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(72) Inventor(s):
Nicholas Jon Beales

(73) Proprietor(s):
Nicholas Jon Beales
3 Rotcombe Vale, High Littleton, Bristol, BS39 6JZ, United Kingdom

(74) Agent and/or Address for Service:
Abel & Imray
Westpoint Building, James Street West, Bath, BA1 2DA, United Kingdom

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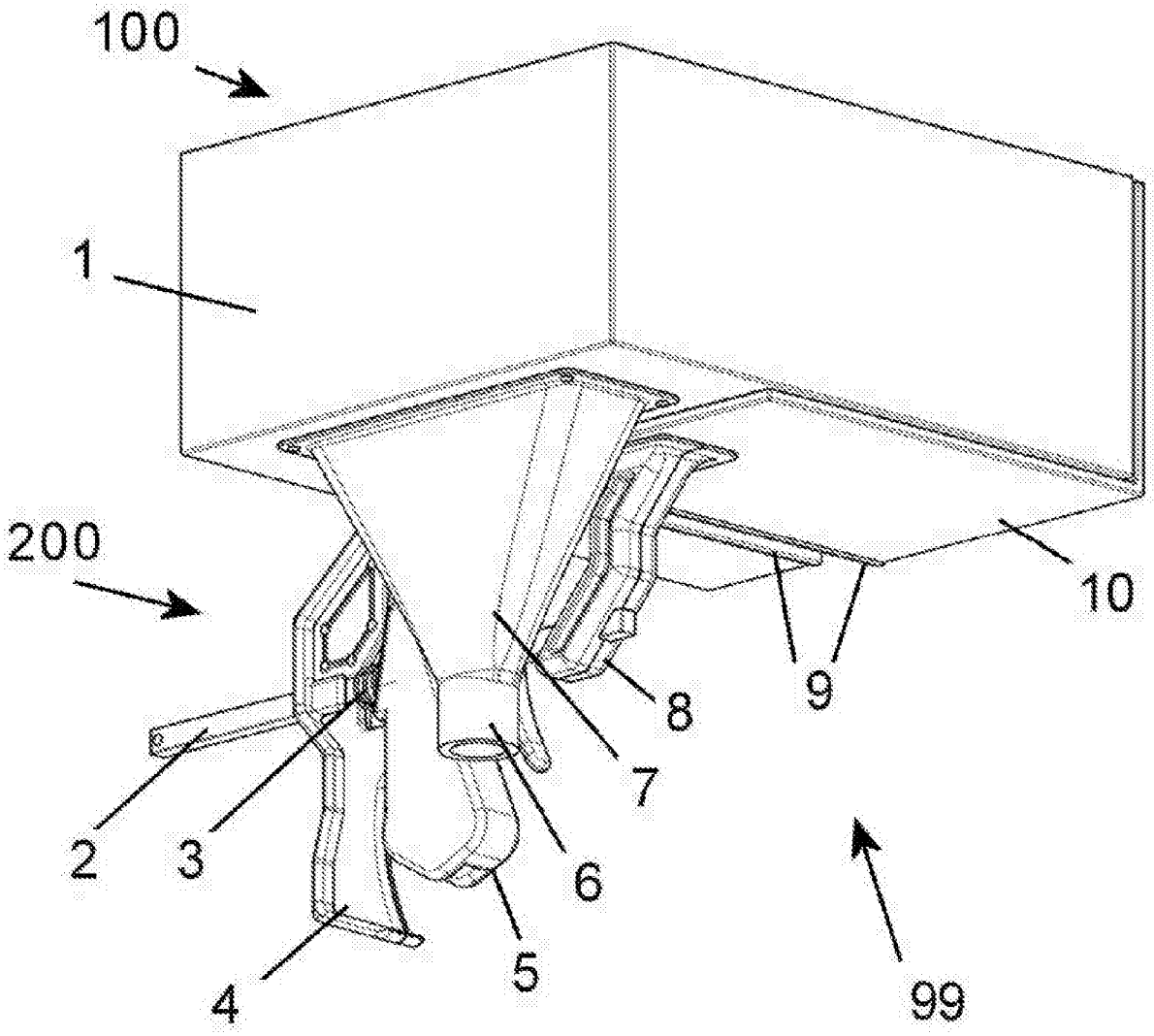


