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- (54) **Szívóharang egy mobil tisztítókészülékhez, mobil tisztítóberendezés, amely rendelkezik egy ilyen szívóharanggal, valamint tisztítási eljárás**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

The present invention relates to a suction bell for a mobile cleaning device for the cleaning of bag filters, with a basic body which has an external circumference adapted to the internal circumference of a bag filter opening and a longitudinal axis. Furthermore, the present invention also relates to a suction plant with such a suction bell and a cleaning device with a suction plant and a suction bell, and finally a method for the cleaning of horizontally fitted bag filters with the use of the suction bell, suction plant and cleaning device.

Suction bells for use in the cleaning of bag filters are not known from the prior art. Suction devices are routinely only positioned in the vicinity of a bag-filter opening in order to vacuum away dust content occurring in the air there in the case of a cleaning process. For this purpose, suction plants are used, which are known from fields of technology in which relatively large quantities of dust occur routinely in the processing of the material, which must be vacuumed away. For example, such suction devices are known in the processing of wood. In the case of a mobile use for a bag-filter cleaning, the free end of the suction hose is simply positioned in the vicinity of the bag-filter opening.

The suction plants known from the prior art do not form a unit with the cleaning device during operation, because they do not come into physical connection with one another. In the case of cleaning devices, rotary cleaning heads are generally used, which are difficult to handle in the case of the cleaning of horizontally fitted bag filters, if a unity between suction plant and cleaning device is not present. A suction bell according to the preamble of claim 1 is known, for example, from FR-A-1427379.

The object of the present invention is therefore to provide a suction bell which creates a connection during operation between a suction plant and a cleaning device and allows a substantially dust-free cleaning of bag filters with regard to the environment.

The object is achieved according to the invention by the features of claim 1.

The object is further achieved by a suction plant according to claim 6.

The object is also achieved by a cleaning device according to claim 12 and by a method according to claim 19.

With the suction bell according to the invention, it is possible to create a sealed connection between an internal circumference of a bag-filter opening and an external circumference of the basic body of the suction bell. Furthermore, it is possible to create a sealed connection between a cleaning element and the basic body of the suction bell. Accordingly, during operation as a part of a suction plant or in combination with a suction plant, the suction bell can form a sealed coupling element for a cleaning device. Furthermore, it is possible for the cleaning element to receive guidance in the through-opening of the basic body, which ensures a controlled movement pathway. This is important, especially for the cleaning of horizontally fitted bag filters.

A further advantage of the present invention is that the through-opening extends parallel to the longitudinal axis of the basic body. Through this measure, the guidance length of the through-opening for the cleaning element is optimised. This is also particularly advantageous for the cleaning of horizontally fitted bag filters. However, this is also advantageous for vertically fitted bag filters.

A further advantage of the present invention is that the basic body is divided in a plane transverse to the longitudinal axis into an upper bell part and a lower bell part, wherein the first

felt seal is attached to the external circumference of the lower bell part. Through the division of the basic body into an upper bell part and a lower bell part, it is possible to adapt the suction bell to different bag-filter diameters. Accordingly, it is not necessary to store the entire suction bell in different dimensions. On the contrary, it is sufficient to store a series of different lower bell parts in order to achieve an adaptation to the respective bag-filter opening.

A further advantage of the present invention is that the lower bell part has a top plate to which a third felt seal is attached in order to form a seal between the top plate and a base plate of the upper bell part.

Through the third felt seal, it is ensured that no dust particles can escape even at this connecting position.

A further advantage of the present invention is that the first felt seal has a variable thickness in order to seal different bag filters and supporting bodies. Through this measure, identical lower bell parts can be attached to different external diameters in order to be adapted to the respective internal diameter of a bag-filter opening.

A further advantage of the present invention is that the basic body has a connection for a suction plant. Through this measure, the suction bell can be handled separately from a suction plant. This facilitates the mobile use of the suction bell, for example, in the case of an alternating cleaning of horizontally fitted and vertically fitted bag filters.

The invention is also achieved by a suction plant with a suction bell according to the invention. It is particularly advantageous if the suction plant is constituted mobile. Horizontally fitted and vertically fitted bag filters can then be cleaned on site in a practical manner, in the same way and with the same plant.

