Dec. 21, 1937. J. L. PETERSON 2,102,970

MACHINE FOR APPLYING TRANSFERS

Filed Feb. 28, 1935 4 Sheets-Sheet 1

FIG. 1.

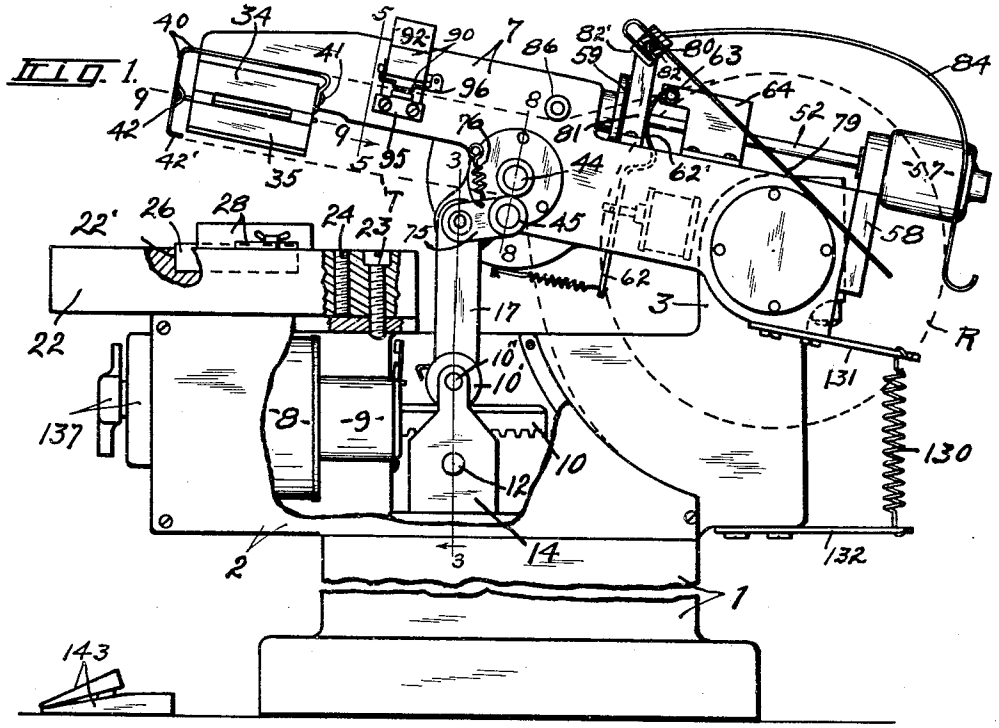
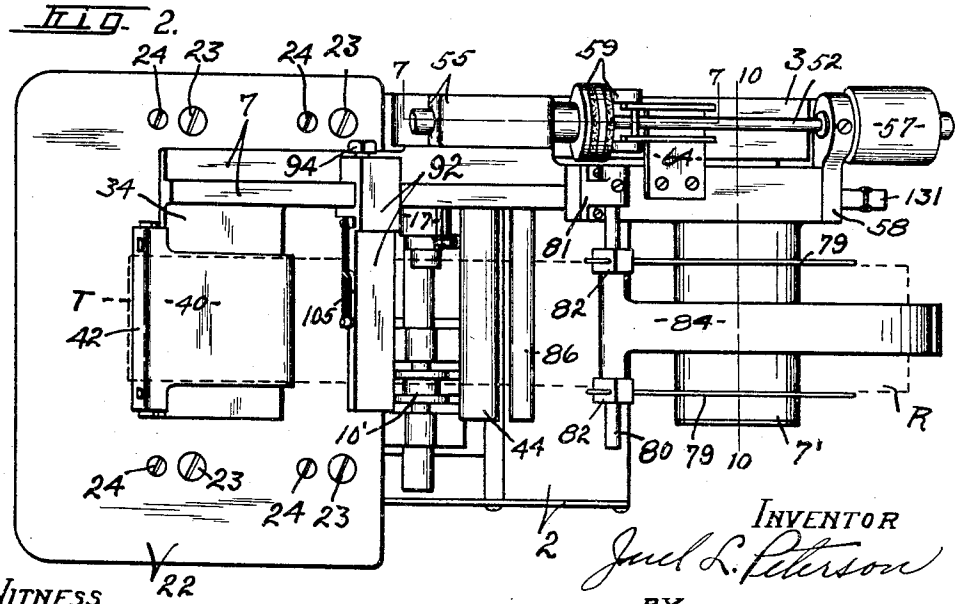


FIG. 2.



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MACHINE FOR APPLYING TRANSFERS

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FIG. 3.

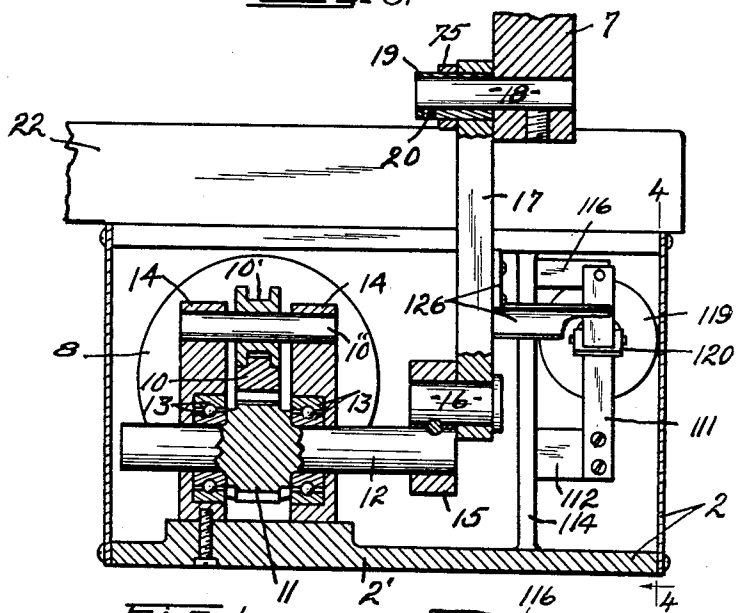


FIG. 4.

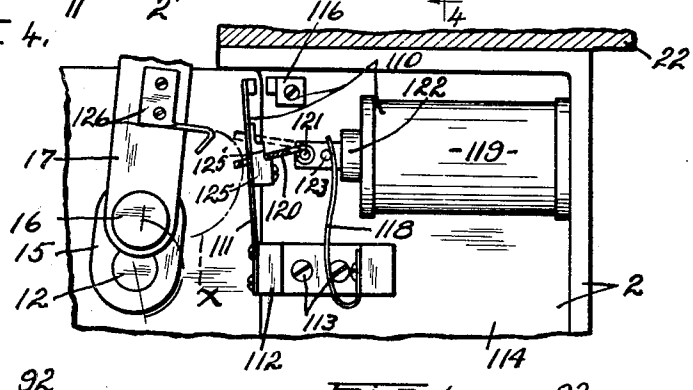


FIG. 5.

