

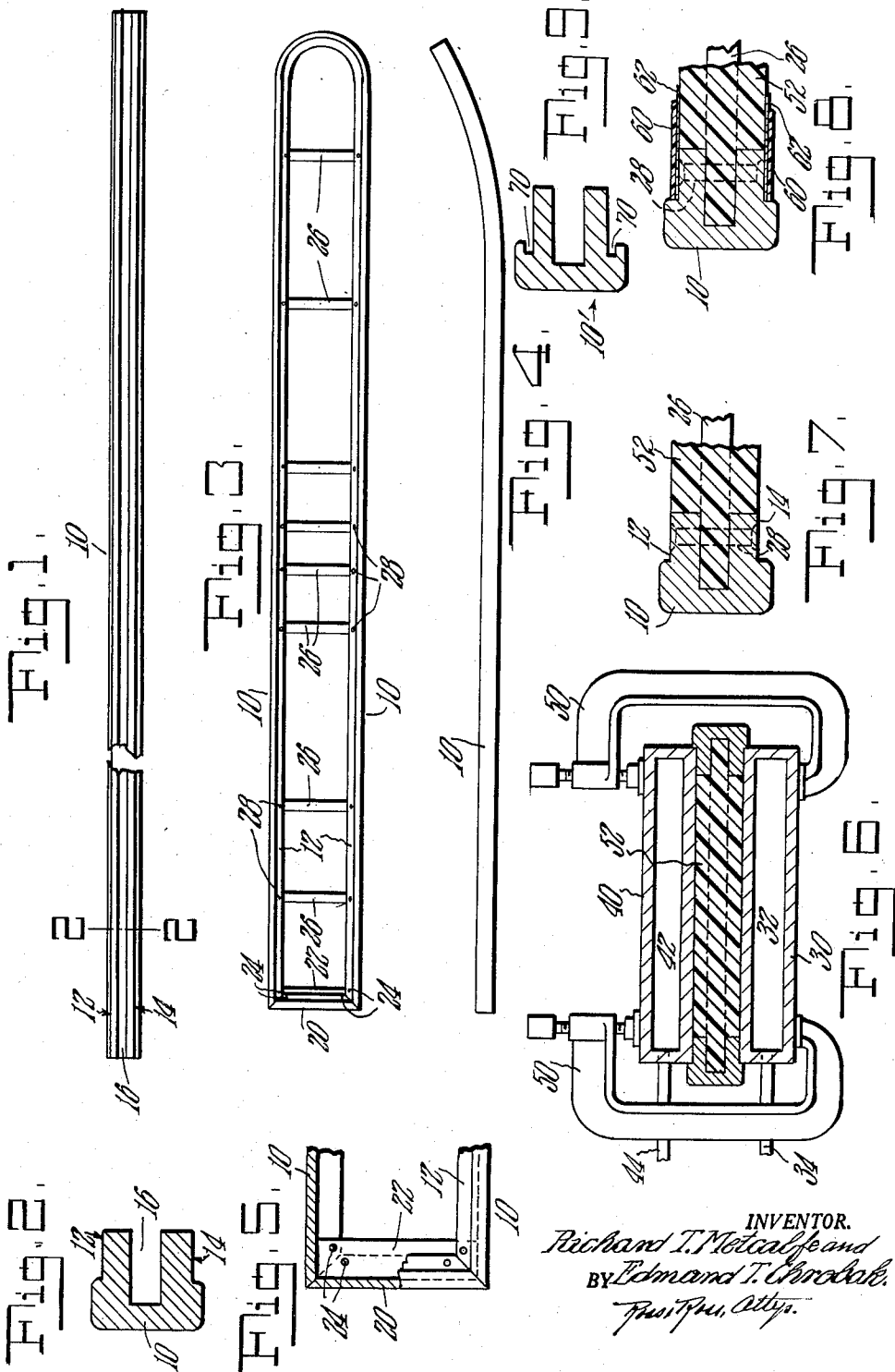
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SKI HAVING A FOAMED PLASTIC BODY PORTION

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SKI HAVING A FOAMED PLASTIC BODY PORTION

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1 Claim. (Cl. 280—11.13)

Our invention relates to new and useful improvements in a ski construction and is directed more particularly to the provision of a water ski.

The ski envisioned in this invention is a plastic ski which will be stronger than known skis of the prior art and will obviate the presently existing problems of maintenance which presents skis offer and will further function as a ski which will not break as easily as the present types of wooden skis.

