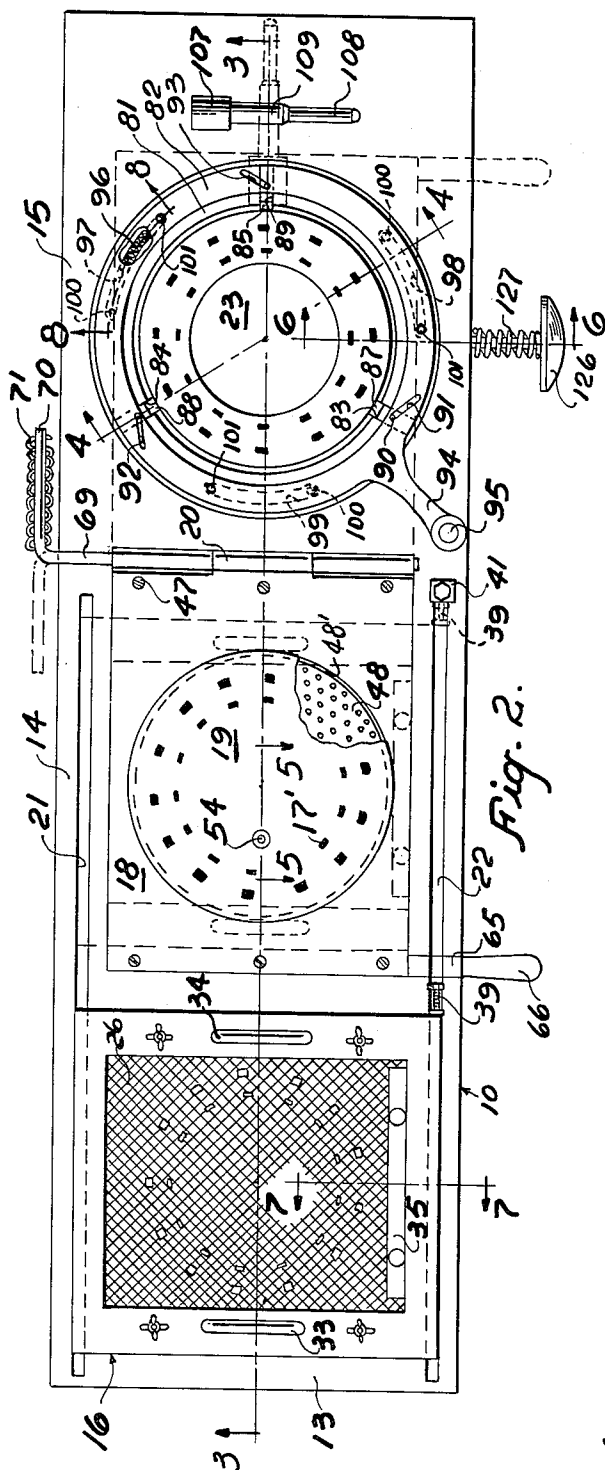
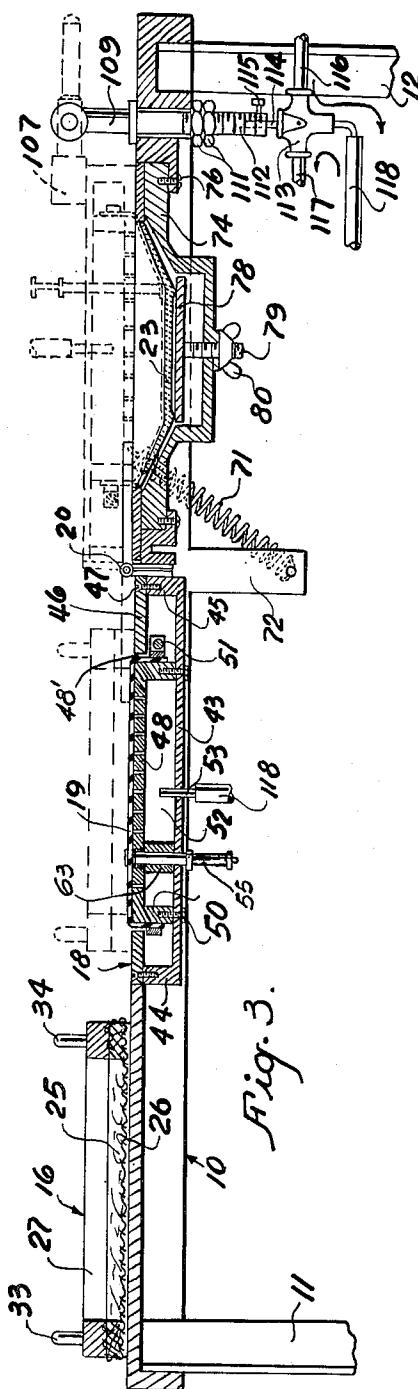


