Nov. 15, 1966 S. E. LANHAM ETAL 3,284,963

CLEANSING AID

Filed March 26, 1964 2 Sheets-Sheet 1

FIG. 1.

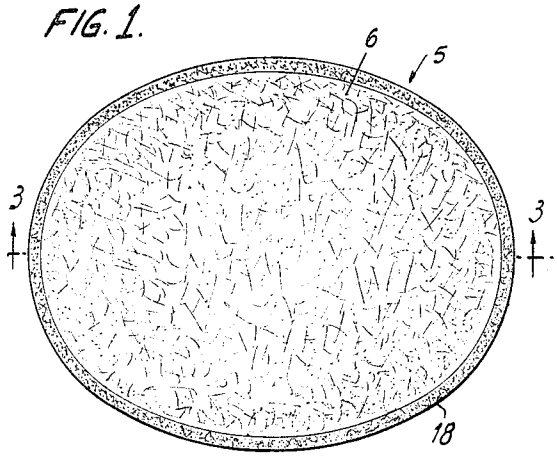


FIG. 2.

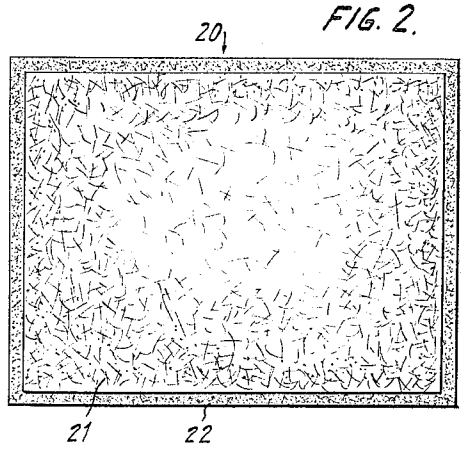


FIG. 3.

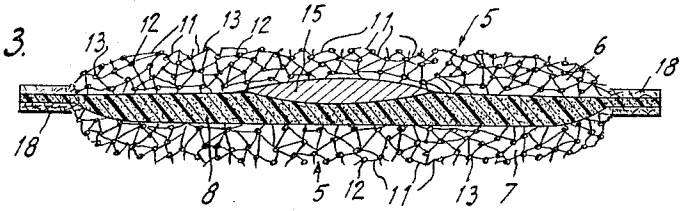


FIG. 4.

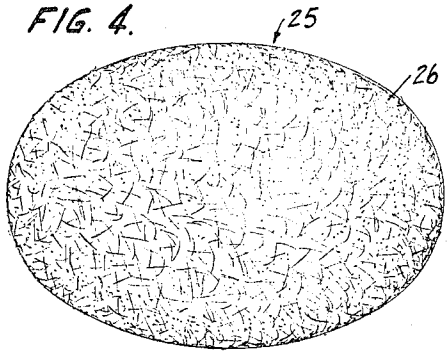
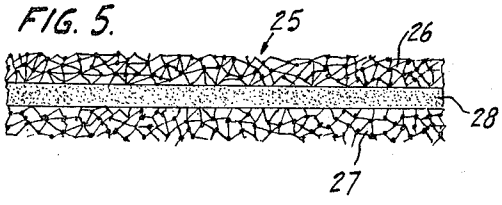


FIG. 5.



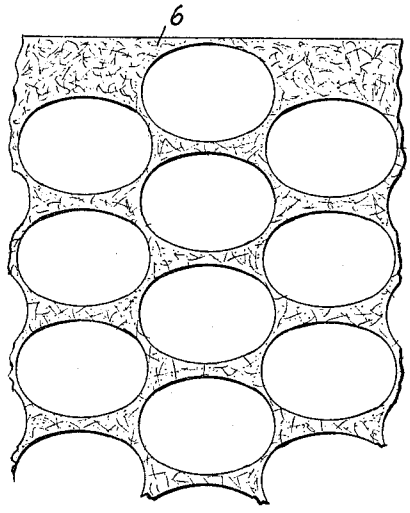


FIG. 6.

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CLEANSING AID

Filed March 26, 1964 2 Sheets-Sheet 2

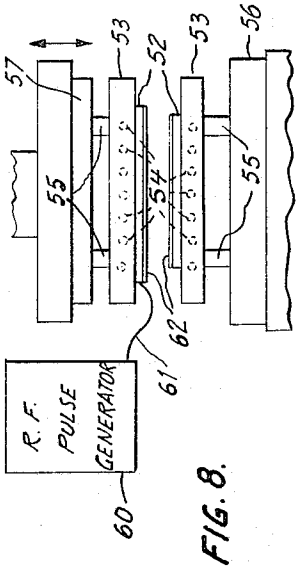

FIG. 8.

