United States Patent [19]

Cobb

[11] **3,812,779**

[45] **May 28, 1974**

[54] **AUTOMATIC MULTI-COLOR PRINTING ARRANGEMENT**

[75] Inventor: **Clyde C. Cobb,** Brooklyn, N.Y.

[73] Assignee: **American Screen Process Equipment Company,** Chicago, Ill.

[22] Filed: **May 22, 1969**

[21] Appl. No.: **826,793**

[52] **U.S. Cl.**..... **101/115,** 101/44, 101/193

[51] **Int. Cl.**..... **B41f 15/04**

[58] **Field of Search** 101/114, 115, 123, 193, 101/287, 316, 4, 41, 44, 9, 11; 83/262, 282, 268, 419, 420, 255, 209, 370; 77/32.2

[56] **References Cited**

UNITED STATES PATENTS

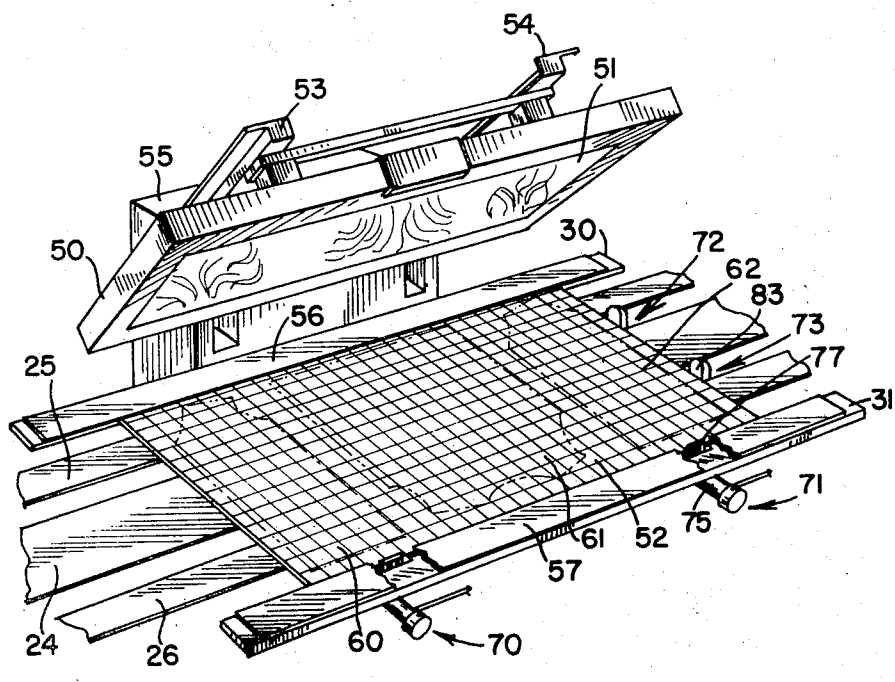
1,369,934	3/1921	Onstad	101/DIG. 3
2,196,684	4/1940	Rodder et al.	83/262 X
2,846,946	8/1958	Schwarzberger	101/115
3,180,253	4/1965	Hildmann	101/41
3,198,115	8/1965	Harvey	101/44 X

Primary Examiner—J. Reed Fisher

[57] **ABSTRACT**

A multi-color printing arrangement adapted to print cut piece textile goods with different colors without running, smearing, overlapping or the like. Means is provided to assure proper registration of the workpiece carrying the material to be printed, a portion of the registration means also functioning to hold the workpiece during the printing cycle. Means in the novel control circuit permits selection of the duration of the cycle best suited for the ink used.

