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(54) **Device for cleaning a facade**

Vorrichtung zum Reinigen einer Fassade

Dispositif pour le nettoyage d'une façade

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EP 2 397 235 B1

Description

Field of the invention

[0001] The invention relates to a façade cleaning apparatus with two sub-frames and means for displacing the sub-frames connected to the frame and two groups of brushes connected to the sub-frames and means for rotating the brushes and the façade cleaning apparatus comprises displacement means for displacing the sub-frames to and fro and passing each other in directions opposite to each other at right angles to the axles of the brushes.

State of the art

[0002] A façade cleaning apparatus according to the preamble of claim 1 is known from GB-A-1 092 728. This known apparatus comprises two brushes which are each connected in rotatable fashion to an end of a swivable arm. These arms are rotatably connected with the other end to a frame and are pivoting past each other in opposite directions. A disadvantage of this known apparatus is that during operation and as a result of the pivoting motion the frame continually moves towards the façade and back so that the brushes cannot be shielded and dirt brushed off the façade flies around in all directions and the force with which the brushes are pushed against the façade is not constant and the façade is not cleaned evenly.

Summary of the invention

[0003] It is an object of the invention to provide a façade cleaning apparatus of the type defined in the opening paragraph with which the façade can be cleaned evenly and with which the dirt that has been brushed off is not spread in all directions. To this end the façade cleaning apparatus according to claim 1 of the invention is provided. By having the brushes rotate in opposite directions past each other, no resultant force is exerted on the façade as a result of the movement of the sub-frames and so no reaction force is exerted on the framework, so that the apparatus continues to be in place in horizontal direction without the need of balance weights being used.

[0004] In addition, by having the brushes in one group rotate in opposite direction to the brushes in the other group, or by having neighboring brushes in each group rotate in opposite directions, there is no resultant force exerted on the façade either because of the rotating action of the brushes. A preferred embodiment of the façade cleaning apparatus according to the invention is characterized in that the façade cleaning apparatus comprises a protective hood which partially surrounds the brushes, as well as a squirting device for squirting the cleansing agent, preservative or water onto the façade, and a plurality of fans for blowing air into the protective hood. The protective hood is shaped such that the air is led on to

the façade thereby forming an air curtain that, by means of the air flow, restricts the splashing or spraying of cleansing agent, preservative or water in any direction, and thus leads the cleansing agent, the preservative or water to the façade with minimal loss.

[0005] A further preferred embodiment of the façade cleaning apparatus according to the invention is characterized in that the façade cleaning apparatus further includes further fans which are fitted to the back of the frame and by which the façade cleaning apparatus can be turned around a vertical axis so as to have the façade cleaning apparatus take up the desired position relative to the façade.

[0006] A still further preferred embodiment of the façade cleaning apparatus according to the invention is characterized in that the façade cleaning apparatus comprises a plurality of pairs of guide wheels connected to the frame for guiding the apparatus along the façade during operation, where the axis of rotation of the guide wheels are parallel to the displacement direction of the sub-frames and where seen in a direction parallel to the axles of the brushes the axles of the guide wheels of each pair are at a distance from each other. By selecting the distance between the guide wheels of a wheel pair to be sufficiently large, in case the façade is clad with corrugated façade plates whose ridges and grooves extend in horizontal direction there will always be one of the wheels in contact with a ridge, so that the apparatus will not pass over the façade cladding in a jolting manner.

[0007] Preferably, the pairs of guide wheels are displaceable in a direction at right angles to the axles of both the brushes and the guide wheels. By displacing the guide wheels of the brushes the frame with brushes is brought to a greater distance from the façade and thus obstacles on the façade may be bypassed. In addition, the bottom pairs of guide wheels can then be displaced independently of the top pairs of guide wheels so as to retain an equal distance to the façade in case of obstacles.

Brief description of the drawings

[0008] The invention will now be described in more detail based on an example of embodiment of the façade cleaning apparatus shown in the drawing figures, in which:

Fig. 1 shows a view in front elevation of an embodiment of the façade cleaning apparatus;

Fig. 2 shows a view in side elevation of the façade cleaning apparatus shown in Fig. 1; and

Fig. 3 shows a view in rear elevation of the façade cleaning apparatus shown in Fig. 1.

Detailed description of the drawings.

