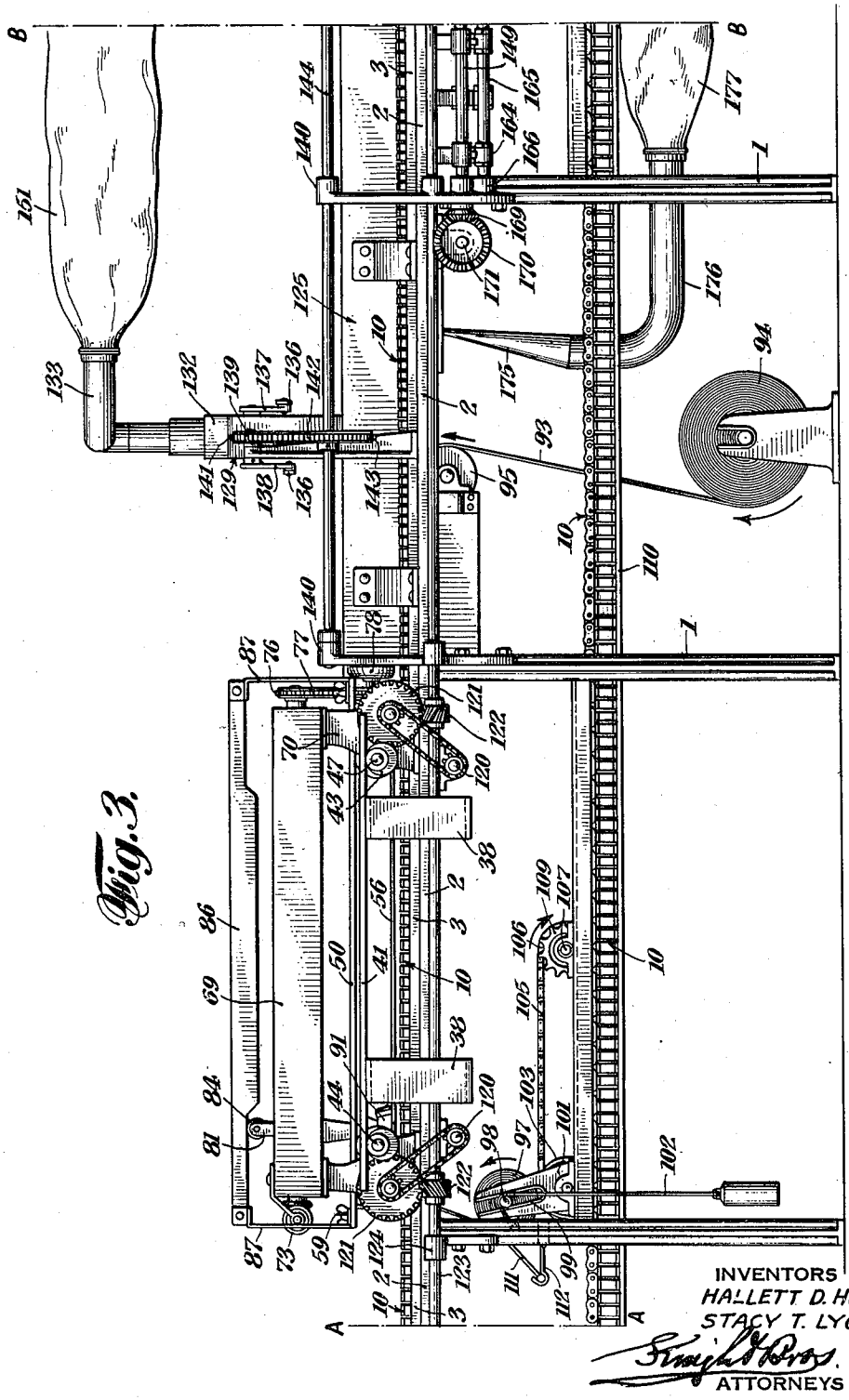

Fig. 3.

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STENCIL PRINTING AND FLOCKING MACHINE

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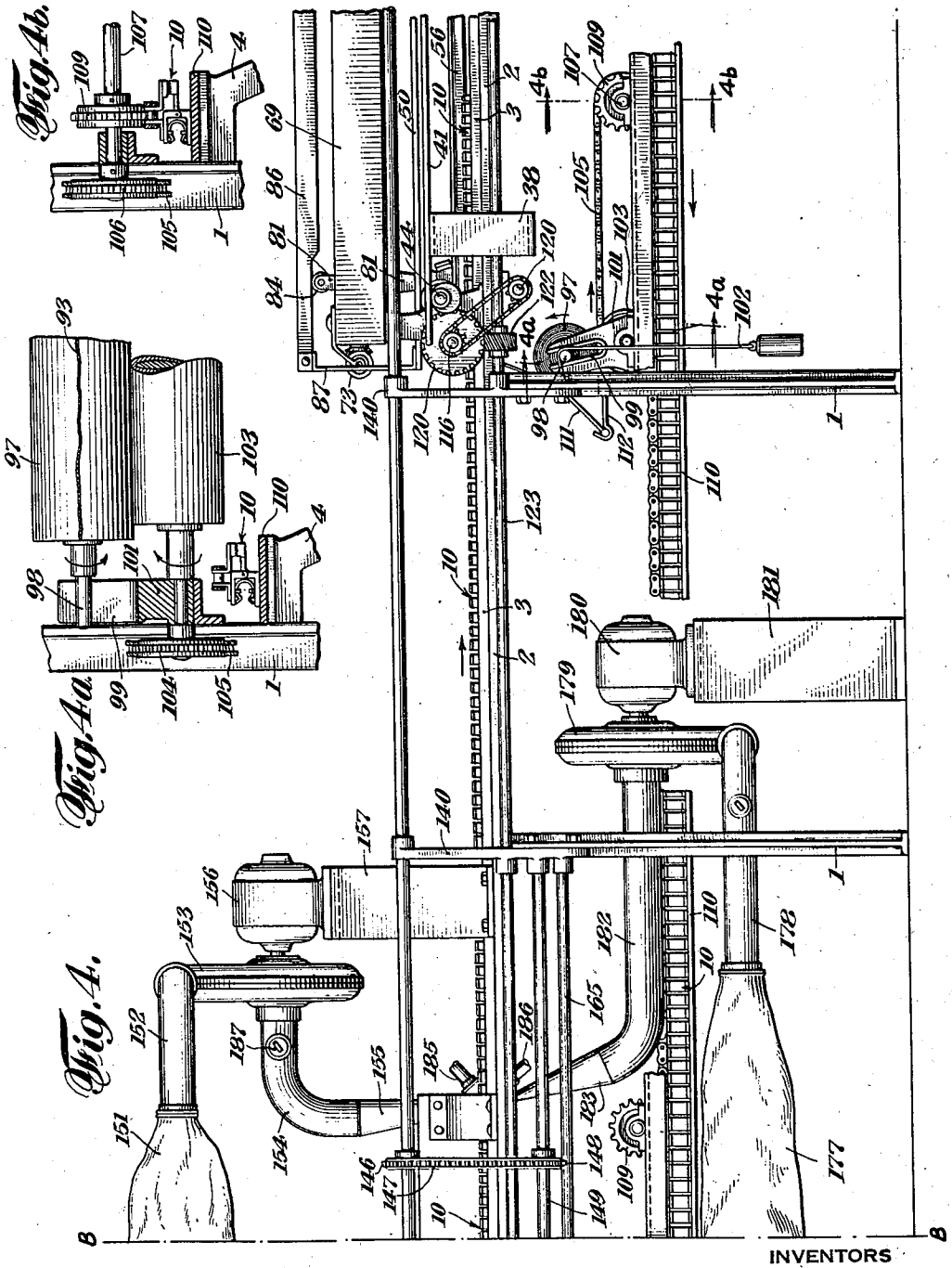

Fig. 4b.

Fig. 4a.

Fig. 4.

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STENCIL PRINTING AND FLOCKING MACHINE

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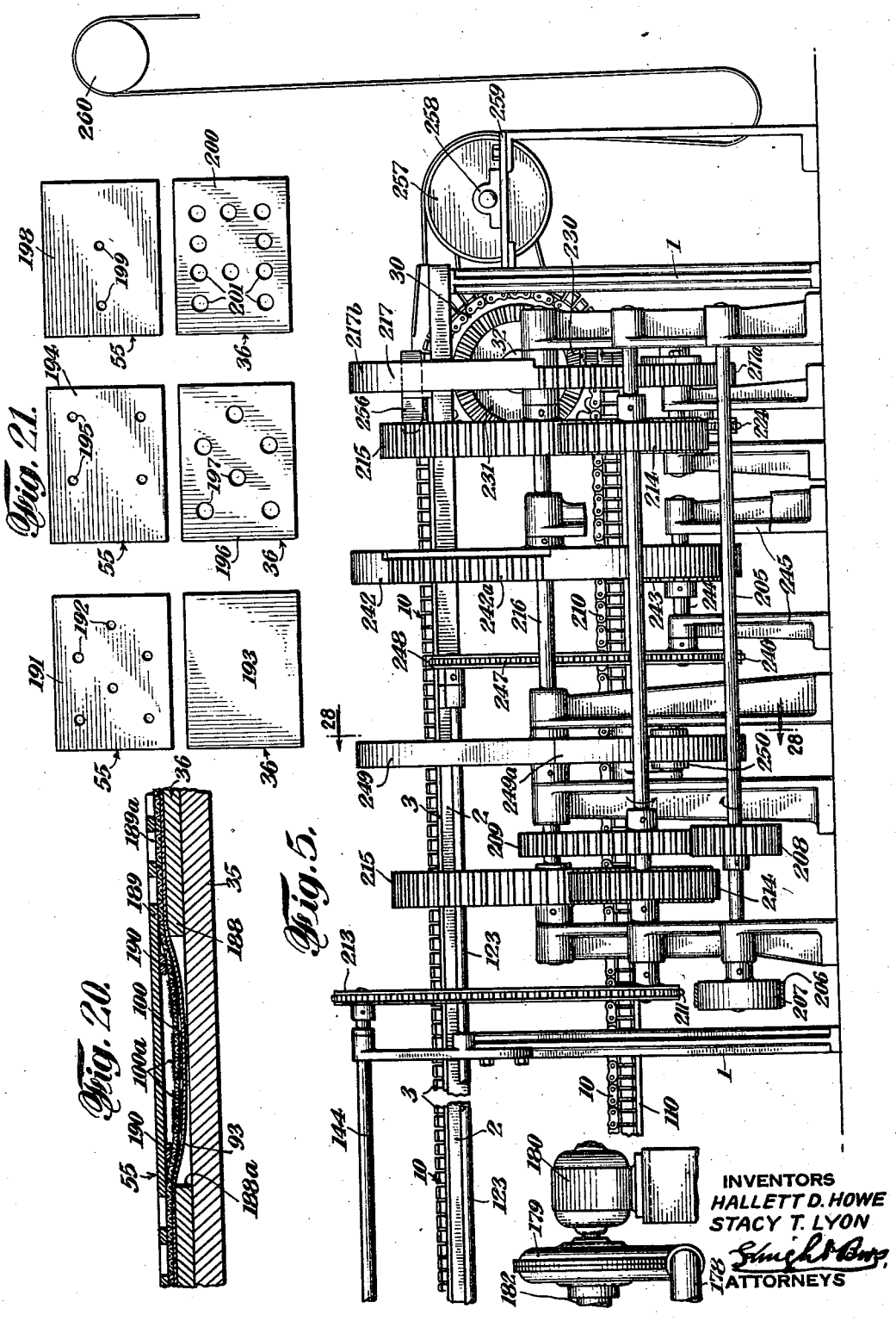

Fig. 21.

Fig. 20.

Fig. 5.

