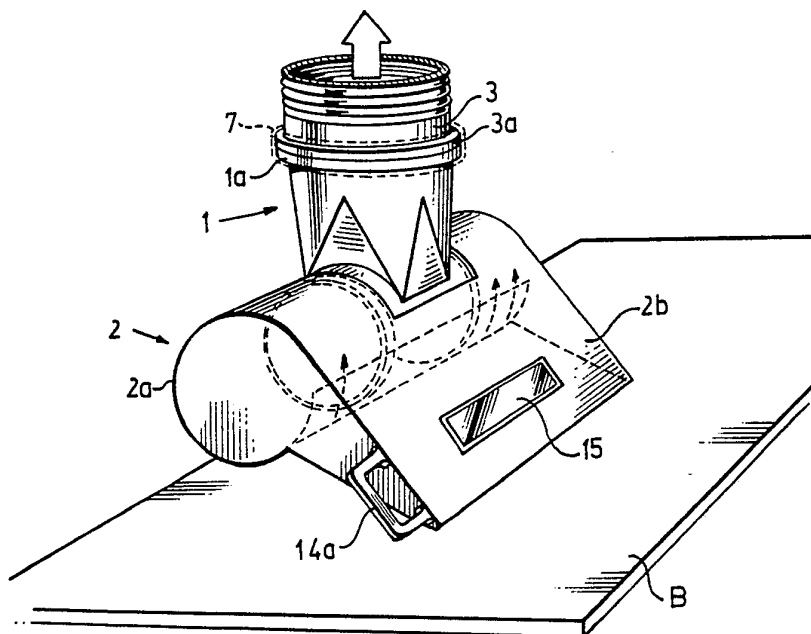




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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## (54) Title: EXHAUST HOOD



## (57) Abstract

Suction hood for connecting to a spot suction system having a flexible suction duct (4). The suction hood has a collection member (2) which substantially comprises a canopy portion (2b) merging in the region of a suction gap into a part-cylindrical portion (2a), the hood also having a connection member (1) adjoining the part-cylindrical portion and connectable to a duct end member (3) on the free end of the flexible suction duct (4). The collection member (2) is turnable and/or swingable relative the duct end member (3) with the intermediary of the connection member (1) so that the canopy portion (2b) of the collection member (2) can be adjusted as desired.

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## EXHAUST HOOD

The invention relates to a suction hood for connection to a spot suction system having a flexible suction duct, the hood including a collection member and a connection member, the latter being articulately connectable to a duct end member at the free end of the flexible suction duct.

Such suction hoods are already known (see SE-B-424 409, for example), where the collection member is either substantially conical or elongate, with a suction gap extending in its longitudinal direction, and these hoods are used for spot suction of health-endangering gases, welding or soldering smoke or the like in the vicinity of a work station, where such gases or the like are generated. The flexible suction duct is, for example, accommodated in, or connected to, an articulated arm, so that the suction hood can be manually moved in three dimensions to a desired position. In spite of this universal flexibility, it is difficult in many cases to achieve good ergonomic conditions and effective evacuation.

The object of the invention is to provide a suction hood, achieving by its construction improved ergonomic conditions, improved and uniform suction effect and even better adjustability than known suction hoods of this kind.

This object is achieved in accordance with the invention by the following features:

- the collection member of the suction hood comprises a substantially part-cylindrical portion extending transverse to the axis of the connection member, such as to form a vortex chamber operating at sub-pressure, and merging into a canopy portion in the region of a suction gap having an area at most equal to that of the connection member, and

## 2.

- the collection member with its associated canopy portion is turnable or swingable about an axis parallel to the axis of the part-cylindrical portion, as well as being turnable about the axis of the connection member.

In this way there is achieved the desired screening effect and adjustability of the suction hood, as well as advantageous flow conditions. By the sub-pressure in the vortex chamber and the dimensioning of the suction gap area (which must not exceed that of the connection member) there is obtained a uniformly distributed flow at the canopy portion, this flow merging into a vortex flow inside the substantially part-cylindrical portion. This vortex flow is generated about the axis of the substantially part-cylindrical portion.

Similar suction hoods, although intended for stationary location and without a turnable connection member, are known per se from e.g. the US-A-3 221 635 (Hill). In such cases the canopy portion is exclusively utilized as a stationary collection means, which deflects the flow to the part-cylindrical portion, in which a circulating flow is maintained.

