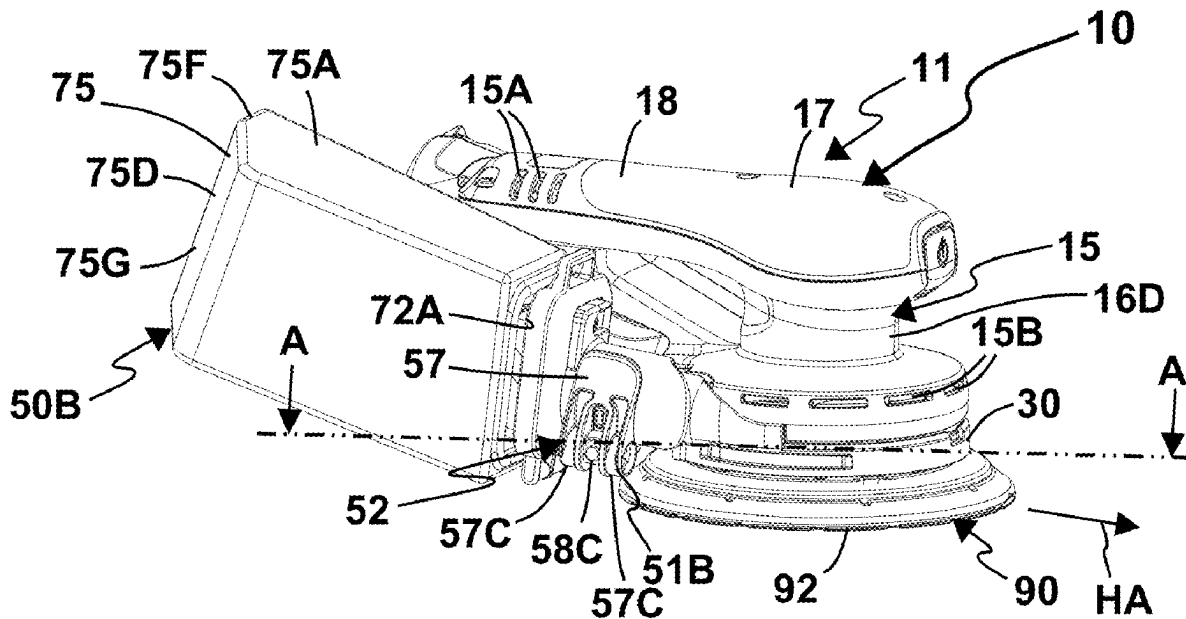


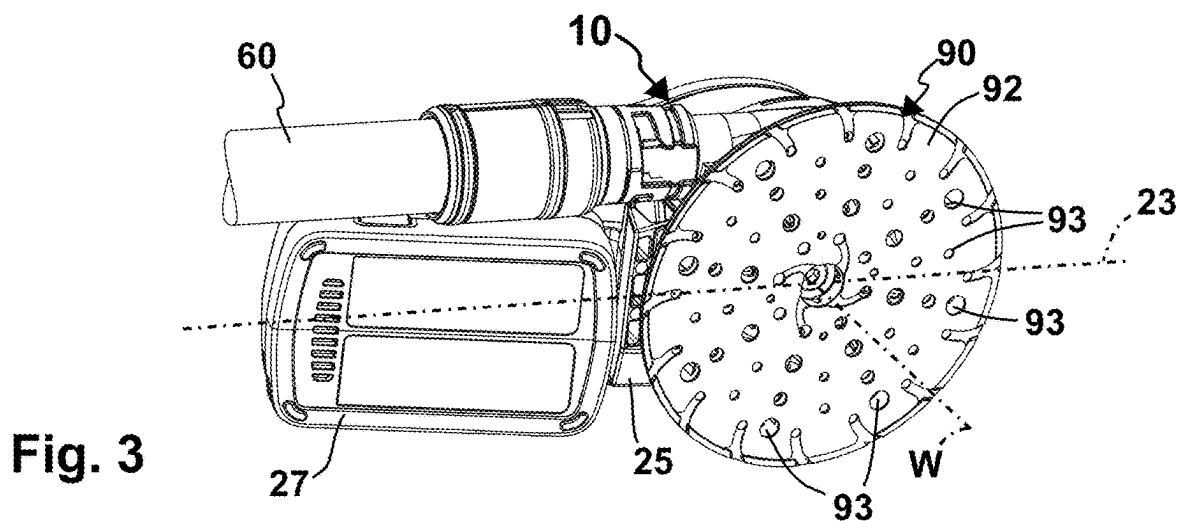
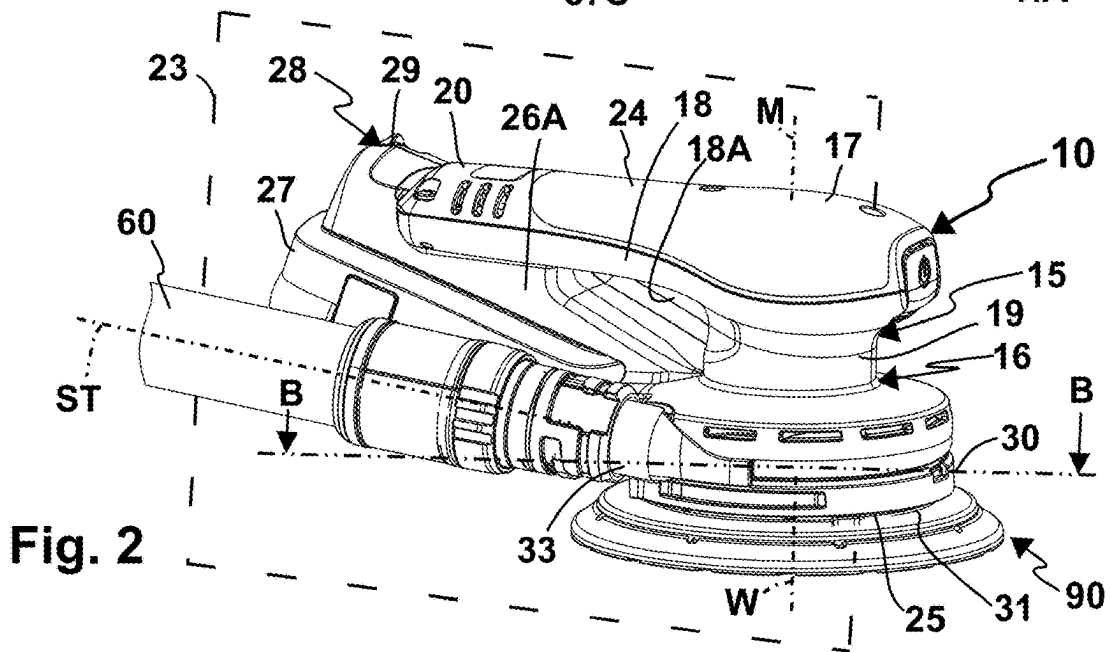
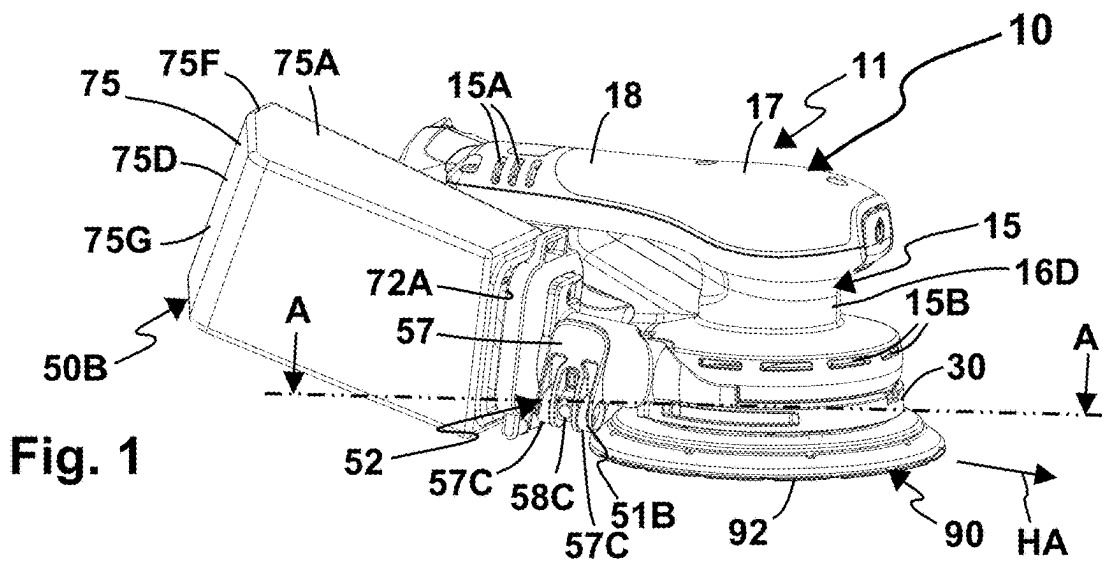


