(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 679 724 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.01.2014 Bulletin 2014/01

(51) Int Cl.:
E01C 19/05 *(2006.01)* ***E01C 19/10*** *(2006.01)*
F26B 23/02 *(2006.01)*

(21) Application number: **12174361.1**

(22) Date of filing: **29.06.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) Asphalt production arrangement and a method for heating a drier drum in an asphalt production arrangement

(57) The present invention relates to an asphalt production arrangement (1) for preparation of an asphalt mixture. The arrangement (1) comprises a hollow drier drum (2), adapted to hold an aggregate for an asphalt mixture, and a heat source (3) arranged in connection with said drier drum (2). The heat source (3) is adapted to heat said drier drum (2), such that said aggregate is heated to a desired temperature. The heat source (3) comprises a pellets combustion device (4) adapted to bum wood or biomass, or pellets, or pulverized pellets of wood or biomass in order to generate said heat. The present invention further relates to a method for heating a drier drum (2) in such an asphalt production arrangement (1).

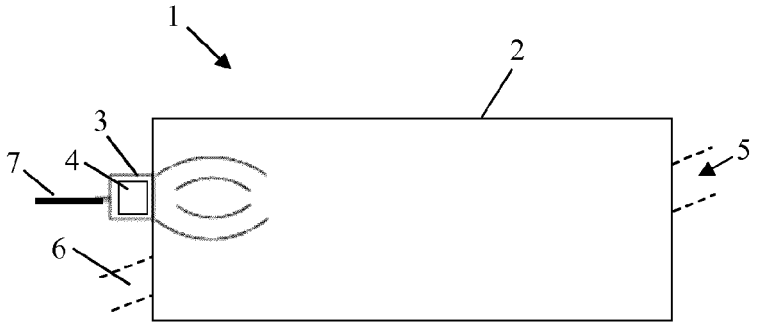

FIG. 1

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Description

Field of the invention

[0001] The present invention generally relates to an asphalt production arrangement and a method for preparing an asphalt mixture, for subsequent intermediate storage and future spreading on a road or the like. The present invention specifically relates to an asphalt production arrangement and a method for heating a drier drum in an asphalt production arrangement for preparation of an asphalt mixture, according to the preambles of the independent claims.

Background of the invention

[0002] Asphalt is basically a mixture of aggregate and a binder, and is used as a surface course, binder course and/or base course on for example roads, airports, parking sites, etc. Generally, when preparing an asphalt mixture a predetermined amount of aggregate, e.g. from a raw material silo, is loaded onto a conveyer belt or the like, whereupon the aggregate is directed towards a drier. The drier preferably rotates during operation, and the aggregate is fed into a first upper end of the drier and is discharged from a second lower end. In the drier, the aggregate is exposed to heat and is heated to a temperature between 120 and 300 °C, such that the aggregate is dried. The heat is generated by a heat source in the drier. Thereafter, the aggregate is placed in a mixer where a heated binder, which usually is bitumen based, is provided in liquid form. Subsequently, the asphalt mixture is kneaded, at a process temperature of approximately 160 °C, to its final consistency, for subsequent intermediate storage and future spreading.

[0003] Today the heat source in the drier oftentimes is a burner, which usually is run on heavy oil, diesel, coal or propane gas. It is important that the temperature in the drier remains equal over the time.

[0004] In FR 2358966 A an example of a method for producing asphalt is disclosed. According to the method, an aggregate is heated without bitumen in a drying drum. Furthermore, the aggregate is mixed in a mixer.

[0005] The inventors of the present invention has identified a need for an improved method and arrangement for producing asphalt, and in particular an improved asphalt production arrangement and a method for heating a drier applicable in preparation of an asphalt mixture, which method and arrangement are less harmless to the environment and which makes use of an alternative energy source.

[0006] An object of the present invention to provide an asphalt production arrangement and a method for heating a drier in an asphalt production arrangement, which method and arrangement are more environmental friendly and provides improved working conditions.

[0007] Another object of the present invention is to provide an asphalt production arrangement and a method for heating a drier in an asphalt production arrangement wherein an alternative energy source is used, such that undesirable consequences of the burning of fossil fuels, such as high carbon dioxide emissions, is avoided.

[0008] A further object of the present invention is to provide an asphalt production arrangement and a method for heating a drier in an asphalt production arrangement, which provides equal temperature in the drier over the time in the short term perspective, and an equal temperature of the aggregate in a long term perspective.

