

The invention relates to an electric vacuum cleaner as per the characterising clause in patent claim 1.

An electric vacuum cleaner is already known in the art under no. DE-A-3 217 240. There the chamber for holding a filter bag is situated above the fan motor. However, the blast air is then carried along a duct which runs the length of the filter bag into the end of the filter bag which is furthest away from the motor fan. The relevant duct at the same time forms a hinged secondary support for the filter bag, which is suspended from it in such a way that it can be detached. In the normal position, the filter bag and the tubular secondary support, which is positioned alongside the filter bag, are in a roughly vertical position. On the other side of this vertical position the housing which encloses the two parts swings open in a V-shape, so that the filter bag can be lifted up and out. The blast air duct is connected to the secondary support by a folding joint. Construction and operation are relatively costly.

The purpose of the invention is to improve an electric vacuum cleaner of this type in terms of simple manufacturing techniques so that it is easy to operate, above all by ensuring that the process of removing the filter bag is clean and comfortable, while at the same time taking advantage of the tipping arrangement of the filter bag to shorten the distance between it and the motor casing as much as possible.

This purpose is fulfilled by the invention defined in the claim. The subclaims comprise advantageous developments of the subject matter of the invention.

Thanks to this design, it is substantially easier to handle the filter bag associated with this type of device. Dust and larger, heavier particles are almost entirely prevented from falling out of the bag, thanks simply to the advantageous way in which the position of the filter bag changes, from a tipped position with its opening pointing downwards to an upwards-opening position when it comes to removing the bag. This means that the filter bag can be changed while the electric vacuum cleaner is in its normal upright position; the latter does not have to be placed in a special position, for example on its side in the case of an upright machine. In addition, it is possible to retain the proven, technically energy-efficient design characteristic of vacuum cleaners of this type, in which the motor works upwards from below and the filter bag is filled directly from below with the dust-laden air. The methods used to achieve this are simple and functional, specifically in that the connecting coupling of the filter bag is directed towards the motor casing, and the filter bag support, which incorporates a valve shutter arrangement, separates from the blast air duct when the chamber is opened up out of the operating position (in which the chamber connecting piece faces the motor casing), holding the filter bag closed until it reaches a vertical position, whereupon the connecting piece automatically separates as the chamber swings over into the fully-open position (whereupon the chamber connecting piece opens vertically upwards). This hinged opening, which happens in the parting plane between motor casing and filter bag chamber, does not just mean that the process of removing the bag, described above, is easier due to much-improved accessibility, but also that the conditions for assembly of the device are generally much more favourable.

The connecting coupling leading to the blast air duct is spatially integrated with the connecting piece. The filter bag support, which is carried along by the opening movement, acts as a lid for the connecting piece. As soon as the secondary support reaches the position described above, the filter bag can be removed. As the filter bag's opening is only accessible in this position, the contents of the full bag are safely prevented from falling out. The fact that the valve shutter is positioned on the secondary support is an additional advantage. This means that the filter bags do not themselves need to be fitted with valves. Particularly advantageous is the fact that the connecting piece separates completely automatically, because the swivel movement of the secondary support is arrested, while the chamber connecting piece continues to swing outward. If the chamber connecting piece is opened right out to the full convenient angle of 180°, it is possible simply to slide the filter bag out of the vertically-positioned, upwards-opening chamber as if it was an insert.

The connecting piece is a useful development of one floor of the filter bag, the surface shape of which roughly corresponds to the cross-section of the chamber connecting piece. In practical terms, the latter forms a connecting collar to which the porous, usually textile wall of the chamber which holds the filter bag is attached. It is possible to use a metal container, plastic frame or some similar arrangement to brace the textile wall. If no such support is provided, the sack may be suspended from the shaft of the electric vacuum cleaner, in such a way that it can be detached. Given that the bottom of the filter bag is adapted to fit the connecting piece's cross-section, this cross-section is also fully utilised. The stable, well-defined position of the filter bag is further enhanced by the fact that the bottom of the bag is supported by a stepped rim on the inner wall of the chamber connecting piece. For this purpose the wall of the filter bag is slightly indented, by an amount equivalent to the dimensions of the support. The hinged axis of the chamber connecting piece lies at roughly the same level as the stepped support for the bottom of the filter bag. This means that the secondary support and chamber connecting piece both swivel round a common axis. The secondary support is arrested in the roughly vertical position described above by a swivel limit stop positioned next to the common axis of rotation, whereupon the filter bag is released. A handle on the movable front of the secondary support makes it easier to open up the device, while in the closed position it is secured in the normal way, for example by a snap-in locking device with push-button release. In respect of a structurally simple and small valve shutting device,

