

Dec. 8, 1931.

J. M. LEWIS

1,835,883

HELMET

Filed March 20, 1930

2 Sheets-Sheet 1

Fig. 1.

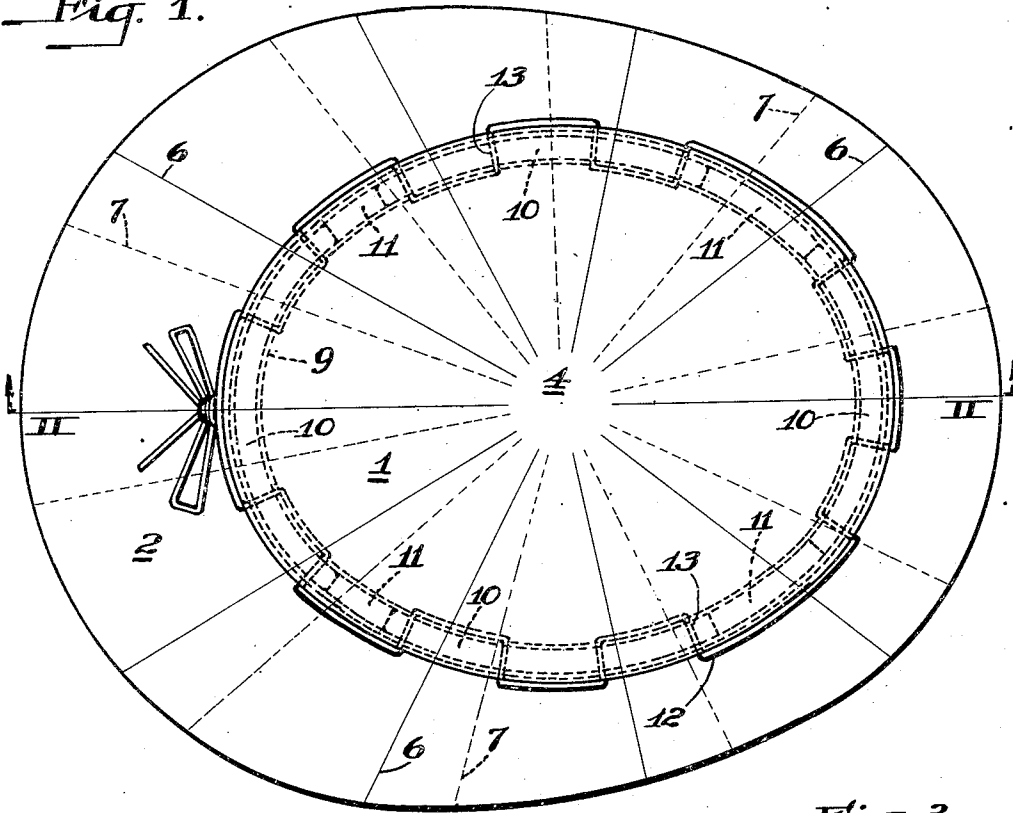


Fig. 2.

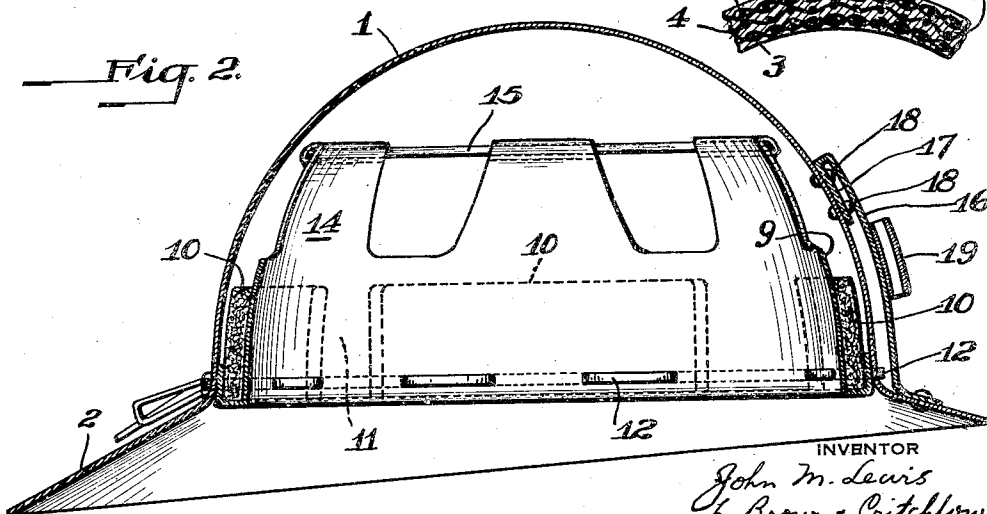


Fig. 3.



WITNESSES
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Fig. 4.

