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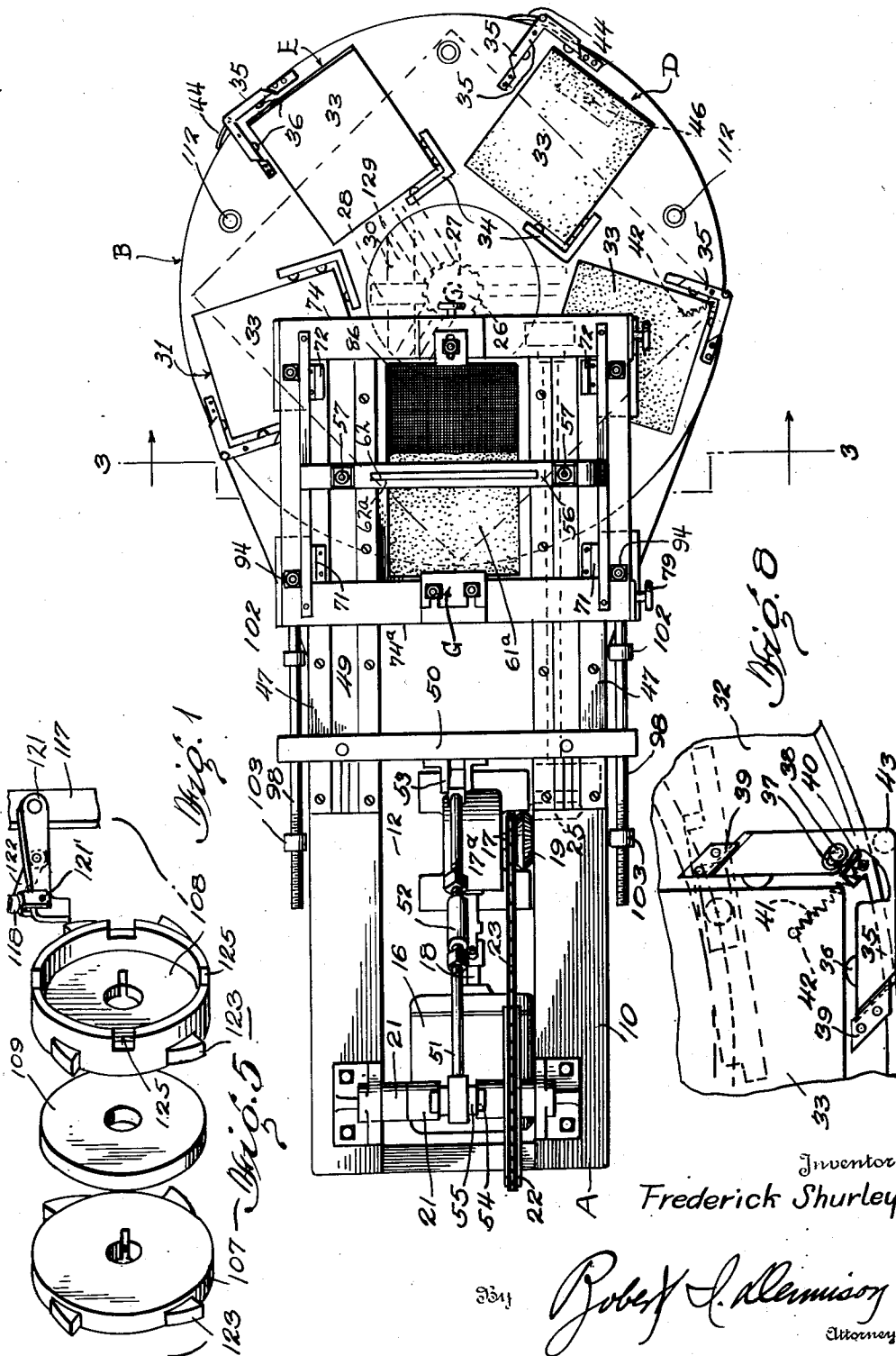
F. SHURLEY

2,229,346

MULTICOLOR PRINTING MACHINE FOR GLASS, METAL, AND THE LIKE

Filed April 27, 1938

5 Sheets-Sheet 1



Jan. 21, 1941.

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2,229,346

MULTICOLOR PRINTING MACHINE FOR GLASS, METAL, AND THE LIKE

Filed April 27, 1938

5 Sheets-Sheet 2

Fig. 2

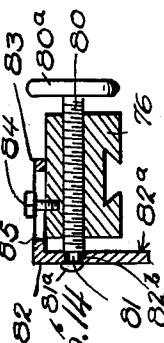
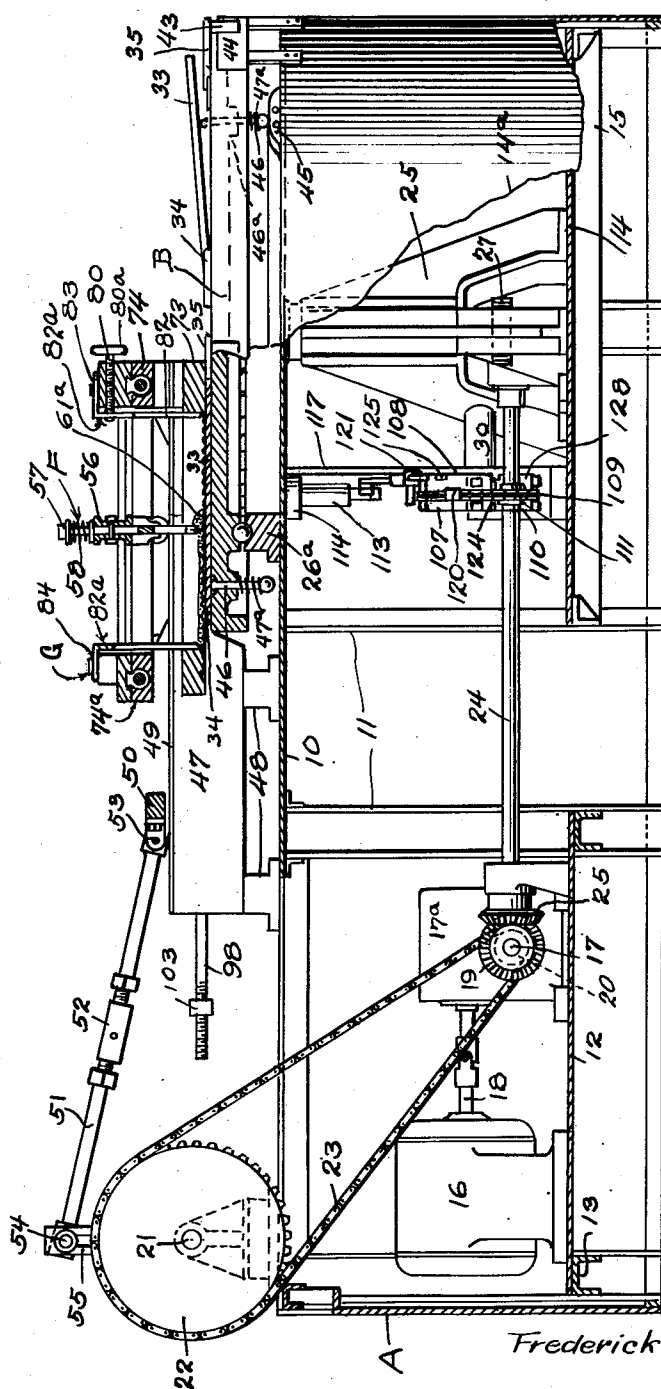
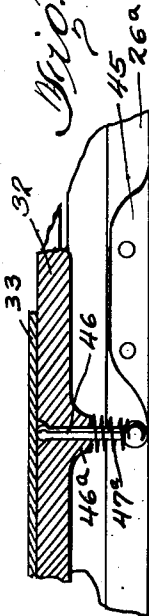


