

March 6, 1934.

H. PLAUSON

1,949,876

PREPARATION OF EMULSIONS FOR TREATING AND PREPARING ROAD SURFACES

Filed Feb. 6, 1929

3 Sheets-Sheet 1

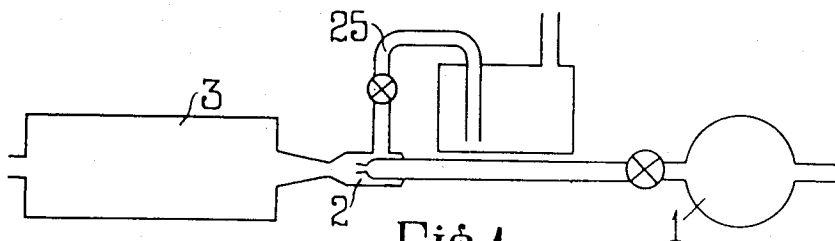


FIG. 1.

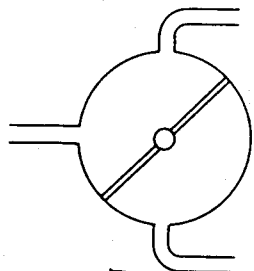


FIG. 2.

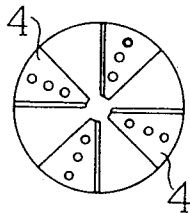


FIG. 3.

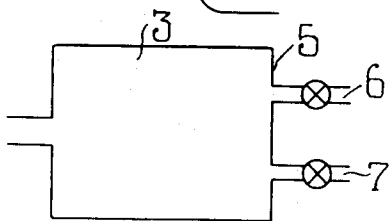


FIG. 4.

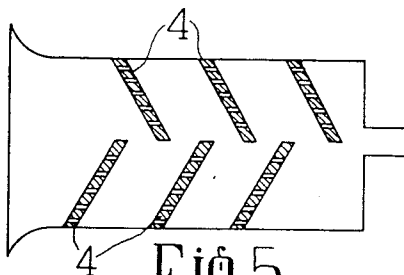


FIG. 5.

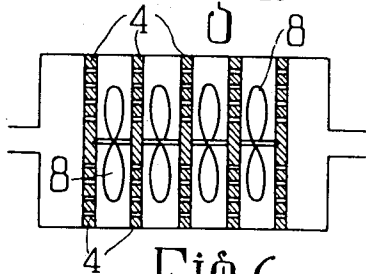


FIG. 6.

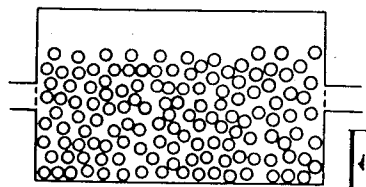


FIG. 7.

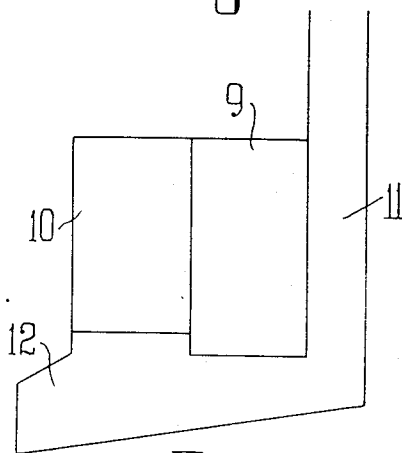


FIG. 8.