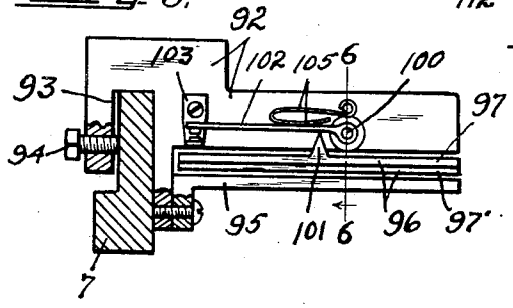
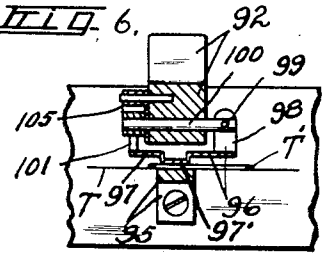


FIG. 6.



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MACHINE FOR APPLYING TRANSFERS

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FIG. 7.

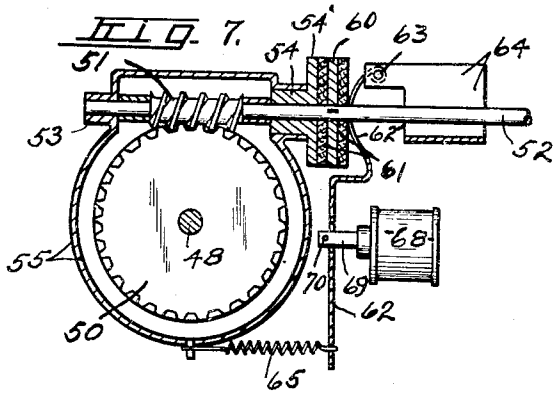


FIG. 8.

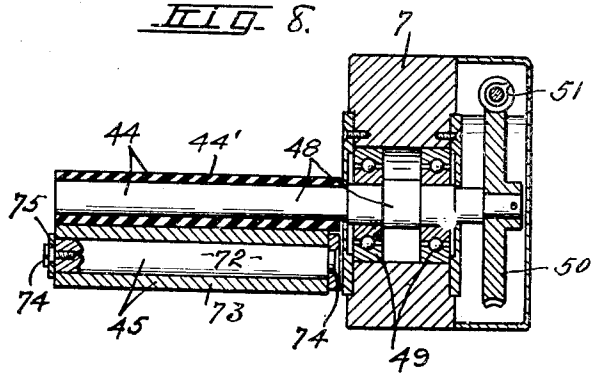


FIG. 9.

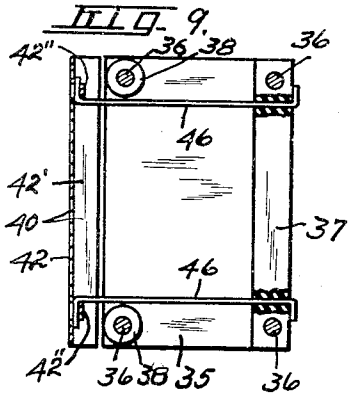


FIG. 10.

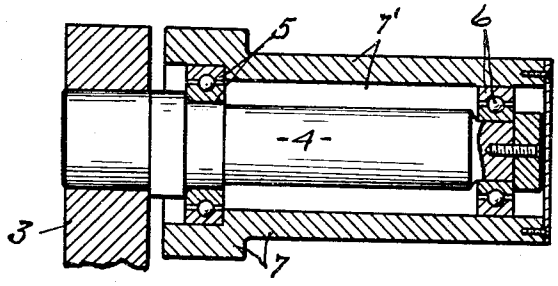
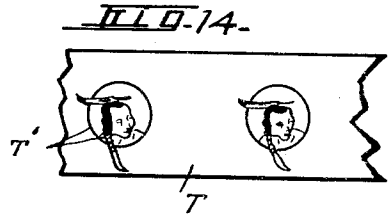


FIG. 14.



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MACHINE FOR APPLYING TRANSFERS

Filed Feb. 28, 1935 4 Sheets-Sheet 4

FIG. 11.

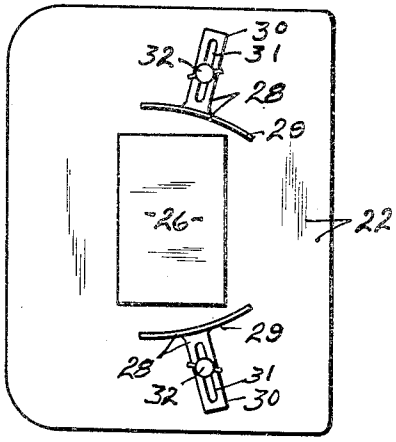


FIG. 12.

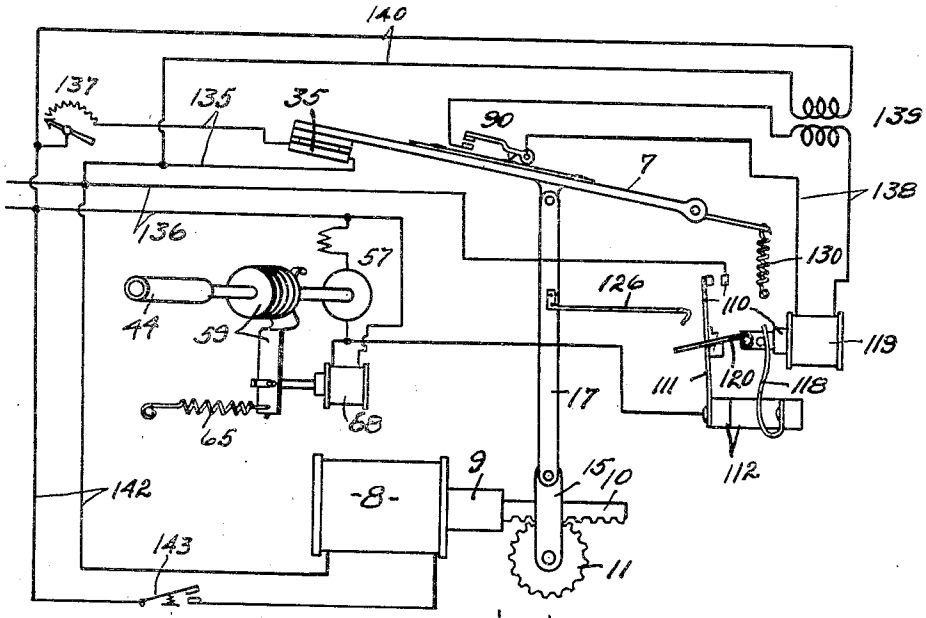
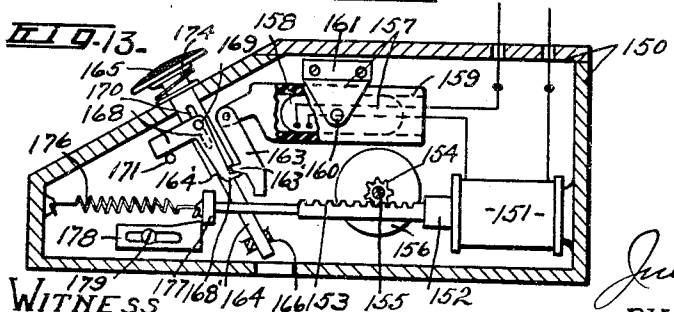


FIG. 13.