Fig. 9



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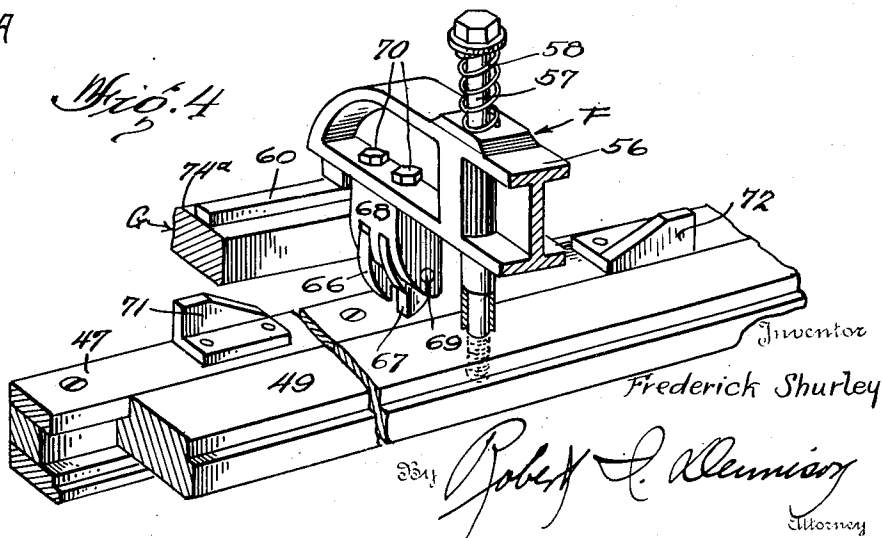
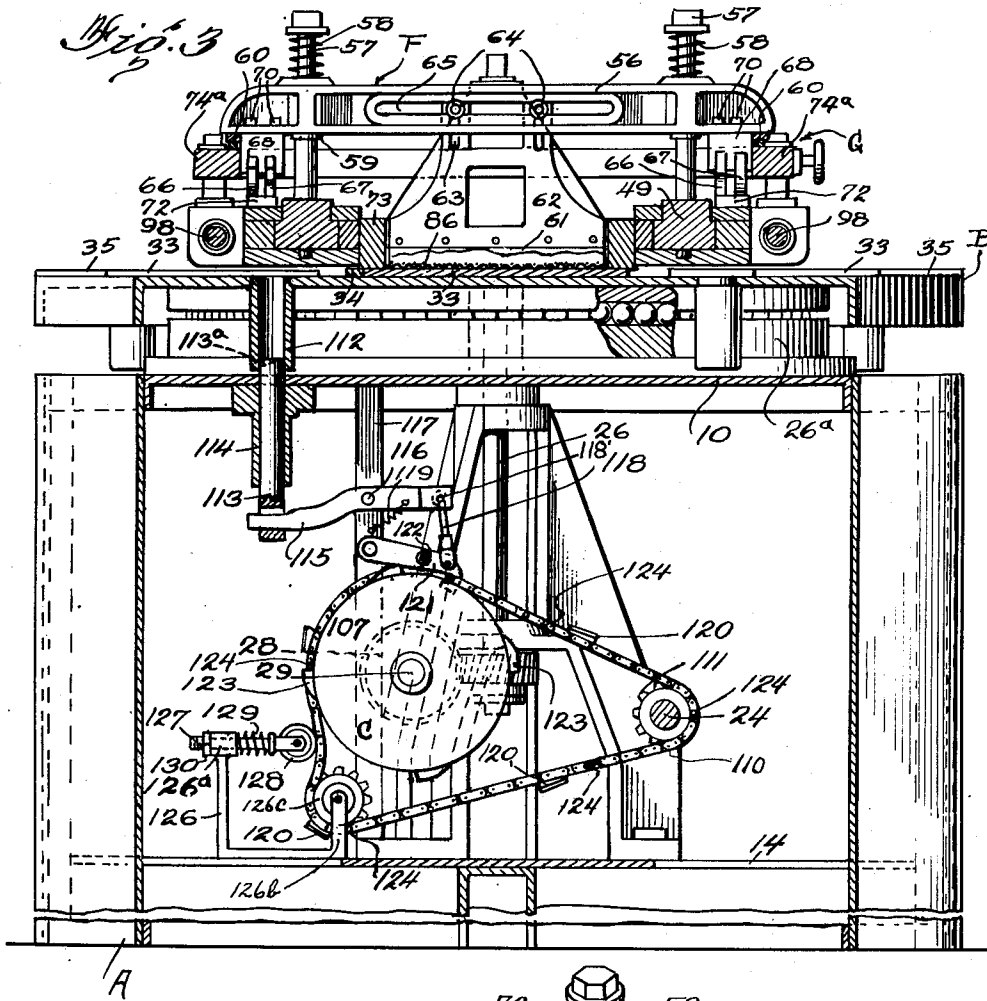
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MULTICOLOR PRINTING MACHINE FOR GLASS, METAL, AND THE LIKE

Filed April 27, 1938

5 Sheets-Sheet 3



Jan. 21, 1941.

