SCOURING ARTICLE AND METHODS OF MAKING AND USING

Background

Nonwoven articles are often used for cleaning various surfaces, e.g. food-contacting surfaces and the like.

Summary

According to a first aspect of the present invention, there is provided a scouring article comprising:

a monolithic nonwoven pad comprising an interior and a first major surface and a second major surface, the monolithic nonwoven pad comprising:

at least some nonwoven fibers that are bonded to each other by fiber-fiber melt-bonding; and,

at least some nonwoven fibers that are bonded to each other by a binder that is distributed throughout the monolithic nonwoven pad in the form of globules;

wherein the monolithic nonwoven pad comprises a first semi-densified fibrous layer that is integral with the monolithic nonwoven pad and that comprises an outward major surface that provides the first major surface of the monolithic nonwoven pad;

and wherein the first major surface of the monolithic nonwoven pad comprises a first array of spaced-apart scouring bodies, at least selected scouring bodies of which first array each comprise an inward portion that penetrates at least partially into the first semi-densified fibrous layer of the monolithic nonwoven pad, and an outward portion that protrudes outward beyond the first major surface of the monolithic nonwoven pad.

According to a second aspect of the present invention, there is provided a method of making a scouring article, the method comprising:

providing a monolithic nonwoven pad comprising an interior and a first major surface and a second major surface, the nonwoven pad comprising at least some nonwoven fibers that are bonded to each other by fiber-fiber melt-bonding;

forming at least a first semi-densified fibrous layer that is integral with the monolithic nonwoven pad and that comprises an outward major surface that provides the first major surface of the monolithic nonwoven pad;

impregnating at least one binder precursor throughout the monolithic nonwoven pad,

solidifying the binder precursor into binder globules that are distributed throughout the monolithic nonwoven pad, at least some of which binder globules bind at least some of the fibers of the monolithic nonwoven pad to other fibers of the monolithic nonwoven pad;

forming, on the first major surface of the nonwoven pad, a first array of spaced-apart scouring bodies, at least selected scouring bodies of which first array each comprise an inward portion that

penetrates at least partially into the first semi-densified layer of the nonwoven pad, and an outward portion that protrudes outward beyond the first major surface of the nonwoven pad.

In broad summary, herein is disclosed a scouring article comprising a monolithic nonwoven pad that comprises at least a first semi-densified fibrous layer that is integral to the monolithic nonwoven pad and that provides a first major surface of the monolithic nonwoven pad. These and other aspects, including methods of making and using the article, will be apparent from the detailed description below. In no event, however, should this broad summary be construed to limit the claimable subject matter, whether such subject matter is presented in claims in the application as initially filed or in claims that are amended or otherwise presented in prosecution.

Brief Description of the Drawings

Fig. 1 is a top view of an exemplary scouring article as disclosed herein.

Fig. 2 is side schematic view of a portion of an exemplary scouring article as disclosed herein.

Fig. 3 is a side schematic view of a portion of another exemplary scouring article as disclosed herein.

Fig. 4 is a side schematic view of an exemplary scouring body as disclosed herein.

Fig. 5 is an optical micrograph of a major surface of an exemplary Working Example monolithic nonwoven pad as disclosed herein.

Fig. 6 is an optical photograph of an exemplary Working Example scouring article positioned beside a Comparative Example scouring article.

Like reference numbers in the various figures indicate like elements. Some elements may be present in identical or equivalent multiples; in such cases only one or more representative elements may be designated by a reference number but it will be understood that such reference numbers apply to all such elements. Figs. 1-4 are not to scale and are chosen for the purpose of illustrating different embodiments of the invention. In particular the dimensions of the various components are depicted in illustrative terms only, and no relationship between the dimensions of the various components should be inferred from Figs. 1-4. Although terms such as "top", bottom", "upper", lower", "under", "over", "front", "back", "up" and "down", and "first" and "second" may be used in this disclosure, it should be understood that those terms are used in their relative sense unless otherwise noted. As used herein, the term "inward" means toward an imaginary plane located in the center of an article, along an axis that is generally oriented along the shortest dimension (i.e., the thickness dimension rather than the length or width dimension) of the article. The term "outward" means a direction generally away from such a plane. As used herein as a modifier to a property or attribute, the term "generally", unless otherwise