1 Claim, 10 Drawing Figures



PATENTED MAY 28 1974

3,812,779

SHEET 1 OF 3

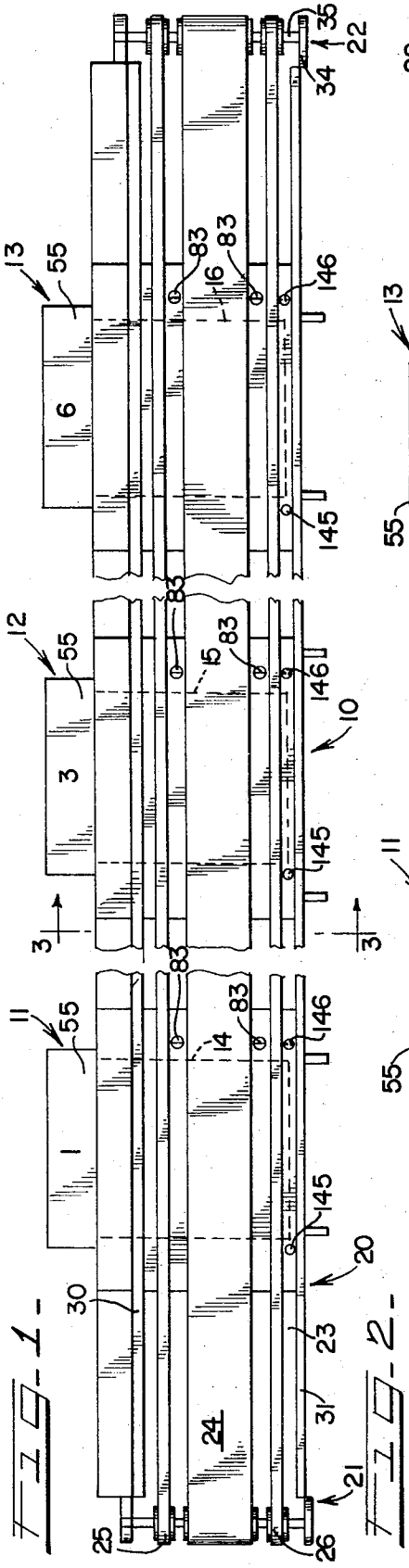


FIG. 1

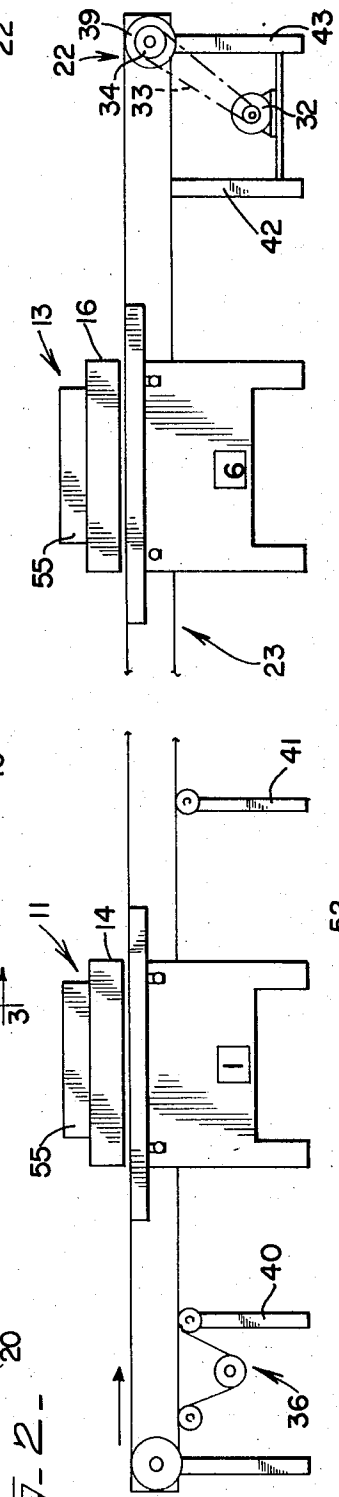


FIG. 2

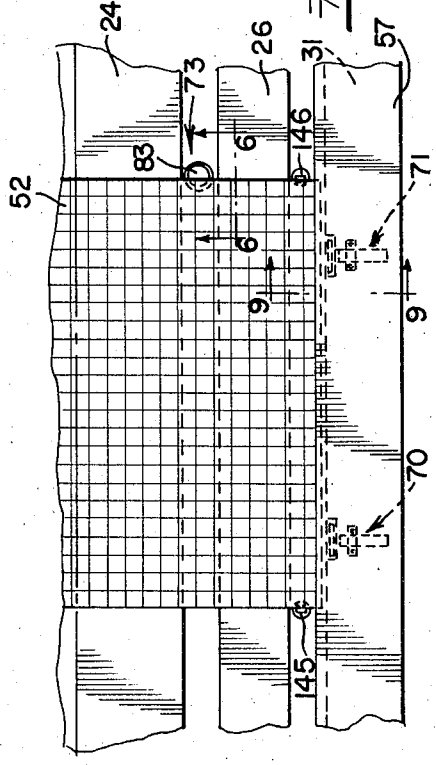
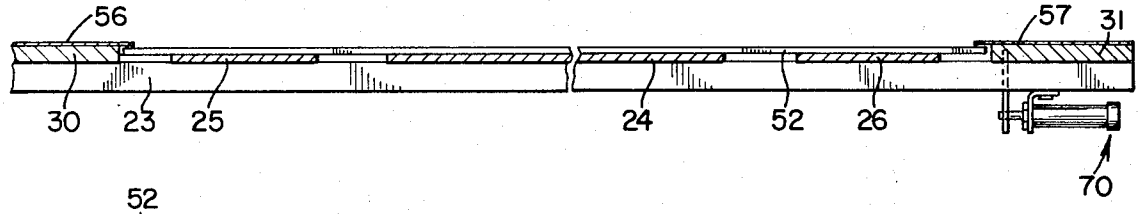


FIG. 4

INVENTOR
CLYDE C. COBB

BY Robert E. Wagner ATT'Y.

