Oct. 7, 1941. A. WINKLER ET AL 2,257,829

METHOD AND APPARATUS FOR FORMING WINDOWS IN BLANKS FOR ENVELOPES AND OTHER ARTICLES

Filed Dec. 7, 1937 3 Sheets-Sheet 1

Fig. 1

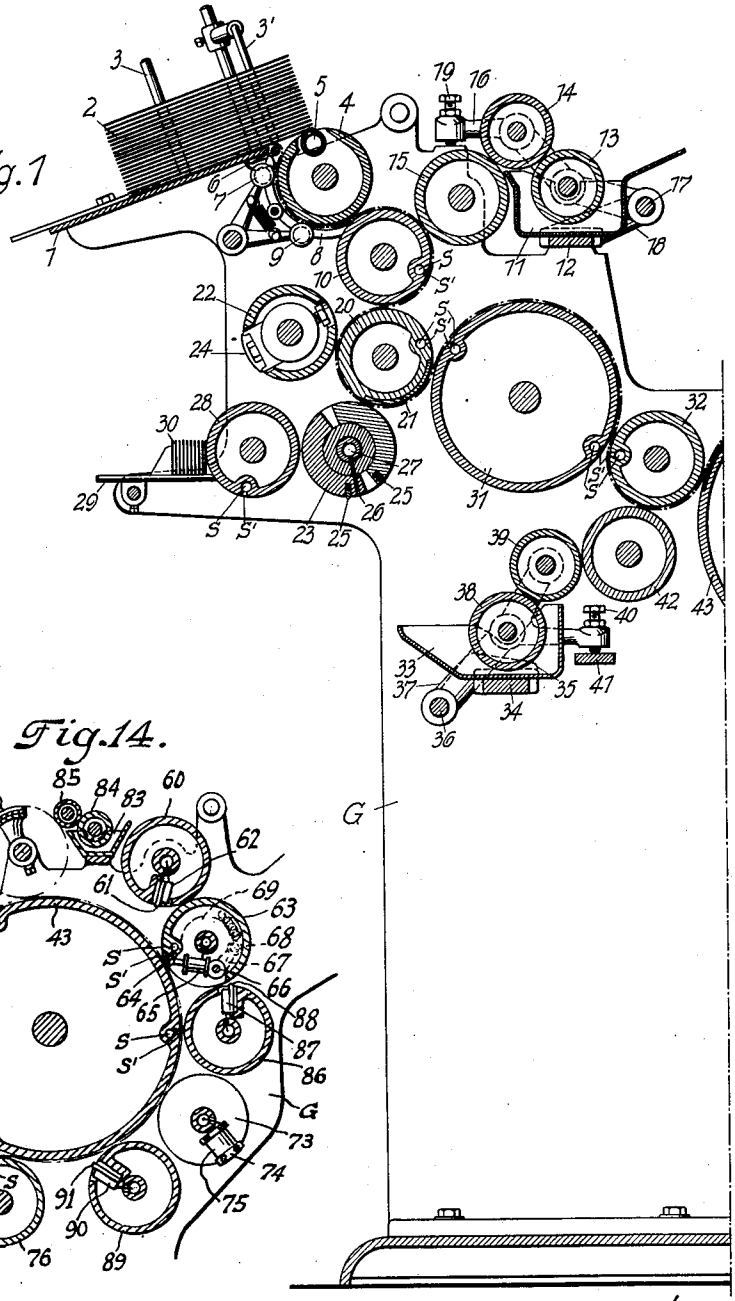


Fig. 14.

