

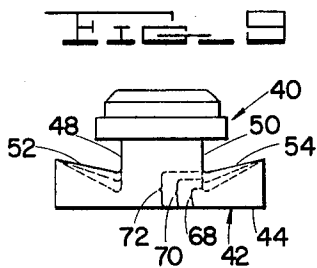
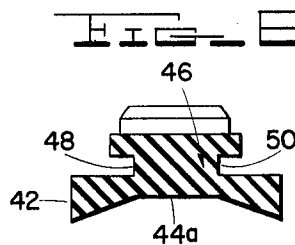
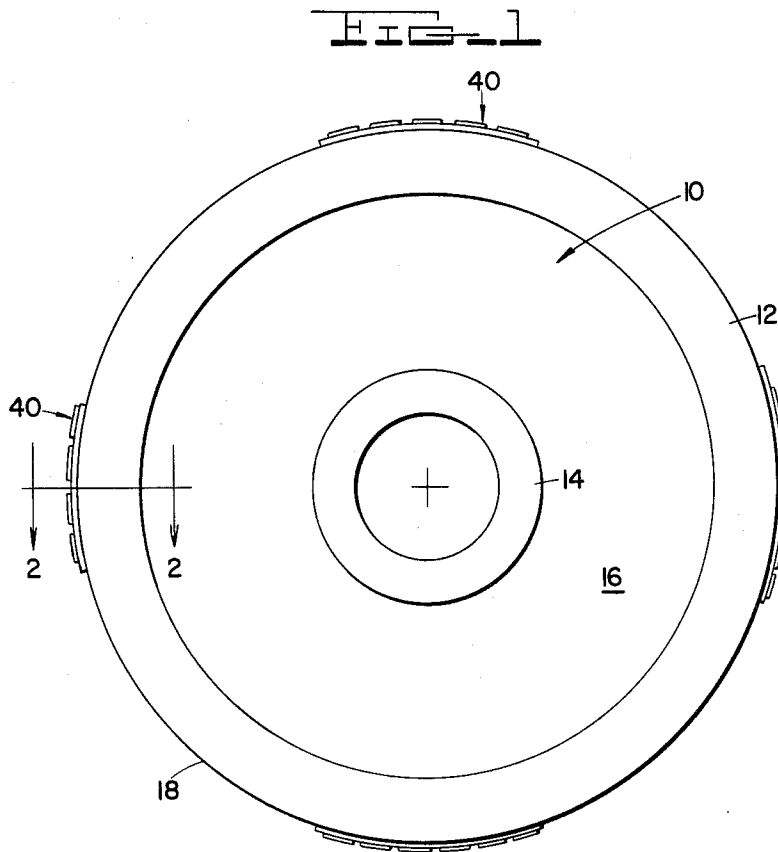
Jan. 25, 1966

