

July 4, 1933.

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1,917,168

PROCESS FOR TREATING FIBROUS MATERIAL

Filed Jan. 18, 1929

FIG. 1.

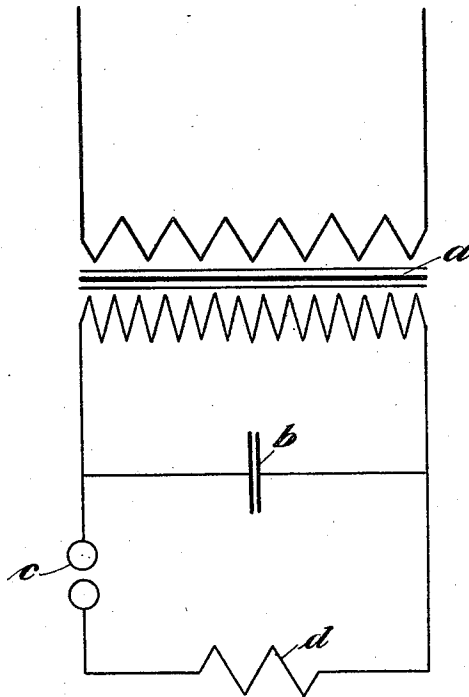
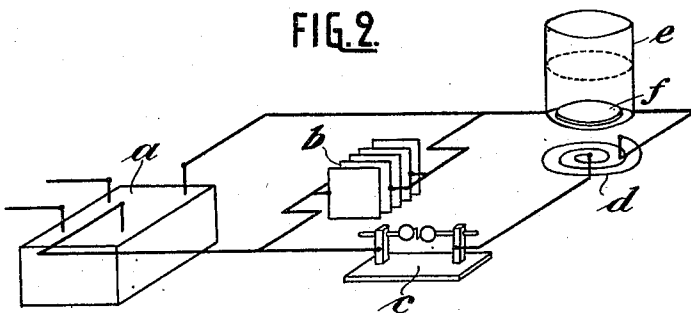


FIG. 2.



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PROCESS FOR TREATING FIBROUS MATERIAL

Application filed January 18, 1929, Serial No. 333,486, and in Germany January 18, 1928.

My invention relates to a process by which fibres and fibrous material, of any kind, whether of animal or vegetable origin, or the products thereof can be separated, opened and cleansed, and fat, oil or pectin removed therefrom by treating them with water in a high-frequency magnetic field for a sufficient length of time. Heretofore the cleansing and dissolving steps could only be effected by chemical or mechanical means. By the process of my invention the fibres or fibrous material can not only be opened and cleansed or extracted but at the same time bleached or dyed without being damaged. Under the influence of the high-frequency magnetic field, produced in any known manner, the operation is effected within the shortest possible time and in the most simple manner.

The influence of the high-frequency magnetic field is very peculiar. The fibrous material, for instance wool, silk, hemp, flax, cotton, ramie, jute, straw, cane, reed, bark, bones, wood etc. is put into a pot or vessel, permeable to electric oscillations and waves, consisting for instance of insulating material, such as glass or earthen ware or other ceramic material filled with water, which pot or vessel is then placed within a flat or spiral coil through which a high-frequency current is passed. Within a very short time the fats in the fibres are broken down and the fibres opened and can be used directly for spinning. If water alone is used, the fats and oils are recovered, but if for instance water containing an alkaline lye is used, the fats and oils will be saponified. In this case the fibres or spun yarns, woven cloths or textile fabrics of any kind can be easily washed. The pectins of the fibres can either be separated entirely by this process or only to a certain degree and can be used later on for stiffening and finishing purposes. If wood is treated in such high-frequency magnetic field the cellulose therein may quickly be obtained.

In the same way fresh green vegetables can be prepared for food; also meat and fishes can be treated as well as fruits, nuts, etc. Tea, cocoa or coffee may also be extracted by this process.

The fibrous material or the products obtained therefrom can be dyed by the same process, the color entering into the cells of the cellulose; the pigment thus introduced cannot be eliminated by washing. For dyeing the fibrous material, the dye is dissolved

in the water in which the material is submerged during treatment.

The degree of separation of the fibres will depend upon the time which the fibres are left in the high-frequency magnetic field. After a certain time the fibres are dissolved entirely and arrived at a colloidal state.

In order to dry the cleaned fibres or the fibrous material or their products, same are treated in a similar way. The wet fibres, yarn, textile fabric, or cloth or the like are placed in the vessel of insulating material above a small quantity of mineral oil sufficient to cover a metal plate on the bottom of the vessel. The high-frequency current will instantly induce Foucault or eddy currents in the metal plate and quickly heat it, so that the oil is brought to a higher temperature than the water which is present in the fibres. The overheated oil gases replace the water in the fibres, thus drying and giving same a soft good finish.

The apparatus which may be used in carrying out my process is shown by way of example in the drawing though other arrangements may be used.

