A large bucket of the kind used in mineral extraction in mining works in which its door has been configured with a metal structural frame and a rubber retaining surface, achieving to lower the general weight of the bucket and the unavailability due to wear or fissures.
BUCKET DOORS USED IN LARGE MECHANICAL SHOVELS

[0001] The following invention is directed towards a bucket door for a large mechanical shovel. Specifically, it is directed towards a large bucket of the kind used in mineral extraction in mining works in which its door has been configured with a metal structural frame and a rubber retaining surface, achieving to lower the general weight of the bucket and the unavailability due to wear or fissures.

PREVIOUS ART

[0002] In works where land movement is of great volume, large mechanical shovels which loading buckets are of great capacity, the availability of the latter is sensitive in the sense of performance and operational costs. A particular case is given in the mining industry, in which hundreds of tons are moved on a daily basis due to the hustle promoted by the high price of metals now a day. Since the mineral has always been there, the sooner it is extracted the higher its current value will be, therefore it is indispensable to count with the highest number of extraction and movement, being essential the use of shovels with large buckets.

[0003] The buckets currently used in this field, correspond to structures made entirely out of metal with pivoting doors designed for the unloading of the material. A typical example of this type of buckets is Patent Application US2007214688 which describes a bucket for a mechanical shovel equipped of a body that defines a cavity which has an entrance to receive the material and an exit to unload the material. It contains a mobile door secured to the body of the bucket in the unloading zone of the same. The configuration of this bucket, as well as of many of the previous art (see FIG. 1), corresponds to a resistant structure (a) over which a base sheet (b) is disposed, in order to then dispose over it an iron coating (c), which will ultimately face the wear produced by the loaded material. This configuration causes an important weight in the door of the bucket and produces fissures and wear throughout the entire metallic material with which it is made of. The fissures are not only caused by the banging of the loaded material but also by the transmission of vibrations due to the contact between the metallic elements which compose it.

[0004] A way to diminish the typical problems of the buckets has been solved by the incorporation of rubber to certain zones over the metal in order to reduce the vibrations. An example of these types of developments is set forth in Patent JP5187034 where it is possible to observe a metallic bucket disposed with a rubber cushion between the outer metallic surface and the inner metallic surface of the bucket. Likewise, it also has a vibration mechanism which allows the penetration of the bucket in the load front. In any case, the proposed solution still corresponds to a metallic bucket only equipped by a pseudo-rubber buffer, which does not impede the banging and wear of the inner metallic surface of the bucket.

[0005] The solution proposed in the present invention consists of a bucket of a resistant structure, a base form structure and a rubber coating disposed over the frame, thus achieving a more productive bucket which dimensions are quicker, safer and more economical. All these characteristics translate to, among others, the following advantages:

[0006] Diminishing of the unavailability of the door due to wear or fissures.

[0007] Diminishing of the weight of the bucket's door.

[0008] Greater lifespan of the component.

[0009] Change in the concept and design of the door.

[0010] Re-design of the door’s angle.

[0011] Substitution of iron reinforcement by rubber reinforcement.

[0012] Removal of loads of iron, meters of welding and residual tensions.

[0013] Substitution of iron reinforcement by rubber reinforcement which allows absorbing impacts and generating greater resistance to wear, thus minimizing damages and extending the production times in between maintenance.

BRIEF DESCRIPTION OF THE FIGURES

[0014] FIG. 1: Represents an exploded view of a typical configuration of the previous art bucket door.

[0015] FIG. 2: Represents a front elevation view of invention's bucket door.

[0016] FIG. 3: Represents an exploded view of the invention’s bucket door.

[0017] FIG. 4: Represents a full view of the invention’s bucket door.

[0018] FIG. 5: Represents a front elevation view of the inner surface of the bucket door.

[0019] FIG. 6: Represents an elevation view of the inner surface of the bucket with a specific close up of one of its corners.

DETAILED DESCRIPTION OF THE INVENTION

[0020] The bucket door of the present invention is composed by three main bodies: a main resistant structure (1), a form structure (2) and a rubber coating (3).

[0021] The main structure (1) is elaborated in iron of great resistance and is equipped with structural beams (4), horizontal as well as vertical which grant them the necessary rigidity to withstand its weight; the torque produced by the pivoting and banking of the transported material in the bucket. One of its ends is equipped with connecting elements (5) that allow the door to secure itself in a pivoting way to the bucket’s structure. Immediately, on the opposite end to that in which the connecting elements (5) are found, an angular zone (6) has been configured, designed to lessen the premature wear of the form structure (2) due to the effect of greater weight at the moment of banging.

