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(54) **A STICK VACUUM CLEANER**

EIN STABSTAUBSAUGER

UN ASPIRATEUR À BÂTON

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(73) Proprietor: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

(72) Inventors:
• **CIMEN, Fatma Nur**
34950 Istanbul (TR)

- **DENIZER, Furkan**
34950 Istanbul (TR)
- **BOLDAZ, Erdogan**
34950 Istanbul (TR)
- **YAGCI, Alper**
34950 Istanbul (TR)
- **DURMUS, Unal**
34950 Istanbul (TR)

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Description

[0001] The present invention relates to a stick vacuum cleaner, in particular to a stick vacuum cleaner comprising a dust sensor so as to detect passage of dust through air flow.

[0002] The closest prior art is seen in JP2018088970.

[0003] Stick vacuum cleaners which comprise a body, a brush head and a pipe extending between the brush head and the body are widely used in households. Due to their practical use and light weights, the stick vacuum cleaners provide users convenience, especially in cleaning dark and narrow places. Even though the stick vacuum cleaner are able to reach dark and narrow spaces under the furniture and other household appliances, the users are having problems while checking the cleanness of the area that was swept. In order to ensure that the swept area is clean enough, the user has to bent over and look underneath the furniture and use a light source to see dark and narrow places. Stick vacuum cleaners having cameras attached to the brush heads are widely known. These stick vacuum cleaners also possess a display attached close to the handle, preferably on to the body so as to provide the user with a view of the area that is being swept. However, the visual provided by the camera is limited and the users have problems distinguishing the dust particles to be swept from the background, particularly if the ground is covered by a carpet.

[0004] A prior art publication in the technical field of the present invention may be referred to as CN201641896U among others, the document disclosing a stick vacuum cleaner comprising a camera and a display.

[0005] An objective of the present invention is to allow users to see the dust particles in difficult areas in an ergonomic way without the user being have to bent over and use light sources which causes discomfort and reluctance.

[0006] The method realized to achieve the aim of the present invention and disclosed in the first claim and the dependent claims comprises a stick vacuum cleaner having a body wherein a motor, a dust bag, a filter and a battery is provided. The body is connected to a brush head via a pipe which is attached to the brush head through a bracket that acts as an intermediary elbow. The bracket also allows the rotation of the pipe with respect to the body. The motor, powered by the battery, creates a suction force which helps the brush head to suck inside the air along with the dust particles and transfer them via the pipe to the dust bag. At least a camera is provided on the brush head and used for capturing images of the area that is being swept. In order to illuminate dark areas a light source is provided on the brush head. A display that is utilized to display the image captured by the camera is provided on to the body. A dust sensor is placed near to the brush head and more preferably on to the bracket is provided so as to detect dust particles sucked inside the stick vacuum cleaner. A con-

trol unit is provided to receive the image from the camera, process it and recognize the dust particles. Afterwards, the control unit highlights the dust particles on the image to be displayed on the display. Therefore detection and removal of dust particles becomes easier and convenient. Another major task of the control unit is to synchronize the data received from dust sensor and the image, meaning that the control unit removes the highlighting if the dust sensor sends a data containing suction of a dust particle synchronously with the sweeping movement of the brush head of the area where on the dust particles were previously detected thereby ensuring an easy and effective way to sweep areas that are dark, narrow and hard to access.

[0007] In the stick vacuum cleaner of the present invention an auditory signal means is placed on to the body so as to inform the user of removal of the dust particles. The auditory signal is given when the dust sensor sends a data containing suction of a dust particle synchronously with the sweeping movement of the brush head of the area where on the dust particles were previously detected. Thereby, the user is notified that the swept area is cleaned and that the user can continue with the sweeping operation in adjacent areas, increasing efficiency in cleanups and saving time.

[0008] In an embodiment of the invention the light source is placed between two cameras so as to create depth perception. Thus, a high resolution image wherein dust and foreign particles forming protrusions and distortions on a background that extends on a horizontal and smooth plane is obtained. In this way, the control unit easily identifies dust particles increasing the overall operational effectiveness of the stick vacuum cleaner.