A further advantage of the present invention is that the suction plant has an earth cable for the prevention of a static charge. This ensures that all dust components are vacuumed away and do not remain adhering through static charge on the device and/or on device parts.

A further advantage of the present invention is that a control unit for controlling the operation of the plant has a foot pedal for the activation and deactivation of the suction plant. Through the activation and deactivation of the suction plant by means of the foot pedal, the user can keep hands free, for example, in order to activate a cleaning device.

The object according to the invention is also achieved by a cleaning device with a suction plant according to the invention and a suction bell according to the invention.

For the cleaning device, it is also advantageous that the latter is constituted mobile. The latter can then be used with the mobile suction plant and the separate suction bell for every arbitrary use for cleaning bag filters, whether these are fitted horizontally or fitted vertically.

A further advantage of the present invention is that a cleaning element can be guided through the through-opening of the suction bell and can be moved back and forth. Through this measure, the actual coupling between cleaning device, suction plant and bag filter is implemented. Through the sealed connection of the suction bell with the bag filter, and the suction bell with the cleaning element, a cleaning can be implemented without dust escaping into the environment. Accordingly, the entire equipment can also be used in clean rooms or at least in rooms to be kept as free from dust as possible.

A further advantage of the present invention is that a cleaning head with at least one cleaning nozzle is arranged at the free end of the cleaning element. A cleaning nozzle allows a controlled volume flow for the cleaning of a contaminated bag filter. It is particularly advantageous that the cleaning head and/or the at least one cleaning nozzle is set into rotation during operation. Such so-called rotation nozzles allow an optimal cleaning over the entire circumference of the bag filter.

The object is also achieved by a method for the cleaning of horizontally fitted bag filters. For horizontally fitted bag filters, the use of rotation nozzles is hitherto unknown. However, with the suction bell, suction plant and cleaning device according to the invention, cleaning with a rotation nozzle is also possible in the case of horizontally fitted bag filters, without dust escaping into the environment.

An exemplary embodiment of the present invention is described in greater detail with reference to the drawings. The drawings show:

Fig. 1 a schematic view of a cleaning device, suction bell, suction plant according to the present invention;

Fig. 2 a perspective view of a suction bell according to the invention with different lower bell parts; and

Fig. 3 a perspective view of an upper bell part according to the present invention with a through-opening for a cleaning element with felt seal.

Fig. 1 shows schematically a complete cleaning equipment. The cleaning equipment has a suction bell 100, a suction plant 200 and a cleaning device 300.

The suction bell 100 has a basic body 101, which, in the present embodiment, is composed of an upper bell part 103 and a lower bell part 105. In other embodiments, the basic body 101 can also be constituted in one part or also arbitrarily many parts. The basic body 101 has a longitudinal axis 107. Parallel to the longitudinal axis 107 and, in the present embodiment, also concentric to the latter, a through-opening 109 (see Fig. 3) passes through the basic body 101. The through-opening 109 passes through the entire basic body 101, that is to say, both the upper bell part 103 and also the lower bell part 105.

In the basic body 101 and, in the present embodiment, in the upper bell part 103, a connecting pipe 111 is constituted laterally for the connection of the suction plant 300. The connecting pipe 111 extends at an angle to the longitudinal axis 107 so that, between the basic body 101 and respectively the upper bell part 103 and the connecting pipe 111, an acute angle is enclosed. In Fig. 1, it is evident that the connecting pipe 111 extends diagonally upwards with reference to the basic body 101, when the suction bell 100 is orientated in its operating function for the cleaning of a vertically fitted bag filter. In the case of an arrangement of the suction bell for the cleaning of a horizontally fitted bag filter, the connecting pipe 111 would be directed diagonally to the rear.

In the basic body 101 and, in the present embodiment, in the lower bell part 105, a first felt seal 113 is attached. The first felt seal 113 completely encircles the lower bell part 105. The attachment of the first felt seal 113 is implemented, for example, by adhesive or also, in an advantageous manner, mechanically by means of a clamping element 115. The lower bell part

105 has a top plate 117, and the upper bell part 103 has a base plate 119 butting against the top plate 117. A second felt seal 121 is fitted between the top plate 117 and the base plate 119.

