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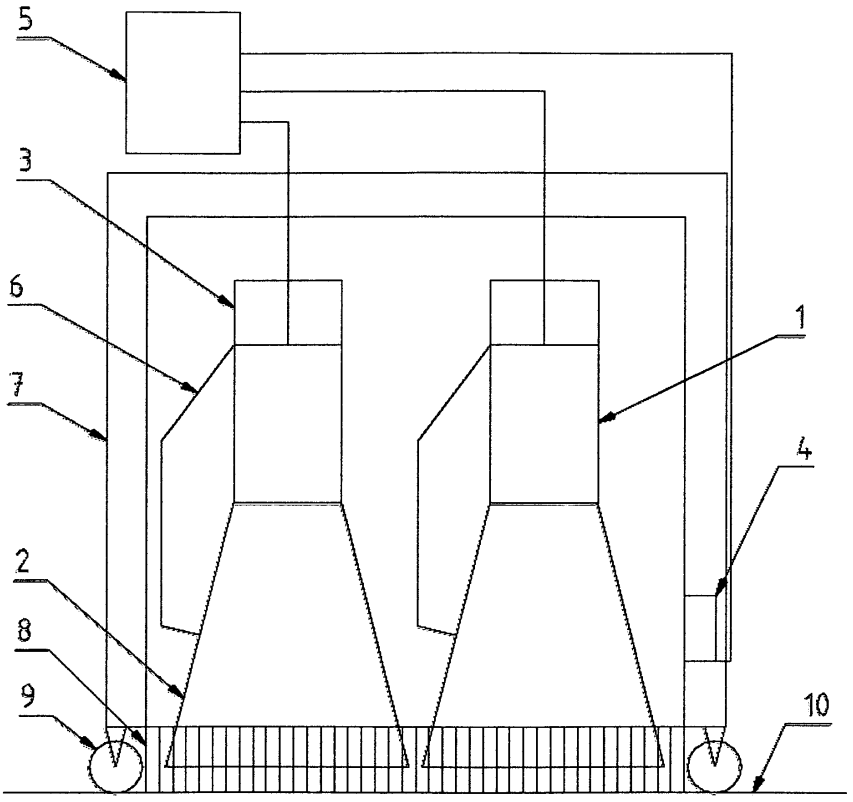
(54) **Equipment for microwave heating of reconditioned asphalts roads**

(57) A microwave heating equipment for asphalt road repairs, containing two microwave heating units (11), which are located in a mobile frame (7). The heat source of each heating unit (11) is a magnetron (1), which generates microwave radiation at the frequency of 2.45 GHz. Next to the magnetron (1), there is a waveguide (2) designed to guide and aim the microwave radiation from the magnetron (1) to the repaired spot on the road (10). Further, the heating unit (11) contains a fan (3) to cool the magnetron (1) and to divert the heat from its surroundings towards the waveguide (2). The mobile frame (7) is equipped with casters (9) and a chain screen (8) to prevent the escape of microwave radiation. The source of energy can be the electricity supplied by the ordinary means (230/400 V) or by a mobile power unit.



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Description

FIELD OF TECHNOLOGY

[0001] This Utility Model applies to a microwave heating equipment for asphalt road repairs, especially for the repairs of potholes or cracks in asphalt roads. Heating of the repaired spots in asphalt roads using this equipment ensures homogeneous joining of the added mixture with the original asphalt surface of the road.

