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PROCESSING METHYL CELLULOSE AND
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decree of distribution, to Inez M. AbbottNo Drawing. Application August 16, 1947,
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My invention relates to a process of treating methylcellulose and the products thereof.

More particularly, my invention includes the dispersing or dividing of methylcellulose. Methylcellulose disperses very slowly in a liquid, and in accordance with prior art practices, the residue becomes a tough, membranous mass upon evaporation of the liquid used during dispersion.

It is the object of my invention to provide an absorbent material which includes therein methylcellulose in a condition to rapidly absorb various liquids.

As an illustration of my invention, but not as a limitation thereof, except where required by the appended claims, the invention will be described in connection with the preparation of surgical dressings, fabrics, tissues and the like, which include methylcellulose, or the fibers or fibrils thereof, in an open or divided state.

It is the object of my invention to provide a process for the opening up or dividing of methylcellulose, or the fibers or fibrils thereof, in a liquid and for the recovering or maintaining the same in an open or divided state.

I have found that methylcellulose treated in accordance with my process has a greater capacity for absorbing liquids and at the same time has a more rapid rate of absorption than methylcellulose in the state or condition heretofore available.

Another particular characteristic of methylcellulose treated in accordance with my invention is that it rapidly combines with liquids to form a gel, which liquids include body fluids and body exudates. This particular characteristic of the product of my process makes the product especially useful in medical dressings. These medical dressings may include other carrier means or the methylcellulose may function as the surgical dressing. One of the forms of surgical dressings made in accordance with my invention is a powdery or fiber-like material which may be applied directly to burns or wounds in first aid or in subsequent treatment thereof. Another form thereof is where such product is incorporated in a dressing or used to absorb drainage. For example, it may be employed in connection with a tapped, infected lung, osteomyelitis and other types of infection where we have a leakage of body fluids which are desired to be absorbed.

In the prior art treatment of burns, tissues form on the surface and are known as an eschar. This eschar is a layer of consolidated body exudates and dead tissue. Often under the

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eschar, bacteria develop and are protected before detection thereof, and before proper medicaments are disposed in reacting relation therewith.

One of the objects of this invention is to provide a medicated methylcellulose dressing made in accordance with my invention and which will function to supplant or take the place of the eschar and will further function to absorb the body exudates and thus permit the body tissues to heal in the absence of a true eschar.

In accordance with one presently accepted practice for the treatment of burns, a solution of tannic acid or a solution of silver nitrate is applied, or they are consecutively applied. With this treatment, a tough, leathery-like coating or eschar develops and often bacteria develop under the surface of this eschar. With the use of products of my invention, a relatively thin and soft protective layer may be formed, but it is of a character to absorb body exudates. Also, products of my invention comprise included medicaments disposed to readily react with injured tissues. Thus, I am able to obtain not only the effect of the medicaments, but to provide an excluding layer which assists in preventing bacterial development.

It is a characteristic of the product of my invention that it is substantially inert to usual medicaments and body fluids, and thus is not conducive to complications or reactions, and has the physical characteristic of bringing about absorption of body exudates and providing a protective envelope. The product of my invention is not only inert, non-toxic, and non-irritating to burns, wounds or body tissues but has other desired properties. These include absorption properties, ability to hold medicaments in a well divided state and to effectively release the medicaments upon wetting of the product, ability to gel, and to form a protective envelope.

Methylcellulose is readily obtained commercially and is generally sold in types having different viscosities. For example, Dow Chemical Company sells methylcellulose under the trade name of "Methocel" and it is available on the market in several viscosities or types, as: 12, 25, 100, 400, 1500 and 4000 centipoises. The literature of Dow Chemical Company states that "Methocel" is synthesized from highly purified cellulose by interaction with caustic soda and methyl chloride, and that "Methocel" pharmaceutical grade is neutral, odorless, tasteless and completely inert. In my invention, I may use methylcellulose regardless of its viscosity in appropriate formulas.

In my invention I first subject methylcellulose

to what I will term a primary treating solution, or an organic dispersing agent. This solution functions as a dispersing and probably as a swelling agent and opens up or divides the methylcellulose, or the fibers or fibrils thereof. Preferably, I employ pharmaceutical grade methylcellulose either as obtained on the market or after the same has been mechanically sub-divided as by treatment in a hammer mill.

The said primary treating solutions comprise chloroform, methylene chloride, ethyl acetate, methyl acetate, methyl lactate, ethyl lactate, lactic acid, or a combination of such agents. Preferably, there is also present a small quantity of water as apparently water present in small quantities aids in the primary treatment. I have found that where I treat methylcellulose with such a primary treating solution, there is swelling, dividing or opening up of the methylcellulose, or the fibers or fibrils thereof. However, if methylcellulose is subjected to the action of my primary treating solution and then the volatiles are evaporated, I find that the residue is a harsh, tough and membranous mass and is no more suited to the objects of my invention than the original methylcellulose. While I have set forth typical examples of solutions which may function as my primary treating solution, it is to be expressly understood that I am not limited thereto and may employ solutions which will provide the same results to varying degrees. In selecting such primary treating solutions, I have selected those having relatively low boiling points so that the solutions selected as secondary treating solutions may have boiling points which are not too high. In this respect the secondary treating solution will always have a higher boiling point than the primary treating solution. Also, the primary treating solution must have the action on the methylcellulose, or fibers or fibrils thereof as above stated.

The step of expanding the methylcellulose, or the fibers or fibrils thereof, is followed by a second step or treatment with what I term a secondary treating solution, or an organic dispersing agent, to retain the methylcellulose, or the fibers or fibrils thereof in a divided or opened state. The secondary treating solution, or organic dispersing agent, must be miscible to the primary treating solution.

While the secondary treatment has for its purpose the maintaining of the said divided state, yet most of the agents I have employed provide a further dividing or opening up of the methylcellulose in this secondary step. Some of the agents employed in this secondary step include fractional distillates of petroleum. The boiling point thereof must be higher than the boiling point of the primary treating solution. Thus, fractional petroleum distillates having a boiling point in the range of 40° C. to 180° C., will be within the range of my invention as secondary treating solutions and the particular one selected in a given case must be selected in accordance with the boiling point of the primary treating solution. Other secondary treating solutions which I have employed include coal tar distillates comprising benzene, toluene, and dimethyl benzene.

