

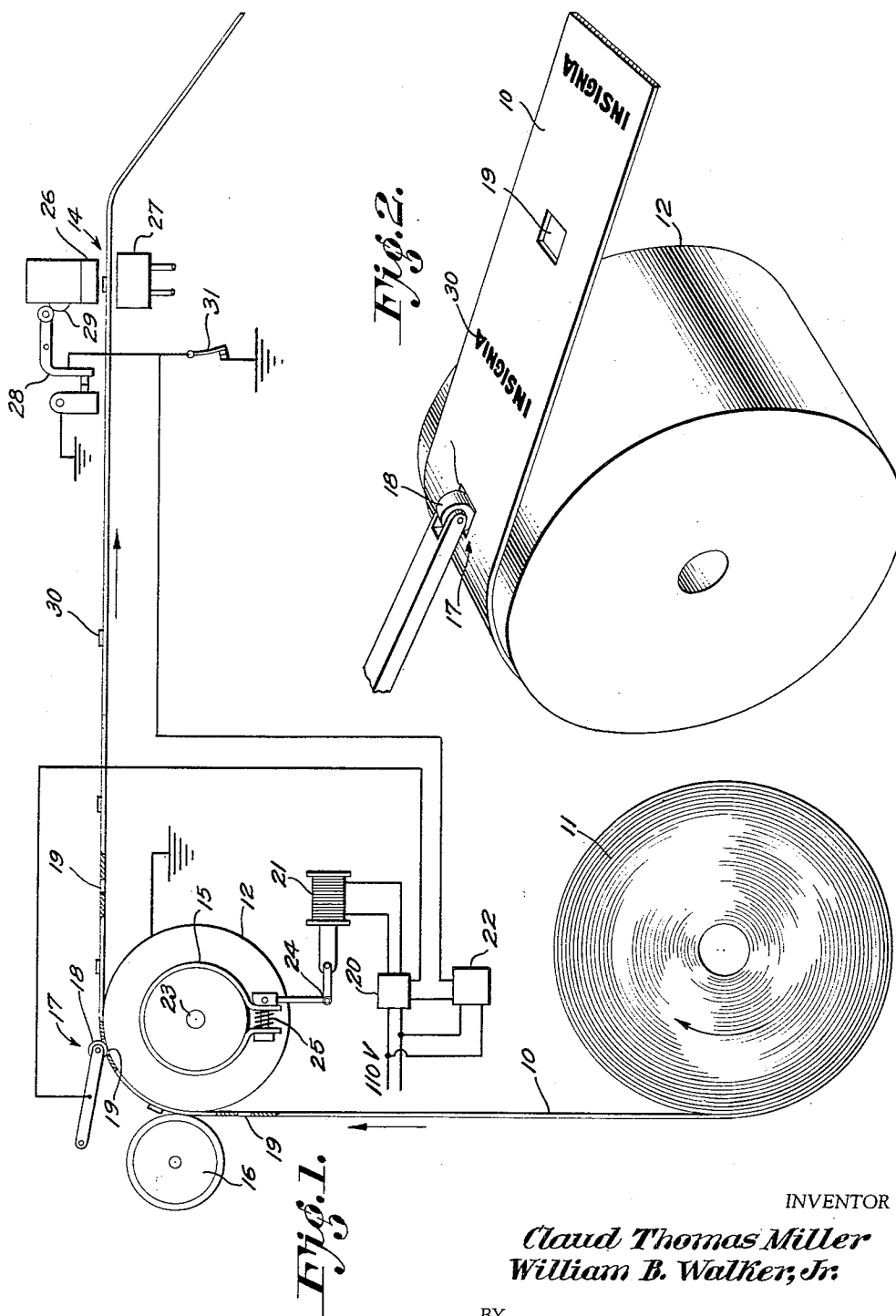
Aug. 28, 1956

C. T. MILLER ET AL
TRANSFER APPARATUS

2,760,290

Filed Nov. 16, 1953

2 Sheets-Sheet 1



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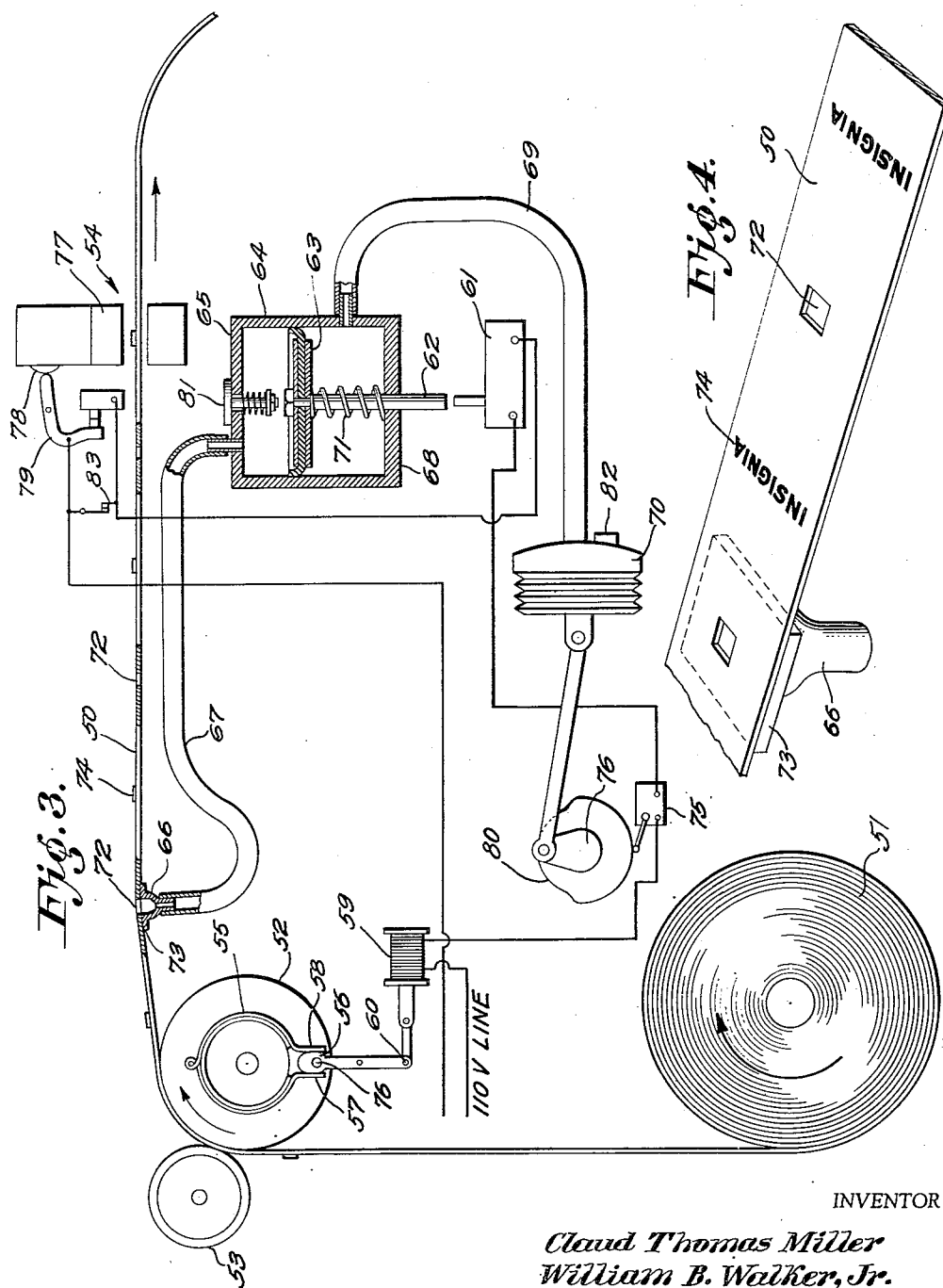
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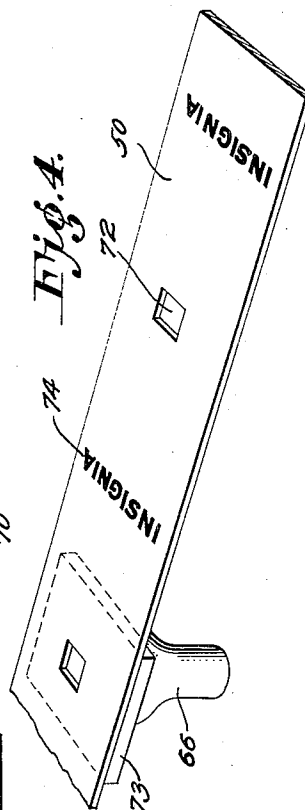
2 Sheets-Sheet 2



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1

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TRANSFER APPARATUS

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Application November 16, 1953, Serial No. 392,351

3 Claims. (Cl. 41—1)

This invention relates to improvements in the technique and equipment for the application of indicia on various textile products, such as hosiery, gloves, and the like.

