

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
3 February 2011 (03.02.2011)

PCT

(10) International Publication Number
WO 2011/014137 A1

(51) International Patent Classification:
B07B 4/02 (2006.01)

(21) International Application Number:
PCT/UA2009/000063

(22) International Filing Date:
7 December 2009 (07.12.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
u 2009 08072 31 July 2009 (31.07.2009) UA

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,

DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

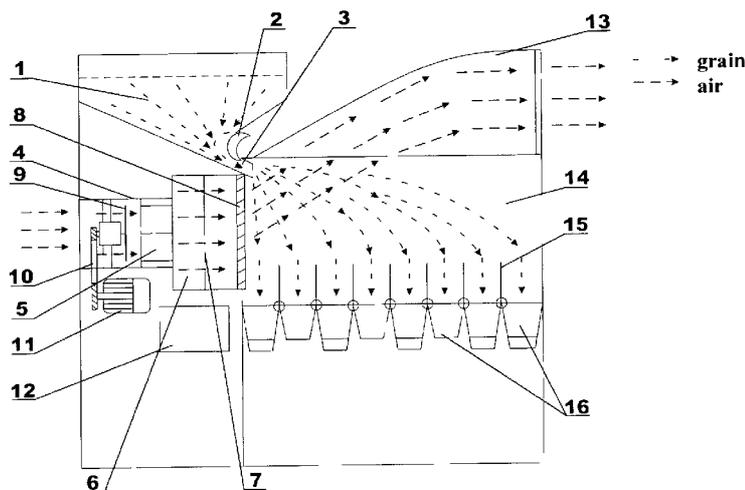
Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4.17(i))
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(H))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(Hi))

Published:

- with international search report (Art. 21(3))
- with amended claims and statement (Art. 19(1))

(54) Title: FRIABLE MIXTURES SEPARATING DEVICE



(57) Abstract: The invention relates to the field of separation of friable mixtures after a form and properties of the component particles' surfaces, can be use in agriculture and comprises a body, loading device, working element, separation chamber and drive unit. Working element is executed as high- circulating impeller, which is actuated by an electric motor, combined with a rectifier, static pressure chamber, set of deturbulization nets and air flow generator, incorporated in one block. The invention claimed allows increasing of air flow power, and also increasing of reliability and simplification of separator design.

WO 2011/014137 A1

FRIABLE MIXTURES SEPARATING DEVICE**TECHNICAL FIELD**

The present invention relates to the field of separating the friable
5 mixtures after a form and properties of the component particles' surfaces and
can be utilized in agriculture at cleaning of grain and products of its
processing, and also in food, chemical, mining, metallurgical and build
industries for separation of friable mixtures depending on mass, size and
form, on the base of the process of initial material blowing out in free falling
10 state.

BACKGROUND ART

The separator for the division of friable materials after the surface form
and properties is known (Journal "Тракторби Н селібно3МашиHHbi" ЖУ»2, 1964
p., p.27), which comprises a body, loading device, working element in
15 cylindrical rotor form with an internal dividing surface revolving in relation to
an axis which is installed under a corner to horizon, device for collection and
output the overhead faction, components of which have a higher coefficient of
friction, from the separator.

The lack of this known separator is that the device for collection and
20 output of a faction with the higher coefficient of friction uses a ditch with
internal auger, in which the particles of overhead faction can get only after
tearing away from the dividing surface of rotor in a point, near the overhead
point of cylinder. At the same time for the real friable mixtures a difference in
the coefficients of friction of overhead and lower faction (that is the faction
25 the components of which have a lower coefficient of friction) is small.
Hereupon producing the cylinder from traditional machine-building materials,
for example steel, the particles of overhead faction can not rise at a height
large enough for allowing collecting them in the ditch and output by the auger
from a separator. Therefore in the known separator the working element is a
cylinder, which has an internal dividing surface, covered by a smooth woolen

cloth (fleecy fabric "beta").

