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## (54) DEVICE TO CLEAN THE BRISTLES OF A BROOM

(57) A cleaning device (1) to clean a broom, comprising a containing structure (3), where an opening (3a) is obtained, which is designed to allow the cap/bristle assembly of a broom to be inserted into the containing structure (3); at least one cleaning element (5), which is housed inside the containing structure (3) and comprises a rotation shaft (14), along which at least one row of teeth (18) extends longitudinally, said teeth (18) being orthogonal to the rotation shaft (14) and being designed to go through the bristles of the broom; an extractable collecting receptacle (8), which is also housed inside the containing structure (3) and is designed to receive the dirt removed from the bristles by the row of teeth (18); suction means (7), which are also housed inside the containing structure (3) and comprise a fan (20), which is designed to create a depression inside the collecting receptacle (8), with which it communicates through a suction window (27).

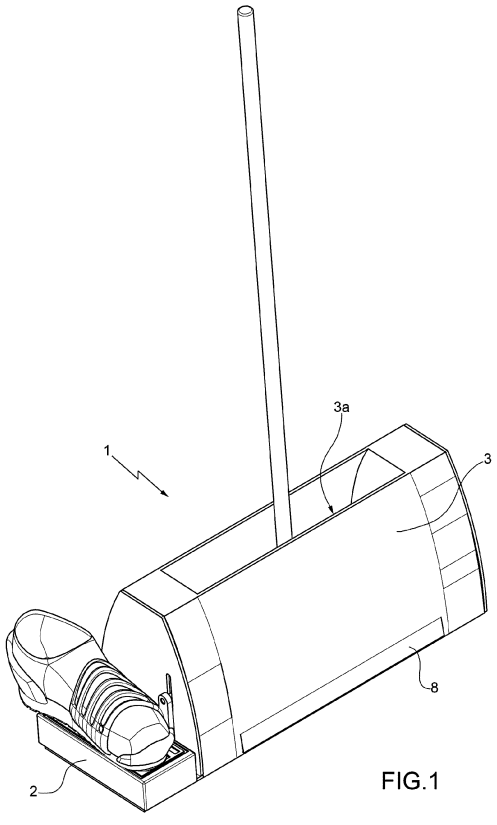


FIG.1

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## Description

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This patent application claims priority from Italian patent application no. 102019000018191 filed on 08/10/2019.

### TECHNICAL FIELD

**[0002]** The invention relates to a device to clean the bristles of a broom.

**[0003]** In particular, this invention addresses the cleaning of an indoor broom consisting of a handle, which can be made of different materials (wood, steel, aluminium), of a plastic material support, to which the handle is screwed and which is technically called cap, and of an assembly of bristles, which are applied to the cap and are designed to carry out the actual sweeping action. The bristles can be made of different materials: nylon, PVC, polyester, natural bristles, depending on the specific type of use.

### BACKGROUND ART

**[0004]** The cleaning of a broom after it has been used is generally carried out either by hand, by directly removing dirt with the hands in order to then throw it away in a garbage bin, or by hitting the bristles of a broom against a surface with a grid-like surface, for example a grille.

**[0005]** The solutions described above evidently involve a significant drawback concerning the risk, for the operator carrying out the cleaning, of inhaling the dusty dirt settled on the bristles.

**[0006]** Other drawbacks affecting the two solutions discussed above result from the direct contact of the operator with dirt and from the diffusion of said dirt in the air, thus inconveniencing both the operator and other people standing nearby.

**[0007]** Therefore, a solution is needed, which allows the bristles of the broom to be cleaned without having to deal with the drawbacks of the prior art.

**[0008]** The inventors of this invention conceived a device whose technical features are capable of fulfilling the aforesaid need. In particular, the device according to the invention has the advantage of being extremely practical, though comprising an effective shaking system to remove dust and dirt from the bristles of the broom and an air suction system aimed at confining the dust and dirt collected by so doing inside a container.

