

A hoarding system for mitigating noise and dust at building site and a method of using and installing the same

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Technical Field

The invention relates to a hoarding system, more specifically to a hoarding system for mitigating noise and dust at building site, and a method of using the hoarding system.

10 The hoarding system and the method of using the same according to the invention are suitable for various construction sites where generate a large amount of noise and dust, such as building site, quarry site and highway.

Background

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Currently, in order to mitigate the noise disturbance generated at areas, e.g. building site, blasting site and highway etc., on residents living nearby, typically a noise barrier will be provided around the sites or along both sides of the highway so that the noise can be mitigated. For example, Chinese utility model patent application No. 01275521 discloses a noise barrier, which mainly includes I-shaped columns and rectangular acoustic panels, wherein one acoustic panel is fixed between two columns. This noise barrier aims to solve the problem of noise pollution along urban roads. However, the current noise barrier can only mitigate noise, but without the ability of tackling the problem of dust generated at building site or blasting site. Dust originated from these sites will float with wind, negatively influencing on the environment nearby. In addition, the acoustic panels used in the current noise barrier are generally made from acoustic-absorbing materials, e.g. asbestos or rock wool, which will be inevitably embrittled, damaged and then peeled off piece by piece after a period of exposure under the sun and rain. Therefore, the noise isolating effect is significantly reduced.

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Summary

To solve the defects in the prior arts, the invention aims to provide a hoarding system and a method of using the hoarding system that can both mitigate noise and reduce dust pollution.

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According to the invention, a hoarding system for mitigating noise and dust at building site is provided. The hoarding system comprises more than one hoarding unit

being connected with each other, each hoarding unit including a wall structural frame and an acoustic-absorbing material layer arranged within the wall structural frame. The acoustic-absorbing material layer is held between an acoustic-absorbing material protection panel being fixed on the front face of the wall structural frame and a sound-isolating metal plate being fixed on the back face of the wall structural frame, with the acoustic-absorbing material protection panel having meshes. On the top of the hoarding unit a water spraying device is provided, which can facilitate the sedimentation of dust generated during construction. Therefore, the hoarding system can achieve the objective of mitigating both of noise and dust.

The water spraying device is provided with a water supply line, which is connected in series with an electromagnetic valve and a timing switch for controlling ON/OFF of the electromagnetic valve and setting the spraying time and the spraying amount.

The hoarding unit includes an upright portion arranged vertically and a forward inclining portion which extends from the top of the upright portion and is bent towards the building site. The upright portion of the hoarding unit forms an angle of 120° to 150° with the forward inclining portion, and the water spraying device is mounted on the top of the forward inclining portion.

On the upper part and the lower part at the back face of the wall structural frame a tilted stay bar and a horizontal stay bar are arranged respectively, such that the tilted stay bar, the horizontal stay bar and the wall structural frame form a steady triangular supporting structure together.

Two upper connecting plates and two lower connecting plates, all having threaded holes, are fixed to the right and left sides of the back face of the wall structural frame at its upper part and lower part, respectively. One end of the tilted stay bar is fixed on the upper connecting plate by means of bolt and one end of the horizontal stay bar is fixed on the lower connecting plate by means of bolt, while the other ends of the tilted stay bar and the horizontal stay bar are connected with each other behind the wall structural frame by means of bolt. The joints between the tilted stay bars at both sides and the horizontal stay bar are connected with each other through a connecting rod. In this way, the supporting rod pieces can be easily disassembled from the hoarding unit, thus enabling the delivery and storage of the hoarding unit is very convenient.

A horizontal inner stay bar for increasing stability is fixed in front of the bottom part of the wall structural frame through bolt.

The upright portion of the hoarding unit is 2.5-3m long, the forward inclining portion thereof is 0.7-1.2m long, and the hoarding unit is 2-3m wide.

- 5 The wall structural frame is formed by a plurality of lateral rod pieces and a plurality of vertical rod pieces that are securely connected with each other, wherein the lateral rod pieces is L-shaped angular iron while the vertical rod pieces is I-shaped iron, and the water supply line of the water spraying device is fixedly mounted on the vertical rod pieces.