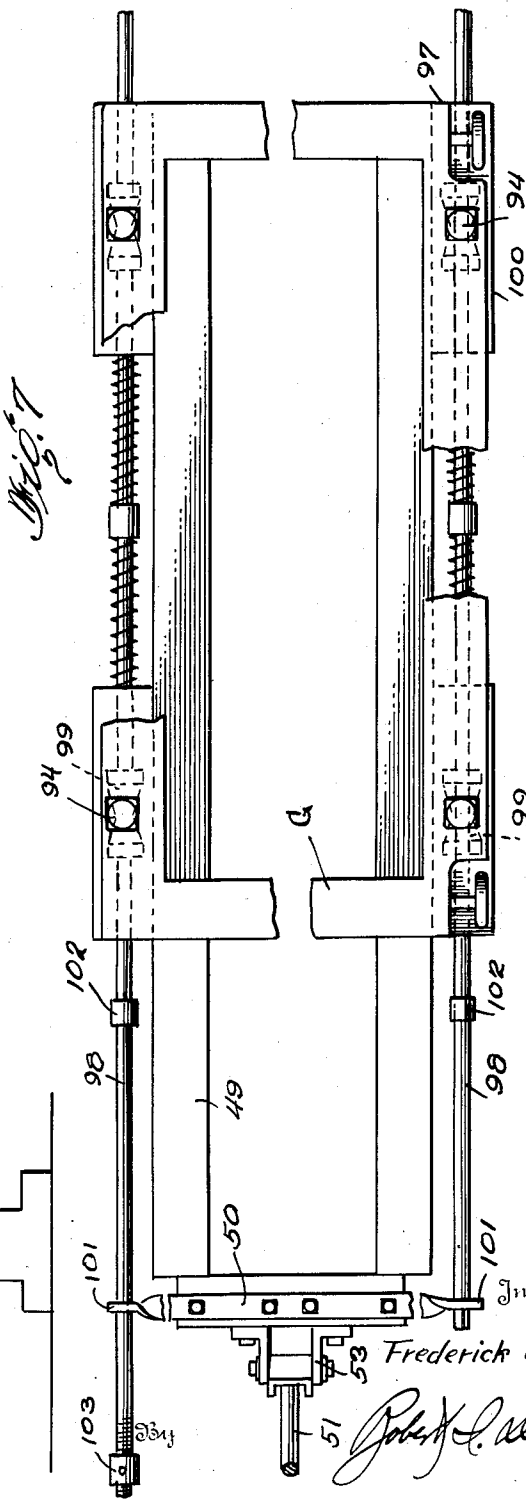
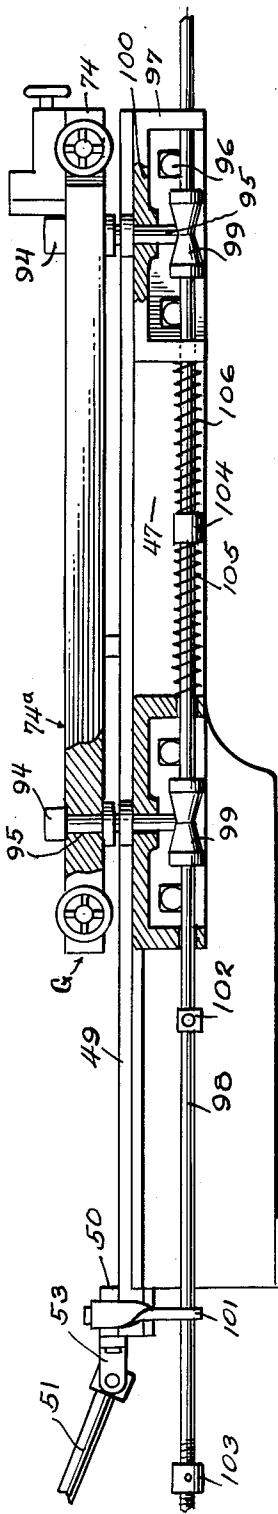
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MULTICOLOR PRINTING MACHINE FOR GLASS, METAL, AND THE LIKE

Filed April 27, 1938

5 Sheets-Sheet 4



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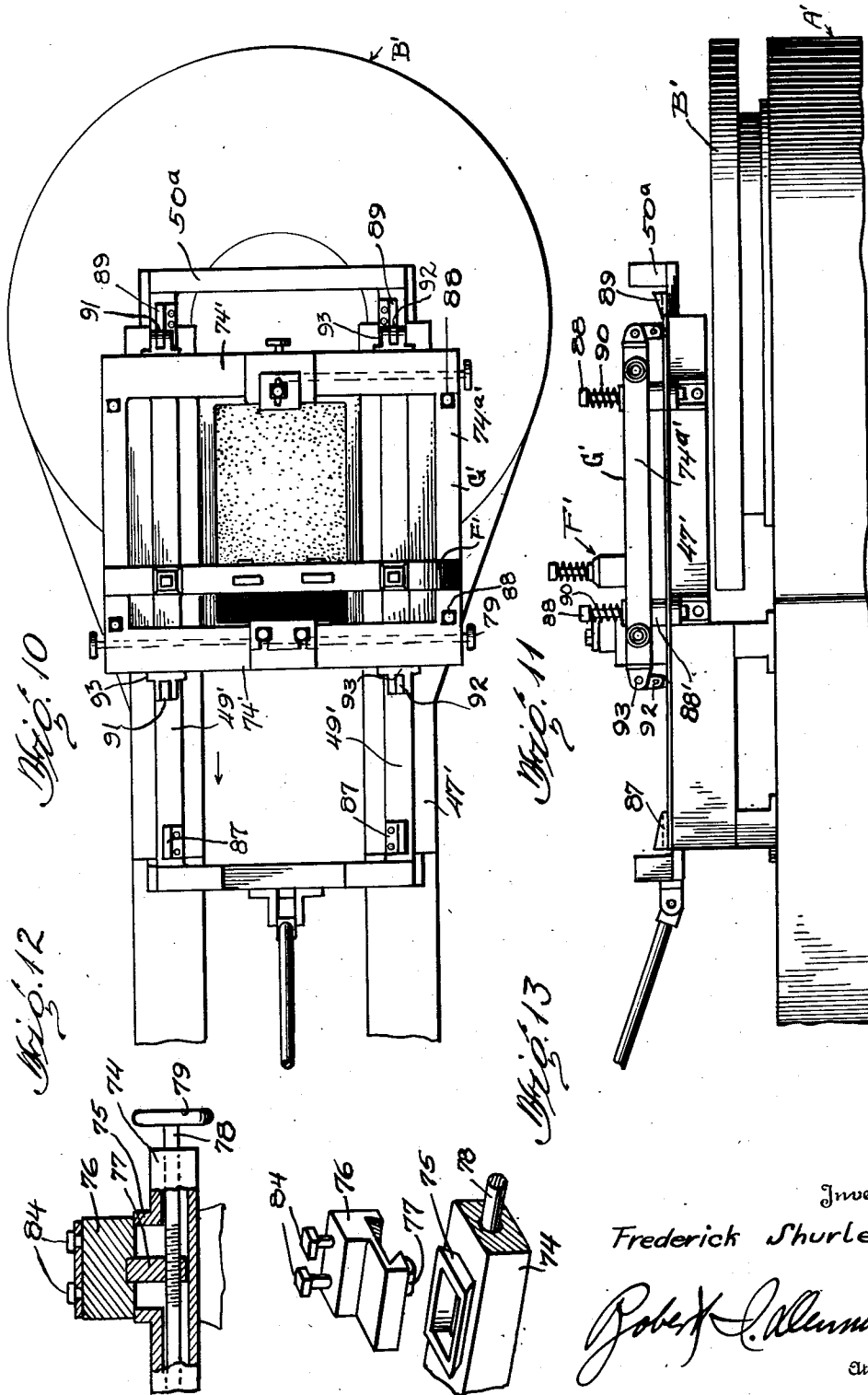
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MULTICOLOR PRINTING MACHINE FOR GLASS, METAL, AND THE LIKE

