

April 6, 1954

S. B. SCHWARTZ ET AL
TRANSFER PRINTING MACHINE

2,674,056

Filed Jan. 15, 1952

5 Sheets-Sheet 1

FIG. 1

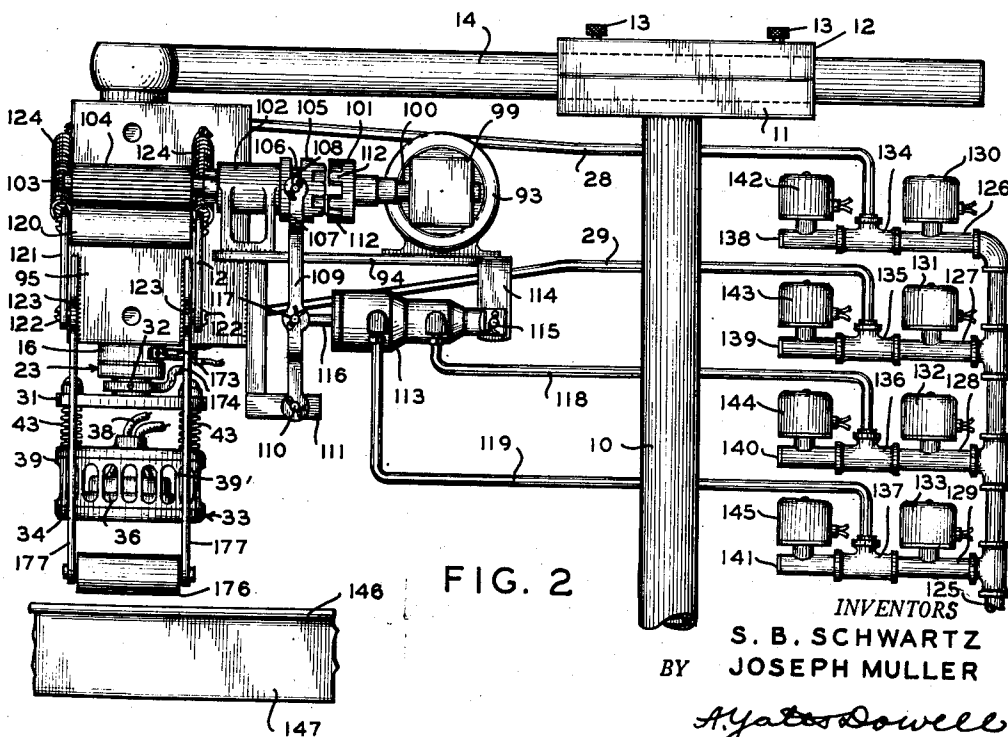
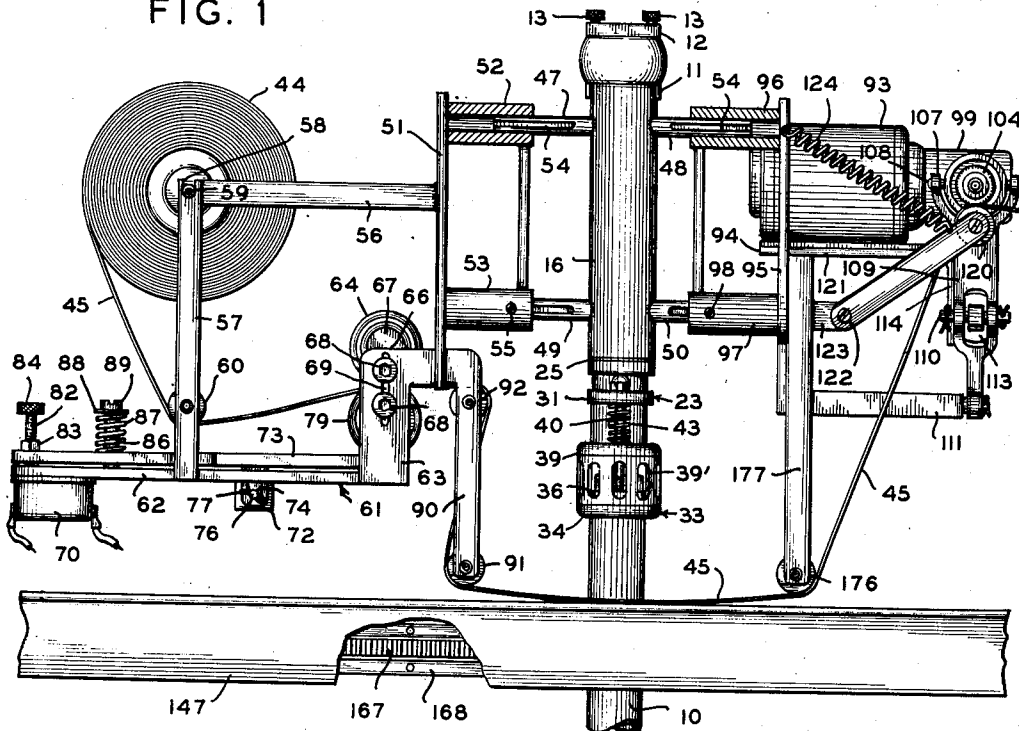