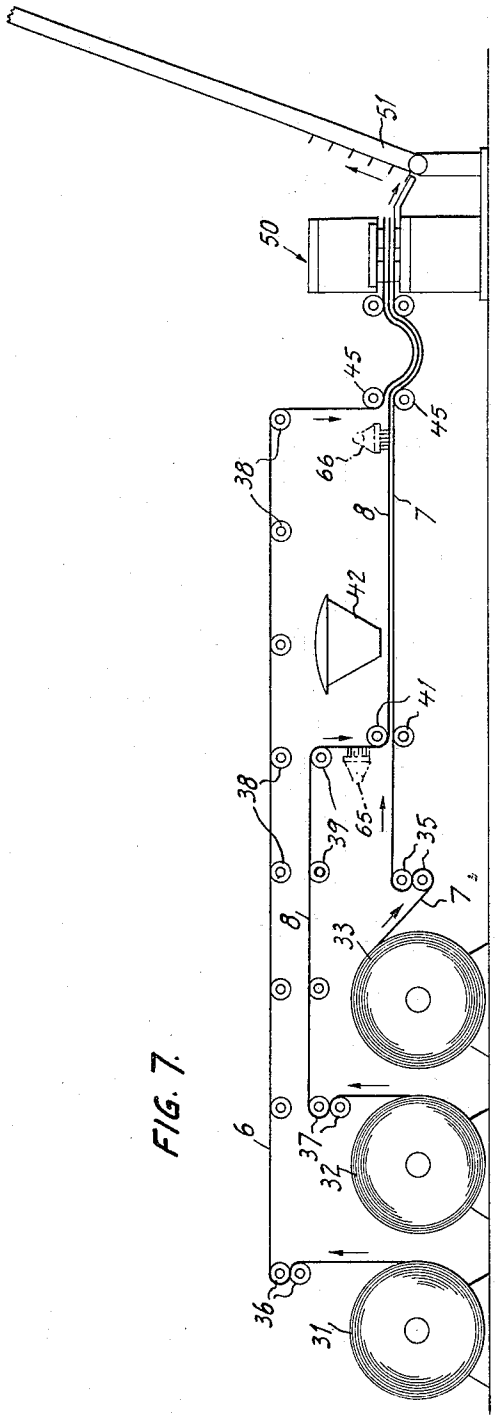

FIG. 7.

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CLEANSING AID

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14 Claims. (Cl. 51—400)

This invention relates generally to a cleansing aid, including the process of fabricating same, adapted for home use in the cleansing of kitchen utensils and the like. More particularly, the invention relates to the structure of and process for making a cleansing aid in the form of a pad presenting highly effective and durable abrasive surfaces and preferably having incorporated therewith a water-soluble cleansing agent, said pad including means for retaining liquefied cleansing agent within the pad to thereby prevent unnecessary wastage of the cleansing agent.

A cleansing or scouring pad of the type above referred to should ideally represent a combination of several functional and physical characteristics. It is, of course, desired that the outer surfaces of the pad provide a good abrasive action, be of an open or lofty structure so as not to mat or become clogged by the dirt, grease or other material removed in the cleansing operation and furthermore be of a rust-free material. It is also desirable that the pad be of sufficient resilience so as to be comfortable to handle and also capable of conforming to irregular contours in the article or utensil to be cleansed. Preferably the pad may be provided with its own self-contained supply of a cleansing agent as a convenience factor in avoiding the necessity for having on hand a separate supply of cleansing agent and for applying same externally to the pad. Whether or not provided with a self-contained supply of cleansing agent, it is nevertheless highly desirable that the pad include means for minimizing waste of a cleansing agent when dissolved in an aqueous solution by retaining said solution within the pad, which means serve the function of a reservoir and act to dispsense only so much of said solution as is required to complement the abrasive action in removing the foreign substances and particles from the article being cleansed. It is also desirable that the pad be comprised of component elements which are firmly bound together so as to maintain the structural integrity of the pad and prevent tearing away or disintegration of the component elements thereof, even after long periods of usage, from the strains and stresses imparted thereto while in rubbing contact with articles being cleansed or scoured.