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The acoustic-absorbing material layer can be Fiberglas 700 Series material. In this case, it would not be embrittled and damaged after long time exposure under the sun and rain.

- 15 The acoustic-absorbing material protection panel is a wire net with meshes, each of which has a length and a width both of 35 mm

A hook is arranged on the upper part of the hoarding unit. Therefore, it is convenient to hoist the hoarding unit to the building site,

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Adjacent hoarding units are sealingly connected with each other through sound-isolating tapes. Therefore, the hoarding units can be flexibly combined together as needed.

- 25 The invention further includes a method of using and installing the above-mentioned hoarding system for mitigating noise and dust at building site, comprising the following steps:

- Step A: cleaning and leveling out the peripheric area of the building site, and laying water supply line and electrical wires of the water spraying device around the peripheric area of the building site;

- 30 Step B: connecting a plurality of hoarding units together and thus enclosing the building site but leaving an access way, thus forming a noise barrier restricting the outward transmission of noise generated at the building site, and then switching on the electrical circuit and the water supply line of the water spraying device on the top of the hoarding unit; and

- 35 Step C: spraying water toward the building site by the water spraying device on the top of the hoarding unit, thus forming a local climate over the building site that is wet and has a lower temperature than the surroundings, wherein the local climate will

generate a humid downward airstream facilitating dust sedimentation.

5 The water supply line of the water spraying device is connected in series with an electromagnetic valve and a timing switch for controlling ON/OFF of the electromagnetic valve and setting the spraying time and the spraying amount. Therefore, the spraying time and the spraying amount of the water spraying device can be set according to conditions of building site.

10 Compared with the prior arts, the hoarding system for mitigating noise and dust at building site according to the invention can solve both problems of mitigating noise generated during construction and dust pollution on the surrounding circumstance due to the existence of the water spraying device that facilitates dust sedimentation. Since the acoustic-absorbing material layer is Fiberglas 700 Series material, it would not be embrittled and damaged after long time exposure under the sun and rain, thus
15 ensuring the hoarding system maintains a durable noise-mitigating effect. With the modular hoarding units and the supporting rod pieces thereof being connected through bolts, it is convenient to disassemble the rod pieces. Therefore, the hoarding units can be reused, and also be flexibly combined together. A plurality of the hoarding units thus can be place one on the top of the other, thus reducing the space required for
20 delivery and storage.

Brief Description of Drawings

25 Fig. 1 is the side view of the hoarding unit of the hoarding system for mitigating noise and dust at building site according to the invention.

Fig. 2 is the back view of the hoarding unit.

30 Fig. 3 is the horizontal cross-sectional view of the hoarding unit.

Fig. 4 is the enlarged view at the upper connecting plate.

Fig. 5 is the enlarged view at the lower connecting plate.

35 Fig. 6 is the enlarged view at the joint between the tilted stay bar and the horizontal stay bar.

Preferred Embodiments of the Invention

In the following an embodiment of the invention will be discussed in details with reference to the attached drawings.

5 The hoarding system for mitigating noise and dust at building site according to the invention consists of more than one hoarding unit 10 that are connected with each other. As shown in Figs. 1, 2 and 3, the hoarding unit 10 includes a wall structural frame 1, a sound-isolating metal plate 2 fixed to the wall structural frame 1, an acoustic-absorbing material layer 3, an acoustic-absorbing material protection panel 5,
10 and a water spraying device 6. The wall structural frame 1 is formed by a plurality of lateral rod pieces 15 and a plurality of vertical rod pieces 16 that are securely connected with each other. The acoustic-absorbing material layer 3 is sandwiched between the sound-isolating metal plate 2 and the acoustic-absorbing material protection panel 5. The acoustic-absorbing material protection panel 5 faces toward
15 the noise and dust source, i.e. the building site, while the sound-isolating metal plate 2 faces the opposite side.

