Nov. 7, 1939. J. L. KLEINMAN 2,178,588

RACKET

Filed May 13, 1935 2 Sheets-Sheet 1

Fig. 1

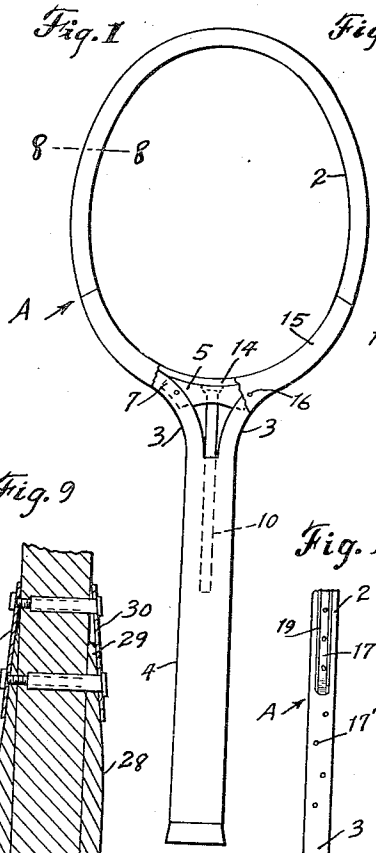


Fig. 2

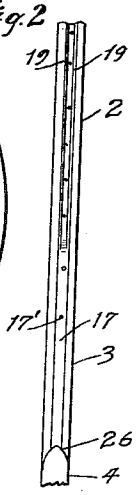


Fig. 3

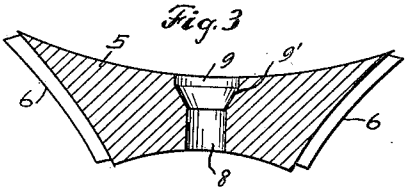


Fig. 4

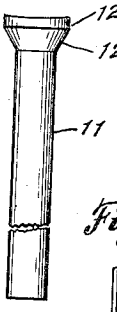


Fig. 9

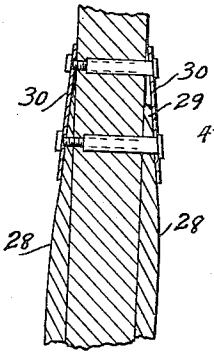


Fig. 15

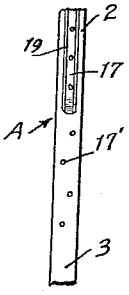


Fig. 5

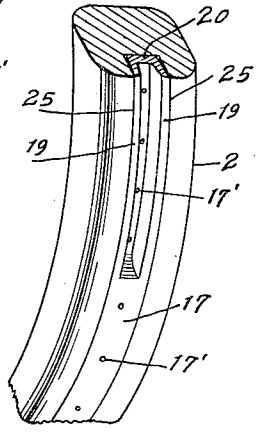


Fig. 14

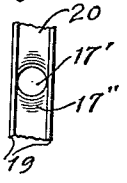


Fig. 10

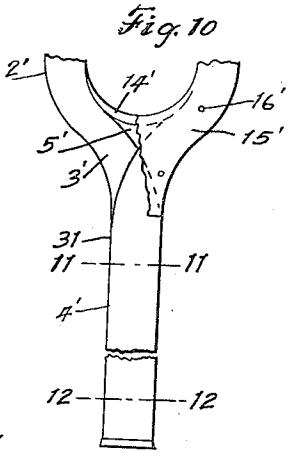


Fig. 11

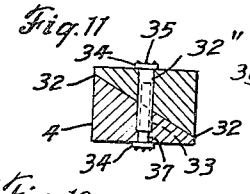


Fig. 13

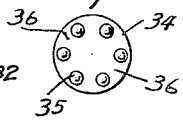


Fig. 12

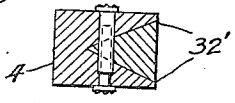


Fig. 7

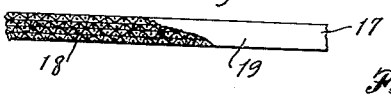


Fig. 6

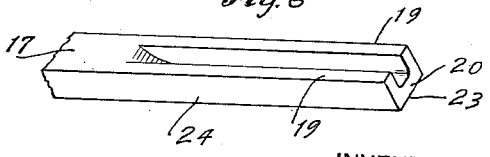
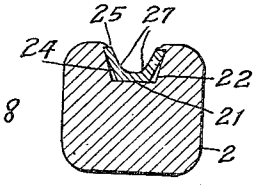


Fig. 8



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Jacob L. Kleinman,

Nov. 7, 1939.

