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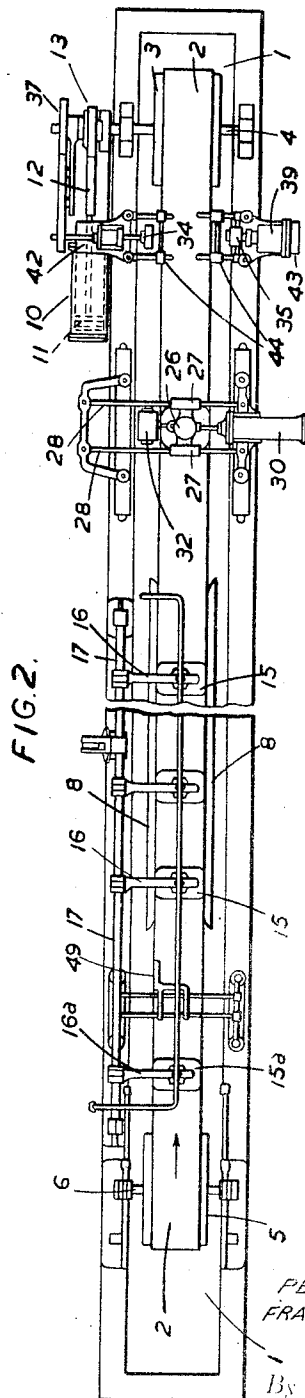
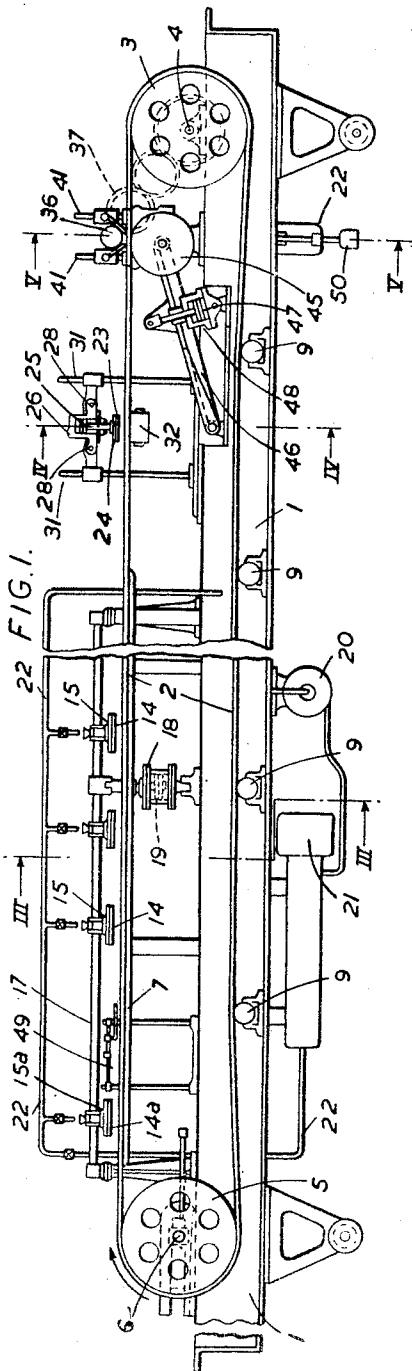
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2,546,360

