

[54] **FORMATION OF CREASES IN BOARD
IN OR FOR THE MANUFACTURE OF
CARTON BLANKS**

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interest
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93/58.2, 58.3, 59, 36, 37, 45, 46, 47, 48;
76/107 C

[56]

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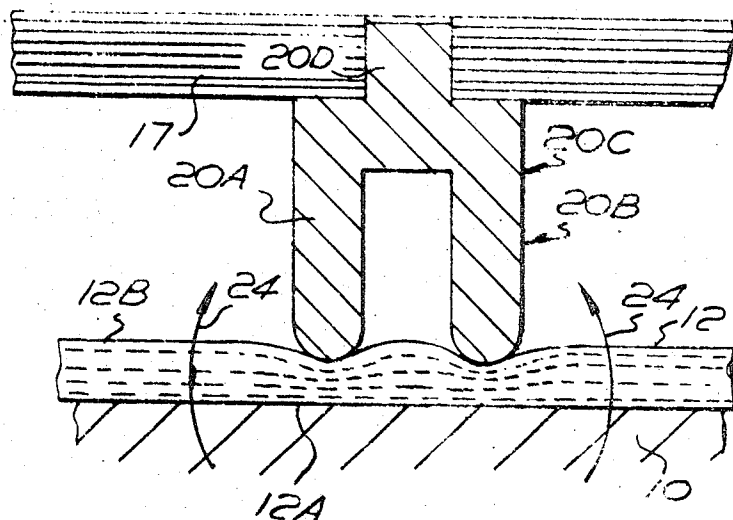
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[57]

ABSTRACT

The formation of creases in carton blank board wherein each crease is defined by a pair of closely spaced parallel crease lines. The said pair of lines is formed by the edges of a pair of spaced creasing rules which press the board against a creasing machine platen.