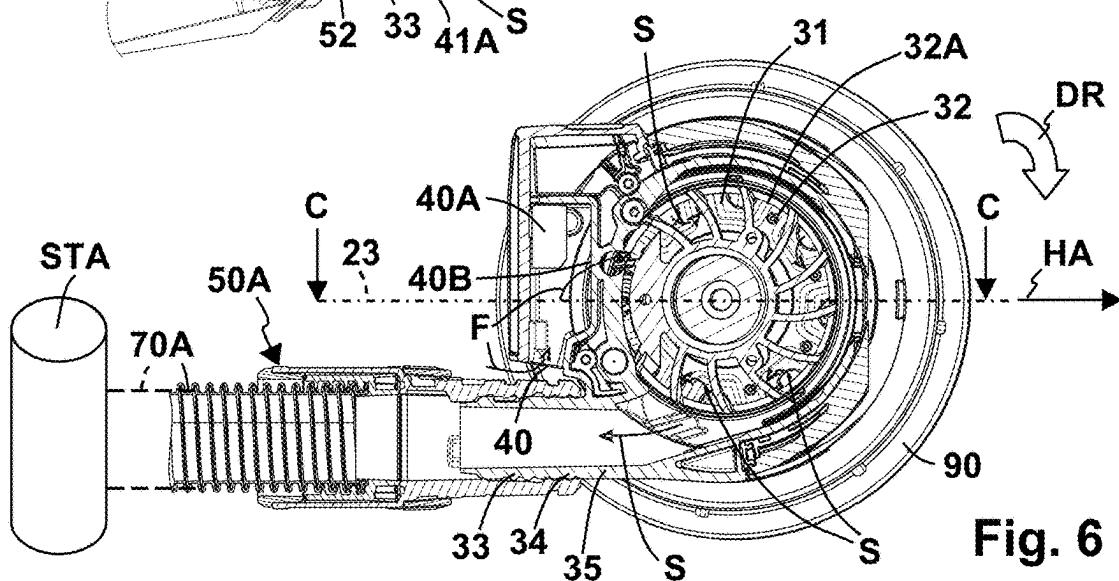
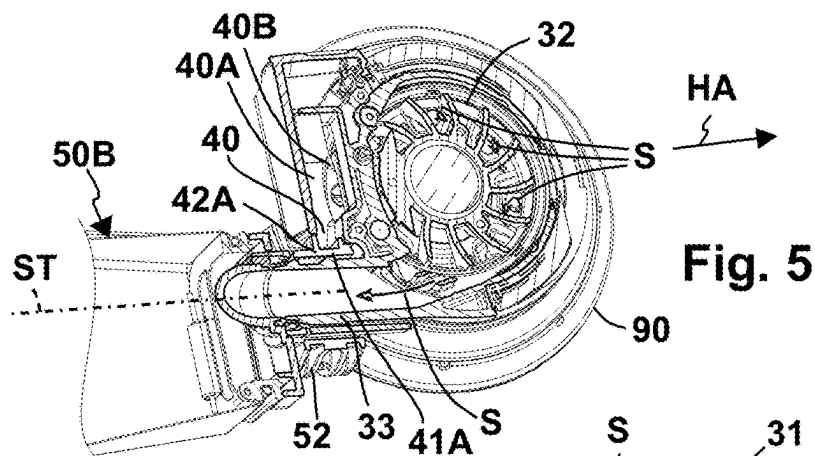
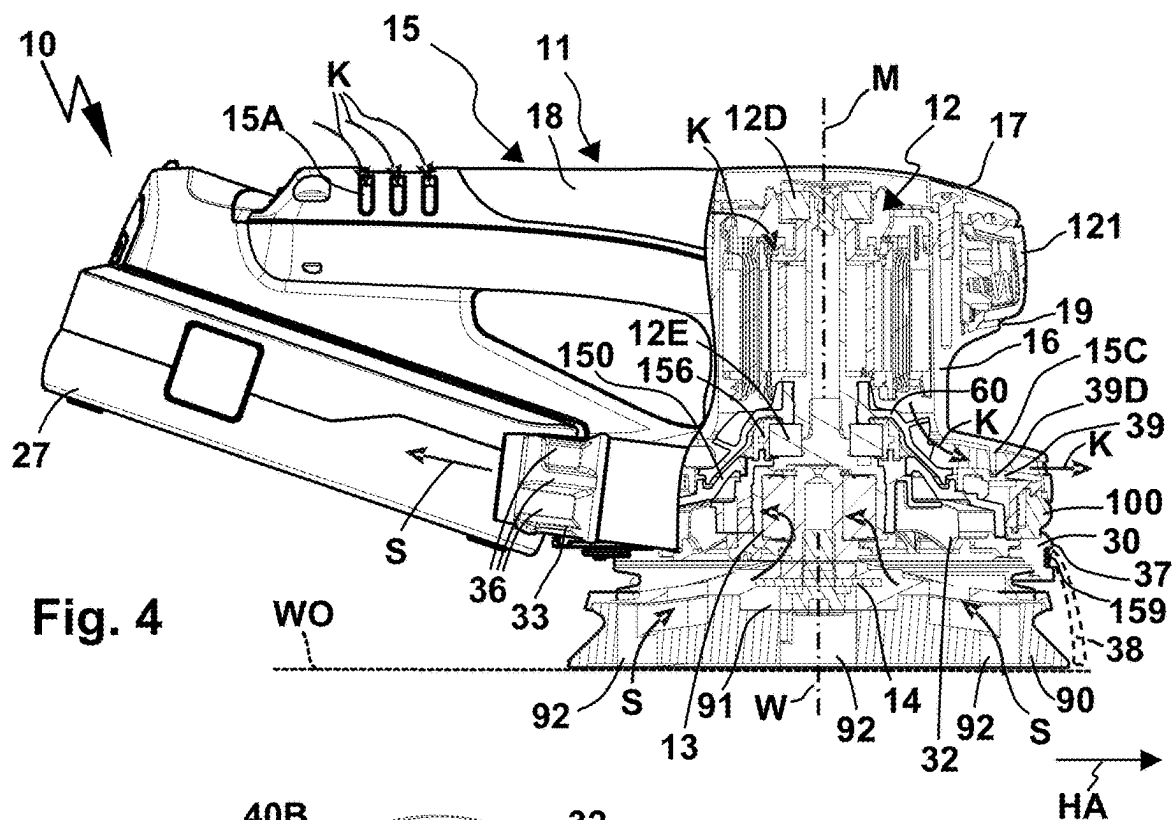
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**SCHUESSLER et al.**(10) **Pub. No.: US 2025/0256375 A1**(43) **Pub. Date: Aug. 14, 2025**(54) **GRINDING MACHINE WITH AN EXTERNAL  
AIR INLET****Publication Classification**(51) **Int. Cl.**  
**B24B 55/10** (2006.01)  
(52) **U.S. Cl.**  
CPC ..... **B24B 55/102** (2013.01)(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.

