United States Patent [19]

Seedorf

[11] **3,848,528**

[45] **Nov. 19, 1974**

[54] **MULTI-STATION PRINTING SYSTEM**

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[73] Assignee: **The Roy M. Moffitt Company**

[22] Filed: **Sept. 25, 1972**

[21] Appl. No.: **291,964**

[52] **U.S. Cl.** **101/115,** 101/126, 101/196, 101/288, 226/30, 226/33

[51] **Int. Cl.** **B41f 15/10,** B41f 15/24

[58] **Field of Search** 101/115, 181, 126, 124, 101/288, 196–199, 123, 116–118, 155, 190; 34/155; 226/29, 30, 11, 33, 21, 39

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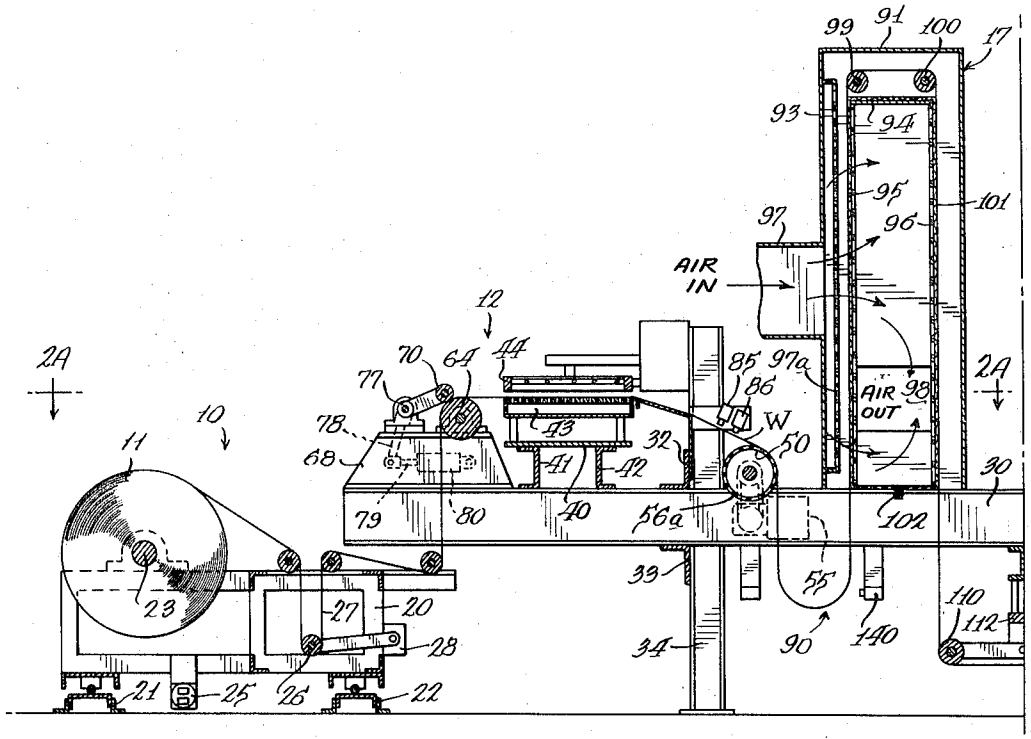
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Attorney, Agent, or Firm—Wegner, Stellman, McCord, Wiles & Wood

[57] **ABSTRACT**

A multi-station printing system with a screen printer at each of the stations for printing on an intermittently travelling continuous web of material which is stopped in accurate registry at each of the stations, an air dryer between stations for drying the web and by means of negative pressure created by air flow imparting a drag on the web for proper handling thereof in guiding and registry, and control means for accurately positioning the web for printing at each station and for permitting operation of one station independently of the others.