the invention proposes that such a valve shutter should take the form of a valve flap affixed to the upper outside rim of a short feed pipe projecting through the bottom of the filter bag from the secondary support. This valve may consist of a flap made out of rubber or a plastic with similar properties. If the secondary support's material were suitably tough, one could think in terms of a moulded adaptation of the same material. So as to facilitate the separation of filter bag and connecting piece, the outside of the short feed pipe should be shaped in such a way that it angles downwards towards the hinged axis. The short feed pipe should also be curved to match the radius of the hinged movement of the filter bag support. In order fully to exploit the available cross-section of the chamber, it is possible to make it even easier to remove the filter bag from the chamber by designing the bottom of the filter bag in such a way that it forms recessed handholds. In order to prevent sections of the filter bag wall from poking out through these recesses or crinkling up in a way which could subject them to increased mechanical stress, cams forming a part of the secondary support would fit into these recessed handholds, thus supporting the wall of the bag. Such matching cams also serve as a useful indication as to whether the filter bag has been inserted properly and whether it is the right kind of bag. From this point of view, additional orientation points around the circumference of the filter bag's bottom would be useful, in that they would fit into matching slots in the inner wall of the chamber connecting piece. It would also be advantageous if the bottom of the filter bag were only supported by the two stepped edges, running at right angles to the recessed hand-holds. In this way the bottom of the bag would retain some flexibility, so that if any particles were trapped in between, the bottom of the filter bag would not be damaged, as it would give way slightly.

Another advantageous possibility presented by the hinged uncoupling of the filter bag chamber from the secondary support might be that the axis of rotation of the secondary support is positioned eccentrically in relation to the hinged axis of the chamber connecting piece, in such a way that a locking catch which connects both opening parts at the start of the swivel movement is released as the secondary support reaches a vertical position. It would be easiest to design this kind of coupling device by positioning the projecting catch for the lock at the free end of the chamber connecting piece and the matching locking shoulder on the corresponding outside edge of the secondary support. Finally, a useful locking function may be performed in quite a simple way by shaping the projecting catch as a latch, positioned on a flexible part of the wall of the chamber connecting piece. As the filter bag chamber is closed, the components thus return automatically to their correct coupling positions. The material of the wall itself acts as a spring for the latch. Thanks to the blast air duct coupling, this type of electric vacuum cleaner is also optimally designed in terms of hygiene, without in any way impairing the comfortable operation achieved by the way in which the chamber swivels open, carrying the filter bag support with it. In the open position, material which has been trapped behind the secondary support in the area adjoining the connecting piece is unable to escape. To resolve this, the blast air duct coupling emerges from the underside of the filter bag support, running in the direction of the swivel motion. Material which has been sucked up (dust) thus remains safely in the system. The most structurally advantageous way of constructing the blast air duct coupling is to use a concertina hose. This not only saves space, but is also capable of compensating for the movement of the connection point (connecting piece fittings). In addition, a mild suction effect is produced as the concertina hose extends. This effect is an additional way of ensuring that the dust particles mentioned previously are not blown out, but sucked in. In principle, the same is

true in principle for another variation, in which the duct coupling consists of a hose which slides up and down on a guide-tube. In this way, a kind of telescopic union is created, the guide-tube being rigid and the adjoining hose flexible, so that the latter is also capable of bending as necessary to compensate for the opening of the filter bag support. A final variation consists of a duct coupling composed of a flexible tube pointing in the direction of the hinged motion, which traverses the filter bag support and projects into the filter bag itself. One advantage of such a design is that the space inside the filter space itself is used to contain the duct. In the normal operating position, the tube, which projects into the filter bag's innards rather like a standpipe, would only be covered by accumulated dust at a very late stage. Another advantage is that incoming dust would enter the empty space above the dust sediment in the bag. This is more energy-efficient and also means that suction performance would remain relatively consistent. The motor does not need to work against the resistance of the accumulated waste material. The tube may take the form of a flexible continuation of the motor casing. Its springy recoil would also help the filter bag support to return to its normal position; also true of the concertina hose, which acts like a spring (tension spring), and indeed for the second variation as well. With regard to the concertina hose, a neat way of accommodating it in the normal operating position would be to arrange for a small chamber beneath the bag support, into which the telescoped concertina hose would fit. All three variations have one major advantage - in addition to that of enabling dust-free (hygienic) filter changes - in that it is quite unnecessary to affix a dust retaining device to the disposable component, i.e. the filter bag.