FIG. 2

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5 Sheets-Sheet 2

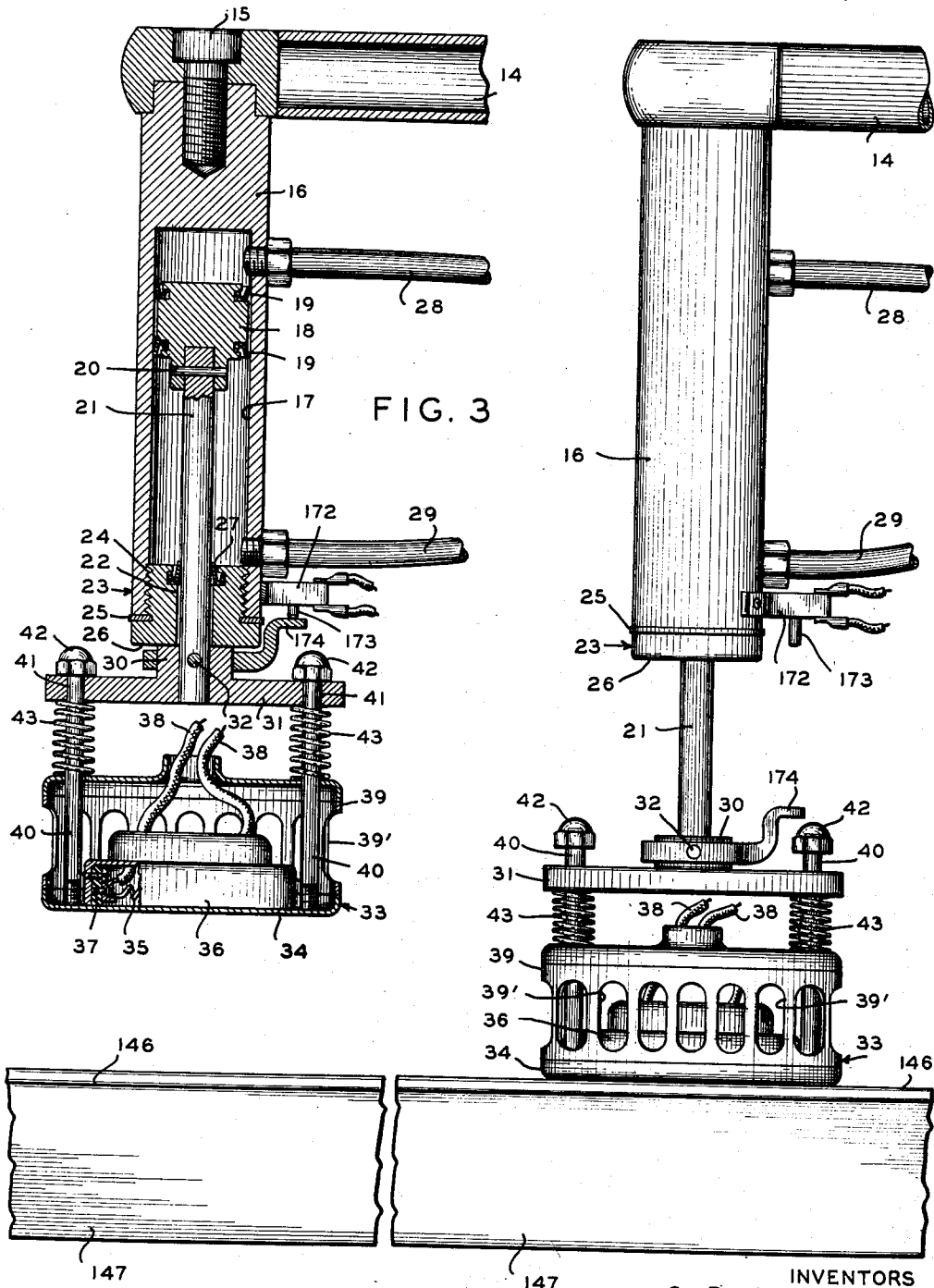


FIG. 3

FIG. 4

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5 Sheets-Sheet 3

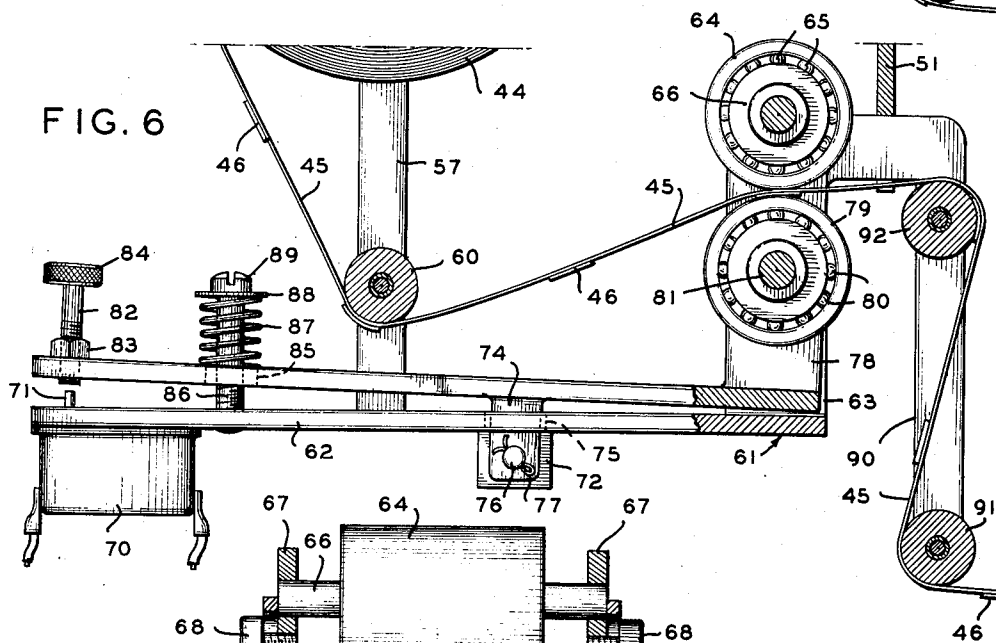
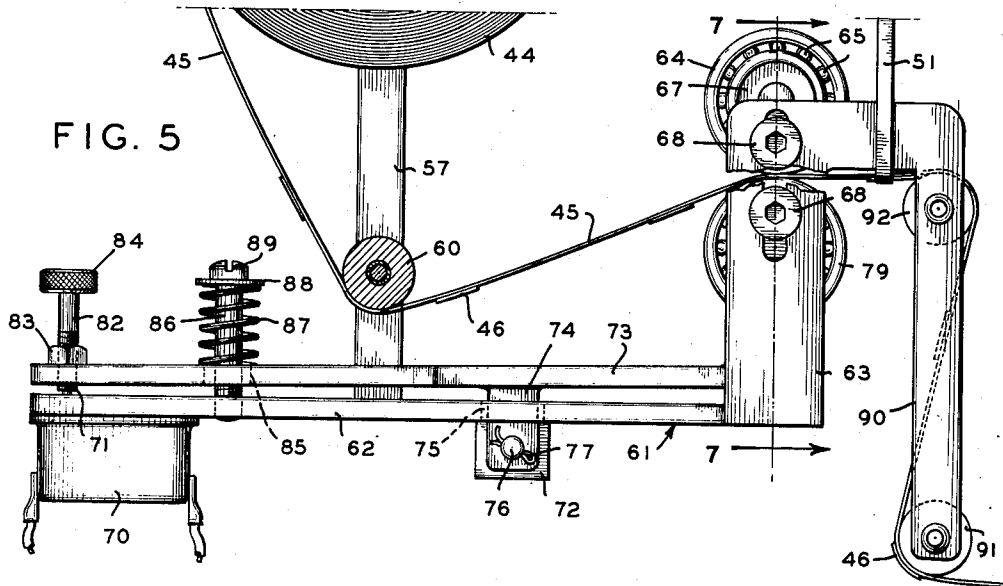
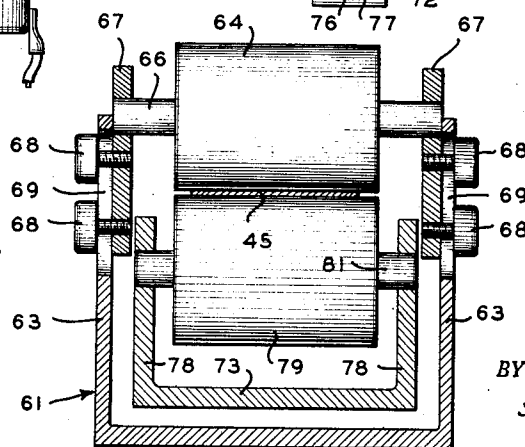