Fig. 1

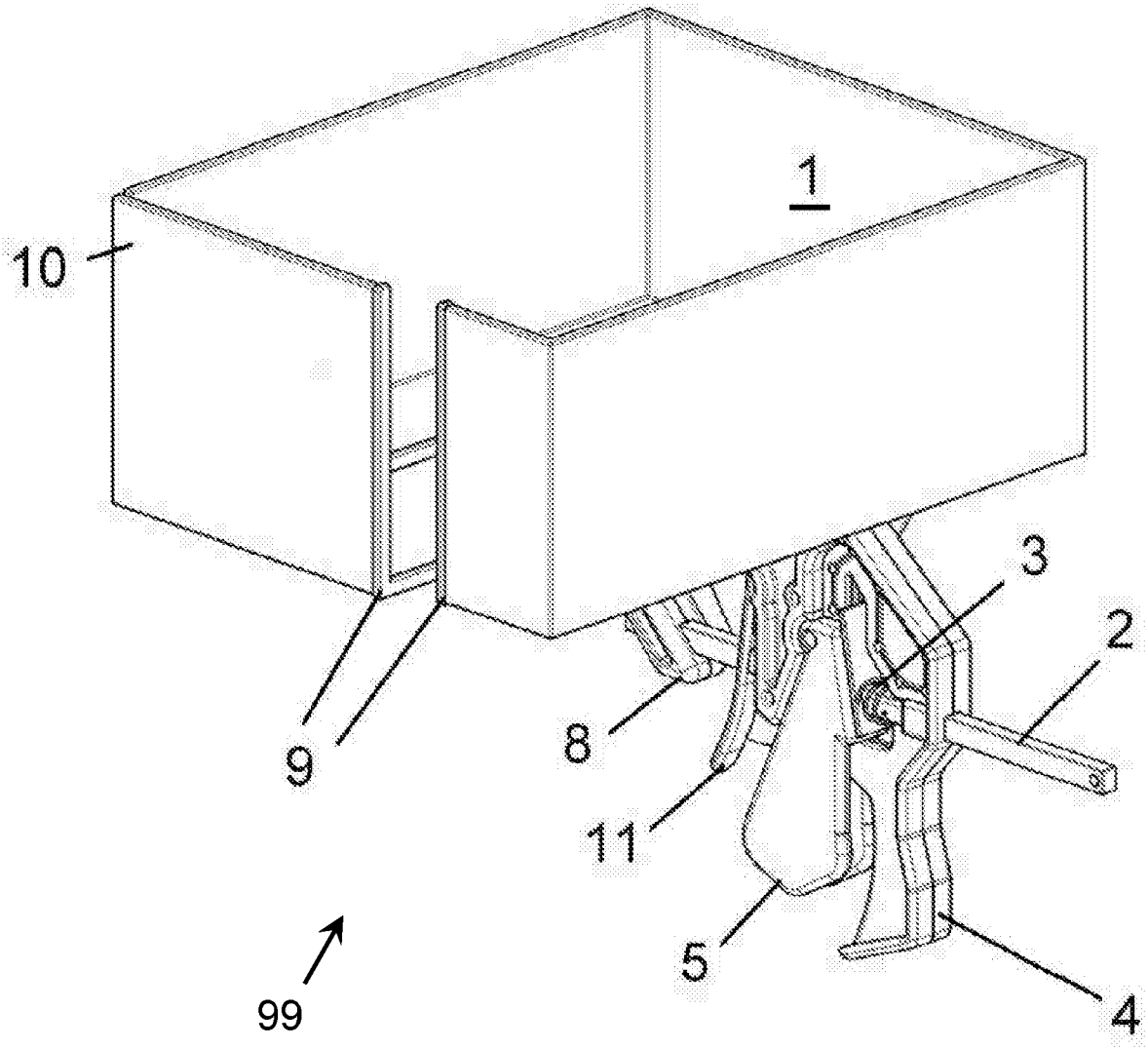


Fig. 2

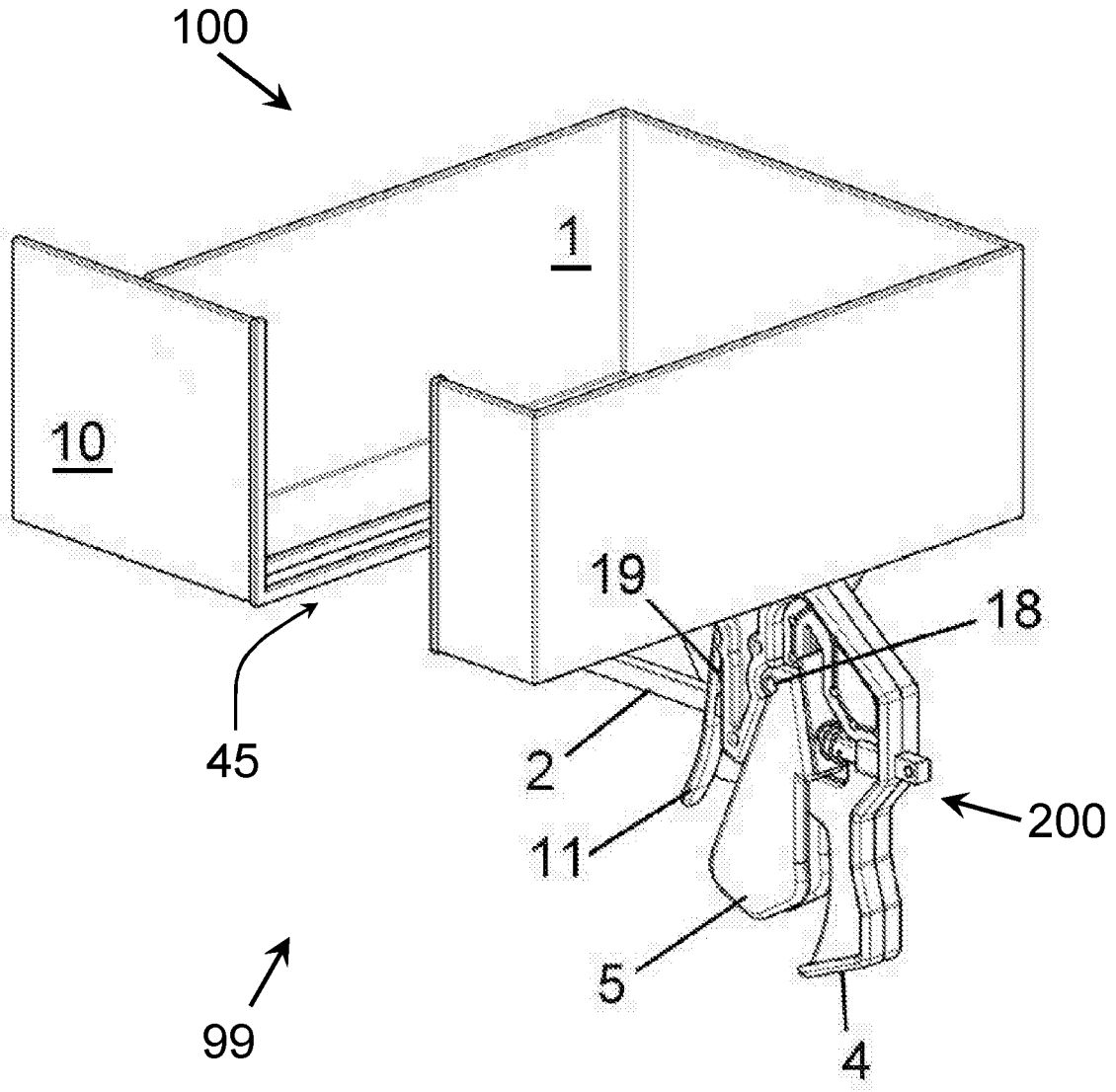


Fig. 3

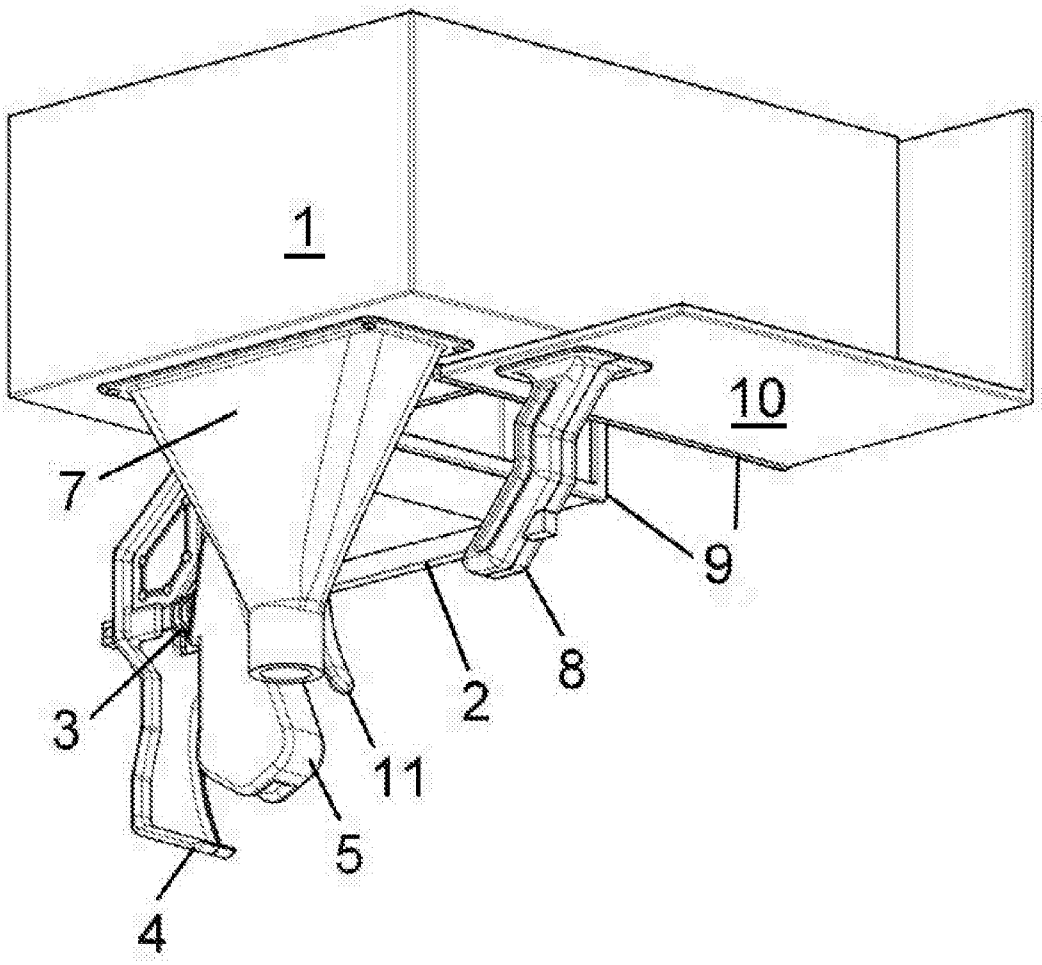


Fig. 4

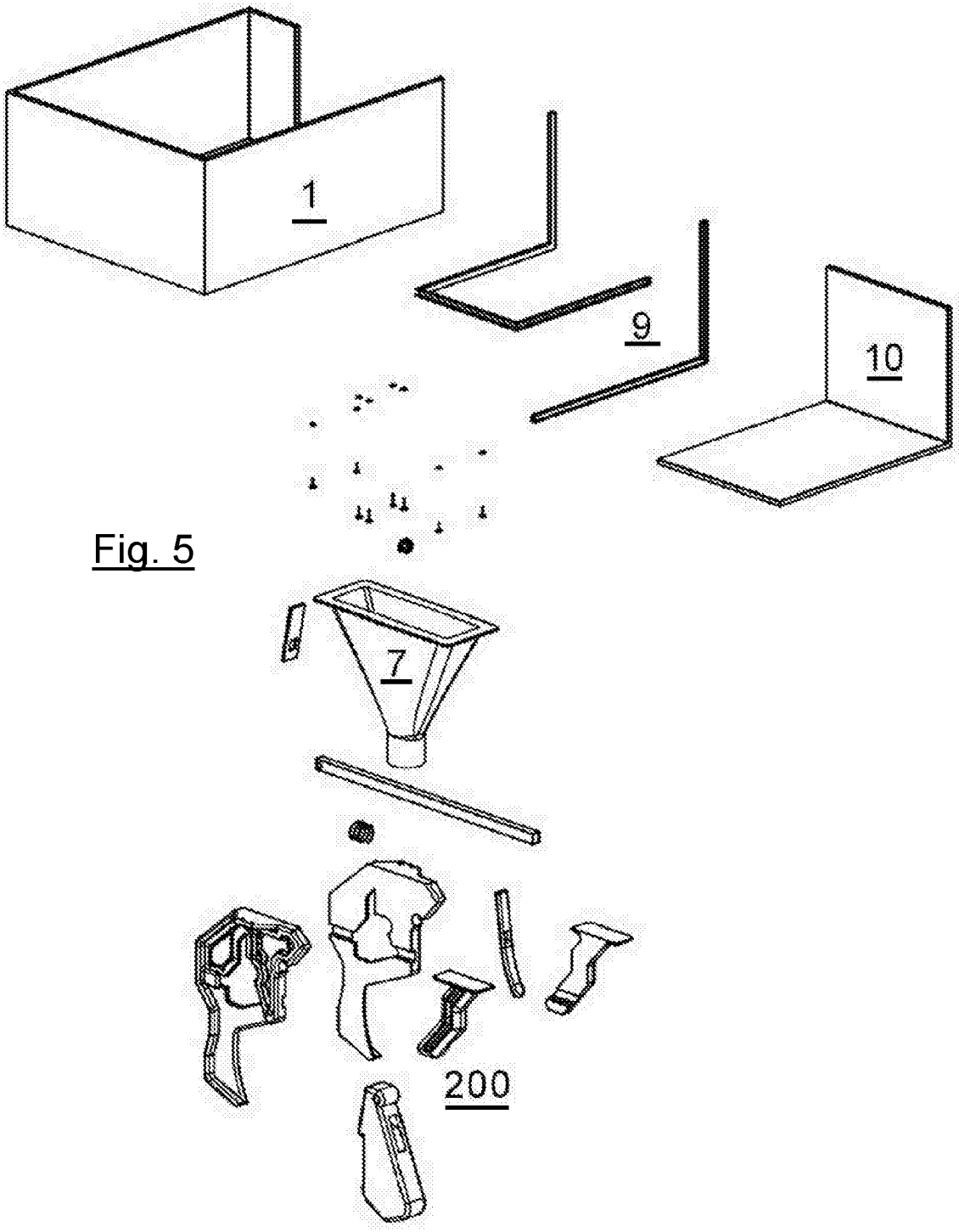


Fig. 5

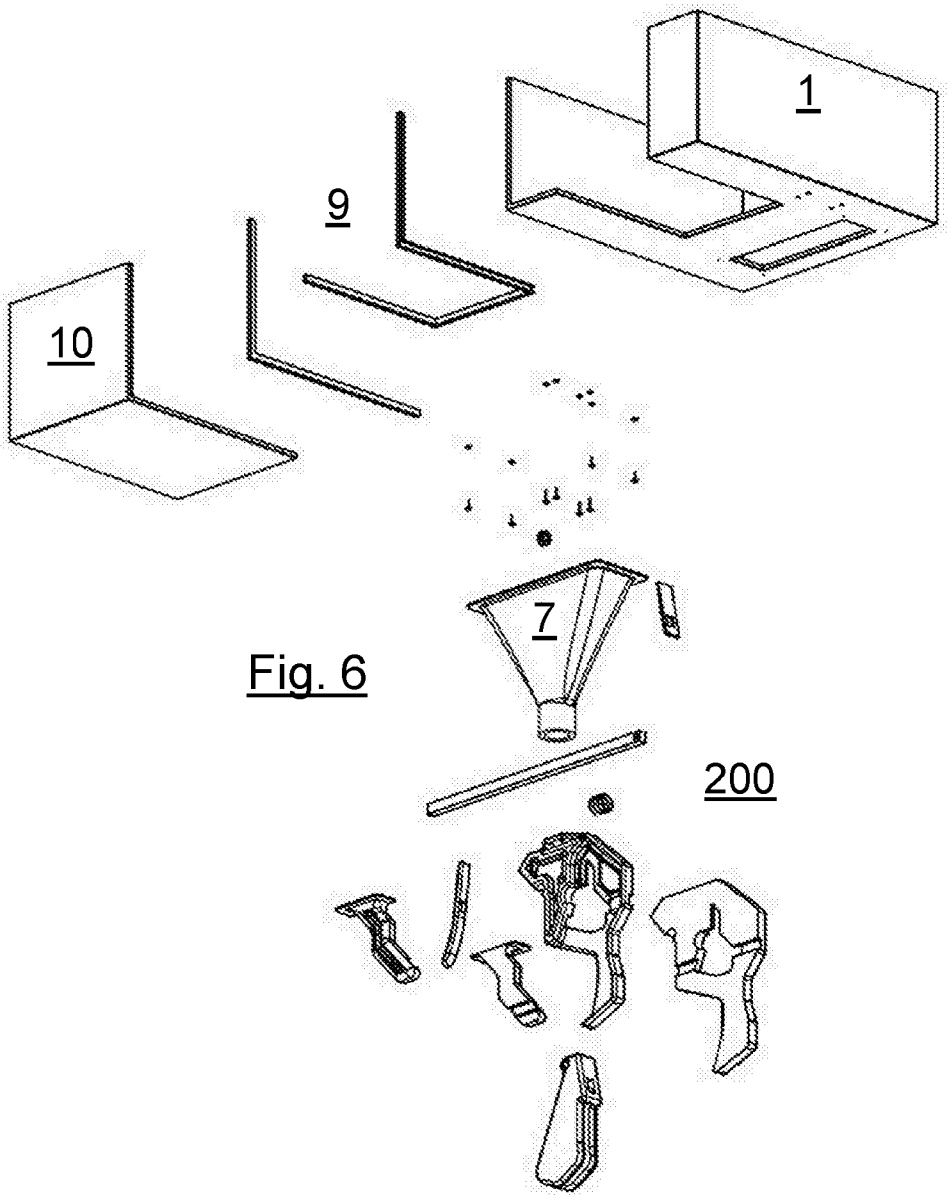


Fig. 6

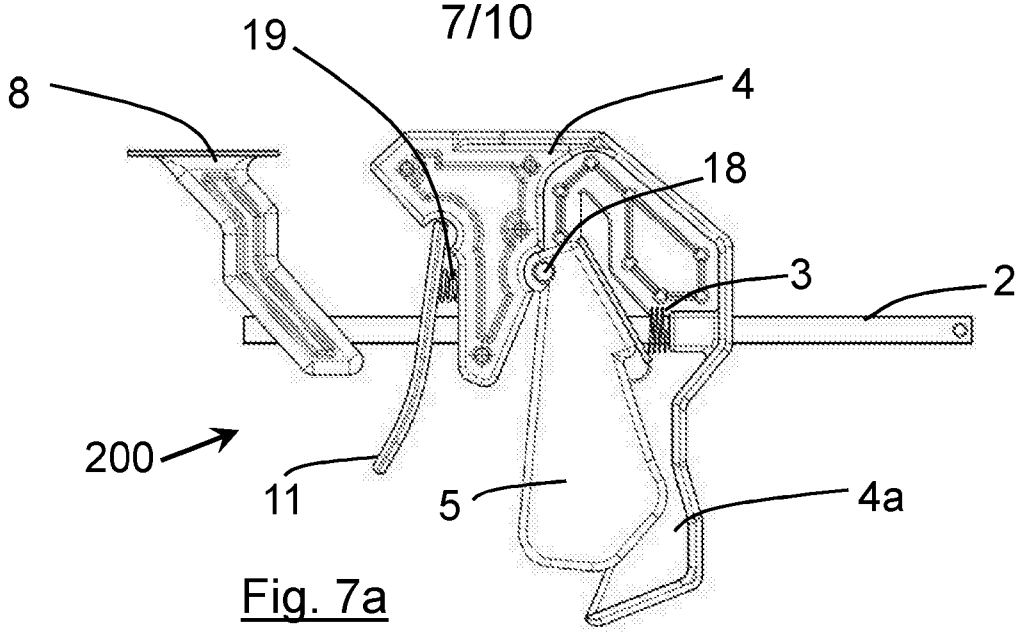


Fig. 7a

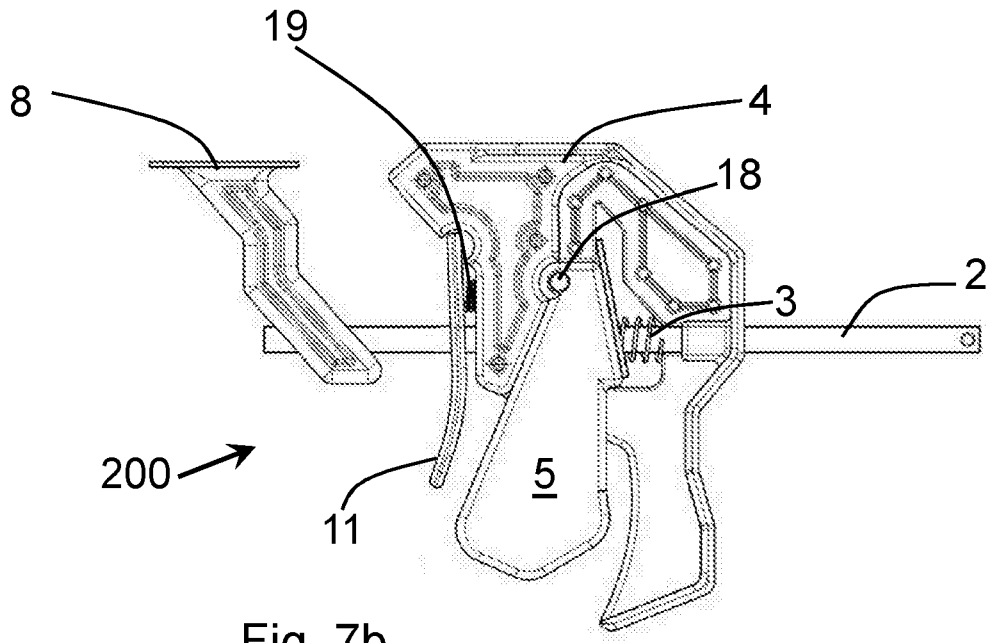


Fig. 7b

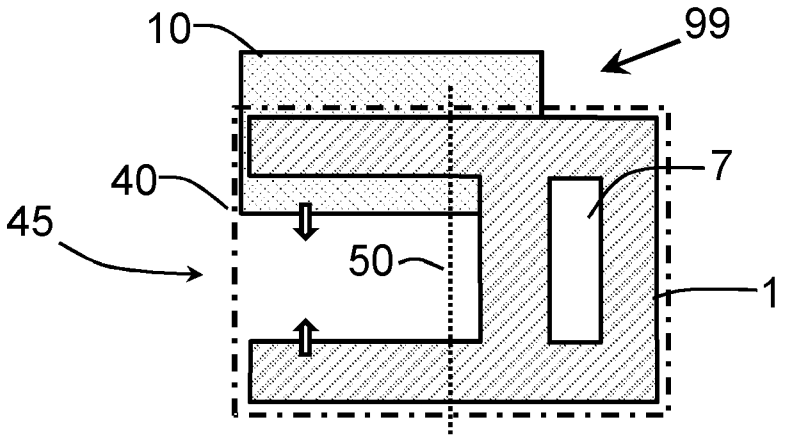


Fig. 8a

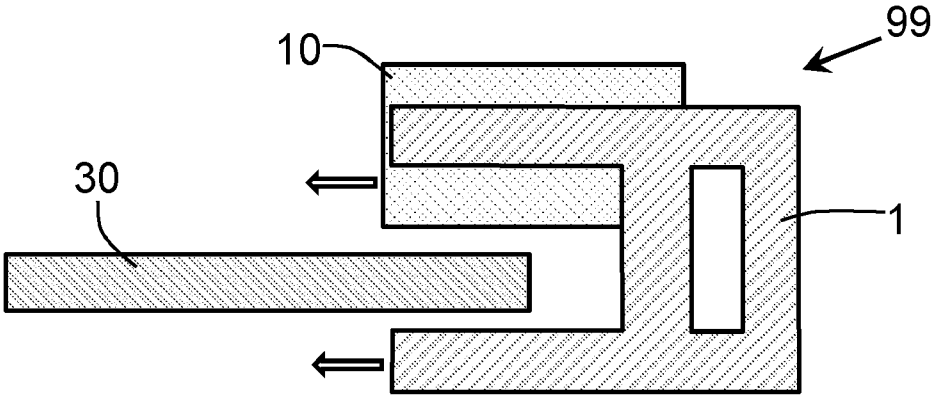


Fig. 8b

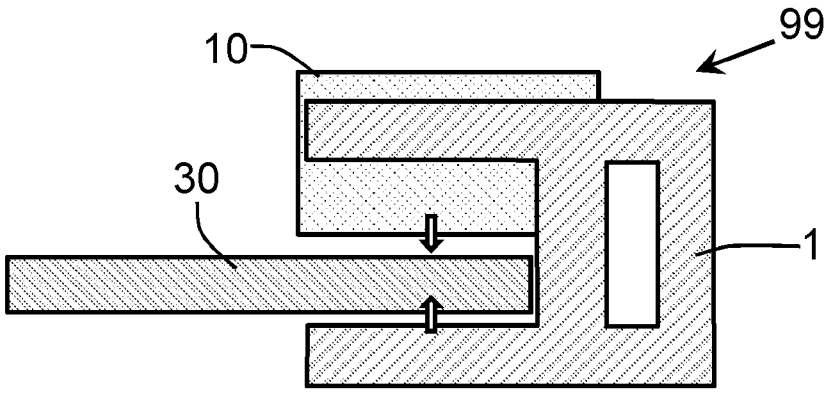


Fig. 8c

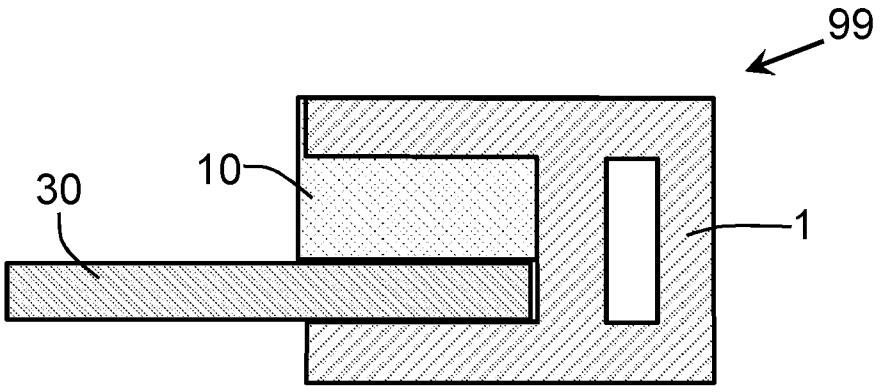


Fig. 8d

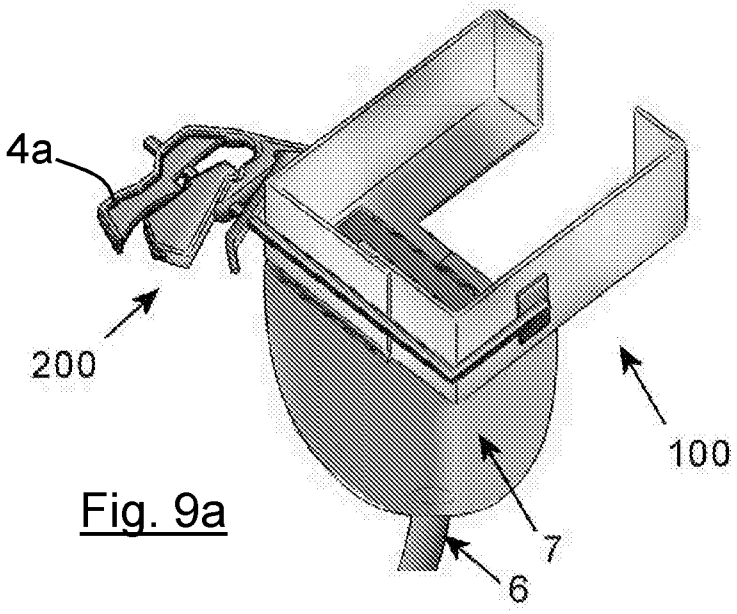


Fig. 9a

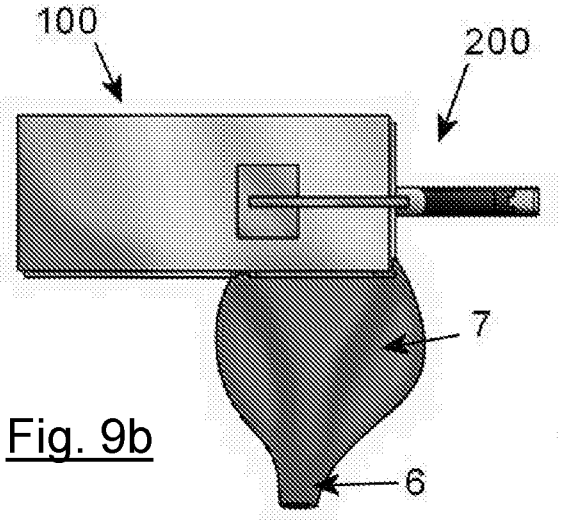


Fig. 9b

METHOD AND DEVICE FOR DEBRIS COLLECTION

Field of the Invention

The present invention relates to a debris collection device, in particular a device for collection of debris or dust or sawdust caused by drilling or working on dust-producing structure such as wood; more particularly but not exclusively the device of the present invention may be used for collection of