The subject matter of the invention is explained in more detail below, with the help of drawings showing various examples of methods of construction. These include:

- Fig. 1        a view of the electric vacuum cleaner, designed according to the invention's specifications - the dotted lines represent the filter bag chamber in the open position,
- Fig. 2        a perspective drawing of the filter bag,
- Fig. 3        an exploded view of the hinged area of the vacuum cleaner in the closed position,
- Fig. 4        the cutaway section indicated by the line IV-IV in fig. 3,
- Fig. 5        a diagram corresponding to fig. 3, but in this case showing the open position and the final vertical position of the secondary support,
- Fig. 6        an enlarged representation of the swivel limit stop responsible for arresting the secondary support,
- Fig. 7        a view of fig. 5 from above,
- Fig. 8        an exploded view of the hinged section of the vacuum cleaner in the closed position, showing a duct coupling,
- Fig. 9        a diagram corresponding to fig. 8, showing the secondary support in an intermediate position, including the blast air duct coupling (the final open position is shown by the vertical line E-E),
- Fig. 10       an enlarged view of the swivel limit stop responsible for stopping the secondary support in a vertical position,

- Fig. 11 a broadly schematic representation of the electric vacuum cleaner, illustrating the principle behind the first type of blast air duct coupling (concertina hose),
- Fig. 12 showing the intermediate and fully-open positions,
- Fig. 13 the electric vacuum cleaner, showing another version of the blast air duct coupling (hose/guide-tube),
- Fig. 14 the relevant intermediate and fully-open positions,
- Fig. 15 the electric vacuum cleaner with another version of the blast air duct coupling (flexible tube), and
- Fig. 16 the related intermediate and fully-open positions.

The electric vacuum cleaner illustrated is drawn up as a hand-held device. It has a housing 1, to which a shaft 2 is connected with a handle 3 at one end. In the transitional area between handle 3 and shaft 2 is situated an on-off switch 4. The electric cable connection is not shown.

The housing 1 is divided up into a motor casing 5 and a chamber 6 positioned above it, which holds a filter bag 7. Details of the fan motor are not included in the drawing.

A connecting coupling arrangement V joins the side of the filter bag 7 facing the motor casing 5 to the blast air duct 8.

The underside of the motor casing 5 merges into a tubular coupling 9, which provides a passage for the air current from the suction nozzle 10.

As concerns the suction nozzle 10, this may be what is known as a suction/brush nozzle, with a rotary brush in the mouth of the nozzle which a separate drive causes to rotate.

The fan motor thus works upwards from below, compressing dust-laden air into the filter bag 7, which is situated in a tipped position over the motor casing 5.

The cross-section of the housing 1 is always shaped as a long rectangle, the long sides of which are slightly bowed outwards, as are the short sides. In figure 1, the vacuum cleaner is shown broadside-on.

The chamber 6 holding the filter bag 7, which itself corresponds to the cross-section of the housing, consists of a textile sack 11 stiffened by a wire basket, the lower part of which - i.e. the part nearest the motor casing - merges into a stiffened rim in the form of a chamber connecting piece 12. The reinforced textile sack 11 may be attached to this chamber connecting piece 12 by means of detachable clip fasteners. The connecting area is stepped for this purpose. The step can be seen in fig. 1. It is indicated by 13, and means that the textile sack can be attached internally or externally. An internal attachment is recommended.

In order to remove the filter bag 7, the housing 1 can be opened up, which exposes its entire cross-section. The open position can be seen in figs. 1 (shown by a dotted line), 5 and 7. The hinged axis 14 which makes this possible is situated on the short side of the housing 1.

The pivot lugs are designated by 15. These pivot lugs are positioned at two junctions of the short and long sides of the chamber 6. A pivot lug from the motor casing 5 extends between the two pivot lugs 15.

