Conventional Application for a Patent

45770

We

ALUMINIUM PECHINEY

of 28, rue de Bonnel, 69003 Lyon, France

hereby apply for the grant of a Patent for an invention entitled

"A BELL-SHAPED DEVICE FOR AN APPARATUS FOR CHARGING DUSTY MATERIALS"

which is described in the accompanying complete specification. This application is a Convention Application and is based on the application numbered 78 11000 for a patent or similar protection made in France on 10th April, 1978.

Our address for service is:

Care: SPRUSON & FERGUSON
PATENT ATTORNEYS
ESSO HOUSE, 127 KENT STREET
SYDNEY, NEW SOUTH WALES,
AUSTRALIA.

Dated this TWENTY-THIRD day of MARCH 1979

ALUMINIUM PECHINEY

By: [Signature] Registered Patent Attorney
DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

In support of the Convention Application made for a patent for an invention entitled

"A BELL-SHAPED DEVICE FOR AN APPARATUS FOR CHARGING DUSTY MATERIALS"

I, Bernard de Passemar
c/or ALUMINIUM PECHINEY
28, rue de Bonnel, 69003 Lyon, France

do solemnly and sincerely declare as follows:—

1. I am the applicant for the patent of addition.
   (or, in the case of an application by a body corporate)
2. The basic application as defined by Section 141 of the Act was made in France on the 10th day of April 1978 by ALUMINIUM PECHINEY

3. I am the actual inventor of the invention referred to in the basic application.
   (or where a person other than the inventor is the applicant)

4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

Declared at Lyon, France this 8th day of February 1979

Bernard de Passemar
Signature of Declarant
A novel device for charging pulverulent or granular materials also containing fine particles which are likely to fly around, in order to prevent the particles from flying around in this way during the formation of a heap of materials to trap the dust and to recycle it, comprising a pulverulent or granular material feed column, a rigid charging chamber which is axially integral with the feed column by means of an articulated suspension, as well as a suction column for the said fine particles, characterised in that, in order for the said apparatus to float on the surface of the heat being formed, it comprises from the bottom to the top: a) a light charging chamber in the shape of a truncated pyramid or truncated cone comprising at least two polygonal or toric crowns formed by inflatable tubes situated in different planes, rigidifying cross-members between the tubes as well as a flexible...
skirt which is integral with the semi-rigid structure produced in this way, b) a flexible connecting hopper connected in a sealed manner to the inflatable charging chamber; c) a connecting sleeve placed between the flexible hopper and the material feed nozzle, d) and at least one dust suction nozzle connected to a dust-removing device.
Name of Applicant: ALUMINIUM PECHINEY

Address of Applicant: 28, rue de Bonnel, 69003 Lyon, France

Actual Inventors: JEAN-PASCAL HANROT and JACKY VOLPELIERE


Complete Specification for the invention entitled:

"A BELL-SHAPED DEVICE FOR AN APPARATUS FOR CHARGING DUSTY MATERIALS"
ABSTRACT

A novel charging device for pulverulent or granular materials also containing fine particles which are likely to fly around, which comprises from the bottom to the top:

a) a light charging chamber in the shape of a truncated pyramid or truncated cone comprising at least two polygonal or toric crowns formed by inflatable tubes situated in different planes, rigidifying cross-members between the tubes as well as a flexible skirt which is integral with the semi-rigid structure produced in this way, b) a flexible connecting hopper connected in a sealed manner to the inflatable charging chamber, c) a connecting sleeve placed between the flexible hopper and the material feed nozzle, d) finally at least one dust suction nozzle connected to a dust-removing device.

The charging device according to the invention has the property of floating on the heap of material being formed, and preventing its spirals of dust which are formed during this operation.

The invention relates to a novel bell-shaped apparatus intended to be adapted to an apparatus for charging pulverulent or granular materials containing fine particles which are likely to fly around, which makes it possible to prevent the dust from flying around during the charging operation, to trap it and to recycle it.

The production of a heap of pulverulent products on a storage surface, or again the filling of a ship's hold by means of a flexible nozzle with its end located above the heap being formed, has always caused a dense cloud of dust which is extremely inconvenient for the personnel present, if no device is provided for trapping the fine particles.
In fact, it is well known that any pulverulent material which is delivered through a vertical feed nozzle carries along a volume of air as it falls which is substantially equal to four or five times that of the material at rest. This entrainment is caused by a suction effect owing to the acceleration by the weight of the material delivered through the nozzle and by its friction with the air. As the material falls in the pipework, the air which is intimately bound to it fluidizes it.

Thus, the fluidized pulverulent material charges the ambient air with dust, firstly carrying it along in the direction in which the product leaving the feed nozzle flows out an spreading over the surface of the heap being formed, then rising in spirals, after having made contact with the heap, and being continuously renewed and expelled to form an opaque cloud which can be extremely large.

