Feb. 23, 1965 W. M. SCHOLL 3,170,178

METHOD OF MAKING A FOOT CUSHIONING INSOLE

Filed June 22, 1962 2 Sheets-Sheet 1

FIG. 1

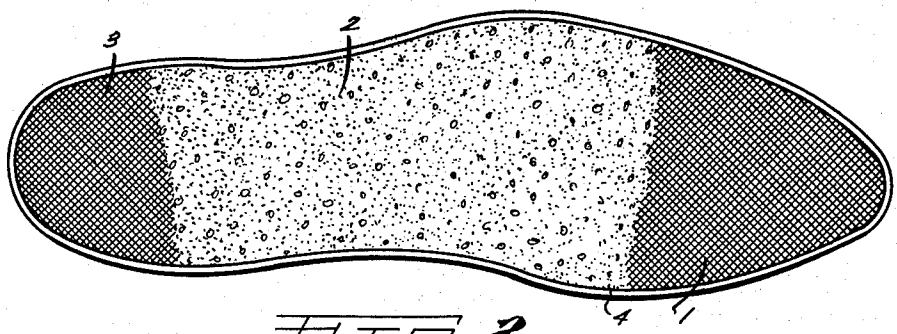


FIG. 2

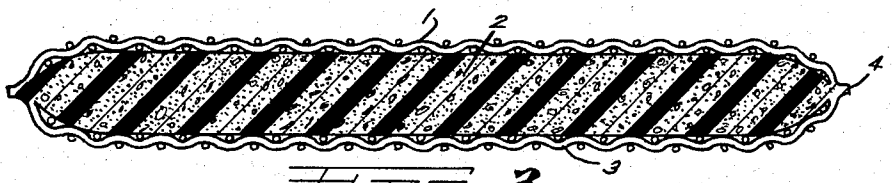


FIG. 3

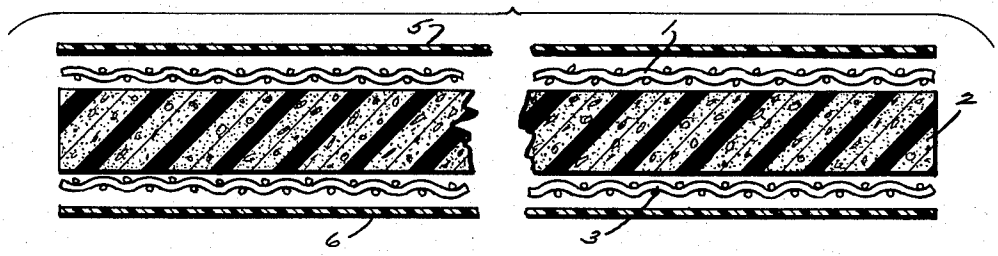
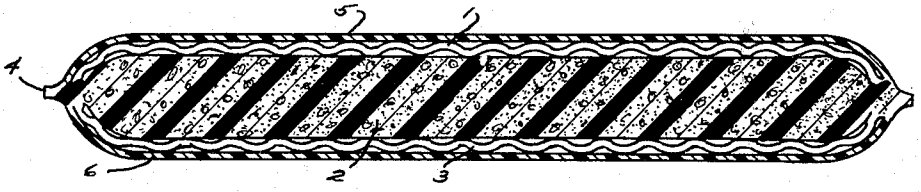


FIG. 4



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Feb. 23, 1965 W. M. SCHOLL 3,170,178