2 Claims, 7 Drawing Figures



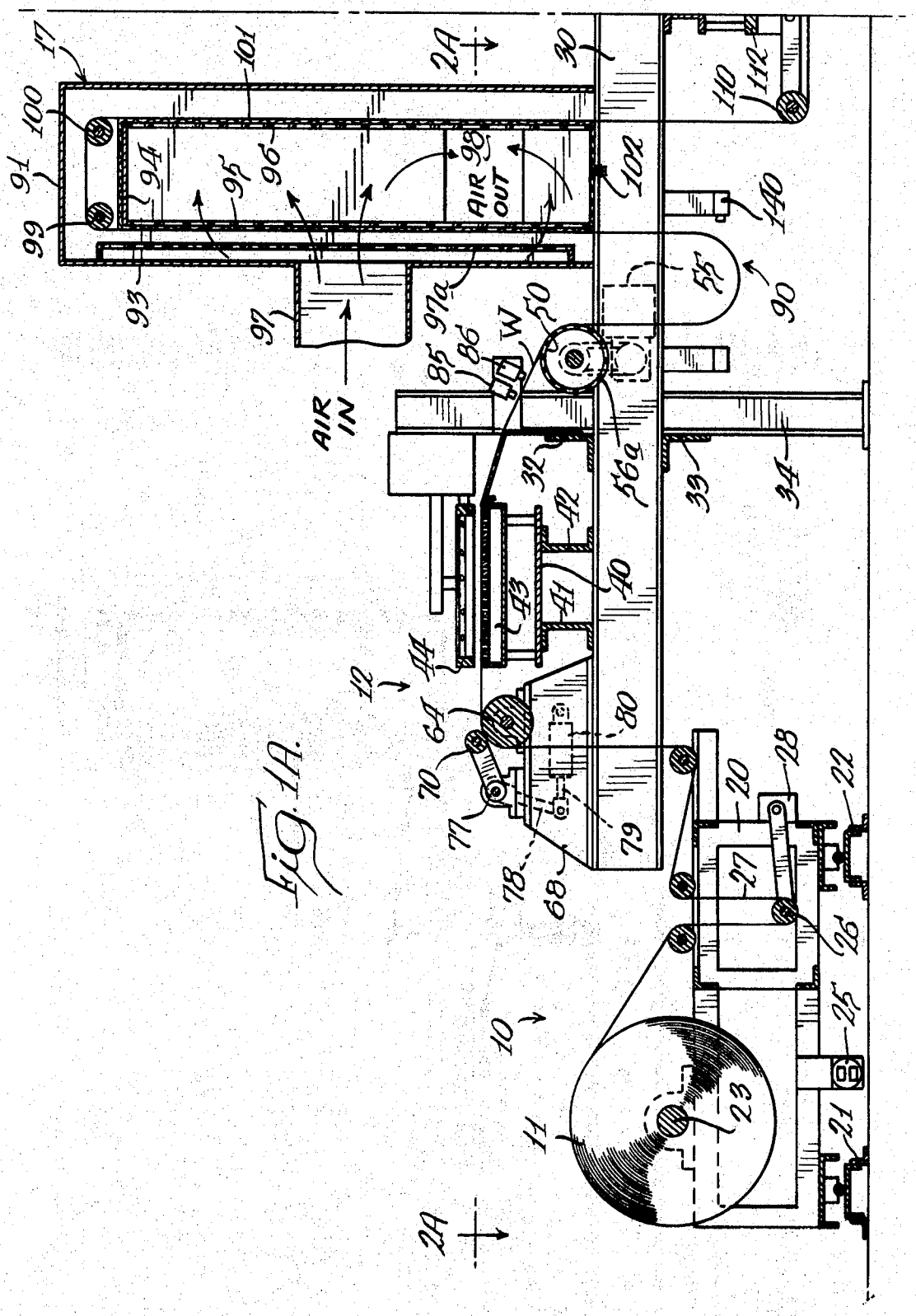


FIG. 1A.

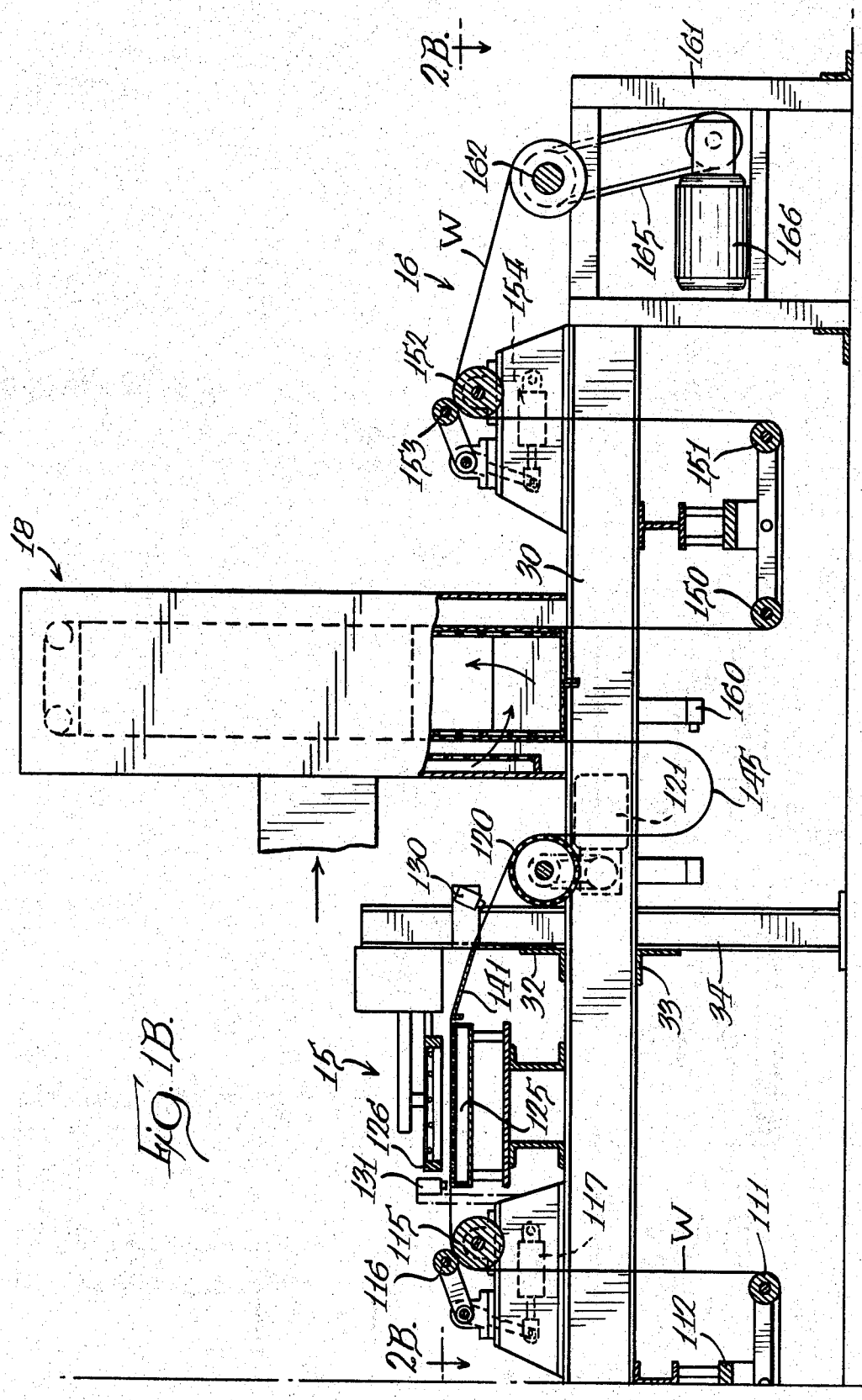

2B.
161
162
W
16
154
165
166
152
153
151
18
30
150
160
121
145
120
130
141
32
33
34
15
131
126
125
117
W
111
116
115
112
2B.

Fig. 1B.