Each of the above qualities considered desirable in a cleansing aid of this type are present in the pad of the instant invention. The pad according to the instant invention comprises a composite or laminated structure of which the two outer laminae are each formed of a lofty, open, resilient, web material of relatively low density and having excellent abrasive qualities, the third or inner lamina of the pad being formed from a web of more dense but sponge-like and compressible material having a cellular structure such as to render it highly water absorbent so as to retain the associated cleansing agent when in liquefied form.

The web material constituting the outer laminae of the pad consists of a plurality of randomly oriented nonwoven fibers, which may be either natural or synthetic, bound together at their points of touching contact by a binder, preferably a resin, so as to maintain the integrity of the web which presents an open, lofty and somewhat resilient three dimensional structure possessing extremely low density and having contained therein a network of many relatively large intercommunicating voids. Preferably, there is also distributed within the web material

abrasive particles which are firmly adhered to the structure by the aforesaid binder which generally exists in the form of globules located at the points of intersection of the respective fibers. A web of abrasive material of the sort above described has heretofore been desribed in patent issued to Clarence Robert Loeffler, No. 2,327,199, issued August 17, 1943, patent to R. L. Melton et al., 2,334,572, issued November 16, 1943, and also patent to H. L. Hoover, et al., 2,958,593, issued November 1, 1960.

For use as abrasive web material, it has been found that synthetic fibers such as nylon and polyesters (e.g., Dacron) are particularly well suited. The uniformity and quality of such types of fibers can be closely controlled. Also, these fibers retain substantially their desired physical properties when wet with water or oil. However, various natural fibers which are flexible, resilient, durable, and tough can also be utilized in the abrasive web material. The resulting extremely open fibrous construction exhibits a remarkably effective abrasive action. It is essentially nonclogging and nonfilling in nature, particularly when used in conjunction with liquids such as water and oils. Furthermore, it can be readily cleaned upon simple flushing with a rinsing liquid, dried and left for substantial periods of time and then reused with all its original properties intact. The structure of the web is flexible and readily compressible and upon release of compression returns substantially completely to the intial uncompressed form.

The third or inner lamina of the pad is preferably formed of a foamed synthetic, thermoplastic material, such as for example polyurethane foam or the like which may be either of the polyester or polyether type. Due to the cellular structure of this foamed material, the inner web is highly flexible and compressible, thereby adding resilience to the overall pad, the cellular structure furthermore enabling the web to readily absorb and retain water which is not a characteristic of the outer abrasive laminae of the pad. Thus, as the pad is wetted in preparation for use, the wetting of the water-soluble cleansing agent preferably incorporated therewith liquefies a portion of the cleansing agent, thus causing the solution to become absorbed in the pores and cellular structure of the foamed inner web material. Thereafter as the pad is put to use, the inner lamina of foam material is somewhat compressed causing the solution of cleansing agent to be exuded from the foam material and applied to the surface of the article being cleansed. Without the inner ply of foam material, the cleansing agent when liquefied would quickly wash through the open structure of the abrasive outer webs thereby being much more wasteful of the cleansing agent. Upon reuse of the pad, after having dried, the introduction of water thereto first saturates the inner foamed web and thus places in solution the film of cleansing agent lining the pores and cells of the foam material thereby minimizing the amount of additional cleansing agent required. The intermediate or inner lamina of the foam web material also serves as an effective means for binding the three laminae or plies of the composite pad into a unified and integral structure. By application of heat to the opposed surfaces of the inner foamed web material up to the point where the material becomes soft and tacky and applying the outer webs of abrasive material thereto while in the soft and tacky condition, the inner lamina serves as a bonding medium which when subsequently cooled firmly unites the three laminae into an integral unit.

In accordance with one embodiment of pad structure the bonding of the three laminae is achieved by application of both heat and pressure at only the border area of the pad so as to produce a fin-sealed edge comprised

of the three pad laminae bound together in a compressed state. In this embodiment the application of heat also acts on the resin binder in the two outer laminae so as to effect a binding of the fibers of said outer laminae in a compressed state. According to another embodiment of the invention, the bonding of the three laminae is achieved through a flame lamination technique by which heat is applied to the entire surface on both sides of the inner web of foamed material, whereupon each outer ply is brought into contact with a respective heated surface with a force sufficient to effect a surface bond and without leaving any of the laminae of the pad permanently compressed. In the case of each embodiment, the bonding of the several laminae into an integral product is accomplished without the addition of any glue, adhesive or other binding additives which might tend to impair the permeability or free flow of water from one lamina to the other at their respective interfaces.