METHOD OF MAKING A FOOT CUSHIONING INSOLE

Filed June 22, 1962 2 Sheets-Sheet 2

FIG. 5

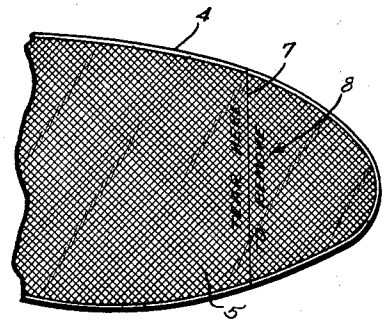


FIG. 6

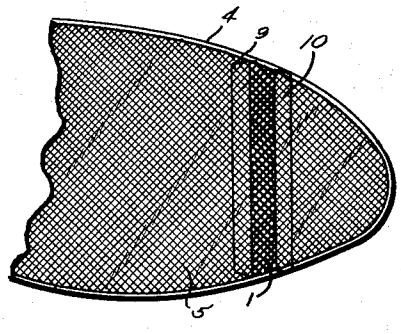


FIG. 7

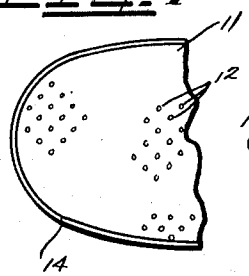


FIG. 8

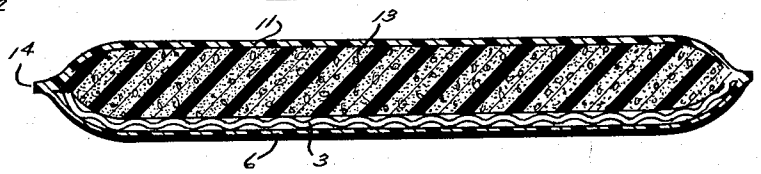


FIG. 9

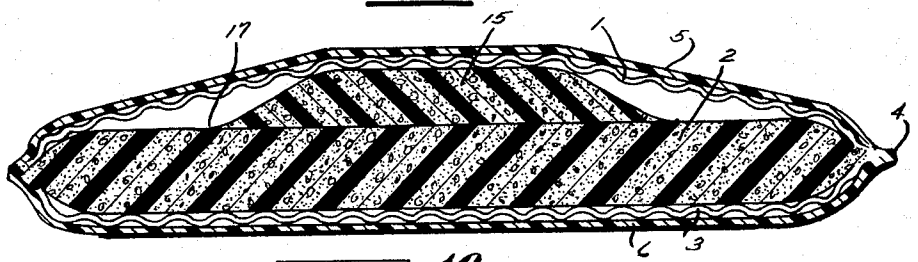
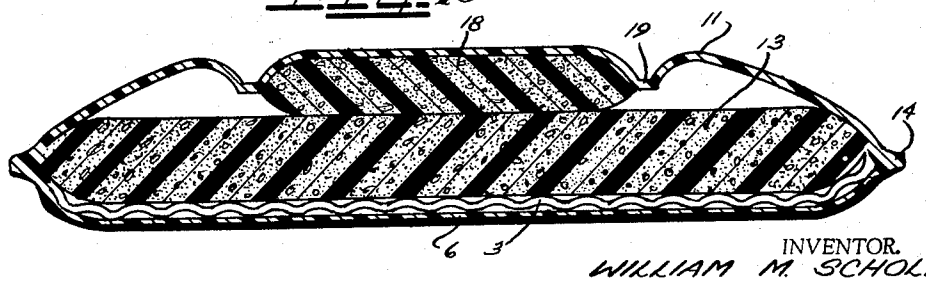


FIG. 10



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United States Patent Office 3,170,178 Patented Feb. 23, 1965

3,170,178

METHOD OF MAKING A FOOT CUSHIONING INSOLE

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Filed June 22, 1962, Ser. No. 204,359
6 Claims. (Cl. 12—146)

This invention relates to improvements in an insole and a method of making the same, and more particularly to an insole of the type freely disposed in an article of footwear beneath the plantar surface of the human foot to aid in alleviating adverse conditions of the foot, the insole being preferably of the cushioning variety, although it may equally as well be of the heat insulating variety, or take other forms, all as will be apparent to one skilled in the art.

The instant application is a continuation-in-part of my copending application entitled "Insole and Method of Making the Same" filed June 11, 1958, Serial No. 741,378, now abandoned.