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STENCIL PRINTING AND FLOCKING MACHINE

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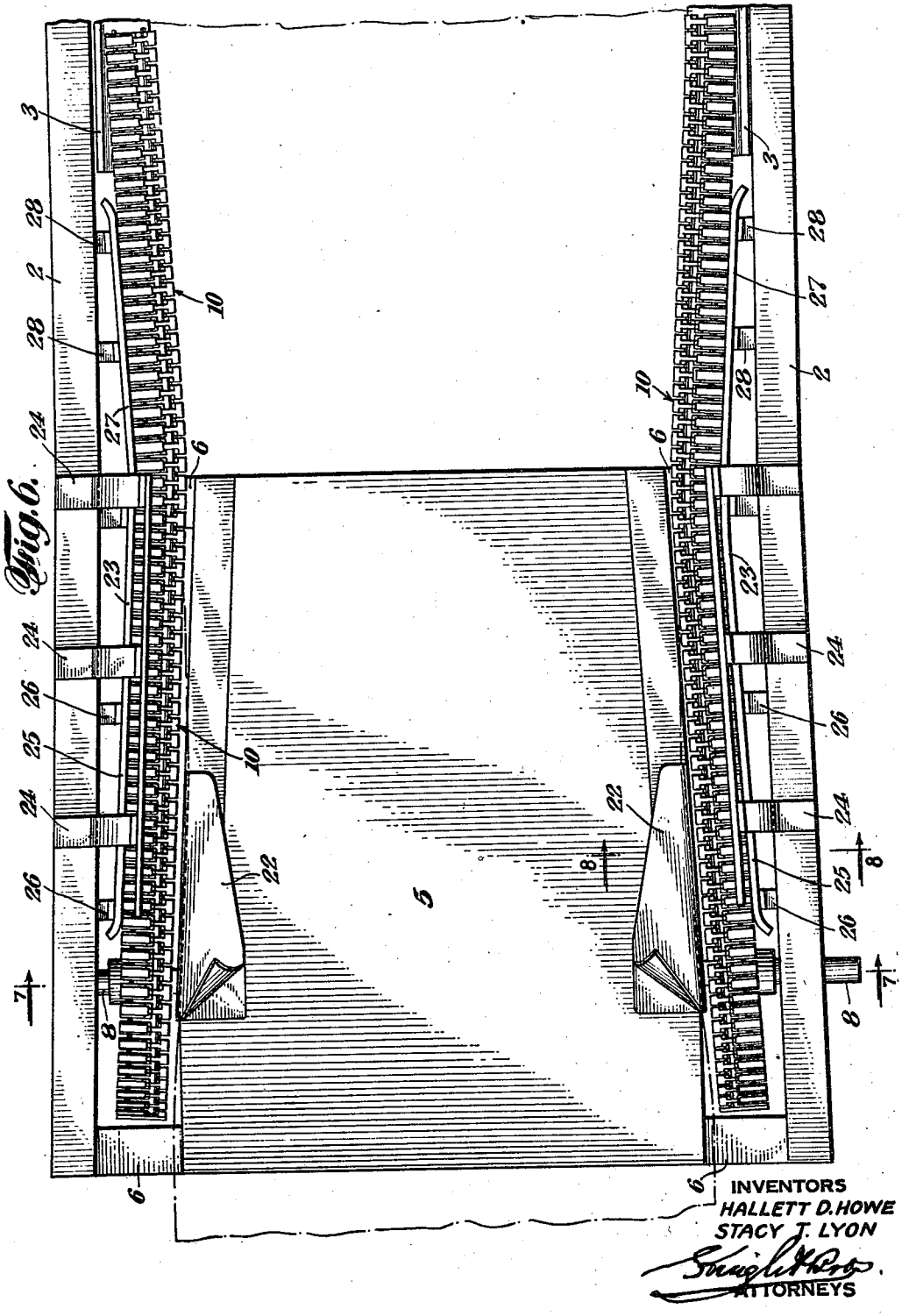

Fig. 6.

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STENCIL PRINTING AND FLOCKING MACHINE

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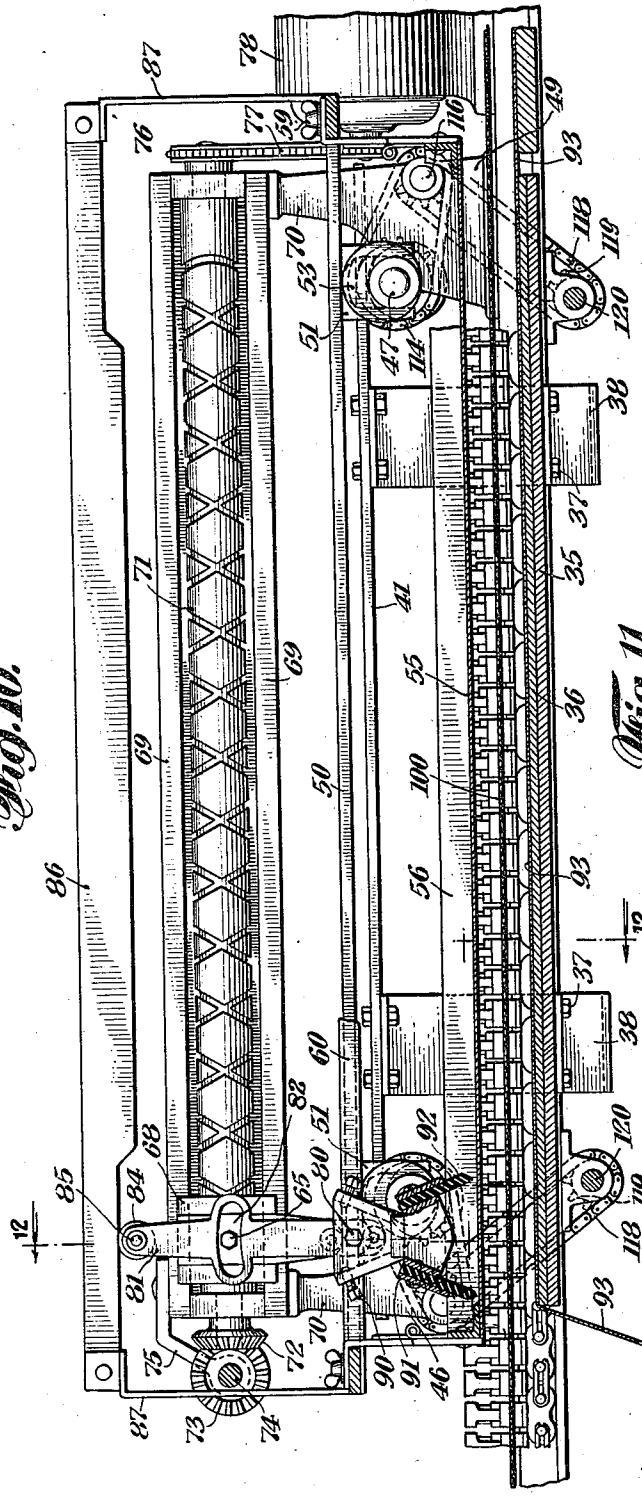

Fig. 10.

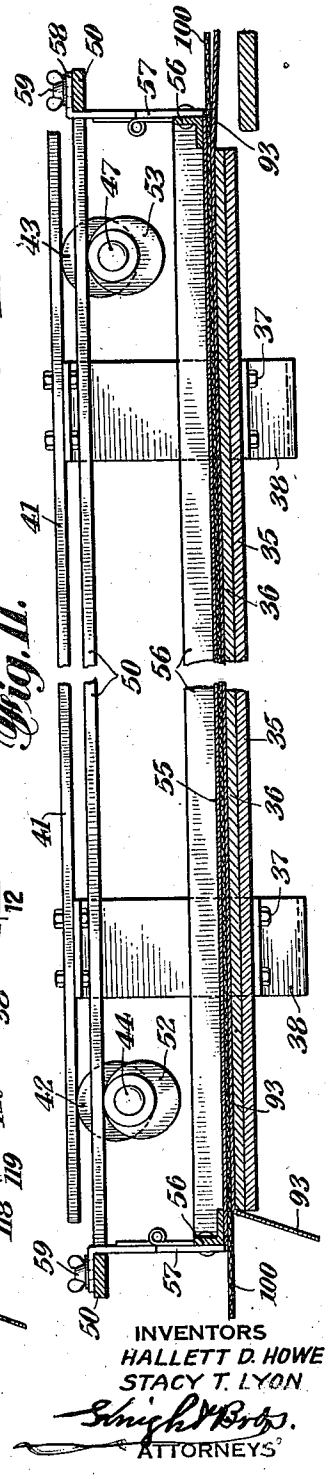

Fig. 11.

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STENCIL PRINTING AND FLOCKING MACHINE

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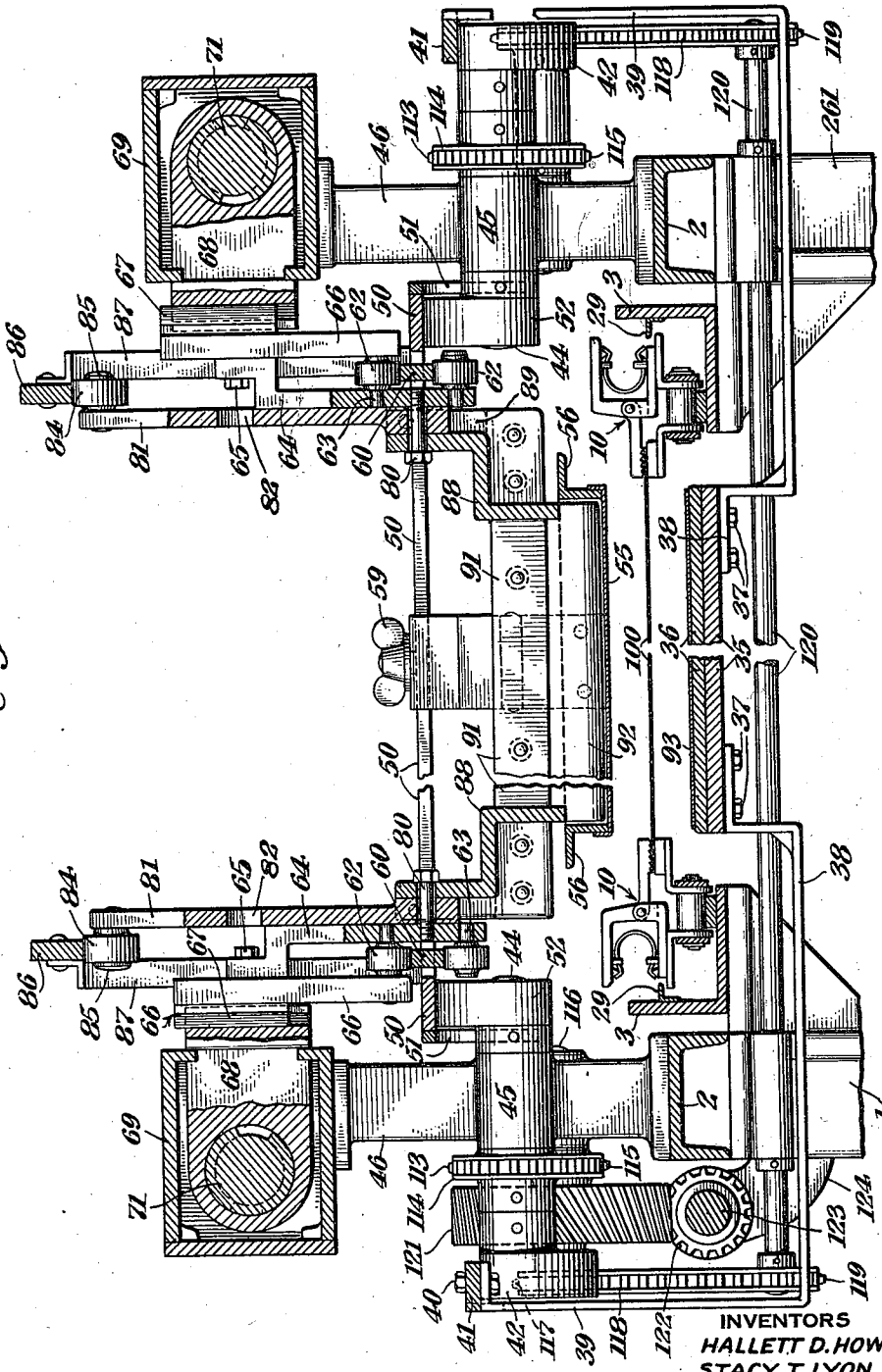
Fig. 12.