The most closely related to the invention of technical nature, purpose, results achieved, and chosen to be a prototype is the separator for the dividing friable mixtures by a form and properties of surface (Patent of Russian Federation N° 2287380, published 20.11.06), which comprises a body, loading device, working element, executed in the form of cylinder rotor with an internal dividing surface, device for the output of overhead fraction and drive unit. In this known device a device for the output of overhead fraction is executed as a slot cap, united by airway with the suction air system with the adjustable pressure.

This device however has some drawbacks. At first, a decline of air flow power takes place at the expense of total lack resistance of airway.

In addition, to the lacks of the above mentioned device low reliability and complicated design take place through the presence of plenty of structural elements and their connecting elements, and also through probability of getting into separator air inlet of shallow admixtures that are on the floor around a machine.

20 DISCLOSURE OF INVENTION

The aim put into the basis of the invention is to increase the air flow power, and also to simplify the separator construction.

For the accomplishment of the above mentioned objects the concerning friable mixtures separating device comprises a body, loading device, working element, separation chamber and drive unit. In accordance with an invention, working element is executed as high-circulating impeller, which is actuated by an electric motor, combined with a rectifier, static pressure chamber, set of deturbulization nets and air flow shaper, incorporated in one block. Meanwhile the loading device is executed as a bunker which contains mobile choke fastened on him.

In one preferred embodiment of the present invention the drive unit

contains an electric motor, movable jointed through a transmission belt with an airscrew with capability of its rotation, and also frequency transformer jointed with an electric motor with capability of turn frequency regulating.

5 According to another preferred embodiment of the present invention, the separator additionally comprises an electro-cabinet and reflector, movable jointed in a body, and the separation chamber contains trays and window shades connected with them with capability of turning.

The present invention provides increasing air flow power. Using the
10 impeller in the machines of such type allows to minimize air flow power reducing due to the total absence of air inlets resistance, which are not used, to eliminate getting into separator air inlet of shallow admixtures that are on the floor around a machine as an elements of the invention claimed are located in a high distance relative to the floor, and also to get grain warm flow
15 necessary for the effective drying without using additional devices which improves machine operating features. The impeller electric motor speed can be changed in wide range of rotation frequencies due to frequency transformer using.

The aim of increasing reliability and design simplification is achieved at
20 a present separator due to that the separator is based on using of high-speed impeller activated by the electric motor, which is combined with a rectifier, static pressure chamber, set of deturbulization nets and air flow generator, incorporated in one block. Meanwhile the impeller design allows air warming by the aerodynamic method for the further drying of material separated.

25 In addition, a device is provided by the supplying bunker, which does not need using of vibrating tray, which improves the separated grain supplying comparing to analogues equipped by vibrotray.

BRIEF DESCRIPTION OF DRAWINGS

30 Figure shows the general view of the separator.

BEST MODE FOR CARRYING OUT THE INVENTION

A separator comprises a body 17, loading device 3, separation chamber 14, working element in the form of high-speed impeller 4 operated by the electric motor 11, which is combined with a rectifier 5, static pressure chamber 6, set of deturbulization nets 7 and air flow shaper 8 incorporated in one block (see Figure). The loading device 3 is executed as a bunker 1, which contains mobile choke 2 fastened on him. Drive unit is executed as an electric motor 11 movable jointed through a transmission belt 10 with an airscrew 9 with capability of its rotation. An electro-cabinet 12 and reflector 13 are movable fastened in a body 17. Separation chamber 14 contains trays 16 and window shades 15 connected with said trays with capability of turning.

The invention operates as follows. Operation of the machine is based on the changing of free falling grain trajectory by the air flow from the impeller 4 and on the further distribution and division of initial material on faction depending on mass, size and form (see Figure).

The initial material, further "grain", is given in a bunker 1, is distributed on the width of tray 16 under its own weight and in such state is coming in the form of uniform stream into the separation chamber 14, where said grain is being stratificated and divided by mass, size and form due to impeller 4 air flow effecting grain (see Figure).

