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(54) **GRINDING MACHINE WITH AN EXTERNAL AIR INLET**

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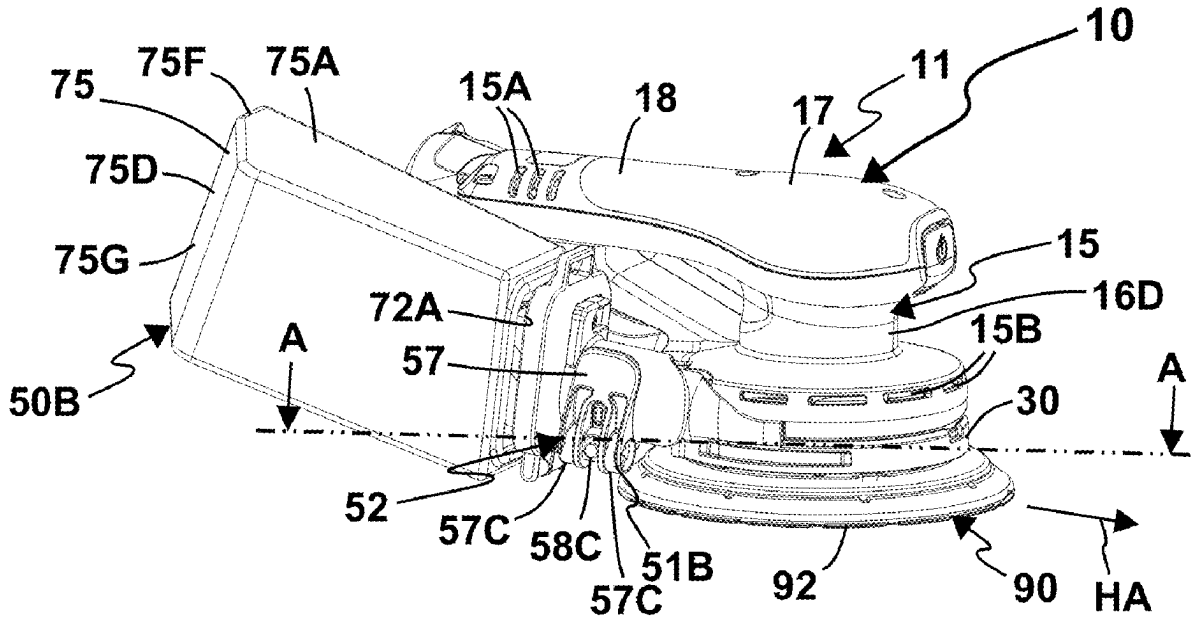
(57) **ABSTRACT**

A grinding machine has a machine housing and a drive motor arranged therein, for rotating and/or oscillating drive of a tool holder to which a disk tool is releasably attachable. The machine has a disk tool cover delimiting a dust removal space in which the holder is arranged and which holds the tool when the tool is arranged on the holder. A dust removal connector through which a dust/air stream can flow is arranged on the space. A dust removal device is connectable to the connector. The dust/air stream conveys out of the space dust occurring during machine operation. Away, and separately, from the connector, at least one external air inlet for letting in external air is arranged on the space. The machine has a closure mechanism arranged on, or activated using, the device. The inlet is closable, at least in part, with the mechanism.



