April 7, 1942. F. H. GROVES 2,279,233

KNOCK-DOWN CARTON

Filed July 11, 1939 2 Sheets-Sheet 1

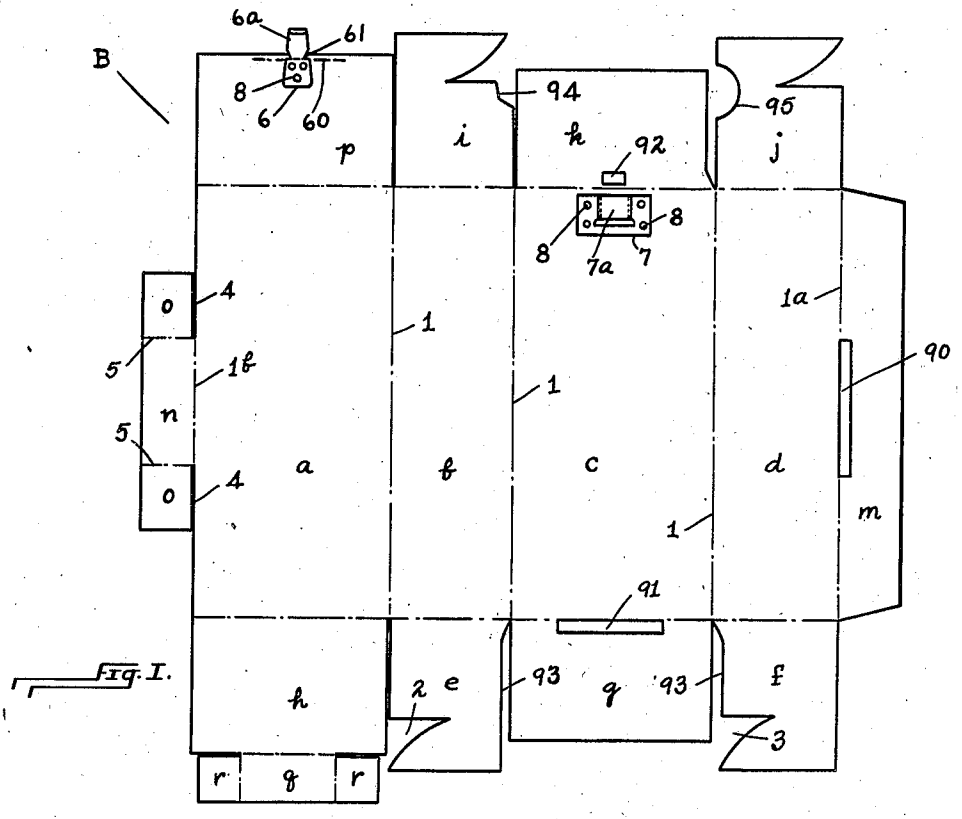


Fig. I.

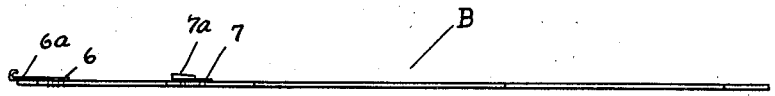


Fig. II.

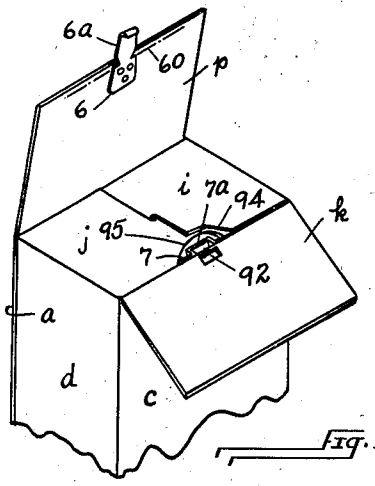


Fig. III.

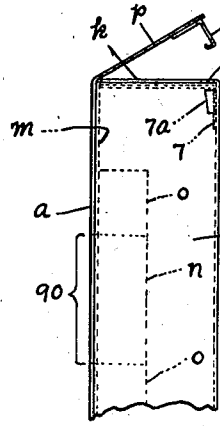


Fig. IV.