EXISTING STATE-OF-ART

[0002] At present, asphalt roads are repaired without heating the area around the repaired spot, or with the heating applied immediately before adding the asphalt mixture into the damaged spot in the road, which is more expensive. When the area around the repaired spot in an asphalt road is not heated, a water-permeable line forms between the new and the original asphalt surface of the road. This causes yet further damage to the road, starting right in this permeable line. Therefore, the repairs of asphalt roads are more frequently performed with heating applied on the repaired spots, which ensures a significantly higher quality of the repair. The heating is performed either using the devices with gas burners, mostly propane-butane, or more sophisticated equipment that uses infra-red radiation. In both cases, the heat is transferred to the subsurface layer of the repaired spot through penetration. However, this method of heat transfer causes overheating of the surface layer and results in non-ecological asphalt burning. This leads to excessive energy demand for heating, which significantly increases the cost of asphalt road repairs. Probably, there have already been some attempts to use electromagnetic heating and melting of asphalt materials and mixtures, which is proven e.g. by published patent application file PV 1999-4074. This file contains a general description of this method of heating asphalt materials and mixtures as well as basic schematic drawings of model equipment for this type of heating. However, the subject-matter of the above patent application is the use of the well-known nature of microwave heating to heat and melt asphalt mixtures. The description and schematic drawings do not represent any specific design of equipment fit for such heating, especially as regards the operating ability, mobility, and safety, and they do not contain any specific design of a microwave heating equipment for asphalt road repairs. That is why microwave radiation is still not used for local heating of repaired asphalt roads. Therefore, it is desirable to develop a microwave equipment that will ensure the optimum heating of the repaired spot on the road, lower energy demand, maximum safety for the operator, and reduction of the negative impact on the environment.

NATURE OF THE TECHNICAL SOLUTION

[0003] The aim stated above is fulfilled by the microwave heating equipment for asphalt road repairs under this Utility Model, which contains at least one magnetron with a waveguide. The nature of the technical solution of the equipment consists in the fact that each magnetron with a waveguide is equipped with a fan to cool the magnetron and divert heat from its surroundings. The heat from the surroundings of the magnetron is removed through an adjacent channel to the area of the waveguide. Each set of a magnetron with a waveguide, fan and adjacent heat diversion channel forms an independent integrated heating unit. The required number of units is mounted in a mobile frame, which is equipped with casters. Around the circumference of the bottom of the mobile frame there is a chain screen to prevent the escape of microwave radiation. The heating unit is secured by a system of safety switches, which are connected with the control unit of this equipment. The microwave heating equipment for asphalt road repairs under this Utility Model represents a new and efficient device for heating of the repaired spots, whose integration in the process of repairs of asphalt roads will ensure significant improvement in the quality of repairs and consequently a better durability of the repaired spots.

REPRESENTATION IN THE DRAWING

[0004] The attached schematic drawing represents a model design of the microwave heating equipment for asphalt road repairs under this Utility Model.

