METHOD FOR REPLACING AN EXISTING STONE PANEL IN A STONE PANEL WALL ARRANGEMENT, AND AN ASSEMBLY COMPRISING A STONE PANEL WALL ARRANGEMENT

The present invention relates generally to the field of architecture and construction, and more specifically to a method for replacing an existing stone panel in a stone panel wall arrangement and an assembly comprising a stone panel wall arrangement.

The US-20190085567 discloses a stone panel having a rear, mounting face, a front, a decorative face, an upper surface having a raised section and a recess, and a lower surface. The upper surface and the lower surface of adjacent stone panels overlap to form a joint therebetween. At least one bracket extends from the stone body; a leftward extension on the stone body; and a rightward extension on the stone body, such that the leftward extension and rightward extension of adjacent stone panels form a joint therebetween.

This application addresses the problem of replacing and securing stone panels in a stone panel wall arrangement, and safely accessing parts of a building using a BMU platform, in a more efficient and effective manner.

This problem is solved by the subject matter of the independent claims. Further improvements are given by the subject matter of the dependent claims.

The method comprises the following steps:

- providing a retaining anchor in the structure wall element, the retaining anchor being located in a first area of a gap in the stone panel wall arrangement,
- inserting a new stone panel into a gap in the stone panel wall arrangement.

The method of the application is safe, as compared with the prior art. There is no danger that a replaced stone panel can fall out from the stone panel wall arrangement.

In a development, the step of connecting the safety wire with the structure wall element comprises connecting a safety wire with a bottom bracket of another existing stone panel of the stone panel wall arrangement.

In a development, the step of connecting the safety wire with the structure wall element comprises forming a closed loop of a piece of wire by connecting two open ends of the piece of wire are connected with each other. is put into its final position.

At least one new stone panel is provided with a bottom groove at the bottom of the new stone panel, with a top groove at the top of the new stone panel, and with a first side groove at a first side of the new stone panel, and with a second side groove at a second side of the new stone panel, with the bottom groove being positioned on a lower bracket that is provided at the structure wall element such that the lower bracket being located in a second area of the gap and with an upper bracket being positioned in the top groove with the upper bracket being connected with the retaining anchor, wherein a safety wire is provided in the bottom groove, in the first side groove, and in the second side groove, wherein the safety wire is connected with the structure wall element.

In a development, the safety wire is connected with a lower bracket of an existing stone panel. That makes it easy to connect the safety wire with the structure wall element. In a development, the safety wire forms a closed loop of a piece of wire with two open ends of the piece of wire being connected with each other, which makes it easy to mount that safety wire.

In a further development, the safety wire is provided within holes in the new stone panel that connect the bottom groove with the first side groove and the second side groove 20. In a development, a channel for a placing a safety wire is provided by the bottom groove, by the first side groove, and by the second side groove, and by holes that connect the bottom groove with the first side groove and the second side groove and/or that connect the top groove with the first side groove and the second side groove. That channel makes with holes sure that the safety wire is always tightly connected with the new stone panel. This prevents detaching and falling of the new stone panel.

Definitions

The term "stone panel wall arrangement" is used herein to refer to a wall arrangement on a structure wall element. The term "existing stone panel" is used herein to refer to a stone panel that has not yet been replaced. The terms "retaining anchor" or “retainer anchor” are used herein to refer to an element that enables the insertion of a retaining element into a gap in the structure wall element. The term “gap” designates an opening that implies a breach or defect, for example in the sense that an existing wall element has been partly removed. The term "new stone panel" is used herein to refer to a new stone panel that is installed on a structure wall element for closing such a gap. The term "bottom groove" refers to a groove in the bottom of the stone panel, whereas the term "bottom of the stone panel" may refer to the bottom of the stone panel.

A “suction cup” designates a cup made of flexible material, such as rubber, that uses suction as an adhesive means. A “safety wire”, in the sense of a locking-wire designates a type of positive locking device that prevents stone wall panels from falling out due to vibration and other forces.

