

Aug. 27, 1968

N. J. WATERBURY

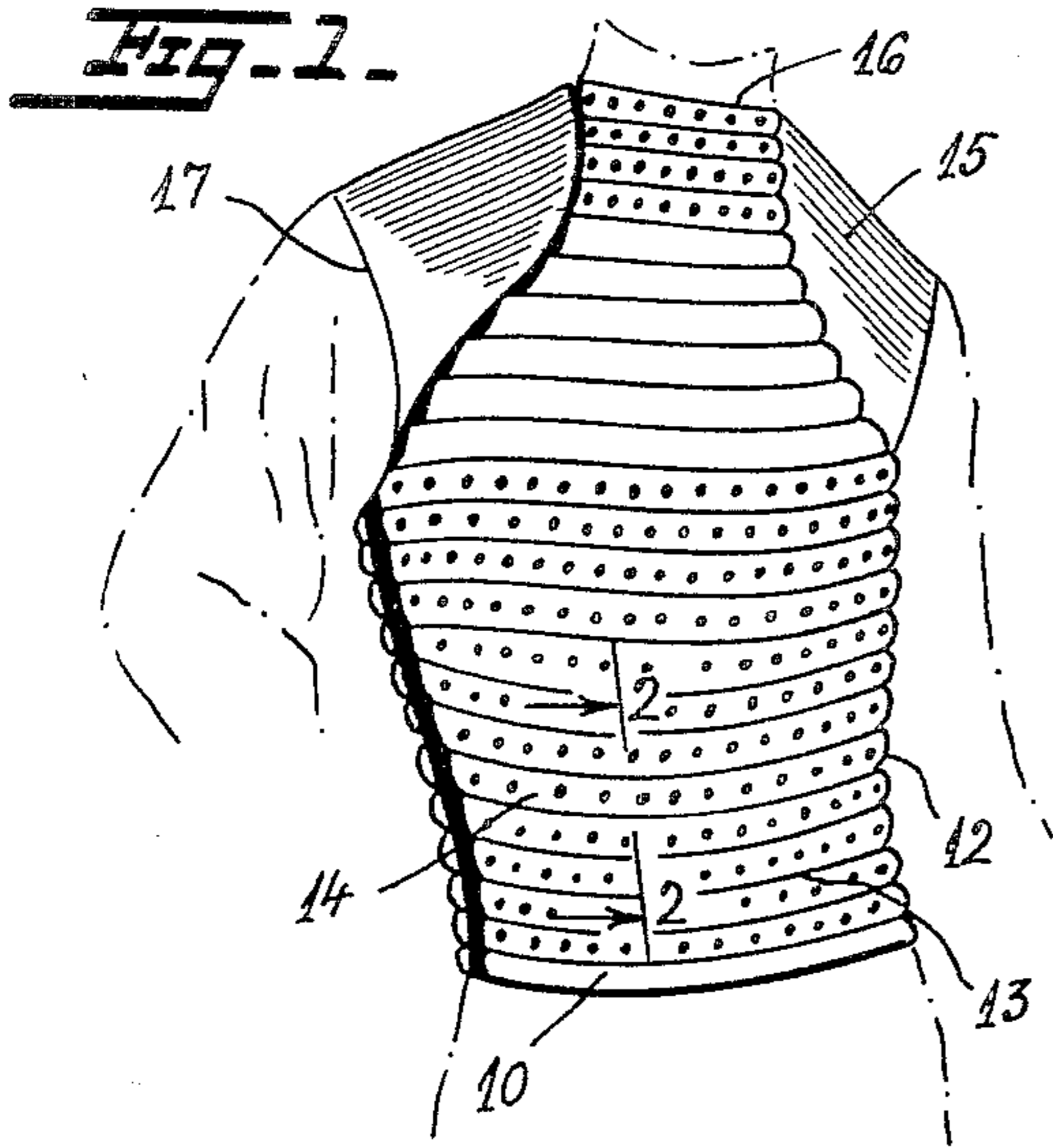
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BUOYANT BULLETPROOF COMBAT UNIFORM

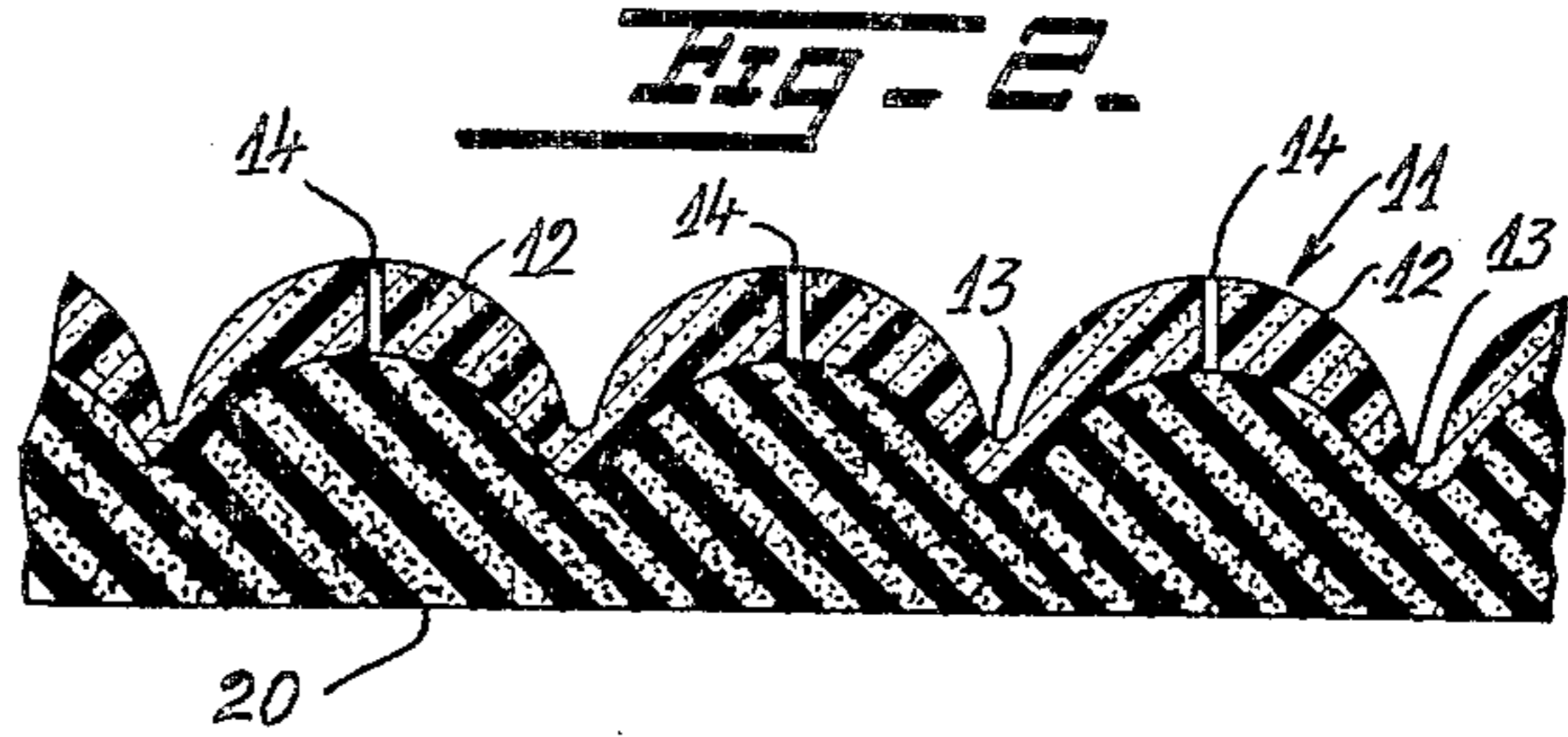
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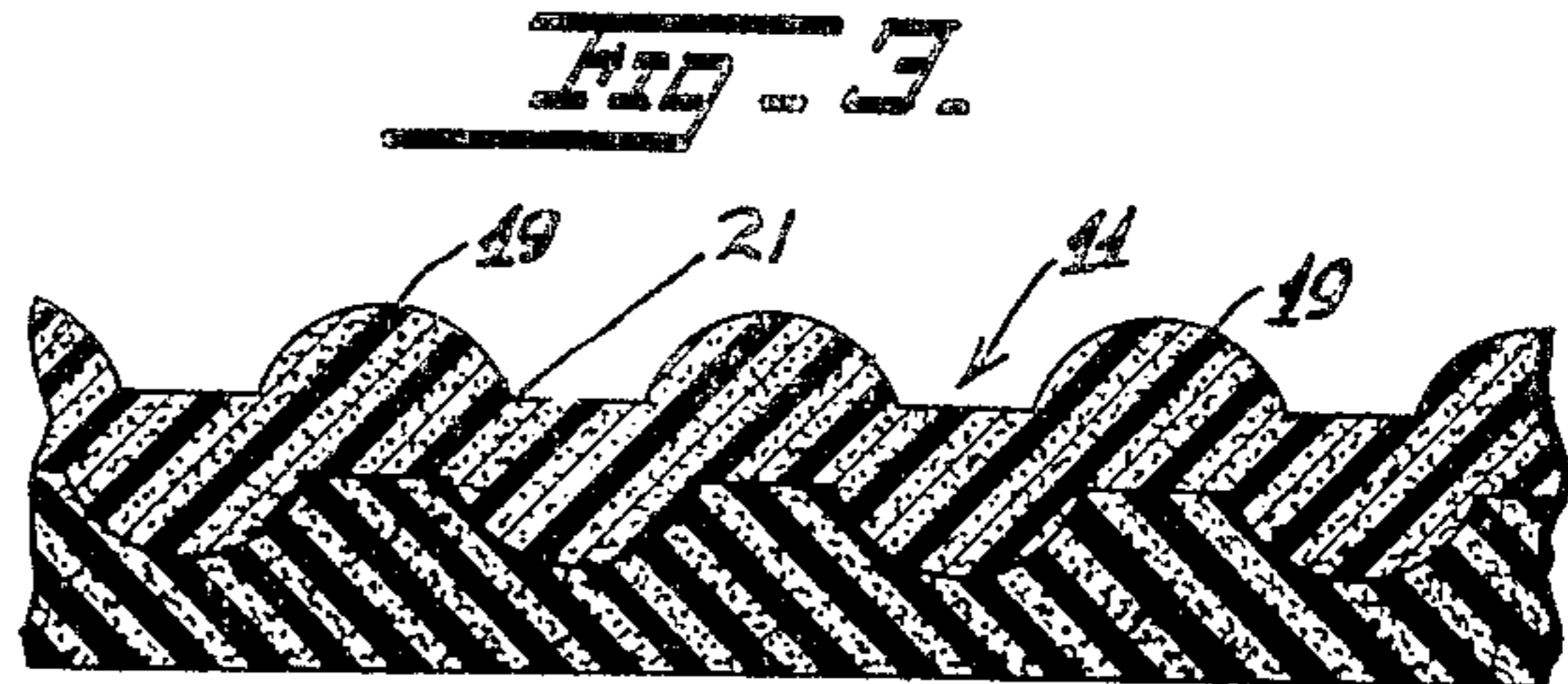
**Fig. 1.**