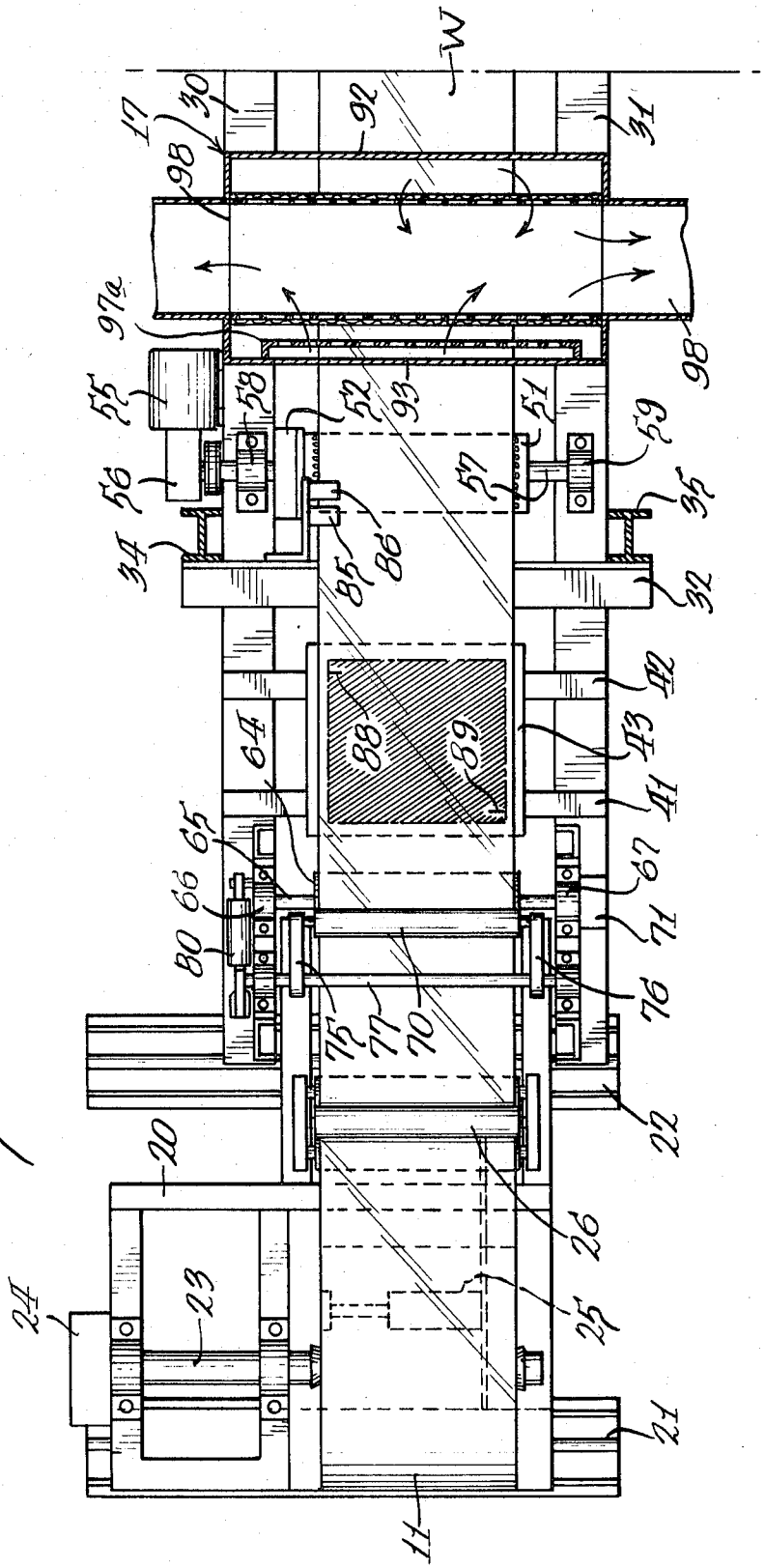

W
17
30
92
31
98
97a
98
55
58
52
93
51
59
56
57
35
34
85
86
32
42
64
88
89
43
41
65
67
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71
80
76
75
77
70
22
20
26
24
23
25
21
11

FIG. 2A.

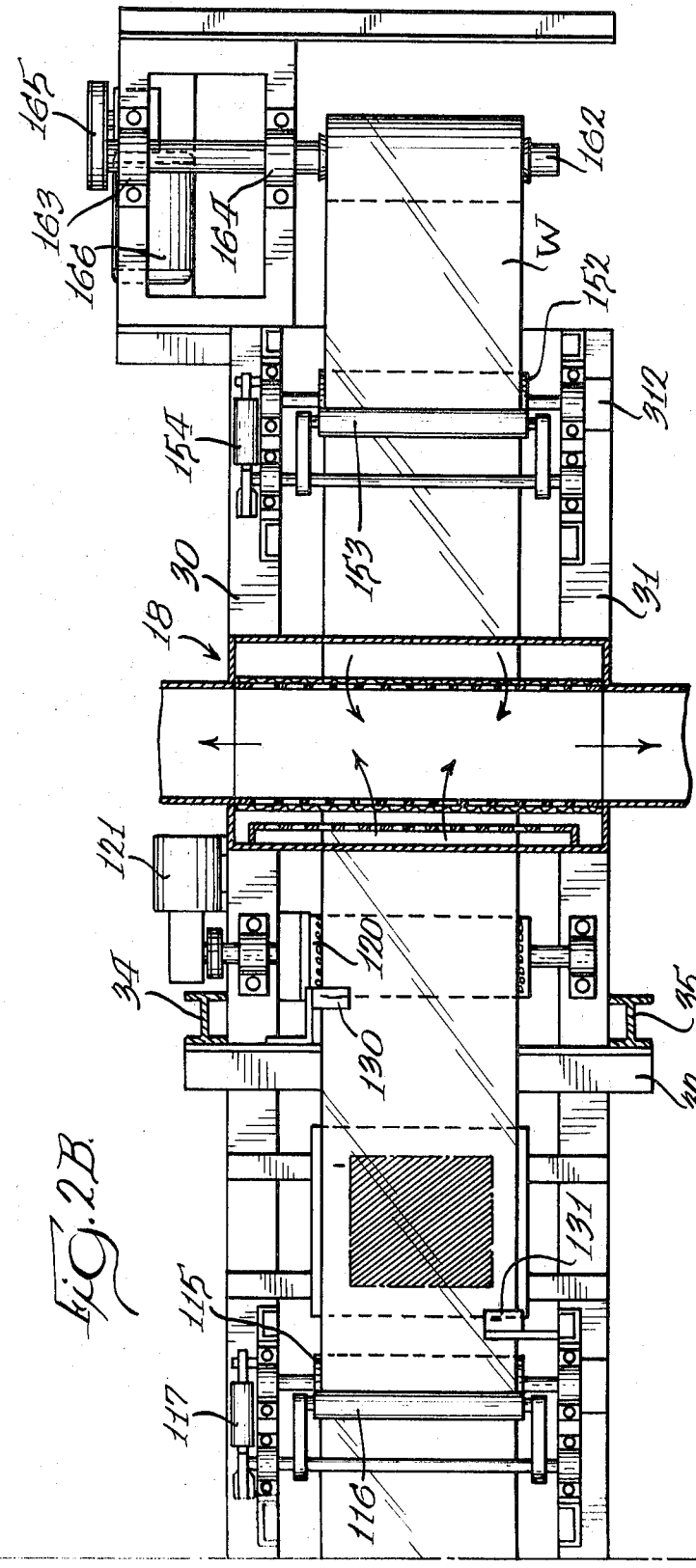

165
163
166
164
162
W
152
312
154
153
30
18
91
121
120
34
95
130
32
131
115
117
116

FIG. 2B.

