

[54] **SPORTS RACKET**
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[51] **Int. Cl.**..... **A63b 49/12**
[58] **Field of Search**.... **173/73 R, 73 C, 73 D, 73 H, 173/73 J**

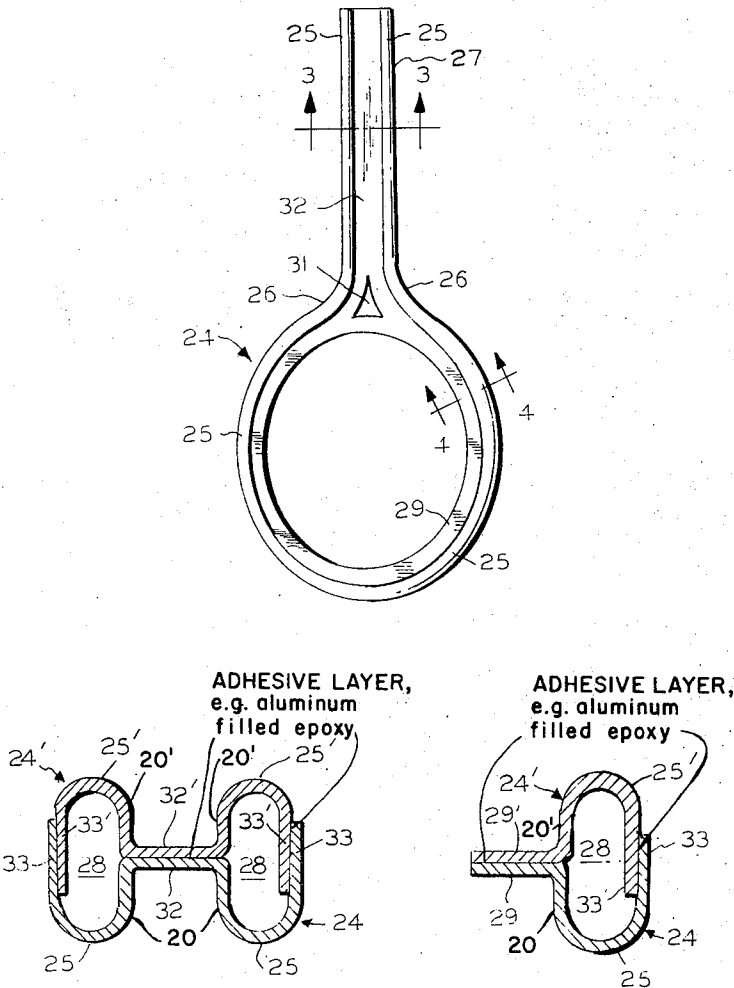
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[57] **ABSTRACT**
A frame for a sports racket comprising a pair of adhesively united metallic stampings and a handle for same. Each stamping is made from a metallic blank initially shaped similarly to the outline of the finished frame. Each blank is stamped to form a channel around its periphery. The channels in the respective blanks being so sized that when the blanks are assembled the outer legs of the channels overlap one another. The handle may be a molded rigid structural plastic foam.