As shown in Figs. 1 and 2, the hoarding unit 10 includes an upright portion 101 placed vertically, and a forward inclining portion 102 which extends from the top of
20 the upright portion 101 and is bent towards the building site. The upright portion 101 of the hoarding unit 10 forms an angle with respect to the forward inclining portion 102. The angle falls within a scope of 120° to 150°, and in the example as shown the angle is 135°. The water spraying device 6 is mounted on the top of the forward inclining portion 102. The upright portion 101 of the hoarding unit 10 has a length of
25 2.5 to 3.5 m, the forward inclining portion 102 thereof has a length of 0.7 to 1.2 m, and the hoarding unit 10 has a width of 2 to 3 m. In an example of the invention, the upright portion 101 of the hoarding unit 10 is 3 m long, the forward inclining portion 102 is 0.9 m long, and the hoarding unit 10 is 2.5m wide. Adjacent hoarding units 10 can be sealingly connected with each other through sound-isolating tapes. The angle
30 between adjacent hoarding units 10 can be optionally selected as needed, and the adjacent hoarding units 10 can be combined together in a flexible manner. For the sake of convenient hoisting, a hook 8 is provided at the joint area between the upright portion 101 and the forward inclining portion 102 of the hoarding unit 10, as shown in Fig. 1.

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The lateral rod piece 15 of the wall structural frame 1 is of L-shaped angle iron with a dimension of 75×75×6 mm, while the vertical rod piece 16 is of I-shaped bar with a dimension of 100×55 mm. The vertical rod piece 16 is arranged in front of the lateral

rod piece 15, the two rod pieces being connected with each other by means of welding. As shown in Fig. 3, the sound-isolating metal plate 2, the acoustic-absorbing material layer 3 and the acoustic-absorbing material protection panel 5 are fixedly clamped within a recess formed between two adjacent vertical rod pieces 16.

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The water spraying device 6 is arranged on the top of the hoarding unit 10, and connected to an outside water source through a water supply line 61 mounted on the vertical rod pieces 16. The water supply line 61 of the water spraying device 6 is connected in series with an electromagnetic valve and a timing switch (not shown) that can control ON/OFF of the electromagnetic valve and set the spraying time and the spraying amount. The spraying time and the spraying amount of the water spraying device 6 can be set according to conditions of building site. Therefore, a local climate that is wet and has a lower temperature is generated around building site. The local climate can effectively reduce diffusion of dust towards surrounding areas.

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Each hoarding unit 10 can be provided with one or more water spraying devices 6. Using the electromagnetic valve and its timing switch to control the spraying time and the spraying amount of the water spraying devices 6 is well known in the art, the details of which is omitted hereby.

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The acoustic-absorbing material layer 3 can be formed by Fiberglas 700 Series material produced by Owens Corning Company. This product meets the requirement of ASTM standard, and is very stable under sunlight. It will not be decomposed even under insolation, and not be damaged after long time exposure to the sun and rain. Therefore, it is more durable and can maintain a noise reducing function over time. Of course, other acoustic-absorbing materials meeting the requirement of ASTM standard can be used also.

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The acoustic-absorbing material protection panel 5, which can be formed by a wire net, is provided with meshes, having a length and a width both being 35 mm. In this way, the acoustic-absorbing material layer 3 can be held and protected, and in the meantime the noise wave is allowed to pass through the meshes and thus absorbed by the acoustic-absorbing material layer 3.

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To maintain the hoarding unit 10 being vertical, a supporting structure is needed. The supporting structure can be implemented in various manners. In the example of the invention, the supporting structure includes tilted stay bars 71, horizontal stay bars 72, a connecting rod 73 and a horizontal inner stay bar 74, as shown in Figs. 1 and 2. Upper connecting plates 11 and lower connecting plates 12, all having threaded holes,

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are fixedly welded to the right and left sides of the wall structural frame 1 at its upper part and lower part. The tilted stay bar 71 and the horizontal stay bar 72 are fixed on the upper connecting plate 11 and the lower connecting plate 12 respectively by means of bolts at one end thereof, and connected with each other at the other end thereof behind the wall structural frame 1 by means of bolts. The joints between the tilted stay bars 71 and the horizontal stay bars 72 at two sides are connected with each other through the connecting rod 73. The horizontal inner stay bar 74 is fixed to the bottom part of the wall structural frame 1 from the front side. After the supporting structure is mounted, a weight, e.g. a stone, is put on the connecting rod 73, such that the hoarding unit 10 is stably stood on the ground. The elements of the above supporting structure are connected with each other by means of bolts, so that they can easily removed from the hoarding unit 10, thus facilitating storage, delivery and reuse of the hoarding unit 10.

