Sept. 8, 1959 D. ROBINSON 2,903,033

CLOSURE DEVICES

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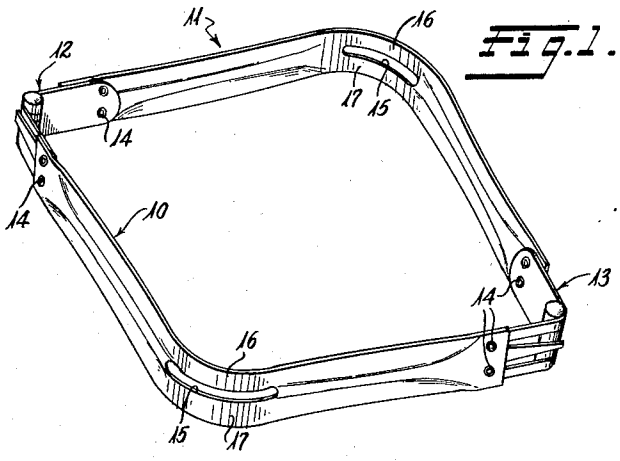


Fig. 1.

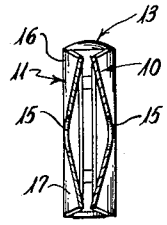


Fig. 4.

Fig 2.

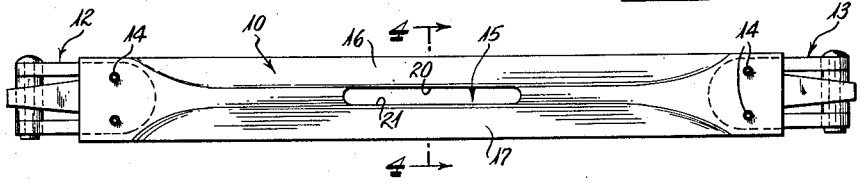


Fig. 3.

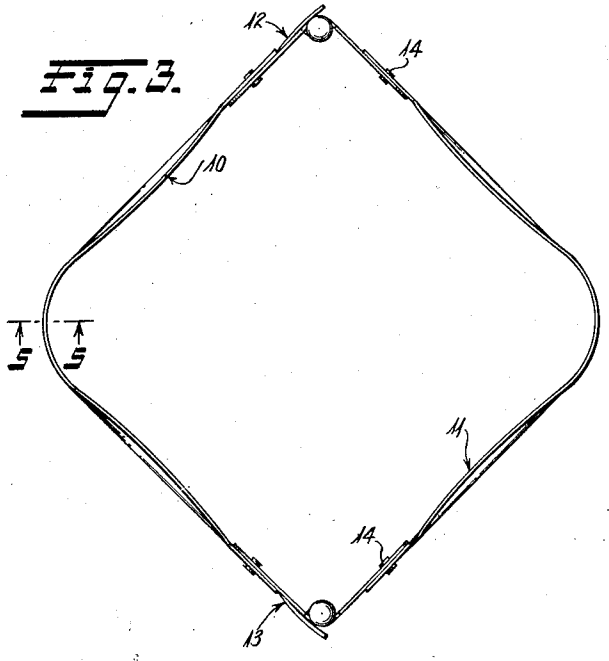
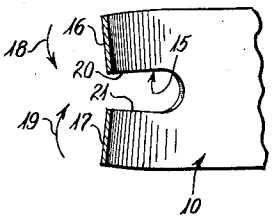


Fig. 5.



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Fig. 6.