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2,178,588

RACKET

Filed May 13, 1935

2 Sheets-Sheet 2

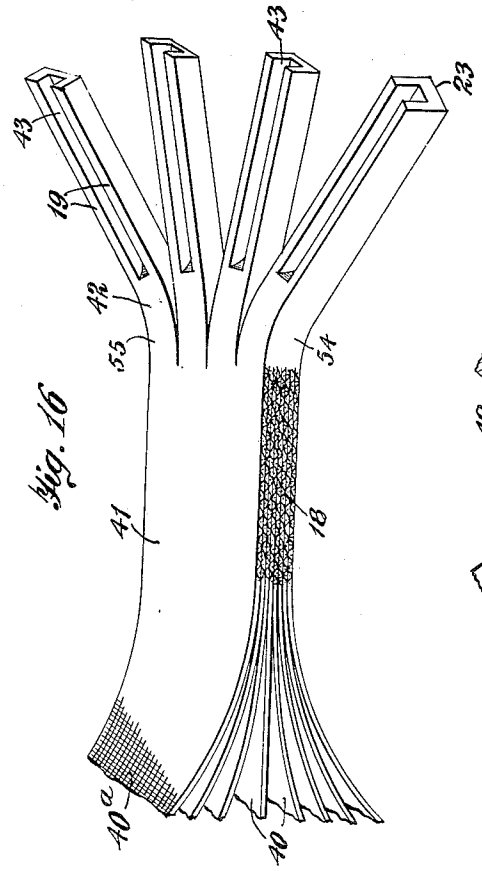

Fig. 16

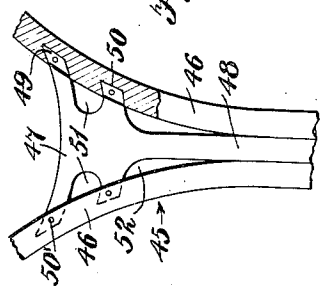

Fig. 17

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UNITED STATES PATENT OFFICE

2,178,588

RACKET

Jacob L. Kleinman, New York, N. Y.

Application May 13, 1935, Serial No. 21,260

60 Claims. (Cl. 273—73)

This invention relates generally to rackets of all sorts and types and particularly to that of squash and tennis. It is filed as a continuation in part of my co-pending application for Rackets S. N. 559,863 filed August 28, 1931, and is an improvement of same. This invention is also an improvement of the construction disclosed in my Patent No. 1,942,479 issued January 9, 1934.

A primary object of this invention is to provide a racket so constructed, wherein the parts are so manipulated, that the racket in itself (the frame, neck and handle) is greatly increased in strength without being materially increased in weight.

A further object is to provide a racket (particularly of the kind known as the open throat type) wherein the wedge member, while being secured to the neck sections by means of glue is also held thereto by means of a separate member having one end secured to the wedge and the other end positioned within the upper part of the handle, thereby increasing the strength of the neck of the racket.

A still further object is to provide a reinforcing member for the frame composed of layers of woven fabrics, chemically treated whereby the frame may be increased in strength to resist warping and to minimize splitting possibilities while being strung.

Yet a further object is to provide a reinforcing member that includes in its substance a web whose threads are so interwoven with each other that when the member is being bent (while being secured to the frame) the upper layers of its structure will "give" or stretch thus permitting the flexing of said member.

Another object is to provide a racket having its handle so constructed that the sections interlock with each other, thus increasing the strength of the handle, providing a rigid structure and wherein the visible joints may appear at the side of the handle.

A still further object is to provide cover-plates to cover the joints and protect certain sections, thereby increasing the strength of such sections, and also to provide special fastening elements securing said sections to each other in their connected position. Yet another object is, to provide a racket frame wherein the openings for receiving the strings are provided with guiding walls or pathways, thus providing a smooth sliding surface for the string while stringing the frame.

The object, generally, of this invention is, to provide a racket that is practical and durable in use, simple in construction, convenient and economical in cost to manufacture.

Other objects and advantages of the present invention will appear from the description thereof to follow, taken in connection with the accompanying drawings in which—

Fig. 1 is a front view of a racket embodying my present invention, partly broken away at the neck to reveal the internal structure;

Fig. 2 is a side view of Fig. 1, showing the frame, including the reinforcing member, neck and a portion of the handle,

Fig. 3 is an enlarged view of the wedge belonging to the neck of the racket.

Fig. 4 is an enlarged view of the member belonging to the throat portion of the racket.

Fig. 5 is an enlarged perspective view of a portion of the frame of Figs. 1 and 2, showing how the reinforcing member is secured to the outer periphery of the frame.

Fig. 6 shows an enlarged perspective view of a portion of the reinforcing member.

Fig. 7 is a side view of Fig. 6, partly broken away, showing the construction of the reinforcing member.

Fig. 8 is an enlarged cross-sectional view of the frame (including the reinforcing member), taken along the line 8—8 of Fig. 1 showing the construction of same.

Fig. 9 is an enlarged sectional view of a portion of the handle of the racket showing the construction of same.

Fig. 10 shows a modified form of the construction of the handle and throat joint.

Fig. 11 is a cross-sectional view taken along the line 11—11 of Fig. 10.

Fig. 12 is a cross-sectional view taken along line 12—12 of Fig. 10 and is a modification of Fig. 11.

Fig. 13 is a front view of the head of the fastening element holding the jointed sections together,

Fig. 14 is an enlarged view of a portion of the reinforcing member showing how the edge portions of the openings are tapered,

Fig. 15 is a modification of Fig. 2, showing the groove and member 17 terminating above the neck portion.

Fig. 16 is an enlarged perspective view showing the structure of the reinforcing member, and Fig. 17 is a modified form of the neck section of the racket.