J. V. FERNANDEZ
APPARATUS FOR DECORATING OR PRINTING
ON CONCAVE OR CONVEX SURFACES

4 Sheets-Sheet 2

Filed Dec. 9, 1954



BY

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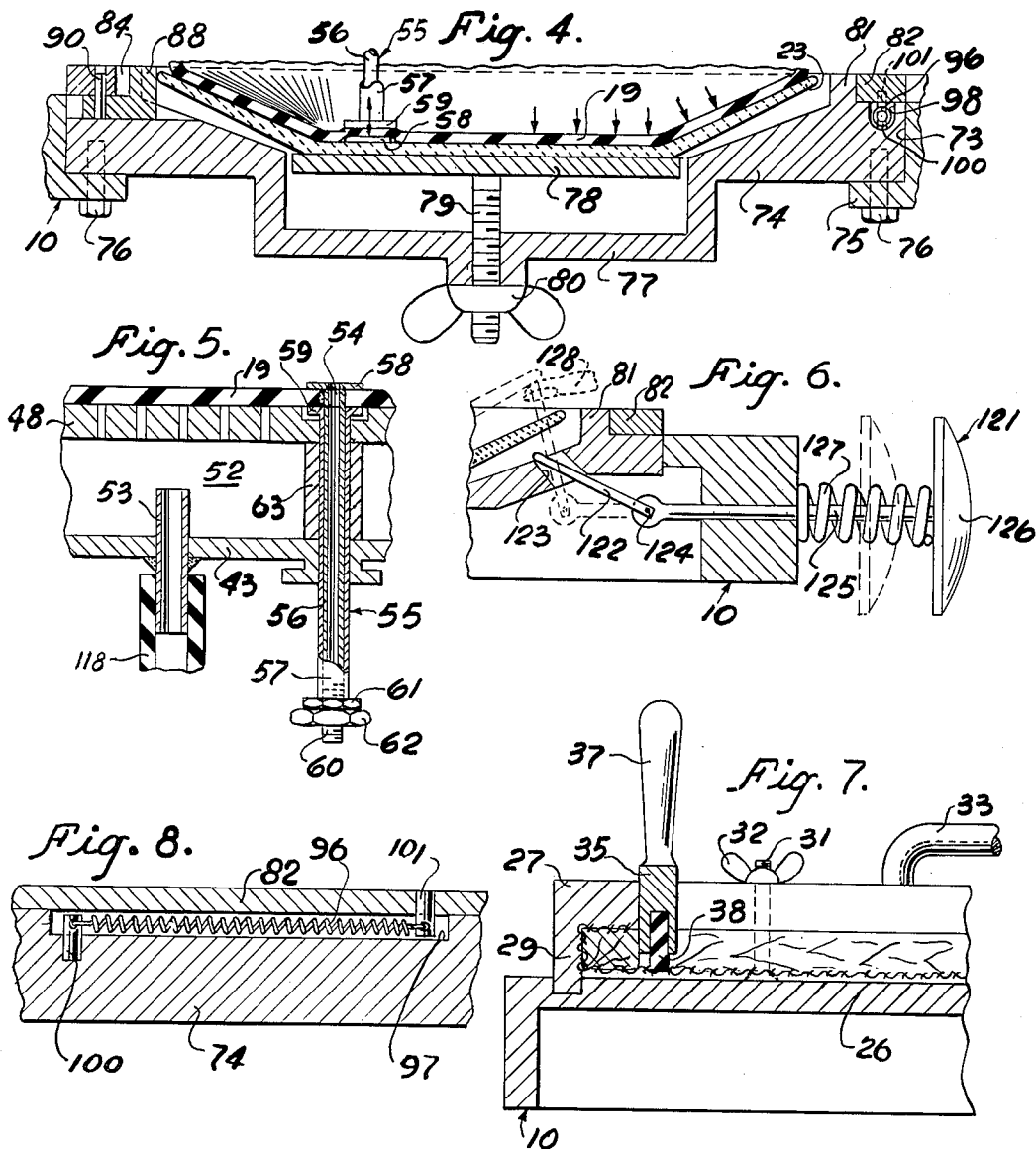
March 27, 1956