M. B. BEAVER
TYPE HAVING FLEXIBLE BASE OF VARYING THICKNESS
TO FORM HINGE MEANS

3,230,880

Filed Sept. 20, 1962

2 Sheets-Sheet 1



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FIG. 2

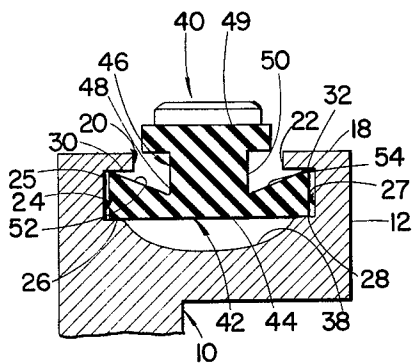


FIG. 6

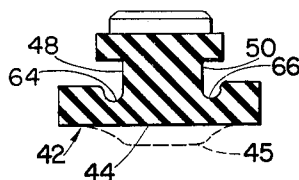


FIG. 3

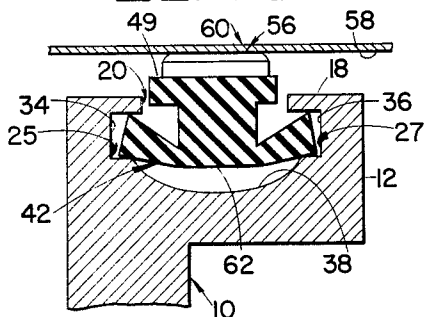


FIG. 7

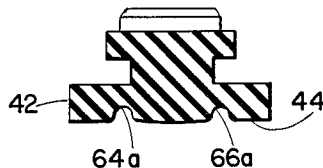


FIG. 4

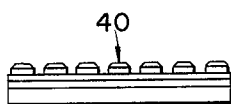


FIG. 5



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TYPE HAVING FLEXIBLE BASE OF VARYING THICKNESS TO FORM HINGE MEANS

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Filed Sept. 20, 1962, Ser. No. 225,039

8 Claims. (Cl. 101—380)

The present invention relates to an improved printing device and more particularly to a printing device employing type formed of resilient material, such as rubber, for printing indicia, symbols or the like on flat, irregular or curved surfaces.

Products are conventionally packaged in metal, plastic, cardboard and the like containers, depending upon whether or not the products are in the form of liquid, cream, solids and the like. Beverages, for example, are conventionally packaged in tin cans, glass bottles, or plastic containers, while creams and solids are conventionally packaged in metal, plastic, cardboard and the like containers. As these various products are processed and packaged, it is frequently desirable to imprint on the containers certain variable indicia, such as a date code indicating the date of packaging. For this purpose, printing devices employing rubber type have been heretofore used; however, such devices have not been capable of providing a satisfactorily distinct impression at a high rate of speed on all types of surfaces, whether they be flat, curved or irregular.

In my U.S. Patent No. 3,071,071, dated January 1, 1963 and entitled "Printing Device," I disclosed and claimed a novel arrangement for obtaining more satisfactory results than had theretofore been possible. While the printing device of my prior patent constituted an improvement, it was discovered that a relatively soft rubber could more advantageously be used in lieu of a harder rubber in those instances in which the shape and integrity of the imprint was to be maintained during a somewhat difficult printing operation. The present invention constitutes an improvement over my prior arrangement in the respect that a harder rubber may be used for providing the clear, legible impressions on various surfaces whether they be flat, curved or irregular. My improved arrangement retains the functional benefits of my prior arrangement even though a higher durometer rubber is used, such that integrity and fidelity of printing may be achieved in those instances in which printing is performed at a high rate of speed and on various types of surfaces.

It is therefore an object of my invention to provide an improved printing device employing type formed of resilient material of relatively high durometer whereby indicia may be imprinted on various different surfaces at a relatively high rate of speed even though the surfaces may be flat, irregular or curved.

Another object of my invention is to provide a unique design of rubber type wherein the desired flexural characteristics may be obtained even though the durometer of the rubber used in the segments is higher than would normally be used.

Other objects will become apparent as the description proceeds.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevation of a high speed printing wheel which embodies the concept of my present invention;

FIG. 2 is a fragmentary sectional illustration of a portion of the wheel of FIG. 1 taken substantially along section line 2—2 of FIG. 1;

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FIG. 3 is a fragmentary sectional illustration similar to FIG. 2 but showing the rubber type as being flexed in a normal printing operation;

FIGS. 4 and 5 are side and top views, respectively, of a segment of the rubber type of the nature employed in the wheel of FIG. 1 and shown in cross-section in FIGS. 2 and 3;

FIG. 6 is a cross-section of a different embodiment of the rubber type segment of the preceding figures;

FIG. 7 is a cross-sectional illustration of still a different embodiment of the rubber type segment;

FIG. 8 is a cross-sectional illustration of yet another embodiment of the segment; and

FIG. 9 is an end view of a type segment of FIGS. 2 and 3 and is used in explaining the unique features of the invention.

Referring to the drawings, and more particularly to FIG. 1, there is shown a wheel-like type holder 10 having an outer rim portion 12 which is integrally joined to a hub portion 14 by means of a disc-shaped web 16. This holder 10 may be formed of any suitable material such as a strong plastic or metal. Steel has proven to be a satisfactory material. The rim 12 is provided with an outer, coaxial, cylindrical surface 18 which is provided with a coaxial, annular groove generally indicated by the reference numeral 20. This groove 20 is provided with spaced-apart, generally parallel, radial sides 22 and 24, respectively, which are provided with two juxtaposed axially extending coaxial slots 25 and 27 having lower or inner, cylindrical sides 26 and 28 which are of a common diameter, two outer, cylindrical sides 30 and 32 of a common diameter, and inner connecting radially extending bottoms 34 and 36, respectively. The depths of these slots 25 and 27 will become apparent from the description to follow.

