

July 26, 1927.

R. H. ROBINSON

1,636,867

TENNIS RACKET

Filed June 26, 1924

2 Sheets-Sheet 1

Fig. 1

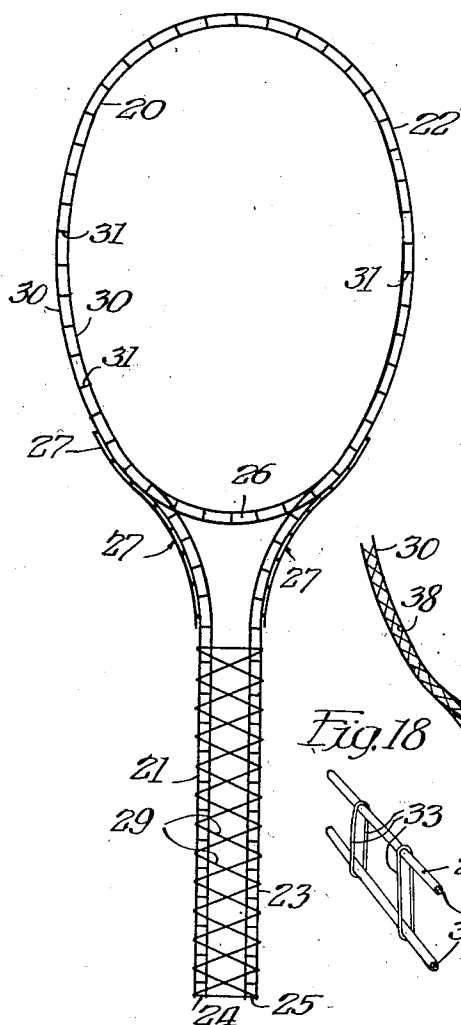


Fig. 2

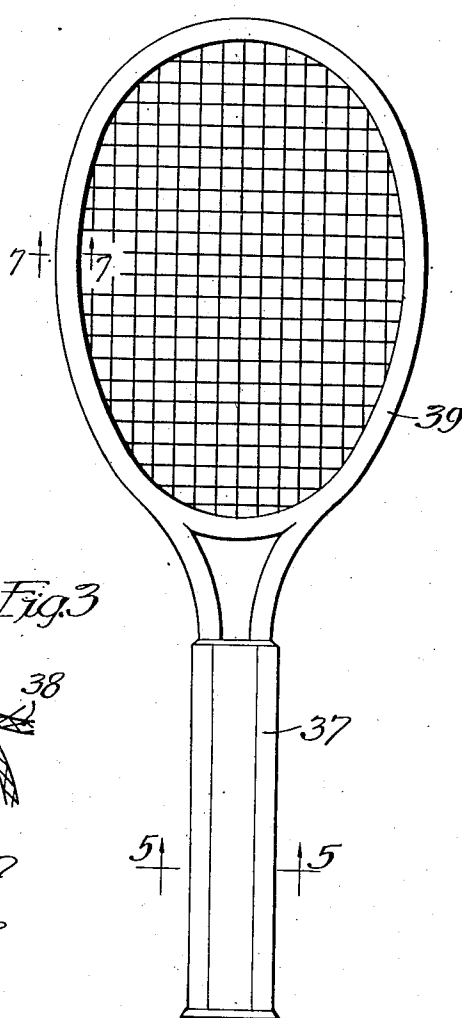


Fig. 3

Fig. 18

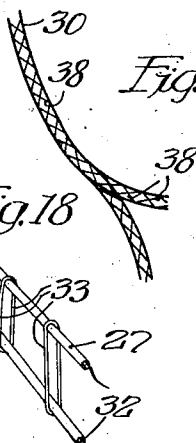


Fig. 4

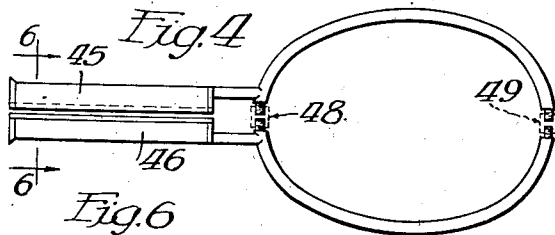


Fig. 6

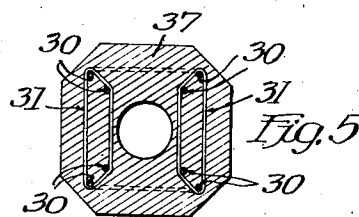


Fig. 5

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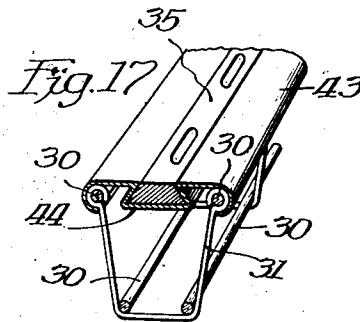
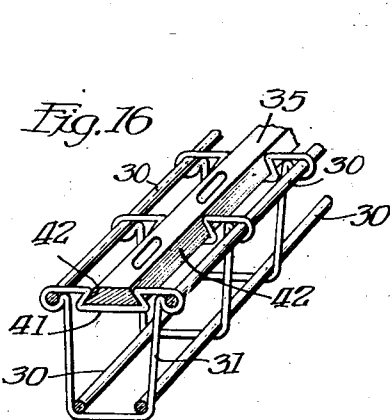
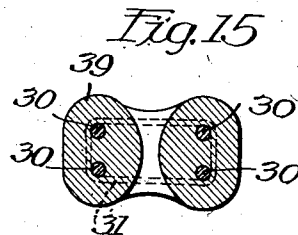
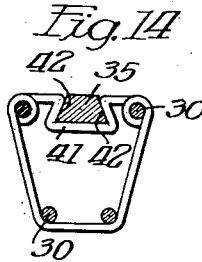
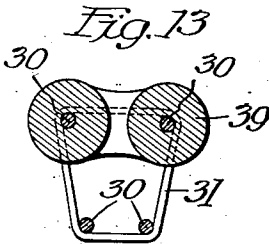
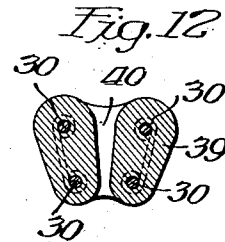
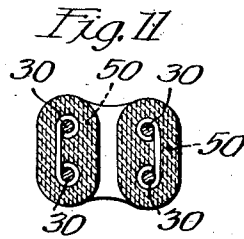
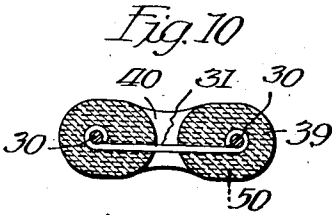
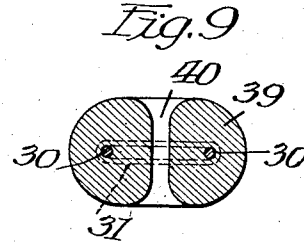
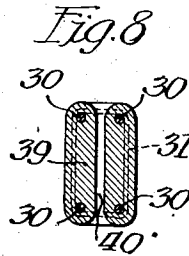
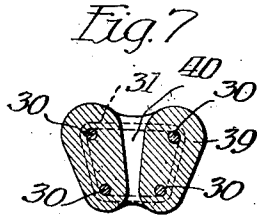
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

ROY H. ROBINSON, OF CHICAGO, ILLINOIS.

TENNIS RACKET.

Application filed June 26, 1924. Serial No. 722,453.

This invention relates to amusement apparatus but more particularly to rackets or bats for playing tennis, squash, or similar games, and has for its primary object to provide a light, durable and economical construction.

Further objects of the invention are to reduce the wind resistance, to provide increased strength in the frame, to facilitate the stringing, to eliminate the use of wood in the head and throat, to protect the stringing from being cut by the frame, and in general to provide an improved article of the character described.