Textile mills have been attempting to speed up the application of indicia on various products through the use of semi-automatic and automatic machines. Each of these various machines now on the market operates satisfactorily if the strip of commercial heat transfer paper is delivered to the stamping or transfer station in a precisely controlled fashion, i. e., as the transfer strip is unrolled each indicia thereon must be successively and automatically positioned in the transfer station at the precise location which will enable impression of the indicia on a predetermined portion of an article.

It is a well known fact that paper is highly susceptible to variations in moisture content of the surrounding atmosphere with the result that the distance between the successive transfer markings or indicia varies with each change of moisture content in the air. This is due to the contraction or expansion of the paper base. While various attempts have been made to control the advance of the web, none of the devices thus far developed is completely satisfactory under operating conditions. Further, it has been noted that most of the techniques now used depend for the detection of an indicia either on material added to the strip material or the thickness of the indicia itself.

It will be appreciated, therefore, that even though the manufacturer of the commercial heat transfer strip skillfully spaces the indicia thereon with precise exactness, he cannot guarantee this spacing because of the atmospheric conditions under which his strip will be used. While the error over a short length of the strip will be minute and therefore negligible, the build-up of this error as the roll of transfer paper is used will destroy the initial registry of the indicia at the transfer station.

Also it is substantially impossible to produce a roll of transfer paper having a constant thickness throughout its length. The inevitable variations in paper thickness cause uneven movement of the transfer strip due to binding and slippage in the moving mechanism. The result is misalignment of the indicia with the transfer station.

The textile mills have tried to overcome these problems by controlling the operation of their machines in accordance with a detection of the indicia itself. The detection means employed are in some cases injurious to the indicia or prohibitively expensive due to the signal means which must be added to the transfer strip.

Our invention overcomes this problem in a manner which does not cause injury to the indicia in any manner and which does not depend on the addition of any signaling means to the transfer strip.

A new transfer strip is employed in our invention. It comprises broadly a roll of transfer paper which has an indicia and a hole, the hole being detected by the instant invention to control the positioning of the indicia in the transfer station.

The transfer strip has a series of spaced indicia and spaced holes. The strip is fed through a transfer station

2

by suitable means well known to the art. A detection device is positioned adjacent the transfer station to detect a preselected hole as it passes; the detecting device then energizes a control means which stops the transfer strip. Through suitable adjusting features the transfer strip can be stopped when an indicia is in precise registry with the transfer station.

Our invention may be employed with a semi-automatic or a completely automatic machine wherein the various operations may be performed in timed relation by means of suitable timing an actuating mechanisms well known to the art.

Various other objects and meritorious features of our invention will be apparent from the following description taken in conjunction with the drawings wherein like numerals refer to like parts throughout the several figures and wherein:

Fig. 1 is a schematic view of an electrical detection and control system;

Fig. 2 is a blown-up view of the movable contact roller and the transfer strip;

Fig. 3 is a schematic view of the pneumatic detection and control system, and

Fig. 4 is a blown-up view of the pneumatic detecting head and the transfer strip.

As seen in Figs. 1 and 2, the transfer strip 10 is fed from a supply roll 11, upwardly past a drive roll 12, horizontally through a stamping or transfer station 14, and then on to a waste paper take-up roll device (not shown) which may be of the slip-clutch type. The slip-clutch take-up roll applies a constant tension to the strip 10 and enables the drive roll 12 to advance the strip smoothly through the transfer station 14. The slip-clutch roll does not move the strip when the drive roll 12 has been stopped by the brake means 15.

A suitable pressure means such as spring biased, rubber covered, free turning roller 16 is located adjacent the drive roll 12 for maintaining smooth contact of the transfer strip 10 therewith.

In the embodiment shown, the electrical switch 17 is formed by the drive roll 12 and a contact roller 18 which is pivotally mounted and biased toward the drive roll. As the transfer strip advances, the contact roller 18 rides on the strip until a hole 19 passes thereunder, at which time the contact roller 18 is biased through the hole 19 into electrical contact with the drive roll 12. The thickness of the strip 10 has been exaggerated to show the invention more clearly.