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KNOCK-DOWN CARTON

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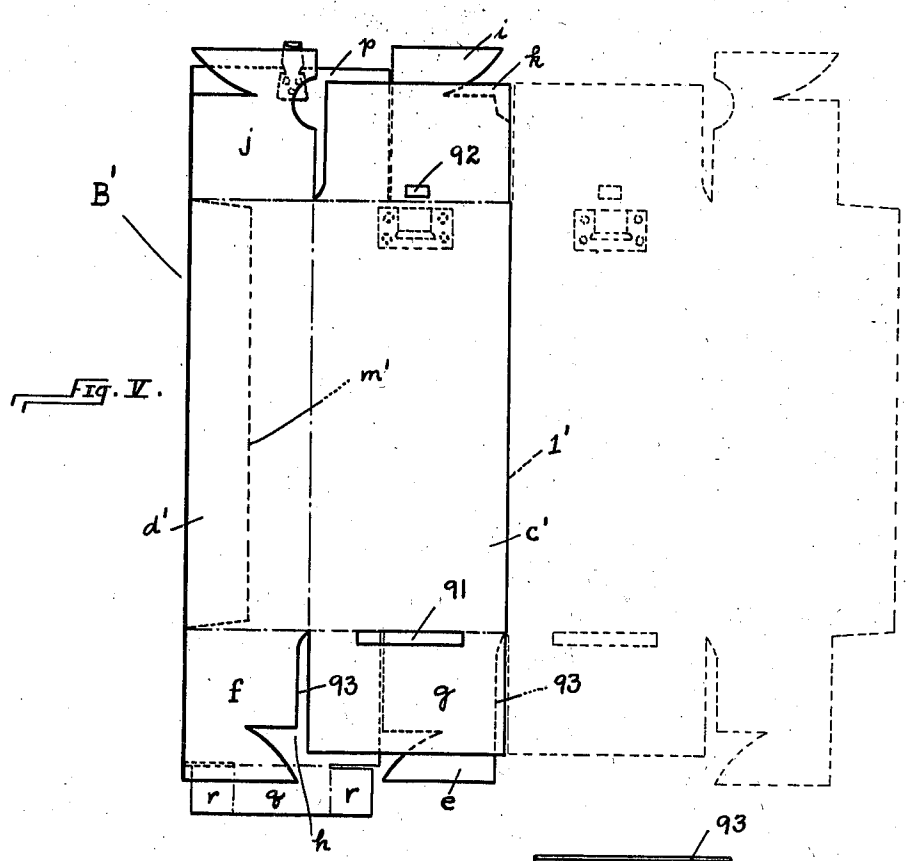


Fig. V.

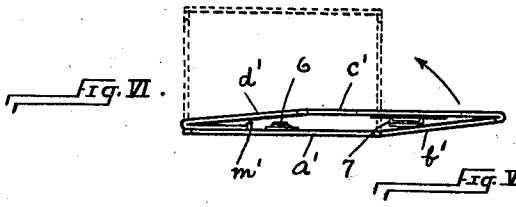


Fig. VI.

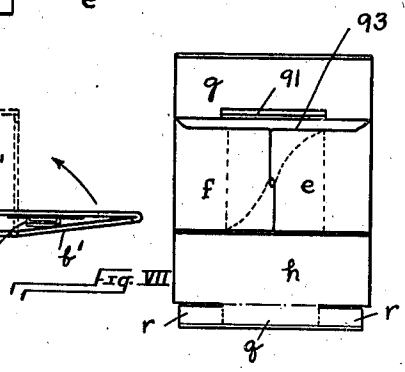


Fig. VII

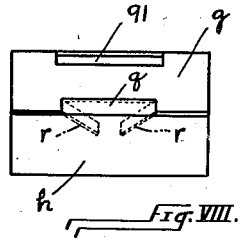


Fig. VIII.