The bottom of the annular groove 20 is indicated by the numeral 38 and as clearly shown in FIGS. 2 and 3 is spaced radially inwardly from the slot sides 26 and 28 leaving the latter as having only relatively short, axial lengths. The purpose of this undercut 38 will be explained in more detail hereinafter.

A segment of type generally indicated by the numeral 40 is molded of suitable resilient material, such as rubber, and in a working embodiment of this invention has a generally H-shaped cross-section as shown. It will be understood that a plurality of such segments 40 may be provided in predetermined spaced-apart angular relationship as best seen in FIG. 1. In the usual instance, the type segment 40 is elongated as shown in FIGS. 4 and 5 and is provided with a plurality of numbers, letters or similar indicia as shown. In cross-section, the type segment shown in FIGS. 2 and 3 comprises a base leg generally indicated by the reference numeral 42 which is elongated and provided with a straight, flat surface 44. Upstanding from the base leg 42 in a direction substantially perpendicular thereto and also intermediate its ends is a relatively wide bar portion indicated generally by the reference numeral 46. This bar portion 46 is provided with opposite parallel sides 48 and 50 which are disposed well within the annular groove 20, a top leg 49 being provided on the opposite end of the bar portion 46 which extends in a direction substantially parallel to the base leg 42. The length of the top leg 49 is smaller than the distance between the sides of the groove 20 such that it may be moved downwardly between the sides without contacting the same.

The upper or outer surface of the base leg 42, on the side opposite surface 44, is uniquely tapered as shown in FIGS. 2 and 3, there being two identically shaped but oppositely disposed surfaces 52 and 54 as shown. Each of these surfaces 52 and 54 is straight and tapers inwardly and downwardly toward the respective bar

portion side 48, 50 and the bottom surface 44 of the base leg 42. Thus, the thickness of the base leg in the two regions immediately adjacent to or in line with the bar portion sides 48 and 50 is less than that at the outer ends. In other words, the base leg 42 is more flexible in the localized regions immediately adjacent to the bar portion sides 48 and 50 than it is in the portions laterally outwardly therefrom.

As will be obvious to a person skilled in the art, the thickness of the base leg 42 must be such as to support the weight of the entire type segment without distorting or deforming.

The opposite ends of the base leg 42 are inserted into and movably received by the two annular slots 25 and 27, respectively, formed in the sides 22 and 24 of the annular groove 20. The width of these slots, in other words the distance between the sides 26, 30 and 28, 32 is substantially equal to the thickness of the outer extremities of the base leg 42 whereby these outer extremities may slide in the respective slots. The distance between the bottom walls 34 and 36 of the two slots should be as long as the base leg 42 and may be slightly longer as shown.

As shown in FIG. 2, only the outer end portions of the base leg 42 are seated on the sides 26 and 28, respectively, of the two slots 25 and 27, respectively, such that an annular cavity or space is provided between the inner surface 44 of the type segment and the undercut 38. In the normal position as shown in FIG. 2, the outer face of the type segment is spaced outwardly from the surface 18 of the type holder while the inner surface 44 is spaced from the bottom wall or undercut 38 of the groove 20.

Referring now to FIG. 3, when the type face 56 engages a surface 58 upon which an impression is to be made, downward force in the direction shown by the arrow 60 is exerted upon the type segment 40 thereby causing base leg 42 to deform downwardly into the undercut portion 38 and the ends of the base leg to slide away from the bottom slot walls 34 and 36 thereby preventing distortion of the top leg 48 and the type face 56. More specifically, since the base leg is thinner in the regions immediately adjacent to the bar portion sides 48 and 50, as shown in FIG. 3 these portions will bend or pivot somewhat on the order of hinges such that the outer portions of the base leg bend very little. Also, the central portion 62 and the surface 44 of the base leg 42 remain in substantially the same shape as that prior to deformation such that no bending or distortional forces are exerted on the bar portion 46 which might be communicated upwardly through to the type face 56.