The circuit closed by this switch 17 is a control circuit which actuates a relay 20 which in turn connects a solenoid 21 to the line. Upon connection of the pull type solenoid 21 to the line, the brake mechanism 15 is set and the drive roll 12 is stopped. A transformer 22, connected to the line and the control circuit, provides the required low voltage for the control circuit of about 3 to 6 volts. The contact roller 18 is suitably insulated, and the drive roll 12 which is of steel is connected to the ground, which may be the machine itself.

The drive roll 12 is mounted free on a shaft 23 with a clutch (not shown) of the slip type, fastened partly to the shaft 23 and partly to the drive roll 12, which tends to rotate the drive roll constantly. The brake 15, which is connected by suitable linkages 24 to the pull-type solenoid 21, is biased to released condition by a spring 25.

The transfer station 14 includes a movable transfer member or pressure pad 26 and a fixed member 27 which contains a thermostatically controlled heating element. A trigger switch 28 is positioned adjacent the path of travel of the pressure pad 26 for engagement with a cam 29 on the pad. The trigger switch 28 is designed to be opened momentarily only when the pressure pad 26 moves past it on the upward or withdrawal stroke. The

3

opening of the trigger switch 28 breaks the control circuit thereby enabling the delivery of the next indicia 30 to the transfer station 14. Upon the downward or pressure stroke of the pad 26, the trigger switch 28 remains in closed condition through a hinging action. The trigger switch may be used on automatic machines of the type, for example, which employ a tripping feeler which is tripped when socks are fed into the transfer station to initiate downward stamping movement of the pressure pad. If desired, a hand switch 31 may be employed to break the control circuit after the transfer operation has been completed. The hand switch 31 may be of the spring-biased type to insure closing, thereby conditioning the control system for setting the brake when the next hole in the strip passes under the contact roller 18.

In operation the transfer strip 10 is fed through the transfer station by the drive roll 12, the strip being continuously held taut by the take-up roll. When a hole 19 in the strip passes between the contacts of the switch 17, the contact roller 18 passes through the hole and closes the control circuit. The closed control circuit trips relay 20 which in turn energizes solenoid 21 and sets the brake 15. The transfer operation then takes place; upon completion, a switch is opened to release the brake and feed another indicia 30 to the transfer station 14. Switch 28 is mounted near the movable pressure pad 26 and remains open after the transfer operation for a time interval sufficient to allow movement of the contact roller 18 back onto the strip 10. The period of time switch 28 is opened is controlled by the design of cam 29. When desired, the hand switch 31 may be used.

In Figs. 3 and 4 we have shown a pneumatic modification of our invention. The strip 50 is unwound from a feed roll 51, is passed between a drive roll 52 and a pressure roller 53, is fed through a transfer station 54, and is wound on a suitable tensioning take-up device (now shown) as in the previously discussed embodiment.

In this embodiment the brake 55 is spring-biased to set condition and has a cam 56 positioned between its ends 57 and 58. A solenoid 59 when energized releases the brake 55 through suitable linkages 60 to the cam 56 and allows the drive roll 52 to be rotated by the slip clutch (now shown); when deenergized, the solenoid 59 sets the brake by allowing the ends 57 and 58 to spring closed. It is necessary that the control circuit be closed to advance the strip 50 and opened to stop the strip.

The control circuit includes a sensitive switch 61 which is tripped open from its normally closed position by a piston rod 62 on piston 63 in a control cylinder 64. One end 65 of the cylinder 64 is in fluid communication with an apertured detecting member 66 by a tube 67. The other end 68 of the cylinder 64 is connected by tube 69 to a bellows 70 which provides a suction in the base 68 of the control cylinder. The piston 63 under suction of bellows 70 tends to move against the pressure of return spring 71 toward the base 68 thereby pulling a vacuum in the cylinder head 65 which prevents opening of the sensitive switch 61 until the evacuated condition in the cylinder head 65 is destroyed by movement of a hole 72 in the strip 50 over the detecting member 66. The detecting member has a contact plate 73 over which the strip 50 may smoothly pass, the plate 73 being adjustable through suitable means to insure proper registration of an indicia 74 in the transfer station 54.

The bellows 70, or other evacuating means, such as a piston and cylinder, is timed to the operation of the machine through suitable means to open switch 75 to break the single circuit while the bellows is on its compression stroke. This allows preparation of the bellows for its evacuating step while the brake 55 is set. The bellows is operated by the cam 80 which is mounted on a shaft 76.