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Patented Dec. 21, 1937

2,102,970

UNITED STATES PATENT OFFICE

2,102,970

MACHINE FOR APPLYING TRANSFERS

Juel L. Peterson, Seneca Falls, N. Y., assignor to Caleb Smith, Seneca Falls, N. Y.

Application February 28, 1935, Serial No. 8,703

16 Claims. (Cl. 41—1)

This invention relates to improvements in a transfer apparatus adapted more particularly to apply transfers to relatively small sized objects of manufacture that may be readily brought into cooperative relation with the apparatus, such as, for instance, articles of clothing or the like.

The main object of this invention is to provide a simply constructed and operated apparatus that will rapidly and efficaciously apply transfers to relatively small objects such as hosiery or other articles of clothing.

In carrying out the above mentioned object, I preferably utilize a transfer tape comprising a relatively long base strip composed of paper or other suitable material having required markings or impressions duplicated thereon at spaced intervals. These transfer markings or impressions are composed of ink or other composition which may be readily melted when subjected to a relatively high temperature of heat and these markings may be applied to the base by printing methods in the ordinary manner. The transfer tape is provided in long strips formed in rolls. In my novel transfer machine the tape is automatically fed intermittently from the roll over articles to which the transfer is to be applied, between a platen for supporting the articles and a heating element, and the heating element is brought into pressure engagement with the transfer base and article, whereby the ink is melted and transferred from the paper base to the article, and the transfer marking or impression is thus imprinted on the 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 impressions varies with each change of the moisture content in the air, due to the contraction or expansion of the paper base produced thereby. This variation in the distance between the transfer markings is such that, insofar as the applicant is aware, it heretofore has been very difficult to maintain the markings or impressions in proper relation with the transfer elements of the machine.

Another important object of this invention resides in providing a transfer apparatus which will automatically bring each successive transfer marking or impression to a predetermined position at each intermittent movement of the transfer tape or base, irrespective of the size of the markings, the distance they are spaced apart, or any irregularities occurring in the spacings thereof.

A more specific object of the invention is to provide a mechanism wherein the operation of certain elements thereof may be readily controlled to conform the machine to varying working conditions such as the time required to make the transfer, the thickness of the article to be labeled etc.

Other objects and advantages pertaining to the structure of the device and to the form and relation of the parts thereof, will more fully appear from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a side elevation partly broken away and partly in section, of a transfer apparatus embodying the various features of this invention.

Figure 2 is a plan view of the structure shown in Figure 1.

Figure 3 is a detail transverse sectional view, on enlarged scale, taken substantially in the plane of the line 3—3, Figure 1.

Figure 4 is a fragmentary sectional view taken on line 4—4, Figure 3.

Figure 5 is a transverse sectional view taken on line 5—5, Figure 1, with parts shown in section.

Figure 6 is a detail sectional view taken on line 6—6, Figure 5.

Figure 7 is a detail sectional view taken on line 7—7, Figure 2.

Figures 8 and 9 are detail sectional views taken respectively, on lines 8—8 and 9—9, Figure 1.

Figure 10 is a detail transverse sectional view taken in the plane of line 10—10, Figure 2.

Figure 11 is a top plan of the transfer table and the platen associated therewith.

Figure 12 is a diagrammatic view illustrating the different associated elements of my novel transfer apparatus and the electrical connections therefor.

Figure 13 is a longitudinal sectional view of a time switch, particularly adapted to be used in connection with my transfer apparatus.

Figure 14 illustrates a section of a transfer tape, particularly adapted to be used on the machine disclosed herein.

The device as illustrated in the drawings comprises a lower base 1, and an upper base or frame 2, mounted in any suitable manner upon the lower base 1. The upper base 2 is provided at one side of the rear end thereof with an upwardly

projecting lug or arm 3 which carries a supporting shaft or stud 4, as illustrated more particularly in Figures 1 and 10. The supporting shaft 4 has mounted thereon a pair of axially spaced bearing members 5 and 6. Upon the bearings 5 and 6 is mounted a rock arm 7 which is mounted adjacent one end thereof upon said bearings and extends outwardly therefrom over the base 2 for movement toward and from said base.

The arm 7 is moved about the shaft 4 as a pivot by motor means which, in this instance, comprises a solenoid 8, mounted in the upper base 2 at the forward end thereof, as shown in Figure 1. The plunger 9 of the solenoid 8 is provided with a rack 10 which is in meshing engagement with a pinion 11, secured to or made integral with a crank shaft 12 which is journaled in suitable bearings 13, which in turn are mounted in standards 14, secured to the bottom 2' of the base 2, adjacent opposite sides of the pinion 11. The rack 10 is maintained in meshing engagement with the pinion 11 by a guide roller 10' journaled on a shaft 10'' secured in the upper ends of the standards 14 as shown in Figure 3.

One end of the crank shaft 12 has mounted thereon a crank 15 which is pivotally connected as by the pin 16 to one end of a connecting link 17. The link 17 extends upwardly from the pin 16 and has the upper end thereof pivotally connected to the rock arm 7 intermediate the forward end thereof and the shaft 4 by means of a stud 18 secured to said arm and an eccentric collar 19 which is rotatably secured to said stud by a set screw 20, so that the distance between the axis of the stud 18 and the pin 16 may be varied to alter the travel of the arm 17 for bringing the heating element carried by said arm into proper relation with a platen for a reason which will hereinafter more fully appear.

A table 22 is mounted on the upper face of the base 2 at the forward end thereof. The table 22 in this instance is a rectangular member in plan view and is secured to the base by four clamping screws 23. In order that the table may be adjusted relatively to the base 2, I have provided the same with four spacing screws 24 positioned in close proximity to a respective clamping screw as shown in Figures 1 and 2. The lower ends of the screws 24 are adapted to engage the adjacent portion of the base 2 so that by loosening the clamping screws 23 the height of the table 22 may be varied by the manipulation of the spacing screws 24 and then the table may be secured to the base in the adjusted position by the screws 23.