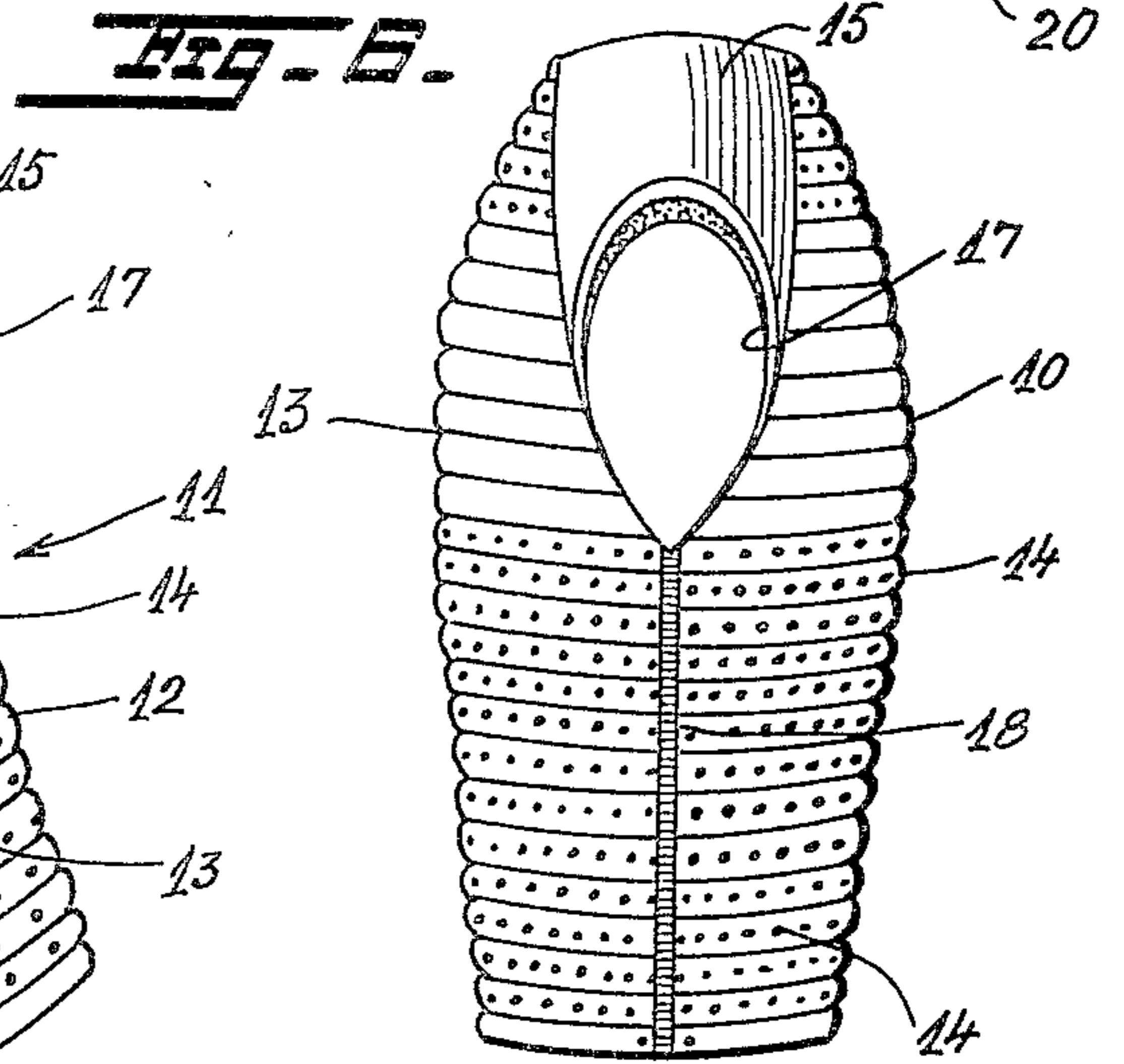
**Fig. 2.**



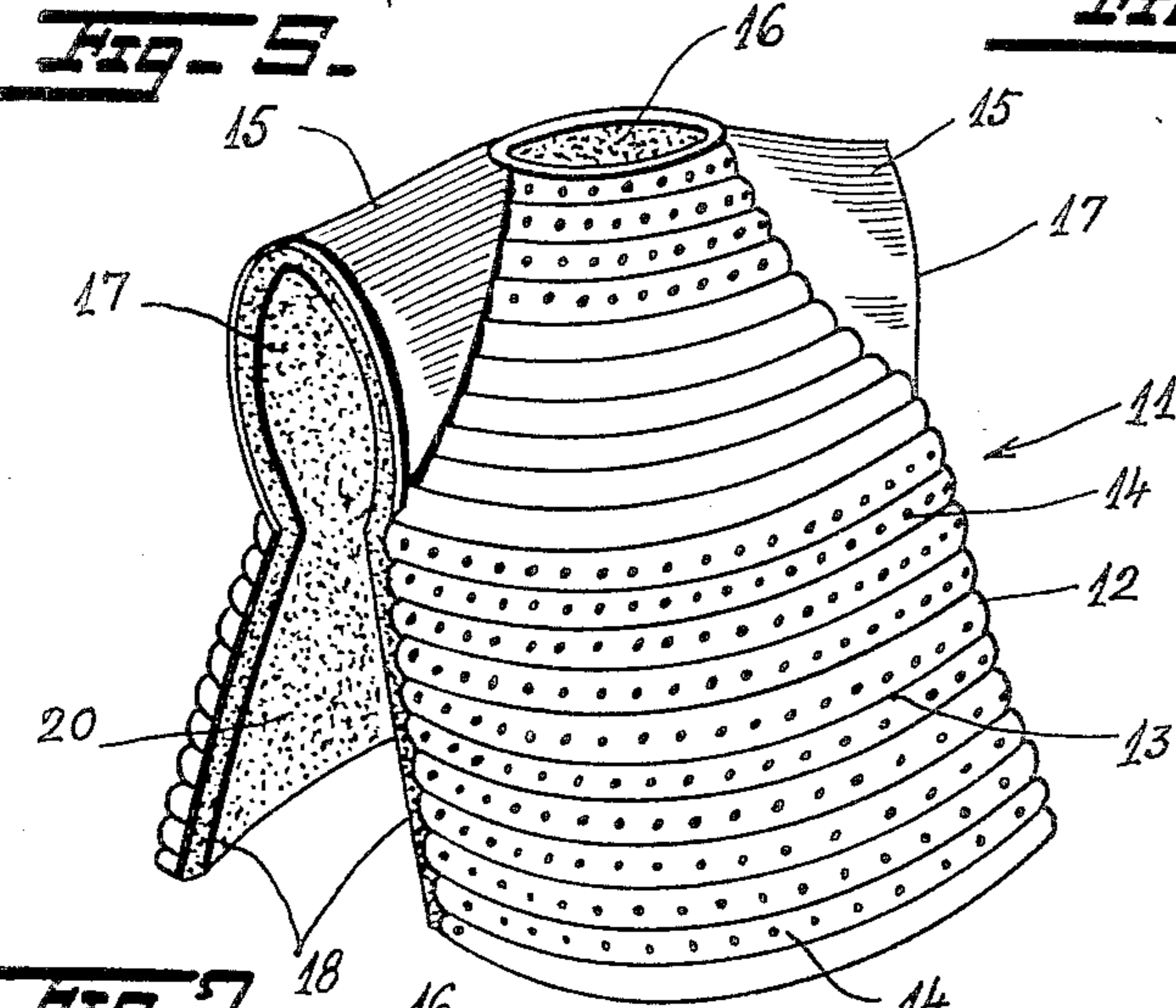
**Fig. 3.**



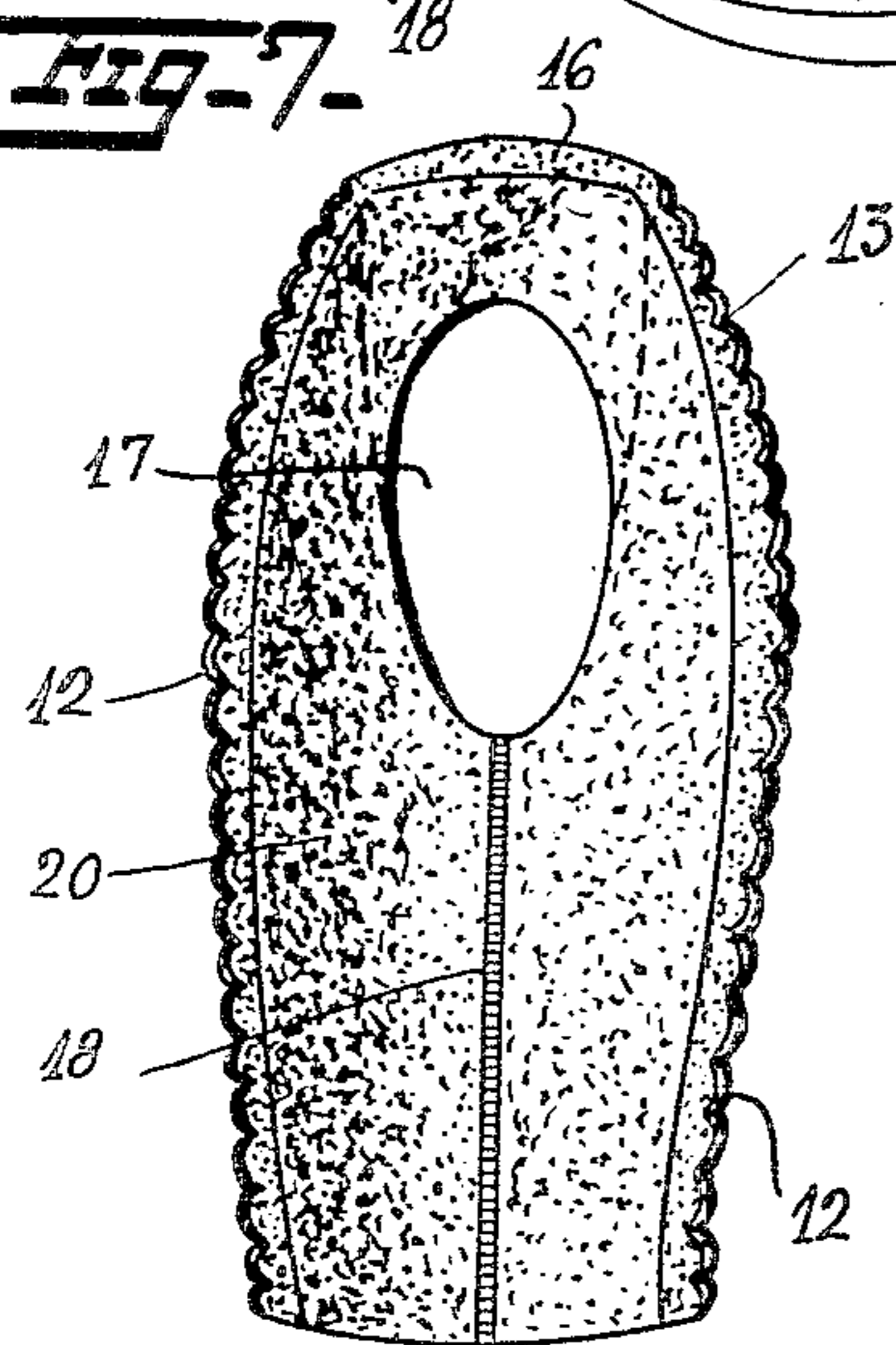
**Fig. 4.**



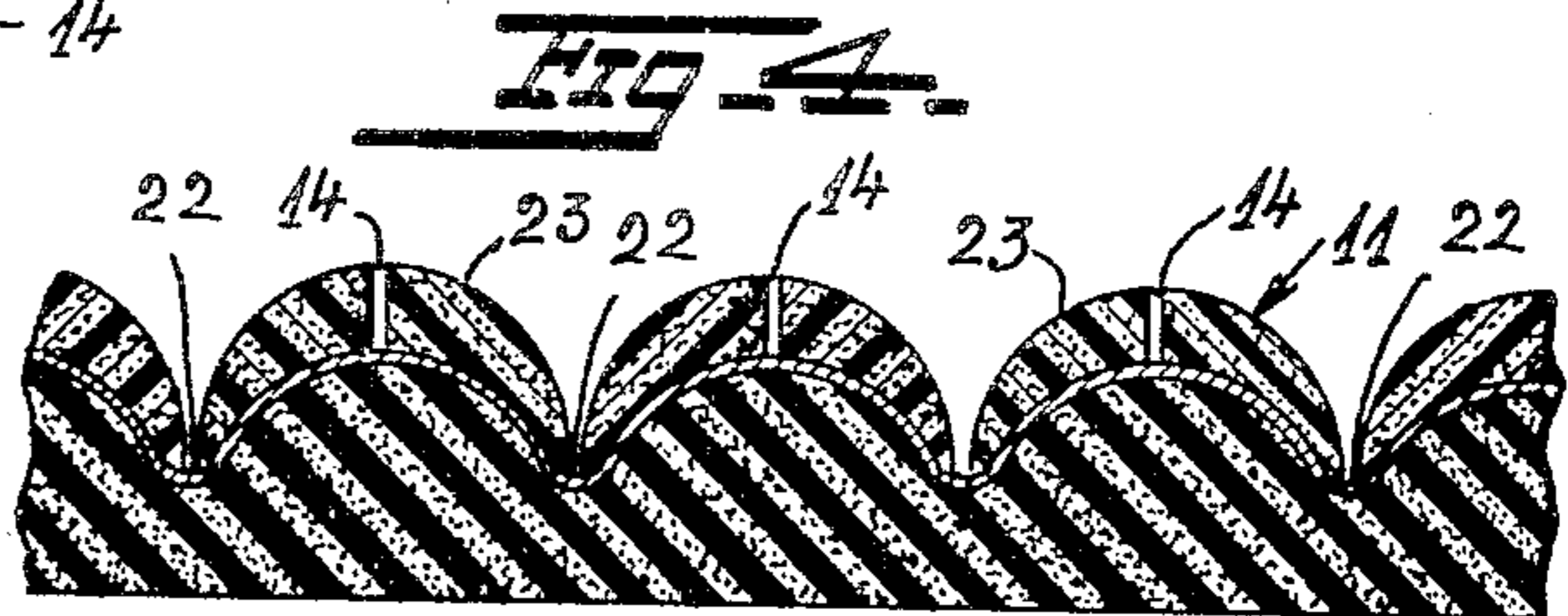