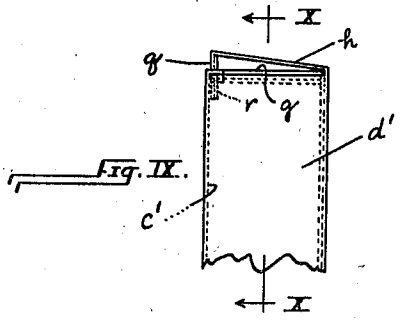


Fig. IX.

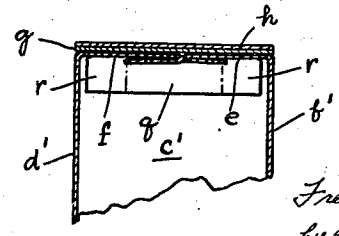


Fig. X.

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Patented Apr. 7, 1942 2,279,233

UNITED STATES PATENT OFFICE

2,279,233

KNOCKDOWN CARTON

Frederick H. Groves, Dormont, Pa.

Application July 11, 1939, Serial No. 283,802

2 Claims. (Cl. 229—47)

My invention relates to knock-down cartons constructed of paper-board. The usual knock-down carton is formed of a blank of paper-board, cut and creased to pattern, and adapted to be folded into the form of the carton.

In Letters Patent of the United States No. 2,100,644, granted to me November 30, 1937, I illustrate and describe a knock-down carton of elaborate and specialized construction; that is to say, a tamper-proof carton, a carton provided with a locking device, such that, once the carton has been erected and closed, it must be broken, torn, or otherwise permanently disfigured, in order to gain access to its contents. More particularly, my present invention relates to such a specialized carton.

In the production of such specialized cartons it was found that the locking devices, secured as they are to the cut and creased paper-board blanks, prevent the blanks from being compactly stacked and bundled for shipment and storage, wherefore an important advantage realized in the use of the less specialized knock-down cartons, first mentioned, is lost to the makers and users of the more elaborate tamper-proof cartons.

With this circumstance in mind, my present invention is brought into focus. It consists in certain refinements in the structural organization of the carton-locking devices upon the blanks, to the end that the advantages attending the use of the unspecialized cartons may be enjoyed in the more elaborate tamper-proof cartons. The organization of the locking devices also facilitates the erection of the blank into a carton of desired structure.

In the accompanying drawings Fig. I is a view in plan of a blank of paper-board, cut and creased to form the walls and flaps of a carton, and provided with carton-locking means in accordance with the invention.

Fig. II is a view of the blank in side elevation, as seen from the left-hand side of Fig. I.

Fig. III is a fragmentary isometric view of the carton in erected position, with the inner and outer cover flaps ready to be closed and locked. In this view the male locking element extends in the plane of the outer cover flap, as it does before the blank is folded and erected.

Fig. IV is a fragmentary view, showing the carton in side elevation, with the inner cover flap in closed position, with the outer cover flap in position to be closed upon the inner flap, and with the male locking element bent into position to enter engagement with the female locking element.

Fig. V is a view in plan of a cut and creased blank of modified form, in which the invention has been embodied.

Fig. VI is a view in end elevation of the modified blank. The dotted lines illustrate in end elevation the side walls of the carton in erected position.

Fig. VII is a view in elevation of the end of the carton, showing the inner and outer bottom flaps in position to be closed upon the bottom wall of the carton.

Fig. VIII is a view comparable with Fig. VII, showing the inner bottom flap in closed position, and the outer bottom flap in partially closed position.

Fig. IX is a fragmentary view, showing the carton in side elevation, with the outer bottom flap in almost fully closed position upon the inner bottom flap.

And Fig. X is a sectional view, on the plane X—X of Fig. IX, showing the bottom flaps completely closed and secured.