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4 Sheets-Sheet 3



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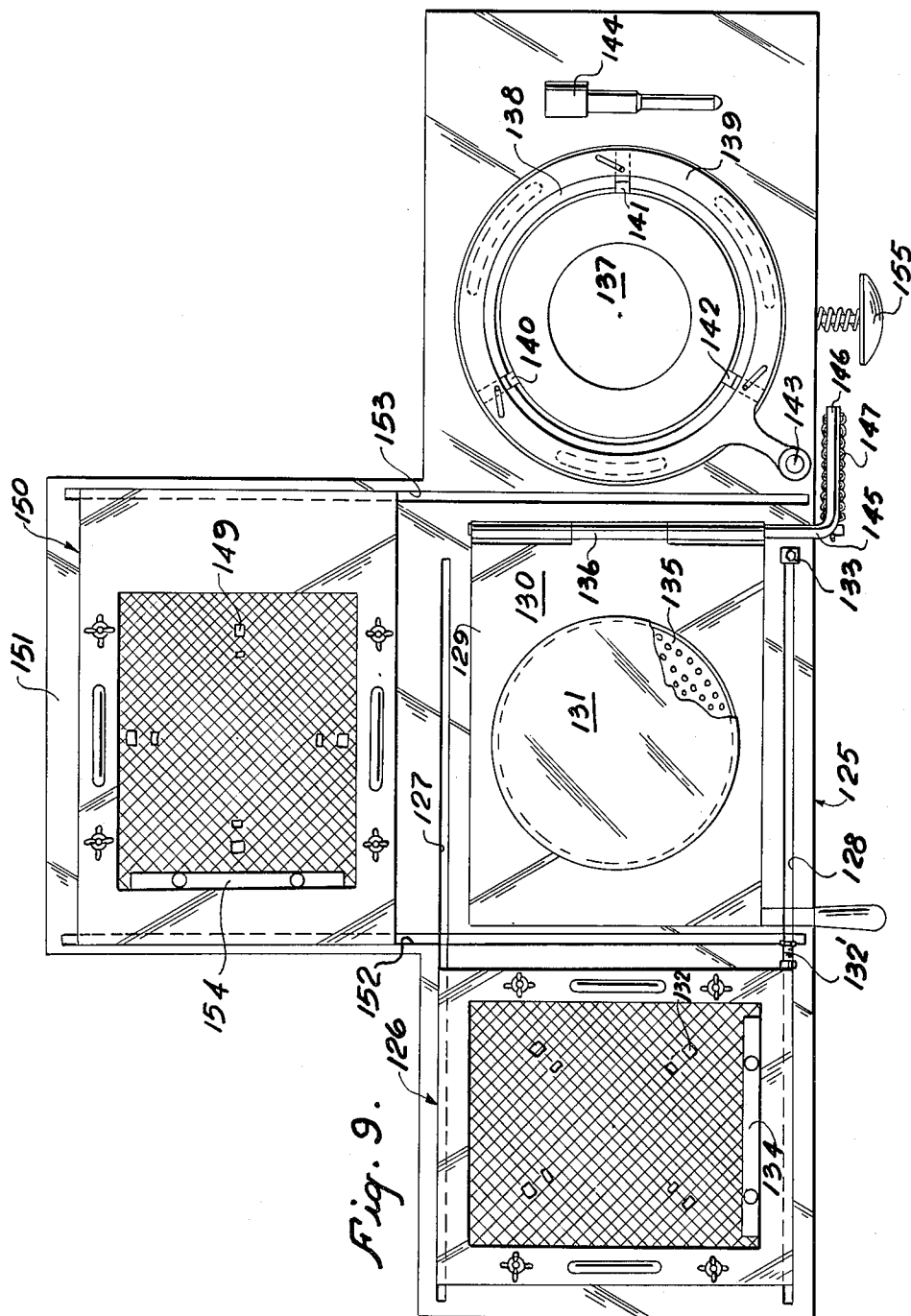
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APPARATUS FOR DECORATING OR PRINTING ON CONCAVE OR CONVEX SURFACES