The table 22, in this instance, is provided with a central recess 22' in longitudinal alignment with the outer end portion of the supporting shaft 4 for the rock arm 7. In the recess 22' is positioned a platen 26 to be supported by the table. The platen 26 is preferably composed of vulcanized rubber or other slightly resilient material, and has the upper surface thereof positioned a relatively short distance above the table 22 for supportably receiving thereon the article, such as hosiery, to which the transfer is to be applied.

The table 22 as shown more particularly in Figures 1 and 11 may be provided with a pair of guide members 28. Each of the guide members, as shown, comprises a vertical portion 29 and a laterally disposed horizontal portion 30, said latter portion being provided with an elongated slot 31 for the reception of a clamp screw 32 by which the guide member may be adjustably secured to the table in cooperative relation with the platen 26 to assist the operator in properly positioning the article upon which the transfer is to be applied upon the platen 26.

It will now be observed by referring to Figure 2 that the rock arm 7 extends outwardly from the arm 3 of the base over the table 22 in a vertical plane at one side of the platen 26 and that the rear or pivoted end of the arm is provided with an integral extension or hub 7' which receives the outer end of the shaft 4 therein and is in longitudinal alignment with the platen 26.

The opposite or free end of the arm 7 is provided with a laterally extending substantially horizontally disposed carrier plate 34 which extends outwardly from the arm 7 over the platen 26 in longitudinal alignment with the hub 7' of said arm. The plate 34 is substantially rectangular in plan view and has secured to the bottom face thereof in fixed spaced relation thereto a heating element 35.

The element 35 may be constructed in any suitable manner and is preferably provided with a heating coil, not shown, adapted to receive an electric current therethrough. The element 35 in this instance is secured to the carrier plate 34 by four screws 36 and spacing members 37 and 38. The spaced members 38 are, as shown in Figure 9, tubular members, while the spacing member 37 is in the form of a rectangular strip which extends across the inner or rear side of the element and plate. The spaced members 37 and 38 are preferably composed of insulating material so as to prevent as much heat as possible from being transmitted from the heating element to the carrier plate 34 and arm 7.

The carrier plate 34 also has a guide plate 40 mounted thereon for guiding the transfer base or tape over the carrier plate 34 and about the heating element 35. This guide plate 40 is preferably composed of thin spring metal and is secured to the rear or inner side of the plate 34 by screws 41. The plate extends upwardly from the screws 41 as shown in Figure 1 and across the upper face of the carrier plate 34 in slightly spaced parallel relation thereto and has the outer end portion 42 thereof bent to extend downwardly in spaced parallel relation with the outer or forward side faces of the plate 34 and heating element 35. The outer end of the portion 42' of the carrier plate may, as shown in Figure 1, be bent rearwardly at substantially right angles to the remaining portion thereof and is normally positioned a relatively short distance below the plane of the lower face of the heating element for normally maintaining the transfer tape in spaced relation to the lower face of the heating element.

It will now be observed by referring to Figures 1 and 2 that the hub 7' of the arm 7 forms a convenient support for the roll of transfer tape and is utilized for this purpose as indicated by broken lines in these figures. The tape is threaded from the roll as R, across the upper portion of the guide plate 40 and thence downwardly across the outer face of the portion 42 of the guide plate and thence rearwardly about the end portion 42' thereof, across the lower face of the heating element 35 and then between a drive roll 44 and a pressure roll 45, adapted to intermittently draw the transfer tape from the roll R over the guide plate 40 and across the lower face of the heating element 35. It will, therefore, be understood that the tension produced upon the transfer tape by the action of the feed roll 44, in drawing the same over the

guide plate 40, tends to deflect the end portion 42 of said guide plate inwardly toward the heating element 35 and in order to prevent this, I have provided the guide plate with a pair of light flexible control rods 46 which have their outer ends secured to the portion 42 of the plate by the extension thereof beneath inwardly stamped ears 42'' formed on the plate 42.

The rods extend inwardly from the connection with plate 40 between the heating element 35 and the carrier plate 34 in a plane just inside of the spacing members 38 and have their rear ends secured in the spacing strip 37 as illustrated in Figure 9. These control rods 46 not only function to maintain the portion 42 of the guide plate against being deflected inwardly during the feeding of the transfer tape, but also function to maintain said portion 42 of the guide plate in substantially parallel spaced relation with the front sides of the carrier plate 34 and heating element 35 when the tape is brought into contact with the heating element by the engagement of said element with the article positioned on the platen 26, and thereby prevent a variation in the registration of the markings or impressions carried by the tape with the heating element, which might otherwise be caused by the inward deflection of the portion 42 of the guide plate, by maintaining a uniform distance of travel for the transfer tape. It will also be observed that inasmuch as the inwardly directed end portion 42' of the guide plate 40 is of less width than the distance between the portion 42 and the adjacent side of the heating element 35, the guide plate is free to move upwardly beyond the lower face of said element by the engagement of the end 42' with the platen 26 as the heating element 35 is brought into operative relation with the platen so that the portion of the transfer tape T, adjacent the heating element, may freely move into contact with said element and the ink defining the emblems or impressions on the transfer tape will be melted and transferred to the object positioned on the platen 26.

The hereinbefore mentioned feed roll 44 comprises a shaft 48 journaled adjacent one end thereof in suitable bearings 49 provided in the rock arm 7 in inwardly spaced relation to the stud 18 for the drive link 17 as shown more clearly in Figure 8. One end portion of the shaft 48 extends outwardly from the arm 7 in a horizontal plane over the base 2 in longitudinal alignment with the hub 7' of the arm 7 and carrier plate 34. This extended portion of the shaft 48 is preferably covered by a sleeve 44' composed of rubber or other suitable material adapted to frictionally engage the transfer tape as it is passed between said shaft and the pressure roll 45. The opposite end of the shaft 48 extends a short distance beyond the opposite side of the arm 7 and has secured thereto a worm gear 50 which is in meshing engagement with a worm 51 mounted on a drive shaft 52 as shown more particularly in Figures 7 and 8.

This drive shaft 52 is journaled at opposite sides of the worm 51 in suitable bearings 53 and 54 provided in the housing 55, for the gear members 50 and 51 and which is secured to the outer face of the arm 7 in any suitable manner. The drive shaft 52 extends rearwardly from the housing 55 and is operatively connected in any suitable manner with an electric motor 57 secured to a bracket 58 which in turn is secured to the rear end of the arm 7 to move therewith. The motor 57 is preferably of the series wound type to obtain relatively high starting torque.