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May 21, 2024 (DE) ..... 10 2024 114 135.2





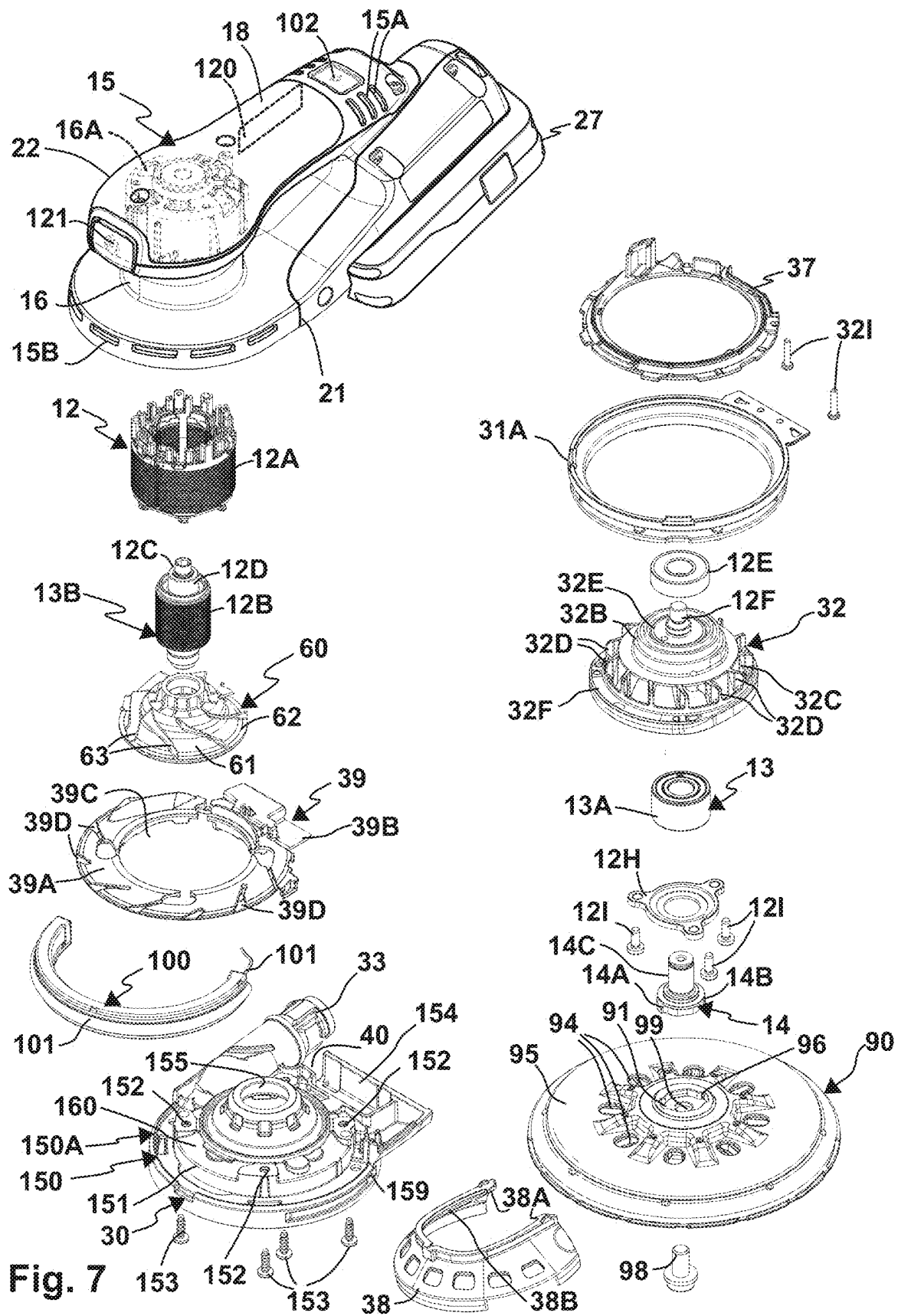


Fig. 7