In the area of the partition between the motor casing 5 and the chamber 6, a secondary support T is also incorporated, upon which the filter bag 7 sits. This filter bag support T is shaped so that it corresponds to the housing's cross-section, but stands back from the outer sidewall of the housing in such a way that when the motor housing 5 and the chamber 6 are positioned co-axially, as shown in fig. 1, it cannot be seen at all. In fact the filter bag support T, which is also hinged, is held in place - with the exception of a small access point - by the exposed lower edge of the chamber connecting piece 12, and pivots on the same hinged axis 14 as the filter bag chamber 6. On the side closest to the hinge, the support piece T also bears two pivot lugs, similar to those of the chamber connection piece 12, here indicated by 16.

The filter bag 7, which is directly connected to the secondary support T, has a bottom 17. In general outline the latter also corresponds to the cross-sectional shape of the chamber connecting piece 12, which has a stepped rim 18 on its inner wall, corresponding to the short sides of the bag's bottom 17, which acts as a support. This means that the bottom of the bag 17 is prevented from falling back into the chamber 6 when the device is open. The bridge-shaped support for the bottom of the bag 17 also means that the middle portion of the bottom is quite flexible. The common hinged axis 14 of chamber connecting piece 12 and filter bag support T is positioned at about the same level as the stepped rim 18 which supports the bottom of the filter bag 17. When the housing is closed (fig. 3), the stepped rim 18 overlaps the upper surface of the bottom 17 mentioned above, so that it is not blown upwards by the pressure of suction. The lower surface of the bag's bottom 17 rests, as already indicated, on the upper surface of the filter bag support T. This results in a sort of clamping arrangement round the short sides of the bag's bottom 17, comprised of chamber connecting piece 12 and secondary support T.

In this position, the stepped cylindrical mouth 8' of the blast air duct 8 projects into the lower portion of a short feed pipe 19. The latter extends from the upper surface of the filter bag support T. The short feed pipe 19 is a continuation of the support piece T and projects through a cross-sectional opening 20 in the filter bag's bottom 17 into the innards of the filter bag 7, in such a way that the edges are sealed.

In order to prevent sucked-up waste matter from falling down into the motor casing 5 while the filter bag is in the tipped position illustrated, the short feed pipe 19 has a valve flap 21 at its open end. The overlapping edge of the latter lies on the upper edge of the short feed pipe 19, and is capable of moving freely. It is only fastened down at the point indicated by 22, so that it lifts up under the pressure of the air current, falling back into its closed position as the corresponding pressure from below dies away. The valve flap 21 can be produced as a separate component and attached at point 22 by means of a spring fastener; alternatively it could be designed as a continuation of the short feed pipe 19 or the filter bag support T, assuming the material of which they were made was sufficiently flexible.

The short feed pipe 19 tapers towards its open end, so where it projects through opening 20 it has a centring effect.

As can also be seen from fig. 3, the outside edge 19' is chamfered. It runs at a downward angle towards the hinged axis 14. A line projected in this direction would intersect the pivotal axis. The connection point 22 is situated on the higher side of the short feed pipe's outside edge.

The short feed pipe 19 also runs in a curve, the radius of which is centred on the pivotal axis 14. In the area between the base of the short feed pipe 19 and the pivotal axis, there is a window-like aperture in secondary support T. The corresponding opening bears the reference number 23. The frame piece on the side of the hinge is wider than the two frame pieces facing each of the longer sidewalls of the housing.

At its free end, the outer edge of the support piece T is shaped as an easily-reached handle 24. It consists of an angled continuation of the underside of the support piece. This emerges from an area which stands back from the outer surface 25 on that side. The relevant flange runs vertically. The adjoining flange, which is effectively horizontal, runs back to the outer sidewall of the housing and merges with the latter at the same level. A snap-in locking device is situated near the handle, not shown in detail, which serves to ensure that the housing closes securely, and is operated by a push-button. The area of the motor casing 5 round the handle 24 is recessed, so that the handle fits into it. The recess is designated 26.

Also extending from the upper surface of the secondary support (in the position shown in fig. 3) are raised cams 27, situated in the region of the longer frame pieces. These close off the recessed handholds 28 along the longitudinal edges of the filter bag's bottom 17. Both recessed handholds are rounded and open to the respective opposing inner walls of the chamber connecting piece. When the housing 1 is open, the wasp-waist-shaped middle portion of the bottom 17 of the filter bag can be comfortably grasped and withdrawn from the chamber 6.