APPLICATION OF TRANSFERS TO GLASS- CERAMIC- AND OTHER WARE

Filed Sept. 16, 1948

3 Sheets-Sheet 1



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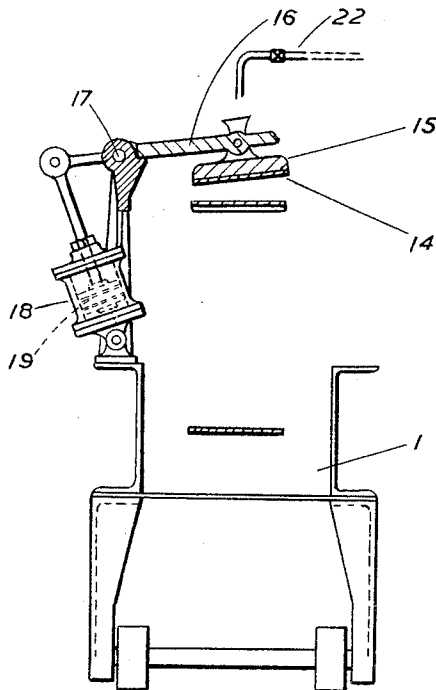
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3 Sheets-Sheet 2

FIG. 3.



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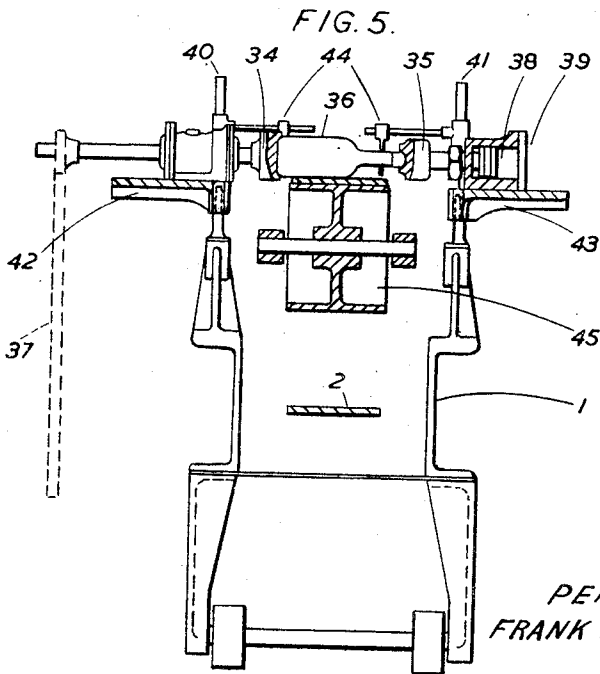
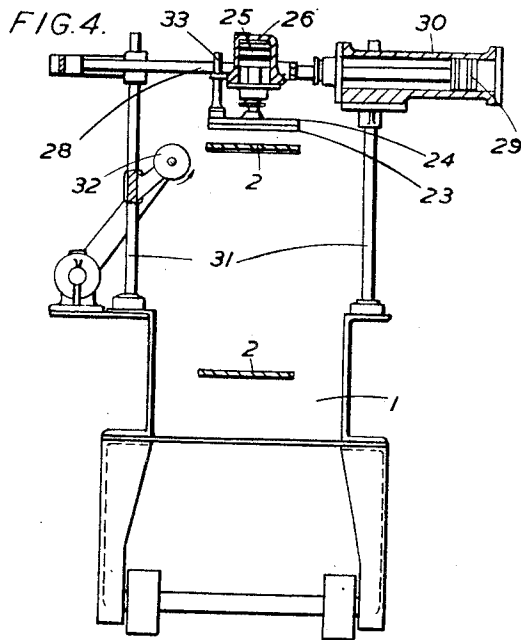
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UNITED STATES PATENT OFFICE

2,546,360

APPLICATION OF TRANSFERS TO GLASS-,
CERAMIC-, AND OTHER WARE

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19 Claims. (Cl. 41-1)

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A transfer for application to glassware, ceramic ware and other ware usually consists of a film of collodion or similar substance on one surface of which a decoration or design is printed and the other surface of which is adhesively bonded to an absorbent paper backing. The printed matter may be in the form of a trademark, the reproduction of a bottle label, the name of a supplier and so forth, which it is desired to transfer to the ware and to fuse subsequently into its surface.

A common mode of applying a transfer as aforesaid is to soak it in, preferably tepid or warm, water until the water penetrates the absorbent backing and so softens the adhesive that holds thereto the printed film, and then to separate by hand the printed film from the backing and attach it by the softened and remaining adhesive to the surface of the ware.