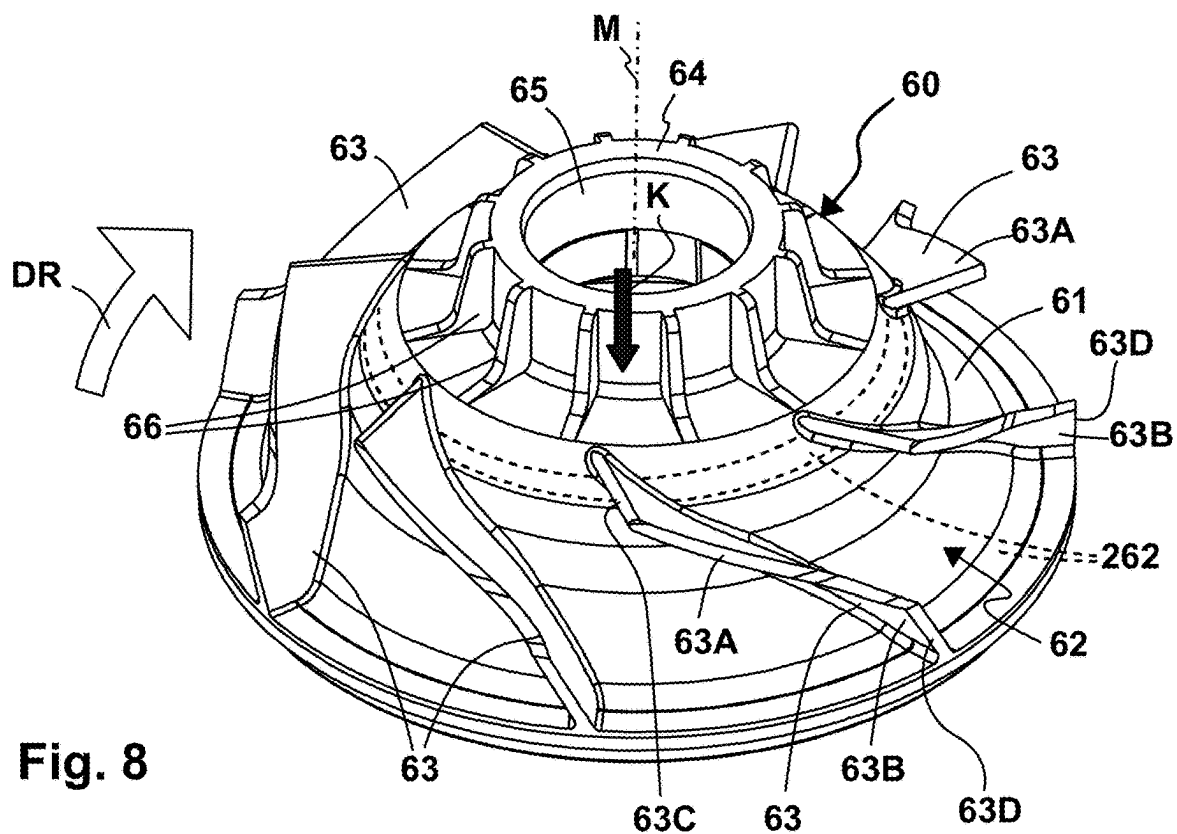


Fig. 8

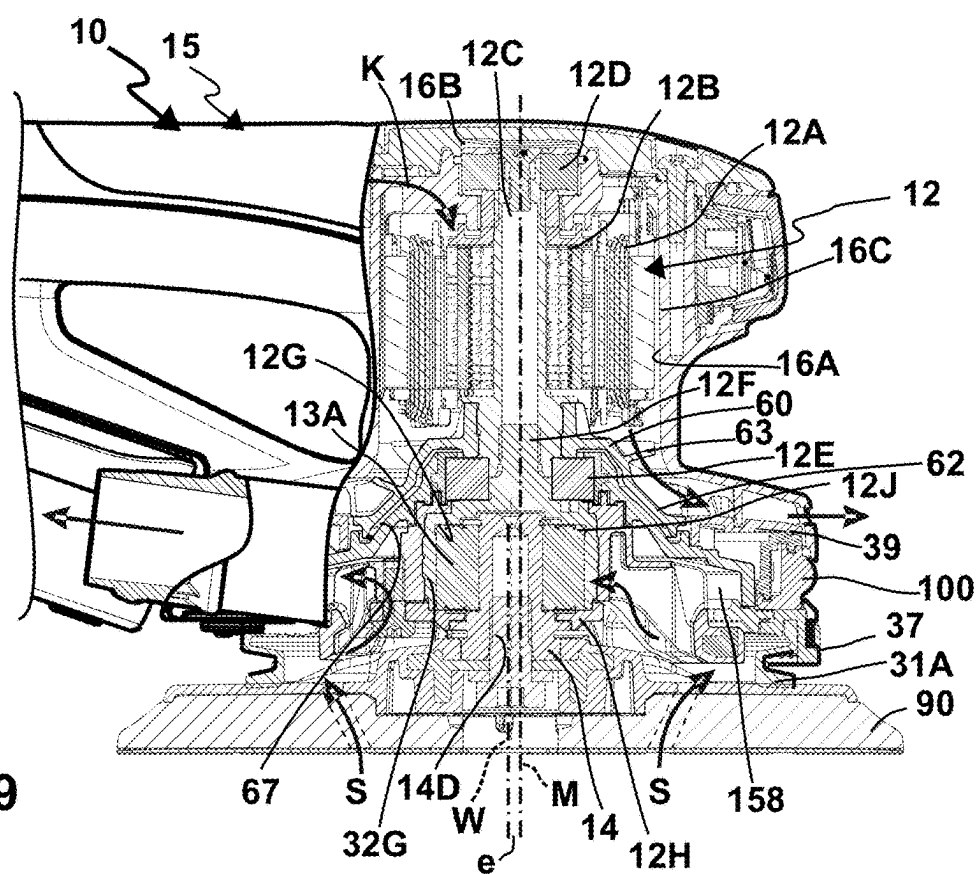


Fig. 9

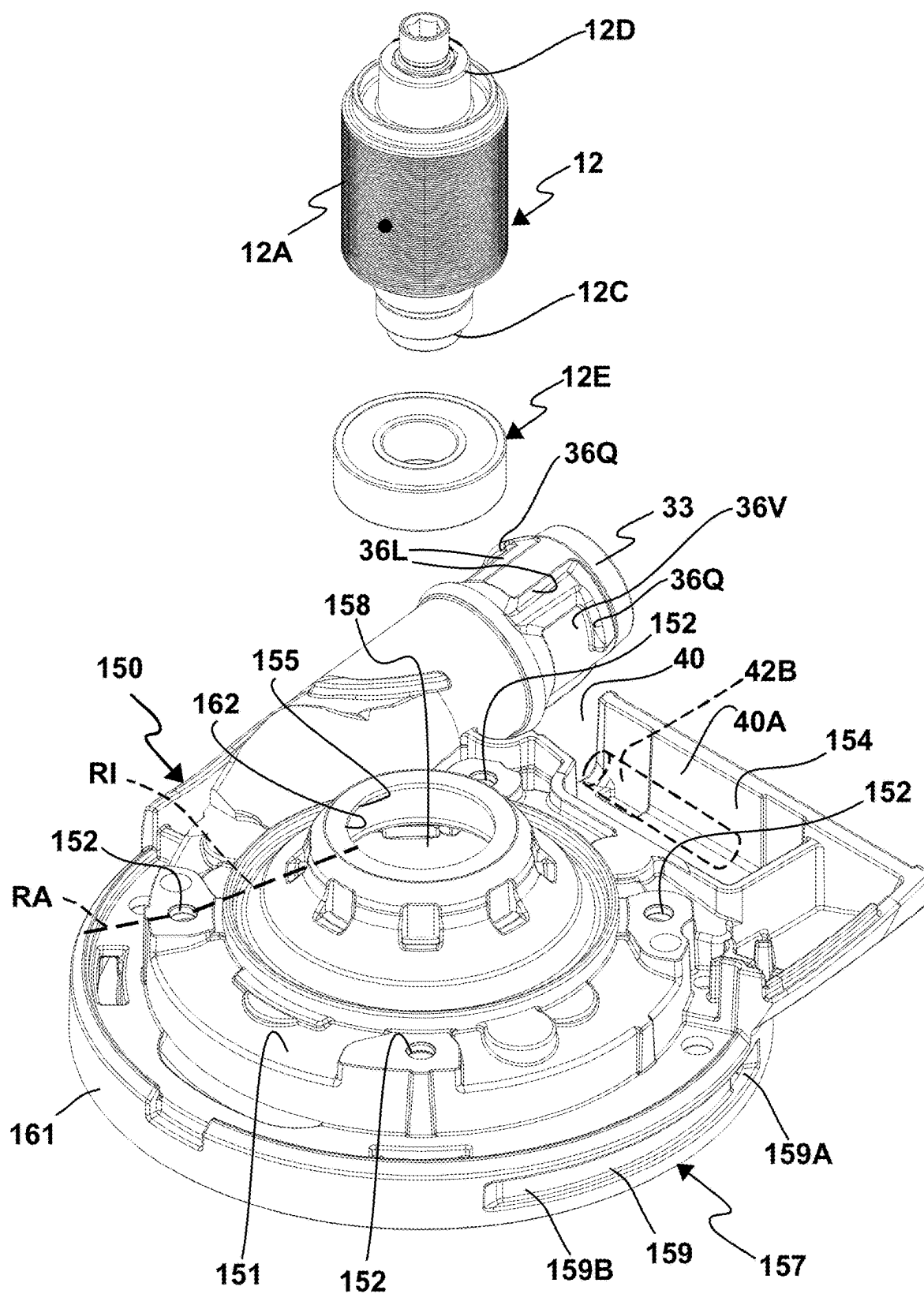


Fig. 10

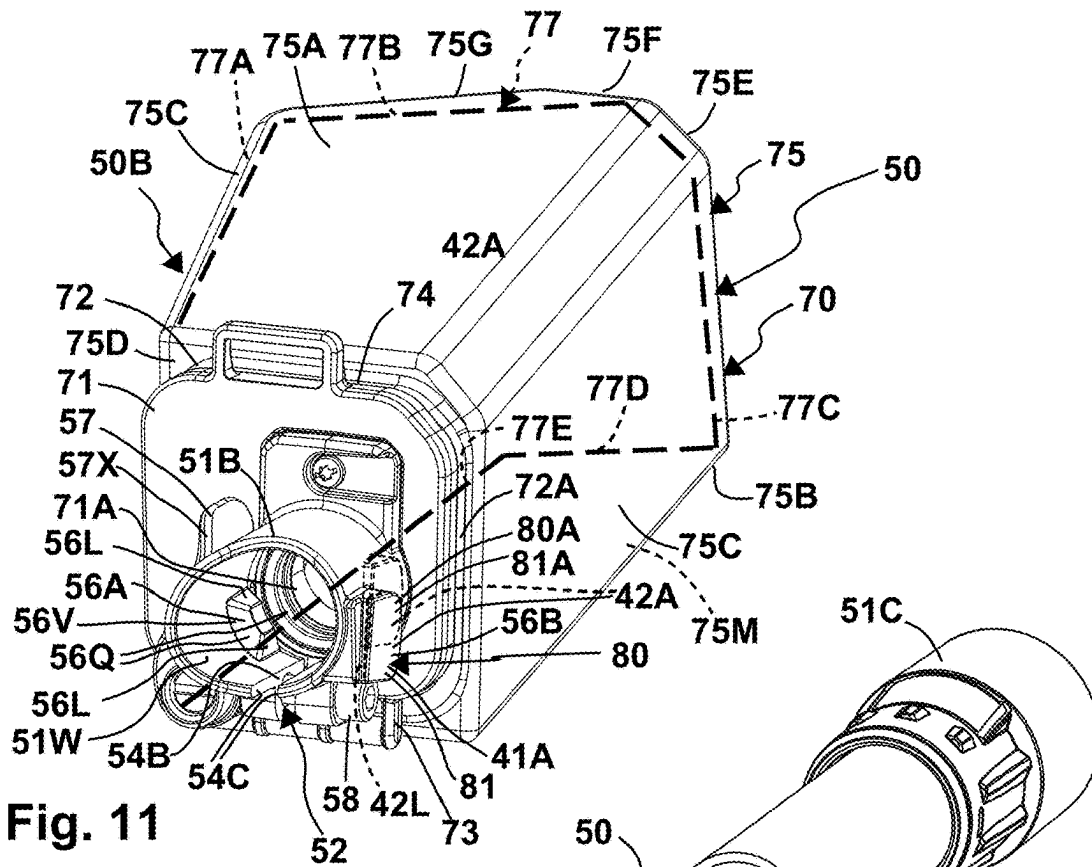