**Fig. 5.**



**Fig. 7.**



**Fig. 4.**



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Fig. 8.

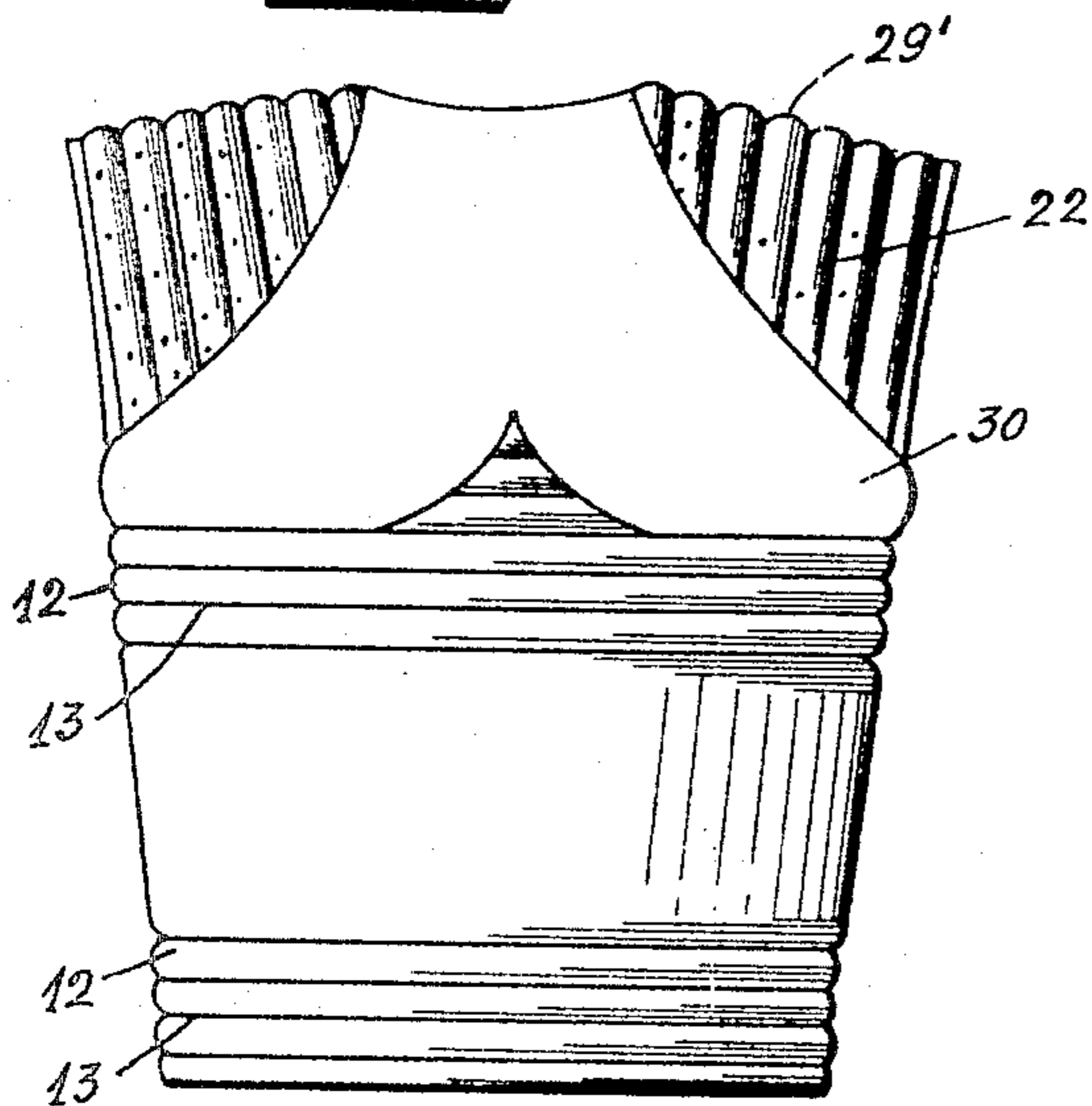


Fig. 9.

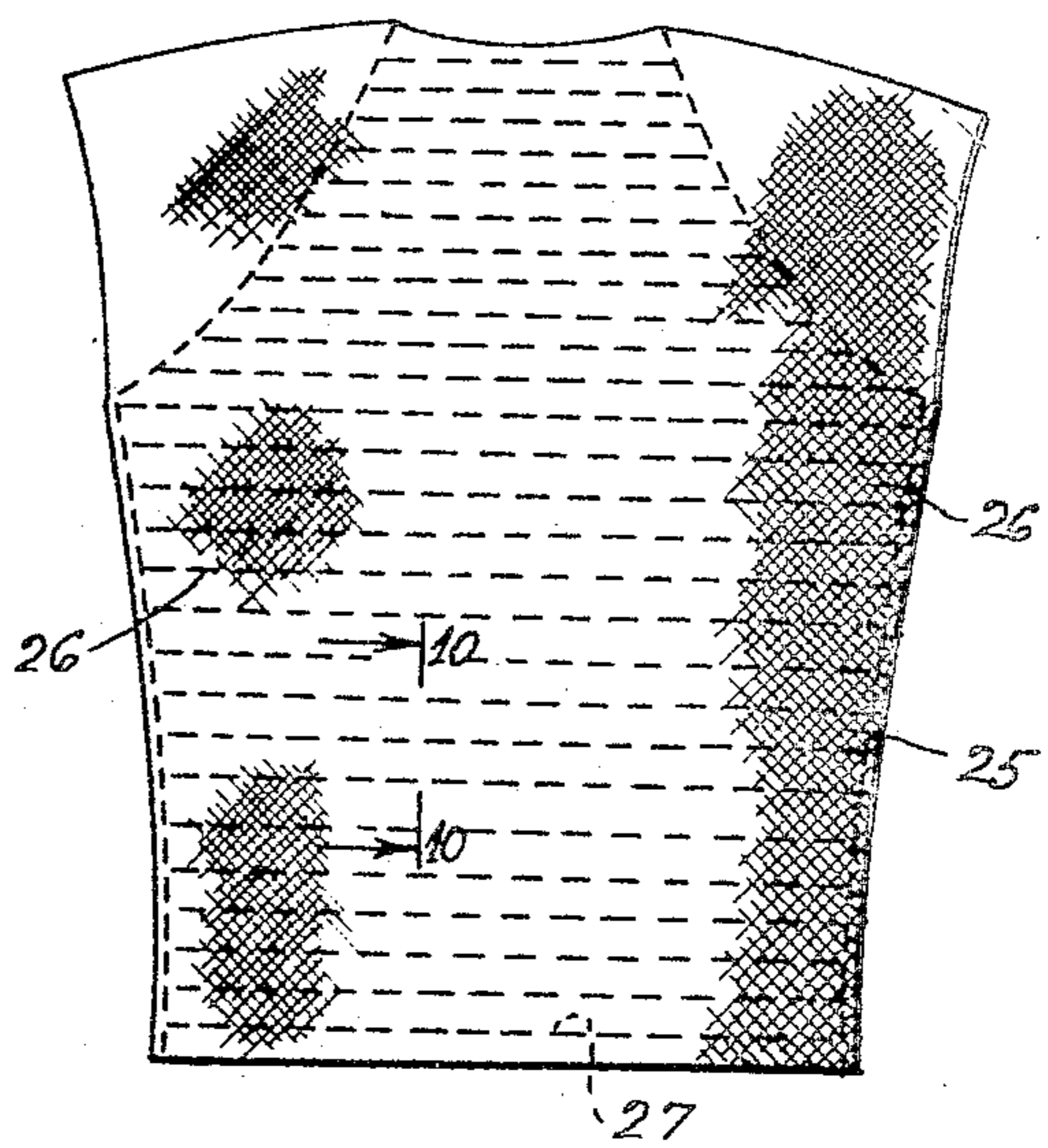


Fig. 10.

