

June 11, 1940.

J. ISSARTEL ET AL  
APPARATUS FOR COLORING, PRINTING, AND DECORATING FLAT  
SURFACES, PARTICULARLY WOVEN TEXTILES

2,203,910

Filed July 2, 1937

2 Sheets-Sheet 1

Fig. 1.

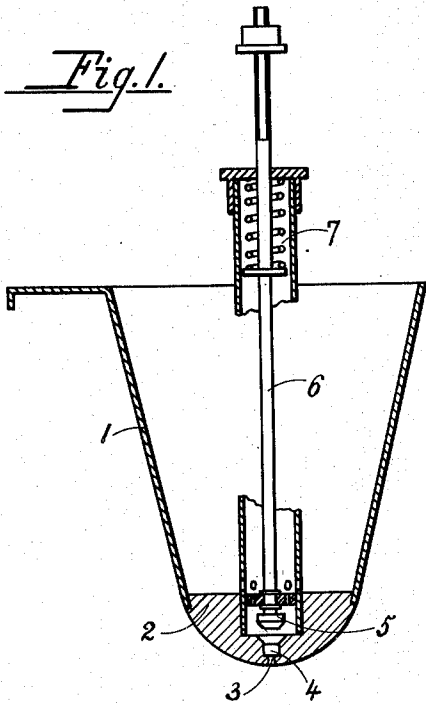


Fig. 2.

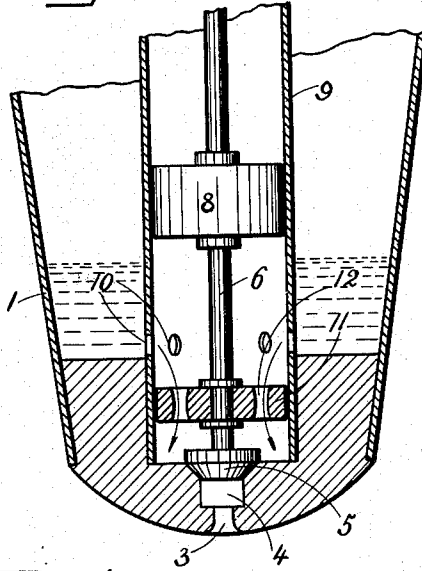


Fig. 4.

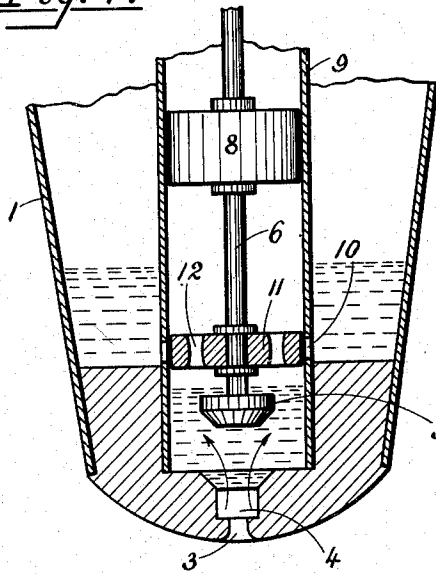
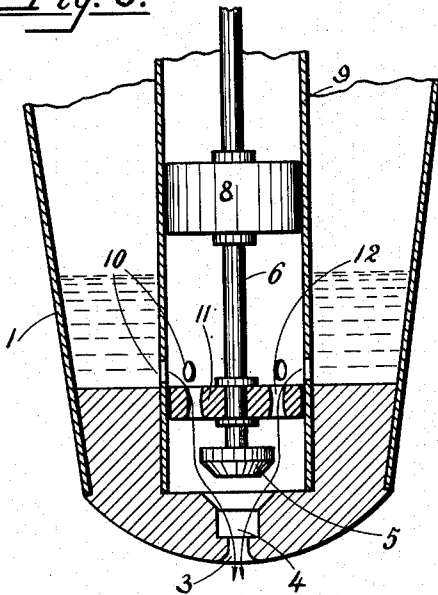


Fig. 3.