6 Claims, 10 Drawing Figures



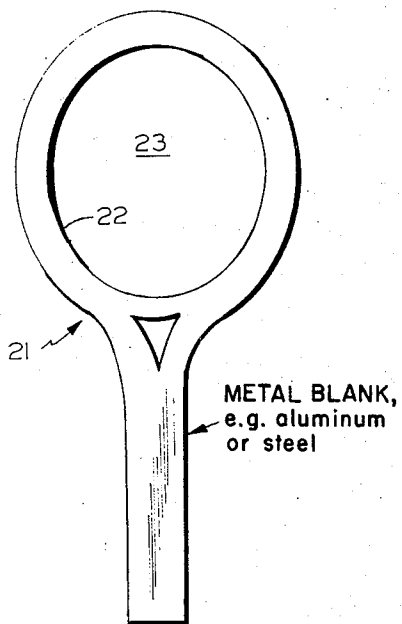


FIG. 1

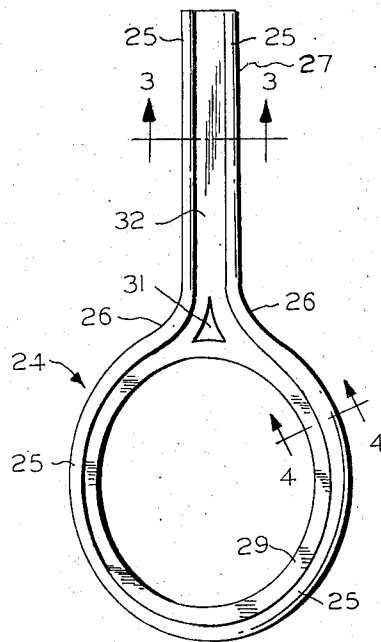


FIG.2

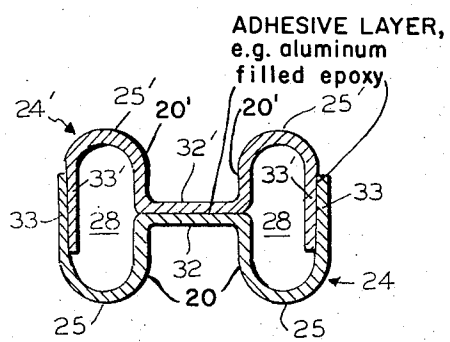


FIG.3

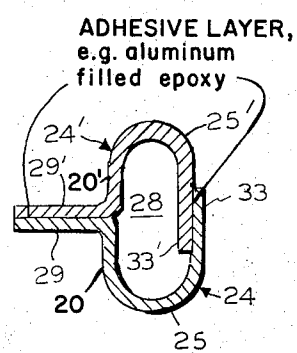
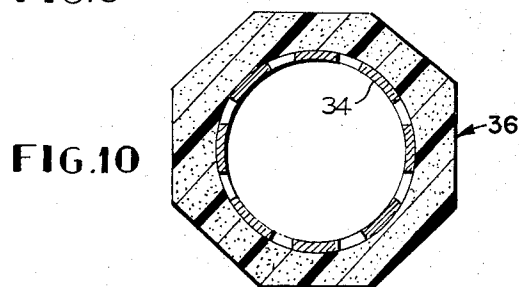
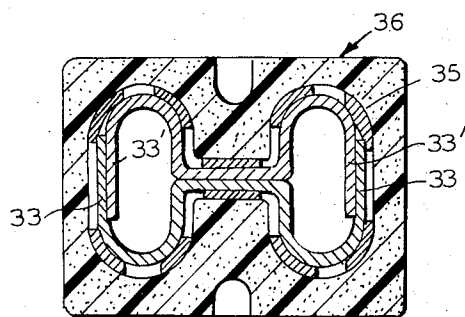
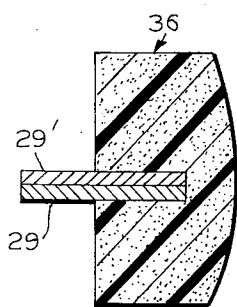
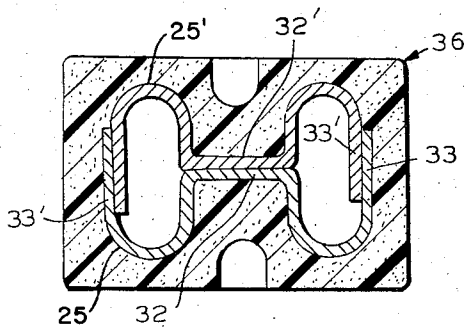
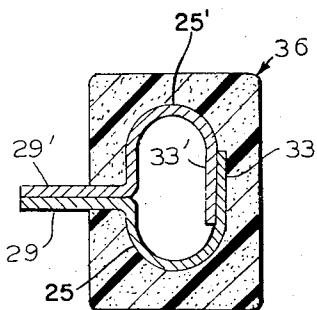
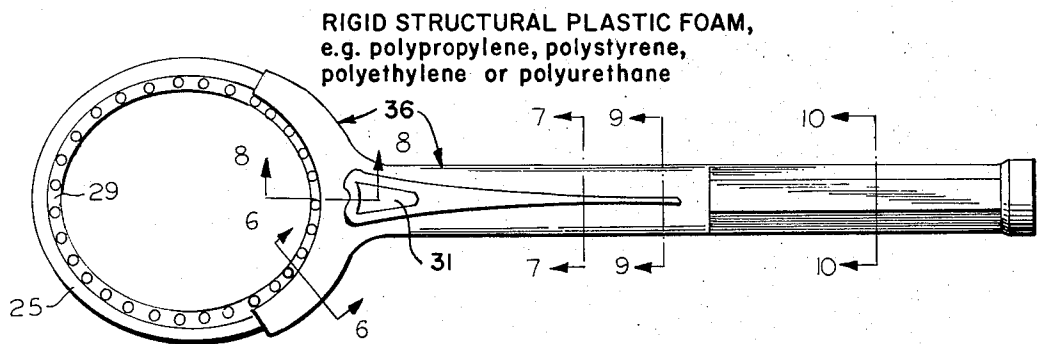


