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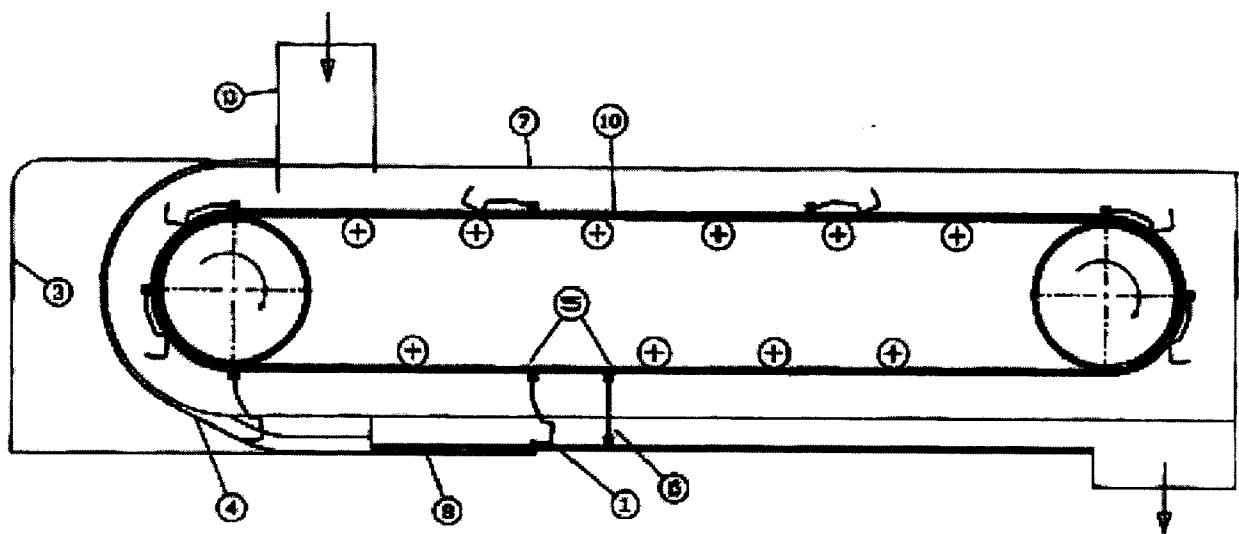
TITLE OF INVENTION	SELF-CLEANING ENCLOSED BELT CONVEYOR FOR LOOSE MATERIALS
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57	Abstract (not more than 150 words) and figure of the drawings to which the abstract refers, are attached.	Number of sheets	17
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**ABSTRACT**

The self-cleaning enclosed belt conveyor for loose materials comprises a mobile belt (10) operatively connected to proper containment walls (2), where mechanical means (1, 15) are provided for, connected to said conveyor belt (10), wherein said mechanical means perform together with a bottom (8) of said containment walls (2) a recovery operation of the loose materials present in the area between the belt (10), the bottom (8) and said containment walls (2), bringing the materials back either to belt's upper stretch or to adequate containment systems.

FOR PUBLICATION



**SELF-CLEANING ENCLOSED BELT CONVEYOR FOR LOOSE MATERIALS**

The present invention is about a self-cleaning steel belt conveyor for loose materials. The steel belt conveyors, made of a metal net traction belt, armored by 5 partially overlapping plates so as to form a conveying trough, are generally used for the transport of materials that can be particularly hot or aggressive due to their physical or chemical characteristics.

For example, in the disposal or treatment plants of hot ashes, produced by different combustion processes, it is necessary to move said ashes cooling them 10 for subsequent uses, avoiding their dispersion in the environment. In the present state of the art, in these circumstances, double mechanical conveyors are thus created, comprising a main belt for the ashes' transport and a secondary mechanical conveyor placed below the main belt for collecting the materials that might fall out from the first one.

15 The primary need of the secondary mechanical conveyor exists to avoid the formation of material lumps that could cause some irregularities to the normal operation of the conveyor.

