April 20, 1943. E. L. BECKWITH ET AL 2,316,766

SCABBARD OR SHEATH

Filed Jan. 3, 1940 2 Sheets-Sheet 1

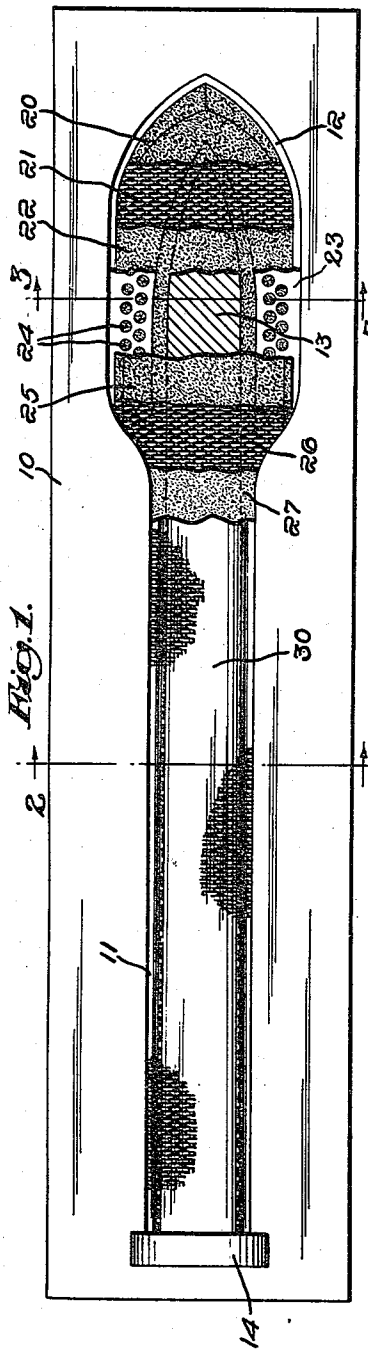

Fig. 1.

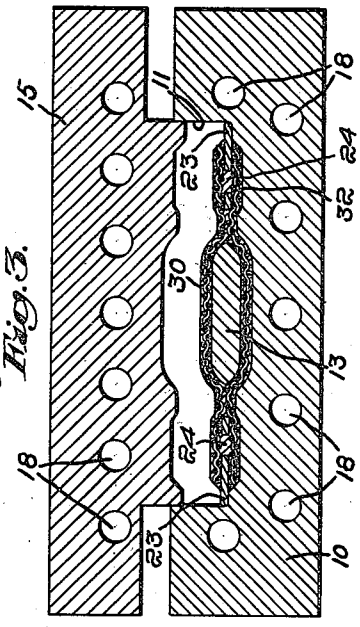

Fig. 3.

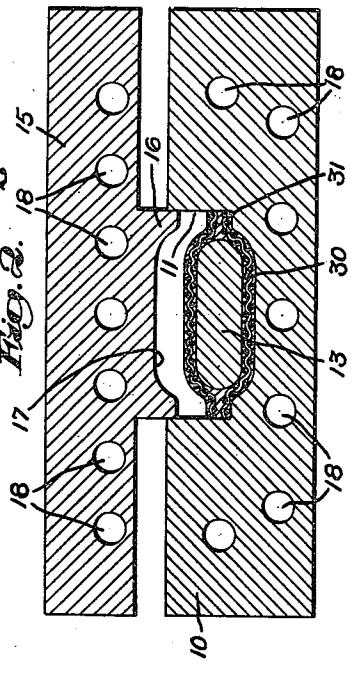

Fig. 2.

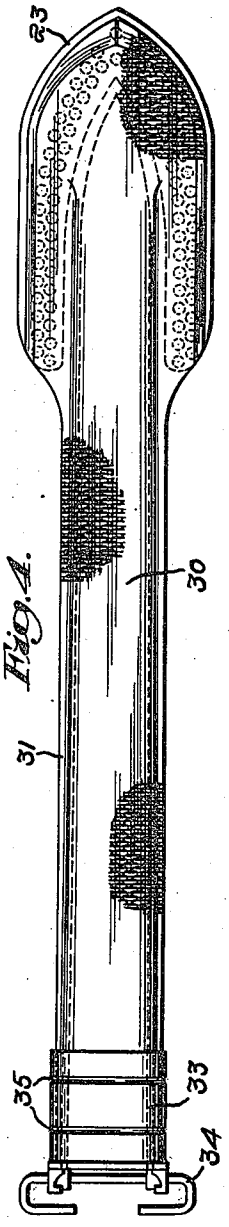

Fig. 4.