debris created when drilling out holes in doors or door frames. The invention also relates to a method of collecting debris, created when working on doors or door frames.

Background

Increasing numbers of users are involved in working on properties.

This may include a multitude of tasks, from professional to amateur, in many different fields.

Many improvements are ongoing, and may for example be required to be undertaken in environments that are being used. It may therefore be inappropriate and unfortunate to create excessive mess. For example where drilling holes it may be inappropriate to allow the sawdust created to cover things in the vicinity.

A particular job where it is difficult to capture mess and sawdust is when drilling out holes for latches, catches or locks or the like in doors or doorframes, which are typically wood and larger holes, however where it is difficult to hold a collection device under the area being worked on, particularly given the typical area will be the edge of the door or somewhere on the frame. The door and/or frame will typically be worked on *in situ* and may therefore be vertically arranged when debris is created.

Prior Art

GB 2 495 794 (WRIGHT) discloses a device which includes, in use, two sides, a tray and means to attach to an independent wall attachment mechanism. The device may also include a removable lid which may be arcuate. The wall attachment

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mechanism may be adhesive tape. The device may be provided with one or more slots through which the tape can extend in use. At least one dedicated compartment may be used for the storage of small items. The device may be used with a core cutting / hole saw / trepanning drill.

US 9 452 882 (BUERK) discloses a debris receptacle which is removably attachable to an edge or lip of a work surface. A debris receiving volume defined by a bottom surface and a rear panel is disposed between lower clamp arms that extend under a work surface and are biased toward upper clamp arms that extend over the work surface. Springs disposed within concentric columns that are coupled to the lower and upper clamp arms provide a biasing force, which urges the lower clamp arms toward the upper clamp arms to removably secure the debris receptacle to the edge of the work surface. The debris receptacle is thus mounted to receive debris swept from the work surface through a gap defined between the rear panel and the edge of the work surface.

JP 4 648 233 (NIIMA et al) discloses a dust collecting cup having high reliability in installation and excellent convenience in use. This dust collecting cup includes: a cup part attached and detached to and from a chuck of a power tool; and a dust collecting cylinder connected to the front of the cup part. In the rear of the cup part, a plurality of locking arms, having a claw part projected toward the axis of the cup part are extended, and with the respective locking arms inserted between a clamp part of a side handle of the power tool and a housing, the claw parts are locked on the housing side to be mounted on the power tool.