Referring to the drawings, (Fig. 1) 2 indicates the bow or frame, 3 the neck and 4 the handle. 5 is a wedge provided with flanged portions 6 (see Fig. 3) the inner faces of the neck sections 3 are provided with slots adapted to receive the flanged portions 6 of wedge 5 when the latter is positioned in its place at the throat of the racket, thereby

forming an interlocking joint (a sort of a mortice and tenon connection) between the wedge and the neck sections as at 7. The wedge 5 is provided with an opening 8, the upper portion of said opening being enlarged as at 9, thus forming a shoulder, bevel or floor 9'. The upper portion of the handle is provided with an opening 10, (if desired, such opening 10 may run through the full length of the handle) a rod or strip 11 (see Fig. 4) of suitable material, style or shape is placed within the openings 8 and 10, the enlarged top portion 12 is positioned in the enlarged space 9 of opening 8, the bevel or roof 12' resting against the floor or bevel 9' of wedge 5, thus holding the wedge 5 firmly in its position. A member 14 is then secured to the lower inner periphery of the frame, locking and thus preventing the displacement of the rod 11. If desired, a cover-plate 15 may be secured to the front face of the racket at about the neck portion thereof, thereby hiding or concealing the joints between the neck section 3, wedge 5, and member 14, from view. Of course glue may be used in joining together these various sections, members or parts; but in addition to the glue, openings may be formed through these joined sections, for example as at 16, wherein suitable fastening elements may be inserted, thereby making the connections more secure. The wedge 5 being concaved at the upper and lower portions, provide end sections larger in size than the regular width of the wedge, thus providing a larger contact area between the sides of the wedge and the neck sections, thereby increasing the strength of the neck structure without materially affecting the throat opening. If desired wedge 5 and member 11 may be made of one piece, in such a case member 11 would be projecting from the bottom of wedge 5 as a flanged portion, preferably flat and of about the same thickness as that of said wedge 5. The lower end portion of the flange would then be positioned between the two end sections of the frame, which forms the neck and a portion of the handle structure. In such a case the wedge would actually engage the inner faces of the neck sections at spaced points, thus providing an open throat racket of a much stronger and more rigid structure than that of the ordinary type. Of course various modifications may be resorted to without departing from the spirit of the invention, whereby breakage possibilities at this point may be minimized.

The outer periphery of frame 2 (see Figs. 2 and 5) is provided with a groove wherein is inserted a reinforcing member 17, said groove and member 17 terminates at about the neck section, and may be finished off in any suitable manner, for example, as at 26, where one of the handle sections is overlying and covering the ends of the groove and of member 17. Of course such a groove and member 17 may be of any desirable length or size and may terminate at any point, even above the neck portion, for example, as indicated by arrow A (Fig. 1) in which case the ends of said groove and member 17 may be covered by windings or any other suitable means (not shown). Also see Fig. 15.

One of the reasons for including the reinforcing member in the construction of the racket frame, and especially in a manner as herein described, is to reinforce the frame, giving same additional strength to resist warping possibilities so that the life and use of same may be prolonged, but another object of the present invention (particularly of the reinforcing member as constructed) is to minimize splitting possibilities of the frame while being strung. A matter which is of great concern to the manufacturer, merchant and user of rackets.

The record of applicant's inventions with respect to the art involved in this case will prove that he has given this matter quite some consideration, that he has spent many years in research work concerning the matter herein involved, and conducted many extensive experiments within this line in order to produce a better racket, more substantial and more practical than the ordinary type, wherein the objectionable features may be eliminated, while he has labored during such experiments applicant has discovered the following (referring to the structure of the channeled member). An ordinary channeled article, because of the side walls being higher than the web or floor, cannot be bent by hand, (especially where the side portions of the floor have been turned up to form the side walls of the channeled article because no part of the walls can yield, give or stretch, nor can they contract or condense, it was therefore almost impossible to bend a channeled member by hand so as to fit same to a round or curved object, for example, such as the top of the bow or frame of a racket, to overcome this objectionable feature and to create a channeled member that would be of a strength sufficient for the desired purpose and yet whose walls would yield, give, stretch, condense or contract, so that the working man could fit such channeled member to any size, style or shape of any racket, applicant is making his channeled shaped member of a composition that is rigid, strong and yet flexible enough for the purpose, practical and inexpensive to manufacture, the following is a description of applicant's invention.

The reinforcing member 17 (Figs. 5, 6, 7, 8 and 16) is made of plies, sheets or layers of material 40, such layers may be made of any suitable material, for example, fabric or canvas 40*a*. Several such plies or layers 40 are placed one over the other and combined together with a suitable binder, for example, these layers of material 40 may be threaded with phenolic resin or any other suitable adhesive and then compressed in a hydraulic press under a pressure of about 2000 pounds per square inch at a temperature of about 335–350° F. for a period of about fifteen to thirty minutes, then, when removed from press such layers and binder will be united into one compressed solid strong mass or sheet 41, such sheet is then cut into suitable strips 42 and then grooved as at 43. The threads 18 not being too tightly twisted or woven allow for a certain amount of "give" in either direction as at 54 and 55 so that such strips will flex and bend to an extent sufficient to be applied to the bow or frame of a racket. These strips are quite solid and strong and have to be handled, cut or milled almost like metal, so that when a portion of the top 17 (Fig. 6) is cut or milled out leaving two walls 19 and a web or floor 20 a channel portion is formed that will, because of its special weave construction (as aforesaid) bend to any direction and the walls would give, stretch, contract or condense as may be required. Furthermore, the stringer, while stringing a racket, forces a tapered metal tool into the opening, placing same tightly against the string to hold same at proper tension while he inserts the rest of the string into the next opening, such force at times, being so great that it splits the frame. But in applicant's present structure, the tool will engage