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STENCIL PRINTING AND FLOCKING MACHINE

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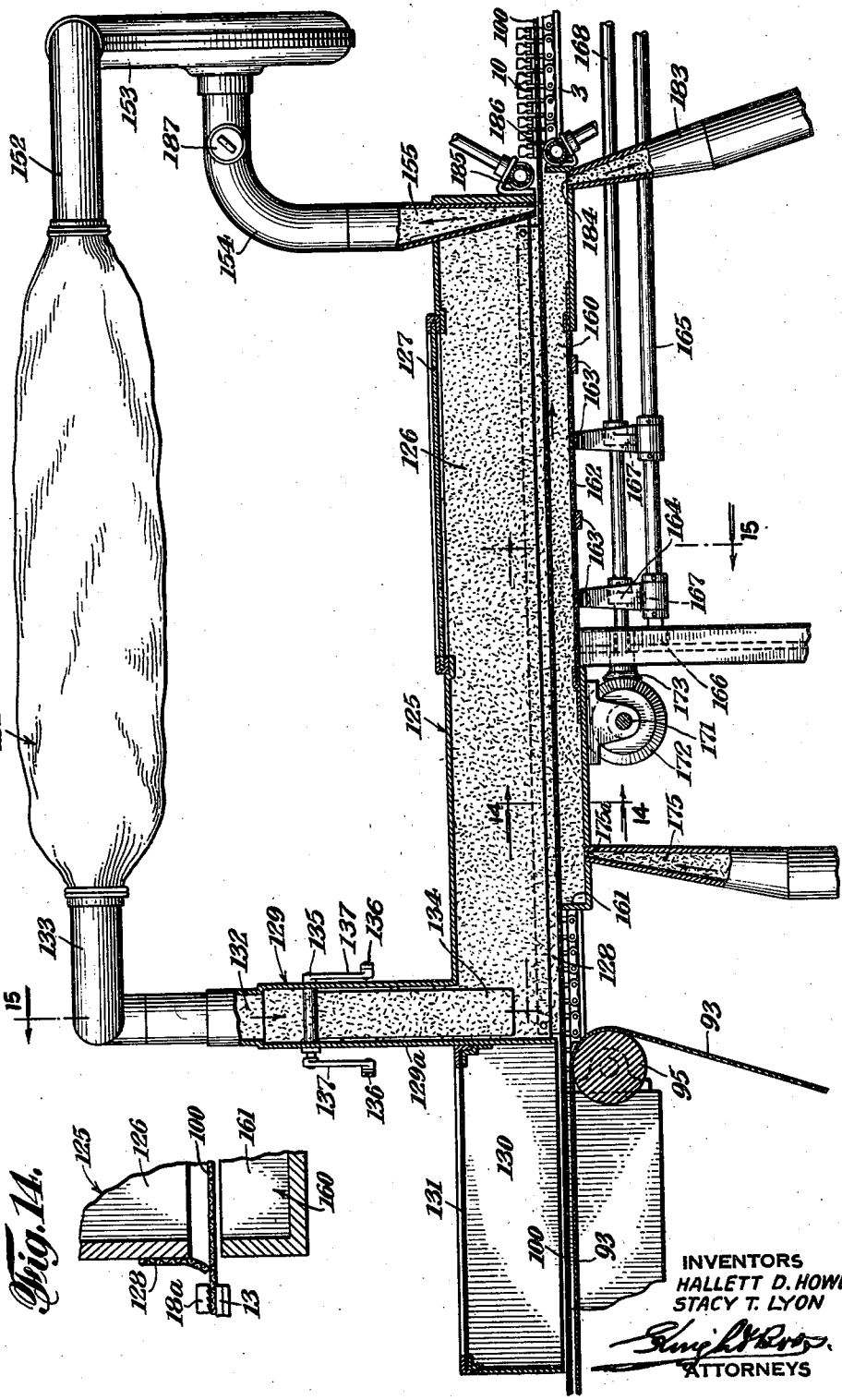

Fig. 13.

Fig. 14.

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STENCIL PRINTING AND FLOCKING MACHINE

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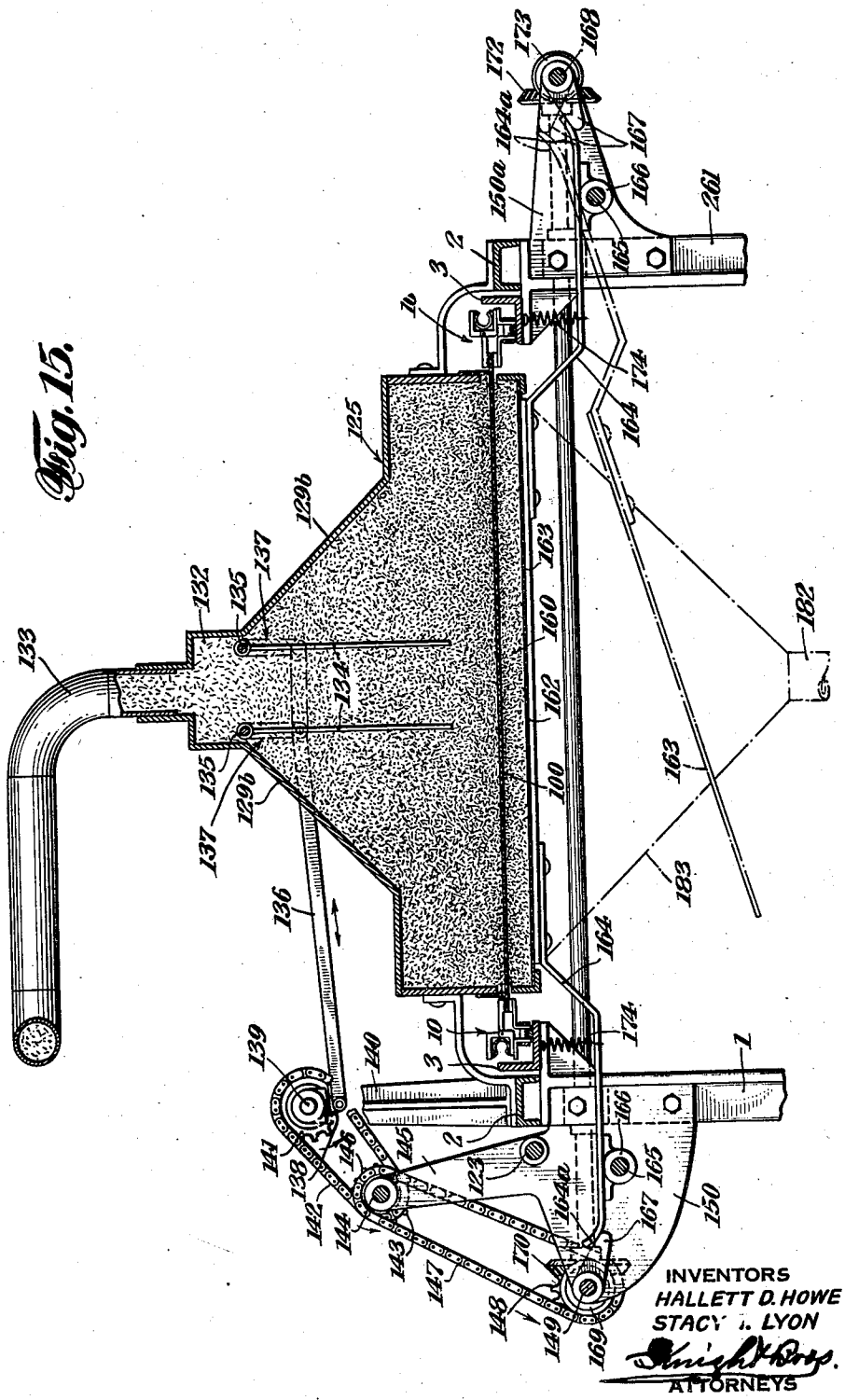
Fig. 15.



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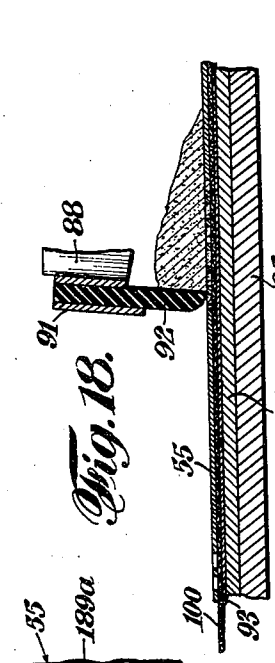

Fig. 18.

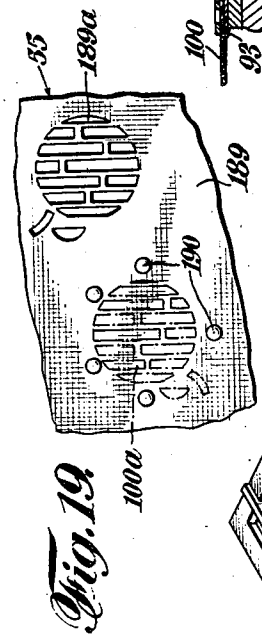

Fig. 19.

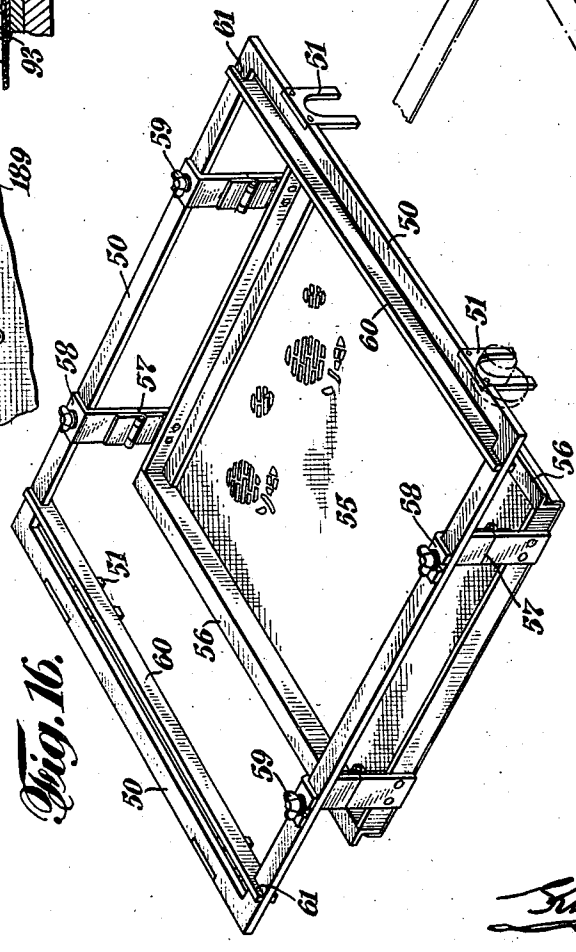

Fig. 16.