Fig. 11

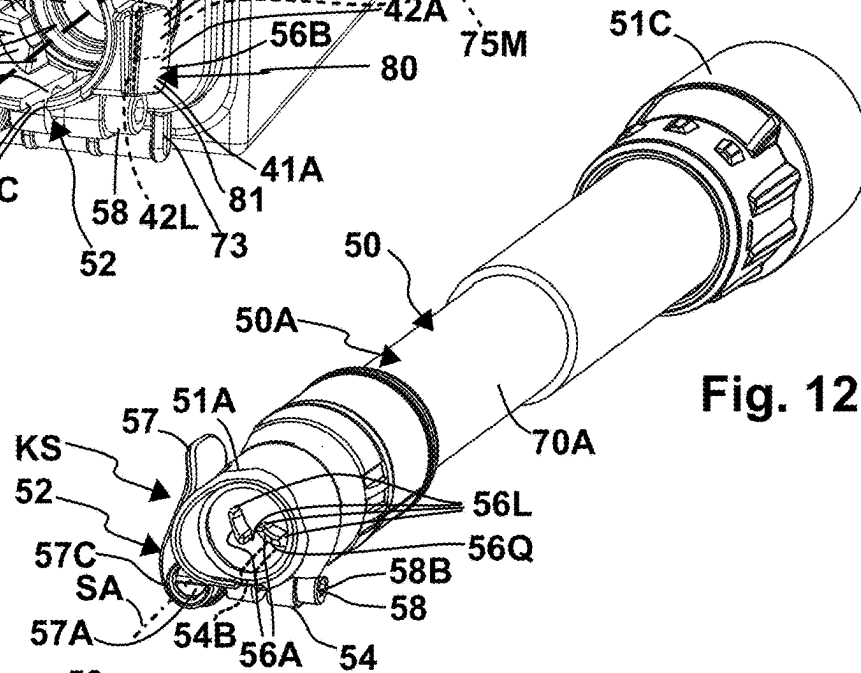


Fig. 12

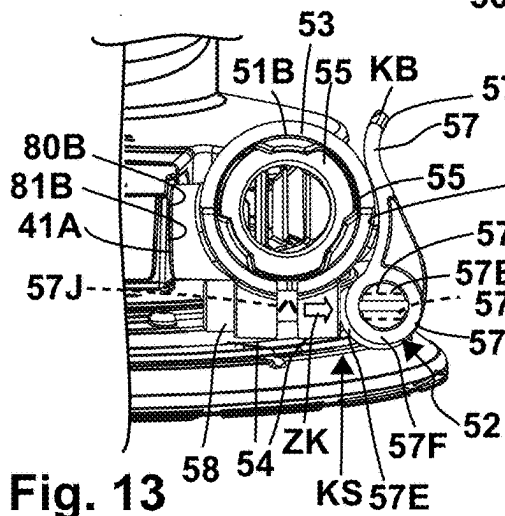
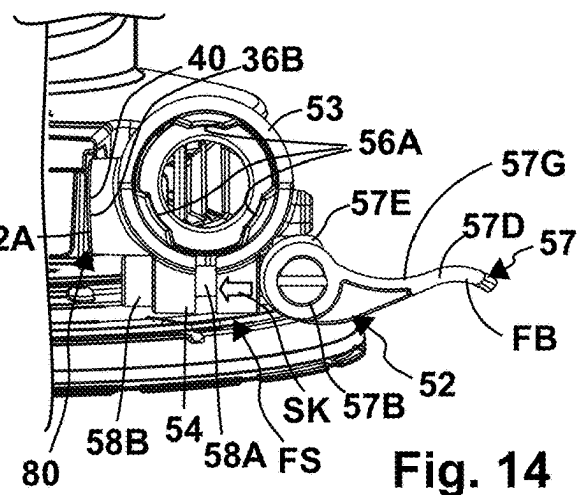