The motor 57 may be energized from any suitable source of potential and in a manner which will hereinafter be more fully explained, and when the circuit for the motor 57 is broken it is desirable that the operation of the motor and the feed roll 44 driven thereby, be discontinued immediately and for this purpose I have provided a simple brake mechanism 59 which comprises in providing one of the bearing members as 54 for the shaft 52 with an outwardly projecting annular flange 54' and the shaft 52 with a metallic disc 60 keyed thereto so as to be rotated thereby but free to be moved axially thereon. A pair of discs 61 composed of fiber or other suitable material is rotatably mounted on a shaft 52, one at either side of the disc 60 for frictional engagement with said latter disc and with the flange portion 54' of the bearing 54.

These brake discs 60 and 61 are brought into frictional engagement with each other and with the bearing flange 54' by means of a brake lever 62 which, in this instance, has the upper end thereof forked and fulcrumed as at 63 to a bracket 64 secured to the adjacent portion of the arm 7. The upper forked portion of the lever 62 is curved forwardly from the fulcrum 63 as at 62' for engagement with the rearmost disc 61 of the brake at opposite sides of the shaft 52. The lever 62 extends downwardly from the curved portion 62' and has secured to the lower end thereof a tension spring 65 which, in turn, is connected with the housing 55, said spring being tensioned to normally swing the lever toward the brake discs to maintain said discs in frictional contact with each other.

Any suitable means may be provided for relieving the braking action of the discs 60 and 61 upon the shaft 52 to permit the free rotation of said shaft and for this purpose I have shown a solenoid 68 secured in any suitable manner to the arm 7 at the rear of the brake lever 62. The plunger 69 of the solenoid is extended through an elongated slot provided in the brake lever 62 intermediate the ends thereof and the outer end of said plunger is provided with a pin 70 which extends outwardly beyond said plunger across the adjacent portion of the lever transversally of the slot. It will thus be understood that when the solenoid 68 is energized to draw the plunger 69 inwardly that a rearward swinging movement of the brake lever 62 will be produced thereby against the action of the spring 65 so that the curved portion 62' will be moved rearwardly out of contact with the brake disc 61.

The hereinbefore mentioned pressure roll 45 as shown more particularly in Figures 1 and 8 comprises a central shaft or core 72 encased in a sleeve 73 composed of any suitable material adapted to cooperate with the feed roll sleeve 44' to effect intermittent movement of the transfer tape. The ends of the core 72 of the pressure roll are rotatably connected as at 74 with the ends of a bifurcated rock arm 75, journaled on the eccentric collar 19 for the drive rod 17 adjacent said rod as shown in Figure 3. The pressure roll 45 is yieldingly maintained in operative relation with the drive roll 44 by means of a spring 76 having one end thereof connected with the rock arm 75 and the other end secured to the rock arm 7.

As before stated, the roll R of transfer tape is mounted upon the hub 7' of the rock arm 7 and may be maintained thereon in alignment

with the platen 26 and heating element 35 by any suitable means such as the rods 79, positioned one at either side of the roll and supported at one end upon a shaft 80 secured to a bracket 81 which, in turn, is secured to the upper face of the arm 7 as shown in Figures 1 and 2. The rods 79 are frictionally mounted on the shaft 80 to prevent axial movement of said rods along said shaft and for this purpose the pivotal ends of the rods extend through a supporting block 82 which has a transverse opening thereto for the reception of the shaft 80. Each rod 79 extends through the block 82 at one side of the shaft opening and has the outer end portion thereof return bent and extended into a slot 82' provided in the under side of the block in communication with the shaft opening whereby said end of the rod 79 may frictionally engage the shaft 80.

I also employ tension means such as the spring strap 84 for releasably maintaining the transfer roll R from rotating upon the support 7'. This strap 84 is an elongated member as shown in Figures 1 and 2, having one end thereof pivotally mounted upon the shaft 80 intermediate the blocks 82. The strap 84 extends outwardly from the shaft 80 over the roll R and has the outer or free end thereof extended downwardly for frictionally contacting with the peripheral surface of the roll R.

As before stated, the tape T is drawn from the roll R over the guide plate 40 and in so doing is passed beneath a guide roller 86 which is mounted in any suitable manner upon the arm 7 intermediate the ends of the arm and in the plane of the upper face of the guide plate 40.

Interposed between the guide roller 86 and the guide plate 40 is a switch member 90 adapted to be actuated by the ink on the transfer tape constituting the emblem or transfer marking, for controlling the operation of the motor 57 and the feed roll driven thereby in a manner presently described.

This switch 90, as shown more clearly in Figures 1, 2, 5 and 6, comprises a supporting arm 92 which has one side thereof provided with an inwardly extending recess 93 adjacent one end thereof, adapted to receive therein the arm 7 as illustrated in Figure 5. The arm 92 is clamped to the arm 7 by means of a screw 94 to maintain the switch arm in fixed relation with the rock arm 7 and at the same time permit the adjustment of the switch arm relatively to said rock arm. The switch arm 92 extends outwardly from the arm 7 in a plane in longitudinal alignment with the hub 7' and carrier plate 34, and has secured thereto a supporting plate 95. The plate 95 is arranged in parallel spaced relation with the lower face of the arm 92 for the reception of switch control member 96 therebetween.

This switch control member comprises an elongated substantially flat body portion 97 of substantially the same length as the supporting plate 95 and preferably equal to or greater than the width of the transfer tape T. The rear side of the body portion 97 of the control member 96 is provided with a pair of vertically disposed ears 98 which are pivotally connected as at 99 to a pin 100 secured to the switch arm 92 as illustrated in Figure 6. The central portion of the body 97 is provided with a downwardly extending substantially flat channel portion 97' arranged in the plane of the supporting plate 95, which normally engages the tape T as said tape passes over the plate 95. The side of the body portion 97 opposite the ears 98 is provided with an upwardly extending substantially V shaped projection 101 arranged adjacent the inner side of the arm 92 in close proximity to the fulcrum pin 100 and adapted to engage a movable contact arm 102 of the switch 90 which is pivotally mounted at one end upon the pin 100. The arm 102 extends forwardly from said pin over the projection 101 and has the outer or free end thereof provided with a contact element adapted to engage a corresponding contact element on a fixed terminal 103 secured to the arm 92 in insulated relation therewith.

The contact arm 102 and control member 96 are yieldingly maintained in the lowermost position by a spring 105 secured at one end to the arm 92 and having the outer portion thereof engaging the upper face of the arm 102 as shown in Figure 5. The structure of the contact arm 102, fixed terminal 103, and the control member 96 are so related to each other and to the tape T that when a portion of the tape intermediate adjacent emblems or impressions is present between the channel member 97' and the supporting plate 95 the electric circuit passing through the switch will be closed and when a portion of the tape having an emblem or impression is present between the channel portion 97' and the plate 95, the thickness of the ink forming the emblem or impression will be sufficient to rock the control arm 102 upwardly out of engagement with the terminal 103 and open the circuit.