[0009] In an embodiment of the invention the light source is configured to emit light in different wavelengths. The dust particles are formed by materials having a wide range of physical properties. Therefore, each dust particle radiates certain wavelengths better than the others and by changing the wavelength in a range predetermined by the manufacturer, preferably between 100 - 900 nm, detection rate of dust particles is increased, ensuring an effective cleaning.

[0010] In an embodiment of the invention, the cameras are removable attached to the brush head. Even though the cameras are secured inside casings, during sweeping, it is highly probable that the cameras might hit a hard surface and therefore got damaged. By providing cameras that are removable attachable to the brush head, the user may easily change the broken cameras therefore reducing maintenance cost of the stick vacuum cleaner.

[0011] In an embodiment of the invention, the control unit is in wireless communication with the cameras, the light source and the dust sensor. The cameras, the light source and the dust sensor are in connection with a wireless communication hub preferably located on the brush head which is in wireless communication with the control unit.

[0012] In an embodiment of the invention the control unit is connected to the camera, the light source and the dust sensor via a cable. The cable extends between the brush head and the body and is covered inside a cable duct positioned underneath the pipe.

[0013] The drawings are not meant to delimit the scope of protection as identified in the claims nor should they be referred to alone in an effort to interpret the scope identified in the claims without recourse to the technical disclosure in the description of the present invention.

Figure 1 - is a side view of the stick vacuum cleaner.

Figure 2 - is a side view of the brush head

Figure 3 - is a side view of the body

[0014] The following numerals are assigned to different parts demonstrated in the drawings and referred to in the present detailed description of the invention:

1. Stick vacuum cleaner
2. Body
3. Brush head
4. Bracket
5. Pipe
6. Camera
7. Light source
8. Display
9. Dust Sensor
10. Control unit
11. Auditory signal means
12. Cable

[0015] The present invention relates to a stick vacuum cleaner (1) comprising; a body (2), a brush head (3) having a bracket (4), a pipe (5) extending between and connecting the body (2) to the brush head (3) via the bracket (4), at least a camera (6) and a light source (7) placed on to the brush head (3) so as to capture the image of the area to be swept, a display (8) placed on to the body (2) to display the image captured by the camera (6).

[0016] The present invention relates to a stick vacuum cleaner (1) comprising; a dust sensor (9) placed near to the brush head (3) to detect the dust particles inside the air sucked through the brush head (3), a control unit (10) configured to; recognize the dust particles on the image, highlight the dust particles on the display (8), remove highlighting if the dust sensor (9) detects the passage of the dust particles simultaneously with the sweeping movement of the brush head (3) of the area where on the dust particles were previously detected. The dust sensor (9) is configured to detect the passage of dust particles inside the pipe (5). The control unit (10) receives signal from the dust sensor (9) in real time and compares this data with the data acquired by the camera (6). In case, the detection of the passage of dust through the dust sensor (9) coincide with the sweeping movement of the brush head (3) on the area where on the dust particles were previously detected, the control unit (10) decides

that the dust particle is sucked inside the stick vacuum cleaner (1) and removes highlighted area on the display. Therefore, all the dust particles are effectively removed from areas that are hard to access and ease of use is provided for the user.

[0017] In another embodiment, an auditory signal means (11) is placed on to the body (2) so as to notify the user of removal of the dust particles. Removal of highlighted area on the display (8) triggers the control unit (10) to send a signal to the auditory signal means (11) which in turn gives an auditory signal to the user. Therefore, the user is notified of the removal of dust and foreign particles.

[0018] In another embodiment, the light source (7) is placed in between the two cameras (6). Use of two or multiple cameras (6) helps the user to see the area from different perspectives and creates depth perception, therefore the control unit (10) detects the exact location of the dust particles to be swept in an accurate manner.