first the web or floor **20**, the woven threads which are a portion of the body of web **20** and because they are positioned criss-cross or cross-wise on top of each other will surround and arrest the tapered metal tool and not permit same to engage the frame portion of the opening, so that the frame itself will be actually shielded against and not subjected to splitting possibilities while being strung, as ordinary racket frames are. Of course a channeled member constructed as herein described is preferable but if desired other fibres may be used instead of threads, or other means (liquids or powders) may substitute the above mentioned chemicals, the degree of heat or pressure may be changed or substituted as may be desired. The main object is to provide a channeled member that could be easily flexed or bent by hand and whose web or floor is strong enough to offer the desired protection to the frame. If desired, the groove on the frame **2** may be eliminated and the strip or reinforcing member **17** may be applied directly to the surface of the frame, in such a case the walls **19** would be wider so as to correspond with the width of the frame **2**. Of course said strip or reinforcing member **17** may be incorporated into the frame **2** in any suitable manner, in fact, various changes may be resorted to. Thus applicant has solved the important problem of providing a practical channeled member composed of materials especially suitable for the above mentioned purpose.

With reference to Fig. 8, it will be noticed that the groove in the frame **2** is deeper and narrower in cross section than the reinforcing member **17**. Said groove is provided with a flat floor **21** and with side walls **22** which are disposed at a slight angle. The reinforcing member **17** is provided with a flat rear or bottom face **23** (see Fig. 6) adapted to be seated on the floor **21**, the outer faces **24** of the side walls **19** are at a slightly steeper angle than that of the side walls **22**, and in order to facilitate the entering of the reinforcing member **17** into the groove (when being forced into same) the upper portions of the faces **24**, although being in width (as aforesaid) slightly wider or larger than the space between the walls **22**, will (because of their flexibility) spring or "give" a little and then, forcing itself back to normal position, tightly engaging the upper portions of the walls **22**, and (being of a stronger material than wood) will seat or nest itself into the walls **22**, so that a roof or cover **25** is formed which holds said reinforcing member in its place and is also overlying and covering the joints of said member and groove, hiding or concealing the space therebetween which may be used as glue pockets. It will be noticed that the groove in the reinforcing member **17** (Fig. 8) is provided with round or semi-circular corners contour in cross-section as at **27**, thereby increasing the thickness of the walls **19** at their bases as at **24**, thus supporting and thereby increasing the strength of said walls.

Frame **2** and reinforcing member **17** are provided with openings **17'** for the purpose of receiving the racket string (not shown) the outer edge of each side of the openings **17'** are removed (see Fig. 14) as at **17''** providing a smooth pathway or sliding surface for the string during stringing the racket, eliminating the possibilities of scratching or scraping the surface of the string, thus prolonging the life of the strings in the racket. It will be seen that the walls **19** serve as guides for the strings guiding the same to slide in the pathways **17''** thus shielding such strings against possible damage. Such openings may be formed either straight or at an angle (appearing in a zig-zag manner) thus the string may cross the grain of the frame (see Fig. 15).

Referring to Fig. 9, to complete the handle structure, side sections **28** are applied to the handle **4**, the upper parts of said sections are tapered to their end portions as at **29**, these end portions being covered and thus protected by cover plates **30**, positioned thereover, hiding or concealing the joints of the above mentioned end portions from view.

In the structure shown in Figs. 10, 11 and 12, the end sections of the frame which form the body portion of the handle **4'** interlock with each other in a manner, for example, as shown in Fig. 11, wherein the sections are provided with rectangular walls overlapping each other thereby providing or forming an oblong joint cross-sectionally of said handle, or in Fig. 12, (this form of construction provides a good solid and strong handle-shank **31**, and also provides the novel feature of having the visible joints **32** or **32'** located away from the front face of the handle, namely located at the side of the handle). Wedge **5'** is then secured to the throat portion of the frame, member **14'** overlies wedge **5'** and a part of the lower inner periphery of the frame **2'**, cover-plate **15'** overlies and covers the joints between the neck section **3'**, the wedge **5'** and member **14'**. Openings **16'** may be formed in a manner and for the purpose as shown in Fig. 1.

It will be noticed that the joined sections may be provided with a suitable fastening element, for example, such as member **32''** in Fig. 11, this member **32''** is provided with a screw-threaded opening **33** and with a shouldered head portion **34**. Said head portion is provided with projections or beads **35**, these fancy beads provide ornamental features to the face of the portion where they appear (see Fig. 13). Said head is provided with spaces **36** so that a screw driver or any other suitable tool may be positioned in said spaces **36** and operate the fastening member. A second member **37**, provided with an externally threaded portion is positioned within the opening **33** of the member **32''** and is likewise provided with the same style of head **34** for the same purpose as is member **32''**. Thus in addition to holding the parts together the fastening element also provides ornamental features for the front face of the racket and handle, or wherever same may be positioned.