Short Description Of Figures

The present disclosure is illustrated by way of example and not limited in the accompanying figures in which like reference numerals indicate similar elements. Embodiments of the application will now be described with reference to the attached drawings.

Fig. 1 shows a perspective view of a work area for replacing an existing stone panel in a stone panel wall arrangement on a structure wall element,
Fig. 2 shows a front view of the stone panel wall arrangement of Fig. 1,
Fig. 3 shows a front view that illustrates the use of a safety wire in a new panel that is used to close a gap in the stone panel wall arrangement of Fig. 2.
Fig. 4 shows a cross-sectional view of an upper bracket 29 of Fig. 2,
Fig. 5 shows a cross-sectional view of a lower bracket 28 of Fig. 2,
Fig. 6 shows a perspective view of the upper bracket 29 of Fig. 2,
Fig. 7 shows a front view of the upper bracket 29 of Fig. 2,
Fig. 8 shows several views of the lower bracket 28 of Fig. 2, and

Fig. 9 shows several views of another embodiment of an upper bracket 29.

Detailed Description of Figures

Figure 1 illustrates a method for replacing a damaged stone panel on a building's façade 1. The process involves barricading an area of work under a gap 6 to ensure sufficient space and covering the area of work ground 24 right below the stone panels 2 with protective panels made of polyfoam and plywood. A traffic marshall is assigned to control the ground traffic for safety purposes.

To safely remove the existing stone panel 2, a safety catch netting is installed between the surface of a structure wall element 3 and the BMU platform right below the area of work. At least one suction cup is attached to the existing stone 2 panel to secure it in place. The existing sealant around the existing stone panel 2 is thoroughly cut away to expose the existing holding elements 22 in the form of brackets or pins of the existing stone panels 2.

A safety belt is installed around the existing stone panel 2 and is connected to both the structure wall element 3 and the BMU platform. The existing holding elements 22 are then removed using a cutting tool. The existing stone panel 2 is carefully moved to the BMU platform and lowered to the ground 24. The safety belt is disconnected from the BMU platform, and the damaged existing stone panel 2 is unloaded.

To replace the damaged existing stone panel 2, a new stone panel is loaded onto the BMU platform and a safety belt is installed around it. The safety belt is connected to the BMU platform and brought up to the gap 6 for replacement. The safety belt is then disconnected from the BMU platform and connected to the structure wall element to secure the new stone panel in place. New sealant is installed around the new stone panel to prevent water stagnation.

Figure 2 illustrates a method for replacing an existing stone panel 2 in a stone panel wall arrangement 1 on a structure wall element, such as a carrier wall, a structure wall 3, a façade stone, or a pillar. The method comprises the following steps.

One step is to provide a retaining anchor, also referred to as a wall anchor 4, in the structure wall element 3, which is located in a first area, referred to as the upper area, of a gap 6 in the stone panel wall arrangement 1.

Next, a new stone panel 7 is inserted into the gap 6 in the stone panel wall arrangement 1. The new stone panel 7 is provided with a pre-cut bottom groove 8 at the bottom 9 of the new stone panel 7, a pre-cut top groove 10 at the top 11 of the new stone panel 7, a first side groove 12 at a first side of the new stone panel 7, and a second side groove 13 at a second side of the new stone panel 7. The bottom groove is positioned on a lower bracket 28, also referred to as piece-A, provided at the structure wall element. The lower bracket 28 is located in a second area, referred to as the lower area, of the gap.

Then, a lower bracket 28 is inserted into the top groove 10, and connected to the retaining anchor 4. A safety wire, made of steel wire 27, is provided in the bottom groove 8, in the first side groove 12, and in the second side groove 13. The method further includes connecting the safety wire 27 with the structure wall element 3.

In Fig. 3, the subject matter is shown for replacing an existing stone panel 2 in a stone panel wall arrangement 1 on a structure wall element 3 (carrier wall, a structure wall, a façade stone, a pillar). The method includes the following steps:
- providing a retaining anchor, e.g. a wall anchor 4, in the structure wall element 3, wherein the retaining anchor 4 is located in a first area 5, an upper area of a gap 6 in the stone panel wall arrangement 1,
- Inserting a new stone panel 7 into a gap 6 in the stone panel wall arrangement 1.

