Jan. 28, 1969 J. W. SCULLY 3,424,068

CARTON FORMING BLOCK

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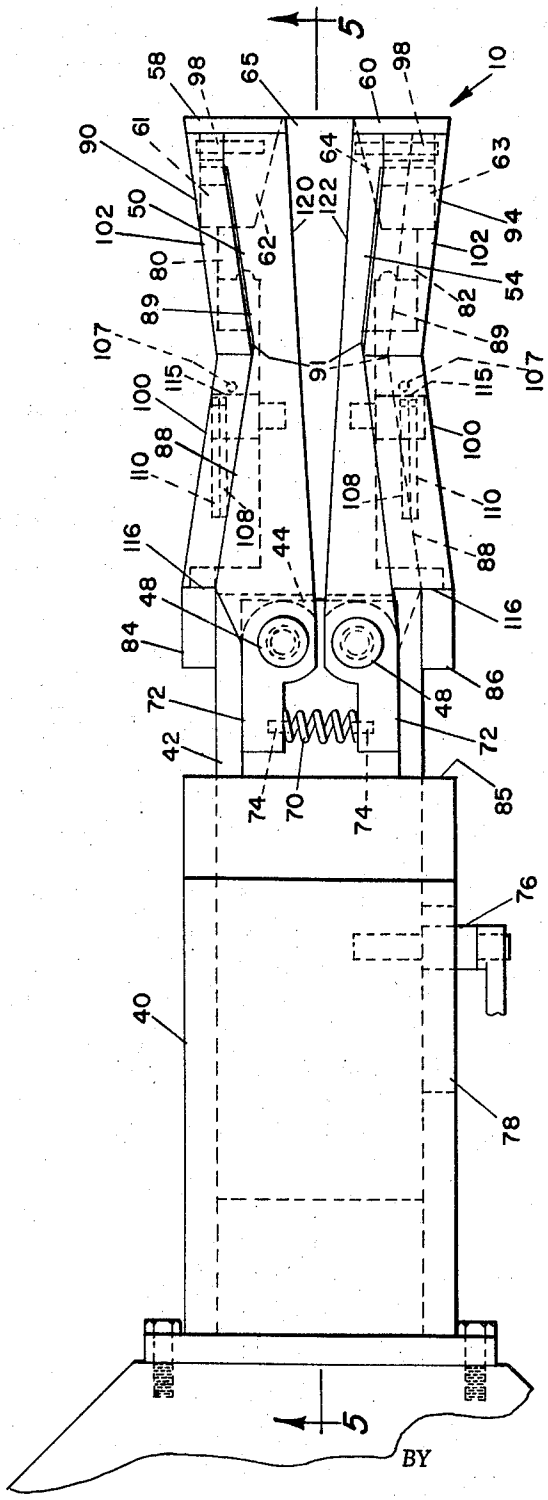


Fig. 1

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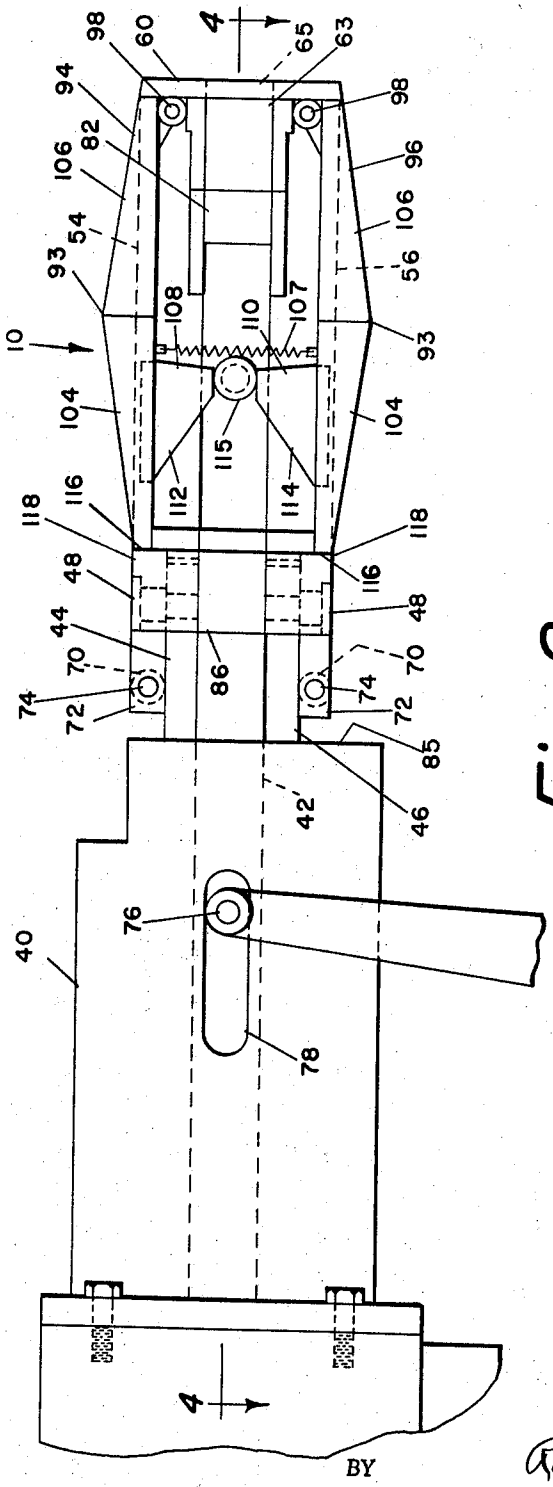