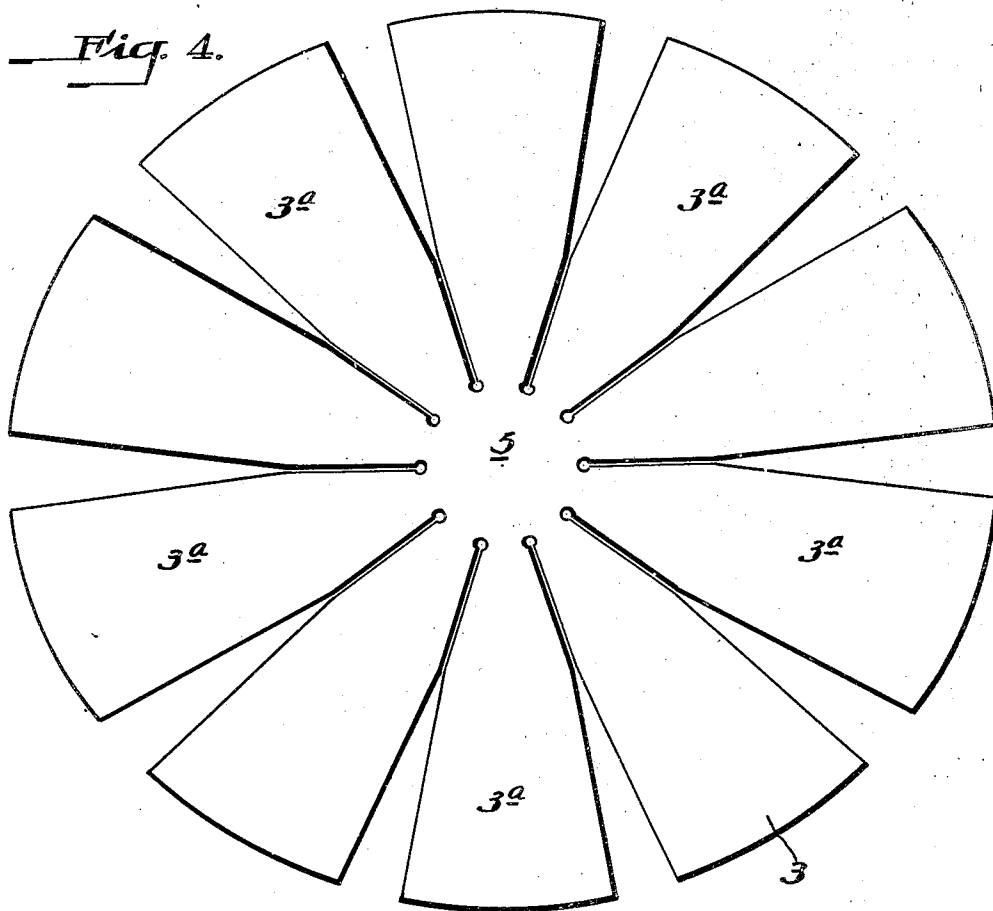
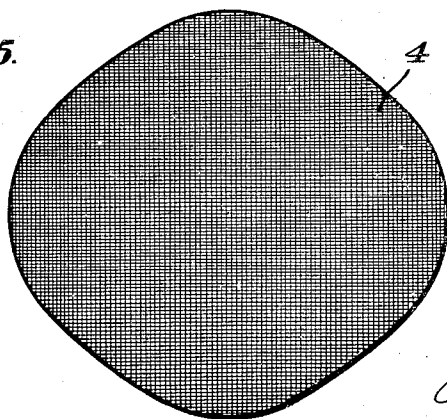


Fig. 5.



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UNITED STATES PATENT OFFICE

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HELMET

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The invention relates to protective headgear, particularly to safety helmets of the type worn by miners, fire fighters and others engaged in occupations where the head is endangered by falling objects, electric currents, or from other causes.

The object of the invention is to provide a molded safety headgear which is light in weight, rigid, strong enough to withstand severe shock, is of non-conducting nature and has no exposed metal parts which may conduct electricity to the wearer, is easily and economically made, and which is provided with a cushioned sweat band which is renewable and adjustable to vary the shape and size of its head-engaging opening.

The invention is described in connection with the accompanying drawings which illustrate its preferred embodiment, and in which Fig. 1 is a plan view of a helmet showing the mode of construction; Fig. 2 a longitudinal section on line II—II, Fig. 1; Fig. 3 an enlarged fragmentary view of the crown section shown in Fig. 2; and Figs. 4 and 5 plan views of elements used in the construction of the helmet.

