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# UNITED STATES PATENT OFFICE.

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## ABSORBENT SHEET MATERIAL.

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*To all whom it may concern:*

Be it known that I, ALBERT L. CLAPP, a citizen of the United States, residing at Marblehead, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Absorbent Sheet Materials, of which the following is a specification.

The object of this invention is to provide a suitable absorbent fibrous material for use in the manufacture of that prepared roofing and flooring, in which the porous sheet is impregnated or saturated with a waterproof composition, and usually coated with asphalt or pitch, and, in some cases, surfaced with crushed slate or other form of grit. In order that the fibrous material to be used for such purposes may be saturated, it must be open and porous, and, in addition, it must possess sufficient tensile strength to prevent its being torn or injured when passed through the saturating tank, the squeeze rolls and the various other instrumentalities which operate thereon in the manufacture of the finished roofing or flooring element.

Heretofore it has usually been customary to form the felt of a mixture of wool and cotton fibers, although various suggestions have been made for providing a sufficiently porous sheet by the use of leather fiber, waste paper, charcoal and the like, because of the scarcity or high cost of cotton or woolen rags. An attempt to use waste paper —"news" or "mixed"—with rag fiber, except in very small proportions, has not heretofore been practically successful, because its use in large proportions prevents or destroys the requisite porosity of the felt, even though such fillers as charcoal, sawdust or the like are employed.

I have discovered that a roofing felt of the desired porosity can be produced from various cellulose or other fibers, provided kieselguhr is thoroughly beaten into the pulp prior to the formation of the sheet, and that by the use of this substance it is possible to produce a satisfactory sheet even though a very large proportion of waste paper is employed in its manufacture. If the waste paper is used, it is desirable, for the purpose of obtaining a sheet of the necessary tensile strength, to employ some strengthening fiber or fibrous material.

In carrying out my invention, I may employ, for example: 250 parts of "news" and "mixed" paper; 250 parts of sulphite screenings (i. e. relatively coarse cellulose fiber produced from chips of wood by digestion with calcium bisulphite); and 150 parts of kieselguhr.

These are loaded into a beater engine with sufficient water to allow for a proper circulation and are subjected to a beating operation until the mass is formed into a pulp of the desired density or viscosity. A short time only—say 15 to 20 minutes—is required for this operation, as the paper fiber, especially news, and sulphite fiber disintegrate readily. Hence, with the materials stated, much less power and time are required for the beating of the stock than are required when rags, bagging and the like are employed in the manufacture of the felt. After the pulp has been prepared, as described, it is formed into a web or sheet of the desired thickness by the usual machinery employed in the manufacture of roofing felt.

Felt thus formed from the materials stated, has, because of the use of sulphite screenings, the necessary tensile strength to withstand the treatment to which it is subjected in the manufacture of roofing or flooring, and, because of the use of kieselguhr, is very porous and highly absorbent, due in part to the fact that kieselguhr itself has a light porous cellular structure and is capable of absorbing and carrying the saturating materials. If the sheet were formed without the kieselguhr, it would be wholly unsuitable for use as a roofing felt as it would be too hard and dense, due to the fact that the fibers mat too closely together, to permit the molten asphaltic or bituminous compounds to penetrate or saturate it. When kieselguhr, in approximately the proportion stated, is employed, a felt or felt-like material is produced which is so porous and absorbent that it may be saturated with the molten compounds more easily and more rapidly than has heretofore been practicable. Such sheet material, because of the large proportion of waste paper used in its manufacture, and of the small expenditure of time and power to beat out the pulp, is most economical to produce, and yet has, in addition, the optimum qualities of a high grade roofing felt. I regard the use of sulphite screenings in connection with paper as desirable, although, so far as I am aware, this

material has not been used in the manufacture of roofing felt, because the tendency of the fibers is to mat into a dense mass, and a felt formed thereof would be of such close texture that it would not absorb the saturating compounds.

I should not regard it as a departure from the invention as set forth in the claims if other fibrous materials were substituted for the waste paper or for the sulphite screenings. For example, though I do not regard it as necessary, one may substitute cotton or other rags for the paper, or for the sulphite screenings, in loading the beater. In fact, one may employ otherwise suitable materials which mat closely together, and which, because of the tendency of the fibers to form a dense and relatively impenetrable mass, have heretofore been regarded as practically impossible of use for the purpose. In addition to the fact that kieselguhr, because of its structure and capacity, is able to absorb or retain a large amount of the saturating compound, I have discovered that it possesses the decided advantage of interlocking with the fibers of the sheet so that it is retained therein. It possesses a great advantage over charcoal, sawdust or other organic fillers, since, being fireproof, it removes the fire hazard incident to their storage and use, as it will be remembered that such materials are subject to spontaneous combustion under certain conditions.

Having prepared a fibrous porous absorbent sheet as herein described, it is ready for manufacture into prepared roofing or flooring. The sheet is fed rapidly through a bath of molten asphalt, pitch or resinous or hydrocarbon or other suitable waterproof compound, and, after the excess or surplus compound is removed by squeeze rolls, a layer of higher-melting-point pitch or asphalt in a molten or plastic state is applied to one or both faces of the sheet. Grit, if desired, may then be applied to the sheet and partially embedded in the plastic coating thereof, either in plain colors or in designs of different colors. A decided advantage is attained, to wit, that a sheet of felt, as herein described, of a given weight will absorb and retain a greater weight of saturating compound than has heretofore been practicable with commercial roofing felts. Hence the weight of the ultimate product, with a felt of a given weight is greater than has hitherto been regarded as practical, thus effecting a decided saving in the manufacture of the roofing and at the same time improving the quality of the product.

While the especial object of the invention, as hereinbefore stated, is the production of a roofing felt, I have found that porous sheet material produced as herein described is capable of other application in the arts. For example, I have discovered that, by using only the waste paper (news paper, preferably) and kieselghur, I am able to produce a blotting paper of very good grade. If a greater strength is desired, I may add bleached sulphite fiber. A high grade blotting paper may thus be produced, by beating to the desired consistency, 240 parts of news paper, 150 parts of sulphite fiber, and 150 parts of kieselguhr. It will be understood, of course, that the resulting pulp may be colored to the desired shade during or after the beating operation. The advantage in thus producing a blotting paper is that less time and expense are consumed than where the paper is made as heretofore from rag stock.

Having thus explained the nature of my said invention and described a way of making and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. A porous absorbent sheet of roofing felt, consisting of the fibers of "news" and chemical wood pulp, and an initially porous absorbent fireproof filler, all in intimate admixture.

2. A porous absorbent roofing felt, consisting of paper fiber and an initially porous absorbent fireproof filler, all in intimate relation in a felted sheet.

3. A porous absorbent roofing felt, consisting of paper fiber and kieselguhr, all in intimate relation in a felted sheet.

In testimony whereof I have affixed by signature.

ALBERT L. CLAPP.