With the suction hood in accordance with the present invention the canopy portion further serves as a screen, particularly for protecting the face of an operator. In addition, it can be adjusted, i.e. oriented in its turning direction, as desired, so that optimum screening and directed collection of gases are achieved. For a pause in work, or for operations not generating dangerous gases or the like, the canopy portion can be turned or swung to a stored position out of the way.

Advantageous further developments of the suction hood are disclosed in claims 2 - 8.

## 3.

The invention will now be described below in more detail and with reference to the accompanying drawings, which illustrate some embodiment examples.

Fig. 1 schematically illustrates in a perspective view a first embodiment of the suction hood in accordance with the invention;

Fig. 2 illustrates, similarly in a perspective view, the suction hood of Fig. 1 connected to a hose-like suction duct above a work table;

Fig. 3 is an exploded view of the different parts of the suction hood according to Figs. 1 and 2;

Fig. 4 is a side view of the suction hood according to Figs. 1 - 3;

Fig. 5 is a side view of a second embodiment of the suction hood in accordance with the invention;

Figs. 6a and 6b are perspective views of the suction hood in accordance with the invention, connected to an articulated holding arm with an internal suction duct, different attitudes of the arrangement being shown in the Figures;

Figs. 7a, 7b and 7c are end views of the suction hood in three different attitudes above a work table.

The suction hood illustrated in Figs. 1 - 4 substantially comprises a connection member 1 and a collection member 2, the latter having a substantially part-cylindrical portion 2a, to which is connected a canopy portion 2b. In accordance with the invention the connection member 1 is turnably connected to a duct end member 3, mounted on the end of a suction duct 4

## 4.

(Figs. 2 and 4), this duct comprising such as a flexible hose. In this embodiment, the hose is arranged externally on a holding arm 6a, 6b, 6c articulated at several places 5a, 5b, 5c (Fig. 2), and the suction hood 1, 2 is suspended on the duct end member 3 at the free end of the arm. The relative turnability between the connection member 1 of the suction hood and the duct end member 3 is obtained by both these parts being circular cylindrical, the connection member 1 being inserted in the duct end member 3. An axial lock is provided by the members 1, 3 respectively having a flange 1a, 3a, these flanges being juxtaposed when the connection member 1 is thrust into the duct end member 3, and are kept together for mutual turnability with the aid of a holding ring 7 indicated by dashed lines in Fig. 1.

As illustrated in Fig. 3, the connection member 1 merges into a junction portion 1b having a rectangular cross section, which in turn adjoins to a transversally oriented, circular cylindrical tubular portion 1c. The latter portion 1c fits into the part-cylindrical portion 2a of the collection member 2 in the region of an opening 8, this opening being elongate and situated centrally between the ends of the portion 1c and extending about  $180^\circ$  in circumference. The end edges 8a, 8b of this opening form end positioning abutments for the junction portion 1b of the connection member 1, when the tubular portion 1c is turned inside the part-cylindrical portion 2a of the collection member 2.

The portion 2a extends over an angle of at least  $270^\circ$ , preferably exceeding  $315^\circ$ , so that a fairly small gap 9 is formed between the free edge 10 of this portion 2a and the opposing canopy portion 2b adjoining the portion 2a. What is essential here is that the area of the gap 9 does not exceed that of the connection member 1, thus enabling a sufficiently large and uniformly distributed sub-pressure 2b to develop inside the part-cylindrical portion. It is thus possible for the in-

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flowing air to coact optimally with a stationary vortex flow in the part-cylindrical portion. In addition, the flow pattern in front of the gap will be aerodynamically advantageous in such an arrangement.

In the illustrated embodiment, the canopy portion 2b is substantially flat and rectangular, but can be given any desired shape, e.g. somewhat curved and/or rounded off. The part-cylindrical portion 2a is closed at its ends with the aid of end walls 11,12, which have extended tapering portions 11a,12a extending up to the long edge 13 of the canopy portion 2b to form side flanges for defining a collection space (together with the canopy portion 2b and the part-cylindrical portion 2a).