Preferably, the rubber of which the type segment is fabricated is of 75-durometer such that the shape and integrity of the type face 56 can be maintained during a printing operation even though the surface upon which an impression is being made is irregular and perhaps quite rough.

It will now be readily seen that this invention permits the type to be forcibly pressed against the surface being printed without causing the type face to distort and thereby produce a smear instead of a clear imprint, all the distortion being taken by the base leg 42 which deflects downwardly into the undercut portion 38. The opposite ends of the base leg 42 slide in the two slots 25 and 27, respectively, during the application of downward force on the type segment and thus, since these ends are not restrained, there is no substantial stretching of the base leg 42 thereby substantially minimizing fatigue of the rubber from which the type segment is formed. Also, by reason of the thinner sections in the base leg 42 immediately adjacent to the bar portion sides 48 and 50, it will be noted that very little distortion of the base leg 42 occurs when the type segment 40 is depressed as shown in FIG. 3, the distortion being limited to the localized areas where the hinge action as aforesaid occurs. This provides for a more controllable flexure

of the type segment in the performance of high speed printing operations and also permits the use of a higher durometer rubber in the type segment such that clear, legible impressions may be made without smudging or smearing. It will be seen that the provision of the undercut portion 38 eliminates the cushions or lost motion springs commonly provided in prior printing devices which become clogged with ink thus necessitating frequent cleaning.

Careful analysis of the motion of the type segment based on FIGS. 2 and 3 reveals that the bar portion 46 acts very similar to a plunger or piston and undergoes little or no distortional forces in the process of being flexed to the position shown in FIG. 3. This freedom from distortion is accompanied with the somewhat universal degree of flexure of the bar portion 46 such that the type face 56 can always conform to the general plane of the surface 58 upon which an impression is being made. In other words, the bar portion 46 is free to tilt to a limited extent while flexing downwardly without impairing the character of the impression which is being made on the surface 58.

Another valuable feature realized from the particular thinned-out regions of the base leg as already described is the fact that the force required to flex the type from its illustrated position of FIG. 2 to its extreme illustrated position of FIG. 3 wherein the bottom surface 44 could contact the bottom wall 38, remains fairly constant throughout this entire distance.

The outer, thicker portions of the base leg 42 provide a means for slidably mounting and holding the type segment in the holder.

In FIG. 6 is illustrated a slightly different embodiment of the type segment invention wherein like numerals indicate like parts. The primary difference between this particular type segment and the one illustrated in FIGS. 2 and 3 is that instead of the upper surface of the base leg being tapered, it is formed substantially flat and parallel to the bottom surface 44 with the exception that immediately adjacent to or in line with the sides 48 and 50 of the bar portion, as shown, two elongated grooves or recesses 64 and 66, respectively, are provided. This serves to provide thinner sections or portions in the base leg 42 in the two regions immediately adjacent to or in line with the bar portion sides 48 and 50 whereby the bar portion may act as a plunger or piston in substantially the same manner as the arrangement of FIGS. 2 and 3. When flexed under the conditions shown in FIG. 3, the bottom surface 44 flexes somewhat along the dashed line 45.

In FIG. 7, the different embodiment of the type segment there illustrated differs from that shown in FIG. 6 only in the respect that the recesses 64a and 66a are disposed oppositely in the base leg 42 from the recesses 64 and 66, respectively, of FIG. 6.

In FIG. 8, this arrangement is the opposite of that shown in FIGS. 2 and 3 wherein the upper surface of the base leg 42 is formed substantially flat and normal to the sides 48 and 50 of the bar portion 46 while the bottom surface 44a is angled upwardly and inwardly from the outer ends thereof to provide a thinner section in the base leg in the two regions immediately adjacent to or in line with the bar portion sides 48 and 50, as shown.