Other devices are disclosed in US 2014/341665 (CLARK), EP 1712315 (SOMMERFELD et al) and CN 201792012 (JINLONG).

Some of the above devices comprise jigs or drill guides and are therefore complicated in nature and/or require careful set-up before use. Some of the above devices appear to have many moving parts and therefore expensive to manufacture.

At least some of the above devices would not be suitable for use in a method of drilling out a hole for latches, catches or locks or the like in vertically arranged doors or doorframes.

The present invention seeks to mitigate one or more of the above-mentioned problems. Alternatively or additionally, the present invention seeks to provide an improved method of collecting debris when working on a door or a door frame.

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Summary of the Invention

According to the present invention there is provided a debris collection device for use with the method as set forth in claim 1. Such a debris collection device may be used when working on a dust-producing structure. The dust-producing structure may for example be a vertically arranged door or door frame. The device comprises a collection portion and a connection mechanism. The connection mechanism may comprise a clamping member. The device is preferably so arranged that the collection portion may be rearranged by movement of the member so as to allow the structure to be inserted into the collection portion. Thus in embodiments of the invention, a vertically extending edge of a door or door frame may be received into, and clamped in position in, the collection portion of the device so that when the door is worked on (for example drilling of one or more holes in the door) in a manner that produces dust and other debris, the debris can be collected in the collection portion while allowing the user to focus on working on the door or door frame.

The collection portion may be substantially rigid, wholly or partially. The portion may be arranged to slidably displace. The displacement may comprise displacement of one member with reference to another member, wherein the portion may be wholly mounted on one member or partly mounted on one member and partly mounted on the other member.

The connection mechanism may comprise two members, which comprise clamp pads at distal ends, and may comprise a hinge or pivot. In some embodiments one of the members may be arranged to displace along a bar or similar so as to become spaced apart from the other member.

The members may be different in composition, for example wherein a first member may comprise a basal body member, and a second member may comprise a displaceable clamping member.

The second member may move on or along a guide, bar or rail by movement of said guide, bar or rail, wherein the first member is located permanently on the guide, bar or rail.

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The clamping mechanism may be envisaged to comprise a release mechanism, and/or a locking mechanism. The mechanism may be sprung or biased in some embodiments.

In this way the device may be utilised for clamping over or onto an elongate and/or vertical structure such as a door frame or door edge, for example wherein the portion is vertically arranged in reference to the members.

The portion may be arranged to displace to enable the connection mechanism to connect the device with the door or frame, and may be arranged to displace to resize in accordance with the door or frame or more particularly the connection mechanism.

For example in some embodiments the portion may displace wholly from the connection mechanism. In other embodiments the portion may comprise two separate slidable parts, wherein one part may slide and overlap the other to decrease the width of the portion in accordance with the width of the distance between the members.

The device may thereby be particularly well suited to the tasks of drilling holes in doors or doorways, wherein the device may be envisaged to be located below the drilling location, so as to enable sawdust, or other debris, to fall into the portion.

The portion may be arranged to change shape with the structure in some embodiments, for example wherein the portion or parts thereof, pads or contact with the structure may comprise elasticity or capacity for resilient deformation.

There is also provided a method, as set out in claim 1, of collecting debris caused when working on a vertically arranged structure, for example in the form of a door or door frame or the like, by arranging a debris collection device to collect such debris. Such a method may utilise the above-mentioned debris collection device. The device includes a collection portion and a connection mechanism. The method includes a step of arranging the collection portion to create an opening. The method includes a step of receiving part of a vertically arranged structure, namely a door or a door frame, in an opening of the collection portion. The method includes a step of operating the connection mechanism (for example by means of operating a clamping member of the connection mechanism) so as to close an opening of the collection portion and/or clamp the part of the vertically arranged structure within the collection portion. The method includes a step of working on the vertically arranged structure so as to create debris which is then collected within the collection portion. The

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method includes a step of releasing the connection mechanism (for example by means of releasing a clamping member of the connection mechanism) and/or removing the device from the vertically arranged structure. There may be one or more clamping members arranged as part of the connection mechanism, being operable to cause the device (for example, parts of the collection portion) to releasably clamp a vertically arranged structure such as a door.

The above-mentioned step of working on the vertically arranged structure so as to create debris may include drilling one or more holes. Such work may be conducted by the user independently of the positioning of the device. It may therefore be the case that the device need not have any drill guides or the like, and therefore may be simple in construction and easy to use. The primary function of the device may be one of debris collection, thus facilitating ease of use. For example, a device in accordance with certain embodiments of the invention need not require precise alignment with the location of the holes to be drilled in the structure being worked on.

The connection mechanism may be arranged below the collection portion. For example, if the collection portion has a base, the connection mechanism may be wholly positioned beneath the base of the collection portion.

When the vertically arranged structure (e.g. door) is clamped within the collection portion, it may be that the collection portion engages with the structure on two opposing and substantially parallel sides of the structure (e.g. on the opposite sides of the door). The collection portion may additionally engage with a third side (e.g. the side-face of the door from which the latch/lock protrudes) of the structure. Such a third side will typically be substantially perpendicular to the two parallel sides of the structure. Having a collection portion, which engages the structure (e.g. door) on three sides may have the advantage of maximising, or increasing, the amount of debris caught by the collection portion during use.

When the structure (e.g. door/door frame) is clamped within the collection portion, the collection portion has the general form of a slotted open-top box. The box so formed has a substantially rectangular base and has a slot so shaped as to accommodate the structure received therein, for example in a close-fitting manner so as to reduce the chance of debris falling to the floor through gaps between the box and structure that might otherwise exist. The box has vertically extending walls, which

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extend upwardly from the base. Such walls exist on all four sides of the base. The walls may extend to a height of at least 50 mm above the level of the base.

The collection portion may have a first part that is arranged to move relative to a second part; for example, a first slidable part that is arranged to slide relative to the second part. In such a case, the step of operating the connection mechanism (which may optionally include operating a clamping member of the connection mechanism) to close the opening may involve relative movement of the first and second parts towards each other. The direction of such relative movement, of the first and second parts when moving towards each other, may be translational movement in a single substantially horizontal direction only. In the case where the connection mechanism includes a clamping member, the collection portion may thus comprise a slidable part, attached to such a clamping member. The direction of such relative movement, of the first and second parts when moving towards each other, may consist of linear movement only.

The collection portion may have two parts movable relative to each other, there being a first part having a base, a rear wall extending upwardly from the base, two side walls extending upwardly from the base (on opposite sides of the base), the rear wall extending from one side wall to the other side wall, and at least one front wall extending upwardly from the base and extending from one of the side walls. The second part of the collection portion may have a base and at least one front wall extending upwardly from the base. The second part of the collection portion may have no rear wall. The second part of the collection portion may have no side walls. In use, the front wall of the first part may cooperate with the front wall of the second part to form a front wall of the collection portion, with an opening (for example a slot) with a width that varies according to the relative positions of the first and second parts. The base of the second part may have a free end opposite to the end from which the front wall extends. The free end of the base of the second part preferably terminates at a location spaced inwardly from the rear wall of the first part. The base of the first part and the base of the second part may, in use, cooperate to form a base of the collection portion, with an opening (for example a slot) having a width that varies according to the relative positions of the first and second parts. It may be that the collection portion has a base which is formed at least in part by a base of the first part of the collection portion and a base of the second part of the collection portion.