Since the connection member 1 is turnable about a first axis X (see Figs. 3 and 4) in relation to the duct end member 3, and the collection member 2 is swingable (approximately 180°) in relation to the connection member 1 about a second axis Y perpendicular to the first axis X, the collection member 2, and particularly its canopy portion 2b, can be adjusted as desired by the operator, suitably with the aid of handles 14a,14b,14c on the respective end wall 11a,12a (Figs. 1 - 5), on the part-cylindrical portion 2a and/or on the canopy portion 2b (Figs. 7a,7b,7c). Accordingly, the entire suction hood 1,2 can be oriented in a desired position with the aid of the articulated holding arm 6a,6b,6c (Fig. 2), as is already known per se, while it can also be turned and swung to a desired attitude, as illustrated in Figs. 2, 7a,7b,7c, e.g. to a first work position according to Figs. 2 and 7a, wherein the canopy portion 2b is placed at an angle behind (seen from the operator) an object A on a table B, gases or the like being generated at the object A and evacuated via the suction hood, or to a second work position according to Fig. 7b, wherein the

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canopy portion 2b is placed obliquely in front of the object in question, the canopy portion 2b then also serving as a screen against spatter and dangerous light, e.g. during welding. A third work position may also be taken up according to Fig. 7c, with the canopy portion 2b arranged horizontally to cover a comparatively large area of the work table B. Of course, the canopy portion can also be placed in an unillustrated stored position, with the canopy portion 2b directed horizontally away from (or to one side) of the operator.

In the second work position according to Fig. 7b, an observation window 15 of restricted transparency, e.g. a welding glass, facilitates the operator's work, and such work as welding can be carried out without a special protective mask or the like.

In Fig. 5 there is illustrated an alternative embodiment of the connection member 1', which allows even better flexibility of the collection member 2'. The connection member 1' includes here a first part 16,17,18, the intermediate portion 16 of which is at an angle of about  $45^\circ$  in relation to the laterally displaced, turnable connections 17,18 (about mutually parallel axes X',X'') respectively to the duct end member 3' and to a second part 19-22. A connection 19 of this second part is turnably coupled to the connection 18, the other end of the connection 18 being joined to a coupling member 20, which is turnably coupled to a coupling member 21 for turning about an axis Y' at right angles to the axes X',X'' and parallel to the axis C of the part-cylindrical portion 2'a of the collection member 2'. The other end of the coupling member 21 merges into a connecting portion 22 adjoining the part-cylindrical portion 2'a of the collection member 2'. When the duct end member 3' is placed in a given position, the collection member 2' can be swung round the axis X' along a circular line and furthermore it can be oriented in a desired angular position relative the



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axis X", as well as being swung about the axis Y' parallel to the part-cylindrical portion 2'a.

In Figs. 6a and 6b there is illustrated a modified embodiment of the articulated holding arm, known per se. The illustrated arm 6'a,6'b,6'c,6'd has an internal suction duct 4' in this case. The duct is in communication with the suction hood 1",2" via the connection member 1", which is connected turnably to the relatively short arm part 6'd to enable turning about an axis X'". In this case the connection member 1" is rigidly connected to the collection member 2". Since the arm part 6'd is short, the suction hood can still be swung in a similar manner as in the previous examples, namely about the axis Y'" of the joint between the holding arm parts 6'c and 6'd. The canopy portion 2"b is here provided with an observation window 15 with a magnifying glass 25.

According to Figs. 6a and 6b, the suction hood 1",2" is provided, apart from a handle 14c, with an illumination means in the form of a fluorescent tube 23 along the part-cylindrical portion 2"a in the vicinity of the suction gap 9", and in front of the tube there is a dazzle shield 24.

The invention can be modified by one skilled in the art in many different ways within the scope of the following claims. Accordingly, the turnable connection of the connection member to the duct end member can be formed in a way other than the one described above, and in addition, the swingable or fixed connection of the connection member to the collection member can be varied. The suction gap can be made larger or smaller, and the canopy portion can be given a desired detail embodiment. The part-cylindrical portion of the hood does not need to be exactly cylindrical, but can be polygonal in cross-section, and its suspension can also be modified, e.g. with a flexible holding means separate from the suction duct. However, both the holder means and the suction duct must be connected to the connection member of the suction hood.