Summary of the invention

[0009] The above-mentioned objects are achieved by the present invention according to the independent claim.

[0010] Preferred embodiments are set forth in the dependent claims.

[0011] In accordance with the present invention the asphalt production arrangement for preparation of an asphalt mixture comprises a hollow drier drum, adapted to hold an aggregate for an asphalt mixture, and a heat source arranged in connection with said drier drum. The heat source is adapted to heat said drier drum, such that said aggregate is heated to a desired temperature. The heat source comprises a pellets combustion device adapted to burn wood or biomass, or pellets, or pulverized pellets, of wood or biomass in order to generate said heat.

[0012] According to another aspect, the present invention relates to a method for heating a drier drum in an asphalt production arrangement. The method comprises the steps of:

- providing wood or biomass, or pellets, or pulverized pellets, of wood or biomass to said heat source;
- generating heat by combustion of said wood or biomass, or pellets, or pulverized pellets, in said heat source;
- applying heat to drier drum to heat an aggregate within said drier drum.

Short description of the appended drawings

[0013]

Figure 1 shows an asphalt production arrangement comprising a drier drum and a heat source according to one embodiment of the present invention.

Figure 2 shows an asphalt production arrangement comprising a drier drum and a heat source according to another embodiment of the present invention.

Figure 3 shows a method for heating a drier drum in an asphalt production arrangement according to another embodiment of the present invention.

Detailed description of preferred embodiments of the invention

[0014] Figure 1 shows an asphalt production arrangement 1 for preparation of an asphalt mixture, according to one embodiment of the present invention. The arrangement 1 comprises a hollow drier drum 2, adapted to hold an aggregate for an asphalt mixture and a heat source 3 arranged in connection with the drier drum 2. The heat source 3 is adapted to heat the drier drum 2, such that the aggregate is heated to a desired temperature. The desired temperature is between 120-300°C, and preferably between 180-280°C. The heat source 3 comprises a pellets combustion device 4 adapted to burn wood or biomass, or pellets, or pulverized pellets, of wood or biomass in order to generate the heat. The drier drum 2 may be provided with an inlet 5 for receiving an aggregate and an outlet 6 for discharging the aggregate from the drier drum 2. The pellets, or pulverized pellets, are fed to the pellets combustion device 4 via a supply line 7. The desired temperature is dependent on, e.g. the moisture content of the aggregate. The desired temperature of the aggregate is obtained by regulating the amount of wood or biomass, or pellets, or pulverized pellets, being fed to the pellets combustion device 4.

[0015] According to one embodiment, the pellets have a predefined fraction. The predefined fraction is preferably between 0-3 mm.

[0016] According to one embodiment, as illustrated in Figure 2, the arrangement 1 comprises a pulverizing device 8 adapted to pulverize the pellets into a first predefined fraction 10. The first predefined fraction is less than 2 mm. The pulverizing device 8 comprises a plurality of cutting discs adapted to pulverize the pellets into the first predefined fraction 10. The first predefined fraction 10 comprises a second predefined fraction 11 which is less than 1 mm. In another embodiment, the pulverizing device 8 may comprise an impact crusher or a grinding device.

[0017] In the embodiment shown in Figure 2, the arrangement 1 further comprises a sifting device 9 adapted to sift the first predefined fraction 10, wherein the second predefined fraction 11 is separated from the first predefined fraction 10. The second predefined fraction is less than 1 mm. Thus, pulverized pellets of said first predefined fraction 10 having a greater fraction than 1 mm will remain in the pulverizing device 8 until a fraction of less than 1 mm is obtained. Burning pellets, or pulverized pellets with a predefined fraction less than 1 mm is advantageous in that the pellets, or pulverized pellets may be fed to the pellets combustion device 4 in a more precise amount than when feeding the pellets combustion device 4 with pellets, or pulverized pellets having a larger fraction, which ensures that the temperature is kept at an equal level in the drier drum 2 over a time period.

[0018] In Figure 2, the sifting device 9 comprises a wind sifter provided with a first blowing device 12, adapted to generate a first air flow 13 which is adapted to flow through the pulverized pellets of the first predefined fraction 10 in the sifting device 9, such that the first air flow 13 forces the second predefined fraction 11 to be separated from the first predefined fraction 10. Preferably, the second predefined fraction 11 is less than 1 mm.