Fig. 2

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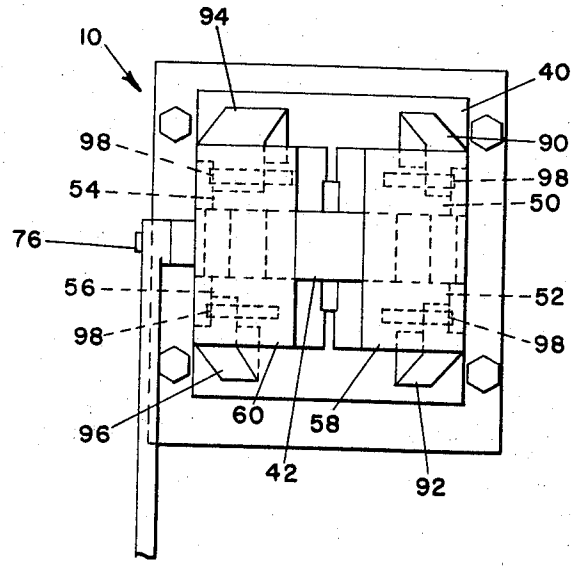


Fig. 3

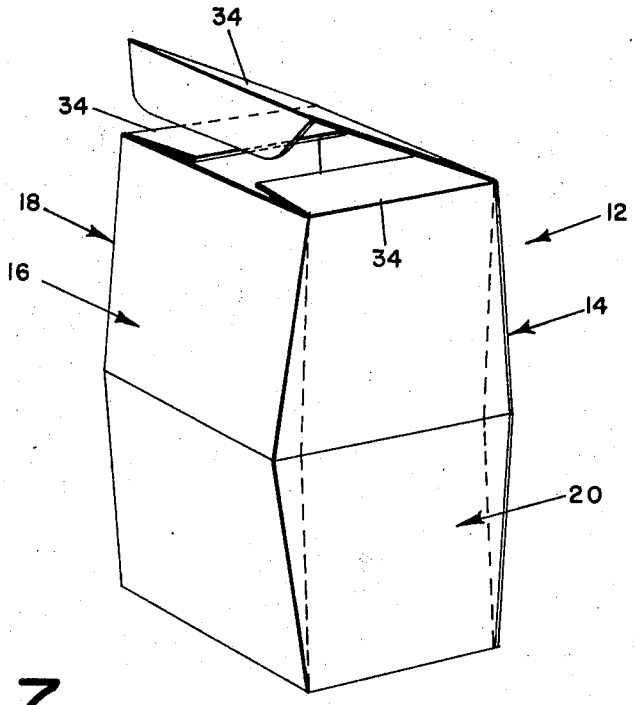


Fig. 7

