

May 25, 1965

J. A. CAMERON

3,185,604

METHOD OF FORMING A SCOURING ARTICLE

Filed April 12, 1962

FIG. 1

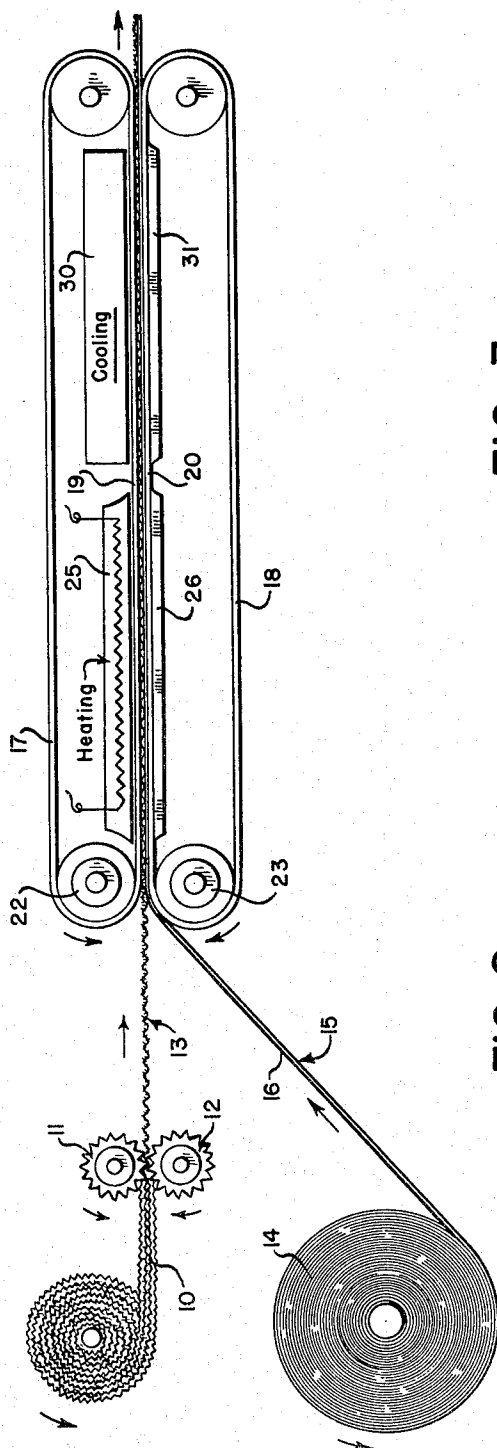


FIG. 2

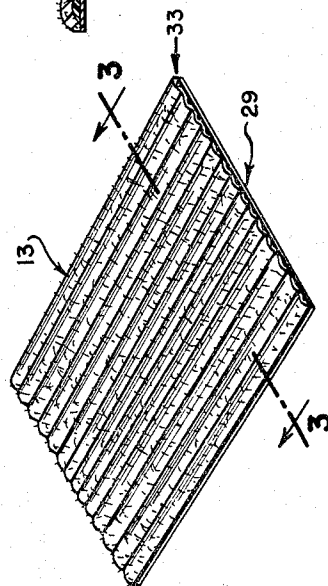
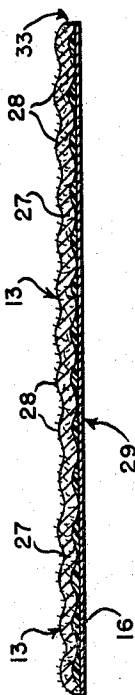


FIG. 3



INVENTOR
John A. Cameron
BY *Frederick F. Wack*
E. J. Guillian and Walter D. Ames
ATTORNEYS

1

3,185,604

METHOD OF FORMING A SCOURING ARTICLE
John A. Cameron, Fort Lauderdale, Fla., assignor to
General Foods Corporation, White Plains, N.Y., a corporation of Delaware

Filed Apr. 12, 1962, Ser. No. 186,941

3 Claims. (Cl. 156-210)

This invention relates to a method of forming a scouring article which utilizes metal wool filaments to apply an abrasive action to the surface of work, and more particularly to a method of forming a scouring article which scours by means of a corrugated layer of metal wool filaments.