Thus, the user has to make a minimum number of sweeps on an area where on the dust particles were previously detected.

[0019] In another embodiment, the light source (7) is configured to emit light in differentiating wavelengths.

The dust particles are formed from a wide range of materials having different shapes, colors and reflection values. By continuously changing the wavelength of the light source (7), the dust particles are illuminated in an effective way, therefore improving cleaning capacity of the stick vacuum cleaner (1).

[0020] In another embodiment, the camera (6) is removable attachable to the brush head (3). Therefore, damaged cameras (6) are easily replaced, decreasing the maintenance cost of the stick vacuum cleaner (1).

[0021] In another embodiment, the control unit (10) is in wireless communication with the camera (6), the light source (7) and the dust sensor (9). The camera (6), the light source (7) and the dust sensor (9) is connected to a communication hub having wireless communication abilities which is wirelessly connected to the control unit (10). Thus, cables extending between the brush head (3) and the body (2) are not utilized thereby achieving a cost advantage. Another advantageous effect of using wireless connection is that the cables extending between the brush head (3) and the body (2) are prone to get damaged during sweeping. Use of wireless communication eliminates this possibility therefore decreasing the maintenance costs of the stick vacuum cleaner (1).

[0022] In another embodiment, the control unit (10) is connected to the camera (6), the light source (7) and the dust sensor (9) via a cable (12) extending between the brush head (3) and the body (2). A cable (12) extending between the brush head (3) and the body (2) and covered inside a cable duct provides a cost effective way to connect control unit (11) with the camera (6), the light source (7) and the dust sensor (9).

Claims

1. A stick vacuum cleaner (1) comprising; a body (2), a brush head (3) having a bracket (4), a pipe (5) extending between and connecting the body (2) to the brush head (3) via the bracket (4), at least a camera (6) and a light source (7) placed on to the brush head (3) so as to capture the image of the area to be swept, a display (8) placed on to the body (2) to display the image captured by the camera (6), **characterized in that** a dust sensor (9) placed near to the brush head (3) to detect the dust particles inside the air sucked through the brush head (3), a control unit (10) configured to;

- recognize the dust particles on the image,
- highlight the dust particles on the display (8),
- remove highlighting if the dust sensor (9) detects the passage of the dust particles simultaneously with the sweeping movement of the brush head (3) of the area where on the dust particles were previously detected.

2. A stick vacuum cleaner (1) according to claim 1, **characterized in that** an auditory signal means (11) is placed on to the body (2) so as to notify the user of removal of the dust particles.

3. A stick vacuum cleaner (1) according to any one of the preceding claims, **characterized in that** the light source (7) is placed in between the two cameras (6).

4. A stick vacuum cleaner (1) according to any one of the preceding claims, **characterized in that** the light source (7) is configured to emit light in differentiating wavelengths.

5. A stick vacuum cleaner (1) according to any one of the preceding claims, **characterized in that** the camera (6) is removable attachable to the brush head (3).

6. A stick vacuum cleaner (1) according to any one of the preceding claims, **characterized in that** the control unit (10) is in wireless communication with the camera (10), the light source (7) and the dust sensor (9).

7. A stick vacuum cleaner (1) according to claims 1 to 5, **characterized in that** the control unit (10) is connected to the camera (6), the light source (7) and the dust sensor (9) via a cable (12) extending between the brush head (3) and the body (2).

Patentansprüche

1. Ein Stabstaubsauger (1) umfasst einen Körper (2),

einen Bürstenkopf (3) mit einer Halterung (4), ein Rohr (5), das sich zwischen dem Körper (2) und dem Bürstenkopf (3) über die Halterung (4) erstreckt und diese miteinander verbindet, mindestens eine Kamera (6) und eine Lichtquelle (7), die auf dem Bürstenkopf (3) angeordnet sind, um das Bild der zu kehrenden Fläche zu erfassen, ein Display (8), das auf dem Körper (2) angeordnet ist, um das von der Kamera (6) aufgenommene Bild anzuzeigen, gekennzeichnet ist er durch einen nahe dem Bürstenkopf (3) angeordneten Staubsensor (9) zum Erfassen der Staubpartikel innerhalb der durch den Bürstenkopf (3) gesaugten Luft, wobei eine Steuereinheit (10), die dazu konfiguriert ist;

