

July 15, 1952

H. H. STRAUSS
SHIPPING CONTAINER

2,603,402

Filed March 5, 1951

2 SHEETS—SHEET 1

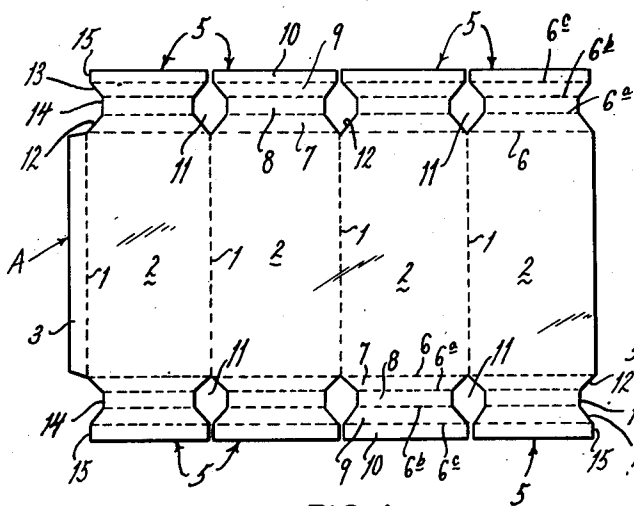


FIG. 1.

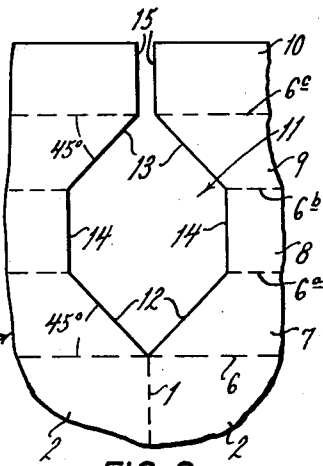


FIG. 2.

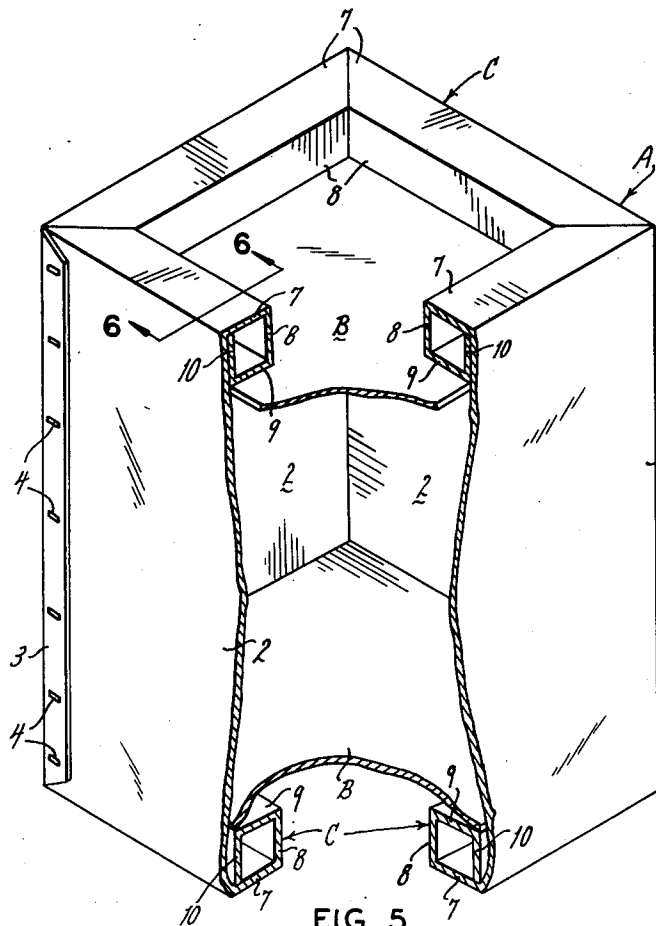


FIG. 5.