In my invention, I disperse the methylcellulose in the primary treating solution and cause a dividing or opening up of the methylcellulose, or its fibers or fibrils. Then in the presence of a secondary treating solution having a boiling point of approximately 15° above the boiling point of

the primary treating solution, I remove the primary treating solution and then finally recover the divided methylcellulose from the secondary treating solution. One way of expressing the matter is that I have discovered that I can recover the divided methylcellulose when substantially in the presence of a secondary treating solution without causing the methylcellulose to coalesce into a tough, membranous mass. When an attempt was made to recover the divided methylcellulose from the primary treating solution, it was found that the residue was a tough membranous mass. By providing a minimum difference in boiling points between the primary treating solution and the secondary treating solution of substantially 15° C., then substantially all recovery of the divided methylcellulose will be made after the primary treating solution has been driven off and the ill effects of the primary treating agent, if used alone (for example, providing a tough membranous residue), will be eliminated.

As the recovered, divided methylcellulose of my invention is inert, its value for medicinal purposes may be augmented when medicaments are added thereto. My preferable method of adding medicaments to the divided methylcellulose of this invention is to add the medicaments when the primary and secondary treating solutions are present. When the methylcellulose is in the presence of the primary and secondary treating solutions, it has reached substantially its greatest state of dispersion and obviously at such time better dispersion of the medicaments will obtain, thus providing a better and more uniform product. The medicaments to be added must be at least dispersible in the treating solutions and thus the treating solutions function to provide more complete dispersion of the medicaments in the methylcellulose.

Previously, I stated that there should be substantially a minimum of approximately 15° C. variation in the boiling points between the primary and secondary treating solutions to insure that the final recovery of the divided methylcellulose would be from the secondary treating solution. This of course included the premise that the volumes of treating solutions would be in the range of the minimum volumes required. I have found that practical results obtain under such conditions when this variation is reduced to very slight differences but this requires more exacting technique. If a very substantial excess of the secondary treating solution is employed, the difference need be only a few degrees. As to the maximum variation between the boiling points of the primary and secondary treating solutions, I find no need to extend this beyond 20° C. to get consecutive removal of the treating solutions, and if further extended, I find two adverse results. First, there is a waste of energy and second, there will be a limiting of the types of medicaments which can be included, as fractions of the same may distill off with the inherently higher temperatures which must be maintained in the final recovery of the divided methylcellulose and medicaments from the secondary treating solution. Of course, if the recovery of the divided methylcellulose is made at atmospheric pressure, we may have not only fractional distillation of medicaments, but may have damage to the medicaments caused by heat. Obviously, if recovery of the divided methylcellulose and the included medicaments is made at sub-atmospheric pressures, lower temperatures may be employed with less heat damage to the medicaments.

The medicaments, which can be incorporated in the divided methylcellulose of my invention when both the primary and secondary treating solutions are present, will of course be those which are not adversely affected by such treating solutions. Due to the nature of the primary and secondary treating solutions, they will not form any substantial limiting factor as to the medicaments which may be employed. They are very stable chemical compounds and have little or no reaction with medicaments commonly employed in medical dressings. Of course, the medicaments commonly employed should be those which can be dissolved or at least dispersed in treating solutions to obtain the desired dispersion in the end product. Thus the medicaments should be added at least at no later stage than when some of the secondary treating solution is present and preferably when both treating solutions are present. While the medicaments can be added to the end product, this is not preferable as the dispersion thereof will not be as complete.

Preferably, I include a surface active agent, of either the cation or anion active class, in products embodying my invention which are designed for medical uses as such agents augment the wetting action of the compounds by either water or body exudates. A typical agent is dioctyl sodium sulfa succinate, commonly sold as "OT 100."

Typical medicaments which may be added to the divided methylcellulose of my invention and their properties therein comprise: glycerol, it is hygroscopic, it is a plasticizer forming a tougher and softer protective coating, it is a dispersing agent for many medicaments, and is anti-bacterial; polyethylene glycol, it is soluble in both oil and water and functions as a dispersing agent for other medicaments; boric acid; sulfa compounds, as sulfanilamide, sulfathiazole, sulfa-pyridine, etc.; merthiolate; mercurochrome; hexylresorcinol; dyes, as azo dyes, acridine dyes, fluorescein dyes, rosiline dyes, phenolphthalein dyes, and miscellaneous dyes; local and topical anaesthetics; digestants, as pancreatin, pepsin, bromelin and papain; antibiotic substances, as penicillin and salts thereof, gramicidin and salts thereof, tyrothricin and salts thereof, streptomycin and salts thereof, and subtilin and salts thereof; and cell proliferants, as allantoin, urea, uric acid, and chlorophyll. These are only examples and the medicaments are not limited thereto.

In order that the practicing of my invention may be better explained and illustrated, I will set forth a number of examples with proportions and with summary results, but it is to be understood that such examples are not a limitation of my invention except when required by the appended claims and are to be considered illustrative.

Example 1

Methylcellulose, 4000 centipoises	gms.	2.5
Activated charcoal	gm.	.1
Chloroform	c. c.	40
Petroleum distillate, B. P. 77° C. to 110° C.	c. c.	40

Chloroform was employed as the primary treating solution and the methylcellulose was placed therein. The petroleum distillate was employed as the secondary treating solution. As indicative of one medicament, activated charcoal was employed and its chief characteristic was that of absorbing odors. After the addition of

the secondary treating solution, the mixture was heated ten minutes at 130° C. The chloroform, due to its lower boiling point, was first driven off and finally the petroleum distillate was driven off. The residue remaining was in the nature of a soft felt-like pad. It was used as a surface coating on a gauze bandage and the gauze side of the bandage was placed in closed proximity to the wound of an ulcer case. The product readily gelled on the surface of the gauze bandage and functioned as a carrier for the charcoal, and in turn the charcoal tended to absorb body odors.