- die Staubpartikel auf dem Bild zu erkennen,
- die Staubpartikel auf dem Display (8) hervorzuheben,
- Hervorhebungen zu entfernen, wenn der Staubsensor (9) gleichzeitig mit der Wischbewegung des Bürstenkopfes (3) den Durchgang der Staubpartikel in dem Bereich erfasst, in dem zuvor Staubpartikel erfasst wurden.

2. Ein Stabstaubsauger (1), wie in Anspruch 1 aufgeführt, **ist dadurch gekennzeichnet, dass** ein hörbares Signalmittel (11) auf dem Körper (2) angeordnet ist, um den Benutzer über das Entfernen der Staubpartikel zu informieren.

3. Ein Stabstaubsauger (1), wie in den vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** die Lichtquelle (7) zwischen den beiden Kameras (6) angeordnet ist.

4. Ein Stabstaubsauger (1), wie in den vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** die Lichtquelle (7) dazu konfiguriert ist, Licht in differenzierenden Wellenlängen zu emittieren.

5. Ein Stabstaubsauger (1), wie in den vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** die Kamera (6) abnehmbar am Bürstenkopf (3) zu befestigen ist.

6. Ein Stabstaubsauger (1), wie in den vorherigen Ansprüchen aufgeführt, **ist dadurch gekennzeichnet, dass** die Steuereinheit (10) in drahtloser Kommunikation mit der Kamera (10), der Lichtquelle (7) und dem Staubsensor (9) steht.

7. Ein Stabstaubsauger (1), wie in den Ansprüchen 1 bis 5 aufgeführt, **ist dadurch gekennzeichnet, dass** die Steuereinheit (10) mit der Kamera (6), der Lichtquelle (7) und dem Staubsensor (9) über ein Kabel (12) verbunden ist, dass sich zwischen dem Bürstenkopf (3) und dem Körper (2) erstreckt.

Revendications

câble (12) s'étendant entre l'embout de brosse (3) et le corps (2).

1. Un aspirateur balai (1) comprenant ; un corps (2), un embout de brosse (3) ayant un support (4), un tube d'aspiration (5) s'étendant entre le corps (2) et l'embout de brosse (3) et reliant ces deux via le support (4), au moins une caméra (6) et une source lumineuse (7) placées sur l'embout de brosse (3) de façon à capturer l'image de la zone à balayer, un écran (8) placé sur le corps (2) pour afficher l'image capturée par la caméra (6), **caractérisé en ce qu'un** capteur de poussière (9) est placé à proximité de l'embout de brosse (3) pour détecter les particules de poussière se trouvant dans l'air aspiré par l'embout de brosse (3), une unité de contrôle (10) capable de :
 - reconnaître les particules de poussière figurant sur l'image,
 - mettre en surbrillance les particules de poussière sur l'écran (8),
 - enlever la surbrillance si le capteur de poussière (9) détecte le passage des particules de poussière simultanément avec le mouvement de balayage de l'embout de brosse (3) sur la zone où les particules de poussière ont été précédemment détectées.
2. Un aspirateur balai (1) selon la revendication 1, **caractérisé en ce qu'un** moyen de signal sonore (11) est placé sur le corps (2) afin d'avertir l'utilisateur du dépeussierage des particules de poussière.
3. Un aspirateur balai (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la source lumineuse (7) est placée entre les deux caméras (6).
4. Un aspirateur balai (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la source lumineuse (7) est configurée pour émettre de la lumière dans différentes longueurs d'onde.
5. Un aspirateur balai (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la caméra (6) est amovible et peut être fixée à l'embout de brosse (3).
6. Un aspirateur balai (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'unité de contrôle (10) est en communication sans fil avec la caméra (10), la source lumineuse (7) et le capteur de poussière (9).
7. Un aspirateur balai (1) selon les revendications 1 à 5, **caractérisé en ce que** l'unité de contrôle (10) est reliée à la caméra (6), à la source lumineuse (7) et au capteur de poussière (9) par l'intermédiaire d'un