Mounted in the circuit for the motor 57 and adapted to be controlled by the action of the switch 90 is a relay switch mechanism 110. As shown more clearly in Figures 3 and 4 this relay switch is mounted in the forward portion of the base 2 opposite the solenoid 8 and comprises a spring contact arm 111 which is secured at one end in insulated spaced relation to a supporting block 112 which, in turn, is secured in any suitable manner, as by screws 113, to a partition 114 provided in the base 2 adjacent the forward end thereof. The outer or free end of the contact arm 111 is adapted to engage a fixed terminal 116, secured in insulated spaced relation to an adjacent portion of the base 2, such as the partition 114. The contact arm 111 is tensioned to normally remain in engagement with the fixed terminal 116 for maintaining the switch closed.

The contact arm 111 is manipulated to effect the opening and closing of the switch by means of a spring 118, a solenoid 119 and a link 120, said link being connected at one end, as at 121, to the outer end of the plunger 122 of the solenoid 119. The spring 118 is in this instance, a flat member having one end secured as shown in Figure 4, to the block 112 and has the other end thereof engaged with a pin 123 provided in the plunger 122 at the rear of the pivot 121 for the link 120. The spring 118 is tensioned to normally urge the solenoid plunger 122 outwardly toward the contact arm 111. The link 120 has the outer end portion thereof provided with an aperture adapted to receive the contact arm 111 therethrough. The contact arm 111 is provided with a cam block 125 secured thereto in operative alignment with the plunger 122. This cam block 125 has the outer or rear face thereof formed with a stepped portion 125' adapted to be engaged by the rear wall of the aperture in the link 120, when said link and the plunger 122 are moved outwardly toward the contact arm 111 by the spring 118. The solenoid 119 may be se-

cured in any suitable manner to the adjacent portion of the base 2 in operative relation with the contact arm 111.

The operation of the relay switch mechanism 110 is as follows: The contact arm 111 is normally maintained in its outermost position in spaced relation to the terminal 116 by the action of the spring 118 upon the plunger 122 and link 120. When the contact arm is in the open position as illustrated in the Figure 4, the link 120 is in a slightly downwardly inclined position in engagement with the stepped portion 125' of the block 125 with the outer end thereof in the path of movement of a trip arm 126 secured to the drive link 17.

The relation of the trip arm 126 to the link 120 is such that as the link 17 is moved from the lowermost position to the uppermost position for producing an upward rocking movement of the rock arm 7, the trip arm will engage the outer end of the link 120, as said arm is moved upwardly in the path indicated by the dot and dash line X, Figure 4, and move said link beyond the stepped portion 125' of the block 125 and thereby release the contact arm 111 and permit said arm to move into engagement with the terminal 116 for closing the switch.

After the trip arm 126 has moved beyond the link 120 out of engagement therewith, said link will rest upon the upper end of the stepped portion 125' and when the switch is to be again opened the solenoid 119 is energized to effect the inward movement of the plunger 122 against the action of the spring 118. As the plunger 122 is thus moved inwardly or in a direction away from the contact arm 111, the link 120 will be drawn away from the contact arm until the inner wall of the aperture of the link passes beyond the upper end of the stepped portion 125' whereupon the link will freely swing downwardly about the pivot 121 until it comes into engagement with the lower end of the stepped portion 125'. Then as the solenoid 119 is de-energized, the spring 118 will move the plunger 122 and link 120 outwardly and thereby swing the contact arm 111 in a corresponding direction out of contact with the terminal 116.

In operation, the rock arm 7 is normally maintained in its uppermost position by a spring 130 secured at one end to the arm as by a lever 131 and at the other end to the base 2 as by a lever 132; see Figure 1. When the arm 7 is in its uppermost position the link 17 and crank arm 15 will be in their extended position in a straight line passing through the axis of the stud 18 and shaft 12 and thereby limit the upward movement of the arm 7. Furthermore when the arm 7 is in the uppermost position, the plunger 9 of the solenoid 8 will be maintained in its outermost position by the action of the pinion 11 upon the rack 10 as illustrated in Figure 1.

The transfer tape is threaded from the roll R beneath the guide roll 86 and between the switch control member 96 and plate 95, and thence over and around the guide plate 40 beneath the heating element 35 and then between the drive roll 44 and pressure roll 45 as indicated by broken lines in Figure 1. The tape is arranged with the side thereof upon which the emblem is placed, facing outwardly and the tape is arranged with one of the emblem portions thereof, as T', Figure 14 in predetermined registration with the lower face of the heating element 35 and the switch 90 is adjusted along the arm 7 to bring the portion 97' of the switch control member 96 into contact with the forward end portion of a transfer emblem so that the switch 90 will be maintained in the open position.

The switch 90 is electrically connected with the solenoid 119 by a circuit 138 which has incorporated therein the secondary coil of a transformer 139 which has the primary coil thereof connected with the main supply circuit 136 by a circuit 140 as shown in Figure 12. The motor 57 is supplied with current from the circuit 136 which has incorporated therein the relay switch 110 and also the brake solenoid 68 which is arranged in series with the relay switch. Current is supplied to the operating solenoid 8 by a circuit 142 connected with the circuit 136 and which has therein a manually controlled switch 143 by which the action of the solenoid may be governed.

Heat is supplied to the heating element 35 through a circuit as 135 connected with a main supply circuit 136 (see Figure 12) adapted to be connected with any suitable source of potential not shown. The temperature of the heating element 35 may be controlled by a rheostat switch 137 provided in the circuit 135.

Operation

Assuming now that the heating element 35 is at the proper temperature and that the arm 7 and elements associated therewith are in the normal inoperative position. When it is desired to operate the machine the operator first places an article such as a piece of hosiery to which the transfer is to be applied upon the platen 26. The operator then closes the switch 143 in any suitable manner as with the foot, to close the circuit 142 and supply electric current to the solenoid 8. As the solenoid 8 is thus energized the plunger 9 and rack 10 are drawn inwardly producing a corresponding rocking movement of the crank shaft 12. This movement of the crank shaft is preferably slightly less than 180° and sufficient to draw the arm 7 downwardly against the action of the retracting spring 130 and bring the heating element 35 into pressure engagement with the article on the platen 26 and the transfer tape therebetween. The switch 143 is maintained closed by the operator a few moments until the transfer ink has been melted by the heat produced in the heating element and the emblem on the transfer tape thus transferred to the article. As the solenoid 8 is de-energized by the opening of the circuit therefor, after the switch 143 is released the spring 130 will return the rock arm 7 and the heating element 35 together with the link 17 and plunger 9 to the normal starting position, thereby releasing the article receiving the transfer and permitting the same to be replaced by another article.