In examples hereinafter given, the centipoise of the methylcellulose employed will be abbreviated to c. p. Also, the details of the action of the primary treating solution and the secondary treating solution will be somewhat abbreviated but the nature of each will be generally indicated. Also, the petroleum distillate which was used in the following examples had a boiling point of 77° C. to 110° C. unless otherwise indicated.

Example 2

Methylcellulose, 4000 cp.	gms.	2.5
Glycerol	gm.	0.5
Ethyl cellulose (19% sol. in chloroform)	gms.	2
Chloroform	c. c.	30
Petroleum distillate	c. c.	35

The chloroform was used as the primary treating solution and the methylcellulose and ethyl cellulose solution was placed therein. The said agents were allowed to remain in contact for about thirty minutes and with agitation and the dispersion appeared complete. The petroleum distillate was added as the secondary treating solution. The dispersion was filtered and the treating solutions were partly removed by filtration. Then after air drying and finally by heating for ten minutes at a temperature of 100° C. to remove traces of petroleum distillate, a final product was obtained which was a compact and coherent pad. It was not too friable and was slow to absorb water. It was a useful product but not a preferred form. The ethyl cellulose functioned as a binder to hold the end product in a form retaining pad.

Example 3

Methylcellulose, 4000 cp.	gms.	10
Activated charcoal	gms.	7
Ethyl cellulose (10% sol. in chloroform)	gms.	1
Chloroform	c. c.	160
Petroleum distillate	c. c.	120

The chloroform was employed as the primary treating solution and the methylcellulose and ethyl cellulose solution were placed therein. The activated charcoal was added and well dispersed. Petroleum distillate was added as the secondary treating solution. The material was removed to a form and air dried and then heated to 100° C. to remove traces of the petroleum distillate. This material formed a compact pad which did not absorb water readily but which, because of the presence of activated charcoal, readily absorbed noxious odors from putrescent wounds.

Example 4

Methylcellulose, 4000 cp.	gms.	30
Glycerol	gms.	3
OT 100	gms.	.3
Chloroform	c. c.	480
Petroleum distillate	c. c.	360

Chloroform was used as the primary treating solution and the methylcellulose was placed therein. The glycerol was added to the mixture. The OT 100 had been previously dissolved in the chloroform. The petroleum distillate was used as the secondary treating solution. The mixture was poured into a form and partly dried by filtration and then dried by applying heat at 100° C. This material formed pads or dressings which were rather slow to absorb water. Their texture was not as soft or fluffy as other examples of my invention.

Example 5

Methylcellulose, 4000 cp-----	gms--	30
Glycerol -----	gms--	7.5
Boric acid-----	gms--	3
OT 100-----	gms--	.06
Chloroform -----	c. c--	450
Petroleum distillate-----	c. c--	500

Chloroform in which the OT 100 had been dissolved was used as the primary treating solution and the methylcellulose was placed therein. The boric acid was triturated with the glycerol and added to the above mixture. Petroleum distillate was used as the secondary treating solution. The mixture was poured out in forms and a portion of the treating solutions were removed by filtration. The material was then divided and one portion permitted to air dry to complete removal of the treating solutions. The second portion was dried at a temperature of 90° C. No difference was noted in the final resulting material. The material was readily teased apart by means of a wool card. This final material was a fine powdery fluff. It wet slowly with water.

It will be noted that heretofore a portion of the treating solutions were removed by filtration, and a final treatment by air drying or by treating with heat. This resulted in a partial loss of medicaments. Hereafter all treatments will be by partial removal of treating solutions by vacuum and the removal of final traces of treating solutions by heat.

Example 6

Methylcellulose, 4000 cp-----	gms--	30
Glycerol -----	gms--	7.5
Boric acid-----	gms--	3
OT 100-----	gms--	.3
Chloroform -----	c. c--	400
Petroleum distillate-----	c. c--	400

The chloroform, in which had been previously dissolved the OT 100, was used as the primary treating solution. The boric acid was triturated in the glycerol and the mixture added to the dispersed methylcellulose in the chloroform. The petroleum distillate, which was used as the secondary treating solution, was added and the mass thoroughly mixed by stirring. The mixture was subjected to the heat of boiling water and a vacuum applied. The treating solutions were recovered, fractionated and reused. The final traces of the treating solutions were removed by subjecting the resulting material to a heat of 95° C. After a complete drying, the material was teased apart by means of wool cards. The material was a soft, fluffy mass. This material was divided into ten gram portions which were enclosed in gauze to form a medical dressing. The material was readily wet by water. A clinical test was made and the attending nurse reported that said dressings were: "Two or three times as effective as ordinary dressings in absorbing body exudates in a case of empyema."

Example 7

Methylcellulose, 4000 cp-----	gms--	30
Glycerol -----	gms--	7.5
Mercurochrome -----	gms--	.3
OT 100-----	gms--	.3
Chloroform -----	c. c--	400
Petroleum distillate-----	c. c--	400

Chloroform, in which had been dissolved the OT 100, was used as the primary treating solution. The mercurochrome was triturated with the glycerol and added to the dispersed methylcellulose in the chloroform. The glycerol-mercurochrome mixture formed a gummy mass which was hard to disperse. The petroleum distillate was used as the secondary treating solution and was added next. The mixture was treated to the heat of boiling water and a vacuum applied. The volatile solvents were recovered, fractionated and reused. The mass was treated with a heat of 95° C. to remove final traces of treating solutions. The mass was then teased apart by means of wool cards. The resulting material was a soft fluffy mass which was readily soluble in water.

Example 8

Methylcellulose, 25 cp. -----	gms--	30
Glycerol -----	gms--	7.5
Pancreatin -----	gms--	1.5
Sodium bicarbonate -----	gms--	6
OT 100 -----	gms--	.3
Chloroform -----	c. c--	400
Petroleum distillate -----	c. c--	400

Chloroform, in which had previously been dissolved the OT 100 was used as the primary treating solution. The pancreatin and sodium bicarbonate (a combination medicament) was triturated with the glycerol. This formed a mass which was dispersed with difficulty in the dispersed methylcellulose in chloroform. Petroleum distillate was used as the secondary treating solution and was added after the dispersion indicated above. The previously mentioned procedure of removal and recovery by vacuum was followed. Final traces of treating solutions were removed by heat. The material was teased to a soft fluff by means of wool cards and made into medical dressings surrounded with gauze. The material was readily soluble in water. A clinical test was made and the attending nurse reported that by use of the dressings: "the necrotic surface of the ulcer was very much softened and was removed when the dressing was removed."