The new stone panel 7 is provided with a pre-cut bottom groove 8 at the bottom 9 of the new stone panel 7, with a pre-cut top groove 10 at the top 11 of the new stone panel 7, with a first side groove 12 at a first side 14 of the new stone panel 7, and with a second side groove 13 at a second side 15 of the new stone panel 7.

Further steps are mentioned below.

Positioning the bottom groove 8 on a piece-A lower bracket 28 that is provided at the structure wall element 3. The lower bracket 28 is located in a second area 26, a lower area of the gap 6.

Inserting a lower bracket 29 into the top groove 10 and connecting the lower bracket 29 with the retaining anchor 4.

Providing a safety wire 27 (steel wire) in the bottom groove 8, in the first side groove 12, and in the second side groove 13.

Connecting the safety wire 27 with the structure wall element 3.

The step of connecting the safety wire 27 with the structure wall element 3 can have one, two, or three steps :

Connecting the safety wire 27 with a lower bracket 22 of another existing stone panel 2 of the stone panel wall arrangement 1.

Forming a closed loop of a piece of wire 27 by connecting two open ends of the piece of wire 27 with each other, using a wire end connector clamp. The loop should be long enough so that the ends can be closed before the new stone panel 7 is put into its final position 6.

Providing holes in the new stone panel 7 that connect the bottom groove 8 with the first side groove 12 and the second side groove 13 and that connect the top groove 10 with the first side groove 12 and the second side groove 13.

Fig. 4 illustrates the method for replacing an existing stone panel in a stone panel wall arrangement 1 on a structure wall element, such as a carrier wall 3, a structure wall, a façade stone, or a pillar. The method includes the following steps: providing a

retaining anchor, e.g. the wall anchor 4, in the structure wall element 3, the retaining anchor 4 being located in a first area, the upper area of the gap 6 in the stone panel wall arrangement 1; inserting the new stone panel 7 into the gap 6 in the stone panel wall arrangement 1, wherein the new stone panel 7 is provided with a pre-cut bottom groove 8 at the bottom 9, a pre-cut top groove 10 at the top 11, a first side groove 12 at a first side 14, and a second side groove 13 at a second side 14. After positioning the bottom groove 9 on a lower bracket in the form of a piece-A 28 provided at the structure wall element 3, there is the step of inserting an upper bracket 29 into the top groove 10. A step of connecting the upper bracket 29 with the retaining anchor 4 follows, wherein a safety wire in the form of a steel wire 27 is provided in the bottom groove 8, in the first side groove 12, and in the second side groove 13. The safety wire 27 is then connected with the structure wall element 3.

The safety wire 27 is provided in the bottom groove 9, in the first side groove 13, and in the second side groove 14.

In Fig. 5, the subject matter is shown for replacing an existing stone panel in a stone panel wall arrangement 1 on a structure wall element, in the form of a carrier wall, a structure wall 3, a façade stone, or a pillar. A new stone panel 7 is inserted into the gap 6 in the stone panel wall arrangement 1. The new stone panel 7 is provided with a pre-cut bottom groove 8 at the bottom 9 of the new stone panel 7. The bottom groove 8 is positioned on a lower bracket 28 that is provided at the structure wall element 3, the lower bracket 28 being located in a second area, a lower area of the gap 6.

Fig. 6 and Fig. 7 show the lower bracket 28 that provided at the structure wall element 3 in greater detail. The lower bracket 28 has a horizontal basis 49, that extends vertically upwards into an upper wing 50 on one lateral edge and vertically downwards into a lower wing 51 on the opposite lateral edge. A mounting hole 52 is centrally provided in the lower wing 51. The horizontal basis 49, the upper wing 50, and the lower wing 51 have each a rectangular shape. The lower bracket 28 is bent from one single sheet of stainless steel with a thickness of a few millimeters, preferably 3mm.

The lower bracket 28 of Fig. 6 can also be used as an upper bracket 29, simply by turning it upside down.