FIG. 7



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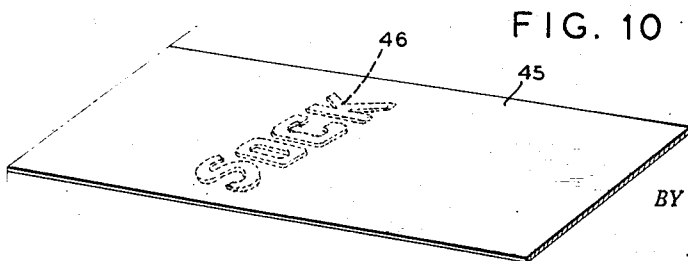
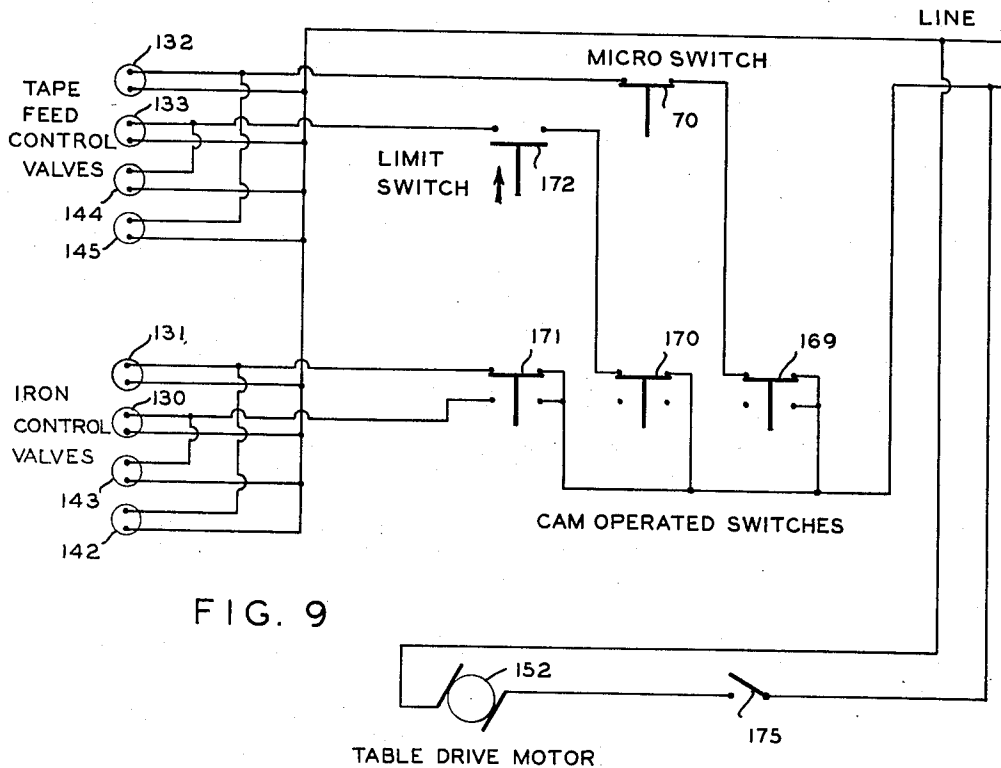
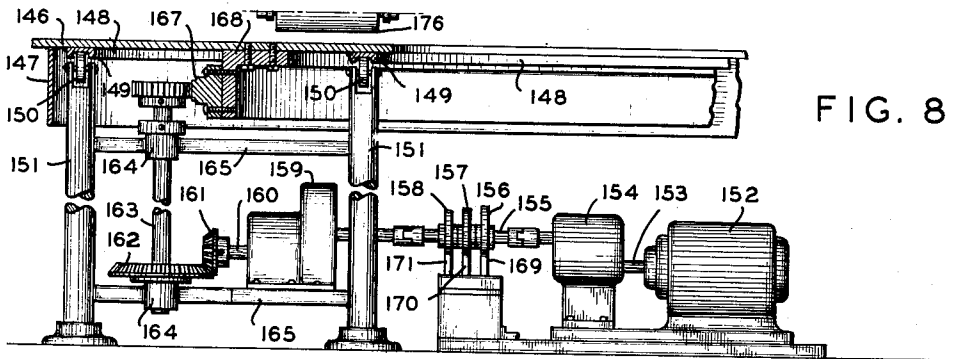
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5 Sheets-Sheet 4



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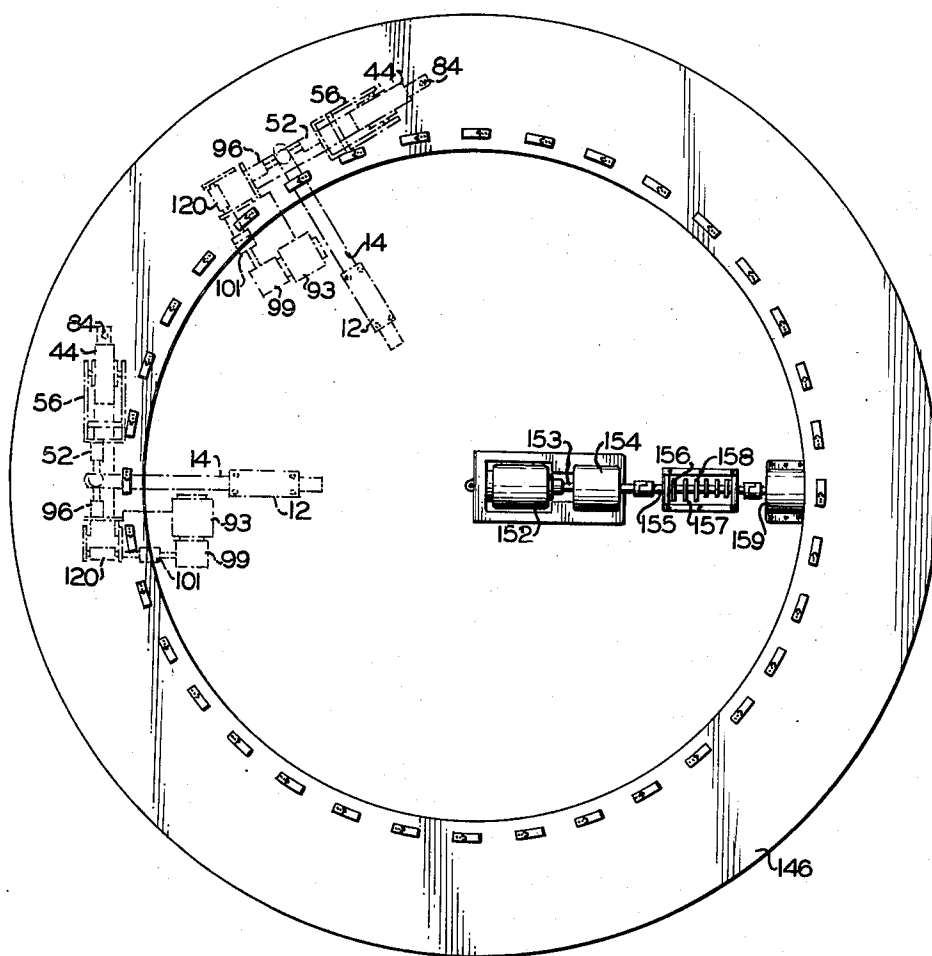


FIG. II

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UNITED STATES PATENT OFFICE

2,674,056

TRANSFER PRINTING MACHINE

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Application January 15, 1952, Serial No. 266,613

12 Claims. (Cl. 41—1)

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This invention relates to printing, and more particularly to an apparatus for applying information or identifying marks to textile fabrics such as hosiery.