Referring to Fig. I of the drawings a carton blank B is shown in plan, and in exemplary way the blank is shown as a single web of paper-board, cut and creased to form a carton of the structure illustrated and described in an application for Letters Patent, Serial No. 284,239, filed by me on July 13, 1939. The broken lines *l* indicate the lines or creases on which the blank is, in the erection of the carton, adapted to be bent and folded. The blank includes portions *a*, *b*, *c* and *d* that form the four side walls of the erected carton, and notched portions *e* and *f* that are adapted in known way to be interlocked, to form the bottom wall of the carton, together with portions *g* and *h* that provide inner and outer bottom flaps which overlie and reinforce the bottom wall of the carton. The blank also includes notched portions *i* and *j* that form the top wall of the carton, and portions *k* and *p* that provide inner and outer cover flaps which overlie and reinforce such top wall of the carton. The portion *d* is continued laterally in a strip *m*, while a tongue *n* extends laterally from the outer edge of portion *a*, such tongue including tangs *o*, *o* that, slit from the body of blank portion *a*, as at **4**, **4**, are adapted to be bent on lines **5**, **5**, to admit of the erection or assembly of the carton in the manner presently to be described. The strip *m* includes an elongate slot **90** that is contiguous with the line *la* on which the strip is adapted to be bent from the plane of portion *d*, and the inner bottom flap *g* is in such manner provided with a slot **91**. Additionally, the inner cover

flap *k* is provided with an orifice **92**. The utility of these openings in the blank will presently appear.

The blank is provided with male and female locking elements **6** and **7** that are riveted severally to two of said carton-wall-forming portions of the paper-board blank. More specifically, the male element **6** is riveted to the portion *p* that forms the outer cover flap of the erected carton, while the female element is secured to the portion *c* that forms one of the side walls of the erected carton. It is important to note that the locking elements are applied and secured to the faces of the portions *p* and *c* which in the erected carton are inner faces, faces enclosed within the body of the carton. Advantageously, if not essentially, the locking elements are formed of sheet metal, a strong sheet metal, such as tinplate.

As described in an application for Letters Patent Serial No. 281,872, filed by me June 29, 1939, the sheet-metal body of the male element includes two portions: a basal portion (to which the reference numeral **6** is immediately applied), and a hook portion **6***a*. The female element includes a portion **7***a* which, offset from the otherwise flat sheet-metal body of the element, forms with the adjacent wall of the blank a socket that is open at both ends. Such socket is adapted to receive the hook portion of the complementary male element. The means for riveting or securing the locking elements to the blank B may take various forms, although I prefer to attach the locking elements in the manner described in Patent No. 2,100,644, above noted. Briefly, the thin body of each locking element is pierced at several points **8** with a pointed instrument, providing pointed tangs (not shown) that are pressed into the paper-board body of the blank and clinched, as illustrated and described in said patent.

In order for the locking elements **6** and **7** to be brought together and joined in locking engagement in the erected carton, it is necessary that the hooked portion **6***a* of the male locking element **6** shall stand upright with respect to the plane of the carton wall portion to which it is secured—to the cover flap *p* in this case. When, as hitherto has been the practice, the male locking element is applied to the blank with its hooked portion **6***a* in such upright position, it prevents the desired compact stacking and packaging of a plurality of blanks, it being noted that the female locking elements **7** do not offer serious interference (cf. Fig. II).

In accordance with this invention I provide a male locking element which, as applied to the blank, is substantially flat; it extends substantially in the plane of the blank; and it is of no greater effective thickness than the female locking element. Both locking elements are arranged at an interval from, and on opposite sides of, the medial line of the blank, the line *l* between the blank portions *b* and *c*, and the hooked end of the male locking element is arranged to extend outward from the peripheral edge of the cover flap portion *p* to which the element is at its inner end secured. By virtue of such organization a plurality of blanks may be stacked compactly, with the position of one blank reversed with respect to the next-adjacent blank in the stack in such manner that the locking elements on the successive blanks in the stack or pile are staggered. It is further important to note that the male locking element is in structure adapted to be readily bent on a transverse axis or hinge-line into the upstanding position that is essential for engagement with the female locking element in the erected carton. Such axis is located intermediate the opposite ends of the element, as particularly shown at **60** in Fig. I. In order to facilitate the bending, and to insure bending precisely on the desired line, the sheet metal body of the locking element is weakened, say by means of opposite marginal notches **61**. Such structure provides an exemplary embodiment of the invention.