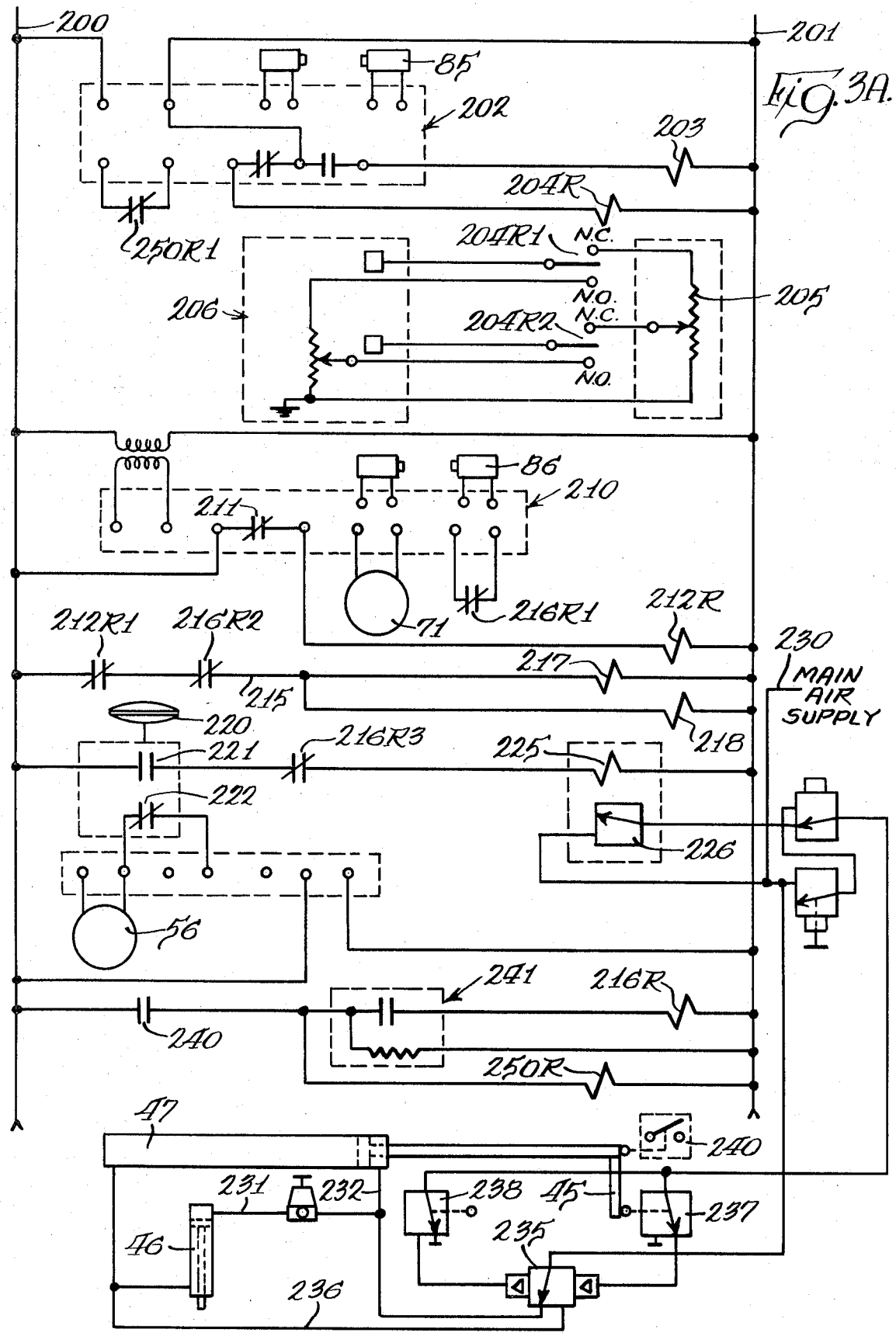

200
201
85
202
203
204R
250R1
204R1
N.C.
N.O.
N.C.
204R2
N.O.
205
206
86
210
211
71
216R1
212R
212R1
216R2
215
217
230
MAIN AIR SUPPLY
218
220
221
216R3
225
222
226
56
241
216R
240
250R
47
240
231
232
238
45
237
46
235
236

Fig. 3A.

Fig. 3B.

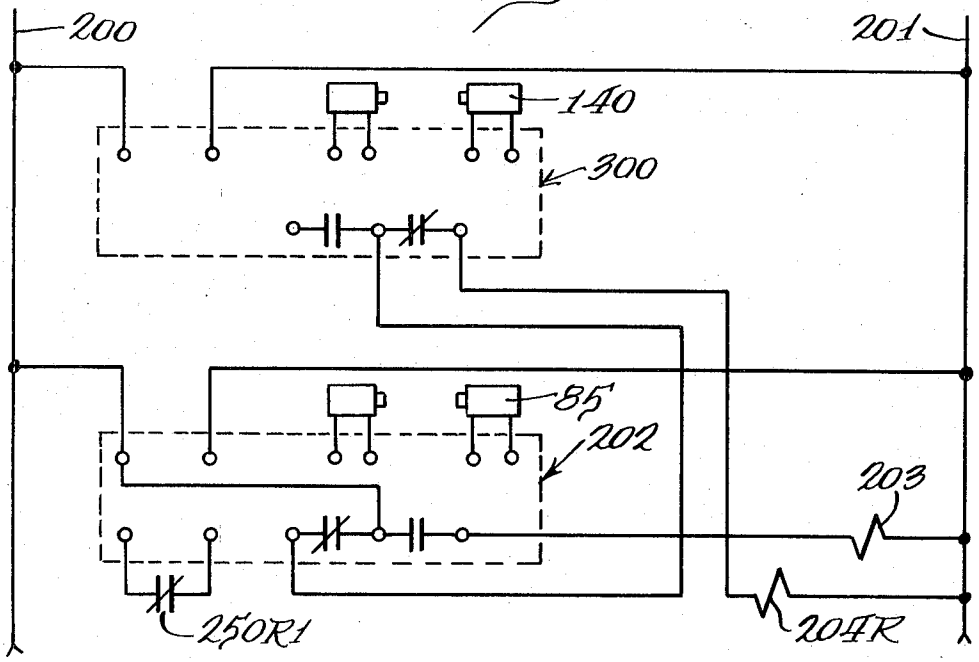
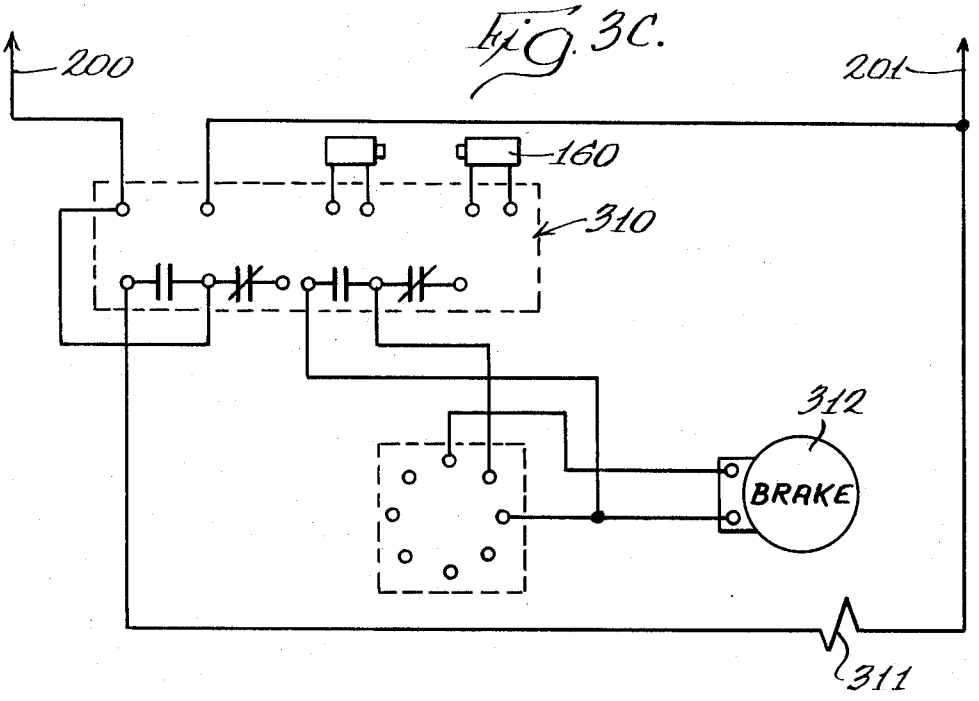