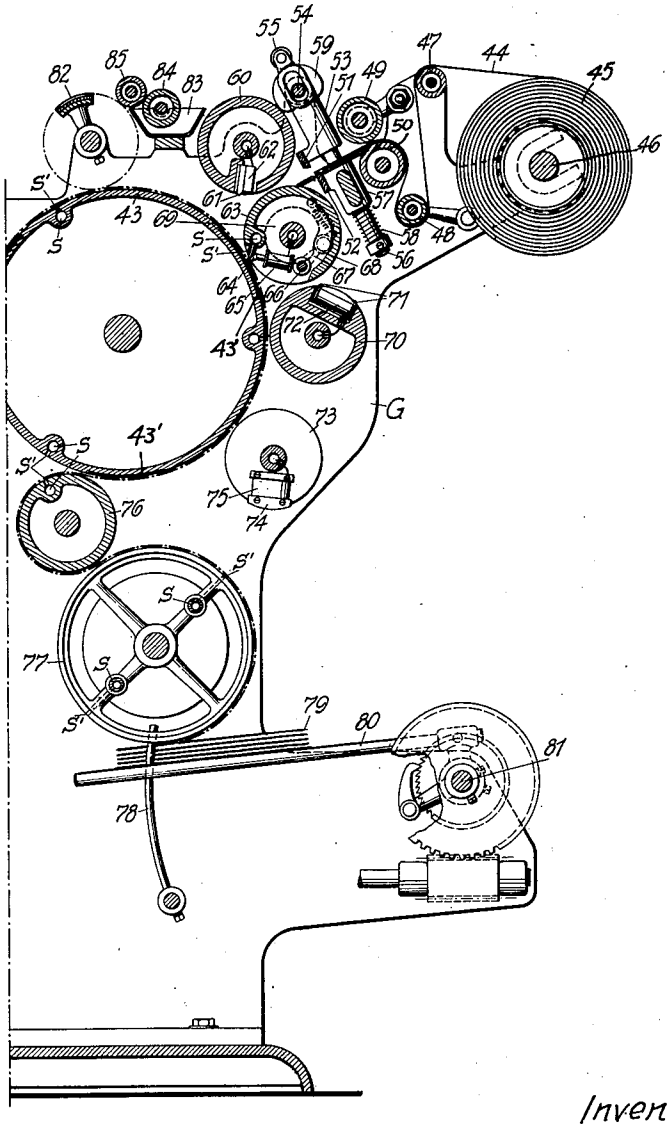
Inventors.
Alfred Winkler
Max Dünnebier.
per Wm. Wallace Watts
Attorney.

Oct. 7, 1941. A. WINKLER ET AL 2,257,829

METHOD AND APPARATUS FOR FORMING WINDOWS IN BLANKS FOR ENVELOPES AND OTHER ARTICLES

Filed Dec. 7, 1937 3 Sheets-Sheet 2

Fig. 2



Inventors.
Alfred Winkler.
Max Dünnebier.
per Wallace White.
Attorney.