It is now become desirable to make foot cushioning and alleviating appliances in the form of insoles, metatarsal lifts, arch lifts, and in various other forms, utilizing layers of plastic material heat sealed together. The heat sealing usually embodies a seam around the bounding edge of the appliance, although various types of lifts and inserts may be included at intermediate points and heat sealed to one or more of the layers, or pocketed inside a heat seal seam joining layers on each side of the lift. Such a structure provides not only durability, resistance to foot acids and perspiration, launderability, but also adds to the pleasing appearance of the devices since they can be made in substantially any desirable colors and retain their appearance throughout their life. Sometimes in the making of foot appliances of this character it is desirable to incorporate one or more layers of open mesh fabric woven of plastic filaments, somewhat in the nature of a fly screen, but heretofore such an open mesh fabric could not be satisfactorily electronically heat sealed to similar or other plastic layers and at the same time provide a tear seam immediately adjacent the heat seal seam whereby waste material could be stripped from the finished product, the heat and tear seal seam being established in one single and rapid operation. Utilizing one or more such fabric layers and heat and tear sealing a product from stacked stock layers of indefinite size, utilizing an electronic heat sealing die would leave exposed ends of the plastic filaments at the edge of the finished product rendering that edge somewhat saw-tooth in character, and highly irritating to the user, especially if the exposed portion of a filament became bent out of normal position. In any event, with the electronic die heat sealing process, it was virtually impossible to provide a fine smooth edge that would not irritate the foot of the user or injure the article of footwear in which the device was disposed.

In the past, insoles embodying a plurality of layers of open mesh fabric woven from plastic filaments heat sealed together around the bounding edge of the insole have been made. However, in each instance of which I am aware where such material was employed, the entire insole comprised a plurality of layers of that material only, no cushioning means being embodied in the structure. Where dies were used to unite such layers in the prior manufacture, in order to establish a heat seal seam it was necessary

to employ two different press operations. That method is prohibitively expensive in a highly competitive field emboding the manufacture and sale of foot cushioning and correcting devices and appliances. Other methods heretofore employed for uniting the edges of such layers required the precutting of blanks to substantially the desired size, stacking the blanks, holding them in a templet or the like, and then passing entirely around the bounding edge of the insole with a heated tool to eliminate the raw edges and effect the heat seal seam. Precutting of pieces to size, stacking them, and the tedious operation with the heated tool is also prohibitively expensive when competition must be met. In other instances, a binding was placed around the raw edges of precut stacked blanks, and such is definitely not desired in a heat seal product.

With the foregoing in mind, it is an important object of the instant invention to provide a multi-layer foot appliance which may be formed in a single operation with electronic dies from stacked stock layers of indefinite size, and wherein at least the upper and lower layers are heat sealed together in a bounding seam, one of such layers being of an open mesh fabric woven of plastic filaments, the device having a smooth and even as well as relatively thin heat seal seam.

Another object of the invention is the provision of a foot alleviating or corrective appliance which may be formed in a single operation with electronic dies, and which appliance may embody several layers of material, one or more of which may be an open mesh fabric woven of plastic filaments, but wherein the heat seal seam uniting the layers is externally smooth, requiring no further or additional efforts to attain this smoothness, and is devoid of any unevenness, notwithstanding the number of layers of open mesh plastic fabric utilized in the device.

Also an object of this invention is the provision of a foot alleviating or corrective appliance embodying one or more sheets of open mesh fabric woven from plastic filaments, and which device may be cut from stacked stock layers of indefinite size by means of electronic dies which establish a heat seal seam around the bounding edge of the device, one of the outer layers of the finished device being of the open mesh fabric, while the outermost layer overlying the outer open mesh layer is a thin thermoplastic film which may, if desired, be removed at any time by tearing along the inside of the heat seal seam joining the respective layers.

Still a further feature of this invention is the provision of a foot alleviating or corrective appliance made of a plurality of layers of plastic material joined by a fine line heat seal seam defining the bounding edge of the appliance, and in which the outermost layer on at least one side of the appliance is a thin thermoplastic film covering the next outermost layer which is an open mesh fabric woven of plastic filaments, the thin plastic film being removable whenever desired by stripping it from the appliance along the inside of the heat seal seam.

Still a further object of this invention resides in the provision of a foot alleviating or corrective appliance made up of a plurality of layers of plastic material, certain of which are joined by a heat seal seam defining the bounding edge of the appliance, the outermost layer on at least one side of the device being a thin plastic film which may be utilized on the device or stripped therefrom if desired by tearing the same free along the inside of the heat seal seam.

A further object of this invention is the provision of a new and novel method of making a foot cushioning, alleviating or corrective appliance embodying open mesh fabric woven of plastic filaments joined to other parts of the device by a heat seal seam.