[0019] According to the embodiment shown in Figure 2, the wind sifter comprises cyclone separator 14 adapted to separate the second predefined fraction 11. The cyclone separator 14 is adapted to exhaust pulverized pellets of the second predefined fraction 11 from the sifting device 9 by suction. The fraction of the pulverized pellets which are exhausted from the sifting device 9 depends on the flow rate of the air flow. The greater the flow rate is, the larger the fraction of the pulverized pellets obtained is.

[0020] In another embodiment, the sifting device 9 comprises a rotary feeder 16 adapted to feed the second predefined fraction 11 to the buffer silo 20. The rotary feeder preferably comprises a rotating disc.

[0021] According to the embodiment shown in Figure 2, the arrangement 1 comprises a dosing device 17 adapted to deliver a predetermined amount of pellets, or pulverized pellets of predefined fraction 10, 11 to the pellets combustion device 4. The arrangement 1 may further comprise a compressor 18 adapted to aid in transporting pellets, or pulverized pellets of the second predefined fraction 11, via said supply line 7, to said pellets combustion means 4, and a feeding means 19 adapted to feed pellets, or pulverized pellets of the second predefined fraction 11 from said dosing device 17 to said supply line 7.

[0022] Furthermore, according the embodiment shown in Figure 2, the arrangement 1 comprises a buffer silo 20 adapted to store a minimum amount of pellets, or pulverized pellets of said second predefined fraction 11, wherein the minimum amount of pellets, or pulverized pellets of said second predefined fraction 11 being stored is approximately between 5-20 m^3, and preferably 12 m^3. Storing a minimum amount of pellets, or pulverized pellets of said second predefined fraction 11 in a buffer silo 20 ensures that an equal amount of pellets, or pulverized pellets of said second predefined fraction 11 is fed to the pellets combustions device 4 over a time period. The buffer silo 20 may further comprise a level regulation device 21 which, depending on the amount of pellets, or pulverized pellets of said second predefined fraction 11 present in the buffer silo 20, regulates the amount of pellets being fed to the pulverizing device 8. This also helps to ensure that the feeding of pellets, or pulverized pellets of said second predefined fraction 11 to the pellets combustion device 4 remains equal over a time period.

[0023] In the embodiment shown in Figure 2, the arrangement 1 further comprises a storage silo 22 adapted to store pellets. Preferably the pellets is provided to the pulverizing device 8 via a feeder screw 23 or by any other suitable feeding means.

[0024] According to another aspect, the present invention further relates to a method for heating a drier drum

2 in an asphalt production arrangement 1. According to the embodiment shown in Figure 3, the method comprises the steps of:

- providing wood or biomass, or pellets, or pulverized pellets, of wood or biomass to the heat source 3;
- generating heat by combustion of the wood or biomass, or pellets, or pulverized pellets, in the heat source 3;
- applying heat to drier drum 2 to heat an aggregate within the drier drum 2.

[0025] In one embodiment, the pellets provided to the heat source 3 has a predefined fraction.

[0026] According to another embodiment, the method further comprises the steps of:

- pulverizing the pellets into a first predefined fraction 10;
- burning pulverized pellets of the first predefined fraction 10.

[0027] In another embodiment, the method further comprises the step of:

- sifting the pulverized pellets of the first predefined fraction 10, wherein pulverized pellets of a second predefined fraction 11 is separated.

[0028] In another embodiment, the method further comprises the step of:

- burning pulverized pellets of the second predefined fraction 11.

[0029] In yet another embodiment, the method further comprises the step:

- dosing the pellets, or pulverized pellets, of the predefined fraction, such that a predetermined amount of pellets, or pulverized pellets, of the predefined fraction is fed to the pellets combustion device 4.

[0030] Thus, the heat source 3 comprising the pellets combustion device 4 preferably bums pellets of said second predefined fraction 11. However, the pellets combustion device 4 may burn pellets of any other fraction. The advantage of burning pellets of the second predefined fraction 11 is that it facilitates keeping the temperature in the drier drum 2 at an equal level over a time period. The reason for keeping an equal temperature over the time in the drier drum 2 is to provide an exact temperature of the final product, i.e. the asphalt mixture, which is advantageous in that the asphalt provides for improved durability.

[0031] The present invention is not limited to the above-described preferred embodiments. Various alternatives, modifications and equivalents may be used. Therefore, the above embodiments should not be taken as limiting the scope of the invention, which is defined by the appending claims.