The pressure pad 77 is equipped with a cam 78 which maintains the trigger switch 79 in closed condition except when it moves down and up for the transfer operation, thereby preventing movement of the strip 50 during the

4

transfer operation. The bellows cam 80 is operatively interconnected with the pressure pad 77 through suitable means to accomplish its compression stroke during the transfer operation.

Suitable relief valves 81 and 82 are placed in the cylinder head 65 and the bellows 70, respectively.

In operation, the transfer strip 50 is fed through the transfer station 54 by the feed roll 52, the strip being continuously held taut by the take-up roll system. When a hole 72 passes over the detecting contact plate 73, the vacuum in the cylinder head 65 is destroyed and the piston rod 62 trips switch 61 open. The open circuit deenergizes solenoid 59, thereby enabling the spring-biased brake 55 to set itself and stop the strip. The transfer operation then takes place, the trigger switch 79 being opened during this operation. If desired, a hand switch 83 may be thrown open during the transfer operation.

Also, the bellows 70 pushes the piston 63 back to cocked position to close switch 61 during the transfer operation by means of an automatic interlock system, if desired, which correctly times this step while the strip is stopped. Switch 75 is opened during the compression stroke.

The control system is then conditioned for advancing the next indicia 74 to the transfer station 54. The sensitive switch 61 has been closed by cocking the piston 63; the bellows switch 75 closes at the end of the compression stroke; and the trigger switch 79 closes when the pressure pad 77 reaches its withdrawn position. The closed circuit energizes solenoid 59 to turn cam 56 to release the spring brake 55.

It will be readily appreciated that various well known interlocked and timed feeding and control mechanisms may be combined with the instant invention to produce a hand operated machine, a semi-automatic machine, and a completely automatic machine.

The detecting members which actually contact the strip are suitably mounted for adjustment to proper positions for insuring proper registry of indicia with the transfer station.

Multiple rolls and control systems may be employed where more than one indicia is to be positioned at the transfer station at the same time.

We claim:

1. Apparatus for successively positioning indicia of a transfer strip at a transfer applying station, said transfer strip having substantially equally spaced indicia and substantially equally spaced, longitudinally aligned holes along its length, which comprises moving means for moving said transfer strip through said station including a drive roll around which said strip passes, detecting means for detecting a hole in said strip including a contact roller which engages said strip as it is moved by said drive roll and which is positioned for passing through a hole in the transfer strip into electrical contact with said drive roll, said contact roller being positioned along the path of said transfer strip such that upon arrival of a hole thereat an indicia is properly positioned in said station, and control means responsive to the electrical contact by said contact roller with said drive roll for rendering said moving means ineffective, thereby enabling accomplishment of the transfer operation.

2. Apparatus for successively positioning indicia of a transfer strip at a transfer applying station, said transfer strip having substantially equally spaced indicia and substantially equally spaced, longitudinally aligned holes along its length, said transfer station having a movable member, which comprises a drive roll for passing said strip through said station, means for rotating said drive roll, brake means for stopping said drive roll, a solenoid for actuating said brake means, a control circuit for said solenoid comprising a relay, a trigger switch, and a contact roller, said contact roller engaging said strip at said drive roll and adjustably positioned for passage through a hole in the strip into electrical contact with said drive

5

roll when an indicia is properly positioned in said station, said trigger switch being positioned in the path of travel of said movable member for triggering thereby on the return stroke of the movable member to cause delivery of a new indicia to the transfer applying station.

3. Apparatus for successively positioning indicia of a transfer strip at a transfer applying station, said transfer strip having substantially equally spaced indicia and substantially equally spaced, longitudinally aligned holes along its length, said transfer station having a movable member, which comprises moving means for moving said transfer strip through said station including a drive roll around which said strip passes, detecting means for detecting a hole in said strip including a contact roller which engages said strip as it is moved by said drive roll and which is positioned for passing through a hole in the transfer strip into electrical contact with said drive roll, said contact roller being positioned along the path of said transfer strip such that upon arrival of a hole thereat an indicia is properly positioned in said station, control

6

means responsive to the electrical contact by said contact roller with said drive roll for rendering said moving means ineffective, thereby enabling accomplishment of the transfer operation, and a trigger switch electrically connected to said control means for rendering said moving means effective after completion of the transfer applying operation, said trigger switch being positioned in the path of travel of said movable member for triggering thereby on the return stroke of the transfer applying operation to cause delivery of a new indicia to the transfer applying station.

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