Fig. 13



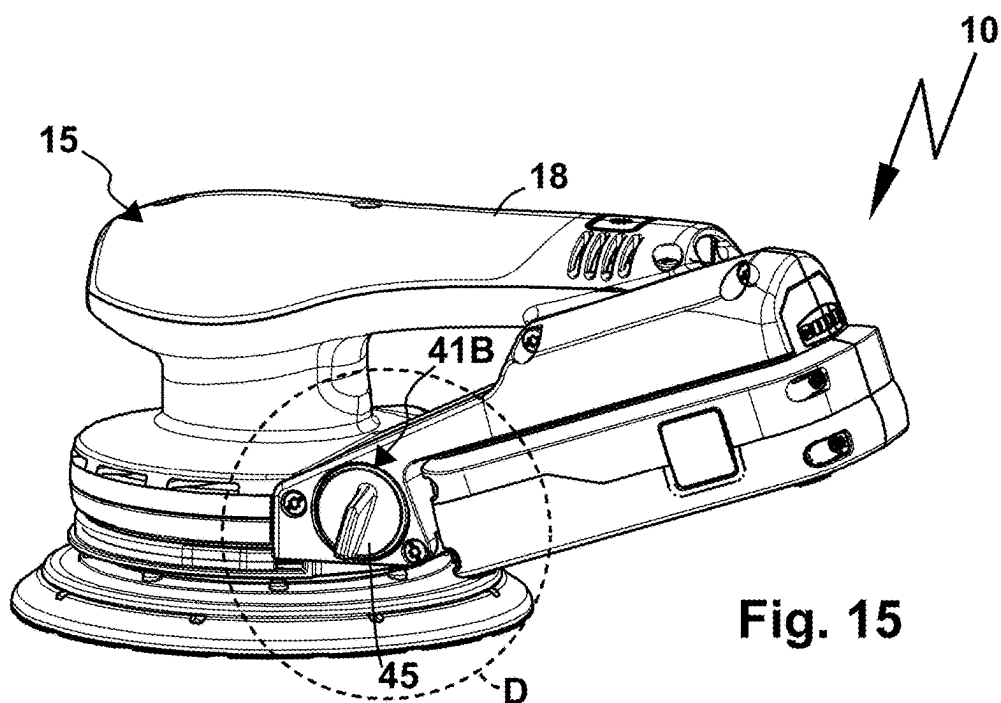


Fig. 15

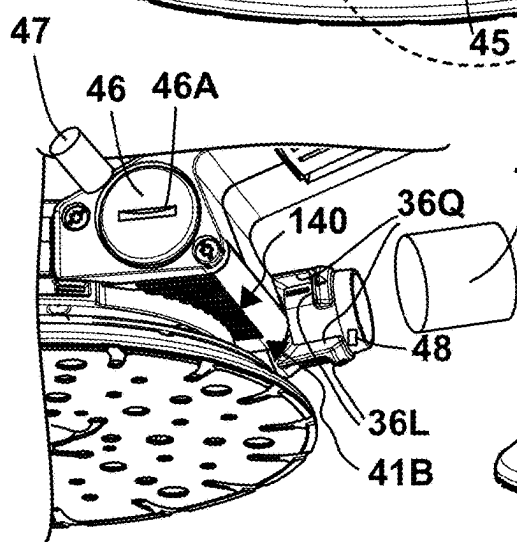


Fig. 17

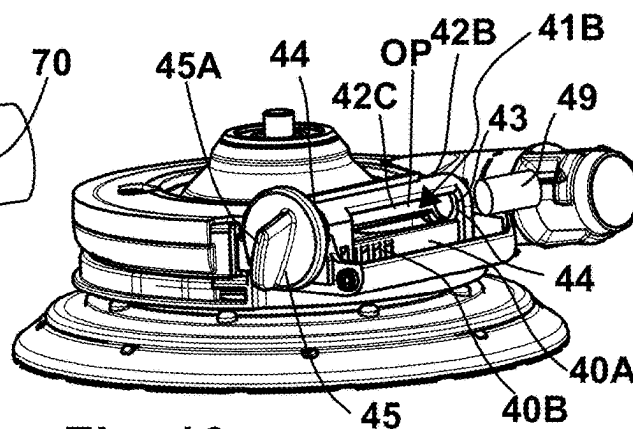


Fig. 16

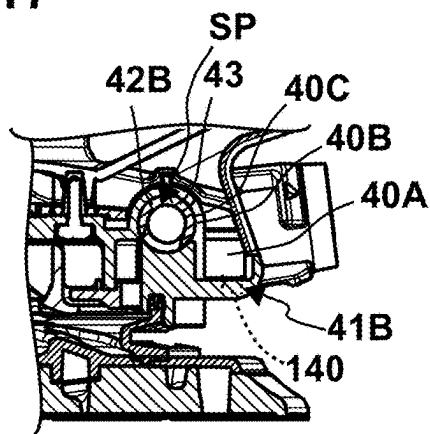


Fig. 18

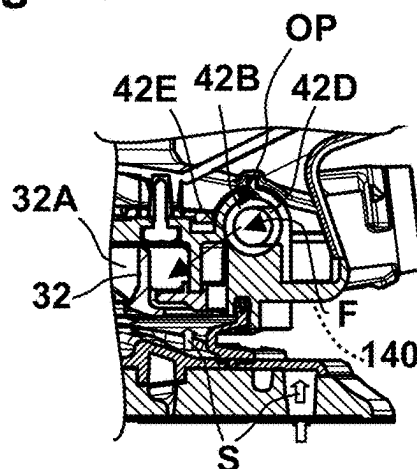
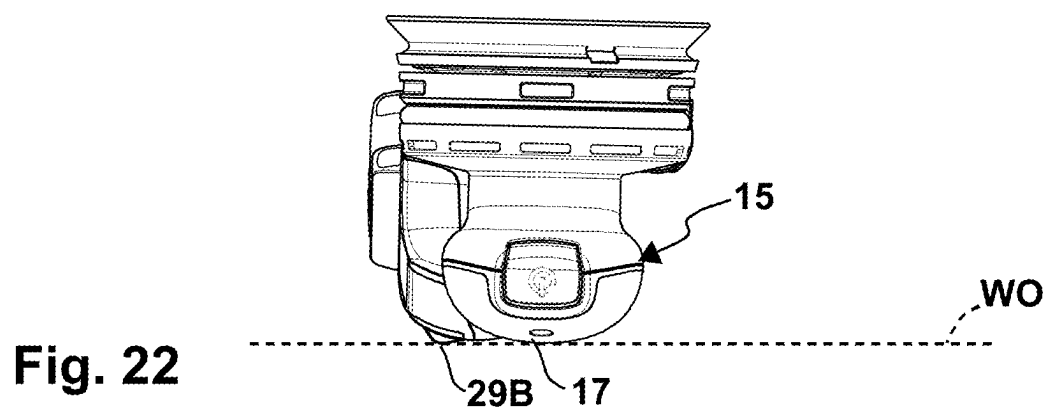
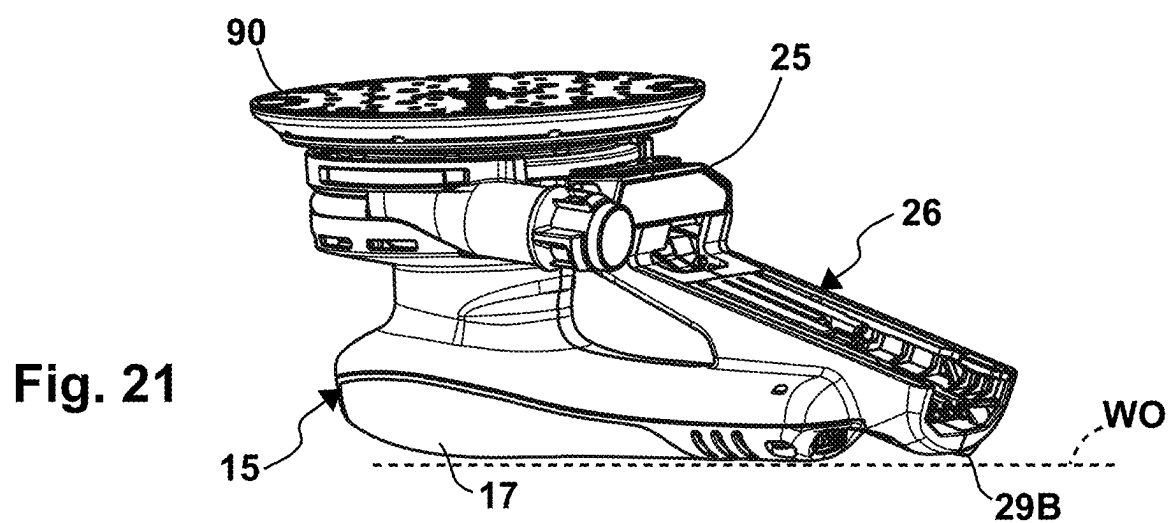
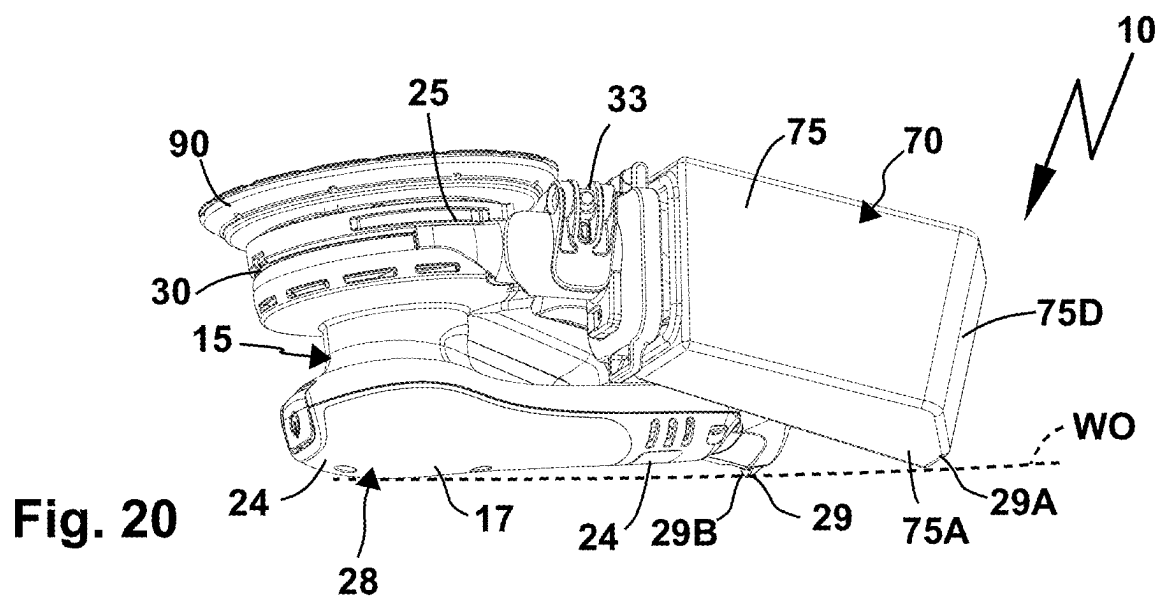


Fig. 19





## 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, it is 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 hypocycloid 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 hypercycloidally.