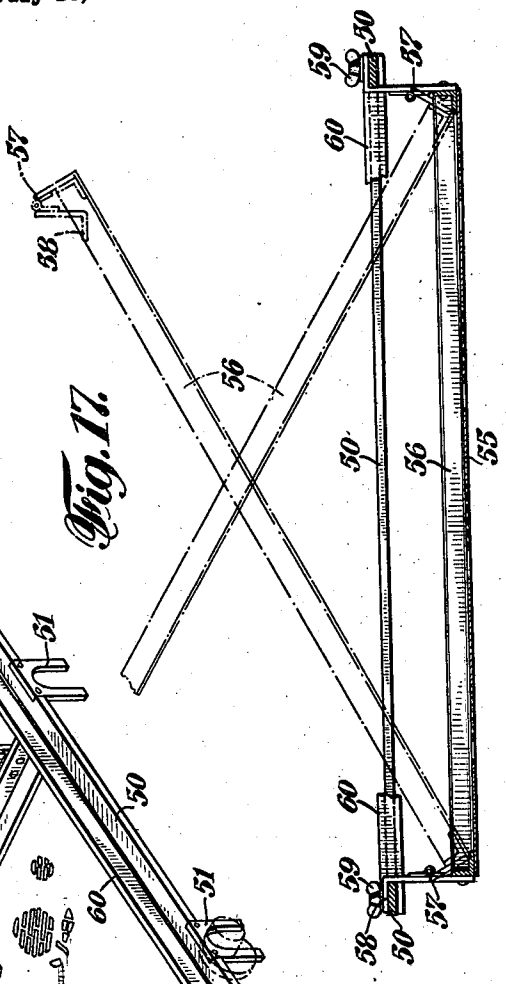

Fig. 17.

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STENCIL PRINTING AND FLOCKING MACHINE

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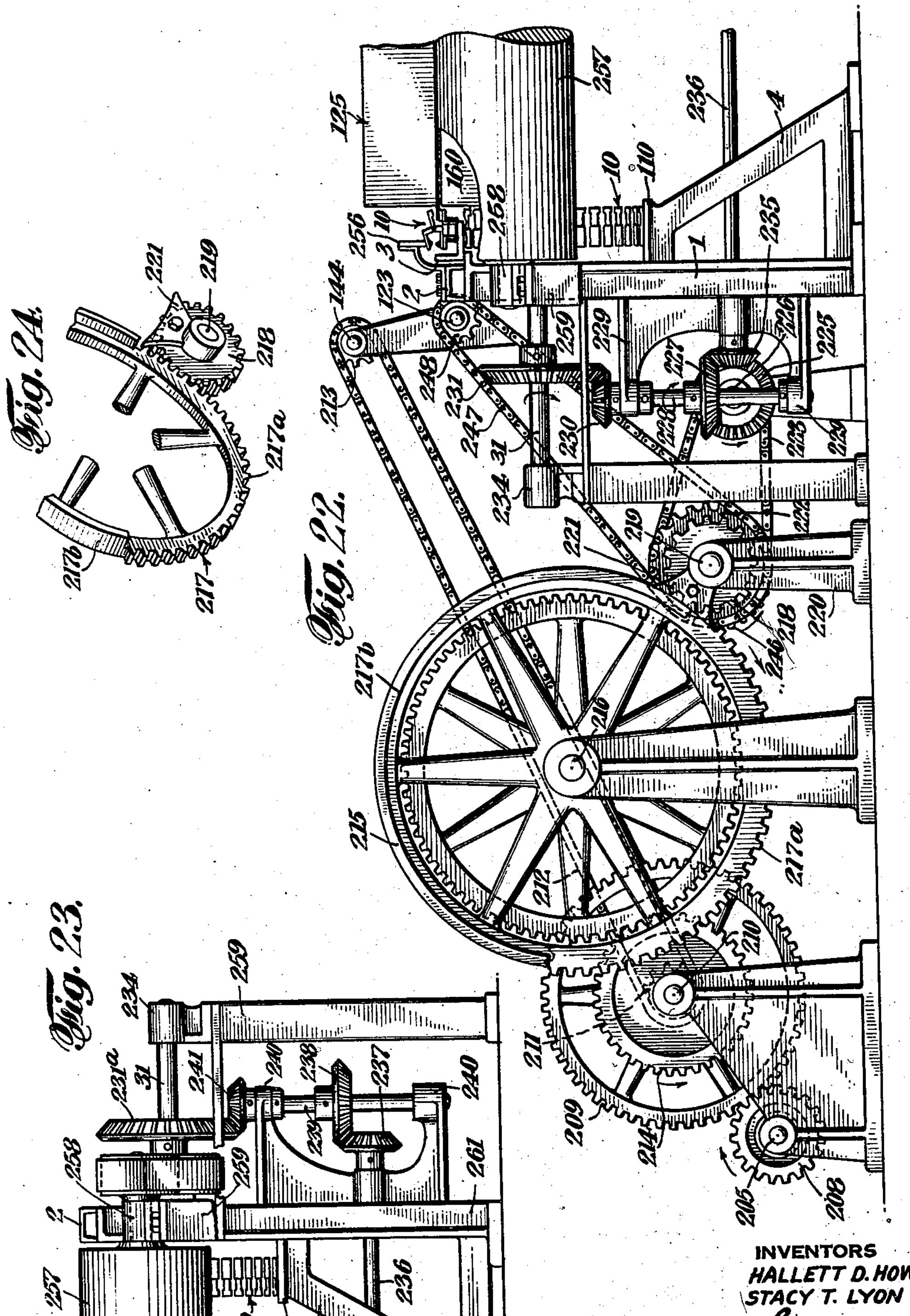

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STENCIL PRINTING AND FLOCKING MACHINE

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Fig. 26.

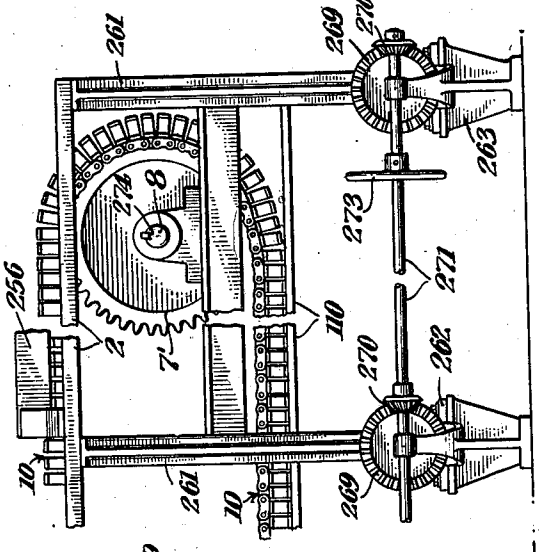


Fig. 27.

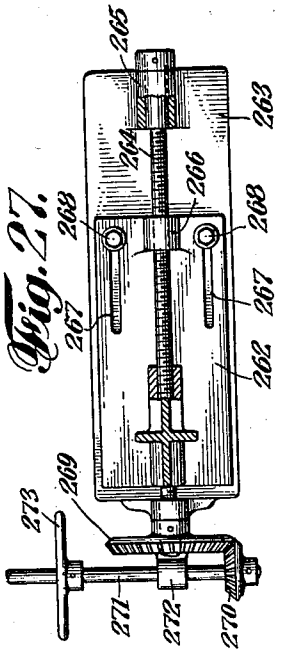
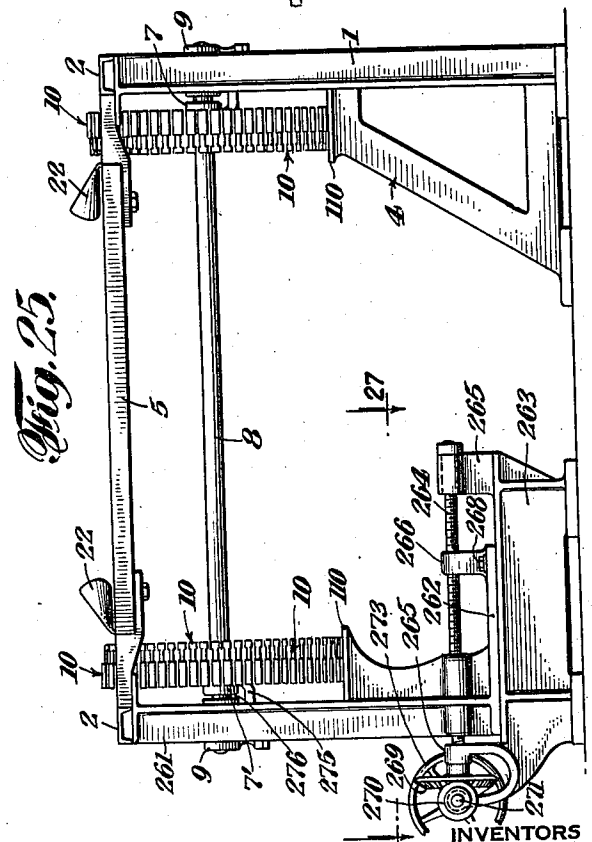


Fig. 25.



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Patented Oct. 15, 1935

2,017,459

UNITED STATES PATENT OFFICE

2,017,459

STENCIL PRINTING AND FLOCKING MACHINE

Hallett D. Howe, North Adams, and Stacy T. Lyon, West Roxbury, Mass.

Application July 16, 1932, Serial No. 622,844

40 Claims. (Cl. 101—115)

The present invention, which relates to improvements in stencil printing machinery, has for its main object the production of such a machine that will be capable of producing registered stencil impressions in two or more colors upon any suitable material.

Two or more stencil printing mechanisms are arranged to operate simultaneously upon progressive sections of a web or other suitable form of material to be decorated, the stencil designs of the several stencils being complementary parts of each other or of the complete design which is to be produced upon the work, and the impression from each of the stencils being applied to the material in proper registered relation to all other parts of the design, whether applied first or at subsequent operations. Several stencil printing mechanisms are preferably arranged to be operated by a common operating mechanism and with relation to material feeding mechanism which moves the material intermittently one step or station at a time so as to successively present each section of the work material in position for the operation of each stencil mechanism. In this way the several stencil mechanisms will operate simultaneously upon successive sections of the web or other form of work material, the relative timing of the operations of the feed mechanism and stencil printing mechanisms being such that the plural stencil printings are accomplished while the work is at rest and the feed takes place while the stencil printing mechanisms are out of action, the extent of feed being accurately determined to ensure registry between the successively applied stencil impressions.

The improved stencil printing mechanism is employed for decorating in one or more colors any suitable material such as a textile fabric or paper in the form of a web or successive sheets, the ink or pigment used being selected with due regard to the material printed upon and the effect it is desired to produce. In its simplest form the machine is arranged to produce a plurality of registering impressions with a suitable ink or pigment, but in the preferred development of the improved machine there have been added suitable mechanisms for applying an additional ornamental finish to the stencil impressions made upon the work. This additional ornamentation may be by means of an ornamental dust or powder of any suitable kind, but has been demonstrated from a practical standpoint as a flock printing machine.

When the improved machine is combined with flock applying mechanism, a flocking unit is preferably provided to act upon the material after each of the stencil printing units with which arrangement a plurality of stencil printing and flocking units can be arranged to produce flocked stencil impressions of a plurality of colors, the successive impressions registering and the successive applications of different colored flocks being applied to the successive stencil impressions.

In the stencil printing and flocking development of this invention arrangements have been made to apply the ornamental powder or flock to both surfaces of the material being decorated, the ink or pigment of stencil impressions being forced through the material (which in this case is a textile material) so as to receive the ornamental flock on both surfaces, the flock adhering to the glue or sticky ink or pigment and drying thereon to produce a permanent ornamentation. In the flock applying units the flock or other ornamental dust or powder is spread over the upper and lower surfaces of the work after each stencil impression has been made and by the application of suitable air blasts and suction devices the drying action is started and the flock is caused to adhere to the sticky impression surfaces and the surplus of the ornamental flock or other powder is drawn from the work material and returned in the stream of flock laden air through the pumps or blowers to be again scattered over the surfaces of the succeeding stencil impressions.