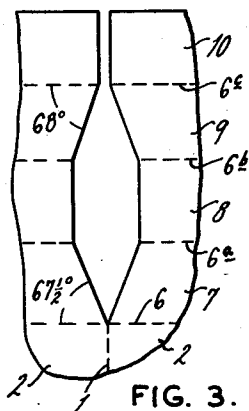


FIG. 3.

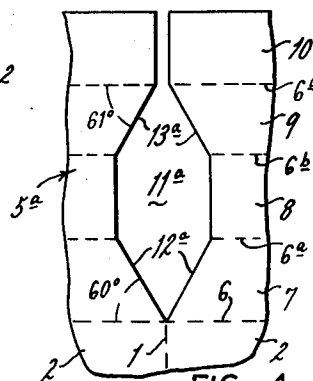


FIG. 4.

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2 SHEETS—SHEET 2

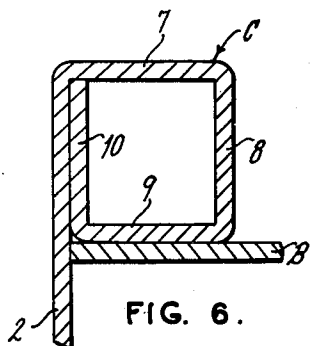


FIG. 6.

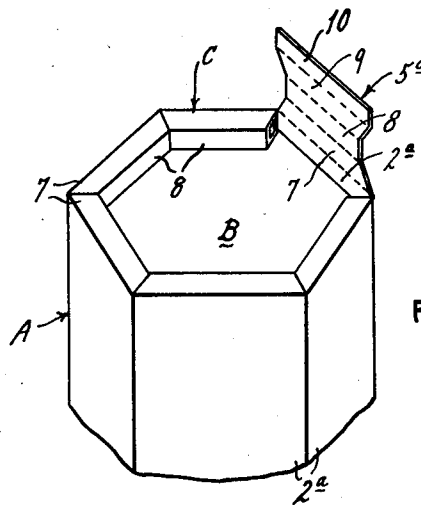


FIG. 7.

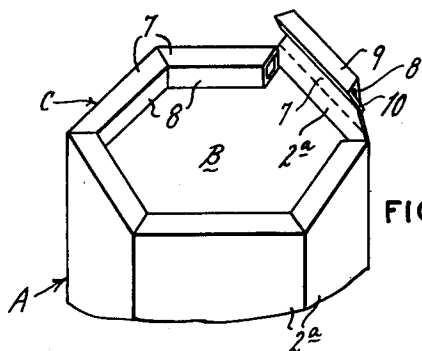


FIG. 8.

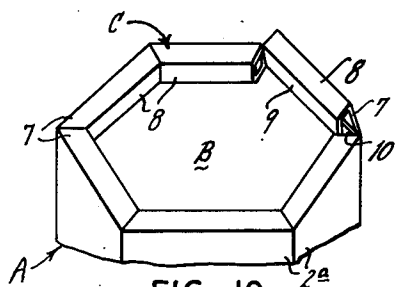


FIG. 10.

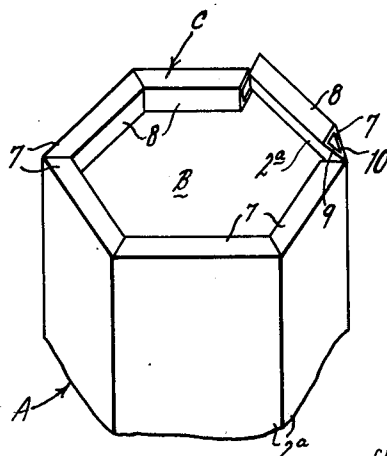


FIG. 9.

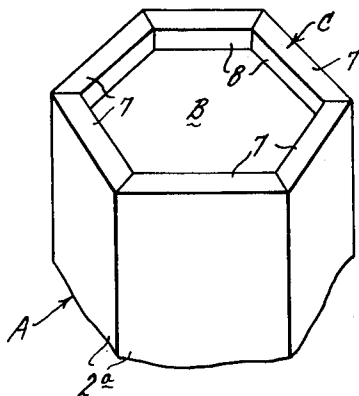


FIG. 11.