Figure 1

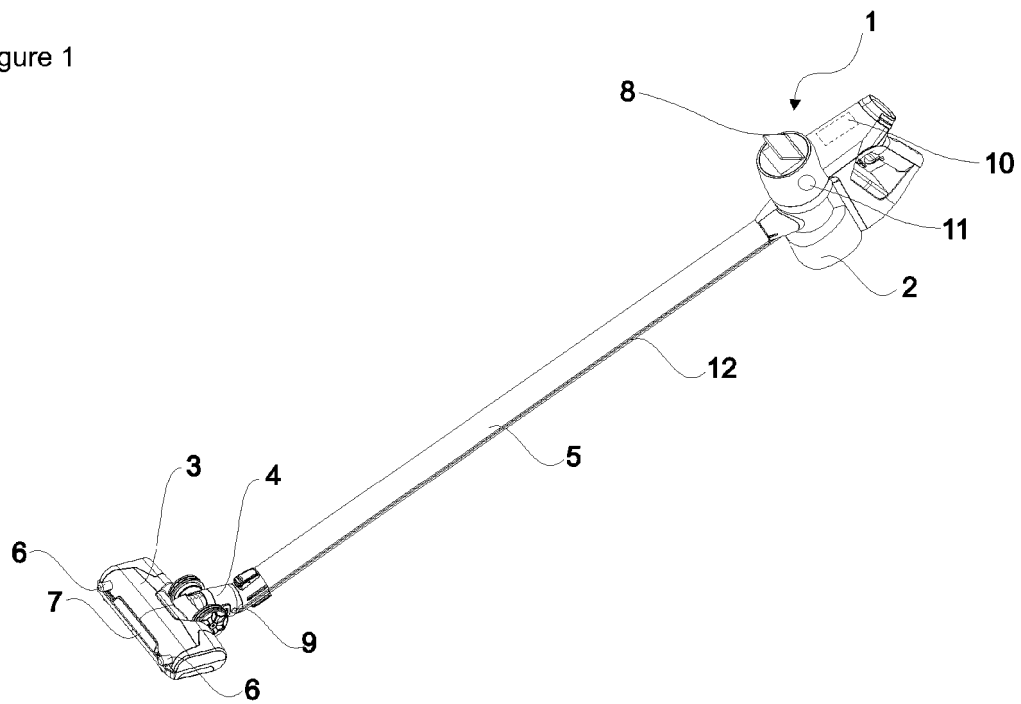


Figure 2

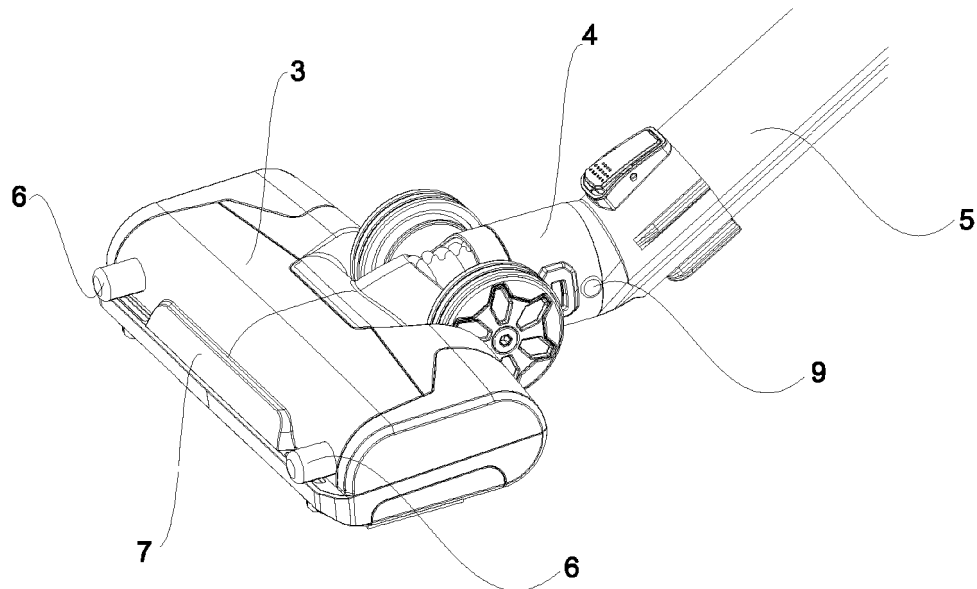