A known means of protection from the untimely emission of dust involves preventing the jet of fluidised material from making contact with the ambient air until its moment of impact on the heap being formed, and simultaneously sucking a volume of air which is at least equal to the total volume of air and material introduced at any moment.

To this end, a first well-known apparatus consists of a metallic truncated cone of which the small base is integral with the end of the feed nozzle while the large base is provided with rubber petals of rectangular shape. The corolla thus formed round the jet of material prevents it from making contact with the ambient air and thus reduces the formation of spirals of dust.

In an interesting improvement proposed for limiting
the formation of spirals of dust, it has been recommended to provide the corolla of this apparatus with a nozzle which sucks the dust-charged air.

Although this apparatus imparts certain improvements by limiting the formation of spirals of dust, it should be noted that it has disadvantages which obstruct the development thereof.

Firstly, the corolla represents a large mass which causes overloading of the jib of the gantry supporting the feed nozzle and on which it is suspended by a number of cables. This overloading makes it necessary to reinforce the structure of the gantry and, hence, to increase its construction cost.

Secondly, the corolla provided with petals is frequently buried in the heap being formed and it has to be freed by considerable mechanical forces for the apparatus to function well.

Finally, the rigidity of the device formed by the corolla and the nozzle necessitates a continuous vertical movement of the assembly so that the large base of the corolla is held in the vicinity of the heap being formed, and it is well known that the last disadvantage has virtually never been overcome, for example, when a boat subjected to a swell is being charged.

However, another equally well known apparatus consists of a dust receiver which is suspended on the gantry supporting the feed nozzle, in the vicinity of the heap, into which falls the material escaping from the heap owing to overflows, once the material has been deaerated. This device has the effect of reducing the speed at which the material falls in the open air and, hence, the formation of spirals of dust.
This apparatus has drawbacks which limit its use to pulverulent products and is not suitable for granular products. It is also very heavy and needs a reinforced gantry to support it.

Since effective protection from untimely emission of dust at the moment of charging pulverulent or granular materials has not yet been found and since the problem has only been solved imperfectly for many years, the applicants have carried out their research in this field and have consequently found and developed a novel bell-shaped device intended to be adapted to an apparatus for charging these materials which provides a true and effective solution to the difficulties encountered by the skilled man.

The novel device according to the invention which is intended for charging pulverulent or granular materials also containing fine particles which are likely to fly around, the aim of which is to prevent the particles from flying around in this way while a heap of materials is being formed by trapping the dust with a view to recycling it, comprises a material feed nozzle, a charging chamber which is axially integral with the feed column by means of an articulated suspension means, as well as a dust suction column, is characterised in that, in order to make the said device float on the surface of the heap being formed, it comprises from the bottom to the top:

a) A light charging chamber in the shape of a truncated pyramid or truncated cone comprising at least two polygonal or toric crowns formed by inflatable tubes, located in different planes, rigidifying cross-members between the tubes as well as a flexible skirt which is integral with the semi-rigid structure thus produced, b) A flexible connecting hopper connected in a sealed manner to the inflatable charging chamber.
c) A connecting sleeve placed between the flexible hopper and the material feed nozzle.

d) At least one dust suction nozzle connected to a dust removing device.

The pyramid-shaped chamber of inflatable structure forms a semi-rigid bell comprising at least two inflatable tubes located in two different planes and at a distance from each other. These tubes are in parallel planes in the majority of cases but can also be situated in concurrent planes, depending upon the particular cases specified.

These inflatable tubes are generally situated in two horizontal planes, but the fact that they can be located in oblique planes is not excluded.

Similarly, and in a general manner, the inflatable tubes are coaxial when they are in parallel planes, but it has been checked that their axes can be different for more special applications.

The tubes constitute crowns of toric circular shape, or again of polygonal shape, whose perimeters, which are generally different, can be identical in certain cases.

In order that the light and inflatable pyramid-shaped chamber might have a certain vertical rigidity, the above-mentioned tubes are connected to each other by means of rigidifying cross-members which can themselves be inflatable tubes, or can be produced from metallic materials such as aluminium, steel, reinforced or unreinforced polymeric materials such as polyamide, polyethylene, polypropylene, polyester etc., or again of natural materials such as wood.

Thus, the tubes which are connected to each other by cross-members constitute a semi-rigid and light structure which is closed by a flexible skirt which can be made of
textile material and which traps the spirals of dust.

In order to facilitate evacuation of the spirals of dust formed in the charging chamber, it may be worth arranging on the periphery of the skirt openings for taking the external air which then carry the dust along in the suction nozzle connected to a dust-removing device.