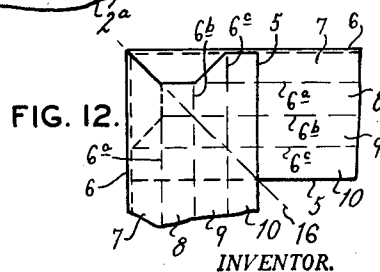


FIG. 12.

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2,603,402

SHIPPING CONTAINER

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Application March 5, 1951, Serial No. 213,919

1 Claim. (Cl. 229-5.5)

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This invention relates to heavy duty shipping containers, particularly of the class known as drumpaks comprising a multi-sided tubular body and a separate end closure disk fitting in one or each end of said tubular body and supported and/or retained therein by internal hollow ledge sections formed by inwardly folded marginal flaps of the side wall panels thereof.

The principal object of the present invention is to provide for automatically and irreversibly locking said hollow ledge sections together at their adjacent ends to form a continuous hollow inner peripheral supporting and/or retaining ledge for the end closure. Another object is to provide a continuous hollow ledge having a cross-sectional shape which will greatly increase the strength and rigidity of the ledge and container. Another object is to shape the folded ledge forming sections with a wide base for vertical stacking and to insure adequate stacking strength. These and other objects and advantages will become apparent hereinafter.

According to the present invention, the side wall panel flaps at one or both ends of the container are progressively folded inwardly along four spaced parallel score lines into said end of said container to form on the inner sides of said wall panels, hollow ledge sections of substantially rectangular cross section with the four right angled sides of the rectangular hollow ledge positioned, the outermost ledge panel flatwise against the inner face of said side panels, the next panel facing inwardly from said end of said container, the third panel parallel to the side panels and the fourth, facing outwardly perpendicular to said wall panels.

The invention is applicable to containers of various types and of square, rectangular, or polygonal shape.

The invention consists in the parts and in the arrangements and combinations of parts herein-after described and claimed. In the accompanying drawings which form part of this specification and wherein like numerals and like symbols refer to like parts wherever they occur:

Fig. 1 is a plan view of the blank from which the body of a square container is formed,

Fig. 2 is a plan view of the cut-out part of the body blank employed in the formation of a square or rectangular container,

Fig. 3 is a plan view of the cut-out part of the body blank employed in the formation of an octagonal container,

Fig. 4 is a plan view of the cut-out part of the body blank employed in the formation of a hexagonal container,

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Fig. 5 is a perspective view illustrating the container formed from the blank of Fig. 2 in its completed form with a portion removed to show detail,

Fig. 6 is an enlarged detail cross sectional view taken along the line 6-6 in Figure 5,

Figs. 7 through 11 illustrate the progressive steps taken in folding the last marginal flap of a hexagonal container down to its final position, and

Fig. 12 is a plan view of one corner of the container of Fig. 5 with the panels of adjacent sections folded inwardly along the scores 6, but not folded along the scores 6a, 6b, or 6c.

In Figs. 1, 2, 5 and 6 of the accompanying drawings this invention is shown embodied in the heavy duty shipping container comprising a rectangular open-ended body A and an end closure disk B fitting therein adjacent to each end thereof, said tubular body and end closures being preferably made of corrugated board, fibreboard, or like material. The tubular body of the container or carton is divided by vertical creases or scores 1 into four side wall panels 2 and is made from a flat blank having a flap 3 at one end that overlaps and is permanently secured by staples 4, tape, or other suitable means to the opposite end of said blank at one vertical corner of said tubular container.

Each side wall panel 2 is provided with upper and lower marginal flaps 5 that are each divided by four spaced parallel horizontal score lines 6, 6a, 6b, and 6c, respectively, into an inner marginal panel 7; an inner intermediate panel 8, an outer intermediate panel 9, and an outer marginal panel 10. As shown in Fig. 1, a hexagonal shaped notch 11 is formed in each end of each of the upper and lower marginal flaps 5 of each side wall panel 2. One side of each hexagonal-shaped notch 11 extends from the score line 6 to the score line 6a, thereby providing the inner marginal panel 7 with an oblique-angled end 12, and the other side of said notch extends from the score line 6b to the score line 6c, thereby providing the outer intermediate panel 9 with an oblique-angled end 13. The inner intermediate panel 8 and the outer marginal panel 10 are provided with square or right-angled ends 14 and 15, respectively.