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## CLAIMS

1. A suction hood for connection to a spot suction system having a flexible suction duct (4,4'), the suction hood having a collection member (2;2';2"), and a connection member (1;1';1") articulately connectable to a duct end member (3;3';6'd) on the free end of the flexible suction duct, characterized in that:

- the collection member (2;2';2") of the suction hood comprises a substantially part-cylindrical portion (2a;2'a;2"a) extending transverse to the axis (X;X";X'") of the connection member (1;1';1"), said part-cylindrical portion forming a vortex chamber operating at sub-pressure, and merging into a canopy portion (2b;2'b;2"b) in the region of a suction gap (9;9';9") having an area at most equal to that of the connection member (1;1';1"), and in that
- the collection member (2b;2'b;2"b) with associated canopy portion is turnable or swingable about an axis (Y;Y';Y") parallel to the axis (Y;C) of the part-cylindrical portion (2a;2'a;2"a), as well as being turnable about the axis (X;X";X'") of the connection member (1;1';1").

2. Suction hood as claimed in claim 1, characterized in that the connection member (1') is divided into two parts, namely a first part (16,17,18) which is turnable relative the duct end member (3') about a first axis (X'), and a second part (19,20,21,22) rigidly connected to the collection member (2') and disposed to allow turning or swinging about a second axis (Y') at right angles to the first axis.

3. Suction hood as claimed in claim 2, characterized in that said first part (16,17,18) includes an intermediate portion (16) which extends obliquely in relation to said first axis (X'), in that said second part (19,20,21,22)

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is consequently swingable about this first axis (X'), and in addition is turnable relative the first part (18) about a third axis (X'') parallel to the first axis (X'), and in that said second part (19,20,21,22) includes two coupling members (20,21), which are mutually turnable about said second axis (Y').

4. Suction hood as claimed in any one of claims 1-3, characterized in that the canopy portion (2b) is provided with an observation window (15) with a light protective or magnifying glass.

5. Suction hood as claimed in any one of the preceding claims, characterized in that the canopy portion is provided with a handle (14a,14c).

6. Suction hood as claimed in claim 5, characterized in that the handle (14a) is placed on an end wall.

7. Suction hood as claimed in any one of the preceding claims, characterized in that the collection member (2'') is provided with a light source (23).

8. Suction hood as claimed in claim 10, characterized in that the light source (23) is a fluorescent tube disposed adjacent to the substantially part-cylindrical portion.