The cleansing agent which may be incorporated in a pad is preferably a thin, flat pellet or tablet of soap, synthetic detergent, or a combination thereof in a solid or semisolid form and disposed between the inner web of foamed material and one of the outer webs of abrasive material.

It is therefore an object of this invention to improve upon a cleansing aid in the form of an abrasive pad adaptable for home use in scouring kitchen utensils or the like.

It is a further object of this invention to provide a cleansing aid in the form of a scouring pad having a self-contained supply of cleansing agent incorporated therewith.

It is also an object of this invention to provide an abrasive scouring pad with means for preventing unnecessary waste of the cleansing agent utilized therewith.

It is a still further object of the invention to provide an improved method for fabricating a cleansing aid in the form of an abrasive scouring pad which may have incorporated therewith a self-contained cleansing agent.

Further objects of the invention, together with the features contributing thereto and the advantages accruing therefrom, will be apparent from the following description when read in conjunction with the drawings wherein:

FIG. 1 is a plan view of a scouring pad according to one embodiment of the instant invention;

FIG. 2 is a plan view of a scouring pad according to another embodiment of the invention;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 1;

FIG. 4 is a plan view of a scouring pad according to still another embodiment of the invention;

FIG. 5 is a side view in elevation of the pad shown in FIG. 4;

FIG. 6 is a plan view of a section of the pad forming web material after pads according to the FIG. 1 or FIG. 4 embodiment have been cut out therefrom;

FIG. 7 is a diagrammatic view illustrating the process for fabricating scouring pads according to the instant invention; and

FIG. 8 is a more detailed view in enlarged scale of a part of the pad fabricating equipment illustrated in FIG. 7.

Referring now in particular to FIGS. 1 and 3 it will be seen that a pad **5** in accordance with one embodiment of the invention may assume a generally oval shape, the pad comprising a laminate structure which includes outer laminae **6, 7** of abrasive web material and an inner lamina **8** of a synthetic sponge-like foamed plastic material. The abrasive web material constituting the outer laminae **6, 7** is one which is comprised of a plurality of individual fibers **11** randomly oriented, nonwoven, and bound together at the points where they contact one another by a binder, preferably resin, which tends to form in globules **12** at the juncture points between the respective fibers. Distributed within the web material are also fine abrasive particles **13** which may be of any suitable abrasive material such as aluminum oxide, silicon carbides, quartz, or the like, the abrasive particles being adhered to the web structure by the binder and preferably concentrated at or near the outer surface of the abrasive webs. The web material comprising the outer laminae **6, 7** presents an open, lofty and somewhat resilient structure possessing extremely low density and containing a network of many relatively large intercommunicating voids. Material of this character provides excellent abrasive qualities due to its natural resiliency and the openness of its structure which permits the dirt, grease or other foreign substances loosened by the abrasive action to wash away freely and not clog the surface of the pad to impair the abrasive action thereof.

Disposed within the pad at the interface between the inner lamina **8** and the outer lamina **6** is a water soluble cleansing agent **15** which may be either a soap, synthetic detergent, or a combination of both. The cleansing agent is introduced to the pad during fabrication thereof as a pasty, semisolid deposit which may, however, before usage, depending upon the length of time between fabrication of the pad and usage, dry out and become solid so as to constitute a thin tablet or wafer. The cleansing agent could, however, if desired, be initially incorporated into the pad structure in a solid tablet or wafer form.

The inner lamina **8** comprises a web of foamed plastic material such as polyurethane or the like. Such materials are flexible and compressible thereby providing added resilience to the overall pad structure. Such material is also, due to its cellular structure, highly absorbent, thereby enabling it to serve as a reservoir for retaining the cleansing agent in liquefied form after application of water thereto. In use, pressure applied to the pad incident to the scrubbing action compresses the foamed material of the inner lamina **8** causing it to exude the retained solution of cleansing agent which thereupon flows freely through the open structure of the outer lamina of the pad to the pad outer surface to assist and complement the abrasive action of the pad in removing the dirt, grease or other foreign substance from the article being cleaned.