SEQUENCE LISTING PART OF DESCRIPTION

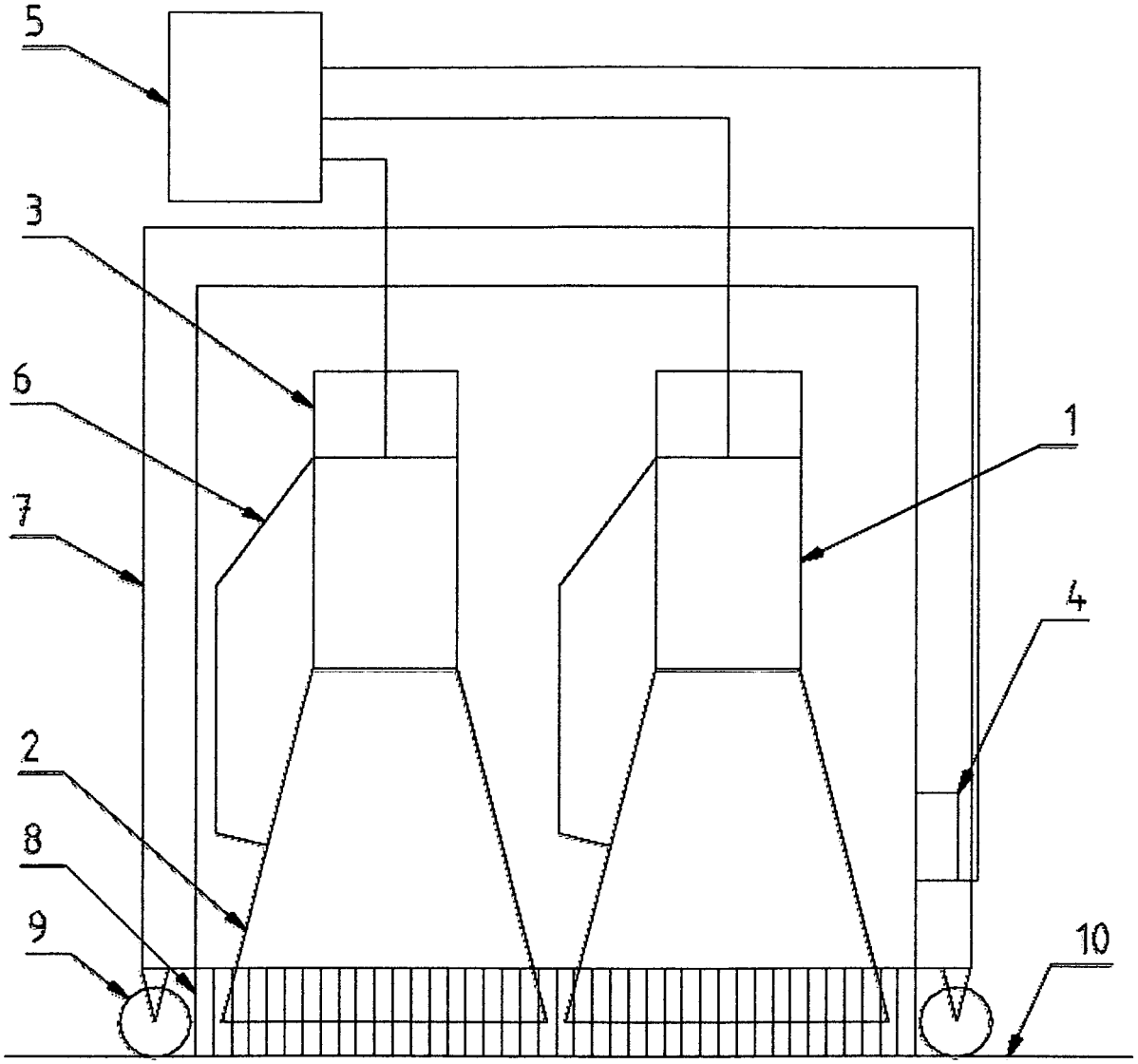
[0005]

1) Magnetron
2) Waveguide
3) Fan
4) Set of safety switches
5) Control unit
6) Channel for heat removal
7) Mobile frame
8) Chain screen
9) Casters
10) Road under repair
11) Heating unit

Claims

1. Microwave heating equipment for asphalt road repairs, containing at least one magnetron with a waveguide, **wherein** in each magnetron (1) with a waveguide (2) is equipped with a fan (3) to cool the magnetron (1) and to divert the heat from its surroundings through a channel (6) towards the

waveguide (2), and this set constitutes an integrated heating unit (11), which is located in a mobile frame (7) equipped with casters (9) and a chain screen (8) around the bottom circumference, which prevents the escape of microwave radiation and fits close to the road under repair (10), wherein the heating unit (11) is secured by a set of safety switches (4) connected to the control unit (5) of this equipment.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EUROPEAN SEARCH REPORT

Application Number
EP 11 46 6015

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	CN 2 701 906 Y (GUANGDONG MIDEA GROUP CO LTD [CN]) 25 May 2005 (2005-05-25) * the whole document *	1	INV. E01C23/14
Y	US 4 319 856 A (JEPPSON MORRIS R) 16 March 1982 (1982-03-16) * column 13, line 19 - column 22, line 45 * * figures 7-11 *	1	
A	DE 101 21 929 A1 (DUNGER RUEDIGER [DE]) 3 January 2002 (2002-01-03) * paragraph [0001] - paragraph [0020] * * figures 1,3 *	1	
A	GB 2 024 291 A (JEPPSON M) 9 January 1980 (1980-01-09) * page 6, line 111 - page 9, line 38 * * figure 6 *	1	
			TECHNICAL FIELDS SEARCHED (IPC) E01C H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 March 2012	Kremsler, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 46 6015

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-03-2012

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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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Patent documents cited in the description

- WO PV19994074 A **[0002]**