This mode of hand application is not only slow, thereby proportionately adding to the production costs of the finished ware, but manifests serious disadvantages among which may be mentioned, firstly that the transfer tends to curl which makes difficult removal of the absorbent backing, and secondly, the film when stripped of its backing is slippery and is so difficult to handle that by the time it has been "planted" on the ware, creases have more often than not been introduced, which must then be carefully and laboriously smoothed out by hand.

The present invention provides a method of and an apparatus for mechanically applying initially backed transfers which is speedier and more efficient than the common mode of hand application and which eliminates its disadvantages.

Briefly the method of the invention comprises successively conveying the transfers first to a backing removing station and then past this station to a ware supporting station, wetting the transfers in their travel to the first mentioned station, automatically stripping off the wetted backings at that station, and automatically transferring the backing-stripped transfers or films to the ware at the second mentioned station.

Apparatus in accordance with the invention essentially comprises a substantially horizontal endless conveyor on the upper run of which the transfers are placed at intervals with the backings uppermost, a device for wetting the backings while the transfers are being conveyed, means in rear of said device for stripping or wiping off the wetted transfer backings, ware-supporting means situated near the rear end of the conveyor run, and mechanism for operating the conveyor and the recited means in correctly timed relationship to effect the required stripping and the application of the transfers to the ware.

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By way of non-limitative example one embodiment of such an apparatus, for use in applying transfers to bottles and similar containers, is illustrated diagrammatically on the accompanying drawings and will now be described.

Fig. 1 of the drawings represents this embodiment in longitudinal section;

Fig. 2 is a plan corresponding to Fig. 1;

Fig. 3 represents a cross section on the line III-III of Fig. 1 and shows one of the transfer wetting or damping devices;

Fig. 4 represents a cross section on the line IV-IV of Fig. 1, i. e. at the backing stripping station; and

Fig. 5 represents a cross section on the line V-V of Fig. 1, i. e. at the ware supporting station.

The frame of the illustrated apparatus is in the form of a water trough 1 above which an endless conveyor belt 2 is mounted on a driver pulley 3 secured to a shaft 4 suitably journaled near one end of the frame and on an idler pulley 5 secured to a shaft 6 suitably journaled near the other end. A platform 7 (Fig. 1) and side guides 8 (Fig. 2) support and guide the upper belt run, and a series of rollers 9 positioned in the trough or frame support the lower belt run. Preferably the conveyor belt is driven intermittently or stepwise, always in the direction indicated by the arrow in Fig. 1, by compressed air or other pressure fluid through a double-acting main driving cylinder 10 (Fig. 2) the piston 11 of which is connected to a rack 12 co-acting with a pinion 13 on the driver pulley shaft 4 and containing a ratchet drive (not shown). Owing to the ratchet drive each return stroke of the piston 11 is an idle stroke during which the conveyor belt remains stationary.

A series of longitudinally spaced devices for wetting or damping the backings of the transfers are shown mounted above the upper run of the conveyor belt 2, their spacing being equal to the length of travel of the belt at each of its intermittent movements. Each of these devices (see especially Fig. 3) comprises a pad 14, of felt or sponge rubber or any appropriate absorbent material, secured to a holder 15 which is pivotally suspended from a toggle arm 16. The arms 16 of all the said devices are secured to a single rocker shaft 17 which is operable to lower and raise the pad holders 15 by means of a pivoted pressure fluid cylinder 18 the piston 19 of which is connected with the rocker shaft. If desired, an additional device, similar in all respects to those just described, may be provided at the forward end of the upper run of the conveyor belt for the purpose of damping the surface of the belt to ensure greater adhesion of the transfers to the belt. Such an additional

device is shown in Figs. 1 and 2 and is designated 14a, 15a, 16a.