The helmet provided according to the invention comprises crown and brim portions built up integrally from a plurality of layers of formable material embedded in and surrounded by a hard and non-conducting plastic material, thus providing a rigid, strong and sturdy structure. The term "formable material" as used herein includes not only readily formable fabric materials, such as textiles, leather and the like, but also those which may be shaped by special operations such as spinning, examples of which are sheet metal or vegetable fiber products. As used in the preferred embodiment, the formable materials are of a foraminous nature because they are light, may be easily cut and shaped, and because they may be thoroughly impregnated with the plastic material. Although various suitable formable foraminous materials are available, for example punched sheet metal, it is preferred to use woven textiles, such as cloth, or wire screen, duck cloth being preferably used.

In the use of textile materials, each layer

comprises a plurality of sectors adapted to fit together to form the proper shape, the various layers being disposed to overlap and break joints between sectors in adjacent layers. The sector-shaped pieces may be formed in a variety of ways, but in the preferred embodiment a sheet of fabric of suitable size is cut inwardly from the edge at an appropriate number of peripherally spaced intervals to form a plurality of generally sector-shaped pieces joined to an uncut central body portion, the sectors extending from the edge of the brim to a point materially within the crown. The sector construction makes it possible to shape the helmet quickly and easily without the bulges or wrinkles which would result from the use of continuous single-piece layers. Although it is preferred to use sector shapes of the type described above, it will be understood that other shapes may also be used.

When textile materials are used, the crown is preferably reinforced, most suitably by one or more layers of stiffer material interposed between the textile fabric layers. In the preferred embodiment wire screen is used for this purpose, because its foraminous nature permits thorough inter-penetration of the plastic. Also, such screen may be shaped properly and smoothly without being cut into sector shape. For best results, this layer is cemented to the fabric layers before impregnation with the plastic.

Various plastics are known which may be satisfactorily used in the construction of hats according to the invention, such as asphalt, or the plastics compounded from rubber, casein, or cellulose compounds, especially those made from cellulose acetate. It is preferred, however, to use plastics of the type comprising organic condensation products, this class of plastics being generally termed synthetic resins or resinoids. These materials are in initially plastic and moldable, but in general they become very hard, infusible, non-conducting, and insoluble in organic solvents, dilute acids and alkalies, when subjected to heat and pressure. Of these materials the best known type, and the one preferably used, is that resulting from condensa-

tion of phenol and formaldehyde, although other types may be used, of which the phenol-furfural, and the urea-formaldehyde resinoids are examples.

5 The illustrative embodiment shown in the drawings represents a molded helmet of the type commonly worn by miners and firemen, which comprises a dome-shaped crown portion 1 and a brim 2 sloping downwardly and outwardly therefrom. In this preferred construction the helmet is formed from two layers 3 of duck and an intermediate layer 4 of wire screen.

15 As shown in Fig. 4, the layers 3 are formed by cutting or slitting pieces of duck inwardly from the edge at a plurality of peripherally spaced points to form sector shaped pieces 3a joined at their inner ends to a generally circular central body portion 5. These pieces or layers extend to the edge of brim 2, and preferably body portion 5 is relatively small, for example about 3½ inches in diameter, for a helmet of average size. This construction insures smoothness of the layers 25 when the hat is assembled in a mold, and layers comprising about ten sectors are satisfactory. Other types of sector-shaped pieces may, of course, be used.

30 The intermediate layer comprises a piece of wire screen 4 cut in the generally elliptical form shown in Fig. 5. When cut in this shape and of such size as to extend to a point short of the juncture of crown 1 and brim 2, the wires will adjust themselves when the crown is molded to form a smooth layer substantially free from any bulges. A 20-mesh screen formed from 0.013 gage steel wire affords a satisfactory reinforcement.

40 In the assembly of the hat, a layer 3 of duck cut as described is placed in a mold of appropriate form and the sectors 3a are fitted together or slightly overlapped to form the crown and brim. Layer 4 of wire screen, previously shaped to conform to the crown 45 in a form or die, is next inserted in the crown portion of the mold, followed by another layer 3. The layers 3 are disposed to stagger the joints 6 between the sectors of the outer layer with respect to joints 7 of the inner layer, 50 as shown in Fig. 1.

In order to provide adequate bonding between the various layers, so as to prevent their separation under shock or other rough usage, the layers are cemented together during assembly and before the final plastic molding operation. To this end the screen is coated with a suitable bonding material, such as the cements used in vulcanizing rubber. The screen and adjacent surfaces 60 of layers 3 are coated with this material and air dried before being placed in contact.

After the helmet has been assembled in the manner just described, and the layers having been impregnated with a plastic, of the 65 type referred to, it is pressed in a heated

mold. The structure of the helmet as thus constructed is shown in Fig. 3, where the layers are shown surrounded by and impregnated with molded resin 8, forming a dense, hard and strong material.