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2 Sheets-Sheet 2

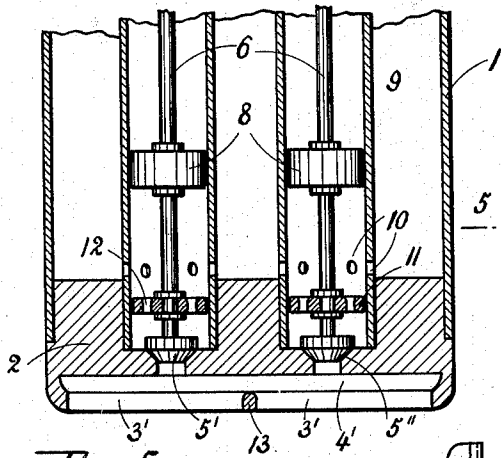


Fig. 5.

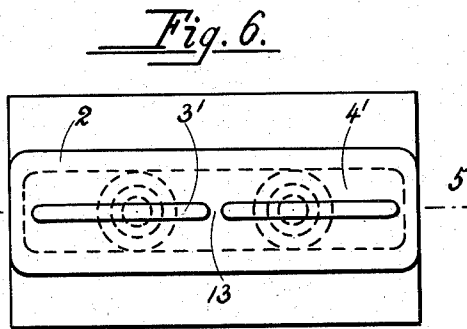


Fig. 6.

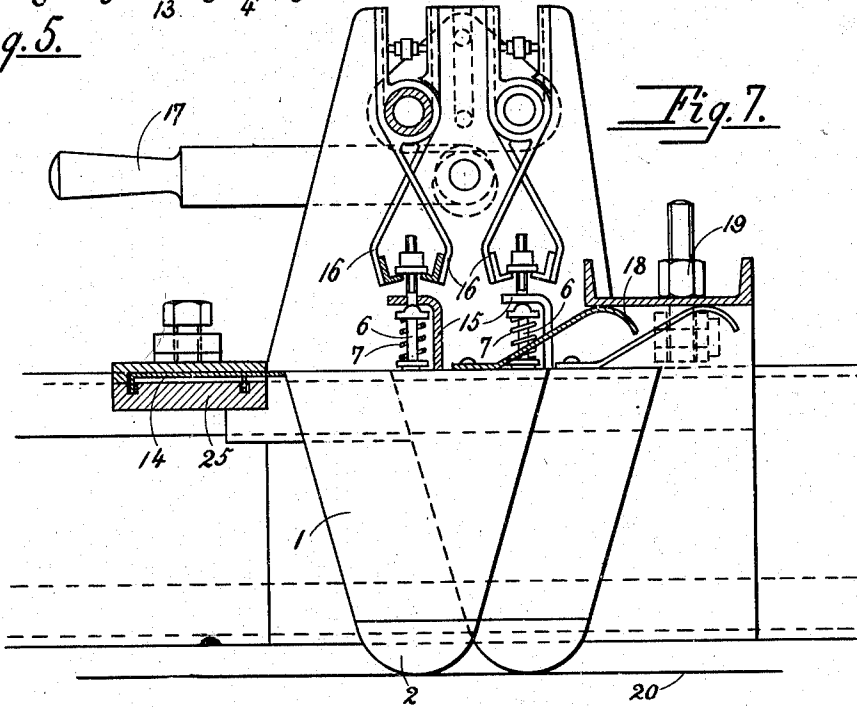
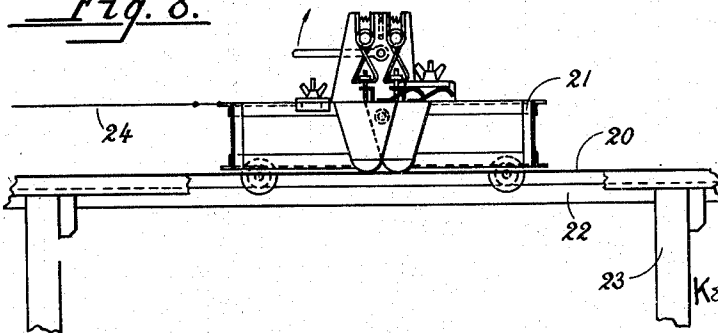


Fig. 7.