José Valiela Fernandez, New York, N. Y.

Application December 9, 1954, Serial No. 474,165

8 Claims. (Cl. 101—126)

This invention relates to a method of and apparatus for decorating or printing on concave or convex surfaces of ceramic articles.

This application is a continuation in part of my co-pending application, Serial No. 216,435, filed March 19, 1951, for Apparatus for Decorating Concave and Convex Surfaces.

It is the principal object of the present invention to provide an apparatus which permits the printing of a selected pattern upon a dish or other ceramic article wherein the pattern is impressed upon a transfer member by a silk screen arrangement that is movable to a station over the transfer member and out of the way to permit the transfer member to be lifted and disposed over the ceramic article to be decorated or printed.

It is another object of the present invention to provide a method for printing and decorating ceramic articles wherein the operator can effect the method from one station and wherein the operations are carried out with ease and require the simple movement of the members by the hands of the operator and permit the automatic alignment of the members in their stations where the work is to be performed.

It is another object of the invention to provide in a printing apparatus for ceramic articles a centering device which locates the article in the proper location to receive the imprint from the transfer member.

It is another object of the invention to provide in an apparatus for printing patterns on ceramic articles an operating lever serving to engage the transfer member frame to hold the same in place prior to and during the use of the compressed air to effect the extension of the rubber transfer member on to the ceramic surface and which, at the same time, automatically effects the operation of the air valve that controls the flow of compressed air to the transfer frame.

It is another object of the invention to provide in an apparatus for printing upon ceramic articles means associated with the rubber-like transfer member to permit the escape of air from between the face of the member and the dish to be printed.

It is another object of the invention to provide a method and apparatus for printing and decorating ceramic articles that has two silk screen arrangements adjustable from different locations to a station over the transfer member so as to permit the use of different color ink upon the ceramic article and wherein the silk screen arrangements are within easy reach of the operator and a common transfer member is used to print the two colors, one at a time, upon the ceramic article.

Other objects of the invention are to provide a printing apparatus for ceramic articles which is of simple construction, has a minimum number of parts, inexpensive to manufacture, easily operated by a single operator, durable, compact, accurate, and efficient in operation.

For other objects and for a better understanding of the invention, reference may be had to the following detailed

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description taken in connection with the accompanying drawing, in which:

Figure 1 is a perspective view of the apparatus used in carrying out the method of the present invention;

Fig. 2 is a top plan view of the apparatus;

Fig. 3 is a longitudinal sectional view of the apparatus taken on line 3—3 of Fig. 2, and looking in the direction of the arrows thereof;

Fig. 4 is an enlarged sectional view taken through the support for the ceramic article and as viewed on line 4—4 of Fig. 2;

Fig. 5 is an enlarged fragmentary sectional view taken generally along line 5—5 of Fig. 2 and through the transfer member and looking upon the air escape device;

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 2 and looking upon the apparatus for ejecting the ceramic article;

Fig. 7 is an enlarged fragmentary sectional view taken through the silk screening arrangement and as viewed on line 7—7 of Fig. 3;

Fig. 8 is a fragmentary sectional view of the tensioning spring arrangement for the centering ring as viewed on line 8—8 of Fig. 2; and

Fig. 9 is a top plan view of a further form of the invention wherein two silk screen arrangements are used in order to permit the use of two different colors for transfer upon the ceramic article.