7 Claims, 4 Drawing Figures



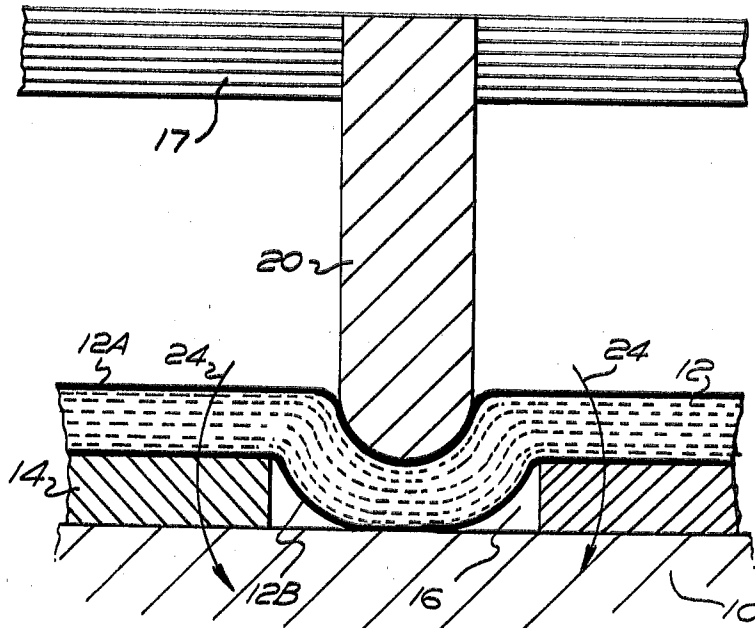


FIG. 1 PRIOR ART

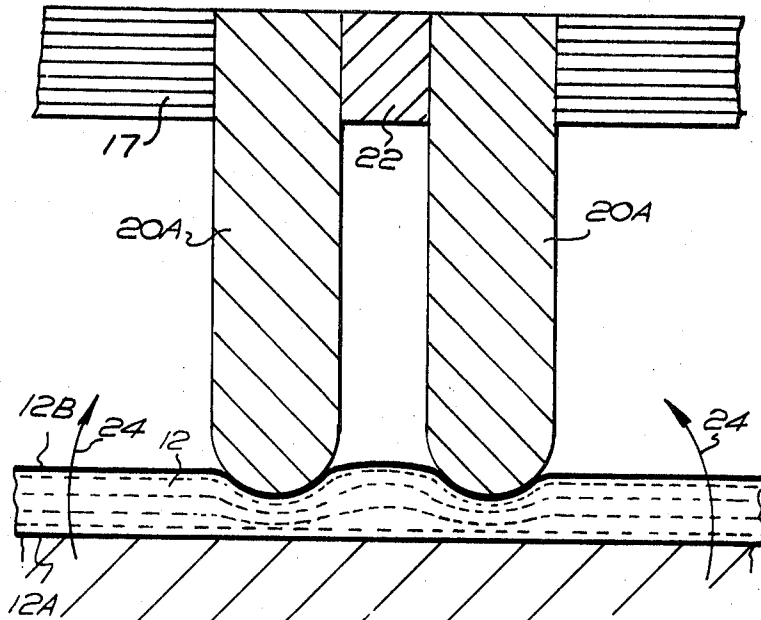
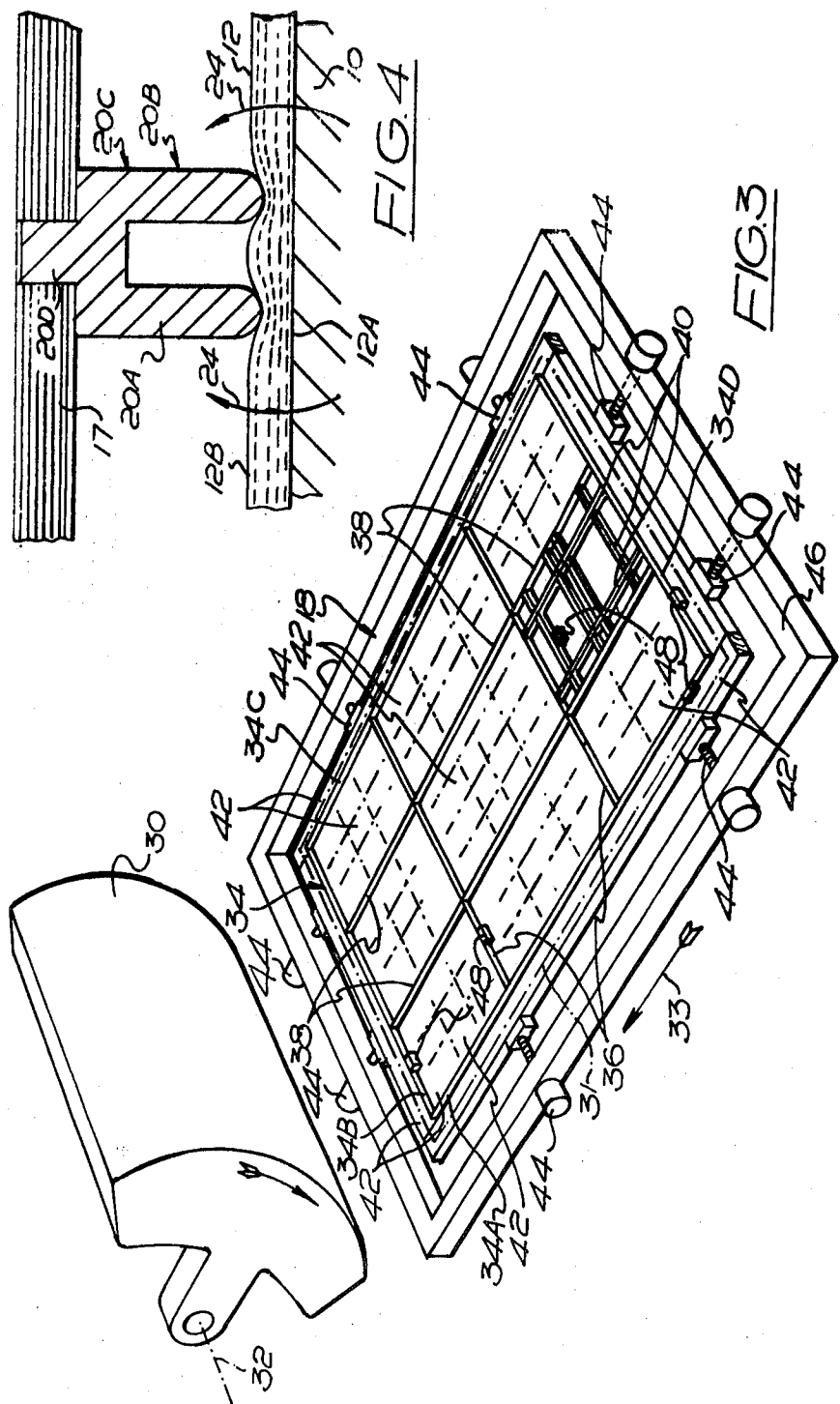