To the end that clearest understanding of the structure may be obtained, I shall outline the manner in which the blank is erected into the form of a carton. The strip *m* is bent upward, on the line *la*, through 90° from the plane of the blank; the tongue *n* is in like manner bent on the line *lb*; and the tangs *o*, *o* are bent on the lines **5**, **5** and swung into position flat against the face of the tongue. Then the blank is folded on the lines or creases between the portions *a*, *b*, *c* and *d*, in such manner as to form a tube of rectangular cross section, with the strip *m* positioned against the inner surface of the carton wall portion *a*, and with the locking elements **6** and **7** located within the tube. When, in the folding of the blank, the tongue-bearing edge of portion *a* is swung towards the strip-bearing edge of portion *d*, the tongue *n*, with the tangs *o*, *o* folded against it, is inserted and pressed into the slot **90**. When the tongue-carrying margin of portion *a* is thus brought to position against strip *m*, and the blank brought into the form of the tube alluded to, the tangs *o*, *o* are spread outward against the inner face of wall portion *d*, as shown in dotted lines in Fig. IV. As so positioned, the tangs extend outward from (above and below, as shown in Fig. IV) the opposite ends of the slot **90**, and secure the otherwise free edge of wall portion *a* to the strip-bearing edge of wall portion *d*. When the carton has been erected into the form of a rectangular tube, it only remains to close the wall portions and flaps *e*, *f*, *g*, *h*, and *i*, *j*, *k*, *p* at the opposite ends of the tube, to complete the erection of the carton and provide a closed container. Before describing such closing of the ends of the carton I shall describe one of the permissive modifications.

Turning to Fig. V, I show a blank B′ which in general is of the same structure as the blank B, already described. The principal differences are that the tongue *n* and slot **90** (Fig. I) are omitted in the modified structure (Fig. V), and that the strip *m′*, extending laterally from the portion *d′*, is permanently glued or cemented to the inner surface of the portion *a′*. The half of the blank to the right of the medial line or crease *l′* (the portions indicated in dotted lines in Fig. V) is folded to position upon the half to the left of such medial line, and the strip or flap *m′* is glued or otherwise permanently secured to the portion *a′*. The blank is shown in full lines in Fig. V in the condition in which it is supplied to the users. The two halves of the blank, united along their opposite side edges, lie substantially flat, one half upon the other. It will be perceived that the locking elements **6** and **7**, applied to the blank B′ in the same manner as they are applied to the blank B first described, offer no interference to the organization of the blank, as shown in Figs. V and VI, nor to the stacking of a plurality of such blanks in the desired way.

In the erection of the modified carton, it is merely necessary to swing the portions *b′*, *c′* and *d′*, relatively to the portion *a′*, from the full-line

to the dotted line position shown in Fig. VI. In such way the blank is brought into tubular form, ready for the end walls and flaps to be closed.

The end flaps of the blank shown in Fig. V are identical in form and arrangement with those of the blank shown in Fig. I, and in describing the completion of the carton-erecting operation the same reference characters will be used for both structures. The notched end wall portions *i* and *j* at the top of the carton, and the end wall portions *e* and *f* at the bottom of the carton are folded inward and interengaged in known way (cf. Figs. III and VII), to form the opposite end walls of the carton. Then, at the bottom of the carton, the inner flap *g* is closed upon end wall *e*, *f*, and tangs *r*, *r*, provided on a tongue *q* on the outer flap *h* (after the manner that tangs *o*, *o* are provided on tongue *n*), are folded inward against the surface of said tongue *q*; such tongue is then inserted in the slot **91** in inner flap *g*, and the outer flap *h* is pressed into position upon the inner flap *g*. Then, the tangs *r*, *r* are spread into position against the inner face of carton wall *c'*, (cf. Fig. X), and the bottom wall flaps are thereby secured in assembled and closed position. It is to be remarked that the bottom wall flaps *e* and *f* are marginally recessed, as at **93**, to provide clearance for the passage through of the tongue *q*.