### DISCLOSURE OF INVENTION

**[0009]** The subject-matter of the invention is a device to clean a broom, whose essential features are set forth in claim 1 and whose preferred and secondary features are set forth in claims 2 - 7.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** The invention will be better understood upon perusal of the following description of an explanatory, non-limiting embodiment, with reference to the accompanying figures, wherein:

- figure 1 is a perspective top view of the device according to the invention during an operating phase;
- figure 2 is a perspective top view of the device of figure 1 with parts removed for greater clarity;
- figure 3 shows a detail of the moving system of the device of figure 1; and
- figure 4 is a further perspective top view of the device of figure 1 with parts removed for greater clarity.

### BEST MODE FOR CARRYING OUT THE INVENTION

**[0011]** In figure 1, number 1 indicates, as a whole, a preferred embodiment of the broom cleaning device according to the invention.

**[0012]** The device 1 comprises an operating pedal board 2 and a containing structure 3, which, as described below and shown in figure 2, contains a moving assembly 4 connected to the pedal board, cleaning elements 5 and a dirt collecting assembly 6 to collect the dirt coming from the bristles of the broom. In particular, the collecting assembly 6 comprises suction means 7 and a collecting receptacle 8. In the containing structure 3 there is obtained an opening 3a, which is designed to allow the cap/bristle assembly of a broom to be inserted into the containing structure 3.

**[0013]** The moving assembly 4 comprises a rack 9 directly connected to the pedal board 2, a gearing 10 consisting of a primary gear 11 meshing with the rack 9, a pair of transmission gears 12a and 12b meshing with one another and a pair of moving gears 13a and 13b, each carrying, integral thereto, a respective rotation shaft 14 of said cleaning elements 5 and meshing with a respective transmission gear 12a and 12b.

**[0014]** The control board 2 controls the vertical reciprocating motion of the rack 9, thus provoking the rotation of the primary gear 11, which, for it is connected to the transmission gear 12a as explained below, causes the movement of the gear 11 with the consequent rotation of the two rotation shafts 14.

**[0015]** According to figure 3, the connection between the primary gear 11 and the transmission gear 12a comprises four pivoting struts 15 (three pivoting struts 15 would be enough), each having a pivot end fixed on a hub of the primary gear 11, and a circular coupling surface 16, which is obtained in the body of the transmission gear 12a and faces the pivoting struts 15. The coupling surface 16 consists of continuous succession of recesses 17, each designed to be engaged by a connection end 15a of a respective pivoting strut 15, which is opposite the pivot end.

**[0016]** In case the primary gear 11 rotates at a greater

speed than the transmission gear 12a and, hence, than the coupling surface 16, the relative speed so determined tends to cause the struts to open 15, so that they cause the respective connection ends 15a to engage the respective recesses 17. In this situation, the transmission gear 12a is caused to rotate by the action of the primary gear 11. On the other hand, when the transmission gear 12a and, hence the coupling surface 16 rotate at a greater speed that the primary gear 11, the struts 15 tend to "close", thus causing the respective connection ends 15a not to engage the recesses 17, so that the primary gear 11 and the transmission gear 12a are not constrained to one another. With this mechanism, the motion can only be transmitted from the primary gear 11 to the transmission gear 11a and not vice versa. This system allows for a significant noise and wear reduction compared to other prior art systems producing the same effect.

**[0017]** The cleaning elements 5 comprise the two rotation shafts 14, each comprising two rows of teeth 18 extending longitudinally on the respective rotation shaft 14 and on opposite sides. In use, each row of teeth 18 goes through the bristles of the broom in order to remove the collected dirt. The rotary motion of the rotation shafts supports the cleaning action, removing dirt from the bristles.

**[0018]** As already mentioned above, the collecting assembly 6 comprises suction means 7 and a collecting receptacle 8. The collecting receptacle 8 is a sort of drawer, hence a parallelepiped-shaped structure without the upper wall, which can be extracted from the containing structure 3. The two cleaning elements 5 act above the collecting receptacle 8, so that the dirt removed from the bristles by means of the teeth 18 directly falls into the collecting receptacle 8. The possibility of extracting the collecting receptacle 8 allows it to be easily emptied and cleaned.