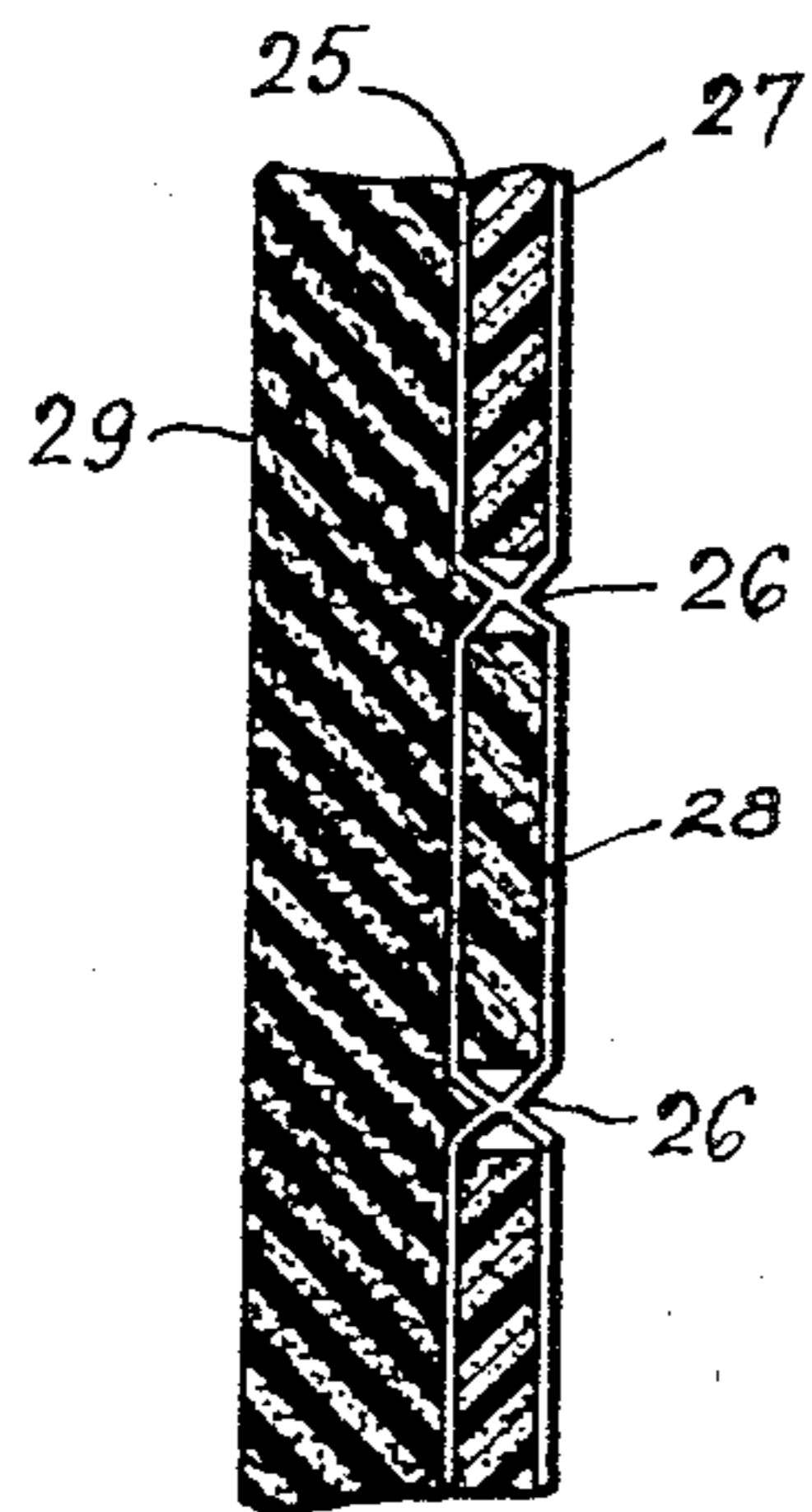


Fig. 11.

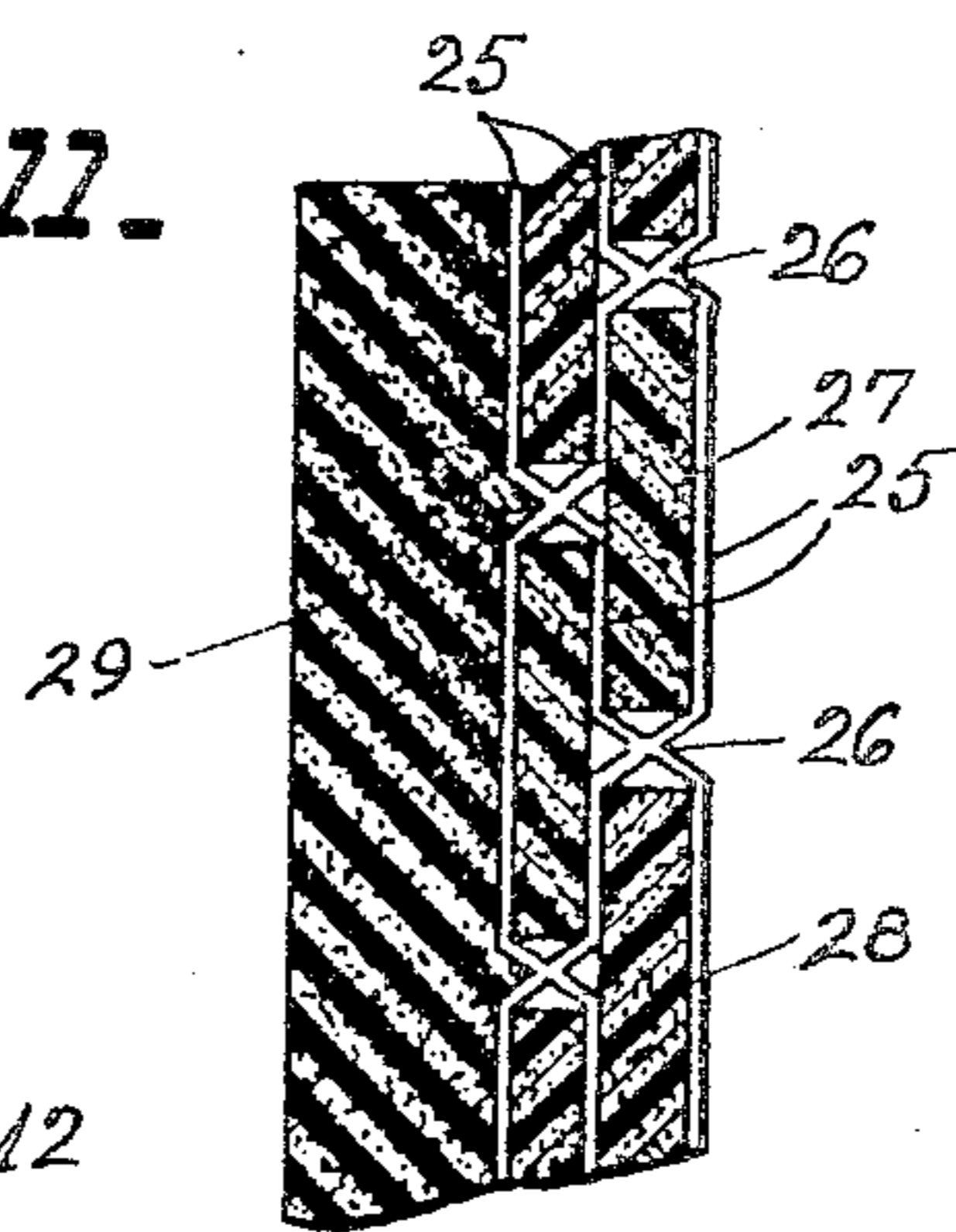


Fig. 13.

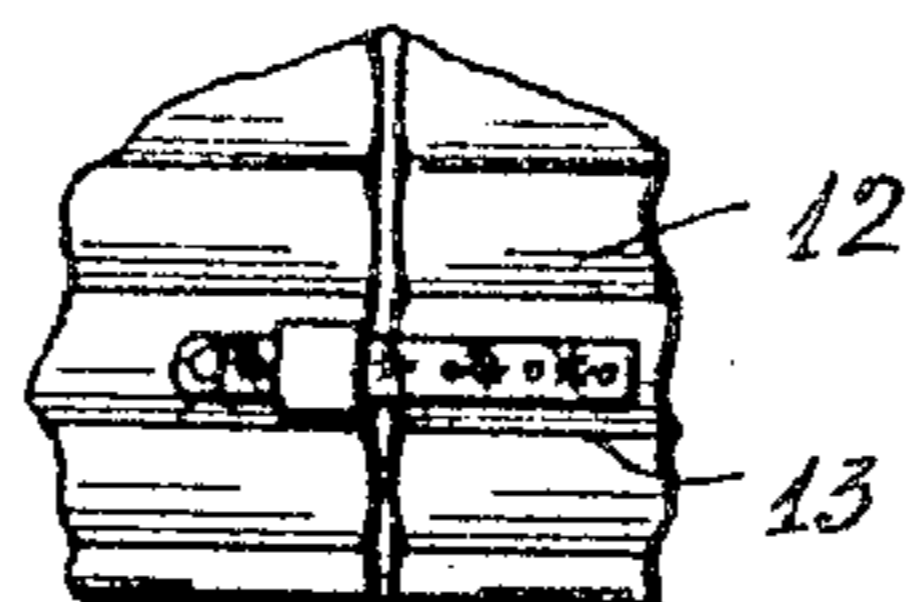
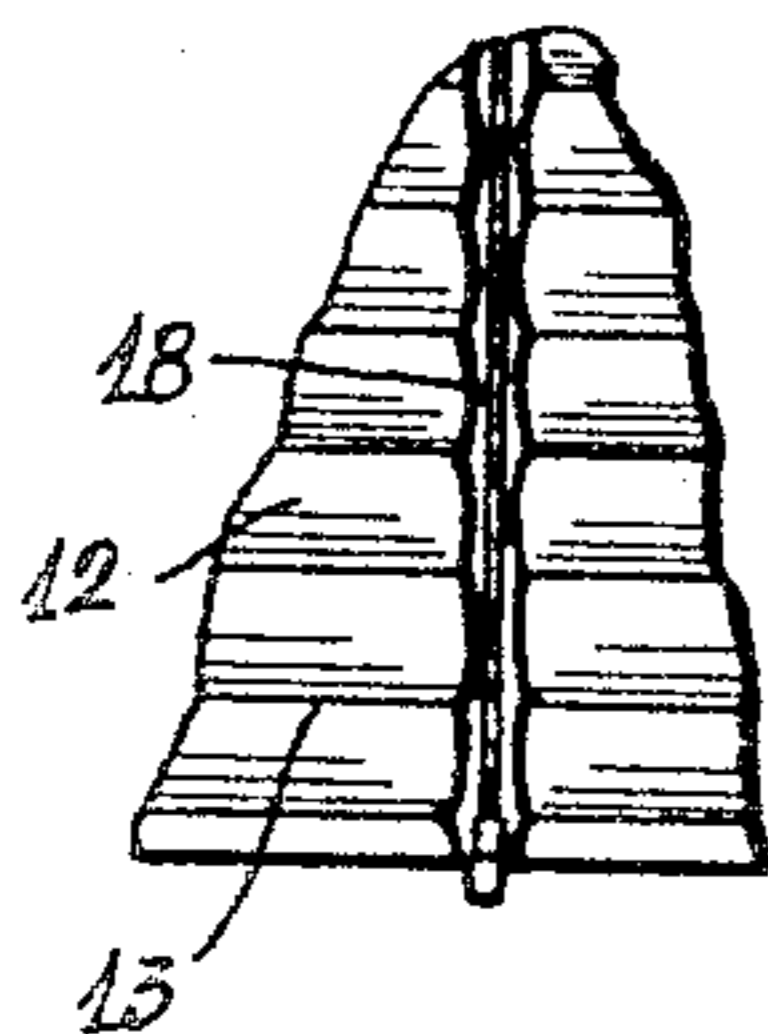


Fig. 12.