FIG. 3



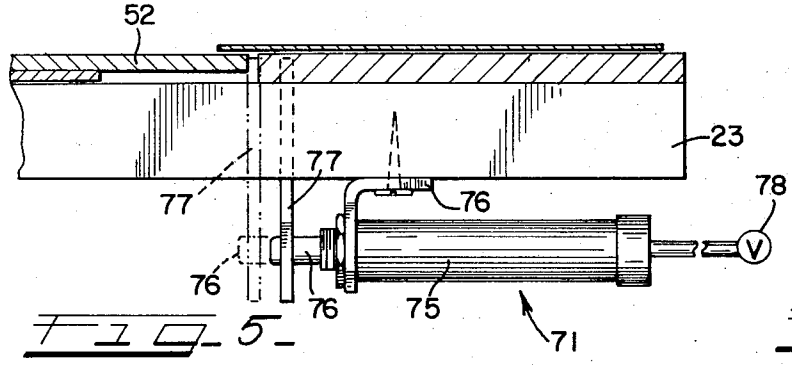


FIG. 5

FIG. 6

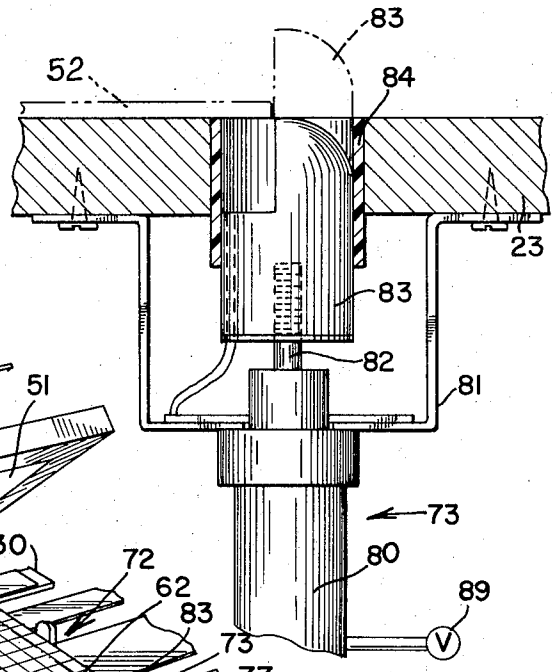
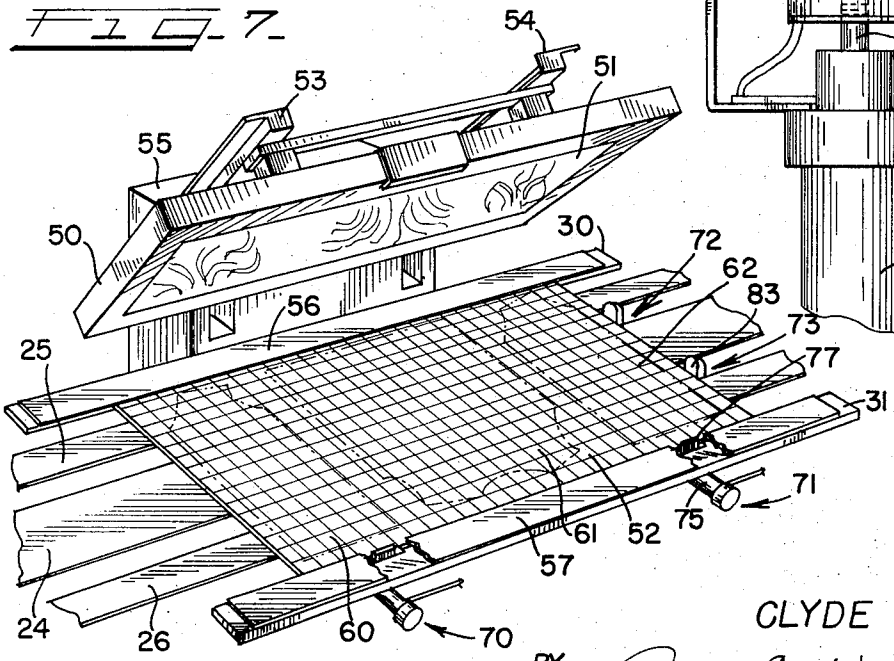


FIG. 7



INVENTOR
CLYDE C. COBB

BY Robert E. Wagner ATT'Y.