[0009] Figs. 1, 2 and 3 show a view in front elevation, side elevation and rear elevation respectively of an em-

bodiment of the façade cleaning apparatus according to the invention. The façade cleaning apparatus 1 comprises a frame 3 with rotary brushes 5, 7 connected to it. The brushes are divided into two groups A and B. Each group of brushes A, B is connected to a separate sub-frame 9, 11 which can be displaced together with the frame 3. The façade cleaning apparatus 1 further includes displacement means (not shown in the Figures) for displacing the sub-frames 9 and 11 to and fro and passing each other in directions C and D opposite to each other and at right angles to the axles 13 of the brushes 5, 7 (and parallel to the façade during operation).

[0010] The façade cleaning apparatus 1 further includes a plurality of pairs of guide wheels 15 connected to the frame 3, for guiding the apparatus along the façade during operation. The axles 17 of the guide wheels 15 run parallel to the directions of displacement C and D of the sub-frames 9 and 11. The axles 17 of each pair of guide wheels 15 are present in a direction parallel to the axles 13 of the brushes 5, 7 at a distance E from each other.

[0011] The sub-frames move in horizontal direction during the cleaning operation of façades having horizontal profiles. The axles of the brushes are then oriented in horizontal direction.

[0012] The guide wheels 15 are connected to arms which are retractable and extendible in a direction at right angles to the axles of both the brushes and the guide wheels. By displacing the guide wheels of the brushes, the frame with brushes is brought to a greater distance from the façade and in this way it is possible for obstacles on the façade to be bypassed. The bottom pairs of guide wheels can then be displaced independently of the top pairs of guide wheels.

[0013] The façade cleaning apparatus 1 further has a protective hood 19 which is partially present around the brushes 5 and 7, as well as a squirting device for squirting cleansing agent, preservative and water on to the façade. This squirting device comprises a plurality of nozzles 21 (Fig. 1) which are present between and above the two groups of brushes. A plurality of fans 23 are accommodated in the protective hood and blow air into the protective hood 19 in such a way that the air is led on to the façade thereby forming air curtains (see Fig. 1) which restrict the splashing or spraying of cleansing agent, preservative and water in any direction.

[0014] In addition to the fans 23 the façade cleaning apparatus 1 further includes further fans 27 in the rear of the protective hood. With these further fans the façade cleaning apparatus, while being suspended from a hoisting crane and not hanging against the façade, can be turned around a vertical axis so as to obtain the desired position of the façade cleaning apparatus relative to the façade.

[0015] The frame 3 comprises lifting lugs 29 for moving the façade cleaning apparatus in vertical direction along the façade. The bottom of the protective hood 19 has supports 31 on which the apparatus can be put on the

ground.

[0016] Albeit the invention described above has been described in the foregoing with reference to an example, it will be evident that the invention is not by any manner or means restricted thereto. The extent of the invention is indeed exclusively determined by the following claims.

Claims

1. A façade cleaning apparatus which comprises an elongated frame (3) with two sub-frames (9,11) and means for displacing the sub-frames connected to the frame and two groups (A,B) of brushes (5,7), each group (A, B) of brushes (5, 7) being connected to a separate sub-frame (9, 11) and means for rotating the brushes (5, 7) about their axles (13), **characterized in that** the façade cleaning apparatus comprises displacement means for displacing the sub-frames (9,11) to and fro and passing each other in directions (C,D) opposite to each other at right angles to the axles (13) of the brushes and parallel to the façade during operation, wherein each group (A,B) of brushes comprises at least two brushes (5,7) and the direction of rotation of the brushes in one group is configured to be opposite to that of the brushes in the other group or where neighboring brushes in each group are configured to have opposite directions of rotation wherein the means for displacing the sub-frames are means for displacing the sub-frames in longitudinal direction of the frame.
2. A façade cleaning apparatus as claimed in claim 1, **characterized in that** the façade cleaning apparatus comprises a protective hood (19) which partially surrounds the brushes (5,7), as well as a squirting device for squirting the cleansing agent onto the façade, and a plurality of fans (23) for blowing air into the protective hood in such a way and the protective hood is shaped such that the air is led to the façade thereby forming an air curtain that, by means of the air flow, restricts the splashing or spraying of cleaning agent, preservative or water in any direction, and thus leads the cleansing agent, preservative or water to the façade with minimal loss.
3. A façade cleaning apparatus as claimed in claim 2, **characterized in that** the façade cleaning apparatus further includes further fans (27) which are fitted to the back of the frame (3) and by which the façade cleaning apparatus can be turned around a vertical axis so as to have the façade cleaning apparatus take up the desired position relative to the façade.
4. A façade cleaning apparatus as claimed in any one of the preceding claims, **characterized in that** the façade cleaning apparatus comprises a plurality of pairs of guide wheels (15) connected to the frame

(3) for guiding the apparatus along the façade during operation, where the axes of rotation of the guide wheels are parallel to the displacement direction (C,D) of the sub-frames (9,11) and where seen in a direction parallel to the axes of the brushes the axes (17) of the guide wheels of each pair are at a distance (E) from each other.

