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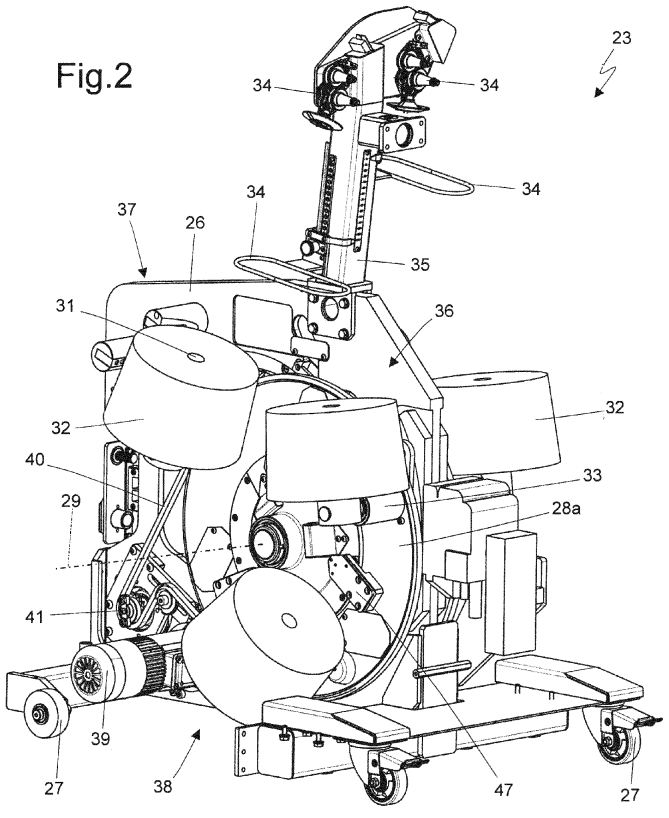
(54) **Feed unit for feeding thread to an automatic manufacturing machine**

(57) A feed unit (23) for feeding thread (24) to an automatic manufacturing machine (1); the feed unit (23) having: a supporting table (28a; 28b); a first unwinding pin (30) fitted to the supporting table (28a; 28b), and which supports a first spool (31), wound with a first reel (32) of thread (24), as the first reel (32) is unwound; and a second unwinding pin (30) which is fitted to the supporting table (28a; 28b), is located alongside the first unwinding pin (30), and supports a second spool (31), wound with a second reel (32) of thread (24), as the second reel (32) is unwound.

Fig.2



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Description

TECHNICAL FIELD

[0001] The present invention relates to a feed unit for feeding thread to an automatic manufacturing machine.

[0002] The present invention applies to advantage to a feed unit for feeding thread to an automatic cigarette filter manufacturing machine, to which the following description refers purely by way of example.

BACKGROUND ART

[0003] Cigarette filters have been proposed, in which at least one piece of thread is inserted centrally to embellish the filter (i.e. using a thread of a different colour from the conventional white filtering material) and/or to aromatize the filter (using a thread impregnated with volatile aromatic substances).

[0004] To insert the thread inside the filter, automatic cigarette filter manufacturing machines are equipped with a thread feed unit, on which the thread is unwound off a spool; and an insertion unit, which receives the continuous thread from the feed unit, and inserts it into a strip of filtering material at a pneumatic conveyor assembly, which compacts the strip of filtering material into a rope.

[0005] Patent Application WO2008016839A1 describes a feed unit, which feeds a thread to an insertion unit connected to a pneumatic conveyor assembly of an automatic cigarette filter manufacturing machine. The feed unit comprises a vertical unwinding pin supporting a spool wound with a reel of thread, which is gradually unwound; and a number of fixed thread guides, which guide the thread from the periphery of the reel to the insertion unit connected to the pneumatic conveyor assembly. Whenever the reel of thread on the unwinding pin spool runs out, however, the machine must be shut down immediately (thus resulting in serious output losses: even only one minute's downtime means the loss of several thousand filters), and a skilled worker must intervene quickly to replace the old spool with a new one and at the same time manually splice the trailing end of the old thread to the leading end of the new one.

DESCRIPTION OF THE INVENTION

[0006] It is an object of the present invention to provide a feed unit for feeding thread to an automatic manufacturing machine, designed to eliminate the above drawbacks and which, at the same time, is cheap and easy to implement.

[0007] According to the present invention, there is provided a feed unit for feeding thread to an automatic manufacturing machine, and as claimed in the accompanying Claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] A number of non-limiting embodiments of the present invention will be described by way of example with reference to the attached drawings, in which:

Figure 1 shows a schematic front view of a dual automatic filter manufacturing machine equipped with a thread feed unit in accordance with the present invention;
Figure 2 shows a schematic view in perspective of the feed unit of the Figure 1 automatic manufacturing machine;
Figure 3 shows a front view of the Figure 2 feed unit;
Figure 4 shows a view in perspective, with parts removed for clarity, of the Figure 2 feed unit;
Figure 5 shows a side view of a supporting table of the Figure 2 feed unit;
Figure 6 shows a rear view of the Figure 5 supporting table.

PREFERRED EMBODIMENTS OF THE INVENTION

[0009] Number 1 in Figure 1 indicates as a whole a dual automatic manufacturing machine for producing cigarette filters. Machine 1 comprises two forming beams 2a, 2b for forming respective continuous filter rods 3a, 3b; and a filtering material feed line 4a, 4b for each forming beam 2a, 2b. Feed lines 4a, 4b receive the filtering material from a conveyor line 5, which forms part of machine 1 and extends between an input station 6 of feed lines 4a, 4b and a store 7 containing two bales 8a, 8b of filtering material.

[0010] Respective strands 9a, 9b are unwound from bales 8a, 8b and pulled along conveyor line 5 by a traction roller assembly 10a at input station 6.

[0011] Conveyor line 5 comprises a guide device 11 located over bales 8a, 8b to guide strands 9a, 9b; and an expanding device 12 located at input station 6, directly upstream from traction roller assembly 10a, to expand strands 9a, 9b crosswise with jets of compressed air and form respective flat-section strips 13a, 13b, which are then fed to traction roller assembly 10a.