When constructing a wooden racket, if a one-piece frame is required, a single strip of the proper thickness may be bent to form the bow and the neck, the end sections of said strip may form at least a portion of the body of the handle, but if a laminated racket is required, then several thin strips may be put together until the proper thickness is acquired, and bent, collectively or individually, as herein above described. These bends may be made by means of steam or any other suitable means, glue may be used to hold these strips together; as a matter of fact, any kind of a racket structure, made of any material, may be used wherein the present invention may be included.

By showing a preferred structure, I do not, by any means, limit myself to this structure only. Various suggestions of this invention may be used or be applied to any racket. And I desire it to be understood that I have same in mind when describing this invention, and seek protection by Letters Patent, and although I have mentioned in

describing my invention of what materials certain parts may be made, how they may be shaped or styled and how they may be assembled, yet, I desire it to be understood, that this structure, or parts thereof, may be made of any suitable material and in any desirable style or shape and assembled in any suitable manner, and that various changes in detail may be resorted to without departing from the spirit of the invention.

I claim:

1. In a racket, sections forming the frame, neck and handle structure, said frame provided with means adapted to receive a string, a wedge bridging said neck section, said wedge provided with an opening, a portion of said opening being enlarged, said handle having an opening within at least the upper portion thereof, said openings disposed longitudinally of the racket, a member positioned within said openings, said member provided with an enlarged portion, said enlarged portion positioned within the enlarged portion of said first mentioned opening and means for securing said member within said openings.

2. In a racket, a frame, a neck and a handle, at least a portion of the outer periphery of the frame provided with a groove, said groove provided with a floor approximately flat in cross-section, a reinforcing member of which at least a portion is provided with a floor approximately flat in cross-section and upwardly projecting side walls positioned within said groove, the walls of said reinforcing member and of said groove being so shaped that at least a part of the upper portion of the side walls of said member engages at least a portion of the side walls of said groove in a manner so as to conceal the space between the lower portions of the walls of said groove and of said reinforcing member, and means for receiving a string within said frame.

3. In a racket, a frame, a handle, a compressed reinforcing member comprising layers of fabric and a binder wherein the threads are interwoven with each other in a manner so as to permit the flexing of same, said member being secured to at least a portion of said frame, thus increasing the strength of same, and means for receiving a string within said frame.

4. In a racket, a handle, a frame structure, at least a portion of said frame structure formed of compressed means including layers of material and a binder, and means for receiving a string within said frame.

5. In a racket, a frame structure including a fabric laminated reinforcing member, said frame and member provided with openings for receiving a string, the threads of said member surrounding said openings, thus shielding and protecting same from injuries.

6. In a racket, a handle, a frame including a reinforcing member, said member and frame having openings formed therein for receiving a string, upwardly projecting walls formed adjacent to said openings, and at least a portion of the reinforcing member adjacent said openings being removed thus providing guiding pathways for the string.

7. In a racket, an element bent to form the frame of the racket, said frame provided with means for receiving a string, the free ends of said element extending longitudinally of the handle and brought together to form the neck section and at least a portion of the handle of said racket, a wedge bridging said neck section, a flange projecting from said wedge and positioned within said handle portions, leaving through-spaces between said flange and said neck sections.

8. In a racket, a frame, said frame provided with means for receiving a string, a neck and a handle, a wedge secured to the inner faces of said neck at spaced points, leaving through openings between said inner faces and said wedge.

9. A racket comprising sections, certain of said sections joined to each other thereby forming a frame, a neck, and a handle, openings formed in said joined sections, certain of said sections positioned within said openings and being provided with head portions, said portions provided with beads located substantially at about the end sections thereof and leaving spaces therebetween in alignment with each other for receiving means whereby said last mentioned sections may be tightened or loosened, and means within said frame for receiving a string.

10. In a racket, an element bent to form the bow of the racket, the free ends of said element adapted to form the neck sections and at least a portion of the handle of said racket, said bow provided with means for receiving a string, said neck sections provided with slots, a wedge provided with flange portions, said portions adapted to be positioned within said slots, said wedge provided with an approximate centrally located opening disposed longitudinally of said racket, and a member having one end portion positioned within said opening and the other end portion positioned between said free ends, thus adding to the strength of said neck.

11. A racket adapted to receive a string, said racket including a neck section, a wedge secured to said neck section, said wedge provided with an approximately centrally located opening disposed longitudinally of said racket, said opening adapted to receive a portion of a centrally located handle section whereby said wedge may be held securely to said neck section.

12. A racket structure including a channel-shaped frame portion, a channel-shaped member positioned within said frame portion, said channeled member comprising a floor approximately flat in cross-section and upwardly projecting side walls, the interior thereof including corners shaped substantially semi-circular in cross-section, so that the walls may be thicker at their base portion, thereby increasing the strength of said walls.

13. In a racket, a frame structure including a fabric laminated member, said frame provided with openings adapted to receive a string, a portion of the member adjacent certain of said openings being removed, thus providing a pathway for the string.