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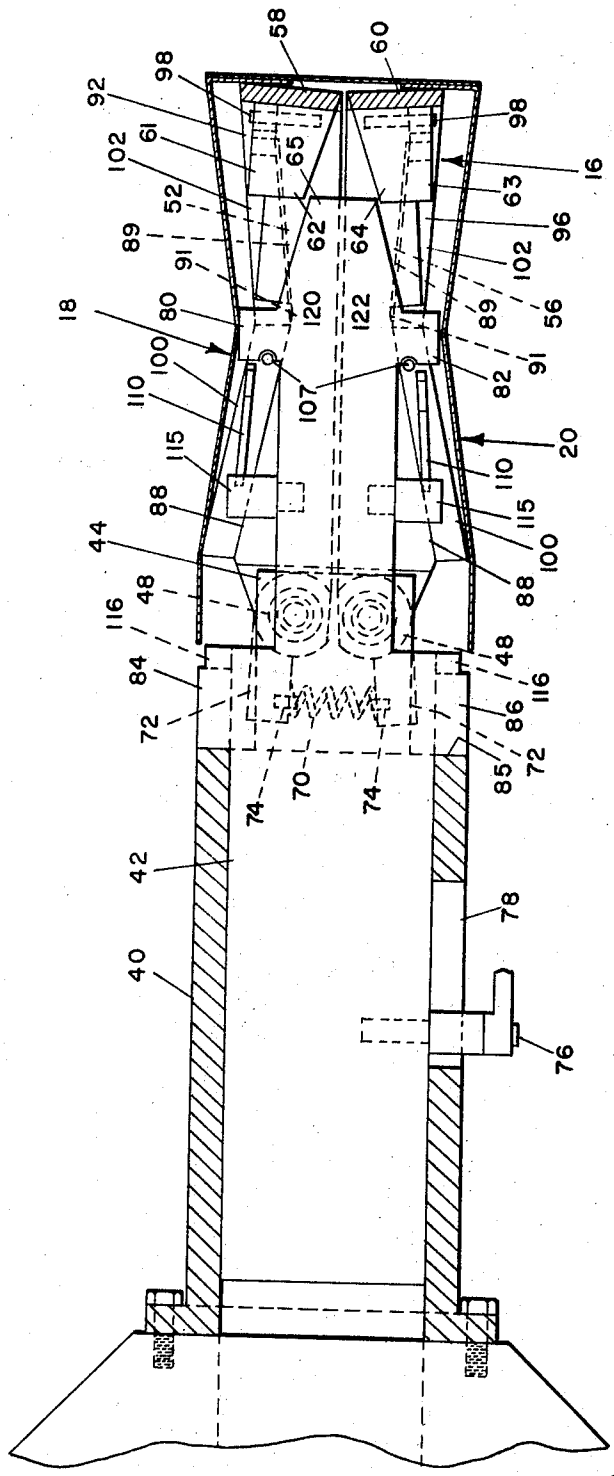


Fig. 4

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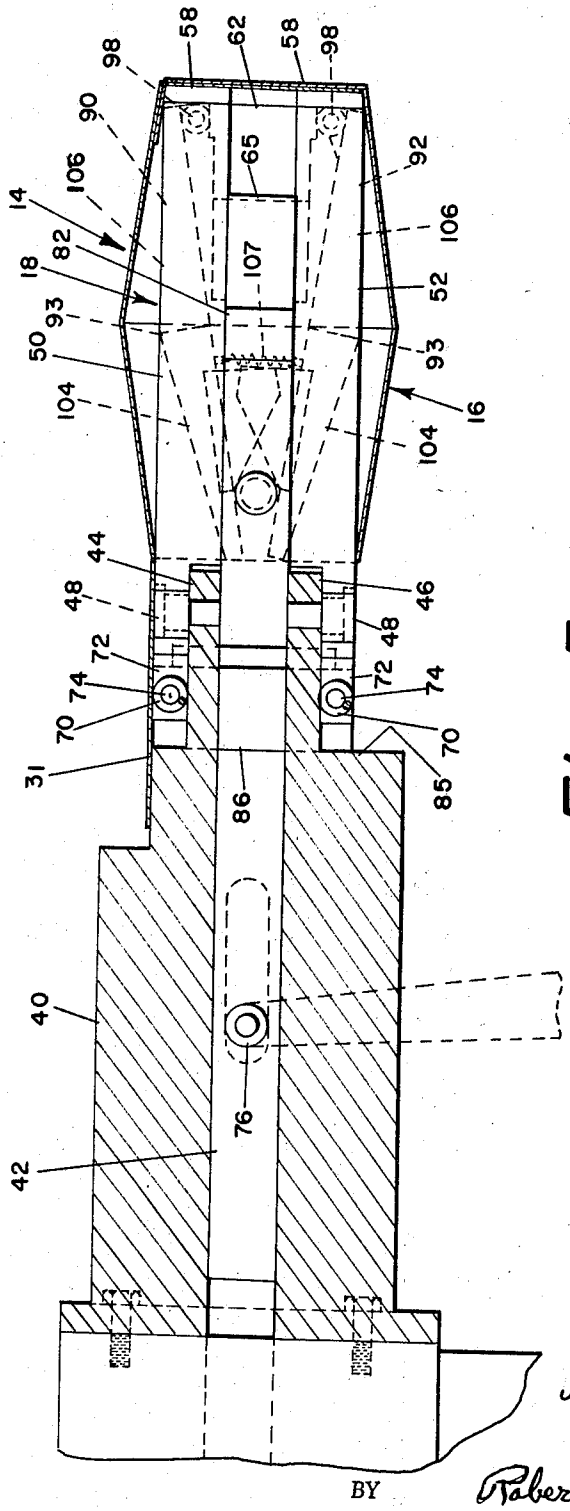


