

## UNITED STATES PATENT OFFICE

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## PROCESS OF MAKING MINERAL FIBER ARTICLES

No Drawing.

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My invention relates particularly to a process of making articles, such as paper and blocks, containing mineral fibers, with the aid of sea growths.

6 The object of my invention is to provide a new and advantageous process of the above character whereby articles, as, for example, paper and blocks, containing a mineral fiber, as, for instance, asbestos, may be obtained.

10 Hitherto it has been found impossible to make from raw kelp in the usual paper making apparatus, sheets of 10 mils or less in thickness without incorporating therein, by carding, at least 40% by weight of vegetable fiber, such as cotton, flax, etc., in the finished article in order to make the mineral fiber felt and carry on the paper making machine. Such a large amount of vegetable fiber thus was required as to detract materially from the

20 heat resisting and other qualities, including the cost of manufacture thereof. In accordance with my invention I find it possible to manufacture paper from raw kelp in a paper making apparatus of the usual type, if desired, containing no vegetable fiber, or substantially no vegetable fiber, the only fiber present being a mineral fiber, such as asbestos, mineral wool, etc., or if desired, I may add a small proportion of vegetable fibers of any desired character, such as cotton, flax, etc., but in an amount less than 40% by weight of the finished product. It is to be understood, however, that it is not necessary in any respect to have any vegetable fiber whatever present in making the paper or other articles in accordance with my invention. It is found that the product made in accordance with my invention, even when no vegetable fiber is present, has very nearly all the heat resisting qualities of the mineral fiber used but is also thoroughly felted and has an extremely high electrical insulating value. I find, in accordance with my invention, that sheets made even as thin as 1 mil, and containing only

45 mineral fibers and no vegetable fibers, are even in texture and may be calendered to a high surface finish. Furthermore, such sheets have a very high tensile strength and are less absorptive of moisture than when vegetable fibers are present, as well as being

easy to manufacture. Likewise, in the manufacture thereof the product runs evenly and releases freely from the screen or felt of the paper making machine.

While my invention is capable of being carried out in many different ways I shall describe hereinafter only certain ways of producing the product aforesaid in accordance with my invention.

For example, I may introduce 100 lbs. of asbestos fiber, preferably of about  $\frac{1}{4}$ " length or shorter, into a beating engine of the ordinary paper-making type, together with 120 gals. of water and 20 lbs. of kelp, which may or may not have been previously dried and which may be the raw material, that is to say, not previously combined with any reagents. The kelp used is preferably laminaria containing both alginic acid or its compounds, as well as algulose. To this I add 4 lbs. of sodium bicarbonate. The beater is then run until the kelp, particularly the alginic acid constituent thereof, has been dissolved by the alkali by combining therewith and becomes completely incorporated with the asbestos. I then add 5 lbs. of a precipitant, such, for example, as calcium acetate, dissolved in 5 gals. of water to precipitate the compounds formed by substituting the calcium for the sodium in the kelp compounds and run the beater until the incorporation of the materials therein is completely homogeneous. This entire operation in the beating engine will ordinarily consume about two hours. The mass is then removed from the beating machine and run through a Jordan engine of the usual type and thence on to a paper-making machine in the usual manner. The Jordan engine and the paper-making machine may, for example, be such as is used in the production of newspaper print and book papers, and the paper-making machine comprises, in general, a web-forming screen, a drying portion and calender rolls. The kelp which becomes solubilized by combination with the sodium carbonate, forms a colloidal solution of high viscosity in the machines referred to so as to act as a carrier of the mineral fiber, causing it to flow together and felt, in which condition it is fixed

by the precipitant, as the precipitated compound is insoluble in water. Furthermore, there is no waste of the material because of its insolubility, and, furthermore, the finished dried product is non-inflammable. Therefore, the paper will withstand high temperatures and has a high insulating value.

As another example of my invention I may proceed as above, but incorporate therein also, a quantity of vegetable fiber in any desired amount, but not exceeding 40% by weight of the finished product. For instance, for this purpose I may introduce 30 lbs. of cotton fiber into the beating engine with the other materials above referred to.

In the above compositions it is to be understood that any other mineral fiber than asbestos may be used, as, for example, mineral wool, etc. Also, any other suitable material for solubilizing the alginic acid or its compounds may be used instead of sodium carbonate, as, for example, sodium hydrate, potassium carbonate, sodium phosphate. Again, instead of the calcium acetate used as a precipitant I may use any other mineral salt which will produce an insoluble compound by reaction with the alginic acid, such, for example, as other mineral salts, such, for instance, as zinc sulphate, aluminum sulphate, etc., or dilute acids, such as sulphuric acid. In any of these different ways a kelp product may be obtained acting as a suitable carrier for the fibers present.

While I have described my invention above in detail I wish it to be understood that many changes may be made therein without departing from the spirit of the same.

I claim:

1. The process which comprises forming a paper in which the fibrous materials present are only mineral fibers, by intermingling raw kelp, asbestos and sodium carbonate, introducing calcium acetate as a precipitant to form insoluble kelp compounds therewith, and making paper therefrom.

2. The process of forming fibrous bodies which comprises intermingling raw kelp, asbestos and an alkaline carbonate, introducing a salt of an organic acid as a precipitant to form insoluble kelp compounds thereof, and shaping the mass.

In testimony that I claim the foregoing, I have hereunto set my hand this 29th day of May, 1928.

ARTHUR L. KENNEDY.

**CERTIFICATE OF CORRECTION.**

**3**

**Patent No. 1,820,538.**

**Granted August 25, 1931, to**

**ARTHUR L. KENNEDY.**

**It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 71, for "bicarbonate" read carbonate; line 75, for "becomes" read become; page 2, line 50, claim 2, for "from" read form; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.**

**Signed and sealed this 29th day of September, A. D. 1931.**

**(Seal)**

**M. J. Moore,  
Acting Commissioner of Patents.**