200
201
140
300
85
202
203
250R1
204R

Fig. 3C.


200
201
160
310
312
BRAKE
311

MULTI-STATION PRINTING SYSTEM

BACKGROUND OF THE INVENTION

This invention pertains to a multi-station printing system with a screen printer at each station with means for accurately registering an intermittently travelling continuous web at each station prior to printing and with dryer means between the stations for drying the web and imparting a drag thereto to provide for accurate guiding and web registry.

The prior art known to the applicant for multistation screen printing has used a continuous belt or other support for a web or sheet material to carry the material through successive stations. Another type relies upon wheels at printing stations with pins to engage perforations in the web. Such devices have resulted in expensive, complex and inaccurate mechanisms which must be designed and built for a particular application.

SUMMARY OF THE INVENTION

The invention disclosed herein provides for a multi-station printing system wherein the desired numbers of units can be associated together for the desired numbers of stations to handle a web of material with control of the web feeding and guiding, enabling independent operation of the screen printer at each station. Additionally, the system includes a dryer between each of the stations for drying the web preparatory to the next printing operation thereon, with the dryer constructed to utilize the drying air flow to provide a negative pressure to apply tension or a drag to the web to facilitate its handling both in edge guiding thereof and obtaining registry at a printing station.

An object of the invention is to provide a multistation printing system with a screen printer at each of the stations for printing on a section of continuous web including means for accurately locating the travelling web in stopped position at each of said stations and with means for operating each of said stations independently of the other whereby any desired number of stations may be provided by joining together a plurality of station units and their controls.

Another object of the invention is to provide a multi-station printing system as defined in the preceding paragraph wherein accurate registry of the web at each of the stations is provided by web feeding means including a driven vacuum roller and web brake means with a control system for scanning a registry mark to reduce the speed of web travel by reducing the speed of the driven roller and for subsequently scanning a registry mark to obtain instantaneous stopping of the web and with the driven roller having a yieldable relation with the web whereby the driven roller does not interfere with the stopping of the web by the web brake means.

In multi-station printing systems as defined in the preceding paragraph, the improvement wherein a pair of registry marks are printed at the first station with the leading mark being usable for subsequent slowing and stopping of the web to locate the next area thereof at the first printing station for printing and with the trailing mark then being scanned at succeeding printing stations to locate the previously printed area in position for printing at the succeeding station with the maximum printing area at the succeeding station being smaller than at the first station whereby the registry mark scanned is a mark that was printed at the same time as the printed matter within the printing area at the succeeding station.

A further object of the invention is to provide a multi-station printing system as defined in the preceding paragraphs wherein a dryer for the web is positioned between each of the stations and with the dryer constructed to utilize the drying air flow to create a negative pressure in a manner which exerts a drag on the web to facilitate accurate controlled handling thereof and more particularly wherein the dryer has a pervious plastic surface through which the drying air may flow to an air exhaust at the side of the pervious surface opposite that which engages the web whereby a negative pressure draws the web against the pervious surface and with the surface being sufficiently slippery to permit continued movement of the web as caused by the driving roller at a printing station. The pervious plastic surface may be stationary or be a belt moving with the web with suitable retarding of the belt.

An additional object of the invention is to provide a multi-station printing system wherein the drive roller at the stations beyond the first station is responsive to scanning means at the particular station for reducing its speed preparatory to stopping of the web and is also responsive to the size of a web loop in advance of the dryer associated with that station whereby reduction in the size of the loop to a predetermined level will also reduce the speed of the driving roller at the successive station to permit build-up of the loop.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a vertical, central, longitudinal section of a part of the multi-station printing system;

FIG. 1B is a view, similar to FIG. 1A, showing the remainder of a multi-station printing system;

FIG. 2A is a plan section, taken generally along the line 2A—2A in FIG. 1A;

FIG. 2B is a plan section, taken generally along the line 2B—2B in FIG. 1B;

FIG. 3A is a schematic of the electrical and pneumatic circuit showing the circuit common to each station;

FIG. 3B is a schematic of part of the circuit used for each succeeding station after the first station; and

FIG. 3C is a schematic of the circuit for controlling rewind of the web.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The general views of the drawings show the multistation printing system as comprising an unwind stand indicated generally at **10** for a roll of web material **11** with the web travelling to a first printing station, indicated generally at **12,** and then to a second printing station, indicated generally at **15,** and then to a rewind stand, indicated generally at **16.**

An air dryer, as indicated generally at **17,** is located between the printing stations with another dryer, indicated generally at **18,** of the same construction located in advance of the rewind stand **16.** Although only two printing stations **12** and **15** are disclosed, there may be any desired multiple of stations with the stations each operating independently on the intermittently travelling continuous web and with the only requirement being the added equipment and circuitry for controlling the operations at each of the stations.

