

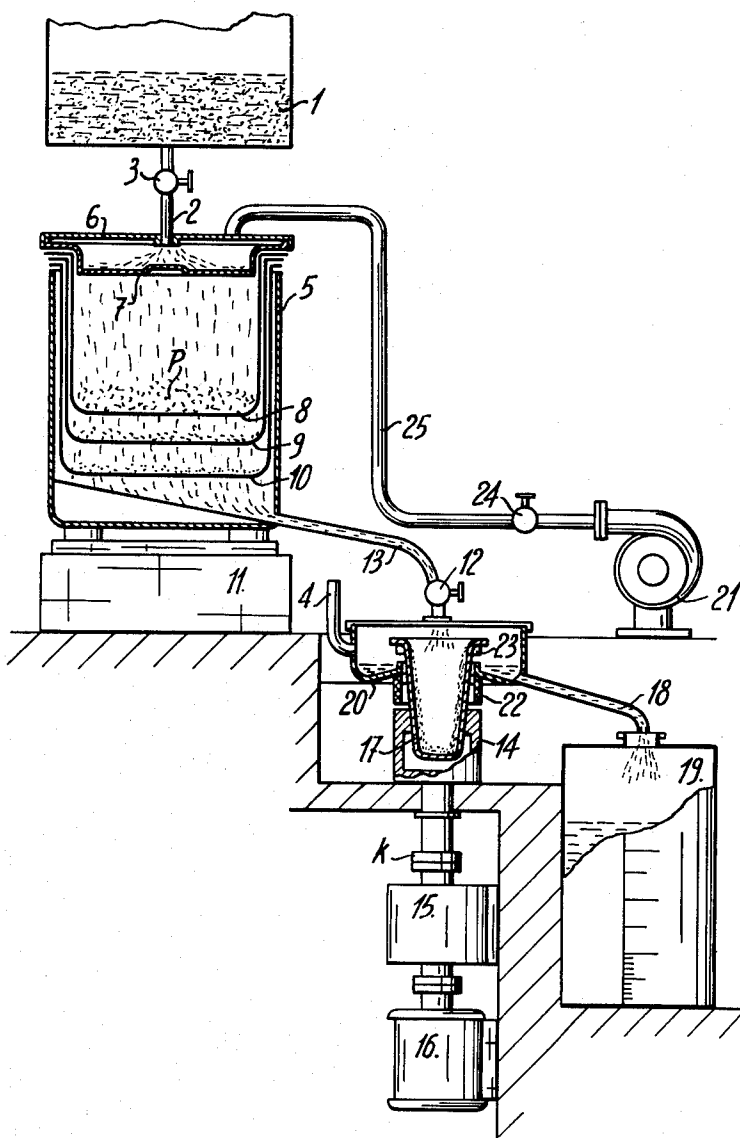
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APPARATUS FOR THE TESTING OF BITUMINOUS BUILDING MATERIALS

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APPARATUS FOR THE TESTING OF BITUMINOUS BUILDING MATERIALS

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9 Claims. (Cl. 73-432)

The composition of bituminous building materials is generally tested by trying to separate as exactly as possible the components of samplings of each of the mixtures. To this end there are used different solvents which, on the basis of their chemical affinity with the usual binding agents, are able to dissolve said binding agents and thereby to free anew the solid parts of the mixture. The solvent each time is used by cold extraction with standard temperature or by hot extraction with heating or further as condensate. The customary extraction devices perform the testing however over such a long period of time that the result of the test may not be used for the judgment of the mixture manufactured in a continuous manner. But by the high output of up to date mixing plants a quick checking of the mixture is absolutely necessary, in order to carry out immediately the necessary changes of the relative quantities of the different components. It is to be noted that outputs of 40 to 70 tons an hour and for one plant are customary today. The building construction departments require the constant sending of samplings to their formal testing offices, while the building and construction companies are making their own tests on the building site by means of travelling laboratories. These laboratories are generally equipped in such a way that samplings are first placed in a pot and after addition of a solvent, the sampling is left to soak a certain length of time and then an experienced person separates the solid parts from the soluble parts by periodic decanting of the solvent containing the soluble parts and by adding corresponding quantities of fresh solvent. The experienced person repeats said operation by using a stirring device, until said solvent remains approximately clear. The liquid is then poured onto a fixed mesh sieve through which the finest solid parts pass. Then, the material is submitted to a centrifugal process in order to separate the finest solid parts from the liquid part (solvent+binding agents). The solid mixture parts are then dried in a dry cell, sieved and weighed. The binding agent part is evaluated either by means of the quick method of Dr. F. Schulz or by distillation followed by a reduction.