As shown in Fig. 4, the upper connecting plate 11 is of a rectangular shape, and welded to the back face of the vertical rod piece 16. The tilted stay bar 71 is of L-shaped angle iron with a dimension of 75×75×6 mm, and is connected to the vertical rod piece 16 through bolts. As shown in Fig. 5, lower connecting plates 12, 13 of right-angle trapezoidal shape are welded on both sides of the vertical rod piece 16 at the bottom part thereof. The lower connecting plates 12, 13 are both provided with two threaded holes. The horizontal stay bar 72 is fixed to the lower connecting plate 12 at the back side of the vertical rod piece 16 with two bolts, while the horizontal inner stay bar 74 is fixed to the lower connecting plate 13 at the front side of the vertical rod piece 16 with two bolts. Both of the horizontal stay bar 72 and the horizontal inner stay bar 74 are channel irons with a dimension of 100×48 mm. As shown in Fig. 6, at the joint area of the tilted stay bar 71 and the horizontal stay bar 72, a rectangular connecting plate 75 with a threaded hole is welded to the outer end of the horizontal stay bar 72. The lower end of the tilted stay bar 71 is secured to the rectangular connecting plate 75 through a bolt.

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The method of installing and using the hoarding system for mitigating noise and dust at building site according to the invention includes the following steps:

Step A: cleaning and leveling out the peripheric area of the building site, and laying water supply line and electrical wires of the water spraying device 6 around the peripheric area of the building site;

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Step B: enclosing the building site with a plurality of hoarding unit 10 connected with

each other, thus forming a noise barrier restricting the outward transmission of noise generated in the building site, and then switching on the electrical circuit and the water supply lines of the water spraying device 6 on the top of the hoarding unit 10;

- 5 Step C: spraying water toward the building site by the water spraying device 6 on the top of the hoarding unit 10 during construction. According to principles of meteorology, spraying water toward the building site will enable air of the building site being very wet and having a lower temperature than the surroundings. Therefore, a local climate having downward airstream is formed, which is obviously
10 advantageous to the sedimentation of dust.

- In Step C, the water supply line 61 of the water spraying device 6 can be connected in series with an electromagnetic valve and a timing switch for controlling ON/OFF of the electromagnetic valve and setting the spraying time and the spraying amount.
15 Therefore, the spraying time and the spraying amount of the water spraying device 6 can be set according to the conditions of building site.

- While the invention has been described in conjunction with the preferred embodiments outlined above, it is evident that many alternatives, modifications and
20 variations will be apparent to those skilled in the art. Various changes may be made without departing from the spirit and scope of the invention as defined in the following claims.

Claims

1. A hoarding system for mitigating noise and dust at building site, comprising more than one hoarding unit (10) being connected with each other, wherein the
5 hoarding unit (10) includes a wall structural frame (1) and an acoustic-absorbing material layer (3) arranged within the wall structural frame (1), characterized in that,

the acoustic-absorbing material layer (3) is held between an acoustic-absorbing material protection panel (5) being fixed on the front face of the wall structural frame (1) and a sound-isolating metal plate (2) being fixed on the back face of the wall
10 structural frame (1), the acoustic-absorbing material protection panel (5) having meshes therein; and

the hoarding unit (10) is provided with a water spraying device (6) for dust sedimentation on the top thereof.

15 2. The hoarding system for mitigating noise and dust at building site according to claim 1, characterized in that, the water spraying device (6) is provided with a water supply line, which is connected in series with an electromagnetic valve and a timing switch for controlling ON/OFF of the electromagnetic valve and setting the spraying
time and the spraying amount.

20 3. The hoarding system for mitigating noise and dust at building site according to claim 1, characterized in that, the hoarding unit (10) includes an upright portion (101) arranged vertically and a forward inclining portion (102) which extends from the top of the upright portion (101) and is bent towards the building site, wherein the upright
25 portion (101) of the hoarding unit (10) forms an angle of 120° to 150° with the forward inclining portion (102), and the water spraying device (6) is mounted on the top of the forward inclining portion (102).

