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COATED NON-IRRITATING COAL TAR PITCH

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This invention relates to the production of a coal tar pitch that is substantially non-irritating to the human skin and has for its particular objects the treatment of the surfaces of particles of finely divided coal tar pitch with a bland, neutral substance, such, for example, as neutral petroleum wax, in such a manner as to completely encase such particles within a microscopically thin skin or envelope of such bland substance whereby the noxious ingredients of the pitch, more especially the phenols, the cresols and the chrysenes, are rendered completely harmless or non-irritating to the skin of those handling or otherwise coming in contact with the treated material.

The invention is especially of importance in those industries in which coal tar pitch is handled in powdered or finely ground form or in which the human body is exposed to direct contact with dust created by the breaking down of coal tar pitch. The protection of workers in these industries from contracting severe cases of dermatitis, a disease that results from the severe irritating and even burning actions of finely divided coal tar pitch particles on sensitive areas of the human skin, has long been a serious industrial problem.

In the manufacture of baked sand cores and dry sand molds in the foundry industry, this tendency for workers to contract dermatitis is most prevalent since the coal tar pitch must be first admixed in a dry stated with molding sand. It is during this operation that a considerable quantity of pitch dust is created and this, on coming in contact with the skin of the worker, produces, as above stated, severe skin irritation that frequently develops into dermatitis. In the case of dry sand molding, the same is also true although here it is a case of the dust created by the mere mechanical or manual handling of the bags of pitch dust and the mixing of the contents thereof with the sand which creates the obnoxious dust problem.

Medical evidence seems to point to the fact that when the fine particles of coal tar dust contact the human body there is enough chrysene, phenols, cresols in the material to cause burning. See in this connection the publication Industrial Hygiene for January 1949, the article entitled Phenol and Dermatitis and also the article entitled Coal Tar and Dermatitis. In other words, it creates a chemical burn on the skin. It is also fairly well recognized by the medical profession that this contact dermatitis is very materially increased when the finely divided coal tar pitch contacts a human body, which is perspiring or sweating profusely, and it appears that the phenols, cresols and chrysenes are dissolved out of the coal tar pitch by the sweat of the human body which acts as a solvent for them and they are therefore deposited on the skin as a residue, as the sweat evaporates, in a very much more active form. In other words, the concentration is increased by the solvent action of the human sweat on the individual particles of coal tar pitch, thus removing more and more phenol, cresols and chrysenes from the pitch and increasing the intensity of the burn. Again, the action of finely subdivided particles of coal tar pitch on contact with the human body is affected by direct sun-

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light, although the reason for this is medically and chemically obscure. In any event, however, the action of direct sunlight on a body which is covered with coal tar pitch is particularly severe.

The choice of substances which can be used for the purpose of my invention is extremely limited. In the first place, it must be a substance which will completely flow around each individual coal tar pitch particle and encase it. In the second place, it must be a substance which is without any action on the human skin. In the third place, and this is extremely important, it must be a substance which is not soluble in the pitch and in which the pitch is not soluble. Were it attempted to encase the coal tar pitch particle in a substance of the nature of an oil but in which oil the coal tar pitch was soluble, it is apparent that the pitch would dissolve in the oil surrounding it, which acts as a solvent for it, and the bare surface of the pitch particle would be exposed to the skin on contact. There would be a further very serious disadvantage in using a material of this type in that, in the shipment of finely divided ground coal tar pitch, the material must reach its destination in a ground, finely divided form and if any substance is used on the surface of these very finely subdivided particles of pitch which will cause the pitch to coalesce or dissolve, the shipment will reach its destination as one solid lump.

In carrying out the invention, it has been found advisable to employ a petroleum wax which is sufficiently soft to spread easily and completely over the particles of coal tar pitch and which is neutral in character, viz., it is neither acid nor alkaline. The specification of such wax is desirably as follows:

Specific gravity at 60° F.....	0.894
Flash point, COC, Cleveland open cup in ° F.....	445
Viscosity, Saybolt, at 210° F.....seconds..	48
Unworked penetration at 77° F.....	69
Melting point, A. S. T. M. under Specification D-127-49	118

This type of wax has great water and water vapor resistance and possesses adhesive qualities, flexibility and toughness which render it especially adaptable as a coating that will remain fixed on the individual particles of coal tar pitch. Also, and this is likewise most important, the coal tar pitch is absolutely insoluble in this wax and, vice versa, the wax is totally insoluble in the coal tar pitch. The wax possesses all the essential qualities of being entirely free of any irritating action on the skin. My invention is not to be limited, however, to the use of this particular type of wax. Any non-drying, neutral and non-irritating vegetable oil or mineral oil or wax can be substituted for the petroleum wax in the coating, provided that, as above stated, the coal tar pitch be not soluble in such coating and that the coating be not soluble in the coal tar pitch.