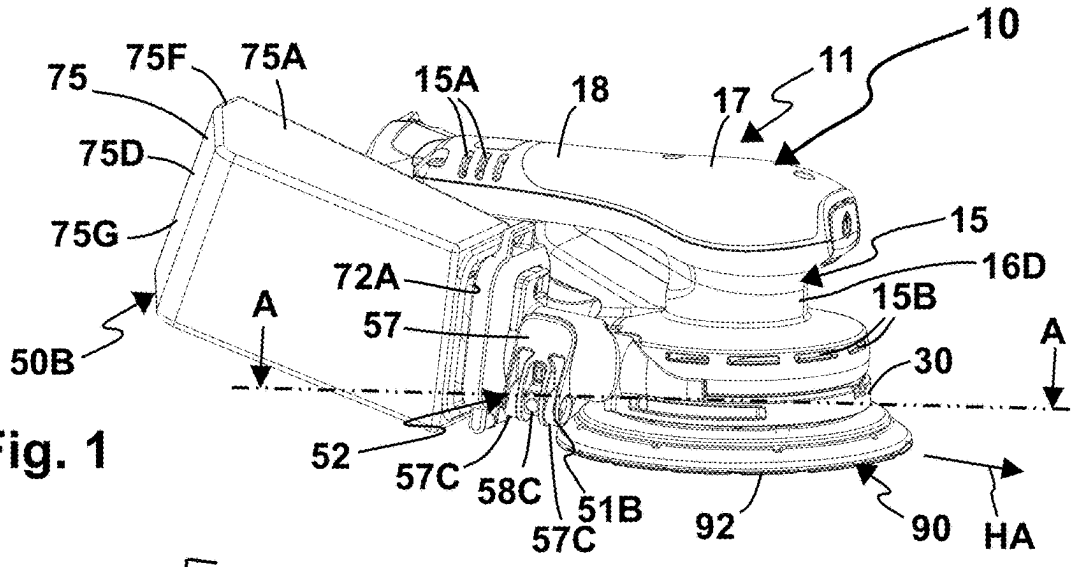


Fig. 1

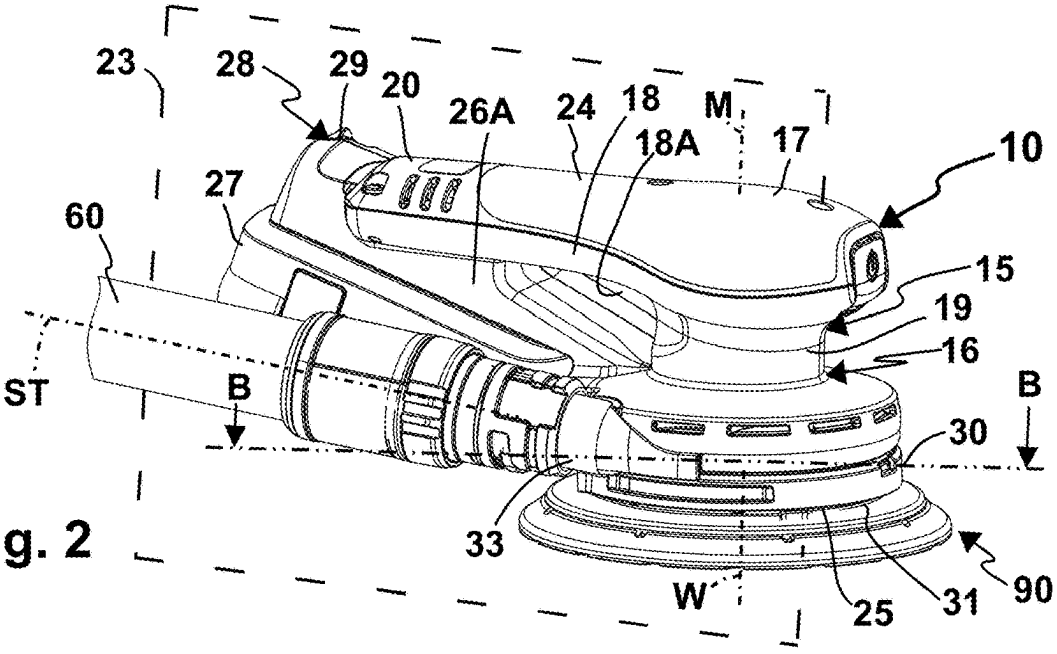


Fig. 2

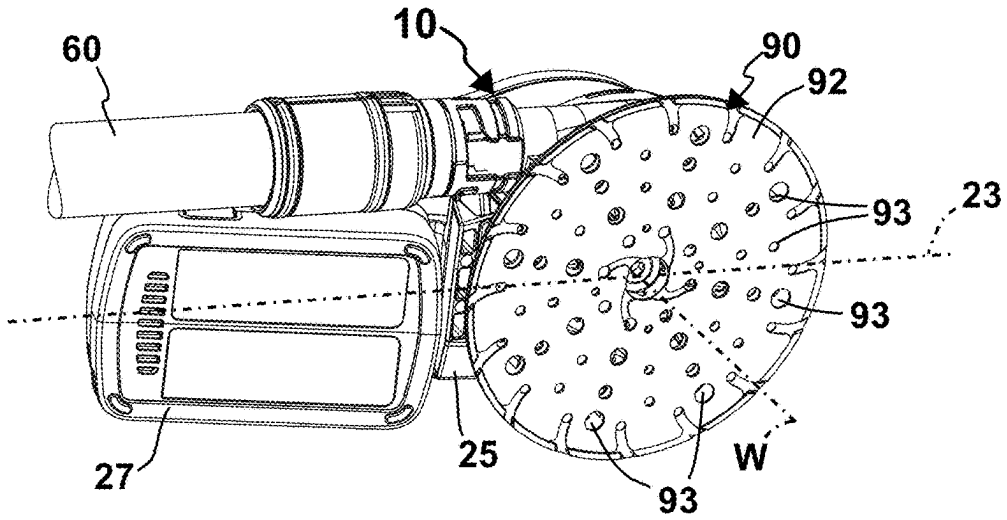


Fig. 3

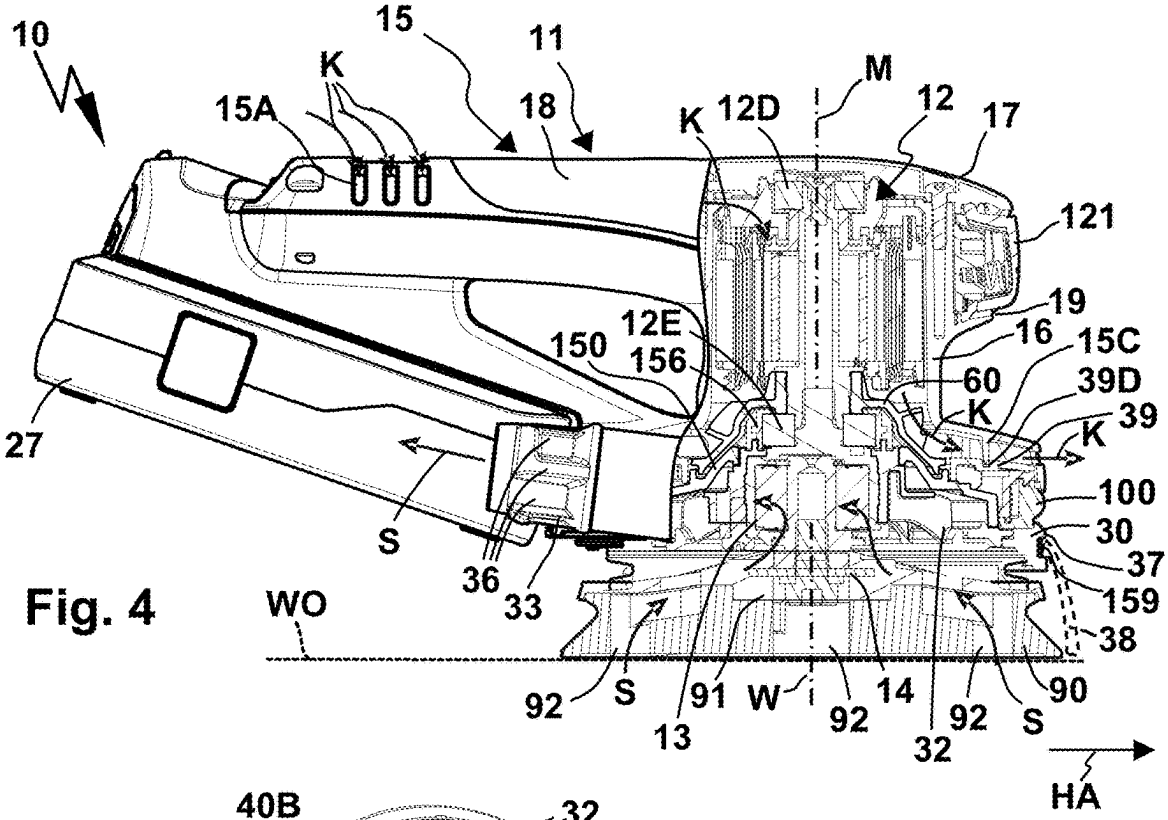


Fig. 4

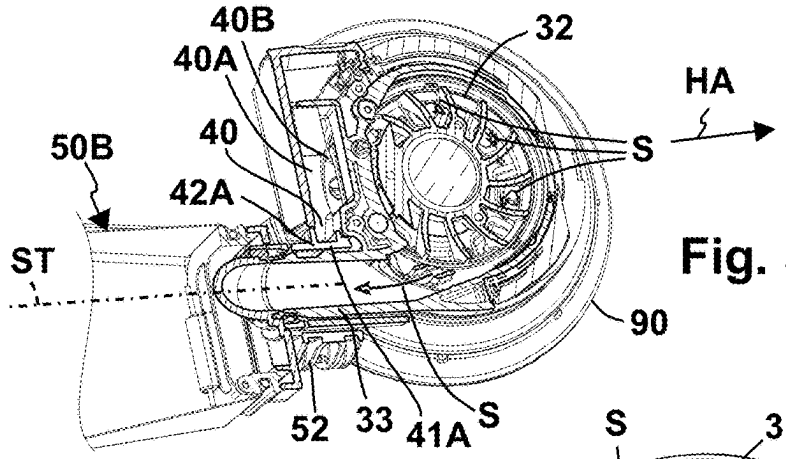


Fig. 5

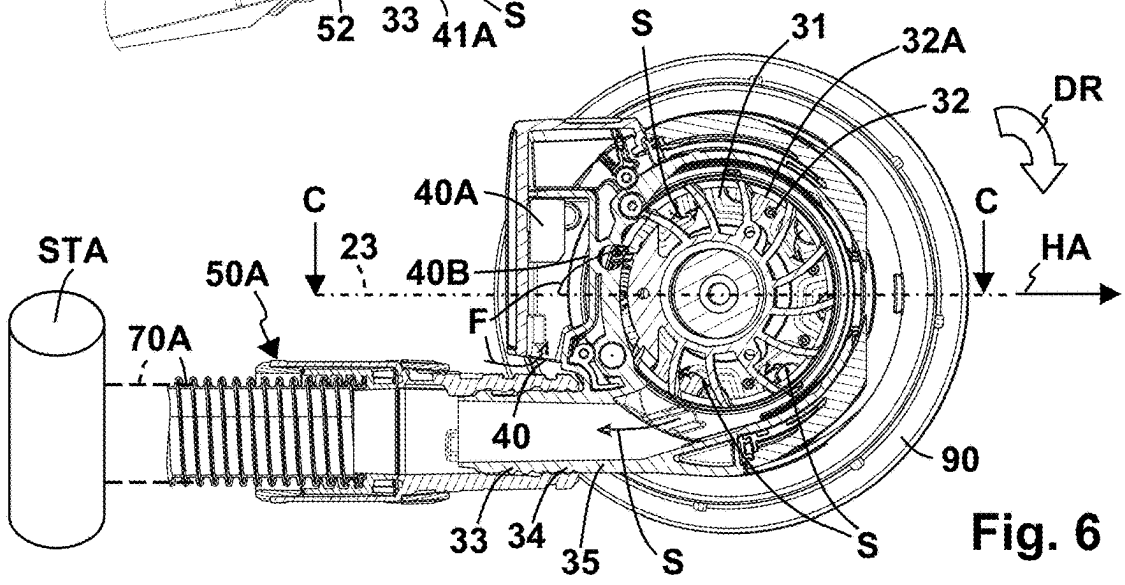


Fig. 6

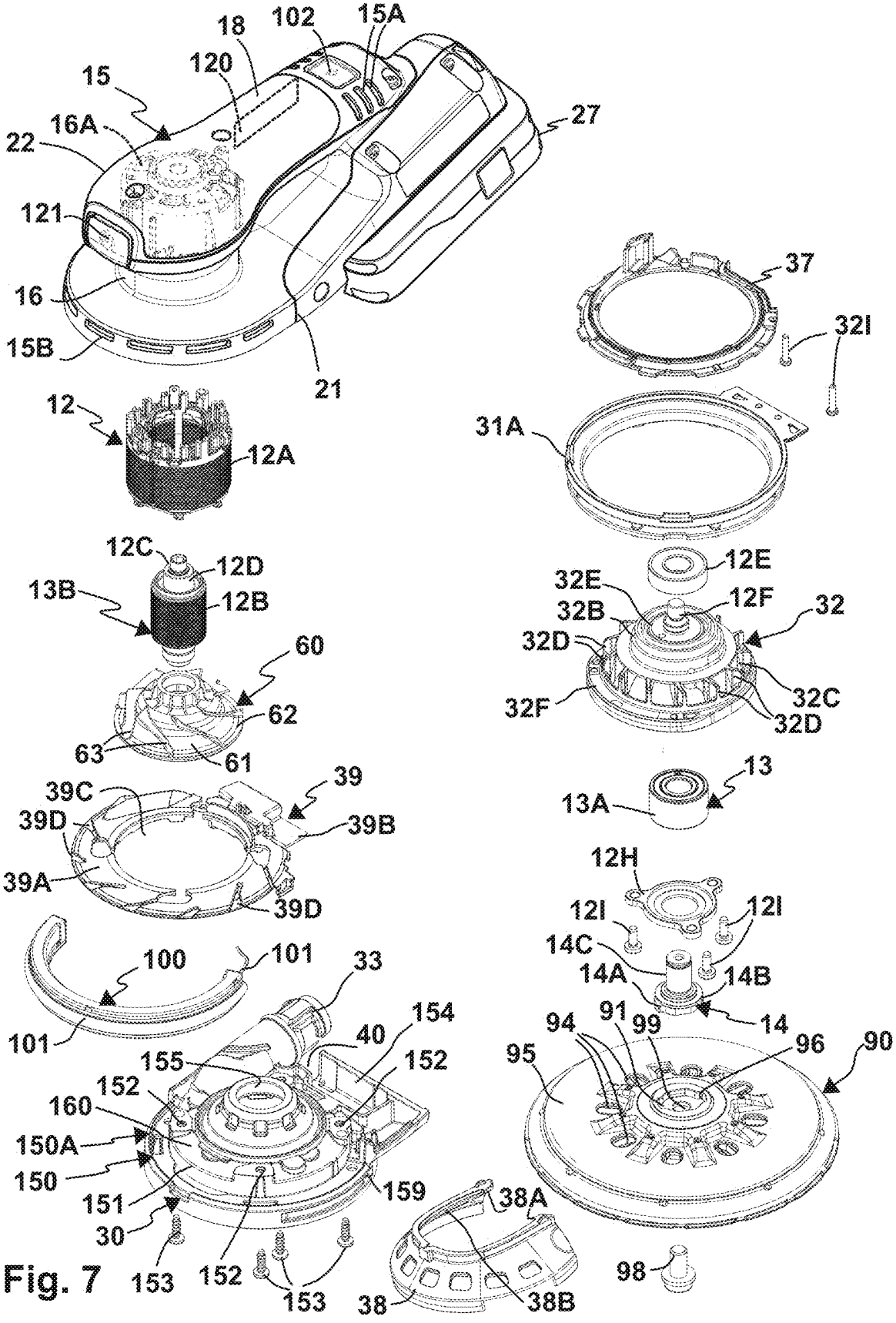

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Fig. 7

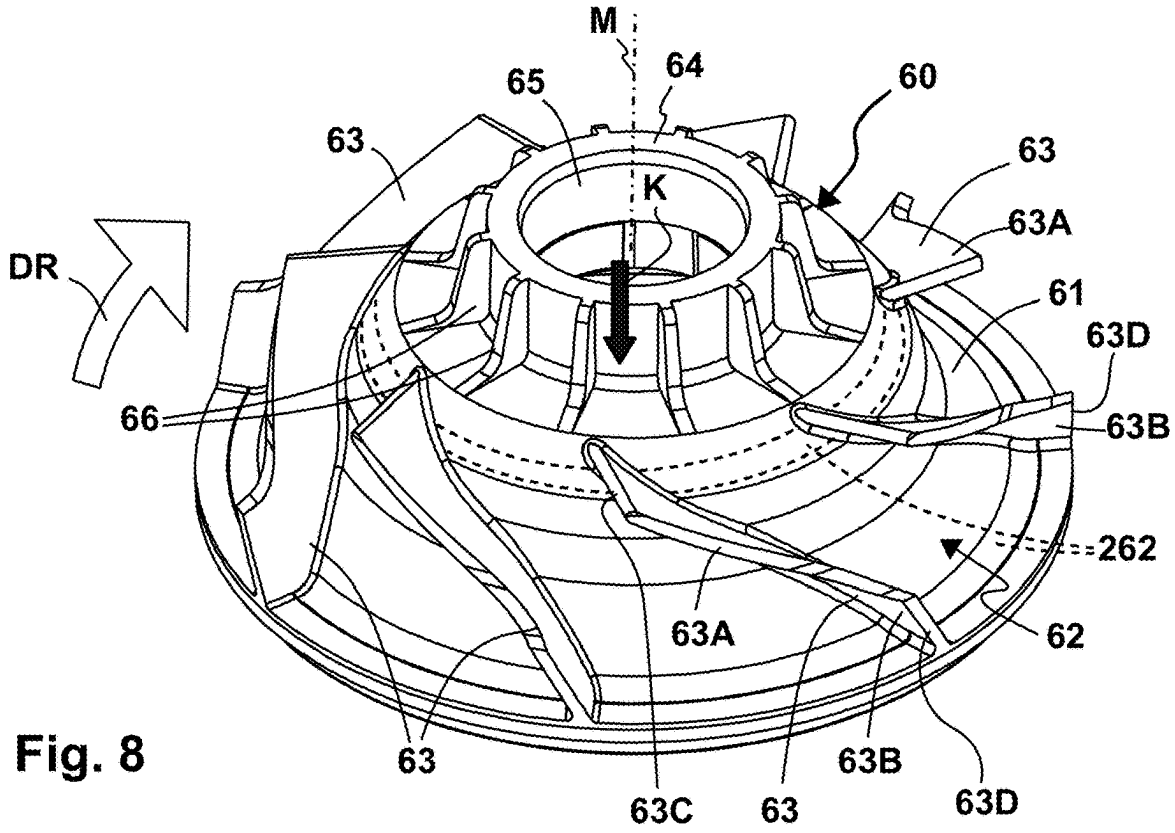
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Fig. 8

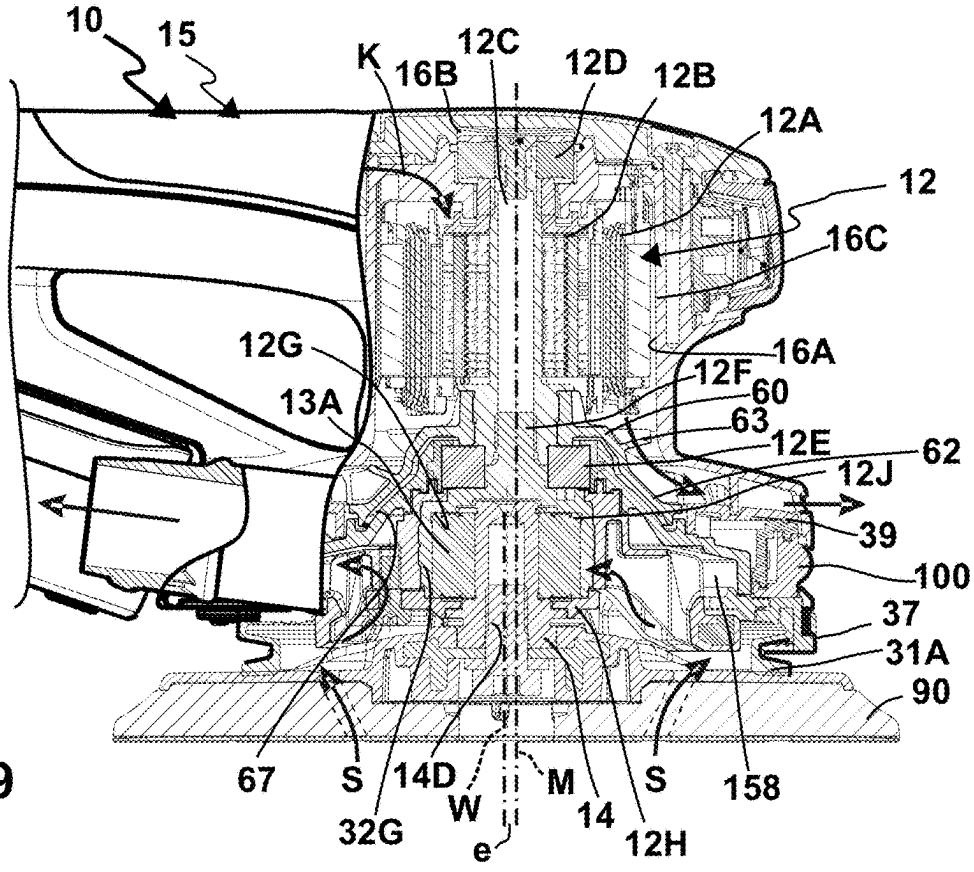
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Fig. 9

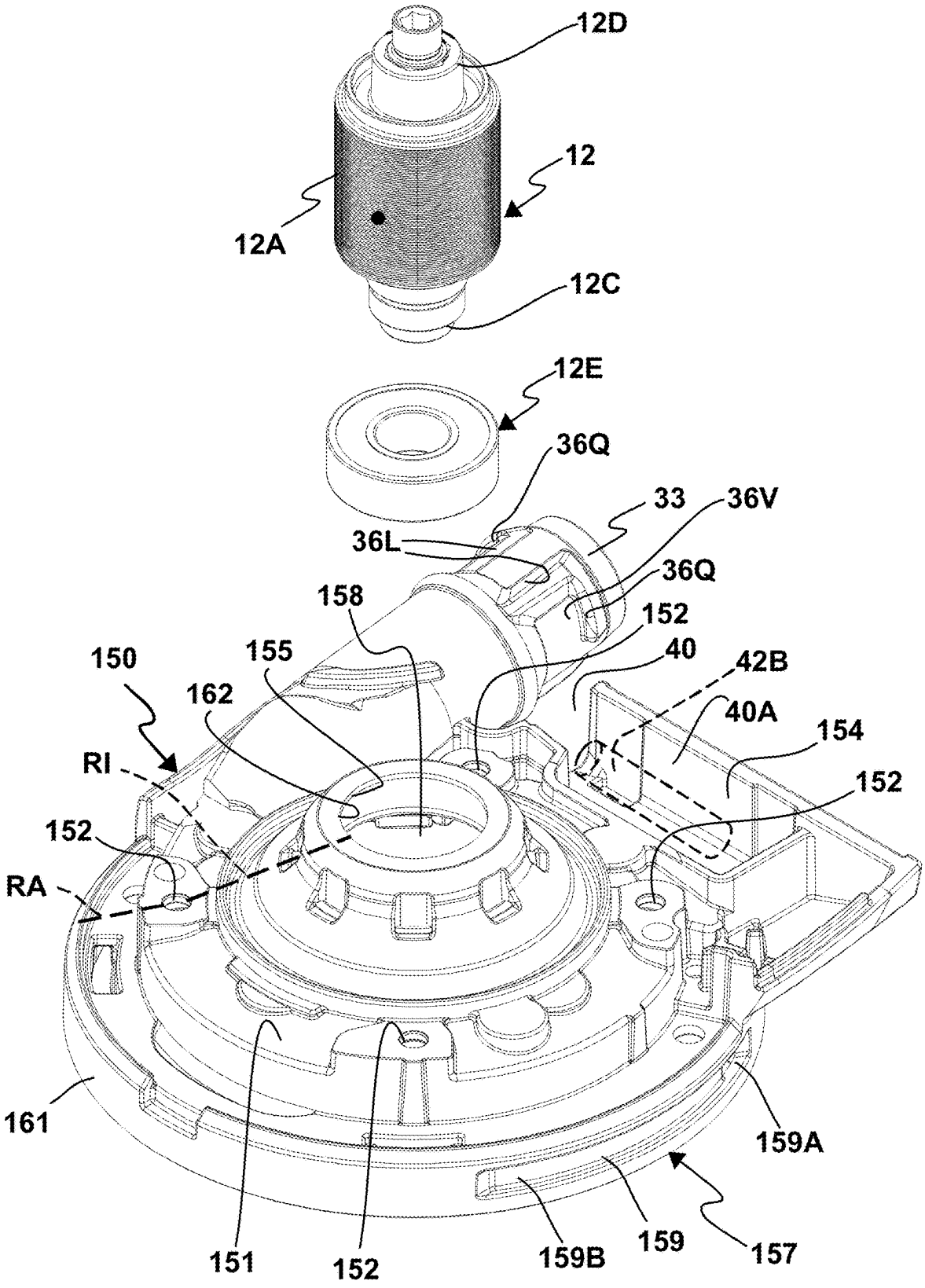
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Fig. 10