Fig. 8 shows another embodiment of a lower bracket 28 that is provided in a retaining anchor 4 in the structure wall element 3, with the retaining anchor 4 being located in a second area 26, the lower area of the gap 6 in the stone panel wall arrangement 1.

The bottom groove 8 is positioned on the lower bracket 28, that comprises a piece-A element 60 provided at the structure wall element 3 by a bolt 63 that is provided in the retaining anchor 4, and a piece-B element 61 provided at the bottom groove 8. The piece-A element 60 and the piece-B element 61 are interconnected by a bolt-nut-element 62.

The piece-A element 60 is made from an L-shaped stainless steel profile that comprises an elongated hole 64 that is arranged longuitudinally, while the piece-B element 61 has essentially the same shape as the piece-A element 60, but it comprises an elongated hole 65 that is arranged in a transverse direction.

Fig. 9 depicts a method for providing a retaining anchor 4 in the structure wall element 3, the retaining anchor 4 being located in a first area 5, the upper area of a gap 6 in the stone panel wall arrangement 1; and inserting a new stone panel 7 into the gap 6. The new stone panel 7 is provided with a pre-cut top groove 10 at the top 11. After having positioned the bottom groove 8 on a lower bracket 28 provided at the structure wall element 3, an upper bracket 29 is inserted into the top groove 10, and the upper bracket 29 is connected with the retaining anchor 4.

The upper bracket 29 comprises a first retaining element in the form of a threaded screw 70, a threaded coupler sleeve 71, and a second retaining element 72 that is provided with a retaining pin 73. The outer end of the threaded second retaining element 72 is provided with a hexagonal keyhole.

After inserting the new stone panel 7 into the gap 6 in the stone panel wall arrangement 1, the second retaining element 72 is turned such that the retaining pin 73 engages in the top groove 10. The new stone panel 7 has a pre-cut slot 10 at the top to allow the

of the retaining pin 73 to secure it. The new stone panel is permanently secured by turning the retaining pin 73 by 90 degree facing down with an Allen key that is inserted into the hexagonal hole.

In Figs. 1 - 9, a stone panel wall arrangement 1 is shown on a structure wall element 3, which can be a carrier wall, a structure wall, a façade stone, or a pillar. The arrangement includes a plurality of existing stone panels 2 and new stone panels 7. At least one new stone panel 7 has a pre-cut bottom groove 8 at the bottom 9, a pre-cut top groove 10 at the top 11, a first side groove 12 at the first side 14, and a second side groove 13 at the second side 15. The bottom groove 8 is positioned on a lower bracket (Piece-A) provided at the structure wall element 3, which is located in the second area 26 (lower area) of the gap 6. An upper bracket is positioned in the top groove 10 and connected with the retaining anchor 4. Additionally, a safety wire 27 (steel wire) is provided in the bottom groove 8, first side groove 12, and second side groove 13, and connected with the structure wall element 3.

The stone panel wall arrangement 1 presents several features aimed at providing enhanced safety and security for the wall structure. An aspect of the arrangement is the provision of a stone panel 7 with a safety wire 27 that can be fixed at a wall structure to prevent the dislodging of the stone panel 7. In particular, the safety wire 27 is connected with a lower bracket of an existing stone panel 2 to form a closed loop of a piece of wire with two open ends of the piece of wire being connected with each other. This configuration ensures that the safety wire 27 can effectively prevent displacement of the stone panel 7.

Furthermore, the safety wire 27 is provided within holes in the new stone panel 7 that connect the bottom groove 8 with the first side groove 12 and the second side groove 13. This arrangement ensures that the safety wire 27 is optimally positioned to provide maximum resistance to displacement forces. By integrating the safety wire 27 with the stone panel wall arrangement 1, a secure and durable wall structure is achieved, thereby enhancing safety and stability.