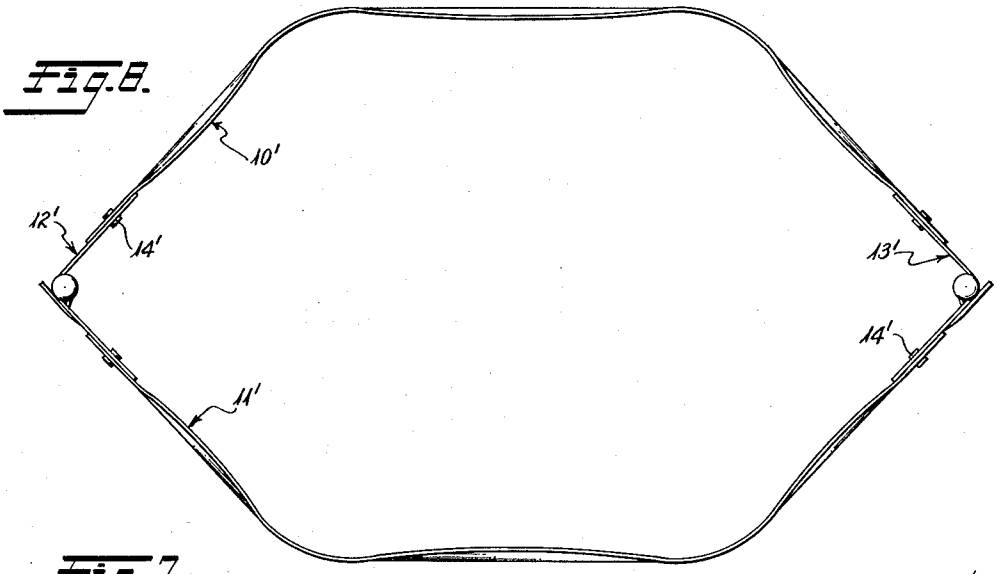
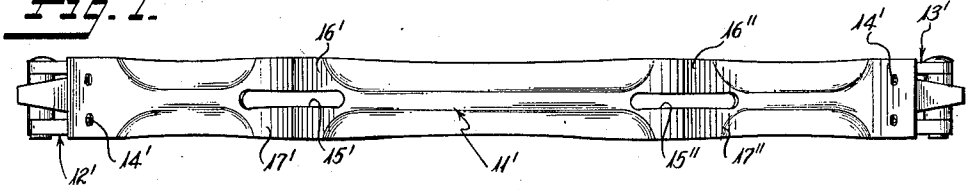


Fig. 7.



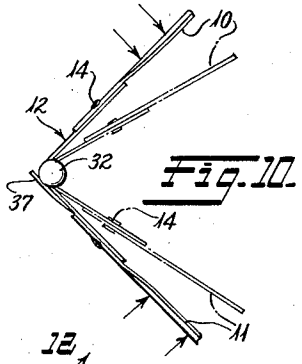


Fig. 10.

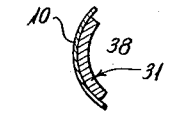


Fig. 12.

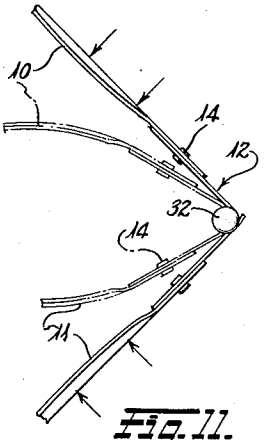


Fig. 11.

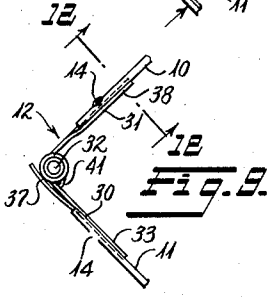


Fig. 9.

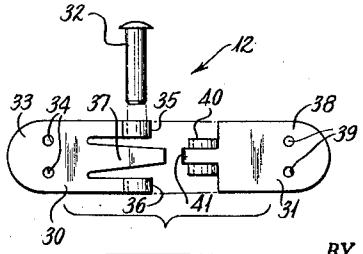


Fig. 8.

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2,903,033

CLOSURE DEVICES

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Application November 14, 1956, Serial No. 622,154

22 Claims. (Cl. 150—10)

The present invention relates to closure devices and more particularly to bag closing devices such as pocketbook frames, tobacco pouches, knitting bags, eyeglass cases, etc. The invention is specifically concerned with improvement and simplification of a pocketbook frame of the type disclosed in the U.S. patent to Lamarthe No. 2,142,904 granted January 3, 1939.