Oct. 7, 1941. A. WINKLER ET AL 2,257,829

METHOD AND APPARATUS FOR FORMING WINDOWS IN BLANKS FOR ENVELOPES AND OTHER ARTICLES

Filed Dec. 7, 1937 3 Sheets-Sheet 3

Fig. 3

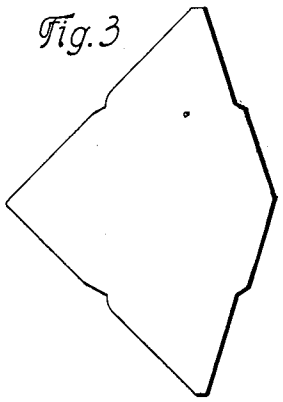


Fig. 4

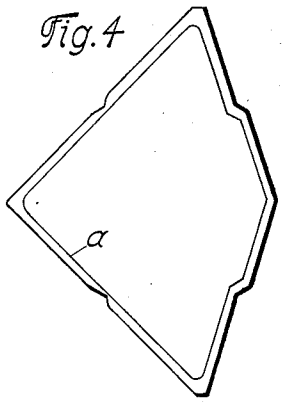


Fig. 5

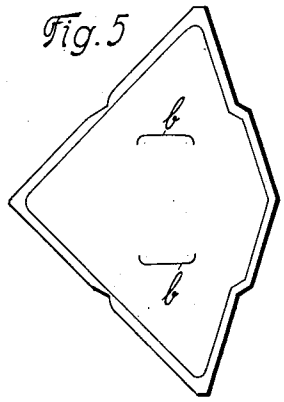


Fig. 6

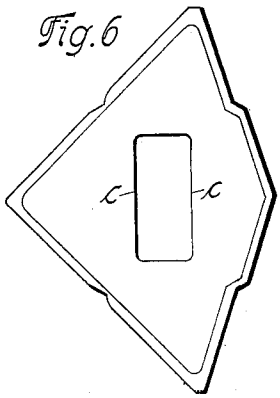


Fig. 7

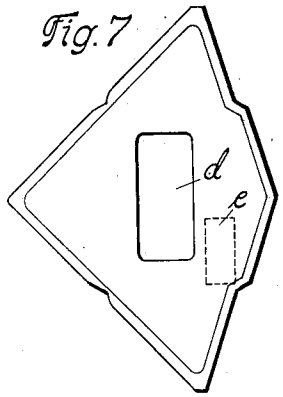


Fig. 8

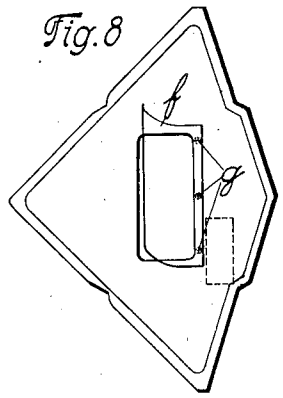


Fig. 9

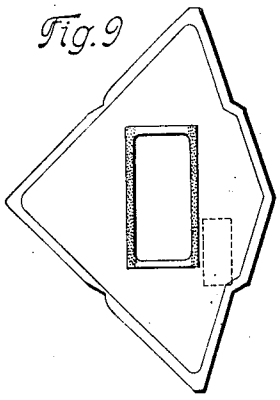


Fig. 10

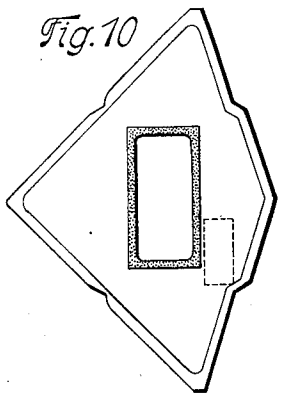


Fig. 11

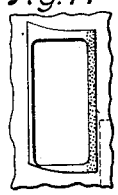


Fig. 12

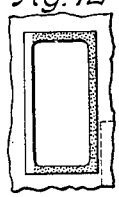
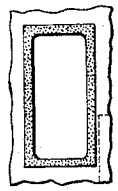


Fig. 13



Inventors.
Alfred Winkler
Max Dünnebier.
per Wallace White
Attorney

Patented Oct. 7, 1941 2,257,829

UNITED STATES PATENT OFFICE

2,257,829

METHOD AND APPARATUS FOR FORMING WINDOWS IN BLANKS FOR ENVELOPES AND OTHER ARTICLES

Alfred Winkler and Max Dünnebier, Neuwied, Germany

Application December 7, 1937, Serial No. 178,494
In Germany April 21, 1937

14 Claims. (Cl. 93—61)

This invention relates to a method and apparatus for forming windows in blanks intended for making envelopes, bags and similar articles, of the type in which a window of transparent material is applied to a window opening in the blank. The apparatus may comprise a unitary mechanism for receiving the blanks, cutting the window openings, applying the transparent patch or panel, and delivering the finished blank; or may be combined with means for printing upon one or both sides of the blank; or may be embodied in or combined with a machine for the manufacture of the envelopes, bags or other articles.