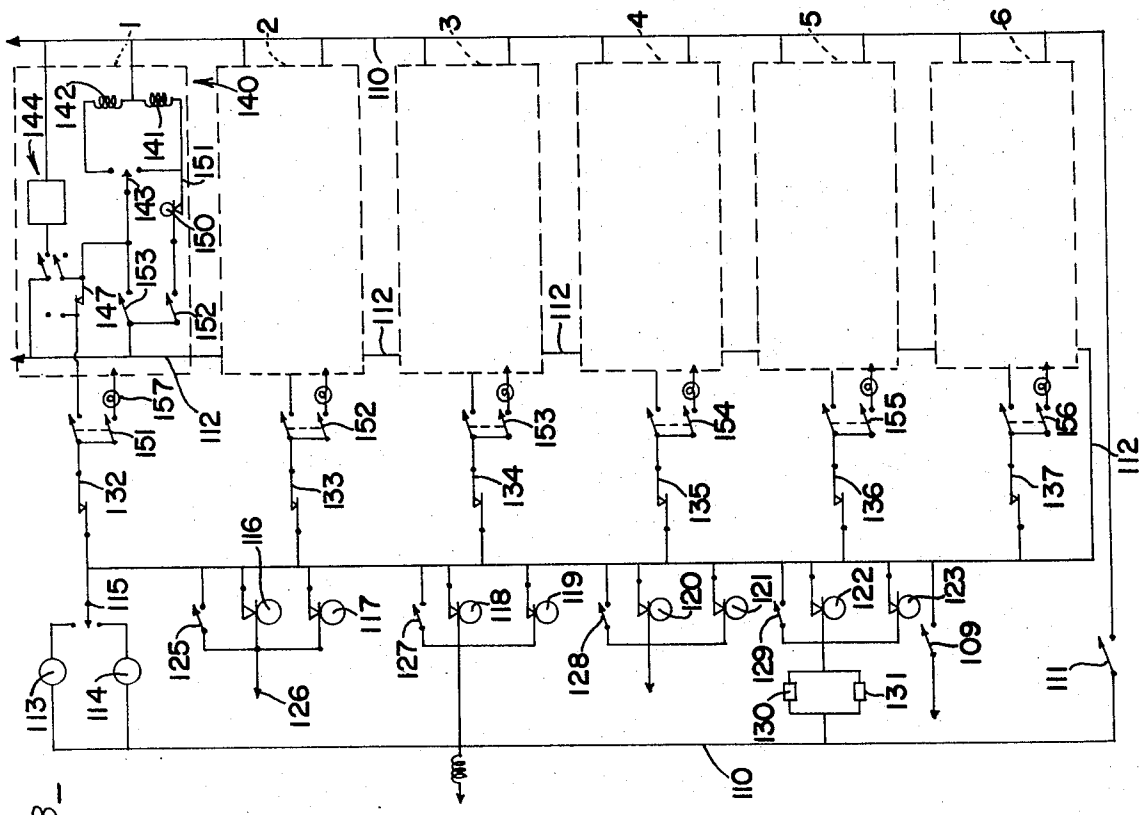


FIG-8-

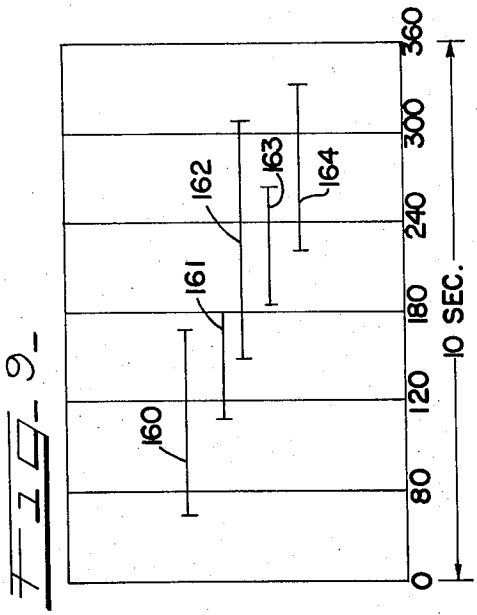


FIG-9-

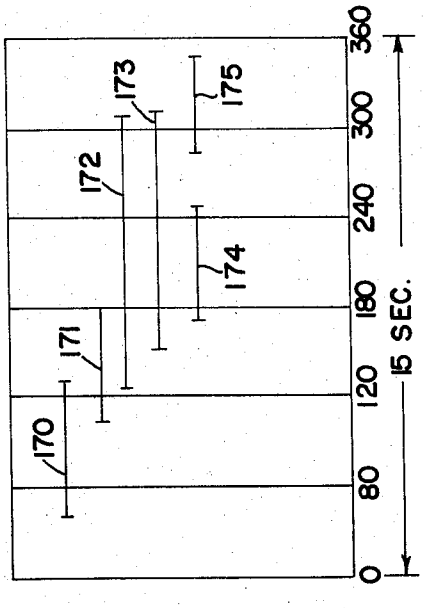


FIG-10-

INVENTOR
CLYDE C. COBB

BY Robert E. Wagner
ATT'Y.

AUTOMATIC MULTI-COLOR PRINTING ARRANGEMENT

This invention relates to a multi-color printing arrangement and, more specifically, relates to a new and improved printing arrangement which permits cut piece textile goods to be consecutively and automatically printed on conventional silk screen presses without requiring hand registration or manual handling between printing stations. Further, the invention includes a novel control arrangement to automatically assure accurate positioning of the workpiece carrying the cut piece textile goods before the printing cycle is commenced, thereby reducing the percentage of rejects or misprints.

In the printing of cut textile pieces in the past, it was customary to place the individual pieces on a table coated with an adhesive to maintain the cut pieces properly located during printing. The individual pieces were printed by a hand operation, with a silk screen stencil being placed over the cut pieces. The printing and flood strokes were performed by hand after the screen was located against a rail on the table edge having a locating pin or stop. The screen was then manually lifted off the table and printed piece by the operator who moved the screen to the next adjacent station to print the particular color on the cut piece located at that station. As expected, the cost of printed pieces of this type was relatively expensive, however, was continued because of the lack of a feasible method by which multi-color printing work could be printed. Upon completion of the printing, the printed textile pieces were hung on a line over the table to dry and were subsequently joined by sewing. As noted, registration of the screen in a longitudinal direction on the printing stroke was attempted to be achieved by placement of a pin-like stop along the edge of the table against which the screen was pressed. The screen was also pressed against the edge of the table to locate the screen in a transverse direction relative to the preplaced cut textile goods. While the quality of products printed by the above technique was acceptable, it was difficult to maintain the number of rejects or pieces rendered unusable within the 3 percent to 5 percent limitation which is customary for job printers in the trade. For want of a more satisfactory technique, however, this printing technique has continued.

Attempts were made to print the cut pieces or clothing placed on a moving belt. An adhesive was coated on the belt to retain the cut pieces located after placement. Registration was attempted to be accomplished by placing the cut textile pieces on a locating mark on the belt and, thereafter, indexing the belt a predetermined distance to bring the cut pieces beneath the printing screen. As expected, this left something to be desired where exacting tolerances were required, as is the case with more expensive materials. In printing sweatshirts and similar goods, this type of arrangement was satisfactory inasmuch as the tolerances or location of the printing relative to the piece could vary considerably without rendering the finished product unusable. It can be appreciated that the minimum tolerances which were within the capability of such arrangement would be wholly unsatisfactory in printing cut textile pieces for use in shirts and blouses and, especially, those in which diverse colors are used. Accordingly, the hand printing techniques were continued to be used

in multi-color printing where more exacting tolerances were required.