The unwind stand **10** has a movable frame **20** mounted for lateral movement on rails **21** and **22** and carries a mandrel **23** mounting the roll **11.** The lateral position of the frame and web roll **11** is controlled by a conventional edge guide system including a sensing head (not shown) which detects the lateral position of the web and when correction is required operates a cylinder **25** for lateral positioning of the frame **20.** Also, as is known, the mandrel **23** has an electric brake **24** associated therewith which is responsive to the position of an adjustable weight dancer idler roll **26** in a loop **27** of the web. The position of the dancer idler roll controls a potentiometer **28** which controls the application of the mandrel brake. The mandrel **23** is non-driven, with the web being drawn from the roll and the brake imparting a drag to mandrel rotation when required as detected by the dancer idler roll.

The mechanism in each of the printing stations and the dryer structure therebetween is shown supported on a framework having a pair of longitudinal spaced apart beams **30** and **31** which are spanned by transverse braces **32** and **33** suitably secured to the beams **30** and **31** and also to vertically extending floor engaging supports **34** and **35.**

The screen printing mechanism at the first printing station **12** includes a base **40** mounted on suitable transverse support members **41** and **42** supported on the longitudinal beams **30** and **31** and having a bed **43** provided with vacuum means, as generally known, to hold the web W in position for printing when the vacuum is applied. A screen frame **44** is mounted above the bed **43.** A squeegee moves both vertically and longitudinally of the screen to print upon the web W. This squeegee is shown at **45** in FIG. **3.** The general structure of the screen printing mechanism is conventional and includes pneumatically operated cylinders for obtaining desired movements including a squeegee cylinder **46** which lowers the squeegee to print position relative to the screen and a print cylinder **47** which moves the squeegee **45** longitudinally of the screen for obtaining the transfer of the printing material through the screen to the web W.

The web feeding means and means for providing web registry at the station **12** include a drive roller **50** having a perforate cylindrical surface **51** with a vacuum applied through the interior thereof to the approximate upper half of the roller through a vacuum connection **52** whereby the drive roller **50** yieldably holds the web W to impart movement thereto in response to rotation of the drive roller. The drive roller **50** is driven by an infinitely variable, potentiometer-controlled motor **55** through an electric clutch **56** connected to a belt drive **56a** which drives a shaft **57** of the roller. The shaft **57** is mounted in bearings **58** and **59,** mounted on the longitudinal beams **30** and **31,** respectively. The drive roller **50** imparts movement to the web but is not used to control accurate location of the web at the printing station.

An idling brake roller **64** is mounted on a shaft **65** carried by bearings **66** and **67** on frame members extending vertically upward from longitudinal beams **30** and **31.** One of the frame members extending upwardly from the beam **30** is shown at **68.** This idler roll **64** has the web W passing thereover in the travel of the web to the screen printer and normally idles. Preparatory to stopping the web at the station, a pressure roller **70** is brought into engagement with the web to press it against the brake roller **64** and subsequently an electric brake **71** connected to the shaft **65** is operated to stop brake roller and stop web W. The pressure roller **70** is carried at its ends by a pair of arms **75** and **76** fastened to a rotatably mounted shaft **77** which is connected by an arm **78** to the rod **79** of an air cylinder **80.**

A pair of photocells **85** and **86** are suitably mounted from the frame and are positioned to scan a registry mark on the web W and through a circuit, to be described, initially causing a slowdown in the rate of advance of the web followed by accurate stopping of the web in the proper position relative to the screen **44** of the screen printer. The motor **55** has two adjustably-set speeds selected from the infinitely variable speed curve of the motor. At the first station, a pair of registry marks, indicated at **88** and **89,** are printed on the web at the leading and trailing edges of the impression area, respectively. The registry mark **88** then functions with the photocells **85** and **86** to cause slowdown and stopping of the web with minimal spacing between successive impression areas on the web and while the trailing registry mark **89** may still be within the perimeter of the screen printing structure and not in position to be scanned at the first station.

With the web stopped, the printing operation is then performed at the first station **12** followed by a resumption of feeding of the web and the web travels to a dryer **17** after passing through a loop formation indicated generally at **90.**

The dryer **17** embodies a casing having a top panel **91** and side panels **92** and **93** along with end panels which form an enclosure having an open lower end spanning the space between the frame beams **30** and **31.** A hollow cabinet is positioned within the casing and has a top wall **94** and perforate side walls **95** and **96** which, with enclosing end walls, form a negative pressure chamber. The casing has an inlet opening **97** for entry of heated air at a relatively high velocity which passes through a nozzle plate **97*a*** and circulates through the cabinet, as shown by the arrows, and then through the perforate walls into the negative pressure chamber for exhaust through an air outlet **98.**

The web W after leaving loop **90** travels upwardly in the dryer casing and then changes to a downwardly travelling direction by passage about rollers **99** and **100** and exits at the lower end of the dryer casing. The air flow through the dryer results in a negative pressure within the negative pressure chamber which draws the web against the surface of the negative pressure chamber to provide a drag or tension on the web. It has been found that this action is facilitated by the use of a covering over the negative pressure chamber which, as shown, is in the form of a pervious belt of mesh plastic, such as polypropylene, which is fixed over the negative pressure chamber and which is tied at its lower end **102.** This belt of plastic material **101** is relatively slippery, whereby the negative pressure may hold the web against the negative pressure chamber surface but still permit travel of the web. The belt may be movably mounted for travel with the web, but with drag means to exert a drag on travel of the belt.

As the web W leaves the dryer **17,** it passes downwardly to an edge guiding and web centering unit having an adjustable frame adjustable about a vertical axis with a pair of guiding rollers **110** and **111** mounted on the frame **112.** This web guiding structure is well known in the web feeding art and includes a mechani-

cal or electronic sensing device positioned along an edge of the web to detect variance in the path of travel and correspondingly adjusts the frame **112** and the rollers **110** and **111** to bring the web back to proper tracking relation. The retardation of the web by the dryer **17** maintains proper tension on the web enabling the guiding unit to perform properly in guiding the web. In view of the conventional nature of such structure, it is shown only generally and reference may be made to the prior art for specific details thereof.