[0022] Over the main structure (1) the form structure (2) is set, which corresponds to a drilled sheet which replaces the traditional sheets of the previous art, as the one illustrated in FIG. 1. The fact that the form structure (2) is more like a structure than a sheet allows to drastically reduce the weight of the bucket and, obviously, it is also designed to receive in it a coating of lesser weight. Immediately over said form structure (2) there is a rubber coating (3) intended to withstand the load impact transported in the bucket.

[0023] Additionally, the rubber constitutes an excellent mean to reduce the vibrations produced by the banging and friction of the material loaded in the bucket, as well as by the banging or contact generated each time the bucket door is closed against the bucket. The installation of the rubber coating is done by means of high resistance bolts (7) as illustrated in FIG. 6, and does not require welding nor cutting welding, thus contributing to lessen the total weight of the bucket door. Due to the fact that the coating is of rubber, it is obviously a lesser weight than that of a metallic coating and it allows for a more secure installation not only due to this variable, but
also because since the coating is bolted it means not having to perform open flame operations. The rubber may have different thickness depending on the requirements associated to the work conditions, as well as for its correct adjustment to the bucket when the closing is produced.

With reference to FIG. 4, the main structure (1) of the door has, on its main beams (8) passing cavities (9), which have the purpose of allowing the movement of the latch (not illustrated in the figures) which secures the door over the bucket while the loading operation is carried out.

On the sides of the main structure (1) sheet metal (10) have also been disposed which have the purpose of giving structural support to the flaps (11) disposed over the sides of the form structure (2). Said flaps (11) have the purpose of confronting buffering elements disposed in the bucket that allow attenuating the impact of the door closing and, consequently, lessening the fissures due to bangings.

The abovementioned corresponds to an illustrative form of exemplifying the invention, but it is understood that a mid-level technician with knowledge in this matter may introduce elements technically equivalent designed to fulfill the same functions than the elements previously described in the invention, without altering the solution described in this text and, thus, it will be understood to be within the scope of protection of this invention.

Without further elaboration, it is believed that one skilled in the art can, using the preceding description, utilize the present invention to its fullest extent. The preceding preferred specific embodiments are, therefore, to be construed as merely illustrative, and not limitative of the remainder of the disclosure in any way whatsoever.

In the foregoing and in the examples, all temperatures are set forth uncorrected in degrees Celsius and, all parts and percentages are by weight, unless otherwise indicated.

The preceding examples can be repeated with similar success by substituting the generically or specifically described reactants and/or operating conditions of this invention for those used in the preceding examples.

From the foregoing description, one skilled in the art can easily ascertain the essential characteristics of this invention and, without departing from the spirit and scope thereof, can make various changes and modifications of the invention to adapt it to various usages and conditions.

1. Bucket doors used in large mechanical shovels, for example, those used in the extraction of mineral in the mining industry, wherein it is composed by a main resistant structure over which a form structure is disposed, and immediately over it a rubber coating, constituting such rubber coating the zone where the load comes in contact with said bucket and the zone where the bucket comes in contact with said door.

2. Bucket door according to claim 1 whereby said main structure is fabricated of high resistance steel and is conformed by structural beams, horizontal as well as vertical.

3. Bucket door according to claim 2 wherein on one end of said main structure there are connecting elements that allow the door to secure itself in a pivoting way to the bucket's structure.

4. Bucket door according to claim 3 wherein said main structure, on the immediate opposite end to that in which the connecting elements are disposed, an angular zone has been configured.

5. Bucket door according to claim 1 wherein said form structure is conformed by a drilled sheet which configures a frame.

6. Bucket door according to claim 1 wherein said rubber coating is installed over said form structure with high resistance bolts.

7. Bucket door according to claim 6 wherein said rubber coating may be of different thickness.

8. Bucket door according to claim 1 wherein said main structure has configured, on one of its main beams, passing cavities which allow the movement of a latch in order to secure the door over the bucket.

9. Bucket door according to claim 1 wherein on said main structure sheet metals have also been disposed which grant structural support to flaps disposed on the sides of the frame.

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