Fig. 5

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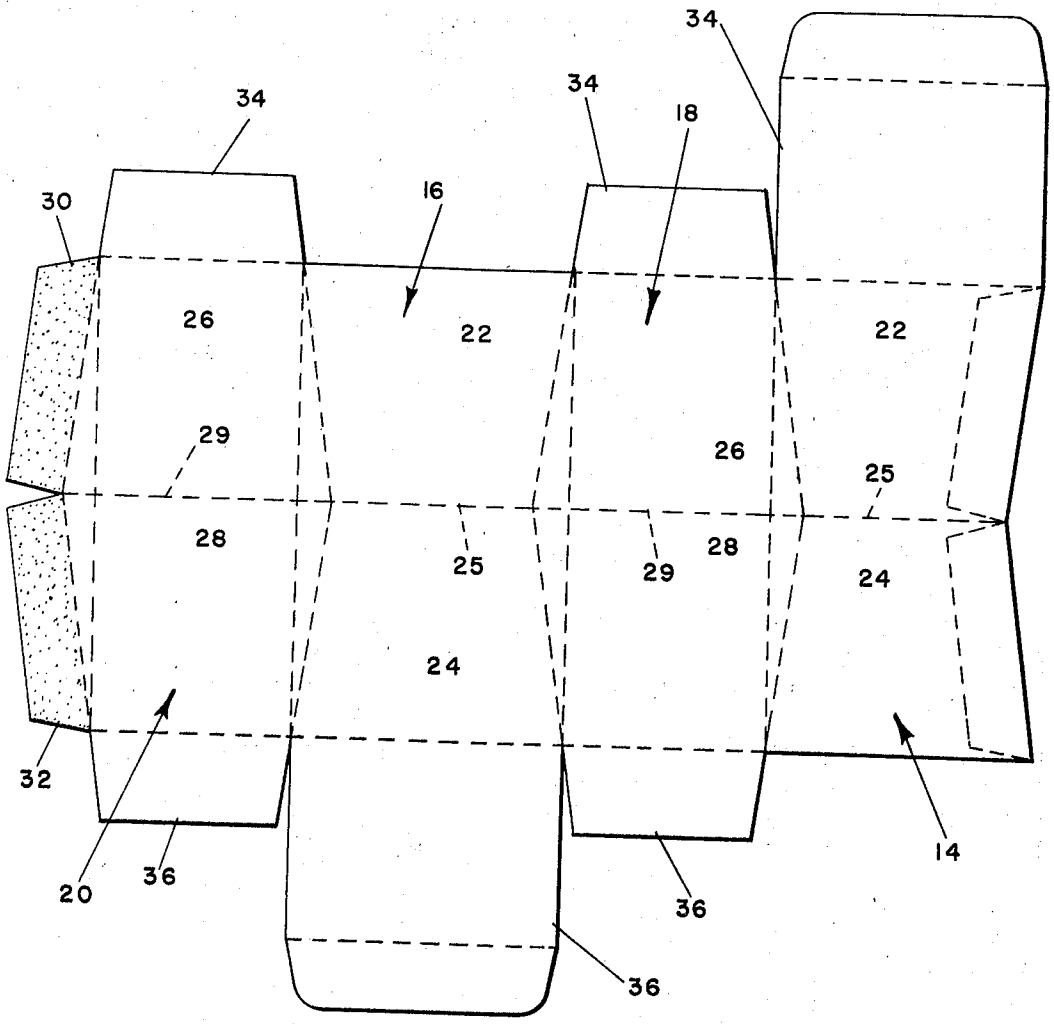


Fig. 6

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3,424,068

CARTON FORMING BLOCK

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U.S. Cl. 93—59 12 Claims
Int. Cl. B31b *1/28;* B23b *31/42*

This invention relates to a carton forming block and more particularly to a collapsible carton forming block.

The invention has for an object to provide a novel and improved carton forming block about which a prescored carton blank may be wrapped to produce a carton having non-parallel side walls and shaped in a manner such as to preclude longitudinal withdrawal of the carton from the block, and which is characterized by novel structure for collapsing the side walls of the forming block to permit such withdrawal of the carton.