5 A third felt seal 123 (see Fig. 3) is fitted in the through-opening 109. The third felt seal 123 encircles the internal diameter of the through-opening 109 in an inlet region for a cleaning element.

10 The lower bell part 105 is attached in a replaceable manner relative to the upper bell part 103, for example, through screw connection. In Fig. 1, another lower bell part G is illustrated, which has a smaller external diameter than the lower bell part 105. Through the connection of different lower bell parts 105/G with the upper bell part 103, the suction bell 100 as a whole can be adapted to a different internal diameter of a bag filter. A further adaptation is possible if the thickness of the first felt seal 113 is varied.

15 Fig. 1 also illustrates the suction plant 300. The suction plant 300 has a conventional suction device with electric motor 301 and collecting bag 303. Between a housing 305, to which the electric motor 301 is attached, and the connecting pipe 111 of the suction bell 100, a suction hose 307 is arranged. The suction hose 307 is flexible and expandable in length to a predetermined dimension. The connection of the suction hose 307 to the connecting pipe 111 is implemented through conventional connecting elements, for example, hose clips. In the connected condition, the suction bell 100 forms a connecting element of the suction plant 300 for connection to a bag filter. On its housing 309, the suction plant 300 has wheels 311, so that the latter is mobile. The suction plant 300 also has an earth cable 313, with which a static charging is prevented.

25 The cleaning equipment also has a cleaning device 200 with a cleaning element 201, which, in the present case, is a cleaning hose. In different embodiments, the cleaning element 201 can also form a rigid lance.

30 The cleaning hose 201 is flexible and connected to a control unit 203. The control unit 203 has a conventional electrical device for the opening and closing of a compressed air supply and for the activation and deactivation of a cleaning device and optionally also of the suction plant 300.

35 For the operation of the control unit 203, a foot pedal 205 is provided. The foot pedal 205 is connected via electrical cable to the control unit 203, wherein the control unit 203 is optionally connected in turn to the suction plant 300 via electrical cable (not illustrated). By activating the foot pedal 205, on the one hand, the compressed air supply can be interrupted or delivered and, on the other hand, the cleaning device and/or the suction plant can be activated or deactivated. Of course, the control unit can additionally have a large number of further functions, which can be triggered or cancelled at least partially via the foot pedal 205. The control technology is prior art and does not form the subject matter of the present invention. At a free end of the cleaning element 201, a cleaning head (not illustrated) with at least one cleaning nozzle is attached. In the present embodiment, the cleaning head or respectively the at least one cleaning nozzle should rotate during operation. Of course, in other embodiments, non-rotating cleaning heads or respectively cleaning nozzles can also be used.

50 In Fig. 2, the suction bell 200 is illustrated schematically with different lower bell parts 105. Fig. 3 shows schematically how the third felt seal 123 is arranged in the region of the inlet of the cleaning hose 201 into the internal circumference of the through-opening 109 of the upper bell part 103 or respectively basic body 101. Through a variation of the thickness of the felt seal 123,

it is possible to create a seal with cleaning elements 201 of different thickness. The second felt seal 121 is also clearly shown in Fig. 2.

5 For a cleaning process, the suction plant 300 is connected to the suction bell 100 and to the cleaning device 200. The mobile suction plant 300 according to the invention has a maximal volume flow of 1100 cbm/h with a compression of 1750 Pa. A dust residue from the filter bags is not released but vacuumed away. The cleaning hoses 201 are designed for a pressure of up to 20 bar. A maximal temperature resistance is at around 180°C. Accordingly, cleaning filter plants is also possible in the high temperature range in N-1 operating mode (without downtime). The
10 compressed air hoses have a woven steel lining and are additionally earthed via earth cables. Accordingly, an earthing with regard to static charges is also implemented here, and a formation of sparks is prevented. The control unit 203 has a foot pedal 205 for every cleaning head (not illustrated) and accordingly for every suction plant 300.