[0012] Downstream from traction roller assembly 10a, strips 13a, 13b are fed, along respective feed lines 4a, 4b and in a substantially horizontal direction 14, through a pressing unit 15 comprising two traction roller assemblies 10b, 10c similar to assembly 10a. Next, strips 13a, 13b are fed, along respective feed lines 4a, 4b in direction 14, through an inflating device 16, which blows air into strips 13a, 13b; and then through a processing unit 17, where a chemical substance, in particular triacetin, is added to strips 13a, 13b to impart aroma and plasticity to the filtering material. Finally, strips 13a, 13b are fed, along respective feed lines 4a, 4b in direction 14, through a traction roller assembly 10d similar to assemblies 10a and 10b, 10c, and which defines an output portion of feed lines 4a, 4b.

[0013] Feed lines 4a, 4b are connected to forming beams 2a, 2b by a pneumatic conveyor assembly 18 located directly downstream from traction roller assembly 10d. Pneumatic conveyor assembly 18 receives strips 13a, 13b from feed lines 4a, 4b, and feeds strips 13a, 13b to forming beams 2a, 2b. On respective forming beams 2a, 2b, strips 13a, 13b of filtering material, already partly gathered by assembly 18, are further gathered and compacted to form respective cylindrical ropes of filtering material. These are fed onto respective paper strips 19a, 19b, gummed beforehand at a gumming station 20, and are then wrapped crosswise in strips 19a, 19b to form two continuous filter rods 3a, 3b.

[0014] At the output of forming beams 2a, 2b, a control station 21 checks the density of filter rods 3a, 3b, and a cutting head 22 cuts rods 3a, 3b transversely into respective successions of filter portions (not shown).

[0015] As shown in Figure 1, automatic manufacturing machine 1 comprises a feed unit 23 for supplying pneumatic conveyor assembly 18 with two threads 24a, 24b, each of which is inserted into the centre of a corresponding filtering material rope when compacting respective strip 13a, 13b. Threads 24a, 24b may serve to embellish continuous filter rods 3a, 3b (i.e. using threads of a different colour from the conventional white filtering material) and/or to aromatize the filter rods (using threads 24a, 24b impregnated with volatile aromatic substances). More specifically, pneumatic conveyor assembly 18 comprises an insertion unit 25, which receives threads 24a, 24b from feed unit 23, and inserts threads 24a, 24b into respective strips 13a, 13b of filtering material.

[0016] As shown in Figure 2, feed unit 23 comprises a vertical frame 26, which is mounted on brake wheels 27 (i.e. each fitted with a releasable brake to prevent it from rotating), and supports twin vertical supporting tables 28a, 28b (only one shown in Figure 2) located on opposite sides of frame 26. Each supporting table 28a, 28b is circular, and is fitted to frame 26 to rotate about a horizontal centre axis of rotation 29 (i.e. perpendicular to frame 26). Both supporting tables 28a, 28b share the same centre axis of rotation 29, and are parallel and coaxial. Each supporting table 28a, 28b is fitted with three unwinding pins 30 (shown in Figures 4 and 6), each of which supports a spool 31, wound with a reel 32 of thread 24a, 24b, as reel 32 is unwound. The three unwinding pins 30 are arranged side by side along the periphery of respective supporting table 28a, 28b, and are equally spaced about centre axis of rotation 29.

[0017] Being fitted with three unwinding pins 30, each supporting table 28a, 28b can accommodate up to three reels 32 at a time: obviously, only one reel 32 is unwound at a time, the other two reels 32 being standbys, i.e. which are unwound (one after the other) when the unwinding reel 32 runs out. The twin supporting tables 28a, 28b provide for simultaneously unwinding both threads 24a, 24b, which are fed together to dual automatic manufacturing machine 1: thread 24a for filter rod 3a is unwound off a reel 32 on an unwinding pin 30 on supporting table 28a, while thread 24b for filter rod 3b is unwound off a reel 32 on an unwinding pin 30 on supporting table 28b.

[0018] As shown in Figure 3, each unwinding pin 30 is parallel to supporting table 28a, 28b (i.e. crosswise to centre axis of rotation 29) and is connected to supporting table 28a, 28b by a connecting arm 33 (shown in Figures 3 and 6) with which it forms an L-shaped structure. In other words, each connecting arm 33 projects perpendicularly from supporting table 28a, 28b (i.e. axially with respect to supporting table 28a, 28b and therefore parallel to centre axis of rotation 29), and the end of connecting arm 33 opposite supporting table 28a, 28b is fitted with unwinding pin 30, which is perpendicular to connecting arm 33 (and therefore parallel to supporting table 28a, 28b). In one embodiment, each unwinding pin 30 is fitted idly to connecting arm 33 to rotate freely about its longitudinal axis. In another embodiment, each unwinding pin 30 is fixed to connecting arm 33.

[0019] For each supporting table 28a, 28b, frame 26 of feed unit 23 is fitted with a number of guide members 34 for guiding thread 24a, 24b, and which are located in a fixed position alongside supporting table 28a, 28b to guide the unwinding thread 24a, 24b from supporting table 28a, 28b (i.e. from corresponding reel 32) to insertion unit 25 integrated in pneumatic conveyor assembly 18. In a preferred embodiment, frame 26 of feed unit 23 has a top arm 35 extending vertically upwards from the top of frame 26 and supporting a number of guide members 34.

[0020] As shown in Figures 2 and 3, each supporting table 28a, 28b is mounted to rotate about centre axis of rotation 29, to move each unwinding pin 30 cyclically into two unwinding stations 36, 37, where unwinding pin 30 (and therefore reel 32 fitted to unwinding pin 30) is located close to guide members 34; and into a standby station 38, where unwinding pin 30 (and therefore reel 32 fitted to unwinding pin 30) is located away from guide members 34. More specifically, unwinding stations 36 and 37 are located at the top (to the right and left of guide members 34), and standby station 38 is located at the bottom. In the embodiment shown in the drawings, supporting table 28a rotates anticlockwise, so, for each 120° rotation of supporting table 28a, the unwinding pin 30 at standby station 38 moves into the 'right' unwinding station 36; the unwinding pin 30 at the 'right' unwinding station 36 moves into the 'left' unwinding station 37; and the unwinding pin 30 at the 'left' unwinding station 37 moves into standby station 38.