The improved machine is illustrated in the accompanying drawings as a combined stencil printing and flocking machine.

In said drawings

Figure 1 is a diagrammatic side elevation of the improved machine showing the entire assembly including a plurality of stencilling and flocking units and the controlling and operating mechanism;

Figure 2 is a side elevation, on a larger scale, of the feeding-in end of the machine, extending to section line A—A of Figures 1, 2, and 3;

Figure 3 is a side elevation of an intermediate part of the machine showing the first stencilling unit and the blowing-in or flock introducing end of a flocking unit, extending from line A—A to line B—B of Figures 1, 2, 3, and 4;

Figure 4 is a side elevation of another part of the machine showing the suction or discharge end of the first flocking unit and a portion of the second stencil unit, extending from line B—B of Figures 1, 3, and 4;

Figures 4*a* and 4*b* are fragmentary sectional

views taken respectively on the lines 4a—4a and 4b—4b of Figure 4, showing the feeding means for the bed-protecting paper;

Figure 5 is a side elevation of the drive and delivery end of the machine extending beyond the final stencil and flocking units of Figures 3 and 4;

Figure 6 is a plan view of the feeding-in end or part of the machine shown in Figure 2; this view shows the means for guiding the selvage edges of the web of material (to be printed) into the bite of the endless chain of grippers;

Figure 7 is a transverse sectional view taken on the line 7—7 of Figures 2 and 6 showing the idler sprockets at the feeding-in end;

Figure 8 is a transverse sectional view taken on the line 8—2 of Figures 2 and 6 showing the supporting track bar and the grippers-controlling cam bar;

Figure 9 is an enlarged detail perspective view of a gripper chain element;

Figure 10 is a vertical longitudinal sectional view of the stencil unit shown in Figure 3;

Figure 11 is a fragmentary part of the same view showing only the stencil, bed plate and means for relatively moving them;

Figure 12 is a vertical transverse sectional view of the stencil unit taken on the line 12—12 of Figure 10;

Figure 13 is a vertical longitudinal sectional view of the flocking unit shown in Figures 3 and 4;

Figure 14 is a fragmentary vertical transverse sectional view taken on the line 14—14 of Figure 13;

Figure 15 is a vertical transverse sectional view of a flocking unit taken on line 15—15 of Figure 13;

Figure 16 is a detail perspective view of a stencil frame carrying a removable stencil;

Figure 17 is a detail longitudinal sectional view of a stencil and frame showing by dot and dash lines, positions of the stencil partly raised in the act of removing it for changing or cleaning;

Figure 18 is an enlarged fragmentary vertical longitudinal sectional view showing the doctor blade in action upon a first impression stencil;

Figure 19 is a fragmentary plan view of stencil used to make second impressions;

Figure 20 is an enlarged detail sectional view through a stencil printing mechanism for a second or subsequent impression in registry with and while protecting previous impressions from injury;

Figure 21 is a diagrammatic view of the arrangement of designs and bed openings for a series of stencils and stencil beds for producing a three color design;

Figure 22 is an end elevation of the main driving mechanism at one side of the delivery end of the machine;

Figure 23 is a fragmentary end view of part of the driving means at the other side of the delivery end of the machine;

Figure 24 is a fragmentary perspective view of the Geneva movement forming part of the intermittent main driving mechanism;

Figure 25 is a detail end view showing the means for varying the width of the machine to suit different widths of material to be printed;

Figure 26 is a fragmentary side elevation of part of same;

Figure 27 is a sectional detail plan view taken on line 27—27 of Figure 25;

Figure 28 is a sectional detail view taken on line 28—28 of Figure 5 showing control means for the stencil doctor operating motor;

Figure 29 is a diagrammatic detail view showing the cycle of operations.

Gripper chain feeding mechanism

In the form of machine shown in the drawings, the feeding mechanism has been designed to feed a continuous web of textile material through the successive stencil printing and flocking mechanisms. For the purpose of handling such textile material with sufficient accuracy to register the complementary impressions of the successive stencil printing mechanisms, the machine is provided with two endless chains of grippers travelling over suitable guide tracks and sprockets with the grippers presented inwardly to engage the selvage edges of the textile web to properly spread it out and convey it through the machine.

The machine as shown comprises the side frames made up of braced uprights 1 connected at top by the angle iron side rails 2 upon which are mounted the track bars 3 for the gripper feed chains 10 and certain other parts of the machine. These machine side frames also carry the track bars 110 for supporting the return run of the gripper chains, and are further properly braced and secured to the floor in the usual manner, one form of such bracing being illustrated at 4 in Figures 22, 23, and 25. The machine may be adjustable in width as hereinafter explained.

At the feeding-in end of the machine a table 5 is mounted upon the flanged plates 6 supported upon and projecting inwardly from the top rails 2. These flanged plates 6 are cut away to permit the idler sprocket wheels 7, 7' and the gripper chains carried thereby to pass freely from below on opposite sides of the receiving table 5. The idler sprocket wheels 7, 7' are freely journalled upon the transverse shaft 8 carried in bearing blocks 9 supported upon auxiliary frame bars secured to and extending between the first two uprights 1 at each side of the machine.

Two parallel endless chains 10 of grippers pass around the idler sprocket wheels 7, 7' and present the grippers inwardly at opposite edges of the table 5. These gripper chains extend the whole length of the machine for the purpose of engaging the selvage edges of the web of textile material at the feeding-in end and gently spreading the material longitudinally and transversely over the receiving table and conveying the spread out material by intermittent steps through the several operating mechanisms. The endless gripper chains 10 are made up of continuous series of automatic grippers such as shown specifically in Figures 8 and 9 of the drawings, in which the cheek links or plates 11 and 12 of the inner and outer pairs of links are both formed with integral laterally projecting flanges 11a or 12a; each of the inwardly projecting flanges 11a or 12a carrying a rubber faced pad 13 constituting the lower jaw of a gripper, while on each of the outwardly projecting flanges 11a or 12a is riveted a base plate 14 formed with parallel upwardly presented ears or lugs 15, a rear angular stud 16 and parallel upwardly presented pins 17. Pivotally mounted between the ears or lugs 15 is the upper gripper jaw 18 having a longitudinally grooved inner face 18a presented toward the lower rubber faced fixed gripper jaw 13. Each upper gripper member 18 has an upwardly and rearwardly projecting heel member 19 formed with a downwardly presented angular lug

20; a C-shaped leaf spring 21 being confined between base plate 14 and heel member 19 by the studs 16 and 20 and pins 17 to hold the movable gripper closed against the fixed gripper with a yielding pressure. The inner cheek links 11 are joined in fixed pairs by the tubular pivot members 11b upon which are freely journalled the anti-friction chain-supporting rollers 11c which run upon the driving and idling sprockets and the directing track bars 3. The outer cheek links 12 embrace adjacent ends of pairs of inner links 11 and pivotally couple with them by means of pivot pins 12b fixed at one end in one cheek link 12 and extending through tubular pivot members 11b and fastened in openings in the other cheek link 12 by one of the usual spring keys, such as 12c.

22—22 are opposite curved selvage guides secured above the side edges of the table 5 through which the selvage edges of the web of textile material are threaded. These guide members 22 are presented at converging angles just in front of the two endless gripper chains 10 as they move upwardly over the idler sprocket wheels 7. The gripper chains 10 pass from the sprocket wheels 7 with their heel members 19 presented beneath the inwardly inclined overhanging cam bars 23 which are mounted upon the top rails 2 by means of brackets 24. Below the brackets 24 are the inclined guide rails 25 supported from the top side rails 2 by means of brackets 26, said guide rails 25 engaging the gripper chain links beneath the outer flanges 12 to guide the endless chains inwardly from their idler sprockets 7 to a point beyond the intersection of the lines of open grippers with the selvage edges of the material to be treated. With the edges of the material presented between the open jaws of the grippers, as the material is fed forwardly by the chain of grippers, the gripper tail members 19 pass from beneath the cam bars 23 to permit the springs 21 to close the grippers upon the selvage edges of the material. From the points of engagement of the grippers with the material the chains of grippers are led outwardly or caused to diverge slightly by reason of the engagement of the gripper links with the track bars 3 that start in beyond the outwardly inclined gripper guiding members 27 supported on the side frames by brackets 28. This action is made clear in Figure 6 of the drawings. To ensure against the accidental vertical displacement of the gripper chains from the track bars 3, the angle iron side rails 2 have secured to their inner faces the angle iron guide rails 29 which are presented just above the outwardly projecting link flanges 12 as shown particularly in Figure 12 of the drawings.

The endless chains of feeding grippers pass horizontally over the guiding track bars 3 in a horizontal plane throughout the length of the machine, (rollers 11c running on track bars 3), said chains passing adjacent to the delivery end of the machine over the driving sprockets 30 which are mounted upon a rotary shaft 31 journalled in bearings 32 of the machine side frames and the auxiliary bearing posts 234 hereinafter referred to. This sprocket carrying shaft 31 is suitably geared to the power driven mechanism hereinafter referred to by which the gripper chains are intermittently moved for carrying the work through the machine in successive steps for the action of the stencil printing and flock applying mechanisms.

The feed chains, having taken hold of the selvage edges of the web of textile material which is to be decorated, pass with the web from the feeding-in end of the machine to the first station at which is located the first stencil printing mechanism which will now be described.

Stencil printing mechanism

The stencil printing mechanism preferably employed in the present machine comprises a relatively movable work supporting impression bed and printing stencil supported respectively below and above the plane of feed of the material and acted upon and controlled by suitable means for moving them together upon the work at the time the impression is to be made.

The stencil printing bed below the path of the work is indicated particularly in Figures 10, 11, and 12 of the drawings, the bed being indicated at 35 in the form of a rigid plate or table on which is supported a pressure plate or platen 36 preferably of fibre board. The bed 35 is bolted at 37 to the horizontal arms 38 of the inwardly presented angle iron frame members 39 which are secured by bolts 40 to the adjustable side bars 41 from which the impression bed is suspended.

The bed supporting bars 41 rest upon four eccentrics indicated at 42, 42 and 43, 43, each eccentric 42 being fixed to a short shaft 44 journalled at 45 in a bearing bracket 46 projecting upwardly from the machine side frame; while each eccentric 43 is similarly mounted upon a short shaft 47 journalled in a bearing 48 of a bracket 49 upon the machine frame.

50 is a rectangular frame provided with downwardly presented forked guides 51 adjacent its four corners, which guides straddle and move vertically upon the four short shafts 44, 44 and 47, 47, above referred to. Each of these shafts carries, adjacent to a forked guide member 51, an eccentric 52 or 53 presented beneath a side member of the frame 50 so as to support said frame and move the same vertically when the eccentrics are moved. It will be observed that the eccentrics 42 and 52 are arranged exactly oppositely upon the short shafts 44 and that the eccentrics 43 and 53 are arranged exactly opposite upon the short shafts 47 with the result that the impression bed supported through its frame by eccentrics 42, 42 and 43, 43, will be raised when the printing stencil, supported through its frame by eccentrics 52, 52 and 53, 53, is lowered, and vice versa.

The stencil plate or screen proper, indicated at 55, is mounted upon a suitable rigid frame, preferably of angle iron formation as shown at 56, which is supported from its two opposite ends by hinged link members 57 having their lower links rigidly attached to the stencil frame 56 and their upper links formed with outwardly presented angular flanges 58 which rest upon the frame 50 and are secured in the desired adjusted position thereon by means of bolts and wing nuts indicated at 59. By reason of the described mounting of the stencil screen 55 within the frame 50 such screens can be readily removed for cleaning or for changing the design to be printed. Figure 17 indicates in dot and dash lines possible positions of the stencil when removing it, after disengaging the supporting hinged link members 57 from the frame 50.