The improved apparatus is adapted for the application of transparent material that can be welded or attached to the blank by the application of heat, and either with or without the initial application of dry heat-sensitive adhesive, and also for the application of transparent material requiring the use of liquid paste for its attachment to the blanks.

It has been heretofore proposed to apply ordinary transparent paper to the window openings of such blanks, by pasting around the edges of the openings, and it has also been proposed to employ certain cellulose films as transparent patches or panels and to attach this material after a preparatory treatment with a dry adhesive, and to cause the dry edges to be "welded" to the blanks by the application of heat in a pair of flat surfaces adapted to be closed one upon the other while the blank is held stationary by suction means. This method of application comprising the use of a stamp or die is, of course, entirely unsuitable for high speed operation, and for large production, as the operation is necessarily slow and requires that each blank and transparent patch or panel be first brought to rest and then held in position during the "welding" operation.

One object of the present invention is to provide an improved method and apparatus having means for conveying the blanks and means for welding the patches to the blanks while being so conveyed. A further object is to provide rotary means for conveying the transparent material to the moving blanks. A still further object is to provide heated means for separating the transparent patches from a continuous strip, and a still further object is to provide means for continuously feeding the successive blanks and for feeding the transparent material and for welding or pasting the separated patches to the edges of openings in the blanks.

With these and other objects in view, the invention consists in the novel method and construction hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the appended claims, it being understood that various changes in the method and in the form and construction and in minor details may be made without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings, Figs. 1 and 2—arranged side by side according to the dot-and-dash lines—show a vertical, longitudinal section of one form of the apparatus.

Figs. 3 to 10 inclusive show an envelope blank at different successive steps in the process carried out by the apparatus shown at Figs. 1 and 2.

Figs. 11 to 13 inclusive show three successive steps in the welding of a window patch according to a modified form of the apparatus; and Fig. 14 is a detail view showing such modified form of apparatus.

Referring to Figs. 1 and 2 of the drawings, the apparatus illustrated thereby receives the blanks already shaped, and comprises means for printing upon both sides of the blanks, means for cutting the window opening, means for attaching the transparent patch, and means for stacking the cut-out portions of the blanks and for stacking the finished blanks.

Referring particularly to Fig. 1, the blank stack 2 is supported upon a table 1 and is retained in proper position by adjustable stops 3 and 3'. In the stack 2 the blanks correspond to Fig. 3. The hollow receiving roller 4 operates in the manner fully described in Patent No. 1,939,193, having a small rotating internal suction roller 5 which seizes the lowermost blank of the stack by its front point or edge and bends its front part downwardly over the freely rotating roller 6 arranged at the highest edge of the stack table 1, so that the front point or edge of the blank is introduced between the said roller 4 and a spring-pressed counter-roller 7. Between the two rollers 4 and 7 the blank is now positively seized and is pulled from beneath the rest of the stack. By the round guides 8 the blank is conducted between the roller 4 and a second counter-roller 9 also pressed against it by spring action. The further course of the blank, described in detail hereinafter, through the entire apparatus is indicated by means of dot-and-dash lines.

Passing from the rollers 4 and 9, the blank is first seized by the roller 10 which, for that purpose, as is the case with a number of the other

rollers and cylinders, is equipped with a suction channel *s* and with suction openings *s'* leading from such channel to the roller circumference. All these rollers and cylinders which are provided with suction means are connected each to a suction air control device, not shown in the drawings, by which the suction air is controlled in proper timed relation to the operation of the apparatus. The roller 10 forms the printing cylinder of a printing mechanism by means of which an inner imprint can be applied to the blank if so desired. Such inner imprint is indicated for example at Figs. 4 to 10 by the inner line *a* which runs substantially parallel to the outer contour line of the blank and is intended to indicate the marginal outline of this imprint. In the example shown the printing mechanism consists of a color trough 11 attached to a cross rail 12 extending between the two side frames G of the apparatus, a color dipper roll 13, a color applying roll 14, and a plate cylinder 15. The dipper and the applying rolls 13, 14 are jointly supported by a lever pair 16 which swings about an axle 17. Arms 18 secured on the cross rail 12 serve as a support for the axle 17, and the free ends of the two bearing levers 16 each rests with a stop screw 19 on one of the side frames G.