Filed April 27, 1938

5 Sheets-Sheet 5.



UNITED STATES PATENT OFFICE

2,229,346

MULTICOLOR PRINTING MACHINE FOR
GLASS, METAL, AND THE LIKE

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Application April 27, 1938, Serial No. 204,653

11 Claims. (Cl. 101—123)

This invention relates to multicolor printing machines for glass, metal and the like.

An important feature of the invention is to devise a means for printing, illustrating, embossing, coating articles, such as metal, glass, cardboard, leather, Celluloid and similar materials in flat sheets or panels by means of a screen, stencil, or other plates. It has particular reference to a machine for printing on flat sheets of glass, metal, cardboard, fibre veneer, wood and similar panels. The flat panels formed of the materials suggested are supplied with a design, trade-mark or other insignia which may be permanent, semi-permanent, or substantially so.

Another feature of the present invention involves the construction in a printing machine which allows the work sheets to be charged and discharged from an intermittently rotatable printing table in properly timed relation with the printing mechanism so as to produce an economical and practical design on the sheets to be printed.

Another feature of the present invention is to provide a machine which carries out the printing operation in properly timed relation with the movements of the printing table so that the design may be printed upon the sheets on each stroke of the reciprocating printing carriage.

Still another feature of the present invention is to provide automatic gripping abutments on the carrier table to release and grip the panels to be printed so as to facilitate the charge and discharge of the panels to be printed with economy and dispatch.

A further feature of the present invention is to provide a machine having an adjustment for the stencil or screen so that various colors may be used in the same design without interfering with the registration of the outline of the design.

Another feature of the present invention is to devise a machine that is automatic in the action of rotating the table and locking the said table in a predetermined position during the printing operation and in further providing a releasing means which releases the locking means to allow the table to revolve to the next succeeding printing station where the next panel is printed or coated.

Further objects of the invention are to provide a machine of the character referred to that is strong, compact and durable, thoroughly reliable for its intended purpose, and comparatively inexpensive to manufacture and operate.

With the foregoing and other objects in view,

the invention consists of a novel construction, combination and arrangement of parts, as will be hereinafter more specifically described and illustrated in the accompanying drawings, and specifications wherein the preferred embodiment of the invention is shown, but it is to be understood that changes, variations, and modifications may be resorted to without departing from the spirit of the claims hereunto appended.

In the drawings wherein like reference characters indicate like parts throughout the several views:

Fig. 1 is a top plan view of the machine constructed in accordance with the present invention, and showing a work sheet in raised position at the discharge station.

Fig. 2 is a side elevation thereof having parts broken away showing the printing carriage and stencil cradle in a central, longitudinal, vertical section.

Fig. 3 is a transverse sectional view taken substantially on the plane of line 3—3 of Fig. 1 and looking in the direction of the arrows.

Fig. 4 is a fragmentary perspective view of a portion of the printing carriage and the stencil cradle.

Fig. 5 is an exploded perspective view of the parts of the Geneva gear and the locking pawl which hold the outer disks in locked position during the printing operation.

Fig. 6 is a side elevation of the adjusting frame of the stencil cradle having certain parts thereof broken away and with the lower stencil frame and the printing carriage removed.

Fig. 7 is a top plan view of the same stencil cradle with certain parts broken away, and with the lower stencil frame and printing carriage removed.

Fig. 8 is an enlarged top plan view of a portion of the carrier table with certain parts broken away and illustrating one of the automatic gripping abutments.

Fig. 9 is a vertical sectional view in detail of a portion of the carrier table showing the lifting plunger in retracted position prior to engaging the cam and raising the sheet at the discharge station.

Fig. 10 is a top plan view of a portion of the machine with certain parts removed and illustrating a modified form of the invention for lifting the printing cradle.

Fig. 11 is a side elevation of Fig. 10.

Fig. 12 is an enlarged detailed vertical section through the adjusting block and the end rail of the adjusting frame on the stencil cradle.

Fig. 13 is an exploded view showing the adjusting block and a portion of the end rail of the adjusting frame of the stencil cradle.

Fig. 14 is an enlarged central vertical section taken through the outer adjusting block showing the bearing connection between the adjusting screw and the outer extension neck.

Referring to the drawings in detail, it will be seen that the machine of the present invention includes an intermittently rotating carrier table B supported on the base A. On the carrier table B are a plurality of printing stations on which the work sheets are supported. The work sheets are moved one after another into printing position. A metal stencil or a fabric screen carrying the design to be applied to the work sheet, carried by the stencil cradle G drops on the work sheet and the printing carriage F reciprocates back and forth over the stencil causing the coloring material to penetrate the stencil or stencil screen and deposit on the work sheet. It will be seen as the parts are described in detail, that the printing carriage F reciprocates in timed relation to the intermittent movement of the carrier table B. Likewise, the stencil cradle moves up and down in timed relation to the movements of the carrier table so that the work sheets or panels will not be smeared as would happen in the case if the carrier table moved while the stencil was contacting the work sheet.

The base A which supports the parts of the machine includes a horizontal bed 10 supported on a plurality of legs 11. As the machine is designed for this explanation, the base is in the shape of a banjo or key and the bed 10 is flat. I prefer to build the base A of steel using such structural shapes that I find most suitable for the purpose. Under what may be designated the handle portion of the bed 10 is a horizontal platform 12 supported on cross beams 13, the ends of which are secured to adjacent legs 11; while under the round part of the bed 10 is another platform 14 secured to the leg braces 15, the ends of the latter being secured to contiguous legs 11. If desired, a sheet metal skirt 14^a may be secured to the legs and form sides to enclose the base.