The problem of the present invention is to employ in the frame unreinforced spring bands with predetermined areas having a uniformly weakened resistance to curvature without sacrificing dimensional stability of the bands.

More particularly, a proper frame comprising opposed spring bands must be straight when closed and level when open. Further, the opening produced should be generally polygonal as well as stable when open and the corners of the polygonal opening should be smoothly rounded. Moreover, the opening and closing actions should be smooth and uniform and the closing action must be fast and is desirably achieved without buckling of the bands adjacent the hinges which secure the opposed spring bands together.

In accordance with the invention, the opposed spring bands are transversely curved and the sections of the bands which are intended to form the rounded corners of the polygonal frame when the frame is opened are provided with a longitudinally extending elongated slot which is defined by laterally spaced longitudinally extending marginal strips. In this manner, it has surprisingly been found that the spring bands need no longer be reinforced, that the unreinforced bands possess fully adequate dimensional stability and that a stable polygonal opening having smoothly rounded corners can be formed with a smooth and uniform opening action and a fast and uniform closing action.

The invention includes the mounting of the spring bands on the interconnecting hinges.

The invention will be more fully understood from the detailed description which follows taken in conjunction with the accompanying drawings in which:

Fig. 1 is a perspective view of a form of the invention in which the spring bands open to form a four-sided opening, the frame being shown in open position;

Fig. 2 is a side elevation of the frame of Fig. 1 in its closed position;

Fig. 3 is a top plan view of the open frame of Fig. 1;

Fig. 4 is a transverse cross-section of the closed frame taken on the line 4—4 of Fig. 2;

Fig. 5 is a partial cross-section of the slotted portion of one of the open spring bands, this view being taken on the line 5—5 of Fig. 3;

Fig. 6 is a top plan view of another form of the invention in which the spring bands open to form a hexagonal opening, the frame being shown in open position;

Fig. 7 is a side elevation of the open frame of Fig. 6;

Fig. 8 is an exploded view of a preferred form of hinge constructed in accordance with the invention;

Fig. 9 is a bottom plan view of the hinge of Fig. 8 in assembled condition and illustrates the manner in which the hinge is connected to the spring bands while retaining

the transverse curvature in the band at the point of connection;

Figs. 10 and 11 are partial top plan views illustrating the improved closing action achieved in accordance with the invention; and

Fig. 12 is a cross-section taken on the line 12—12 of Fig. 9.

Referring more particularly to Fig. 1, the numerals 10 and 11 designate metal spring bands which are transversely curved substantially entirely throughout their length, this transverse curvature being particularly apparent in Fig. 4. The bands 10 and 11 are positioned in parallel planes in juxtaposed relationship and are secured at each of their ends to hinge members 12 and 13. The particular manner of securement and the specific construction of these hinge members 12 and 13 constitute features of the invention but not the essence thereof. The securement of the bands to the hinge members and the structure of the hinge members will be more fully discussed hereinafter. For the present, the bands 10 and 11 are riveted, eyeleted, welded, soldered or clipped to the hinge members 12 and 13 as indicated by the numeral 14.

The spring bands 10 and 11 are longitudinally slotted, as indicated at 15. As a result, an intermediate portion of the length of the bands 10 and 11 is formed to constitute laterally spaced marginal strips 16 and 17.

Referring to Figs. 2 and 4, it can be seen that in the closed frame the transverse curvature of the bands 10 and 11 is retained through the slotted portions thereof. However, and with reference to Figs. 1, 3 and 5, it will be seen that in the open frame, some of the curvature is lost in the rounder corner portion of the bands which correspond with the slotted portions of these bands. This loss in curvature in the opened frame is particularly well shown by the positions of marginal strips 16 and 17 in Fig. 5, these positions being altered with respect to the positions of the strips 16 and 17 shown in Fig. 4 where the frame is closed. As will be evident, opening of the frame has been accompanied by movement of the marginal strips 16 and 17 as indicated diagrammatically by the arrows 18 and 19, respectively, in Fig. 5. The inner surfaces 20 and 21 of the marginal strips 16 and 17 move closer together and the slots 15 must be of sufficient width to permit this movement.