15 For the implementation of a cleaning, the cleaning element 201 of the cleaning device 200 is guided through the suction bell and the bag-filter opening into the bag filter. The control unit 203 is then activated, and the cleaning element 201 is moved within the bag filter, for example, back-and-forth. After completion of the cleaning process, the control unit 203 is deactivated, for example, via the foot pedal 205. The cleaning element 201 is then withdrawn from the bag filter.
20 The suction plant 300 is then detached from the bag filter by removing the suction bell 100 from the bag-filter opening.

For cleaning horizontally or vertically fitted bag filters, cleaning elements with rotation nozzles are used in the present embodiment. Rotation nozzles are generally known from the prior art
25 and do not form part of the present invention.

List of reference numbers

	100	suction bell
5	101	basic body
	103	upper bell part
	105	lower bell part
	107	longitudinal axis
	109	through-opening
10	111	connecting pipe
	113	first felt seal
	115	clamping element
	117	top plate
	119	base plate
15	121	second felt seal
	123	third felt seal
	G	lower bell part
	200	cleaning device
	201	cleaning element
20	203	control element
	205	foot pedal
	300	suction plant
	301	electric motor
	303	collecting bag
25	305	housing
	307	suction hose
	309	housing
	311	wheels
	313	earth cable
30		

SZÍVÓHARANG EGY MOBIL TISZTÍTÓKÉSZÜLÉKHEZ, MOBIL TISZTÍTÓBERENDEZÉS, AMELY RENDELKEZIK EGY ILYEN SZÍVÓHARANGGAL, VALAMINT TISZTÍTÁSI ELJÁRÁS

Szabadalmi igénypontok

1. Szívóharang (100) egy zsákos szűrőhöz nyomás alatt történő tisztítás céljából rotációs fűvókák révén, amely rendelkezik egy alaptesttel (101), amely egy külső kerülettel rendelkezik, amely igazítva van a zsákos szűrő nyílásának a belső kerületéhez, egy átmenő nyílással (109), amely egy tisztítóelem (201) számára szolgál, és egy hossz tengellyel (107), **azzal jellemezve, hogy** az alaptest (101) el van osztva egy síkban, amely keresztirányú a hossz tengelyhez (107) képest, egy felső harang részre (103) és egy alsó harang részre (105), ahol a felső harang rész (103) szétkapcsolható módon össze van kapcsolva az alsó harang résszel (105), és **azzal, hogy** egy első filctömítés (113) van elhelyezve az alsó harang résznek (105) a külső kerületén és egy második filctömítés (121) van elhelyezve az átmenő nyílásnak (109) a belső kerületén.
2. Szívóharang (100) az 1. igénypont szerint, **azzal jellemezve, hogy** az átmenő nyílás (109) a hossz tengellyel (107) párhuzamosan van kialakítva.
3. Szívóharang (100) a 2. igénypont szerint, **azzal jellemezve, hogy** az alsó harang rész (105) magában foglal egy fedőlapot (117), amelyre egy harmadik filctömítés (123) van elhelyezve azon célból, hogy legyen kialakítva egy tömített lezárás a fedőlap (117) és a felső harang rész (103) egy fenéklapja (119) között.
4. Szívóharang (100) az előző igénypontok bármelyike szerint, **azzal jellemezve, hogy** az első filctömítés (113) egy változó vastagsággal rendelkezik azon célból, hogy képes legyen tömített módon lezárni különböző zsákos szűrőket és tartókosarakat.
5. Szívóharang (100) az előző igénypontok bármelyike szerint, **azzal jellemezve, hogy** az alaptest (101) magában foglal egy csatlakozó csőidomot (111) egy szívóberendezés (300) számára.
6. Szívóberendezés (300), amely rendelkezik egy az 1.-től 5.-ig igénypontok bármelyike szerinti szívóharanggal (100).
7. Szívóberendezés (300) a 6. igénypont szerint, **azzal jellemezve, hogy** az mobil kialakítású.
8. Szívóberendezés (300) a 6. vagy 7. igénypont szerint, **azzal jellemezve, hogy** az egy $1100 \text{ m}^3/\text{h}$ értékű maximális térfogatárammal rendelkezik egy 1750 Pa értékű nyomásnál.
9. Szívóberendezés (300) a 6.-tól 8.-ig igénypontok bármelyike szerint, **azzal jellemezve, hogy** egy földelő kábel (313) áll rendelkezésre egy statikus feltöltődés megelőzésére.
10. Szívóberendezés (300) a 6.-tól 9.-ig igénypontok bármelyike szerint, **azzal jellemezve, hogy** egy vezérlőegység (203), amely a berendezés működésének a vezérlésére szolgál, rendelkezik egy első lámpedállal (205) a szívóberendezés (300) aktiválása és deaktiválása céljából.
11. Szívóberendezés (300) a 6.-tól 10.-ig igénypontok bármelyike szerint, **azzal jellemezve, hogy** egy szívótömlő (307) van csatlakoztatva a szívóharangra (100) oldalról, keresztirányban a szívóharangnak (100) a hossz tengelyéhez (107) képest.
12. Tisztítókészülék (200), amely rendelkezik egy a 6.-tól 11.-ig igénypontok bármelyike szerinti szívóberendezéssel (300) és egy az 1.-től 5.-ig igénypontok bármelyike szerinti szívóharanggal (100).