Water from the trough 1 flows into a pump 20 (Fig. 1) and is circulated through a thermostatic electric heater 21 and pipe line 22 back to the trough. Heated water is supplied from line 22 by drip feed (Fig. 3) to the pads 14, 14a of the wetting devices. Alternatively, the water could be supplied to the pads through flexible tubing and, if necessary, the pads could be maintained at a uniform temperature by water-jacketting the pad holders 15, 15a and causing the heated water to circulate through the jackets in its passage from the pump 20 and heater 21 back to the trough 1.

The illustrated device for stripping the backings successively from the transfer whilst these are on the conveyor belt comprises (Figs. 1, 2 and 4) a wiper pad 23 secured to a holder 24 having a piston 25 slidable in a pressure fluid cylinder 26 so that the pad can be depressed to engage the backings and also raised clear. The cylinder 26 is mounted, by tubular guides 27 on cross guide rods 28 and is adapted to be displaced transversely to and fro by reason of its connection with a piston 29 slidable in a pressure fluid cylinder 30. The whole wiper unit just described is carried on supporting columns 31 and is capable of three dimensional adjustment as follows: longitudinally by sliding the supporting columns along the frame of the apparatus, vertically by sliding the cylinder 30 together with the guide rods 28 and cylinder 26 up or down the supporting columns, and transversely by sliding the cylinder 26 along the guide rods 28, the parts after adjustment being locked in the required position.

At each active stroke of the piston 29, to displace the wiper 23, 24 to the left in Fig. 4 and effected during the pauses or dwell of the intermittently moving conveyor belt 2, the said wiper is depressed by the piston 25 being slid downwards in its cylinder 26, so that it contacts the wetted backing of the transfer brought to rest beneath it and wipes or strips the said backing from the transfer. A rotary brush 32, suitably mounted and driven as appears from Fig. 4, engages the backing adhering to the underside of the wiper pad 23 at the end of the wiper's active stroke and throws it laterally clear of the apparatus by centrifugal force, preferably into a waste bin (not shown). At each return stroke of the piston 29, and therefore of the wiper 23, 24 the said wiper is lifted by the piston 25. Guide rods 33 maintain alignment of the wiper during its vertical movements.

The ware-supporting means, which is situated near the rear end of the upper run of the conveyor belt 2 comprises, in the illustrated embodiment (Figs. 1, 2 and 5) a driving chuck 34 and a co-acting idler chuck 35 between which the bottles (36) to which transfers are to be applied are successively gripped. The driving chuck 34 is geared to a main driving spindle through gearing 37 selected so as to rotate each bottle at a speed such that its surface speed slightly exceeds the speed of the belt, for the purpose of stretching a transfer during application and eliminating creases. Alternatively the bottle may be rotated by friction with the conveyor belt 2 with elimination of the gearing 37. The idler chuck 35 is axially displaceable to grip and to release the bottles by the action of a piston 38 in a pressure fluid cylinder 39. Both of the chucks 34, 35 are adjustable horizontally to take

bottles of various lengths and vertically to take bottles of various diameters, the chuck 34 together with its bearing and the chuck 35 together with its operating cylinder being slidable horizontally along the brackets 42 and 43 respectively, and the brackets 42, 43 being slidable vertically on the supporting columns 40, 41 respectively. 44 denote locating forks which hold a bottle in position prior to it being gripped between the chucks. The chuck faces are in the form of interchangeable adaptors designed to fit the bottoms and the necks of the bottles.

A roller 45 carried by a pivoted arm 46 (Fig. 1) which is actuated by a piston 47 in a pressure fluid cylinder 48, is adapted to press the upper run of the conveyor belt 2 into contact with a bottle gripped between the chucks 34, 35 at appropriate times.