The printing cylinder 10 conveys the blank from the plate cylinder 15 to a roller 20 which holds the blank by suction and is equipped with a hardened steel insert 21. The blank passes between the roller 20 and two rollers 22 and 23, the former of which is equipped in the known manner with two knives 24 for cutting out the two short window edges *b* (Fig. 5) running in the direction of travel of the blanks, and including the corner roundings adjoining their ends, while the second roller 23 carries two knives 25 for cutting out the two long window edges *c* (Fig. 6) lying crosswise of the direction of travel of the blanks. When the blank leaves the two rollers 20 and 23, therefore, the window opening *d* is completely cut out according to Fig. 7. The cut-out waste piece is held fast by suction upon the roller 23 through the medium of suction openings 26 located in the roller circumference between the two knives 25, and communicating with a suction channel 27 in the shaft. Each waste piece is taken over by the roller 28 which seizes it with its suction openings *s'* and adds it to a stack 30 resting on cross beams 29.

The blank with the window cut-out or opening therein is passed on by the roller 20 to a cylinder 31 having a diameter twice as great as that of the said operating and conveying rollers, so that it takes over and transmits two blanks for each revolution. Accordingly the cylinder 31 is provided at two points in its circumference—diametrically opposed to each other—with suction openings *s'* and suction channels *s* communicating therewith. By this cylinder 31 the blank is conveyed from the roller 20 and is passed on to a printing cylinder 32 of small diameter making one revolution for each blank. The printing cylinder 32 belongs to a printing mechanism which serves for producing a firm name or other outer imprint upon the blanks. Such outer imprint is indicated in Figs. 7 to 10 by the rectangle *e* shown by dotted lines. This printing mechanism in the example shown comprises a color trough 33 mounted upon a cross rail 34 carried by the side frames G. To the said cross rail two arms 35 are secured for the support of an axle 36 upon which swings a lever pair 37 whereby a color dipper roll 38 and a color applying roll 39 are supported. The two levers 37 each have an arm which at its free end carries a stop screw 40 which is braced upon a cross rail 41 fastened between the two side frames G. The roller 42 forms the plate cylinder of this printing mechanism for the outer imprint.

The blank passes between the printing cylinder 32 and the plate cylinder 42 and is seized by a large cylinder 43 which conveys three blanks to one revolution and is provided accordingly at three uniformly distributed points of its circumference with suction openings *s'* and corresponding suction channels *s*.

The cylinder 43—see Fig. 2—conveys the blank to that part of the apparatus which serves for fastening the window patch to the window opening of the blank. The mode of operating of this part of the apparatus and the application of the individual elements embodied therein depends on the transparent material which is used for the window patches to be fastened to the blanks. This transparent material in the example shown is in each case taken from a strip 44 which is wound in a roll 45. This roll is carried by a shaft 46 rotating in open bearings in the side frames G. The strip 44 unrolling from the roll 45 passes over guide rollers 47 and 48 and between a roller pair 49 and 50 actuated in such a way that the strip unrolls intermittently to provide a patch for each blank.

When the material employed is of such a nature that it must be cut, the rollers 49, 50 are so operated that the free end of the strip 44, that is to say, the place at which a window patch was previously detached, is conveyed each time in advance of the cutting edges of the two cooperating shear blades 51 and 52 to the extent of the strip piece required for one window patch. By these blades a window patch is then separated from the strip of material. The ends of the upper sheer blade 51 are fastened to two parts 53 guided on a shaft 54 extending between the side frames G and passing through slots in said parts 53. Extending downwardly from each part 53 is a bolt member 56 and at its lower end each bolt 56 is guided in a part 57 and is pressed downwardly by a spring 58. In this manner the springs 58 effect the downward movement of the upper shear blade 51. Its upward movement is effected by two cams 59 fastened to the shaft 54 and engaged by rollers 55 mounted on the parts 53. The lower sheer blade 52 is attached by its two ends to the parts 57.