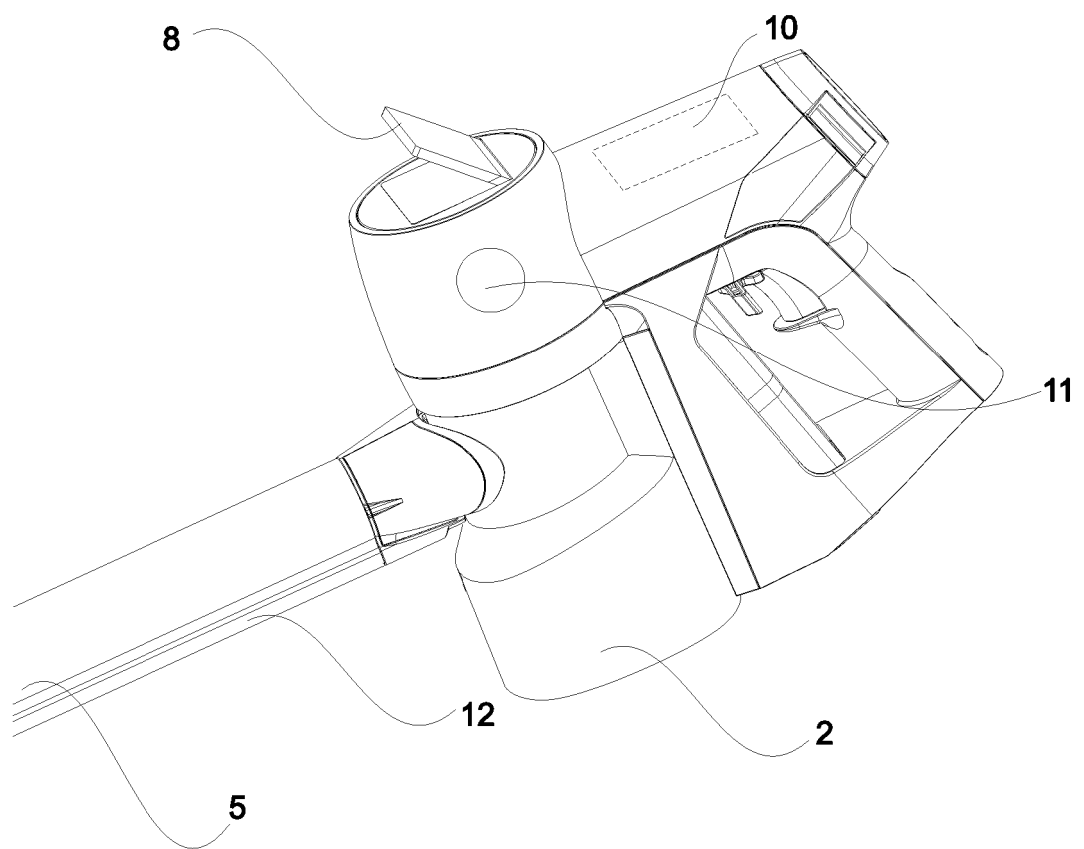


Figure 3



REFERENCES CITED IN THE DESCRIPTION

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