In the form of pad illustrated in FIGS. 1 and 3 the border areas of the three laminae **6, 7, 8** are bound together under application of suitable heat and pressure at said border areas to form a heat seal bond firmly securing the respective laminae into a unified and integral pad structure. Application of a suitable degree of heat to the border area of the pad when under compression breaks down the cellular structure of the foamed thermoplastic material of the inner lamina **8** to render it more dense while fusing thereto the abrasive web material of the outer laminae **6, 7**. At the same time, the fibers **11** of the outer laminae become bound together by the binder incorporated therewith under the influence of the heat to result in a fin-sealed edge **18** as shown. The fin-sealed edge constitutes a relatively thin and rigid pad portion having a good abrasive surface, thereby being particularly effective and useful for reaching into small cracks, crevices or other small openings in the article or utensil to be cleaned, which type of openings could not be effectively cleaned in the absence of such a fin-sealed edge on the pad. Also, by binding the respective laminae together in this manner, it will be apparent that the interface between the major portions of the inner and outer laminae contain no impediment to the free flow or intercommunication of water or cleansing solution therebetween.

The thickness of the web material constituting respective laminae of the pad is not critical and may be varied without substantially impairing the usefulness of the pad as a cleansing aid. Typically, the outer laminae **6, 7** of abrasive web material may have a thickness of approximately ¼ inch, with the thickness of the foamed plastic material constituting the inner lamina of the pad being

approximately ⅛ of an inch. Pads comprised of laminae having the foregoing thickness dimensions have been found to be of an overall thickness which renders them highly effective as cleansing aids and convenient to handle.

The pad **20** of the FIG. 2 embodiment is essentially similar in construction to the FIG. 1 embodiment, the only difference being that the several laminae composing the pad are cut in a rectangular shape rather than in the oval shape of the FIG. 1 embodiment. The outer fibrous and abrasive web material of which only one lamina **21** is shown in FIG. 2 is of the same structure and serves the same purpose as the outer laminae **6, 7** of the FIG. 1 embodiment, the FIG. 2 embodiment also including an inner lamina of plastic foamed material and preferably a deposit of cleansing agent for the same reasons and serving the same purposes as that described in connection with the FIG. 1 embodiment. Likewise, the several laminae of the FIG. 2 embodiment are joined together in a compressed state by a heat sealed bond to provide the pad with a fin-seal edge **22** as in the FIG. 1 embodiment. The FIG. 2 embodiment could be of particular advantage in applications where its use is restricted to articles or utensils having shapes better suited to the rectangular embodiment of FIG. 2 rather than to the oval embodiment of FIG. 1.

The pad **25** of the embodiment shown in FIGS. 4 and 5 is also generally similar to the pad of the FIG. 1 embodiment and is composed of outer laminae **26, 27** and an inner lamina **28**, all corresponding in structure and function with the outer abrasive web material **6, 7** and the inner foamed plastic web material **8**, respectively, of the FIG. 1 embodiment. The FIG. 4 embodiment also preferably includes a deposit, not shown, of cleansing agent disposed similarly to and serving the same function as the tablet **15** of the FIG. 1 embodiment. The only difference in the two embodiments is the manner in which the respective laminae are bound together into an integral pad structure. The embodiment in FIGS. 4 and 5 lacks the fin-seal edge of the FIG. 1 embodiment, the binding of the respective laminae into an integral pad structure being achieved by a surface bond over the entire interfaces between the outer laminae **26, 27** and the inner lamina **28**. The joining of the respective laminae is accomplished by heating the opposed surface areas of the inner web **28** of foamed thermoplastic material to a plastic tacky state and then pressing the outer laminae **26, 27** of abrasive web material into contact therewith to cause a fusion therebetween upon subsequent cooling of the inner thermoplastic web surfaces while permitting the respective web materials to remain in their original uncompressed condition. The bond between the respective web materials is one which provides interfaces of high porosity permitting relatively unimpeded free flow and intercommunication of water between the respective laminae of the pad as in the FIG. 1 embodiment. The thickness of the respective laminae comprising the FIG. 4 embodiment is also not critical. Typically the thickness of the web material constituting each lamina of the pad could have the same thickness of approximately ¼ inch, pads fabricated in such dimensions having functioned satisfactorily as cleansing aids and having been found to be of a size convenient and easy to handle.