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SCABBARD OR SHEATH

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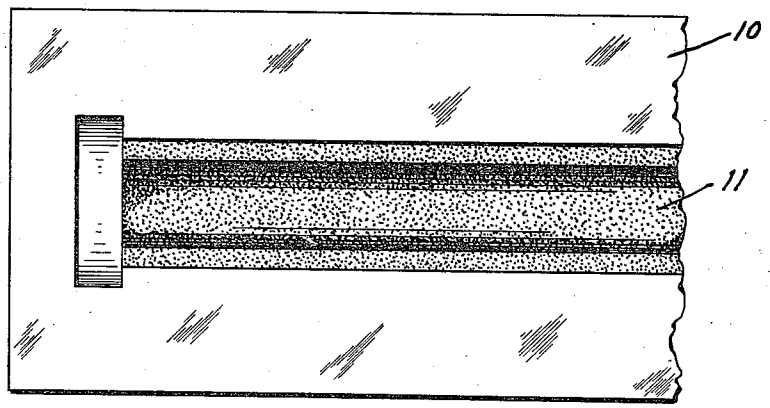

Fig. 5

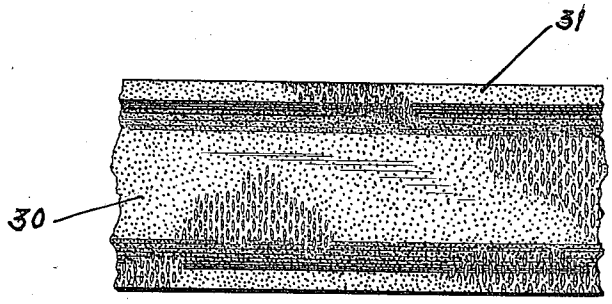

Fig. 6

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UNITED STATES PATENT OFFICE

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SCABBARD OR SHEATH

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Application January 3, 1940, Serial No. 312,192

9 Claims. (Cl. 224—2)

This invention relates to scabbards or sheaths for bayonets, trench knives, swords and the like. It consists in a novel and improved scabbard or sheath having certain advantages over those heretofore available and the invention includes within its scope the process of producing the novel scabbard herein disclosed.

The primary object of the invention is to produce an improved scabbard or sheath of light weight and adequate strength, which may be relied upon to retain its shape permanently without warping or distortion, which is waterproof, and at the same time presents an internal surface that is not so hard as to damage the sharp edge of a weapon when the latter is being inserted or withdrawn from the scabbard.

Heretofore, scabbards have been made largely of metal, saddle leather and wood and have not possessed the desirable qualities above discussed to any high degree. The scabbard of our invention has walls which comprise a compressed textile base embedded in a shell of hard molded resin, and these walls overlap about the margin of the scabbard and are fused and molded into a solid integral flange which may, if desired, be extended along both sides and across the closed end of the scabbard. We are able to construct such a scabbard weighing not over 12 ounces, exclusive of metal fittings, and which, for all its light weight, is so strong that there is no danger of its breaking, and so stiff that it can safely be used for digging as an intrenching tool when necessary. Moreover, the solid peripheral flange supplies a formidable striking edge which may be used offensively with considerable effect while the bayonet is contained therein, or apart from the bayonet.

The scabbard includes a tubular metal fitting at its open end, having means for attachment to the belt of the soldier. The molded material of our improved scabbard is arranged to extend through this fitting as a lining preventing contact of the bayonet blade with the metal and safeguarding its sharp edge when being inserted in or withdrawn from the scabbard.

