(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 935 261 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.06.2008 Bulletin 2008/26

(51) Int Cl.:
A24D 3/02 *(2006.01)*

(21) Application number: **07123904.0**

(22) Date of filing: **21.12.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(30) Priority: **22.12.2006 IT BO20060874**

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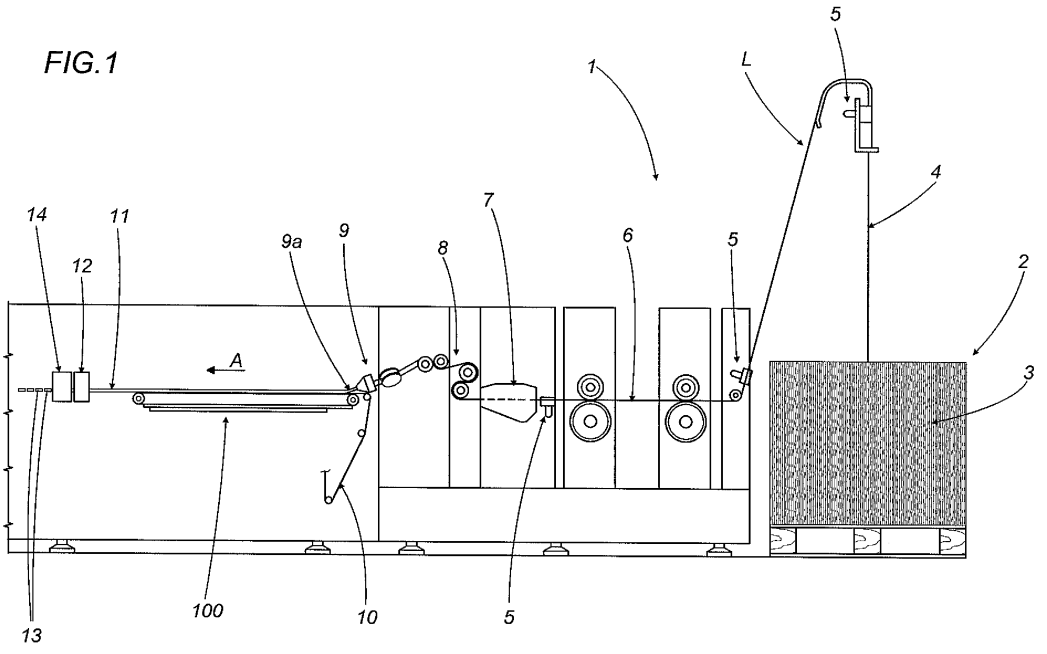
(54) A machine manufacturing filters for tobacco products

(57) In a machine manufacturing filters for tobacco products, a continuous stream (6) of fibrous tow is advanced by feed rollers (8) along a set path (A), passing through a station (9) at which the fibres are gathered into a continuous bundle (9a), a garniture section (100) where the bundle is wrapped to form a continuous filter rod (11), and a rotary cutter (12) by which the rod (11) is divided into single filter plugs (13). Before being bundled, the fibrous tow passes through a chemical treatment device (7) equipped with a bath (15) containing a liquid additive, a revolving brush (19) by which the additive is applied to the stream (6), and a reservoir (20) holding a supply of the additive, connected to the bath (15); the device (7) is also equipped with a set of sensors (24) monitoring the consumption of the additive, and a counter (14), interlocked to the sensors (24) and serving to keep a tally of the single plugs (13) turned out.

FIG.1



EP 1 935 261 A1

Description

[0001] The present invention relates to a machine for manufacturing filters applicable to tobacco products, and in particular to cigarettes.

[0002] Conventionally, the manufacture of cigarette filters involves processing a continuous stream of filter material, such as cellulose acetate, known also as filter tow, drawn from a compacted bale.

[0003] The stream is fed along a set path through processing stations, where it is first stretched lengthwise and crosswise and then impregnated with plasticizing additives.

[0004] Customarily, the impregnating step takes place as the stretched material is directed through special devices designed to invest the advancing fibres with a flow of plasticizer, typically triacetin, a substance which at the normal operating temperature and pressure of the devices in question will remain in the liquid state.

[0005] The fibres are thus sprayed with a flow of liquid consisting in particles of predetermined quantity and size, in such a way that a prescribed quantity of the triacetin will be absorbed.