[0021] Rotation of each supporting table 28a, 28b about centre axis of rotation 29 is controlled by an electric motor 39, which is fitted to frame 26, alongside supporting table 28a, 28b, and drives supporting table 28a, 28b via an endless belt 40 wound about the periphery of supporting table 28a, 28b. More specifically, cascade gearing connects a drive shaft of electric motor 39 angularly integral with a drive pulley 41, about which belt 40 is wound.

[0022] In a preferred embodiment shown in Figure 3, each unwinding pin 30 is fitted to supporting table 28a,

28b to rotate, with respect to supporting table 28a, 28b, about a peripheral axis of rotation 42 parallel to centre axis of rotation 29 (i.e. perpendicular to supporting table 28a, 28b and crosswise to unwinding pin 30). As shown in Figures 5, 6 and 7, each supporting table 28a, 28b is connected to an actuating device 43, which adjusts the angular position of each unwinding pin 30 with respect to supporting table 28a, 28b as a function of the angular position of supporting table 28a, 28b about centre axis of rotation 29. More specifically, each actuating device 43 adjusts the angular position of each unwinding pin 30 with respect to supporting table 28a, 28b so as to set unwinding pin 30 to the best position with respect to guide members 34 guiding thread 24a, 24b: as shown in Figure 4, both reel 32 at the 'right' unwinding station 36, and reel 32 at the 'left' unwinding station 37 are oppositely oriented so that both 'face' guide members 34 guiding thread 24a.

[0023] As shown in Figures 4, 5 and 6, each actuating device 43 comprises at least two cams 44 (Figure 5) located in fixed positions about centre axis of rotation 29; and, for each unwinding pin 30, two corresponding cam followers 45 (Figures 5 and 6) which engage cams 44 and are connected mechanically to unwinding pin 30. More specifically, connecting arm 33 of each unwinding pin 30 is fitted in rotary manner to supporting table 28a, 28b, and has an outer end connected rigidly to unwinding pin 30, and an inner end (opposite the outer end) integral with a vertex of a triangular frame 46; and the two cam followers 45 are fixed to triangular frame 46 at the other two vertices not engaged by the inner end of connecting arm 33. By virtue of the shape of the two cams 44, the two cam followers 45 thus control the angular position of triangular frame 46 about peripheral axis of rotation 42, and therefore also the angular position of unwinding pin 30 about peripheral axis of rotation 42.

[0024] As shown in Figure 3, each supporting table 28a, 28b comprises three splicing devices 47 fixed to supporting table 28a, 28b and each located between two unwinding pins 30. Each splicing device 47 is used to splice a trailing end of thread 24a, 24b on a reel 32 fitted to an unwinding pin 30 on one side of splicing device 47, to the leading end of thread 24a, 24b on a reel 32 fitted to an unwinding pin 30 on the other side of splicing device 47. Threads 24a or 24b of the two reels 32 are thus joined continuously, so, once one reel 32 runs out, unwinding of the other reel 32 commences automatically and seamlessly. Each splicing device 47 is normally activated by an operator, who first inserts the two ends for splicing inside respective seats on splicing device 47, and then turns on splicing device 47, which at this point splices the two ends automatically. In a preferred embodiment, each splicing device 47 untwists the ends of the two threads 24a or 24b for splicing, superimposes the untwisted ends, and then connects the two ends mechanically using jets of water and air, which twist the two ends together.

[0025] In a different embodiment not shown, each supporting table 28a, 28b is fitted with other than three unwinding pins 30, e.g. two or four unwinding pins 30 equally spaced about centre axis of rotation 29.

[0026] In a different embodiment not shown, automatic manufacturing machine 1 is a one-line machine, and so only needs to receive one thread 24. This embodiment may therefore employ either feed unit 23 with two supporting tables 28a and 28b (obviously, only one supporting table 28a or 28b is used, and the other 28b or 28a is left idle) or a feed unit 23 with one supporting table 28.

[0027] Operation of feed unit 23 described above will now be described with reference to supporting table 28a, which feeds thread 24a to insertion unit 25 integrated in pneumatic conveyor assembly 18 of automatic manufacturing machine 1 (supporting table 28b operates in exactly the same way as supporting table 28a).

[0028] First, an operator loads three spools 31, each wound with a full reel 32, onto the three unwinding pins 30 on supporting table 28a. The operator then takes the leading end of thread 24a on the reel 32 in the 'left' unwinding station 37, and threads it manually through corresponding guide members 34 to insertion unit 25 integrated in pneumatic conveyor assembly 18. The operator (using corresponding splicing device 47) then splices the trailing end of thread 24a on the reel 32 in the 'left' unwinding station 37 to the leading end of thread 24a on the reel 32 in the 'right' unwinding station 36, and (using the corresponding splicing device 47) splices the trailing end of thread 24a on the reel 32 in the 'right' unwinding station 36 to the leading end of thread 24a on the reel 32 in standby station 38. At this point, automatic manufacturing machine 1 can be started, and begins using thread 24a unwound off reel 32 in the 'left' unwinding station 37; when reel 32 in the 'left' unwinding station 37 runs out, reel 32 in the 'right' unwinding station 36 is unwound automatically, by virtue of the trailing end of thread 24a on reel 32 in the 'left' unwinding station 37 being spliced to the leading end of thread 24a on reel 32 in the 'right' unwinding station 36. When reel 32 in the 'right' unwinding station 36 starts to unwind, electric motor 39 rotates supporting table 28a 120° anticlockwise about axis of rotation 29 to move the unwinding reel 32 into the 'left' unwinding station 37, to move the full reel 32 into the 'right' unwinding station 36, and to move the run-out spool 31 into standby station 38.

[0029] At this point, the operator may replace the run-out spool 31 in standby station 38 with a new spool 31 wound with a full reel 32, and so (using the corresponding splicing device 47) splices the trailing end of thread 24a on reel 32 in the 'right' unwinding station 36 to the leading end of thread 24a on reel 32 in standby station 38. Alternatively, the operator may wait for two spools 31 to run out, before replacing them with respective spools 31 with full reels 32.

[0030] Feed unit 23 described has numerous advantages.

[0031] Firstly, it provides for feeding insertion unit 25 of automatic manufacturing machine 1 with a large

amount of thread 24a, 24b with no operator assistance whatsoever. In fact, feed unit 23 provides for supplying insertion unit 25 of automatic manufacturing machine 1 with three reels 32 of thread 24a or 24b, before any operator assistance is needed.