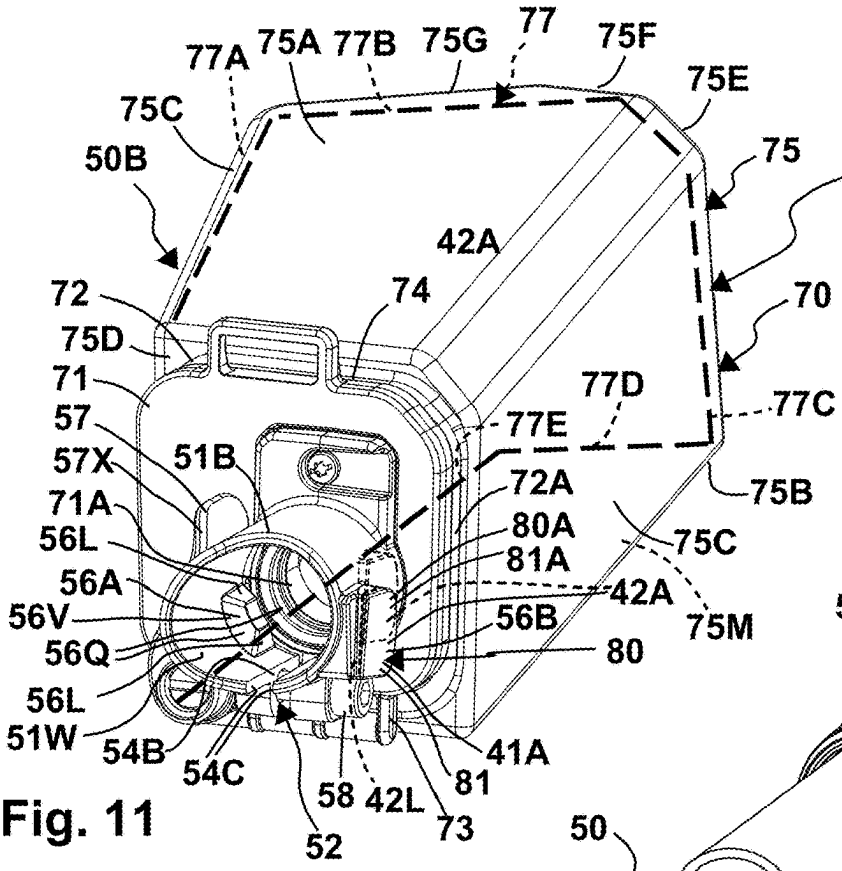

Fig. 11

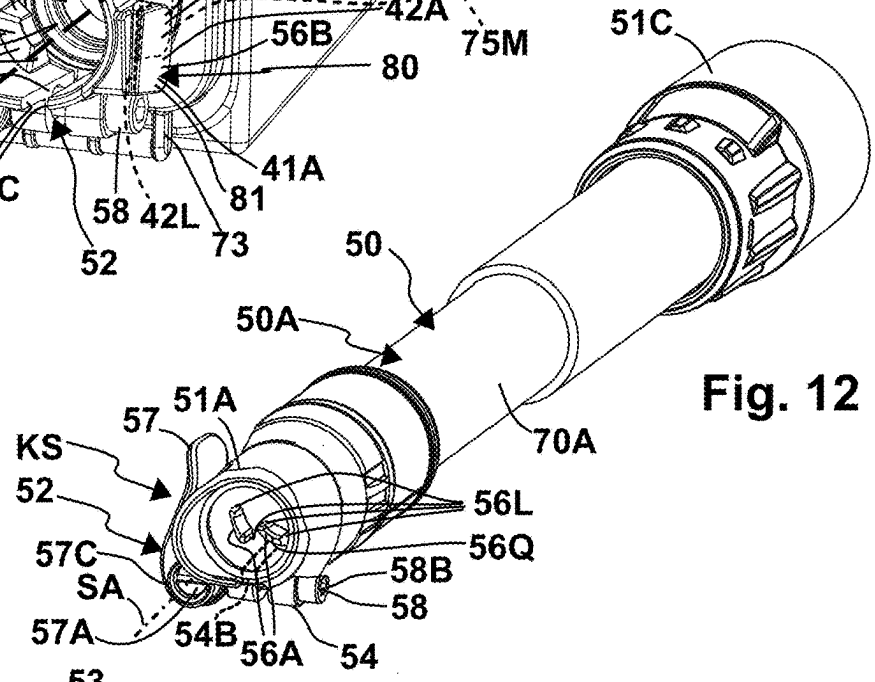

Fig. 12

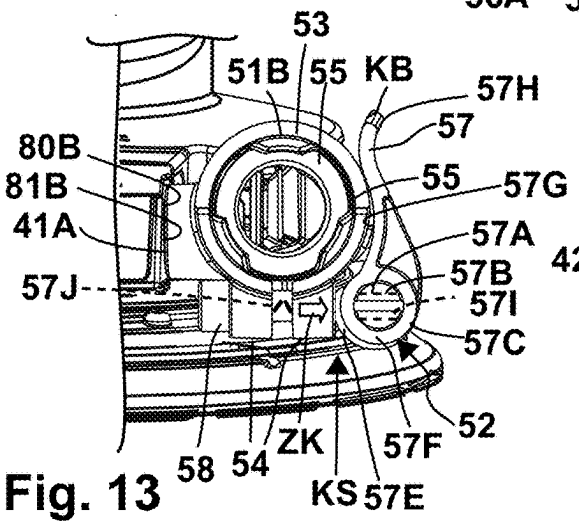

Fig. 13

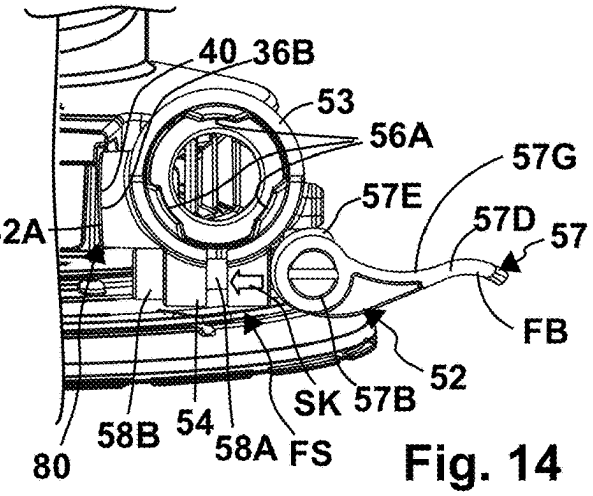

Fig. 14

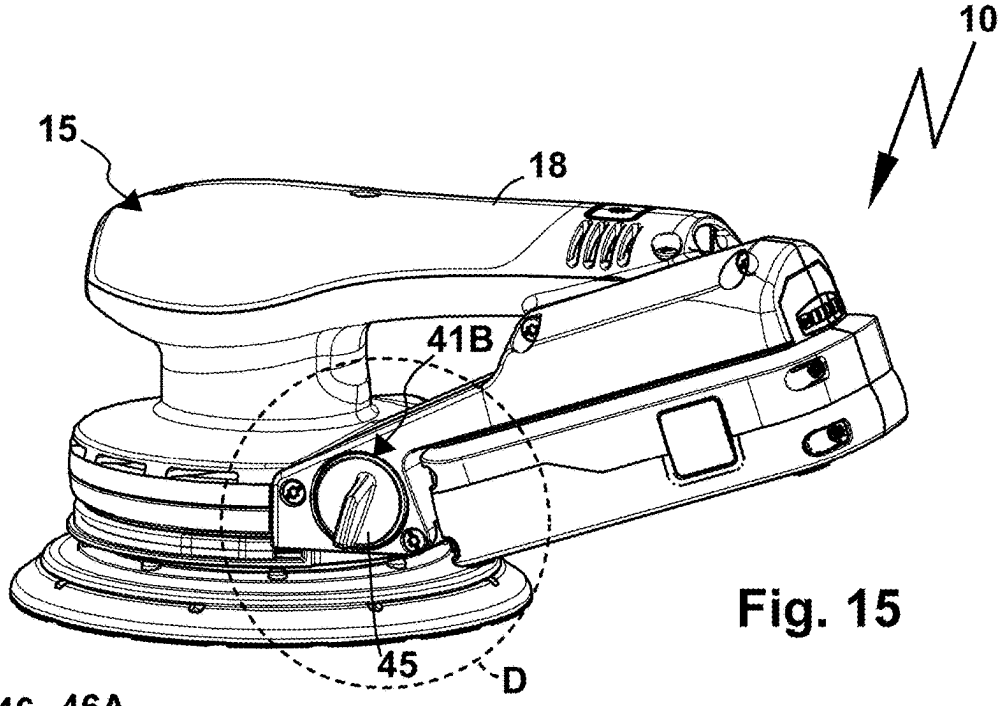

Fig. 15

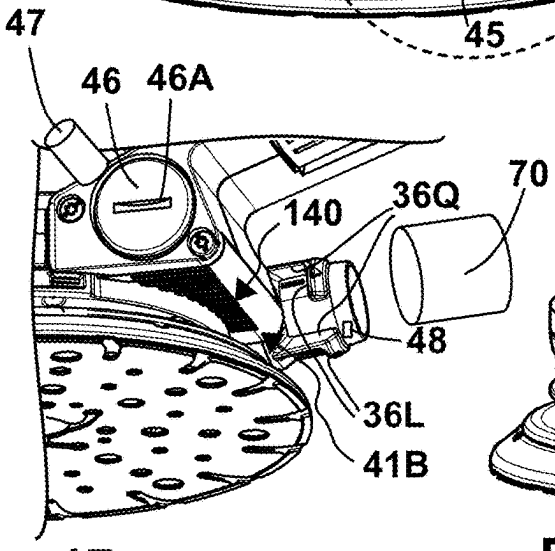

Fig. 17

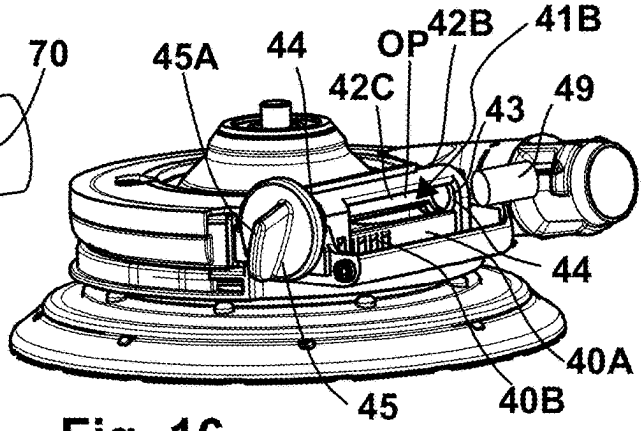

Fig. 16

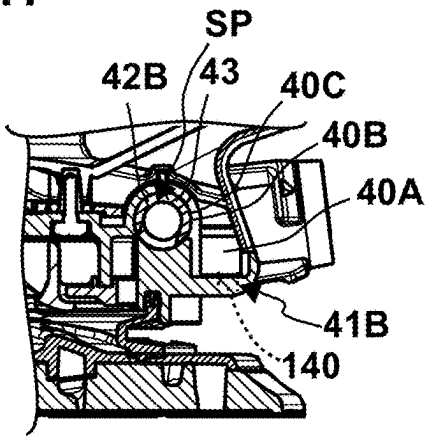

Fig. 18

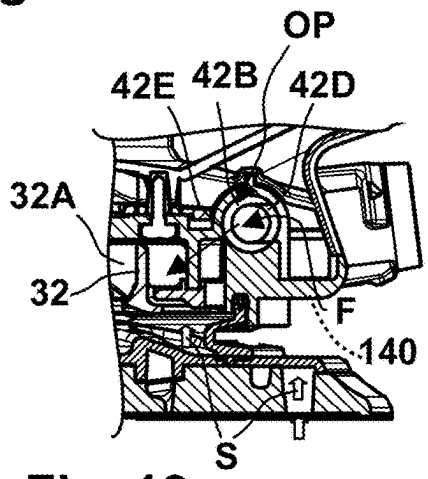

Fig. 19

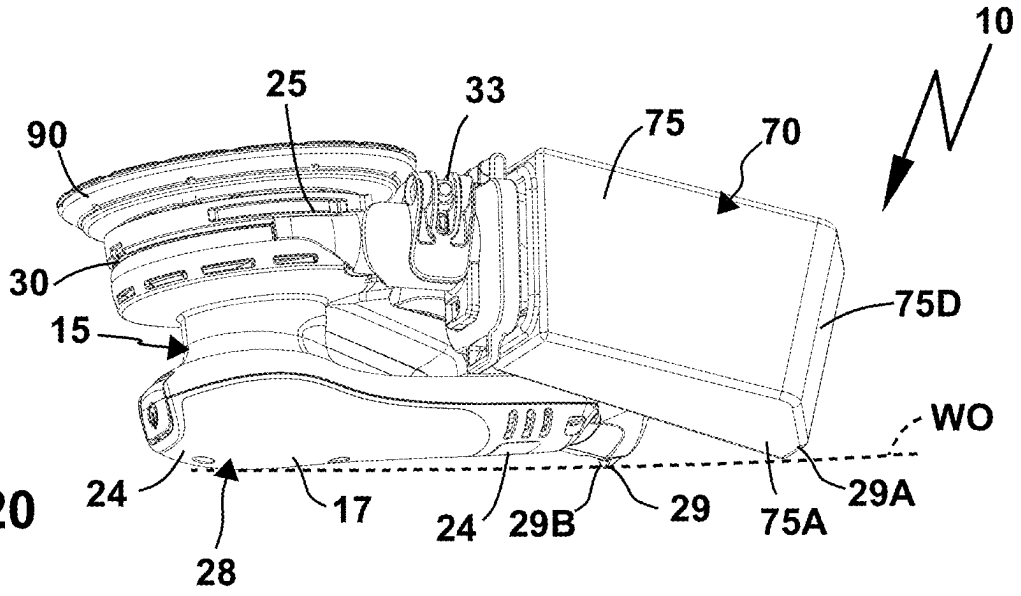

Fig. 20

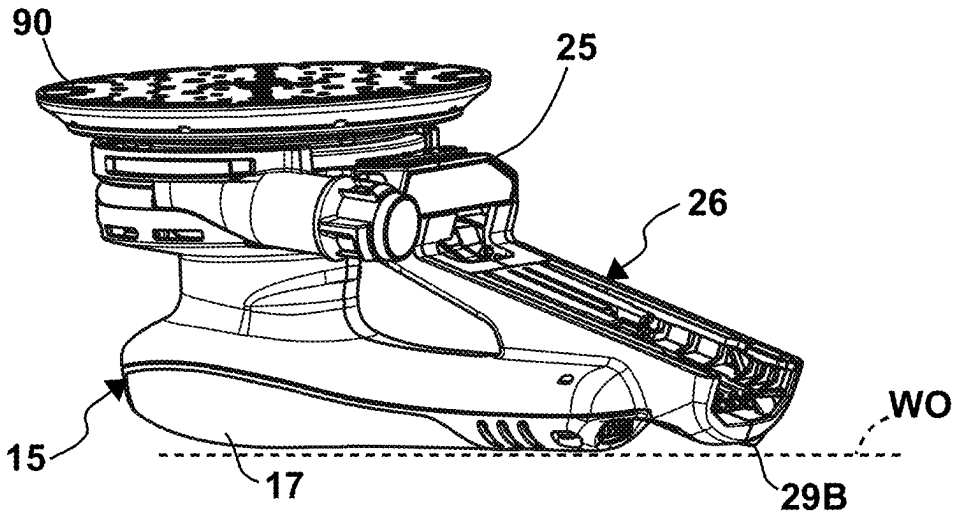

Fig. 21

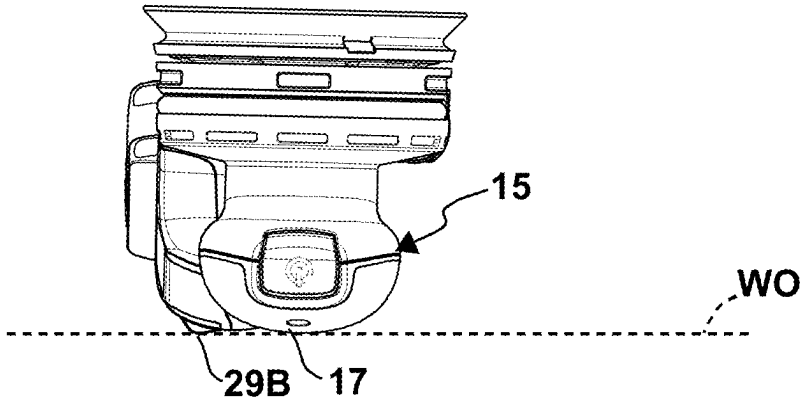

Fig. 22

GRINDING MACHINE WITH AN EXTERNAL AIR INLET

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] Applicant claims priority under 35 U.S.C. § 119 of German Application No. 10 2024 114 135.2 filed on May 21, 2024 and German Application No. 10 2024 103 662.1 filed on Feb. 9, 2024, the disclosures of which are incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The invention relates to a grinding machine having a machine housing and a drive motor, in particular an electric motor, arranged in the machine housing for driving a tool holder so as to rotate and/or to oscillate, to which holder a disk tool can be releasably attached, wherein the grinding machine has a cover for the disk tool, which cover delimits a dust removal space in which the tool holder is arranged and which is provided and configured to hold the disk tool when the disk tool is arranged on the tool holder, wherein a dust removal connector through which a dust/air stream can flow is arranged on the dust removal space, to which connector a dust removal device, in particular one forming a component of the grinding machine or of a system that comprises the grinding machine, in particular a suction hose for connecting the grinding machine to a vacuum cleaner or to a dust collection device can be connected, wherein the dust/air stream is provided for conveying away dust that occurs during operation of the grinding machine, out of the dust removal space.

2. Description of the Related Art

[0003] Typical grinding machines allow connecting a dust collection container, a suction hose or the like to their dust removal connector, so that dust that is formed during grinding of a workpiece can be conducted away into the dust collection container or suctioned away by the vacuum cleaner.

[0004] During operation of the grinding machine with a vacuum cleaner, a great partial vacuum regularly prevails at the dust removal connector, i.e., the grinding machine, with its disk tool, is drawn, so to speak, onto the workpiece surface to be machined. This may facilitate the ease of working, to a certain degree, because specifically, for example, the grinding tool constantly lies on or against the workpiece surface. If, however, the suction power is too great, the grinding tool can no longer be moved easily.

[0005] Furthermore modern vacuum cleaners also have a suction stream monitor, so as to ensure sufficient removal of dust. If, however, the disk tool is being drawn onto the workpiece, the suction stream drops and the partial vacuum in or at the dust removal connector increases, so that at least a warning is issued at the vacuum cleaner if sufficient dust removal is therefore no longer guaranteed.

[0006] To avoid such situations, it is known, in principle, to provide for a certain leakage at the dust removal space, in other words, for example, inflow openings on the outside circumference of the dust removal space, through which external air can flow into the dust removal space. During operation with a dust collection container, however, such external air inlets can be disruptive.

SUMMARY OF THE INVENTION

[0007] It is therefore the task of the present invention to make available an improved grinding machine.

[0008] To accomplish this task, is it provided, in a grinding machine of the type stated initially, that away from and separately from the dust removal connector, at least one external air inlet for letting in external air is arranged on the dust removal space, and the grinding machine has a closure mechanism that is, in particular, arranged on the dust removal device or can be activated by means of the dust removal device, using which mechanism the external air inlet can be closed off completely or at least in part.

[0009] Furthermore a dust removal device, in particular a dust collection device, to be used with a grinding machine according to the invention, serves to accomplish the task, wherein the dust removal device has a closure mechanism, in particular a closure part, to close off the external air inlet of the grinding machine.

[0010] It is advantageous if the dust removal device is releasably attached to a dust removal connector of the grinding machine, for example it can be plugged onto the dust removal connector.

[0011] It is a basic idea of the present invention that an external air inlet does not always have to remain open, but rather that it can be closed if necessary. In particular during operation with the dust collection container or a dust collection device, it is advantageous if the external air inlet is closed or can be closed completely or at least in part. In contrast, when the vacuum cleaner, for example the suction hose is connected, the external air inlet can remain open or be opened by means of the closure mechanism, so that the vacuum cleaner can always draw in external air to a certain extent, and no excessive partial vacuum occurs in the region of the dust removal connector or the vacuum cleaner.

[0012] It is possible that the grinding machine has multiple closure mechanisms, for example a closure mechanism on the dust removal device as well as a closure mechanism that is arranged on the machine housing. If, therefore, a closure mechanism is described in the following description, this can be a closure mechanism that is arranged on the grinding machine, in particular its machine housing, but also a closure mechanism that is arranged on the dust removal device and/or forms a component of the dust removal device. The closure mechanism could also be referred to as "at least one closure mechanism."

[0013] It is possible, for example, that the external air inlet can be adjusted using the closure mechanism of the dust removal device, to a predetermined, fixed extent, for example that a flow cross-section of the external air inlet is reduced by means of the closure mechanism of the dust removal device when this mechanism is arranged on the external air inlet, by 50%, 60%, 70%, 80% or 90%. A further closure mechanism, which is arranged on the grinding machine or its machine housing, can bring about a further reduction in the flow cross-section, for example. In particular, it is advantageous if the closure mechanism arranged on the machine housing of the grinding machine has an adjustable valve element that can be adjusted between an open position and a closed position.

[0014] The closure mechanism is provided and/or configured to close off a flow cross-section of the external air inlet, in whole or in part.

[0015] A flow cross-section of the external air inlet can be closed off by means of the closure mechanism, in its closed position, completely or preferably by at least 90%, even more preferably by at least 95% or 97%.

[0016] The external air inlet can preferably be closed off completely, using the closure mechanism, or can be closed off in an air-tight manner, so that no external air can flow in through the external air inlet.

[0017] However, it is also possible that the external air inlet can be closed off by means of the closure mechanism, essentially but not completely. In this way, it is possible that at least a part of the external air inlet is open to flow, to such an extent that a slight amount of external air can flow into the external air inlet. By means of the closure mechanism, it is preferably possible to cover and close off the external air inlet by at least 80%, preferably by at least 90%, even more preferably by at least 95% or 98%. It can advantageously be provided that when the external air inlet is covered and/or closed off by means of the closure mechanism, in comparison with the external air inlet not being covered by the closure mechanism, maximally still 20%, preferably still 15%, even more preferably still 10% and finally, even more preferably still 5% of a volume stream of the external air can flow in through the external air inlet. If, therefore, the closure mechanism closes off and/or covers the external air inlet, at least 80-95% less external air, for example, gets through the external air inlet than when the external air inlet is not closed off or covered by the closure mechanism.

[0018] The closure mechanism is advantageously configured in such a manner that the amount of external air that flows through the external air inlet can be variably adjusted with it. For example, the closure mechanism can have a valve element that is mounted on the grinding machine and/or on the dust removal device, for example, so as to be adjustable between an open position that releases the external air inlet and a closed position that closes off the external air inlet, at least in part or entirely.

[0019] It is advantageous if it is provided that the external air inlet is arranged away from the dust/air stream that flows through the dust removal connector and/or that the external air inlet does not have any flow connection to the dust/air stream that flows through the dust removal connector outside of the dust removal space and/or that the external air inlet is flow-connected to the dust removal connector by way of the dust removal space.

[0020] The external air inlet is arranged away from the dust/air stream that flows through the dust removal connector. The external air cannot flow directly into the dust/air stream that flows through the dust removal connector. The external air first flows into the dust removal space before it can flow into the dust removal connector, in particular before it can flow in as part of the dust/air stream.

[0021] The dust removal connector has a closed and/or fluid-tight flow connection to the dust removal space.

[0022] For example, the dust removal connector or a channel of the dust removal connector runs toward a side wall of the cover, without an opening or interruption in the sense of an external air inlet or the like being present on the dust removal connector.

[0023] The external air inlet has no flow connection to the dust removal connector and/or to the dust/air stream that flows through it, other than a flow connection by way of the dust removal space and/or aside from the flow through the dust removal space. The dust removal space is directly flow-connected to the dust removal connector, without external air being able to flow into this flow path.