Wide public acceptance has been gained for scouring articles in which the abrasive action is applied to such household utensils as pots and pans by means of filaments of metal wool. For example, scouring and polishing pads made from so-called steel wool, filaments of which have been matted or felted together, or intertwined or interwoven into a mass, have long been marketed in a variety of sizes and shapes. The form of these scouring pads has been such as to enable them to be readily gripped by the housewife, who applies the requisite scouring motion to the pads to cleanse the utensils effectively.

However, it has long been known that scouring articles in which the metal wool itself, is in direct contact with the hands of the user has undesirable characteristics, which are inherent in the metal wool. Steel wool, for example, is abrasive and unpleasant to the touch, and is highly susceptible to rusting after a plurality of immersions in water. Contact of the hands of the user with the rusted metal surface of a pad is particularly disagreeable. Additionally, metal wool may break or splinter, which results in slivers of the metal entering the skin of the user. These problems have been met at least in part by providing a backing for the metal wool and to which the metal wool adheres. Such a backing, which is usually made of cellulosic or vegetable fibrous material, adequately protects the hands of the user for several immersions of the backing in water.

It has also been recognized that scouring articles formed from metal wool have particular utility when the metal wool filaments from which the scouring layer of the pad is formed are corrugated to provide a series of alternate crests and troughs. This type of structure is advantageous in that the valleys and peaks formed by the corrugations serve as repositories for soap with which the layer of filaments can be impregnated. Since it would be particularly unpleasant manually to apply corrugated, metal wool to a surface to be scoured without the intermediation of a protective layer, it has been attempted to provide a backing sheet for a layer of corrugated, metal wool filaments in order that this useful form of filament can be utilized without injury to the hands of the user thereof. Examples of several forms of such scouring articles are to be found in U.S. Patent No. 2,287,801 to Hepner. While a patent such as that to Hepner does illustrate embodiments of scouring pads employing corrugated metal wool filaments, this type of scouring pad did not come into successful commercial use during the term of the patent, probably because of the difficulties which were encountered in the production of these scouring articles on a commercial scale. Although apparatus was available for the production of a wide variety of scouring pads, no scouring article making use of corrugated metal wool filaments was a commercial success due to the inability of those skilled in the art to find a practical method by means of which the corrugated filaments could be adhered to a suitable protective backing sheet in such a manner that the crests of the wool filaments extended outwardly from the backing sheet and were readily avail-

2

able for the application of the scouring action while the troughs of the corrugated filaments were firmly adhered to the backing sheet, which protected the hands of the user.

It is, therefore, a primary object of the present invention to provide a method for forming a scouring article which makes use of corrugated metal wool filaments, the practice of which method will produce a scouring article in which the corrugated filaments will be provided with a hand-protective backing sheet and will remain stationed firmly against the backing sheet through all normal scouring uses of the article.

It is another object of the present invention to provide a method for forming a scouring article that makes use of corrugated, metal wool filaments for its scouring action, which method lends itself admirably to utilization on a commercial scale and which will form a continuous succession of scouring articles.

In accordance with my novel method, a backing sheet is precoated with an adhesive material and a layer of metal wool filaments corrugated to provide alternate crests and troughs in the filaments is brought into contact with the adhesive coating. The backing sheet and the layer are then forced together to urge the troughs of the filaments into the adhesive coating. When the coating is set while maintaining the position of the troughs within the coating, a unitary scouring article utilizing the corrugated, metal wool filaments is produced. The adhesive coating which is applied to the backing sheet may have alternate forms, for example, a useful coating may be a thermoplastic material heat activatable to an adhesive condition, e.g. a polyethylene film. When such a coating is used, heat is preferably applied to the coating while simultaneously forcing the sheet and filamentary layer together, whereupon the coating becomes plastic and permits the troughs of the filaments to penetrate the coating. A unitary scouring article is obtained by cooling the coating to set same while maintaining the position of the troughs within the coating.

Another type of adhesive which can be utilized with advantage in the present invention is that class of organic compound compositions known as plastisols, which set up to a solid condition when heated. If plastisols are utilized as the adhesive coating of the backing sheet, the layer of corrugated metal wool filaments and the coating are first brought into contact and the sheet and layer urged together so that the crests of the filaments penetrate the coating. The coating is then heated to set the coating, and firmly secure the filaments to the backing sheet.