FIG.4



SPORTS RACKET

BACKGROUND OF THE INVENTION

Metal framed tennis rackets have found widespread acceptance in recent years. Such rackets generally have included a metal frame having two handle or shank extensions made in one piece with a rim which encircles a major part of the head of the racket. The usual practice is to complete the encirclement of the racket head in the region of the throat by means of an insert which extends between the shank extensions of the frame. The lower ends of the centermost vertical strings and the ends of the lowermost horizontal strings are connected with this insert. The prior art show various forms of inserts and various schemes by which they may be secured to the frame. The Morrison U.S. Pat. No. 1,587,919 shows a racket in which two stamped channel form halves of the frame are secured together by deforming the metal. Thus the entire head-encircling rim and the shank of each half is made of one piece of metal.

THE INVENTION

According to the invention a racket frame is made from two adhesively connected stampings. Each stamping is made in one piece from a metallic sheet. A flat blank is cut from the sheet metal with its outer periphery conforming in general to the shape of a racket head and a shank which may be the handle or to which a handle may be connected. The flat blank has a central opening corresponding generally to the shape of the portion of the racket which will be provided with strings. This opening is made somewhat undersized. This flat blank is then shaped by a stamping operation to provide a channel which extends from the base of the shank along its edge, the edge of the throat section and around the outer periphery of the head and back along the other edge of the throat section and the other edge of the shank to its base. The central opening will be enlarged somewhat during the formation of the channel, some of the metal being drawn into the channel. After stamping the central opening is finished to the final dimensions of the desired string portion. The overwide rim in the blank serves not only to provide metal to be drawn into the channel, but also acts to keep the radial rims flat. The two stampings which make up a racket frame are of slightly different size so that the outermost legs of the channels may overlap and fit one another face to face over a substantial area. The abutting faces of the channel legs and of the radial rims are adhesively secured to one another. The planes of the adhesive joints are at right angles to one another. The resulting frame is a rigid subassembly and when provided with a handle and strings provides an excellent sports racket.

The handle may be wooden or metallic, but preferably takes the form of rigid structural plastic foam molded in place on the shank and the lower part of the racket head.

The preferred embodiment of the invention will be described having reference to the accompanying drawings in which:

FIG. 1 is a plan view of the initial blank;

FIG. 2 is a plan view of completed frame comprising two stamped halves in face to face engagement;

FIG. 3 is a sectional view on the line 3—3 of FIG. 2;

FIG. 4 is a sectional view on the line 4—4 of FIG. 2;

FIG. 5 is a plan view of a completed racket;

FIG. 6 is a sectional view on the line 6—6 of FIG. 5;

FIG. 7 is a sectional view on the line 7—7 of FIG. 5;

FIG. 8 is a sectional view on line 8—8 of FIG. 5;

FIG. 9 is a sectional view on line 9—9 of FIG. 5; and

FIG. 10 is a sectional view on line 10—10 of FIG. 5.

The racket is fabricated from sheet metal such as aluminum or aluminum alloy. Work hardening aluminum alloys such as SAE No. 5154 and 5052 are suitable when the racket is to be used by the average player. Metals other than aluminum, e.g. steel may also be used. A flat metal blank 21 see FIG. 1 is cut from the sheet (not shown). While cutting the blank, a elliptical opening 23 having its periphery at 22 is formed in the blank. The blank 21 is then stamped to form the member 24; see FIG. 2. This member 24 has a channel 25 which runs around the outer periphery of the head portion and along the edges of the throat 26 and shank 27. During stamping the peripheral edge 22 is drawn outward by the metal being drawn into the channel 25. The opening 23 is initially somewhat undersized and the rim 29 is finished to its final dimensions after the stamping operation. During cutting of the blank a cut-out 31 is formed at the throat 26.