14. A racket including a frame, the outer periphery of at least the upper portion of said frame provided with a groove, a compressed reinforcing member formed of layers of fabric and a binder positioned within said groove, means for receiving a string within said frame, and means covering the end portions of said groove and of said reinforcing member.

15. In a racket structure, a frame, neck and handle formed of sections interlocking with each other, certain of said sections provided with shouldered head portions, said head portions provided with beads located substantially at about the end sections thereof and leaving spaces therebetween in alignment with each other for receiving means whereby either of said sections may be rotated, thus locking said sections to each other.

16. In a racket structure including a frame, at

least a portion of the outer periphery of the frame being provided with a grooved section, a fabric laminated member having side walls wedged into said groove in such a manner whereby at least a part of the upper portions of the side walls of said member engages tightly a part of the upper portions of the side walls of said groove, thus locking itself into position and concealing the joint between the lower portion of said grooved section and of said member, means within said frame for receiving a string, said member provided with means forming a seat for said string.

17. In a structure as set forth in claim 16, wherein said last mentioned means comprises a pathway for housing said string.

18. In a racket structure including a frame, at least a portion of the outer periphery of the frame being provided with a grooved section, a fabric laminated member having side walls wedged into said groove in such a manner whereby at least a portion of the upper sections of the side walls of said member engages tightly and nests itself into the wall portions of said groove, thereby locking itself into position within said grooved section and concealing the joint between the lower portions of said grooved sections and said member, means for receiving a string within said frame, said member provided with at least one groove for housing said string.

19. In a racket, a frame, a handle, at least a portion of the outer periphery of said frame being provided with a channeled section, a compressed laminated member comprising layers of material and a binder having at least a section thereof positioned within said channeled section through the front face thereof, at least a portion of one of said sections overlying at least a portion of the other section thereby providing a cover for the joint of said portion, and means for receiving a string within said frame.

20. In a racket, a frame, a handle, at least a portion of the outer periphery of said frame being provided with a grooved section, a member formed of a compressed mass of layers of fabric and a binder positioned within said grooved section through the front face thereof, at least a portion of said grooved section overlapping at least a portion of said member thereby holding same in position, means for receiving a string within said frame, the seat for said string being located below the surface of said outer periphery.

21. In a racket, a frame, at least a portion of said frame provided with a channel-shaped section, a reinforcing member formed of a compressed mass of layers of material and a binder having at least a portion thereof positioned within said channel-shaped section through the front face thereof and interlocked therein said member thus being held in its position, and openings within said frame for receiving a string therein.

22. In a racket, a frame, a laminated reinforcing member formed of compressed layers of material secured to the outer periphery of said frame, registering openings formed within said frame and said member for receiving a string, said member adjacent said openings being provided with pathways for said string.

23. In a racket, a frame, at least a portion of the outer periphery of said frame provided with a channel-shaped section, a solid member positioned within said channel-shaped section through the front face thereof, said channel-shaped section provided with a projection overlying at least a portion of said member thereby holding same in its position, registering openings within said frame and said member for receiving a string therethrough, a portion of said member between said openings forming a seat for said strings holding same in desired position, said seat being situated below the upper surface of said projection.

24. A racket structure including a frame, at least a part of the upper portion of said frame provided with a compressed laminated reinforcing member formed of layers of material and a binder, said member terminating at about the lower portion of said frame, and means covering the joint between said member and said frame.

25. In a racket structure, sections forming a frame, neck and handle, a reinforcing member secured to said frame and neck section, registering openings formed within said frame and said member for receiving a string, at least a portion of said member adjacent at least one of said openings being removed thus providing a pathway for said string, and means secured to certain of said sections covering the end portion of said reinforcing member.

26. In a racket, sections forming the frame, neck and handle structure, a wedge bridging said neck section, said wedge and at least a portion of the upper section of said handle being provided with openings disposed longitudinally of the racket, a member positioned within said openings and means for holding said member safely within said openings.

27. A racket structure comprising a frame, a handle and a neck section, said neck provided with a one-piece bridge member, openings within said bridge member and at least within the upper portion of said handle, said openings being longitudinally disposed and in alignment with each other, an element positioned within said openings and a member placed opposite said element thus holding same in position.

28. A racket comprising a frame structure of which at least a portion of the outer face is provided with a channel-shaped member, said channeled member comprising a web and upwardly projecting side walls, the outer face of said web being comparatively flat in shape, at least a portion of the interior of said channeled member being substantially of semi-circular shape in cross-section whereby the walls may be provided with lower thickened portions so that the strength of said member may be increased thus increasing the strength of said frame structure.

29. A racket structure including a frame having at least a portion thereof grooved, a reinforcing member secured to said grooved portion in such a manner wherein the adjacent side walls of same converge to form a tight joint at about the upper portions thereof leaving a lower spacing adapted to receive a cementitious material for securing said member to said portion.

30. A racket structure including a frame having at least a portion of the outer periphery provided with a channeled section, a compressed laminated member formed of layers of material and a binder positioned within said section in a manner whereby the adjacent walls of same converge to form a tight joint at about the upper section thereof leaving at least one lower spacing adapted to receive a cementitious material for the purpose of securing said member to said section.