After separation from the receiving bunkers the grain is divided and packaged into bags. If necessary, part of grain can be sent through collections of reverse factions into the bunker 1 for reseparation.

Operation of the device is possible in five modes:

- 1- previous cleaning mode;
- 2- primary cleaning mode;
- 3- calibration mode;
- 4- warm air dry mode;
- 5- mixed mode (calibration, cleaning, drying simultaneously).

A separator is able to:

- 1 - separate grains of 3rd and 4th class from the six class grains (if they

are there);

2- separate grains, affected by dorn-bug and weevil;

3-refine wheat grains from wild oat and oat;

5 4-divide mixture of wheat and barley, up to 60% for one passage-way;

5-separate pea, affected by bruhus beetle;

6-separate rotten corn from healthy one;

7-dry 3%of grain simultaneously for one passage-way at his cleaning and calibration by the air flow;

10 8-separate from a general bulk the most viable, productive grains;

9-separate wheat grains which have enhanceable maintenance of gluten due to:

- ability of machine to select the grains with the biggest mass of 2 and 3 factions;

15 - selection of the most dense, executed and full weight grains with enhanceable maintenance of albumen and gluten.

10- dispersion on groats mill, dividing groats by sizes on seven factions.

Meanwhile:

- to remove meal giving groats the high ready sale;

20 - to handle practically all of types of agricultural production — from small-seeded (alfalfa, poppy, colza) to the corn, bobs and seed of sugar beet;

- to separate industrial friable materials (a shallow stone crumb for mineral plaster).

25 Thus, the invention clamed allows increasing of air flow power, and also increasing of reliability and simplification of separator design.

CLAIMS

1. Friable mixtures separating device comprises a body, loading device,
5 working element, separation chamber and drive unit, characterized in that the
working element is executed as high-circulating impeller, which is actuated
by an electric motor, combined with a rectifier, static pressure chamber, set of
deturbulization nets and air flow shaper, incorporated in one block, and the
loading device is executed as a bunker which contains mobile choke fastened
10 on him.

2. Separation device according to claim 1, characterized in that the drive
unit contains an electric motor, movable jointed through a transmission belt
with an airscrew with capability of its rotation, and also frequency
transformer jointed with an electric motor with capability of turn frequency
15 regulating.

3. Separation device according to claim 1-2, characterized in that the
separator additionally comprises an electro-cabinet and reflector, movable
jointed in a body, and the separation chamber contains trays and window
shades connected with them with capability of turning.

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AMENDED CLAIMS**received by the International Bureau on 01 June 2010 (01.06.2010)**