The previously described mechanical conveyors, even if they solve the technical problem illustrated above, have however some inconveniences.

20 The double conveyors known to the state of the art are made in a cumbersome and complex fashion from a structural point of view, their construction is thus more expensive than that of a single belt conveyor not only for their making but for their operation as well, furthermore because of their cumbersome form it is not often possible to employ them due to the lack of 25 sufficient space.

The double conveyor transporting system requires the use of two different control units, hence greater energy consumption with respect to the use of a single conveyor.

U.S. Patent No. 5,660,283 illustrates an opened belt conveyor comprising a 30 rubber belt having several cleats integral with said rubber belt, and thus not able to rotate, having the main function of conveying the material.

U.S. Patent No. 5,947,261 discloses a drag conveyor system comprising several plastic paddles which provide for conveying the material in the lower

This invention of the self-cleaning belt conveyor for loose materials consists of a mobile belt operatively connected to proper containment walls; mechanical means are housed on the belt, which perform together with the bottom of said containment walls a recovery operation of the loose materials that lay down in the area between the belt and the conveyor's bottom, bringing the materials back to said belt or towards collection means.

In the following description the operation and the variation to the invention's self-cleaning belts are explained, with reference to the annexed drawings wherein some preferred embodiments are shown in an explanatory but not limiting way.

Figure 1 is a side view of the self-cleaning belt conveyor for loose materials that provides for the joint work of the scraping elements (1, 15) for the transport.

Figure 2 is a vertical section of said belt conveyor which shows a different embodiment of the element that cleans the conveyor's lower part.

Figure 3 is a side view of the self-cleaning belt conveyor that provides for the use of both scraping elements but with a different collection means other than the belt.

The belt conveyor has a set of containment walls comprising side walls (2), a cover (7) and a bottom (8), which enclose entirely said belt (10) except for the materials loading and unloading zones (fig. 2).

In the area herein after referred to as back section (3) (fig. 1) there is a containment portion (4) fit to force the loose materials fell on the bottom (8) to be collected or pushed forward through mechanical means (1, 15) illustrated later on, or to be brought back to the belt conveyor (10) or else to be conveyed towards collection means (9) (fig. 3).

More precisely, in a first lay-out said mechanical means are connected by hinges (5) to the conveyor belt (10) and include one or more scraping elements (1) arranged at regular intervals. They are made of a steel plate having an end (6) with a contour fit to push and collect the loose materials. In this way, because of the relative position where the scraping elements (1) and the bottom (8) are found when they are located on the lower side of the belt (10), that is along the return stretch, they are conveying and collecting all the loose materials that may be present on said bottom (8).

A second embodiment of the scraping elements is illustrated in figure 2. Said scraping elements (15) comprise a flexible connection element consisting of

a section of metal net (11), or another equivalent mechanical element, connected at one end to the belt (10) and at the other end to a hanging mass (12) usually made of a steel solid piece or by another wear resistant matter, of parallelepipedal shape.

5 Said mass (12) has the function of keeping in tension the flexible element (11) during the motion of the belt (10) in the return stretch that is when it is near the bottom (8), in order to obtain the effect of pushing the loose material possibly collected at the bottom toward the back section (3).

In special cases, when the belts (10) must perform a long or slanted run, 10 the scraping elements (1, 15); assembled on the belt (10) as usual, can push what has been laid down during the return run of the belt (10) either towards the containment area (4) or towards the recovery containers (9). From the recovery container the material can be periodically picked up manually or also through 15 mechanical or pneumatic discharge systems. In the long runs there can be more collection points, relative to the amount of loose material laid down the bottom.

In any case, regardless of the embodiment of the scraping elements (1, 15), the operation of the self-cleaning belt conveyor for loose materials occurs in the following manner.

The conveyor belt (10) is operated by an external control unit through the 20 traction drum; the belt (10) is supported by upper internal rollers (16) and lower rollers (17) assembled on rests (18) equipped with external bearings or bushings. At the loading zone (13) the loose materials get loaded.