FIG. 2

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FORMATION OF CREASES IN BOARD IN OR FOR THE MANUFACTURE OF CARTON BLANKS

The present invention relates to the formation of creases in board in or for the manufacture of carton blanks and in particular concerns a method of and apparatus for, the formation of creases in such carton blanks or in paper board from which such a blank or blanks is or are to be produced.

The board or carton blanks may be printed or otherwise decorated either before or after the creasing operation, or may be unprinted.

Carton blanks are cut out of a sheet of board and the cutting operation normally takes place simultaneously with the creasing of the blank, but in the broadest aspect of the invention the cutting operation may take place before, during or after the creasing operation.

In the known method of creasing and simultaneous cutting of carton blanks, a cutting and creasing forme is constructed. This forme is a plate like structure from a face of which upstands or upstand a knife or knives having an edge or edges defining the peripheral shape of the blank or blanks and a creasing rule at each of the locations where creases are to be formed in the blank.

This forme is used to produce a female counterpart or "make ready" between which and the forme the board is pinched in order to cut therefrom, and crease, the blank. The make ready is constructed by laying a first layer of paper on a platen, (this may be flat for flat bed cutting and creasing machine or cylindrical or part cylindrical for a rotary cutting and creasing machine) laying a second layer of paper over the first and next laying a layer of hard manilla board over the second layer of paper. The manilla board is covered by a sheet of carbon paper and the forme and pack of layers on the platen are brought into contact so that ink lines are produced on the manilla board where creases are to be formed, this being as a result of the creasing rule edges pressing against the pack of layers. The manilla board is now cut away whilst on the platen along the peripheral regions of each carton to be cut, and along each line where a crease is to be formed a slot or channel is cut in the manilla board. The cutting of these slots or channels requires a high degree of skill because if the slots or channels are not cut accurately then this can lead to trouble at a later stage in the handling of blanks for example when they are erected especially where the blanks have to be erected by automatic machinery. Indeed, the accurate formation of these grooves has been a major problem in the field of forming creases in board. Moreover, a new make ready has to be constructed for every new carton blank to be produced. This is naturally time consuming particularly in view of care which must be exercised in forming the said slots.

Many proposals have been put forward for assisting and rendering simpler the cutting of the said slots or channels and some have resulted in commercially available specialised cutting tools to enable the person cutting the slots to control accurately the cutting of the slots, but the setting up of these tools is time consuming and operation thereof is difficult. because of this, these tools have not been widely accepted in the carton industry.

An object of the present invention, or at least the preferred form thereof, is to provide a method of creasing board whereby the said disadvantages are eliminated.

According to the present invention a crease is formed in a carton board by two spaced, parallel creasing rule edges. The two rule edges will produce two spaced crease lines in the board and it will be appreciated that the said rule edges will require to be close enough together so that the two crease lines form a single crease about which the board may be folded, but must be sufficiently far apart to form two crease lines for the crease.

The spacing between the creasing rules will require to be varied depending upon the board being creased. In general, experiment has shown that the thicker the board, the greater the spacing between the rules.

An advantage of forming the crease by means of two rule edges is that the board can be supported on the opposite side simply by a planar surface, e.g. the platen flat or arcuate itself whereby considerable time and expenditure are saved as no make ready is required.

Tests have shown that the crease lines in the board need to be at least of noticeable depth to enable the board to be folded satisfactorily and when the rules are set relative to the platen there is little danger of the creasing rules fracturing the board.