Referring now to the figures, 10 represents a supporting table having end legs 11 and 12. The table is elongated and has three working stations. These stations are indicated generally at 13, 14 and 15. The station 13 is located at the lefthand end of the table and over which may be located and slid a silk screen assembly indicated generally at 16 that has an imprint 17 which is to be put on a transfer assembly 18 that has a rubber sheet 19. The transfer assembly 18 is hinged at one end to the table by a hinge connection 20 so that the assembly 18 can be pivoted from the intermediate station 14 to overlie the station 15 at the right hand end of the table. The silk screen arrangement is used for imprinting the design upon the rubber sheet 19 and is slidable between the lefthand station 13 and the intermediate station in grooves 21 and 22 that extend between the stations 13 and 14. When the transfer rubber sheet assembly 18 is to be hinged from the station 14 to the station 15, the silk screen arrangement 16 is returned to the station 13. A ceramic article or plate 23 is supported at the station 15 at the righthand end of the table by means to be further described, the imprint from the transfer assembly 18 is made upon the plate 23.

The silk screen arrangement 16 includes a matrix frame 25 to which silk screen 26 having the pattern or opening 17 is affixed on the underside thereof. This frame 13 is in turn supported on a rigid frame 27 that has at the opposite sides thereof depending flanges 28 and 29 that run respectively in the grooves 21 and 22 in the table 10. The matrix frame 25 is secured to the rigid frame 27 by four fastening bolts 31 and wing nuts 32. The two frames provide a printing carriage and the top frame has handles 33 and 34 by which the arrangement or carriage can be readily moved along the grooves 21 and 22 from station 13 to station 14. Within the frames 25 and 27 is a squeegee 35 having handles 36 and 37 and a rubber strip 38 that serves to distribute paint or ink over the silk screen 26 as the squeegee is moved back and forth by the operator and when the silk screen arrangement is disposed over the rubber sheet 19 and upon station 14 so that the ink or paint is distributed through the pattern openings 17 and imprinted upon the rubber sheet 19.

In order to control and properly position the silk screen arrangement 16 over the rubber sheet 19 of the

transfer assembly 18, an adjustable positioning bolt 39 is adjustably secured to the rigid frame 27 at the righthand side thereof. The bolt 39 is locked in its adjusted position by a lock nut 40. The bolt 39 will engage the stationary stop 41 located at the end of groove 22 on the table 10 so that the imprint will be properly centered over the rubber sheet 19. The imprint upon the rubber sheet 19 is indicated at 17', Fig. 2.

The transfer assembly 18 when at the station 14 lies within an opening in the table 10 so that the rubber sheet 19 is flush with the top surface of the table so as to accommodate the silk screen arrangement 16.

The transfer assembly 18 comprises a bottom plate 43 having upstanding ends 44 and 45 to which a top plate 46 is secured by fastening screws 47. This top plate 46 has a round opening 48' upwardly through which rubber sheet 19 is extended and supported by a round perforated plate 48. This perforated plate has a depending flange 49 by which the plate 48 is secured by fastening screws 50 to the bottom plate 43. The rubber sheet 19 is secured about the periphery of the perforated plate 48 by a band clamp 51. An air chamber 52 is provided within the perforated plate 48 in which air is delivered through an air inlet pipe 53 to the chamber 52 in order to lift the rubber sheet 19 from the perforated plate at the time the plate is printed.

The rubber sheet 19 is provided with a small reinforced opening 54 which serves as an exhaust opening or exit for any air that may be trapped between the rubber sheet and the article or plate onto which the design is transferred. To permit the trapped air to move out through the bottom plate 43, a floating tubular device 55 made of relatively lightweight material is connected about the rubber sheet opening 54, Fig. 5. This structure 55 includes an inner tube or pipe 56 and an outer tube or pipe 57. The inner tube 56 has a flange 58 that rests on the top face of the rubber sheet. This inner tube 56 penetrates the rubber sheet and extends downwardly through the outer tube 57. The outer tube 57 has a flange 59 that engages with the underside of the sheet 19. The inner tube 56 is threaded at its lower end as indicated at 60 and by tightening nuts 61 and 62 upon the threaded end 60 of the inner sleeve, the flanges 58 and 59 of the tubes are brought into tight clamping relationship with the opposite faces of the rubber sheet 19. The floating tubular structure 55, while being carried by the rubber sheet, is slidable through aligned openings in the perforated plate 48, a spacer 63 and the bottom plate 43.