Heretofore, particularly in the hosiery trade, it has been customary to apply identifying marks and the like to such hosiery by a strictly manual operation in which the desired marks are in the form of a transfer carried by a paper tape, the transfer or printing being effected by applying a hot iron to the reverse side of the tape, and with the transfer ink in contact with the fabric. Needless to say, this is a time consuming and inefficient operation and has materially contributed to the manufacturing cost of such hosiery.

Also in the past, numerous machines for accomplishing such marking have been proposed, but these machines have presented serious drawbacks, one of which is the proper registration of the printed matter with the iron for applying the same. Likewise, proper iron operation to prevent scorching or burning has presented a problem with the result that no satisfactory, relatively inexpensive and efficient machine for this purpose has heretofore been available.

It is accordingly an object of this invention to provide a transfer printing machine which may be economically constructed from readily available parts and materials and which will efficiently operate to perform its intended functions.

It is a further object of the invention to provide an automatic transfer printing machine in which means are provided for feeding transfers in the form of a tape and in which means is also provided for automatically and accurately registering each transfer with the applying means.

It is a further object of the invention to provide an automatic transfer printing machine which may be adjusted to accommodate various types and sizes of fabric articles.

A still further object of the invention is the provision of an automatic transfer printing machine in which the transfer may be automatically and accurately registered regardless of the size of such transfer.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a front elevational view showing the automatic transfer printing machine of this invention;

Fig. 2 a side elevational view showing the printing machine of Fig. 1;

Fig. 3 a fragmentary sectional view showing

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the cylinder and operating piston for the transfer iron, and with the iron in retracted position;

Fig. 4 a fragmentary elevational view similar to Fig. 3 but showing the iron in extended position;

Fig. 5 a fragmentary elevational view showing the control means for registration of the transfer tape, and with the parts in position during the advancing movement of such tape;

Fig. 6 a view similar to Fig. 5 but showing the parts in position while the transfer tape is stationary during operation of the transfer iron;

Fig. 7 a sectional view on the line 7—7 of Fig. 5;

Fig. 8 a fragmentary elevational view with parts in section for greater clarity and showing the feed table and details of the drive therefor;

Fig. 9, a schematic diagram of the electrical control circuit for the printing machine of this invention;

Fig. 10 a fragmentary detail view of the transfer tape and transfer as applied thereto; and

Fig. 11, a top plan view of the automatic transfer printing machine of this invention.

With continued reference to the drawing and particularly Figs. 1 and 2, there is shown an automatic transfer printing machine constructed in accordance with this invention and comprising a supporting standard 10 upon the upper end of which may be secured by welding or the like, a block 11. A complementary block 12 may be secured to the upper surface of block 11 by screw-threaded fastening means 13. The abutting faces of the blocks 11 and 12 may be provided with longitudinal complementary recesses which serve to slidably receive and clamp in adjusted position a horizontally extending supporting member 14. Secured to one end of supporting member 14 by a screw-threaded fastening means 15 is a vertically disposed cylinder 16 from which the remainder of the mechanism is supported.

As best shown in Fig. 3, cylinder 16 is provided with a bore 17 which serves to slidably receive a piston 18 having packings 19 at each end thereof. Secured to the piston 18 by a pin or the like 20 is a piston rod 21 which is slidably received in an aperture 22 in an end closure 23 threadably engaged with the lower end of the cylinder 16 at 24. In order to provide a fluidtight seal at the lower end of the cylinder 16, a gasket 25 may be positioned between an annular flange 26 and the lower edge of the cylinder 16, gasket 25 being tightly clamped in place by the screw-threaded engagement 24. Also, in order to prevent leakage of fluid from within the cylinder 16 around the piston rod 21 there may be provided a packing

27 secured to the closure 23 and slidably engaging the surface of the piston rod 21 to prevent leakage of fluid from the bore 17 of cylinder 16. Obviously, if desired, other types of packing 27 may be employed, such as the conventional gland or stuffing box, but with the pressures employed in this apparatus, in all probability a packing 27 of the oil seal type will be satisfactory. Fluid pressure is supplied to the upper end of bore 17 through a conduit 28 and to the lower end of bore 17 through a conduit 29.

The lower end of piston rod 21 extends through an aperture in a boss 30 projecting from the upper surface of a cross-head 31. Piston rod 21 may be secured to the cross-head 31 by a pin or other equivalent means 32.

Supported from the cross-head 31 for movement therewith is a transfer iron 33 of more or less conventional construction and which may conveniently include a transfer contacting shoe 34 which is heated by an electrical heating element 35 disposed within a casing 36. The ends of heating element 35 may be secured to a terminal strip 37 which facilitates connection to electrical conductors 38 extending to a source of electrical energy. In order to protect the operator from burns, the iron 33 may be provided with a housing 39 enclosing the same, this housing having a plurality of apertures 39' which serve to dissipate the heat, the housing 39 remaining relatively cool and even if contacted by the operator would not result in a painful burn.

Iron 33 is supported from cross-head 31 for vertical movement therewith and also for vertical movement relative thereto by means of upstanding rods 40 threadedly received in the shoe 34; rods 40 extending upwardly through apertures 41 in the cross-head 31. The rods 40 may be provided with heads 42 disposed above the upper surface of cross-head 31 in order to limit downward relative movement of the iron 33. Disposed about the rods 40 and between the lower surface of cross-head 31 and the upper surface of housing 39 are compression springs 43 which upon downward movement of the iron 33, into engagement with an article, permit the same to move upwardly with relation to the cross-head 31 and compress the springs 43 in order to exert a resilient pressing force upon such articles. Iron 33 is of course moved vertically by the introduction of fluid pressure through conduits 28 or 29 to the appropriate ends of bore 17 in cylinder 16.

Transfers for use in the machine of this invention are supplied in the form of a roll 44 of paper or other suitable tape 45. This tape having printed thereon with suitable ink a design or lettering 46 as shown in Fig. 10. Since it is necessary that the tape 45 be fed to present successive transfers to the action of iron 33 and further since the design or lettering 46 must register precisely with the iron 33 suitable means is provided for feeding and registering such transfers. Extending from opposite sides of the cylinder 16 are upper horizontal rods 47 and 48 and lower horizontal rods 49 and 50. Slidably received on the rods 47 and 49 is a bracket 51 which is provided with outwardly extending tubular members 52 and 53 which are received over the rods 47 and 49 respectively. The rods 47, 48, 49, and 50 may be provided with flats 54 and such flats may be engaged by a set-screw or the like 55 to secure the bracket 51 in adjusted position. Secured to the bracket 51 by welding or the like are a pair of spaced parallel horizontal bars 56 which in conjunction with vertical spaced parallel arms

57 serve to support the roll 44 by means of a U-shaped recess 58 in the upper end of each arm 57, recesses 58 serving to receive the ends of axle 59 extending through the roll 44. A guide roll 60 for the tape 45 is also journaled between the arms 57 below the roll 44.