Claims

1. Asphalt production arrangement (1) for preparation of an asphalt mixture, said arrangement comprising:

   - a hollow drier drum (2), adapted to hold an aggregate for an asphalt mixture;
   - a heat source (3) arranged in connection with said drier drum (2), and adapted to heat said drier drum (2), such that said aggregate is heated to a desired temperature,

   characterized in that said heat source (3) comprises a pellets combustion device (4) adapted to burn wood or biomass, or pellets, or pulverized pellets, of wood or biomass in order to generate said heat.

2. Asphalt production arrangement according to claim 1, wherein said pellets have a predefined fraction.

3. Asphalt production arrangement according to claim 2, wherein said predefined fraction is between 0-3 mm.

4. Asphalt production arrangement according to any of claims 1-3, wherein said arrangement comprises a pulverizing device (8) adapted to pulverize said pellets into a first predefined fraction (10).

5. Asphalt production arrangement according to claims 4, wherein said pulverizing device (8) comprises a plurality of cutting discs adapted to pulverize said pellets into said first predefined fraction (10).

6. Asphalt production arrangement according to any of claims 4-5, wherein said arrangement (1) comprises a sifting device (9) adapted to sift said first predefined fraction (10), wherein a second predefined fraction (11) is separated from said first predefined fraction (10).

7. Asphalt production arrangement according to claim 4, wherein said second predefined fraction (11) is less than 1 mm.

8. Asphalt production arrangement according to any of claims 6-7, wherein said sifting device (9) comprises a wind sifter provided with a blowing device (12), adapted to generate a first air flow (13) which is adapted to flow through said pulverized pellets of said first predefined fraction (10) in said sifting device (9) such that said first air flow (13) forces said second predefined fraction (11) to be separated from the first

predefined fraction (10).

9. Asphalt production arrangement according to claim 8, wherein said wind sifter comprises cyclone separator (14) adapted to separate said second predefined fraction (11).

10. Asphalt production arrangement according to any of claims 1-9, wherein said arrangement (1) comprises a dosing device (17) adapted to deliver a predetermined amount of pellets, or pulverized pellets, of a predefined fraction to said pellets combustion device (4).

11. Method for heating a drier drum (2) in an asphalt production arrangement (1) according to claims 1-10, said method comprising the steps of:

- providing wood or biomass, or pellets, or pulverized pellets, of wood or biomass to said heat source (3);
- generating heat by combustion of said wood or biomass, or pellets, or pulverized pellets, in said heat source (3);
- applying heat to drier drum (2) to heat an aggregate within said drier drum (2).

12. Method according to claim 11, wherein said method further comprises the steps of:

- pulverizing said pellets into a first predefined fraction (10);
- burning pulverized pellets of said first predefined fraction (10).

13. Method according to claim 12, wherein said method further comprises the step of:

- sifting said pulverized pellets of said first predefined fraction (10), wherein pulverized pellets of a second predefined fraction (11) is separated.

14. Method according to claim 13, wherein said method further comprises the step of:

- burning pulverized pellets of said second predefined fraction (11);

15. Method according to any of claims 11-14, wherein said method further comprises the step of:

- dosing said pellets, or pulverized pellets, of said predefined fraction (10, 11), such that a predetermined amount of pellets, or pulverized pellets, of said predefined fraction (10, 11) is fed to said pellets combustion device (4).