4. The hoarding system for mitigating noise and dust at building site according to
30 any one of claims 1 to 3, characterized in that, on the upper part and the lower part at the back face of the wall structural frame (1) a tilted stay bar (71) and a horizontal stay bar (72) are arranged respectively, the tilted stay bar (71), the horizontal stay bar (72) and the wall structural frame (1) forming a steady triangular supporting structure.

35 5. The hoarding system for mitigating noise and dust at building site according to claim 4, characterized in that, two upper connecting plates (11) and two lower connecting plates (12), all having threaded holes, are fixed to the right and left sides of the back face of the wall structural frame (1) at its upper part and lower part

respectively, wherein one end of the tilted stay bar (71) is fixed on the upper connecting plate (11) by means of bolt and one end of the horizontal stay bar (72) is fixed on the lower connecting plate (12) by means of bolt, while the other ends of the tilted stay bar (71) and the horizontal stay bar (72) are connected with each other behind the wall structural frame (1) by means of bolt, the joints between the tilted stay bar (71) and the horizontal stay bar (72) being connected with each other through a connecting rod (73).

6. The hoarding system for mitigating noise and dust at building site according to claim 5, characterized in that, a horizontal inner stay bar (74) for increasing stability is fixed in front of the bottom part of the wall structural frame (1) through bolt.

7. The hoarding system for mitigating noise and dust at building site according to claim 3, characterized in that, the upright portion (101) of the hoarding unit (10) is 2.5-3m long, the forward inclining portion (102) thereof is 0.7-1.2m long, and the hoarding unit (10) is 2-3m wide.

8. The hoarding system for mitigating noise and dust at building site according to any one of claims 1 to 3, characterized in that, the wall structural frame (1) is formed by a plurality of lateral rod pieces (15) and a plurality of vertical rod pieces (16) that are securely connected with each other, wherein the lateral rod pieces (15) is L-shaped angular iron while the vertical rod pieces (16) is I-shaped iron, and the water supply line (61) of the water spraying device (6) is fixedly mounted on the vertical rod pieces (16).

9. The hoarding system for mitigating noise and dust at building site according to any one of claims 1 to 3, characterized in that, the acoustic-absorbing material layer (3) is Fiberglas 700 Series material.

10. The hoarding system for mitigating noise and dust at building site according to any one of claims 1 to 3, characterized in that, the acoustic-absorbing material protection panel (5) is a wire net with meshes, each of which has a length and a width both of 35 mm, and a hook (8) is arranged on the upper part of the hoarding unit (10).

11. The hoarding system for mitigating noise and dust at building site according to any one of claims 1 to 3, characterized in that, adjacent hoarding units (10) are sealingly connected with each other through sound-isolating tapes.

12. A method of using and installing a hoarding system for mitigating noise and dust at building site, wherein the hoarding system comprises a plurality of hoarding units (10) being connected with each other, and the hoarding unit (10) includes a wall structural frame (1) and an acoustic-absorbing material layer (3) arranged within the wall structural frame (1), and the hoarding unit (10) is provided with a water spraying device (6) on the top thereof, the method comprising the following steps:

Step A: cleaning and leveling out the peripheric area of the building site, and laying water supply line and electrical wires for the water spraying device (6) around the peripheric area of the building site;

Step B: connecting a plurality of hoarding units (10) together and thus enclosing the building site but leaving an access way, thus forming a noise barrier restricting the outward transmission of noise generated at the building site, and then switching on the electrical circuit and the water supply line of the water spraying device (6) on the top of the hoarding unit (10); and

Step C: spraying water toward the building site by the water spraying device (6) on the top of the hoarding unit (10) during construction, thus forming a local climate that is wet and has a lower temperature than the surroundings, wherein the local climate will generate a humid downward airstream facilitating the sedimentation of dust.

13. The method of using and installing a hoarding system for mitigating noise and dust at building site according to claim 12, characterized in that, the water supply line of the water spraying device (6) is connected in series with an electromagnetic valve and a timing switch for controlling the on/off of the electromagnetic valve and setting the spraying time and the spraying amount, and thus the spraying time and the spraying amount of the water spraying device (6) can be set according to the condition of building site.