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The aforementioned bases, rear walls, side walls, and front walls of the first and second parts of the collection portion may each be substantially rigid.

The collection portion when viewed in plan may defines a substantially rectangular footprint. The step of receiving the vertically arranged structure in the opening may include the end of the part of the structure being so received entering a region of the rectangular footprint which is beyond the halfway point of the rectangular footprint. Thus, in accordance with embodiments of the invention, a substantial proportion of the device retains the door/door frame being worked on, allowing efficient and effective collection of debris.

It may be that the method includes a user of the device successively pressing and releasing a mechanism, for example a ratchet mechanism, in order to close the opening of the device and/or clamp the vertically arranged structure within the collection portion of the device. In embodiments of the invention, a unidirectional ratchet mechanism allows the device to be securely clamped on a door/door frame, the ratchet mechanism preventing unintentional release of the device from the door/door frame. The method may include the user releasing the ratchet mechanism and opening and/or closing the opening whilst bypassing the ratchet mechanism. In embodiments of the invention, the bypassing of the ratchet mechanism may allow for quick movement of the device between positions corresponding to different amounts of opening of the collection portion.

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The method may include a step of operating a vacuum pump to remove debris collected within the collection portion. For example, a vacuum cleaner may be attached to the device. There may be a step of attaching the vacuum pump to the collection portion of the device. Debris may be removed from the collection portion, for example by such a vacuum pump, via an aperture formed in the base of the collection portion. Debris may be removed from the collection portion via a funnel exit of the device.

The debris collection device is preferably portable. The debris collection device preferably weighs less than 2Kg.

It may be that the step of receiving the vertically arranged structure in the opening of the device is performed by the user holding the device with one hand only. Alternatively or additionally, it may be that the step of clamping the part of the

vertically arranged structure within the collection portion is performed by the user holding the device with one hand only.

Preferably, the part of the vertically arranged structure is clamped sufficiently firmly within the collection portion of the device that it is self-supporting. Thus, the step of the user working on the vertically arranged structure may be performed without anyone holding the debris collection device.

The collection portion may comprise a substantially rigid part. The collection portion may comprise a resilient contact edge which contacts opposing sides of the vertically arranged structure when the vertically arranged structure is clamped within the collection portion.

The debris collection device may be used for collecting debris from a further different vertically arranged structure having a different thickness such that the width of the opening of the collection portion when clamped on the structure is different. Thus, in embodiments of the invention, the device is opened to a first width for use in relation to a first door or door frame and then subsequently opened to a second width, being different from the first width, for use in relation to a second door or door frame.

The present invention also provides a debris collection device for use in the method of the invention as described herein. Thus, such a debris collection device may comprise the collection portion referred to herein and the connection mechanism referred to herein, which may comprise the clamping member referred to herein. It may be that the collection portion is rearranged by movement of the clamping member so as to allow the structure to be inserted into the collection portion.

It will of course be appreciated that features described in relation to one aspect of the present invention may be incorporated into other aspects of the present invention. For example, the method of the invention may incorporate any of the features described with reference to the apparatus of the invention and *vice versa*.

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Brief Description of Figures

Embodiments of the invention will now be described by way of example only and with reference to the accompanying Figures in which:

Figure 1 shows an isometric view of a first embodiment of a debris collection device according to the present invention in a first position;

Figure 2 shows the device of Figure 1, in a reverse isometric view;

Figure 3 shows, in a reverse isometric view (i.e. viewing in the same direction as Figure 2), the device of Figure 1, but in a second position;

Figure 4 shows, in an isometric view (i.e. viewing in the same direction as Figure 1), the device of Figure 3 in its second position;

Figure 5 shows an exploded isometric view of the embodiment of the device shown in Figure 1;

Figure 6 shows a reverse exploded isometric view of the embodiment of the device shown in Figure 1;

Figures 7a and 7b show side detail views of the clamp members of the device of Figure 1;

Figures 8a to 8d show schematically in plan view operation of the device of Figure 1;

Figure 9a shows an isometric view of a second embodiment of a device collection device according to the present invention; and

Figure 9b shows a side view of the device of Figure 9a.

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Detailed Description of Figures

With reference to the Figures generally there is shown an embodiment of the device 99 comprising a collection portion 100 and a connection mechanism 200; wherein the connection mechanism comprises two clamping members 4, 8 and the collection portion is rearranged by movement of the two members so as to allow a structure, such as a door (not shown, other than in Figures 8b to 8d), to be inserted into the portion 100.

With particular reference to the embodiment shown in Figures 1 to 7b there is shown an embodiment of the device comprising a substantially rigid bipartite debris collecting portion 100, comprising a basal part 1 and a sliding part 10, wherein the basal part 1 is arranged on a clamp member 4 and the sliding part 10 is arranged on the opposing clamp member 8.

The connection mechanism 200 comprises two clamp members wherein one clamp member 4 supports a basal part 1 of the collection portion and the other clamp member 8 supports the displaceable part 10. Clamp member 8 is mounted on a bar 2 which is arranged to be moved relative to clamp member 4, as described in further detail below.

The device 99 has pads for contacting the structure which are formed by the edge of the two collection portion parts 1, 10, wherein the collection portion parts 1, 10 comprise silicone edging 9 so as to limit or prevent damage to any clamped structure (e.g. a door).

The clamp members 4, 8 of the first embodiment are bonded to the underside of the corresponding parts 1, 10 of the collection portion 100.

With reference to Figure 8a (which shows schematically the parts 1, 10 of the collecting portion 100 in plan) the collection portion 100 is substantially rectangular in plan view (as illustrated schematically by the rectangle 40 drawn with a broken line), wherein the displaceable sliding part 10 extends out of the side of the rectangle so as to provide a break in a perpendicular portion side (opening 45), and allow entrance of the structure (e.g. door) to beyond a halfway point of the rectangle 40 in plan (the halfway point being illustrated schematically by dotted line 50 in Figure 8a).

With reference to Figure 8a, also to Figures 1 and 4, on the opposing side of the rectangular portion 40 in plan from the entrance (opening 45) for the structure produced from displacement of the sliding portion part 10, there is a rigid funnel 7 extending downwards, which provides a rectangular slot entrance in the bottom of the basal portion part 1, and which comes to a circular exit collar 6, which collar 6 may be used to attach a vacuum cleaner nozzle or similar.

The clamp members 4, 8 may be moved towards one another by a sprung arm 5 ratchet mechanism, which has a pivoted locking release arm 11, wherein the ratchet arm grips and slides along the bar 2 to close the clamp together along the bar (by progressively moving the clamp member 8 and bar 2 in the direction towards the clamp member 4). The user may depress pivoted release arm 11 to release the arm 11 from the bar 2, thus bypassing the ratchet mechanism, and allowing the user to freely move the bar 2 and clamp members 4, 8.

When the release arm 11 is not depressed, a spring 19 biases it to return and hold the bar 2 from unauthorised movement.

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The sprung driving arm 5 pivots on a pivot 18 in the basal part support member 4 against a spring 3 and the basal part support member 4. As shown in Figure 7a, the basal part support member 4 comprises a grip 4a which the user can hold in one hand while allowing the driving arm 5 to be pulled towards the grip 4a by a finger of the same hand of the user. The clamp members 4, 8 may be moved towards each other by successive operation by the user of the driving arm 5. The mechanism utilised is thus similar to those used in relation to sealant guns (also referred to as caulking guns).