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Fig. 1

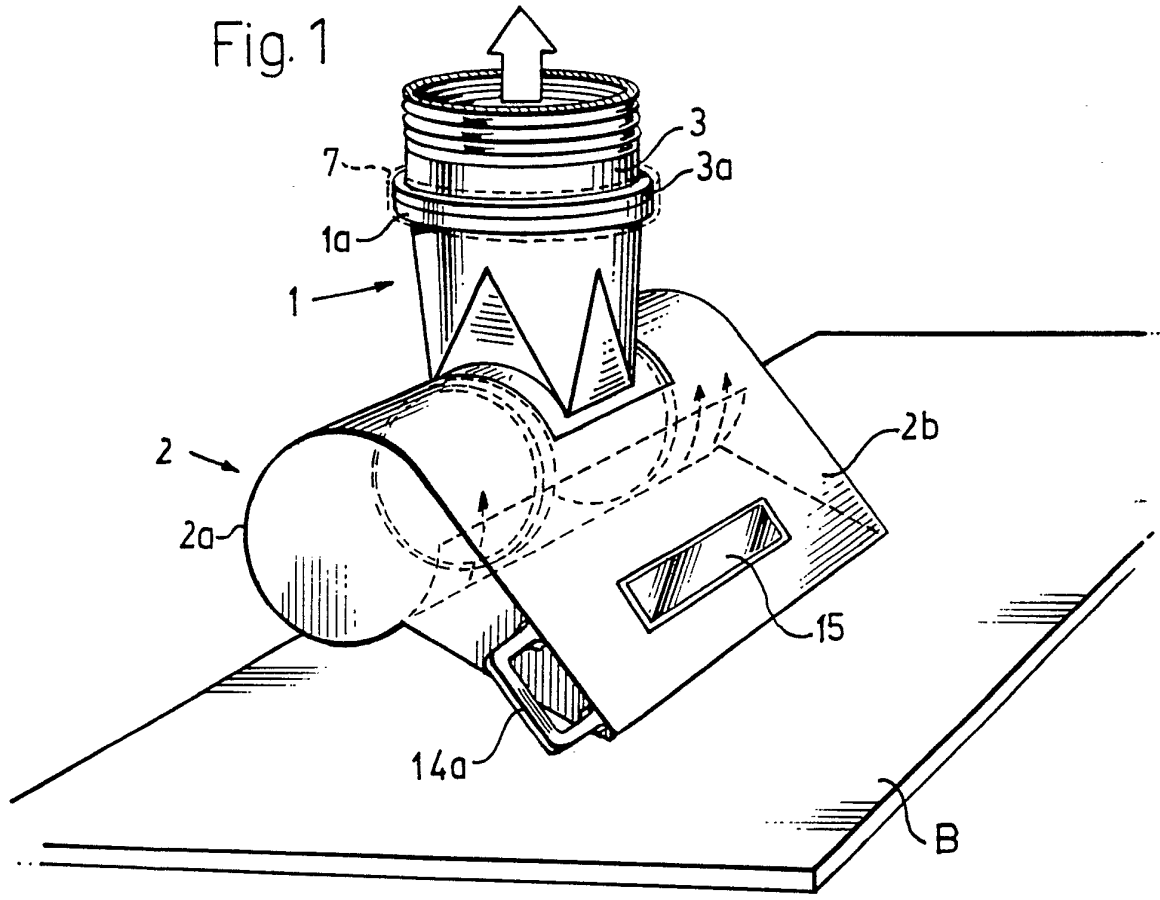


Fig. 2

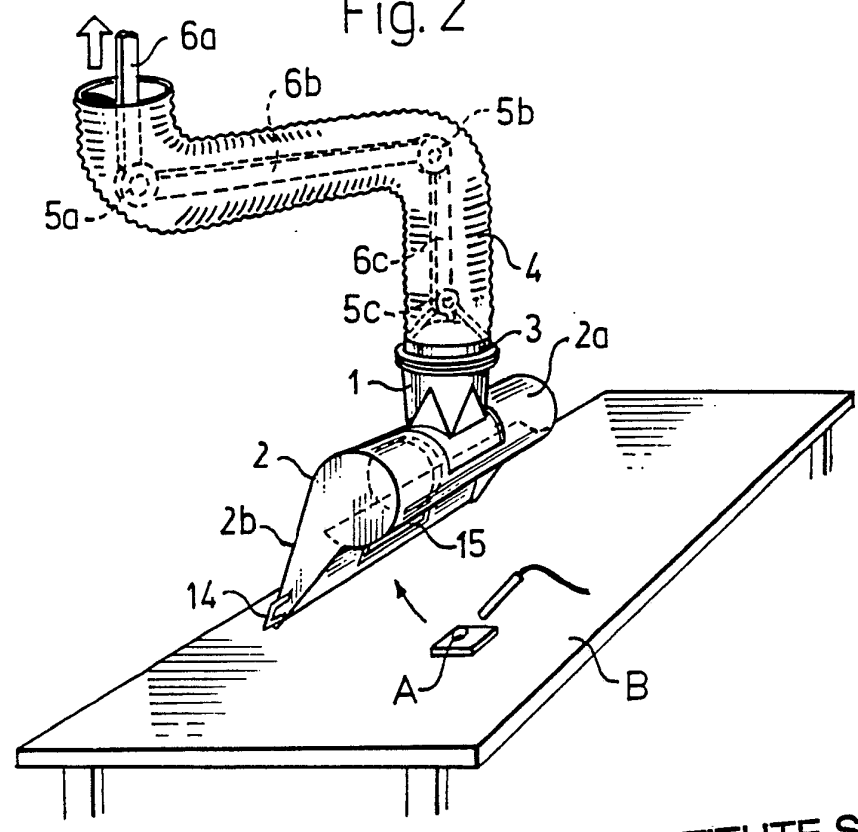


Fig. 3

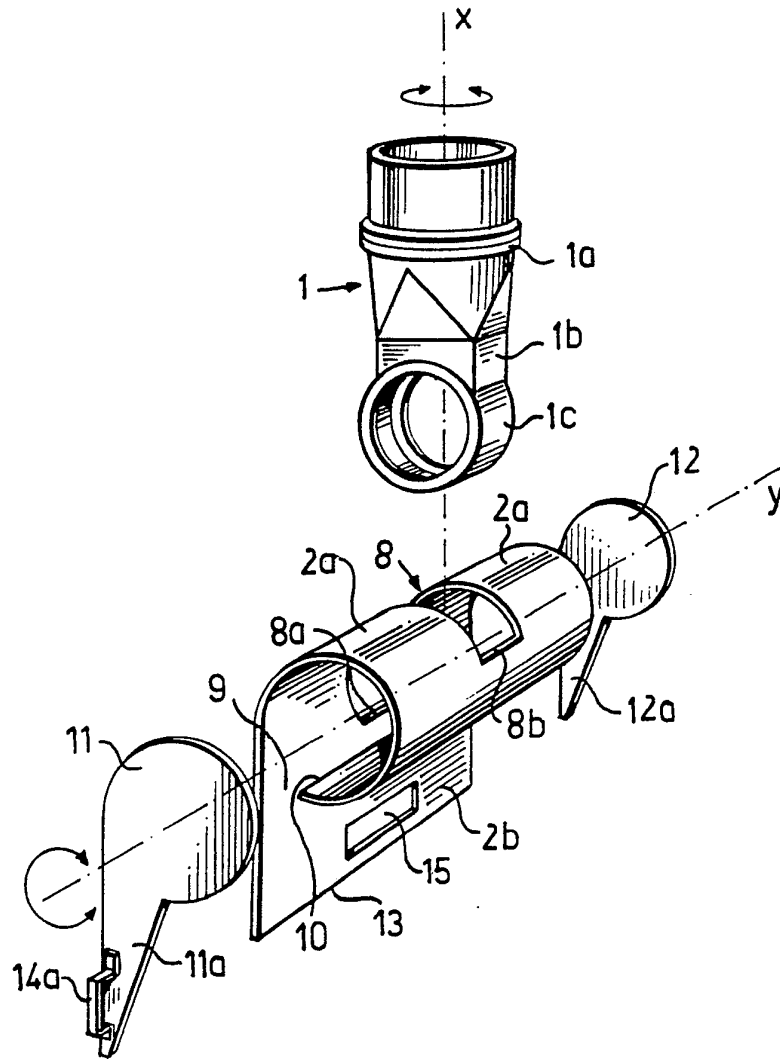


Fig. 4

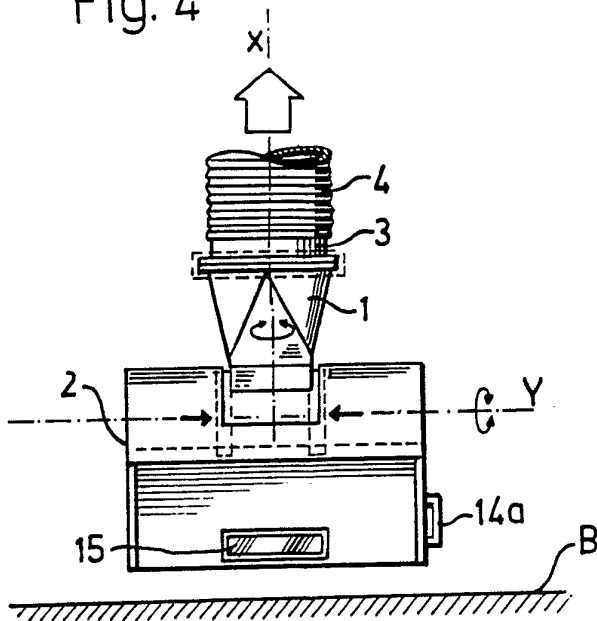


Fig. 5

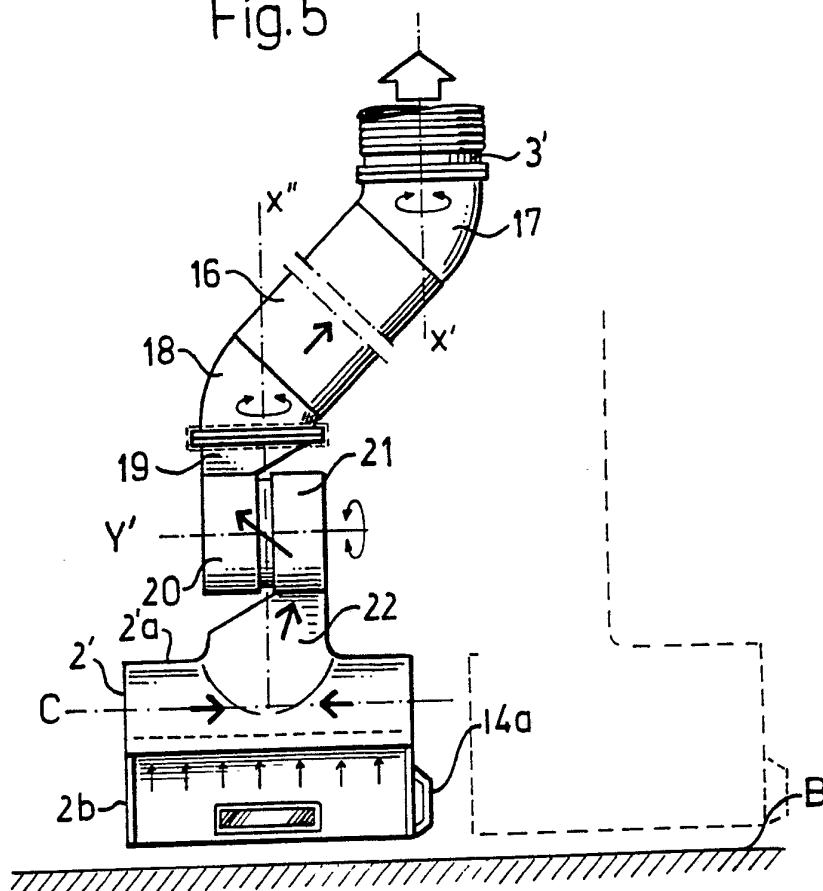


Fig. 6a