As the drive link 17 is drawn downwardly by the action of the energized solenoid 8 the trip arm 126 will spring past the switch link 120 without closing the contact points of the switch 110. However, upon the return or upward movement of the drive link 17 the trip arm operatively engages the switch link 120 and permits the switch to close as the arm 7 approaches its normal uppermost position in the manner hereinbefore described. The closing of the switch 110 immediately closes the circuit 136 for the motor 57 and causes the operation of said motor to actuate the drive roll 44 and at the same time releases the breaking action of the discs 60 and 61 by energizing the brake solenoid 68.

The operation of the drive roll 44 will, of course, draw the tape from the roll R to bring a fresh

transfer emblem or impression into cooperative registration with the heating element 35. This movement of the transfer tape effects the closing of the switch 90 as the transfer emblem T' in registration with the supporting plate 95 and switch control element 97' passes beyond these members.

The closing of the switch 90 completes the circuit 138 for the solenoid 119. As the solenoid 119 is energized the switch link 120 is again brought into operative relation with the contact arm 111 by the inward movement of the plunger 122. As the switch 90 is again opened by the engagement of the next succeeding transfer emblem with the control member 96 the solenoid 119 will be de-energized and the switch 110 will be opened by the action of the spring 118 upon the plunger 122 and link 120 thereby opening the circuit 136 for the motor 57 and the brake solenoid 68. The solenoid 68 thus being de-energized, permits the spring 65 to again effect the braking action of the discs 60 and 61 upon the drive shaft 52 thereby discontinuing the drive action of the roll 44 upon the transfer tape T at substantially the same time the switch 90 is opened by the engagement of a transfer emblem with the control member 96. This completes one cycle of the operation of the machine and it is obvious that these cycles may be repeated for successively applying transfer markings or emblems to articles of manufacture.

It will now be observed by referring more particularly to Figure 1 that the control switch 90 is positioned in close proximity to the heating element 15 so that a minimum length of the transfer tape extends therebetween. This has the advantage of maintaining a minimum amount of variation in length of the tape between the said control element and the heating element, and thus provides for substantially uniform registration of the transfer emblems with the heating element under extreme variations in the spacing of the transfer emblems which may be caused by the expansion or contraction of the transfer base tape as produced by variations in the moisture content of the surrounding atmosphere.

Furthermore, it will be understood that owing to the operation of the feed roll being controlled by the transfer emblem at a predetermined position thereof, any variation in the spacing of the emblems due to the expansion or contraction of the transfer tape, will effect but slightly the relation of each successive emblem and the heating element as they are brought into registration therewith. Also, what little variation there may thus be produced in said relation of the transfer emblems and heating element will be maintained substantially constant and will not accumulate by continued operation of the machine as would be the case if a predetermined length of the transfer base tape was fed during each intermittent feeding of the tape.

While a switch such as indicated at 143 in Figure 12 adapted to be fully manually controlled may be successfully used in connection with my transfer apparatus, it is preferable under certain working conditions to employ a time switch which after having been manually closed will remain closed a predetermined period of time and then will open automatically irrespective of whether or not the operating member for the switch is manually controlled after the initial movement thereof. I have, therefore, illustrated in Figure 13 a simple form of such a time switch which is particularly adapted to be used in connection with my novel transfer machine.

The structure shown in this figure comprises a housing 150 in which is secured a solenoid 151. The plunger 152 of the solenoid is provided with rack teeth 153 which are in meshing engagement with a pinion 154 mounted on a shaft 155. The shaft 155 extends in a horizontal plane transversally of the housing 150 and has the ends thereof journaled in the side of said frame in any suitable manner. A balance wheel 156 is secured to the shaft 155 at one side of the plunger 152 and is of such weight to materially retard the action of the plunger 152 when the solenoid 151 is energized or de-energized.

In the upper portion of the housing 150 is mounted a mercury switch 157 which is connected in series with the solenoid 151. This switch comprises a glass bulb 158 for containing the mercury and switch terminals. The glass bulb 158 is mounted in a cradle 159 composed preferably of rubber and which is pivotally connected intermediate its ends at 160 to a bracket 161 secured in any suitable manner to the housing 150. To one end of the cradle 157 is pivotally connected a hook member 163 which extends downwardly in an oblique angle in substantially parallel relation to a pedal shaft 164 of a pedal 165. The shaft 164 extends inwardly from one side of the housing 150 in an oblique plane and has the inner end thereof slideably mounted in a bearing 166. The shaft 164 has the lower end portion thereof reduced in diameter to form a shoulder 164' adapted to be engaged by the hook member 163.

A latch 168 is pivotally mounted upon a pin 169 which extends diametrically through an elongated slot 170 provided in the pedal shaft 164 and has the ends thereof secured in the side wall of the housing 150. The latch 168 is an L shaped member having one arm thereof extending laterally from the plane of the pedal shaft and adapted to engage a stop pin 171 for limiting the downward movement of said arm and for maintaining the other arm of the latch member in substantially parallel relation with the shaft 164.

The end of the cradle 157 opposite the hook 163 is substantially greater in weight than the end carrying said hook so that when the pedal shaft is maintained in its normal outermost position by a spring 174 mounted between the pedal head and the housing 150 the hook 163 will be maintained thereby in position to operatively engage the shoulder 164' on the pedal shaft. The lower end of the arm of the latch 168 extending in parallel relation with the shaft 164 is provided with a detent 168' normally positioned below the lateral projection 163' of the hook 163 and adapted to be moved by the action of the laterally disposed arm of the latch into engagement with said projection 163' for holding the hook and cradle 159 in the lowermost position when said hook is moved inwardly by the action of the pedal 165 for maintaining the cradle in the tilted position.

In operation the solenoid 151 is connected in one side of the circuit 142 in place of the switch 143 and when it is desired to close the switch the operator effects the inward movement of the shaft 164 by pressing upon the pedal head 165. The downward movement of the shaft 164 effects the tilting of the cradle 159 and the bulb 158 carried therein about the pivot 160 thereby causing the mercury to close the terminals contained within the bulb. As the pedal approaches its innermost position the latch 168 will engage the hook 163

and prevent said hook from returning to its normal uppermost position and thereby maintain the cradle and the bulb in the tilted position with the switch closed.