It will generally be found advantageous to apply saponaceous materials to the metal wool filaments subsequent to the formation of the scouring article, whereby an article which is commonly described as a soap pad will be formed. The soap can be applied to the corrugated filaments either in the form of a concentrated liquid or as a soap foam. The soap should be applied so that it penetrates the interstitial voids between the filaments which form the corrugated layer, and also at least partially fills the valleys between adjacent crests of the corrugations. The soap which is so impregnated into the metal wool filaments will be dried by conventional means.

These and other objects, features and advantages of the present invention will be more readily apparent when considered in connection with the accompanying drawing, which forms a part hereof, and in which:

FIG. 1 is a diagrammatic illustration of a preferred embodiment of the method of the present invention;

FIG. 2 is a perspective view of a scouring article which can be produced by the practice of the method of FIG. 1, and

FIG. 3 is a vertical sectional view along line 3—3 of FIG. 2.

Referring now to the drawing, and in particular to FIG. 1 thereof, a mat 10 of steel wool filaments is passed between corrugating rolls 11 and 12, and the result is a corrugated layer 13 of steel wool filaments. Also provided is a supply roll 14 which is formed from a continuous web of paper 15, precoated with polyethylene 16.

The coated paper web 15 and the layer 13 of steel wool filaments are directed between flights of two endless belts. Upper endless belt 17 and lower endless belt 18 are disposed so that the bottom flight 19 of belt 17 and the top flight 20 of belt 18 are contiguous or closely spaced from each other. Because power rolls 22 urge belt 17 into generally counterclockwise movement and power rolls 23 urge belt 18 into generally clockwise movement, contiguous flights 19 and 20 will move in the same direction. Adjustment of the angular velocity of the rolls 22 and 23 permits the belts 17 and 18, and consequently the flights 19 and 20, to travel at the same speed.

With web 15 and layer 13 drawn between flights 19 and 20 of belts 17 and 18, the layer 13 being superposed on the web 15, the flights 19 and 20 are passed between heating element 25 and backing plate 26. Flight 20 overlies and contacts backing plate 26 while flight 19 underlies and is contacted by heating element 25. Since the heating element 25 is relatively heavy and rests on the backing plate 26, the element 25 exerts pressure as well as heat on the materials which underlie it. After passing between heating element 25 and backing plate 26, the layer 13 of filaments, which is now unitary with the coated web 15, is passed beneath a weighted cooling element 30 and over a further backing plate 31 and then discharged from between belts 17 and 18.

When the layer 13 of corrugated filaments and the coated web 15 are together passed beneath heating element 25, the downwardly extending troughs of the corrugations are pressed against the polyethylene coating 16, which is softened due to the heat applied to it through the belt 17 and the layer 13 of corrugated filaments. As the polyethylene coating becomes tacky, the troughs of the corrugations penetrate the coating 16 and extend therewithin to a position in which the filaments are either in direct contact with the web 15, itself, or spaced from the web a short distance. Maintenance of heat and pressure on the layer 13 for a short period results in uniform penetration of the troughs of the corrugated filaments into the polyethylene coating 16. It will be noted that after the layer 13 and web 15 pass beneath the heating element 25, they are still maintained in a position adjacent to each other by means of belts 17 and 18. In this continuing position layer 13 and web 15 are set by the cooling effect of the ambient air. Alternatively, forced air, either at ambient or colder temperatures can be used to set the thermoplastic polyethylene coating 16. If desired, pressure means in addition to the belts 17 and 18 may be supplied in order to ensure the continuing close contact of the layer 13 and web 15 during cooling. Such additional means can include a heavy, overlying plate similar to the heating element 25, but maintained either at ambient temperatures or refrigerated by internal cooling or other means. In such case, a support such as a plate corresponding to backing plate 26 would be used to receive the pressure exerted against the belts 17 and 18.

In an operation where the coating 16 on web 15 was polyethylene, it was found desirable to maintain the heating element 25 at a temperature of about 400° F., or somewhat above the melting point of the polyethylene used. The weight of the heating element was such that a pressure of about seven pounds p.s.i. was maintained on the layer 13 of filaments and coated web 15. The belts were foraminous and composed of polytetrafluoroethylene, although other heat-resistant materials can be utilized providing they will not ignite or substantially change their form under the temperatures and pressures

applied. After a unitary scouring article had been produced by means of the practice of the method described hereinbefore and illustrated in FIG. 1, the article was optionally impregnated with liquid soap and then dried by means well known in the art to produce a soap-impregnated scouring article.

