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PROCESS OF MAKING FELT

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This invention relates to felt and more particularly to building felt adapted to be saturated with waterproofing compounds such as asphalt, coal tar, coal tar pitch or other bituminous waterproofing material to form waterproof products for building and roofing purposes.

Heretofore the manufacture of felt intended to be saturated with waterproofing compounds, such as liquid bituminous materials, has usually been accomplished by employing one or more of the following as raw materials:

(1) Rags which contain substantially a mixture of cotton and wool;

(2) Rags consisting substantially of cotton;

(3) Rags which contain jute fiber in the form of waste bagging;

(4) Rags which contain old carpets composed largely of jute with quantities of cotton and wool;

(5) Rags which contain rag clippings of all grades with varying amounts of paper; and

(6) Paper stock composed largely of waste paper.

These materials are partially disintegrated in rag cutters and thereafter, while in suspension in water, are beaten in paper mill beaters, then Jordaned if desired, and finally formed into a continuous sheet on Fourdrinier or cylinder paper making machines.

Rags are a relatively expensive raw material and the use of substantial proportions of the same in the manufacture of felt results in a relatively expensive product.

Paper stock composed largely of waste paper is a less expensive raw material than rags, but the use of large quantities of this material in the manufacture of felt tends to harden or stiffen the felt sheets and produce a product of inferior quality for many purposes.

One object of my invention is the production of a felt sheet having a high capacity for the absorption of waterproofing saturants such as heat liquefied bitumen from low cost fibrous materials such as straw or other annual crop fibers.

A further object of my invention is to provide an economical process for the preparation of absorptive fibers for felt which process for its practice does not involve expensive pressure cooking vessels or the maintenance of unduly elevated temperatures. Other objects and advantages of the invention will appear from the following detailed description.

In accordance with my invention, fibers having a high capacity for absorption of waterproofing materials are produced from annual crop fibers particularly straw, such as wheat straw, rye straw, oat straw, rice straw, barley straw. These fibers may be blended with other, relatively strong, fibers whose principal function is to impart strength to the felt. Strength fibers may be any fibers heretofore employed for imparting strength to felt and may include the strength fibers disclosed in my copending application Serial No. 86,098, filed February 4, 1926.

The absorptive fibers of this invention may be prepared by treating straw such as wheat straw, rye straw, oat straw, rice straw or barley straw in an alkaline medium under such conditions that fibers having a high absorptive capacity are produced.

I have found that the treatment of straw in the presence of a dilute solution of caustic alkali at or about atmospheric temperature, e, g., at a temperature below about 50° C., preferably in a beating engine at atmospheric temperature, results in the formation of highly absorbent fibers admirably suited for the production of roofing felt. Fibers of high saturating capacity may be produced by beating such straw at atmospheric temperature in a solution containing ten per cent of caustic soda based on the weight of the straw until the straw is resolved into fibers, or microscopic fibre aggregates.

Instead of a solution of caustic alkali, a weaker alkaline solution may be employed as the medium in which the straw is disintegrated. Employing such weaker solution, it is advisable to raise somewhat the temperature of the solution. Fibers of high absorptive capactiy may be produced, for example, by treating, preferably beating, straw at a temperature of not more than about 50° C. in the presence of a solution containing about ten per cent of sodium carbonate based on the weight of the straw until the straw is reduced to fibers, or fibre aggregates, or by treating them in a solution containing 8 per cent of sodium carbonate based on the weight of the straw at temperatures up to about 80° C. It has been found that the subjection of fibrous material to the action of too strong a solution of alkali for too long a time will result in fibers of diminished absorptivity and hence is to be avoided.

For purposes of comparison there is given in the following table, the saturating capacity of (1) felt made by mixing absorptive straw fibres produced in accordance with this invention (tests numbered 1 to 5 in the following table) in the proportion of 75 per cent straw fibers to 25 per cent kraft pulp which is added to the beaten straw, and (2) felt made by mixing 25 per cent

kraft pulp with 75 per cent straw fibers produced from a like straw base but beaten at a higher temperature (test numbered 6 in the following table). In this table the figure for saturating capacity indicates the percentage increase in weight of the felt based on the dry weight thereof, due to absorption of kerosene by the felt upon subjection to the absorption test. The asphalt saturating capacity of the felt would ordinarily be found to be 25 per cent higher than the kerosene absorption figure given in the table, for example a felt having a kerosene absorption value of 169 would absorb approximately 210 per cent by weight of asphalt based on the dry weight of the felt.