[0024] It is advantageous if the cover comprises the dust removal space on the circumference side, with reference to an axis of rotation of the tool holder, about which axis the tool holder can be driven by means of the drive motor.

[0025] It is advantageous if the cover encloses a circumferential wall that extends on the circumference side with reference to the axis of rotation of the tool holder. The dust removal connector and/or the external air inlet is/are preferably arranged on a circumferential wall.

[0026] It is advantageous if the external air inlet and the dust removal connector are provided not on an end face of the cover and/or on an end face of the circumferential wall, wherein the end face faces the disk tool or lies opposite the disk tool when the disk tool is mounted on the tool holder. Consequently the grinding machine is therefore configured in such a manner that the external air that flows through the external air inlet does not flow past an end face of the cover or circumferential wall, or through a slot or space between the disk tool and the cover or the circumferential wall, into the dust removal space.

[0027] It is advantageous if a seal is provided on the cover, in particular the circumferential wall of the cover, for making contact with the disk tool, in particular on an installation side of the disk tool. The installation side and a machining surface of the disk tool, provided for machining a workpiece surface, are preferably arranged on opposite sides of the disk tool.

[0028] It is advantageous that the dust removal space, aside from the dust removal connector and the at least one external air inlet, is closed off by means of the disk tool when the disk tool is arranged and/or mounted on the tool holder.

[0029] It is advantageous if the grinding machine has a dust/air wheel for generating a dust/air stream or the dust/air stream. Consequently it is therefore possible that the grinding machine generates the dust/air stream actively, so to speak, and conveys it forward to the dust collection device, for example. The dust/air wheel is a fan wheel, for example. The dust/air wheel preferably has blades for producing an air stream. Preferably the dust/air wheel is a radial fan wheel for producing a radial air stream or dust/air stream. The dust/air wheel can also, however, be an axial fan wheel for producing an axial air stream or dust/air stream. Furthermore the dust/air wheel can be a radial-axial fan wheel, which can produce both, namely an axial and a radial air stream or, for example, an axial air stream in the sense of drawing in dust/air from the direction of the disk tool, which dust/air the fan wheel can blow out or convey further, for example radially in the direction of the dust removal connector.

[0030] The dust/air wheel is arranged, for example, in particular in the manner of a sandwich, between the drive motor on the one hand and the disk tool or the tool holder, on the other hand.

[0031] For example, the tool holder is arranged directly on the dust/air wheel.

[0032] At this point, it should still be mentioned, with regard to the grinding machine, that it preferably can have an eccentric gear mechanism and/or a gear mechanism for producing a hypercycloid movement of the tool holder or the

like, which mechanism is driven or can be driven by the drive motor, and drives or has the tool holder. Furthermore the grinding machine can also, alternatively or supplementally to an eccentric gear mechanism and/or a gear mechanism for producing a hypercycloid movement, make available an oscillating type of drive for the tool holder or be configured for an oscillating drive. The grinding machine can have, for example, an oscillation gear mechanism that is driven or can be driven by the drive motor, and drives or has the tool holder.

[0033] It is advantageous if the dust/air wheel draws in external air that is flowing through the external air inlet, to produce the dust/air stream. For example, the external air can flow in through the external air inlet and is conveyed further by means of the dust/air wheel, wherein this external air then becomes dust/air, so to speak, in that it picks up and/or entrains particles that occur or dust that occurs, specifically during operation of the grinding machine, for example during grinding of a workpiece surface.

[0034] The dust/air wheel is preferably provided and configured for drawing in external air through the external air inlet and/or for producing the dust/air stream.

[0035] At this point, however, it should be added that of course other air that does not flow through the external air inlet but rather, for example, flows into the dust removal space on an underside of the cover for the disk tool, can form a component of the dust/air stream or contribute to the production of the dust/air stream.

[0036] Furthermore, it is advantageous if the dust removal space is configured in such a manner that air flowing through the disk tool entrains particles from a machining side of the disk tool provided for machining a workpiece and flows out of the dust removal space as a dust/air stream, through the dust removal connector.

[0037] It is advantageous if the external air inlet is arranged directly next to the dust removal connector and/or on the side next to the dust removal connector. Thereby, for example, a compact arrangement of dust removal connector and external air inlet is created.

[0038] It should also be mentioned that the external air inlet can be referred to as "at least one external air inlet" and/or can comprise multiple external air inlets or external air inlet openings. For example, it is possible that the dust removal connector is arranged between two external air inlet openings or two external air inlets. Furthermore the flow cross-section of the at least one external air inlet can comprise at least two external air inlet openings. It is possible that the grinding machine has at least one external air inlet that cannot be closed off by means of a closure mechanism or by means of the closure mechanism. This external air inlet is thereby permanently in an open position or ready for external air to flow through.

[0039] It is advantageous if, with reference to a longitudinal center plane of the grinding machine, which plane extends, for example, along a longitudinal axis or main longitudinal axis of the machine housing and/or through the motor axis or tool axis, the dust removal connector forms a or the component that lies farthest on the outside and/or if the external air inlet is closer to the longitudinal center plane than the dust removal connector is.

[0040] For example, it is advantageous if the dust removal connector, in particular an outlet opening of the dust removal connector, is farther removed from a center of the grinding machine and/or from an axis of rotation about which the tool holder is driven to rotate or can be rotated, than the at least one external air inlet is, in particular an inlet opening of the external air inlet.

[0041] The dust removal connector, in particular an outlet opening of the dust removal connector, can have a greater distance from the tool holder than the external air inlet does, in particular an inlet opening of the external air inlet.

[0042] The external air inlet can be arranged in a free end region of an external air channel, which region has at least one inflow opening for inflow of the external air into the dust removal space, in particular an accommodation chamber for the dust/air wheel. The inflow opening simultaneously forms an outflow opening, from which the external air can flow out of the external air channel.

[0043] It is advantageous if external air that flows in by way of the external air inlet, in particular when the dust collection device is connected to the dust removal connector, entirely or essentially does not flow directly from the external air inlet to the dust removal connector, but rather is conveyed forward through the dust removal space by the dust/air wheel, before it flows into the dust removal connector. A small part of the external air that flows in by way of the external air inlet can flow directly to the dust removal connector, for example if a corresponding partial vacuum prevails at the dust removal connector, in particular when a vacuum cleaner is connected. If, however, no vacuum cleaner is connected, it is advantageous if external air that flows in by way of the external air inlet first has to be conveyed forward, entirely or almost entirely, in the direction toward the dust removal connector, by the dust/air wheel, until it flows into the dust removal connector, in particular after it picks up dust and other particles, and/or as dust/air.

[0044] The external air inlet or external air channel is preferably arranged on a suction part or in a suction region of the dust/air wheel, so that the dust/air wheel can draw in external air by way of the external air channel or external air inlet, but can blow out no or almost no dust/air by way of the external air inlet or external air channel.

[0045] A flow direction of the external air, in the direction of the dust/air wheel, when the external air flows in through the external air inlet or external air channel into a conveying region of the dust/air wheel, is preferably oriented radially to an axis of rotation of the dust/air wheel or at an angle of maximally 20° or 30° at a slant to the axis of rotation of the dust/air wheel.

[0046] A surface area of a flow cross-section of an inflow opening that is flow-connected to the external air inlet, by way of which external air flows into an accommodation chamber in which the dust/air wheel is arranged, is preferably oriented radially to an axis of rotation or the axis of rotation of the dust/air wheel or oriented maximally 20° or 30° at a slant to the axis of rotation of the dust/air wheel.

[0047] A direction of rotation of the dust/air wheel and/or placement of the external air inlet is preferably provided in such a manner that the dust/air wheel draws in external air by way of the external air inlet and conveys it forward, by at least 40 degrees, preferably at least 60 degrees, further preferably at least 80 degrees, even further preferably at least 90 degrees about an axis, for example an axis of rotation of the dust/air wheel provided for generating the dust/air stream, before the external air can flow into the dust removal connector. It is furthermore preferred if the direction of rotation of the dust/air wheel and/or the placement of

the external air inlet is/are configured in such a manner that the external air that flows in by way of the external air inlet flows over at least 180 degrees, preferably at least 270 degrees, further preferably at least 300 degrees of a rotation of the dust/air wheel about its axis of rotation and/or by at least 180 degrees, preferably at least 270 degrees, further preferably at least 300 degrees about the axis of rotation of the dust/air wheel from the external air inlet in the direction of the dust removal connector. It is even further preferred if the external air that flows in by way of the external air inlet is conveyed further by means of a rotation of the dust/air wheel by at least 340 degrees, even further preferably 350 degrees, to the dust removal connector and/or flows by at least 340 degrees, even further preferably 350 degrees about the axis of rotation of the dust/air wheel from the external air inlet in the direction of the dust removal connector.

[0048] It is advantageous if the dust removal connector projects beyond the external air inlet or relative to the external air inlet, so that a closure part or activation part of the dust removal device, for example of the dust collection device, can get in front of the external air inlet when a connection to the dust removal connector takes place, so as to close off the external air inlet. The activation part serves, for example, for activating the closure mechanism in the sense of closing the external air inlet. The closure part preferably serves to close off the external air inlet, at least to close it off partially.

[0049] An advantageous embodiment of the invention provides that the dust removal device, for example the dust collection device, has a closure part for closing off the external air inlet. The closure part is configured, for example, as a closure wall.

[0050] The closure part is preferably configured and/or provided for the purpose of closing off the external air inlet completely, in an air-tight manner, when the closure part is arranged on the external air inlet. However, it is also possible that the closure part does cover the external air inlet, but does not close it off completely, in an air-tight or flow-tight manner, i.e., that the closure part does lie against or is arranged on the external air inlet, but nevertheless a small amount of external air can flow into the external air inlet, for example through a gap or slot between the closure part and external air inlet.

[0051] It is advantageous if it is provided that the dust removal device, for example the dust collection device, has a plug-in guide and/or a plug-in guide contour and/or an anti-rotation unit contour, in particular formed by the closure part or comprising the closure part, which prevents or at least limits rotation of the dust removal device with reference to a plug-in axis, along which the dust removal device can be plugged onto the dust removal connector and/or which is configured in such a manner that the closure part lies opposite the external air inlet in the state of the dust removal device when it is plugged onto the dust removal connector and/or closes off the external air inlet completely or at least essentially. The plug-in guide or plug-in guide contour or anti-rotation unit contour ensures, for example, that the closure part lies opposite the external air inlet when the dust removal device is arranged on the grinding machine.

[0052] It is advantageous if it is provided that the dust removal connector is tubular or comprises a removal connector tube or a removal connector piece or is formed by a removal connector tube or a removal connector piece.

[0053] It is advantageous if the dust removal device has a connection body for a flow-tight connection to the dust removal connector. The closure part is arranged separately from the connection body and/or next to the connection body. The connection body is tubular, for example, or comprises a connection tube. The closure part, in contrast, is away from the tube body, i.e. the tube body as such or the connection body as such does not close off the external air inlet, however it does close off the closure part arranged next to the connection body.

[0054] If the dust removal device is structured as a dust collection mechanism, it preferably has a first connection body that differs geometrically from a second connection body that forms a connection body of the suction hose. It is true that the two connection bodies, the dust collection device connection body and the suction hose connection body, can fundamentally be tubular or comprise tubular bodies. For the remainder, however, they can have different geometries. For example, the tubular body does not have a closure part or activation part arranged on it or next to it, while the connection body of the dust collection container or of the dust collection device has an activation part and/or closure part.

[0055] An advantageous concept provides, for example, that the external air inlet is arranged next to the dust removal connector, in such a manner that the external air inlet has a greater flow cross-section for external air to flow through when a suction hose connection body or connection body of the suction hose is connected than when a dust collection device connection body or a connection body of the dust collection device is connected.

[0056] The dust collection device is preferably provided and configured for completely closing off and/or covering the external air inlet. For example, the closure part is configured in such a manner that it completely closes off or can completely close off the external air inlet. If multiple external air inlets are present, it is advantageous if the closure part is configured so as to completely close off all or multiple external air inlets. However, multiple closure parts, separate from one another, can also be provided on the dust collection device, so as to close off multiple external air inlets that are separate from one another, individually, separately, in whole or in part.

[0057] If, however, a suction hose is connected to the dust removal connector, in other words vacuum cleaner operation is provided, it is advantageous if the external air inlet or its flow cross-section remains free, entirely or completely, for external air to flow through. It is advantageous if the dust removal connector and the external air inlet are arranged in such a manner that when a cylindrical tubular connection piece of a suction hose is connected to the dust removal connector, the external air inlet remains open and/or is not covered and/or cannot be covered and/or cannot be closed off.

[0058] Consequently it is advantageous if the dust removal connector has two operating modes, namely:

[0059] connection of a dust collection device, wherein the external air inlet is then completely closed, so that optimal dust removal is present, or

[0060] connection of a suction hose.

[0061] If a suction hose or vacuum cleaner is connected, the external air inlet remains entirely or partially free, so that external air can flow in, so that the suction stream has such a flow quality or such a pressure that no warning occurs at

the vacuum cleaner. For example, the external air inlet, which is open when a suction hose is connected, ensures that the suction stream that flows through the external air inlet does not have such a partial vacuum that the vacuum cleaner generates a warning.

[0062] It is advantageous if the closure mechanism has a closure link that is mounted on the grinding machine or the dust removal device, using a bearing mechanism, so as to be adjustable between an open position, which releases the external air inlet, and a closed position, which closes the external air inlet, at least in part or entirely. Consequently, therefore, a dedicated closure mechanism that can be opened and closed is provided, so as to close off the at least one external air inlet. If multiple external air inlets are present, these can be closed off by means of a single closure mechanism having a single, for example a sufficiently large and/or multi-part closure link. The closure link is plate-shaped, for example, and/or configured as a rotating element or the like. The bearing mechanism can support the closure link in a displaceable and/or pivoting manner or is configured for displaceable and/or pivoting mounting.

[0063] It is advantageous if the closure link has a drive contour or is connected or movement-coupled to a drive contour, which can be activated by the dust removal device when it is connected to the dust removal connector and/or when it is removed from the dust removal connector, so as to switch the closure link between the open position and the closed position. In particular, for example, an activation part is arranged on the dust collection device or arranged on its connection body, so that this part can activate the external air inlet by means of activation of the closure link. The activation part comes into activation engagement with the drive contour, for example when the dust removal device is plugged onto the dust removal connector.

[0064] The dust removal connector is preferably tubular or has a removal connection tube or a removal connection piece. It is also possible that the dust removal connector is formed by a removal connection piece or a removal connection tube. The connection piece or the connection tube projects beyond the cover, for example, that delimits the dust removal space.

[0065] A flow direction of external air that flows through the external air inlet, and a flow direction of a dust/air stream that flows through the dust removal connector preferably run transverse to one another. In particular, it is advantageous if the flow directions are at a right angle or approximately at a right angle or at an angle between 80 and 120 degrees relative to one another.

[0066] It is advantageous if the machine housing of the grinding machine has a handle that projects to the rear, counter to the main working direction provided for regular machining of the workpiece or a workpiece using the grinding machine.

[0067] It is advantageous if the dust removal connector projects beyond the machine housing, in the direction of the handle, and/or is oriented in the direction of the handle. It is advantageous if longitudinal expanse axes of the handle and of the dust removal connector are parallel to one another or have an angle of less than 30 degrees or less than 20 degrees.

[0068] It is advantageous if the at least one external air inlet is arranged below the handle and/or on the side next to the handle.

[0069] It is advantageous if an energy storage unit for supplying electric current to the grinding machine is arranged or can be arranged on the handle or next to the handle.

[0070] It represents an actually independent invention in connection with the characteristics in the preamble of claim **1**, but can also represent an advantageous embodiment of the grinding machine and of the hand-held machine tool described up to now, if the machine housing has a support contour arrangement having at least one support contour, on a top side that faces away from the tool holder or is opposite to the tool holder, for setting the grinding machine onto a substratum with its top side, in such a manner that it cannot tilt. It is a basic idea, in this regard, that the grinding machine can be set down onto a substratum, for example a workpiece surface, not just with the disk tool facing down, but rather also with its top side facing down. In this case, a tool change, for example, can be carried out particularly easily.

[0071] The machine housing has, for example, a longitudinal center plane, and the support contour arrangement is configured and provided for supporting the machine housing with reference to the longitudinal center plane so as to prevent tilting. For example, the support contour arrangement has a support contour at three locations that are spaced apart from one another, in each instance. At least two of the support contours preferably have a transverse distance with reference to the longitudinal center plane. These two support contours, which have a transverse distance, preferably have a longitudinal distance from one or two support contours that are arranged on the machine housing in the longitudinal expanse of the longitudinal center plane, relative to the two aforementioned support contours.

[0072] For example, the machine housing has at least one support rib that extends transverse to a longitudinal center plane of the machine housing, as a component of the support contour arrangement. Such a support rib can therefore have an elongated shape. Furthermore, it is advantageous if the support contour arrangement has a support projection that is transversely spaced apart from the longitudinal center plane. Of course it is advantageous if the arrangement has support projections that are spaced apart from one another on opposite sides of the longitudinal center plane. For example, such a support rib or support projection is arranged on a handle that projects away from a drive section of the machine housing in the direction of the longitudinal center plane. The drive motor is arranged in the drive section, for example.

[0073] The support projection or the support rib projects, for example, beyond a rounded or flat surface of the machine housing.

[0074] Furthermore, it is advantageous if the support contour arrangement comprises a handle section on the top side of the machine housing, which section is provided and configured to support the palm of an operator on the machine housing. For example, the handle section has a spherical shape.