The present invention sets forth a novel means and method for multi-color printing and is unlimited in the number of colors which may be printed consecutively with accurate registration of each color assured. The present system and control permits the use of available types of ink or acid dyes through the provision of a novel selection means which allows selection of the cycle best suited to the ink or dye used. The cut textile pieces are placed on a carrier or workpiece formed of hardboard having a light adhesive coating to maintain the cut pieces positioned once they are placed. The workpiece is previously and permanently printed with horizontal and vertical lines to form a number of small squares or coordinates to permit repetitious and nominally accurate placement of the cut pieces. As will become apparent, such placement is not critical and may be easily performed without special skill required.

The workpiece carrying the cut piece textile goods is sequentially printed and accurate registration at each printing station is assured by a novel registration means. In this manner, diverse colors may be printed successively without overlapping, smearing or the like and the resulting products are of the highest printing quality. It has been found that the number of rejects or pieces rendered unusable due to faulty printing is reduced to a fraction of a percent with the attendant economic advantages.

It is a principal object of this invention to provide a new and improved automatically-operable mutli-color printing arrangement and method.

It is a further object of this invention to provide an automatic printing arrangement which will reduce the amount of hand labor in multi-color textile printing while providing an attendant increase in production quantity and quality.

It is a still further object of this invention to provide a new and improved control arrangement for multi-color printing having means to assure accurate registration of the material to be printed under successive presses.

It is a still further object of this invention to provide a new and improved printing arrangement including means to prevent initiation of the printing stroke unless a workpiece carrying cut pieces to be printed is properly registered for printing, thereby reducing the number of rejects.

Objects in addition to those specifically set forth will become apparent to the man skilled in the art upon consideration of the accompanying drawings and following description.

IN THE DRAWINGS:

FIG. 1 is a schematic top plan view of the multi-color printing arrangement of the present invention with the presses indicated schematically and the conveying means broken away;

FIG. 2 is a side elevational view of the schematic printing arrangement shown in FIG. 1 with the central portion omitted for clarity;

FIG. 3 is a transverse cross-sectional view taken generally along the line 3—3 of FIG. 1 through the conveying means with the press omitted;

FIG. 4 is an enlarged top plan view of the conveying means shown in FIG. 1 taken beneath the printing

screen and illustrating a workpiece without cut pieces thereon in position to be printed;

FIG. 5 is an enlarged cross-sectional view of the right-hand end of FIG. 3 illustrating the transverse registration means;

FIG. 6 is an enlarged view of the longitudinal stops taken generally along the line 6—6 of FIG. 4;

FIG. 7 is a schematic perspective view of the printing head and conveying means with a workpiece containing cut pieces in position to be printed;

FIG. 8 is a schematic diagram of the control circuit for a six-station printing arrangement of the type shown in FIGS. 1–7;

FIG. 9 is a time sequence diagram for a 10-second single-stroke mode of press operation; and

FIG. 10 is a time sequence diagram similar to FIG. 9 showing a 15-second double-stroke mode of press operation.

Referring now to FIG. 1, reference numeral 10 generally indicates the automated multi-color printing arrangement of the present invention including a conveying means 20 and a plurality of printing stations in the form of presses indicated schematically at 11, 12 and 13. Each of the presses 11, 12 and 13 may be a silk screen printing press with the frame location of each shown in outline by dotted lines 14, 15 and 16, respectively. The silk screen presses are of conventional type available on the open market. In this respect, silk screen printing equipment having the bed area open or free of components is best suited for this application.

The conveying means 20 functions to transport the workpieces carrying the cut pieces to be printed (not shown in FIGS. 1 and 2) between the various printing stations 11, 12 and 13. The number of printing stations and colors capable of being sequentially printed is limited only by the physical length of the conveyor because, as will become apparent, the present invention permits any number of machines to be added with each capable of printing a color different from the preceding machine in registrations relative to the previously printed colors.

The conveying means 20 includes a pulley assembly indicated generally at 21 and 22 supported on a table or frame structure indicated generally at 23. As seen in the top plan view of FIG. 1, the conveying means 20 consists of a central wide belt 24 having marginal belts 25 and 26 on opposite sides thereof. In one application, the wide belt was of the order of about 6 inches, while the narrower belts were of the order of about 2 inches. Along the opposite edges of the table 23 are provided side guide members 30 and 31. These are located slightly above the top of the belts and will be specifically described in detail hereinafter.

The conveying belts 24, 25 and 26 are driven by a motor 32 supported beneath the frame or table 23 and having a drive belt 33 to drive a pulley 34 connected through an electrically operated clutch 39 to a shaft 35 which supports the pulley assembly 22. The belts 24–26 extend around the pulley assembly 21 in a known manner, while an idler assembly 36 (FIG. 2) maintains the belt properly tensioned. Energization of the motor 32 and electric clutch 39 causes the belts to be moved in a longitudinal direction. Suitable supports are provided as at 40, 41, 42 and 43 in FIG. 2 to support the table 23 around which the belt is movable. The relationship of the table and belts will become more apparent in the description of FIGS. 4–7.

For convenience in illustration, the press 12 has been omitted in FIG. 2, however, it is to be understood that any number of press stations could be placed along the conveying means. The control system shown in FIG. 8 will be described with reference to six printing stations, each of which is capable of a single or double stroke operation.