Example 9

Methylcellulose, 4000 cp. -----	gms--	30
Glycerol -----	gms--	7.5
OT 100 -----	gms--	.6
Chlorophyll (water soluble) -----	gms--	.6
Chloroform -----	c. c--	400
Petroleum distillate -----	c. c--	400

Chloroform was used as the primary treating solution. In the chloroform had been previously dissolved the OT 100. The chlorophyll was triturated with the glycerol and the mixture added to the methylcellulose dispersed in the chloroform. The secondary treating solution, petroleum distillate, was added and the whole thoroughly mixed. The treatment by vacuum and heat was followed. The material was teased to a soft fluff. The material was soluble with difficulty in water due to the presence of chlorophyll.

Example 10

Methylcellulose, 4000 cp.	gms.	30
Glycerol	gms.	7.5
OT 100	gms.	.3
Allantoin	gms.	.12
Chloroform	c. c.	400
Petroleum distillate	c. c.	400

Chloroform was used as the primary treating solution. The OT 100 had been previously dissolved in the chloroform. The allantoin was triturated in the glycerol. A fair suspension was formed. This suspension was thoroughly mixed with the dispersed methylcellulose in chloroform. Petroleum distillate, as the secondary treating solution, was added. The petroleum distillate was thoroughly mixed with the mass. The procedure of removal by vacuum and heat was followed. The mass was teased to a fluffy mass. It was readily soluble in water. Allantoin is a cell proliferant. It was added in this example to promote cell growth.

Example 11

It will be noted that glycerol, which is hygroscopic, was used in compounding Examples 7, 8, and 9. It was added to aid in the incorporation of mercurochrome, pancreatin and chlorophyll. In each case a physical incompatibility was noted. Another dispersing agent for medicaments was tried. This was polyethylene glycol of a molecular weight of 1500. The molecular weight is not critical. Then Examples 7, 8, and 9 were again made with the exception that polyethylene glycol was substituted for glycerol. This resulted in a uniform dispersion of the medicaments and dispersion was readily obtained.

Example 12

Methylcellulose, 25 cp	gms.	10
Pancreatin	gms.	1.5
Sodium bicarbonate	gms.	6
Polyethylene glycol, M. W. 1500	gms.	5
OT 100	gms.	.2
Chloroform	c. c.	250
Petroleum distillate	c. c.	250

Chloroform, in which had been dissolved the OT 100, was used as the primary treating solution. The pancreatin and sodium bicarbonate was triturated with the polyethylene glycol (acting as a dispersing agent for the medicaments) until a uniform mixture was prepared. After the methylcellulose had been dispersed in the chloroform, the polyethylene glycol-pancreatin-sodium bicarbonate mixture was added and was readily and uniformly dispersed. The secondary treating solution, petroleum distillate, was next added and thoroughly dispersed. The removal by vacuum and heat was followed. The resulting material was teased apart with wool cards to a powdery fluffy mass. It was quickly and readily soluble in water.

Example 13

Methylcellulose, 25 cp	gms.	10
Chlorophyll (water soluble)	gms.	.9
OT 100	gms.	.3
Polyethylene glycol, M. W. 1500	gms.	5
Petroleum distillate	c. c.	250
Chloroform	c. c.	250

The chloroform, in which had been dissolved the OT 100, was used as the primary treating solution. The methylcellulose was immersed in the

chloroform and the mixture was shaken until dispersion appeared complete. The chlorophyll was triturated with the polyethylene glycol until a uniform mixture was obtained. The mixture of chlorophyll-polyethylene glycol was added to the methylcellulose in the chloroform and the mixture was stirred until dispersion appeared uniform. The chlorophyll was easily dispersed by this treatment. Petroleum distillate was added as the secondary treating solution and was uniformly dispersed by shaking. The treating solutions were removed by vacuum and heat treatment. The remaining material was readily fluffed by the use of wool cards to a fibrous powdery mass. When tested for solubility in water the material dissolved to a gel at a very rapid rate. This result is in contrast to the Example 9 where it was discovered that chlorophyll increased surface tension and delayed dispersion. The only changes (over Example 9) were the use of methylcellulose 25 cp., polyethylene glycol M. W. 1500, and an increased amount of OT 100. This material may be used, as an example, as a dressing for chronic, necrotic ulcers.

Example 14

Methylcellulose, 25 cp	gms.	10
Glycerol	gms.	2.5
Allantoin	gms.	.2
OT 100	gms.	.3
Polyethylene glycol, M. W. 1500	gms.	2
Chloroform	c. c.	150
Petroleum distillate	c. c.	150

The chloroform was used as the primary treating solution. The OT 100 was dissolved in the chloroform—a convenient manner of dispersion. The methylcellulose was immersed in the chloroform for approximately thirty minutes and the dispersion appeared complete. Dispersion of the methylcellulose was hastened by agitation.

The allantoin and glycerol were triturated in the polyethylene glycol until a uniform mixture was obtained and the mixture was then added to the methylcellulose which had been dispersed in chloroform. The materials were intimately mixed or dispersed by stirring. The petroleum distillate was added as the secondary treating solution and was dispersed by shaking. The volatile solutions were removed by vacuum-heating treatment. The material was easily teased to a fluffy material by carding. The medicated material was readily soluble in water.

This material when applied with a little water to cuts, wounds, abrasions and burns forms a neat, compact, synthetic protective coating due to the presence of methylcellulose. Also the allantoin provides conditions augmenting healing. Small cuts inflicted during shaving stopped bleeding almost instantly and were healed in twenty-four hours and they were not re-opened on shaving the second day.

