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H. G. HAMMON

2,659,935

METHOD OF MAKING COMPRESSED SPONGES

Filed March 18, 1950

FIG. 1.

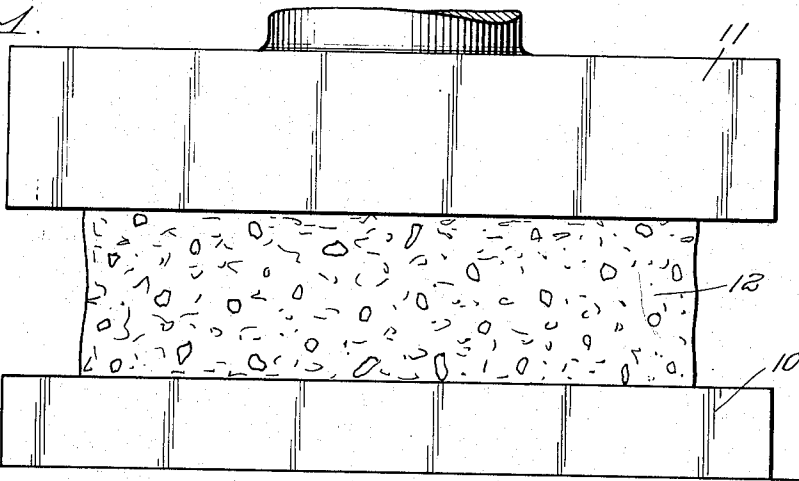


FIG. 2.

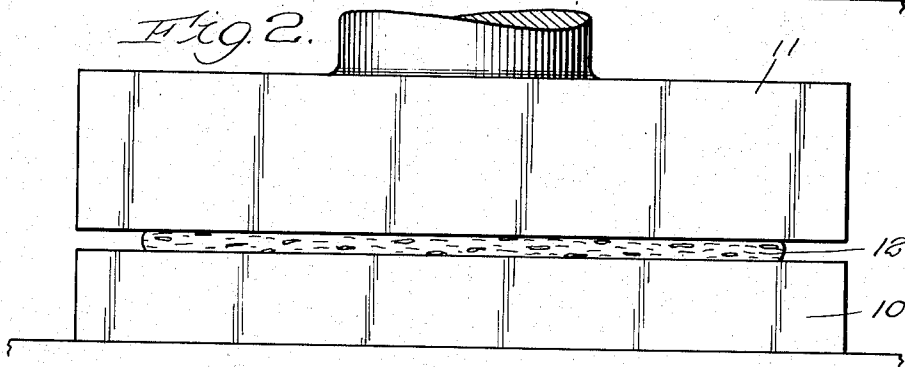
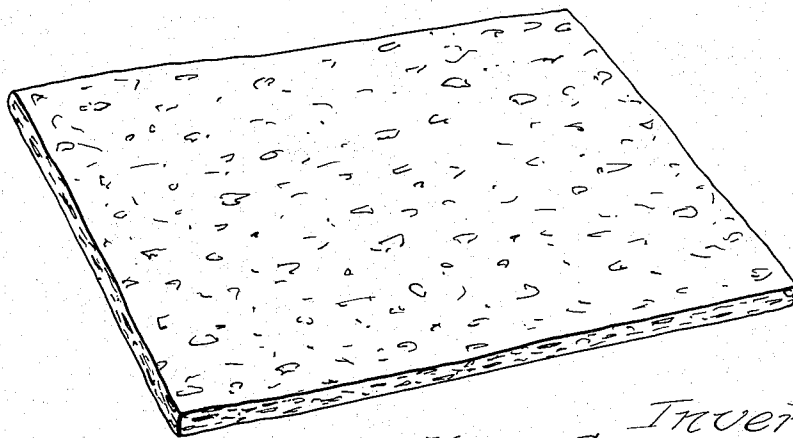


FIG. 3.



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# UNITED STATES PATENT OFFICE

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## METHOD OF MAKING COMPRESSED SPONGES

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2 Claims. (Cl. 18—55)

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This invention relates to a method of making a compressed sponge particularly such a sponge comprising polyvinyl formal and in which from 35 to 80% of the hydroxyl groups of the alcohol have been reacted.

In the copending application of Christopher L. Wilson, Serial No. 29,657, filed May 27, 1948, now Patent No. 2,609,347 which is a continuation-in-part of application Serial No. 769,537, filed August 19, 1947, now abandoned, there is described and claimed a polyvinyl formal sponge which may be used as an ordinary sponge or may be cut in thin sheets to make a synthetic wash cloth, chamois skin and the like. These sponges, as described in the Wilson application, are tough and tear resistant and are resistant to the action of most ordinary chemicals with which they might come in contact. The sponges have interconnected pores so that they are capable of absorbing and holding a large quantity of water or other liquid.