[0075] It is advantageous if a vertical axis of the grinding machine or hand-held machine tool, which axis extends between the underside and the top side, in a state in which the grinding machine or hand-held machine tool lies on a substratum with its underside, and in a state in which the grinding machine or hand-held machine tool lies on the substratum with its top side, using the support contour arrangement, has essentially the same incline relative to the

substratum or has inclines that differ from one another by maximally 20°. It is therefore possible that the grinding machine or hand-held machine tool, in the state when its top side is laid down onto the substratum, has a slightly slanted incline, which amounts to 10° to 20° or the like, for example. Nevertheless, the grinding machine or hand-held machine tool is set down or can be set down onto the substratum with its top side, in a tilt-proof manner.

[0076] The support contour arrangement is preferably structured in such a manner that the support surfaces of all the support contours lie in a common support plane. When the grinding machine is laid down onto or supported on a substratum that forms a level surface, using the support contour arrangement, the support plane corresponds to the level surface of the substratum. The support contour arrangement is configured in such a manner, for example, that an energy storage unit and/or a rechargeable battery pack arranged on the machine housing and/or a dust removal device arranged on the machine housing, in particular a dust collection container, does not project beyond the support plane or is not arranged behind the support plane.

[0077] The support contour arrangement is preferably furthermore configured in such a manner that the machine housing can be laid down onto the substratum, using the support contour arrangement, independently of whether an energy storage unit or rechargeable battery pack is arranged on the machine housing. Consequently the machine housing is not supported by an energy storage unit or rechargeable battery pack that is arranged on the machine housing, so that it can be laid down onto a substratum, but rather is supported using the support contour arrangement.

[0078] Furthermore, it is advantageous if the support contour arrangement is structured in such a manner that the machine housing can be laid down onto a substratum exclusively using the support contour arrangement, without an energy storage unit arranged on the machine housing making contact with the substratum.

BRIEF DESCRIPTION OF THE DRAWINGS

[0079] In the following, an exemplary embodiment of the invention will be explained using the drawing. The figures show:

[0080] FIG. **1** a perspective slanted view of a hand-held machine tool having a dust collection container,

[0081] FIG. **2** the slanted view of the hand-held machine tool according to FIG. **1**, but with a connected suction hose,

[0082] FIG. **3** the hand-held machine tool according to FIG. **2** from below,

[0083] FIG. **4** a side view of the hand-held machine tool according to the above figures, partly in section,

[0084] FIG. **5** a perspective slanted view of a section through a front part of the hand-held machine tool according to FIG. **1**, approximately along a section line A-A in FIG. **1**,

[0085] FIG. **6** a sectional view similar to FIG. **5**, but through the hand-held machine tool according to FIG. **2** and directly from above, approximately along a section line B-B in FIG. **2**,

[0086] FIG. **7** an exploded representation of the hand-held machine tool according to the above figures,

[0087] FIG. **8** a perspective slanted view of a dust/air wheel of the hand-held machine tool,

[0088] FIG. **9** a longitudinal section through a front part of the hand-held machine tool according to the above figures, approximately corresponding to the sectional representation according to FIG. **4**,

[0089] FIG. **10** a bearing support, a motor bearing, and a drive motor of the hand-held machine tool,

[0090] FIG. **11** a perspective slanted view of a dust collection device having a clamping mechanism for being connected to the hand-held machine tool,

[0091] FIG. **12** a perspective slanted view of a suction hose having a clamping mechanism for being connected to the hand-held machine tool,

[0092] FIG. **13** a rear partial view of the hand-held machine tool according to the above figures, having the clamping mechanism of the dust collection container shown in FIG. **11** or **12**, in the clamping position (wherein the dust collection container is not shown, for the remainder),

[0093] FIG. **14** the view according to FIG. **13**, with the clamping mechanism in the release position,

[0094] FIG. **15** a variant of the hand-held machine tool according to the above figures, having a closure mechanism for closing off an external air inlet,

[0095] FIG. **16** a perspective detail view of the variant according to FIG. **15**, wherein an upper and a rear part of the hand-held machine tool are not shown,

[0096] FIG. **17** a perspective detail view from below, of a variant of the hand-held machine tool having a further closure mechanism, approximately corresponding to a Detail D in FIG. **15**,

[0097] FIG. **18** a sectional view through the detail according to FIG. **17**, approximately along a section line C-C drawn in FIG. **6**, with the closure mechanism in the closed position,

[0098] FIG. **19** the sectional view according to FIG. **18**, but with the closure mechanism in the open position,

[0099] FIG. **20** the hand-held machine tool according to FIG. **1** with its top side laid down onto a substratum,

[0100] FIG. **21** the hand-held machine tool in the position according to FIG. **20**, but without the energy storage unit and dust collection container, and

[0101] FIG. **22** the hand-held machine tool in the position according to FIG. **20**, but from the front and without the dust collection container, and with a smaller disk tool.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0102] A hand-held machine tool **10** according to the drawing is configured, for example, as a grinding machine **11**. The hand-held machine tool **10** has a drive motor **12**, the power take-off of which rotates about a motor axis M and drives a gear mechanism **13**, for example an eccentric gear mechanism, an oscillation gear mechanism, or the like, which in turn drives a tool holder **14** rotationally and/or eccentrically and/or hypercycloidically.

[0103] The drive motor **12** is an electric drive motor. The drive motor **12** has, for example, a stator **12**A as well as a rotor **12**B.

[0104] The tool holder **14** rotates about a tool axis W or is driven or can be driven rotationally about a tool axis W.

[0105] The tool axis W and the motor axis M are, for example, eccentric to one another.

[0106] The gear mechanism **13** is or comprises, for example, an eccentric gear mechanism or eccentric bearing **13**A.

[0107] The drive motor **12** and the gear mechanism **13** form a drive train **13**B or at least parts of a drive train **13**B, which is accommodated in a machine housing **15** of the hand-held machine tool **10**.

[0108] The hand-held machine tool **10** is a hand-guided machine tool, i.e., a machine tool to be guided by hand, or that can be guided by hand by an operator. Accordingly, the operator can guide the hand-held machine tool freely along a workpiece surface WO, for example in a main working direction HA, toward the front, or counter to the main working direction HA, toward the rear, or transverse to the main working direction HA.

[0109] The machine housing **15** has a drive part **16** that accommodates the drive motor **12** and the gear mechanism **13**, consequently the drive train. The drive part **16** has, for example, a motor mounting bracket **16**A for accommodating the drive motors **12**.

[0110] A handle section **17**, which has or is formed by a hand rest, for example, is arranged on the drive part **16**. The handle section **17** or the hand rest is suitable for being grasped by the hand of an operator and/or for allowing the hand of an operator to rest on it.

[0111] A handle **18** projects from the drive part **16**, for example counter to the main working direction HA. The handle section **17** and the handle **18** are arranged, for example, on a front section or a front side **19** and a back or rear section or a rear side **20** of the machine housing **15** with reference to the main working direction HA.

[0112] The tool holder **14** and/or the tool axis W and/or the motor axis M are situated approximately in the region of a longitudinal center plane **23**, which extends from the front side **19** to the rear side **20** of the hand-held machine tool **10**. The handle section **17** is arranged on a top side **24** of the hand-held machine tool **10**, while the tool holder **14** is arranged on an underside **25** that lies opposite the top side **24**. The underside **25** is provided for guiding the hand-held machine tool **10** along the workpiece surface WO or lies opposite the workpiece surface WO during operation of the hand-held machine tool **10**.

[0113] The hand-held machine tool **10** is preferably a battery-operated or rechargeable-battery-operated hand-held machine tool. The concepts explained below, regarding dust removal, regarding the configuration of the drive train, and regarding optimized attachment of a dust collection mechanism, could easily be implemented also in the case of a grid-connected hand-held machine tool. In this case, the hand-held machine tool **10** would have a connection cable, for example, for a connection to a power-supply network.

[0114] Slightly outside of the center with reference to the longitudinal center plane **23**, an energy storage unit connector **26** for an electric energy storage unit **27**, for example a rechargeable battery pack, is arranged.

[0115] The energy storage unit connector **26** is provided, for example, on a holding part **26**A of the machine housing **15**. The holding part **26**A extends between the drive part **16** and an end region of the handle **18** that is at a distance from the drive part **16**.

[0116] A reach-through opening **18**A is provided between the handle **18** and the holding part **26**A. A hand that holds the handle **18** can reach into the reach-through opening **18**.

[0117] The tool holder **14** is arranged within and/or below a cover **30** that extends away from the drive part **16** to the underside **25** of the hand-held machine tool **10**. The cover **30** delimits a dust removal space **31** that is provided for collecting and carrying away dust that is formed during machining of the workpiece surface WO.

[0118] For example, a disk tool **90**, in particular a grinding tool, can be releasably fastened to the tool holder **14**. For this purpose, the disk tool **90** has a drive holder **91**, for example. The drive holder **91** and the tool holder **14** comprise, for example, bayonet contours and/or rotational entrainment contours and/or a screw connection or the like.

[0119] The disk tool **90** has a machining surface **92**, for example a grinding surface or polishing surface, wherein the grinding surface can also be formed by means of a grinding agent that can be releasably attached to the disk tool **90**. Inflow openings **93** into which air can flow are arranged on the machining surface **92**. For example, an air stream charged with dust, in other words a dust/air stream S, can flow through the inflow openings **93** in the direction of the dust removal space **31**, wherein the dust/air stream S can flow out at outflow openings **94** that are flow-connected to the inflow openings **93**, on an installation side **95** of the disk tool **90** that lies opposite the machining surface **92** and is provided for installation on the hand-held machine tool **10**.

[0120] A ring-shaped seal **31**A or sealing cuff surrounds the dust removal space **31**. The seal **31**A is held, for example, on the machine housing **15** and lies against the installation side **95** of the disk tool **90**. The outflow openings **94** are arranged in an interior space that is enclosed by the seal **31**A.

[0121] It is possible that the dust removal space **31** is suctioned off, for example, using a vacuum cleaner STA. In this case, active production of a dust/air stream by means of the hand-held machine tool **10** is not necessary, but it is possible.

[0122] In the present case, however, the hand-held machine tool **10** or grinding machine **11** has an active production of the dust/air stream or is configured for active production of the dust/air stream. A dust/air wheel **32** that is driven or can be driven by the drive motor **12** is arranged within the dust removal space **31**. For example, the dust/air wheel **32** is arranged on the power take-off of the drive motor **12**.

[0123] The dust/air wheel **32** can support the dust/air stream S even if the vacuum cleaner STA is connected to the dust removal connector **33**.

[0124] The dust/air wheel **32** therefore produces a dust/air stream S or supports its flow.

[0125] The dust/air wheel **32** is connected, in a torque-proof manner, to a motor shaft **12**C of the drive motor **12**, which shaft represents the power take-off of the drive motor **12**. The drive motor **12** or the motor shaft **12**C rotates in a direction of rotation DR.

[0126] The dust/air wheel **32** rotates in the direction of rotation DR, so that the dust/air stream S flows through the dust removal space **31** in the direction of rotation DR and flows into the dust removal connector **33**.

[0127] The dust/air wheel **32** and optionally the vacuum cleaner STA produce an air stream that draws in particles, dust or the like, which occurs, for example, during machining of the workpiece surface WO, through the inflow openings **93** of the disk tool **90**. The dust/air stream S produced in this manner flows out of the outflow openings **94** into the dust removal space **31**, where the dust/air wheel **32** conveys it further in the direction of the dust removal connector **33**.

[0128] The dust removal connector **33** is configured, for example, as a removal connection tube **34** or a removal connection piece **35**, or has a connection tube **34** or a connection piece **35**.

[0129] The dust removal connector **33** is preferably arranged approximately tangentially with reference to the dust/air wheel **32**.

[0130] It is advantageous if the dust removal connector **33** is arranged outside the center with reference to the longitudinal center plane **23**, for example close to the longitudinal side **22**. Therefore the dust/air or the dust/air stream S flows out of the dust removal space **31** eccentrically relative to the tool axis W and tangentially to the same.

[0131] A dust removal device **50** can be connected to the dust removal connector **33**.

[0132] Fundamentally, the hand-held machine tool **10** or grinding machine **11** can also be operated without a dust removal device **50**, wherein then the dust/air stream S is blown out into the environment by way of the dust removal connector **33**.

[0133] The dust removal device **50** is, for example, a dust removal device **50**A in the form of a suction hose **70**A or a dust removal device **50**B in the case of a dust collection device **70**.

[0134] Both dust removal devices **50**A and **50**B can pick up dust that flows through the dust removal connector **33**. For example, the vacuum cleaner STA can pick up dust. Furthermore, the dust collection device **70** can collect dust.

[0135] Both dust removal devices **50**A and **50**B can optionally be connected to the dust removal connector **33** and, for this purpose, have a tubular connection body **51**A or **51**B. The connection bodies **51**A or **51**B can be plugged onto the dust removal connector **33**, for example the removal connection tube **34**, along a plug-in axis ST, or pulled off from the dust removal connector **33** by means of a pulling movement.

[0136] Both dust removal devices **50**A and **50**B are also referred to, in general, as a dust removal device **50** in parts of the following description.

[0137] The connection bodies **51**A, **51**B are also referred to, in general, as connection bodies **51**, in particular if the same or similar components are present in both the dust removal devices **50**A, **50**B or connection bodies **51**A, **51**B.

[0138] The connection bodies **51**A and **51**B are equipped with clamping mechanisms **52** with which the dust removal devices **50**A and **50**B can be clamped onto the dust removal connector **33**.

[0139] In the case of the connection body **51**A, a variant shown in FIGS. **2** and **3** is also possible, which makes do without a clamping mechanism **52**. In particular, this embodiment without a clamping mechanism **52** is optionally conceivable if the following optional measure of a shape-fit contour is provided on the tubular connection body **51**A.

[0140] Furthermore, as an optional measure, at least one shape-fit contour **56**A is provided, which projects radially inward into the connection body **51**A or **51**B and can come into engagement with at least one counter-shape-fit contour **36** on the connection tube **34** or connection piece **35**.

[0141] For example, one, two or more shape-fit contours **56**A can be provided on opposite sides and/or at an angular distance relative to a longitudinal expanse or longitudinal expanse axis of the connection body **51**A or **51**B. As an example and schematically, two shape-fit contours **56**A are drawn in, in the case of the connection body **51**B, wherein the angle position and/or the longitudinal distance with reference to the plug-in axis ST of the shape-fit contours **56**A relative to one another is shown only schematically and should be understood as an example. In particular, the shape-fit contour **56**A that is on the right in the drawing is shown close to the gap or slot **54**B, so that it can be seen.

[0142] The at least one counter-shape-fit contour **36** is arranged radially on the outside, outside of a flow cross-section of the dust removal connector **33**. For example, the counter-shape-fit contour **36** is configured as an arrangement of shape-fit holders and/or shape-fit projections or the like and/or it comprises such an arrangement. The at least one counter-shape-fit contour **36** comprises ribs, projections or the like, for example, which project beyond an outside circumference wall surface of the dust removal connector **33**.

[0143] The at least one shape-fit contour **56**A comprises one or more shape-fit projections **56**V, for example. The at least one shape-fit contour **56**A and/or the shape-fit projections **56**V projects or project, for example, beyond an inside circumference wall surface **51**W of the connection body **51**.

[0144] The inside circumference wall surface **51**W is configured, for example, as an essentially round inner wall surface. The inside circumference wall surface **51**B delimits the holder cross-section **55**, for example.

[0145] The at least one counter-shape-fit contour **36** comprises, for example, a depression **36**V, and the shape-fit contour **56**A comprises, for example, a shape-fit projection **56**V for engagement into the depression **36**V.

[0146] When the at least one shape-fit contour **56**A engages into the at least one counter-shape-fit contour **36**, the dust removal device **50** is fixed in place, for example, counter to the plug-in axis ST along which the dust removal device **50** can be plugged onto the dust removal connector **33**, so that it cannot be pulled out.

[0147] The at least one shape-fit contour **56**A and the at least one counter-shape-fit contour **36** advantageously form an anti-rotation unit, in particular in connection with a shape-fit contour **56**B that will still be explained in detail below, which contour is provided, in the case of the dust collection device **70**, on the connection body of the device or close to the connection body **51**B of the device.

[0148] A particularly good hold of the dust removal device **50** on the dust removal connector **33** is made possible by the clamping mechanism **52**. The clamping mechanism **52** is adjustable between a clamping position KS, in which a holder cross-section **55** of the connection body **51** is narrowed, and a release position FS, in which the holder cross-section **55** is so great that the dust removal device **50** can be removed from the dust removal connector **33** along the plug-in axis ST.

[0149] It is advantageous if the holder cross-section **55** is so large, in the release position FS, that the shape-fit contour **56**A can also come out of engagement with the counter-shape-fit contour or the counter-shape-fit contours **36**. The shape-fit contour **56**A is configured, for example, as a shape-fit projection that projects into the holder cross-section **55**.

[0150] The shape-fit contour **56**A comprises transverse shape-fit contours **560** that run transverse to the plug-in axis ST. The counter-shape-fit contours **36** comprise transverse counter-shape-fit contours **360** that run transverse to the plug-in axis ST. When the dust removal connector **33** engages into the connection body **51**A or **51**B and the

transverse shape-fit contours **56**Q and the transverse counter-shape-fit contours **36**Q engage into one another, the connection body **51**A, **51**B is held on the dust removal connector **33**, with reference to the plug-in axis ST, so that it cannot be pulled out.

[0151] The shape-fit contour **56**A also comprises longitudinal shape-fit contours **56**L that run parallel or precisely parallel to the plug-in axis ST with a directional component relative to the plug-in axis ST. The counter-shape-fit contour **36** that corresponds to this comprises longitudinal counter-shape-fit contours **36**L that run parallel or precisely parallel to the plug-in axis ST with a directional component relative to the plug-in axis ST. When the dust removal connector **33** engages into the connection body **51**A or **51**B and the longitudinal shape-fit contours **56**L and the longitudinal counter-shape-fit contours **36**L engage into one another, the connection body **51**A, **51**B is held on the dust removal connector **33** so as not to rotate with reference to a rotation about the plug-in axis ST.