Fig. 8.



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## UNITED STATES PATENT OFFICE

2,203,910

APPARATUS FOR COLORING, PRINTING, AND  
DECORATING FLAT SURFACES, PARTICULARLY  
WOVEN TEXTILESJoannès Issartel and Ernest Robert, Lyon, France,  
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body corporate of SwitzerlandApplication July 2, 1937, Serial No. 151,580  
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14 Claims. (Cl. 91—12)

This invention relates to an apparatus for coloring and decorating flat surfaces or fabrics, particularly woven textiles.

An object of the present invention resides in the provision of a means for the application of colors and other substances in a particularly efficient as well as simple and cheap manner to woven textiles and other flat surfaces such as paper, leather, artificial leather, wood surfaces, and sheet metal in order to produce color effects, patterns, decorations, and the like.

In order to print woven textiles with colors, so-called calico printing, three groups of processes are employed customarily, namely, hand-printing, stencil-printing, and cylinder-printing. All these processes intended for mass production are troublesome and time-consuming and frequently stand in the way of an economical utilization of the colors and covering means. In addition to these processes adapted to mass production, hand-painting is still used to a certain extent which finds its origin in the Far East and requires artistic talent. The same applies to batik dyeing, in which certain effects are produced by dispersing masses of colors which have a greater or lesser tendency to run.

Attempts to decorate woven textiles, paper, and the like with the aid of apparatus composed of a plurality of color containers of square cross-section provided at their lower ends with tubular color-discharge openings projecting beyond the container walls and closable by valves and which could be moved with the aid of runners resembling those of a sledge over the fabric to be printed have not produced serviceable results. The main difficulties in the employment of such apparatus intended for the simultaneous production of a plurality of straight lines or stripes consisted therein that, owing to non-uniform absorption of the color by the base, defects in printing such as spots and other defective parts occurred in addition to losses of color and other defects.

It is an object of the present invention to provide a means for coloring and decorating woven textiles such as cotton, wool, silk, artificial silk, and other flat surfaces, whereby the coloring and decorating of the base is effected in a very simple and cheap manner without the occurrence of defects in printing, losses in color, and the like, and whereby the most varied kinds of patterns and decorations can be produced in mass operation, with complete and convenient control.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and shown in the drawings which, by way of illustration, show what we now consider to be a preferred embodiment of our invention.

An embodiment of the apparatus suitable for

carrying out this invention is illustrated by way of example in the accompanying drawings.

Fig. 1 is a longitudinal vertical section of a color-printing apparatus according to the present invention.

Fig. 2 is a longitudinal sectional view of a modification of the present invention with the valve in closed position.

Fig. 3 shows the device illustrated in Fig. 2 in normal operating condition with the valve in open position.

Fig. 4 shows the apparatus illustrated in Fig. 2 in a condition in which the operating fluid has just been withdrawn from the discharge opening and the collecting chamber.

Fig. 5 is a longitudinal vertical sectional view of a modified apparatus according to the present invention taken along line 5—5 of Fig. 6.

Fig. 6 is a bottom view of the apparatus shown in Fig. 5.

Fig. 7 is a part sectional view of an embodiment of the present invention comprising a plurality of containers.

Fig. 8 is a part sectional view of the apparatus shown in Fig. 7 in connection with transport means for moving the apparatus relatively to the surfaces to be decorated.

Like parts are designated by like numerals in all figures of the drawings.

Referring more particularly to Fig. 1: 1 represents a, for example pocket-shaped, color container, the walls of which approach one another in a downward direction. In the power part of the container, a block 2 consisting of metal, for example brass, forms a solid container bottom or mouthpiece and has a color-discharge opening or mouth 3 constructed, for example, in the shape of a slot for outlet of the wet flowable color to the fabric beneath.