FIG. 7 depicts the process for fabricating the above described pads. As shown, elongate sheets of fibrous abrasive web material **6, 7** are supplied from spools **31, 33** thereof, a sheet of foamed thermoplastic material **8** being supplied from a spool **32** thereof. The sheets are continuously withdrawn from their respective spools at a uniform rate, the sheet of abrasive web material **7** being fed through a suitably driven pair of feed rolls **35** while the other sheet of abrasive web material **6** and the sheet of foamed thermoplastic web material **8** are similarly fed by suitably driven feed rolls **36, 37** respectively. The sheet **6** is thereafter supported by a series of rolls **38**, the sheet **8** being thereafter supported by a series of rolls **39**. As the sheet **7** is fed into the nip of feed rolls **41** it is brought into contact with the sheet **8**, the two sheets thereafter being fed in superposed relation beneath a dispenser **42** which is charged with the cleansing agent and deposits measured amounts thereof intermittently at spaced increments both laterally and longitudinally relative to the upper surface of sheet **8**. As the two sheets **7, 8** enter the nip of feed rolls **45**, the upper surface of sheet **8** is brought into contact with sheet **6** which overlies the deposits of cleansing agent, the three sheets thereafter being fed in superposed relation to one another into a die-cutting press **50**. Feed through the die-cutting press is intermittent in synchronism with the cyclic operation of the press, the momentary interruption of feed being compensated for by permitting the combined sheets to develop a loop between the feed rolls **45** and the press.

For fabricating the pads according to the FIG. 1 embodiment thereof, the die-cutting press **50** performs a two-stage operation, the first stage operating to compress and heat seal the three sheets **6, 7** and **8** in a plurality of oval patterns to form the fin-seal edge **18** of the individual pad structure, the second stage of press operation operating to cut or sever the three sheets at the heat sealed area so as to separate the individual pads from the elongate sheet material, which pads are then directed to a suitable conveying mechanism **51** for delivery of the completed pads to another location. The heat sealing and cutting pattern effected by the press on the sheets of web material can be seen in FIG. 6 which shows a section of the sheet material remaining as scrap after individual pads have been separated therefrom. The individual pads are cut out from a pattern in which they are aligned in a series of transverse rows, the adjacent rows being relatively offset from one another in the interests of minimizing waste of the web material from which the pads are formed. It will of course be understood that the spacing of the areas cut away from the sheets to produce the individual pads is arranged to coincide with the placement of the cleansing agent deposited by the dispenser **42**, so that each of the resulting pads will have incorporated therewith a deposit of said cleansing agent.

FIG. 8 illustrates in greater detail the portion of the press effective in the first stage of operation for heat sealing the sheet material to form the fin-seal edge of the individual pads. As shown, the mechanism includes opposed heating dies **52** mounted in heated blocks **53** each provided with a plurality of electrical resistance heat cartridges **54**. The blocks **53** are supported on posts **55** of heat insulating material, the posts **55** associated with the lower die being mounted on a stationary portion **56** of the press, the posts associated with the upper die being secured to a reciprocally driven portion **57** of the press. Preferably, heating of the web material is also achieved dielectrically by radio frequency energy supplied from a radio frequency pulse generator **60**, the output of the generator being transmitted to the upper die **52** through a flexible conductor **61** connected thereto. Shorting out of the radio frequency energy across the gap between the dies **52** is prevented by coating the edge of the dies with a hard dielectric substance **62** such as a ceramic or the like. Such a coating also avoids execessive wear on the dies which otherwise would result from contact with the abrasive web material. The use of dielectric heating by radio frequency energy lessens the time to heat the web material to the desired temperature. It also avoids the tendency which would otherwise exist for the dies to stick to the web material.

For farbicating the pad according to the FIGS. 4, 5 embodiment, a slightly modified process is employed. According to this modified process a gas burner manifold **65** provided with a series of gas jets is disposed so as to direct a flame on the undersurface of sheet **8** immediately prior to its being brought into contact with sheet **7** at the nip of the feed rolls **41**. Accordingly, as

the sheets 7 and 8 pass between the rolls 41 and the heated surface of sheet 8 starts to cool, the two sheets become flame laminated over their entire abutting surfaces. A similar gas burner manifold 66 is disposed so as to direct a flame over the entire upper surface of sheet 8 immediately prior to its being brought into contact with sheet 6 by the feed rolls 45. Accordingly, as sheets pass between rolls 45, sheet 6 becomes surface bonded to the upper surface of sheet 8, the three sheets being thereby bonded one to another at their respective interfaces as they are fed into the press 50. In this modified process the press performs only a single stage operation of severing individual pads from the elongate sheets, the heretofore described first stage of press operation, employed for producing pads of the FIG. 1 embodiment, not being employed in the modified process for producing pads in accordance with the FIG. 4 embodiment thereof.