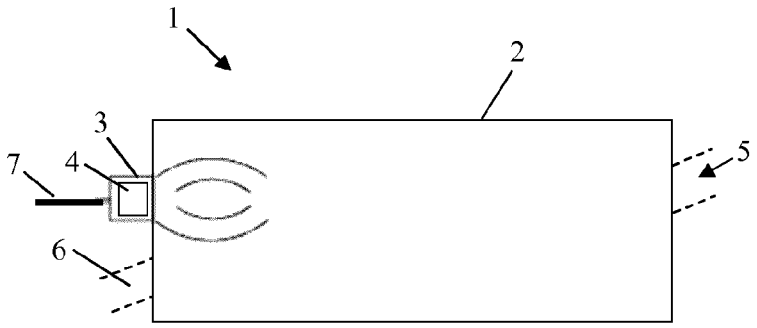

FIG. 1

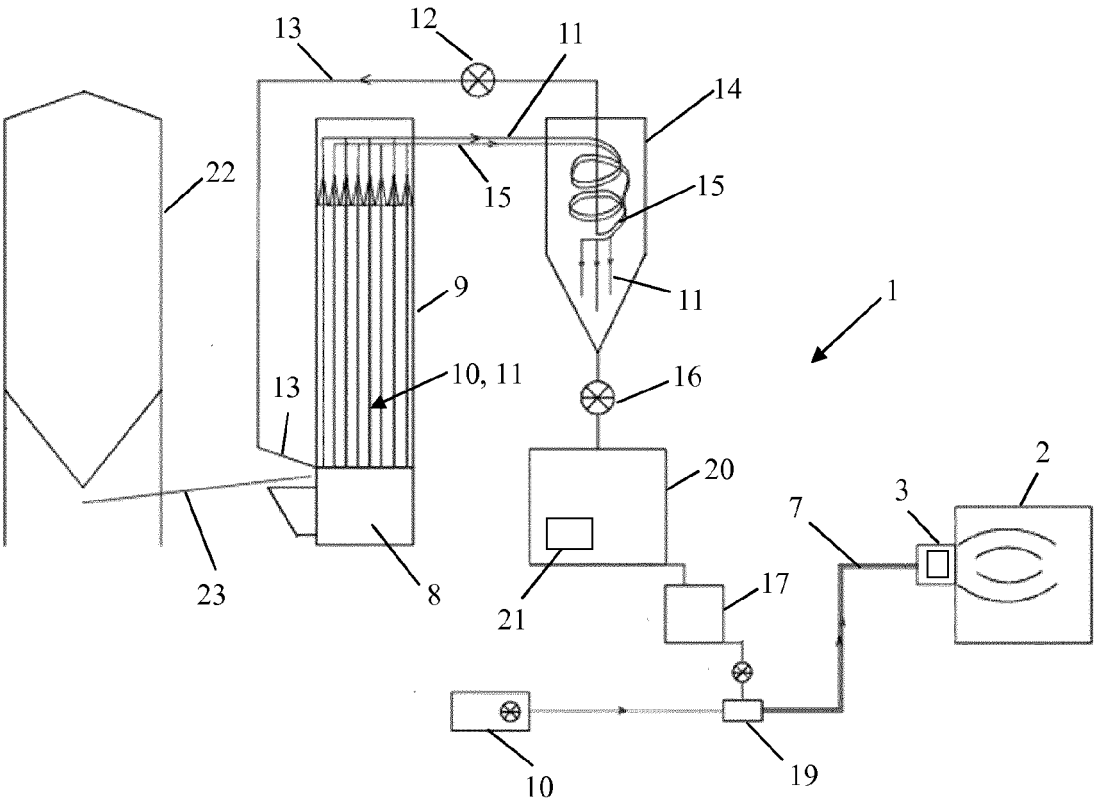

FIG. 2

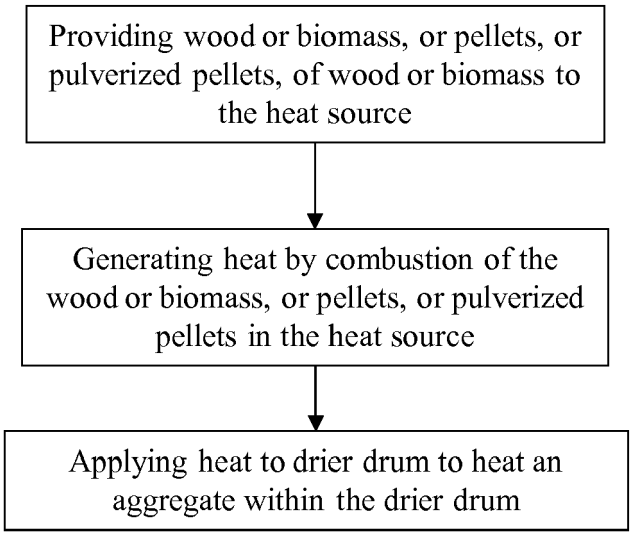
Providing wood or biomass, or pellets, or pulverized pellets, of wood or biomass to the heat source
Generating heat by combustion of the wood or biomass, or pellets, or pulverized pellets in the heat source
Applying heat to drier drum to heat an aggregate within the drier drum

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 4361

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 351 251 A (BRASHEARS DAVID F) 28 September 1982 (1982-09-28) * the whole document * -----	1-5,11, 12	INV. E01C19/05 E01C19/10 F26B23/02
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TECHNICAL FIELDS SEARCHED (IPC)

E01C
F26B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 November 2012	Flores Hokkanen, P

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 17 4361

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28-11-2012

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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