After the switch is closed by the tilting of the cradle the solenoid 151 becomes energized and draws the plunger 152 inwardly against the action of the balanced wheel 156 and a retracting spring 176 secured at one end to the housing 150 and at the other end to the plunger 152. As the plunger 152 is thus drawn inwardly by the solenoid a trigger 177 mounted on the plunger engages the lower end of the hook member 163 and rocks said hook member out of engagement with the latch 168, thereby releasing the hook and permitting the cradle 159 and bulb 158 to return to the normal uppermost position and thereby electrically disconnect the terminals contained in the bulb. As the terminals are thus disconnected the solenoid 151 is de-energized and the plunger 152 again returned to its normal outermost position by the action of the spring 176. The outward movement of the plunger is limited by an adjustable stop 178 which is secured to the housing 150 by a screw 179 which extends through an elongated slot provided in the stop. It will thus be seen that the position of the stop 178 determines the outward position of the plunger 152 and thereby determines the length of time it requires for the trigger 177 to be brought into operative engagement with the hook 163 after the solenoid 151 has been energized.

Although I have shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the exact construction shown as various changes in the form and the relation of the parts thereof may readily be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. In a device of the class described, manually controlled power operated pressure means for applying transfer emblems or impressions to an article of manufacture, and separate power operated means controlled by the transfer emblems or impressions and by the pressure means for successively feeding the transfer emblems or impressions into predetermined relation with the pressure means.

2. In a device of the class described, a platen, a heating element, operating means for producing relative movement of the platen and heating element toward and from each other, feeding means for intermittently moving transfer tape to bring emblems carried thereby into operative relation with the platen and heating element, and separate control means associated with the operating means and with said tape for governing the operation of the feeding means.

3. In a device for applying transfers to articles of manufacture, a support for articles, a carrier member mounted for movement toward and from said support, an element on the member adapted to bring transfer emblems into operative engagement with articles on said support, operating means for actuating said carrier member, feed means for successively bringing the transfer emblems into predetermined registration with the element, control means actuated at a predetermined position of the carrier member for starting the operation of said feed means, and separate control means actuated by a transfer emblem at a predetermined position thereof for effecting the stopping of the feed means.

4. In a device for applying transfers to articles of manufacture, a support for articles, a carrier member mounted for movement toward and from said support, an element on the member adapted to bring transfer emblems into operative engagement with articles on said support, operating means for actuating said carrier member, feed means for successively bringing the transfer emblems into predetermined registration with the element, control means actuated at a predetermined position of the carrier member for starting the operation of said feed means, and separate control means mounted on the carrier in close proximity to the element and actuated by a transfer emblem at a predetermined position thereof for effecting the stopping of the feed mechanism.

5. In a device for applying transfers to articles of manufacture, a base, a platen mounted on the base, a carrier member mounted on the base, a heating element mounted on the carrier member, operating means for moving the carrier member toward and from the platen to bring the heating element into and out of cooperative relation with articles on said platen, feed means mounted on the carrier member for successively bringing transfer emblems into predetermined registration with the heating element, means controlled by the operating means and during said movement of the carrier member for starting the operation of the feed means, and separate means including an element actuated by the emblem for stopping the operation of the feed means at a predetermined position of the transfer emblem.

6. In a device for applying transfers to articles of manufacture, the combination with transfer tape having transfer emblems arranged thereon in spaced relation, of a platen for the articles, a heating element, operating means for bringing the platen and heating element into and out of cooperative engagement with each other, means for intermittently feeding the tape to bring the transfer emblems thereon into successive registration with the heating element, control means engageable with the tape for governing the operation of the feed means, and guide means for maintaining the tape in spaced relation to the heating element when said element is out of cooperative engagement with the platen, said guide means having movement relative to the heating element to permit said tape to contact with the heating element when the latter is in operative engagement with the platen.

7. In a device for applying transfers to articles of manufacture, the combination with transfer tape having transfer emblems thereon, of a pair of co-acting pressure elements at least one of said elements being movable toward and from the other, operating means including a motor mounted on one of the pressure elements for intermittently moving the tape to bring the emblems into successive operative relation with said elements, and means cooperating with the tape for governing the operation of the operating means.

8. In a device for applying transfers to articles of manufacture, the combination with transfer tape having transfer emblems thereon, of a pair of co-acting pressure elements at least one of said elements being movable toward and from the other, operating means for inter-

mittently moving the tape to bring the emblems into successive operative relation with said elements, and means engaging the emblems on the tape and actuated by the thickness of the ink thereof for governing the operation of the operating means.

9. In a device for applying transfers to articles of manufacture, pressure means including a heating element, means for bringing the element into operative engagement with an article of manufacture including a movable supporting member for said element, and feeding means including co-acting pressure rollers mounted on the supporting member to move therewith in fixed predetermined relation with the heating element, and control means mounted independently of the heating element and governed by the operation of the second mentioned means for successively feeding transfer emblems into predetermined relation with the heating element when said element is in the inoperative position.

10. In a device of the class described, a platen, a heating element, operating means for producing relative movement of the platen and heating element toward each other, including power means, a circuit for the power means and a manually operated time switch in said circuit, means for supporting a roll of transfer tape, and means rendered effective by the operation of the time switch and controlled by the tape for automatically feeding said transfer tape from the roll into operative relation with the platen and heating element.

11. In a transfer machine of the class described, in combination, a work support, a pressure element, operating means for moving the pressure element toward the work support, and means for intermittently feeding the transfer tape comprising feed rolls co-acting to frictionally engage said tape therebetween, power means for rotating said rolls, control means governed by the operating means for automatically starting the operation of the power means, and separate control means governed by the transfer tape for automatically stopping the operation of the power means.

12. A transfer machine of the class described, in combination, a work support, a pressure element, a solenoid, an electric circuit therefor, switch means in said circuit for effecting the energizing and de-energizing of the solenoid, means actuated by the solenoid during the energizing thereof for moving the pressure element toward the work support, separate means connected with the pressure element for moving the same away from the work support when the solenoid is de-energized, means including an electric motor for intermittently feeding transfer tape, an electric circuit for said motor having a normally open switch therein, and means rendered effective by the operation of said power means for automatically closing said last mentioned switch.

13. A device as in claim 12 having separate control means rendered effective by the tape for automatically opening said last mentioned switch.

14. In a device for applying transfers to articles of manufacture, pressure means including a heating element, a movable supporting member for said element, operating means for actuating the member to bring the element into and out of operative engagement with an article of manufacture, tape feeding means including coacting pressure rolls and an electric motor therefor mounted on the supporting member to move therewith in fixed predetermined relation with the heating element, a circuit for said motor having a normally open switch therein, and means for automatically controlling the operation of the motor to intermittently feed the tape into operative relation with the heating element including control mechanism set into operation by said operating means for closing said switch.

15. A device as in claim 14 wherein said last mentioned means includes control members actuated by the tape at a predetermined position thereof for opening said switch.

16. A device as in claim 14 wherein said last mentioned means includes control members actuated at a predetermined position of the tape for opening said switch, and means including a brake mechanism associated with the motor and governed by the opening and closing of said switch for controlling the operation of the motor and rolls.

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