The web W travels upwardly to the second printing station and travels about a brake roller **115** having a coacting pressure roller **116** with an air cylinder **117** for positioning thereof similarly to the brake roller **64** and pressure roller **70** of print station **12.** Generally, the structure at the print station **15** is the same as at station **12** and need only generally be referred to. This structure includes the variable speed vacuum drive roller **120** operated by a motor **121** and the vacuum bed **125** associated with the screen frame **126** and with the parts operable in the same manner as the corresponding parts at print station **12.** At this station, the photocells for controlling slowdown and stopping of the web are arranged differently from those at station **12.** The photocell **130,** as shown, is located beyond the printing element for scanning either of the marks **88** or **89** printed on the web and is in circuit to provide for slowdown of the vacuum drive roller **120.** The photocell **130** could be located in advance of the printing element. A second photocell **131** is located adjacent the printing elements and positioned to scan the trailing registry mark **89** which has been made at the same time as the impressions located within the printing station. Extreme accuracy is obtained because of the scanning of the registry mark made at the same time as the printed matter with which registry is to be maintained at the second print station **15.** Also, there is uniformity of stopping at each station because the web is at a uniform slow speed at all stations when the mark is sensed. This use of the trailing registry mark is possible because the print area at the second station is smaller than at the first station.

As more fully described in connection with the circuit, the vacuum drive roller **120** is not only subject to the slowdown signal provided by photocell **130** but is also subject to slowdown dependent upon the size of the loop **90.** A photocell **140** detects when the loop **90** shortens beyond a permissible limit and when such occurs the speed of motor **121** is reduced to reduce the speed of vacuum drive roller **120** until the loop **90** exceeds the permissible minimum limit. At each print station, the web passes from the flat part of the bed of the screen printer onto a sloped leaving edge which is inclined downwardly toward the vacuum drive roller to reduce the minimum space on the web between successive printings. An intermediate support plate **141** supports the web. The web W after leaving the vacuum drive roller **120** passes through a loop **145** and then into the dryer **18** which is of the same construction as dryer **17** and from the dryer the web passes around a pair of rollers **150** and **151** of an edge guide and web centering mechanism similar to that following the dryer **17.** The web then travels to a brake roller **152** having a pressure roller **153** operable by an air cylinder **154** with this construction being the same as for brake rollers **64** and **115.** The web then travels to the rewind stand **16.**

The brake roller **152** and pressure roller **153** are controlled from a photocell **160** which detects a reduction in the size of the loop **145** ahead of the dryer **18** beyond a minimum permissible limit. The circuit for photocell **160** includes a time delay in signalling increase of the loop size.

The rewind unit **16** has a frame **161** which rotatably mounts a wind-up mandrel **162** supported by bearings **163** and **164** with the mandrel being driven by a belt **165** from a motor driven constant tension control unit **166.**

The circuit is shown in FIGS. 3A, 3B and 3C with the part shown in FIG. 3A being typical for the control of the web feeding and printing mechanism at each printing station. The circuit is shown as a cross-the-line diagram between the power lines **200** and **201.** The electronic eye **85** is connected into a relay box **202** which controls the solenoid **203** of an air valve for the pressure roller operating air cylinder **80.** The relay also controls the relay coil **204R** for deenergization thereof whereby the relay contacts **204R-1** and **204R-2** move to their normally closed position to place a potentiometer **205** into the control circuit for the motor **55** which drives the vacuum driving roller **50.** This motor control circuit is indicated generally at **206** and is commercially sold under the name CADET CONTROL. With the actuation of the relay **202,** the resulting shift in the circuit has caused reduction in the speed of the web W at the station **12** and shortly thereafter the photocell **86** scans the registry mark **88** to actuate the relay, indicated generally at **210R.** This immediately actuates the brake **71** for the brake roller **64** by suitable means, such as a thyraton tube circuit, and also opens a normally closed switch **211** to deenergize a relay **212R.** This permits relay contact **212R-1** to close and through line **215,** having the normally closed contact **216R-2,** the solenoid valves **217** and **218** are actuated to apply vacuum to the bed **43** of the print mechanism, and closes a vent valve therefor, respectively. This applies a vacuum to the bed **43** to hold the web W firmly in position preparatory to printing. The web will have stopped for applying the vacuum because of the rapid actuation of brake **71** compared to the relay actuation of the solenoid valves **217** and **218.**

The presence of a vacuum in the vacuum bed **43** is sensed by a vacuum switch **220** which has contacts **221** and **222.** The normally closed contact **222** is opened to deenergize the electric clutch **56** and drive train for the vacuum drive roller **50** whereby the vacuum roll is free to adjust and avoid placing of tension on the web W during the print cycle. Switch **221** is closed by the vacuum sensing switch **220** to act through a normally closed relay contact **216R-3** and energize a solenoid **225** for operating a three-way air valve **226** which is closed to supply air under pressure to the pneumatically operated components at the print station.

The main air supply from an air line **230** acts through lines **231** and **232** to lower the squeegee **45** of the print mechanism and operate the squeegee print cylinder **47.** The air is supplied through a pilot operated reversing valve **235** with this valve being shiftable to apply air through a line **236** to the opposite ends of the cylinders **46** and **47** to reverse the operation of the squeegee. The position of the reversing valve **235** is dependent upon the position of the mechanically operated air valves **237** and **238** which are operable by the squeegee at the opposite ends of its stroke. Thus, as the squeegee **45** is

moved to its right-hand limit position, the valve **238** is shifted to reverse the condition of the reversing valve **235** from the position shown. When the parts return to the position shown in the drawing, the valve **237** is actuated to return the reversing valve **235** to the position shown.