Anchored to platform 12 is a driving motor 16 and a housing 17^a which contains the reduction gears, the latter being driven by the shaft 18 from the motor. A drive shaft 17 having a miter gear 19 and a sprocket wheel 20 fixed thereto extends from the side of gear housing 17^a. A crank shaft is journaled in a pair of bearing blocks anchored to the bed 10, and on the end of the crank shaft is fixed a sprocket wheel 22. Trained about the sprocket wheels 22 and 20 is a linked drive chain 23. On one end of a longitudinally extending shaft 24 is a miter gear 25 continuously meshing with gear 19, and the other end is journaled in a bearing on platform 14. The one end of the shaft 24 is journaled in a bearing on platform 12 and the shaft extends from one platform 12 to the other platform 14.

The legs of a pedestal bearing 25 are bolted to platform 14. In the bearing 25 is journaled the vertical shaft 26 on the upper end of which is fixedly mounted to rotate therewith an intermittently rotating circular work-carrying table B disposed on a horizontal plane above the bed 10. Table B is supported at the margins by ball bearing 26^a which is circular in configuration and the lower race thereof is mounted on bed 10. On the lower end of shaft 26 is a gear 27 which meshes with a gear 28 on the one end of the shaft 29 which is connected with the Geneva gear C to

be presently described. The intermediate portion of shaft 29 is journaled in a sleeve bearing 30 on one of the legs of the pedestal bearing 25.

On the carrier table B are a plurality of equidistantly spaced printing stations 31 and for the purpose of explaining the invention, five of such stations are illustrated and described. While the invention is adaptable to three or more stations, it has been found that five stations operate very efficiently in practice permitting discharge at one station D and loading at the next succeeding station E, while work in one of the three remaining intermediate stations is being operated upon by the printing mechanism to be described later. It is believed that a description of one printing station 31 will give a clear understanding of the others since they are all the same.

For printing rectangular blank sheets 33, each station has one fixed flat angular-shaped abutment 34 fastened on the table top 32, and another automatically movable angular gripping abutment 35 both of which coact to grip the rectangular work sheet 33 at diagonally opposite corners. On the legs of the abutments 34 and 35 are yielding projections 36 which, as shown, consist of rubber knobs fastened to the legs. These yielding knobs center the work sheet 33 where the sheet is not cut to a true rectangle. It will be understood that where round or other polygonal-shaped work sheets 33 are to be printed, the abutments 34 and 35 may be changed respectively to arcuate shape or angles of different sizes to grip the diagonally opposed edges of these particular configurations.

To permit movement of abutments 35, one leg is provided with a guide slot 37 to receive the shank of a headed guide 38 which is anchored in the top 32 of the table. The edges at the ends of the legs of the abutments conform with and ride against the biased edges of guide projections 39 fixed to the table top by screws as shown in Fig. 8. A guide pin 40 secured to the abutment 35 extends through a guide slot in table top 32 and the lower end is attached to one end of coil spring 41 on the bottom of the table top. The other end of spring 41 is secured to a screw 42 fastened against the bottom of the table top 32. At the outer vertex of each of the automatically movable abutments 35, and free of the edge of the table, is a depending cam pin 43 which retracts the abutment automatically when it engages a cam piece 44 fixedly secured to the bed 10. There are two of these cam blocks 44 circumferentially spaced from each other at adjoining stations so as to retract the abutments 34 at two different consecutive positions of the stations, the one for discharge indicated at D, and the other indicated at E for charging the stations with work sheets 33. When assembled, the work sheets 33 rest on the flat top 32 of the table B gripped between abutments 34, 35.

While I have shown and described one way of holding the work sheet 33 to be printed, many other means of holding them are possible. For example, I may hold magnetically attracted work sheets by electro-magnets. Where the work sheets are limp, I may use suction to hold them on the printing stations. The manner of holding the sheets by suction and magnetism or combinations of both is revealed in my Patents 2,034,003, March 7, 1936, and 1,995,522, March 26, 1935, and need not be discussed in detail.

An automatic lift is provided to raise the work sheet at one station only which is the discharge station D. To accomplish this, a cam block 45

is fastened securely to the base bed 10 to engage a lifting plunger 46 slidably mounted in a bearing sleeve 46a secured to the table top off the center of the stations 31. It will be understood there is one lifting plunger 46 mounted in each of the five stations, each of which consecutively raise the work sheet as shown in Fig. 2 at the discharge station D. A coil spring 47a encircles the plunger and normally retracts it, when the plunger is not engaged by cam block 45, by having one end bearing against the bearing sleeve 46a. A head on the upper end of the lifting plunger 46 prevents it from pulling through the table top under the tension of spring 47a and this head seats flush with the table top 32 in a countersink surrounding the bearing opening.

The printing on the blank work sheets 33 is accomplished by scraping and pushing over a stencil or screen a powder, liquid or plastic wave or gob of coloring material 61a by a reciprocating flexible squeegee blade which slides over a stationary fabric screen or metal stencil 86 provided with the design or designs of one or more colors to be transferred. If screens are used, the design is pervious to the coloring matter, while if a stencil is used the design is cut out, all of which is known in the art. To this end, a pair of parallel channeled track bars 47 are secured on blocks 48 which latter are fastened to the bed 10 of base A. The printing carriage F includes runner blocks 49, one for each track bar 47 which reciprocate in the channels and are connected at one end by cross head 50. An adjustable connecting rod 51, provided with a turn-buckle adjustment 52, has one end pivoted to a pair of bearing ears 53 in the center of cross head 50 and the other end of the connecting rod has a ring bearing journaled to a crank pin 54 which latter is adjustable in the bifurcated slotted crank 55 of crank shaft 21.