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3 Sheets-Sheet 2

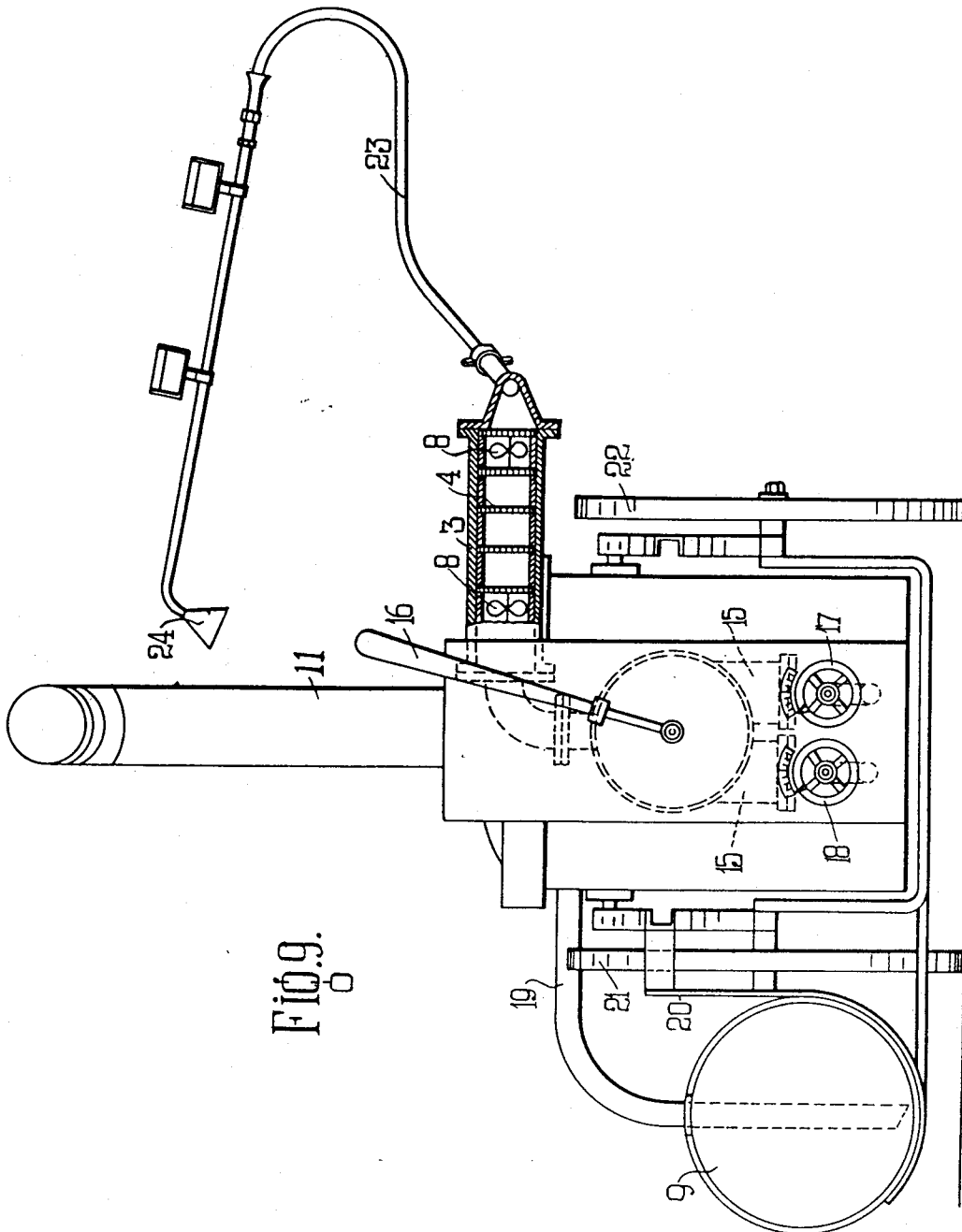


Fig. 9.

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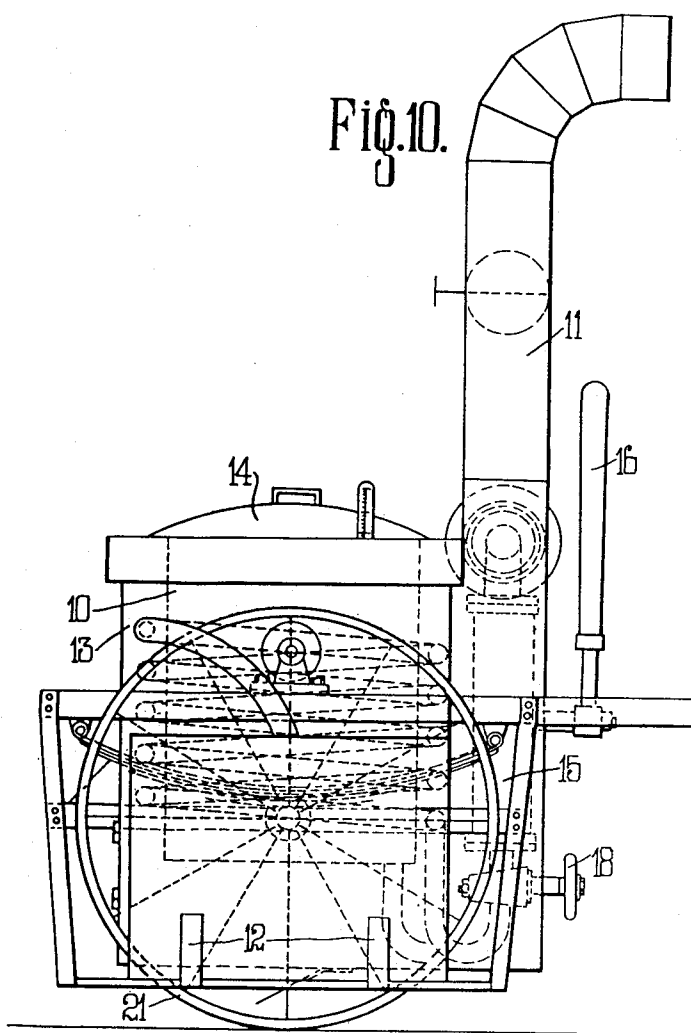
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PREPARATION OF EMULSIONS FOR TREATING AND PREPARING ROAD SURFACES