**[0019]** The suction means comprise a gearing 19 and a fan 20. The gearing 19 comprises a primary gear 21, which is integral to an end of a rotation shaft 14, a transmission gear 22, which meshes with the primary gear 21, and a fan fear 23, which meshes with the transmission gear 22.

**[0020]** The fan 20 is housed, so that it can freely rotate, inside a casing 24, where a suction opening 25 (visible in figure 4) and a delivery opening 26 are obtained. The suction opening 25 faces a suction window 27, which is obtained in a side wall of the collecting receptacle 8 so as to allow a depression to be created inside the collecting receptacle 8. On the contrary, the delivery opening 26 faces out of the containing structure 3.

**[0021]** The depression inside the collecting receptacle 8, which is generated by the fan 20 through the suction window 27, forces the dirt removed from the bristles to accumulate inside the collecting receptacle 8 and prevents dust or dirt parts from getting out of the containing structure 3.

**[0022]** The position of the suction window 27 leads to the creation of an air flow that allows the dust removed from the bristles to be transported into the collecting receptacle 8.

**[0023]** In order to prevent the smallest parts thereof from being dispersed in the air on the outside, in the area of the suction window 27 there is a filter, which is capable of stopping the smallest parts and of causing them to settle inside the collecting receptacle.

**[0024]** The cleaning of the bristles of a broom takes place by inserting the cap/bristle assembly of the broom into the containing structure 3 through the opening 3a and by operating the pedal board 2 through a foot of the operator.

**[0025]** The operation of the pedal board causes the movement of the gearings 10 and 19, thus causing the rows of teeth 18 to remove dirt from the bristles, which then settles in the collecting receptacle 8 thanks to the depression created inside the collecting receptacle 8.

**[0026]** The sucked air, after having been filtered through suction window 27, is conveyed towards the outside of the containing structure 3.

**[0027]** Unlike what described above, the gearings 10 and 19 can be activated by an electric instead of mechanical actuator.

**[0028]** Owing to the above, the device according to the invention ensures a simple and efficient cleaning of the bristles of a broom, without the drawbacks of the prior art. Indeed, the technical features of the device are such as to avoid both the direct contact of the operator with the dirt collected by the bristles and the diffusion of said dirt in the air, thus preventing it from being inhaled by the operator or by other people nearby.

## Claims

1. A cleaning device (1) to clean a broom, comprising a containing structure (3), where an opening (3a) is obtained, which is designed to allow the cap/bristle assembly of a broom to be inserted into the containing structure (3); at least one cleaning element (5), which is housed inside the containing structure (3) and comprises a first rotation shaft (14), along which at least one row of teeth (18) extends longitudinally, said teeth (18) being orthogonal to said first rotation shaft (14) and being designed to go through the bristles of the broom; an extractable collecting receptacle (8), which is also housed inside the containing structure (3) and is designed to receive the dirt removed from the bristles by the row of teeth (18); suction means (7), which are also housed inside the containing structure (3) and comprise a fan (20), which is designed to create a depression inside the collecting receptacle (8), with which it communicates through a suction window (27); a first gearing (10), which is also housed inside the containing structure (3) and is connected to said rotation shaft (14) in order to activate the rotation thereof; a second gearing (19), which is also housed inside the containing

structure (3) and is connected to said fan (20) in order to activate the rotation thereof; and operating means (2), which are designed to control the movements of said first gearing (10) and of said second gearing (19); said first gearing (10) comprising a primary gear (11), upon which said operating means (2) act, a first transmission gear (12a), which is connected to said primary gear (11) by means of connection means (15, 16, 17), and a first moving gear (13a), which carries, integral thereto, said first rotation shaft (14) and meshes with said first transmission gear (12a); said cleaning device being **characterized in that** said connection means between said primary gear (11) and said first transmission gear (12a) comprise at least three pivoting struts (15), each having a pivot end fixed on a hub of the primary gear (11), and a circular coupling surface (16), which is obtained in the body of the first transmission gear (12a) and faces the pivoting struts (15); said coupling surface (16) consisting of a continuous succession of recesses (17), each designed to be engaged by a connection end (15a) of a respective pivoting strut (15), which is opposite the pivot end.