The lower end of the container or the block 2 is so constructed, according to the present invention, that it slides smoothly over the fabric or the like without leaving it, in the manner of a smoothing iron. Edges or other projections are absent. The outlet or slot is of such small or narrow dimension that by suction or closure above it the outflow of color may be wholly stopped.

In the embodiment of the present invention illustrated, the lower part of block 2 and the edges of the discharge opening are rounded off in order to ensure smooth travel over the base. The containers which are, for example, triangular in cross section are preferably only of limited width so that a plurality of containers which may, if desired, be charged with different colors and, if desired, be provided with discharge openings of different shapes and can be combined together and the resulting aggregate be employed as a single unit.

A relatively small collecting and distributing chamber 4, which can be separated or shut off from the color container 1 by a valve 5, is provided above the color-discharge opening 3. The cavity 4 may be considered a feed chamber leading to the outlet 3, and fed from the container unless cut off by the chamber valve 5. The collecting chamber 4 may be of about the same shape as the discharge opening; it may, however, also be of different shape. The essential feature is that, by the interposition of chamber 4, uniform distribution of the color above the discharge opening is effected, and constant and uniform outflow through the discharge opening 3 is ensured. If, for example, above a slot-shaped discharge opening, a collecting chamber of corresponding length is provided, it may be advisable to introduce the color from container 1 into collecting chamber 4 through a plurality of inlet openings individually controlled by valves, in order to ensure as rapid and uniform a distribution thereof as possible over the entire length of the elongated collecting chamber. In some cases, it has proved to be advisable to additionally provide one or more, for example circular, inlet chambers closable by valves above the, for example elongated, collecting chamber. In general, it is advisable to ensure that the valve head effecting the closure does not penetrate into the relatively narrow collecting chamber proper when the valve is closed.

The shaft or stem 6 of valve 5 is slidably guided to move against the action of spring 7. The valve is closed by the pressure of spring 7 and opened by force acting against the pressure of spring 7. By suitable operation of the valve or valves, the inflow of the color mixture into chamber 4 can be regulated and a metered discharge of the color on to the base be effected. The valve 5 is shown beveled and when closed rests on a beveled seat in the block 2 above the chamber 4.

In many cases, it is advisable to temporarily withdraw all or part of the color mass contained in collecting and distributing chamber 4 and discharge opening 3; this is preferably done by suction above the chamber without need of closing valve 5. Such an apparatus is illustrated in longitudinal section in Figs. 2, 3, and 4. Fig. 2 shows the color-printing device with the valve closed, and Fig. 3 shows the same device with the valve open, i. e., in working position, while Fig. 4 shows the color in the process of being sucked back by the action of reduced pressure.

In the embodiments according to Figs. 2, 3, and 4, the valve shaft 6 is provided with a suction plunger or piston 8 which is guided in a tube or cylinder 9 which is connected by ports or openings 10 with the interior of color container 1. The cylinder extends the height of the container, with its lower end fitted and attached in the bottom block 2. Close above the valve head 5, on the stem 6, is an inflow regulating plate or disk or sleeve 11 which is provided with passages or openings 12 which may, if desired, be capable of regulation, for example, be entirely or partially closable against flow from above to below the disk or vice versa. Regulating plate or sleeve 11, like plunger 8, is rigidly connected to valve shaft 6. As is shown in Fig. 3, on opening valve 5, the color passes from the general space of container 1 through openings 10 into the interior of tube 9 and from the latter through openings 12 of the inflow regulating disk or sleeve 11, then flows past the valve head 5 in the direction of the arrows into distribution chamber 4, from

which it passes in a uniform flow through discharge openings 3 on to the base.

If the color-printing operation is to be interrupted or terminated, the color is sucked out of distributing chamber 4 and discharge opening 3. According to the condition illustrated in Fig. 4, this is effected by lifting valve shaft 6. Plunger 8 thereby exerts a suction action, by means of which the mass of color is lifted within the tube and drawn up from the chamber. When the valve shaft is so raised, the inflow-regulating disk or port valve 11 closes the port openings 10 in the walls of tube 9 so that, in this position, the interior of the tube is disconnected from the main general space of container 1, cutting off further inflow and downflow, and preserving the suction by closure.