5. A façade cleaning apparatus as claimed in claim 4, **characterized in that** the pairs of guide wheels (15) can be displaced in a direction at right angles to the axes (13,17) of both the brushes and the guide wheels.

Patentansprüche

1. Fassadenreinigungsvorrichtung, bestehend aus einem lang gestreckten Gestell (3) mit zwei Untergestellen (9, 11) und mit dem Gestell verbundenen Mitteln zum Versetzen der Untergestelle und zwei Gruppen (A, B) von Bürsten (5, 7), wobei jede Gruppe (A, B) von Bürsten (5, 7) mit einem gesonderten Untergestell (9, 11) verbunden ist, und Mittel zum Rotieren der Bürsten (5, 7) um ihre Drehachse (13), **dadurch gekennzeichnet, dass** die Fassadenreinigungsvorrichtung Verstellmittel umfasst für das in gegenseitig entgegengesetzten Richtungen (C, D) rechtwinklig zu den Drehachsen (13) der Bürsten und während des Betriebs parallel zur Fassade hin und her aneinander vorbei Versetzen der Untergestelle (9, 11), wobei jede Gruppe (A, B) von Bürsten mindestens zwei Bürsten (5, 7) umfasst und die Drehrichtung der Bürsten bei der einen Gruppe entgegengesetzt der Drehrichtung der Bürsten der anderen Gruppe ist, oder wobei benachbarte Bürsten in jeder Gruppe entgegengesetzte Drehrichtungen haben, wobei die Mittel zum Versetzen der Untergestelle Mittel zum Versetzen der Untergestelle in Längsrichtung des Gestells sind.
2. Fassadenreinigungsvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Fassadenreinigungsvorrichtung eine Schutzhaube (19) hat, die sich teils um die Bürsten (5, 7) befindet, sowie eine Spritzvorrichtung zum Spritzen der Reinigungsflüssigkeit auf die Fassade, und eine Reihe von Gebläsen (23) zum Blasen der Luft in die Schutzhaube auf solche Weise und die Schutzhaube so geformt ist, dass die Luft auf die Fassade geleitet wird, dadurch einen Luftvorhang bildend, der ein Wegspritzen oder Zerstäuben der Reinigungsflüssigkeit, des Konservierungsmittels oder des Wassers in jede Richtung beschränkt, und dadurch Reinigungsflüssigkeit, Konservierungsmittel oder Wasser durch den Luftstrom mit minimalem Verlust auf die Fassade leitet.
3. Fassadenreinigungsvorrichtung nach Anspruch 2,

dadurch gekennzeichnet, dass die Fassadenreinigungsvorrichtung ferner weitere Gebläse (27) umfasst, die an der Rückseite des Gestells (3) befestigt sind und womit die Fassadenreinigungsvorrichtung um eine vertikale Achse gedreht werden kann, um die Fassadenreinigungsvorrichtung in die gewünschte Position in Bezug auf die Fassade zu bekommen.

4. Fassadenreinigungsvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Fassadenreinigungsvorrichtung eine Reihe von mit dem Gestell (3) verbundenen Führungsräderpaaren (15) umfasst, die im Betrieb die Vorrichtung entlang der Fassade führen, wobei die Drehachsen der Führungsräder sich parallel zur Versetzungsrichtung (C, D) der Untergestelle (9, 11) befinden, und im Hinblick auf eine Richtung parallel zu den Achsen der Bürsten die Drehachsen (17) der Führungsräder von jedem Paar sich in einem Abstand (E) von einander befinden.
5. Fassadenreinigungsvorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Paare der Führungsräder (15) in einer Richtung rechtwinklig zu den Drehachsen (13, 17) der Bürsten wie der Führungsräder verstellbar sind.