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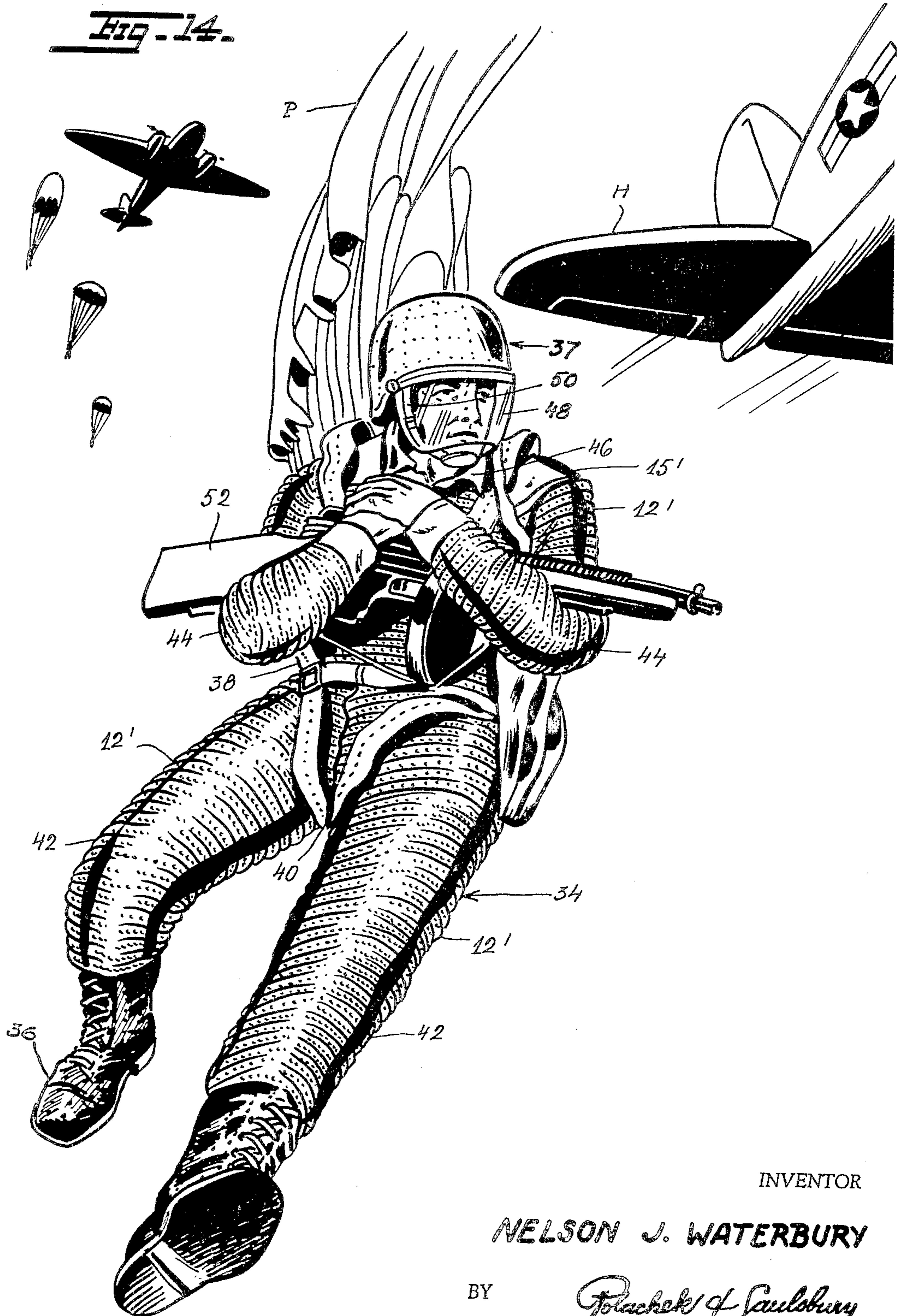
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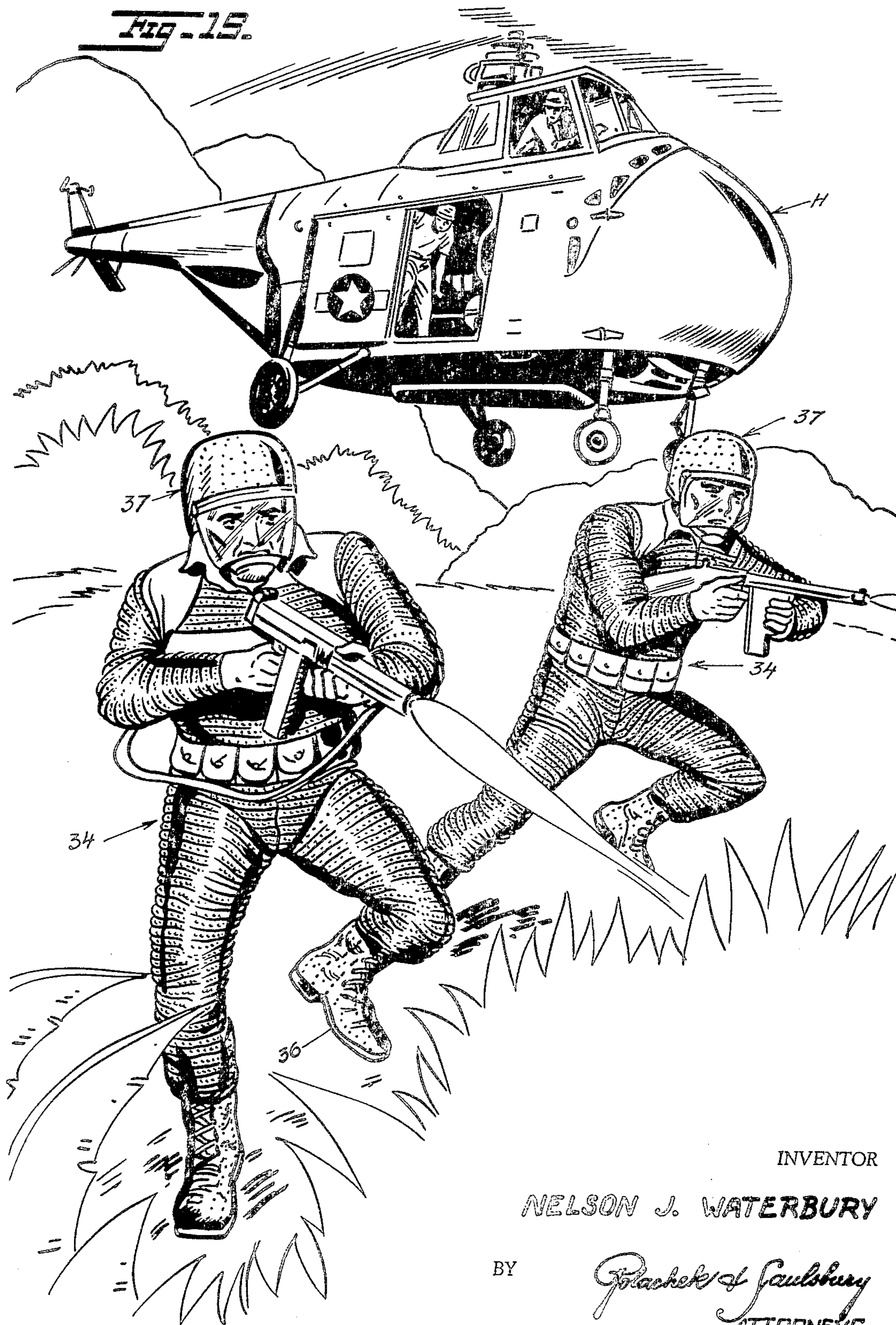
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BUOYANT BULLETPROOF COMBAT UNIFORM

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Fig. 16.