Example 15

Methylcellulose, 25 cp	gms.	30
Glycerol	gms.	7.5
Allantoin	gms.	.6
Tyrosine (in alcohol)	gms.	.025
OT 100	gms.	.9
Polyethylene glycol, M. W. 1500	gms.	6
Chloroform	c. c.	400
Petroleum distillate	c. c.	400

The chloroform, in which the OT 100 had been dissolved, was used as the primary treating solution. The methylcellulose was immersed in this

primary treating solution and was shaken for about thirty minutes and dispersion seemed complete. The glycerol and allantoin were triturated into the polyethylene glycol until a uniform mixture was prepared. This mixture was incorporated in the methylcellulose-chloroform mixture by stirring until uniformly dispersed. The tyrothricin (in alcohol) was added to the mixture and dispersed by shaking and stirring. The petroleum distillate was added and dispersed by shaking for about ten minutes and a uniform mixture was obtained. The volatiles were removed by vacuum-heat treatment. The material was fluffed to a finely fibrous mass. This example illustrates the use of an antibiotic substance. Tyrothricin, properly applied, is active in destroying and inhibiting the growth of gram-positive bacteria which most often cause acute infections. A laboratory test of this medicated material against *Staphylococcus aureus* proved it to be effective in very low dilutions.

No special care was used in preparing this material under aseptic conditions but a culture of the material failed to produce any colonies.

In applying a product of my invention to small wounds, the wound may be moistened with a drop of water, if not already moist. A small portion of the material is placed on the surface of the wound and a few drops of water may be added if needed. A gel is formed and should be spread to provide appropriate coverage. The protective layer is permitted to dry and forms a seal over the wound. If there be need, an oiled dressing may be placed over the protective layer to prevent sticking to clothing, etc.

This dressing has been proven to be very effective in cases of boils. Infection has been rapidly reduced with rapid healing. In the case of an infected abrasion a protective layer of the material was applied as has been indicated. The infection subsided rapidly and healing was prompt.

In a case of a blister caused by the use of an adhesive bandage, an application was made as indicated. The wound healed rapidly without infection and without a scab.

The material has also been proven effective in cases of burns. Infection is reduced and healing progresses without a scab. The surface of the tissues may be seen through the dressing.

The foregoing examples illustrate some of the medicaments which can be incorporated into the products embodying my invention. Furthermore, they illustrate the use of chloroform as a primary treating solution and petroleum distillate as a secondary treating solution. In some of the examples, glycerol and/or polyethylene glycol has been employed. Also, they indicate a differential in boiling points between the primary treating solution or solutions and the secondary treating solution or solutions which will be in the neighborhood of 20° C. and specifically 15.8° C.

In order to determine other treating solutions other tests were made. The following example indicates the use of methyl acetate as a primary treating solution and benzene as a secondary treating solution:

Example 16

Methylcellulose, 4000 cp-----	gms--	0.5
Methyl acetate-----	c. c--	25
Benzene-----	c. c--	20

The methyl acetate was added to the methylcellulose and allowed to stand for one hour.

Methyl acetate functioned as a primary treating solution. Then the benzene was added and the material was allowed to stand for another hour. The volatiles were removed by heat and the end product was soft and fluffy. In this particular example and others following, no medicaments were used as a determination was being made for treating solutions. As the previous examples indicated that the end product was inert to the various medicaments to be added, thus I was determining agents and formulations to obtain the proper physical characteristics of the end product.

Example 17

Methylcellulose, 4000 cp-----	gms--	0.5
Chloroform-----	c. c--	30
Toluene-----	c. c--	30

The chloroform was added to the methylcellulose and permitted to stand two hours. Then toluene was added and the mass was permitted to stand fifteen hours. The volatiles were evaporated and the residue was soft and fluffy. It shredded to form a filamentous mass. It was thus established that toluene is one of the secondary treating solutions which may be used in my invention.

Example 18

Methylcellulose, 4000 cp-----	gms--	0.5
Chloroform-----	c. c--	30
Benzene-----	c. c--	30

The chloroform was added to the methylcellulose and permitted to stand forty-four hours. The benzene was added and the mass was permitted to stand five hours. The volatiles were evaporated and the residue was a short felt and not fluffy. Upon carding the material was fluffy but there were traces of lumps. This example indicates that benzene can be used in my invention as a secondary treating solution. Furthermore, the differential in boiling points between chloroform and benzene is approximately 8° C. I thus established that with as little as 8° C. between the boiling points I could first remove, during evaporation, the primary treating solution and have the final recovery in the presence of the secondary treating solution.

Example 19

Methylcellulose, 4000 cp-----	gms--	0.5
Chloroform-----	c. c--	25
Toluene-----	c. c--	15

Twenty-five c. c. of chloroform was added to the methylcellulose. The dispersion was well shaken and placed on a watch glass to evaporate. Toluene was added in three separate portions of 5 c. c. each. The chloroform was being evaporated as the toluene was being added and the example indicated that the secondary treating solution need not be added all at one time. After evaporation of the volatiles, the end product was soft and fluffy and was readily fluffed by the use of cards.

Example 20

Methylcellulose, 4000 cp.-----	gms--	0.5
Methylene chloride-----	c. c--	35
Toluene-----	c. c--	30

The methylene chloride was added to the methylcellulose and shaken vigorously. The dispersion was permitted to stand forty-four hours and the material appeared well dispersed. Toluene was added and the dispersion permitted to stand four hours. Upon evaporation of the

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volatiles, the residue was soft and felt-like and could be readily fluffed by cards. This example indicated another primary treating solution.

Example 21

Methylcellulose, 4000 cp.	gms.	0.5
Methylene chloride	c. c.	30
Petroleum solvent	c. c.	30

Added 30 c. c. of methylene chloride to the methylcellulose and permitted the mass to stand four hours. Then added 30 c. c. of petroleum solvent and permitted the mass to stand two hours. The volatiles were evaporated and the material was soft and fluffy. The material was slightly lumpy when carded.

Example 22

Methylcellulose, 4000 cp.	gms.	0.5
Methylene chloride	c. c.	15
Chloroform	c. c.	15
Petroleum solvent	c. c.	30

Fifteen c. c. of methylene chloride and 15 c. c. of chloroform were added to the methylcellulose and permitted the mass to stand two hours. Then added 30 c. c. of petroleum solvent and permitted the mass to stand two hours. Upon evaporation of the volatiles, a soft fluffy product was obtained and it did not need to be fluffed by cards. This example indicates a combination primary treating solution and one of less cost than straight chloroform.