It is also an object of the instant invention to provide a new and novel method of heat sealing plastic open mesh fabrics together to form a device with the seam at the bounding edge and with the seam smooth and even in all its exposed portions.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a plan view of an insole embodying improvements of the instant invention, with parts broken away to expose parts therebeneath, and with the original cover layer removed;

FIGURE 2 is a magnified transverse vertical sectional view of the structure of FIGURE 1;

FIGURE 3 is a fragmentary vertical sectional view illustrating various layers going to make up a device embodying principles of the instant invention, in one form, and also illustrating a step in the method of making a foot appliance embodied in this invention;

FIGURE 4 is a greatly enlarged or magnified vertical sectional view illustrating a further step in the making of the device;

FIGURE 5 is a fragmentary plan view of the structure of FIGURE 4;

FIGURE 6 is a fragmentary plan view of the same structure as FIGURE 5 but illustrating how the cover layer may be removed if desired;

FIGURE 7 is a fragmentary plan view of a slightly different form of foot alleviating device embodying principles of the instant invention;

FIGURE 8 is a greatly enlarged transverse vertical sectional view through the structure of FIGURE 7;

FIGURE 9 is a greatly enlarged transverse vertical sectional view through a foot alleviating or cushioning appliance of a still different form but embodying principles of this invention; and

FIGURE 10 is a view similar in character to FIGURE 9, but illustrating another form of construction.

As shown on the drawings:

In FIGURES 1 and 2 I have illustrated a foot cushioning device in the form of an insole which is highly desirable where both cushioning and aeration or ventilation is desired. This form of the device comprises a top layer 1 which is in the form of an open mesh fabric woven of plastic or thermoplastic filaments; an intermediate and much thicker layer 2 of cushioning material, preferably plastic, and a bottom layer 3 of the same material as the top layer 1. These layers are heat sealed together around the bounding edge of the device by a thin and smooth heat seal seam as indicated at 4.

The open mesh layers 1 and 3 are woven of plastic filaments that are capable of being commercially heat sealed by the electronic die severing process. There are a number of plastics which are suitable for this purpose, but by way of example it may be stated that satisfactory results have been obtained by the use of a copolymer vinyl ester, vinylidene chloride, polystyrene, and others, certain of which are mentioned in U.S. Letters Patent No. 2,160,931 and No. 2,495,045. The cushioning layer 2 may satisfactorily be a chemical foam such as a synthetic resin foam, vinyl chloride foams, polyester foams, isocyanate foams and polyurethane foams being satisfactory examples.

Obviously, the open mesh layers 1 and 3 permit the passage of air. The foam layer also permits the passage of air therethrough because it is cellular with intercommunicating cells. Therefore, when a device as shown in FIGURES 1 and 2 is worn it not only insulates the foot against heat or cold, but also permits a circulation of air adjacent the plantar surface of the foot by successive compressions and expansions during walking.

This finished insole may be in any desirable colors, may be laundered at will, is extremely quick drying, and is completely resistant to fungus, foot acids, perspiration and the like. Consequently, it requires no special attention whatever and is extremely long lived.

The mere heat sealing of the layers together by the electronic die severing process, particularly where the woven fabric layers are on the outside of the appliance, would in most cases result in a rough or saw-tooth edge in the heat seal seam, by virtue of the interstices between the filaments making up the fabric layers. It is therefore desirable to fill those interstices during the heat sealing of the layers together so as to provide a smooth-edged seam devoid of any roughness or irregularity. To this end, I superpose stock layers of indefinite size, with the cushion layer 2 disposed between the fabric layers 1 and 3. Stock sheets of indefinite size are utilized so that many appliances may be severed from the respective sheets during the heat sealing process without the necessity of restacking and without the necessity of precutting blanks. The stock sheets 1, 2 and 3 are superposed between an upper stock sheet 5 which is an extremely thin thermoplastic film, such as an unsupported vinyl film, and a similar film 6 is disposed beneath the bottom fabric sheet 3, as indicated in FIGURE 3. In this figure all of the various sheets are spaced apart for purposes of clarity, but it will be understood that they are lying one upon the other.