[0032] Moreover, using feed unit 23 described, supply of thread 24a, 24b to insertion unit 25 of automatic manufacturing machine 1 need never be interrupted, in that, on each supporting table 28a, 28b, as thread 24a, 24b is being unwound off one reel 32 on one unwinding pin 30, the other two run-out reels 32 on the other two unwinding pins 30 can be replaced with full reels 32.

[0033] Feed unit 23 described provides for safely unwinding thread 24a, 24b off reel 32, by virtue of the unwinding reel 32 always being set to the best position, with respect to guide members 34, to avoid overstressing thread 24a, 24b, thus preventing thread 24a, 24b from breaking as it is unwound (particularly at the splices between the trailing end of one reel 32 and the leading end of the following reel 32, which are always weaker points). Breakage of thread 24a, 24b is a serious occurrence, which can only be remedied with the assistance of the operator, and which calls for immediate shutdown of automatic manufacturing machine 1, thus resulting in serious output losses: even only one minute's downtime means the loss of several thousand filter portions.

[0034] Feed unit 23 described can be installed quickly and easily on any automatic manufacturing machine 1, and even only when required to produce filters with thread 24. This is an important characteristic, in that it allows feed unit 23 to be shared between various automatic manufacturing machines, thus reducing cost.

[0035] Finally, feed unit 23 described is cheap and easy to implement.

[0036] Feed unit 23 described is installed on an automatic cigarette filter manufacturing machine 1, but may also be used to advantage to feed any type of thread to any type of automatic manufacturing machine employing thread.

Claims

1. A feed unit (23) for feeding thread (24) to an automatic manufacturing machine (1); the feed unit (23) comprising:

   a supporting table (28a; 28b); and
   a first unwinding pin (30) fitted to the supporting table (28a; 28b), and which supports a first spool (31), wound with a first reel (32) of thread (24), as the first reel (32) is unwound;
   the feed unit (23) being **characterized by** comprising a second unwinding pin (30) which is fitted to the supporting table (28a; 28b), is located alongside the first unwinding pin (30), and supports a second spool (31), wound with a second reel (32) of thread (24), as the second reel (32) is unwound.

2. A feed unit (23) according to Claim 1, wherein each unwinding pin (30) is positioned parallel to the supporting table (28a; 28b) and connected to the supporting table (28a; 28b) by a connecting arm (33) with which it forms an L-shaped structure.

3. A feed unit (23) according to Claim 1 or 2, wherein the supporting table (28a; 28b) is mounted to rotate about a centre axis (29) of rotation to move each unwinding pin (30) cyclically into an unwinding station (36, 37).

4. A feed unit (23) according to Claim 3, wherein each unwind pining (30) is fitted to the supporting table (28a; 28b) to rotate, with respect to the supporting table (28a; 28b), about a peripheral axis (42) of rotation parallel to the centre axis (29) of rotation.

5. A feed unit (23) according to Claim 4, and comprising an actuating device (43), which adjusts the angular position of each unwinding pin (30) with respect to the supporting table (28a; 28b) as a function of the angular position of the supporting table (28a; 28b) about the centre axis (29) of rotation.

6. A feed unit (23) according to Claim 5, wherein the actuating device (43) comprises at least one cam (44) located in a fixed position about the centre axis (29) of rotation; and, for each unwinding pin (30), a respective cam follower (45) which engages the cam (44) and is connected mechanically to the unwinding pin (30).

7. A feed unit (23) according to Claim 5 or 6, and comprising at least one thread guide member (34) located in a fixed position alongside the supporting table (28a; 28b) to guide the thread (24) it is unwound; and the actuating device (43) adjusts the angular position of each unwinding pin (30) with respect to the supporting table (28a; 28b) to set the unwinding pin (30) to the best position with respect to the thread guide member (34).

8. A feed unit (23) according to any one of Claims 1 to 7, and comprising a splicing device (47), which is fitted to the supporting table (28a; 28b), is located between the two unwinding pins (30), and splices a trailing end of the thread (24a; 24b) of the first reel (32) to a leading end of the thread (24a; 24b) of the second reel (32), so that the second reel (32) is unwound automatically and seamlessly when the first reel (32) runs out.

9. A feed unit (23) according Claim 8, wherein the splicing device (47) untwists the ends of the two threads (24a; 24b) to be spliced, overlaps the untwisted

ends, and connects the two ends mechanically using water and air jets, which twist the two ends together.

10. A feed unit (23) according to Claim 8 or 9, and comprising:

three unwinding pins (30) integral with the supporting table (28a; 28b) and equally spaced around the supporting table (28a; 28b); and
three splicing devices (47), each located between two unwind pins (30).

11. A feed unit (23) according to any one of Claims 1 to 10, and comprising at least one thread guide member (34) located in a fixed position alongside the supporting table (28a; 28b) to guide the thread (24) as it is unwound.

12. A feed unit (23) according to any one of Claims 1 to 11, and comprising a frame (26) supporting the supporting table (28a; 28b) and mounted on wheels (27).

13. A feed unit (23) according to any one of Claims 1 to 12, and comprising a vertical frame (26) supporting twin supporting tables (28a, 28b), which are located on opposite sides of the frame (26) and support respective unwinding pins (30).

14. A feed unit (23) according to Claim 13, wherein the twin supporting tables (28a, 28b) simultaneously unwind two threads (24a, 24b), which are fed to an automatic two-line manufacturing machine (1).

15. An automatic cigarette filter manufacturing machine (1) comprising:

a store (7) containing a bale (8a; 8b) of filtering material;
a conveyor line (5), which extracts a strand (9a; 9b) of filtering material from the bale (8a; 8b);
a filtering material feed line (4a; 4b), which receives the strand (9a; 9b) of filtering material, and converts the strand (9a; 9b) of filtering material into a strip (13a; 13b) of filtering material;
a conveyor assembly (18), which receives the strip (13a; 13b) of filtering material, and forms the strip (13a; 13b) of filtering material into a rope of filtering material;
a forming beam (2a; 2b), which receives the rope of filtering material and a strip (19a; 19b) of paper to form a continuous filter rod (3a; 3b);
an insertion unit (25) connected to the conveyor assembly (18) to insert a thread (24a; 24b) into the strip (13a; 13b) of filtering material; and
a feed unit (23) for feeding the thread (24a; 24b) to the insertion unit (25) and according to any one of Claims 1 to 14.