When the material employed for the transparent patches is such that heat may be used for melting off the individual pieces from the strip 44, the roller 60 is used for this melting off and the shears 51, 52 are put out of commission. The roller 60 is equipped for this purpose with a rail 61 extending in its longitudinal direction. This rail is built into the roller and projects beyond the roller circumference only with a sharp knife-like edge. It is electrically heated by means of a suitable device 62 to a degree of heat necessary for melting off the patch. The free end of the strip 44 in this case is led by the roller pair 49, 50, by the length required each time for one window patch through the narrow split between the two rollers 60 and 63 arranged in close but not contacting relation. The rail 61 of the roller 60 in passing the roller 63, however, bears so close against its circumference that it effects the melting off of the window patch. The roller 63 is so adjusted that

it seizes either a window patch cut off by the sheers **51**, **52** or a window patch melted off by the heated rail **61** of the roller **60** at the moment of this cutting-off or melting-off, the patch being seized by suction through the suction openings *s'* communicating with the suction channel *s* and being fed to a blank in the manner hereinafter described.

The further treatment of the blanks which, as set forth above, have gone as far as the cylinder **43** and have been taken over by it, likewise depends on the material used for the window patches which are to be fastened thereto. In the first place the apparatus is adapted to fasten to the blanks window patches that permit of the so-called "welding on." Among these belong the window sheets of transparent papers or of cellulose foil of the viscose group provided with a one-sided coating which becomes adhesive due to the effect of heat, and acetate foils which do not require a coating but become adhesive in themselves by the effect of heat. The blank to be provided with a window patch of one of these kinds of materials is conveyed by the cylinder **43** to the roller **63** which feeds to the blank the window patch separated, in the manner above described, from the strip **44**. The roller **63** is so adjusted that it lays the window patch upon the blank so as to cover the window opening *d* uniformly on all sides.

As the diameter of all the standard rollers making one revolution for each operation on the article is determined by the length of the largest blank to be handled in the apparatus, measured in its direction of travel, a minimum distance of these rollers may result which is too great for the continuous conveyance of the window patch fed towards them and lying upon the blank. For this reason the window patch *f* (Fig. 8), as soon as it has been laid upon the blank by the roller **63**, is attached by this roller at spaced welded points *g* (Fig. 8) at the window edge lying in front in the direction of travel. This is effected by fingers **64** carried in the roller **63** and corresponding in number to the welding points, which fingers are electrically heated by a device **65** of any well-known kind. The fingers **64** are pivoted about a shaft **66** supported in the roller **63** and are controlled by a roll lever **67** likewise attached to the shaft **66** but outside of the roller and whose roll **68** engages a stationary cam **69**. The control of the fingers **64** is so effected that with each revolution of the roller **63** they engage the leading edge of the window patch during a definite short movement of the blank and the window patch. In the circumference of the cylinder **43** inserts **43'** of a low heat conducting material are fastened at those places where this point welding (and also the complete welding on of the window patches still to be described) is effected, in order to prevent a rapid drainage of the heat supplied to the window patch at the welding places.

The blank with the window patch *f* thus attached to it is conveyed by the cylinder **43** from the roller **63** to the roller **70** within which are carried two rails **71** extending in its longitudinal direction and which are electrically heated by a suitable device **72**. By these rails **71** the window sheet is welded to the blank alongside the two longitudinal window edges located crosswise of the direction of travel, as shown at Fig. 9 by the stippled portions. The blanks then pass between the cylinder **43** and a roller **73** which, as in the example shown, may consist of individual parts attached to a common shaft, and comprising segments **74** adapted to be heated electrically by a suitable device **75**, and adapted to weld on the window patches along the two short window edges extending in the direction of travel in accordance with Fig. 10.