The perspective view of FIG. 7 is a greatly simplified version of a silk screen printing arrangement illustrating a screen frame 50 and stencil screen 51, which is suitable for printing the workpiece 52. The screen 50 is mounted on a pair of support bars 53 and 54 which are supported in the machine housing 55 and movable upwardly and downwardly toward the workpiece 52. A flood and squeegee bar assembly (not shown) is provided to perform the flood and printing strokes in a known manner.

Each of the side guides 30 and 31 is provided with a plate 56 and 57, respectively. These are provided at least in the vicinity of the printing press and project over the top of the workpiece 52 which is sized so as to fit loosely between the guides 30 and 31. For convenience of illustration, the plate 57 has been broken away in FIG. 7, however, is continuous, at least in the region of the press.

The workpiece 52 may be a piece of hardboard of any suitable type having horizontal and vertical lines printed thereon to form squares or coordinates which permit positioning of the material to be printed. A layer of adhesive is coated on the workpiece 52 and the cut pieces 60, 61 and 62 positioned by hand with reference to the locating coordinates or squares. The adhesive used has sufficient adherence to maintain the cut pieces 60–62 properly located, however, permits removal of the cut pieces when printing is completed without damage to them.

Each printing station has the printing screen positioned at set-up to print on a workpiece with the guide edge 30 serving as the reference for each station in a transverse direction. Stops 83 provide a longitudinal reference. Once printing is commenced on a workpiece 52, as long as it is held against the guide edge 30 and the stops 83, multi-color printing can be accomplished sequentially with a degree of accuracy which was practically unable to achieve in the past.

A novel registration means is provided which consists of the transverse registration means indicated generally at 70 and 71 and the longitudinal registration means indicated generally at 72 and 73, the latter including the stops 83. Inasmuch as the registration means 70 and 71 and 72 and 73 are identical, specific description will be limited to the registration means 71 and 73, respectively.

Referring now to FIGS. 3, 4 and 5, it can be seen that the workpiece 52 is supported for movement on the belts 24–26 of the conveying means 20. The conveying means moves through a timed cycle which is of sufficient duration to assure movement of the workpiece 52 from one printing station to the next. Throughout the movement, the guides 30 and 31 are effective to maintain the workpiece 52 properly oriented to assure its movement into position at the next printing station. The longitudinal registration means 72 and 73 become active to stop the workpiece 52 from further longitudinal movement while the transverse registration means

70 and 71 locates and holds the workpiece in a manner to become apparent.

Registration may be summarized as follows. The workpiece 52 is moved on the belts 24–26 until it engages the extended stops 83 forming a part of the longitudinal registration means 72 and 73. At this time, the side or transverse registration means 70 and 71 become active and function to push the workpiece 52 transversely of the belts into engagement with the side guide 30. The longitudinal registration means 72 and 73 then retract slightly in advance of the printing stroke while the transverse registration means 70 and 71 continue to remain active to hold the workpiece properly positioned during printing.

Referring now to FIG. 5, the transverse registration means 70 includes an air cylinder 75 supported by a bracket 76 beneath the table 23. The cylinder 75 has an axially movable plunger portion 76 which supports a work-piece or palette-engaging finger 77. Operation of the cylinder 75 is controlled through a solenoid-operated valve indicated schematically at 78. When fluid is admitted to the cylinder 75, the plunger 76 extends, carrying the finger 77 into engagement with the right-hand edge of the palette or workpiece 52, moving it transversely of the conveying means 20. This condition is apparent in FIG. 5 where the fingers 77 are shown in phantom lines, while in FIG. 7, the plate 57 has been broken away to show the fingers 77 pushing the workpiece 52 against the guide 30.

The longitudinal registration means 73 includes an air cylinder 80 supported on a bracket 81 carried beneath the table or frame 23 by suitable fasteners. In the enlarged fragmentary view of FIG. 6, the longitudinal registration means 73 is illustrated with the plunger rod 82 and stop 83 in a retracted position in solid lines with an extended or registration position shown in dotted lines. The workpiece-engaging stop 83 may be joined to the rod 82 by means of threads or the like and moves up and down in a cylindrical guide bushing 84 carried in the frame or table 23. The cylinder 80 is actuated through the admission of air or the like by a four-way solenoid-operated pilot valve 89, the control of which is timed and will be described with reference to FIG. 8. In the actuated position, the palette-engaging stop 83 is elevated as shown in phantom lines in FIG. 7 to prevent further movement of the palette.

Referring now to FIGS. 8 and 9, the novel control circuit which permits selective control over the operation and time sequence of the presses will be given. As is apparent, the circuit is very simplified, however, functions to exercise precise control of the printing operation, assuring that the printing stroke will not be commenced unless the workpiece is accurately registered. In this fashion, the number of rejects, smeared prints or the like will be greatly reduced.

The main power line 110 is provided with a main line switch 111 which serves to energize the entire series of presses indicated at 1–6. The common or ground line is indicated generally at 112. The control circuit for the printing stations are identical and, therefore, only one schematic diagram is illustrated, it being understood that the boxes representing stations 2–6 would normally include a control circuit arrangement like the control circuit arrangement 140 shown in connection with the number 1 station in the electrical diagram. In practice, the control components located in the diagram below ground line 112 are generally located in a central control box with the control panel visible and accessible to the operator.