Example 23

Methylcellulose, 4000 cp.	gms.	0.5
Methylene chloride	c. c.	15
Chloroform	c. c.	15
Toluene	c. c.	30

Methylene chloride and chloroform were added to methylcellulose and let stand one hour. Then added the toluene and let stand one hour. Evaporated the volatiles and the material was a soft, short fibered material and could be fluffed by cards.

Example 24

Methylcellulose, 4000 cp.	gms.	0.5
Methylene chloride	c. c.	15
Chloroform	c. c.	15
Benzene	c. c.	30

Added methylene chloride and chloroform to methylcellulose. Permitted the same to stand one hour. Added the benzene and let the same stand forty-four hours. Upon evaporation of the volatiles, the material was rather firm but soft and could be fluffed by cards.

The Examples 22 to 24 are illustrative of a combination of agents forming the primary treating solution.

Example 25

Methylcellulose, 4000 cp.	gms.	0.5
Toluene	c. c.	30
OT 100		0.0188
Methylene chloride	c. c.	10
Chloroform	c. c.	20
Water	c. c.	1

Placed the methylcellulose and the OT 100 in a flask and added thirty small sized ball bearings. Next, the mass was thoroughly shaken. The ball bearings were employed to aid in the dispersion. Added the water and provided further agitation. Next, added 10 c. c. of toluene and continued agitation. Then the balance of the toluene was added. Upon evaporation of the

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volatiles, the residue was soft and fibrous and could be carded to provide a soft, fine fluff. Other comparative tests indicated that the water, under conditions mentioned, was helpful in dispersing the methylcellulose.

Example 26

Methylcellulose, 4000 cp.	gms.	0.5
Chloroform	c. c.	20
Petroleum distillate	c. c.	30
Water	c. c.	1
OT 100	gms.	.02

The methylcellulose and the OT 100 were placed in a mortar and some of the chloroform was added. The mass was triturated and the balance of the chloroform was added periodically in small amounts. Then the mass was transferred to a cylinder and the petroleum distillate added and the mass well shaken. Upon evaporation of the volatiles, the residue was a soft, short fiber felt. It carded well. From this example and other similar examples it was determined that trituration before adding the secondary treating solution was helpful. It appeared unsatisfactory to triturate after the secondary treating solution had been added but shaking while the secondary treating solutions are present proved helpful. Water again appeared helpful when added to the primary treating solution.

Example 27

A series of tests were run employing 0.5 gm. of methylcellulose; 0.02 gm. of OT 100; 1 c. c. of water and 20 c. c. of chloroform. The amount of petroleum solvent was varied and thus it was found that the lower limit of the petroleum distillate in this combination was approximately 10 c. c. and that optimum results obtained by the use of 15 c. c. or over. Also it was found that by keeping the other factors constant except the water, the maximum amount of water which can be incorporated for optimum results was 1 c. c. Under such circumstances the amount of methylcellulose was 0.5 gm.; OT 100 was .02 gm.; chloroform was 20 c. c.; and petroleum distillate was 30 c. c.

Example 28

In order to determine the range of the fraction of petroleum distillate which could be used and to determine whether methylcellulose of different viscosities could be employed, petroleum distillate having a boiling point in the range of 36° C. to 60° C. was employed and methylcellulose having a viscosity of 25 cp. was employed in this example. In the previously mentioned examples where petroleum distillate was used, its boiling point was 77° C. to 110° C. so as not to introduce a variable in this respect, as other factors were being determined.

Methylcellulose, 25 cp.	gm.	0.5
Methylene chloride	c. c.	30
Petroleum distillate, B. P. 30° C. to 60° C.	c. c.	30

The methylene chloride was added to the methylcellulose and shook for thirty minutes with balls present to aid in the agitation. Then the petroleum distillate was added and was shaken for fifteen minutes and then let stand one hour. After evaporation of the volatiles, the residue was soft and fluffy and did not need carding, but does card well. The methylene chloride has a boiling point of 40° C. and the final boiling point of the fraction of petroleum distillate employed

was sufficiently higher so that the final recovery of the residue was in the presence of the petroleum distillate.

This and other tests indicated that I can employ in my invention fractional distillates of petroleum having a boiling point in the range of 40° C. to 180° C. providing the proper primary treating solution is employed to give a differential so that the final recovery of the residue is in the presence of the secondary treating solution.

Example 29

Methylcellulose	-----gm--	0.5
Ethyl acetate	-----c. c--	1
Water	-----c. c--	1
Chloroform	-----c. c--	5
Dimethyl benzene	-----c. c--	5
OT 100	-----gm--	0.02

One c. c. of ethyl acetate and 5 gms. of methylcellulose were added to 1 c. c. of water in a mortar. The same was triturated to a paste. Then 5 c. c. of chloroform, to which had been added the OT 100, were introduced with 1 c. c. of chloroform at a time and with trituration after each addition. Then added 5 c. c. of dimethyl benzene and stirred well. This established the use of ethyl acetate as a primary treating solution and benzene as a secondary treating solution. Also, this example evidenced a further phenomenon in that the product appeared somewhat fibrous but well comminuted under a microscope. This material is very useful in my invention and it appears that a long fibrous character is not essential to a successful product.

I have employed methylcellulose as is obtained on the market or have mechanically sub-divided it by treatment in a hammer mill. For some uses of my product, the finer the particle size the more utility the same will have. I have found that by mechanically sub-dividing, I can get a powder of approximately cosmetic grade. By use of the last example the pieces are extremely small but yet their fibrous character can be determined by a microscope.