The flaps 5 at each end of the tubular body A of the container are each bent progressively inwardly into said end along the score lines 6c, 6b, 6a and 6 to form a hollow horizontally disposed ledge section C of substantially square cross-section on the inside face of the side wall panel 2 which carries said flap. In this folded ledge

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forming position of each flap 5, the panels 7, 8, 9 and 10 thereof form the right angularly disposed sides of the rib section C. As shown in the drawings, the ledge section C is positioned with the panel 10 seated flatwise against the corresponding side wall panel 2 of the container, with the panel 9 disposed horizontally or extending normal to said side wall panel and facing inwardly away from the adjacent end of said container, with the panel 8 parallel to the side of said wall panel, and with the horizontal panel 7 facing outwardly toward said end. The vertical panel 10 of the hollow right-angled square ledge section C is positioned with its upper edge snugly seated in the vertex of the right angle formed by the horizontal panel 7 of said ledge section and the corresponding side wall panel 2 of the container.

All of the ends of the panels of the upper and lower marginal flaps 5 which extend from the side wall panel 2 and which form the hexagonal-shaped notch 11 are disposed at an angle that will bring said ends into conterminous endwise abutting relation when said flaps are folded to final relation. By this arrangement the ledge sections C are rigidly and irreversibly wedge locked in end to end relation in the end of the tubular body A of the carton to form therein a continuous internal peripheral ledge of hollow square cross-section.

Figure 12 is a plan view which illustrates the novel shape of the ledge panels required to form the wedge locking of the sections into a continuous ledge. In the drawing the adjacent ledge panels 7 only are shown in their final position, the panels 8, 9 and 10 and corresponding panels 8, 9 and 10 of the adjacent section being extended flatwise to illustrate the overlap on either side of the 45° diagonal line 16 bisecting the corner of the container. The overlap of adjacent panels 8, 9 and 10 to the right and to the left of the diagonal indicates the amount of board each of these corresponding panels requires to provide endwise abutment of each panel with its corresponding panel of the adjacent sections when the panels are folded into final position as described for irreversibly wedge locking each section into a continuous ledge.

The upper and lower end closure disks B snugly fit within the tubular body A of the container inwardly of the continuous hollow right-angled ledges at said ends, the lowermost end closure disk seating on the horizontal panel 9 of the lower ledge, while the uppermost end closure disk is supported on the contents of the container with its marginal portion overlapped by and retained flatwise against the horizontal panel 9 of the uppermost ledge.

In forming the continuous internal peripheral hollow square ledge in one end of the tubular body prior to the insertion of the first closure disk into said body, the marginal flap 5 of the side wall panel is progressively pre-folded along its score lines 6c, 6b, 6a, and 6, and then folded inwardly on the score line 6 into the tubular body as far as possible, then curled inwardly and upwardly to the said side wall to its final position. The remaining flaps are then folded in the same manner to complete the hollow peripheral square supporting ledge.

In forming the continuous internal peripheral hollow square ledge in the other end of the tubular body A of the container, after contents are in place, one marginal flap 5 at said end is first progressively folded along the score lines 6c, 6b,

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and 6a to form the hollow right-angled square ledge section, after which said flap is folded along the score line 6 to bring said section into its final position in the end of the container. The next adjacent flap 5 is then progressively folded along its score lines 6c, 6b, and 6a thereof to form a hollow right-angled triangle of the said flap with the outer marginal panel 10 positioned flatwise against the inner marginal panel 9 and then the said outer marginal panel 10 and intermediate panels 8 and 9 are folded inwardly thence upwardly until panel 10 is in its final position against the side wall panel 2. This facilitates the final step of folding the said flap 5 inwardly along its score line 6 to cause the ledge section panels 8, 9, and 10 thereof to snap or spring over the adjacent end of the finally positioned first ledge section with the end of each panel of the hollow square ledge in conterminous endwise abutting relation with the corresponding end of the adjacent hollow ledge panel. The remaining flaps are folded and snapped into final position in a similar manner. The last flap, however, when folded along the score lines 6c, 6b, and 6a to form the square rib section, overlaps the ends of the adjacent finally positioned ledge sections at opposite ends thereof, and this last ledge section when folded inwardly at score line 6 into its final position snaps over the ends of the finally positioned ledge section at opposite ends thereof, thus completing the continuous internal peripheral hollow square ledge and irreversibly locking all of the ledge forming sections together as a result of the abutting joints between the ends of the panels 7, 8, 9, and 10 of the adjacent rib sections.