The many other objects and advantages will be better understood by reference to the following specification when considered in connection with the accompanying drawings illustrating certain selected embodiments thereof, in which:—

Fig. 1 is a front view of a partially completed racket embodying certain principles of my invention.

Fig. 2 is a front view of a completed racket.

Fig. 3 is a detail view of a modified form of frame construction.

Fig. 4 is a front view of a modified form of frame.

Fig. 5 is a transverse section on the line 5—5 of Fig. 2.

Fig. 6 is a transverse section on the line 6—6 of Fig. 4.

Fig. 7 is a transverse section on the line 7—7 of Fig. 2.

Figs. 8 to 15 are transverse sections of modified forms of frame.

Figs. 16 and 17 are detail perspective views of modified forms of frame construction, and

Fig. 18 is an enlarged detail perspective view of the throat reinforcing shown in Fig. 1.

Rackets or bats for use in tennis or other similar games have generally been constructed of wood and strung with gut. Great difficulty has been encountered for a number of years in securing suitable wood for this purpose and recently there has been manufactured a considerable number of rackets having tubular metal frames. These metal frames are generally stronger and more uniform than the wooden frames and their smaller cross-sectional area reduces the wind resistance. The principal disadvantages of the tubular metal frame are the cost of production and the cutting action of the metal on the stringing.