It is desired to point out that the loss in curvature and the attendant movement of the marginal strips 16 and 17 may not be particularly noticeable in all instances, although in many instances it is quite pronounced and easily observed. However, this loss in curvature and narrowing of the slots 15 always occurs and is essential to the invention.

It is desired to emphasize that the present invention provides valuable economies and unique and unusual results which are critical to the use of a transversely curved spring band having an elongated longitudinally extending slot defining laterally spaced apart marginal bands. To illustrate, elimination of one of the strips 16 or 17 entirely destroys the invention because there is a complete loss in dimensional stability. This loss in dimensional stability is demonstrated by the fact that the closed frame is not straight and the open frame is not level. Further, the slot 15 should be elongated for otherwise, the angle at the corner will become too sharp and the band will snap after repeated use. Moreover, the unreinforced spring bands of the invention are not the equivalent of the reinforced bands of the prior art because the elimination of reinforcing provides substantial economies in material and assembling costs and because the unreinforced slotted bands of the invention provide a smoother and more uniform opening and closing action and a stronger snap action.

Referring to the hexagonal frame form of the inven-

tion shown in Figs. 6 and 7, this form of the invention employs two longitudinally separated slots 15' and 15'' instead of the single slot used in the four-sided frame of Figs. 1–5.

Since the form of the invention shown in Figs. 6 and 7 is substantially identical with that shown in Figs. 1–5, primed numerals corresponding to those used in Figs. 1–5 are employed in Figs. 6 and 7 and these primed numerals correspond in significance to the numerals discussed in connection with Figs. 1–5.

Referring more particularly to the hinges 12 and 13, the hinge 12 is shown in the exploded view of Fig. 8. As can be seen, the hinge 12 includes brackets 30 and 31 and a pivot pin 32 which links the brackets 30 and 31 together into a unitary hinge member.

The bracket 30 includes a band securing portion 33 having rivet or eyelet holes 34 therein and a pair of marginal pin retaining cylindrical guides 35 and 36. The bracket 30 also includes a central tongue member 37.

The bracket 31 includes a band securing portion designated 38 having rivet or eyelet holes 39 and a single central pin retaining cylindrical guide 40.

The pin retaining guides 35, 36 and 40 are formed by bending each of the brackets 30 and 31 over upon itself. The portion of the bracket 31 which constitutes the guide 40 is formed to include a projecting knuckle so that when the guide 40 is formed by bending, this guide includes a lug 41 which is integral with the guide 40.

The hinge 12 is formed by placing the guide 40 adjacent the tongue 37 and in line with the guides 35 and 36. The pin 32 is then inserted through the aligned guides 35, 40 and 36. As will be understood, the spring hinges 12 and 13 are largely conventional and have only been described for the purpose of completeness and to facilitate an understanding of a valuable although non-essential feature of the invention. As will be obvious, the invention is not limited to any specific hinge construction.

In accordance with a feature of the invention, the band securing portions 33 and 38 of the brackets 30 and 31 are transversely curved as is best seen in Fig. 12 so that the curvature of the bands 10 and 11 can be retained adjacent the hinge 12. This prevents buckling when the bands 10 and 11 are made of light gauge metal. This undesirable buckling adjacent the hinge is common to present available frame constructions and can be tolerated. However, this buckling prevents the attainment of a smooth single step snap close action and the prevention of buckling adjacent the hinge constitutes a feature of the present invention.