31. In a racket, an element bent to form the bow of the racket, the free end portions of said element forming the neck and also sections con-

stituting at least a part of the handle structure, said sections being provided with rectangular walls overlapping each other in a manner whereby a diagonal joint is being provided, thus increasing the contact area between said sections and strengthening said structure, and a member overlying and covering at least a portion of the upper part of said handle structure at about the neck section concealing a portion of said joint from view.

32. In a racket, at least one element bent to form the bow of the racket, the free end portions of said element forming the neck section and also constituting at least a part of the handle structure, said portions being provided with rectangular shaped walls secured to each other in a manner whereby an oblong joint is being provided, thus increasing the contact area therebetween and strengthening said structure, and means covering at least a portion of said neck section thereby concealing a part of said joint from view.

33. In a structure as set forth in claim 32 wherein the visible lines of said oblong joint are located at the side portions of said handle structure.

34. A racket structure comprising a frame, neck and a handle formed of several structural elements of different densities, means for securing said elements to each other, at least one of said elements provided with a screw threaded portion interfitting with at least one of said other elements, said threaded element being provided with a shouldered head portion adapted to conceal the joint between said threaded element and said other element, the outer face of said head portion being provided at about the end section thereof with projections leaving spaces therebetween in alignment with each other for receiving means whereby said element may be rotated, thus being locked in position or removed therefrom.

35. In a racket structure, an element bent to form the bow, neck and handle portions of the racket, the handle portions secured to each other in a manner forming a diagonal joint longitudinally of said handle, sections secured to said bow, neck and handle thereby completing and reinforcing the racket structure, certain of said sections provided with head portions, said head portions provided with projections leaving spaces therebetween in alignment with each other for receiving means whereby said section may be rotated and thus secured to or removed from its position, the sections forming the bow being provided with openings for receiving a string, the outer section of said bow forming a seat for said string.

36. A racket, a frame structure wherein at least a portion of the outer periphery is provided with a reinforcing member of channel-shape formed of compressed layers of fabric and a binder, said member being flexible to an extent so as to be applicable to the shape of said frame structure, and means within said frame for receiving a string.

37. A racket including a frame, the outer periphery of at least the upper portion of said frame being provided with a groove, a channel-shaped reinforcing member positioned within said groove, the end portions of said channeled member being shaped substantially level with the outer surface of said frame, and means covering a part of the end portions of said member within said groove.

38. A racket frame structure, at least a portion of said frame structure provided with a groove, the floor of said groove being substantially flat in cross section, a reinforcing member within said groove, said member formed of compressed laminated layers of material and a binder, at least a portion of said member being of channel-shape, the interior of said channel-shape comprising a floor approximately flat in cross-section and the corners thereof being shaped substantially semi-circular in cross-section, the outer face of the floor of said channel-shaped portion being approximately flat in cross-section and adapted to be seated upon the floor of said groove and means within said frame structure for supporting a string.

39. In a racket, the combination of a frame having a groove on its outer periphery and a hard reinforcing member within said groove, the cross-section of said reinforcing member increasing in width from its lower to its upper portion, said upper portion adapted to engage a portion of the side wall of said groove in a manner so as to be tightly secured therein.

40. In a racket, the combination of a frame having a groove on its outer periphery and a hard reinforcing member within said groove, the cross-section of said reinforcing member having side faces the upper portions of which are spaced further apart than their lower end portions, said upper portions adapted to engage portions of the side walls of said groove in such a manner as to conceal the joint between the lower portions of said side faces and said walls.

41. In a racket, a handle, a frame including a reinforcing member, said member and frame having openings formed therein for receiving a string, side walls formed adjacent to said openings, a floor between said walls, at least a portion of said floor adjacent said opening being removed thus providing pathways for the string.

42. In a racket, a handle, a frame including a reinforcing member, said member and frame having openings formed therein for receiving a string, a floor between said openings adapted to support said string when the latter is positioned within said openings, at least a portion of said floor adjacent said openings being removed thus providing pathways for the string.

43. In a racket structure including a bow section, at least a portion of said bow section provided with a channeled portion, said channeled portion provided with a floor approximately flat in cross section, a reinforcing member positioned within said channeled portion, at least a part of said reinforcing member being of channel-shape, the outer face of the floor of said channel-shaped part being approximately flat in cross-section and adapted to be seated upon the floor of said channeled portion, the interior of said channel-shaped part being substantially semi-circular in cross-section, and registering openings within said bow section and said reinforcing member for receiving a string.

44. A racket structure composed of several structural elements of different densities, certain of said elements being of a more substantial nature than the other of said elements and being interlocked therewith, said certain elements being provided at the outer face thereof with spaced means adapted to receive an instrument for the purpose of being tightened or loosened in connection with certain of said other elements.

45. In a racket, a frame structure including a compressed reinforcing member formed of layers

of fabric and a binder, said frame and member provided with openings for receiving a string, said openings being formed in such a manner that portions of certain of the threads of said reinforcing member are overlying and covering at least certain parts of the frame portion adjacent said openings, thereby strengthening said frame portion and minimizing splitting possibilities of the latter when same is being strung.