The thickness of the base leg in the regions immediately adjacent to or in line with the bar portion sides 48 and 50 may be varied depending upon the shape or type of surface upon which an impression is to be made. For example, for a flat, unyielding, hard surface, these regions will be thicker than they should be in the case of imprinting upon irregular and more flexible surfaces. For irregular surfaces, it is desired for the type to deform in accordance therewith but still make a clear impression, and this is accomplished by reason of the fact

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that the thinner base regions provide more flexure where it is needed.

Thus, using the same holder 12, it is possible to provide a type segment 40 having the precise degree of flexure in the base leg as may be required to perform any given printing operation. The same holder 12 therefore has utility for any given printing operation, the flexure of the type segment being the only part in the assembly which needs to be varied. Flexure of the type is controllable so as to be able to print on any given surface.

This is best illustrated in FIG. 9 wherein the numerals 68, 70 and 72 indicate different thicknesses, respectively, in the aforesaid regions. The type segment having the thinnest dimension 68 is used to make impressions on surfaces which are yielding (flexible) or quite irregular, such as unsupported surfaces of thin cardboard cartons. Under these conditions, maximum flexibility in the type segment is desired. The intermediate thickness 70 is used to make impressions on unyielding, irregular surfaces, such as molded plastic bottles having undulating surfaces. The third and maximum thickness 72 is used on relatively flat, unyielding surfaces such as surfaces of metallic containers.

The same idea as to different thicknesses equally applies to the embodiments as shown in FIGS. 6, 7 and 8.

While my improved printing device has been shown as being incorporated in a wheel-like holder 10 useful in the production line imprinting of indicia upon containers or packages, it will be readily understood that my invention is not limited to such an arrangement and that my improved printing device may be incorporated in a hand-operated device.

The type segments as described may be conveniently inserted into and removed from the slots in the type holder by merely deforming the base leg of the type segments to an extent adequate to fit the segment into the slots.

In the following, dimensions of a working embodiment of this invention, as illustrated in FIGS. 2 and 3, are given by way of example only and not by way of limitation, it being intended that the scope of protection covering the invention be that defined by the claims appended hereto.

Length of base leg 42 (in cross-section) -----inch--	1/2
Thickness of outer extremities of base leg 42--do----	1/8
Thickness of base leg 42 in line with bar sides 48 and 50 -----do-----	1/16
Thickness of bar portion 46 -----do-----	3/16
Length of bar portion 46 between top leg 49 and base leg 42 -----do-----	3/32
Length of top leg 49 -----do-----	5/16
Thickness of top leg 49 -----do-----	1/16
Height of characters 56 -----do-----	1/16
Rubber -----durometer--	75

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention.

What is claimed is:

1. A segment of rubber type comprising a body of rubber material, said body comprising, in cross-section, an elongated base leg having opposite ends and upper and lower surfaces which are spaced apart, said base leg having a thickness which is defined by said upper and lower surfaces, said lower surface being substantially straight and flat, a bar portion upstanding from said upper surface intermediate said ends, said bar portion having opposite spaced apart sides, said upper surface starting with said opposite ends, tapering toward said lower surface in a direction toward said bar portion sides, respectively, and terminating adjacent said sides, the length of each portion of the base leg between an

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end thereof and said bar portion being greater than the thickness of said base leg in line with the sides of said bar portion, the portions of said base leg immediately adjacent to said bar portion sides being more flexible than the portions outwardly therefrom thereby providing hinge-like portions in the regions where the base leg attaches to said bar portion, an elongated top leg on said bar portion spaced from and substantially parallel to said base leg, said bar portion extending in a direction normal to the length dimension of said base leg, said base leg having a thickness which supports the weight of itself as well as said bar portion without distortion.

2. A segment of rubber type comprising a body of rubber material, said body comprising, in cross-section, an elongated base leg having opposite ends and upper and lower surfaces which are spaced apart, said base leg having a thickness which is defined by said upper and lower surfaces, said lower surface being substantially straight and flat, a bar portion upstanding from said upper surface intermediate said ends, said bar portion having opposite spaced apart sides, said upper surface starting with said opposite ends, tapering toward said lower surface in a direction toward said bar portion sides, respectively, and terminating adjacent said sides, the length of each portion of the base leg between an end thereof and said bar portion being greater than the thickness of said base leg in line with the sides of said bar portion, the portions of said base leg immediately adjacent to said bar portion sides being more flexible than the portions outwardly therefrom thereby providing hinge-like portions in the regions where the base leg attaches to said bar portion, said bar portion having a top portion spaced from said base leg, said bar portion extending in a direction normal to the length dimension of said base leg, said base leg having a thickness which supports the weight of itself as well as said bar portion without distortion.