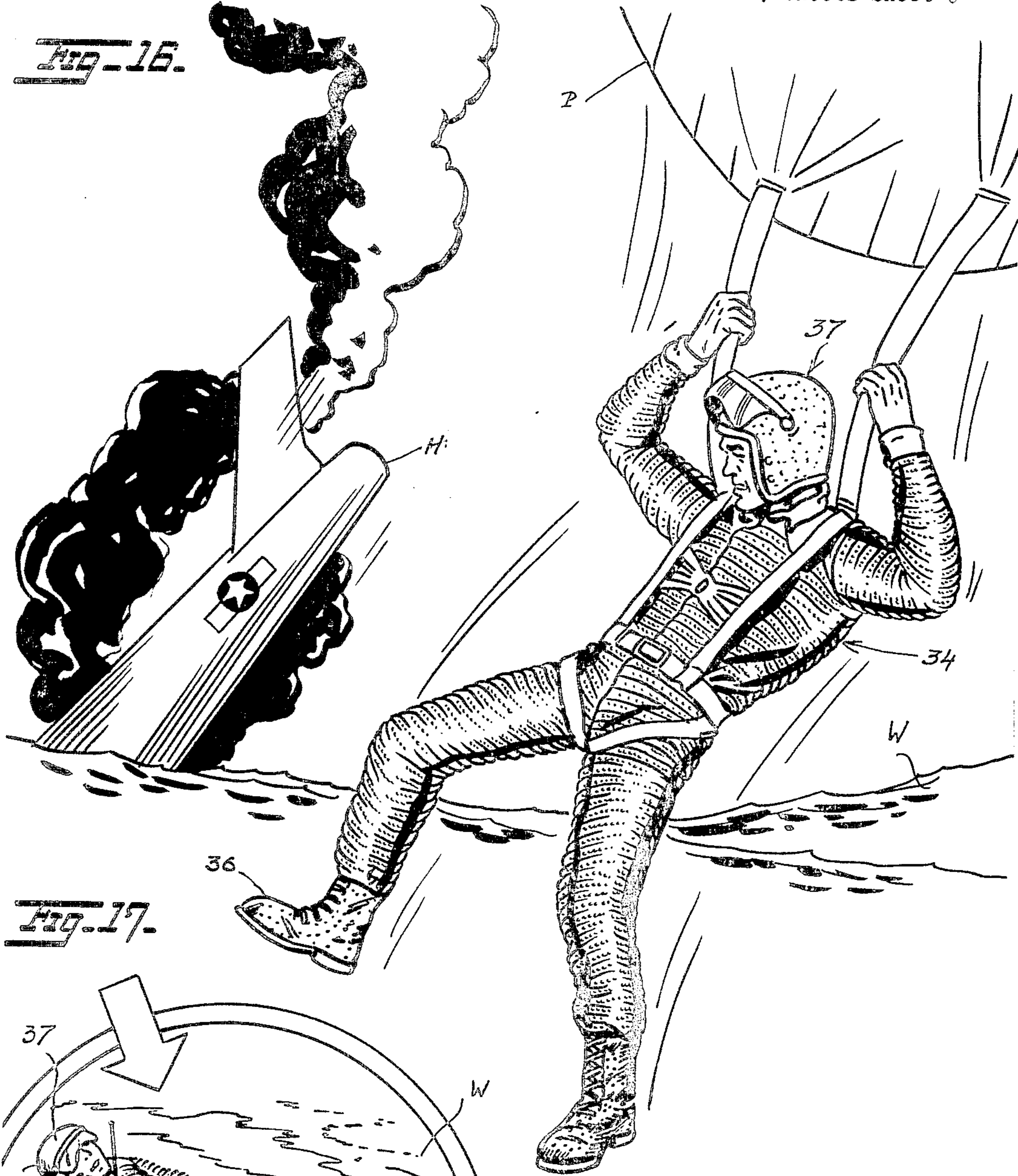
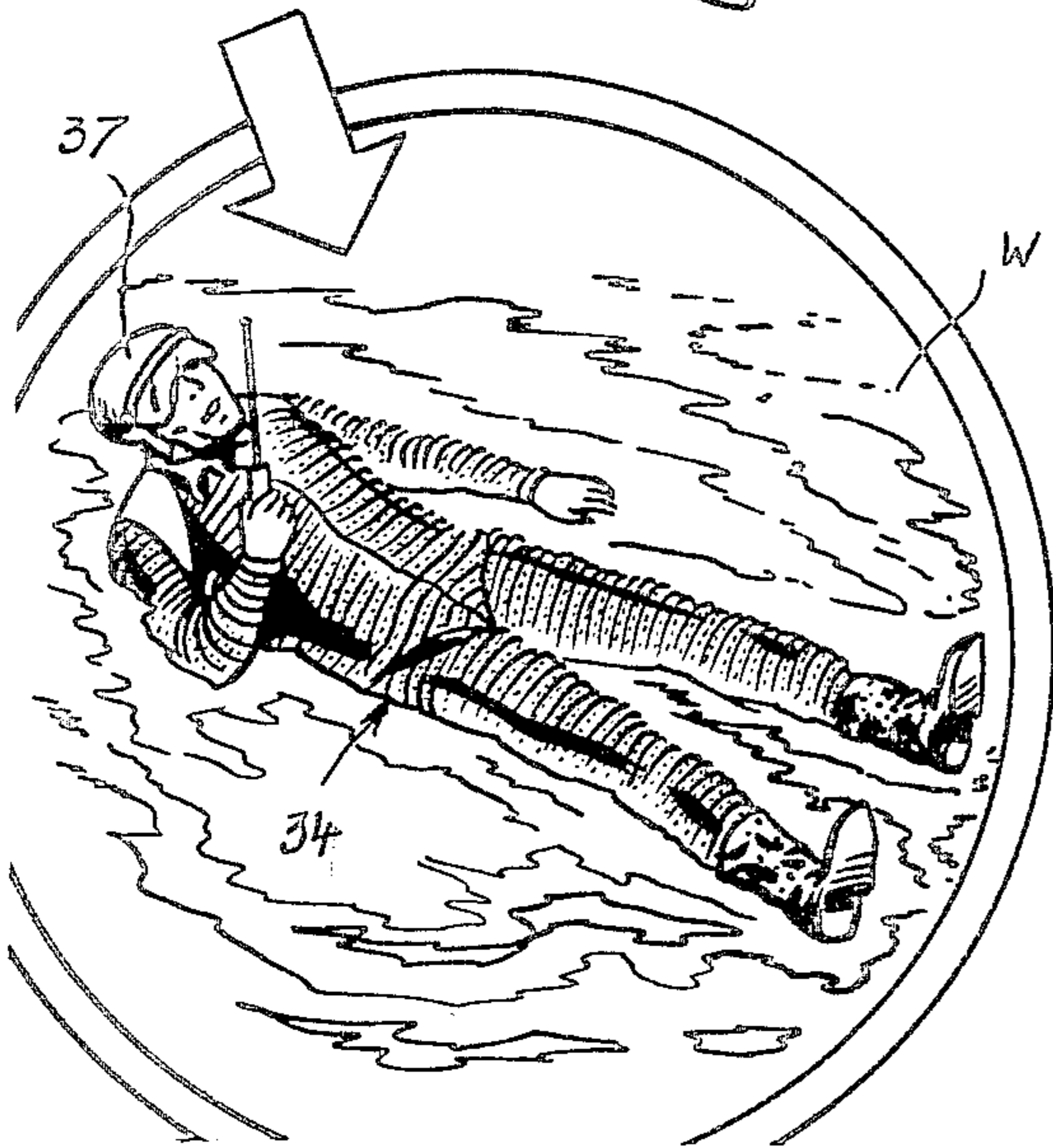


Fig. 17.