Reference Numbers List

1 stone panel wall arrangement
2 existing stone panel
3 structure wall element
4 retaining anchor
5 first area
6 gap
7 new stone panel
8 bottom groove
9 bottom
10 top groove
11 top
12 first side groove
13 second side groove
14 first side
15 second side
16 area of work
17 protective panels
18 safety catch netting
19 bmu platform
20 suction cup
21 existing sealant
22 existing holding elements
23 safety belt
24 ground
25 first lower bracket element
26 second area
27 safety wire
28 lower bracket
29 upper bracket
30 first retaining element
31 coupler element
32 second retaining element

49 horizontal basis

50 upper wing

51 lower wing

52 mounting hole

60 piece-A element

61 piece-B element

62 bolt-nut-element

63 bolt

64 elongated hole

65 elongated hole

70 first retaining element

71 coupler sleeve

72 second retaining element

73 retaining pin

Claims

1. Method for replacing an existing stone panel (2) in a stone panel wall arrangement (1) on a structure wall element (3), the method comprising the following steps:
- providing a retaining anchor (4) in the structure wall element (3), the retaining anchor (4) being located in a first area (5) of a gap (6) in the stone panel wall arrangement (1),
- inserting a new stone panel (7) into a gap (6) in the stone panel wall arrangement (1), wherein the new stone panel (7) is provided with a bottom groove (8) at the bottom (9) of the new stone panel (7), with a top groove (10) at the top (11) of the new stone panel (7), and with a first side groove (12) at a first side (14) of the new stone panel (7), and with a second side groove (13) at a second side (15) of the new stone panel (7),
- the bottom groove (8) being positioned on a lower bracket (28) that is provided at the structure wall element (3), the lower bracket (28) being located in a second area (26) of the gap (6),
- inserting an upper bracket (29) into the top groove (10), and
- connecting the upper bracket (29) with the retaining anchor (4),
wherein a safety wire (27) is provided in the bottom groove (8), in the first side groove (12), and in the second side groove (13), the method further comprising the step of connecting the safety wire (27) with the structure wall element (3).

2. Method according to claim 1, comprising a step of creating a gap (6) by removing an existing stone panel (2) from the structure wall element (3).

3. Method according to claim 2, comprising one or more of the following steps:
- barricading an area of work (16) under the gap (6) (to ensure sufficient space), and
- covering the area of work (16) with protective panels (17).

4. Method according to claim 2 or claim 3, comprising one or more of the following steps:
- assigning a traffic marshall to control a ground traffic,
- identifying the location of the existing stone panel (2) that needs to be replaced,

- providing a safety catch netting (18) between a surface of the structure wall element (3) and a BMU platform (19) right below the area of work (16).

5. Method according to claim 4, comprising one or more of the following steps:
- providing (installing and securing) at least one suction cup (20) to the existing stone panel (2),
- removing existing sealant (21), thereby exposing existing holding elements (22) of the existing stone panel (2),
- installing a safety belt (23) around the existing stone panel (2) and
- connecting the safety belt (23) with a structure wall element (3).

6. Method according to claim 5, comprising one or more of the following steps:
- connecting the safety belt (23) with the BMU platform (19),
- removing the existing holding elements (22),
- moving the existing stone panel (2) to the BMU platform (19),
- lowering the BMU platform (19) to a ground (24),
- disconnecting the safety belt (23) from the BMU platform (19), and
- unloading the existing stone panel (2) from the BMU platform (19).

7. Method according to one of claims 2 to 6, comprising one or more of the following steps:
- loading the new stone panel (7) to a BMU platform (19),
- installing a safety belt (23) around the new stone panel (7),
- connecting the safety belt (23) with the BMU platform (19),
and
- bringing the BMU platform (19) up to the gap (6),
- disconnecting the safety belt (23) from the BMU platform (19),
- connecting the safety belt (23) with a structure wall element (3).

8. Method according to one of the aforementioned claims, comprising the following steps:
- providing a first lower bracket element (25) at the structure wall element (3), in the second area (26) of the gap (6),

- providing a second lower bracket (28) element at the first lower bracket element (25),
- adjusting the second lower bracket (28) element with respect to the first lower bracket element (25),
- securing the position of the second lower bracket (28) element with respect to the first lower bracket element (25).