Two members 24 and 24' (see FIGS. 3 and 4) are connected face to face so that channels 25 and 25' enclose the tubular space 28. The flat rims 29 and 29' which extend inward from the channels 25 and 25' are engaged face to face with their inner margins coincident as shown in FIG. 4. In the region of the shank 27 of the thus formed frame the two sets of channels 25 and 25' are connected by flat webs 32 and 32'. The legs of each channel are of unequal lengths. The shorter leg 20 (20') is connected to the outer periphery of rim 29 (29'). The member 24' is slightly smaller than member 24 so that the longer legs 33 and 33' of the channels 25 and 25' respectively overlap one another and are in face to face engagement. The interface between legs 33, 33' and the one between rims 29, 29' are at right angles to one another. The strings of the racket will be coplanar with the rims 29, 29'. An adhesive layer is provided in each of the interfaces between the legs 33 and 33', between the rims 29 and 29' and between the webs 32 and 32'. This adhesive holds the two halves of the frame in assembled relation.

The frame comprising the adhesively interconnected members 24 and 24' is provided with a handle as shown in FIGS. 5 through 10. A metallic tubular extension 34 (FIG. 10) is fitted onto the shank 27 of the frame. The end 35 of extension 34 is formed to embrace the shank 27 closely where the two join (see FIG. 9). The overlap between these parts is about 3 inches long. The shank and the extension are desirably welded together, but may be united by the same adhesive as was used to unite the frame halves, or by rivets. This subassembly is then placed in a mold and a mass 36 of rigid structural plastic foam formed around the handle, shank, throat and a part of the head of the frame. This foam may be polypropylene, polystyrene, polyethylene or polyurethane. Polypropylene is applicants' preference.

The adhesive used to unite the metallic parts is an aluminum filled epoxy adhesive. A satisfactory adhesive of this type is available from the 3M's Company and is identified as 2214 Hi Flex. This epoxy-based-aluminum-filled adhesive is a heat-curing structural adhesive and is said to have increased flexibility. Other adhesives intended for use in uniting metallic parts are available and may be used.

It is important to note that the adhesive is present in two joints arranged at right angles to one another. This provides a rigid frame which is capable of withstanding loads imposed in any direction. Experience indicates that the adhesive union between the rims 29, 29' may be omitted. The racket strings, which pass through aligned holes in these rims, hold these rim faces tightly together. Thus while use of two adhesive joints is preferred a single adhesive joint between may be used, though the frame's useful life may be impaired.

The rigid structural plastic foam may have any desired density. The presently preferred foam has a density, when made of polypropylene, of about 35 pounds per cubic foot. The extent to which the molded foam extends along the periphery of the head can be controlled and is selected to give the desired balance to the racket. Handles made of other materials may be used. For example wooden grips may be secured to the shank by rivets.

The frame shown in FIG. 2 may be formed with a longer shank which could be formed to provide a handle if desired. While this is practical, there is an increase in the waste left during the cutting of the initial blank. The illustrated head and shank to be provided with a handle is the preferred, because it is believed that a completed racket can be made from it more economically than the above described alternate form.

It will be obvious that rackets for use in various sports may be made utilizing the invention and no limitation to a racket useful in a particular game is intended. The drawings are intended only as a means of illustrating the invention. They are not intended to show any particular type of sports racket.

We claim:

1. A frame for a stringed sports racket comprising:

- a. a pair of interengaging members;
- b. each member comprising
 1. a planar rim encircling an opening, shaped in accordance with any desired strung surface, said rim having an integral, coplanar throat and shank portion extending outward therefrom,
 2. a continuous channel extending along the edges of said portion and around the outer periphery of said rim,
 3. said channel having legs of unequal length which are perpendicular to the plane of said rim, the shorter leg interconnecting said outer periphery and the bottom of the channel,
- c. the pair of interengaging members defining a frame having,
 1. a double thickness web made up of said planar rims and said portions in face to face engagement, and
 2. a hollow tubular part extending along the edges of said portions and around the outer peripheries of said rims and made up of said channels whose longer legs overlap one another, the overlapping portions being in face to face engagement,
- d. adhesive means uniting said interengaging members.
2. The frame defined in claim 1; and a handle connected to said interengaged shank portions.
3. The racket defined in claim 2 in which said handle comprises molded rigid structural plastic foam.
4. The racket defined in claim 2 in which said handle comprises a tubular extension connected to said shank portions and rigid structural plastic foam molded about said tubular extension.
5. The combination defined in claim 4 in which said foam also is molded about portions of said tubular part and said rims adjacent said throat and shank portions.
6. The combination defined in claim 1 in which said adhesive means includes layers of adhesive between said overlapping portions of said longer legs and between said planar rims.

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