Two timers 113 and 114 are wired in parallel with a selector switch 115 provided to permit selection of the appropriate time or mode of operation. In the present application, the timer 113 is of a 10 second duration, while the timer 114 is of a 15 second duration to permit single or duplicate cycles of press operation. Obviously, other cycles may be added. Selection of the desired time is made by moving the switch 115 to the associated contact to place the circuit across the 110-volt potential to operate the motor.

The timing motor 113 drives cams 116, 118, 120 and 122, while timer motor 114 drives cams 117, 119, 121 and 123 as shown in the solid lines. The cams 116–123 each function to close normally open switch contacts for a predetermined duration during the cycle selected.

Cams 116 and 117 differ in the total time of a full printing cycle with cam 116 operating through 60° to 165° while cam 117 operates from 60° to 130°. A manual start switch 125 is provided in the main line. Initiation of the operation of the conveyor motor 32 is accomplished by closing switch 109, while the switch associated with cam 116 must be closed to energize the electrical clutch control through line 128. When the conveyor motor is running, energization of the clutch 39 shown in FIG. 2 permits the motor 32 to drive the conveyor through a predetermined cycle. Manually operable switch 125 is in parallel with the cam and switches 116 and 117 and is in the normally open position, being available for manual closing if manual operation of the conveyor is desired.

Cam 118 and its associate normally open switch control voltage and current to the solenoid-operated valve 78. A three-way pilot valve, in turn, controls the air supply to the air cylinders forming a part of the transverse registration means 70 and 71. As indicated, the three-way pilot valve 78 is solenoid-operated and may be rated at 110 volts. A manually operated switch 127 is wired in parallel with the cams 118 and 119 to permit the pilot valve 78 to be manually operated during set-up of the printing arrangement.

Cams 120 and 121 with associated switches function to control a four-way pilot valve 89 which, in turn, controls the air supply to each of the cylinders in the longitudinal registration means 72 and 73. A manually operated switch 128 is wired in parallel with the cams 120 and 121 to permit manual operation during the start-up and set-up of the press.

Cam 122 is wired in parallel with the 15 second cam 123 and a manually operable selector switch 129. When the cams close the associated normally open contacts, or the switch 129 is closed, a pair of relays 130 and 131 which are wired in parallel are energized. Relay 130 operates switches 132, 133 and 134 to complete the circuit to press stations 1, 2 and 3 and initiate cycling of each of the presses if the manually operated switches 151, 152 and 153, respectively, are closed. Relay 131 operates switches 135, 136 and 137 which control the individual presses 4, 5 and 6. As noted above, the internal circuitry of each of these presses has been omitted, being illustrated by a dashed line in the shape of a box. It is to be understood, however, that the circuitry is illustrated for the number 1 printing station and press which will be described in greater detail.

Referring to the upper left-hand portion of FIG. 8, the control circuit for the number 1 station and press is indicated generally at 140, including the field windings 141 and 142 for the press motor. A selector switch 143 which is manually operable permits the reverse or forward mode of press operation to be selected for manual operation of the press during set-up. Switch 143 is normally spring loaded to assure that it will not remain in the reverse mode when the press is automatically operated.

A palette sensing circuit is indicated generally at 144 and may include a Frost electronic light source and sensing element or the equivalent. In practice, the sensing elements are wired in series and the light sources wired in parallel. These are located at 145 and 146 in FIG. 4 and reflectance of the light off the edge of the workpiece 52 "tells" the machine of its presence in an appropriate position for printing by closing normally open switch 147. If the workpiece 52 is not in position, switch 147 remains open and the press may not begin its printing cycle.

A homing cam 150 manually driven off the conventional indexing means of the press operates a normally open switch 151 to the closed position after commencement of the printing cycle to provide an alternate circuit. Accordingly, if the press is in operation and, for some reason the control circuit is interrupted, the homing cam 150 will provide an alternate path to effect completion of the press cycle. Switch 152 in series with switch 151 operated by homing cam 150 is normally closed when the press is in the automatic mode of operation.

During set-up or the like, a switch 153 in parallel with the switch 152 permits manual selection of the forward and reverse modes through the selector switch 143. Each press is provided with a manually operated press selector switch 151, 152, 153, 154, 155 and 156 in series with the relay operated switches 132-137, respectively. Each of the former switches may be double-pole single-throw and, as shown in connection with printing station 1, may include an indicator such as the lamp 157 to permit observation of the condition of the selector switch. Any one of the presses in printing stations 1–6 may be taken out of operation without affecting the operation of the other station.

In operation, the main line switch 111 is closed to place 110 volt potential across ground line 112 and the main line 110. The timer motor for the appropriate mode or time cycle of press operation is selected by moving the switch 115 to the associated contacts, thus completing the circuit through the selected timer which may have a duration of 10 or 15 seconds for a 360° rotation. For example, timer 113 is energized to manually rotate cams 116, 118, 120 and 122. As cam 116 rotates, its normally open switch contact is closed for a period from about 60° to 165° or about 2 7/9 of a second when the full cycle is 10 seconds. As cam 116 closes its associated normally open switch contact, the electrical clutch 39 on the conveyor is energized and operates it through the cycle shown in solid lines at 160 on the time sequence diagram of FIG. 9. When the timer 113 approaches approximately 110°, cam 120 closes its associated normally open switch contact to operate the solenoid which opens valve 89 admitting air to the cylinder 80 to elevate the stops 83 in the path of the palette. The stops 83 remain elevated through a time period represented by the line 161 on the time sequence diagram of FIG. 9 or until the timer reaches 180° or halfway through its cycle.