The color discharge openings or orifices 3 may be of different shapes; they may, for example, be slot-shaped, square, rectangular, annular, or circular. According to a preferred embodiment, the discharge slot is narrow and extends over the entire width of the color container. By constructing the color container wide enough, fabrics in the piece and the like can be colored over their entire width and in this way surface colorings be obtained. Slot-shaped discharge openings may also, if desired, be provided with interchangeable or removable partitions so that the slot can be reduced to produce smaller discharge openings of the same kind. In the case of apparatus having relatively long color discharging slots, it is advisable to employ a plurality of color feeding devices individually controllable by valves. In this case, a common color distributing chamber for all or several of the outlet openings may be provided or, if desired, a plurality of color distributing chambers into which, if desired, colors of different kinds can be introduced.

An embodiment of an apparatus according to this invention having a relatively long slot-shaped discharge opening with a plurality of color feeding devices is illustrated by way of example in Figs. 5 and 6.

In Fig. 5, an apparatus provided with a color discharge opening 3' extending along the entire width of the mouthpiece is illustrated in longitudinal section. In Fig. 6 the bottom part of the apparatus according to Fig. 5 is shown in plan view from below.

In the apparatus shown in Figs. 5 and 6, the distributing chamber 4' is filled through two color inlet passages leading from tubes 9 and controlled by valves 5' and 5''. The dimensions of distributing chamber 4' are such that it can accommodate only a limited amount of printing color. Color discharge opening 3' is divided by a bridge 13 which is situated between the two color inlet valves 5' and 5''.

A plurality of color containers of the hereinbefore described kind may be assembled to a unit. This embodiment of the present invention is shown in Fig. 7. The color containers may, for example, be arranged side by side or stepped one behind the other. The valves may be operated together or, for example, individually or in groups. In Fig. 7, two color containers are shown which are situated in stepped position one behind the other. The color containers 1 are provided with extensions 14 which are clamped to a holder 25. These extensions may be made of resilient material. The valve shafts or stems 6 projecting from the containers are guided movably for the action of spring 7 by means of angle irons 15 and the stems are held and operated by

the gripping members 16 which can be raised and lowered by hand by means of a lifter or lever 17. The color containers are pressed down to the material to be ornamented by means of plate springs 18, the pressure of which can be regulated by screw 19.

Fig. 8 shows an arrangement in which, for example, an assembly as illustrated in Fig. 7 is suspended in a carriage 21 which can be moved by rollers or other guiding elements along the rails 22 of the printing table 23, for example, by pulling the cord 24. The container blocks or mouthpieces travel along and color the fabric or material 20 lying on the table.

The various embodiments of apparatus of this invention can be used in the most varied ways, particularly for mass production of the most varied kinds of decorations, colored patterns, and colored effects. Printing of the bases may be effected by moving the color-printing apparatus over the base or by moving the base beneath stationary color-printing apparatus or by moving both the printing apparatus and the base. For example, by moving the color-printing apparatus in a longitudinal, transverse, and/or diagonal direction, striped decorations in the same or different colors may be obtained; by serpentine-like movement, corresponding patterns may be obtained, and so on. The movement of the color-printing apparatus over the base may be carried out by hand according to patterns or designs and thereby artistic effects produced, or the color-printing apparatus may be guided over the base with the aid of suitable guides, for example, guiding rails of a serpentine or other desired configuration.

The procedure may also be followed of covering individual parts of the fabric or the like with, for example, stripes, flowers, patterns, and the like of paper or other suitable material and coloring or printing the uncovered surface according to this invention in one or more colors. Covering masses, so-called reserves, such as resin solutions and the like may, for example, also be applied in suitable designs on the base and the uncovered positions be printed according to this invention with colors. In this case, apparatus according to this invention may be employed for applying the reserves.

For the mechanical control of the color-printing apparatus, auxiliary means such as cam lifters, curves, discs, and the like controlled by hand or mechanically may be employed. With the aid of auxiliary means as aforesaid, the color containers may, for example, be temporarily raised from the material and be then again pressed on. An alternative procedure, for example, is to trace a copying design with a feeler and to guide the coloring apparatus, for example, electro-mechanically with the aid of the feeler.