Fig.1

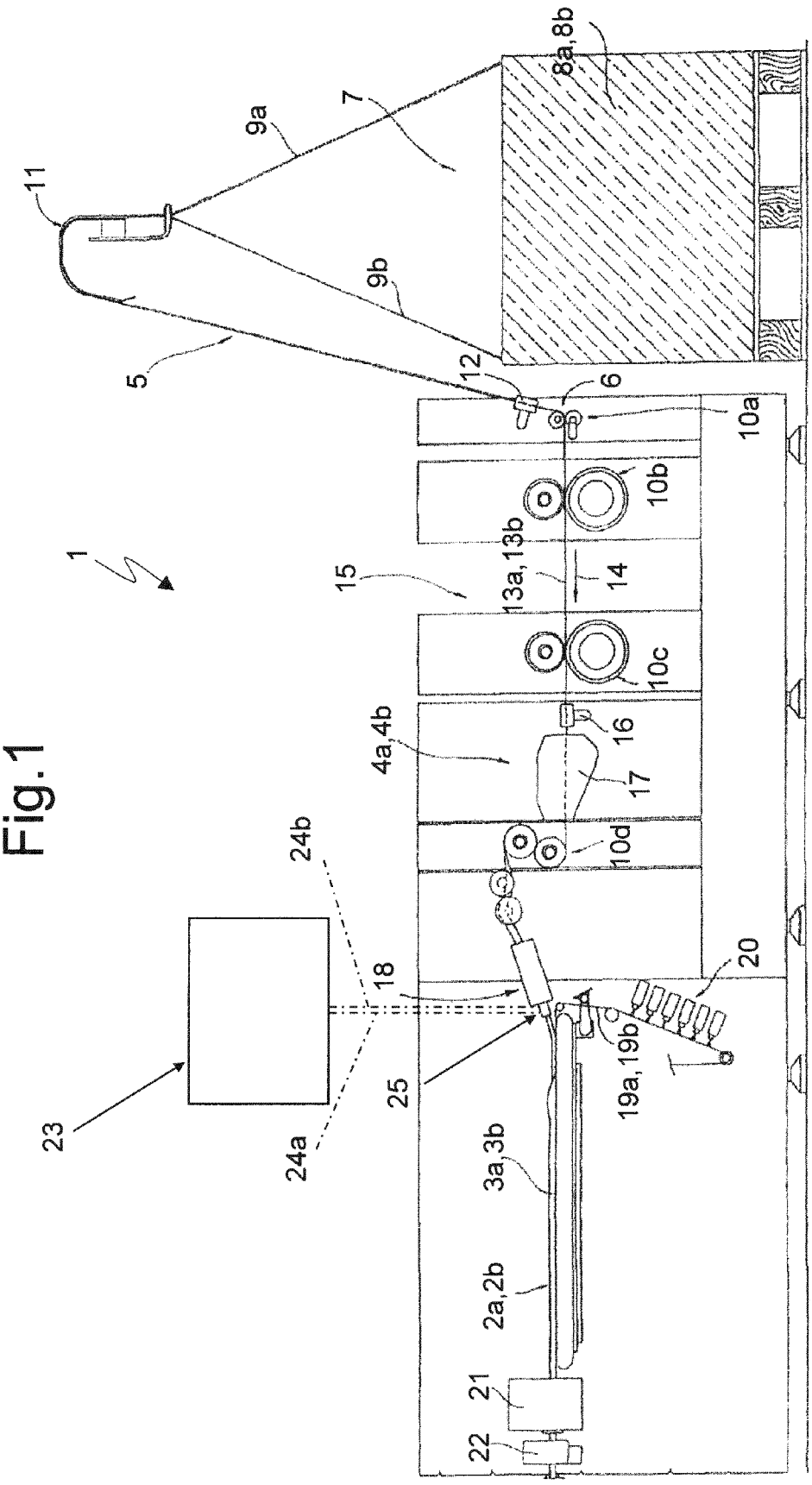

8a,8b
7
9a
11
9b
5
12
6
10a
10b
1
15
13a,13b
14
10c
4a,4b
16
17
10d
24b
18
20
23
25
19a,19b
24a
3a,3b
2a,2b
21
22