3. A segment of rubber type comprising a body of rubber material, said body comprising, in cross-section, an elongated base leg having opposite ends and upper and lower surfaces which are spaced apart, said base leg having a thickness which is defined by said upper and lower surfaces, said lower surface being substantially straight and flat, a bar portion upstanding from said upper surface intermediate said ends, said bar portion having opposite spaced apart sides, said upper surface being substantially parallel to said lower surface and having two recesses therein adjacent to said bar portion sides, respectively, whereby said base leg in the regions in line with said bar portion sides is thinner and more flexible than in the laterally outer regions thereof, the length of each portion of the base leg between an end thereof and said bar portion being greater than the thickness of said base leg at said recesses thereby providing hinge-like portions in the regions of said recesses, said bar portion extending in a direction normal to the length dimension of said base leg, said base leg having a thickness which supports the weight of itself as well as said bar portion without distortion.

4. A segment of rubber type comprising a body of rubber material, said body comprising, in cross-section, an elongated base leg having opposite ends and upper and lower surfaces which are spaced apart, said base leg having a thickness which is defined by said upper and lower surfaces, a bar portion upstanding from said upper surface intermediate said ends, said bar portion having spaced apart opposite sides, said base leg being thinner in the two first regions in line with said bar portion sides, respectively, than in the second regions laterally outwardly thereof, the length of each portion of the base leg between an end thereof and said bar portion being greater than the thickness of said base leg at said first regions thereby providing hinge-like portions in said first regions, said base leg being more flexible in said first regions than in the thicker portions thereof, said

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bar portion extending in a direction normal to the length dimension of said base leg, said base leg having a thickness which supports the weight of itself as well as said bar portion without distortion.

5. The segment of claim 1 formed of 75-durometer rubber.

6. The segment of claim 4 formed of 75-durometer rubber.

7. A segment of rubber type comprising a body of rubber material, said body comprising, in cross-section, an elongated base leg having opposite ends and upper and lower surfaces which are spaced apart, said base leg having a thickness which is defined by said upper and lower surfaces, said lower surface being substantially straight and flat, a bar portion upstanding from said upper surface intermediate said ends, said bar portion having opposite spaced apart sides, said upper surface being substantially parallel to said lower surface, said lower surface having two recesses therein in line with said bar portion sides, respectively, whereby said base leg in the regions immediately adjacent to said bar portion sides is thinner and more flexible than in the laterally outer regions thereof, the length of each portion of the base leg between an end thereof and said bar portion being greater than the thickness of said base leg at said recesses thereby providing hinge-like portions in the regions of said recesses, said bar portion extending in a direction normal to the length dimension of said base leg, said base leg having a thickness which supports the weight of itself as well as said bar portion without distortion.

8. A segment of rubber type comprising a body of rubber material, said body comprising, in cross-section, an elongated base leg having opposite ends and upper and lower surfaces which are spaced apart, said base leg having a thickness which is defined by said upper and

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lower surfaces, said upper surface being substantially straight and flat, a bar portion upstanding from said upper surface intermediate said ends, said bar portion having opposite spaced apart sides, said lower surface starting with said opposite ends, tapering toward said upper surface in a direction toward said bar portion sides respectively, and terminating adjacent said sides, the length of each portion of the base leg between an end thereof and said bar portion being greater than the thickness of said base leg immediately adjacent to the sides of said bar portion, the portions of said base leg in line with said bar portion sides being more flexible than the portions outwardly therefrom thereby providing hinge-like portions in the regions where the base leg attaches to said bar portion, said bar portion having a top portion spaced from said base leg, said bar portion extending in a direction normal to the length dimension of said base leg, said base leg having a thickness which supports the weight of itself as well as said bar portion without distortion.

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