The color-printing apparatus may, for example, also be suspended above the table carrying or guiding the base, for example, on elastic cords which allow of a certain movement, and be guided by hand or mechanically. Rails which may, for example, be curved or otherwise shaped may be employed inter alia for the purpose of guiding.

When employing a single color container, this may be guided in a simple manner, for example, by hand over the base and thereby particularly artistic effects obtained. By using color containers having, for example, punctiform color discharge openings, designs such as of flowers, leaves etc. may, for example, be produced.

For printing and decorating flat surfaces, flow-

ing colors of the usual kind may be employed, particularly color mixtures adjusted with the aid of thickening agents to the desired degree of viscosity.

As the above examples show, the invention enables both surface printing to be effected and also the most varied patterns, decorations, and the like to be produced, it being possible to produce multi-colored effects in a very simple manner in one single operation. Patterns of the tartan type and so-called moiré effects may, for example, be obtained, and continuous straight or curved lines may be produced. Interruptions in the design may also be effected, for example, when employing an apparatus containing a plurality of color containers, in which, for example, the color containers are disposed in one common support, by temporarily interrupting the color outflow from individual color containers, whilst others operate continuously. Designs such as leaves and flowers may also be produced in a very simple manner, for example, by employing color-printing apparatus, the discharge openings of which are so shaped that they are adapted to produce lines, spots, points, and the like. By suitable guiding, for example, in accordance with copying designs or along stencils, it is easily possible to produce the desired patterns or designs.

While we believe the above described embodiments of our invention to be preferred embodiments, we wish it to be understood that we do not desire to be limited to the exact details of process, design, and construction shown and described, for obvious modifications will occur to a person skilled in the art.

What we claim is:

1. Apparatus for applying designs in wet colors upon fabric or other surfaces, comprising a container for the flowable color having a bottom relatively slidable in direct contact upon the surface to be colored, said bottom formed with one or more constantly open color discharge outlets of narrow width, and with a feed chamber from which the outlet descends and arranged to receive color from the container, a valve to close off the feed chamber from receiving color, an interior wall forming a cylindrical reservoir within the container and mounted upright upon said bottom with a port in said wall admitting color to the reservoir and thence to the chamber, and means operable while the valve is open for closing said port and for creating suction in said reservoir to terminate color outflow through the chamber and outlet, without closing the valve.

2. An apparatus as in claim 1 and wherein said means comprises a liftable stem, with a piston lifted by the stem to create suction in the reservoir and a port valve lifted by the stem to close the port while the valve is open.

3. Apparatus for applying designs in wet colors upon fabric or other surfaces, comprising a container for the flowable color having a bottom relatively slidable in direct contact smoothly upon the surface to be colored, said bottom formed with at least one color discharge outlet channels of narrow width and always open, and with a small feed chamber from which the outlet channel descends and arranged to receive color from the container, an interior chamber valve movable downwardly to shut off the chamber from the container and upwardly to open the chamber to the container, an operating stem extending upwardly from the valve for control from above the container, a cylindrical tube arranged upright within the container and fitted to the bottom,

with ports in the tube wall near the bottom for admission of color to the tube and thence to the chamber, a piston means connected to said stem and adapted to be lifted thereby to create suction within the tube and chamber to cut off downflow of color through the open chamber and outlet channels, and a port valve means adapted to be lifted by said stem thereby to close the tube wall ports against admission of color when suction is caused to stop downflow.

4. Apparatus for applying designs in wet colors upon fabric or other surfaces, comprising a container for the flowable color having a bottom relatively slidable in direct contact upon a flat surface to be colored, said bottom formed with a constantly open descending discharge outlet of narrow width, and with a feed chamber from which the outlet descends and arranged to receive color from the container, an interior chamber valve movable to closed position to shut off the chamber from the container and reversely to open the chamber to receive color from the container, a stem extending upwardly from the valve for operation from an exterior point above the container, and separate suction means operable while the chamber valve is open to create suction thereabove to stop downflow of color through the outlet.