One of the materials of this invention envisions the use of expandable foamed polystyrene in a simple and controllable process wherein the transition of beads or pellets of the material into foamed shapes does not require the addition of a foaming agent nor elaborate equipment. The simplicity of the expanding process permits manufacturers to produce economically foamed polystyrene by the molding of the same.

Other prime objects of our invention include; first, the attainment of a high speed of construction and assembly of the device due to its simplification of design and its unique composition of parts; second, the provision of an improved ski which may be made more economically and with fewer operations in its manufacture than prior devices known in the art; and third, the provision of such other improvements in and relating to skis of the type above referred to as are hereinafter to be described and claimed.

With the above primary objects in view, it is still another object of our invention to provide a construction of the above described character which is distinctive in its appearance, practical in its value, reliable in its operation, and efficient in its use.

In the annexed drawings, we have illustrated a complete example of a method of manufacture of the device of the invention which we have devised for the practical application of the principles of the invention.

It is to be understood however that various changes and alterations are contemplated and may be made in these drawings, exemplifying a preferred method and a resulting mechanical structure, within the scope of the claim subjoined hereto and all without departing from the spirit hereof.

In the drawings:

Fig. 1 is a broken side elevational view of the side rail of the device of the invention;

Fig. 2 is an enlarged sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view of the formed side rail member of the device of the invention;

Fig. 4 is a side elevational view of the member shown in Fig. 3;

Fig. 5 is an enlarged top plan view of the rear end portion of the member shown in Fig. 3 with certain parts broken away for purposes of clarity;

Fig. 6 is an enlarged sectional view through a pair of steam chests employed in the manufacture of the device of the invention showing the structure of the invention therebetween;

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Fig. 7 is an enlarged partial sectional view showing the relationship of certain components of the invention;

Fig. 8 is an enlarged partial sectional view, similar to Fig. 7, showing the relationship of certain components of the invention in a subsequent stage of development thereof; and

Fig. 9 is a view, similar to Fig. 2, showing a modified form of the invention.

In these drawings, we have presented but one general embodiment of the invention (which embodiment is deemed preferable) but same is for purposes of illustration only.

Changes may be made in various respects and within the scope of the appended claim without departure from the broad aspects of the invention inasmuch as it is susceptible of incorporation in other modified forms coming equally within the spirit hereof.

Referring now to the drawings more in detail, we have shown a rail member 10, which is generally an extruded shape such as shown in Figs. 1 and 2, has a pair of shoulders 12 and 14 on the top and lower surfaces thereof, and is provided with a transverse slot 16 extending inwardly from the inside side wall thereof as shown.

The member 10 is bent horizontally and substantially into a generally U shape such as is shown in Fig. 3. Same may be so formed by any conventional bending method and following formation may be held in such shape by means of a wooden form (not shown).

A heel plate 20, made of the same material as member 10, is provided. Same is secured to the member 10 at the opposite outer free ends thereof, being fitted thereto as by miter joints, as shown in Figs. 3 and 5.

A cross member 22 is provided which has its ends and one side thereof receivable in the transverse slots in the members 10 and 20, as shown. The components are secured together by means of pins 24 which are inserted in appropriate openings drilled through the members 10 and 20 and the cross member 22.

Other cross or brace members 26 are provided along the length of the U shaped member 10 which have their opposite ends receivable in the transverse slot of the opposed sides of the member 10, as shown. The members 26 are secured to the member 10 by means of pins 28 which are inserted into appropriate openings drilled through the member 10 and the cross members 26.

Members 10 and 20 are preferably made of aluminum due to the light weight thereof although same may be formed from other metals.

The cross members 22 and 26 may be made of the same material or, if desired, may be made of wood.

The cross members 22 and 26 having been inserted in place, the form is now ready for the vertical bending to give the forward or toe portion of the structure the familiar curved configuration so common to skis so as to form the general outline of a ski construction as best shown in Fig. 4.

The form is then ready for the forming operation.

A plastic of the expandable polystyrene type such as is produced by Koppers Company, Inc., under the trademark "Dylite" is employed in the forming operation. This material is readily expanded to shapes in molds as will hereinafter appear.

A bottom steam chest 30 is disposed beneath the form with the corners of the upper surface thereof nesting snugly on the shoulders 14 of the opposite sides of the member 10.

The beads or pellets of Dylite 52 are then charged into the mold formed by the member 10 on the sides and by the upper surface of the bottom steam chest 30 on the bottom.

Dylite foam is available in bead form and requires only heat to transform the small, free-flowing beads into a

strong, light plastic foam with a discrete closed cell structure possessing a tough skin. By heating in a mold, the beads expand, crush together and fuse to one another.