60, 60 indicate track bars formed with bifurcated opposite ends 61 in engagement with the frame 50, as shown particularly in Figure 16 of the drawings. There is a track bar 60 mounted on each side of the stencil supporting frame 50, said track bars being engaged above and below

by rollers 62 journalled upon studs 63 projecting outwardly from the brackets 64 which are in turn secured by bolts 65 to the vertical slides 66 in the lower ends of which the upper roller studs 63 also engage. The rigidly connected brackets 64 and slides 66 constitute vertically movable side frames for supporting and operating the ink manipulating doctor, moving it periodically into and out of its operative relation with the stencil. Each of these slides 66 is vertically dovetailed at 67 upon a horizontally travelling block 68 operating in and guided upon a housing 69 supported at opposite ends upon the upper ends of the upwardly projecting brackets 70 mounted on the machine frame. In the end walls of each of these housings 69 is journalled the bearing ends of a double or reversing feed screw 71. These feed screws 71 are geared to operate in unison by the miter gears 72 upon the projecting rear ends of their bearing shafts, which miter gears mesh with corresponding gears 73 keyed to the opposite ends of a coupling shaft 74 journalled in bearing bracket 75 projecting from the housings 69. These feed shafts 71 are threaded through and drive the blocks 68 above referred to for causing these blocks 68 to carry the doctor supporting frame from one end to the other of the screw supporting housings.

One of the feed screws 71 has secured to its journal shaft upon the end and opposite the miter gear 72 a sprocket wheel 76 which is driven by a sprocket chain 77 operated by electric motor 78 which is automatically controlled to throw it into and out of operation by the means hereinafter described.

Stud bolts 80 are mounted in the opposite brackets 64 to pivotally support the vertically extending members 81 alongside of the brackets 64, each member 81 having between its ends a transverse slot 82 concentric with the pivot bolts 80 through which convenient access is afforded for mounting a screw bolt 65 which connects a bracket 64 with a member 66. The upper end of each member 81 carries an anti-friction roller 84 freely journalled upon a stud 85 and presented beneath a pressure track bar 86 supported at its ends by angle bars 87 projecting up from the stencil supporting frame 50.

Embracing the lower end of each of the pivotally mounted doctor supporting members 81 is an angular boxing 88 freely mounted upon a bolt 80 and having side walls 89 through which project adjusting screws 90 in position to engage members 81 to determine the position of the blade carrying boxing with reference to the supporting members 81. The members 88 at the lower ends of members 81 are connected by plates 91 set at a slight angle to receive the rubber doctor blades 92 that are fastened thereon with their lower edges presented just above the stencil plate for rubbing the ink or pigment through the interstices of the stencil.

The action of the doctor mechanism when the feed screws 71 are caused to rotate is to move the blocks 68 longitudinally of the machine with the result that anti-friction rollers 85 will first engage the angular shoulders on pressure bars 86 for shifting the doctor carrying levers 81 rearwardly of the direction of movements of the blocks and then by the engagement of the thick portion of the pressure bars 86 force the doctor mechanism downwardly with one of the doctor blades in rubbing contact with the stencil plate. The amount of pressure applied by the doctor blade to the stencil plate is determined by the adjusting screws 90 at the side of the boxing on which the doctor blade is in action. It will be understood that the doctor blade moves from one end to the other of the stencil plate carrying the body of ink or pigment with it and rubbing sufficient of the same through the interstices of the design to make the desired impression upon the work. The control of the motor hereinafter referred to is such that the doctor blade will make one complete stroke from end to end over the stencil and then stop. When the motor is again started the blade will be shifted to place the second blade in action and the first out of action and the movement will be in the reverse direction to the other end of the stencil. The body of surplus ink or pigment is carried back and forth over the stencil between the two doctor blades which alternate in action, the ink being always in printing position ahead of the active doctor blade.

It will be noted that the web of cloth or other material indicated at 100 supported laterally by the gripper chains is presented between the impression bed 35, 36 and the printing stencil 55 in which position gripper chains stop and the web of material is at rest.

Bed-protecting web

Extending over the fibre base plate 36 is a web 93 of protecting paper or other suitable material, which passes from a supply roll supported in standards 94 over an idler roll 95 beneath the web of work material 100 and down to a take-up roll 97 mounted on an axle 98 which rests in inclined guide slots 99 of a pivotally mounted supporting frame 101. Weighted cords or bands 102 attached to the machine frame pass over the projecting ends of the axle 98 to give the take-up roll 97 a downward pressure against the friction roll 103 by which the take-up roll 97 is supported and rotated as it builds up. One end of the shaft of the winding friction roll 103 carries a sprocket wheel 104 over which operates a sprocket chain 105 driven by a sprocket wheel 106 carried upon one end of a shaft 107 journalled in bracket bearings 108 on the inner faces of the machine side frames and extending from side to side of the machine. This transverse shaft 107 carries adjacent to the side frames the sprocket wheels 109 which mesh with and are driven by the sprocket chains which carry the cloth engaging grippers, the chains in this position being reversed or upside down and on the return inactive run of the grippers in which the gripper tail members 19 slide upon the return horizontal track bars 110 of the machine frame.

A scraper blade 111 is supported in the hook bracket arms 112 to incline toward and rest upon the protecting web of paper 93 to scrape from the web any excess of paint or ink that has passed from the design applied to the work material 100. The action of the scraper removes surplus foreign matter from the protecting paper as it is wound up.

The described arrangement and operation of the protecting web of paper is such that when the endless chains of cloth carrying grippers are at rest there will be a portion of the protecting paper 93 beneath the work material in readiness for the stencil printing operation. When the controlling driving mechanism acts to shift the work material by causing the feed grippers to travel, the protecting web of paper will be moved in the direction opposite to the feed of the work to wind up upon roll 97 the section of paper that was beneath the stencil impression just made and

present a new section of paper in position to protect the bed from the next stencil printing operation.

The stencil and impression bed are moved together prior to each stencil printing operation by the rotation of the four short shafts 44, 44, and 47, 47, carrying the eccentrics 42, 42, 43, 43, 52, 52, 53, 53, above described. Each of these four shafts carries adjacent to its bearing (45 or 48), a sprocket wheel 113 over which operates a sprocket chain 114 driven from a sprocket wheel 115 on short shaft 116 carrying a second sprocket wheel 117 around which extends a sprocket chain 118 driven by a sprocket wheel 119 on the shaft 120 which extends transversely from side to side of the machine frame. There are two shafts 120 for each stencil printing mechanism, one connecting the two eccentric carrying shafts 44 through chains and sprockets and the other connecting the two eccentric carrying shafts 47 in the same way. Two of the sprocket carrying shafts 116 are provided at one side of the machine with worm gears 121 which are in constant mesh with and are driven by the worms 122 mounted upon the shaft 123 journalled in bracket bearings 124 secured to one of the side frames of the machine and extending from the first stencil printing station to the power end of the machine where it is suitably geared to said power mechanism for causing the periodic operation of the stencil printing mechanism.

After the web of work material has received a stencil impression and the stencil and bed have been moved apart the endless chains of grippers are again thrown into action and move the printed section of the material away from the first printed station and a new section of the work material into position to receive a stencil impression. As the printed material moves forwardly it is brought under the influence of the flock applying mechanisms which constantly operate and comprise in their preferable form the following construction.

Flock applying mechanism

Referring particularly to Figs. 13, 14, and 15 of the drawings it will be observed that the web of work material passes from the first stencil printing mechanism into a flocking box 125 having a top opening 126 normally closed by a glazed cover member 127. The bottom of the box 125 is open and the side edges are provided with felt strips 128 which are designed to engage the upper face of the work material just inside of the conveying chains of grippers.

129 is a flock supply box or chamber extending transversely of the flocking box 125 and opening into the box through the top wall at its receiving end. The rear wall 129*a* extends inwardly to a point just above the path of the material 100 closing off from the main flocking box 125 a small enclosure 130 having a textile material top 131, open at bottom to the material 100 and serving as a means for confining any surplus flock that passes from the flocking box beneath wall 129*a* under the pressure of the flock circulating air current, thereby restricting as far as possible the escape of the flocking material into the air of the work room. This flock distributing box 129 is formed with inclined diverging side walls 129*b* which extend from the rectangular chamber 132 to which the blower pipe 133 is coupled.

In the portion 132 of the box 129 are mounted the flock distributing veins or plates 134 depending from short shafts 135, upon a projecting end of each of which is mounted a rock arm 137 connected through pitman 136, with crank arms 138 mounted upon opposite ends of a short shaft 139 journalled in the upper end of the bracket 140 secured to one of the side frames of the machine. This shaft 139 carries a sprocket wheel 141 driven by sprocket chain 142 from the sprocket wheel 143 on shaft 144 journalled in the upper ends of brackets 145 and extending longitudinally of the machine to a point where it carries on its rear end a sprocket wheel 213 driven by the power mechanism in the manner hereinafter referred to. By the mechanism described the parallel veins or plates 134 are oscillated from side to side of the box 129 to distribute the flock forced in by the blower which maintains a circulation of flock laden air through the flocking box 125 in the manner presently to be explained. The shaft 144 carries a second sprocket wheel 146 driving a sprocket chain 147 and sprocket wheel 148, the latter being mounted upon a shaft 149 journalled in bracket bearings 150. Shaft 149 also carries one of the tappet arms 167, hereinafter referred to, and a miter gear 169 meshing with and driving a similar gear 170 on the end of transverse shaft 171 geared at its opposite end through miter gears 172, 173, to the driven shaft 168 extending longitudinally of the machine on the side opposite shaft 149.

The air pipe 133 communicates with an air relief or breathing bag 151 interposed between the air pipe 133 and the outlet air pipe 152 of the centrifugal blower 153. The blower 153 has a central air inlet pipe 154 leading up from a suction box 155 mounted in the outlet end of the flocking box 125. This suction box 155 is extended laterally of the box 125 and has at its lower end a narrow suction slit that is presented just above the path of the cloth so as to draw away from the cloth all surplus flock that has not adhered to the tacky surface of the flock stencil impression upon the work. It will be observed from the described construction that the flock is introduced and spread at the receiving end of the flocking box 125 and the surplus flock drawn out at the delivery end.

The centrifugal blower 153 is directly geared to an electric motor 156 mounted on an upright standard 157 suitably supported from the machine frame. While the circulation of the flock laden air by centrifugal pump is preferably continuous it will be understood that by suitable controlling means the flock circulation can be intermittent. The best results, however, have been found to result from a continuous operation of the circulation of flock, even during the period when the web of cloth is at rest.

In addition to the arrangement above described for applying flock or other ornamental dust or powder to the stencil impressions on the upper surface of the cloth, means are also provided for applying flock to the exposed under faces of the stencil impressions, the ink or pigment employed in making such impressions being of the required consistency to pass through the interstices of the cloth and produce the design of the impression on the under surface as well as on the top surface.

160 is the bottom flocking box extending from side to side beneath the path of the work web and having terminal walls or lips 161 which rise to points just below the web path. The bottom of this flocking box 160 is partly formed of a textile fabric 162 across which extends a plurality of beater arms 163 mounted upon rock arms 164 pivotally mounted on shafts 165 in bracket arms

166. Each of these arms 164 has a rearwardly projecting heel 164a which is intermittently engaged by a tappet 167, two of which are carried by the shaft 168 journalled in the brackets 150a and the others of which are mounted on the shaft 149 above referred to.

Each of the arms 164 is connected through a spring 174 with the machine frame to retain the beater arms 163 normally up against the textile bottom of the flocking box 160 and allow the rotating tappets 167 to intermittently force them away from the box 160 and then suddenly release them to allow the springs to snap them back against the textile bottom for scattering and floating the excess flock in the bottom flocking box.