My improved frame construction has all the advantages of the metal frame but may be more economically produced. One of the features of my improved frame is the truss construction which is light in weight and yet possesses great strength. The advantages of this type of construction long have been recognized in the engineering and building arts. This truss framing may be utilized alone or embedded in some suitable material such as bakelite, celeron condensite or fiber of the type now used in gears. Such material is plastic and has high compressive strength and relatively high tensile strength. It is reinforced with fabric in some forms as shown. I prefer to build the truss construction of wire because of its strength. The form of the framing may be greatly varied as will be readily evident from the detail description which follows, but it should be clearly understood that this description is merely illustrative of the principles involved.

Referring to the drawings, and particularly to Figs. 1 to 3, 5, 7 and 18, the frame comprises a continuous truss extending along one side of the handle, as 21, next forming the oval head as 22, and then returning along the other side of the handle as 23, the ends of this frame being designated 24 and 25. A short section 26 of framing, similar in character to the main frame, preferably connects the portions thereof to form the throat of the racket. Short lengths of truss construction as 27 are preferably secured to the frame adjacent the throat to reinforce this frame where the greatest strain occurs. In the construction of the racket, I prefer to bend the frame in the manner indicated and then wrap the handle portion with one or more wires as 29. These wrapping wires are preferably welded, brazed, soldered, or otherwise fastened to the frame members at the points of contact therewith.

The frame comprises preferably two or more spaced longitudinal wires as 30 and transverse or connecting wires as 31. In the embodiment shown in Fig. 1 there are four such longitudinals connected at intervals by separate loops which are secured to the longitudinals in the same manner as the handle wrapping wires previously described. The extremities of the longitudinals in the throat section 26 are preferably similarly secured to the corresponding wires in the main frame.

A portion of one of the reinforcing trusses is illustrated in Fig. 18. This comprises longitudinals 32 and connecting wires 33. In the present embodiment these reinforcing trusses 5 27 are placed upon the corresponding outer faces of the main frame and secured thereto. The spacing of the longitudinals in the main frame is varied throughout its length, the portions in the handle being farther apart to 10 provide a handle of sufficient size. When the wire frame of the head is not to be embedded, a strip 35 of fiber or other similar material (Figs. 14, 16 and 17) is preferably mounted therein to receive the stringing, as 15 will be fully described hereinafter. In any case the handle portion 37 would preferably be either embedded in some suitable material, as indicated in Figs. 2 and 5, or encased to protect the hands. In Fig. 3 is shown a 20 modified form of truss framing in which the longitudinal wires are spirally wrapped by connecting wire or wires as 38 instead of by spaced loops as described in connection with the embodiment of Fig. 1. These connecting 25 wires would be properly secured to the longitudinals at the points of contact in the manner previously described.

In the embodiment illustrated in Fig. 2, the wire frame (shown in Fig. 1) has been 30 embedded in bakelite or other similar material as 39. A cross section of the head portion of this embedded frame is shown in Fig. 7, the section passing through one of the stringing holes 40. Figs. 8 to 12 and 15 35 show sections corresponding to Fig. 7 of different forms of embedded framing, the longitudinals and connecting wires being similarly numbered. In the embodiments of Figs. 8, 11, 12 and 15 there are four longitu- 40 dinals whereas in Figs. 9 and 10 there are only two. Where the frame is embedded, there may be one or more longitudinals or reinforcing wires, but where the head portion of the frame is not embedded, four or 45 more are preferable to obtain the proper rigidity. In the embodiment of Fig. 13, only the outer longitudinals and the portions of the connecting wires adjacent thereto are embedded.

50 As has been previously stated, the frame constructions shown in Figs. 14, 16 and 17 are intended to be used without embedding of the head portions. In the constructions illustrated in Figs. 14 and 16 the outer portions of the connecting wires are bent as at 55 41 to fit the beveled outer edges 42 of the strip 35 and retain this strip in the frame. The strip is slid longitudinally through these bent portions of the connecting wires. The 60 embodiment shown in Fig. 17 differs from those of Figs. 14 and 16 in that a plate as 43 connects the outer longitudinals, the side edges of the plate being crimped about these longitudinals. A trough 44 is formed in this 65 plate to receive and hold the stringing strip

35. The longitudinals may be brazed or otherwise fastened to this plate.

In the embodiment shown in Figs. 4 and 6 the frame is made in two parts 45 and 46 which are adapted to be secured together. 70 The handle sections are adapted to be dove-tailed together (Fig. 6) as at 47. The frame parts are connected by suitable turnbuckles as at 48 and 49. This form simplifies the 75 molding of the embedding material. The turnbuckles permit adjustment of the head to tighten or loosen the stringing in the manner described in my Patent No. 1,470,878, dated October 16, 1923.

In the embodiment illustrated in Figs. 10 80 and 11 parallel strips of fabric, as 50, have been incorporated in the molded body. This increases the strength of the frame.