As an optional feature of our invention a metal reinforcing plate may, if desired, be molded into the tip of the scabbard and where this is done the plate is preferably perforated so that integral bonding studs of plastic material will be formed in the molding operation, anchoring the plate and constituting integral parts of the body of the scabbard.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof selected for purposes of illustration and shown in the accompanying drawings, together with the molds and mandrel employed in its construction. In the drawings—

Fig. 1 is a plan view of the lower mold showing the various layers of material which enter into the composition of the scabbard, the layers being shown as broken off in progressive locations,

Fig. 2 is a view in cross section through both molds on the line 2—2,

Fig. 3 is a similar view in cross section on the line 3—3 of Fig. 1,

Fig. 4 is a plan view of the completed scabbard.

Fig. 5 is a fragmentary view of the lower mold showing its sand blasted surface, and

Fig. 6 is a fragmentary view of the scabbard showing the frosted or etched outer surface produced by the sand blasted mold.

We may employ as a base material for our improved scabbard any suitable woven or knitted textile material depending upon the requirements of the article to be produced. For example, for a bayonet scabbard we may employ a heavy 22 or 24 oz. canvas or mill duck, or for a smaller sheath we may employ a jersey material knitted from a much lighter thread.

Flat blanks of the required shape may be died or otherwise cut out from the textile sheet and then incorporated in a molded scabbard, being at the same time impregnated and encased within a shell of a suitable moldable resin. For this purpose we prefer to use vinyl acetate aldehyde which is obtainable in sheets or as a dry powder under the trade name of "Alvar." This is a thermoplastic resin of the type which becomes plastic under heat and pressure and then hardens to form a hard, resilient, transparent or semi-transparent shell encasing the textile base, impregnating it and fusing into an integral mass in all overlapping or contacting areas.

Instead of vinyl acetate aldehyde we may employ other suitable thermoplastic or thermosetting resins having the necessary characteristics of strength, hardness, fusion, resistance to moisture, etc., such as urea formaldehyde condensation products, for example, those sold under the commercial name of "Pollopas," Fantasite H," "Trolite Special E," "Bendalasta" and others.

Referring now to the drawings: in Fig. 1 the lower mold 10 is represented as having a cavity which is of the contour desired in the finished scabbard containing the mandrel upon which it is made. As herein shown, the body 11 of the cavity tapers about ¼" per foot from its left

hand end and then widens into a spade-shaped end portion 12. In addition to the material entering permanently into the construction of the scabbard, the lower mold cavity is shaped to contain a mandrel 13 for determining the internal shape of the scabbard and this mandrel is provided with an enlarged end 14. With the lower mold there is provided an upper mold 15 having a projecting portion 16 provided with a cavity 17 which is complementary to the cavity of the lower mold. Both the upper and lower molds are provided with longitudinal passages 18 through which steam or cold water may be caused to flow alternately for heating and cooling the molds.

In constructing a bayonet scabbard of the shape shown in Figs. 1 and 3, the lower mold cavity is first provided with a layer 20 of powdered thermoplastic material, in this case "Alvar." Then the canvas blank 21, which fills the mold cavity except in its spade-shaped end portion 12, is placed upon this layer and covered with a second layer 22 of "Alvar." Upon this layer is placed a flat metal reinforcing plate 23 having a forked body provided with a multiplicity of small perforations 24. The plate is shaped to extend along and beyond the sides and end of the spade portion of the scabbard. The molds are shouldered to provide a peripheral cavity for the edge of the plate 23 where it projects beyond the textile blank 21. The mandrel 13 is also placed upon the resin layer 22 and is thus supported in the same plane as the reinforcing plate 23 and spaced symmetrically within its concave inner contour. Upon the perforated reinforcing plate 23 and the mandrel is spread another layer 25 of "Alvar." Above the layer 25 is placed a second canvas blank 26, and finally, above this, is spread a final layer 27 of "Alvar." It will be apparent that the edge portions of the two convas plies are located in parallel superposed relation around the contour of the mandrel.