**2.** A cleaning device (1) according to claim 1, **characterized in that** it comprises a second rotation shaft (14), which carries two longitudinal rows of teeth (18) arranged on opposite sides relative to the respective second rotation shaft (14); said first gearing (10) comprising a second transmission gear (12b), which meshes with said first transmission gear (12a), and a second moving gear (13b), which carries, integral thereto, said second rotation shaft (14) and meshes with said second transmission gear (12b).

**3.** A cleaning device (1) according to claim 1 or 2, **characterized in that** said extractable collecting respectable (8) has a parallelepiped-shaped structure without the upper wall and is arranged under said cleaning element (5).

**4.** A device according to one of the preceding claims, **characterized in that** said second gearing (19) comprises a primary gear (21), which is integral to an end of said first or said second rotation shaft (14), a transmission gear (22), which meshes with the primary gear (21), and a fan gear (23), which meshes with the transmission gear (22) and is integral to said fan (20).

**5.** A cleaning device according to one of the preceding claims, **characterized in that** said fan (20) is housed, so as to be free to rotate, inside a casing (24), where a suction opening (25) and a delivery opening (26) are obtained; sad suction opening (25) faces a suction window (27) obtained in a side wall of the collecting receptacle (8) so as to allow a depression to be created inside the collecting receptacle (8) .

**6.** A cleaning device (1) according to one of the preceding claims, **characterized in that** said operating means comprise a pedal board (2), which is arranged on the outside of the containing structure (3) and is connected to a rack (9), which meshes with a primary gear (11) of said gearing (10) .

**7.** A cleaning device according to one of the claims from 1 to 5, **characterized in that** said operating means comprise an electric motor.