Fig.2

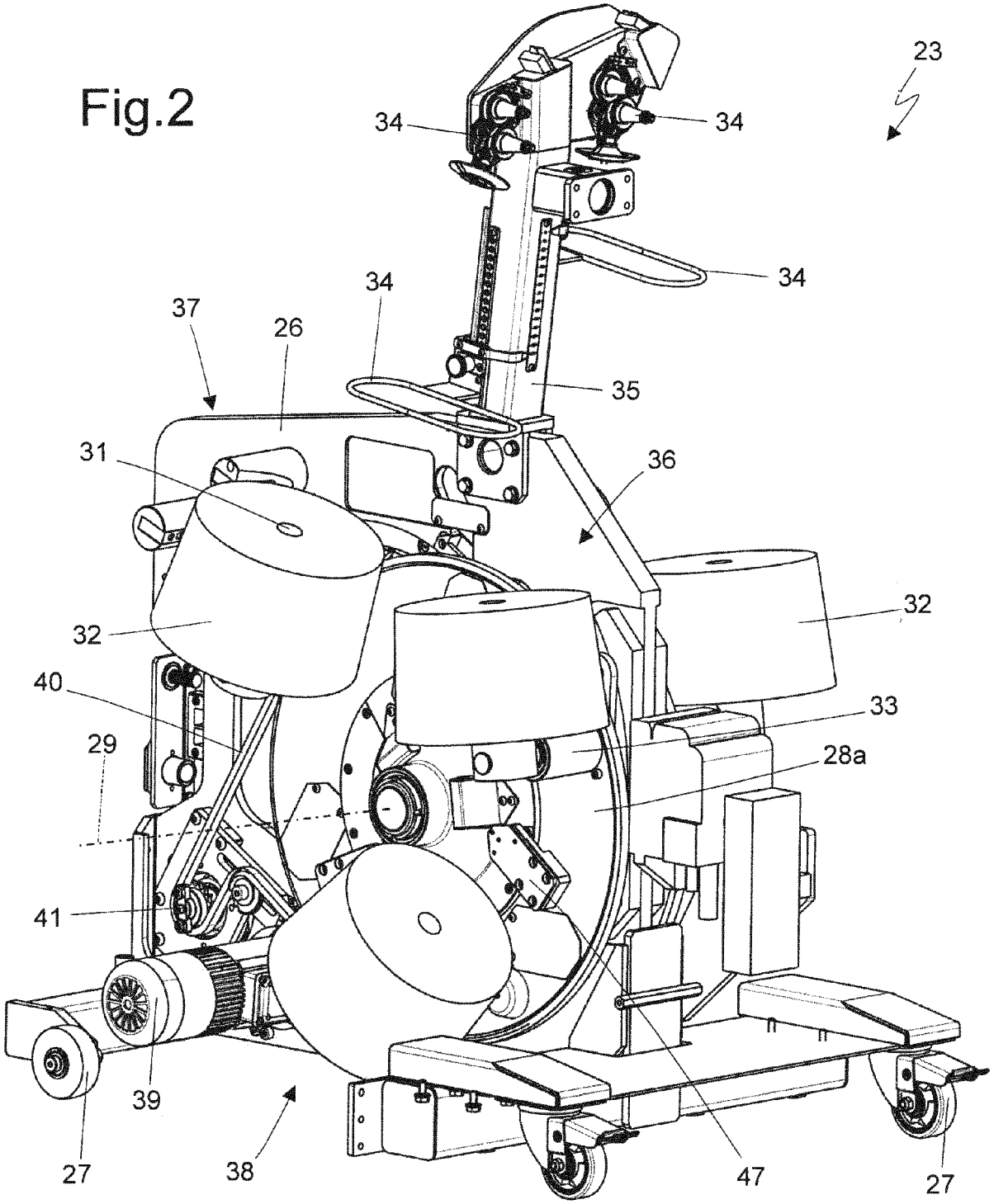
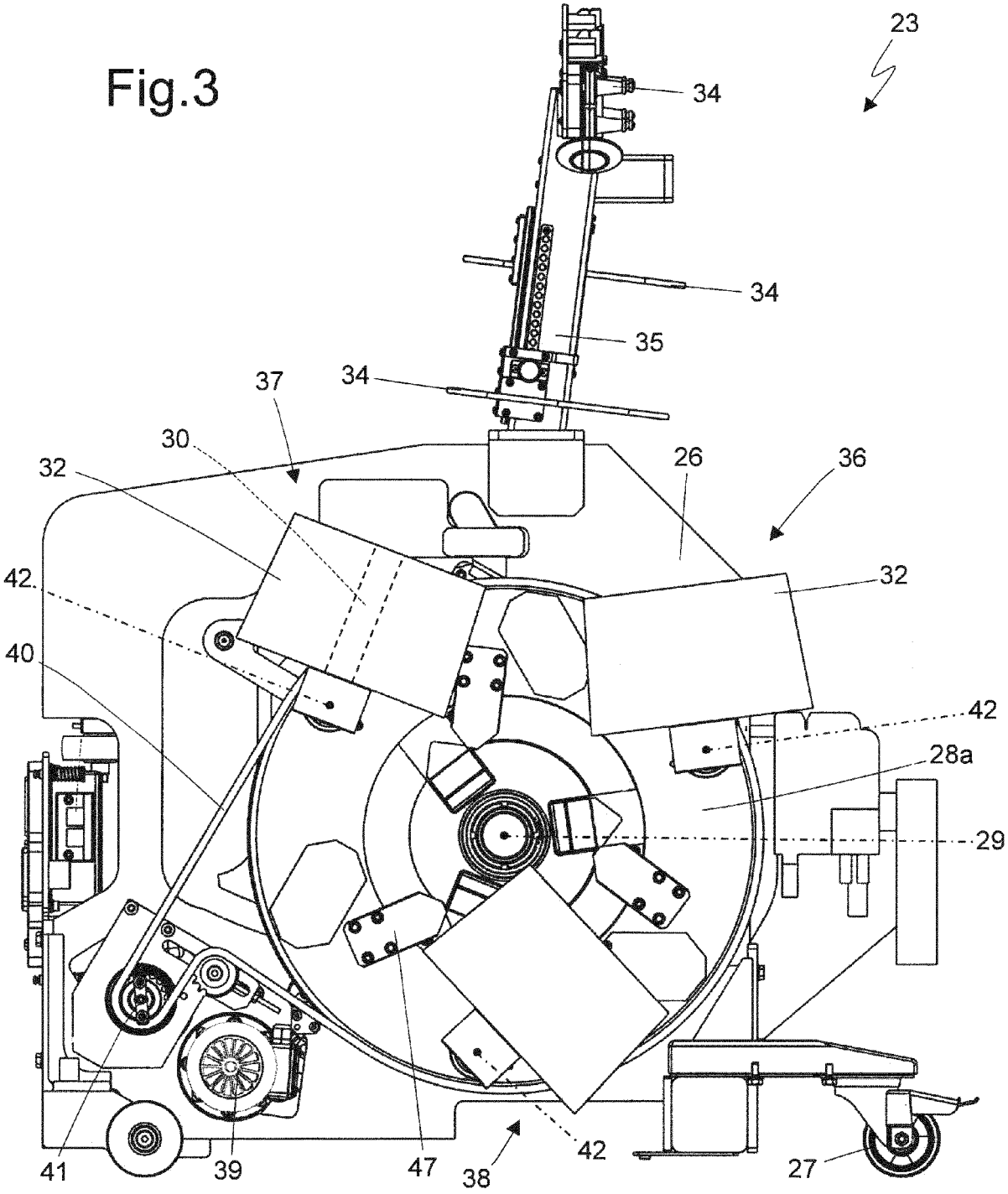