5. An apparatus as in claim 4 and wherein the suction means operable while the chamber valve is open comprises a piston lifted by the stem of the valve to apply suction to the color in the chamber and so suspend outflow through the outlet.

6. Apparatus for applying designs in wet colors upon fabric or other surfaces, comprising a container for the flowable color having a bottom relatively slidable in direct contact upon the surface to be colored, said bottom formed with at least one constantly open color discharge outlet channel of narrow width, and with a feed chamber from which the outlet descends and arranged to receive color from the container, an interior chamber valve movable to closed position to shut off the chamber from the container and reversely to open the chamber to receive color from the container, a stem extending upwardly from the valve for operation from an exterior point above the container, a wall forming an interior reservoir within the container general space and above its bottom, a port in said wall leading from the container general space into such reservoir, an interior means operated by the movement of the valve stem to close such port and thus disconnect the reservoir from the container, and an interior means operated by the stem to create suction in the reservoir and chamber in the same movement with the closing of such ports by said sleeve means, while said chamber valve is open, thereby to terminate outflow in said channel without closing said valve.

7. Apparatus for applying designs in wet colors upon fabric or other surfaces, comprising a flat rigid table to support the fabric, a container for the flowable color having a bottom smoothly slidable in direct contact on top of the fabric to be colored resting flatwise upon the table, said bottom formed with at least one constantly open descending color discharge channel of such narrow width that outflow may be interrupted by suction applied above, and with a feed chamber above the outlet and from which the open narrow outlet descends, such feed chamber having substantial volume and being arranged to receive color

by flow from the container, an interior chamber valve movable downwardly to closed position to shut off the chamber from the container and upwardly to open the chamber to receive color from the container, means for exterior operation of said chamber valve, and means operable when said valve is open for applying and relieving suction above the chamber to interrupt and permit liquid outflow according to the design to be applied to the fabric.

8. An apparatus as in claim 7 and wherein is resilient means to cause pressure of the container downwardly toward the table and against the fabric to be colored, and means for adjusting the resilient pressure thereof.

9. Apparatus for applying designs in liquid colors upon textile or other flat surfaces, comprising a liquid color container having its bottom slidable smoothly upon the surface to be colored, said container bottom being formed with one or more color discharge outlets each fed by a descending channel of such narrow width that downflow can be quickly stopped as desired by applying interior suction upon the liquid and can be resumed by relieving the suction, with a small feed chamber arranged to receive liquid from the container, and from which each channel descends to the outlet, a chamber valve means closable to shut off the chamber from the container and openable to receive color from the container, and means to apply suction to the liquid above the chamber while the chamber valve is open and to relieve such suction thereby to afford quick application and stoppage of color according to the design desired.

10. Apparatus as in claim 9 and wherein the container bottom is a solid block in which is formed the feed chamber and the channel descending therefrom to the outlet.

11. Apparatus as in claim 9 and wherein the feed chamber is horizontally elongated and the discharge outlet is an elongated groove fed therefrom.

12. Apparatus as in claim 9 and wherein the container is open at top and within the container is provided an upright interior walled reservoir at the bottom of which the feed chamber is located, and the means to apply suction for quick control of discharge from the chamber consists of a piston working in said reservoir.

13. Apparatus as in claim 9 and wherein are ports in the reservoir wall to admit liquid from the container to the reservoir, a port closing device, and a single connection to operate the port closing device and the suction means in coordination, whereby to close or open the ports when the suction means is to be actuated to apply or relieve suction on the liquid.

14. Apparatus as in claim 9 and wherein is a cylindrical reservoir above the feed chamber within the container, with ports in the reservoir wall for inflow of liquid from the container, the chamber valve having a valve rod extending upwardly through the reservoir, valve means carried by said rod to close and open said wall ports, and a suction piston carried by the rod within the reservoir above said valve and valve means; said ports being so arranged that when the rod is lifted and the chamber valve open, the wall ports may be closed and the piston operable to apply and relieve suction.

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