After the superposing of the layers, a die preferably having the form or contour of the desired article is incorporated in an electronic heat sealing press and is brought down under pressure upon the superposed layers, whereupon a short charge of high frequency electric current is passed through the die, and the heat seal seam 4 is formed. In the illustrated instance all of the layers are incorporated in that heat seal seam, but as will later appear herein the cushion layer need not be incorporated in the heat seal seam if layers above and below it are. At the same time the heat seal seam 4 is formed, a tear line is established immediately adjacent that seam permitting waste stock to be readily removed or stripped from the finished article.

The thin films 5 and 6 perform two functions. First, these films provide additional material at the heat seal seam to fill up the interstices between the filaments in the fabric layers 1 and 3 so that a smooth-edged heat seal seam is provided. Secondly, these films 5 and 6 are less dense than the material making up the other layers and because of that these layers may readily be stripped from the insole by rupturing them and tearing them loose along the inside of the heat seal seam 4, since the provision of the heat seal seam has also established through these extremely thin layers, at least in effect, a tear line at the inside of the heat seal seam. But the film cover layers 5 and 6 need not be removed until desired. If ventilative insoles are requested then the film layers may be removed at the time of manufacture. However, if the ventilative insoles are not demanded, the cover layers may remain on the finished article and serve to maintain that article in a clean and sanitary condition as long as may be desired. These cover layers may be provided with directions for the removal as shown in FIGURE 5 by printing or otherwise marking a tear line 7 on the respective film, and putting a legend 8 adjacent the tear line telling how the cover layer may be removed. Should the user desire to retain the cover films, that may be done and the device put to use with them in place. However, should the user desire to remove them, this may be readily done by disrupting the film in the region of the line 7, by tearing, cutting, or otherwise, and folding back the film as indicated by the flaps 9 and 10 in FIGURE 6 and stripping

the entire film from the device along the inside of the heat seal seam 4.

The choice of removing the film covers may be left entirely to the user. If he does not wish his foot to contact directly the woven fabric layer, he may leave a cover film 5 or 6 in place, but if for any reason he desires to remove the cover film this may readily be accomplished as explained above. Whether or not either or both the films 5 and 6 is removed, the heat seal seam remains entirely smooth and even on its outer edge, is comfortable to the foot, will not injure articles of footwear, and is smooth and even over its entire extent, wherefore it is highly durable. This is apparent from the disclosures in FIGURES 1 and 2 wherein the cover films have been removed, and the disclosure in FIGURE 5 wherein the cover film remains in place.

In FIGURES 7 and 8 I have illustrated a different form of the instant invention, wherein a foot cushioning appliance is shown as embodying a top layer 11 of plastic film which is thicker and denser than the cover films 5 and 6 above described and which is intended to remain as a permanent part of the finished appliance. This top layer 11 may be an unsupported vinyl sheet, and may be provided with numerous perforations 12 therein as seen in FIGURE 7 if ventilation is desired. This form of the invention also includes a thick cushioning layer 13 which may be of the same plastic foam as the layer 2 above described. In this instance the upper fabric layer 1 and the upper cover film 5 are not utilized. However, the woven fabric layer 3 and the bottom cover film 6 are used in the same manner as above described. The layers are joined by a bounding heat seal seam 14 which, as stated above, is smooth and even. The lower cover film 6 may be left intact upon the device, or removed whenever desired as above explained.

In FIGURE 9 another form of the instant invention is illustrated which embodies all of the layers above described in connection with FIGURES 3 and 4, but in addition a cushion lift 15 to provide additional pressure to an arch of the foot and which is of lesser size than any of the other layers is disposed at any desirable location between the upper fabric layer 1 and the main cushion layer 2 which is of equal area with the fabric layers. The lift 15 may be of any suitable material, the same as the cushion layer 2 or of denser material if so desired. However, if the lift 15 is a plastic foam of the character of the layer 2, it may be anchored in position by being heat sealed to the cushion layer 2 only, as indicated at 17, and it need not be secured to any of the other layers.

In FIGURE 10 I have shown an embodiment of the invention made up of the same layers of material described in connection with FIGURES 7 and 8, but in this instance a lift 18 of lesser size than the other layers is disposed beneath the dense cover film 11 in substantially any desirable location such as beneath the metatarsal arch, the longitudinal arch, to cause an elevation of the heel, or in some other location if desired. Preferably the lift is of the same material as the cushion layer 13, but it may be of other material if desired. If it is of plastic foam, it is preferably anchored to the cover in the desired location by a bounding heat seal seam as indicated at 19 and it need not be directly attached to any other layer.