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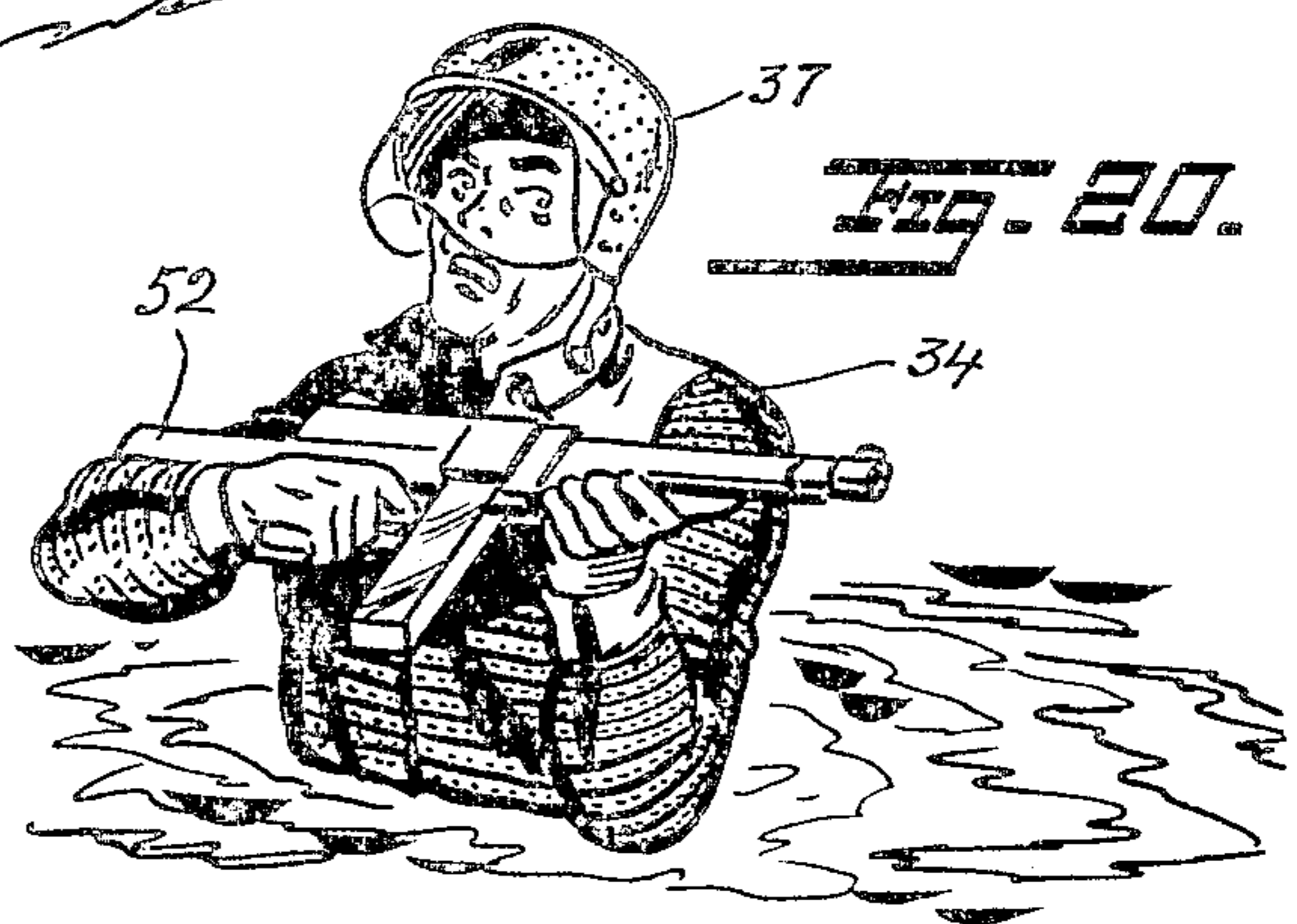
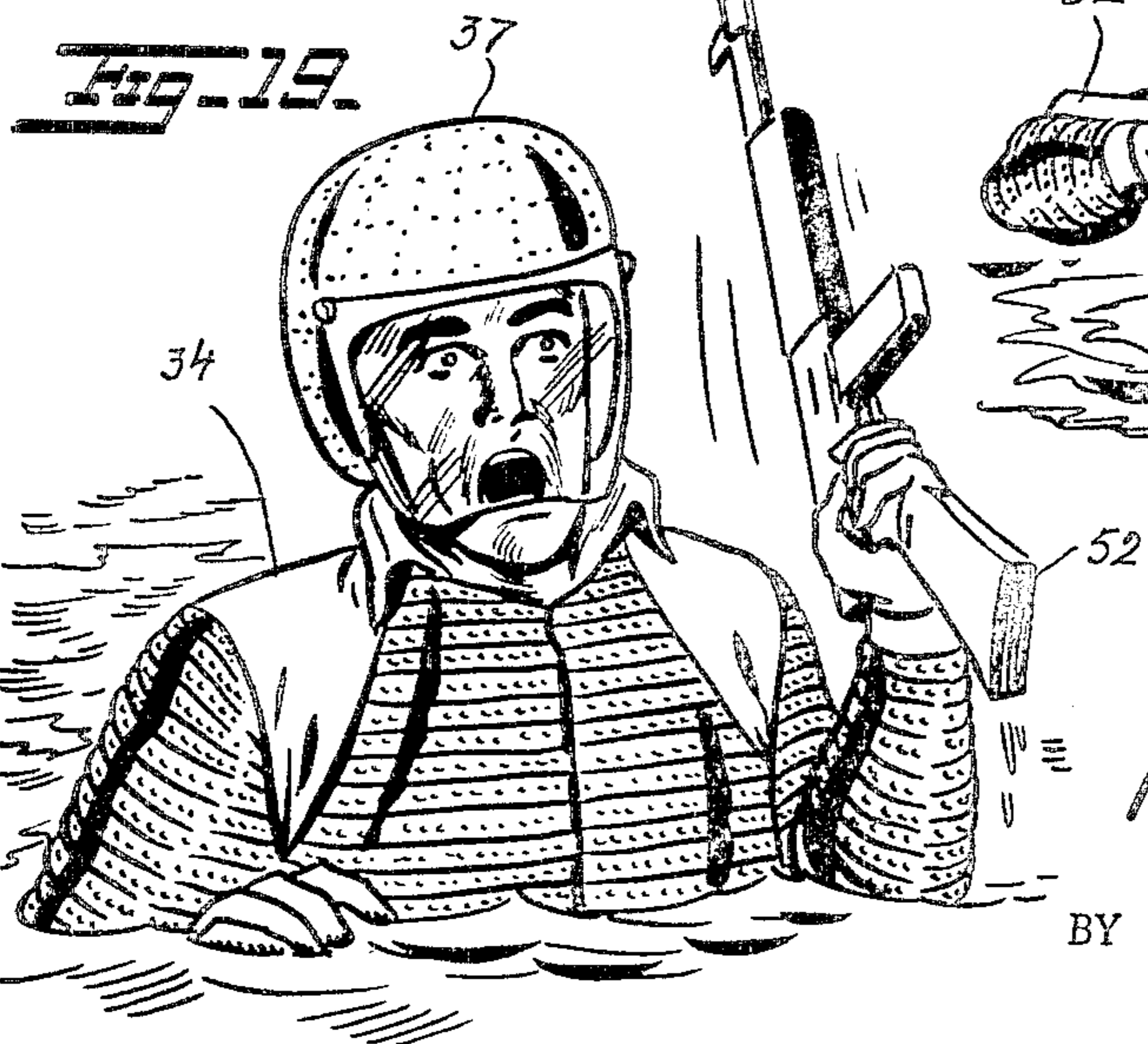
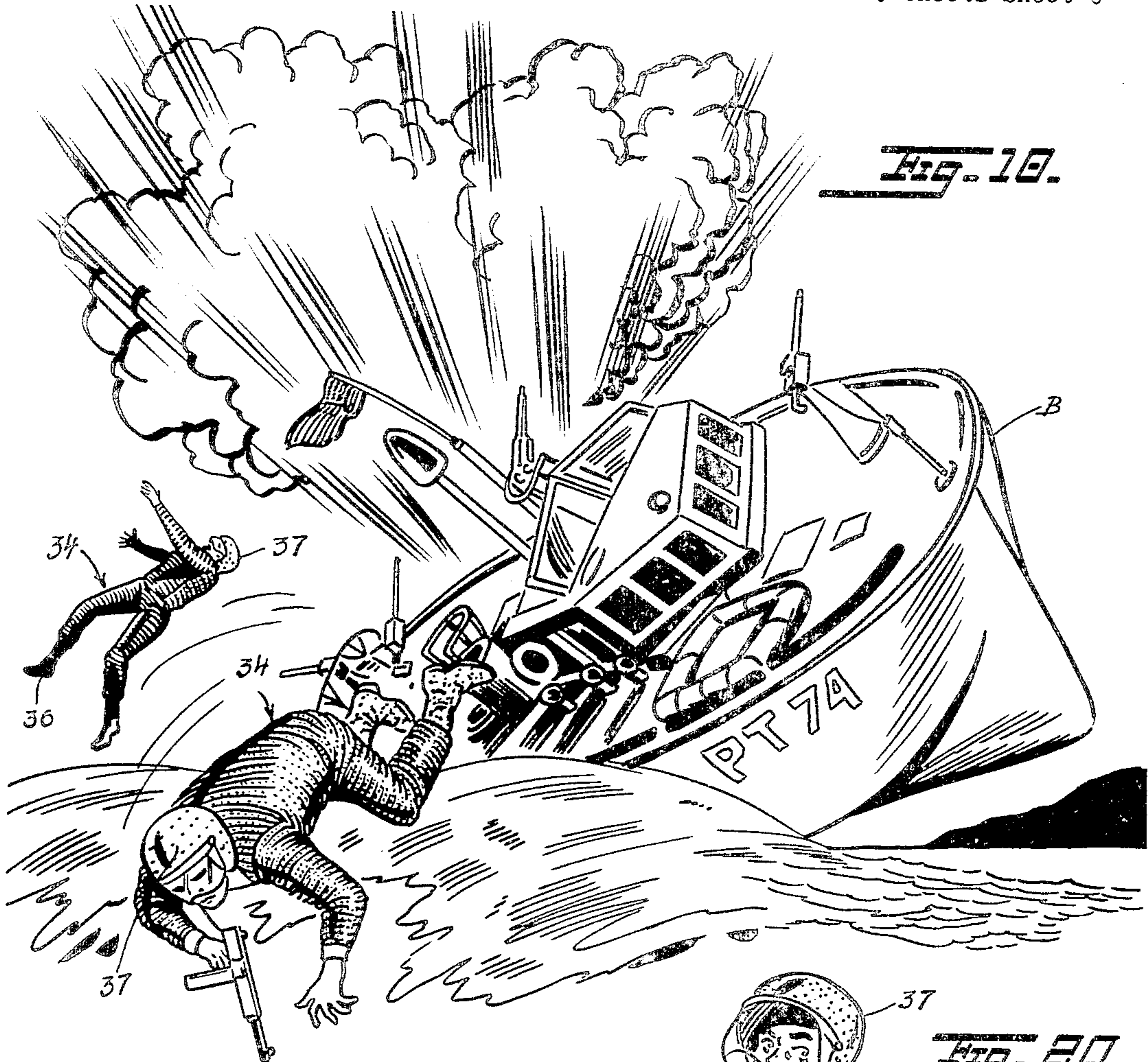
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BUOYANT BULLETPROOF COMBAT UNIFORM

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6 Sheets-Sheet 6



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**BUOYANT BULLETPROOF COMBAT UNIFORM**  
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 twenty-five percent to Nicholas R. du Pont, Wil-  
 mington, Del.

Filed Dec. 30, 1965, Ser. No. 517,671

6 Claims. (Cl. 2—2.5)

### ABSTRACT OF THE DISCLOSURE

A combat garment that is buoyant, bulletproof, shock resistant and flexible permitting maximum body movements. The garment is composed of a plastic material, such as fiber glass, resin or the like, mixed with sub-micron metallic particles in the molecular structure. The material is molded into parallel ribs hinged to each other.

This invention relates to a garment that protects the wearer including soldiers, pilots, sailors, marines, Red Cross, Salvation Army, war correspondents, troop entertainers from death or serious injury as well as military property such as aircraft, ship, etc. Said garment is extra light in weight, highly flexible, being buoyant, bulletproof, waterproof, weatherproof, crushproof, corrosionproof and shock resistant. Included with this combat uniform which can be made of camouflaged material are the following accessories: a bulletproof and buoyant combat helmet with an attached prescription visor for better vision which is also bulletproof to protect the face, separate buoyant, bulletproof vest that may be worn as integral part of the uniform for heavy duty assignments that will better protect the chest and rib cage, buoyant bulletproof gloves and buoyant bulletproof combat boots.

This equipment is made of relatively rigid plastic material with layers of cellular plastic material or the like having submicron metallic particles or the like mixed together in the molecular structure in desired proportions to make sintered parts as strong and as dense as solid metal that will make up the molded parts of the buoyant, bulletproof, weatherproof, waterproof, corrosionproof, shock resistant garment that will be exceptionally flexible and light in weight.

In the invasion of Normandy Beach during World War II many servicemen in the Army, Navy, Marines and Paratroops were drowned because they were unable to swim and because of the weight of the equipment that they were wearing. In treacherous combat zones such as Vietnam, it is very essential that the servicemen be equipped with complete protection from bullets and flying objects such as shrapnel as well as from natural elements such as insects and snakes. It is a well known fact that the present day bulletproof vests are extremely heavy, bulky and constitute separate pieces of equipment that have to be carried and put on for special occasions.

This invention provides a bulletproof vest that is buoyant and can be worn as an integral part of the outer garment which a serviceman would normally wear. In this manner, he is protected continuously while he is in a combat zone and can proceed across rivers and swamps without the necessity of procuring boats or additional equipment, making it possible for troops to literally walk through the enemy lines. The vest also may be made of a camouflage material as an integral part of the outer garment but preferably the garment should be made as a one-piece outfit that protects the entire body and the wearer.

It is well known that combat forces have been subjected to serious injuries and death because of the damage to other parts of the body including loss of limbs, loss of eyesight and serious damage to the chest and rib cage.

This new space type garment would replace the present combat garments now used by the allied forces and provide an extremely light weight protector. The weather is no longer a problem since the garment material is suitable for either hot or cold climate terrain. The fact that this garment is buoyant, bulletproof, weatherproof, waterproof, crushproof, corrosionproof and shock resistant makes it much safer and less hazardous for invasion forces which include airborne pilots and soldiers, sailors and marines, that sometimes find themselves landing in an emergency in treacherous swamps and waters. This garment could prove invaluable to the fierce fighting Swedish, Norwegian and British jungle combat troops as well as troops of the Allied Forces and United Nations enforcement officers who are often called on a moment's notice to settle disputes in the troubled allied areas, not excluding the Medical Corps, the Red Cross, Salvation Army, war correspondents and troop entertainers that risk their lives.

It is therefore an object of this invention to provide a bulletproof vest which is buoyant, which has a great deal more shock resistance than the ordinary bulletproof vest, which is much lighter than vests theretofore known, and one which is flexible to assure maximum restricted body movements.

Another object of the invention is to provide a protector for the chest and rib cage of the human body that will at the same time maintain maximum flexibility of the human body.

Another object is to provide a garment which will deflect objects directed at it and at the same time be crush resistant.

Another object is to provide a garment which is extremely light-weight and which is sufficiently buoyant to act as a life preserver.

Another object is to provide a light-weight garment for the human body which is compact, which will permit the maximum flexibility of the human body and which can be incorporated as an integral part of the normal clothing for the human body.

A still further object is to provide a light-weight crush resistant garment comprised of a layer of relatively rigid plastic material and a layer of cellular plastic material having submicron metallic particles or the like which have been placed in chemical combination (molecular structure).

The above and further objects and novel features of the present invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

FIGURE 1 is a front view of the vest as affixed to the human body.

FIG. 2 is an enlarged vertical sectional view taken along line 2—2 of FIG. 1.

FIG. 3 is an enlarged vertical sectional view similar to FIG. 2 showing a modified construction of vest.

FIG. 4 is an enlarged vertical sectional view similar to FIG. 2 showing a further modified construction of vest.

FIG. 5 is a front perspective view showing of the vest before it is affixed to the human body.

FIG. 6 is a side elevational view of the vest.

FIG. 7 is a vertical central sectional view of the vest.

FIG. 8 is a front view of the vest showing a modified construction.

FIG. 9 is a front view of a vest showing a further modified construction.

FIG. 10 is a vertical-sectional view along lines 10—10 of FIG. 9.