Fig.3



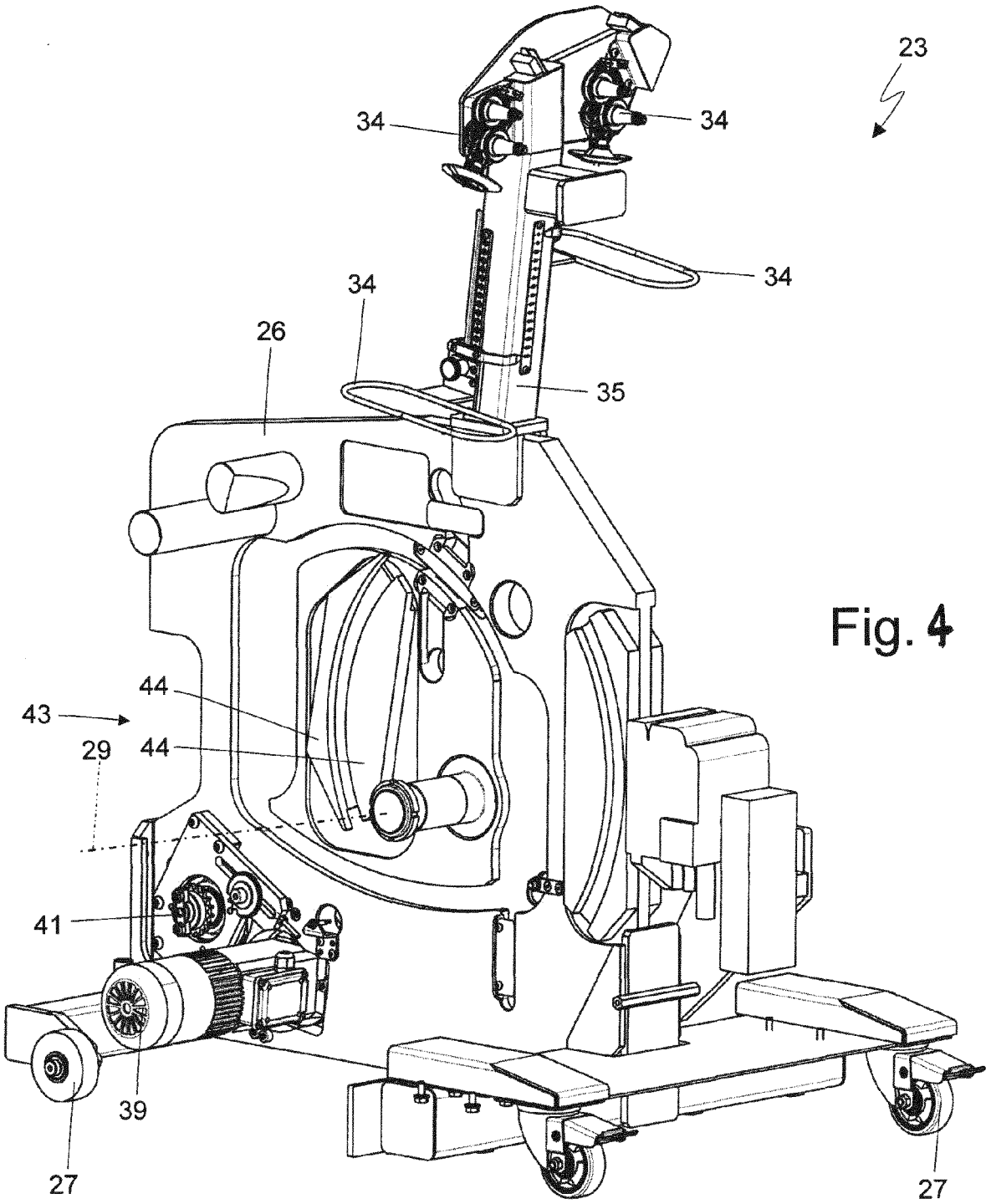


Fig. 4

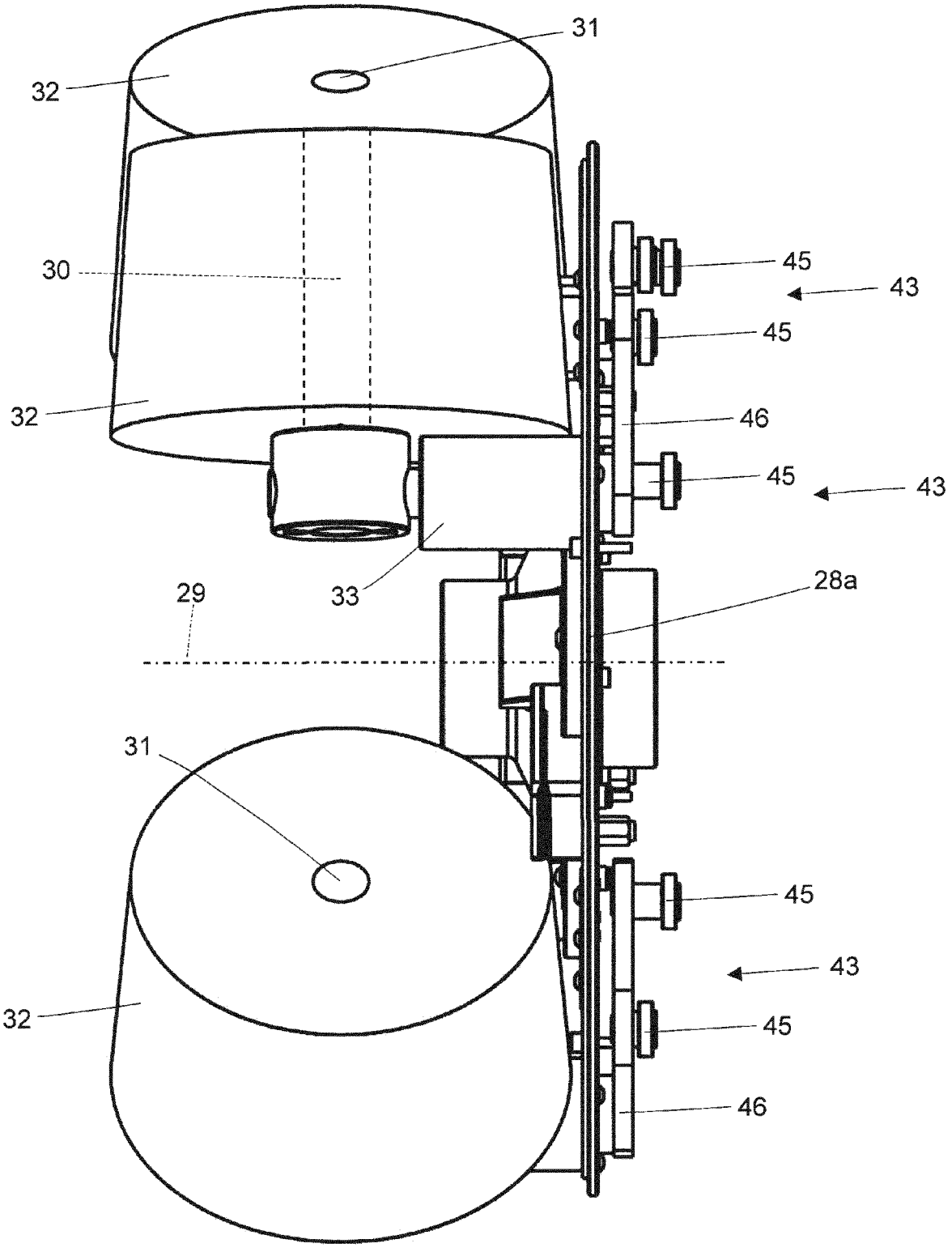


Fig.5

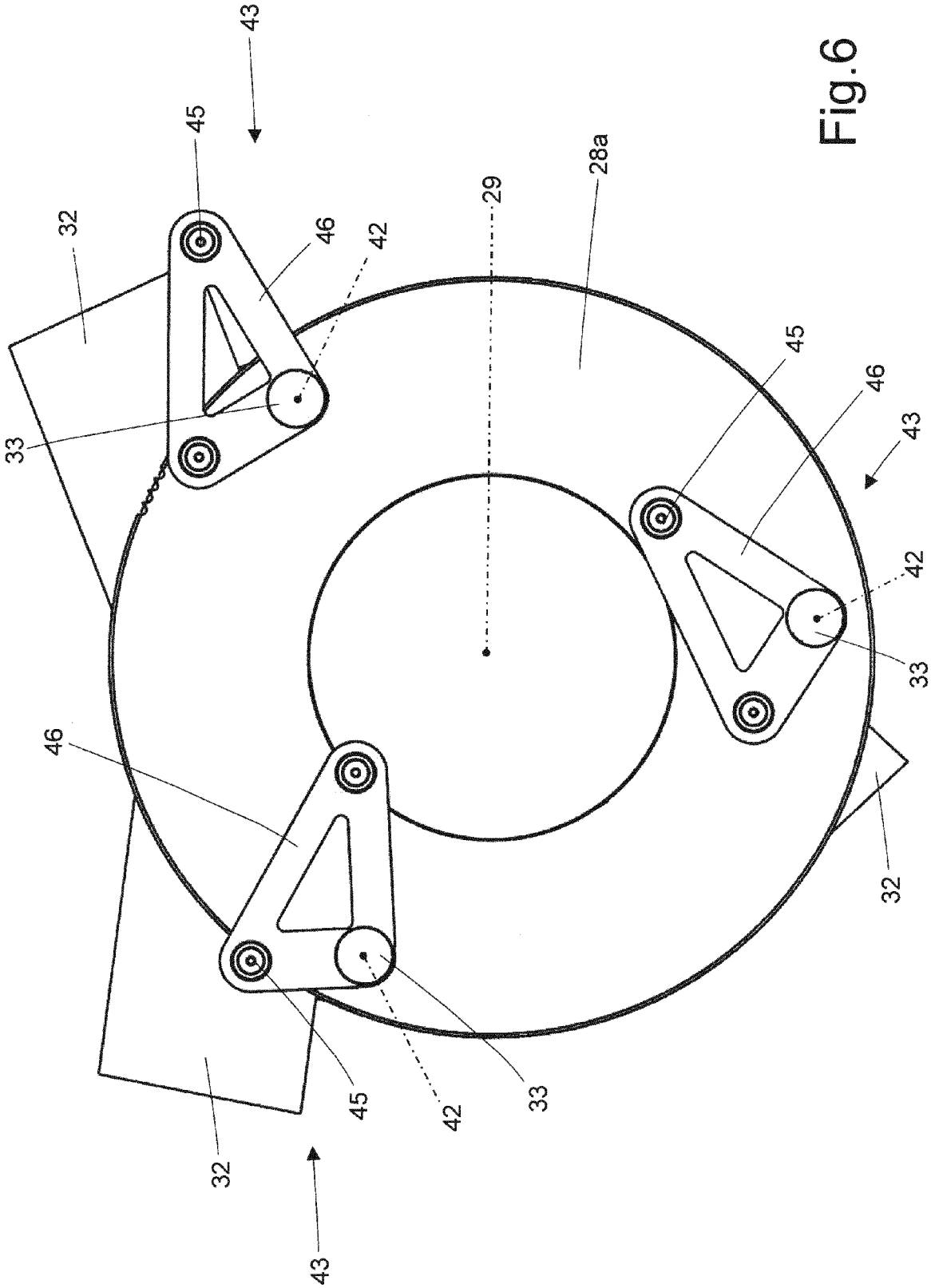


Fig.6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 19 9309

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 518 531 A1 (TSUDAKOMA IND CO LTD [JP]) 16 December 1992 (1992-12-16) * column 4, line 11 - column 6, line 7; figures *	1-14	INV. A24D3/02 B65H49/12
X	DE 10 2008 028073 B3 (MADEIRA GARNFABRIK RUDOLF SCHM [DE]) 10 December 2009 (2009-12-10) * abstract; figures *	1,3,7,8, 11,12	
X	US 4 013 243 A (MAYER INGO) 22 March 1977 (1977-03-22) * the whole document *	1-5,7,12	
X	US 5 323 982 A (LIGON LANG S [US] ET AL) 28 June 1994 (1994-06-28) * the whole document *	1,2,7	
A,D	WO 2008/016839 A1 (REYNOLDS TOBACCO CO R [US]; NELSON JOHN LARKIN [US]; BARNES VERNON BRE) 7 February 2008 (2008-02-07) * page 11, line 5 - page 12, line 6; figure 2 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) A24D B65H
A	GB 2 020 158 A (CIGARETTE COMPONENTS LTD) 14 November 1979 (1979-11-14) * the whole document *	1-15	
A	WO 2010/028354 A1 (REYNOLDS TOBACCO CO R [US]; BRANTLEY FRANKLIN FORREST [US]; GOUGH VAN) 11 March 2010 (2010-03-11) * the whole document *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 March 2013	Marzano Monterosso

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
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