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

[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 13A.

[0107] The drive motor 12 and the gear mechanism 13 form a drive train 13B or at least parts of a drive train 13B, 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 16A 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 26A of the machine housing 15. The holding part 26A 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 18A is provided between the handle 18 and the holding part 26A. 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 31A or sealing cuff surrounds the dust removal space 31. The seal 31A 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 31A.

[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 12C 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 12C 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 50A in the form of a suction hose 70A or a dust removal device 50B in the case of a dust collection device 70.

[0134] Both dust removal devices 50A and 50B 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 50A and 50B can optionally be connected to the dust removal connector 33 and, for this purpose, have a tubular connection body 51A or 51B. The connection bodies 51A or 51B 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 50A and 50B are also referred to, in general, as a dust removal device 50 in parts of the following description.

[0137] The connection bodies 51A, 51B 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 50A, 50B or connection bodies 51A, 51B.

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

[0139] In the case of the connection body 51A, 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 51A.

[0140] Furthermore, as an optional measure, at least one shape-fit contour 56A is provided, which projects radially inward into the connection body 51A or 51B 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 56A 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 51A or 51B. As an example and schematically, two shape-fit contours 56A are drawn in, in the case of the connection body 51B, wherein

the angle position and/or the longitudinal distance with reference to the plug-in axis ST of the shape-fit contours 56A relative to one another is shown only schematically and should be understood as an example. In particular, the shape-fit contour 56A that is on the right in the drawing is shown close to the gap or slot 54B, 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 56A comprises one or more shape-fit projections 56V, for example. The at least one shape-fit contour 56A and/or the shape-fit projections 56V projects or project, for example, beyond an inside circumference wall surface 51W of the connection body 51.

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

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

[0146] When the at least one shape-fit contour 56A 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 56A 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 56B 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 51B 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 56A can also come out of engagement with the counter-shape-fit contour or the counter-shape-fit contours 36. The shape-fit contour 56A is configured, for example, as a shape-fit projection that projects into the holder cross-section 55.

[0150] The shape-fit contour 56A 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 51A or 51B and the

transverse shape-fit contours **56Q** and the transverse counter-shape-fit contours **36Q** engage into one another, the connection body **51A**, **51B** 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 **56A** also comprises longitudinal shape-fit contours **56L** 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 **36L** 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 **51A** or **51B** and the longitudinal shape-fit contours **56L** and the longitudinal counter-shape-fit contours **36L** engage into one another, the connection body **51A**, **51B** 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 **36L** and the transverse counter-shape-fit contours **36Q** delimit, for example, the at least one depression **36V**. Preferably, multiple depressions **36V** 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 **56A** can rotate relative to the at least one shape-fit contour **56**, so that the shape-fit contours **56** and **56A** 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 **51A** or **51B**.

[0156] The clamping clip **53** can also be, in a manner not shown, a clamping clip that surrounds the connection body **51A** or **51B** and is separate from the connection body **51A** or **51B**, 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 **54C** of the clamping legs **54** lie opposite one another, wherein a slot or gap **54B** is formed between the end regions **54C**, which slot or gap is smaller in the clamping position KS than in the release position FS.

[0159] An activation element **57X** 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 **57A**.

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

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

[0163] The pivot lever **57** has a pivot arm **57D** that can be grasped by an operator, which arm projects away from the pivot bearing **57A**. The pivot arm **57D** has an activation contour **57E** in the region of the pivot bearing **57A**, for example close to the bearing holder **57C**. The activation contour **57E** comprises an eccentric contour **57F** 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 **57B** 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 **57B**, 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 **58A**, for example, which extends between a support head **58B** and an entrainment head **58C**. The bolt section **58A** passes through passage openings **54A** on the free end regions of the clamping legs **54**.

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

[0166] Therefore when the eccentric contour **57C** 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 **58B** is activated in the direction of the pivot lever **57**, and thereby the holder cross-section **55** narrows, so that the connection body **51A** or **51B** 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 **50A**, **50B** 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 **58B**. Specifically, when the support head **58B** or an entrainment contour arranged close to it entrains the clamping leg **54** on which the support head **58B** is arranged, away from the other clamping leg **54** that is close to the entrainment head **58C**, 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 **57J** can also be provided, for example an elastic, block-shaped body, a helical spring or the like. The spring mechanism **57J** 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 58A of the tie rod 58 passes through the spring mechanism 57J, for example.

[0169] The pivot arm 57C has a holding contour 57G, 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 57D 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 57H 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 57H to activate it and/or to pivot it in the direction of the release activation position FB.

[0170] The connection body 51B 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 71A and 72A for the dust/air stream S, wherein the passage opening 71A 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 72A of the dust collection container 75, which is clearly larger as compared to the passage opening 71A, 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 72A 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 51B.

[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 72A 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 75A, 75B that lie opposite one another and can form upper and lower side walls, for example. Longitudinal side walls 75C extend between the side walls 75A, 75B. The carrier body 72 is arranged on a front wall 75D, for example. The dust collection container 75 is delimited or closed off by means of a rear wall 75E, on a side that faces away from the carrier body 72. The rear wall 75E can have sections 75F and 75G 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 77A.

[0177] In the region of the rear wall 75D, a support body transverse section 77B of the support body 77 is provided, which section projects away from the support body longitudinal section 77A. The carrier body 72 and the support body transverse section 77B, together with the support body longitudinal section 77A that connects the two components, form a U-shaped form. A support body section 77C that projects away from the support body transverse section 77B toward the side wall 75B, which section is connected to the carrier body 72 using a support body section 77D and a support body section 77E, serves for further support of the dust collection container 75. The support body sections 77B and 77D run approximately parallel to one another, as do the support body sections 77A and 77D. For example, the support body sections 77A and 77B as well as the support body sections 77D and 77E 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 75M 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 80A. The plug-in guide contour 80A and the anti-rotation unit contour 81 are arranged on the dust collection device 70, in particular on its connection body 51B.

[0181] A plug-in guide contour 80B that interacts with the plug-in guide contour 80A as well as an anti-rotation unit contour 81B that interacts with the anti-rotation unit contour 81 are arranged on the dust removal connector 33. For example, the plug-in guide contour 80B and the anti-rotation unit contour 81B 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 70A, 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 70A, if necessary, which hose is connected to the connection body 51A, so as to move the grinding machine 11 along the workpiece surface WO. The suction hose 70A has the connection body 51A at its one longitudinal end and a connection body 51C 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 51B 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 50B, which inlet remains open when the dust removal device 50A or the suction hose 70A 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 40A 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 40B for flow of external air F into an accommodation chamber 32A, in which the dust/air wheel 32 is arranged, are flow-connected to one another by way of the external air channel 40A.

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

[0187] It is advantageous if the external air channel 40A 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 70A 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 42A that serves for closing off the external air inlet 40 and forms a component of a closure mechanism 41A. The closure part 42A 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 42A 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 42A. For example, a narrow slot can be present between an outside circumference of the closure part 42A and a contour or wall of the external air inlet 40 that runs next to the closure part 42A, 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 80A 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 42A or is/are arranged on the closure part 42A. It is also possible that the closure part 42A forms the plug-in guide contour 80A 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 42A 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 42A 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 42A forms the shape-fit contour 56B 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 80B on the external air inlet 40 forms a counter-shape-fit contour 36B for the shape-fit contour 56B.