Having assembled the constituent parts of the scabbard and the mandrel as above described, the upper mold 15 is brought into cooperative relation with the lower mold as shown in Figs. 2 and 3. Steam is caused to flow through the passages 18 heating both molds and the two molds are subjected to heavy pressure, as by being placed in a hydraulic press. Under these conditions, "Alvar" is reduced to liquid or plastic form, is forced into interstices of the textile blanks, completely saturating and impregnating them, is forced through the perforations 24 of the reinforcing plate, is fused together in all overlapping areas, and is molded smoothly as a hard transparent shell conforming to the shape of the mold cavity and the mandrel.

The molded walls 30 of the scabbard are supported internally by and conform exactly to the contour of the mandrel 13. The mold cavities are shouldered so that an integral peripheral rib 31 is formed in the scabbard, extending along both sides of the body of the scabbard and merging into a wider shoulder 32 which extends about the spade-shaped end of the scabbard with the reinforcing plate sealed within it. The rib contains a double ply layer of fabric and forms with the adjacent walls of the scabbard a solid T-shaped section extending along each edge of the hollow body and imparting strength and rigidity thereto. The reinforcing plate 23, if used, projects slightly and supplies a metallic binding or shoe for this portion of the scabbard.

In the molding operation the plastic material flows through the perforations 24 of the reinforcing plate, thus forming a multiplicity of anchoring studs by which the plate is firmly and permanently retained in place. The transparent shell presents a smooth plane surface or a surface which may be slightly pebbled and follows the contour of the canvas weave depending upon the amount of "Alvar" used in the outer layers of the scabbard. A thin layer may be used if the latter condition is desired, while a slightly thicker layer will result in a smooth plane surface. The side walls 30 in the body of the scabbard are stiff, resilient and permanently spaced apart to enclose an opening substantially wider than the thickness of the external rib 31. At its sides this opening is bounded by smooth concave surfaces of solid molded resin as best shown in Fig. 2.

After the molds have been maintained under full molding pressure for a sufficient time, steam flowing through the passages 18 is cut off and cold water substituted thus rapidly chilling the molds. They may then be separated, and Figs. 2 and 3 represent the molds as they are being separated at the conclusion of a molding operation. The complete body of the scabbard and mandrel are then lifted from the lower mold and the mandrel withdrawn by pulling upon its enlarged end 14. It will be noted that in the process of molding the scabbard the textile material is substantially compressed and is then permanently maintained in this compressed condition by the setting and hardening of the thermoplastic material under full molding pressure. This step of the process therefore has the effect of placing the fibres under permanent compression and thus increasing the tensile strength of the fabric material compared to that of its normal uncompressed strength.

The scabbard is completed by being provided at its open end with a tubular metal fitting 33 having means, such as a loop 34, for detachably connecting the scabbard to the belt of the soldier. Such a fitting may be secured in place in any suitable manner, for example as shown in Fig. 4, it may be secured by a crimping operation in which it is heated sufficiently to soften the scabbard and then provided with circumferential corrugations 35 which embed themselves permanently in the molded material of the scabbard. In any case, however, the molded material projects substantially through the tubular portion of the fitting 33 thereby serving as a lining and preventing damage to the sharp edge of the bayonet by contact with the metal of the fitting.

It is desirable to employ a mandrel of a steel alloy having a high coefficient of expansion, in combination with a resin product having a low mold shrinkage factor since these characteristics cooperate to facilitate the somewhat difficult operation of withdrawing the mandrel from the finished scabbard. The mandrel itself preferably has a taper of ¼" per foot and when cooled tends to free itself from the interior walls of the scabbard. "Alvar" is a good example of a resin product having this desirable low mold shrinkage, and "Lusite" and "Polystyrene" are other examples.

While we prefer to employ "Alvar" in powdered form as above explained, this product is available and we may use it in blanks of sheet form, or it may be calendered upon the textile blanks before they are inserted in the molds.

An optional feature of our invention consists

in sand blasting the mold cavity in order to impart infinitesimal irregularities to its molding surface and thus produce a scabbard with a frosted or etched outer surface that will diffuse and not specularly reflect the light.

The process of making the case or scabbard of our invention is not herein claimed but forms the subject matter of our co-pending divisional application Ser. No. 372,938, filed January 2, 1941.