Since the bands 10 and 11 are unreinforced (reinforcement having been rendered unnecessary by the slots 15) and because the bands 10 and 11 tend to resist buckling, when the frames are of small size and/or the band material is somewhat heavy, adequate buckle resistance may be present. However, in larger size frames and particularly where light gauges of metal are used, it has been found that resistance to buckling adjacent the hinge is greatly enhanced by transversely curving the band securing portions 33 and 38. In this way, the transverse curvature of the bands 10 and 11 adjacent the hinge is retained when these bands are secured to the hinges.

The absence of buckling is diagrammatically indicated in Fig. 10 where the arrows indicate the closing movement of the bands 10 and 11. As can be seen, the bands 10 and 11 remain in straight and regular polygonal shape is retained until the lug 41 has passed beyond dead center with respect to the tongue 37 at which point the tension of the tongue 37 against the lug 41 causes the bands to snap shut. As will be appreciated, the absence of buckling provides a firm resistance to closing pressure (normally applied at the center of the bands) and all movement of the bands 10 and 11 is immediately transmitted into relative movement between the lug 41 and the tongue 37.

More specifically, when buckling of the band is successfully avoided, closing pressure applied from opposed centers of the bands immediately results in progressive closing of the hinges. Therefore, the bands may be made to snap together smoothly by a light uniform pressure. When buckling does occur, the bands distort and a greater closing pressure is needed, this greater pressure being required after the bands have been distorted and when the band centers are close together despite the fact that the hinges are fully open.

The bands of the invention are preferably constituted by spring metal of uniform thickness. As an illustration of suitable spring metals, reference is made to high carbon steels such as blue watchspring steel. These materials are exemplified by steels containing about 0.60 to 1.25% carbon. A typical spring steel for use in the invention is a tempered spring steel having a carbon content of 0.65% and a hardness of Rockwell 48 to 51 on the C scale.

As previously indicated, the spring bands are transversely curved and a curvature having a radius from about approximately ½'' to approximately 1'' is particularly suitable. The preferred curvature is approximately ¾'' in radius. The curvature may be uniform throughout the width of the band or, if desired, the curvature can be non-uniform in which event it is preferred that the curvature be more pronounced in the central portion along the width of the band. In a particularly preferred form of the invention, the central portion along the width of the band is curved to form an approximately right angled curved channel, e.g. a channel having a radius of approximately 9/32'' over a ¼'' distance. The side marginal portions along the width of the band are formed flat to extend away from the curved central portion of the band at an angle of approximately 136° with respect to one another.

The thickness of the spring steel bands may vary over a wide range. Generally, it is preferred to select the thinnest gauge of metal having sufficient strength to provide dimensional stability in the band. Thus, the thickness of the band may range from a minimum of approximately 0.008'' to a maximum of approximately 0.020''. It will be appreciated that excessive thickness of the band simply adds to the cost and the weight of the same. It should be understood that many factors enter into the selection of a suitable band thickness among which a point of primary concern is the length of the frame which is to be produced. Thus, a frame having a length of 6'' may be satisfactorily produced using a band thickness of 0.010'' thickness or less whereas a 12'' or 14'' frame would preferably be constructed with a band having a thickness of 0.017'' to 0.020''.

It will be understood that still larger size frames can be made using a frame construction in accordance with the invention. In such instance, the thickness of the frame might desirably be greater than 0.020''. Generally speaking, the frames of the invention are between 3'' and 36'' in length although these frames are more usually between 4'' and 14'' in length.

The length of the slot in accordance with the invention is subject to wide variation. Generally speaking, the length of the slot exceeds its width and is made sufficiently long so that the metal band is not curved excessively so that repeated use, as by opening and closing the frame, will not cause failure in one of the marginal strips surrounding the slot.

The length of the slot is also influenced by the degree of curvature which is desired. Thus, in the construction of a four-sided frame of generally square outline in which the band must be bent through an angle at the rounded corner of approximately 90°, the slot is preferably constructed to be approximately 1½''–2'' long. However, the length of the slot may desirably vary between 1'' and 3½''. The length of the frame which is to be constructed also has a bearing on the length of

the slot which is most desirable and generally speaking, the longer the frame, the longer the slot which operates most successfully. The length of the frame is, however, of minor importance in governing the slot length since a slot approximately 1½" to 2" in length will work satisfactorily on all frame sizes from 4" to 14".