At each pause or dwell of the intermittently moved belt 2 a transfer is fed on to the upper run of the belt through a positioning frame 49 (Figs. 1 and 2) by one operator. A second operator places a bottle in the locating forks 44 of the bottle supporting means which forks hold the bottle in position prior to being gripped by the chucks 34, 35. This second operator then depresses a foot pedal 50 which admits pressure fluid to the various operating cylinders through a control valve (not shown). By an arrangement of cushion valves (also not shown) the piston 47 in the cylinder 48 for effecting upward pressure displacement of the conveyor belt 2 is made to lag behind the piston 38 in the cylinder 39 of the displaceable bottle chuck 35 so that the bottle 36 is securely held between the chucks 34, 35 before pressure is applied to the conveyor belt by the before-mentioned roller 45. On depression of the foot pedal 50, therefore, the bottle 36 is gripped in the chucks 34, 35, the conveyor belt 2 is pressed firmly upwards against the bottle and simultaneously the conveyor belt moves forward sufficiently for a transfer conveyed from the backing stripping station to be completely lapped on to and attached to the bottle. The piston 29 in the cylinder 30 operating the stripping means is also actuated by the depression of the pedal but on its idle stroke which re-sets the wiping device ready for its next operation. The release of the foot pedal 50 actuates all pistons in the reverse direction through the said control valve causing the pressing roller 45 to be withdrawn, the bottle to be released from the chucks 34, 35 and the main driving piston 11 to travel on its idle stroke ready for the next operation. At the same time, while the conveyor belt is at rest the wiper 23, 24 is drawn across a wetted transfer at an earlier stage thus removing the paper backing prior to its later application to the bottle.

From this it will be understood that at each operation the conveyor belt is moved a step equal to the distance between the centers of the wetting pads, and that each transfer as it reaches the stripping means and while the conveyor belt is stationary is wiped across its previously wetted backing which is thereby removed in preparation for the application of the transfer to the bottle at a subsequent operative step.

During their passage along the initial part of the length of the conveyor belt, the transfers are prevented from curling by the repeated damping actions of the series of pads 14 which also thoroughly soak the backings during the passage of the transfers between the loading frame 49 and the stripping means by which time the transfers

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have lost all tendency to curl, and lie quite flatly upon the conveyor belt. The transfers have no tendency to adhere to the pads 14 because the adhesion of the collodion with the smooth, wetted surface of the conveyor belt is greater than the adhesion which can develop between the pads and the porous paper backing of the transfers. The transfers, therefore, continue their journey to the stripping means with their collodion face firmly held by adhesion to the conveyor belt, and the paper backing floating on a film of partially dissolved adhesive which previously attached it to the collodion.

While each transfer is stationary beneath the stripping means the paper backing is removed by a wiping action in the manner already described. The wiper pad 23 can be assisted in its action by the application of a vacuum sucker to its tip, or by the use of tacky substances, and any tendency for the paper backing to adhere permanently to the wiper pad can be corrected by the application of a jet of compressed air as an alternative to the revolving brush 32 arranged to remove the paper strips.

After removal of the paper backing the transfer with its gummy side upwards continues along the conveyor belt to the point where it is to be transferred in the manner described to the supported bottle. As the transfer approaches the bottle the conveyor belt is thrust upwards, thus causing the transfer to make contact with the bottle as it travels with the conveyor belt. The gummed surface of the transfer having greater adhesion than the reverse side causes the transfer to leave the conveyor belt and wind itself around the bottle.

After the application of the transfer the conveyor belt is withdrawn from contact with the bottle, and the bottle released from the supporting means. A further bottle is then inserted before the arrival of the next transfer.

Although one embodiment has been described the invention is not to be taken as limited thereto since various changes may be made as will be readily apparent to those skilled in the design of machinery.

We claim:

1. Apparatus for applying initially backed transfers including a supporting sheet forming a backing and a detachable transfer carried thereby to ware, comprising, in combination, a substantially horizontal endless conveyor on the upper run of which the transfers are placed at intervals with the supporting sheets uppermost; a backing wetting device for the supporting sheets disposed above the conveyor and in spaced relation along its length a stripping means for said supporting sheets, means for operating said stripping means in a direction transverse to the direction of movement of said conveyor, a ware supporting means; and means for revolving ware on said supporting means in a position adjacent said stripping means, and means for pressing the upper run of said conveyor carrying the detached transfer, upwardly against said ware for applying the detached transfer to the ware.