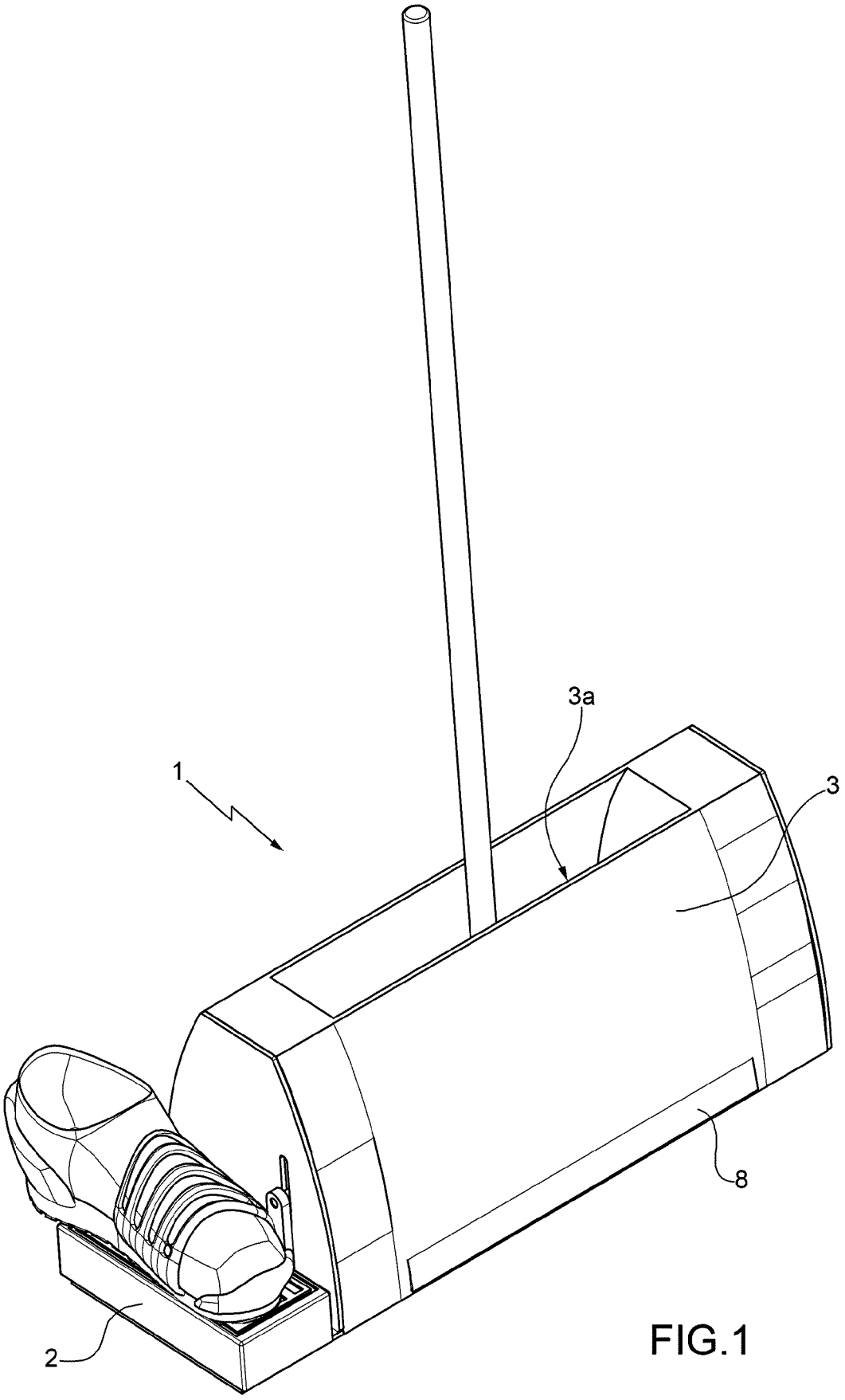


FIG.1

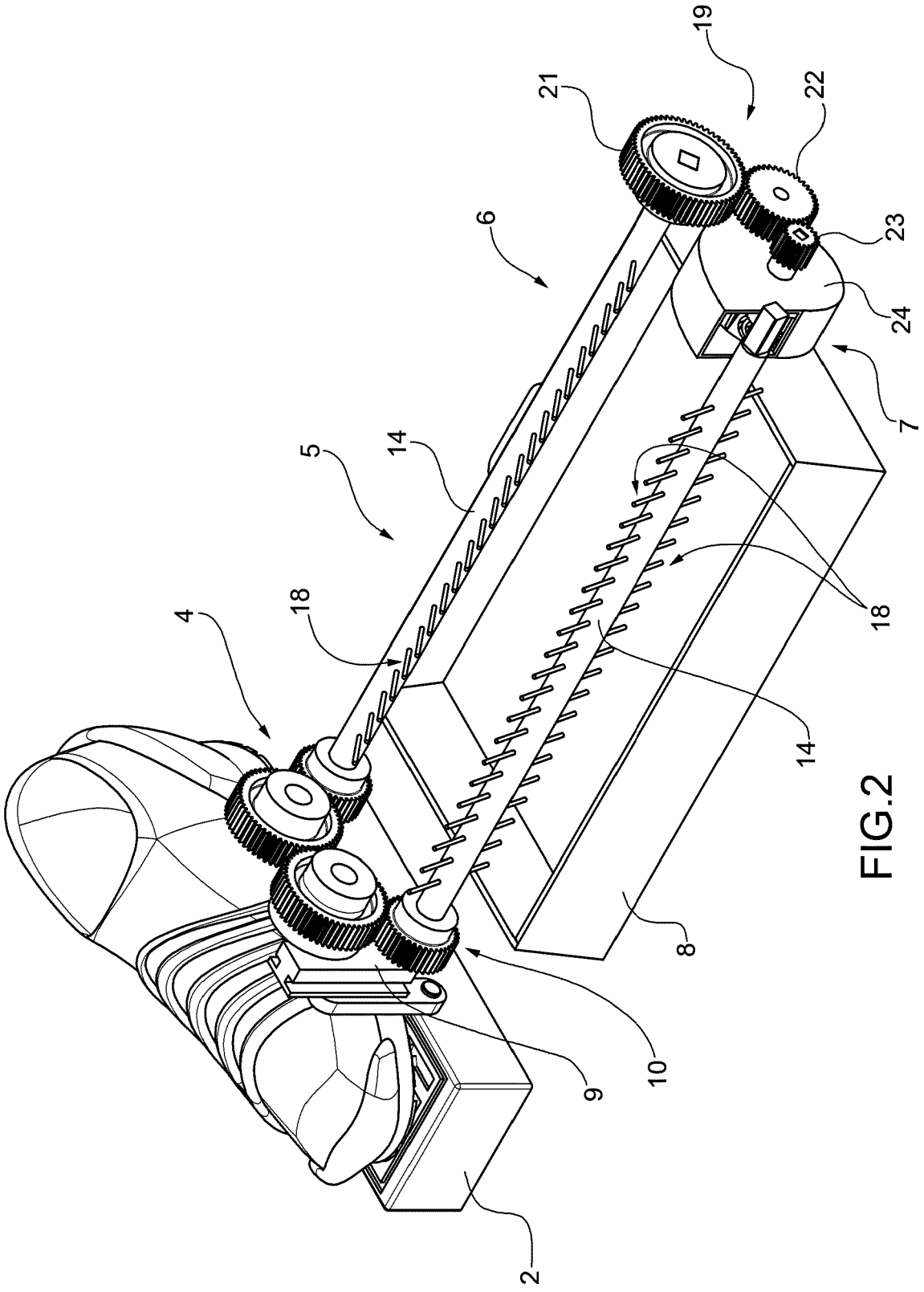


FIG.2

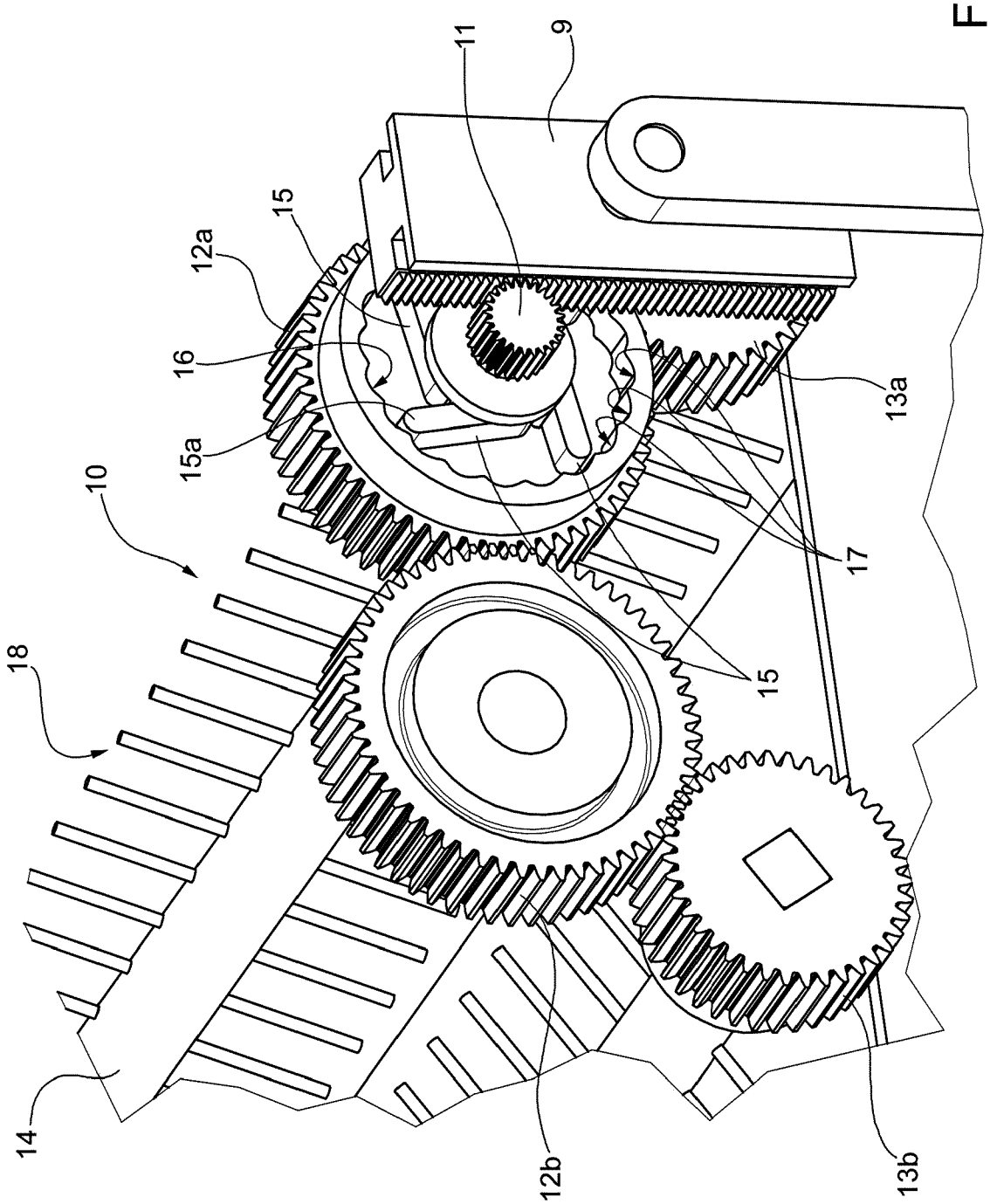


FIG.3

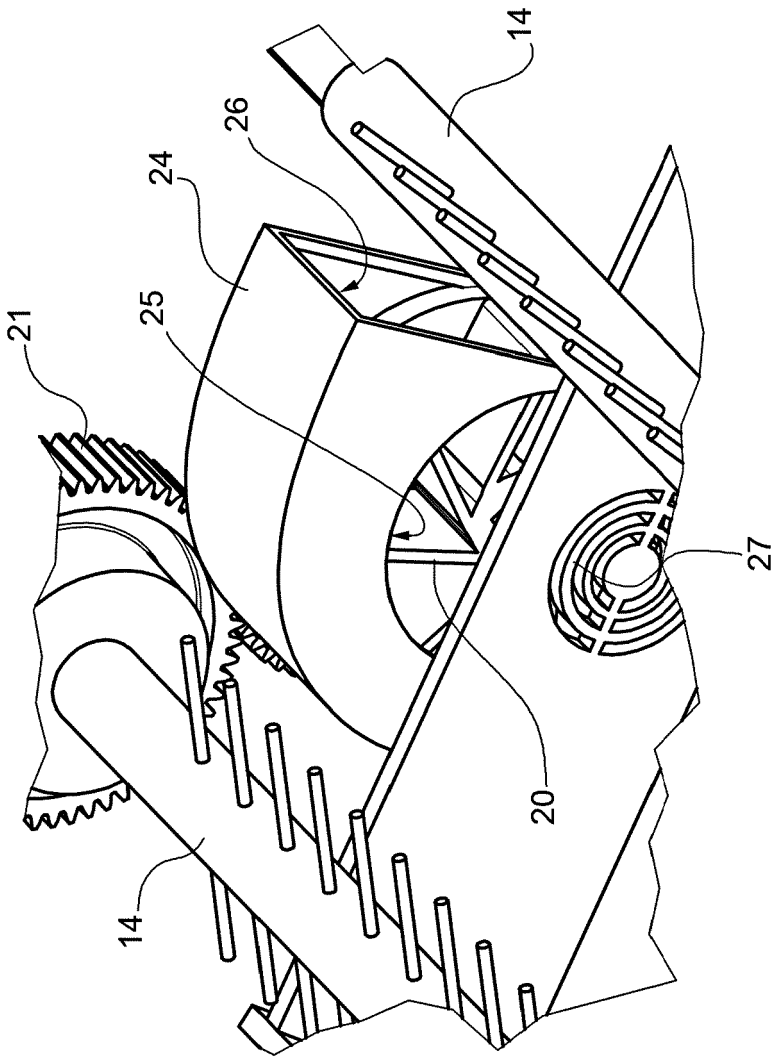


FIG.4

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Application Number
EP 20 20 0898

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A46B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 25 February 2021 | Kun, Karla |

CATEGORY OF CITED DOCUMENTS

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 20 0898

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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