Secured to the lower end of bracket 51 by welding or the like is a fixture 61 which as best shown in Figs. 1, 5, 6, and 7 comprises a base-plate 62 which is secured to the lower end of vertically extending arms 57 by welding or the like, base plate 62 being provided at one end thereof with upwardly extending spaced parallel ears 63. Mounted for vertical adjustment on the ears 63 is a roll 64 which may be provided with anti-friction bearings 65, roll 64 having an axle 66 received in end plates 67, plates 67 serving to receive screw threaded fastening means or the like 68; which extend through vertical slots 69 in the ears 63. As will be seen from an inspection of Fig. 7, roll 64 may be moved vertically by loosening the screw-threaded fastening means 68 to permit vertical sliding movement thereof in the slots 69 and upon proper adjustment of the roll 64, the screw-threaded fastening means 68 may be tightened to securely clamp the roll 64 in adjusted position. At the opposite end of base-plate 62 from the upstanding ears 63, a microswitch 70 is secured to the under surface thereof and the actuating plunger 71 of the microswitch 70 extends upwardly through an aperture in the base plate 62. Also secured to the base plate 62 are downwardly depending spaced ears 72, the purpose of which will be presently described.

A rocker arm 73 is pivotally mounted on the base-plate 62 by means of a depending boss 74 extending through an aperture 75 in the base-plate 62, boss 74 being pivotally received on a shaft 76 supported by the depending ears 72. Shaft 76 may be secured in place by a cotter key or other equivalent fastening means 77. Rocker arm 73 is provided at one end with spaced upstanding ears 78 which are received between the upstanding ears 63 on base-plate 62. Ears 78 serve to rotatably support a roll 79 which may be provided with anti-friction bearings 80, this roll being supported by an axle 81 extending through apertures in the ears 78. Roll 79 is located directly below roll 64 and is designed to cooperate therewith in a manner to be presently described.

At the opposite end of rocker-arm 73 a pushrod 82 in the form of a screw-threaded member is threadedly received in the rocker-arm 73 and projects downwardly therethrough directly above plunger 71 of microswitch 70. Pushrod 82 is provided with a lock nut 83 which serves to engage the upper surface of the rocker-arm 73 and lock the pushrod 82 in adjusted position, whereby the point of operation of the microswitch 70 may be determined. Pushrod 82 is also provided with a finger engaging knob 84 to facilitate convenient adjustment thereof.

An aperture 85 is provided in the rocker-arm 73 between the pushrod 82 and the pivot shaft 76, aperture 85 serving to receive an upstanding bolt 86 secured to the base plate 62, bolt 86 having received thereon above the rocker-arm 73 a compression spring 87 which engages a washer 88 disposed beneath the head 89 of the bolt 86. Compression spring 87 engages the upper surface of rocker-arm 73 and tends to bias the same in a counterclockwise direction as viewed in Figs. 1, 5, and 6 to urge the pushrod 82 into engagement with the plunger 71 of microswitch 70. The ten-

sion of spring 87 may be adjusted by turning movement of the bolt 86.

Also secured to the lower end of bracket 51 by welding or the like are depending spaced parallel arms 90 which serve to rotatably support vertically spaced guide rollers 91 and 92. Guide rollers 91 and 92 are provided for the purpose of receiving and guiding the tape 45 in a manner to be later described. The mechanism just described provides the registration means for insuring that the lettering 46 will be positioned directly beneath the iron 33 and the operation of this registration mechanism will be described in connection with the description of the operation of the entire machine.

Automatically operable tape pulling means for advancing the tape 45 as each transfer is applied is provided, and may take the form of a motor 93, mounted upon a shelf 94, attached to a bracket 95, as by welding or the like. Bracket 95 is provided with spaced parallel tubular members 96 and 97, these tubular members being slidably received on rods 48 and 50 secured to the cylinder 16. Tubular members 96 and 97 are provided with set screws 98 which engage the flats 54 on the rods 48 and 50 to securely lock bracket 95 and associated equipment in adjusted position.

Motor 93 is provided with a reduction gear 99 from which extends a power output shaft 100, on which shaft is mounted a clutch-jaw 101. A journal bearing 102 mounted upon shelf 94 serves to rotatably support a roll shaft 103 in axial alignment with the power output shaft 100. Mounted upon roll shaft 103 is a serrated roll 104. A driven clutch jaw 105 is slidably mounted on the end of roll shaft 103 adjacent clutch jaw 101, jaw 105 being arranged to cooperate therewith. An annular groove 106 is provided in the outer surface of jaw 105 and a clutch operating yoke 107 partially embraces the jaw 105 and is provided with pins 108 which extend into the groove 106 from opposite sides. Yoke 107 is provided with a downwardly extending arm 109 which is pivotally mounted at 110 on a bracket 111 secured to the bracket 95. Pivotal movement of the arm 109 and the yoke 107 serves to engage or disengage the cooperating teeth 112 on the jaws 101 and 105.

In order to control the operation of the moveable clutch jaw 105, there is provided a fluid pressure cylinder 113 pivotally mounted at one end thereof, on a bracket 114 depending from shelf 94, by a pivot pin or other equivalent means 115. A piston rod 116 projects from the opposite end of cylinder 113, and is pivotally secured to the arm 109 by a suitable connection, such as a pivot pin 117. The piston rod 116 connects to a piston of the double acting variety disposed within the cylinder 113. A conduit 118 provides fluid pressure for one end of the cylinder 113, and a second conduit 119 provides fluid pressure for the opposite end of cylinder 113.

The tape 45 is held in engagement with the serrated roller 104 by an idler roll 120 rotatably mounted between spaced parallel arms 121, which in turn are pivotally mounted at 122 on spaced ears 123 extending from bracket 95. Idler roll 120 exerts a resilient pressure on tape 45 to urge the same into engagement with serrated roll 104 by reason of tension springs 124, connected to arms 121, and to bracket 95.

A main fluid pressure supply line 125 is provided with a plurality of branch lines 126, 127, 128, and 129, and the passage of fluid through such branch lines is controlled by solenoid valves

130, 131, 132, and 133 respectively. The outlet sides of valves 130, 131, 132, and 133 are each connected to T fittings 134, 135, 136, and 137. Fluid pressure exhaust outlets 138, 139, 140, and 141 are connected to the T fittings 134, 135, 136, and 137 respectively and the flow of fluid through such exhaust outlets is controlled by solenoid valves 142, 143, 144, and 145 respectively. Conduits 28 and 29 which supply fluid pressure to the opposite ends of cylinder 16 are connected to T fittings 134 and 135 respectively and conduits 118 and 119 which supply fluid pressure to opposite ends of cylinder 113 are connected to T fittings 136 and 137 respectively. The solenoid valves are energized in the proper sequence to perform the necessary operations of the machine and the electrical circuit and manner of operation of this control circuit will be later described.