The width of the slot is primarily influenced by the thickness of the metal band employed. Desirably, the width of the slot is approximately 5 to 40% of the width of the frame and is preferably between 10 and 25% of the width of the frame. It will be appreciated that the greater the width of the slot, the greater is the lessening of the resistance to curvature or bending of the slotted portion of the band.

The side margins of the slot can be of any desired configuration, e.g. pointed, square, round, etc.

In a hexagonal frame the desired curvature in the bent portions of the frame when the frame is opened is reduced and the length of the slot can also be reduced. Thus, the slot may vary from ½" in length to 2" in length.

To specifically illustrate the present invention, a four-sided approximately square frame having a length of 9" can be constructed using a strip of tempered spring steel containing 0.65% carbon and having a hardness of Rockwell 48–51 on the C scale and having a thickness of 0.012". The strip was severed to form a pair of bands having a length of 7⅝" and a width of ⅝". The strip constituting the band was curved transversely to a radius of ¾". In this specific illustration of the invention, the steel bands can each be formed with a single centrally positioned slot having a length of 1¼" and a width of ⅛".

To further illustrate the invention, a 9" hexagonal frame can be constructed using the same steel bands above described with each band being provided with a pair of slots symmetrically positioned with respect to the length of the band and having their centers approximately 3½" apart. Each of these slots can be constructed to have a length of 1" and a width of 5/32".

To still further illustrate the present invention, a four-sided frame having a length of 6½" can be constructed using a pair of the above described steel bands each having a length of 5½" and a width of ⅝", the steel bands each being provided with a centrally positioned slot having a length of 1¼" and a width of ⅛".

Another illustration of the present invention is the provision of a 11" four-sided frame using a strip of tempered spring steel as above described but transversely curved to include a central channel portion having a radius of 9/32" extending over a lateral distance of ¼" and flat side marginal portions positioned at an angle of 136° to one another. This frame was constructed of a pair of steel bands made of the said strip each band having a length of 9⅝" and a width of ⅝" and centrally positioned slot having a length of 2" and a width of ⅛".

I claim:

1. A closure device comprising a pair of parallel juxtaposed spring bands, said spring bands being secured together at their ends by hinge members, each of said spring bands being transversely curved substantially throughout the length thereof and having at least one longitudinally extending elongated slot positioned intermediate the length of said band, said slot being defined between laterally spaced longitudinally extending marginal strips forming part of said band.

2. A closure device comprising a pair of parallel juxtaposed metal spring bands, a pair of spring hinge members, each of said hinge members connecting one end of one of said bands with the corresponding end of the other of said bands, each of said spring bands being transversely curved substantially throughout the length thereof and having at least one longitudinally extending elongated slot positioned intermediate the length of said band, said slot being centrally positioned with respect to the width of said band and being defined by laterally spaced longitudinally extending marginal strips, said marginal strips interconnecting opposite ends of each of said bands.

3. A closure device comprising a pair of parallel juxtaposed spring bands, said spring bands being interconnected at their ends by means of spring acting hinge members, each of said spring bands being of uniform width and thickness and being transversely curved substantially throughout the length thereof, said spring bands having at least one longitudinally extending elongated slot positioned intermediate the length thereof, said slot being defined between laterally positioned longitudinally extending marginal strips.

4. A closure device comprising a pair of parallel juxtaposed spring bands, said spring bands being secured together at their ends by means of spring hinge members, each of said spring bands being transversely curved and unreinforced substantially throughout the length thereof between said hinge members, said bands having at least one longitudinally extending elongated slot positioned intermediate the length of said band and defined between laterally positioned longitudinally extending marginal strips, said slot being centrally positioned with respect to the width of said band and said strips being spaced apart by said slot a distance sufficient to prevent engagement of the inner surfaces of said strips during opening and closing of said closure device.