In addition, the filter bag support T is positioned and designed in such a way that it moves through a limited angle of rotation, i.e. cannot attain the 180° angled position of chamber connecting piece 12; instead, it remains standing in a position which lies roughly in or just beyond the vertical plane E-E running through the cross-sectional plane of the connecting coupling, so that the connecting coupling arrangement V has already passed the median of the 180° maximum angle of rotation. In this position, there is enough room to remove filter bag 7 from the secondary support (cf. fig. 5). The corresponding position is defined by a limit stop 29 between the pivotal lug of the motor casing 5 and the rear edge 30 (in the direction of travel) of one or both pivotal lugs 16 on the filter bag support T (cf. fig. 6).

In addition to the separation of secondary support T from filter bag 7, provision is made for the automatic disconnection of the connecting coupling arrangement V, notably in that the swivelling motion of secondary support T is arrested in the manner mentioned, while the chamber connecting piece 12 and chamber 6 continue to swivel into the 180° position illustrated in fig. 5. The friction between filter bag wall 31 and chamber wall 6', combined with the pressure of its contents, together hold the filter bag in the chamber by dint of friction. The transition from its original tipped position into the exactly opposite one, in which the bag's opening 20 is pointing upwards, is effected in such a way that there is no chance for dust or larger particles to escape. Thus the filter bag can be comfortably grasped and lifted out in the manner described above. There is no inward pressure on the wall of the bag. In fact, it is unnecessary to touch the wall of the bag while it is being removed; so there is no chance that its contents will be blown out. If need be, a suction effect can be obtained by stretching the bag. Inserting a new bag is a simple operation for the same reasons, as the chamber, with its whole cross-section exposed, is positioned with its opening pointing upwards (cf. fig. 1). After insertion, the chamber 6 simply needs to be swung back into the position indicated in fig. 1 by the extended line, so

that the upper part of the housing 1 which contains the chamber 6 automatically locks back into position on the motor casing 5. As the chamber swings back into the closed position, the opening 20 intercepts the short feed pipe 19, or vice versa. This may happen while the filter bag support T is still vertical, held upright by friction, or else when the latter is once again positioned on its back on top of the motor casing 5. In the closed position, the cams 27 fit perfectly into the recessed handholds 28, that is, so perfectly that even when the filter bag begins to bulge, perhaps because of the pressure of its contents, the fleece-like paper filter wall 31 is unable to protrude.

To make more room for the two opposed handholds 28, the corresponding outer parts 12' of the inner wall of the chamber connecting piece 12 are slightly recessed.

To ensure that it is possible to fit the filter bag 7 in an idiot-proof, absolutely correct position, the bottom 17 of the latter has orientation points 32 on both shorter sides, which fit into the matching recesses 33 in the relevant areas of the inner wall of the chamber connecting piece 12. These orientation points consist of trapezoidal lugs projecting from the shorter sides of the platform-shaped body which forms the filter bag's bottom 17. Thus it is possible accurately to align the opening 20 and the short feed pipe 19 before a mismatch becomes obvious by the fact that the two parts of the housing do not fit together properly. The longitudinal sides 27' of the cams 27, which face each other, are transversely rounded, as may be seen in fig. 4, and this also serves to ensure that the bag's bottom 17 is correctly aligned. They act as control surfaces on the correspondingly rounded recesses of the handholds 28.

Instead of the limit stop method illustrated in fig. 6, an alternative way of separating the secondary support T from the chamber 6 of the filter bag 7 consists in positioning the axis of rotation of the support piece T eccentrically in relation to the axis of rotation of the chamber connecting piece 12, in such a way that a locking catch which joins both parts together at the start of the swivel movement is released as the secondary support T reaches the vertical position. The necessary eccentricity would be about 1.5 mm. With reference to fig. 5, the axis offset would be directed upwards, i.e. run in the plane E-E. The appropriate design consists in situating the projecting catch 39 at the free end of the chamber connecting piece 12, so that it locked the whole assembly together. It consists of a catch jutting out of the inner wall of the chamber connecting piece 12, and pointing towards the axis 14. The matching locking shoulder is designated by 40. It is positioned on the corresponding outside edge of the secondary support T. Taking into account the eccentric positioning of the latter's axis, the secondary support T, acting as a trailing lid, moves into an approximately vertical position, and away from the projecting catch 39. The other side of the coin is that the filter bag chamber can be closed if the support piece T is placed in the position shown in fig. 3. This results in a useful locking function, in that the projecting catch 39 is shaped as a latch, positioned on a flexible part of the wall of the chamber connecting piece 12. This section of the wall is thus under spring tension.