2. Apparatus as set forth in claim 1, in which the backing wetting device comprises a series of holders mounted for movements towards and away from the surface of the upper run of the conveyor, a series of wetting pads carried by the holders, and mechanism for periodically effecting the said movements of the holders.

3. Apparatus as set forth in claim 1, in which the backing wetting device comprises a series of

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holders mounted for movements towards and away from the surface of the upper run of the conveyor, a series of wetting pads carried by the holders, mechanism for periodically effecting the said movements of the holders, a rocker shaft extending longitudinally of said conveyor, toggle arms on the rocker shaft supporting the holders, a pressure fluid cylinder, and a piston in the cylinder connected to the rocker shaft for operating said toggle arms.

4. Apparatus as set forth in claim 1, in which the stripping means comprises a wiper pad, a holder for the pad mounted above the conveyor for both up and down and transverse movements, and mechanism for periodically effecting such movements.

5. Apparatus as set forth in claim 1, in which the stripping means comprises a wiper pad, a holder for the pad mounted above the conveyor for both up and down and transverse movements, mechanism for periodically effecting such movements, said mechanism comprising a transversely movable pressure fluid cylinder with a vertically displaceable piston therein supporting the wiper pad holder, and a horizontal pressure fluid cylinder with a transversely displaceable piston therein connected to the first mentioned cylinder.

6. Apparatus as set forth in claim 1, in which the stripping means comprises a wiper pad, a holder for the pad mounted above the conveyor for both up and down and transverse movements, mechanism for periodically effecting such movements, and a rotary brush for removing the stripped backings from the wiper pad during its transverse movement.

7. Apparatus as set forth in claim 1, in which the ware supporting means comprises a pair of co-acting and relatively displaceable rotatable chucks, and mechanism for driving at least one of the chucks.

8. Apparatus as set forth in claim 1, in which the ware supporting means comprises a pair of co-acting and relatively displaceable rotatable chucks, mechanism for driving at least one of the chucks, a pressure fluid cylinder, and a piston operating in said cylinder connected to one of the chucks for effecting relative adjustment of the chucks.

9. Apparatus as set forth in claim 1 in which the ware supporting means comprises a pair of co-acting and relatively displaceable rotatable chucks, mechanism for driving at least one of the chucks, and means supporting the chucks for adjustment both vertically and longitudinally of the conveyor.

10. Apparatus as set forth in claim 1 in which the ware supporting means comprises a pair of co-acting and relatively displaceable rotatable chucks, mechanism for driving at least one of the chucks, and locating forks for the ware associated with the chucks.

11. Apparatus as set forth in claim 1, including means for periodically raising the upper conveyor run in the vicinity of and towards the ware supporting means.

12. Apparatus as set forth in claim 1, including means for periodically raising the upper conveyor run in the vicinity of and towards the ware supporting means, the said means comprising a pivoted arm, a roller mounted at one end of said arm, and mechanism for turning said arm to cause the roller to engage and raise the upper conveyor run.

13. Apparatus as set forth in claim 1, including means for periodically raising the upper con-

veyor run in the vicinity of and towards the ware supporting means, the said means comprising a pivoted arm, a roller mounted at one end of said arm, mechanism for turning said arm to cause the roller to engage and raise the upper conveyor run, the said mechanism comprising a pressure fluid cylinder, and a piston operating in said cylinder and connected to the pivoted arm.

14. The method of successively applying to articles of ware, separate, initially-backed transfers, each of which includes a transfer proper and an absorbent backing sheet, which method comprises the steps, in combination, of conveying the backed transfers in a substantially horizontal linear path with the backing sheets uppermost, wetting the backing sheets in the course of their travel, removing the wetted backing sheets while continuing to advance the transfers proper progressively in the same linear path, revolving each article of ware in the linear path of movement of the transfers proper, and squeezing successive transfers proper onto the receiving surfaces of said articles of ware.