[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 41B, 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 41B is provided, which has a closure link 42B, which is suitable for closing off or opening the external air inlet 140. The closure link 42B is configured, for example, in the manner of a roller, or formed by a rotating body 43. The closure link 42B is arranged next to the external air channel 40A or arranged on the external air channel 40A. It is advantageous if the closure link 42B extends approximately over the entire longitudinal expanse of the external air channel 40A.

[0199] The closure link 42B 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 42B has, for example, a cylindrical circumferential wall or closure wall 42C, which can be adjusted by means of rotating the closure link 42B in front of the inflow opening 40B, by way of which the external air F can flow into the accommodation chamber 32A, wherein then the closure wall 42C closes off the inflow opening 40B, and can be adjusted away from the inflow opening 40B, so that the inflow opening 40B is free to allow external air F to flow through. Intermediate positions of the closure link 42B are possible, in which the closure wall 42C only partially closes off the inflow opening 40B.

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

[0202] It should be mentioned that the closure link 42B 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 42B 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 42B, an activation element 45 configured in the manner of a handle, for example, can be provided. The activation element 45 has an activation projection 45A, 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 42B. The activation element 46 has a slot 46A that can be activated, for example,

using a screwdriver, a coin or the like, so as to adjust the closure link 42B 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 42B through which the axis of rotation of the closure link 42B passes.

[0207] A further alternative for activation of the closure link 42B 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 42B 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 42B, 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 42B 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 41B or the closure link 42B in the direction of the open position OP during removal from the dust removal connector 33.

[0210] The closure link 42B, 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 40A. The closure link 42B 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 40B or is flow-connected to such an opening. Therefore the closure link 42B could be provided and configured for this purpose, for example, of variably adjusting the external air stream within the external air channel 40A. In addition, the external air channel 40A, in particular the external air inlet 40, can be closed off by means of the closure part 42A 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 42B, 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 42A 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 42A is movably mounted on the dust collection device 70, for example using a schematically

shown bearing 42L, in particular a thrust bearing and/or rotating bearing. For example, the closure part 42A 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 42A 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 29A provided on an edge between the rear wall 75D and the side wall 75A 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 29B provided on the free end region of the handle 18, on the substratum or the workpiece surface WO.

[0215] The support contour pairs 29, 29B or 29, 29A 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 16A or the motor mounting bracket space 16C that makes the motor mounting bracket 16A available, a bearing support 150 is provided. The bearing support 150 forms a lid 150A.

[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 16A or the motor mounting bracket space 16C.

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

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

[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 16B for the motor bearing 12D is arranged. The bearing holder 16B is arranged, for example, on the motor mounting bracket 16A.

[0222] The motor bearing 12E 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 12E. It would easily be possible to support the motor bearing 12E 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 12E 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 40A is configured.

[0227] Furthermore the accommodation chamber 32A 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 16C.

[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 32A and/or is suitable for accommodating the dust/air wheel 32.

[0229] The bearing support accommodation space 158 or the accommodation chamber 32A for the dust/air wheel 32 is flow-connected to the dust removal connector 33. For example, the accommodation chamber 32A 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 38A of the protective body 38 can engage, for example, into the holders 159. For example, the holders 159 comprise engagement holders 159A for the engagement projections 38A and/or, in particular, grooves 159B running in ring shape around the motor axis M, into which ring-shaped holding projections or holding contours 38B 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 12D and 12E are preferably rolling bearings, in particular roller bearings or ball bearings.

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

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

[0236] The eccentric bearing 13C is a rolling bearing, for example, in particular a ball bearing or roller bearing. The eccentric bearing 13C 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 14C of the tool holder 14, is accommodated, for example, on a holder 13B of the eccentric bearing 13A 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 14A, on the outside circumference of which a rotational entrainment contour 14B is arranged. The rotational entrainment contour 14B 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 14B and 96 in total can connect the disk tool 90 to the holding body 12H, in a torque-proof manner, with reference to the tool axis W.

[0239] Furthermore the tool holder 14 has a screw holder 14D, 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 16C. 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 16C 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 12C 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 15A, flows through the motor mounting bracket space 16C, flows around and/or through the drive motor 12, and subsequently flows out of the machine housing 15 by way of outflow openings 15B.

[0244] It is advantageous if the inflow openings 15A 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 15B 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 15B 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 12C. 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 63A and radial sections 63B.

[0254] The axial sections 63A can serve to cause the cooling air stream K to flow through and around the drive motor 12. The axial sections 63A 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 63A.

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

[0256] The radial sections 63B 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 16C by way of the outflow openings 15B.

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

[0258] With reference to the direction of rotation DR, the axial sections 63A are inclined relatively flatly. With reference to the direction of rotation DR, the axial sections 63A preferably have an inclination of 30° to 50°, for example, in particular an inclination of about 45°. The axial sections 63A 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 63A are inclined slightly flatter than the radial sections 63B.

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

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

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

[0263] The fan blades 63, in particular the radial sections 63B, 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 63E, 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 63C, is greater than an exit flow cross-section 63F, which is delimited, among other things, by the exit edges 63D 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 13B.

[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 16D of the machine housing 15. The drive motor 12 is accommodated in the tapered section 16D, for example. The tapered section 16D 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 16D when the operator's hand lies on the handle section 17. Furthermore, the reach-through opening 18A is arranged next to the tapered section 16D. Consequently the tapering of the section 16D advantageously contributes to an increase in size of the reach-through opening 18A.

[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 16C, 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 12E is arranged in the cooling air wheel accommodation space 67. The motor bearing 12E is accommodated completely in the cooling air wheel accommodation space 67. The motor bearing 12E 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 13A is/are accommodated, at least in part, in the cooling air wheel accommodation space 67.



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

[0276] The holding body 12H and/or the gear mechanism 13 and/or the eccentric bearing 13A 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 12H and/or of the gear mechanisms 13 and/or of the eccentric bearing 13A 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 32B of the dust/air wheel 32 extends into the cooling air wheel accommodation space 67. A fan section 32C, on which fan blades 32D are arranged and which borders on the holding section 32B, projects beyond the cooling air wheel accommodation space 67. The fan blades 32D 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 12F in a torque-proof manner with reference to the motor axis M.

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

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

[0281] The dust/air wheel 32 has a balance part 32F 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 31A and the bearing support 150. The seal 31A therefore serves to hold the air guide body 37 on the bearing support 150.

[0284] The seal 31A is held on the bearing support 150 with screws 32L, 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 39A, which surrounds a passage opening 39C, into which the wall section or the wall 151 engages.

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

[0287] Furthermore, the cooling air wheel 60 is also arranged in the passage opening 39C or engages into the passage opening 39C. The cover body 39, in particular the plate section 39A, 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 39A 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 15B.

[0288] Holders 39D are arranged on the plate section 39A, for example on the side along which the cooling air stream K flows. Support ribs or support sections 15C of the machine housing 15 can engage into the holder 39D 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 13B, 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 15A and the drive motor 12, so that the cooling air stream K that flows in by way of the inflow openings 15A 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 (70A) 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 (41A, 41B) 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 (42A) 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 (42A) 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 (42A), 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 (51A, 51B), in particular a tubular one, for a flow-tight connection to the dust removal connector (33), and the closure part (42A) is arranged separately from the connection body (51A, 51B) and/or next to the connection body (51A, 51B).

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 (51A, 51B) of the suction hose (70A) is connected to the dust removal connector (33) than when a connection body (51A, 51B) 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 (70A) 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 (41A, 41B) 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 (41A, 41B).

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 (70A) 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 (70A) 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 (51A, 51B) 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 (41A, 41B), in particular a closure part (42A), for closing off the external air inlet (40) of the grinding machine (11).

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