Fig. III shows the notched portions *i* and *j* interlocked (after the carton has been filled with the goods it is to contain), to form the top wall of the carton, with the inner and outer cover flaps ready to be closed. It will be noted that such portions *i* and *j* are marginally recessed, at **94** and **95**, respectively, providing in conjunction with the orifice **92** in the inner cover flap *k* (cf. Fig. IV) an opening for the introduction of portions **6***a* of the male element into locking engagement with the female element. Before the outer cover flap *p* is closed, the hooked portion **6***a* of the male locking element is pressed downward, and deflected (on axis **60**) from the plane of the flap (Fig. III) into service position, as mentioned above and as shown in Fig. IV. Then, the outer cover flap is closed, and the portion **6***a* of the male locking element is lodged in the socket formed by and between the female element and the wall *c* of the carton. When the outer cover flap reaches fully closed position, the hook at the distal end of the male locking portion **6***a* latches beneath the lower or inner edge of portion **7***a* of the female element. Thus the assembled carton is locked. The carton can not be opened, without tearing or cutting its side walls or end flaps. And it will be particularly noted that throughout the carton structure the arrangement of the flaps and walls is such that it is impossible to use a knife or other instrument fraudulently to pry open either the locking tongues *n* and *q*, or the locking device **6**, **7**.

I claim as my invention:

1. An article of manufacture consisting of a flat web of paperboard cut and creased for the erection of a carton and carrying male and female locking elements arranged to admit of the compact stacking of a plurality of webs for shipment or storage, said web including four carton side-wall-forming portions extending side by side in succession and severally provided at opposite ends with flaps which when the web is erected provide the end walls of the carton, the flap at one end of one of said side-wall-forming portions carrying said male locking element, said male locking element being secured upon the surface of the flap that in the erected carton is the inner surface of the flap, said female locking element secured to the side-wall-forming portion which is second (in the succession of such portions) from the side-wall-forming portion whose flap carries said male locking element, said female locking element being secured upon that surface of the particular side-wall-forming portion which in the erected carton is the inner surface, both of said locking elements extending substantially in the plane of said web and arranged on opposite sides of the medial crease-line between said four carton side-wall-forming portions of the web, the male locking element adapted to be readily bent to upstanding position on the surface and within the edge of said flap to which it is secured, with the effect that (when said web is erected into a carton) said male and female elements, severally arranged on the inner surfaces of a flap and a side-wall-forming portion of the erected carton, may enter carton-locking engagement, with both male and female locking elements enclosed within the carton.

2. An article of manufacture consisting of a web of paperboard cut and creased for the erection of a carton, said web including four carton side-wall-forming portions arranged side by side in succession, said web being folded on the medial crease-line of said succession of four wall-forming portions and the otherwise free edges of the first and the fourth of said portions being united, said blank extending in substantially common plane, with two of said side-wall-forming portions lying face to face with the other two, said side-wall-forming portions severally provided at opposite ends with flaps which, when the web is erected, provide the end walls of the carton, the flap at one end of one of said side-wall-forming portions carrying a male locking element on its inner surface, and a female locking element secured to the inner surface of a side-wall-forming portion distinct from the side-wall-forming portion whose flap carries said male locking element, said locking elements extending in the plane of the doubled blank, with the effect that a plurality of such blanks may be compactly stacked, the male locking element adapted to be readily bent to upstanding position on the surface and within the edge of said flap to which it is secured, with the effect that (when said web is erected into a carton) said male and female elements, severally arranged on the inner surfaces of a flap and a side-wall-forming portion of the erected carton, may enter carton-locking engagement, with both male and female locking elements enclosed within the carton.

FREDERICK H. GROVES.