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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PREPARATION OF EMULSIONS FOR TREAT-
ING AND PREPARING ROAD SURFACESHermann Plauson, Hamburg, Germany, assignor
to Frederick William Attack, Kingston, Ontario,
CanadaApplication February 6, 1929, Serial No. 337,856
In Great Britain February 10, 1928

1 Claim. (Cl. 94—23)

The present invention relates to improvements in road surfacing compositions.

The application of natural or artificial asphalt or artificial mixtures of the same with flux oils, i. e. viscous asphalt oils, and also the admixture of tar and its compositions with asphalt or pitch, can only be carried out on good dry road surfaces and under good weather conditions. In rainy weather or with wet roads, such a surface flakes off and is useless.

Recently the asphalt, tar and their various compositions mentioned above have been converted into so-called emulsions or cold asphalts. It is possible to use these cold asphalts during the rainy season and on wet roads. On the other hand, however, it is necessary to add many expensive substances in order to produce such emulsions and moreover a large manufacturing plant is necessary and, when being transported in railway trucks, a useless load of 50% and more in the form of water has to be carried at the same time. These various circumstances must consequently be regarded as objectionable features of the cold asphalt process. Moreover, the cold asphalt congeals and separates out by being shaken in the tanks during rail transport. Separation also takes place on standing for a long time without being stirred up.

According to the present invention, an absolutely new principle is adopted for the admixture of the natural or artificial asphalt or mixtures thereof, with a flux oil and tar and the like, whereby all the above mentioned disadvantages of the old method are avoided and all the advantages are obtained.

The new method and apparatus for admixing natural or artificial asphalts, pitches, flux oils, tars, mineral oils etc. for road construction purposes or dust-laying purposes is based on the above mentioned road construction or dust-laying products being applied to the road surface in the form of an emulsion with water, the emulsion being prepared at the same time and place of application in such a manner and form as only to be stable for the period of distribution and then immediately sprayed on to the road surface.

By such a process it is not necessary to carry the water over a long distance, but hot emulsions which adhere more firmly and dry more quickly are obtained direct at the point where they are to be used. These emulsions can be produced cheaper than in works, as the new method allows of dispensing with numerous added emulsifying agents. In the cold asphalt process at present in use, five to twenty times greater quantities of

emulsifying agents must be added to the water than according to the present process.

According to the present invention the process consists in premixing and emulsifying water and a bituminous substance in one operation by means of pressure applied to either or both the components, which pressure supplies all the energy required for the emulsification.

According to the present invention, a keeping power of several seconds, at the most one minute, is sufficient i. e. the emulsion need only be capable of being kept until it reaches the surface of the road from the spraying nozzle. In many cases one-twentieth of the addition, and even less, required in the cold asphalt compositions hitherto known, is sufficient. This constitutes a very important technical and also commercial advance for such a cheap product, such as asphalt or tar for road construction purposes.

The method as regards the addition of emulsifiers, is characterized by the feature that small quantities of alkalies or alkali carbonates, alone or with addition of small quantities of further natural or artificial emulsifying agents (such as glycerides, soaps formed from the same, Turkey red oil, known as emulsifying sulphonic acids, sulphite lye, lipoids, potassium compounds of the same, gelatine, size, casein, gum arabic, etc.) are added to the water to be used for the emulsification, only such small quantities being added however as are necessary to produce useful emulsions which have a keeping power only for the period of application to the road surface.