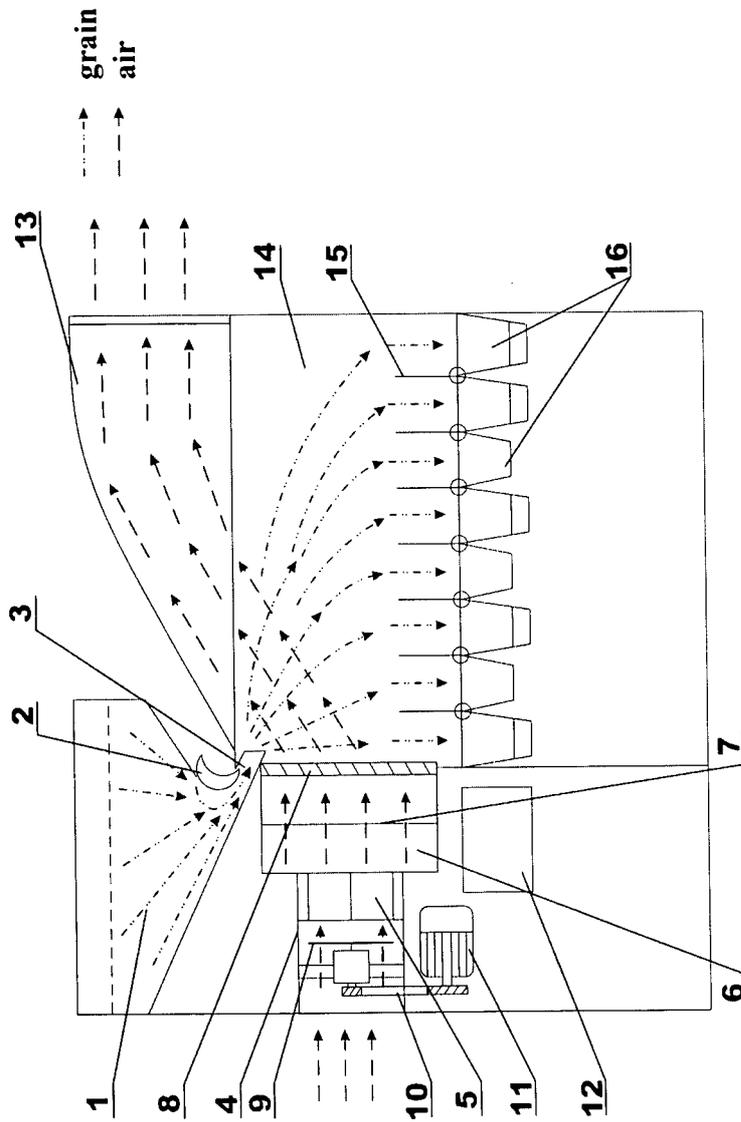
I. Friable mixtures separating device comprising a body, loading device, working element, separation chamber and drive unit, characterized in that the working element is executed as high-circulating impeller in a form of multiblade axial fan, which is installed in a tube jointly with a rectifier and static pressure chamber to provide creating a powerful air flow with using small-power engine actuating said impeller and also to provide heating the air without using additional equipment.

Statement under Article 19

According to the Article 19 of the provisions of the PCT the applicant-decide to amend the claims in the following way. The claim 1 was replaced by amended claim of the same number. The claims 2 and 3 were cancelled.

In the claim 1 the "impeller" was specified in accordance with drawing and the general concept of the "impeller". Generally "impeller" is "multiblade axial fan, which is installed in a tube" which is also shown on the drawing. In comparison with "centrifugal fan", which is a part of all knowing separating devices of the prior art, an "axial fan" allows to create a powerful air flow with small-power engine.

The above said new feature is the main factor characterizing the invention claimed.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/UA 2009/000063

A. CLASSIFICATION OF SUBJECT MATTER		B07B 4/02 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) B07B 4/00-4/08, 7/00-7/04, 9/00, 9/02, 11/00-1 1/06, AOIF 12/00, 12/44		
Documentation searched other than minimum documentation, to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EAPATIS, Esp@cenet, PatSearch, RUPTO		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5032256 A (JAMES D. VICKERY) 16.07.1991, col. 6, lines 42-57, col. 7, lines 1-53, fig. 1, 2	1-3
Y	OOO NPF "AEROMEKH". Statii o separatore SAD. Opisanie separatora SAD, [online] obnovleno 30.04.2007 [retrieved on 2010-04-06], Retrieved from the Internet: <URL: http:// aeromeh.boom.ru/shema.htm>	1-3
Y	RU 2007133781 A (OBSHESTVO S OGRANICHENNOI OTVETSTVENNOSTYU "SEMMASH") 20.03.2009, p. 5, paragraph 5	2
Y	RU 60004 U1 (LYAHOV OLEG VIKTOROVICH et al.) 10.01.2007, fig. 1	3
A	SU 147914 1 A1 (YU. A. IVANOV) 15.05.1989, abstract, fig. 1	1-3
A	RU 63716 U1 (ATAMAS ALEKSEI ALEKSANDROVICH et al.) 10.06.2007	1-3
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input type="checkbox"/> See patent family annex		
* Special categories of cited documents "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 14 April 2010 (14.04.2010)		Date of mailing of the international search report 22 April 2010 (22.04.2010)
Name and mailing address of the ISA/RU FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab , 30-1 Facsimile No. 243-3337		Authorized officer Yu. Borzunova Telephone No. (499) 240-2591