Although there has been shown and described what are considered to be preferred embodiments of the invention, it is of course understood that obvious changes or variations could be made from the forms and techniques specifically described and disclosed herein without departing from the spirit of the invention. It is therefore intended that the invention be not limited to the precise forms and techniques herein shown and described nor to anything less than the whole of the invention as hereinafter claimed.

We claim:

1. A cleansing aid comprising a laminated pad of which the two opposed outer laminae each are in the form of an abrasive resilient web composed of individual randomly oriented nonwoven fibers held together by a binder to define a three-dimensional open lofty structure having a network of relatively large intercommunicating voids, the inner lamina of said pad being a web of compressible and water-absorbent thermoplastic foam material, said inner lamina serving as a heat sealing medium for adhering thereto said outer laminae to bind said outer and inner laminae together into an integral pad structure.

2. The invention according to claim 1 wherein said outer laminae include abrasive particles distributed therein, said abrasive particles being adhered to the fibers of said laminae by said binder.

3. The invention according to claim 2 wherein said abrasive particles are concentrated near the exposed surfaces of said outer laminae.

4. A cleansing aid comprising a laminated pad of which the two outer laminae each are in the form of an abrasive resilient web composed of individual randomly oriented nonwoven fibers held together by a binder to define a three-dimensional open lofty structure having a network of relatively large intercommunicating voids, the inner lamina of said pad being a web of compressible and water-absorbent thermoplastic foamed material, said pad including a deposit of water soluble cleansing agent in at least a partially solid state and disposed between said inner lamina and one of said outer laminae, said inner lamina serving to retain said cleansing agent when liquefied after application of water thereto and to exude when compressed the retained liquefied cleansing agent into said outer laminae, said inner lamina comprising a heat sealing medium for adhering thereto said outer laminae to bind said outer and inner laminae together with said deposit of cleansing agent into an integrated pad structure.

5. The invention according to claim 4 wherein said cleansing agent comprises a soap.

6. The invention according to claim 4 wherein said cleansing agent comprises a synthetic detergent.

7. The invention according to claim 4 wherein said cleansing agent comprises a combination of soap and synthetic detergent.

8. A cleansing aid comprising a laminated pad of which the two opposed outer laminae each are in the form of an abrasive resilient web composed of individual randomly oriented nonwoven fibers held together by a binder to define a three-dimensional open lofty structure having a network of relatively large intercommunicating voids, the inner lamina of said pad being a web of compressible and water-absorbent thermoplastic foamed material adapted to retain a solution of cleansing agent therein and to exude when compressed said solution into said outer laminae, said inner lamina being adhered to each of said outer laminae along only the border areas thereof in a heat sealed bond joining said inner and outer laminae together into an integral pad structure, said inner lamina serving as the heat seal bonding medium.

9. The invention according to claim 8 wherein said border areas of said inner and outer laminae are bonded together in a compressed state to thereby constitute a fin-seal edge extending around said pad.

10. The invention according to claim 8 including a deposit of cleansing agent in at least a partially solid state contained within said pad, said cleansing agent being disposed between said inner lamina and one of said outer laminae.

11. The invention according to claim 10 wherein said cleansing agent comprises a soap.

12. A cleansing aid comprising a laminated pad of which the two opposed outer laminae each are in the form of an abrasive resilient web composed of individual randomly oriented nonwoven fibers held together by a binder to define a three-dimensional open lofty structure having a network of relatively large intercommunicating voids, the inner lamina of said pad being a web of compressible and water-absorbent thermoplastic foamed material adapted to retain a solution of cleansing agent therein and to exude when compressed said solution into said outer laminae, said inner lamina being adhered to each of said outer laminae throughout each entire interface area by a heat sealed bond to join all said laminae into an integrated pad structure, said inner lamina constituting the heat seal bonding medium.

13. The invention according to claim 12 including a deposit of cleansing agent contained within said pad, said cleansing agent being disposed at the interface between said inner lamina and one of said outer laminae.

14. The invention according to claim 13 wherein said cleansing agent comprises a soap.

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