With this general object in view and such others as may hereinafter appear, the invention consists in the carton forming block as hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a plan view of a collapsible forming block embodying the present invention and shown in its expanded condition;

FIG. 2 is a side elevation of the same;

FIG. 3 is an end view of the collapsible forming block shown in its expanded condition;

FIG. 4 is a cross sectional view taken on the line 4—4 of FIG. 2 showing the forming block in its collapsed condition;

FIG. 5 is a cross sectional view taken on the line 5—5 of FIG. 1 showing the forming block in its collapsed condition;

FIG. 6 is a developed view of a prescored carton blank of the type adapted to be wrapped about the present forming block to produce a carton; and

FIG. 7 is a perspective view of a carton formed on the present forming block.

In general, the present invention contemplates a collapsible forming block about which a prescored carton blank having non-rectilinear side wall panels may be wrapped when the block is in its expanded condition to produce a carton having non-parallel side walls and wherein provision is made for collapsing the forming block within the carton to permit removal of the latter from the block. The illustrated collapsible forming block is shaped to produce a carton wherein two opposed side wall panels of the carton bulge outwardly to assume a convex appearance, and the other two opposed side wall panels of the carton are depressed inwardly to assume a concave appearance. In other words, the carton may be defined as generally barrel-shaped when viewed from one side and as shaped generally like an hourglass when viewed from another side at right angles to the first side. Obviously, a carton thus shaped cannot be stripped or withdrawn longitudinally from a rigid forming block of the shape of the carton and, to this end, the present forming block provides a structure such as to be capable of being collapsed or contracted within the carton so as to dispose the non-parallel shaping elements of the forming block in a position to permit withdrawal of the carton.

Referring now to the drawings, the present forming block indicated generally at **10**, when in its expanded condition as shown in FIGS. 1 and 2, is shaped to produce a carton **12** such as that shown in FIG. 7 wherein opposed side wall panels indicated generally at **14, 16** bulge outwardly, and opposed side wall panels indicated generally at **18, 20** are depressed inwardly. By reference to FIG. 6 showing the prescored carton blank for producing the carton shown in FIG. 7, it will be seen that opposed side wall panels **14, 16** each comprise upper and lower isosceles trapezoid sections **22, 24**, respectively, hingedly connected medially at their smaller or narrower ends by scored lines **25**, and opposed side wall panels **18, 20** each comprise upper and lower isosceles trapezoid sections **26, 28**, respectively, hingedly connected medially at their larger or wider ends by scored lines **29**. The carton blank is also provided with upper and lower side seam flaps **30, 32** extending from the outer marginal edges of one pair of the trapezoidal sections **26, 28** as shown. The carton blank is further provided with upper and lower end closure flaps indicated generally at **34, 36** respectively.

In practice the forming block **10** may comprise one of a plurality of radially extended forming blocks secured to an intermittently rotated spider forming a part of a carton forming machine, not shown, but which may be of the same general type as the container forming machine illustrated and described in the United States patent to J. G. Vergobbi, No. 2,446,798, issued Aug. 10, 1948. In the operation of such machines the forming blocks are movable through successive stations of operation wherein the carton blank is wrapped about the forming block and provided with an adhesively secured side seam and an adhesively secured bottom closure while supported on the forming block whereupon the completed carton is stripped from the forming block. In accordance with the present invention provision is made for collapsing the forming block within the completed carton to permit longitudinal withdrawal at the stripping station of a carton having non-parallel side walls.

As herein illustrated, the forming block **10** comprises an elongated rectangular supporting base **40** having a rectangular opening extended therethrough in which an elongated central reciprocable operating member **42** is slidingly mounted. The base **40** is provided with a pair of spaced supporting plates **44, 46** extended outwardly therefrom, each plate **44, 46** having two spaced openings therein for receiving pivot studs **48** on which longitudinally extended supporting arms **50, 52, 54, 56** are pivotally mounted. The outer ends of the arms are connected in pairs by end plates **58, 60**. Thus, the pivotally mounted arms **50, 52** are connected at their outer ends by the end plate **58**, and the pivotally mounted arms **54, 56** are connected at their outer ends by the end plate **60**. Each end plate **58, 60** is provided with inwardly extended cam pieces **61, 63** provided with angular cam surfaces **62, 64**, respectively, which are arranged to cooperate with corresponding angular or wedge shaped surfaces formed at the outer end **65** of the elongated reciprocable operating member **42**. The connected pair of arms **50, 52** on one side and the connected pair of arms **54, 56** on the other side of the block are urged toward each other by coil springs **70** inserted between inwardly directed extensions **72** from the arms as shown. Each extension is provided with a pin **74** over which the ends of the coil springs are fitted. Thus, in operation, when the reciprocable member **42** is moved outwardly to expand the block, the angular surfaces of the outer end **65** engage opposed angular surfaces **62, 64** to spread apart the opposed pairs of arms **50, 52** and **54, 56** on their pivots **48**, and when the reciprocable operating member **42** is retracted inwardly, the springs **70** cause the opposed pairs of arms to rock toward each other. As illustrated in FIGS. 1 and 2, the reciprocable operating member **42** is provided with a pin **76** extended laterally therefrom through a slotted opening

