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FIBROUS MATERIAL

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1 Claim. (Cl. 92—3)

This invention relates particularly to the manufacture of corrugating paper suitable for use in the fabrication of paper boxes and cartons and also to provide a packing material for fragile objects such as glassware, electric light bulbs, etc. It also relates to the manufacture of paper and fiber board and moulded fiber products in general.

The object of the invention is to provide a means of using waste paper stock and other fibrous material so that when used in the manufacture of corrugating paper and other fiber products they have the stiffness and strength required.

In my copending patent application No. 741,010 filed August 22, 1934, Patent No. 2,029,973 I describe a method for removing the pith from partially pulped cornstalks and other fibrous plant material so that the fibrous portions are left for further purification for the manufacture of the same into paper pulp. This pithy material is largely composed of pentosan and hemi-cellulose which has the property, when dried, of forming into compact horn-like masses and is suitable for a number of uses.

The term, pithy material, is understood to include not only the cellular non-fibrous matter that occurs in the central portion of the stalk or stem but also the non-fibrous cellular matter in the leaves and husks and similar cellular non-fibrous matter that occurs in the walls of the stalk. From the standpoint of botanical classification this general terminology may be inaccurate but from the standpoint of chemical composition, physical characteristics and behavior of the material in technical processing and utilization the more general classification is practical and adequate.

In using this material in various ways I discovered that, when mixed with paper stock obtained from macerating waste papers of miscellaneous origin and containing considerable amounts of groundwood, the strength of the resulting paper or board was increased by from twenty-five to one hundred per cent and the stiffness and rigidity of the board was increased to even a greater extent. The presence of fifteen percent of pithy material separated from cornstalks treated in the manner described in the above mentioned patent application was sufficient to increase the bursting test of fiber board from 50 to 55 and further increase was obtained as the proportion was increased up to approximately half of the total furnish.

It is well known that the addition of a long fibered pulp such as kraft pulp, is capable of increasing the strength of board or paper made from waste paper. In this case the long fiber acts as a reinforcement and the result is obvious. On the other hand the property of stiffness is not increased thereby to nearly as great an extent. The pithy material mentioned herein, however, is almost entirely devoid of fibrous characteristics because the individual cells for the most part are not much longer than their diameter. The bond created by their presence is caused by the natural adhesiveness of the substances of which the cells are composed. The lack of felting properties characteristic of the fibers in the cheaper grades of waste paper stock is consequently supplemented by the cementing power of the pithy material and the whole is easily formed on paper or board machines into paper or board which possesses all the desirable properties of corrugating paper. Similar results are also obtained in the manufacture of moulded products.

It is obvious that it is possible to contribute adhesiveness to waste paper stock by the addition of rosin size, starch, sodium silicate and numerous other colloidal materials known to those familiar with the art. These substances are all truly colloidal, however, and the cost of using them is prohibitive because of their price and more especially on account of the small percent retained in the sheet in the usual methods of paper manufacture. The pith cells are, to be sure, composed of colloidal material but this material occurs in cellular structure, the units of which are mostly larger in diameter than the fibers of the waste paper stock and the retention of the material in the sheet is as much as that of the fibers themselves.

It is apparent to those skilled in the art of paper making that I have described herein a procedure of extreme simplicity and flexibility and that the use of more or less of the pith containing material will make possible the manufacture of corrugating paper of specified stiffness and strength and that variation in the strength of the waste paper stock, which is a very variable class of material, can be easily corrected. It happens that the greatest corn-growing country in the world is in the center of consumption of enormous quantities of corrugating paper and fiber board and the economic feasibility of the procedure is obvious.

There is also another property of the pithy material and that is the property of imparting to paper in which it occurs in sufficient amount an imperviousness to oils and grease so that the

paper is suitable for wrapping greasy products such as butter, lard, meats, waxes, greases, etc. This imperviousness also makes it easier to make the paper waterproof with ordinary sizing agents. The imperviousness can be enhanced by beating and with the combination of control of the amount of beating and the amount of pithy material used in the furnish a wide range in degree of imperviousness can be obtained.

What I claim as my invention is:

A paper which is strong and dense in structure, said paper consisting of from 85 to 50% waste paper stock, and from 15 to 50% non-fibrous pithy material from which the fibrous portions have been substantially removed, said pithy material being obtained from processed plant material.

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