The top plate 46 has a projection 65 which has a handle 66 thereon by which the transfer assembly 18 is lifted out of the opening in the table. This projection 65 extends through a notch or recess 67 in the table. The projection has a short groove 68 that is co-extensive and aligned with the groove 22 in the table 10.

The hinge projection 20 has a hinge pin 69 that has an arm 70 that extends downwardly over the rear edge of the table 10 and to which a counterweight spring 71 is connected. This spring is anchored to a depending projection 72 on the table, Fig. 3. The hinge 20 is connected to the right hand end of the opening out of which the transfer assembly is pivoted and to the righthand edge of the assembly. The counterweight spring 71 will assist the operator as the rubber sheet assembly is hinged from station 14 to station 15 or vice versa.

The station 15 of the table has an opening 73 therein in which an adjustable plate support 74 is disposed. A peripheral flange 75 extends around the opening 73 and the adjustable plate support 74 is supported on this flange 75 and secured thereto by fastening bolts 76. The support device has a depending portion 77 in which a central supporting plate 78 is adjustable. This plate 78 has a threaded bolt 79 that is adjustable through a threaded opening in the portion 77 so that the plate 78 can be adjusted to different elevations. A wing nut 80 is se-

cured to the bolt 79 and will lock the bolt and the plate 78 in the adjusted position of the plate 78. The ceramic plate 23 is supported on the plate 78, as shown in Fig. 4.

The support 74 has an annular bead projecting upwardly from the top thereof as indicated at 81 around which extends a centering ring 82.

In the top of the support 74 and cutting the bead are three slots spaced 120 degrees apart as indicated respectively at 83, 84 and 85. Radially adjustable in these slots are centering pins or lugs 87, 88 and 89 respectively fitting said slots. Each of these lugs or pins has an upwardly extending pin 90, Fig. 4. This pin extends into an angled slot 91 in the ring 82. There are three of these slots as indicated at 91, 92 and 93, and they lie respectively adjacent the centering pins 87, 88 and 89.

The centering ring has a handle arm 94 that extends toward the front edge of the table and which has an upstanding handle 95 that is grasped by the operator to turn the ring. As the ring 82 is turned clockwise, as viewed in Fig. 2, the respective lugs will be retracted by virtue of the pins 90 moving toward the outer periphery of the ring 82 and radially outwardly in their respective slots. The ceramic plate will be positioned upon the platform or supporting plate 78 by the operator, but upon turning the ring 82 in a counterclockwise direction, the inclined slots will cause the centering pins to be brought against the edge of the ceramic plate so as to center the same upon the platform or plate 78 and in a proper position to receive the imprint from the rubber sheet 19 when the transfer assembly 18 overlies the plate 23.

In order that the ring 82 can be turned in a counterclockwise direction, three return springs 96 are provided respective in arcuate recesses 97, 98 and 99 in the top and outer periphery of the article support 74. Each spring is anchored at one end in the arcuate slot or groove as indicated at 100 and at its other end by means of a pin 101 to the underside of the centering ring 82. By means of these springs 96, the centering ring is returned to its original position so that the lugs 87, 88 and 89 are extended to retain the plate 23.

After the ceramic plate 23 has been inserted and centered upon its supporting platform 78, the rubber sheet assembly 18 is hinged over the ceramic plate 23 so that the rubber sheet 19 is aligned with the top of the ceramic plate to accurately receive the imprint from the rubber sheet 19. With the rubber sheet transfer assembly 18 over the plate, it is locked in place by a locking roller 102 which is swung on its pivot to extend over the assembly 18, in the manner shown in dotted lines in Fig. 2 and Fig. 3. This roller is operated from a handle 108. The roller is supported on a vertical post 109 that is anchored to the table 10 by lock nuts 111 on the threaded end 112.