According to the Fig. 1 a transformer *a* of usual voltage and cycles produces a high-voltage-current (of 3000-5000 volts, average) across the parallel condenser *b* and the spark gap *c* through the flat coil *d*. The magnetic high-frequency field around this flat coil extends into the contents of a pot *e* of insulating material which is placed on the coil *d*.

Fig. 2 shows diagrammatically an arrangement of the apparatus. On the bottom of the pot or vessel *e* I place a flat metal plate *f* to secure a good contraction of the magnetic lines and to absorb the Foucault or eddy currents.

Instead of the flat coil *d* a cylindrical or spiral coil may be used to produce the same effect, within which the pot or vessel *e* is placed. The current frequencies will be varied in any desired manner according to the purpose to be attained, and same may rise to or above 1,500,000 oscillations per second.

If textile fibres are to be split and the fats broken down the process is worked as follows:

The raw fibre is submerged in water contained in a vessel of glass and the vessel then placed within a spiral or other coil, carrying a high-frequency current, and left there

for some time. The separated fat or oil settles on the surface of the water and is removed in the ordinary manner.

The temperature at which the fibrous material is treated is low and varies of course according to the nature of the fibres or fibrous material being treated and at all events does not rise to a boiling temperature or a temperature which would injure the fibres.

If instead of water an alkaline lye, for instance a solution of caustic soda, is employed, and a solution of soap is immediately produced with strong foaming, which soap can be washed out later with ease, leaving perfectly de-fatted fibres.

The raw fibre is split simultaneously into its ultimate and finest single fibres without requiring any kind of mechanical manipulation. It is thus possible to produce from any kind of raw fibres, (hemp, flax, cotton, jute, animal-wool, silk) finer yarns of very high tensile strength by means of a most simple process.

The fats in the fibres need not be entirely removed in case this should not be required for certain reason. The same applies to the splitting of the fibres particularly if the fibres are spun and woven. This is of importance if the process be used for removing fats and cleansing textile fibres, knit-goods, rope-makers products, felts, nets, laces, silk-cocoons, and in fact spun and woven textiles generally. In this case the fibre itself must suffer no injury.

The process itself is the same as stated above.

In some cases it is expedient to employ water in which acids such as sulfuric acid or muriatic acid, or salts such as sulphates or chlorides have been dissolved.

If the fibrous material or the textile fabric is to be dyed at the same time the process is varied as shown in the following example for jute:

An aqueous soap solution is first prepared to which a dye soluble in water is added. The glass vessel is about half filled with this liquid and a perforated metal plate, preferably of iron, may be placed on the bottom of said vessel. Raw jute is then immersed in the liquid, whereupon the vessel is placed on a flat metal, spiral, or in a metal coil. The coil, or the spiral, is then connected with a source of high-frequency current. The gums are dissolved by reason of the foaming after a short period, and the fibre dyed in grain. The dye quickly penetrates into the cells, even such colors as usually only color the surface.

If opened fibre is dyed, i. e., fibre from which the gums have already been removed, it is not necessary to add soap or other solvents. It is however practical to add during dyeing a very small quantity of Turkey red oil.

It is understood that such colors must be selected which are suitable for the respective fibres.

If vegetables such as peas, beans, spinach, cabbage, turnips, etc. containing more or less fibres and means (consisting of animal fibres) are placed in water and exposed to the influence of the high-frequency magnetic field, under addition of soda and common salt, they will be rendered perfectly soft after a few minutes, and if the influence of the magnetic field is continued long enough, vegetable and meat juices are obtained, which can easily be digested by the human or animal stomach.

Coffee, cocoa, or tea extracts can be produced by the same process, as they likewise contain vegetable fibres.

Fruit and produce, as well as fodder and bones, can be opened within the shortest possible time. Oil, fat and glue can easily be recovered from bones. The raw materials of the sugar industry, such as sugar-beets and sugar-cane can be opened in this way and the sugar easily obtained.

I claim:

1. A process for separating and bleaching the fibres of fibrous material containing fats and oils consisting in immersing the fibrous material in a vessel permeable to magnetic waves containing water having a slight electrical conductivity; then placing the vessel in a high-frequency magnetic field until the fats and oils are broken down and the fibres separated, and removing the fibres from the vessel and drying the same.

2. In a process as set forth in claim 1, adding an aqueous solution of dye to the water to color the fibres.

3. In a process as set forth in claim 1, recovering the fats and oils by removing same from the surface of the water.

4. In a process as set forth in claim 1, adding an alkaline lye to the water whereby the fats and oils will be saponified.

5. In a process as set forth in claim 1, the drying operation consisting in placing the bleached fibres in said vessel containing a small quantity of mineral oil, and subjecting the vessel to the influence of said magnetic field to vaporize the oil.

6. In a process as set forth in claim 1, maintaining the temperature of the water below that which would injure the fibres.

7. In a process as set forth in claim 1, adding chemicals to the water to increase its conductivity.

8. In a process as set forth in claim 1, adding an aqueous soap solution to the water and a dye soluble in water to dissolve the fats by the foaming of the soap and to simultaneously dye the separated fibres.

In testimony whereof I affix my signature.

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