Another upper steam chest 40 is then disposed upon the top of the form with its lowermost corner nesting on the shoulder 12 of the opposite sides of the member 10, all as is shown in Fig. 6.

The chests 30 and 40 are then clamped together as by clamps 50 of conventional design so as to be held in fixed relationship to each other and to form therebetween when steam at approximately 20 p.s.i. is admitted to the interiors 32 and 42 of the chests respectively by conduits 34 and 44 respectively.

The steam in the chests approximates 400° F. in temperature.

The expanding operation consumes approximately 3 minutes.

It will be here understood that two methods of heating may be used for the expansion of the foam in the mold: (1) by the direct introduction of steam into the mold cavity; or (2) by indirect heating of the mold cavity.

By the direct introduction of steam into the mold cavity, openings may be provided in the top wall of the lower chest 30 and in the lower wall of the upper chest through which the steam may be passed directly into the mold cavity.

By the indirect heating of the mold cavity, the mold cavity is externally heated with steam. Water is used in the cavity to generate steam in situ acting as a heat transfer medium. In such instance, an amount of water equivalent to approximately 2½ times the weight of the beads or pellets is added directly to the mold cavity.

Following the formation of the formed plastic foam in the steam chests, cold water is passed through the steam chests for approximately three minutes in order to cool the molding components and the formed member prior to removal thereof from the steam chests.

It will be appreciated that the metal form is more or less sandwiched within the polystyrene foam which has, among others, the characteristic of superior mechanical strength.

It will further be appreciated that the molds thus employed are relatively simple and low in cost when compared with injection and compression dies.

A source of heat, preferably steam, and a means of clamping the mold are the two most essential requirements.

Either partially pre-expanded or unexpanded beads may be used.

As the next step in the process, strips of a plastic material such as a rubber or a polystyrene copolymer 60 are secured to the opposite outer surfaces of the expanded plastic 52 with the opposite side edges of the upper lamination 60 overlapping on the shoulder 12 of the member 10 at its opposite edges and with the opposite side edges of the lower lamination 60 overlapping on the shoulder 14 of the member 10 at its opposite edges.

The laminations 60 are secured to the expanded plastic foam and to the shoulders by means of a resin adhesive 62 which is adaptable to make a good bond between the said components; no pressure or heat being necessary to effect such bonding.

The laminations 60 are of such dimensions as to be receivable snugly between the walls of the member 10. The depth of the laminations is such as to provide the outermost plane thereof disposed inwardly of the outermost plane of the uppermost and/or lowermost surfaces

of the member 10 whereby the surface of the laminations are protected against scratching and scuffing by the member 10 as best shown in Fig. 8.

The laminations 60 may be colored so as to provide any desired ornamentation and the member 10 may be anodized or otherwise treated so as to provide any desired contrasting color effects.

The conventional binding members comprising shoes may be secured to the top side of the upper lamination 60 as by rivets, pins or the like, care being taken to insure that said pins are receivable through openings through the appropriate cross braces 26.

Further, if desired, the several cross braces 26 at the midsection of the ski within the area where the binding is to be affixed may be replaced by an enlarged metallic member which is secured to the member 10 in a manner hereinabove described.

Fig. 9 shows a modified form of side rail wherein rail 10' has longitudinally extending grooves 70 for receiving the edges of laminations such as 60 already described.

Having thus described our invention and the best manner of practicing the new process for forming this novel structure, without limiting ourselves to the order of steps of such method recited, or to the proportions of parts employed therein, or to the precise ingredients named, therein as it is evident that each of these components has a considerable range of equivalents and as it is also evident that the order and proportions of the process may be changed without departing from the scope and purposes hereof.

What it is desired to claim and secure by Letters Patent of the United States is:

A ski of the character described comprising, a generally U-shaped rail member having oppositely spaced side portions connected together by a transversely extending connecting portion at the forward extremities thereof, a transversely extending heel member secured to and connecting the opposite ends of the rearward extremities of the side portions of said rail member, said rail and heel members each having spaced upper and lower shoulders defining therebetween an inwardly facing slot extending along the longitudinal axis of the respective of said rail and heel members, a plurality of brace members extending between the spaced side portions of said rail member with end portions thereof being receivable in the slot thereof, an expanded plastic foam body filled within the area defined by said rail and heel members and enclosing said brace members, and uppermost and lowermost laminations secured to the upper and lower faces respectively of said expanded plastic body and having edge portions securable upon the outer faces of the respective shoulders of said rail and heel members.

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