It will be evident from the foregoing description that my improved frame is light in 85 weight and offers very little wind resistance as the strength of the construction enables the head to be made with small cross-sectional area. The toughness and strength of the embedding material is well known. 90 Where the head portion of the frame is to be embedded, smaller gauge wires may be used. The stringing does not come in touch with metal so that no cutting from this source can take place. Such materials as 95 bakelite or fiber may be finished with a smooth surface so that there is very slight frictional wear on the stringing.

I am aware that the details of construction of my improved racket may be considerably varied without departing from the spirit of my invention and I reserve the right to make all such as fairly fall within the scope of the following claims.

I claim as my invention:

1. In a racket, a frame comprising a handle portion and a head portion, said head portion comprising a plurality of openly spaced longitudinal members, and means for maintaining said members in said spaced relation. 105

2. In a racket, a frame comprising a handle portion and a head portion, said head portion comprising a plurality of spaced longitudinal members, and struts interposed 115 between said members at intervals to maintain said members in spaced relation.

3. A racket comprising a head portion and a handle portion, said head portion comprising a frame of truss construction, and including a plurality of longitudinal members in spaced relation and stays at intervals therebetween for so maintaining said members. 120

4. In a racket, a frame comprising a plurality of longitudinal members in spaced relation, and means for maintaining said members in such relation comprising a wrapping wound substantially spirally thereabout. 125

5. In a racket, a frame comprising a plu- 130

ality of longitudinal members in spaced relation, and means for maintaining said members in such relation comprising a plurality of spaced loops.

6. In a racket, a frame comprising a plurality of spaced longitudinal wires, and strut members acting between said members at intervals to maintain said wires in spaced relation.

7. In a racket, a skeleton frame comprising spaced longitudinal members and struts acting between said members at intervals to form with said longitudinal members a truss construction.

8. In a racket, a frame, and a handle on said frame, said frame being of skeleton construction and comprising spaced longitudinal members, and struts acting between said members to maintain said members in spaced relation.

9. In a racket, a substantially oval head of molded material reinforced with an open-work stiffening frame, a handle connected to said head, and stringing woven through said head.

10. In a racket, a substantially oval head, a handle connected to said head, and stringing woven through said head, said head being formed of molded plastic material having an embedded open-work stiffening frame extending longitudinally therethrough.

11. In a racket, a substantially oval-shaped head, a handle connected to said head, and stringing woven through said head, said head comprising a series of spaced wires extending longitudinally of the head frame and embedded in molded plastic material.

12. In a racket, a head, a handle connected to said head, and stringing woven through said head, said head comprising a skeleton metal frame embedded in a body of molded plastic material.

13. In a racket, a head, a handle connected to said head, and stringing woven through said head, said head comprising a truss frame bent into substantially oval form and embedded in a body of molded plastic material.

14. In a racket, a frame comprising a handle and a head, said handle being formed of wire reinforced molded material.

15. In a racket, a frame of molded plastic material having open connected metal reinforcing members embedded therein, and stringing woven through the head portion of said frame.

16. In a racket, a frame comprising a head and a handle connected thereto, said head comprising a skeleton truss metal framing having a strip of apertured molded plastic substance extending longitudinally thereof

and supported thereby to carry the stringing of the racket.

17. In a racket, a frame comprising a plurality of longitudinal members in spaced relation and means for maintaining said members in such relation, comprising a double helix or spirally wound wire wrapped therearound.

18. In a racket, a substantially oval head of molded plastic material reinforced with an open-work frame of high tensile strength, a handle connected to said head, and strings woven through said head.

19. In a racket, a frame of molded plastic material of high compressive strength and relatively high tensile strength, and a reinforcing frame therefor, said reinforcing frame being of higher tensile strength than the plastic molded material.

20. In a racket, a frame comprising a head and a handle connected thereto, said head comprising a truss metal frame and a molded plastic body connected to and combined therewith.

21. In a racket, a frame consisting of metallic wires in combination with textile material, the same being held rigidly in place by a molded impregnating material, and stringing and a handle combined with said frame.

22. In a racket, a frame formed by a combination of metal reinforcements surrounded by textile materials impregnated with plastic material and hardened to form a rigid frame work.

23. A racket frame composed of longitudinal wires spaced apart by textile materials, the whole being combined with a plastic embedding material and hardened to form a frame for supporting stringing.

24. In a racket, the handle and head of which are formed of molded plastic material reinforced by a combination of textile and metal elements.

25. In a racket, a frame of molded material reinforced by a combination of textile and metal elements.

26. In a racket, a frame composed of a brittle molded plastic material held together by a textile filling and metal tensile sustaining members.

27. A tennis racket having a frame composed of longitudinal metal reinforcements encased in a textile covering and secured in a hardened plastic molded body.

28. In a racket, a frame composed of a brittle textile reinforced molded material held together by high tensile metallic sustaining elements embedded or partially embedded therein.

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