5. A closure device as recited in claim 4 in which said bands are uniformly transversely curved.

6. A closure device as recited in claim 4 in which said bands are transversely curved to a greater degree in the central portion thereof.

7. A closure device as recited in claim 4 in which said bands are transversely curved in the central transverse portion along the width thereof to form an approximately right angled curved channel and the side marginal portions along the width of said bands are flat.

8. A closure device constituted by a frame having a length of between 4" and 14", said frame comprising a pair of parallel juxtaposed spring bands, said spring bands being secured together at their ends by means of spring hinge members, each of said spring bands being transversely curved substantially throughout the length thereof and having one longitudinally extending elongated slot centrally positioned along the length of said band, said slot being defined between laterally spaced longitudinally extending marginal strips forming part of said band, said bands having a thickness of between approximately 0.008" and 0.020".

9. A closure device as recited in claim 8 in which said bands are straight and of uniform width throughout the length thereof.

10. A closure device as recited in claim 9 in which said bands are transversely curved to a radius of approximately ½" to 1".

11. A closure device as recited in claim 10 in which said slot has a width of between 5 and 40% of the width of said band.

12. A closure device as recited in claim 11 in which said slot has a length of between approximately 1" and 3½".

13. A closure device constituted by a frame having a length of between 4" and 14", said frame comprising a pair of parallel juxtaposed spring bands, said spring bands being secured together at their ends by means of spring hinge members, each of said spring bands being transversely curved substantially throughout the length thereof and having a pair of spaced apart longitudinally extending elongated slots positioned intermediate the length thereof, said slots being defined between laterally spaced longitudinally extending marginal strips forming part of said band, said bands having a thickness of between approximately 0.008" and 0.020".

14. A closure device as recited in claim 13 in which said bands are straight and of uniform width throughout the length thereof.

15. A closure device as recited in claim 14 in which said bands are transversely curved to a radius of approximately ½" to 1".

16. A closure device as recited in claim 15 in which said slot has a width of between 5 and 40% of the width of said band.

17. A closure device as recited in claim 16 in which said slot has a length of between approximately ½" and 2".

18. A closure device comprising a pair of parallel juxtaposed spring bands, said spring bands being secured together at their ends by spring hinge members, each of said spring bands being transversely curved substantially throughout the length thereof and having at least one longitudinally extending elongated slot positioned intermediate the length of said band and defined between laterally spaced longitudinally extending marginal strips, each of said spring hinge members being constituted by a pair of brackets mounted on a single pin, each of said brackets being provided with a band securing portion which is transversely curved and means securing the transversely curved ends of said bands to said transversely curved band securing portions of said hinges.

19. In a closure device comprising a pair of parallel juxtaposed unreinforced spring bands, said spring bands being secured together at their opposite ends by spring hinge members with each of said spring bands being transversely curved substantially throughout the length thereof, the improvement which comprises preventing buckling of said bands adjacent said hinges by transversely curving the portion of said hinges to which said bands are connected whereby the ends of said bands will retain their transverse curvature at the point of connection with said bands with said hinge members.

20. A closure device comprising a plurality of spring bands, said spring bands being secured together at their ends by hinge members, each of said spring bands being transversely curved substantially throughout the length thereof and having at least one longitudinally extending elongated slot positioned intermediate the length of said band, said slot being defined between laterally spaced longitudinally extending marginal strips forming part of said band.

21. In a closure device, a spring band, said spring band being transversely curved substantially throughout the length thereof and having at least one longitudinally extending elongated slot positioned intermediate the length of said band, said slot being defined between laterally spaced longitudinally extending marginal strips forming part of said band.

22. A closure device comprising a pair of parallel juxtaposed spring bands, said spring bands being secured together at their ends by hinge members, each of said spring bands being transversely curved substantially throughout the length thereof, of a portion intermediate the ends of said band, said curved portion including an area having a uniformly weakened resistance to curvature intermediate the ends of said curved portion.

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