Fabric articles to be printed by the machine of this invention may conveniently be placed on the upper surface of a plate 146 forming a circular feed table provided with a depending flange 147 which serves to protect the operator from injury and to conceal the mechanism located beneath the table. Plate 146 may be provided with spaced circular tracks 148 secured to the under surface thereof by welding or the like, tracks 148 being provided with annular grooves 149 which serve to receive rollers 150 mounted in the upper ends of supporting legs or standards 151. A sufficient number of legs 151 and rollers 150 may be provided to suitably support the feed table 146.

Driving means for the feed table 146 is provided in the form of a motor 152 having a power output shaft 153 coupled to a speed reduction gearing 154 which in turn is coupled to a drive shaft 155 having cams 156, 157, and 158 disposed thereon. Drive shaft 155 in turn is coupled to a ratchet type or other suitable clutch 159, the output shaft 160 of which carries a bevel gear 161. Gear 161 meshes with a bevel gear 162 carried by a vertically disposed shaft 163 journaled in bearings 164, carried by cross braces 165, supported from legs 151. Secured to the shaft 163 adjacent the upper end thereof is a spur gear 166 which meshes with a circular rack 167 carried by a circular angle member 168 secured to the plate 146 of the feed table. Cams 156, 157, and 158 on drive shaft 155 engage switches 169, 170, and 171 to actuate the same in proper timed sequence and such actuation in connecting with the operation of the machine will be later described.

The ratchet type or other clutch 159 is of conventional construction and serves to automatically rotate the table 146 in periodic step-by-step movements. The clutch 159 automatically engaging and disengaging to accomplish such movement, the drive shaft 155 coupled to such clutch being continuously rotatable.

The control circuit as best shown schematically in Fig. 9 includes in addition to the micro-switch 70, cam operated switches 169, 170, and 171, a limit switch 172 secured to the cylinder 16 and having an operating plunger 173 engageable by a finger 174 carried by the piston rod 21 and secured in place by the pin 32. Finger 174 is operative to engage the plunger 173 and operate the switch 172 when the iron 33 is in uppermost position and upon downward movement of the iron 33 the finger 174 is disengaged from the plunger 173 and allows the switch 172 to return to its normal inoperative condition. The table drive motor 152 is controlled by a switch 175 and this

motor runs continuously during the operation of the machine.

In the operation of the printing machine of this invention, and assuming the table drive motor 152 to be operating, the table 146 will rotate intermittently a predetermined distance by reason of the action of clutch 159, and textile articles to be printed are placed on the table 146 and held in position by any desired means. These articles are advanced beneath the tape 45 carrying the transfers 46, tape 45 being guided by roller 91 and by roller 176 supported from spaced arms 177 which are attached to bracket 95. Each article to be printed comes to rest beneath the tape 45 and directly beneath the iron 33. At this time cam operated switch 171 closes to energize solenoid 136 and solenoid 143, which admits fluid pressure through conduit 28 to the upper end of cylinder 16, thus moving the iron 33 downwardly to transfer the ink 46 from tape 45 to the article to be printed. Upon completion of this printing operation, cam operated switch 171 closes a second set of contacts to energize solenoid 131 and solenoid 142, thus introducing fluid pressure to the lower end of cylinder 16 and retracting iron 33. Solenoid valves 144 and 145 permit the escape of fluid pressure from the cylinder 16 during movement of the piston 18 in such cylinder. The table 146 then moves another step to present a second fabric article to be printed.

Since the transfer 46 is only sufficient for one printing operation, it is necessary to advance the tape 45 and bring a second transfer into registry with the iron 33 after the completion of a printing operation. This advancement of the tape 45 is accomplished by the mechanism above described, and exact registry of the transfer 46 is obtained by actuation of the micro-switch 70. Actuation of this switch is caused by the transfer 46 passing between the rolls 64 and 79, the thickness of the transfer ink being sufficient to move these rolls apart and pivot the rocker arm 73 about the pivot pin 76, thus moving the push rod 82 away from the plunger 71 of micro-switch 70, and allowing this switch to close.

Assuming that a printing operation has just been completed and a transfer 46 is disposed between the rolls 64 and 79 with the micro-switch 70 closed to complete the circuit to solenoid valves 132 and 145, at this time cam operated switch 169 is open in order to interrupt the circuit to these solenoid valves and prevent energization of the same. Upon return of iron 33 to its uppermost position the finger 174 will engage plunger 173 of limit-switch 172, closing this switch to energize solenoid valves 133 and 144, thus admitting fluid pressure to one end of the cylinder 113 and engaging the driven clutch member 105 with the driving clutch member 101 to rotate drive roll 104 and advance the tape 45 through the rolls 64 and 79 from the tape supply roll 44.

As soon as the transfer 46 has passed from between rolls 64 and 79 these rolls move toward each other to open the micro-switch 70 and at the same time cam operated switch 169 closes to supply current to this circuit in order that when the next transfer 46 passes between rolls 64 and 79 and closes micro-switch 70 this will operate to energize solenoid valves 132 and 145 which will disengage driven clutch member 105 from driving clutch member 101 and stop the rotation of roll 104 and the movement of tape 45 which results in accurately registering or positioning a transfer 46 beneath the iron 33. Dur-

ing the advancement of tape 45 cam operated switch 170 opens, which deenergizes solenoid valves 133 and 144, but the driven clutch member 105 will not be disengaged from driving clutch member 101 until micro-switch 70 closes, since it is necessary to introduce fluid pressure to the opposite end of cylinder 113 in order to accomplish such disengagement of the tape pulling drive clutch. It will be seen that it is impossible for the tape 45 to be moved during downward movement of the iron 33 to initiate a printing operation since immediately the iron 33 commences to move downwardly, the finger 174 is disengaged from the plunger 173 thus opening the limit switch 172 and preventing introduction of fluid pressure to the cylinder 113 to engage the driven clutch member 105 with the driving clutch member 101. This movement is only initiated upon the upward movement of the iron 33 to close the limit-switch 172, after which movement of the tape 45 is completely under control of the micro-switch 70 actuated by the transfer 46 passing between the rolls 64 and 79.

It will be seen that by the above described invention there has been provided a completely automatic transfer printing machine in which transfers may be supplied on a continuous paper tape and in which such transfers are accurately registered with a transfer applying iron and in which the articles to be printed may be automatically fed to the machine in timed relation to the operation of the various components thereof, the operation of the machine being accomplished through fluid pressure means controlled by an electrical circuit. The machine of this invention may be constructed from readily available parts and materials and may be fabricated in such a manner that highly efficient operation may be obtained over long periods of time without the necessity for frequent shutdowns for repair and the like.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawing and described in the specifications, but only as indicated in the appended claims.