These known methods take in practice far too much time and do not give precise results due to the inaccurate working of the laboratory assistant and further from the possibilities of errors which may occur during the different phases of the process. By using filter paper or a filter sleeve, the parts passing therethrough and the adhering parts are not easily recognizable the one from the other, while the hard adhering parts may not be separated from the paper with the necessary precision. Further, most of the known sieves do not allow a satisfactory separation of the lower fractions. These drawbacks do not provide a trustworthy evaluation of the results due to the high error dispersion.

Another object of the present invention is an apparatus which is characterized by the fact that it comprises a container for the solvent, a sorting pot in which said sampling is submitted to physical forces, a centrifugal machine for the separation of the finest solid parts which are in suspension in a continuous stream from the sorting pot, a collecting container having means for measuring of volume, and a drying device of the contents of

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the sorting pot and of the contents of the sleeve of said centrifugal machine.

The single figure of the attached drawing shows a schematic representation of the apparatus.

Said apparatus comprises a container 1 for the fresh solvent. Said container is provided with heating means and with a thermo-regulator for maintaining a constant temperature which are not shown. An outlet tube 2 having a cock 3 allows a desired quantity of said solvent to stream out of said container and to stream into a sorting pot 5. Said sorting pot 5 is provided on the one hand with a lid 6 bearing a perforated plate 7 which is to secure a homogeneous disposition of the solvent on the sampling P and, on the other hand, with a set of sieves 8, 9, 10 having different mesh sizes whereby each of said sieves can be individually removed. In the represented form there are three sieves whereby sieve 10 presents a mesh of 0.09 mm., sieve 9 a mesh of 0.63 mm. and sieve 8 a mesh of 2.0 mm.

A swing device 11 sets said sorting pot into a swinging movement, which has a loosening action on said sampling and which sets in movement each of the freed grains of said loosened sampling. In another form of the apparatus said swing device may be replaced by an ultrasonic emitter or by any other known device, which submits said sampling as well as each of the freed grains to an alternating physical force.

The sorting pot 5 is further provided with a drawing-off pipe 13 having a stop cock 12 for the adjustment of the outlet stream speed of the liquid which streams into a centrifugal machine to provide a continuous stream. Said centrifugal machine is provided with a rotatable holder 14 which is connected mechanically by means of a coupling K and of a transmission gear 15 to an electric motor 16 and said motor drives said holder 14 in rotation. In the inner of said holder 14 there is a removable sleeve 17 which is slightly conical and is enlarged in an upward direction. The upper open end of said sleeve 17 merges into a non rotating hinged collecting collar 20 which collects the cleaned solute (solvent+dissolved binding agent). Said collecting collar is provided with an outlet pipe 18 which directs the stream of said cleaned solute into a container 19.

The operation of the described apparatus is according to the following:

The sampling is set into the sorting pot 5, the swing device 11 is set in operation, and by opening of the cock 3, a measured quantity of solvent streams into said pot 5. Said solvent may be at room temperature or at a higher temperature. Under the action of alternative physical forces, said sampling is agitated so that said solvent comes immediately into contact with the binding agent which envelops each of the grains and, as said grains are each individually set in movement through the action of said alternative forces, the binding agent is more readily dissolved. The tests which have been made have proven that the time necessary to dissolve the mixture is only a fraction of the time necessary for the same operation by the known methods.

Further, during the time of the dissolution of the binding agent the solid parts are separated and sorted into the most important grain sizes, so that at the end of the dissolution operation the solid parts are already sorted into the following grain sizes:

- chipping parts over 2 mm.
- coarse sand parts over 0.63 mm.
- fine sand parts over 0.09 mm.
- finer parts under 0.09 mm.

Said sorting is absolutely sufficient for a quick evaluation of the composition of the bituminous mixture.

Such an agitation of the grains achieves further a supplementary dissolving speed of the binding agent. The finer parts are drawn off with the liquid out of the sorting pot and stream with said liquid into the centrifugal machine as a continuous stream in which said finer parts are efficiently separated. By the drawing off of the finer parts and of the liquid from said pot, the inner movement of the liquid, in said sorting pot being provoked through the swing device, causes an outlet without disturbance due to the prevention of the building up of little lumps. Further the finer parts which are drawn off do not come into contact with the coarser grains.