Entering the bottom of the flocking box 160 is a flock supplying head or nozzle 175 extending transversely of the box 160 and having a narrow inlet slot 175a. The head or nozzle 175 is coupled with an air blast pipe 176 communicating through the lower breathing bag 177 with the blower pipe 178 leading from a second centrifugal blower 179 driven by the electric motor 180 mounted on the standard 181. The inlet pipe 182 of the second blower leads from a suction head or nozzle 183 presented in a transverse slot 184 in the bottom of the flocking box 160 at its delivery end. By these means air laden flock is circulated through the box 160 and caused to adhere to the tacky undersurface of the stencil impression, the surplus flock being drawn out at the delivery end of the box.

Arranged transversely of the machine both above and below the path of the web of textile material are the perforated air pipes 185, 186 communicating through suitable hose with a supply of air under pressure, the purpose of these perforated pipes 185, 186 being to assist in clearing from both the upper and lower faces of the web of material the remaining excess of loose flock that has not adhered to the stencil impressions.

At the start of the operation a quantity of loose flock is placed in the flocking boxes 150 and 160 through the glazed door 127. As the process proceeds and it is found that additional flock is needed it is possible to add small quantities through openings in the blower pipes 154 and 178 normally closed by the screw plugs 187.

The successive flocking stations (each having upper and lower flocking boxes) may apply a different colored flock to each of the complementary stencil impressions, and the flock applied to the upper surface of the printed work may be the same or a different color from the flock applied to the under surface of the work.

As hereinbefore stated the plan of the improved machine provides for the use of any desired number of stencil printing mechanisms (within reason) each followed by a flocking mechanism when flock printing is to be produced or when it is desired to produce registered stencil printing in which the successive stencil designs are complementary of each other, the stencil printing process with a different color for each stencil impression may be carried out without the use of the flocking mechanism.

In the above description the details of a single stencil printing mechanism followed by upper and lower flocking mechanism have been explained. The textile web passing from the flocking mechanisms would normally enter the second stencil printing mechanism as indicated in Figure 4 of the drawings. In fact, in Figure 1 there is shown diagrammatically a general plan of the improved machine in which there are three stencil printing mechanisms each followed by an upper and lower flocking mechanism. It will be understood that the several stencil printing mechanisms are in general of the same construction and also that the flocking mechanisms are arranged as above described as upper and lower mechanisms for applying flock to both the upper and lower printed surfaces of the textile web.

In Figure 18 the operation of the doctor upon the ink or pigment in spreading it over the stencil to produce stencil impressions is illustrated more or less diagrammatically, these parts acting as they do in making a first impression or an impression from the first stencilling mechanism. 35 indicates the improved bed, 36 the fibre pressure plate or platen, 93 the protecting paper web, 100 the web of work material, 55 the stencil, and 92 the doctor blade.

Figure 19 shows in plan a fragment of a stencil design for a second impression.

Registry of plural stencil impressions in two or more colors

The present invention includes an important improvement with reference to the registry of complementary stencil designs of successive stencil printing mechanisms, whether in a single color or two or more colors, this feature being illustrated particularly in Figures 20 and 21 of the drawings. In Figure 20 the fibre stencil bed 188 is shown beneath the paper web 93, the textile work web 100, and a wire stencil 189, all of these parts being shown in section and exaggerated as to size for more plainly representing the important features. The form of stencil shown in Figure 20 is for making a second or third stencil impression in registered relation with a previously printed impression or impressions, the idea being to depress the previously printed and flocked part of the design to avoid injuring it with the stencil for the subsequently applied impressions. In carrying out this idea the fibre bed stencil 188 is formed with holes or recesses 188a cut into or through it upon the general plan or arrangement of the stencil impressions applied prior to the impression of the particular stencil under consideration, as shown in Figure 20. In addition to providing the fibre bed with recesses or holes, the undersurface of the new stencil 189 is provided with small lugs or protuberances 190 so arranged with regard to the previous impressions, one of which is indicated roughly at 100a, that the material 100 will be depressed into the holes 188a and the stencil plate 189 will thereby be held out of contact with the work material in the regions of the previous impressions. When the stencil and bed are brought together in the position shown in Figure 20 the doctor rubs the ink or pigment across the surface of the stencil and forces it through the stencil openings indicated at 189a to imprint additional complementary impressions upon the cloth 100 in proper registered relation with the previously formed impressions.

In the series of diagrammatic representations in Figure 21 of the drawings, 191 is the plan of a stencil for a first impression showing an arrangement of small circles 192 which are intended to indicate parts of a complementary design made up by subsequently employed stencils. Beneath is the plain impression plate 193 which supports the cloth in receiving the impressions from stencil 191. At 194 is shown a second impression stencil with indications at 195 of parts of the design which will complement the impressions of stencil 191 or in other words is provided with

parts of a composite design which will register with the previously formed design from stencil 191. The stencil 194 may be printed in a second color. At 196 is shown an impression bed in which there are recesses or holes at 197 arranged to receive the previously printed cloth and permit the depression of design parts 192 when the stencil 194 is moved into place for printing. At 198 is a third form of stencil arranged with design parts 199 that will register and fit between the previously impressed designs of stencil 191 and 194. The impressions from this third stencil 198 may be made in a third color differing from the first and second impressions. At 200 is the plan of an impression plate having a series of recesses or openings 201 arranged to permit the depression of previous impressions from both stencil 191 and 194 when the third stencil 198 is pressed downwardly for the final stencil impression. In this connection it will be understood that the stencils 194 and 198 are provided with lugs in proper arrangement in their under faces to depress the parts of the cloth into the bed depressions to correspond with the previously made stencil impressions.

Operating mechanism

The driving and controlling mechanism is illustrated particularly in Figures 5, 22, 23, and 24. 205 is the main power shaft journalled in suitable upright bearing frames and receiving its power from the driving belt 206 acting upon belt pulley 207. Shaft 205 carries a driving gear 208 which meshes with and drives a larger gear 209 upon an intermediate constantly driven shaft 210 suitably journalled in the frame members and carrying at its inner end a sprocket wheel 211 from which extends a sprocket chain 212 operating over a sprocket wheel 213 upon the shaft 144 above referred to.

Adjacent to its opposite ends the intermediate shaft 210 carries two gears 214 which mesh with and drive two large gears 215 mounted upon a third shaft 216 suitably journalled in the power supporting frame. This shaft 216 carries at its rear end a large mutilated gear 217 having a gear segment 217*a* and a smooth rim segment 217*b*. This large mutilated gear 217 constitutes the driving part of a Geneva movement, the said gear segment 217*a* being arranged to intermittently engage and drive a small gear 218 mounted upon a short shaft 219 journalled in standards 220. The driven gear 218 also carries the stop segment 221 which at the completion of each driving operation of segment 217*a* upon gear 218 comes into engagement with the smooth rim 217*b* and holds the shaft 219 against motion while the mutilated gear 217 completes its rotation. It will be understood that when the smooth rim 217*b* passes the stop segment 221 the gear segment 217*a* will again come into active engagement with the driven gear 218.

The shaft 219 referred to also carries a sprocket wheel 222 driving a sprocket chain 223 which operates a sprocket wheel 224 upon a short shaft 225 which carries a miter gear 226 meshing with and driving a similar gear 227 upon a vertical shaft 228 journalled in bracket bearings 229 projecting from the side frame of the machine adjacent to its delivery end. The vertical shaft 228 has at its upper end a miter gear 230 meshing with a larger miter gear 231 upon the projecting shaft 31 upon which the main driving sprockets 30 of the endless gripper chains are mounted. This shaft carrying the sprockets is journalled at its opposite ends beyond the main side frames of the machines in the standard bearings 234. The gear 227 upon shaft 228 also meshes with and drives a bevel gear 235 on the end of a transverse shaft 236 which is suitably journalled near its ends in bearing brackets upon the machine side frames. At its opposite end the shaft 236 carries a bevel gear 237 driving a similar gear 238 on a vertical shaft 239 journalled in bearing brackets 240 and carrying at its upper end a bevel gear 241 which meshes with the second bevel gear 231*a* on the sprocket carrying shaft 31.

The shaft 216 of the driving mechanism also carries a mutilated gear 242 having the oppositely arranged gear segments 242*a* and 242*b* which periodically engage and drive the gear 243 upon a short shaft 244 journalled in upright bearings 245. This shaft 244 carries at its opposite end a sprocket wheel 246 driving a sprocket chain 247 which operates upon and drives a sprocket wheel 248 upon the rear end of the shaft 123 above referred to.

The shaft 216 also carries a controlling wheel 249 having a raised segmental portion 249*a* running in peripheral contact with a roller 250 journalled in an arm 251 carried by a spring pressed shaft 252 journalled in an upright 253. This shaft 252 also carries a contact arm 254 designed to intermittently engage and operate an automatic switch 255 which controls the circuit for the electric motor 78 above referred to which drives the feed screws 71 of the doctor mechanism.

Referring to Figure 29 it will be observed that the cycle of operations under the described controlling and driving mechanism is graphically indicated;—the sectoin *a* of the circle indicating the proportion of each complete cycle that the endless chains of grippers are moving with the work material. The section *b* indicates the period for the lowering of the stencil and raising of the impression bed preparatory to making a stencil impression; the section *c* of the cycle represents the period during which the motor 78 is operating for moving the doctor blade from one end of the stencil to the other while the section *d* indicates the period after the completion of the stencil impression when the stencil is raised and the impression bed is lowered just prior to a succeeding movement of the gripper chains carrying the work material.

As heretofore explained the flocking or dusting mechanisms operate constantly, the flock being applied to both the upper and the lower surfaces of the stencil impressions after each stencil printing as long as they are within the influence of the flock laden air currents.

As the cloth conveying gripper chains reach the delivery end of the machine the cam rails 256 on the machine side frames engage the gripper heels and hold the grippers in open position while the freed web of the completed work is guided clear of the grippers and passes out over a delivery roll 257 freely journalled at 258 in the auxiliary frame 259. The released grippers pass down around their driving sprockets 30. The web of finished material is draped in long loops as it passes the roller 257 by means of the usual rack and supporting rods one of which is indicated at 260.

It may be desirable sometimes to construct the improved stencil printing and flocking machine with an extensible or adjustable frame to adapt the machine for operation upon different widths of material. For this purpose one of the side frames may be constructed as illustrated in

Figures 7, 25, 26, and 27 of the drawings, according to which each upright 261 of the side frame is provided with a supporting base 262 resting upon a braced base frame 263 upon which it is moved inwardly or outwardly by means of an adjusting screw 264 rotatably mounted and held against longitudinal motion in the bearing arms 265 projecting up from the base 263. Each adjusting screw 264 is threaded through an upright lug 266 projecting from the base 262, said base being slotted at 267 for the reception of screws 268 which pass through said slots and are threaded into the base 263. The screw and slot arrangement permits the adjustment of the side frame upon the base and the clamping of the same in the desired adjusted position.

It is proposed to arrange such an adjustment for each one of the upright frame members of one of the side frames, each of the adjusting screws 264 carrying at its outer end a bevel gear 269 meshing with and driven by a small gear 270 keyed to a long longitudinal shaft 271 which is journalled in bracket arms 272 and carries at intervals the hand wheels 273 by which shaft 271 is manually rotated by two or more men stationed from end to end of the frame that is to be adjusted.

To permit such an adjustment the idler sprocket wheel 7' at the adjustable side of the machine frame is preferably splined upon the shaft 8 as indicated at 274, a bracket arm 275 being secured to the side frame adjacent to the bearing 9 to engage the grooved collar 276 of the sprocket 7' to cause said adjustable sprocket to be moved upon its supporting shaft with the lateral adjustment of the side frame.