During the run on the conveyor belt, part of the material lays down on the 25 bottom (8) of the belt conveyor, in such case the scraping elements (1, 15) which at that moment will be on the return stretch of the belt (10), due to gravity they will have their own end near to the bottom (8) pushing and collecting the material. Close to the back section (3), if referring to the lay-out without the collection means (9) (fig. 1), the scraping element (1) that is on the return side of the belt (10) will collect the loose material held back by the tilted portion (4).

30 Therefore, once it is on the upper side, the scraping element (1) will unload what had been previously collected adding it to what it is coming along the loading zone (13) and it will lean, always due to gravity, on the belt (10) starting another cycle again.

5 The scraping elements (15), consisting of a section of metal net (11) and a hanging mass (12) usually made of a parallelepipedal shaped steel solid piece are able to convey the material laid down the bottom (8) in an unloading device placed in the back section of the belt. In this case the scraping elements (15) can be used together with the scraping elements (1) joint working in the material transport toward the unloading devices.

10 It is clear from the previous description that the self-cleaning belt conveyor for loose materials according to the invention allows the use of single belts for the transport of various loose materials, reducing the installation and operation costs, and also allowing the use of said belts on any kind of pattern.

15 Obviously, several modifications, additions, adjustments, variations and/or substitutions could be made to the embodiments previously described in an explanatory but not limiting way, without falling out of the scope of protection as also recited in the following appended claims.

20 "Comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps or components or groups thereof.

25 The claims which follow are to be considered an integral part of the present disclosure. Reference numbers (directed to the drawings) shown in the claims serve to facilitate the correlation of integers of the claims with illustrated features of the preferred embodiment(s), but are not intended to restrict in any way the language of the claims to what is shown in the drawings, unless the contrary is clearly apparent from the context.

## CLAIMS

1. A self-cleaning enclosed belt conveyor for loose materials comprising a steel conveyor belt (10) operatively connected to proper containment walls (2), which provides mechanical means comprising one or more scraping elements (1, 15) operatively connected to said conveyor belt (10), said scraping elements (1, 15), when they are located on the lower side of the belt (10) and because of the relative position where they are found, wherein said scraping elements perform together with a bottom (8) of said containment walls (2) a recovery operation of the loose materials present in the area between the belt (10) and the bottom (8) of said containment walls (2), in order to bring the materials back to said belt (10) or towards collection means (9) of said materials.  
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2. The self-cleaning enclosed belt conveyor for loose materials according to claim 1, wherein said scraping element (1) is hinged upon said belt (10) and it comprises a plate shaped into a contour fit to push and/or collect the loose materials laid down on the bottom.  
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3. The self-cleaning enclosed belt conveyor for loose materials according to claim 2, wherein said scraping element (15) is fixed to said belt (10) and it comprises a metal net (11), or another equivalent flexible element, connected at one end to the belt (10) and at the other end to a hanging mass (12), said hanging mass (12) having the function of keeping in tension said flexible element (11) when it is near the bottom (8) in order to obtain the effect of pushing the loose material possibly collected at the bottom (8).  
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4. The self-cleaning enclosed belt conveyor for loose materials according to claim 2, wherein said walls (2) comprise near a back section (3) of said belt (10) a tilted portion (4) which together with said scraping elements (1, 15) allows the latter ones to hold back all the materials collected up to that point, thus allowing their disposition on the bearing side of said belt (10) or of said collection means (9).  
20
5. The self-cleaning enclosed belt conveyor for loose materials according to claim 2, wherein said walls (2) comprise near a back section (3) of said belt (10) a collecting device (9) of the material transported by the scraping elements (1, 15).  
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6. A self-cleaning enclosed belt conveyor for loose materials according to the invention, as hereinbefore generally described.  
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7. A self-cleaning belt conveyor for loose materials as specifically described with reference to or as illustrated in the accompanying drawings.  
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8. A self-cleaning enclosed belt conveyor for loose materials including any new and inventive integer or combination of integers, substantially as herein described.