In a practical application, it will be more usual to produce a number of creases in the board during the creasing (and perhaps cutting) and to this end, the forme will have two parallel creasing rules for each crease. Where the cutting is carried out simultaneously with the creasing, conventional cutting arrangements may be used.

Also according to the present invention there is provided a creasing forme for a board creasing machine including a pair of spaced parallel creasing rules for at least some of the creases to be formed so that the edges of such pair of creasing rules will produce spaced parallel crease lines in the carton board to define each crease. The forme may also have a cutting knife defining the peripheral shape of the carton to be cut and creased by the forme. The forme may be for the cutting from a sheet and creasing, a plurality, of carton blanks.

The forme may be built up in the normal conventional manner i.e. by inserting the knife edge and creasing rule pairs (with spacing means therebetween) in slots or channels in a single forme plate or by locating the rules and knife edge between multi-forme plate pieces and the forme is held in clamps to prevent it from collapsing. In either case, each twin creasing rule may alternatively be pre-fabricated from bars to predicted and specified sizes so that the rules of each pair will be integral instead of being separate and spaced by spacer pieces. In such latter case, each creasing rule pair may have the cross sectional shape of a tuning fork, the top edges of twin arms serving to form the crease lines and the lower single leg being for location in an appropriate slot in the forme plate structure.

The invention further provides a cutting and creasing machine provided with a forme as aforesaid and a carton blank which has been creased by the method or forme as aforesaid.

In the method of the invention, the crease lines will be formed in the rear side of the board. This is the opposite to conventional creasing using a make ready and a single creasing rule for each crease, wherein the creasing is effected on the face side of the board.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, wherein;

FIG. 1 is a sectional elevation, to an enlarged scale, of a creasing rule in the process of creasing carton blank board according to a conventional method.

FIG. 2 is a sectional elevation, also to an enlarged scale, of a pair of creasing rules in the process of creasing carton blank board according to the embodiment of the invention;

FIG. 3 shows the platen and cutting and creasing forme of a cutting and creasing machine according to the invention;

FIG. 4 is a sectional elevation similar to FIG. 2, but showing another form of creasing rule.

In FIGS. 1, 2 and 4 the platen is shown at 10, and the board at 12 (with outer and inner faces at 12A and 12B).

In FIG. 1, a make ready on the platen is shown at 14, a make ready slot or channel at 16, the forme at 17 and the creasing rule at 20. Comparing this FIG. 1 with FIG. 2, it will be seen that the board 12 is creased by two parallel creasing rules 20A which are spaced apart by a spacer 22 whose thickness is accurately known and no make ready is used.

In the alternative arrangement of FIG. 4 the twin rules 20A, 20B are defined by the arms of a fabricated tuning fork sectional bar 20C of which the leg 20D is located in a slot in forme 17. The spacing of the rules 20A, 20B is determined accurately during manufacture of bar 20C.

In the subsequent folding of the boards 12 of FIGS. 1 and 2 and 4, the folding is in the direction of the arrows 24 and it will be seen therefore that the creasing rules are applied on opposite sides of the board as regards FIG. 1 and FIGS. 2 and 4.

The machining of groove 16 accurately is very difficult but the accurate spacing of the rules 20A (by means of the accurately machined spacer 22 or machining of bar 20C is relatively simple in comparison and moreover, the twin rule arrangement provides a more accurately located crease. Carton blanks having creases made according to the invention are, because of the accurate location and formation of the creases, more suitable for erection by automatic erecting machinery. As such machinery operates at high speed, this advantage is considerable.

Referring now to FIG. 3, the complete forme, represented by reference numeral 18 in FIG. 2, is shown in perspective view. Also shown in this FIG. is the machine platen 30 which co-operates with the forme 18 in the cutting and creasing process. The platen 30 is shown as being arcuate and having a horizontal axis of rotation 32. In use, the platen rotates continuously whilst the forme 18 reciprocates forwards and backwards as indicated by arrow 33. A sheet of board 31 is placed, face upwards on the forme 18 when it is in the position shown, the forme 18 then moves forward and the platen 30 rolls over the board upper face pressing the board to the platen whereby the board is cut into carton blanks, creases simultaneously being formed in such blanks. When the platen reaches the end of the forward stroke, the platen has left contact with the board. The forme 18 returns to the position shown in FIG. 3 whilst the platen 30 continues its rotation.

