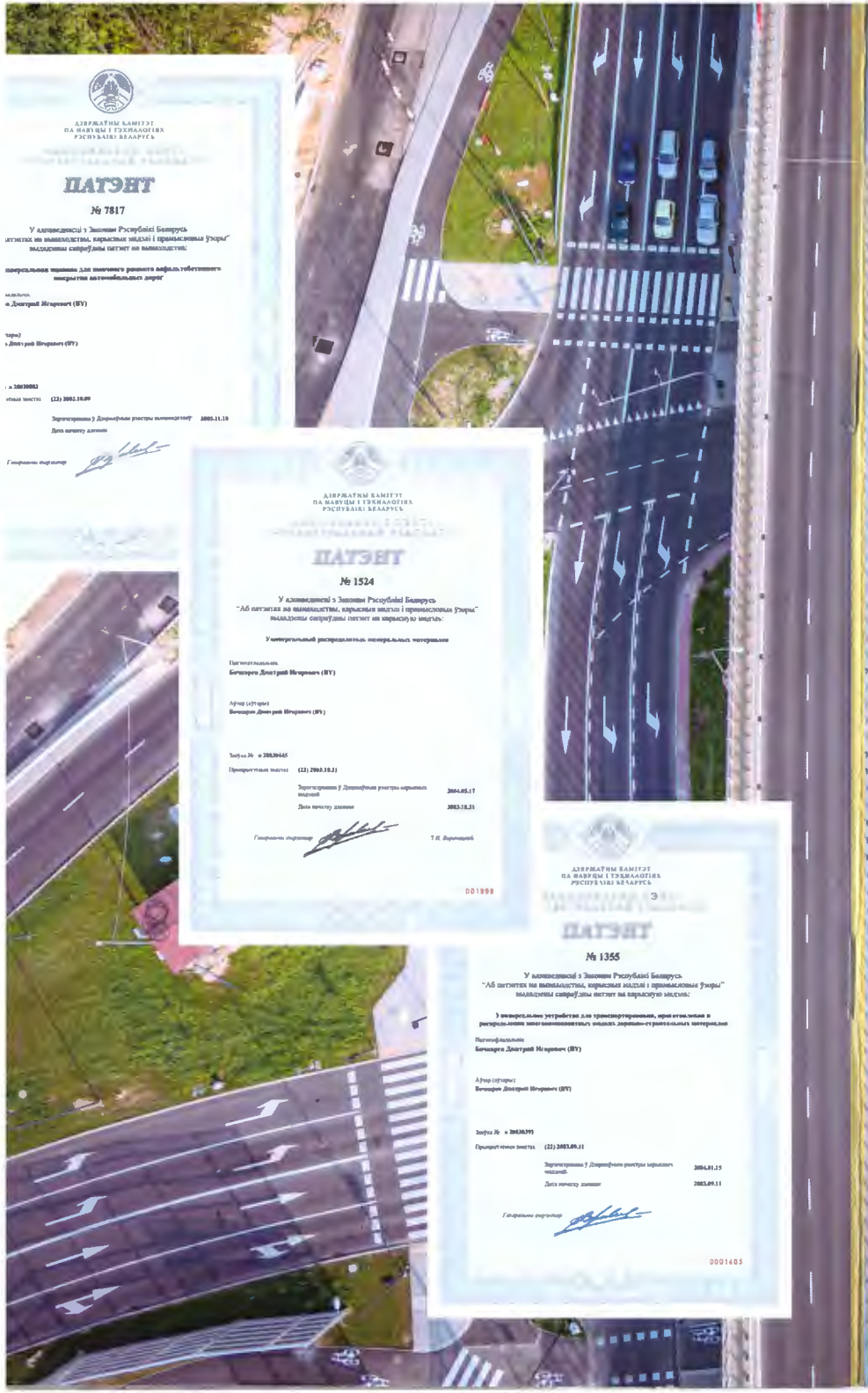

ДЗЯРЖАЎНЫ КАМІТЭТ
ПА НАВУЦЫ І ТЭХНАЛОГІЯХ
РЭСПУБЛІКІ БЕЛАРУСЬ

ПАТЭНТ

№ 7817

У адпаведнасці з Законам Рэспублікі Беларусь
...ктах на вынаходства, карысныя мадэлі і прамысловыя ўзоры"
выдадзены сапраўдны патэнт на вынаходства:

...перасільная машына для паточнага рамонта асфальтабетоннага
покрыцця автамабільных дарог

...а Дмитрий Игоревич (BY)

...ч Дмитрий Игоревич (BY)

...(22) 2002.10.09

Зарегістравана ў Дзяржаўным рэестры вынаходстваў 2005.11.10
Дата пачатку дзеяння

Галоўны дырэктар

ДЗЯРЖАЎНЫ КАМІТЭТ
ПА НАВУЦЫ І ТЭХНАЛОГІЯХ
РЭСПУБЛІКІ БЕЛАРУСЬ

ПАТЭНТ

№ 1524

У адпаведнасці з Законам Рэспублікі Беларусь
"Аб патэнтах на вынаходствы, карысныя мадэлі і прамысловыя ўзоры"
выдадзены сапраўдны патэнт на карысную мадэль:

Універсальный распределитель минеральных материалов

Патэнтаабладальнік
Бочкарев Дмитрий Игоревич (BY)

Аўтар (аўтары)
Бочкарев Дмитрий Игоревич (BY)

Заяўка № a 20030445

Прыярытэтныя звесткі (22) 2003.10.31

Зарегістравана ў Дзяржаўным рэестры карысных мадэлей 2004.05.17
Дата пачатку дзеяння 2003.10.31

Галоўны дырэктар Т.П. Варашылава

DD1999

ДЗЯРЖАЎНЫ КАМІТЭТ
ПА НАВУЦЫ І ТЭХНАЛОГІЯХ
РЭСПУБЛІКІ БЕЛАРУСЬ

ПАТЭНТ

№ 1355

У адпаведнасці з Законам Рэспублікі Беларусь
"Аб патэнтах на вынаходствы, карысныя мадэлі і прамысловыя ўзоры"
выдадзены сапраўдны патэнт на карысную мадэль:

Універсальное устройство для транспортирования, ориентации и
распределения многокомпонентных сыпучих дорожно-строительных материалов

Патэнтаабладальнік
Бочкарев Дмитрий Игоревич (BY)

Аўтар (аўтары)
Бочкарев Дмитрий Игоревич (BY)

Заяўка № a 20030395

Прыярытэтныя звесткі (22) 2003.09.11

Зарегістравана ў Дзяржаўным рэестры карысных мадэлей 2004.01.15
Дата пачатку дзеяння 2003.09.11

Галоўны дырэктар

DD1403

INNOVATIVE TECHNOLOGIES OF INCREASE IN PHYSICAL AND MECHANICAL PROPERTIES AND PRODUCTION CHARACTERISTICS OF ASPHALT CONCRETE SURFACING MATERIALS OF HIGHWAYS

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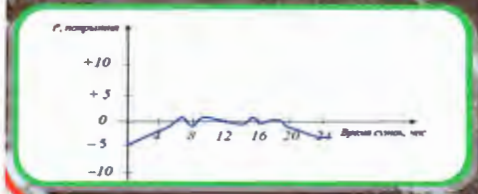
On a condition of highways affect

1. transport loads
2. weather and climatic factors

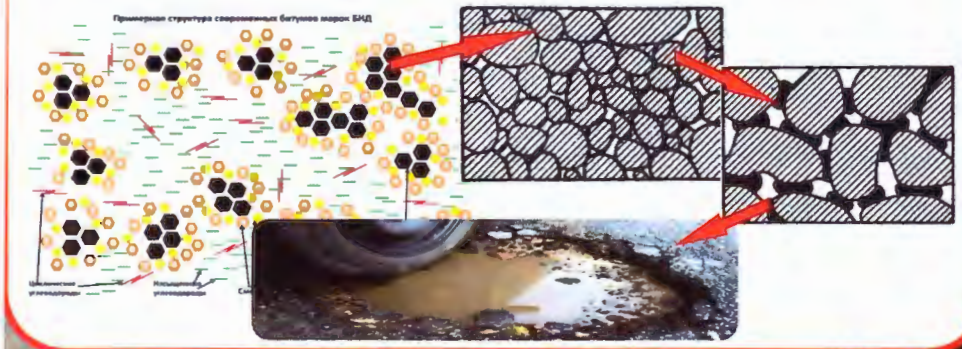
The most adverse effect makes moderately continental climate with the Atlantic cyclones (the damp winter, frequent temperature drops).