The invention is illustrated in the accompanying drawings of which Figures 1-7 represent diagrammatically, details of the construction of various forms of apparatus, for carrying out the invention, Figure 8 is a view showing the arrangements of the pitch kettle and water tank in one form of the apparatus and Figures 9 and 10 show in more detail another form of the apparatus.

Various methods of carrying out the process according to the invention can be adopted. In the first place, the emulsification and application to the road surface may be effected by heating the asphalts, tars, pitches etc. to a more or less high temperature and subjecting them in liquid form to pressure by suitable hand or motor driven pumps, the asphalts etc. subjected to such compression being mixed with water by their flow force by means of suitable injection systems, preferably with addition of small quantities of emulsifiers mixed with water, being then passed through an emulsifier and subsequently sprayed on to the road surface.

One possible arrangement is shown in Figure 1. Here the asphalt is forced by pump 1 through the injector nozzle 2 into the emulsifying chamber 3 and entrains water through the pipe 25.

5 A further method of carrying out the process is to subject the emulsified water, instead of the asphalt, pitch tar etc. or mixtures thereof, to pressure by pumps and to mix the asphalt, pitch, etc. in the molten liquid condition by means of the flow force of this water, and subsequently to emulsify and spray the mixture.

10 A further method is to subject the water and pitch to pressure by means of pumps and to mix the same together by regulating a three-way cock shown in Figure 2, emulsifying and spraying over the road surface.

The process can also be carried out by heating water in a closed vessel, which sets up vapour pressure on the upper surface, so that the pressure is produced solely on the surface of the emulsifying water. The pressure can of course be still further increased by pumping in gas under pressure.

20 The emulsification and spraying are carried out in numerous different ways. In the first place, these operations may be carried out by employing a nozzle for the purpose of emulsification and spraying, which nozzle has the form of a simple tube, the wall of which is provided with more or less steeply inclined single or multiple spiral ribs, 4, having a few or a large number of perforations or slots (Figure 3), emulsification being produced by the kinetic energy of flow of the liquids in consequence of the friction on these baffle members.

35 Comminution can be automatically effected, or can be regulated by a plate 5 at the end of the emulsifying chamber with more or less large spraying jets 7, 8 adjustable from without (Figure 4).

40 Instead of giving the baffles a spiral shape for admixture and emulsification purposes and the like, the nozzle may be modified to consist of a single tube with straight, perforated or slotted plates over the semi-diameter of the tube, which baffles may have a more or less steep inclination in the direction of flow, so that emulsification and also spraying over the road surface, is produced by the dynamic energy of flow set up by friction on these baffles. One such spraying nozzle is shown in Figure 5.

50 The emulsification can also be effected in a chamber and the emulsion produced led rapidly to the nozzle. The chamber may consist of a simple tube having baffles of the type described above.

55 Rotary baffles in the emulsifying chamber can also be used instead of stationary members. Instead of setting up frictional resistance in the nozzle for the purpose of emulsification, smaller vertical or horizontal vanes or the like, blades, causing a mixing effect, arranged in the path of the liquid, may be present in the chamber, the vanes being rotated by the energy of flow of the materials, and thereby producing the emulsification.

60 An example of such a mixing chamber is shown in Figure 6. Here 3 is the chamber, 4 the baffles and 8 the vanes.

70 The baffles may consist of a large number of balls, broken pebbles or porcelain, also other objects such as Raschig rings may be used, (Figure 7).

75 The above relates in most cases to hand operated apparatus. In large plants mounted on auto-

mobile vehicles, which have their own source of power, the pressure required for emulsification and distribution over the road surface will be carried out by small pumps, which are mounted between the tank and the spraying nozzle and are driven by the motor of the vehicle.

80 The heating apparatus and also the emulsifying vessels for the asphalt, tar, etc. and water, can also be mounted on a motor vehicle. In this case it is preferable to allow the emulsifying water to pass through a heated spiral before admixture with the asphalt, tar or the like, or to mount the water tank so that it is heated by the furnace gases passing away after heating the asphalt. In small hand-spraying apparatus, the water tank can also be mounted round the asphalt or tar heating apparatus. It is preferably so arranged that either a small air space is provided between the vessel for the asphalt, tar, or the like, and the water tank, or that the vessels for both the water and pitch are arranged alongside one another and the gas heating the asphalt apparatus is led more or less along the wall of the water tank. This may be effected in small apparatus by mounting the water tank adjacent to the asphalt or tar melting tank, so that the flame only plays over a portion of the water boiler as shown in Figure 8.