Operation of the device 99 of Figure 1 to 7b as part of a method of collecting debris when machining a door (the door being arranged vertically) will now be described with reference to Figures 8a to 8d. Figure 8a shows the two collection portion parts 1, 10 with the opening 45 in a fully open position (corresponding to the second position of the device illustrated in Figures 3 and 4). The user depresses release arm 11 and then manually moves the clamp members 4, 8, and thus also the two collection portion parts 1, 10, towards each other so that the opening 45 is narrowed to be only slightly wider than needed to receive the door 30 (see Figure 8b). The door 30 is received via the opening 45 by the user moving the device 99 as shown in Figure 8b. Once the door 30 is fully inserted into the device 99, as shown in Figure 8c, the user draws the clamping members 4, 8 together by operating the driving arm 5, so that the two collection portion parts 1, 10, move to contact and then grip the door 30. This operation may be performed one-handed by the user. Once the two collection portion parts 1, 10 are firmly griping the door 30 (the position shown in Figure 8d, which corresponds to the first position shown in Figures 1 and 2), the user then works on the door, with a drill, chisel or other device that causes debris to be created. It may be that the device clamps onto the door sufficiently securely that it is able to support its own weight and the weight of any debris collected, thus allowing the user to concentrate on working on the door without being distracted by the issue of how to collect and/or contain any debris created. Such debris is collected in the collection portion 100, and may be immediately vacuumed away via the funnel 7 by means of a vacuum cleaner attaching to exit collar 6. Once work has been finished on the door 30, the device may be removed by the user depressing the release arm 11, moving the collection portion parts 1, 10 apart and then moving the device 99 so that the door and device are separated.

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Figures 9a and 9b show a second embodiment of the invention. It will be observed that in the first embodiment (shown in Figures 1 to 4 for example), the clamp members 4, 8 depend from the collecting portion 100 in a vertical direction so that the grip 4a of the clamp member 4 is arranged and held in a vertical orientation when the device is used on a vertically arranged door. The principal difference between the first embodiment and the second embodiment is that in the second embodiment the clamp is arranged to extend laterally from a side of the collecting portion 100, such that the grip 4a of the clamp member 4 is arranged and held in a horizontal orientation when the device is used on a vertically arranged door.

The invention has been described and illustrated with reference to particular embodiments, by way of example only. It will be appreciated that variation may be made to the above-mentioned embodiments without departing from the scope of invention as defined by the claims, in particular but not solely combination of features of described embodiments. The invention lends itself to many different variations not specifically illustrated herein. By way of example only, certain possible variations will now be described.

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It will be appreciated that the ratchet mechanism described in relation to the accompanying Figures does not include a ratchet device including teeth which cooperate with a pawl mechanism, but instead rely on frictional forces for the ratchet mechanism to work (in a similar manner to a standard manually operable caulk gun). In other embodiments, ratchet teeth may be present.

The shape of the collection portion when viewed in plan may be different from the rectangular form shown in the Figures.

The vertical walls of the collection portion could instead be angled to the vertical to create a structure similar in shape and function to that of a hopper. It will also be appreciated by the reader that integers or features of the invention that are described as preferable, advantageous, convenient or the like are optional and do not limit the scope of the independent claims. Moreover, it is to be understood that such optional integers or features, whilst of possible benefit in some embodiments of the invention, may not be desirable, and may therefore be absent, in other embodiments.

Claims

1. A method of collecting debris caused when working on a vertically arranged structure in the form of a door or door frame, by arranging a debris collection device to collect such debris, wherein

the device includes a collection portion and a connection mechanism, and the method includes the following steps:

arranging the collection portion to create an opening,

receiving part of a vertically arranged structure, namely a door or a door frame, in the opening,

operating the connection mechanism so as to close the opening and clamp the part of the vertically arranged structure within the collection portion,

working on the vertically arranged structure so as to create debris which is then collected within the collection portion, and

releasing and then removing the device from the vertically arranged structure, wherein

when the part of the structure is clamped within the collection portion, the collection portion has the general form of a slotted open-top box, the box having a rectangular base with the opening of the collection portion defining a slot so shaped as to accommodate the part of the vertically arranged structure received therein, the box having vertical walls extending upwardly from the base on all four sides of the base.

2. A method according to claim 1, wherein when the part of the vertically arranged structure is clamped within the collection portion, the collection portion engages with the part of the vertically arranged structure on two opposing and substantially parallel sides of the structure.

3. A method according to claim 2, wherein when the part of the vertically arranged structure is clamped within the collection portion, the collection portion engages with a third side of the vertically arranged structure, the third side being substantially perpendicular to the two parallel sides of the structure.

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4. A method according to any preceding claim, wherein when the collection portion has a first slidable part that is arranged to slide relative to a second part, wherein

the step of operating the connection mechanism to close the opening causes the first and second parts to move together.

5. A method according to claim 4, wherein when each of the first part and the second part of the collection portion include a part of the base of the collection portion.

6. A method according to any preceding claim, wherein the collection portion when viewed in plan defines a rectangular footprint and

wherein the step of receiving part of the vertically arranged structure in the opening includes the end of the part of the structure being so received entering a region of the rectangular footprint which is beyond the halfway point of the rectangular footprint.

7. A method according to any preceding claim, wherein the step of operating the connection mechanism so as to close the opening and clamp the part of the vertically arranged structure within the collection portion includes a user successively pressing and releasing a ratchet mechanism.

8. A method according to claim 7, wherein the user releases the ratchet mechanism and causes opening and/or closing of the opening, bypassing the ratchet mechanism.

9. A method according to any preceding claim, wherein the method includes operating a vacuum pump to remove debris collected within the collection portion.

10. A method according to claim 9, wherein the method includes attaching the vacuum pump to the collection portion.

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11. A method according to claim 9 or claim 10, wherein the debris is removed from the collection portion by the vacuum pump via an aperture formed in the base of the collection portion.

12. A method according to any preceding claim, wherein debris is removed from the collection portion via a funnel exit.

13. A method according to any preceding claim, wherein both the step of receiving part of the vertically arranged structure in the opening and the step of clamping the part of the vertically arranged structure within the collection portion are performed by the user holding the device with one hand only.

14. A method according to any preceding claim, wherein the part of the vertically arranged structure is clamped sufficiently firmly within the collection portion that the step of the user working on the vertically arranged structure is performed without anyone holding the debris collection device.

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15. A method according to any preceding claim, wherein the collection portion comprises a substantially rigid part.

16. A method according to any preceding claim, wherein the collection portion comprises a resilient contact edge which contacts opposing sides of the vertically arranged structure when the part of the vertically arranged structure is clamped within the collection portion.

17. A method according to any preceding claim, wherein the debris collection device is used for collecting debris from a further different vertically arranged structure having a different thickness such that the width of the opening of the collection portion when clamped on the structure is different.

18. A debris collection device for use in the method of any preceding claim.

19. A debris collection device for use in the method of any of claims 1 to 17, the debris collection device comprising the collection portion, the connection mechanism, and a clamping member configured such that, in use, the collection portion is rearranged by movement of the clamping member so as to allow the structure to be inserted into the collection portion.

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