At the same time, increase in moisture content of asphalt concrete and the significant amount of transitions of temperature through 0 °C leads to increase in the destroying impact on surface.



Why there is a destruction of road surface?

Seasoning bituminous cement also influence of the water getting into material pores including to the emptiness of bitumen molecular lattice, leads to a spalling of the crushed stone cementing from the surface. At the same time, there is a hydration of volume bitumen and destruction of polar linkages in structure of asphalt concrete. Such destructive processes also influence of vehicles' wheels, cause cracking and removal from the surface layer the shallow particles of material. In a consequence, it leads to intensification of destruction process and emergence of holes on the surface.



QUALITY IMPROVING OF ROAD SURFACES CAN BE REACHED

At distribution of the hydrophobic structure for preventive processing of asphalt concrete coverings of highways allowing

1. To create on surface also in cracks and pores of asphalt concrete coverings an armor water-repellent layer
2. To reduce covering material water saturation
3. To increase frost resistance of surface material
4. To raise an adhesion coefficient with wheels of vehicles
5. To expand a range of oil industry waste application also formed in the sphere of production and consumption

For achievement of goals, the hydrophobic structure for preventive processing of asphalt concrete coverings of highways includes:

- the oil slime (oil processing waste) containing rubber – 50-80%;
- organic solvent – 5-7%;
- mineral filler – 8-16%;
- water-repellent – 7-27%.

The asphalt distributor realizes distribution on the surface of the highway

Comparative analysis of operating characteristics of asphalt concrete

Index	Pure asphalt concrete	Processed asphalt concrete
Water absorption, %	0,02	0,008-0,012
Frost resistance index	0,84	0,94-0,96
Adhesice capacity	0,52	0,54-0,56

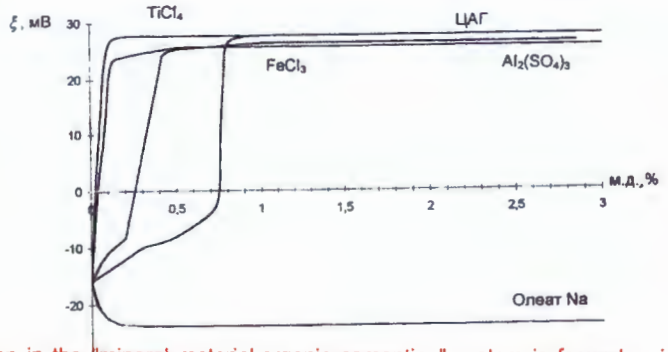
The cost of materials for processing of roads

Name	The surface processing of covering		Processing by preventive structure	
	Demand	Cost	Demand	Cost
1. Crushed stone of fraction 10-15 mm	11,5 kg/m²	10,0 $/t	–	–
2. Bituminous cationic emulsion	0,85 l/m²	325,0 $/t	–	–
3. Oil processing waste	–	–	0,52 l/m²	10,0 $/t
4. Organic solvent	–	–	0,05 l/m²	660,0 $/t
5. Mineral filler			0,15 kg/m²	20,0 $/t
5. Water repellent	–	–	0,03 l/m²	3300,0 $/t
Total costs of materials	0,39 $/m²		0,14 $/m²	

Preventive processing of asphalt concrete covering by the developed composition allows prolonging its endurance by 1.5 times also to increase by **10%** an adhesion coefficient with wheels of vehicles. Annual economic effect at processing 1 km of the highway of the 4th technical category is **6.52 thousand USD**. At processing of **100 km – 652.4 thousand USD**, that corresponds to payback period of equipment for obtaining preventive mixture **0.7 years or one season.**

What does activation consist in?