As the cylinder **47**, operable during the print stroke, reaches the end of the printing stroke, the contacts on a switch **240** are closed, by a sliding actuator bar (not shown), which energizes relay **216R** through a time delay relay indicated generally at **241.** The use of the sliding actuator bar is known as in the printing machine offered by Rondec Screen Process Limited of London, England. The delay in energization of relay **216R** is provided so that relay contact **216R-3** will stay closed to maintain the three-way valve **226** in operative position to supply control air to the switching valves **237** and **238** which reverse the stroke of the cylinder **47.** As is conventional of any screen printer, upon reversal of the cylinder **47,** the squeegee lifts and a flood bar is lowered for the return stroke. Upon energization of relay **216R**, the relay contacts **216R-2** and **216R-3** are opened as well as a relay contact **216R-1.** The opening of the latter contact functions to reset the relay **210** operable by the photocell **86** which releases the electric brake **71** on the brake roller **64** and also energizes relay **212R.** This latter operation opens the relay contact **212R-1** which deenergizes the solenoid valves **217** and **218** to close the vacuum valve and open the vent valve for the vacuum bed **43.** This relief of the vacuum is sensed by the vacuum switch **220** to open contact **221** and close contact **222.** With contact **221** open, as well as relay contact **216R-3,** the three-way valve **226** is moved to open position by deenergization of the coil **225.** The closing of contact **222** energizes the clutch **56** for the drive for the vacuum feed roller **50** to commence movement of the web W. During this interval, the air cylinder **47** has reached the end of its return stroke to engage the sliding actuator bar (not shown) to open the switch **240** which deenergizes the relay **216R** to close relay contacts **216R-1, 216R-2** and **216R-3.**

Additional control relay **250R** has a relay contact **250R-1** which is in the reset circuit of the relay **202.** When the switch **240** was opened, this deenergized relay **250R** whereby the relay contact **250R-1** closed to set the relay **202** for a repeat operation. The relay **250-R** had previously been energized when the switch **240** was closed.

The cycle of operation has been completed and the circuit is conditioned for a repeat operation upon the next scanning of a registry mark **88** by the photocell **85** to commence the slowdown operation.

The foregoing circuit is typical of the general control circuit for the mechanism at each print station and is repeated in the circuit as many times as there are print stations.

There is an addition to the circuit for the print stations succeeding the initial station which relates to the modification of the web speed in second and succeeding stations, dependent upon the size of the loop preceding the respective station.

The additional circuit added for each station after the first print station is shown in FIG. **3B** and provides a loop detecting circuit for additional control of speed of the web to provide slowdown when the loop shortens beyond a predetermined minimum limit. This additional circuit includes a relay, indicated generally at **300,** which is across the lines **200** and **201** and has the photocell **140** connected thereto for detecting the size of the loop **90.** For clarity, the relay **300** is shown in association with parts of the basic control circuit for the web feed mechanism at a second and at succeeding stations corresponding to that described in FIG. **3A,** including the relay **202** and the operating valve **203** for the pressure roller which in this instance is the pressure roller **116.** Also, the relay **204R** functions to reduce the speed of the motor **121** for driving the vacuum feed roller **120.** As the loop **90** shortens, and light contacts the photocell **140,** the relay **204R** will be deenergized which, as previously described, puts the resistance **205** in the motor control circuit to reduce the speed of the vacuum drive roller. In all other respects, the web feed mechanism and print feed station **15** operates the same as that described for the mechanism at print station **12.**

The control of the web loop **145** preceding the rewind unit **16** is shown in FIG. **3C,** with the photocell **160** sensing shortening of the loop to actuate a relay **310** which causes energization of a four-way solenoid valve **311** for operating the pneumatic cylinder **154** which throws pressure roller **153** against the brake roller **152.** Additionally, energization of the relay operates a brake **312** connected to the shaft of the brake roller **152** stopping travel of the web W to permit rebuilding of the loop **145** in advance of the dryer **18.** The tension control unit **166** automatically holds tension on the web on the mandrel **162** until the web W is allowed to run free. Once the loop **145** has returned to the normal length, the relay **310** is deactivated with release of the brake **312** and deenergization of the solenoid valve **311,** whereby the web can again be wound on the mandrel **162.**

With the structure and circuit disclosed herein, it is possible to have a multi-station printing system with a desired number of printing stations required for multicolor operations merely by duplicating mechanism at each station and duplicating circuit control elements. The web upon which the impressions are made is directly controlled without the requirement of any supporting conveying mechanism and the printing mechanism at each station can operate independent of the others with necessary controls to maintain guiding and tensioning of the web for proper printing. The dryer construction for drying the web incidentally provides necessary back tension on the web. The printing area at the first print station is larger than at succeeding stations whereby a registry mark printed at the same time as the impression at the first station can be used for accurately stopping and locating the web at succeeding print stations while an additional registry mark printed at the first station may be used to advance the web at the first station only the required distance to advance a clear section of the web to printing location at the first print station which is particularly important when printing on relatively high cost web material.

I claim:

1. A multi-station screen printing system with a screen printer at each of the stations for printing on a section of continuous web while said web is stationary at a station; means associated with each of said stations for feeding and advancing the web into said station and stopping the web in response to a registry mark thereon and independently of web feeding means at other sta-

tions including, a drive roller beyond the screen printer, means for driving said drive roller at either a fast speed or a slow speed, intermittently operable means in advance of the screen printer for holding the web, and control means including means at the station for successively scanning a registry mark on the web for first reducing the drive roller from fast speed to slow speed and then upon a second scanning of said registry mark stopping the drive roller and activating the web holding means to hold the web in position for printing; and means for permitting independent operation of the screen printer at a station on a stationary web independently of the operation at another station including a web loop between said stations, and means for detecting the size of said loop and controlling the web feeding means at the next station beyond the web loop to maintain the loop to a predetermined dimension, said web holding means including a pair of rotatable rollers engaging the web therebetween and a relay operated brake for stopping rotation of said pair of rollers, and said drive roller is a vacuum roller which yieldably holds the web thereagainst whereby stopping of the web by said holding means is permitted by movement between the web and the vacuum roller.

2. A multi-station screen printing system with a screen printer at each of the stations for printing on a section of continuous web while said web is stationary at a station; means associated with each of said stations for feeding and advancing the web into said station and stopping the web in response to a registry mark thereon and independently of web feeding means at other stations including, a drive roller beyond the screen printer, means for driving said drive roller at either a fast speed or a slow speed, intermittently operable means in advance of the screen printer for holding the web, and control means including means at the station for successively scanning a registry mark on the web for first reducing the drive roller from fast speed to slow speed and then upon a second scanning of said registry mark stopping the drive roller and activating the web holding means to hold the web in position for printing; and means for permitting independent operation of the screen printer at a station on a stationary web independently of the operation at another station including a web loop between said stations, and means for detecting the size of said loop and controlling the web feeding means at the next station beyond the web loop to maintain the loop to a predetermined dimension, and wherein the screen printer at a first station prints leading and trailing registry marks and the screen printer at a succeeding station has a smaller printing area, said scanning means at said first station scanning the leading registry mark to stop the drive roll when the web is positioned for a succeeding printing operation at the first station with the trailing registry mark still in the screen printer area, and the scanning means at the succeeding station scanning the trailing registry mark impressed at the same time as the printed matter on the web which is at said succeeding station.

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