90 Here the water tank 9 is mounted behind, and projects below the pitch kettle 10, 11 is the chimney and 12 the grate.

95 The temperature of the water does not exceed 70 to 90° during the period in which the asphalt is heated from 150 to 200°. As hitherto the gases heating the asphalt and tar spraying apparatus emerge direct into the air, the waste heat is used according to the present invention for pre-heating the water.

100 A hand-operated pump can be used for filling the water tank. Devices may also be adopted however, to enable the pitch pump to be used as a water pump also. It is also preferable to arrange such pump devices so that they pump pitch on one side of the piston and water on the other side of the piston, into the common pipe of the spraying nozzle, so that partial pre-emulsification and dosing of the asphalt and the like and the water, and also their admixture, are simultaneously effected thereby.

105 A particular form of hand operated wheeled truck for carrying out the process is shown in Figures 9 and 10.

110 13 is the space above the furnace in which is the water heating coil as hereafter described. 10 is the melting kettle with lid 14. 11 is the chimney which draws off the flue gases. In the lower portion of the chimney is the double-sided pump 15 worked by the lever 16. Water is pumped through cock 17 and pitch through cock 18.

115 Cock 17 is connected to tube 19 which passes spirally through the space 13 and serves to pre-heat the water. The tube 19 ends in the water tank 9 which is fastened by brackets 20 to the frame of the machine. The whole is mounted on wheels 21, 22. The pump 15 draws water and pitch simultaneously from the water tank and the pitch kettle, mixes them and ejects them to the chamber 3. This consists of a tube in which metal plates 4 having holes of different diameters (1-5 mm) are placed 5-10 cm. apart. Small vanes 8 rotating about their own axles may also be present. The mixture of pitch and water, to the latter of which the emulsifying agent must of course be added, is thus emulsified and passes 150

through the tube 23 to the spraying apparatus 24.

The above described apparatus is intended to be pushed about by hand. The plant for use on automobiles differs therefrom only in that the pump is driven by a petrol or electric motor.

10 In the case of solid or very viscous substances, it is necessary to heat the mixture to 120 to 200°. In heating asphalt and the like to 120 to 200° cold water can be used direct but at 100 to 140° it is preferable to construct the asphalt melting apparatus so that a heating spiral of sufficient length, provided with rapid connection nuts, is provided in the heating chamber. By using such a device the temperature of the water is 10 to 30° higher after circulation therethrough which is sufficient to produce a good emulsion. In the case of mineral oils and also in the case of tars rendered fluid by solvents, no heating is necessary. The emulsification can be carried out at ordinary temperatures if large motor apparatus are used for this purpose.

20 By using suitable three-way cocks or the like mixing and measuring apparatus, in which the ratios between asphalts, tar, etc. and emulsifying water are given by a graduated scale, the desired quantity of water (between 5 to 70%) can easily be determined by an unskilled operator, added, and the product well emulsified and immediately comminuted or sprayed. 30% of kaolin, milk of lime ochre, etc., can also be added to the emulsifying water, and emulsified along with the same. It

is possible at the same time thereby to neutralize the acid tar and also oils, and to cheapen the process, which is impossible in such a simple manner in other cold asphalt methods.

The most important feature of this process is that suitable compositions of artificial asphalts, such as are known under the trade-marks "Sparamex", "Mexasphalt" and the like, with tar or mixtures of tar, pitch, and asphalts, can be emulsified with the same ease as such artificial asphalts, and the emulsification can be carried out in one and the same apparatus. Hitherto it was known that a formula which, for example is found to give good results for the emulsification of "Sparamex" or asphalt could not be used for tar, and a formula which was applicable for tar, could not be used for tar and asphalt mixtures.

In the appended claim by "a static emulsifier" is meant a chamber having fixed or movable baffles, against which the liquids impact, and by their impact on which they are emulsified.

I claim as my invention:—

Process for treating road surfaces which comprises mixing water and a liquid bituminous compound, conveying the mixture under pressure, baffling same to cause unstable emulsification and spraying on to the road surface, all the above operations being carried out continuously in uninterrupted sequence.

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