9. Method according to one of the aforementioned claims, comprising the step of providing (fixing in place) a rubber element to the lower bracket (28).

10. Method according to one of the aforementioned claims, wherein the step of providing a retaining anchor (4) for the upper bracket (29) comprises the steps of
- providing a first retaining element (30) in the retaining anchor (4),
- providing a coupler element (31) at the first retaining element (30), wherein the coupler element (31) is at least partially provided in the structure wall element (3),
- providing a second retaining element (32) in the coupler element (31),
- providing grout to the hole in the structure wall element (3).

11. Method according to claim 10, wherein the step of inserting a new stone panel (7) into a gap (6) in the stone panel wall arrangement (1) comprises a step of turning the second retaining element (32) such that a retaining pin of the second retaining element (32) engages in the top groove (10).

12. Method according to one of the aforementioned claims, comprising the step of providing sealant to a slot around the new stone panel (7).

13. Method according to one of the aforementioned claims, wherein the step of connecting the safety wire (27) with the structure wall element (3) comprises connecting the safety wire (27) with a bottom (9) bracket of another existing stone panel (2) of the stone panel wall arrangement (1).

14. Method according to one of the aforementioned claims, wherein the step of connecting the safety wire (27) with the structure wall element (3) comprises forming

a closed loop of a piece of wire by connecting two open ends of the piece of wire are connected with each other.

15. Method according to one of the aforementioned claims, wherein the step of connecting the safety wire (27) with the structure wall element (3) comprises providing holes in the new stone panel (7) that connect the lower groove with the first groove and the second groove.

16. Stone panel wall arrangement (1) on a structure wall element (3) (carrier wall, a structure wall, a façade stone, a pillar), with a plurality of existing stone panels and new stone panels, wherein at least one new stone panel (7) is provided with a bottom groove (8) at the bottom (9) of the new stone panel (7), with a top groove (10) at the top (11) of the new stone panel (7), and with a first side groove (12) at a first side (14) of the new stone panel (7), and with a second side groove (13) at a second side (15) of the new stone panel (7), with the bottom groove (8) being positioned on a lower bracket (28) that is provided at the structure wall element (3) such that the lower bracket (28) being located in a second area (26) of the gap (6) and with an upper bracket (29) being positioned in the top groove (10) with the upper bracket (29) being connected with the retaining anchor (4), wherein a safety wire (27) is provided in the bottom groove (8), in the first side groove (12), and in the second side groove (13), wherein the safety wire (27) is connected with the structure wall element (3).

17. Stone panel wall arrangement (1) according to claim 16, wherein the safety wire (27) is connected with a lower bracket (28) of an existing stone panel (2).

18. Stone panel wall arrangement (1) according to claim 16 or claim 17, wherein the safety wire (27) forms a closed loop of a piece of wire with two open ends of the piece of wire being connected with each other.

19. Stone panel wall arrangement (1) according to one of claims 16 to 18, wherein the safety wire (27) is provided within holes in the new stone panel (7) that connect the bottom groove (8) with the first side groove (12) and the second side groove (13)

and/or by holes that connect the top groove (10) with the first side groove (12) and the second side groove (13).

20. Stone panel (7) for closing a gap (6) left by a missing existing stone panel (2) in a stone panel wall arrangement (1) on a structure wall element (3), the stone panel (7) being provided with a bottom groove (8) at the bottom (9) of the stone panel (7), with a top groove (10) at the top (11) of the stone panel (7), and with a first side groove (12) at a first side (14) of the stone panel (7), and with a second side groove (13) at a second side (15) of the stone panel (7), the bottom groove (8) being provided for being positioned on a lower bracket (28) and the top groove (10) being provided for being positioned in an upper bracket (29), wherein a channel for a placing a safety wire (27) is provided by the bottom groove (8), by the first side groove (12), and by the second side groove (13), and by holes that connect the bottom groove (8) with the first side groove (12) and the second side groove (13) and/or by holes that connect the top groove (10) with the first side groove (12) and the second side groove (13).