In carrying out the invention, it is preferable to proceed as follows:

A finely ground pulverized coal tar pitch, having a screen distribution of approximately the following, is selected, viz.,

	Per cent
Amount that passes 100 mesh screen.....	74.
Amount that passes 200 mesh screen.....	24.6
Amount retained in the pan.....	1.4

3400 lbs. of the selected pitch is introduced into a ribbon-type, agitated mixing machine, over the top of which is constructed a framework consisting of ordinary glass cloth filters of the nature of air-conditioning filters which will permit air, but not dust, to pass through. Directly in the center of the mixing machine and protruding through the glass fiber filters, are a sufficient number of high-pressure spray heads to successfully cre-

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ate a fog of an emulsion of wax in water. Enough wax emulsion is sprayed through the nozzles into fog form and picked up by the individual particles of coal tar pitch which are then subjected to a rubbing action due to the rapid agitation of the mixer, so that there remains on the particles of pitch present a homogeneous and continuous coating of wax in the nature of approximately 2% of the weight of the coal tar pitch used. In other words, for every 100 lbs. of coal tar pitch there would be a total amount of 2 lbs. of wax dispersed on the surfaces of all the particles of such pitch.

The use of an emulsion of wax is merely to obtain the maximum amount of dispersion of the wax so as to realize the best coverage of the coal tar pitch particles. The wax treatment of the coal tar pitch, however, could be accomplished in other ways, but the essence of the invention lies in the envelopment of the coal tar pitch particles by a film of neutral or non-irritating wax or oil. In making such emulsion, it is desirable to proceed as follows:

84 lbs. of water is introduced into a steam jacketed kettle and 68 lbs. of the selected bland or neutral molten wax is prepared in a separate kettle. Into the water is mixed 12 ounces of triethanolamine and into the 68 lbs. of wax is mixed 1 lb. of oleic acid. The molten wax and oleic acid mixture is then allowed to run slowly into the water containing the triethanolamine and at the same time the combining materials are subjected to high speed dispersion by what is known as a dispersator or colloidizing machine. When this mix has been completed, the mass is then sent through a high pressure homogenizer where it is subject to homogenizing pressures of 3500 lbs. per square inch and this results in the emulsion being properly formed and becoming completely stable so that the wax will no longer separate from the water. It also results in an emulsion with an extremely fine subdivision of the particles of wax. This is important from the standpoint that it is desirable to have the wax in as finely subdivided form as possible so that each micron or sub-micron size particle of wax in the emulsion will be able to reach and coat a particle of coal tar pitch.

As stated above, approximately 154 lbs. of said emulsion are sprayed on 3400 lbs. of powdered coal tar pitch which results in the coated pitch particles having a total wax content of about 2%. The water, of course, evaporates normally and deposits wax as a sealing coat on the pitch. When this coal tar pitch, having a coating of neutral wax on each particle thereof, comes in contact with human skin, the phenols, cresols and chrysenes contained in the coal tar pitch are effectively blocked from acting on the human skin by a waterproof, sealing or insulating coat or skin of wax. Also, as stated above, even though the human body perspires and in the perspiration of the human body the wax-treated coal tar pitch is dispersed, the waterproofing layer of wax around the coal tar pitch prevents the perspiration from dissolving the phenols, cresols and chrysenes out of the coal tar pitch and effectively stops the burning and irritating action on the skin.

Among the waxes which can be substituted for the aforesaid petroleum wax, are cotton seed wax, wool wax

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and ceresin wax and among the oils capable of such substitution are castor oil and deodorized menhaden oil. The amount of such waxes or oils that should be employed ranges between one-quarter per cent and two and one-half per cent, by weight, of the coal tar pitch.

The oleic acid serves as a neutralizer of the normal alkalinity of the triethanolamine. Other substances, such for example as di-glycol stearate, may be substituted for the oleic acid and other emulsifiers, such for example as nonethylene ricinoleate, may be substituted for the triethanolamine and if so substituted a neutralizer, such as oleic acid, can be dispensed with as unlike triethanolamine it is essentially neutral.

Various modifications in the proportions of the ingredients employed and in the method of making my improved non-irritating coal tar pitch, within the scope of the appended claims, may be made without departing from the spirit of the invention as embraced therein.

Having thus described my invention, what I claim is:

1. Bland coal tar pitch, containing a noxious substance selected from the group consisting of phenols, cresols and chrysenes, which pitch is non-irritating to the human skin consisting essentially of finely divided particles of such pitch each of which is individually enveloped by a sealing coat of a member of the group consisting of an oil and a wax which is insoluble in such pitch and in which the pitch is insoluble, the amount of such sealing coat ranging between one-quarter per cent and two and one-half per cent, by weight, of the amount of the pitch.

2. Bland coal tar pitch, containing a noxious substance selected from the group consisting of phenols, cresols and chrysenes, which pitch is non-irritating to the human skin consisting essentially of finely divided particles of such pitch, the major portion of which is at least under 100 mesh in size, each of which is individually enveloped by a sealing coat of a member of the group consisting essentially of a soft, neutral wax which is insoluble in such pitch and in which the pitch is insoluble, and the amount of such sealing coat ranging from one per cent to about two per cent, by weight, of the amount of such pitch.

3. Bland coal tar pitch as claimed in claim 2, wherein the amount of the sealing coat ranges from one-half to not more than two per cent, by weight, of the amount of the pitch.

4. Bland coal tar pitch, containing a noxious substance selected from the group consisting of phenols, cresols and chrysenes, which pitch is non-irritating to the human skin consisting essentially of finely divided particles of such a pitch which are individually enveloped by a sealing coat of a non-drying oil, such coat being insoluble in such pitch and said pitch being insoluble in such coat and the amount of such coat ranging between one-quarter and two and one-half per cent, by weight, of the amount of the pitch.

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