[0152] The longitudinal counter-shape-fit contours **36**L and the transverse counter-shape-fit contours **360** delimit, for example, the at least one depression **36**V. Preferably, multiple depressions **36**V are provided, which advantageously have a longitudinal distance with reference to the plug-in axis ST that essentially corresponds to a longitudinal axis of the dust removal connector **33**, and/or have an angular distance with reference to the plug-in axis ST.

[0153] It is also possible that in the release position FS, the holder cross-section **55** is so great that the shape-fit contour **56**A can rotate relative to the at least one shape-fit contour **56**, so that the shape-fit contours **56** and **56**A can be brought into such a rotational position that they can be displaced along the plug-in axis ST, past one another.

[0154] The clamping mechanism **52** has a clamping clip **53**.

[0155] The clamping clip **53** can be formed, for example, by means of sections of the connection body **51**A or **51**B.

[0156] The clamping clip **53** can also be, in a manner not shown, a clamping clip that surrounds the connection body **51**A or **51**B and is separate from the connection body **51**A or **51**B, for example in the manner of a clamping brace.

[0157] The clamping clip **53** has clamping legs **54**, for example, which narrow the holder cross-section **55** in a position when they are moved toward one another, and increase the holder cross-section **55** in a position when they are moved away from one another.

[0158] Free end regions **54**C of the clamping legs **54** lie opposite one another, wherein a slot or gap **54**B is formed between the end regions **54**C, which slot or gap is smaller in the clamping position KS than in the release position FS.

[0159] An activation element **57**X in the form of a pivot lever **57** serves to activate the clamping mechanism **52**. The pivot lever **57** is mounted on the connection body **51** or close to the connection body **51** so as to pivot about a pivot axis SA, using a pivot bearing **57**A.

[0160] It is advantageous if the pivot axis SA is parallel or essentially parallel, i.e., deviating at an angle of maximally 5°, relative to the plug-in axis ST.

[0161] For example, the pivot bearing **57**A has an axis body or multiple axis bodies **57**B, which are in engagement with bearing holders **57**C of the pivot lever **57**.

[0162] Consequently, therefore, the pivot lever **57** is mounted on the axis body **57**B, using the bearing holders **57**C, so as to pivot about the pivot axis SA.

[0163] The pivot lever **57** has a pivot arm **57**D that can be grasped by an operator, which arm projects away from the pivot bearing **57**A. The pivot arm **57**D has an activation contour **57**E in the region of the pivot bearing **57**A, for example close to the bearing holder **57**C. The activation contour **57**E comprises an eccentric contour **57**F that runs eccentrically relative to the pivot axis SA. Therefore when the pivot lever **57** is switched between a release activation position FB, assigned to the release position FS, in which the pivot lever **57** projects away from the connection body **57**, into a clamping activation position KB that is assigned to the clamping position KS, sections of the eccentric activation contours **57**B that are eccentrically farther away from the pivot axis SA increasingly come into engagement with a support part of the connection body **51** that is provided to support the activation contours **57**B, so as to activate a tie rod **58** and/or adjust it linearly. The support part of the connection body **51** is provided, for example, on the outside circumference of the connection body **51** or of the tubular body, or formed by this outside circumference.

[0164] The tie rod **58** passes through the two clamping clips **53** in the region of the free end regions of the clamping legs **54**. The tie rod **58** has a bolt section **58**A, for example, which extends between a support head **58**B and an entrainment head **58**C. The bolt section **58**A passes through passage openings **54**A on the free end regions of the clamping legs **54**.

[0165] The support head **58**B supports itself, on the outside, on the clamping leg **54** that is farther away from the pivot lever **57**. The entrainment head **58**C supports itself on the axis body **57**B, close to the pivot lever **57**, which body has a holder **57**I through which a bolt section **58**A passes.

[0166] Therefore when the eccentric contour **57**C supports itself on the connection body **51** during activation of the pivot lever **57** from the release activation position FB into the clamping activation position KB, a pulling force ZK acts on the tie rod **58**, by means of which force the support head **58**B is activated in the direction of the pivot lever **57**, and thereby the holder cross-section **55** narrows, so that the connection body **51**A or **51**B becomes wedged in place by the dust removal connector **33**, for example the outside circumference of the connection tube **34**. As a result, an optimal clamping fit and hold of the corresponding dust removal device **50**A, **50**B on the dust removal connector **33** comes about.

[0167] When the clamping mechanism **52** is moved from the clamping position KS into the release position FS, there is the option, for example, that the tie rod **58** acts in the sense of a thrust element, for example using the support head **58**B. Specifically, when the support head **58**B or an entrainment contour arranged close to it entrains the clamping leg **54** on which the support head **58**B is arranged, away from the other clamping leg **54** that is close to the entrainment head **58**C, the two clamping legs **54** are moved away from one another in the sense of an increase in size of the holder cross-section **55**, for example by means of a thrust force SK.

[0168] Alternatively or supplementally to activation of the clamping mechanism **52** from the clamping position KS in the direction of the release position FS, a spring mechanism **57**J can also be provided, for example an elastic, block-shaped body, a helical spring or the like. The spring mechanism **57**J is arranged, for example, between the clamping legs **54**, i.e., their free end regions, and supports itself on the

clamping legs **54**. The bolt section **58**A of the tie rod **58** passes through the spring mechanism **57**J, for example.

[0169] The pivot arm **57**C has a holding contour **57**G, for example a trough-like depression, into which the connection body **51** engages in the clamping activation position KB and/or in which the connection body **51** is accommodated in the clamping activation position KB. Thereby the pivot arm **57**D nestles against the connection body, so to speak, i.e., against its tubular shape, so to speak. In the clamping activation position KB, however, a handle projection **57**H projects away from the connection body **51**, suitable for being grasped by an operator, so that the operator can conveniently grasp the pivot lever **57** at the handle projection **57**H to activate it and/or to pivot it in the direction of the release activation position FB.

[0170] The connection body **51**B of the dust collection device **70** is arranged on a carrier body **71**, which serves to carry a dust collection container **75**. The dust collection container **75** is held on a further carrier body **72**. The carrier bodies **71**, **72** can be adjusted relative to one another, for example mounted so as to pivot on one another, for example using a pivot bearing **73**. Both carrier bodies **71** and **72** have passage openings **71**A and **72**A for the dust/air stream S, wherein the passage opening **71**A of the carrier body **71** is flow-connected to the connection body **51**. When the carrier bodies **71**, **72** are adjusted to be away from one another, the passage opening **72**A of the dust collection container **75**, which is clearly larger as compared to the passage opening **71**A, and through which the dust collection container **75** can be emptied, is released. The carrier body **71** therefore forms a lid, for example, for the passage opening **72**A of the carrier body **72**.

[0171] It is also possible, however, to remove the dust collection device **70** from the dust removal connector **33** in order to empty it, so that dust retained in the dust collection container **75** can be emptied through the connection body **51**B.

[0172] The carrier bodies **71**, **72** can be fixed in place on one another using a fixation mechanism **74**, for example a clamping mechanism, locking mechanism or the like, so that they lie flat against one another and a flow connection exists between the connection body **51** and the dust collection container **75**, but the passage opening **72**A is closed off. The fixation mechanism **74** can also be referred to as a carrier body fixation mechanism. Accordingly, the clamping mechanism or locking mechanism can be a carrier body clamping mechanism or carrier body locking mechanism.

[0173] The dust collection container **75** has a cubical or block-shaped form. For example, the dust collection container **75** has side walls **75**A, **75**B that lie opposite one another and can form upper and lower side walls, for example. Longitudinal side walls **75**C extend between the side walls **75**A, **75**B. The carrier body **72** is arranged on a front wall **75**D, for example. The dust collection container **75** is delimited or closed off by means of a rear wall **75**E, on a side that faces away from the carrier body **72**. The rear wall **75**E can have sections **75**F and **75**G that are angled relative to one another, for example. Consequently, therefore, no opening is present on the dust collection container **75**, except for the opening on the carrier body **72** or the connection body **51**.

[0174] The dust collection container **75** preferably consists of a filter material, for example textile material or the like.

[0175] A support body **77**, for example made of wire or the like, serves to hold the dust collection container **75** in an open or elongated shape. The support body **77** is preferably arranged in the interior of the dust collection container **75**. Support body sections of the support body **77** preferably lie approximately in the region of inner edges of the dust collection container **75**. It is advantageous if the dust collection container **75** is held open by the support body **77**.

[0176] The support body **77** is held on the carrier body **72** and extends away from the latter with a support body longitudinal section **77**A.

[0177] In the region of the rear wall **75**D, a support body transverse section **77**B of the support body **77** is provided, which section projects away from the support body longitudinal section **77**A. The carrier body **72** and the support body transverse section **77**B, together with the support body longitudinal section **77**A that connects the two components, form a U-shaped form. A support body section **77**C that projects away from the support body transverse section **77**B toward the side wall **75**B, which section is connected to the carrier body **72** using a support body section **77**D and a support body section **77**E, serves for further support of the dust collection container **75**. The support body sections **77**B and **77**D run approximately parallel to one another, as do the support body sections **77**A and **77**D. For example, the support body sections **77**A and **77**B as well as the support body sections **77**D and **77**E are approximately L-shaped.

[0178] On the side of the dust collection container **75** that is assigned to the handle **18**, no element of the support body **77** is provided, so that an operator, if he grasps the handle **18** and/or fastens the energy storage unit **27** onto the energy storage unit connector **26** or removes it from the latter, can grasp a soft section **75**M of the dust collection container **75**, so to speak, without the support body **77** being in the way.

[0179] It is easy to plug the dust collection device **70** onto the dust removal connector **33**, in that a plug-in guide **80** and/or an anti-rotation unit contour **81** is/are present so as to guide and hold the dust collection device **70** on the dust removal connector **33** so as to prevent rotation with reference to the plug-in axis ST.

[0180] The plug-in guide **80** comprises a plug-in guide contour **80**A. The plug-in guide contour **80**A and the anti-rotation unit contour **81** are arranged on the dust collection device **70**, in particular on its connection body **51**B.

[0181] A plug-in guide contour **80**B that interacts with the plug-in guide contour **80**A as well as an anti-rotation unit contour **81**B that interacts with the anti-rotation unit contour **81** are arranged on the dust removal connector **33**. For example, the plug-in guide contour **80**B and the anti-rotation unit contour **81**B are formed by an end-face side or end-face wall that surrounds the external air inlet **40**.

[0182] In the case of the suction hose **70**A, a firm hold that can be achieved using the clamping mechanism **52**, for example, makes it possible that an operator can grasp the suction hose **70**A, if necessary, which hose is connected to the connection body **51**A, so as to move the grinding machine **11** along the workpiece surface WO. The suction hose **70**A has the connection body **51**A at its one longitudinal end and a connection body **51**C at a longitudinal end opposite to the first, to produce a connection to the vacuum cleaner STA.

[0183] Also in the case of the dust collection device **70**, the clamping seat of the connection body **51**B on the dust removal connector **33** proves to be advantageous, because

rapid replacement or rapid exchange of the dust collection device **70** is easily possible. In particular, in this way an external air inlet **40** that will be explained below can also be closed off at the same time, by means of the dust removal device **50**B, which inlet remains open when the dust removal device **50**A or the suction hose **70**A is connected.

[0184] The external air inlet **40** is arranged next to the dust removal connector **33** and close to the dust removal connector **33**, and allows external air F to flow into the dust removal space **31**. The external air inlet **40** is therefore arranged on the rear side **20** of the machine housing **50**, seen with reference to the main working direction HA.

[0185] An external air channel **40**A extends on the rear side **20** of the machine housing **50** and/or on the rear side of the dust removal space **31**, on which channel the external air inlet **40** is arranged. The external air inlet **40** and an inflow opening **40**B for flow of external air F into an accommodation chamber **32**A, in which the dust/air wheel **32** is arranged, are flow-connected to one another by way of the external air channel **40**A.

[0186] External air F that flows in through the external air inlet **40** flows through the external air channel **40**A and flows into the dust removal space **31** by way of the inflow opening **40**B.

[0187] It is advantageous if the external air channel **40**A extends essentially over the entire transverse width or at least 50% or 60% of the transverse width of the dust removal space **31** and/or of the machine housing **15** in the region of the dust removal space **31**, transverse to the longitudinal center plane **23**.

[0188] While the dust removal connector **33** runs parallel or at an inclination of less than 30°, preferably less than 20°, even further preferably less than 10° relative to the longitudinal center plane **23**, the external air inlet **40** runs transverse to the longitudinal center plane **23**, for example approximately transverse at a right angle.

[0189] It is advantageous if the placement of the external air inlet **40** is arranged in such a manner that the external air F that flows into the external air inlet **40** flows almost entirely rotationally through the dust removal space **31** and, in this regard, picks up dust and particles before it flows into the dust removal connector **33** as the dust/air stream S. In any case, the dust/air wheel **32** can convey the external air F that flows in through the external air inlet **40** through almost the entire dust removal space **31**, namely within the scope of a rotational movement or a flow movement that flows around the tool axis W, before the dust/exhaust air stream S flows out of the dust removal space **31** through the dust removal connector **33**.

[0190] A flow of external air F through the external air inlet **40** is desirable, in particular, if the suction hose **70**A and thereby the vacuum cleaner STA is connected. As a result, an undesirable partial vacuum situation is avoided, i.e., a sufficient dust/air stream S can always flow through the dust removal connector **33**, without the vacuum cleaner STA or a flow measurement mechanism or pressure measurement mechanism that is present there determining an excessive partial vacuum, which would lead to shut-off of the vacuum cleaner STA. If the vacuum cleaner STA conveys an overly low dust/air stream S, there is the risk that dust could get into the surroundings of the hand-held machine tool **10** or grinding machine **11**, to an unacceptable extent. The vacuum cleaner STA should therefore be able to produce the dust/air stream S as constantly as possible.

[0191] If, in contrast, the dust collection device **70** is connected to the dust removal connector **33**, the external air F that flows into the external air inlet **40** would reduce the conveying power of the dust/air wheel **32**, so that the dust/air stream S could have an overly slight extent. Therefore it is advantageous to close off the external air inlet **40** completely or at least partially when the dust collection device **70** is arranged on the dust removal connector **33**.

[0192] The dust collection device **70** has a closure part **42**A that serves for closing off the external air inlet **40** and forms a component of a closure mechanism **41**A. The closure part **42**A can basically be provided and configured for closing the external air inlet **40** off completely and/or in an air-tight manner. However, it is also possible that the closure part **42**A does cover the external air inlet **40** but does not close it off completely or in an air-tight manner. Consequently, therefore, a small amount of external air can flow in through the external air inlet **40**, even if the external air inlet **40** is covered by the closure part **42**A. For example, a narrow slot can be present between an outside circumference of the closure part **42**A and a contour or wall of the external air inlet **40** that runs next to the closure part **42**A, through which slot external air can still flow into the external air inlet **40**, even if this is only a small amount of external air.

[0193] The plug-in guide contour **80**A and/or the anti-rotation unit contour **81** of the dust collection device **70** is/are advantageously formed or made available by the closure part **42**A or is/are arranged on the closure part **42**A. It is also possible that the closure part **42**A forms the plug-in guide contour **80**A and/or the anti-rotation unit contour **81**.

[0194] When the dust collection device **70** is being connected to the dust removal connector **33**, the external air inlet **40** should be closed. The closure part **42**A already gets in front of the external air inlet **40** when the dust collection device **70** is being plugged onto the dust removal connector **33**, and closes this inlet off.

[0195] The closure part **42**A has, for example, a wall-like form and closes off the external air inlet **40** when the dust collection device **70** has been fastened onto the dust removal connector **33**. At the same time, the closure part **42**A forms the shape-fit contour **56**B that has already been indicated and represents the anti-rotation unit contour **81** or shape-fit contour that acts at least on rotation with regard to the plug-in axis ST. Consequently, the plug-in guide contour **80**B on the external air inlet **40** forms a counter-shape-fit contour **36**B for the shape-fit contour **56**B.

[0196] It is also advantageous, however, both in the case of the embodiments shown in the drawing and in each grinding machine according to the invention, if a closure mechanism can be used to close off an external air inlet independently of the connection of a dust collection container and/or if a closure mechanism allows setting the flow cross-section of the external air inlet, in other words, for example, makes a type of setting valve available or comprises a setting valve. Using such a closure mechanism, not only can the external air inlet be opened completely or closed completely, but it can also assume intermediate positions between an open position and a closed position.

[0197] A closure mechanism **41**B, which serves for closing off an external air inlet **140**, serves for such greater flexibility with regard to closing off an external air inlet. The external air inlet **140**, like the external air inlet **40**, is arranged on the rear side **20** of the grinding machine **11**. However, the external air inlet **140** extends approximately

beyond a transverse width of the rear side **20** and passes through the longitudinal center plane **23**. The external air inlet **140** is open toward the underside **25** and/or in an orientation toward the machining surface **92** of the disk tool **90**, and can therefore suction dust out of the surroundings of the hand-held machine tool **10** and of the grinding machine **11**, into the dust removal space **31**. If, for example, dust still remains on the workpiece surface WO when the grinding machine **11** is guided in the main working direction HA, this dust can be drawn in by way of the external air inlet **140**. Consequently, a kind of "vacuum cleaner function" exists here.

[0198] The external air inlet **140** can also be closed, if necessary, for example when using the dust collection device **70**. For this purpose, a closure mechanism **41**B is provided, which has a closure link **42**B, which is suitable for closing off or opening the external air inlet **140**. The closure link **42**B is configured, for example, in the manner of a roller, or formed by a rotating body **43**. The closure link **42**B is arranged next to the external air channel **40**A or arranged on the external air channel **40**A. It is advantageous if the closure link **42**B extends approximately over the entire longitudinal expanse of the external air channel **40**A.