13. Tisztítókészülék (200) a 12. igénypont szerint, **azzal jellemezve, hogy** az mobil kialakítású.
14. Tisztítókészülék (200) a 12. vagy 13. igénypont szerinti, **azzal jellemezve, hogy** egy tisztítóelem (201) van átvezetve a szívóharangnak (100) az átmenő nyílásán (109) keresztül és ide-oda mozgatható.
15. Tisztítókészülék (200) a 14. igénypont szerint, **azzal jellemezve, hogy** a tisztítóelemnek (201) a szabad végénél egy tisztítófej van elrendezve, amely rendelkezik legalább egy tisztító fűvókával.
16. Tisztítókészülék (200) a 15. igénypont szerint, **azzal jellemezve, hogy** a tisztítófej és/vagy a legalább egy tisztító fűvóka a működés közben forgásba van hozva.
17. Tisztítókészülék (200) a 12.-től 16.-ig igénypontok bármelyike szerint, **azzal jellemezve, hogy** egy vezérlőegység (203), amely a működés vezérlésére szolgál, rendelkezik egy második lábpedállal (205) a tisztítókészülék (200) aktiválása és deaktiválása céljából.
18. Tisztítókészülék (200) a 17. igénypont szerint, **azzal jellemezve, hogy** az első és második lábpedált (205) egy és ugyanaz a lábpedál képezi.
19. Eljárás vízszintesen felszerelt zsákos szűrők tisztítására, amely magában foglalja a következő lépéseket:
 - egy a 12.-től 18.-ig igénypontok bármelyike szerinti tisztítókészülék rendelkezésre állítása;
 - egy a 6.-tól 11.-ig igénypontok bármelyike szerinti szívóberendezésnek, amely rendelkezik egy az 1.-től 5.-ig igénypontok bármelyike szerinti szívóharanggal, a csatlakoztatása a zsákos szűrőhöz;
 - a tisztítóelem bevezetése a zsákos szűrőbe;
 - a vezérlőegység aktiválása;
 - a tisztítóelem mozgatása a zsákos szűrőben;
 - a vezérlőegység deaktiválása;
 - a tisztítóelem kihúzása a zsákos szűrőből;
 - az szívóberendezés szétkapcsolása a zsákos szűrőtől.