Processing of mineral materials cationic surfactant recharges the surface from the negative charge to positive; processing by anionic surfactant leads to increase in the negative charge of surface



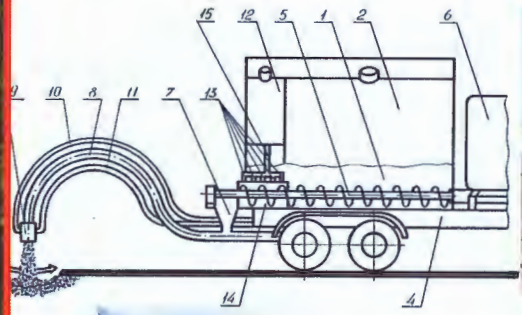
connection in the "mineral material-organic cementing" system is formed owing to chemical adsorption, rheological features of the connected materials also sticking of positively charged molecules of cationic bituminous emulsion to the negatively charged surface of granite crushed stone. Surface-active substances in designs of machines for implement processing of mineral material anionic surfactant increases contact strength up to 65% .

At use of the activated crushed stone

In asphalt concrete and emulsion and mineral mixes:
– increases strength by 1.3 - 1.5 times;
– decreases water saturation by 1.4 times;
– increases endurance of roads by 1.5 times.

In cement-concrete surfaces:
– concrete strength increases up to 40%;
– the frost resistance up to 35% increases;
– the cement share decreases by 15%

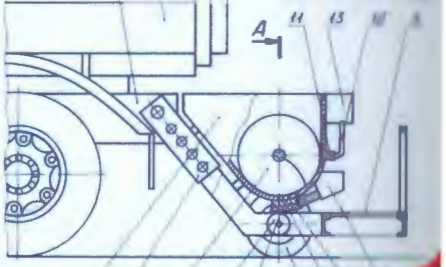
The activation technology of crushed stone:



– patch work

- efficiency is 20 sq.m/h,
- cost is $50,000

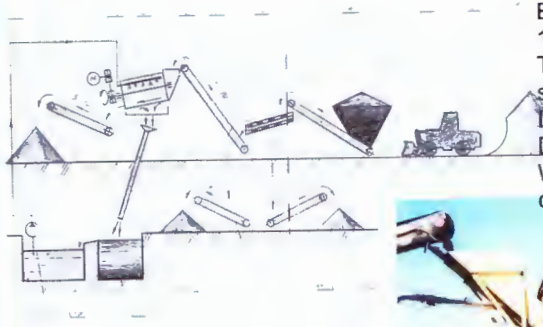
– the surface processing



It is the most efficient to make activation of again formed surface of granite mineral material immediately at subdivision in the centrifugal and impact breaker. Decrease in dust content of the air environment in operation zone of the breaker is also possible.

The amount of capital investments in case of modernization of the existing breaking and sorting line is $100,000
Working costs are $40,000 a year, a payback period is 1.3 years.

Activation of crushed stone is possible just before use on site at washing in installation for crashed stone sink



Efficiency of spalls washing line is 10-15 t/h;
The washed-out fractions of crushed stone: 5-10 mm, 10-15 mm;
Drive power – 4.0 kW;
Drum rotation frequency – 60 rpm;
Water discharge – 0.15 m3 on 1 m3 of crushed stone

The amount of capital investments at line building is $200,000.
Working costs are $40,000 a year.

Payback period is 2 years.

When using materials that do not contain bitumen binder - polymer-mineral composites

Tere is an increase in strength of 76%, a decrease in water saturation by 95% and swelling by 97%. It is possible to use this material as a coating for responsible local transport facilities operating in the most loaded conditions (bridges, overpasses, acceleration and deceleration lanes, etc.), as well as a material for all-weather patching

Comparative analysis of the performance characteristics of asphalt concrete and polymer-mineral composite

Physical and mechanical properties	Asphalt concrete			Polymer-mineral composite		
				Seal pressure, MPa		
	Type A	Type B	SCHMS	0,0	6,0	20,0
Average density, ?, t / m3	2,42	2,40	1,80	1,24	1,29	1,33
Strength at stretching, R^0_p, MPa	3,2	2,2	3,0	6,70	8,50	9,42
Water saturation, W,%	1,3	1,6	1,1	0,17	0,11	0,08
Swelling H,%	0,2	0,35	0,25	-	0,02	0,01

Technological process of surface laying from polymeric and mineral composite can be similar to asphalt concrete laying

Preparation polymeric and mineral composite is realized in the melting and mixing unit by mixing at t = 240 ... 250 °C of:

– mineral raw materials (sand, sifting) – 50%;
– binding (polypropylene, polyethylene, polystyrene etc.) – 47%;
– carbon – 1%;
– target additives – 2%