What is claimed is:

1. A transfer printing machine comprising a circular feed table on which articles to be printed may be placed, a continuously operating power source, a one revolution clutch connecting said power source and said table for imparting intermittent movement to said table, a fluid pressure cylinder adjustably disposed above said table, a piston in said cylinder, a cross-head carried by said piston for movement toward and from said table, a heated iron carried by said cross-head for movement therewith and for movement relative thereto, resilient means for resisting movement of said iron toward said cross-head, a frame adjustably supported on said cylinder, a roll of tape rotatably mounted on said frame, transfers of heat sensitive ink carried by said tape, an elongated base member carried by said frame, a roller adjustably mounted on said base member adjacent one end thereof, a micro-switch mounted on said base member adjacent the opposite end thereof, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, adjustable resilient means engaging said base member and said rocker arm to bias said rollers into engagement, an adjustable push rod

mounted on said rocker arm and engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a bracket adjustably mounted on said cylinder, a friction roller mounted on said bracket, an idler roller mounted on said bracket for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure, solenoid valves for controlling the flow of fluid from said source to said fluid pressure cylinder and to said fluid pressure means, other solenoid valves for controlling the exhaust from said fluid pressure cylinder and from said fluid pressure means, a limit switch mounted on said cylinder, a finger carried by said cross-head and engageable with said limit switch to open and close the same upon movement of said cross-head, a plurality of cam actuated switches, a plurality of cams operated by said power source for actuating said last said mentioned switches in timed relation to the movement of said table, whereby upon movement of an article on said table into position beneath said tape and said iron one of said cam actuated switches will operate to energize certain said solenoid valves and admit fluid to said cylinder to move said iron downwardly into engagement with said tape to apply said transfer to said article, said cam actuated switch operating to deenergize said certain solenoid valves and energize others to return said iron to uppermost position, said finger engaging said limit switch to energize certain other of said solenoid valves to cause said fluid pressure means to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch and energize certain of said other solenoid valves to disengage said clutch, the other of said cam actuated switches operating to control the microswitch and limit switch circuits.

2. A transfer printing machine comprising a feed table on which articles to be printed may be placed, a power source, a clutch connecting said power source and said table for imparting intermittent movement to said table, a fluid pressure cylinder adjustably disposed above said table, a piston in said cylinder, a cross-head carried by said piston for movement toward and from said table, a heated iron carried by said cross-head for movement therewith and for movement relative thereto, resilient means for resisting movement of said iron toward said cross-head, a frame supported on said cylinder, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, an elongated base member carried by said frame, a roller adjustably mounted on said base member adjacent one end thereof, a microswitch mounted on said base member adjacent the opposite end thereof, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, resilient means engaging said base member and said rocker arm to bias said rollers into engagement, means on said rocker arm engageable with said

able with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a bracket mounted on said cylinder, a friction roller mounted on said bracket, an idler roller for holding said tape in engagement with said friction roller, a motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure, solenoid valves for controlling the flow of fluid from said source to said fluid pressure cylinder and to said fluid pressure means, other solenoid valves for controlling the exhaust from said fluid pressure cylinder and from said fluid pressure means, a limit switch, a finger carried by said cross-head and engageable with said limit switch to open and close the same upon movement of said cross-head, a plurality of cam actuated switches, a plurality of cams operated by said power source for actuating said last mentioned switches in timed relation to the movement of said table whereby upon movement of an article on said table into position beneath said tape and said iron one of said cam actuated switches will operate to energize certain of said solenoid valves and admit fluid to said cylinder to move said iron downwardly into engagement with said tape to apply said transfer to said article, said cam actuated switch operating to deenergize said certain solenoid valves and energize others to return said iron to uppermost position, said finger engaging said limit switch to energize certain other of said solenoid valves to cause said fluid pressure means to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch and energize certain of said other solenoid valves to disengage said clutch, the other of said cam actuated switches operating to control the microswitch and limit switch circuits.

3. A transfer printing machine comprising a feed table on which articles to be printed may be placed, a power source means, connecting said power source and said table for imparting intermittent movement to said table, a fluid pressure cylinder disposed above said table, a piston in said cylinder, a cross-head carried by said piston for movement toward and from said table, a heated iron carried by said cross-head for movement therewith, a frame, a roll of tape, rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, an elongated base member carried by said frame, a roller adjustably mounted on said base member adjacent one end thereof, a microswitch mounted on said base member adjacent the opposite end thereof, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, resilient means engaging said base member and said rocker arm to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantial parallel

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relation thereto, tape pulling means comprising a bracket, a friction roller mounted on said bracket, an idler roller for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure, solenoid valves for controlling the flow of fluid from said source to said fluid pressure cylinder and to said fluid pressure means, other solenoid valves for controlling the exhaust from said fluid pressure cylinder and from said fluid pressure means, a limit switch, a finger carried by said cross-head and engageable with said limit switch to open and close the same upon movement of said cross-head, a plurality of cam actuated switches, a plurality of cams operated by said power source for actuating said last mentioned switches in timed relation with movement of said table whereby upon movement of an article on said table into position beneath said tape and said iron one of said cam actuated switches will operate to energize certain of said solenoid valves and admit fluid to said cylinder to move said iron downwardly into engagement with said tape to apply said transfer to said article, said cam actuated switch operating to deenergize said certain solenoid valves and energize others to return said iron to uppermost position, said finger engaging said limit switch to energize certain of said other solenoid valves to cause said fluid pressure means to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected of the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch and energize certain of said other solenoid valves to disengage said clutch, the other of said cam actuated switches operating to control the microswitch and limit switch circuits.

4. A transfer printing machine comprising a feed table on which articles to be printed may be placed, a power source, means connecting said power source and said table for imparting intermittent movement to said table, a fluid pressure cylinder disposed above said table, a piston in said cylinder, a cross-head carried by said piston for movement toward and from said table, a heated iron carried by said cross-head for movement therewith, a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, a base member, a roller mounted on said base member, a microswitch mounted on said base member, a pivotally mounted rocker arm, a roller mounted on said rocker arm adjacent said first mentioned roller, means to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a friction roller, means for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure, solenoid valves for controlling the flow of fluid from said source to said fluid pressure cylinder and to said fluid pressure means, other solenoid valves for controlling the exhaust

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from said fluid pressure cylinder and from said fluid pressure means, a limit switch, a finger carried by said cross-head and engageable with said limit switch to open and close the same upon movement of said cross-head, a plurality of timing switches operable in timed relation to the movement of said table whereby upon movement of an article on said table into position beneath said tape and said iron, one of said timing switches will operate to energize certain of said solenoid valves and admit fluid to said cylinder to move said iron downwardly into engagement with said tape to apply said transfer to said article, said timing switch operating to deenergize said certain solenoid valves and energize others to return said iron to uppermost position, said finger engaging said limit switch to energize certain other of said solenoid valves to cause said fluid pressure means to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch and energize certain of said other solenoid valves to disengage said clutch, the other of said timing switches operating to control the microswitch and limit switch circuits.