78 in the base 40. It will be understood that when the forming block is incorporated in an automatic carton forming machine the supporting base 40 may be connected to an intermittently rotated spider, not shown, and suitable cam operated connections to the laterally extended pin 76 may be provided for automatically reciprocating the central reciprocable operating member 42 to effect expansion and contraction of the forming block. It will be observed that when the reciprocable operating member 42 is moved outwardly to spread apart the opposed pairs of supporting arms, the inner ends of the cam pieces 61, 63 engage laterally extended stop portions 80, 82 of the operating member to limit the outward movement of the same. The inward or retracting movement of the operating member is limited by stop members 84, 86 carried by the operating member and engageable with the outer face 85 of the base 40.

As illustrated in FIG. 1, the outer marginal faces of opposed pairs of supporting arms 50, 52 and 54, 56 are concave shaped or depressed inwardly when viewed in plan elevation, as defined by angular lines 88, 89, inclined inwardly from each end of their respective arms to meet at a point 91 intermediate the ends of the arms. The arms 50, 52 and 54, 56, pivotally mounted on the studs 48, comprise supporting arms for elongated shaping arms 90, 92 and 94, 96 which are pivotally mounted on pins 98 carried by the outer ends of the supporting arms 50, 52 and 54, 56, respectively. As herein shown, the inner and outer marginal faces of the shaping arms are also concave shaped when viewed in plan elevation, the inner marginal faces bearing in nesting relation against the correspondingly shaped outer marginal faces of their supporting arms, as viewed in plan elevation. The concave outer marginal faces of the shaping arms, as defined by the inwardly inclined lines 100, 102 comprise the surfaces about which the prescored carton blank is wrapped to produce the inwardly depressed or concave shape of the carton when viewed in one direction.

Referring now to FIG. 2, comprising the side elevation, it will be seen that the outer marginal faces of the pivotally mounted shaping arms 90, 92, 94, 96 when viewed in this direction are convexly shaped or outwardly bulged as defined by the angular lines 104, 106 inclined outwardly from each end of the arms to meet at a point 93 intermediate the ends of the arms and which comprise the surfaces about which the prescored carton blank is wrapped to produce the outwardly bulged or convex shaped form of the carton when viewed in this direction. The pivotally mounted shaping arms 90, 92 are connected to the arms 50, 52, respectively, and the pivotally mounted shaping arms 94, 96 are connected to the arms 54, 56, respectively, and opposing pairs of shaping arms 90, 92 and 94, 96 are connected to be urged toward each other by springs 107, as shown. As shown in FIG. 2, opposing pairs of shaping arms are provided with inwardly directed offset wing portions 108, 110 having angular cam surfaces 112, 114 arranged to cooperate with opposed pins 115 carried by the longitudinally reciprocable operating member 42 so that in operation when the member 42 is moved outwardly, the arms 90, 94 and 92, 96 will be rocked outwardly to their expanded position as shown in FIG. 2. Conversely, when the operating member 42 is retracted, the arms 90, 94 and 92, 96 will be rocked inwardly by virtue of the connecting springs 107. It will be observed that the free or inner ends of the shaping arms are engaged in recessed portions 116 when the block is in its expanded condition. The recessed portions 116 are formed in plates 118 secured to or forming a part of the pivotally mounted supporting arms 50, 52, 54, 56. Upon retraction of the operating member and inward rocking of the supporting arms the recessed portions move out of the path of the inner ends of the shaping arms to free the same.

From the description thus far it will be seen that when the central member 42 is in its outward position to expand the forming block, the shaping arms 90, 92 and 94, 96 are all supported to resist lateral pressure against the outer surfaces thereof such as when the prescored carton is wrapped thereabout. Thus, as viewed in FIG. 1, the supporting arms 50, 54 and 52, 56 are held in their outwardly rocked position by the operating member 42, and the shaping arms 90, 92 and 94, 96 which bear against and are supported by their adjacent supporting arms are arranged to resist lateral pressure. Likewise, as viewed in FIG. 2, the straight and parallel outer faces of the central operating member 42 bear against the straight and parallel inner faces of the supporting arms, and the free ends of the shaping arms rest in the recessed portions 116 of the plates 118 to resist lateral pressure when viewed in this direction. It will be observed that one of the shaping arms 94 is wider than the other arms for the purpose of supporting the overlapping side seam portions of the carton wrapped thereabout when pressure is applied thereto to set the seam.