[0006] At a subsequent station, the filter material is gathered by shaping means into a continuous bundle of cylindrical appearance, which is then enveloped by degrees in a continuous strip of paper material at a further wrapping station to form a continuous filter rod. Finally, the continuous rod is divided up into single plugs by a rotary cutter device.

[0007] In prior art filter makers, the aforementioned chemical treatment device comprises a container or bath, located along the path followed by the stream of filter tow and beneath the selfsame stream, holding a predetermined quantity of triacetin supplied from a tank by means of a pump.

[0008] The bath accommodates a revolving brush partly immersed in the triacetin, which when set in rotation at a normal operating speed will project a flow of liquid droplets at the stream of cellulose acetate.

[0009] Given that the filters made in the course of each production cycle must present the same filtration properties, the quantity of triacetin absorbed by each filter must remain verifiably constant over time and within prescribed limits.

[0010] To this end, in conventional machines, the manufactured filters are weighed at predetermined intervals of time (every three or four hours).

[0011] Since the weight of the corresponding untreated filters is known, as also is the quantity of triacetin consumed, the average quantity of the chemical absorbed by each filter can be calculated.

[0012] Prior art methods include taking account of the triacetin dispensed by the chemical treatment device but not absorbed by the filter material, using correction coefficients based on previous experience.

[0013] Such a method has not proven reliable, however, or able to guarantee the production of filters with properties responding to the prescribed limits.

[0014] The object of the present invention is to provide a filter maker unaffected by the various drawbacks associated with the prior art as described above.

[0015] The stated object is realized according to the invention in a machine for manufacturing filters applicable to tobacco products, as characterized in the appended claims.

[0016] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 shows a machine according to the present invention, manufacturing filters for tobacco products, viewed in a front elevation;
- figure 2 is an enlarged detail of the machine in figure 1, viewed schematically and in perspective, with certain parts omitted better to illustrate others;
- figure 3 is an enlarged detail of figure 2, viewed schematically.

[0017] With reference to figure 1, numeral 1 denotes a machine manufacturing filters for tobacco products, in particular cigarettes, embodied in accordance with the present invention.

[0018] Whilst the following specification describes a single track filter maker, the elements disclosed are referable equally to a twin track machine.

[0019] The machine 1 comprises a magazine 2 containing a bale 3 of filter material. A fibrous tow 4 is drawn from the bale 3 and advanced by feed means of conventional type toward a station at which the filter material will be processed.

[0020] In detail, the filter material passes through a processing station comprising at least one blower device 5 of conventional type, by which the tow 4 is expanded and formed into a continuous stream 6 of predetermined width. In a preferred embodiment, the processing station will comprise three such blower devices 5, ordered along a feed line L as illustrated in figure 1. The processing station further comprises a device 7 for chemical treatment of the filter material, located downstream of the blower devices 5, where the continuous stream 6 aforementioned is taken up and plasticized by the application of a suitable plasticizer fluid.

[0021] The treated stream 6 is advanced thereafter by feed means 8 toward means 9 by which the tow is formed into a rope or bundle 9a of filter material and caused to advance directly above a web 10 of paper, gummed previously, and finally enveloped by the web 10 in such a way as to fashion a continuous filter rod 11.

[0022] The rod 11 obtained in this way advances toward a cutter head 12 and is divided transversely into a succession of plugs 13 which are then tallied by a counting device 14, stationed downstream of the cutter head 12 and interlocked to the chemical treatment device 7.

[0023] More precisely, as illustrated in figure 2, the device 7 comprises a bath 15 consisting in a fixed structure

16 that presents a top portion 16a and a bottom portion 16b.

[0024] The continuous stream 6 of filter material slides over the top portion 16a, on means of conventional type (not illustrated), following a predetermined feed direction A.

[0025] The bottom portion 16b of the fixed structure 16 forms a reservoir 17 serving to hold a plasticizer material, preferably a fluid, which is applied by the treatment device 7 to the continuous stream 6 of filter material.

[0026] The plasticizer fluid includes additives designed to condition the filter material by compacting the constituent fibres stably and thus improving their filtration properties. One component of the fluid, preferably, will be triacetin.

[0027] The treatment device 7 also comprises means 18, preferably rotary, by which a flow of the above mentioned plasticizer fluid can be generated and directed at the continuous stream 6 of filter material.

