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ASPHALT PAVEMENT CONSTRUCTION

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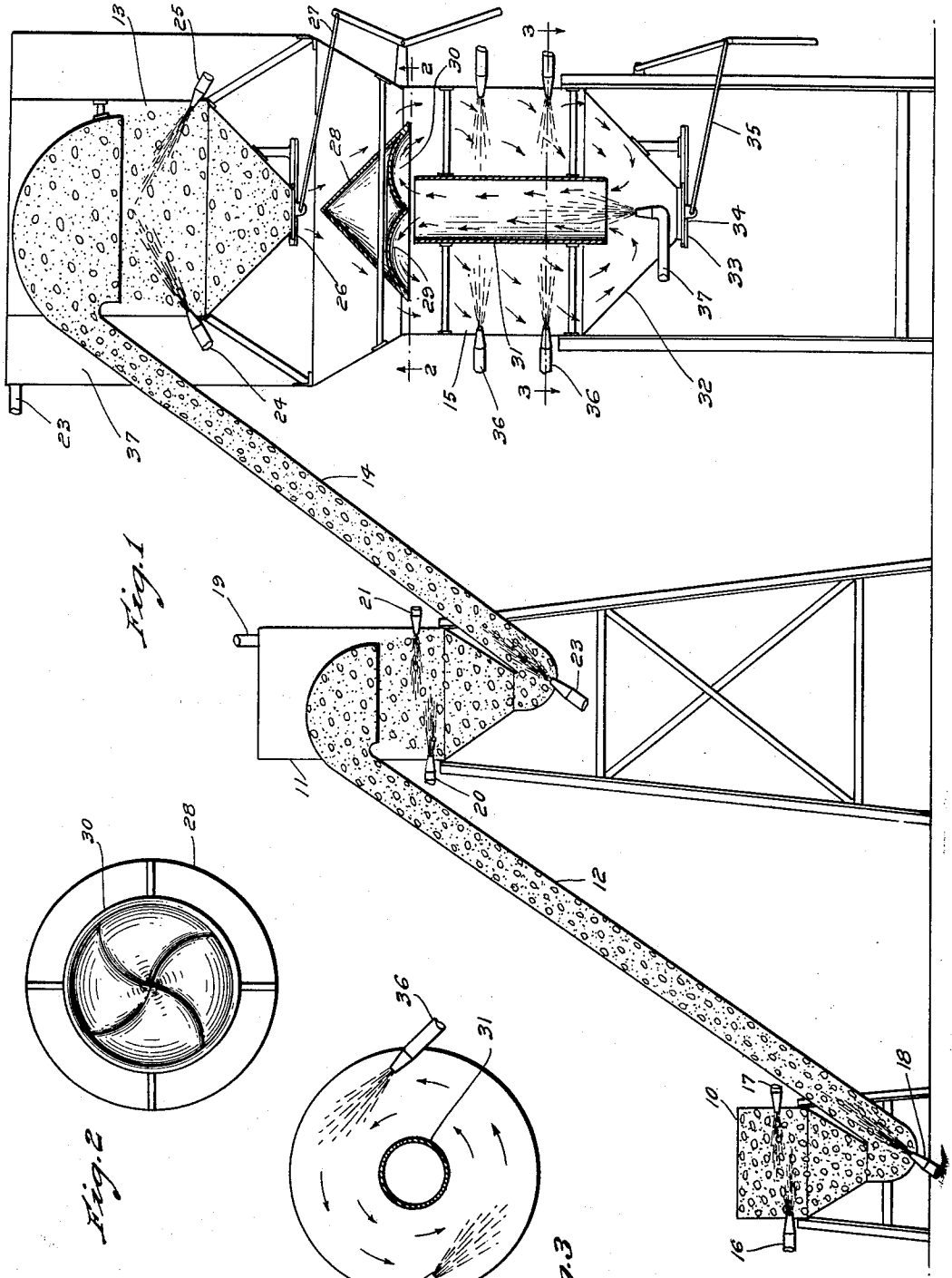


Fig. 1

Fig. 2

Fig. 3

INVENTOR
Ira L. Edgerton
BY
Nathaniel Frucht
ATTORNEY

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ASPHALT PAVEMENT CONSTRUCTION

Ira L. Edgerton, Edgewood, R. I.