In the operation of the forming block it will be seen that when the central operating member 42 is moved outwardly the supporting arms 50, 52 and 54, 56 are rocked on their pivots 48 to bodily move the shaping arms and to present the concave portions of the shaping arms 90, 92 and 94, 96 in their expanded position, as shown in FIG. 1, and simultaneously therewith, the shaping arms are rocked on their own pivots 98 relative to their adjacent supporting arms, as shown in FIG. 2, to present the convex portions of the shaping arms in their expanded position. Conversely, when the central reciprocable member is retracted, the supporting arms 50, 52 and 54, 56 will be rocked inwardly to contract the shaping arms, as viewed in FIG. 5, and simultaneously therewith, the shaping arms will be rocked on their pivots 98 to contract the shaping arms inwardly as viewed in FIG. 4.

It will be observed that in the expanded position of the forming block, as shown in FIG. 1, the lines 102 of opposed shaping arms 90, 94 are in an inclined and non-parallel relation and define the angular walls of an isosceles trapezoid having the larger or base portion terminating at the outer end of the block. Similarly, when viewed in FIG. 2, the lines 106 of opposed shaping arms 94, 96 are in an inclined and non-parallel relation and define the angular walls of an isosceles trapezoid having the smaller portion terminating at the outer end of the block. However, when the block is in its contracted or collapsed condition, as viewed in FIGS. 4 and 5, respectively, the lines 102 are disposed in parallel relation, and the lines 106 are also disposed in parallel relation. Thus, it will be seen that a carton having non-parallel depressed and projecting portions formed about the block in its expanded condition is free of any obstruction when the block is in its contracted condition so as to permit longitudinal withdrawal of the carton.

As viewed in FIG. 1, the end plates 58, 60 are spaced apart in the expanded position of the forming block, the outer or end surfaces thereof being flush with the outer end 65 of the operating member 42. It will be seen that the inner longitudinal edges of the opposed pairs of supporting arms 50, 52 and 54, 56 are defined by angular lines 120, 122 extending from the inner edges of the end plates 58, 60 to the hub portions of their respective arms. When the operating member is retracted to present the outer end 65 below the cam surfaces 62, 64, opposed pairs of supporting arms are moved toward each other by the springs 70 to present the inner longitudinal edges 120, 122 of the supporting arms in parallel and abutting relation.

It will be observed that the supporting arms 50, 52, 54, 56 are pivoted to the base and extended outwardly for rocking movement in one plane, and the shaping arms 90, 92, 94, 96 are pivoted to the outer ends of the supporting arms and extended inwardly for rocking movement in a plane at right angles to said first plane. Thus, in operation,

the shaping arms defining the longitudinal corners of the forming block are bodily rocked inwardly in one plane with the supporting arms, and are rocked inwardly on their own pivots in another plane to effect contraction of the forming block as described.

From the above description it will be seen that in operation a prescored carton blank of the type shown in FIG. 6 may be wrapped about the expanded forming block to present the overlapping side seam portions against the upper face of the wider shaping arm **94** which is supported to resist lateral pressure applied when setting the adhesive seal. The end closing flaps **36** which extend beyond the end of the block may then be folded into overlapping relation against the end of the block and adhesively secured to provide a bottom closure. It will be seen that the end plates **58**, **60** against which the flaps are folded are secured to the ends of the pivotally mounted supporting arms which are held in their spread apart condition by the operating member **42**. The end plates are thus supported to resist endwise pressure applied when setting the bottom closure. Thereafter, the central operating member **42** is retracted to effect collapse or contraction of the shaping members of the block in the manner described to permit longitudinal withdrawal of the carton.

While the above description relates by way of example to a forming block for producing a carton having convex side walls when viewed in one direction, and having concave side walls when viewed in another direction, it will be apparent that a modified structure of the present forming block may be used with advantage for producing cartons of other shapes which are of greater or lesser cross sectional dimensions intermediate the ends thereof so as to preclude withdrawal of the carton without collapsing of the block within the carton.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A collapsible forming block having elongated non-parallel corner shaping elements such as to preclude withdrawal of a carton formed about the block when in its expanded condition, and means for collapsing said corner shaping elements in two different planes at right angles to each other to permit such withdrawal.