[0028] In the example of figure 2, generating means 18 comprise a revolving brush 19 rotatable about a preferably horizontal axis X disposed substantially perpendicular to the feed direction A followed by the stream 6 of filter material.

[0029] The revolving brush 19 is placed internally of the reservoir 17 containing the plasticizer fluid, underneath the stream 6 of filter material, and partially immersed in the fluid. With the brush 19 set in rotation, accordingly, the bristles are made to dip repeatedly into the plasticizer fluid and, on emerging, to project droplets of the fluid at the stream 6 of filter material.

[0030] Also associated with the chemical treatment device 7 is a reservoir 20 holding a supply of the plasticizer and in fluid communication with the aforementioned bath 15.

[0031] Interposed between the supply reservoir 20 and the bath 15 dispensing the plasticizer is a measuring reservoir 21, to which plasticizer fluid is directed from the supply reservoir 20 by a transfer pump 22.

[0032] A metering pump 23 located downstream of the measuring reservoir 21 directs the plasticizer fluid from this same reservoir 21 to the bath 15.

[0033] Numeral 24 denotes means, associated with the measuring reservoir 21, by which to monitor the amount of plasticizer fluid consumed.

[0034] As illustrated in figure 3, the aforementioned monitoring means 24 comprise a first, second, third and fourth sensor denoted 25, 26, 27 and 28 respectively, serving to detect the level of fluid in the measuring reservoir 21.

[0035] The first sensor 25 and the second sensor 26 serve respectively to inhibit and enable the flow of fluid from the supply reservoir 20 to the measuring reservoir 21, whilst the third sensor 27 and the fourth sensor 28 serve respectively to start and stop the counter device 14, which is thus interlocked to these same sensors.

[0036] Relative to the feed direction A followed by the stream 6, the chemical treatment device 7 comprises a vessel 29, positioned downstream of the bath 15, connected to the measuring reservoir 21 by way of a pipeline 30 and serving to reclaim the plasticizer fluid not absorbed by the stream 6.

[0037] The vessel 29 and the pipeline 30 constitute means 31 by which to recover the plasticizer fluid.

[0038] In operation, each production cycle will commence with a certain quantity of plasticizer occupying the bath 15, which must remain constant for the duration of the cycle to ensure that the plugs 13 of filter material produced will present uniform properties; the level is maintained by replenishing the bath from the supply reservoir 20.

[0039] When the machine is started up, the plasticizer fluid contained in the measuring reservoir 21 will be at the level of the first sensor 25.

[0040] As filter production begins and the plasticizer fluid is directed at the stream 6 of fibres, the level in the bath 15 will be maintained constant by the addition of new fluid, effected through the agency of the metering pump 23.

[0041] Fluid is drawn from the measuring reservoir 21 by the metering pump 23, and once the level in the reservoir 21 coincides with that of the third sensor 27, this same sensor will pilot the counter device 14 to begin keeping a tally of the filter plugs 13 turned out.

[0042] The filter plug count continues until the fluid in the measuring reservoir 21 drops to the level of the fourth sensor 28.

[0043] At this juncture, the fourth sensor 28 relays a control signal to the counter device 14, which will stop and close the tally of the plugs 13.

[0044] In this way, information is provided as to the number of filter plugs 13 produced utilizing a given metered quantity of fluid, corresponding to the volume of the measuring reservoir 21 delimited by the two sensors 27 and 28.

[0045] When the level of the fluid coincides with the position of the second sensor 26, this same sensor generates a signal to activate the transfer pump 22 connected to the supply reservoir 20, which responds by directing fluid into the measuring reservoir 21 until the level reaches the position of the first sensor 25.

[0046] Thereupon, the first sensor 25 relays a control signal to deactivate the transfer pump 22 and thus shut off the flow of plasticizer fluid to the measuring reservoir 21.

[0047] At this point, a new counting cycle commences and the sequence of steps described above is repeated.

[0048] The full cycle repeats for as long as the machine remains in operation, thereby allowing a continuous evaluation of the quantity of fluid dispensed in relation to the number of filter plugs produced.

[0049] As the impregnated continuous stream 6 of fibrous tow passes beyond the bath 15 of plasticizer fluid, some of the fluid taken up by the fibres will be shed, and drop into the aforementioned recovery vessel 29 lying downstream of the bath 15.

