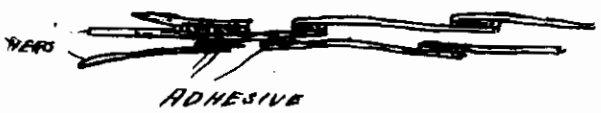
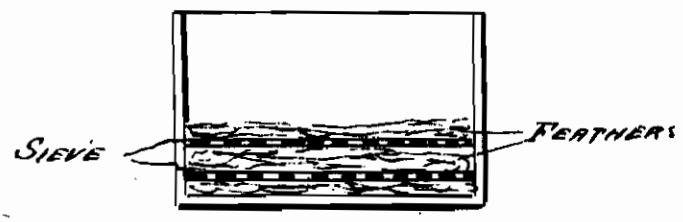
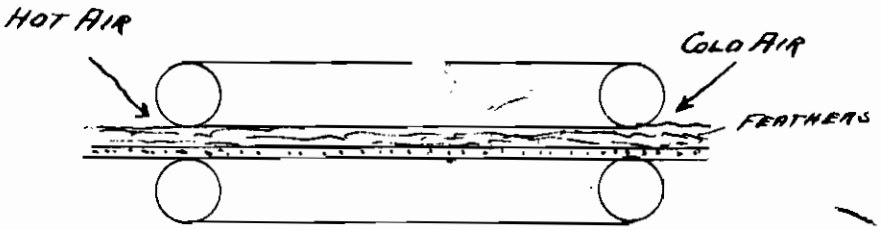
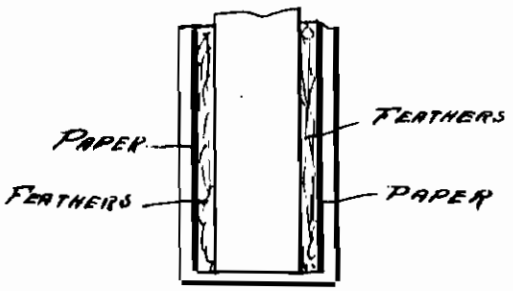
S. DUNAY
FEATHERDOWN FELT AND METHODS OF MANUFACTURING THE SAME
Filed April 9, 1936

Serial No.
73,578









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Published June 22, 1943

Serial No. 73,578

ALIEN PROPERTY CUSTODIAN

FEATHERDOWN FELT AND METHODS OF MANUFACTURING THE SAME

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Application filed April 9, 1936

The invention consists in a coherent structure of feathers and/or down, which may be termed a "featherdown felt," the fibres of the featherdown particles not being matted together but held together by an adhesive at the crossing points of the fibres of the featherdown particles which are in loose contact with one another.

By "featherdown particles" is meant either comparatively small bird feathers which have no quill at all (i. e. the underfeathers or actual down), or feathers which only have a thin quill (smaller coverts). For quite fine, flexible goods, feathers of the firstmentioned type alone may be used, and, for coarser goods, a mixture of both types of feathers may be used, while for quite coarse goods, for instance, chair stuffings, the second type of feathers alone may be used.

The adhesive may be applied to the featherdown particles in a non-solid condition and subsequently hardened. To this end, the adhesive may be kept suspended in a closed chamber in a finely-atomised liquid condition, like a mist, and the featherdown particles then introduced, on which the minute drops of the adhesive settle. The quantity of the atomised adhesive must not be so great that it moistens the featherdown particles to such an extent that the latter collapse, but must be sufficient to unite the featherdown particles at the crossing points of their fibres.

The atomising chamber is preferably provided with sieve inserts at the level of the bottom and the roof thereof respectively. The atomisation of the adhesive and the introduction of the featherdown particles are effected in the space between the sieve inserts. After the featherdown particles have settled on the bottom sieve insert, the upper sieve insert is lowered until the featherdown mass between the sieve inserts has acquired the desired layer thickness. The adhesive is then hardened.

The means employed for hardening the adhesive depend on its nature. If, for instance, glue is used for sticking the featherdown particles together, a glue solution is employed which is liquid at elevated temperature but solid at room temperature, and, before atomisation, the air in the atomising chamber is heated to a temperature at which the glue solution remains liquid. The air must contain sufficient moisture to prevent the glue droplets from drying up. For the purpose of hardening the glue solution, cold air is allowed to pass through the featherdown layer enclosed between the sieve inserts.

Alternatively, if a solution of an adhesive in an easily volatile solvent is used, the mode of procedure is similar, but the heating of the air saturated with the solvent vapours in the atomising chamber is dispensed with, the hardening of the adhesive being effected by evaporating the solvent by means of a warm air current. However, as a further alternative, a liquid adhesive may be used which is hardened by a simple increase in temperature, even without evaporation of the solvent, for instance, a rubber milk sensitive to temperature, which is brought into contact with the featherdown particles in an atomised condition and coagulated by means of hot air.