At 160°, cam 118 closes its associated normally open switch, energizing the solenoid and opening the three-way pilot valve, causing air to be admitted to the cylinders on the transverse registration means 70 and 71. This functions to move the workpiece 52 against the guide rail 30 and is illustrated by the line 162 in the time sequence diagram of FIG. 9. Cam 118 and its associated normally open switch remains closed up to 250° of the cycle. The longitudinal stops have been retracted at 180°, while the transverse registration means continues to remain active and energized through a substantial portion of the cycle. Cam 122 closes at its associated normally open switch at 185°, energizing the relays 130 and 131 which, in turn, close the associated normally open switches 132–134 and 135–137, respectively. This initiates the press cycle, as represented by line 163 in the time sequence diagram of FIG. 9. At start-up, the switch 143 is moved to the forward mode of operation, while switch 152 is closed to place the contact 151 operated by the homing cam 150 in parallel with switches 142 and 147. As is evident, once the press cycle is initiated, the print and homing cam will carry it through to completion with the duration of the print cycle evidenced by line 164 in FIG. 9. Prior to completion of the print cycle which is shortly after the stencil screen is raised from the work, the transverse registration means 70 and 71 are de-energized. The timer 113 continues to 360° or completion and automatically repeats the cycle once again.

The 10 second cycle described above is suited for pigment-type inks and single-stroke operation of the press. When utilizing acid dyes, double-stroke operation of each press is recommended and a cycle of operation of 15 seconds is advisable. The diagram illustrating this is shown in FIG. 10 wherein line 170 represents the conveyor movement from about 60° to 130° through operation of cam 117 maintaining its normally open switch closed through this period. The electrically operated clutch 39 is energized for this period and the conveyor moves the workpieces to the next station. The longitudinal stops become active at approximately 100° and remain active up to 180° as represented by time line 171 (FIG. 10) to arrest the workpieces 52 even though the conveyor belts continue to move.

At about 125°, cam 119 closes its associated normally open switch to energize the solenoid on the three-way pilot valve 78 which, in turn activates the air cylinders in the transverse registration means 70 and 71. As shown by time line 172 in FIG. 10, these remain energized to 300° which overlaps the print stroke represented by line 173, the latter being initiated by print cam 123 closing its associated normally open switch and energizing relays 130 and 131.

In the 15 second mode of operation, the print cam 123 functions to permit its associated switch contact to return to a normally open position at 310°, de-energizing the relays 130 and 132 with the result that the associated switches open. Normally, this would cause the presses to stop, however, the homing cam in each of the presses has gone past completion of the first printing cycle as represented by line 174 in the time sequence diagram of FIG. 10 and part way into the second cycle as represented by line 175. The homing cam on each of the presses keeps switch 151 closed to assure that the second cycle or second printing stroke will

be completed within the 15 second duration allotted by the timer motor **114.** The second press stroke is completed at about 350°. Conveyor movement is initiated after the timer cam **114** has gone approximately 70° into another print cycle. As noted, the homing cam **150** is driven by the press index and functions to complete the circuit to the forward coil **141** on the press through the manual switch **152** and switch contacts **151** closed by the homing cam **150.**

The printing cycle repeats automatically so long as a workpiece is moved into position at the printing station. The workpieces **52** are placed on the inbound or left-hand end of the conveyor shown in FIGS. **1** and **2.** As pointed out previously, the sensing circuit **144** will prevent initiation of press operation unless a workpiece is properly positioned. In the event that a workpiece should be manually moved or get past the forward stops before they are raised, the sensor **145** will automatically sense the absence of the workpiece even though sensor **146** is covered and prevent the start of the printing cycle at that station. Other stations will print as scheduled. This unprinted piece may be printed subsequently by manual operation of the printing station or returned through the entire cycle.

It can be seen that the novel multi-color printing arrangement of the present invention is completely automatic and will continue to operate so long as workpieces **52** are placed on the conveying means **20.** Each of the presses is provided with a longitudinal and transverse registration means which forms a part of the overall registration means which assures accurate positioning of the workpieces **52** beneath each of the printing stations **1–6.** It is obvious that the number of printing stations may be increased by adding press and associated circuitry. If requirements dictate,dryers may be positioned between the printing stations to dry the products enroute to the next station.

Upon a consideration of the foregoing, it will become obvious to those skilled in the art that various modifications may be made without departing from the invention embodied herein.

I claim:

1. A multi-color printing assembly particularly adapted to print diverse colors on material in an exact location relative to a previously printed color without overlapping or spacing from said color, said multi-color printing assembly comprising at least two printing presses in spaced relationship to each other, conveying means to move a workpiece to be printed from one of said presses to the other of said presses, first registration means associated with said conveying means to prevent movement of said workpiece beyond each of said presses thereby registering said workpiece in a longitudinal direction, said registration means to register said workpiece transversely of said conveying means thereby to locate said workpiece for printing thereof, and control means to operate said first and second registration means, said control means including at least two timer means alternately operable to permit selection of a single stroke mode or double stroke mode of press operation.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,812,779 Dated May 28, 1974

Inventor(s) Clyde C. Cobb

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 8, line 23, "142" should read -- 143 --.

Column 10, line 23, "said" should read -- second --.

Signed and sealed this 12th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
U.S. GOVERNMENT PRINTING OFFICE : 869-930