5. A transfer printing machine comprising a feed table on which articles to be printed may be placed, a power source, means connecting said power source and said table for imparting intermittent movement to said table, a fluid pressure cylinder disposed above said table, a piston in said cylinder, a heated iron carried by said piston for movement therewith, a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, a base member, a roller mounted on said base member, a microswitch mounted on said base member, a pivotally mounted rocker arm, a roller mounted on said rocker arm adjacent said first mentioned roller, means to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers, and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a friction roller, means for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure control means for controlling the flow of fluid from said source to said fluid pressure cylinder and to said fluid pressure means, means for controlling the exhaust from said fluid pressure cylinder and from said fluid pressure means, a limit switch, means to open and close said limit switch upon movement of said iron, a plurality of timing switches operable in timed relation to the movement of said table, whereby upon movement of an article on said table into position beneath said tape and said iron one of said timing switches will operate to cause said fluid pressure control means to admit fluid to said cylinder to move said iron downwardly into engagement with said tape to apply said transfer to said article, said timing switch operating to actuate said fluid pressure control means to return said iron to uppermost position, the closing of said limit switch serving

to actuate said fluid pressure control means to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch and operate said fluid pressure control means to disengage said clutch, the other of said timing switches operating to control the microswitch and limit switch circuits.

6. A transfer printing machine comprising a table on which articles to be printed may be placed, a fluid pressure cylinder disposed above said table, a piston in said cylinder, a cross-head carried by said piston for movement toward and from said table, a heated iron carried by said piston for movement therewith and for movement relative thereto, resilient means for resisting movement of said iron toward said cross-head, a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, a base member carried by said frame, a roller mounted on said base member adjacent one end thereof, a microswitch mounted on said base member adjacent the opposite end thereof, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, adjustable resilient means engaging said base member and said rocker arm to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a friction roller, an idler roller for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure, means for controlling the flow of fluid from said source to said fluid pressure cylinder and said fluid pressure means, a limit switch, a finger carried by said cross-head and engageable with said limit switch to open and close the same upon movement of said cross-head, whereby upon actuation of said control means to cause fluid to flow to said fluid pressure cylinder said iron will move downwardly into engagement with said tape to apply said transfer to an article disposed on said table and upon return of said iron to uppermost position said limit switch will close to actuate said fluid pressure means and engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch thus causing said fluid pressure means to disengage said clutch.

7. A transfer printing machine comprising a table on which articles to be printed may be placed, a fluid pressure cylinder disposed above said table, a piston in said cylinder, a cross-head carried by said piston for movement toward and away from said table, a heated iron carried by said cross-head for movement therewith, a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by

said tape, a base member, a roller mounted on said base member, a microswitch mounted on said base member, a pivotally mounted rocker arm, a roller mounted on said rocker arm adjacent said first mentioned roller, means to bias said rollers into engagement, means on said rocker arm engageable to said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a friction roller, means for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a source of fluid pressure, means for controlling the flow of fluid from said source to said fluid pressure cylinder and said fluid pressure means, a limit switch, means to open and close said limit switch upon movement of said iron, whereby upon actuation of said control means to admit fluid to said fluid pressure cylinder said iron will move downwardly into engagement with said tape to apply said transfer to an article disposed on said table, and upon return of said iron to uppermost position said limit switch will close to cause said fluid pressure means to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch thus causing said fluid pressure means to disengage said clutch.

8. A transfer printing machine comprising a table on which articles to be printed may be placed, a heated iron mounted for movement toward and from said table, a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, an elongated base member carried by said frame, a roller adjustably mounted on said base member adjacent one end thereof, a microswitch mounted on the opposite end thereof, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, adjustable resilient means engaging said base and said rocker arm to bias said rollers into engagement, an adjustable push rod mounted on said rocker arm and engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers and for positioning said tape above said table in spaced substantially parallel relation thereto, tape pulling means comprising a bracket, a friction roller mounted on said bracket, an idler roller mounted on said bracket for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and means for engaging and disengaging said clutch, a limit switch, means to open and close said limit switch upon movement of said iron, whereby upon movement of said iron downwardly into engagement with said tape to apply said transfer to an article on said table and upon return movement of said iron to uppermost position the closing of said limit switch will serve to engage said clutch thereby advancing said tape to bring the next transfer into registry with said iron, such registration being effected by the engagement of a transfer with said rollers, the

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thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch to disengage said clutch.

9. For use with a transfer printing machine a transfer tape feeding and registration apparatus comprising a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, an elongated base member carried by said frame, a roller adjustably mounted on said base member adjacent one end thereof, a microswitch mounted on said base member adjacent the opposite end thereof, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, adjustable resilient means engaging said base member and said rocker arm to bias said rollers into engagement, an adjustable push rod mounted on said rocker arm and engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers, tape pulling means comprising a bracket, a friction roller mounted on said bracket, an idler roller mounted on said bracket for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a fluid pressure source, solenoid valves for controlling the operation of said fluid pressure means and switch means for energizing certain of said solenoid valves to admit fluid from said source to said fluid pressure means to engage said clutch whereby said tape will be advanced to bring a transfer into operative position, the registration of said transfer being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch to energize other of said solenoid valves to disengage said clutch.

10. For use with a transfer printing machine a transfer tape feeding and registration apparatus, comprising a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, a base member carried by said frame, a roller adjustably mounted on said base member, a microswitch mounted on said base member, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, adjustable resilient means engaging said base member and said rocker arm to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers, tape pulling means comprising a friction roller, an idler roller for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a fluid pressure source, solenoid valves for controlling the operation of said fluid pressure means and switch means for energizing certain of said solenoid valves to admit fluid from said source to said fluid pressure means to engage said clutch, whereby said tape will be advanced to bring a transfer into operative position, the registration of said transfer being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer

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moving said rollers apart to pivot said rocker arm and close said microswitch to energize other of said solenoid valves to disengage said clutch.

11. For use with a transfer printing machine a transfer tape feeding and registration apparatus, comprising a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, a base member carried by said frame, a roller adjustably mounted on said base member, a microswitch mounted on said base member, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, means to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers, tape pulling means comprising a friction roller, means for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and fluid pressure means for engaging and disengaging said clutch, a fluid pressure source, solenoid valves for controlling the operation of said fluid pressure means and switch means for energizing certain of said solenoid valves to admit fluid from said source to said fluid pressure means to engage said clutch, whereby said tape will be advanced to bring a transfer into operative position, the registration of said transfer being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch to energize other of said solenoid valves to disengage said clutch.

12. For use with a transfer printing machine a transfer tape feeding and registration apparatus comprising a frame, a roll of tape rotatably mounted on said frame, spaced transfers of heat sensitive ink carried by said tape, a base member carried by said frame, a roller adjustably mounted on said base member, a microswitch mounted on said base member, a rocker arm pivotally mounted on said base member, a roller mounted on said rocker arm adjacent said first mentioned roller, means to bias said rollers into engagement, means on said rocker arm engageable with said microswitch to open and close the same upon pivotal movement of said rocker arm, guide means for directing said tape from said roll between said rollers, tape pulling means comprising a friction roller, means for holding said tape in engagement with said friction roller, a driving motor, a clutch between said motor and said friction roller and means for engaging and disengaging said clutch, switch means for engaging said clutch whereby said tape will be advanced to bring a transfer into operative position, the registration of said transfer being effected by the engagement of a transfer with said rollers, the thickness of the ink forming the transfer moving said rollers apart to pivot said rocker arm and close said microswitch, thereby disengaging said clutch.

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