FIG. 11 is a cross-sectional view similar to FIG. 10 showing a modified construction.

FIG. 12 is an enlarged view taken from FIG. 6 showing the side fastening means, and

FIG. 13 is an enlarged view similar to FIG. 12 showing a modified fastening means.

FIG. 14 is a diagrammatic perspective view showing a soldier wearing a garment, shoes and helmet embodying a modified form of the invention jumping from a helicopter carrying a gun in his folded arms.

FIG. 15 is a diagrammatic perspective view showing soldiers wearing the garment, shoes and helmet of FIG. 14 in actual ground combat after having jumped from a helicopter shown overhead.

FIG. 16 is a view similar to FIG. 14 showing a soldier jumping from a helicopter that had been hit by the enemy and about to alight on the water.

FIG. 17 is a diagrammatic perspective view showing the soldier of FIG. 16 floating on his back on top of the water.

FIG. 18 is a diagrammatic perspective view of a boat blown up with soldiers, wearing the garment, shoes and helmet of FIG. 14, being shown blown into the water.

FIG. 19 is a front elevational view of one of the soldiers of FIG. 18 shown standing waist high in the water with his gun supported out of the water.

FIG. 20 is a similar view showing the soldier of FIG. 19 with his finger on the trigger of the gun ready to shoot.

Referring now to the drawings, FIG. 1 shows an embodiment of the invention in the form of a vest as worn on the human body and FIG. 2 is an enlarged vertical-sectional view along line 2—2 of FIG. 1. The vest 10 comprises a front panel and a rear panel, each of said panels being molded from a sheet of plastic material 11 having flexibility and bullet resistance. This plastic material is made of fiber glass resin having submicron metallic particles or the like mixed together in the molecular structure. This compounded material is buoyant and bulletproof.

In this embodiment the plastic sheet 11 is molded to form a plurality of parallel rib members 12 each having a curved cross-section as more clearly shown in FIG. 2. The plastic sheet material at 13 between adjacent rib members has a thickness which is less than the thickness of the rib members and serves as a hinge member thus allowing each rib to be moved toward and away from each other in a horizontal plane when the vest is worn on the human body. The rear surface of the molded sheet 11 has attached to it a layer of foamed polyurethane or the like 20 which serves as a cushion between the body of the person wearing the vest and the molded sheet 11. The polyurethane is formed so that it is comprised of large numbers of individual cells not interconnected and each having pellicular walls. With such a structure air is trapped in each cell and produces a buoyant layer as well as a layer of material which is highly shock resistant. If desired each of the ribs 12 may have a plurality of apertures 14 to facilitate ventilation. The vest shown in FIG. 1 has very high crush resistance to an object striking it because of the horizontally extending and laterally curved rib members. Also because of the curved outer surface of each rib an object striking the rib is deflected away from the vest. This construction does not impair the flexibility of the ribs longitudinally so that they easily adapt themselves about the human body. Additionally the buoyant and shock resistant layer of polyurethane makes a lightweight and efficient bulletproof vest for use by the Armed Forces. If so desired the ribs can additionally be molded to have a slight longitudinal curvature as well as the above described curved cross-sectional shape which would tend to conform to the shape of the human body. If so desired the foamed polyurethane may have embedded into it a mesh of relatively stiff material. The front

and rear panels of the vest are secured together at their upper ends by a pair of shoulder pads 15 made from the same plastic material as the rib members and integrally molded to the rib members as more clearly shown in FIGS. 1 and 5. A neck opening 16 is large enough to permit the human head to pass through. Alternatively one of the shoulder pads 15 could be split to allow for the passage of the head through a much smaller neck opening. In such an alternative shoulder pad construction the split area would be closed by any one of the conventional fastening means. This vest can be incorporated as the body portion of an outer garment normally worn by a serviceman.

In the preferred embodiment the front and back panels are unitarily joined together along one side and selectively closable along the other side. Each side has an arm opening 17. A fastening means, such as a zipper 18, is used to selectively close the open edges of the panels after it is placed on the human body. The vest constructed as above described is extremely light-weight and at the same time it has a very high crush resistance. Additionally the soldier can bend forward and backward with no difficulty or discomfort or fear of getting shot down.

Another modified construction of the plastic sheet 11 is shown in FIG. 3 wherein the ribs 19 are positioned on both surfaces of the sheet and are spaced apart from each other on each surface a distance greater than the spacing of ribs 12. The ribs 19 on one surface are staggered in relation to the position of the ribs on the other surface. The sheet has a reduced thickness 21 adjacent the longitudinal edges of the ribs which serve as hinges to permit free movement of the ribs toward and away from each other as the vest is moved forward and backward. This construction is particularly well adapted for use to absorb the impact of objects which hit the vest at a high rate of speed such as a bullet.

In FIG. 4, there is shown a still further modification of my vest wherein the foamed polyurethane 20 is molded to a sheet 22 of canvas or other fabric or fabric-like material which is in turn adhered to the inner surface of the convex shaped and horizontally extending rib members 23. The sheet 22 serves as a hinge member between the adjacent rib members thereby permitting the vest to be freely bent forward and backward.

In FIGS. 9, 10 and 11, there is shown another modification of my invention wherein each of the front and rear portions of the vest comprises two sheets of nylon cloth, canvas or the like 25 and having their surfaces sewn together along spaced apart parallel lines 26. Between lines 26 are formed a plurality of horizontally extending pockets 27 as more clearly shown in FIG. 10. Rectangular shaped ribs 28 are made of a plastic material and have a longitudinal arcuate shape corresponding approximately to the curvature of the chest portions of a human body. Ribs 28 are inserted into pockets 27. Secured to the rear surface of the pockets 27 is a layer 29 of foamed polyurethane. The flexibility of the seam area 26 between each pocket area imparts the desired flexibility to the vest structure when the ribs have been inserted into the pockets. FIG. 11 shows a vest structure like that shown in FIG. 10 wherein each front and rear section comprises two layers of pocket sections. The pocket surfaces of one section are positioned in staggered relationship to the other section. If so desired, the rib sections 28 can be of a convex cross-sectional shape like ribs 12 shown in FIG. 1.

If it is so desired the shoulder pads 15 may be comprised of the rib members 29' having the same general configuration as ribs 12 and secured to the front and rear panel sections in a manner as shown in FIG. 8. The solid plastic area 30 surrounding the neck opening may also be made of a continuation of the ribs 12 to the point of intersection with the rib members 29'.

In FIGS. 14 to 20, inclusive, the invention is illustrated as embodied in a full length uniform or overall garment 34, shoes 36 and helmet 37 worn by soldiers or troopers



in actual combat duty. The garment 34 is formed of the same material as vest 10 and is composed of parallel rib members 12' similar to rib members 12 each having a curved cross-section with hinged structures therebetween similar to the vest 10. The garment 34 has a bodice portion 38, crotch 40, integral legs 42, arms 44 and neck portion 46. The garment 34 is provided with shoulder pads 15' made from the same material as the rib members 12' and integrally molded to the rib members.

The shoes 36 are formed of buoyant bulletproof material such as the vest 30 consisting of plastic material having submicron metallic particles or the like mixed together in the molecular structure.

The helmet 37 is also formed of buoyant bulletproof material consisting of plastic material having submicron metallic particles or the like mixed together in the molecular structure. The helmet has a bullet proof removable visor 48 of transparent bullet proof plastic material, preferably of the prescription type for better vision, for protecting the face. A chin strap 50 is provided for the helmet.

In FIG. 14, a soldier or trooper wearing a garment 34, shoes 36 and helmet 37 is shown jumping from a helicopter H with a parachute strapped around his body and a gun 52 in his folded arms. The garment, it will be seen, permits easy movement of the body, legs and arms.

FIG. 15 illustrates several soldiers or troopers wearing the garment 34, shoes 36 and helmet 37 having jumped from a helicopter H and landed on terra firma and moving toward the enemy and blasting away at the enemy with ease and facility. The helicopter H from which they jumped is shown overhead.

FIG. 16 illustrates the garment 34, shoes 36 and helmet 37 on a soldier jumping from a helicopter H that had been shot down, the soldier being shown about to alight on the water W strapped to a parachute P, and in FIG. 17 the soldier is shown floating on his back in the water, the garment, shoes and helmet, permitting both operations with ease and convenience.

In FIG. 18, a transport boat B is shown being blown out of the water and soldiers or troopers being shown blown out of the boat into the water, the soldiers wearing the garment 34, shoes 36 and helmet 37 which permit them to swim readily and to right themselves right side up and to stand erect in the water with their weapons 52 held out of the water and held ready for shooting as seen in FIGS. 19 and 20, respectively.

Although this invention has been described in the foregoing specification and illustrated in the accompanying drawings as a bulletproof vest and coverall garment for use by the Armed Forces, it is to be understood that it has many other uses both in the military and civilian areas where it is necessary to protect the wearer from injury. The vest may be made in a variety of colors, and is light in weight and compact enough to be worn under the outer garments or made as a part of the outer garment.

This vest is also sufficiently rigid and shock resistant to be worn in place of any other outer garment.

It should be further understood that such a garment worn by fighting men can in effect materially reduce the number of armed forces required in the services.

Various changes may be made in the structure without departing from the spirit and scope of my invention, as will now be clear to those skilled in the art. For a definition of the limits of the invention reference is had to the appended claims.

What is claimed is:

1. An antiballistic garment comprising a body covering portion, said body covering portion having inner and outer layers, said outer layers comprising a plurality of horizontal, parallel rib members bonded along their longitudinal edges by integral flexible hinge portions of less thickness than said rib members, said rib members being of lightweight semirigid plastic material or the like, and having submicron metallic particles sintered therewith in desired proportions to make said ribs as strong and dense as solid metal, said ribs each being arcuate-shaped along its length and convex-shaped throughout its width thereby providing an undulating convexly curved outer surface and a concavely body conforming inner surface on said outer layer; said inner layer being adhered to said inner surface of said outer layer and comprising a highly flexible closed cellular plastic having pellicular walls whereby a bulletproof, buoyant, weather proof, waterproof, corrosion-proof, shock resistant garment is provided that is also highly flexible and light in weight.

2. A body garment as defined in claim 1, wherein the semirigid plastic material is constituted by nylon.

3. A body garment as defined in claim 1, wherein the body is composed of front and rear panels, said semirigid plastic material is constituted by fiber glass resin.

4. A body garment as defined in claim 1, wherein the body outer layer is constituted by an integrally molded sheet having front and rear panels, said rib members being spaced alternately on opposite surfaces of said sheet with the longitudinal edges of said alternate rib members in overlapped relation, said sheet having a neck opening between said front and rear panels, said panels and neck opening constituting a vest.

5. A body garment as defined in claim 1 wherein the body is elongated being adapted to extend from the top of the shoulders to the lower abdominal part of the human torso, said body being constituted by front and rear panels, each of the rib members having a convex shape throughout its width, and means for securing one end of each of said panels together to form a neck opening therebetween.

6. A body garment as defined in claim 1, wherein the body is in the form of a coverall garment extending from the neck to the feet of a human body and including a bodice portion, arms, legs, crotch and neck opening.

No references cited.

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