15. The method of successively applying to articles of ware, separate, initially-backed transfers, each of which includes a transfer proper and an absorbent backing sheet, which method comprises the steps, in combination, of intermittently advancing the backed transfers in a substantially horizontal linear path with the backing sheets uppermost, successively wetting the backing sheets in the course of their travel, removing the backing sheets while continuing to intermittently advance the transfers proper progressively in the same linear path, revolving each article of ware in the linear path of movement of the transfers proper, successively raising the transfers proper bodily into contact with the receiving surface of the article of ware, and pressing the transfers proper onto the receiving surfaces of the articles of ware.

16. The method of successively applying to articles of ware, separate, initially-backed transfers, each of which includes a transfer proper and an absorbent backing sheet, which method comprises the steps, in combination, of conveying the backed transfers in a substantially horizontal linear path with the backing sheets uppermost, wetting the backing sheets in the course of their travel, removing the wetted backing sheets while continuing to advance the transfers proper progressively in the same linear path, revolving each article of ware in the linear path of movement of the transfers proper at a speed exceeding the rate of advance of the transfers proper for stretching the transfers proper as the transfers proper establish contacting relation with the receiving surfaces of the articles of ware for eliminating creases in the transfers proper as the transfers proper are applied to the receiving surfaces, and squeezing successive transfers proper onto the receiving surfaces of said articles of ware.

17. The method of successively applying to articles of ware, separate, initially-backed transfers, each of which includes a transfer proper and an absorbent backing sheet, which method comprises the steps, in combination, of conveying the backed transfers in a substantially horizontal linear path with the backing sheets uppermost, wetting the backing sheets in the course of their travel, removing the wetted backing sheets while continuing to advance the transfers proper progressively

in the same linear path, revolving each article of ware in the linear path of movement of the transfers proper in a direction normal to the direction in which the backed transfers are linearly moved, and squeezing successive transfers proper onto the receiving surfaces of said articles to ware.

18. The method of successively applying to articles of ware, separate, initially-backed transfers, each of which includes a transfer proper and an absorbent backing sheet, which method comprises the steps, in combination, of conveying the backed transfers in a substantially horizontally linear path with the backing sheets uppermost, wetting the backing sheets in the course of their travel, brushing the wetted sheets from the transfers proper in a direction transverse to the linear direction in which the backed transfers are being conveyed while continuing to advance the transfers proper progressively in the same linear path, revolving each article of ware in the linear path of movement of the transfers proper, and squeezing successive transfers proper onto the moving receiving surfaces of the articles of ware.

19. Apparatus for applying initially-backed transfers, each of which includes a transfer proper and an absorbent backing sheet to articles of ware, comprising in combination, a substantially horizontally disposed linearly extending endless conveyor on the upper run of which the transfers are positioned at spaced intervals with the absorbent backing sheets uppermost, a multiplicity of spacially positioned wetting devices for the absorbent backing sheets located above said conveyor, means for individually lowering said wetting devices into contacting relation with the absorbent backing sheets, means for intermittently advancing said conveyor beneath said wetting devices, a stripping means for displacing said absorbent backing sheets with respect to said transfers proper, means for advancing said conveyor step-by-step for successively presenting said absorbent backing sheets under said spacially disposed wetting devices and under said stripping means, means for operating said stripping means for removing said absorbent backing sheets from the transfers proper in a direction transverse to the direction of movement of said conveyor, said conveyor operating to support the detached transfers proper for advancement in the linear path of said conveyor, a supporting means for articles of ware, and means for revolving articles of ware in said ware supporting means in a position for receiving the transfers proper from the last mentioned position thereof on said conveyor detached from said absorbent backing sheets.

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