If the layers going to make up the various embodiments of the device are not secured to each other, with the exception of the added lifts, except by the bounding heat seal seam an added advantage is provided in that wrinkling or creasing of the appliance during usage is effectively prevented because one layer may have relative movement with respect to another layer and therefore wrinkles or creases will not set in the device even if one is temporarily established.

From the foregoing, it is apparent that I have provided a simple, economical, and highly durable form of foot cushioning or alleviating device, as well as a new and novel method of making the device, particularly with regard to the provision of a smooth even heat seal seam wherein one or more layers of a screen-like or open mesh fabric woven of plastic filaments is utilized, and a tear line established at the time the heat seal seam is formed. It will also be noted that the device embodies removable cover layers which may be left on for various reasons or removed at the choice of the customer.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. The method of making a foot cushioning device comprising a layer of thermoplastic cushioning material and a cover layer of open-mesh fabric woven of thermoplastic filaments, including the steps of

superposing said layers,

placing a thin thermoplastic film over the exposed face of the fabric layer,

heat sealing said layers and film together in a single operation to provide a heat seal seam defining the shape of the finished device and a tear line for removing the device from waste stock, and

tearing off the film along the inner edge of the heat seal seam.

2. The method of making a cushion insole comprising a layer of thermoplastic cushioning material and a layer of open-mesh fabric woven of thermoplastic filaments on each side thereof, including the steps of

placing a thin film of thermoplastic material over the exposed face of each woven sheet,

heat sealing all said layers and films together in a single operation by a die shaped to define the outline of the insole, and

then removing said films except at the heat seal seam.

3. The method of making a foot cushioning device comprising superposed layers of open-mesh fabric woven of thermoplastic filaments, including the steps of

placing a thin film of plastic material over the outer face of each layer at least where they are to be joined,

heat sealing said layers and films together in a single operation to provide both a heat seal seam and a tear line whereby the device may be separated from waste stock, and

removing the films except at the heat seal seam.

4. The method of making a smooth heat seal seam at the outer edge of an open-mesh fabric woven of thermoplastic filaments, including the steps of

superposing the fabric layer and another layer, then covering the exposed face of the fabric layer at least in the region of the seam with a smooth thin plastic film,

heat sealing said layers and film in a single seam, and

removing the film except at the seam.

5. The method of making a cushioning device having a layer of cushioning material disposed between two layers of open-mesh fabric woven of thermoplastic filaments, including the steps of

superposing stock sheets of a thin thermoplastic film, said layers in the order mentioned, and a top thin thermoplastic film,

heat sealing the fabric layers and films in a single operation to provide a heat seal seam defining the shape of the finished device and a tear line therearound for removal of waste stock, while

relying upon the material of said films to fill interstices of said fabric sheets and provide a smooth-edged heat seal seam.

6. The method of making a device including a layer of open-mesh fabric woven of thermoplastic filaments and making a smooth heat seal seam at the outer edge of said layer, including the steps of

superposing the fabric layer, another layer, and a thin thermoplastic film less dense than said layers over the outer face of the fabric layer,

heat sealing said layers and film in a single seam, and

in the same operation defining a tear line only for the film inside the heat seal seam.

References Cited in the file of this patent

UNITED STATES PATENTS

2,407,495	High et al.	Sept. 10, 1946
2,425,388	Oestricher	Aug. 12, 1947
2,481,602	Lindh	Sept. 13, 1949
2,495,045	Woodbury et al.	Jan. 17, 1950
2,631,646	Gannon et al.	Mar. 17, 1953
2,658,288	Scholl	Nov. 10, 1953
2,804,419	Woskin et al.	Aug. 27, 1957
2,878,153	Hacklander	Mar. 17, 1959
2,979,835	Scholl	Apr. 18, 1961
3,063,076	Williams	Nov. 13, 1962
3,071,877	Stickles	Jan. 8, 1963
3,080,589	Midgley	Mar. 12, 1963

FOREIGN PATENTS

728,075	Great Britain	Apr. 13, 1955