46. A racket structure including a handle and a frame, said frame adapted to receive a string, a compressed laminated solid reinforcing member comprising layers of material positioned on top of each other and a binder, said member forming at least a part of at least a portion of said structure, said frame provided with means for housing said string.

47. A racket structure comprising a handle, a neck, and a frame structure, a compressed laminated solid reinforcing member formed of layers of fabric placed on top of each other and a binder, said member associated with at least a portion of said structure in a manner whereby the strength of the latter may be increased, at least a portion of said frame provided with means adapted to receive and house a string.

48. In a racket, a frame structure provided with a compressed laminated solid reinforcing member formed of layers of fabric positioned on top of each other and a binder, registering openings formed in said frame and said member for receiving a string, said member provided with a groove for housing said string.

49. A racket comprising a frame, a handle and a solid reinforcing member, said member formed of layers of material placed on top of each other and a binder, at least a portion of the outer periphery of the frame being provided with a recessed section, said section having a spacious floor cross-sectionally thereof, said reinforcing member positioned within said recessed section and being supported by said spacious floor, registering openings formed within said frame and said member for receiving a string, said member provided with at least one groove for housing said string.

50. In a racket, a frame structure adapted to receive a plurality of strings, a solid laminated reinforcing member formed of layers of fabric placed on top of each other and a binder, said member secured to said frame for the purpose of reinforcing said structure, the seat for at least one of said strings being situated below the outer surface of said frame.

51. In a racket, a frame structure provided with openings adapted to receive a string, a compressed solid reinforcing member comprising layers of fabric placed on top of each other and a binder, said member forming at least a part of said structure for the purpose of supporting said string in a manner whereby splitting possibilities of said frame between said openings when being strung may be minimized.

52. In a racket, a frame structure provided with apertures adapted to receive a string, said frame structure provided with a solid reinforcing member, said member comprising layers of fabric placed on top of each other and a binder, the threads of said fabric being interlocked with each for the purpose of increasing the tensile strength of said member and thus of said frame structure, said member being positioned within said structure and adapted to support said string in a manner whereby splitting possibilities of the frame between said apertures while being strung may be minimized.

53. A racket comprising a handle and a wooden frame structure, at least a portion of said frame structure being provided with a non-metallic reinforcing member, at least a part of said portion being provided with a single row of openings for receiving strings therethrough, at least a portion of at least the outer periphery of said frame section being provided with a double row of openings, the tensile strength of said reinforcing member being of such a degree whereby the sections between said openings will support said string and will not split when said frame is being strung.

54. A racket structure comprising a handle and a wooden bow section, at least a portion of said bow section provided with a non-metallic reinforcing member, at least a part of said bow section and of said member provided with a single row of registering openings for receiving a string therethrough, the tensile strength of said member being of such a degree that said reinforced portion between said openings will not split while the string is being tightened within said single row of openings, the end sections of the openings being shaped in a manner whereby injuries to the string may be minimized thus facilitating the movement of the string within said openings while stringing said bow section.

55. A racket including a frame structure adapted to receive a string, said frame structure provided with a solid reinforcing member comprising layers of material placed on top of each other and a binder, said member adapted to support said string in such a manner whereby the latter may be held in desired position and not sink into the frame structure, thus increasing the life of the racket.

56. In a racket, a wooden frame structure comprising several structural non-metallic elements, at least a portion of said frame structure being shaped flat or substantially so cross-sectionally thereof, one of said elements forming a hard reinforcing member, at least a part of said member being shaped flat or substantially so cross-sectionally thereof, said part being supported by said portion in a manner reinforcing same to an extent whereby said portion may be provided with a single row of openings for receiving strings therethrough, the tensile strength of said member being of such a degree whereby the sections between said openings may support said strings and will not split while being strung.

57. A racket including a non-metallic frame structure comprising several structural elements of different densities, one of said elements forming a solid reinforcing member, at least a portion of said member being shaped approximately flat cross-sectionally thereof, said portion being supported by at least one of said other elements, the tensile strength of said member being of such a degree whereby at least a portion of the outer periphery of said frame may be provided with a single row of openings for receiving strings therethrough, the portions between said openings being reinforced by said member to an extent whereby the string will not sink into said portions thus the latter will not split while the frame is being strung.

58. In a racket, a frame structure including a fabric laminated channel-shaped member, said member comprising a floor approximately flat in transverse section and solid side walls having lower thickened portions, thus increasing the

strength of said member and thereby of said frame structure.

59. A racket including a bow section, at least a portion of the outer periphery of said bow being provided with means forming a grooved section thereon, at least a portion of the floor of said grooved section covered with a reinforcing member formed of layers of material and a binder, thus reinforcing said bow section, thereby minimizing splitting possibilities when the latter is being strung.

60. A racket including a frame, at least a portion of the outer periphery of said frame being provided with means forming a channeled section thereon, at least a portion of the floor of said channeled section being provided with a hard reinforcing member formed of layers of fabric and a binder thus reinforcing said frame, registering openings formed within said reinforcing member and said frame adapted to receive a string therethrough and at least a portion of said reinforcing member adjacent said openings being removed thus providing pathways for said string.

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