[0199] The closure link **42**B or the rotating body **43** is mounted on a bearing holder **44** of the machine housing **15**, wherein the former or the latter can be adjusted between an open position OP, in which the external air inlet **140** is open, and a closed position SP, in which the external air inlet **140** is closed.

[0200] The closure link **42**B has, for example, a cylindrical circumferential wall or closure wall **42**C, which can be adjusted by means of rotating the closure link **42**B in front of the inflow opening **40**B, by way of which the external air F can flow into the accommodation chamber **32**A, wherein then the closure wall **42**C closes off the inflow opening **40**B, and can be adjusted away from the inflow opening **40**B, so that the inflow opening **40**B is free to allow external air F to flow through. Intermediate positions of the closure link **42**B are possible, in which the closure wall **42**C only partially closes off the inflow opening **40**B.

[0201] When the closure link **42**B is in the open position OP, external air F can flow through the closure link **42**B through an inflow opening **42**D and an outflow opening **42**E. In this open position OP, the inflow opening **42**D lies opposite the external air channel **40**A, and the outflow opening **42**E lies opposite the inflow opening **40**B.

[0202] It should be mentioned that the closure link **42**B can also assume, for example, intermediate positions between its open position OP and its closed position SP, so that the amount of the external air F that flows through the external air inlet **140** can be adjusted.

[0203] The closure link **42**B can also be referred to or viewed as a valve element of a setting valve.

[0204] To activate the rotating body **43** or the closure link **42**B, an activation element **45** configured in the manner of a handle, for example, can be provided. The activation element **45** has an activation projection **45**A, for example, which can be clamped using two fingers of an operator.

[0205] Alternatively to the activation element **45**, an activation element **46** provided for activation using a tool or aid can also be provided on the closure link **42**B. The activation element **46** has a slot **46**A that can be activated, for example, using a screwdriver, a coin or the like, so as to adjust the closure link **42**B between its closed position SP and its open position OP.

[0206] The activation elements **45** or **46** are preferably provided on an end face of the closure link **42**B through which the axis of rotation of the closure link **42**B passes.

[0207] A further alternative for activation of the closure link **42**B is represented by an actuator **47**, shown schematically, which is a motor and/or electric and/or driven electrically, for example an electric motor, an electromagnet or the like. The actuator **47** can be activated or controlled, for example, using an electric switch and/or a sensor **48**. The sensor **48** is connected, for example, to a controller **120** of the hand-held machine tool **10**, which controller generates control commands using signals of the sensor **48**, in particular for the actuator **47**.

[0208] The sensor **48** detects, for example, the presence of the dust collection device **70** on the dust removal connector **33**. If therefore, the dust collection device **70** is plugged onto the dust removal connector **33**, the sensor **48** can detect this and control the actuator **47** to adjust the closure link **42**B to its closed position SP. The sensor **48** is, for example, a pressure sensor, an electric switch, an approximation sensor or the like. Of course, an RFID sensor, a magnet, a Hall sensor, an optical sensor or the like can also be provided.

[0209] Furthermore, it is conceivable that a schematically shown activation element **49**, for example an activation projection, projects away from the closure link **42**B, which element can be activated when the dust collection device **70** is plugged onto the dust removal connector **33**, so as to activate the closure link **42**B in the direction of its closed position SP. For example, a type of entrainment fork is possible as an activation element **49**, into which fork an entrainment projection on the dust collection device **70** engages. Thereby it is also possible that the dust collection device **70** again entrains the closure mechanism **41**B or the closure link **42**B in the direction of the open position OP during removal from the dust removal connector **33**.

[0210] The closure link **42**B, in particular in its property as a valve link, can also easily be used in the embodiment according to FIG. **10**, where it is drawn schematically in the external air channel **40**A. The closure link **42**B is accommodated, for example, in a bearing holder, so as to rotate, which holder has, for example, an inflow opening in the manner of the inflow opening **40**B or is flow-connected to such an opening. Therefore the closure link **42**B could be provided and configured for this purpose, for example, of variably adjusting the external air stream within the external air channel **40**A. In addition, the external air channel **40**A, in particular the external air inlet **40**, can be closed off by means of the closure part **42**A of the dust collection device **70**, if applicable completely or essentially completely. Thus, for example in the case of operation of the hand-held machine tool **10** without the dust collection device **70**, the external air stream can be variably adjustable using the closure link **42**B, while with the dust collection device **70** it is completely or partially stopped.

[0211] At this point, it should be mentioned that a smaller closure surface, for example, of the closure part **42**A is suitable for closing off the external air inlet **40** only partially when the dust collection device **70** is arranged on the hand-held machine tool **10**. Furthermore, it is possible that the closure part **42**A is movably mounted on the dust collection device **70**, for example using a schematically

shown bearing **42**L, in particular a thrust bearing and/or rotating bearing. For example, the closure part **42**A can be adjusted into a position shown upward with broken lines, in which it closes off the external air inlet **40** only partially when the dust collection device **70** is arranged on the hand-held machine tool **10**. It is advantageous if the closure part **42**A can also be adjusted into intermediate positions between the position shown with a broken line and the position shown with solid lines and/or also into a position that releases the external air inlet **40** even further.

[0212] Setting the grinding machine **11** or hand-held machine tool **10** down onto its top side **24** can be done very easily, wherein it plays no role whether or not the dust collection device **70** is attached to the dust removal connector **33**. In both situations, the grinding machine **11** can be laid down with its top side **24**, for example onto the workpiece surface WO, and supported without then tilting toward the side, for example toward one of the longitudinal sides **21** or **22**.

[0213] For this purpose, a support contour arrangement **28** is provided. The support contour arrangement **28** comprises the handle section **17** as well as a support contour, for example a projection **29**, arranged on the free end region of the energy storage unit connector **26** or of the handle **18**. The projection **29** is provided at a transverse distance from the longitudinal center plane **23**. If, therefore, the grinding machine **11** or hand-held machine tool **10** is laid down, on its top side **24**, onto the substratum, for example the workpiece surface WO, with the dust collection device **70** when this is attached to the dust removal connector **33**, it supports itself with the handle section **17**, the support contour or the projection **29**, as well as a support contour **29**A provided on an edge between the rear wall **75**D and the side wall **75**A of the dust collection container **75**, on the substratum or the workpiece surface WO.

[0214] If, however, the dust collection device **70** is removed from the dust removal connector **33**, it is likewise possible to set the machine housing **15** down or lay it down with its top side **24**, in a tilt-proof manner, on the substratum or the workpiece surface WO. Then the hand-held machine tool **10** and/or the machine housing **15** supports itself, for example using the support contour **29**, the handle section **17**, as well as a support contour **29**B provided on the free end region of the handle **18**, on the substratum or the workpiece surface WO.

[0215] The support contour pairs **29**, **29**B or **29**, **29**A are arranged on opposite sides of the longitudinal center plane **23**, and furthermore have a longitudinal distance with reference to the handle section **17**, so that stable three-point contact of the hand-held machine tool **10** or grinding machine **11** on the substratum or workpiece surface WO is always possible, with and without the dust collection device **70** being arranged on the machine housing **15**.

[0216] To close off the motor mounting bracket **16**A or the motor mounting bracket space **16**C that makes the motor mounting bracket **16**A available, a bearing support **150** is provided. The bearing support **150** forms a lid **150**A.

[0217] The bearing support **150** is configured, for example, as a wall body **157**, or has a wall body **157**.

[0218] The bearing support **150** or wall body **157** has, for example, a wall section or a wall **151**, which closes off the motor mounting bracket **16**A or the motor mounting bracket space **16**C.

[0219] The rotor **12**B of the drive motor **12** is arranged on the motor shaft **12**C. The motor shaft **12**C is mounted on a motor bearing **12**D and a motor bearing **12**E, so as to rotate with reference to the machine housing **15**.

[0220] The motor bearing **12**D and the motor bearing **12**E are arranged on opposite sides of the rotor **12**B or of the motor shaft **12**C.

[0221] In the region of the top side **24** of the machine housing **15** and/or on a side of the machine housing **15** opposite to the tool holder **14**, a bearing holder **16**B for the motor bearing **12**D is arranged. The bearing holder **16**B is arranged, for example, on the motor mounting bracket **16**A.

[0222] The motor bearing **12**E is held on a bearing holder **155** of the bearing support **150**. The bearing support **150** and/or the wall body **157** form(s) a support structure **160** that carries the bearing holder **155**. The support structure **160** extends with a directional component parallel to the motor axis M, in the direction of the tool holder **14**.

[0223] The bearing holder **155** is arranged approximately centrally on the bearing support **150** or the wall **151**. A ring-shaped bearing holder element **156** is arranged in the bearing holder **155**, for example made of steel or the like, which element accommodates the motor bearing **12**E. It would easily be possible to support the motor bearing **12**E directly on the bearing holder **155**, i.e., that the bearing holder element **156** is not present.

[0224] Around the bearing holder **155**, the bearing support **150** has screw openings **152** through which screws **153** can be inserted, which can be screwed into the machine housing **17**. By means of these screws **153** as well as shape-fit contours on the bearing support **150**, which contours engage, with shape fit, into matching shape-fit contours of the machine housing **15**, the bearing support **150** is held fixed in place with reference to the machine housing **15**. Consequently the motor bearing **12**E is also held fixed in place with reference to the machine housing **15**.

[0225] The screw openings **152** are arranged relatively nearby with reference to the motor axis M. For example, the screw openings **152** are spaced apart from an outside circumference **161** of the bearing support **150** with an outer radial distance RA, and spaced apart from an inside circumference **162** of the bearing holder **155** with an inner radial distance RI. It can be seen that the radial distances RA and RI deviate only slightly from one another, for example by maximally 20% or 30% or at most 40%.

[0226] The bearing support **150** has a channel section **154** on a side that faces the rear side **20** of the machine housing **15**, in which section the external air channel **40**A is configured.

[0227] Furthermore the accommodation chamber **32**A for the dust/air wheel **32** is provided on a side of the bearing support **150** that faces away from the motor mounting bracket space **16**C.

[0228] The wall **151** is arched or dome-like, for example, so that it forms a bearing support accommodation space **158** that forms the accommodation chamber **32**A and/or is suitable for accommodating the dust/air wheel **32**.

[0229] The bearing support accommodation space **158** or the accommodation chamber **32**A for the dust/air wheel **32** is flow-connected to the dust removal connector **33**. For example, the accommodation chamber **32**A is flow-connected to the removal connection tube **34**.

[0230] The bearing support **150** is made, for example, of metal or some other solid or rigid material. Therefore the

bearing support **150** can have holders **159** for carrying a protective body **38**, for example. The holders **159** are arranged, for example, on the outside circumference of the wall **151**.

[0231] Engagement projections **38**A of the protective body **38** can engage, for example, into the holders **159**. For example, the holders **159** comprise engagement holders **159**A for the engagement projections **38**A and/or, in particular, grooves **159**B running in ring shape around the motor axis M, into which ring-shaped holding projections or holding contours **38**B of the protective body **38** can engage and do engage in the state of the protective body **38** when it is mounted on the bearing support **150**.

[0232] The protective body **38** indicated schematically in FIG. **4** and shown in FIG. **7** in a slightly smaller size serves for protecting a radial outside circumference of the disk tool **90**, for example a cushion of the disk tool **90**. The protective body **38** protects the disk tool **90**, in particular when working in inside corner regions, when narrow sides or circumference sides of the disk tool **9** would bump up against an obstacle. Then the protective body **38** makes contact with this obstacle, so that the disk tool **90** arranged behind the protective body **38** with reference to the obstacle is not damaged. The protective body **38** is configured, for example, in the manner of a ring-shaped or partially ring-shaped circumferential wall, an apron or the like.

[0233] The motor bearings **12**D and **12**E are preferably rolling bearings, in particular roller bearings or ball bearings.

[0234] Close to the motor bearing **12**E, the motor shaft **12**C has a holder element **12**F that is connected to the motor shaft **12**C in a torque-proof manner or can be in one piece with the motor shaft **12**C. The motor bearing **12**E is configured, for example, in such a manner that it supports the motor shaft **12**C and/or the holder element **12**F and/or carries it/them so as to rotate with reference to the motor axis M.

[0235] The holder element **12**F has a holder **12**G in which the gear mechanism **13**, for example in the form of the eccentric bearing **13**A, is accommodated. The eccentric bearing **13**A or gear mechanism **13** is held using a holding body **12**H, which is screwed onto the holder element **12**F, for example using screws **12**I.

[0236] The eccentric bearing **13**C is a rolling bearing, for example, in particular a ball bearing or roller bearing. The eccentric bearing **13**C is eccentric with reference to the motor axis M, wherein the tool axis W has an eccentric distance e relative to the motor axis M.

[0237] The tool holder **14**, for example a bolt section **14**C of the tool holder **14**, is accommodated, for example, on a holder **13**B of the eccentric bearing **13**A or gear mechanism **13**, in particular in a press fit and/or using a glued connection and/or the like.

[0238] The tool holder **14** is configured for rotational entrainment of the disk tool **90** with reference to the tool axis W. The tool holder **14** comprises, for example, a rotational entrainment section **14**A, on the outside circumference of which a rotational entrainment contour **14**B is arranged. The rotational entrainment contour **14**B fits, with shape fit, into a rotational entrainment contour **96** on the drive holder **91** of the disk tool **90**, so that the rotational entrainment contours **14**B and **96** in total can connect the disk tool **90** to the holding body **12**H, in a torque-proof manner, with reference to the tool axis W.

[0239] Furthermore the tool holder **14** has a screw holder **14**D, into which a fastening screw **98**, which can be inserted through a passage opening **99** of the disk tool **90**, can be screwed, so that the disk tool **90** can be connected or is connected to the tool holder **14**, in a tension-proof manner, with reference to the tool axis W.

[0240] A cooling air wheel **60** is arranged between the dust/air wheel **32** and the drive motor **12**.

[0241] The cooling air wheel **60** is arranged between the drive motor **12** and the bearing support **150**.

[0242] The bearing support **150** separates the dust removal space **31** from the motor mounting bracket space **16**C. The bearing support **150** can also be referred to as a bulkhead wall or have a bulkhead wall that separates the dust removal space **31** from the motor mounting bracket space **16**C or separates the dust removal space **31** from the further interior of the machine housing **15**.

[0243] The cooling air wheel **60** is connected to the motor shaft **12**C in a torque-proof manner. The cooling air wheel **60** serves to produce a cooling air stream K, which flows into the machine housing **15** by way of inflow openings **15**A, flows through the motor mounting bracket space **16**C, flows around and/or through the drive motor **12**, and subsequently flows out of the machine housing **15** by way of outflow openings **15**B.

[0244] It is advantageous if the inflow openings **15**A are arranged away from and at a distance from the tool holder **14** and thereby from the disk tool **90**, for example in the longitudinal end region of the handle **18**.

[0245] It is advantageous if the outflow openings **15**B are arranged on the front side **19** of the machine housing **15**, above the dust removal space **31** and/or in an outflow direction approximately corresponding to the main working direction HA, so that dust that lies on the workpiece surface WO can be blown away in the main working direction HA by means of the cooling air stream K.

[0246] It is advantageous if outflow openings **15**B are also provided transverse to the main working direction HA. This measure advantageously reduces the flow resistance for the cooling air stream K and/or allows better purging of the work environment around the hand-held machine tool **10**.

[0247] The cooling air wheel **60** has a fan section **61**. The fan section **61** comprises a support wall **62** from which fan blades **63** project and/or on which fan blades **63** are arranged.

[0248] The fan blades **63** can also be held, for example, on ring-shaped carriers **262**, preferably ones having different diameters, which are spaced apart from one another with reference to the motor axis M, which carriers can be provided in place of the support wall **62** or supplemental to the support wall **62**. The carriers **262** are shown schematically.

[0249] The support wall **62** projects away from a holding section **64** of the cooling air wheel **60** or is arranged on the holding section **64**.

[0250] The holding section **64** has a shaft holder **65** configured as a passage opening, for example, to hold the motor shaft **12**C. The holding section **64** is configured, for example, as a cylindrical section or a holding cylinder.

[0251] It is advantageous if ribs **66** project away from the holding section **64**, which ribs serve, for example, as support ribs and/or contribute to producing or directing the cooling air stream K. It is advantageous if the ribs **66** are oriented

parallel to the motor axis M. It is advantageous if flat sides of the ribs **66** extend parallel to the motor axis M.

[0252] The cooling air wheel **60** forms an axial/radial fan or diagonal fan. The fan blades **63** are inclined at a slant with regard to the motor axis M.

[0253] The fan blades **63** have axial sections **63**A and radial sections **63**B.

[0254] The axial sections **63**A can serve to cause the cooling air stream K to flow through and around the drive motor **12**. The axial sections **63**A ensure an axial flow direction of the cooling air stream K, approximately parallel to the motor axis M or along the motor axis M, onto an intake side of the cooling air wheel **60**. The cooling air stream K is drawn in, so to speak, by means of the axial sections **63**A.

[0255] The axial sections **63**A of the fan blades **63** make a transition, in the manner of an interlacing, into the radial sections **63**B.

[0256] The radial sections **63**B advantageously ensure that the cooling air stream K is blown out radially or conveyed away with reference to the motor axis M, so that the cooling air stream K flows out of the motor mounting bracket space **16**C by way of the outflow openings **15**B.

[0257] The axial sections **63**A entrain a volume of the cooling air stream K in the direction of the radial sections **63**B.

[0258] With reference to the direction of rotation DR, the axial sections **63**A are inclined relatively flatly. With reference to the direction of rotation DR, the axial sections **63**A preferably have an inclination of 30° to 50°, for example, in particular an inclination of about 45°. The axial sections **63**A preferably have this inclination also with reference to the motor axis M, which is simultaneously the axis of rotation of the cooling air wheel **60**.