In addition to the adjustment explained in detail, it will be understood that a number of the parts of the machine will have to be changed to suit a change in width of the machine. For instance, the feed table 5 would be removed and a different size of table to suit the adjusted condition would be mounted in its place. Likewise many other parts of the machine would have to be changed or adjusted to suit the new condition. Such adjustments are of common practice in the art so that the idea for adapting the machine for different widths of material will be understood without further elaboration as to the necessary changes.

We claim:—

1. The combination with suitable work feeding mechanism, of a stencil printing mechanism, and means for applying flock to both the upper and lower faces of stencil impressions.

2. The combination with suitable work feeding mechanism, of a plurality of successively arranged stencil printing mechanisms, and means for applying flock to both the upper and lower faces of said stencil impressions.

3. The combination with suitable work feeding mechanism, of a plurality of complementary stencil printing mechanisms, means for registering stencil impressions on the work, and means for applying flock to both the upper and lower faces of said stencil impressions.

4. The combination with suitable feeding mechanism for work material, of a stencil printing mechanism adapted to apply impressions through said material, and means for applying flock to the exposed impressions on both the upper and lower faces of said printed material.

5. In an apparatus of the character described, the combination with suitable work feeding mechanism, of a stencil printing mechanism comprising the relatively movable frames carrying respectively a stencil and an impression bed, shafts carrying oppositely arranged eccentrics supporting said frames, one position of said eccentric carrying shafts presenting the stencil and bed in their close operative relation and another position of said shafts presenting the stencil and bed in spaced inoperative position, and means for rotating said shafts in unison.

6. In an apparatus of the character described, the combination with suitable work feeding mechanism, of a stencil printing mechanism comprising the relatively movable frames carrying respectively a stencil and an impression bed, shafts carrying oppositely arranged eccentrics supporting said frames, one position of said eccentric carrying shafts presenting the stencil and bed in their close operative relation and another position of said shafts presenting the stencil and bed in spaced inoperative position, depending guides upon said stencil carrying frame engaging and guiding upon said shafts, and means for rotating said shafts in unison.

7. In an apparatus of the character described, the combination with suitable feeding mechanism, of two successively arranged stencil printing mechanisms, each comprising a relatively movable stencil and impression bed, one of said stencils having work-engaging lugs upon its under side in direct relation to the stencil design.

8. In an apparatus of the character described, the combination with suitable feeding mechanism, of two successively arranged stencil printing mechanisms, each comprising a relatively movable stencil and impression bed, one of said stencils having work-engaging lugs upon its under side in direct relation to the stencil design, and the cooperating stencil bed having recesses cut in its impression surface in cooperative relation to said lugs.

9. In an apparatus of the character described, the combination with suitable feeding mechanism, of a plurality of successively arranged stencil printing mechanisms having complementary stencils and each comprising a relatively movable stencil and impression bed, the stencil of the last of the succession of printing mechanisms having work-engaging lugs upon its underside in direct relation to the complementary stencil designs of the preceding printing mechanisms.

10. In an apparatus of the character described, the combination with suitable feeding mechanism, of a plurality of successively arranged stencil printing mechanisms having complementary stencils and each comprising a relatively movable stencil and impression bed, the stencil of the last of the succession of printing mechanisms having work-engaging lugs upon its under side in direct relation to the complementary stencil designs of the preceding printing mechanisms, and the stencil bed of said last printing mechanism having recesses in its impression surface in cooperative relation to said lugs.

11. In an apparatus of the character described, the combination with endless sprocket chain work feeding mechanism, of a stencil printing mechanism having a stencil and an impression bed between which the work material is passed, a web of suitable protecting material presented between said bed and said work material, supply and take-up rolls for said protecting web, and means for operating said take-up roll including a sprocket meshing with and driven by the return run of said endless sprocket feed chain,

and a friction drum driven by said sprocket, the take-up roll with its web of protecting material resting upon and rotated by said friction drum.

12. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of an upper flocking chamber and a lower flocking chamber through which the work is passed, means for circulating flock laden air through said chambers, and means for directing the circulating flock laden air against the upper and lower surfaces of the work.

13. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of an upper flocking chamber and a lower flocking chamber through which the work is passed, and independent means for circulating flock laden air through each of said chambers.

14. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of an upper flocking chamber and a lower flocking chamber through which the work is passed, and independent power blowers for circulating flock laden air through said chambers, each of said power blowers having its blast and suction passages communicating respectively with the supply and exhaust ends of one of said flocking chambers.

15. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, a flock directing and distributing plate swinging in the supply end of said flocking chamber, and means for circulating flock laden air past said swinging plate through said chamber.

16. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, a pair of flock directing and distributing plates swinging transversely in the supply end of said flocking chamber, and means for circulating flock laden air between said swinging plates through said chamber.

17. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, an air circulating passageway communicating with the supply and delivery ends of said flocking chamber, flock directing and distributing plates swinging transversely in said passageway at the supply end of said flocking chamber, power driven means for operating said distributing plates, and means for circulating flock laden air through said passageway and flocking chamber.

18. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, means for circulating flock laden air through said chamber, said flocking chamber having a flexible bottom wall, and automatic beater arms arranged to periodically strike said bottom wall to maintain the flock in circulation and prevent it from settling on said wall.

19. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, means for circulating flock laden air through said chamber, said flocking chamber having a bottom wall of flexible textile fabric, automatic beater arms arranged to periodically strike said bottom wall to prevent flock settling on said wall, and cooperating springs and cams for forcing said beater arms against and away from said wall.

20. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, flock distributing plates swinging in the supply end of said flocking chamber, means for circulating flock laden air past said plates through said chamber, said flocking chamber having a flexible bottom wall, and automatic beater arms arranged to periodically strike said bottom wall to prevent flock settling on said wall.

21. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of an upper flocking chamber and a lower flocking chamber through which the work is passed, means for circulating flock laden air through said chambers, and upper and lower air blast devices adjacent the work outlets of said chambers to remove surplus flock from both upper and lower surfaces of the work.

22. In an apparatus of the character described, the combination with suitable work feeding mechanism, and a plurality of complementary work stenciling mechanisms, of a plurality of upper flocking chambers and a plurality of lower flocking chambers through which the work is passed, and means for circulating flock laden air through said chambers, and directing it against the upper and lower surfaces of said work, there being an upper and a lower flocking chamber adjacent to each stenciling mechanism.

23. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of an upper flocking chamber and a lower flocking chamber through which the work is passed, independent power blowers for circulating flock laden air through said chambers, each of said power blowers having its blast and suction passages communicating respectively with inlet and outlet ends of one of said flocking chambers, and work cleaning air blast pipes above and below the path of the work at the outlet ends of said flocking chambers.

24. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stenciling mechanism, of a flocking chamber through which the work is passed, and means for circulating flock laden air through said chamber including a power blower having its blast and suction passages communicating respectively with inlet and outlet ends of said flocking chamber, and a pressure relief "breathing" bag in the flock laden air circuit of said blower.

25. In an apparatus of the character described, the combination with suitable work feeding mechanism, including endless chains of grippers laterally engaging and supporting the work, and work stenciling mechanism, of a flocking chamber through which the work is passed, said flocking chamber having an open bottom designed to be closed by the work when operating, contact strips on the side walls of said flocking chamber adapted to engage the work inside of said feed

grippers, and means for circulating flock laden air through said chamber.

26. In an apparatus of the character described, the combination with stencil printing mechanism having a stencil and an impression bed between which the work material is passed, of an endless chain feeding mechanism comprising chain links having oppositely presented flanges, lower fixed gripper jaws upon the inwardly presented flanges, movable gripper jaws pivotally mounted upon the outwardly presented flanges, means for opening and closing said grippers, and means for driving said feeding mechanism.

27. In an apparatus of the character described, the combination with stencil printing mechanism having a stencil and an impression bed between which the work material is passed, of an endless chain feeding mechanism comprising chain links having oppositely presented flanges, lower fixed gripper jaws upon the inwardly presented flanges, movable spring pressed gripper jaws pivotally mounted upon the outwardly presented flanges, heel members projecting from said movable gripper jaws, and overhanging cam bars in the paths of said gripper heels for opening, holding open, and closing said grippers.

28. In an apparatus of the character described, the combination with stencil printing mechanism having a stencil and an impression bed between which the work material is passed, of an endless chain feeding mechanism comprising chain links having oppositely presented flanges, anti-friction rollers upon the chain link pivots, lower fixed gripper jaws upon the inwardly presented flanges, movable gripper jaws pivotally mounted upon the outwardly presented flanges, heel members projecting from said movable gripper jaws, gripper closing springs mounted between said outwardly presented link flanges and said gripper heels, overhanging gripper controlling cam bars in the paths of said gripper heels, and upper and lower tracks upon which said endless chains of grippers travel, said endless chains of grippers travelling upon said anti-friction rollers on their active run and upon said gripper heels upon their return or inactive run.

29. In an apparatus of the character described, the combination with suitable work feeding mechanism, of two successively arranged stencil printing mechanisms, and means associated with each printing mechanism for applying flock to both the upper and lower faces of the work.

30. In an apparatus of the character described, the combination with suitable work feeding mechanism, of two successively arranged printing mechanisms and independent upper and lower flock applying mechanisms associated with each of said printing mechanisms.

31. In an apparatus of the character described, the combination with suitable work feeding mechanism, of suitable printing mechanism, and independent upper and lower flock applying mechanisms associated with said printing mechanism.

32. In an apparatus of the character described, the combination with suitable work feeding mechanism, of two successively arranged stencil printing mechanisms, two upper flock applying mechanisms associated with said printing mechanisms, and two independent lower flock applying mechanisms also associated with said printing mechanisms.

33. In an apparatus of the character described, the combination with suitable work feeding mechanism, of a stencil printing mechanism comprising relatively movable frames carrying respectively a stencil and an impression bed, a removably mounted stencil, hinged links secured to said stencil and formed with members engaging said stencil carrying frame, and means for securing said links upon said carrying frame.

34. In an apparatus of the character described, the combination with suitable work feeding mechanism, and work stencilling mechanism, of a combined upper and lower flocking chamber through which the work is passed, said flocking chamber being divided into upper and lower chambers by the work when operating, independent means for circulating flock laden air through the upper and lower portions of said double flocking chamber, and independent means for directing flock laden air against the upper and lower surfaces of work passing through said chamber.

35. The combination with suitable work feeding mechanism, of a stencil printing mechanism, and flock applying means arranged respectively above and below the path of the work for applying flock to both the upper and lower faces of stencil impressions.

36. The combination with suitable work feeding mechanism, of a stencil printing mechanism, flock applying nozzles arranged respectively above and below the path of the work for applying flock to both the upper and lower faces of stencil impressions, and means for supplying flock laden air to said nozzles.

37. The combination with suitable work feeding mechanism, of a plurality of successively arranged stencil printing mechanisms, and flock applying members arranged respectively above and below the path of the work adjacent to each stencil printing mechanism for applying flock to both the upper and lower faces of stencil impressions.

38. The combination with suitable work feeding mechanism, of a plurality of successively arranged stencil printing mechanisms, flock applying nozzles arranged respectively above and below the path of the work adjacent to each printing mechanism for applying flock to both the upper and lower faces of stencil impressions, and means for supplying flock laden air to said nozzles.

39. In an apparatus of the character described, the combination with suitable work feeding mechanism, of two successively arranged stencil printing mechanisms, means associated with each printing mechanism for applying flock to both the upper and lower faces of the work, and flock circulating systems communicating with said flock applying means, said circulating systems being separate for the respective printing mechanisms.

40. The combination with suitable work feeding mechanism, of a plurality of successively arranged complementary stencil printing mechanisms, a plurality of flock circulating systems, each system associated with only one printing mechanism, and a plurality of flock applying devices for applying flock to both the upper and lower faces of said stencil impressions.

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