Revendications

1. Dispositif de nettoyage de façade comprenant une charpente allongée (3) ayant deux sous-charpentes (9, 11) et des moyens reliés à la charpente pour déplacer les sous-charpentes et deux groupes (A, B) de brosses (5, 7) où chaque groupe (A, B) de brosses (5, 7) est relié à une sous-charpente individuelle (9, 11) et des moyens pour la rotation des brosses (5, 7) autour de leurs axes de rotation (13), **caractérisé en ce que** le dispositif de nettoyage de façade comprend des moyens de déplacement pour déplacer les sous-charpentes (9, 11) en avant et en arrière l'une le long de l'autre dans des directions opposées (C, D) l'une à l'autre et perpendiculaires aux axes de rotation (13) des brosses et pendant le fonctionnement parallèles à la façade, où chaque groupe (A, B) de brosses comprend au moins deux brosses (5, 7) et le sens de rotation des brosses dans l'un des groupes est opposé à celui des brosses dans l'autre groupe ou bien où des brosses adjacentes dans chaque groupe ont des sens de rotation opposés, où les moyens pour déplacer les sous-charpentes sont des moyens pour déplacer les sous-charpentes se trouvant dans le sens longitudinal de la charpente.
2. Dispositif de nettoyage de façade selon la revendication 1, **caractérisé en ce que** le dispositif de nettoyage de façade comprend un couvercle de protec-

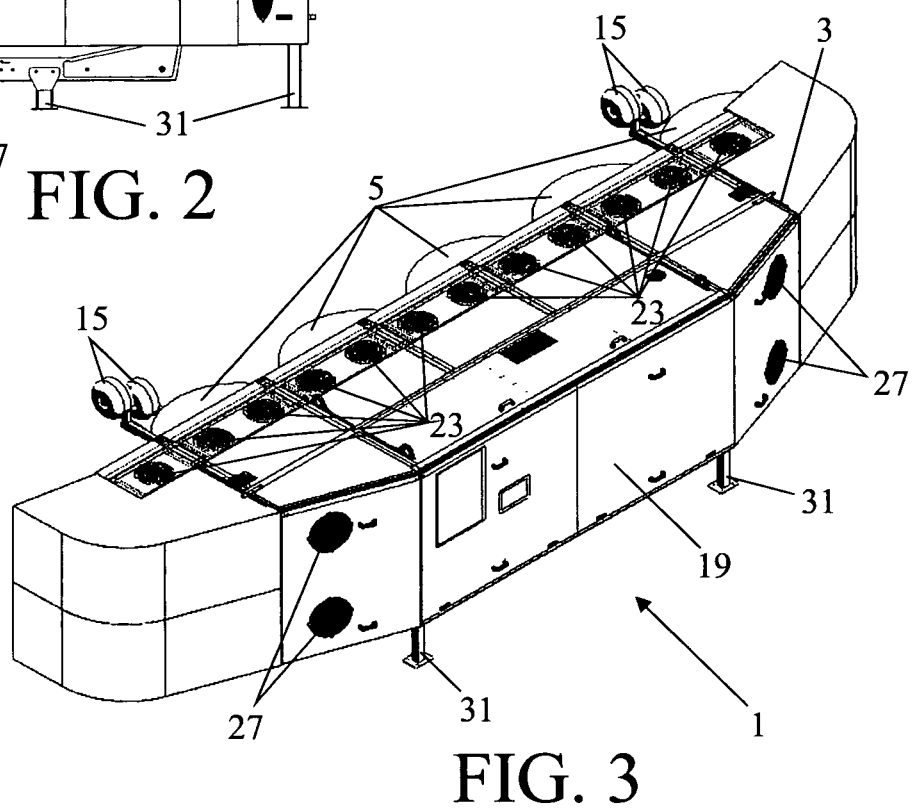
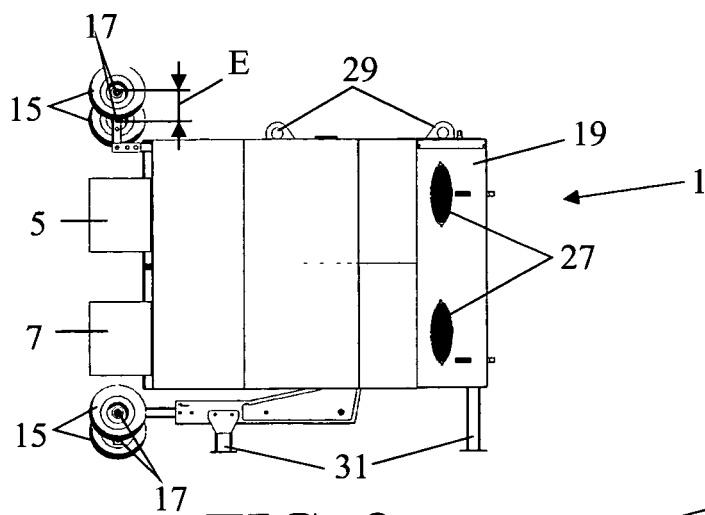
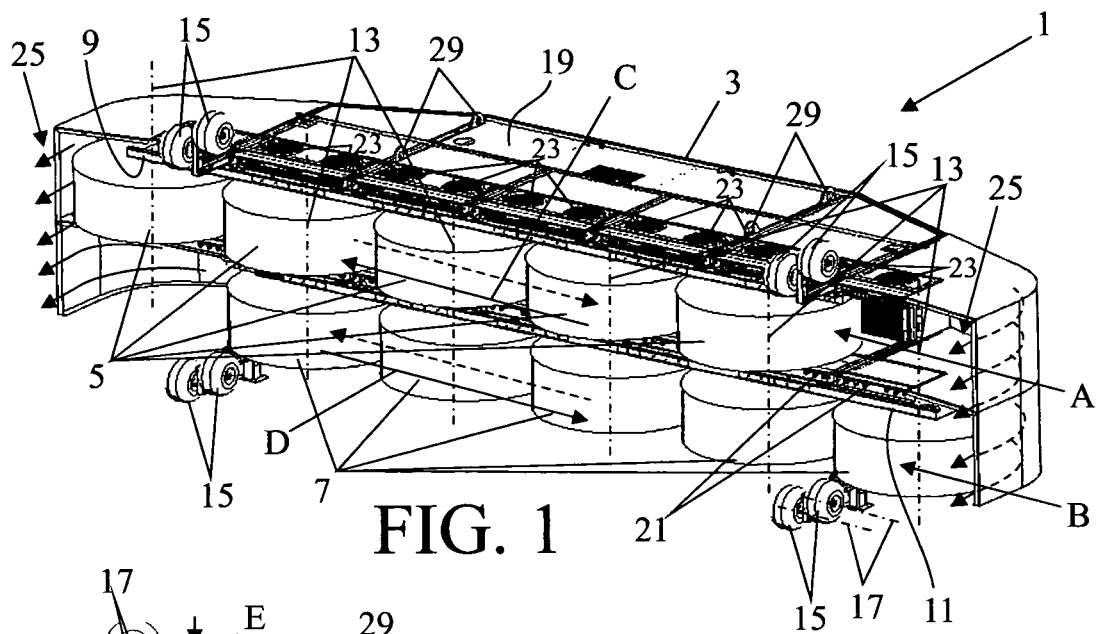
tion (19) se trouvant partiellement autour des brosses (5, 7), ainsi qu'un dispositif de pulvérisation pour pulvériser un liquide de nettoyage sur la façade, et un certain nombre de ventilateurs (23) pour souffler de l'air dans le couvercle de protection de telle manière, et le couvercle de protection est modelé de telle manière, que l'air