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7 Claims. (Cl. 259—147)

The present invention relates to pavement constructions and has particular reference to the preparation of an asphalt mix.

The principal object of the invention is to provide an arrangement for evenly and rapidly coating sand and gravel with a bituminous liquid.

Another object of the invention is to provide an arrangement for quickly and simply heating stone and gravel to a high temperature prior to adding a bituminous liquid, to obtain a firm bind between the liquid and the stone and gravel.

An additional object of the invention is to utilize steam pressure for quickly elevating sand and gravel to a mixing chamber while simultaneously imparting heat thereto.

With the above and other objects and advantageous features in view, the invention consists of a novel method and apparatus more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more specifically defined in the claims appended thereto.

In the drawings,

Fig. 1 is a diagrammatic view of one embodiment of my invention;

Fig. 2 is a bottom plan view of the disperser of Fig. 1 on the line 2—2 thereof; and

Fig. 3 is a view of the asphalt jet positions on line 3—3 of Fig. 1.

It has been found advantageous to provide an arrangement by which sand and gravel fed into a hopper at ground level are elevated to a higher level by means of steam pressure, the steam heating the sand and gravel during the elevation to a high temperature, whereby the heated sand and gravel may then be gravity fed into a mixing chamber into which liquid asphalt is injected to be thoroughly mixed with the sand and gravel in a cyclonic whirl produced by a further injection of directed high pressure steam. To this end, I arrange a series of hoppers at different levels from the ground connected by pipes provided with injection nozzles for steam, and I initially place a load of sand and gravel in the lower level hopper. Steam is injected at both high and low pressure, the low pressure steam being for the purpose of heating the sand and gravel and the high pressure steam being periodically injected to propel and elevate the heated sand and gravel through the pipes and into the hoppers, the highest level hopper functioning as a supply bin from which the heated sand and gravel falls down by gravity into a mixing chamber, where it is dispersed and whirled around by a directed stream of high pressure steam and thoroughly mixed with asphalt liquid injected into the mixing chamber, whereby a mixed asphalt product of high quality is obtained.

Referring to the drawings, Fig. 1 illustrates a preferred arrangement of apparatus for carrying out the process, consisting of a lower hopper bin **10**, an intermediate hopper bin **11** positioned at a higher level and connected to the lower hopper bin **10** by a conduit **12**, and an upper hopper bin **13** positioned at a suitable level above the intermediate

hopper bin **11**, to which it is connected by a conduit **14** and which is set to discharge into a mixing chamber **15**.

The lower hopper bin **10** is cone shaped at its lower end, as illustrated, and is provided with heating jets **16**, **17** leading thereinto and carrying heating steam from a source, not shown, for heating the sand and gravel within the bin, and a syphon jet **18** carrying steam under high pressure positioned at the lower section of the bin and directed upwardly into the conduit **12**, whereby steam at high pressure will propel the sand and gravel upwardly through the tubing **12** and into the intermediate hopper bin **11**, the waste steam escaping through a vent **19**.

The intermediate hopper bin **11** also is cone shaped at its lower end and has steam heating jets **20**, **21** for injecting steam into the bin to keep the sand and gravel hot and a second siphon jet **22** carrying high pressure steam for propelling the sand and gravel, while keeping it hot through the conduit **14** and upwardly into the upper hopper bin **13**, the waste steam escaping through a vent **23**.

The upper hopper **13** has two heating jets **24**, **25** for pouring steam into the sand and gravel to maintain the sand and gravel hot, and has a cone shaped lower portion with a trap door **26** which is operatively opened by a control **27**, whereby the hot sand and gravel are allowed to pass into the mixing chamber **15** over a disperser **28** which is conical in shape and has its base **29** formed with arcuate shaped guide surfaces **30**, see Fig. 2.