Further the described process takes care that the drying of the solid separated parts may be obtained until a fully satisfactory drying is performed without the use of a drying cell but in the separating apparatus itself. To this effect, after the complete drawing off of the liquid, hot air is blown across the sorting pot by means of a fan blower 21. Said fan blower 21 supplies hot air through a pipe 25 provided with a stop cock 24 and which merges into the upper part of said sorting pot 5, preferably through the lid 6. The solid parts remaining upon the three sieves 8, 9 and 10 are rapidly dried by means of the hot air stream. Said hot air stream streams through the drawing off pipe 13 and enters in the collecting collar 20. The upper edge of the removable sleeve 17 is provided with wings 23 which push the warm air through the outlet pipe 4 into the atmosphere. The finer parts which are collected in said sleeve 17 are further submitted to the action of heating rays emitted by an electric heating element 22 which surrounds said removal sleeve 17. Thus, the weighing of the various parts may be achieved in a time much shorter than before. The determination of the amount of the binding agent is obtained by comparison of the total weight of the solid dried parts with the total weight of the parts in the pot. In order to check further the quantity of binding agents the above mentioned methods may be used.

Another important advantage of the described process is constituted by the fact that the necessary amount of solvent is lesser than with known methods because of the quick dissolution of the sampling through agitation. Indeed, as it is easy to understand, the dissolving action of the solvent is greatly increased by the agitation. Further, the apparatus necessary to carry out the described process needs only a fraction of the room volume of known equipment and the cost price is also far less.

This allows instead of the usual big laboratory cars, little two-wheel trailers which may be pulled by means of light touring cars whereby a quick conveyance may be achieved.

A further advantage resides in the fact that the handling of the described apparatus may be achieved by any person even by a person not especially trained because the inaccuracies in the handling of the apparatus by the operator are almost eliminated. It has been noted that the precision of the described checking process is highly increased with respect to all the known methods and that only very unimportant and negligible errors of dispersion may still occur, so that the described process provides a reliable testing, i.e., allows a continuous checking of bituminous building materials, so that by the manufacture in a continuous manner of said building materials, the necessary changes in the respective quantities of the components may be achieved in an extremely short time.

I claim:

1. An apparatus for testing bituminous materials comprising container means having an apertured plate therein on which a sample of bituminous material to be tested is placed, means connected to said container means adjacent said plate to supply solvent onto said sample, means for applying at least to said sample an agitating action in order to increase the effect of the solvent on the sample to dissolve dissolvable parts therefrom and to loosen

solid parts therefrom, sieve means disposed in said container means to separate the solid parts into different grain sizes, means operatively connected to said container means to receive as a continuous stream solute and finer grain solid parts therefrom and to subject the solute and finer grain parts to a separating action to rapidly separate the finer grain parts from the solute, means operatively connected to said receiving means to collect the solute therefrom and to measure same, and drying means for drying said separated solid parts in said container means and said receiving means whereby a rapid determination of the complete composition of bituminous materials may be effected by means of a single operation.

2. An apparatus according to claim 1 wherein said applying means of said agitating action includes an ultrasonic generator means.

3. An apparatus according to claim 1 wherein said applying means of said agitating action includes means operatively connected to said container means to apply oscillating motion thereto.

4. An apparatus according to claim 1 wherein said receiving means includes a centrifuging means.

5. An apparatus according to claim 4 wherein said centrifuging means comprises a conically shaped sleeve having an upper open end to receive the solute and finer grain parts and a lower closed end smaller in diameter than said upper end, motor means operatively connected to said lower end to rotate said sleeve, and a collecting collar disposed around said upper end to receive the solute ejected through said sleeve during operation of said centrifuging means.

6. An apparatus according to claim 5 wherein said drying means includes blower means operatively connected to said container means to supply air thereto and said centrifuging means, an outlet pipe engaging said collecting collar, said upper edge of said sleeve being provided with wing means to direct the air passing through said sleeve into said outlet pipe.

7. An apparatus according to claim 5 wherein said centrifuging means includes a heating element surrounding said sleeve.

8. An apparatus according to claim 1 wherein pipe means are disposed between said container means and said receiving means, said drying means comprise a blower means operatively connected to said container means to supply air thereto which then passes through said pipe means into said receiving means.

9. An apparatus according to claim 1 wherein control means are disposed between said solvent-supplying means and said container means and between said container means and said receiving means to control respectively the supply of solvent to said container means and the continuous stream from said container means into said receiving means.

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