soit dirigé vers la façade, formant ainsi un rideau d'air qui limite les éclaboussements ou nébulisations de liquide de nettoyage, de conservateurs ou d'eau dans chaque direction, et qui dirige de ce fait le liquide de nettoyage, le conservateur ou l'eau vers la façade au moyen du flux d'air avec des pertes minimales.

3. Dispositif de nettoyage de façade selon la revendication 2, **caractérisé en ce que** le dispositif de nettoyage de façade comprend de plus des ventilateurs supplémentaires (27) qui sont fixés sur l'arrière de la charpente (3) et grâce à quoi le dispositif de nettoyage de façade peut être mis en rotation autour d'un axe vertical afin de mettre le dispositif de nettoyage de façade dans la position souhaitée par rapport à la façade.

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4. Dispositif de nettoyage de façade selon une des revendications précédentes, **caractérisé en ce que** le dispositif de nettoyage de façade comprend un certain nombre de paires de roues de guidage (15) reliées à la charpente (3) pour le guidage du dispositif le long de la façade pendant fonctionnement, où les axes de rotation des roues de guidage sont parallèles au sens de déplacement (C, D) des sous-charpentes (9, 11) et où, vue dans une direction parallèle aux axes des brosses, les axes de rotation (17) des roues de guidage de chaque paire se trouvent à distance (E) l'un de l'autre.

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5. Dispositif de nettoyage de façade selon la revendication 4, **caractérisé en ce que** les paires de roues de guidage (15) sont mobiles en direction perpendiculaire aux axes de rotation (13, 17) aussi bien des brosses que des roues de guidage.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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