The ledge panels 7 and 9 are actually inner and outer panels and are in substantially parallel spaced relationship with each other. The panels 8 actually define the opening in the container end. The panels 10 are in substantially parallel relationship with the panels 8 and these panels 10 are in face contacting relation to the adjacent side wall body panel 2. Thus, the combined panels 7, 8, 9 and 10 actually are rectangular in cross section and form the hollow ledge sections which, when properly disposed and arranged with respect to each other, form a continuous in-folded ledge at the ends of the container.

In the illustrations shown in Figs. 7 to 11, inclusive, the tubular body of the carton is of polygonal shape and the six side wall panels 2a have upper and lower marginal flaps 5a that are similar to, and are progressively folded along score lines 6c, 6b, 6a, and 6 in the same manner as the marginal flaps 5 of the hereinbefore described four-sided carton to form hollow square ledge forming ribs C of the same cross-sectional shape as the ledge forming ribs C of the four-sided carton. In this six-sided carton construction, the hexagon-shaped notches 11a with the ends of the flaps 5a, have their sides disposed at the particular angles required to provide the panels 7 with oblique-angled ends 12a, the panels 8 with right-angled ends, and the panels 9 with oblique-angled ends 13a, so that the ends of the panels 7 of adjacent ledge forming sections C and the ends of the panels 8, 9 and 10 are brought into conterminous endwise abutting relation to form wedge joints which lock the ledge sections together in the form of a continuous internal ledge of hollow square cross-section.

Within the limits of the tensile strength of the bendable material of which the container is constructed, increased weight of loading more ef-

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fectually interlocks the hollow ledge sections into a continuous irreversible support and/or retainer for the end closures of the container.

The described square ledge section results from a specific spacing of the score lines on the marginal flaps along which the flaps are progressively folded. The scores 6, 6a, 6b, and 6c are spaced apart in the ratio of approximately 1.000 : 1.000 : 1.102 : 1.102, respectively measured on their median planes. As an example of the practical application of the scoring principle, on receptacles of a diameter up to the order of 15", constructed of paperboard about 1/8" in thickness, the width of the panel 7 may be 1 1/8", the width of panel 8 may be 1 1/8", the width of panel 9 may be 1 1/4", and the width of panel 10 may be 1-14".

The mechanical interlocking feature of the ledge sections results from the novel angular construction of the scored marginal flaps. Each fold of the flaps is slotted or slit and cut out in such manner that when the flap is folded into its ultimate position with respect to the side wall panel, the plane of the end of each side of each square hollow ledge section thus formed will be in counterminous end abutment with the corresponding side of the continuous ledge section.

The angular cut-outs and slots or slits in the marginal flaps are constant for all square, hexagonal or all polygonal type receptacles regardless of variations in diameter or size of said wall panels within each class. The novel geometric design of the cut-outs is arrived at by (1) slotting or slitting the marginal flaps vertically along the median plane of the side wall score line 1 to the inter-section of the median plane of flap score 6c, (2) determining the angle of the cutting line which is to extend from the flap score 6 to the flap score 6a. This angle is derived from the formula—

$$\frac{180^\circ - \frac{360^\circ}{N}}{2} = \text{cutting angle}$$

in which N is the number of side walls of the receptacle. This cut is carried from each side of the intersection of the median planes of the vertical side wall score 1 and the flap score 6, thence to the median plane of the flap score 6a, then perpendicular to the score line 6a to the score line 6b, and thence to the median line of the flap score 6a, then perpendicular to the score line 6a to the score line 6b, and thence to the intersection of the median planes of the flap score 6c and the boundary lines of the vertical slot 1.