2. An elongated collapsible forming block about which a carton blank may be wrapped to produce a carton having non-parallel side walls such as to preclude longitudinal withdrawal of the carton from the block when the block is in its expanded condition, said forming block having elongated shaping arms defining the longitudinal corners of the block, said shaping arms having non-parallel outer surfaces, and means for mounting said shaping arms to move inwardly in two different planes at right angles to each other to contract the forming block and permit longitudinal withdrawal of the carton.

3. An elongated collapsible forming block about which a prescored carton blank may be wrapped to produce a carton having non-parallel side walls such as to preclude longitudinal withdrawal of the carton from the block when the block is in its expanded condition, said forming block having elongated shaping arms defining the longitudinal corners of the block, said shaping arms being arranged in opposed pairs having non-parallel outer surfaces when viewed from two different planes, and means for mounting said shaping arms to rock inwardly in two different planes to contract the forming block and permit longitudinal withdrawal of the carton.

4. An elongated collapsible forming block about which a prescored carton blank may be wrapped to produce a carton having non-parallel side walls such as to preclude longitudinal withdrawal of the carton from the block when the block is in its expanded condition, said forming block having opposed pairs of elongated shaping arms defining the longitudinal corners of the block, said opposed shaping arms providing convex side walls when viewed from one side of the block and concave side walls when viewed at right angles from said one side, and means for mounting said shaping arms to rock inwardly in two different planes to contract the forming block and permit longitudinal withdrawal of the carton.

5. A collapsible forming block having non-parallel side walls in its expanded condition such as to preclude withdrawal of a carton formed about the block when in its expanded condition, said forming block comprising a base member, opposed pairs of supporting arms hingedly connected to said base member to rock in one plane, elongated shaping arms defining the longitudinal corners of said forming block and hingedly connected to the outer ends of said supporting arms to rock in another plane, and means for rocking said arms to effect contraction of the forming block in two different planes to permit withdrawal of said carton.

6. An elongated collapsible forming block about which a prescored carton blank may be wrapped to produce a carton having non-parallel side walls such as to preclude longitudinal withdrawal of the carton from the block when in its expanded condition, said forming block comprising a base member, elongated supporting arms hingedly mounted on said base member and arranged in opposed pairs to rock in one plane, end plates connecting the outer ends of each opposed pair of supporting arms, elongated shaping arms hingedly connected to the outer ends of said supporting arms and mounted to move in pairs in a plane at right angles to said one plane, and means for effecting rocking of said supporting arms and said shaping arms to contract said forming block and permit longitudinal withdrawal of said carton.

7. An elongated collapsible forming block about which a prescored carton blank may be wrapped to produce a carton having nonparallel side walls such as to preclude longitudinal withdrawal of the carton from the block when in its expanded condition, said forming block comprising a base, opposed pairs of elongated supporting arms pivotally connected to said base, an end plate connected to the free ends of each pair of arms, said opposed pairs of arms being spring urged toward each other, a longitudinally reciprocable central operating member slidable in said base and cooperating with said opposed pairs of arms to spread and maintain the same in their expanded condition, opposed pairs of shaping arms pivotally connected to the outer ends of said supporting arms for rocking movement in a plane at right angles to said supporting arms and defining the longitudinal corners of said forming block, said opposed pairs of shaping arms being spring urged toward each other, means carried by said central operating member and cooperating with said shaping arms upon outward movement of the operating member for spreading apart opposed pairs thereof and for maintaining the same in their expanded condition, retraction of said operating member effecting rocking inwardly of said shaping arms in two planes at right angles to each other to contract the forming block and permit withdrawal of the carton.

8. A collapsible forming block as defined in claim **7** wherein the non-parallel side walls defined by the outer surfaces of said shaping arms assume a concave appearance when viewed from one side, and assume a convex appearance when viewed at right angles to said one side.

9. A collapsible forming block as defined in claim **7** wherein the supporting arms bear against the central operating member and the shaping arms bear against their adjacent supporting arms to resist lateral pressure when a carton blank is wrapped about the expanded forming block.

10. A collapsible forming block as defined in claim **7** wherein one of said shaping arms is wider than the remaining arms and adapted to accommodate overlapping side seam portions of a carton blank wrapped about the expanded block.

11. A collapsible forming block as defined in claim 7 wherein said end plates are mounted to resist endwise pressure.

12. A collapsible forming block as defined in claim 7 wherein the central operating member is provided with stop portions engageable with said supporting arms to limit the forward movement of said operating member, and stop portions on said operating member engageable with the base for limiting the retracting movement of the operating member.

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U.S. Cl. X.R.

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