In addition to the runner blocks, the printing carriage F includes a transverse crown piece 56 yieldably supported by its ends on a pair of posts 57 anchored one in each of the runner blocks 49. Surrounding each post is a coil spring 58 one end of which bears on the crown piece 56 and the other against a head on the terminal of the post. A limit stop 59 on each post 57 abuts under the crown piece and prevents further downward movement of the crown piece. The outer ends of the crown piece 56 also ride on strips 60, one being mounted on each side rail of the cradle frame 74a to be presently described and each strip 60 also forms a limit stop for the crown piece. The flexible squeegee blade 61, preferably made of rubber, is secured on the bottom of a flat vertical metal shoe 62 having a shank formed with slots 63 which shank is secured in a slot 62a in crown piece 56 by means of bolts 64. The bolts are slidable in a transverse slot 65 in crown piece 56 and thus the squeegee is adjustable vertically and transversely. To transfer the wave or bank of coloring matter 61a used for printing from one side to the other of the squeegee blade 61, it is necessary to raise the squeegee and step it up over the wave or gob at the end of each stroke. To do this, a pair of cam fingers disposed side by side and swingable in a limited arc and indicated 66 and 67 (see Fig. 4) are pivoted at 68 to a bracket 68, secured by bolts 70 to the crown piece 56, there being one bracket and a pair of cams near each end of the crown piece. The cam 66 rolls up a cam block 71 fixed to track bar 47. Cam finger 67, the inner one, clears cam 71 but rolls up cam block 72 fixed to track bar

47, the two cam blocks being offset transversely and being secured on frame 74a at the opposite ends of the stroke of the printing carriage F. The cam fingers 66 and 67 are of substantially segmental shape with the arcuate edges oppositely disposed so as to roll over the cam blocks while the crown piece 56 is being elevated and transferred from one side to the other of the gob of coloring matter.

The stencil or screen cradle G consists of an adjusting and supporting top frame 74a for the lower rectangular horizontally disposed screen or stencil frame 73. The top frame is also rectangular in configuration and is horizontally disposed. On each end rail 74 of frame 74a for some distance intermediate the ends is an upstanding tongue 75 which seats in a counter groove in the bottom of an adjusting block 76 which slides transversely across the frame on the end rail as a base, there being one block for each rail. Through a slot in the end rail, there depends from block 76, a threaded collar 77 which engages and coacts with the threaded shaft 78 journaled in the end rail. A hand wheel 79 on the outer projecting end of shaft 78 provides for turning the shaft and adjusting the block 76 transversely of the frame. Threaded in an opening in outer block 76 and extending longitudinally of the frame, is a screw 80 turned by a hand wheel 80a on its outer end. The inner end of this screw has a reduced portion 81 and a head 81a adjoining the reduced portion. A pair of angular extension necks 82a have the lower ends of the vertical legs 82 thereof secured to the end rails of the lower stencil frame 73. In the vertical leg 82 of the outer extension neck 82a, there is a round opening 82b which forms a journal for the reduced part 81 of the screw 80, and the head 81a bears against the inner face of the leg as shown in Fig. 14. The horizontal legs 83 of each extension neck overlap the top of each of the blocks 76 and are bolted thereto by the bolts 84 which seat in slots 85 in the horizontal legs to permit the stencil frame 73 to be adjusted longitudinally of the supporting frame 74a by the hand wheel 80a when the bolts are loosened. It will thus be seen that the stencil frame 73, to the bottom face of which is secured the stencil or screen 86, may be adjusted longitudinally by turning hand wheel 80a, or may be adjusted transversely by turning the shafts 78, when the bolts 84 are loosened from their normally tightened relation, all of which permits change of position of screens and stencils and re-registration of the motif or design for applying different colors to different parts of the design.

To prevent smearing of the printed design on the work sheet 33 after it is printed and as the carrier table B rotates, it is necessary to provide a means to raise the stencil or screen cradle G while the table moves. I have shown one form of structure for accomplishing this purpose in Figs. 1, 2 and 3, 6 and 7 and another form in Figs. 10 and 11. In both forms of the invention, the adjusting frame 74a is supported on four elevating pillars arranged near the corners of the adjusting frame 74a, whereby the frame 74a holding the stencil frame 73 together with the stencil or screen are raised bodily free of the work sheet 33 at the printing station when the carrier table B intermittently rotates.

Toward this end I mount the adjusting frame 74a on four pillars 94, the intermediate portions of which are anchored fast in openings 95 in the side rails near the corners. A pair of yokes are

bolted at 96 to the outside of each track bar 47, and in the legs 97 of the yokes are slidably mounted intermediate portions of cam shafts 98, there being one cam shaft on each side of the frame 74a. On the cam shaft 98, within the confines of the legs 97 of each yoke is a cam spool 99 which moves with the shaft. The lower ends of the pillars 94 extend slidably through openings in the crowns 100 of the yokes and bear on the cam spools 99. As the cam shafts 98 move back and forth, the pillars raise the printing cradle including frame 74a and the stencil frame together with the stencil up and down in timed relation to the intermittent rotation of carrier table B.

To move the cam shaft 98, there are depending arms 101 on each end of the cross head 50 and these arms slide on the end portion of the shaft within the limits of adjustable stop collars 102, 103 carried on the shaft. To retain the cam shaft at rest while the arms 101 slide from one collar 102 to the other collar 103 during the reciprocation of the carriage F, a stop collar 104 is fixed to the shaft 98 between the confronting legs 97 of adjacent yokes. A pair of springs 105, 106 encircle the shaft and have their opposite ends bearing on the confronting legs 97 of adjacent yokes and their confronting ends bearing against the collar 104.

What is termed a Geneva gear C controls the movement of the carrier table B and the latching and releasing thereof in timed relation to the reciprocation of the printing carriage F and the raising and lowering of the stencil cradle G. The Geneva gear includes a pair of spaced disks 107, 108 which are keyed to the shaft 29. Between the disks is an idler disk 109 which rotates on shaft 29, and all the disks are of the same diameter. A chain drive 110 is trained about a sprocket 111 on shaft 24 and over the idler disk 109 so the chain can move continuously.

Since the invention has been described and illustrated with a machine utilizing five stations 31 on the carrier table B, it is necessary to release and latch the table five consecutive times in one revolution or rotation. To do this, there are five keeper sleeves 112 depending from the top of table B. A latch pin 113 slides in a sleeve 114 secured to bed 10 of base A. A latch pin actuating arm 115 is pivoted in the center at 116 to a vertical bracket 117 secured at its upper end to bed 10. One end of the actuating arm 115 is swivelled in a slot in the lower end of latch pin 113 while the other end has the upper end of link 118 pivoted thereto as at 118'. The arm 115 is forced down at the outer end by a spring 119, thereby normally urging latch pin 113 in latched projected position when keeper sleeve 112 registers with the position of the latch pin. The leading edge of the latch pin is bevelled at 113a so that it may be retracted when the edge of keeper sleeve 112 rotating with table B, strikes the bevel after which it will snap into latched position and remain there until released by the action of the Geneva gear C.

There are four equi-distantly spaced cam blocks 120 fixed to the chain 110. One end of an elongated pawl 121 is pivoted to bracket 117, and the other end which is free, seats or latches in keeper notches in disk 108 to be presently described. On the side of pawl 121 next to the chain 110 is mounted a roller 122 which extends over the chain and is engaged at predetermined times by each of the four cam blocks 120. The lower end of link 118 is forked, and this forked

end straddles the intermediate portion of pawl 121 to which it is pivoted, as indicated at 121'.