When the sponges of the above copending application are dry, they are very hard and resistant to deformation. However, when they are wet, they become quite soft and resilient and can be handled as ordinary sponges.

When the sponges are sold in their normal size and shape they occupy a considerable space so that relatively few sponges can be packaged in an ordinary shipping container. The large space occupied by a relatively small number of sponges adds to the shipping costs, especially where these sponges are shipped to foreign countries. I have discovered that the dry sponge can be compressed to a considerably less thickness than that occupied by the normal sponge and that, when dry, the compressed sponges will retain their compressed shape until they are wet with water. As soon as the compressed sponges are immersed in water they quickly expand to their normal size and do not take a permanent set.

Before the sponges are compressed they are dried until they are hard throughout and dry to the touch. The sponge preferably contains not more than about 2 or 3% water. When the dry sponge is compressed at a pressure sufficient to reduce materially the bulk of the sponge, the compressed sponge retains its shape when the pressure is removed and does not resume its original shape until it is wet with water. The preferred pressure is at least 100 pounds per square inch, although pressures up to 1,000 pounds per square inch or more may be employed. This pressure is applied until the sponge has been reduced to a thickness of preferably not less than about  $\frac{1}{5}$  its

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normal thickness. In actual practice, the sponges are compressed to about  $\frac{1}{5}$  their normal thickness. The sponges are compressed preferably at ordinary room temperatures as an excessive temperature causes the sponges to assume a permanent set so that they will not recover fully when wet. The temperature at which the dry sponges attain a permanent set is considerably above normal atmospheric temperatures.

One of the features of this invention is the method of making a compressed polyvinyl formal sponge so that when the pressure is removed the sponge will maintain its reduced thickness until the sponge has been wet with water; another feature of the invention is the compressed sponge produced by this method. Other features and advantages of the invention will be apparent from the following description and the accompanying drawings. Of the drawings:

Fig. 1 is a fragmentary side elevation of a typical press in open position with a dry polyvinyl formal sponge arranged therein; Fig. 2 is a view similar to Fig. 1, but showing the sponge compressed; and Fig. 3 is a perspective view of the compressed sponge.

In the drawings there is illustrated a press having a lower platen 10 and an upper platen or ram 11. Arranged between these platens is a polyvinyl formal sponge 12 that has been dried preferably until it contains not more than about 3% water. Pressure is applied to the platen 11 to compress the dried sponge until it has, for example, the approximate relative thickness shown in Fig. 2. When the compressed sponge is removed from the press, it retains its compressed shape, as shown in Fig. 3, until it has been thoroughly wet with water and at which time it immediately expands until it is slightly larger than the sponge shown in Fig. 1. The wet sponge is slightly larger than when it is dry as the drying step itself causes a slight shrinkage in the sponge.

Although the method illustrated in the drawings shows the sponge being compressed through its smallest dimension, it is believed obvious that the sponge could be compressed through any one or more directions. Therefore, when in the specification and claims the sponge is said to be reduced in thickness, this is intended to include not only the smallest dimension, but also the largest dimension or any other dimension. Thus, the sponge could be compressed longitudinally of its major axis, laterally of its major axis or in other desired direction.

Having described my invention as related to various embodiments of the same, it is my inten-

tion that the invention be not limited by any of the details of description unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. The method of making a compressed sponge which comprises providing a polyvinyl formal sponge having interconnected pores throughout, prepared from polyvinyl alcohol and having from 35 to 80% of the hydroxyl groups of the alcohol reacted, said sponge containing not more than about 3% water, and compressing said sponge under a pressure sufficient to reduce materially the bulk of said sponge, said sponge being maintained during the compressing step at a temperature less than that at which the sponge assumes a permanent set.

2. The method of making a compressed sponge which comprises providing a polyvinyl formal sponge having interconnected pores throughout, prepared from polyvinyl alcohol containing substantially no residual hydrolyzable groups and

having from 35 to 80% of the hydroxyl groups of the alcohol reacted, said sponge containing not more than about 3% water, and compressing said sponge under a pressure of at least 100 pounds per square inch until the sponge has a thickness of not less than about one-tenth of its original thickness, said sponge being maintained at substantially atmospheric temperature during the compressing step.

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