One feature of the headgear according to the invention resides in the provision of a removable and adjustable sweat band. As shown particularly in Fig. 2, a sweat band 9 of cloth or other suitable material is disposed within and spaced from the crown by spaced cushioning pads 10 disposed between the band and the crown. The spaces 11 between the ends of the pads permit free circulation of air inside of the crown. Preferably the band is bent back around the pads, as shown in Fig. 2. The band and pads are removably connected to the crown by a non-metallic draw member 12 laced through holes 13, spaced around the crown and in the band and pads. The holes may be cut in the fabric prior to impregnation, or they may be made after the helmet is formed, and the draw member may consist of a leather thong, shoe string or the like.

The sweat band is easily removable for replacement, and the size and shape of its head-receiving opening are readily changed. In the hat shown four pads are used. By using thinner pads the opening may be enlarged, or it may be reduced by means of thicker pads; and by disposing thick and thin pads in an appropriate manner, or by shifting the position of the pads, the opening may be shaped according to the outline of a particular individual's head. In the form shown, the material forming the sweat band is cut to provide a lining portion 14 gathered at its peak by a drawstring 15 in the customary manner. It will be understood, however, that different lining and sweat band materials may be used if desired.

The helmet may be provided with various accessories, such as a bracket for attachment of a light. This bracket may be, and preferably is, formed by a non-conductor of electricity, such as leather, connected to the helmet so as not to carry electric current to the head of the wearer. This may suitably be accomplished as shown in Fig. 2. A leather strap 16 is connected at its lower end to the visor of the helmet, and its upper end is folded under to provide an underlying flap 17 which is attached to the crown by rivets 18. In this manner the rivets are not exposed, and they cannot accidentally contact with electric wires. A bracket 19 is connected to strap 16 for receiving the usual miner's lamp.

The hat provided according to the invention is light, very strong, and durable. The cushioned, adjustable head band reduces the discomfort which usually attends wearing of such rigid headgear, and reduces the number of sizes required to be manufactured. 130

The combination of cemented textile and reinforcing fabric layers provides maximum strength and stability for rough usage, and to withstand puncture by falling objects. A hat constructed as described will, for example, not be dented or injured by an 8-pound object falling through 10 feet. Without the reinforcing layer, the hat would be punctured by such a blow. Also, cementing of the layers adequately prevents their separation under shock.

Additional advantages result from the use of non-conducting fastening for the sweat band, which eliminates metal rivets and provides a fully non-conducting helmet, so as to totally eliminate danger of electrical shock when the helmet contacts with exposed wiring or other conductors carrying currents. This feature is retained even in the case of a helmet constructed of layers of spinnable materials which are conductors, the layers being wholly embedded in a non-conducting plastic. Furthermore, headgears provided according to the invention do not soften under heat and do not burn at any temperature to which they are normally exposed, and they are wholly inert to mine acid and moisture or other reagents which are frequently destructive of materials commonly used for this purpose.

According to the provisions of the patent statutes I have explained the principle and construction of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A molded safety headgear comprising integrally formed rigid crown and brim portions composed of molded plastic material interiorly reinforced by a plurality of superposed layers of formable material, said layers being moldably embedded in said plastic to provide a unitary structure, and the headgear being hard, strong, rigid, impervious and electrically non-conducting.

2. A molded safety helmet comprising integrally formed rigid crown and surrounding brim portions composed of molded plastic material interiorly reinforced by a plurality of superposed layers of textile material and a layer of wire fabric, said layers being moldably embedded in said plastic to provide a unitary structure, and the helmet being hard, strong, rigid, impervious and electrically non-conducting.

3. A molded safety helmet comprising integrally formed rigid crown and surrounding brim portions composed of molded plastic material interiorly reinforced by a plurality of superposed layers of textile material and a reinforcing layer of wire fabric,

all of said layers being cemented together and moldably embedded in said plastic to provide a unitary structure, and the helmet being hard, strong, rigid, impervious and electrically non-conducting.

4. A molded safety helmet comprising integrally formed rigid crown and surrounding brim portions composed of molded plastic material interiorly reinforced by a plurality of superposed layers of formable material comprising fitted sector-shaped pieces disposed to break joints with those of another layer, said layers being moldably embedded in said plastic to provide a unitary structure, and the helmet being hard, strong, rigid, impervious and electrically non-conducting.

5. A molded safety helmet comprising integrally formed rigid crown and surrounding brim portions composed of molded plastic material interiorly reinforced by a plurality of superposed layers of textile material comprising a plurality of sector-shaped pieces extending inwardly from the edge of the brim and joined at a point materially within the crown to a central body portion, the sectors of one layer overlapping and breaking joints with those of an adjacent layer, said layers being moldably embedded in said plastic to provide a unitary structure, and the helmet being hard, strong, rigid, impervious and electrically non-conducting, and a sweatband removably disposed in said crown and adjustable to vary the size and shape of its head-engaging opening.

In testimony whereof, I sign my name.

JOHN M. LEWIS.