This cut-out with the corresponding reversed cut-out of the contiguous flap invariably forms the hexagonal shape irrespective of the number of sides of the receptacle. To illustrate, the cutting line for a square or rectangular receptacle, will be

$$\frac{180^\circ - \frac{360^\circ}{4}}{2} = 45^\circ$$

For a hexagonal shaped receptacle, the cutting line will be

$$\frac{180^\circ - \frac{360^\circ}{6}}{2} = 60^\circ$$

This geometric cut-out design results in the conterminous end abutment of each fold of each marginal flap with the corresponding fold of the contiguous marginal flap when said flaps

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are folded into their final position, and is an essential feature of the invention.

The novelty, therefore, of the invention comprises the construction, shape and assembly of the folds or panels of the marginal flaps of the container, which in their ultimate position form a continuous hollow rib of rectangular cross-section in combination and in cooperation with the design of cut-outs and slots or slits in said flaps whereby upon folding each rib section into its described form, it rests upon and overlaps the two adjacent folded flaps and may be snapped into its final place, completing the continuous hollow supporting peripheral rib, the overlapping portions automatically forming irreversible wedge locks, securing all of said rib elements securely in place.

The hereinbefore described container construction has several important advantages. It provides a strong and durable pilferproof and substantially siftproof container of simple and economical construction for packaging a wide variety of materials or articles. The body flaps may be quickly and easily folded and automatically and irreversibly wedge-locked together to form strong and rigid continuous hollow end closure retaining and/or supporting ledges for the end closure disks. The hollow rectangular cross-sectional shape of the ledges provides a wide base for stacking and greatly increases the strength and rigidity thereof, and the beveled ends of adjacent end and intermediate panels of the square folded ledge forming flaps match together perfectly along lines bisecting the angle of junction thereof to form wedge locked joints which prevent the flaps from being unfolded without destroying or damaging them.

The invention is applicable to containers of square, rectangular, triangular or polygonal shape merely by varying the angularity of the sides of the hexagon-shaped notches in the ends of the ledge forming flaps in accordance with the formula hereinbefore described. The size of the hollow rectangular cross-section of the ledges may be varied by varying the width and score line spacing of the ledge forming flaps according to the ratios hereinbefore described. The angularity of the sides of the hexagon-shaped notches remains constant for a container having a given number of sides regardless of the diameter of the container.

If desired, the top and bottom closure of the container may be glued to the hollow inner peripheral supporting ledge to provide a completely siftproof package. The outer marginal panel 10 may also be glued to the side wall panel if desired. The top and bottom closures may be made of wood, metal or other suitable material to provide increased strength where required and desired.

What I claim is:

A shipping container comprising a tubular body having a plurality of connected-together side wall panels, an extension of each panel constituting a similar hollow ledge section consisting of four substantially similar connected-together panels, an outer panel extending substantially at a right angle inwardly from the end of each side wall panel, an opening defining panel directly connected to the right angularly extending panel and disposed in spaced parallel relationship to each side wall panel, an inner panel directly connected to each opening defining panel and disposed in spaced parallel relationship to the right angularly extending panel, a free end panel con-

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nected directly to the inner panel and in face contacting relation to each adjacent body panel and substantially parallel with each opening defining panel, thus resulting in ledge sections rectangular in cross section, which ledge sections are disposed inwardly of the body at one end thereof to form a continuous ledge for an end closure, the opposite unconnected ends of each ledge section having a vertical edge on said free end ledge panel facing an adjacent body panel at the interior junctures of the connected body panels, the edges of the inner, outer and opening defining panels extending angularly inwardly away from their respective body panels, the adjacent ends of the ledge sections forming a fixed mitre joint at the interior junctures of the body and ledge panels and with the said vertical edges

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and the said inwardly extending edges in contacting relationship, and said contacting and vertical edges forming the said fixed joint for preventing displacement of any one or all of the ledge sections relative to each other and to the body.

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The following references are of record in the file of this patent:

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