The turning of the locking handle 108 and of the roller 107 is utilized to operate a control valve 113 which has a stem 114 secured to the end of the post 109 by a clamp screw 115. The valve 113 is connected by a pipe 116 to a source of compressed air supply and an exhaust pipe 117. A conduit 118 is connected to the sleeve 53 so as to supply air under pressure to the chamber 52 in order to extend the rubber sheet 19 on to the top surface of the ceramic plate 23 in the manner illustrated in Figs. 3 and 4. This will cause a fresh impression of ink upon the rubber sheet to be printed upon the plate. Any air that may have been trapped between the ceramic plate and the rubber sheet will be led off through the floating tubular structure 55. When the printing has been effected upon the ceramic plate in this manner, the roller 107 is released from the transfer sheet assembly 18. The valve 113 will be operated so that the compressed air which has expanded the rubber sheet 19 will be exhausted through the exhaust opening 117 of the valve and at the same time the compressed air source delivered through pipe 116 is cut off. The transfer assembly is accordingly lifted with the aid of the counterweight spring 71 and

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returned to its position within its opening in the central station 14 of the table.

In order to provide access to the edge or undersurface of the ceramic plate to permit its ready and easy removal from the cavity in the support 74, an ejector device 121 is provided. This ejector has a short rod 122 that extends through a hole 123 in the support 74 so that the front end of the rod 122 normally lies under the periphery of the ceramic plate and out of the way. The rod 122 is pivotally connected at 124 to a long plunger rod 125 having a pressure button 126. A compression spring 127 surrounds the rod 125 and engages the edge of the table and the under face of the pressure button 126. Upon the pressure button 126 being pushed inwardly, the rod 122 swings upwardly in the manner illustrated by the dotted line position in Fig. 6 to lift the plate sufficiently so as to allow a finger indicated at 128 to be placed under it so that the ceramic plate can be readily taken from the support and the support made ready for receiving another plate to be printed.

In Fig. 9, there is shown a modified form of the invention wherein the plate can be decorated with two different colors of ink. A table 126 is provided which is similar to the table 10 but which has a rearward extension from its intermediate station. On the table is a silk screen arrangement that slides in grooves 127 and 128 to an intermediate station 129 and over a transfer assembly 130 having a rubber sheet 131 for receiving the imprint of a pattern 132 on the silk screen arrangement 126.

When the silk screen arrangement 126 is adjusted along the grooves 127 and 128 so that its adjustable stop 132 engages with fixed stop 133, squeegee 134 is used over the pattern 132 to force the ink therethrough and onto the rubber sheet 131.

The rubber sheet 131 is carried over a perforated plate 135 through which compressed air is forced in the manner as above described to cause the rubber sheet 131 to be expanded when the transfer assembly 130 is hinged upon its hinge connection 136 to be located over ceramic plate 137 lying in a plate support device 138 and surrounding which is a plate centering device 139 which operates centering pins or fingers 140, 141 and 142. This centering ring has a handle 143 by which the ring is turned. The assembly 130 will be held in place by the roller device 144 that is swung thereover. This roller device 144 operates a control valve similar to the control valve arrangement shown in Fig. 3, which delivers air through the rubber sheet 131 so that it expands into the ceramic plate 137 to print the pattern thereon.

The hinge 136 has a pin 145 which has an arm 146 operated by a tension spring 147. This tension spring 147 acts as a counterweight for the rubber assembly 131.

As soon as the plate 137 has been printed from the ink of the silk screen device 126, the rubber sheet device 130 is returned to the station 129, the rubber sheet 131 is cleaned to prepare it for receiving design 149 from silk screen device 150 that extends over an added rear station 151 of the table and which is moved along grooves 152 and 153 that extend at right angles to the grooves 127 and 128 which the silk screen device 136 traverses.

This silk screen device 150 will have a different pattern and will be used to provide a different color for the ceramic plate 137. The silk screen device 150 is slid along to the station 129 over the rubber sheet 131. Its squeegee 154 is worked thereover to apply the ink to the rubber sheet 131.

Thereafter, the silk screen device 150 is returned to the station 151 and the rubber sheet device 131 is again hinged so as to overlie the plate 137 where it is locked by the roller 144 and the air is delivered to the rubber sheet 131 to expand it into the dinner plate 137 and to print the same with a different color. The transfer assembly 131 is then returned to the position in Fig. 9 and

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a lifting device 155 is pressed inwardly to move the plate out of its support 138.