Having thus disclosed our invention and described an illustrative embodiment thereof, not with any idea of limiting the invention however, we claim as new and desire to secure by Letters Patent:

1. A molded scabbard having walls spaced apart to provide an elongated enclosure, each wall including a single continuous ply of woven textile material embedded and held permanently compressed within a shell of hard synthetic resin, said walls merging at their peripheral edges into a solid integral rib including a multiple ply of said woven textile material also held permanently compressed within a shell of hard synthetic resin, the rib merging inwardly into the walls of the scabbard and providing therewith a stiff T-shaped section which extends along the both edges of the scabbard.

2. A combined scabbard and digging tool having walls which comprise plies of a textile fabric embedded within a hard shell of thermoplastic resin, said plies overlapping about the margin of the scabbard and being molded with the resin into an integral flange extending along the sides and across the closed end of the scabbard, and a perforated metal plate partially enclosed in the end portion of the scabbard with one ply of the textile fabric on each side, with anchoring studs of resin in the perforations of the plate and with its margin projecting beyond the contour of the flange.

3. A scabbard having walls which comprise continuous plies of unbroken textile fabric embedded in a hard shell of thermoplastic resin, said plies converging into overlapping relation about the margin of the scabbard and being molded with the resin in a solid external flange containing a double ply of said fabric and extending along the sides and across the closed end of the scabbard, the walls of the scabbard being stiff, resilient and permanently spaced apart to enclose an opening substantially wider than the thickness of the said external flange and the sides of the opening being bounded internally by smooth concave surfaces of molded resin.

4. A scabbard having walls which comprise plies of textile fabric embedded and held permanently compressed within a shell of hard thermoplastic resin, said plies converging transversely into overlapping relation substantially throughout the margin of the scabbard and being molded with the resin into a solid integral flange extending along both sides and across the closed end of the scabbard, and a tubular metallic fitting surrounding the open end of the scabbard and being lined by walls of resin-enclosed fabric.

5. A scabbard having walls which comprise plies of canvas embedded and held permanently compressed in a hard shell of partially transparent resin through which the weave of the canvas is visible, said canvas plies converging into an even overlapping relation about the margin of the scabbard and being molded with the resin into a continuous integral flange which is thicker than the walls of the body of the scabbard and forms therewith a stiff T-shaped section extending along the longitudinal edges of the scabbard.

6. A scabbard having walls which comprise a continuous sheet of woven fabric held permanently compressed within a shell of hard, resilient, substantially transparent thermoplastic resin product, the scabbard enclosure being bounded about its margin by a continuous integral rib thicker than the walls of its enclosure and containing marginal portions of the sheet of woven fabric in superposed layers, and the scabbard presenting an outer light diffusing surface.

7. A waterproof scabbard having spaced flat side walls each including a canvas base held permanently compressed within a hard smooth shell of molded resinous material, the canvas base of both side walls comprising continuous sheets converging into overlapping relation in their margins along substantially the whole length of the longitudinal edges of the scabbard and the overlying plies being embedded in an integral continuous rib of said resinous material, thus providing stiffening elements in the scabbard structure.

8. A combined scabbard and digging tool having spaced walls comprising plies of textile fabric embedded within a hard shell of thermoplastic resin, said plies overlapping about the margin of the scabbard along its sides and being molded with the resin into an integral flange, and a flat perforated metal plate wider than the body of the scabbard, having a spade shaped end and being enclosed in the end portion of the scabbard with anchoring studs of resin extending through its perforations and with its margin projecting beyond the contour of the flange of the scabbard.

9. A bayonet scabbard comprising an elongated hollow body having stiff, resilient walls consisting of canvas embedded in a hard shell of resin and having an external solid rib extending along its longitudinal edges and about its closed end, the canvas component of the scabbard structure being disposed in double thickness throughout substantially the entire length of the said external rib and being separated into single layers in the side walls of the scabbard, the walls of the scabbard being permanently spaced apart to enclose an opening greater in width than the thickness of the rib and said walls and rib together forming stiff T-shaped sections along both edges of the scabbard, and a tubular metallic fitting surrounding the open end of the scabbard and having an inner lining of resin.

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