There are four sector-shaped cleats 123 equi-distantly spaced around the periphery of each of the disks 107 and 108 that turn with shaft 29. The cleats on disk 107 are aligned with the cleats on disk 108 making four pairs of aligned cleats 123. The pairs of cleats 123 are consecutively engaged and disengaged by one of four equi-distantly spaced laterally projecting pins 124 fixed to chain 110 and one pin grips one pair of cleats 123 at a time and turns the disks 107, 108 one-fourth of a revolution. It will be seen that one pin grips the one pair of cleats at a plane tangent to the vertical diameter of the disks, then turns the disk a quarter turn and is released by the cleats on a plane tangent to the horizontal diameter of the disks.

Around the periphery of disk 108 are four equi-distantly spaced keeper notches 125 which receive the free end of pawl 121 when the notches are brought into registration with the end of the pawl by the turning of the disks 107, 108 under the action of chain 110. The spring 119 which maintains the latch pin in projected relation, also urges the free end of pawl 121 into the keeper notches 124 and while the disks are turning the free end of the pawl rides on the periphery of disk 108 until it snaps into the latched position.

When the cam block 120 engages roller 122 on the pawl 121, it passes under the roller and forces the pawl upwardly. This action causes pawl to release from its keeper notch 125 and at the same time forces latch pin 113 out of the keeper sleeve 112. After a momentary delay while the pawl 121 and pin 113 move, the pin 124 on chain 110 grips the pair of aligned cleats 123 and turns the disks 107—108 one-fourth of a revolution, and this motion is so proportioned as to turn the carrier table B one-fifth of a revolution. The arrangement of the pins 124 with respect to the cams 120 on the chain, provide for release of the latch pin 113 and the pawl 121 in properly timed relation just prior to the time one of the pins grip the cleats 123 and turn the table B. The pawl 121 locks the outer disks 107—108 to insure no motion is imparted to shaft 29 while the center disk 109 turns with the continuously moving chain 110.

It will be seen that while the chain travels over the idle disk 109 without any of pins 124 engaged with the pairs of aligned sector-shaped cleats 123 on disks 107—108, the disks 107—108 are latched against rotation by pawl 121 being seated in keeper notch 125 in outer disk 108. At the same time, latch pin 113 will be seated in the keeper sleeve 112 thereby preventing the carrier table B from turning. During the same time, the carriage F will be scraping the coloring material across the stencil or screen 86. Just before the table B is unlatched, and the disks 107—108 are unlatched, the carriage F shall have completed a stroke in one direction and will be raised as heretofore described in order to move to the other side of the gob of coloring material. Simultaneously with the raising action of printing carriage F, the stencil cradle G also raises. While both the carriage F and cradle G are raised, the cam block 120 on chain 110 contacts roller 122 and unlatches carrier table B, and simultaneously the free end of the pawl 121 is forced out of the keeper notch 125 on disk 108 thereby releasing the disk 107—108 so that shafts 29—26 may turn the carrier table B when

the pin 124, after a momentary delay, moves against the straight face of the aligned cams 123. When the disks 107-108 have been revolved a quarter of a turn, the movement turns carrier table A one-fifth of a revolution, and at the end of the quarter turn, pin 124 frees itself from cams 123 allowing chain 110 to move over the idle disk 109. At about the time the pin 124 frees itself, the next keeper sleeve 112 is latched by the pin 113, and the pawl 121 drops into the next succeeding notch 125 whereby both table B and the disks 107-108 are latched. At the time the table and disks latch, the printing carriage F will have passed over the gob of coloring material and dropped on the remote side ready to begin the return stroke, and simultaneously the cradle G carrying the stencil drops from its raised position while the table B is at rest.

To maintain the proper tension on the chain 110, adjacent the lower segment of the disks, an angular shoe 126 is anchored to platform 14. On the vertical leg of the shoe, there is a collar 126a in which is slidably mounted the plunger 127, and on the end is journaled a roller 128 which presses against chain 110. A spring 129 presses against the roller mounting at one end and the collar 126 at the other end to provide tension on the chain 110. To adjust the tension on plunger 127, the outer end is screw-threaded to receive a nut 130 which bears against collar 126a. On the horizontal leg of shoe 126 is a forked extension 126b wide enough for the chain 110 with the cams 120 and pins 124 mounted thereon, to pass through, and journaled in this extension is the idle sprocket wheel 126c about which the chain 110 is trained.

It has been found necessary to maintain a pressure against chain 110 by the yielding roller 128 sufficient to retain pin 124 in gripping relation with cleats 123 near the end of the stroke to prevent the pin from becoming disengaged from the cleats. The tension of spring 129 insures that the pin shall remain engaged with the cleats 123 until pawl 121 drops into the succeeding notch 125 on disk 108, at which time disks 107-108 come to a sudden stop. When the sudden stop occurs, there is a certain lash or whip made in the chain 110, and the whip causes roller 128 to be depressed, and at the same time permits pin 124 to jump free of the cleats 123. The roller 128, therefore, assures that pawl 121 will always become locked in notch 125.

In the form of the invention shown in Figs. 10 and 11, there are cam blocks 87 and 89 at each end of each of the sliding carriage runner blocks 49'. In this form of the invention shown in Figs. 10 and 11, the ends of carriage runner blocks 49' adjacent the carrier table B' are secured together by the cross bar 50a. Except for elevating the frame 74a' at certain timed points, it is stationary. The frame 74a' is free to slide up and down on four elevating pillars 88 situated near the corners, the lower ends of which are anchored in the track bars 47'. Between the upper face of the track bars and the lower face of frame 74a' surrounding a portion of pillars 88 are buffer rings 88' which form limit stops. The upper ends of the pillars extend above frame 74a' and there is a coil spring 90 surrounding the projecting portion of each pillar, one end of which bears on the heads of the pillar and the other ends bear on the top of the frame. It will be seen that at the proper timed relation, the stencil cradle G' including the supporting frame 74a' carrying the

stencil sheet will be elevated free of the work sheet in the printing station when the carrier table B' is moving and this occurs when the cam fingers to be presently described are engaged by cam blocks 87 and 89 on the ends of sliding runner blocks 49' at each end of the stroke of the printing carriage.