The blank with the now completely welded-on window patch *f* is then conveyed by the cylinder **43** to a roller **76** and by the latter to distributing or laying-off discs **77**, the blanks being seized by suction by both the roller **76** and the discs **77** by means of their suction openings *s'*. The laying-off discs **77** in conformity with their greater diameter convey two blanks to one revolution and are therefore provided with two suction devices arranged diametrically opposite each other. The discs **77** release each blank when it is engaged by the cross beams **78** so that it then drops on to the stack **79**. This stack rests on cross beams **80** which are adapted to swing downwardly automatically about the shaft **81** by automatic mechanism of a known kind as the stack increases.

When the window material is of such a nature that it cannot be welded to the blanks but must be pasted the parts **64**, **65**; **71**, **72**; **74**, **75**, which serve for the welding-on are all put out of commission. In this case the rollers **63**, **70** and **73** which carry these said parts merely serve as conveying rollers. For pasting on the window patch there is provided, for the application of the adhesive around the window opening of the blank, a rotating segment **82** which cooperates with the cylinder **43** and receives adhesive from a container **83** by means of a dipper roll **84** running in the same and of an applying roller **85**. To the blank thus provided with an adhesive coating the window patch detached from the strip **44** by means of the shears **51**, **52** is fed by the roller **63** in the manner described and the blank is conveyed to the stack **79** in the same manner as described above.

Referring to Figs. 11 to 14, the modified apparatus shown at Fig. 14 comprises three rollers **86**, **73**, **89**, each having heated means for welding one or more edges of the transparent patch to the blank. In accordance with this apparatus the blank with the patch *f* thereon passes from the roller **63** to the roller **86** which latter has a longitudinal rail **88** heated electrically by a suitable device **87** and adapted to completely weld the patch edge previously attached to the blank only at the points *g*, (as in Fig. 8), so that the first or leading edge of the transparent patch is completely welded to one edge of the window opening, as shown at Fig. 11. By the action of the cylinder **43** the blank is then fed to the roller **73** which is provided with two, electrically heated rails or members **74** having suitable heating means **75** and adapted to engage the two parallel side edges of the patch extending in the direction of travel to weld such edges to the edges of the window opening as shown at Fig. 12. From the roller **73** the blank is fed by the cylinder **43** to the roller **89** which is provided with an electrically heated rail **91** having suitable heating means **90** and adapted to engage and weld to the edge of the window opening the second cross edge, or trailing edge, of the transparent patch, so that all four edges of the patch are completely welded to the blank as shown at Fig. 13. From the roller **89** the blanks are fed by the cylinder **43** to the cylinder **76** in the manner above described in connection with Fig. 2.

Although the drawings and the above specification disclose the best mode in which we have

contemplated embodying our invention, we desire to be in no way limited to the details of such disclosure, for in the further practical application of our invention many changes may be made, as circumstances require, without departing from the spirit of our invention within the scope of the appended claims.

What we claim is:

1. Method of forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles which comprises conveying a strip of transparent material, conveying the blanks successively, applying heat to the said strip to separate individual window patches therefrom by melting, applying a separated patch to each blank, and welding the edges of the patches to the edges of window openings in the blanks by the application of heated members to said edges.

2. Method of forming windows in blanks for the manufacture of envelopes, bags, and similar articles, which comprises feeding transparent patches to the blanks, applying heat at spaced points to connect the leading edge of each patch to a blank, then applying heat to said patch to completely weld said edge to the blank, then applying heat to the trailing edge of the patch to completely weld said edge to the blank and finally applying heat to the patch edges extending in the direction of travel to complete the welding of the patch edges to the blank.

3. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary members for conveying the blanks, means for applying transparent patches to the moving blanks, and two parallel and two arcuate members for progressively applying heat along definitely restricted lines conforming to the edges of the moving patches to weld the same to the blanks while the latter are advancing through the apparatus.

4. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary members for conveying the blanks, means for applying transparent patches to the moving blanks, and rotary means including straight members and spaced arcuate members for applying heat progressively and to definitely restricted marginal edges of the moving patches to weld the same to the blanks without interrupting the forward movement of the blanks.

5. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary means for conveying the blanks successively and continuously, means for feeding a continuous strip of transparent material, means for separating patches from said strip, means for feeding the patches to the moving blanks, rotating means including spaced arcuate members for welding the advancing patches to the blanks by a rolling action and by the application of heat restricted to the edges of the patches and applied thereto progressively from edge to edge of the patch, and means for receiving the finished blanks.

6. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary means for conveying the blanks successively and continuously, means for feeding a continuous strip of transparent material, means for separating patches from said strip, means for applying the patches to the moving blanks, rotating electrically heated members in the form of arcuate strips for progressively engaging and welding the edges of the patches to the blanks by the application of heat, the rotation of said members being uninterrupted during the welding, and means for receiving the finished blanks.

7. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary means for continuously feeding the blanks, rotary members cooperating with said means, means for conveying transparent patches to the blanks, heated elements in the form of arcuate and straight strips carried by said rotary members for engaging the patches to weld the same to the blanks with a rolling action while the blanks are advancing.

8. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary suction means for continuously feeding the blanks, rotary members cooperating with said means, means for intermittently conveying transparent patches to the blanks, electrically heated elements in the form of spaced arcuate strips and spaced parallel strips carried by said members for engaging the marginal edges of the patches to weld the same to the blanks without interruption of the forward movement of the blanks.

9. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising rotary means for continuously conveying the blanks, a plurality of rotary members cooperating with said means, means for continuously rotating said members, means for conveying transparent patches to the blanks, heated elements in one of said members for engaging and welding two opposed edges of the patches to the blanks, and heated elements in another of said members for engaging and welding the other two opposed edges of the patches to the blanks.

10. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising means for continuously conveying the blanks, two rotary members cooperating with said means, means for imparting to said members uninterrupted rotary motion, means for applying transparent patches to the blanks, two parallel heated elements in one of said members for engaging and welding the longitudinal edges of the patches to the blanks, and two arcuate heated elements in the other of said members for engaging and welding the short edges of the patches to the blanks.

11. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising means for continuously conveying the blanks, a rotary member for supplying transparent patches to successive blanks, a heated and continuously rotating member for welding the leading edge of the patch to the blank, a second rotary member having two arcuate strips for engaging and welding two of the other edges of the patch to the blank, and a third rotary member for welding the fourth edge of the patch to the blank.

12. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising means for continuously conveying the blanks, means for conveying a strip of transparent material, a heated member for separating the said strip into patches by melting, means for applying the patches to

the blanks, and heating elements for welding the edges of the patches to the blanks.

13. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising means for continuously conveying the blanks, means for conveying a strip of transparent material, an electrically heated rotating member for separating the strip into patches by melting, means for applying the patches to the blanks, a plurality of rotary members engaging the patches upon the blanks, and electrically heated elements in said members for welding the edges of the patches to the blanks by the application of heat thereto.

14. Apparatus for forming windows in blanks intended for the manufacture of envelopes, bags, and similar articles, comprising means for conveying the blanks, rotary means for cutting a rectangular window opening in each blank, means for applying transparent patches to the moving blanks, rotary electrically heated strips for engaging and attaching two opposite edges of a transparent patch to the two opposite edges of the window opening extending crosswise of the direction of travel, and two electrically heated arcuate rotary strips for engaging and attaching the other two opposite edges of the patch by a rolling action to the two opposite edges of the window opening extending in the direction of travel of the blanks.

ALFRED WINKLER.
MAX DÜNNEBIER.