The mixing chamber includes a funnel **31** centrally positioned under the disperser **28**, a V-shaped floor **32** with a central opening **33** having a trap door **34** operatively opened by a control **35** for passage of the contents from the mixing chamber, asphalt jets **36** tangentially positioned as illustrated in Fig. 3 for injecting hot liquid asphalt into the chamber in a circular spray, a steam jet **37** for shooting steam under high pressure up through the funnel **30**, and a vent chamber **38** leading to atmosphere and concentric with the upper bin **13**.

The operation of my invention may now be explained. Sand and gravel are fed into the lower bin and heated by steam from the heating jets. Periodically, after a substantial amount of heat has thus been added, steam under high pressure is injected through the siphon jet to force the sand and gravel up through the conduit into the intermediate bin, where the procedure is repeated and hot sand and gravel are elevated to the upper bin. Heat is again applied to the sand and gravel in the high bin, the heated sand and gravel being periodicaliy allowed to flow through the trap door by gravity into the disperser in the mixing chamber. As the hot sand and gravel fall into the mixing chamber, a continuous blast of steam under high pressure is forced through the mixing chamber funnel and against the base of the conical disperser to set up a cyclonic whirl within the mixing chamber and thus to churn up the hot sand and gravel with hot liquid asphalt, which is injected into the mixing chamber at an angle to intensify the whirling movement of the mixture within the mixing chamber. The sand and gravel are thus thoroughly mixed and coated with asphalt, whereby a high quality mix suitable for pavements is provided, the mix being poured through the mixing chamber trap door and into a conveyer receptacle as desired.

My invention thus includes a novel method and a novel arrangement for preparing an asphalt mix suitable for pavements and the like, which has no moving mechanical parts, is simple and economical in operation, and provides a uniform product of high quality.

Although I have described a specific embodiment of my invention, it is obvious that changes in the size, shape and arrangement of the parts may be made to meet other mix requirements without departing from the spirit and the scope of the invention as defined in the appended claims.

My invention has the advantage that dust and the like

becomes entrained in the heating steam and is conveyed through the apparatus into the final mix, without spreading through the air and creating a neighborhood dust problem.

I claim:

1. The method of manufacturing an asphalt mix comprising the steps of heating a mixture of sand and gravel, elevating the heating mixture to a storage chamber, periodically releasing heated mixture from the storage chamber, dispersing the released heating mixture and conducting the dispersed mixture into a mixing chamber, and whirling the dispersed mixture in the mixing chamber while simultaneously injecting liquid asphalt into the whirling dispersed mixture, whereby a thoroughly dispersed sand, gravel and asphalt mixture for pavements is formed.

2. The method of claim 1, including the step of heating the sand and gravel mixture with steam.

3. The method of claim 2, including the step of elevating the heated sand and gravel mixture with high pressure steam.

4. The method of claim 3, including the step of whirling the sand and gravel mixture with steam.

5. An apparatus for manufacturing an asphalt mix for pavements consisting of means for heating sand and gravel, means for elevating the heated sand and gravel, means for periodically dispersing the elevated heated sand and gravel, a mixing chamber, means for passing the dispersed sand and gravel into the mixing chamber, means for whirling the dispersed sand and gravel within said mixing chamber, and means for simultaneously injecting liquid asphalt into the whirling sand and gravel, whereby an asphalt mix for pavements is formed.

6. An apparatus for manufacturing an asphalt mix for pavements consisting of means for heating sand and gravel, means for propelling and elevating the heated sand and gravel by high pressure steam, means for periodically dispersing the elevated heated sand and gravel, a mixing chamber, means for passing the dispersed sand and gravel into the mixing chamber, means for whirling the dispersed sand and gravel within said mixing chamber, and means for simultaneously injecting liquid asphalt into the whirling sand and gravel, whereby an asphalt mix for pavements is formed.

7. An apparatus for manufacturing an asphalt mix for pavements consisting of means for heating sand and gravel, means for elevating the heated sand and gravel, means for periodically dispersing the elevated heated sand and gravel, a mixing chamber, means for passing the dispersed sand and gravel into the mixing chamber, means including high pressure steam for whirling the dispersed sand and gravel within said mixing chamber, and means for simultaneously injecting liquid asphalt into the whirling sand and gravel, whereby an asphalt mix for pavements is formed.

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