In the form of the invention shown in Figs. 10 and 11, there is a pair of depending cams 91, 92 on each end rail 74' which are pivotally mounted to move in a limited arc in bracket 93. The brackets are secured to each end rail 74' near each corner including two on each end rail and one near each corner. The pair of cam fingers 91, 92 on one end rail 74' roll up the cams 87 at one end of the runner blocks 49' and lift the frame 74a' together with stencil sheet free of the work sheets at the end of the stroke of the printing carriage in one direction. Although the frame 74a' will be lifted at an angle, the openings in the frame around pillars 88 being of such shape to provide for angular disposition, the angular displacement of the stencil sheet will be such as to clear the work sheet 33 and the abutments 34 and 35 on the carrier table B'. The pair of cam fingers 91, 92 on the other end rail 74' of frame 74a' roll over cam blocks 89 on the adjacent ends of the runner blocks 47' when the printing carriage F' reaches the end of its stroke in the opposite direction thereby raising the frame 74a' carrying the stencil sheet free of the work sheet 33 although the frame 74a' is disposed at an angle as described heretofore.

Having thus described my invention, what I claim as new is:

1. A printing machine comprising in combination, a table mounted for rotation about a vertical axis and having a plurality of radially disposed stations thereon, upon each of which work to be printed is adapted to be supported, means for rotating the table intermittently, a guide extending over a portion of the table and parallel therewith, a stencil mounted on the guide over the table for vertical movement, said stencil being adapted to be moved downwardly and upwardly between each rotary movement of the table, a slide reciprocated on the guide, and a squeegee carried by the slide in contact with the stencil.

2. A printing machine comprising the combination set forth in claim 1, wherein means operated by the slide movement imparts vertical movement to the stencil.

3. A printing machine comprising in combination, a table mounted for rotation about a vertical axis and having a plurality of radially disposed stations thereon, upon each of which work to be printed is adapted to be supported, means for imparting intermittent rotation to the table, a guide extending over the table and parallel therewith, a stencil frame mounted thereon for vertical movement, pillars depending from said frame, cams on which said pillars rest, a slide, means for reciprocating the slide, means coacting with said slide for moving said cams and raising said stencil frame, a stencil carried by the frame, and a squeegee carried by the slide for reciprocation over the stencil.

4. A printing machine comprising the combination set forth in claim 3 wherein the cams are mounted for movement parallel with the slide, and said cams are provided with means for raising said pillars and frame as said slide approaches either extremity of its travel and moves said cams in either direction.

5. A printing machine comprising in combina-

tion, a table mounted for intermittent rotation about a vertical axis, said table having a plurality of stations thereon, upon each of which work to be printed is adapted to be supported, a guide extending substantially radially over a portion of said table and projecting laterally therefrom, a stencil mounted for vertical movement on the guide, each station on the table in turn being adapted to be positioned beneath the stencil, a slide movable horizontally on the guide, means for reciprocating said slide through variable lengths of stroke, a squeegee on said stencil reciprocated by the slide movement, and means actuated by the slide movement for raising the stencil and squeegee as the latter approaches either extremity of its stroke.

6. A printing machine comprising in combination, a table mounted for intermittent rotation about a vertical axis having a plurality of radially disposed stations thereon, upon each of which work to be printed is adapted to be supported, a guide extending over a portion of said table and parallel therewith, a stencil frame mounted on the guide for vertical movement, a stencil in said frame, a slide mounted for reciprocation on the guide, a squeegee bearing on the stencil and reciprocated thereover by the slide, downwardly projecting pillars on the frame, cams mounted for sliding movement parallel with the slide, means for holding said cams in spaced relation, portions of said slide being adapted to contact said cams and move them as the slide approaches each extremity of its stroke to raise the pillars on said cams, and means for returning the cams to the positions whereby the pillars are in lowered position as said slide commences its next stroke and said slide portions disengage said cams.

7. A sheet printing machine comprising a movable work-carrying table, a panel member having portions pervious and impervious to coloring material, a movable member effective for the major portion of its movement to sweep coloring material over the panel member and transfer said material to the work on the table through the pervious portions of the panel, said table and movable member travelling in substantially plane paths, power means connected with the table to move the same, power means connected with the movable member to move the same, and cam means actuated by the movable member and coacting with means suspended from the panel member whereby the panel is moved angularly with respect to the paths of the table and movable member.

8. A sheet printing machine comprising a movable work-carrying table, a panel member having portions pervious and impervious to coloring material, a movable member effective for the major portion of its movement to sweep coloring material over the panel member and transfer said material to the work on the table through the pervious portions of the panel, said table and movable member travelling in substantially plane paths, power means connected with the table to move the same, power means connected with the movable member to move the same, means carried by the movable member and actuated during the movement thereof to alter the plane path of movement of the movable member, and means actuated by the last mentioned power means and coacting with means on the panel member whereby the panel member is moved angularly with respect to the paths of the table and movable member.

9. A sheet printing machine comprising a movable work-carrying table, a panel member having portions pervious and impervious to coloring material, a movable member effective for the major portion of its movement to sweep coloring material over the panel member and transfer said material to the work on the table through the pervious portions of the panel, said table and movable member travelling in substantially plane paths, power means connected with the table to move the same, control means associated with the power means to provide rest periods in the movement of the table, a latching member coacting with the table to secure the same in position during the rest period, and means actuated by the control means to effect the engagement and release of the latching member with and from the table respectively.

10. A sheet printing machine comprising a work table having more than one work station, said work table mounted to rotate in a plane, power means operatively connected to the table to rotate said table, a control device operatively connected with said power means between said power means and said table to provide intermittent rest periods in the rotation of the table, a panel having one part pervious and another part impervious to coloring material, said panel being disposed over one work station on the table, a reciprocating member wipingly engaging the panel in both directions to sweep a wave of coloring material back and forth over the panel to transfer the coloring material to the work on said one work station, power means connected with said member for reciprocating the same, means actuated by the last mentioned power means and coacting with the panel to move the latter into and out of engagement with the said one work station during the rest period of the table, and automatic means engageable with said member to cause said member to step over the wave of coloring material at the end of each stroke and during the rest period of the table.

11. A sheet printing machine comprising a work table mounted to rotate in a plane, said work table having more than one work station, means on the table for holding the work in stationary position while it is being operated upon, drive means to rotate the table, a control device connected with the drive means to provide intermittent rest periods in the rotation of the table, a panel member having one part pervious and another part impervious to coloring material, said panel member disposed over one work station of the table, a scraping member wipingly engaging with said panel member, drive means to reciprocate one member to sweep a wave of coloring material in both directions over the panel member and transfer the coloring material through the pervious portion to the stationary work during the rest period of the table, means actuated by the last mentioned driving means and coacting with the panel member to move the latter into and out of engagement with the stationary work on the table during the rest period, and means carried by one member and actuated by the last mentioned drive means to cause the members to separate and allow the wave of coloring material to be transferred from one side to the other of the scraping member at the end of each stroke and during the rest period of the table.