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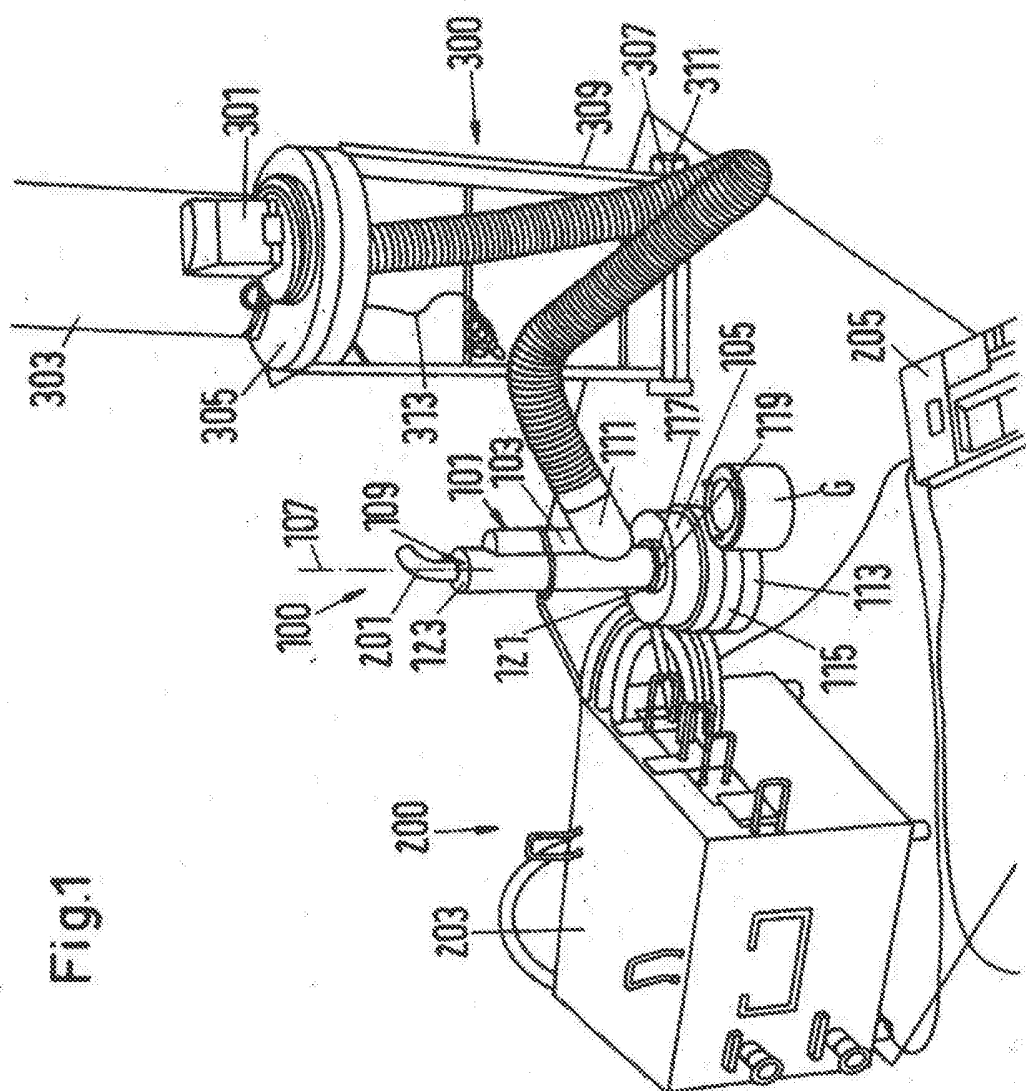


Fig.2

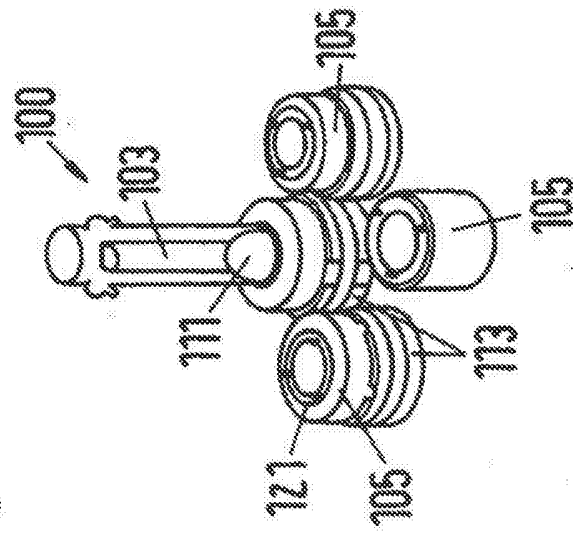


Fig.3