The flexible connecting hopper is generally in the shape of a truncated cone or truncated pyramid, depending upon the shape of the charging chamber itself. This hopper plays a fundamental part in the device according to the invention, because it allows the inflatable charging chamber to float on the heap being formed thus absorbing all the relative vertical and angular displacements between the charging nozzle and the inflatable charging chamber.

The sleeve which forms the connecting member between the flexible hopper and the charging nozzle can be produced from a rigid or flexible material. It can also be provided with various fittings such as suction nozzle which is lateral or again coaxial to the feed nozzle, sampling openings, one or more level detectors etc.

Consequently, the design of the device according to the invention affords qualities which have undeniably been sought for a long time, which impart to it characteristics which are exceptional and unique with regard to the devices of the prior art.

The device according to the invention is therefore very light and this allows it to be maintained easily, whether inflated or not, and imposes only a slight burden on the support element which can consequently have a very lightened structure and, as already expressed, really floats on the
heap being formed without being buried in the material.

Furthermore, since the device according to the invention is inflatable, its flexibility can be controlled in accordance with a suitable selection so that its base fits the shape of the heap. However, this also allows it, when deflated, to be dismantled and stored easily, to only be affected by the wind to a slight extent, but particularly, to be introduced into capacities which are to be filled but which have an opening of very small cross-section.

The device according to the invention will be understood better by means of the description with numerals of the attached drawings which illustrate a particular embodiment.

Figure 1 represents a front view, Figure 2 represents a plan view.

According to Figures 1 and 2, the charging chamber is in the form of a truncated pyramid and is composed of inflatable coaxial tubes 1 and 2 situated in two horizontal parallel planes. The said tubes are connected to each other by means of rigidifying cross-members 3, 4, 5, 6 and 7 which are themselves inflated. A rigid and light structure is thus obtained, owing to the combination of tubes 1 and 2 with the above-mentioned cross-members.

This light and rigid structure is closed by a textile skirt 8 trapping the spiral of dust.

On the periphery of this skirt are located openings 9, 10, 11, 12 and 13 for taking external air which carries the dust into the suction nozzle 14 connected to a dust-removing device (not shown).

The flexible connecting hopper 15 between the truncated pyramid-shaped charging chamber and the material feed
shape of the charging chamber, produced from textile material, plays a very important part in the device, according to the invention, since it absorbs all the movements (of swell, for example), while at the same time allowing the inflatable chamber to float on the surface of the head being formed.

The sleeve 16 is provided with the suction nozzle 14 used for the dust removal of the spirals formed in the inflatable chamber.

Finally, the device comprises a number of suspension cables such as 18, for example, which provides the hopper 15 with all its flexibility and which allows the structure to be manoeuvred before or after use without the risk of damaging the hopper and the skirt by excessive stresses.
The claims defining the invention are as follows:

1. A novel device for charging pulverulent or granular materials also containing fine particles which are likely to fly around, in order to prevent the particles from flying around in this way during the formation of a heap of materials, to trap the dust and to recycle it; comprising a pulverulent or granular material feed column, a rigid charging chamber which is axially integral with the feed column by means of an articulated suspension, as well as a suction column for the said fine particles, characterised in that, in order for the said apparatus to float on the surface of the heat being formed, it comprises from the bottom to the top: a) a light charging chamber in the shape of a truncated pyramid or truncated cone comprising at least two polygonal or toric crowns formed by inflatable tubes situated in different planes, rigidifying cross-members between the tubes as well as a flexible skirt which is integral with the semi-rigid structure produced in this way, b) a flexible connecting hopper connected in a sealed manner to the inflatable charging chamber, c) a connecting sleeve placed between the flexible hopper and the material feed nozzle, d) and at least one dust suction nozzle connected to a dust-removing device.

2. A novel charging device according to Claim 1, characterised in that the crowns are in parallel planes.

3. A novel charging device according to Claim 2, characterised in that the crowns are in horizontal planes.

4. A novel charging device according to Claims 2 and 3, characterised in that the axes of the crowns are coaxial.

5. A novel charging device according to Claim 2, characterised in that the crowns are in concurrent planes.
6. A novel charging device according to Claim 1, characterised in that the perimeters of the crowns are equal.

7. A novel charging device according to Claim 1, characterised in that the rigidifying cross-members are inflatable tubes.

8. A novel charging device according to Claim 1, characterised in that the rigidifying cross-members are produced from metallic materials, from polymeric materials which may be reinforced, natural or synthetic materials.

9. A novel charging device according to Claim 1, characterised in that the textile skirt comprises air inlet openings.

10. A novel charging device according to Claim 1, characterised in that it comprises suspension cables allowing it to be manipulated before or after use without producing stresses on the skirt and the hopper.

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ALUMINIUM PECHINEY

Patent Attorneys for the Applicant
SPRUSON & FERGUSON
FIG. 2