FIGS. 2 and 3 illustrate a scouring article 33 produced in accordance with the method in this invention. In this scouring pad it should be noted that the troughs 27 of the layer 13 of metal wool filaments are firmly embedded in the coating 16 of polyethylene with the crests 28 extending upwardly from the troughs and projecting beyond the polyethylene coating 16. In such position, the crests 28 of the scouring article 33 are free both to hold soap in position in the scouring article and to contact work to be scoured. Since the scouring article produced in accordance with the method of FIG. 1 has been cut to a size and shape in which it is readily adapted to be used, for example, by a housewife, the web 15 is now in the form of a backing 29, which is conventionally formed from paper but may also be made from other materials.

This application is a continuation-in-part of Serial No. 792,145, filed February 9, 1959, now U.S. Patent No. 3,074,099.

It will be apparent that certain alterations and modifications of my method of preparing a scouring article as described hereinbefore and illustrated in the drawing will be obvious to those skilled in this art. All such obvious changes are deemed to be included within the purview of the present invention, which is to be limited only by the scope of the following, appended claims.

What is claimed is:

1. A method of forming a scouring article, comprising providing a backing sheet having disposed thereon a coating of thermoplastic material heat activatable to an adhesive condition, bringing a layer of metal wool filaments corrugated to provide alternate crests and troughs therein into contact with said thermoplastic coating on said sheet, disposing said sheet and said layer between two closely spaced, moving, endless belts of heat resistant material so that one of said belts is in contact with said sheet and the other of said belts is in contact with said layer, while said sheet and said layer are being held between and moved by said belts simultaneously applying heat to a continuous area of said coating through one of said belts to activate said coating and forcing said sheet and said layer together to urge said troughs into a position in which they have penetrated the activated coating and the crests of said layer are filled with said coating, and cooling said coating while maintaining the position of said troughs therewithin to set said coating and produce a unitary scouring article.

2. A method of forming a scouring article, comprising providing a backing sheet having disposed thereon a coating of thermoplastic material heat activatable to an adhesive condition, bringing a layer of metal wool filaments corrugated to provide alternate crests and troughs therein into contact with said thermoplastic coating on said sheet, disposing said sheet and said layer between two closely spaced, moving, endless belts of heat-resistant material so that one of said belts is in contact with said sheet and the other of said belts is in contact with said layer, passing said belts and said sheet and said layer held and moved thereby under a heating element to apply heat to a continuous area of said coating through said belt in contact with said layer to activate said coating and simultaneously forcing said belts together to urge said filament troughs into a position in which they penetrate the activated coating and the crests of said layer are filled with said coating, and then continuing to force said belts together to maintain said troughs in said position until said coating is cooled and produce a unitary scouring article.

3. A method of forming a scouring article, comprising providing a backing sheet having disposed thereon a coating of thermoplastic material heat activatable to an ad-

5

hesive condition, bringing a layer of metal wool filaments corrugated to provide alternate crests and troughs therein into contact with said thermoplastic coating on said sheet, disposing said sheet and said layer between two closely spaced, moving, endless belts of heat-resistant material so that one of said belts is in contact with said sheet and the other of said belts is in contact with said layer, passing said belts under a heating element to apply heat to a continuous area of said coating through said belt in contact with said layer to activate said coating and simultaneously forcing said belts together to urge said filament troughs into a position in which they penetrate the activated coating and the crests of said layer are filled with said coating, and then passing said belts under a cooling element to rapidly cool said coating through said belt in contact with

5

10

15

6

said layer to set said coating while maintaining said troughs in said position and produce a unitary scouring article.

References Cited by the Examiner

UNITED STATES PATENTS

2,240,135	4/41	Field et al.	15—209.5 X
2,287,801	6/42	Hepner	156—153
2,493,968	1/50	Hepner	15—209.5 X
2,714,571	8/55	Irion et al.	156—311
3,012,923	12/61	Slayter	156—196 X
3,074,099	1/63	Cameron	156—210

EARL M. BERGERT, *Primary Examiner.*

CHARLES A. WILLMUTH, *Examiner.*