Example 30

Methylcellulose, 25 cp	-----gm--	0.5
OT 100	-----gm--	0.02
Ethyl lactate	-----c. c--	1
Water	-----c. c--	1
Chloroform	-----c. c--	25
Petroleum distillate, B. P. 120° C. to 177° C	-----c. c--	25

Example 31

Methylcellulose, 4000 cp	-----gm--	0.5
OT 100	-----gm--	0.02
Ethyl lactate	-----c. c--	2
Water	-----c. c--	2
Chloroform	-----c. c--	35
Petroleum distillate, B. P. 120° C. to 177° C	-----c. c--	30

The same procedure was followed in both Examples 30 and 31 and the methylcellulose was placed in a mortar and the ethyl lactate and OT 100 were added. To these also was added the water. The mixture was then triturated to a paste and chloroform was added in portions of 5 c. c. each, with trituration between each addition. The mixture apparently passed through a gel state. Apparently ethyl lactate, water and chloroform formed in combination the primary treating solution. Then the petroleum distillate was added as the secondary treating solution

and this was done by adding portions of 5 c. c. each with stirring between each addition. The mixture passed from a milky suspension to an almost transparent suspension. After evaporation of the volatiles, the residue was a very friable mass and upon trituration became a powder of almost cosmetic grade. The material was very soluble in liquids and when sprinkled on the surface of the water it displayed great surface activity, e. g., broke surface tension of the water. As the boiling point of ethyl lactate is 154° C. it is necessary to employ a secondary treating solution having a rather high boiling point. If medicaments are to be incorporated in the end product, it would appear advisable that the final recovery be made at pressures less than atmospheric so as to remove possible harming of a medicament by higher temperatures. Obviously, the boiling points will be reduced when sub-atmospheric pressures are involved.

Upon examination of the material under a microscope at 110 and 550 diameters or magnifications, it was discovered that the fibrous structure of the methylcellulose had entirely disappeared and had been replaced by a round structure shaped like a ball. Other fragments appeared to be groups of balls and many single round bodies were found. These appeared either as one large ring with a much smaller center ring or a large ring with a small solid center. These Examples 30 and 31 indicated other treating solutions and also indicated that the end product of my process may be a true powder and not fibrous or a comminution thereof.

Example 32

Methylcellulose, 25 cp	-----gms--	0.5000
Methyl lactate, B. P. 144° C	-----c. c--	1
OT 100	-----gms--	0.02
Water	-----c. c--	1
Chloroform	-----c. c--	25
Petroleum distillate, B. P. 120° C. to 180° C	-----c. c--	25

Placed the methylcellulose and OT 100 in a mortar and added thereto the primary treating solutions which consisted of methyl lactate, water and chloroform. The methyl lactate was added first and the water next. This was insufficient to completely wet the mass because of the tendency of the methylcellulose to gel and prevent wetting. One c. c. of chloroform was added and permitted to stand for a few minutes until the mass was wet. The mass was triturated and 9 c. c. of chloroform was added in 1 c. c. portions with trituration after each addition. In each case a stiff paste formed. Next 15 c. c. of chloroform was added in 5 c. c. portions with trituration after each addition. A white, milky suspension was formed. To this was added the secondary treating solution of petroleum distillate in 5 c. c. portions with stirring after each addition. The suspension precipitated into small irregular masses, which were suspended in the treating solutions. The volatiles were removed by heat. The residue was a soft and very friable mass. It was easily powdered to a very fine soft powder. This was done with a rubbing or beating action without pressure to prevent packing.

A microscopic examination of the powdered material under magnifications of 110 and 550 showed the material to be of irregular fragments. There were some balls but most of the fragments seemed to be groups of balls or pitted masses. It was free of fibrous structure. It ap-

peared as if the material had been exploded. After powdering it wet readily and had great surface activity. The fragments flew apart on the surface of the water as they wet.

Example 33

Methylcellulose, 4000 cp-----	gms--	0.5000
OT 100 -----	gms--	0.02
Methyl lactate -----	c. c--	1
Water -----	c. c--	1
Chloroform -----	c. c--	25
Petroleum distillate, B. P. 120° C. to 180° C.-----	c. c--	25

Placed the methylcellulose and OT 100 in a mortar. Added to the contents of the mortar the methyl lactate and water. These were insufficient to complete wetting because of the gel action. Added 3 cc. of chloroform and waited about two minutes for softening and swelling action to complete. Next added, after thorough trituration, the chloroform in 1 cc. portions with trituration until 7 cc. had been added. Trituration was continued at these periods indicated until the stiff paste formed began to stiffen or crack when stirred. The remaining chloroform was added in 5 cc. portions with trituration to smoothness after each addition. A milky suspension was formed. The methyl lactate, water and chloroform constituted the primary treating solution in which the methylcellulose was dispersed.

To the suspension there was added the petroleum distillate in 5 cc. portions with stirring after each addition. The suspension lost the milky appearance and finally began to precipitate in small irregular clumps.

The volatiles were removed by evaporation with heat. The residue comprised a friable mass which was somewhat more compact than the residue obtained from methylcellulose cp. 25. Trituration was required to pulverize the residue to a powder. The powder was of substantially the same quality as obtained from methylcellulose cp. 25. It wet easily.

An examination under the microscope revealed substantially the same structure as obtained in Example 32. A few ball like portions were found. These had a circular edge with a light portion surrounding a dark center. For the most part the material consisted of pitted irregular masses. The later picture was seen under 550 magnifications and the former under 110 magnifications. No fibrous fragments were found.

Examples 32 and 33 thus indicated that methyl lactate can be employed in my invention and with satisfactory results. Again it appeared that the methylcellulose employed need not have any particular viscosity.

Example 34

Methylcellulose, 25 cp-----	gms--	0.5000
Water -----	c. c--	1
Lactic acid -----	gms--	1
OT 100 -----	gms--	.02
Chloroform -----	c. c--	25
Petroleum distillate, B. P. 120° C. to 180° C. -----	c. c--	30

In this example the water, lactic acid and chloroform were used as the primary treating solution. The methylcellulose was placed in a mortar and to it were added the water, OT 100 and lactic acid and also 5 c. c. of chloroform. (The chloroform was added at this time because the water and lactic acid were not enough to

wet the methylcellulose.) The materials were triturated to a stiff paste. Then the chloroform was added in 5 c. c. quantities with trituration after each addition. A milky suspension was formed. The petroleum solvent, which was the secondary treating solution, was added in 5 c. c. portions with stirring after each addition. The milky suspension almost disappeared and was replaced by an almost colorless suspension. The volatiles were evaporated by heat and the material examined. The resulting material was readily friable. It was easily powdered by trituration. Microscopic examination revealed a mixture of ball like masses and occasional fibrous fragments.