In addition, in order to prevent sucked up waste (dust) which is caught in the short feed pipe 19 from falling out when the filter bag is changed, a blast air duct coupling R emerges from the underside of filter bag support T, which faces the motor casing 5, in the direction of the swivel movement.

According to the first version of this arrangement (figs. 8 to 12), this tubular coupling R comprises a harmonica hose 41. The latter bridges the area between the short feed pipe 19 mentioned above and the blast air duct 8 of the motor casing 5, allowing air to pass between them. The motor casing end is attached to the inner surface of the

blast air duct 8. The other end, nearest to the filter bag, is firmly seated in the short feed pipe 19. A plug-in and glue fixture would be a suitable way of attaching this end. The plug fixture is defined by a stepped ring 42 or some similar arrangement, of which only that in the short feed pipe 19 is illustrated. The concertina hose 41 consists of rubber, or of plastic with equivalent properties. The plug-in ends of the hose are cylindrical in shape.

As soon as the filter bag support T has reached the vertical E-E, the filter bag 7 separates from the short feed pipe 19. Any waste remaining behind the valve flap 21 falls back through the tubular coupling R, or remains somewhere inside it. If such a valve flap 21 has not been provided, the action of opening up the secondary support T to the vertical E-E should have served to suck waste away from the mouth of the short feed pipe 19, towards the motor casing.

According to the second version of this arrangement (cf. figs. 13 + 14), the tubular coupling R is comprised of a hose 44 which slides up and down on a guide tube 43 which protrudes from the motor casing 5. This hose must be flexible because of the hinged movement of secondary support T. At the end nearest to the motor casing, a simple slip-on connection suffices, but end of the hose 44 nearest to the short feed pipe should be securely anchored. A simple band or collar or some similar arrangement should be adequate for this purpose. As far as the actual hose 44 is concerned, it may consist of standard commercial material, such as steel-spiral reinforced hosing. The fixed guide tube 43 serves as a kind of free-standing connection piece to the motor casing 5. In this instance, a kind of telescopic union is formed by the combination of tubular section and guide tube. An alternative would be to position the hose 44 so that it slid up and down inside the guide tube 43.

The design according to the third version of this arrangement consists of a tubular coupling R (cf. figs 15 and 16), consisting of a flexible tube 45, which bends in the direction of the swivel motion. This tube passes through a suitable opening in the secondary support T and when the vacuum cleaner is in its normal operating position, extends unattached into the innards of the filter bag 7, right up to near the top of the bag. It acts as a stand pipe, directing the dust-laden air into the bag from above, so that the dust-laden air is not driven through the waste matter which has already been deposited in the bag. The tube 45 is also flexible and forms a collar at one end, which ensures that it cannot be pulled out of the secondary support T. If the tube 45 is sufficiently long, however, this is unnecessary, as the final position of the filter bag support T is, as previously explained, clearly delineated.

The tube 45 is fixed in position by for example a screw or plug-in connection.

With respect to the first version of tubular coupling R, it should be born in mind that the concertina hose 41, which folds to fit into a very small space, is contained in a small chamber 47 in the motor casing when telescoped together (fig. 13), to the floor of which chamber is connected the blast air duct 8. It is easy to incorporate this receptacle 47, which is positioned between the filter bag support T, into the design of the casing.



Patent claims

1. Electric vacuum cleaner with a chamber (6) situated above its fan motor, designed to hold a filter bag (7) which is connected to the blast air duct (8) and via a detachable connecting coupling arrangement (V) to a filter bag support (T) which is carried along with the chamber (6) when the latter is opened, in such a way that once the connecting coupling arrangement (V) has been opened and separated, the filter bag (7) can be removed from the chamber (6), characterised in that the connecting coupling of the filter bag (7) faces the motor casing, and the filter bag support (T), which includes a valve shutter component (K), is separated from the blast air duct (8) when the chamber (6) is opened up from its normal operating position (chamber connecting piece 12 faces the motor casing), holding the filter bag (7) sealed until the latter moves beyond the vertical open position (E-E), in such a way that the connecting coupling arrangement (V) separates automatically as the chamber (6) swings further open, until the latter reaches its fully-open position (the mouth of chamber connecting piece 12 then opens upwards).