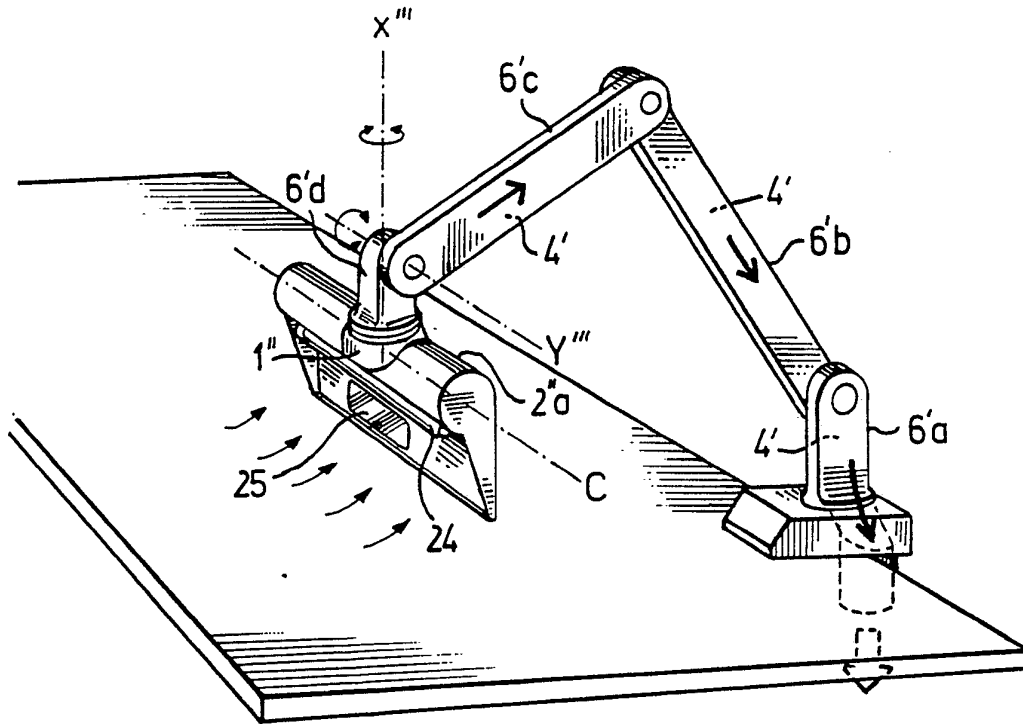


Fig. 6b

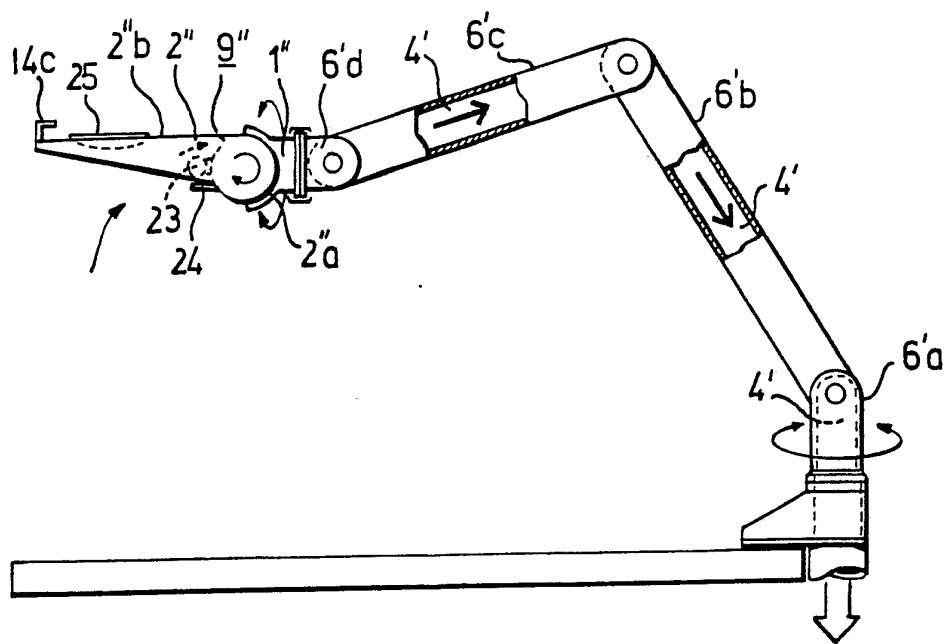


Fig. 7a

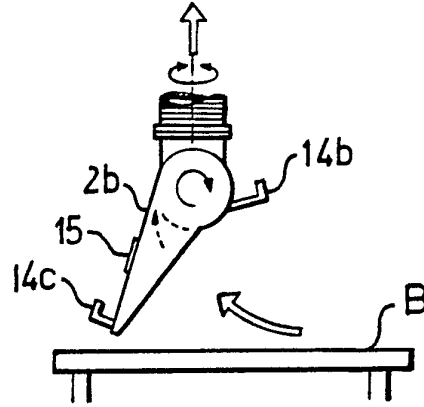


Fig. 7b

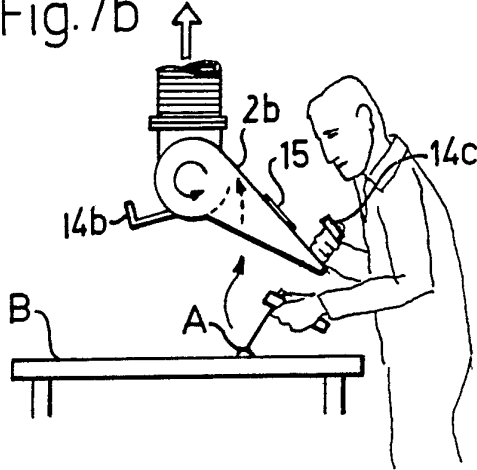
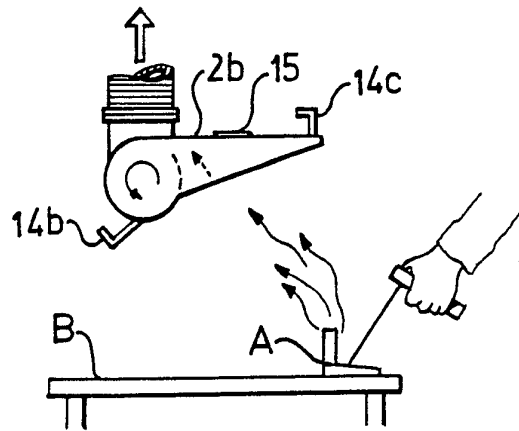


Fig. 7c





# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE88/00265

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC <sup>4</sup>		
B 08 B 15/00		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC 4	B 08 B 15/00-/04	
US C1	98: 115; 15: 306-307	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with Indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A, D	US, A, 3 221 635 (E. HILL, JR) 7 December 1965	
A, D	SE, B, 424 409 (CORAL S.A.S) 5 June 1977 & DE, 2654933 US, 4158462	
A	EP, A1, 0 204 662 (AIRBOX S.R.L) 10 December 1986	
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1988-08-15	1988-08-16	
International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	Liisa Hyrkäs <i>Liisa Hyrkäs</i>	