The use of liquid adhesives is attended with difficulties owing to the great sensitivity of the featherdown particles towards liquids. For the practical manufacture of the featherdown felt, therefore, it is considerably more suitable to apply to the featherdown particles adhesives which are solid at ordinary temperature and fusible by increasing the temperature, e. g., resins in a finely-powdered solid condition. This can be very simply accomplished by thoroughly mixing the featherdown particles with the finely-powdered solid adhesive, for instance, colophony, in mixing drums. The featherdown particles weighted with the adhesive dust do not fly like the unweighted particles and, therefore, can easily be treated in order to bring them into the particular form in which they are to be fashioned into a felt, by heating to a temperature above the melting point of the adhesive and subsequently cooling.

For producing felts of particular shape, such as prismatic or cylindrical felts, the featherdown particles mixed with the adhesive dust are introduced into a prismatic, cylindrical or other mould which determines the shape of the felt and are compressed to the desired layer thickness by means of a die which is movable in the mould in the fashion of a piston. The mould is then heated in a furnace to a temperature above the melting point of the adhesive and then allowed to cool down. Owing to the extremely bad thermal conductivity of the featherdown and because excessive heating thereof must be avoided, heating and cooling take a comparatively long time, particularly in the case of large layer thicknesses. Therefore, it is preferable to employ moulds with permeable walls and to effect the heating and cooling by passing through warm air and then cold air. In this manner, the heating and cooling can be quickly effected.

By a method similar to that just described, endless lengths of felt can also be continuously

produced. To this end, the mixture of featherdown particles and adhesive dust is introduced between parallel parts of two endless bands made of a permeable material, such as textile material, which are guided parallel at a distance apart which determines the thickness of the length of felt to be produced. At the parallel parts, first a heated air current and then a cold air current are successively passed through the moving conveyor bands and the featherdown layer therebetween.

The quantity of adhesive to be employed depends on its nature and the required strength of cohesion between the featherdown particles. When using colophony dust, for instance, good results are obtainable if the quantity of colophony amounts to 50–100% by weight of the quantity of the featherdown.

The compactness of the featherdown felt depends on the pressure to which the mixture of featherdown particles and adhesive is subjected during shaping by hardening, or melting and hardening, of the adhesive. If this pressure is quite small, an extremely loose, but nevertheless shape-retaining, coherent featherdown mass is obtained. This mass is extremely submissive to pressure, but is so resilient that the felt resumes its original shape on removal of the pressure.

The featherdown felt, particularly where continuous lengths of felt are concerned, may have a layer or skin of textile material, paper or other suitable material stuck onto one or both of its sides. This layer serves not only for increasing the strength of the featherdown felt and for protecting it, but also serves for preventing adhesion of the featherdown felt to the walls of the mould during shaping. To this end, when making continuous lengths of felt, the conveyor bands, which effect the shaping of the lengths, simultaneously form the permanent facing of the felt. Similarly, the closed cylindrical or other moulds may also be lined with paper, textile material or any other suitable material, before introducing the mixture of featherdown particles and adhesive dust, such lining being stuck to the featherdown felt during the melting of the adhesive dust and removed together with the felt from the mould. In complicated moulds, the lining or skin may be formed, for instance from a layer of a cellulose derivative which may be applied as a solution, e. g., by spraying, to the inner wall of the mould, which is greased for the purpose of preventing adhesion.

Featherdown felt possesses, for quite a small specific weight per unit volume, excellent heat and sound insulating qualities, and has the advantage over loose featherdown that it is capable of retaining its shape. Consequently, its practical uses are extremely numerous. For instance, it can be used as a filling for quilts or cushions and it has the advantage over loose featherdown that the featherdown particles permanently retain their original relative positions, that is, they neither agglomerate nor gradually collapse. For the same reason, the featherdown felt is suitable as a warm lining for articles of clothing. Thinner layers of the featherdown felt can be employed not only as a lining for clothes, but also as sound insulation, for instance, for telephone kiosks, and for sound damping, for instance, in radio broadcasting studios. Owing to its high permeability to gases and its good filtering properties, the featherdown felt is also suitable as a gas filter, for instance, for keeping away dust and smoke e. g. as an air filter for internal combustion engines and as a smoke filter in cigarette tips or in gas masks. When using the featherdown felt for filtering purposes, the additional materials which are usual in gas or smoke filters may also be added to the featherdown particles simultaneously with the admixing of the adhesive.

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