Examples 35 and 36

Methylcellulose, 25 cp-----	gms--	0.5000
Water -----	c. c--	1
Lactic acid -----	gms--	2
OT 100 -----	gms--	.02
Chloroform -----	c. c--	25
Petroleum distillate, B. P. 120° C. to 180° C. -----	c. c--	30
Methylcellulose, 4000 cp-----	gms--	0.5000
Water -----	c. c--	1
Lactic acid -----	gms--	2
OT 100 -----	gms--	.02
Chloroform -----	c. c--	25
Petroleum distillate, B. P. 120° C. to 180° C. -----	c. c--	30

In these two examples two variables were introduced. First the amount of lactic acid was doubled in relation to the amount used in Example 34 and methylcelluloses of both low and high viscosities were used. This was done to determine whether the increased amount of lactic acid would increase the ball effect and if the lactic acid is operable in my invention with methylcelluloses of different viscosities.

In each case the methylcellulose, OT 100, water, and 5 c. c. of chloroform were placed in a mortar and triturated to a stiff paste. The remaining chloroform was added in 5 c. c. portions with trituration after each addition. A milky suspension of the methylcellulose was thus formed in the primary treating solution. The petroleum distillate was added in 5 c. c. portions with stirring after each addition. The suspension became almost transparent. The volatiles were removed by evaporation with heat. The resulting product was a very friable mass. It was triturated to a powder which had a tendency to cling together which indicated that it was of a fibrous nature. Microscopic examination showed that there were some ball formations but a considerable portion consisted of fibrous fragments.

Thus if lactic acid is to be used and a powdered end product is desired the proportion of lactic acid of Example 34 is more desirable than that of Examples 35 and 36. Other examples (not listed) indicate that an excess of lactic acid provides a rubber like end product.

In Examples 29 to 36, the boiling points of the secondary treating solutions are relatively high and would thus limit the medicaments which could be added while the primary and secondary treating solutions are present. However, said examples produced an end product which was substantially a powder in form. I have found that if the end product is once reduced to powder (e. g., the end products of 29 to 36 inclusive) that this powder can be employed with the primary and secondary treating solutions of the previous examples and the powder form will still be re-

tained in the end product. Thus, one can employ Examples 29 to 36 inclusive and obtain a powdered end product and then subject this powdered end product to primary and secondary treating solutions having lower boiling points and add the desired medicaments during this secondary treatment as most medicaments to be added will tolerate such lower temperatures. Then the end product will have incorporated therein the desired medicaments and will be of a powdered form.

Obviously, changes may be made in the form, proportions, and arrangements of the parts of my invention without departing from the principles thereof, the above setting forth only preferred forms of embodiments of my invention.

I claim:

1. A process of dispersing methylcellulose comprising dividing and opening up the fibers and fibrils of methylcellulose by treatment thereof with chloroform; adding a petroleum distillate having a minimum boiling point about 15° C. above the first mentioned dispersing agent; and consecutively removing the dispersing agents by evaporation whereby the residue is recovered from the petroleum distillate and the fibers and fibrils of the methylcellulose are maintained in a divided and opened state.

2. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent a liquid material which is soluble in the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling agent present in the inner structure of the methylcellulose mass; and thereafter consecutively removing the swelling agent and liquid material from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition.

3. The methylcellulose product of the process of claim 1.

4. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent a liquid material which is soluble in, and has a boiling point about 15° C. above that of the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling agent present in the inner structure of the methylcellulose mass; and thereafter consecutively removing the swelling agent and liquid material from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition.

5. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of methylene chloride functioning as an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent petroleum distillate having a minimum boiling point about 15° C. above the methylene chloride, thereby substantially replacing with petroleum distillate the organic

swelling agent present in the inner structure of the methylcellulose mass; and thereafter consecutively removing the swelling agent and petroleum distillate from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition.

6. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent a liquid material having a boiling point about 15° C. to about 20° C. above that of the swelling agent and which is soluble in the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling agent present in the inner structure of the methylcellulose mass; adding a medicament while the said methylcellulose is present in at least said organic liquid and while the fibers and fibrils are divided and opened; and thereafter consecutively removing the swelling agent and liquid material from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition and containing a medicament.

7. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent a liquid material which is soluble in the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling agent present in the inner structure of the methylcellulose mass; adding water; and thereafter consecutively removing the swelling agent, liquid material, and water from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition.

8. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent a liquid material which is soluble in the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling agent present in the inner structure of the methylcellulose mass; adding a surface active agent and while the fibers and fibrils of the methylcellulose are divided and opened; and thereafter consecutively removing the swelling agent and liquid material from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition.

9. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methyl-

cellulose and swelling agent a liquid material which is soluble in the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling agent present in the inner structure of the methylcellulose mass; adding a binder for the end product and while the fibers and fibrils of the methylcellulose are divided and opened; and thereafter consecutively removing the swelling agent and liquid material from the methyl cellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition.

10. A process of treating methylcellulose which comprises subjecting the methylcellulose to the action of an evaporatable, organic, liquid, swelling agent therefor, thereby dividing and opening up its fibers and fibrils; mixing with the methylcellulose and swelling agent a liquid material having a boiling point about 15° C. to about 20° C. above that of the swelling agent and which is soluble in the swelling agent but which is substantially a nonsolvent for the methylcellulose, thereby substantially replacing with the liquid material the organic swelling

agent present in the inner structure of the methylcellulose mass; adding a medicament while the said methylcellulose is present in at least said organic liquid and while the fibers and fibrils are divided and opened; adding a medicament dispersing agent; and there after consecutively removing the swelling agent and liquid material from the methylcellulose, thereby obtaining as a solid residue a fluffy, porous, methylcellulose product, the fibers and fibrils of which are maintained in a divided and opened condition and containing a medicament.

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