6. Electric vacuum cleaner as per one or more of the above claims, characterised by a swivel limit stop (29) for the secondary support (T) which is positioned next to the common axis of rotation (14).



2. Electric vacuum cleaner as per one or more of the above claims, characterised in that the connecting coupling arrangement (V) consists of a bottom (17) to the filter bag (7), the shape of which roughly corresponds to the cross-section of the chamber connecting piece (12).

3. Electric vacuum cleaner as per one or more of the above claims, characterised in that the bottom (17) of the filter bag (7) is supported by a stepped rim (18) on the inner wall of the chamber connecting piece (12).

4. Electric vacuum cleaner as per one or more of the above claims, characterised in that the hinged axis (14) of the chamber connecting piece (12) is positioned at the same level as the support for the bottom of the filter bag (17).



5. Electric vacuum cleaner as per one or more of the above claims, characterised in that the secondary support (T) and the chamber connecting piece (12) swivel round a common hinged axis (14).

7. Electric vacuum cleaner as per one or more of the above claims, characterised by a handle (24) on the movable outside surface (25) of the secondary support (T).

8. Electric vacuum cleaner as per one or more of the above claims, characterised in that the valve shutter component (K) consists of a valve flap (21) on the upper edge (19') of a short feed pipe (19) which projects through the bottom (17) of the filter bag (7), and forms part of the secondary support (T).

9. Electric vacuum cleaner as per one or more of the above claims, characterised in that the upper rim (19') of the short feed pipe (19) is angled downwards, towards the hinged axis (14).

10. Electric vacuum cleaner as per one or more of the above claims, characterised in that the bottom (17) of the filter bag (7) forms recesses which act as handholds (28).

11. Electric vacuum cleaner as per one or more of the above claims, characterised by raised cams (27) projecting from the secondary support (T), which fit into the recessed openings (28).

12. Electric vacuum cleaner as per one or more of the above claims, characterised by orientation points (32) around the circumference of the filter bag's bottom (17), which fit into matching recesses (33) situated around the inner wall of the chamber connection piece (12).



13. Electric vacuum cleaner as per one or more of the above claims, characterised in that the filter bag's bottom (17) is supported simply by opposed lips (stepped rim 18) which run at right angles to the recessed handholds (28).

14. Electric vacuum cleaner as per one or more of the above claims, characterised in that the hinged axis of the secondary support (T) is positioned eccentrically in relation to the hinged axis of the chamber connecting piece (12), in such a way that a locking catch which locks the two hinged parts together at the start of the swivelling movement is released as the secondary support (T) reaches a vertical position.

15. Electric vacuum cleaner as per one or more of the above claims, characterised in that the projecting catch (39) for the locking contact is situated at the free end of the chamber connecting piece (12) and the matching locking shoulder (40) is positioned at the corresponding outer end of the secondary support (T).

16. Electric vacuum cleaner as per one or more of the above claims, characterised in that the projecting catch (39) is shaped as a latch and is positioned on a flexible part of the wall of the chamber connecting piece (12).

17. Electric vacuum cleaner as per one or more of the above claims, characterised in that a blast air duct coupling (R) emerges from the underside of the filter bag support (T), pointing in the direction of the swivel motion.



18. Electric vacuum cleaner as per claim 18, characterised in that the tubular coupling (R) consists of a concertina hose (41).

19. Electric vacuum cleaner as per one or more of the above claims, characterised in that the tubular coupling (R) consists of a hose (44) sliding up and down a guide tube.

20. Electric vacuum cleaner as per one or more of the above claims, characterised in that the tubular coupling (R) consists of a suitably flexible tube (45) which extends in the direction of the swivel motion and projects through the filter bag support (T) into the filter bag itself (7).

21. Electric vacuum cleaner as per one or more of the above claims, characterised by a chamber (47) beneath the filter bag support (T) which holds the telescoped concertina hose (41).