Each cycle is preferably initiated by an operator who places each sheet of board on the forme 18 when it is in the position shown and he removes the cut blanks from the forme 18 when it returns to the initial position, before reloading the machine. If the machine is

adapted for automatic operation the cut and creased blanks may be removed from the forme 18 automatically when in the forward position, and the forme 18 would be automatically loaded when in the rear position, and rotation of the platen 30 could be continuous.

In a flat platen machine, the platen is simply reciprocated up and down in synchronism with the movements of the forme, but in this case the forme 18 takes up a position underneath the platen in its forward position.

Considering now forme 18 in detail, this comprises a rectangular knife edge 34 defined by knives 34A, 34B, 34C and 34D. the area defined by the knife edge 34 is sub-divided into nine equal rectangular areas by further knives 36, 38 so that during each cycle of the machine, nine carton blanks are produced.

Each of the said nine equal rectangular areas is further sub-divided into sections by twin edge creasing rule assemblies 40 each constructed of two creasing rules 20A as shown in enlarged detail in FIG. 2 or FIG. 4, so that on each blank produced there is also formed a criss-cross pattern of fold creases and each crease is defined by a pair of parallel crease lines as explained in detail in relation to FIGS. 1 and 4. The top edges of the creasing rule assemblies 40 are located below the knife edge by the desired amount for the board being cut and creased to ensure that the creases of the correct depth are formed in the board.

The creasing rule assemblies 40 are shown in one only of the nine rectangular areas in the interests of clarity, but it will be appreciated that this arrangement is duplicated in each of said areas. Moreover, it is to be appreciated that the arrangement of creasing assemblies 40 and cutting knives is varied depending upon the shape of carton to be produced. The simple arrangement shown is merely for the purposes of explanation.

The knives and creasing assemblies 40 are held in position by means of multi-forme plate pieces 42 and the whole assembly comprising plates 42, knives and creasing assemblies 40 is held rigid by means of adjustable screw clamps 44 which in turn are mounted on a rigid form base plate 46 to which the reciprocation drive mechanism is attached.

Small blocks 48 of resilient material such as sponge rubber located adjacent the knives and creasing rules 40 serve to ensure that the carton blanks are pushed off the knives and creasing rules after each cutting and creasing operation. Only a few of these blocks 48 are shown in the drawing as many as are required to achieve the above effect would be used in practice. The blocks 48 may be glued to the forme pieces 42 so that the blocks 48 remain in position during operation of the machine but can be removed fairly readily when dis-assembling the forme 18.

In the subsequent folding of the blank creased according to the invention, the stretching of the board fibres at the opposite side of the crease is minimal and therefore the surface of such side may be varnished or lacquered, a requirement of many blank face surfaces.

I claim:

1. A creasing forme for a board creasing machine including a pair of spaced parallel creasing rules for at least some of the creases to be formed so that the edges of each such pair of creasing rules will produce spaced parallel crease lines in the carton board defining each crease, the creasing rules of each pair being integral in that they are formed in a bar of tuning fork section.

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2. The invention according to claim 1 in which there is a pair of said spaced parallel creasing rules for each crease to be formed.

3. The invention according to claim 1 further comprising a platen having a planar surface for supporting said carton board between said planar surface and said creasing rules.

4. The invention according to claim 3 in which said planar surface is arcuate and said forme is a flat structure over which said arcuate surface rolls to form said creases.

5. The invention according to claim 1 in which said forme is a plate structure having a slot therein, said tuning fork bar comprising a leg projecting in the opposite

direction from said creasing rules and received in said slot.

6. The invention according to claim 1 in which said forme comprises a plate structure and a plurality of multi-forme plate pieces, and clamps securing said plate pieces and pairs of parallel creasing rules to said plate structure.

7. The invention according to claim 1 further comprising cutting knives mounted on said creasing forme in a configuration for cutting the carton board into blanks simultaneously with the creasing of the board by said creasing rules.

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