It should now be apparent that there has been provided a method and apparatus for effecting the printing of ceramic articles of uneven surface, wherein the design is placed on a transfer rubber sheet by means of silk screen arrangements slidable along the table in grooves and upon being retracted to their original positions, the rubber transfer device is lifted through a hinge connection to a position over the plate to be printed and which is being held in a plate support.

It will also be apparent that a simple centering means has been provided for centering the plate upon its supporting platform in proper alignment to receive the rubber transfer sheet.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed:

1. A silk screen printing apparatus comprising a table having three stations, a silk screen arrangement and means for guiding said silk screen arrangement between two stations, one of said two stations having an opening therein, a transfer assembly hingedly connected to said table within said opening and hingeable between the one station and the third station, a ceramic article supporting frame lying within the table at the third station and said transfer assembly being movable to and centerable over the ceramic article support at the third station, said transfer assembly having a rubber sheet for receiving the pattern from the silk screen arrangement and air means connected to the transfer assembly to expand the rubber sheet when positioned over the ceramic article to effect the printing of the article.

2. A silk screen apparatus as defined in claim 1, and a hold down device located at the third station and adjustable upon the table for engagement with the transfer sheet assembly to hold the same in place over the ceramic plate and a control valve associated with said hold down device for controlling the supply of air and the exhausting of the same to and from the rubber sheet transfer assembly.

3. A silk screen apparatus as defined in claim 1, and said silk screen arrangement having an adjustable stop thereon, a fixed stop on said table and engageable by the adjustable stop on the silk screen to properly position the silk screen over the rubber sheet prior to the pattern being transferred to the rubber transfer sheet assembly.

4. A silk screen apparatus as defined in claim 1, and said rubber sheet having an opening therein, a tubular structure connected to said rubber sheet and adjustable therewith through which leakage of air trapped between the printing face of the rubber sheet and the surface of the disc is removed so as not to interfere with the printing operation.

5. A silk screen apparatus as defined in claim 1, and said table having a fourth station extending at right angles and rearwardly thereof, said fourth station and said intermediate station having guiding means and a second silk screen arrangement adjustable at right angles from the direction of adjustment of the first mentioned silk screening arrangement, said second silk screen arrangement being adapted to provide a different color to the finished ceramic article, said second silk screen arrangement being adapted to provide a different pattern for the ceramic plate and through which a different colored printing can be effected.

6. An apparatus for decorating ceramic articles comprising an elongated table, a design transfer member set in said table and hinged on one side thereto, said design transfer member including a hollow metallic block having an opening in one side, a perforated disc placed in the opening, a resilient, non-absorbent sheet having a

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small opening covering said disc, a tubular element connected to the opening in the resilient sheet and passing through and out of said hollow block and a conduit communicating with said hollow block, a printing carriage supporting a silk screen, said carriage being adapted to ride in guideways on said table whereby said silk screen may be positioned over said resilient sheet, and an article supporting member set in said table adjacent to the hinged side of said hollow block, said article supporting member including an inclined annular seating portion, a vertically adjustable platform disposed within said annular seating portion, a ring resting on said annular seating portion, a plurality of biased slots in said ring, a plurality of radially movable fingers provided with upwardly extending pins, said fingers being seated in radially extending slots in said annular seating portion and said pins being disposed within the biased slots in said ring, means for turning said ring, and a plurality of arcuate segments disposed above said ring.

7. An apparatus for decorating ceramic articles as defined in claim 6, having an article ejector mechanism including a supporting member provided with a bearing, a shaft passing through said bearing and having a button

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on one end, a compression spring disposed between said supporting member and said button, and a rod pivotally attached to the second end of said shaft and extending into an opening in the inclined portion of said annular seating portion.

8. An apparatus for decorating ceramic articles as defined in claim 6, having a locking and control device including a vertically disposed rotatable turning post, a horizontally disposed member attached to the upper end of said vertically disposed post, said horizontally disposed member having at one end a handle portion and on the second end and rotatable thereon a cylindrical member, and a stem depending from said vertically disposed post and adapted to operate an air control valve.

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