Test No.	Ratio of chemical in beater to weight of straw	Temperature of solution in straw beater	Saturating capacity of the felt
		°C.	
1	8% of caustic soda	25	172
2	10% of sodium carbonate	45	170
3	8% of sodium carbonate	80	169
4	2% caustic soda mixed with 6% sodium carbonate.	45	201
5	2% caustic soda mixed with 8% sodium carbonate.	40	179
6	4% caustic soda	80	130

It will be noted from the above table that the treatment of straw with 4 per cent caustic soda at 80° C. resulted in straw fibers which, when admixed with kraft pulp, gave a materially less absorptive felt than those containing straw fibers beaten in a caustic soda solution maintained at a temperature of 25° C. or in a soda ash solution or a mixture of soda ash and caustic soda maintained at a temperature stated in the table.

It will be understood by those skilled in the art that the time of treating the straw, preferably by beating, will depend on many factors such as the strength of the alkaline solution in which the straw is beaten, the amount of the charge of straw introduced into the beater, the temperature of the solution, etc., and that the beating should be carried out until the fibers are disintegrated to the desired extent, which can be determined by inspecting and testing the fibers in the beater.

The absorptive fibers produced as hereinabove described may be blended with strength fibers in desired proportion as more fully disclosed in my copending application, and the resulting mixture of fibers formed into a felt sheet on a Fourdrinier or cylinder felt making machine.

It will be noted that in accordance with this invention highly absorptive fibers are produced by treating straw in a dilute alkaline solution, preferably by beating, at relatively low temperatures, i. e., temperatures of not more than about 50° C. in the case of caustic soda solution and 10 per cent or stronger solution of sodium carbonate, and up to 80° C. in the case of 8 per cent or weaker solutions of sodium carbonate, thereby avoiding the necessity of employing pressure cooking vessels heretofore used in the disintegration of straw. Furthermore, the process of this invention minimizes expense involved in treating straw in that lower temperatures are employed with consequent saving of heat.

This application is a continuation in part of my copending application Serial No. 86,098, filed February 4, 1926.

It is to be understood that the above description is to be interpreted as illustrative and not in a limiting sense and that this invention is not restricted to the present disclosure otherwise than as defined by the appended claims.

I claim:

1. The process of making impregnated building felt which comprises mechanically disintegrating cereal straw in substantially its natural condition in a solution of alkaline reagent selected from the group consisting of caustic soda and sodium carbonate maintained at a temperature of not more than about 50° C. to produce straw fibers of high absorptive capacity, felting said fibers to produce a flexible felt sheet containing the same, and impregnating said felt with waterproofing material.

2. The process of making impregnated building felt which comprises mechanically disintegrating cereal straw in substantially its natural condition in a dilute solution of caustic soda at a temperature of not more than about 50° C. to produce straw fibers of high absorptive capacity, felting said fibers to produce a flexible felt sheet containing the same, and impregnating said felt with waterproofing material.

3. The process of making impregnated building felt containing a substantial proportion of straw fibers of high absorptive capacity which comprises beating cereal straw in substantially its natural condition in a solution of caustic soda maintained at a temperature of about atmospheric to produce straw fibers of high absorptive capacity, felting said fibers to produce a flexible felt sheet containing the same, and impregnating said felt with bituminous waterproofing material.

4. The process of producing felt containing a substantial proportion of straw fibers of high absorptive capacity which comprises mechanically disintegrating cereal straw in substantially its natural condition in the presence of a solution containing about 10 per cent of sodium carbonate based on the weight of the straw at a temperature in the neighborhood of about 50° C. to produce straw fibers of high absorptive capacity, felting said fibers to produce a flexible felt sheet containing the same, and impregnating said felt with waterproofing material.

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