[0259] With reference to the direction of rotation DR, the axial sections **63**A are inclined slightly flatter than the radial sections **63**B.

[0260] The fan blades **63** have front blade edges or blade front edges **63**C or entry edges in the direction of rotation DR, and rear blade edges or blade rear edges **63**D or exit edges in the direction of rotation DR.

[0261] It is advantageous if the blade front edge **63**C is arranged in front of the blade rear edge **63**D in the direction of rotation DR.

[0262] The entry edge **63**C runs, for example, essentially radially relative to the motor axis M. The exit edge **63**D, in contrast, runs essentially parallel to the motor axis M.

[0263] The fan blades **63**, in particular the radial sections **63**B, can also, however, be provided for acceleration of the cooling air stream K, in particular in such a manner that, for example, a high differential pressure can be produced, in particular in a diffuser of the hand-held machine tool **10**, which follows the radial sections and surrounds the cooling air wheel **60**. For example, it is provided that an entry flow cross-section **63**E, which extends between fan blades **63** that are arranged one behind the other and/or adjacent, in the direction of rotation DR, between their entry edges **63**C, is greater than an exit flow cross-section **63**F, which is delimited, among other things, by the exit edges **63**D of these fan blades **63**.

[0264] From the following description, measures will become evident, on the basis of which the grinding machine **11** is particularly compact with reference to its expanse parallel to the tool axis W or motor axis M, although it has a dust/air wheel **32** in its drive train **13**B.

[0265] Furthermore, the cooling air wheel **60** and the bearing support **150** are preferably configured in such a manner that they can engage all the way into a tapered section **16**D of the machine housing **15**. The drive motor **12** is accommodated in the tapered section **16**D, for example. The tapered section **16**D extends between the handle section **17** and the cover **30** and can be fully grasped by an operator, for example. In particular, fingers of an operator can engage into the tapered section **16**D when the operator's hand lies on the handle section **17**. Furthermore, the reach-through opening **18**A is arranged next to the tapered section **16**D. Consequently the tapering of the section **16**D advantageously contributes to an increase in size of the reach-through opening **18**A.

[0266] The dome-like or approximately truncated-cone-shaped wall **151**, against the top side of which the cooling air wheel **60** clings, so to speak, contributes to a particularly compact construction and/or a low design with reference to the motor axis M or tool axis W.

[0267] It is advantageous if it is provided that the sides of cooling air wheel **60** and wall **151** that face one another are configured to match one another and/or have geometric progressions and/or contours that match one another.

[0268] The dust/air wheel **32**, which also has a dome-like or approximately truncated-cone-shaped contour on its top side, which faces the wall **151**, at least in a section that lies opposite the wall **151**, is likewise adapted to the wall **151**, namely to its underside.

[0269] The cooling air wheel **60**, in particular the support wall **62**, has an approximately bell-shaped and/or dome-like and/or approximately truncated-cone-shaped form, in total. On a side of the support wall **62** that faces away from the fan blades **63**, the support wall **62** delimits a cooling air wheel accommodation space **67**.

[0270] The cooling air wheel accommodation space **67** makes it possible to provide multiple components.

[0271] For example, the bearing support **150** is arranged, at least in part, in the cooling air wheel accommodation space **67**. In particular, the wall section or the wall **151** extends into the cooling air wheel accommodation space **67**. Consequently, a bulkhead wall that separates the dust removal space **31** from the motor mounting bracket space **16**C, in the form of the bearing support **150**, is arranged in the cooling air wheel accommodation space **67** or an interior of the cooling air wheel **60**.

[0272] The wall section or the wall **151** has an approximately bell-shaped form, at least in the region of the cooling air wheel accommodation space **67**, corresponding to the shape of the support wall **62** in the region of the wall **151**. For example, flat sides of the wall section or of the wall **151** and of the support wall **62** lie opposite one another in a planar manner.

[0273] Furthermore the motor bearing **12**E is arranged in the cooling air wheel accommodation space **67**. The motor bearing **12**E is accommodated completely in the cooling air wheel accommodation space **67**. The motor bearing **12**E is held on a section of the bearing support **150** arranged in the cooling air wheel accommodation space **67**, namely on the bearing holder **155**.

[0274] Furthermore the gear mechanism **13** and/or the eccentric bearing **13**A is/are accommodated, at least in part, in the cooling air wheel accommodation space **67**.

[0275] The holding body **12**H, which holds the gear mechanism **13** or eccentric bearing **13**A, is also accommodated, at least in part, in the cooling air wheel accommodation space **67**.

[0276] The holding body **12**H and/or the gear mechanism **13** and/or the eccentric bearing **13**A project at least partially beyond the cooling air wheel accommodation space **67** on a side that faces away from the drive motor **12**. Nevertheless, a large part, for example approximately half, of the holding body **12**H and/or of the gear mechanisms **13** and/or of the eccentric bearing **13**A extends into the cooling air wheel accommodation space **67**, parallel to the motor axis M.

[0277] Finally, a part of the dust/air wheel **32** is also arranged in the cooling air wheel accommodation space **67**. For example, a holding section **32**B of the dust/air wheel **32** extends into the cooling air wheel accommodation space **67**. A fan section **32**C, on which fan blades **32**D are arranged and which borders on the holding section **32**B, projects beyond the cooling air wheel accommodation space **67**. The fan blades **32**D serve to produce an air stream with reference to the motor axis M or the tool axis W, which stream forms a component of the dust/air stream S.

[0278] The dust/air wheel **32** is held on the holder element **12**F in a torque-proof manner with reference to the motor axis M.

[0279] The dust/air wheel **32** has a holder **32**E for the holder element **12**F of the motor shaft **12**C. The holder element **12**F passes through the holder **32**E or is held in the holder **32**E, in particular held in a torque-proof manner.

[0280] The holder **32**E forms a dust/air wheel accommodation space **32**G, for example to accommodate the gear mechanism **13**.

[0281] The dust/air wheel **32** has a balance part **32**F that serves, for example, for compensation of imbalances brought about by means of the eccentric mounting of the tool holder **14**.

[0282] The dust/air wheel **32** furthermore engages into an interior or a passage opening of an air guide body **37**. The air guide body **37** is configured, for example, as a disk or as a disk-shaped body.

[0283] The air guide body **37** is held in a sandwich-like manner between the seal **31**A and the bearing support **150**. The seal **31**A therefore serves to hold the air guide body **37** on the bearing support **150**.

[0284] The seal **31**A is held on the bearing support **150** with screws **32**L, for example.

[0285] On a side facing away from the dust removal space **31**, a cover body **39** is arranged on the bearing support **150**. The cover body **39** has a ring-shaped plate section **39**A, which surrounds a passage opening **39**C, into which the wall section or the wall **151** engages.

[0286] A wall section **39**B, which covers and closes off the channel section **154**, projects away from the plate section **39**A.

[0287] Furthermore, the cooling air wheel **60** is also arranged in the passage opening **39**C or engages into the passage opening **39**C. The cover body **39**, in particular the plate section **39**A, also serves to steer the cooling air stream K. For example, the cooling air stream K can flow along a side of the plate section **39**A that faces away from the dust/air wheel **60**, and is steered by this side, radially outward with reference to the motor axis M, in the direction of the outflow openings **15**B.

[0288] Holders **39**D are arranged on the plate section **39**A, for example on the side along which the cooling air stream K flows. Support ribs or support sections **15**C of the machine housing **15** can engage into the holder **39**D with shape fit, so that the cover body **39** is held on the machine housing **15** with shape fit, for example in the sense of an anti-rotation unit with reference to the motor axis M and/or as a reinforcement of the machine housing **15**.

[0289] It is advantageous if the hand-held machine tool **10** has an illumination mechanism **100**. The illumination mechanism **100** comprises, for example, a ring-shaped carrier **101**, on which lighting elements, in particular LEDs, not shown in the drawing, are arranged.

[0290] The installation of the illumination mechanism **100** is simple, in that the illumination mechanism **100** is clamped between the cover body **39** and the air guide body **37**. The cover body **39** and/or the air guide body **37** is/are preferably resiliently flexible, so that vibrations that proceed from the drive train **13**B, for example, have a lesser or no effect on the illumination mechanism **100**.

[0291] The illumination mechanism **100** is radially fixed in place with reference to the motor axis M, using the components that hold it, for example the cover body **39** and/or the air guide body **37** and/or the bearing support **150**.

[0292] It is advantageous if the illumination mechanism **100** is accommodated in a groove that is made available by the components that hold it, for example the cover body **39** and/or the air guide body **37** and/or the bearing support **150**.

[0293] Furthermore, installation is also very simple because the bearing support **150**, when it is fastened to the machine housing **15** with the screws **153**, fixes the components arranged between the bearing support **150** and the machine housing **15**, among others the cover body **39** and the air guide body **37**, as well as the illumination mechanism **100** clamped between these two aforementioned bodies **39** and **37**, if applicable, in place with reference to the machine housing **15**.

[0294] Using a connection cable **102**, the illumination mechanism **100** can be connected to a controller **120** of the hand-held machine tool **10** shown schematically in the drawing. A switch **103** serves to turn the illumination mechanism **100** on and off. The switch **103** can be connected directly to the connection cable **102** or connected to the controller **120**.

[0295] It is advantageous if the controller **120** is arranged in the handle **18**. It is practical if the controller **120** is arranged between the inflow openings **15**A and the drive motor **12**, so that the cooling air stream K that flows in by way of the inflow openings **15**A can cool the controller **120**.

[0296] A further switch **121** serves to turn the drive motor **12** on and off. It is advantageous if the switch **121** is arranged on the front side **19** of the machine housing **15**, in particular directly below or next to the handle section **12**, so that an operator can easily grasp and activate the switch **121**.

1. A grinding machine (**11**) having a machine housing (**15**) and a drive motor (**12**) arranged in the machine housing (**15**), in particular an electric motor, for rotating and/or oscillating drive of a tool holder (**14**) to which a disk tool (**90**) can be releasably attached, wherein the grinding machine (**11**) has a cover (**30**) for the disk tool (**90**), which cover delimits a dust removal space (**31**) in which the tool holder (**14**) is arranged and which is provided and configured for holding the disk tool (**90**) when the disk tool (**90**) is arranged on the tool holder (**14**), wherein a dust removal connector (**33**)

through which a dust/air stream can flow is arranged on the dust removal space (**31**), to which connector a dust removal device (**50**), in particular one forming a component of the grinding machine (**11**) or of a system comprising the grinding machine (**11**), in particular a suction hose (**70**A) for connecting the grinding machine (**11**) to a vacuum cleaner (STA) or a dust collection device (**70**) can be connected, wherein the dust/air stream is provided for conveying away dust that occurs during operation of the grinding machine (**11**), out of the dust removal space (**31**), wherein away from and separately from the dust removal connector (**33**), at least one external air inlet (**40**) for letting in external air (F) is arranged on the dust removal space (**31**), and the grinding machine (**11**) has a closure mechanism (**41**A, **41**B) that is arranged on the dust removal device (**50**) or can be activated by the dust removal device (**50**), with which mechanism the external air inlet (**40**) can be closed off, completely or at least in part.

2. The grinding machine (**11**) according to claim **1**, further comprising a dust/air wheel (**32**) for producing a dust/air stream, wherein the dust/air wheel (**32**) draws in external air (F) that flows through the external air inlet (**40**), to produce the dust/air stream, or is provided and configured for drawing in the external air through the external air inlet (**40**), to produce the dust/air stream.

3. (canceled)

4. The grinding machine (**11**) according to claim **1**, wherein the external air inlet (**40**) is arranged directly next to the dust removal connector (**33**) and/or to the side next to the dust removal connector (**33**) and/or not on the dust removal connector (**33**).

5. The grinding machine according to claim **1**, wherein the dust removal connector (**33**) projects relative to the external air inlet (**40**) or beyond the external air inlet (**40**), so that a closure part (**42**A) or activation part of the dust removal device (**50**), in particular of the dust collection device (**70**), can get in front of the external air inlet (**40**) when the dust removal device (**50**) is connected to the dust removal connector (**33**).

6. The grinding machine according to claim **1**, wherein the dust removal device (**50**), in particular the dust collection device (**70**), has a closure part (**42**A) for closing off the external air inlet (**40**).

7. The grinding machine according to claim **1**, wherein the dust removal device (**50**) has a plug-in guide and/or a plug-in guide contour and/or an anti-rotation unit contour that leads to guiding the dust removal device (**50**) with reference to a plug-in axis, along which the dust removal device can be plugged onto the dust removal connector, configured in such a manner that a closure part (**42**A), in the state of the dust removal device (**50**) when the dust removal device (**50**) is plugged onto the dust removal connector (**33**), lies opposite the external air inlet (**40**) and/or closes off the external air inlet (**40**), completely or at least essentially.

8. The grinding machine according to claim **1**, wherein the dust removal device (**50**) has a connection body (**51**A, **51**B), in particular a tubular one, for a flow-tight connection to the dust removal connector (**33**), and the closure part (**42**A) is arranged separately from the connection body (**51**A, **51**B) and/or next to the connection body (**51**A, **51**B).

9. The grinding machine according to claim **1**, wherein the external air inlet (**40**) is arranged next to the dust removal connector (**33**), in such a manner that the external air inlet (**40**) has a greater flow cross-section for external air (F) to flow through when a connection body (**51**A, **51**B) of the suction hose (**70**A) is connected to the dust removal connector (**33**) than when a connection body (**51**A, **51**B) of the dust collection device (**70**) is connected to the dust removal connector (**33**).

10. The grinding machine according to claim **1**, wherein the dust collection device (**70**) is provided and configured for completely closing off the external air inlet (**40**), and/or the external air inlet (**40**) remains free when the suction hose (**70**A) is connected, completely or essentially completely, for external air (F) to flow through.

11. The grinding machine according to claim **1**, wherein the closure mechanism (**41**A, **41**B) has a closure link that is mounted on the grinding machine (**11**) or the dust collection device (**70**) so as to be adjustable, using a bearing mechanism, between an open position that releases the external air inlet (**40**) and a closed position that closes off the external air inlet (**40**), at least in part, wherein the bearing mechanism carries the closure link displaceably and/or so as to pivot, and wherein the closure link has a drive contour or is movement-coupled with a drive contour, which can be activated by the dust removal device (**50**) during connection to the dust removal connector (**33**) and/or during removal from the dust removal connector (**33**), so as to adjust the closure link between the open position and the closed position.

12-13. (canceled)

14. The grinding machine (**11**) according to claim **1**, wherein the machine housing (**15**) has a handle (**18**), which projects to the rear, counter to a main working direction (HA) provided for regular machining of a workpiece using the grinding machine (**11**), wherein the dust removal connector (**33**) projects in the direction of the handle (**18**), beyond the machine housing (**15**), and/or wherein the external air inlet (**40**) is arranged on a rear side (**20**) of the machine housing (**15**), opposite to the main working direction (HA), and/or in the region of the handle (**18**).

15. The grinding machine (**11**) according to claim **1**, wherein the grinding machine (**11**) forms a component of a system that has the dust removal device, wherein the dust removal device comprises the or at least one closure mechanism (**41**A, **41**B).

16. The grinding machine (**11**) according to claim **1**, wherein the machine housing (**15**), on a top side that faces away from the tool holder (**14**) or is opposite to the tool holder (**14**), has a support contour arrangement (**28**) having at least one support contour for setting the grinding machine (**11**) down, in a tilt-proof manner, with its top side, on a substratum.

17. The grinding machine (**11**) according to claim **16**, wherein the machine housing (**15**) has a longitudinal center plane (**23**) and the support contour arrangement (**28**) is configured and provided for tilt-proof support of the machine housing (**15**) with reference to the longitudinal center plane (**23**), and/or wherein the support contour arrangement (**28**) is configured and provided for tilt-free support of the machine housing (**15**) with reference to a longitudinal axis of the machine housing (**15**), wherein the longitudinal axis extends along the longest longitudinal expanse of the machine housing (**15**).

18. The grinding machine (**11**) according to claim **17**, wherein the support contour arrangement (**28**) comprises at least one support rib that extends transverse to a longitudinal center plane (**23**) of the machine housing (**15**) and/or a

support projection that is transversely at a distance from the longitudinal center plane (**23**), in particular arranged on a handle (**18**) that projects away from a drive section of the machine housing (**15**), in the direction of the longitudinal center plane (**23**).

19. The grinding machine (**11**) according to claim **16**, wherein the support contour arrangement (**28**) comprises a handle section on the top side of the machine housing (**15**), which section is provided and configured for supporting the palm of an operator on the machine housing (**15**).

20. The grinding machine (**11**) according to claim **16**, wherein the support contour arrangement (**28**) comprises a support contour on a dust collection device (**70**) or the dust collection device (**70**) that is connected to the dust removal connector (**33**).

21. The grinding machine (**11**) according to claim **16**, wherein the support contour arrangement (**28**) has a support contour is arranged on an energy storage unit part of the machine housing (**15**) that comprises an energy storage unit connector (**26**) of the grinding machine (**11**), wherein at least one of the support contour and the energy storage unit part has a transverse distance from a longitudinal center plane (**23**) of the machine housing (**15**).

22. The grinding machine (**11**) according to claim **1**, further comprising a suction hose (**70**A) that can be connected or is connected to the dust removal connector (**33**), wherein the external air inlet (**40**) is free when the suction hose (**70**A) is connected to the dust removal connector (**33**), for external air (F) to flow through, or has a greater flow cross-section for external air (F) to flow through than when a connection body (**51**A, **51**B) of the dust collection device (**70**) is connected to the dust removal connector (**33**).

23. A dust removal device (**50**), in particular dust collection device (**70**), for use with the grinding machine (**11**) according to claim **1**, wherein the dust removal device (**50**) has a closure mechanism (**41**A, **41**B), in particular a closure part (**42**A), for closing off the external air inlet (**40**) of the grinding machine (**11**).

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