[0050] The surplus fluid collected in the vessel 29 is returned to the measuring reservoir 21 by way of the relative pipeline 30; consequently, the level of plasticizer fluid internally of the reservoir 21 is also determined in part by the fluid recycled from the recovery vessel 29. Accordingly, when evaluating the amount of fluid consumed per number of filter plugs produced, account is also taken of the surplus fluid not absorbed by the stream 6.

[0051] It would also be possible to use just two level sensors, piloting the operation of the counter device and the transfer pump simultaneously.

[0052] The use of four sensors is advantageous in that the risk of the tally being affected by transient phenomena can be avoided.

[0053] To advantage, the measuring reservoir 21 is equipped with an internal float and the sensors identify the position of the selfsame float, hence the level of the plasticizer fluid, through the agency of a magnetic pickup (or other equivalent device) incorporated into the actual float, so that there is no contact with the plasticizer fluid and the operation of the sensor is also simplified.

[0054] Moreover, in the event of two continuous streams being processed, or rather where the filter maker is a twin track type of machine, the equipment will include a measuring reservoir for each stream

[0055] The invention affords important advantages.

[0056] The adoption of monitoring means associated with the measuring reservoir ensures that the properties of filters turned out by the machine can be evaluated in-line, avoiding the need to weigh the treated product at frequent intervals, while guaranteeing that any defects in production can be detected immediately and thus reducing the number of filters rejected.

[0057] Also, with the inclusion of the recovery vessel, likewise connected to the measuring reservoir, it becomes possible to account for the quantity of triacetin effectively absorbed by the stream of filter material and therefore eliminate the risk of evaluation errors attributable to the use of empirically determined correction coefficients.

Claims

1. A machine manufacturing filters for tobacco products, comprising:

- feed means (8) advancing at least one continuous stream (6) of filter material along a predetermined path (A);
- means (9) by which the stream (6) is formed into a continuous bundle (9a) of such filter material;
- means (100) by which to form a continuous filter rod (11) incorporating the bundle (9a);
- cutting means (12) by which the rod (11) is divided into discrete filter plugs (13),
- a chemical treatment device (7) stationed along the predetermined feed path (A) upstream of the means (9) by which the continuous bundle (9a) is formed, equipped with a bath (15) containing a liquid additive, a revolving brush (9) immersed at least partly in the bath (15) and serving to transfer the additive to the stream (6), also a reservoir (20) holding a supply of the additive and connected to the bath (15),

characterized
in that the chemical treatment device (7) comprises means (24) by which to monitor the consumption of the additive, and a device (14) interlocked to the consumption monitoring means (24), serving to count the number of filter plugs (13) turned out by the machine.

2. A machine as in claim 1, wherein the chemical treatment device (7) comprises at least one measuring reservoir (21) interposed between the supply reservoir (20) and the bath (15), and means (24) monitoring consumption of the additive are associated with the measuring reservoir (21).

3. A machine as in claim 2, wherein means (24) monitoring consumption of the additive comprise at least two sensors (27, 28) such as will detect the level of the liquid additive in the measuring reservoir (21) and generate control signals piloting the operation of the counter device (14).

4. A machine as in claim 3, wherein the monitoring means (24) control the flow of the liquid additive from the supply reservoir (20) to the measuring reservoir (21) through the agency of a transfer pump (22).

5. A machine as in claims 2 to 4, wherein the chemical treatment device (7) is equipped with means (31) by which to recover liquid additive not absorbed by the stream (6) of filter material, comprising a vessel (29) positioned downstream of the bath (15) and a pipeline (30) connecting the selfsame vessel to the measuring reservoir (21).

6. A machine as in claim 3, wherein means (24) monitoring the consumption of the additive comprise a first sensor (25) and a second sensor (26) serving respectively to inhibit and enable the flow of the liquid additive from the supply reservoir (20), also a third sensor (27) and a fourth sensor (28) interposed between the first and second sensors (25, 26), serving respectively to start and stop the counter device (14).

7. A machine as in claims 1 to 6, comprising feed means (8) by which two continuous streams (6) of filter material are advanced along relative paths, wherein each stream (6) is served by a respective measuring

reservoir (21), interposed between the supply reservoir (20) and the bath (15).

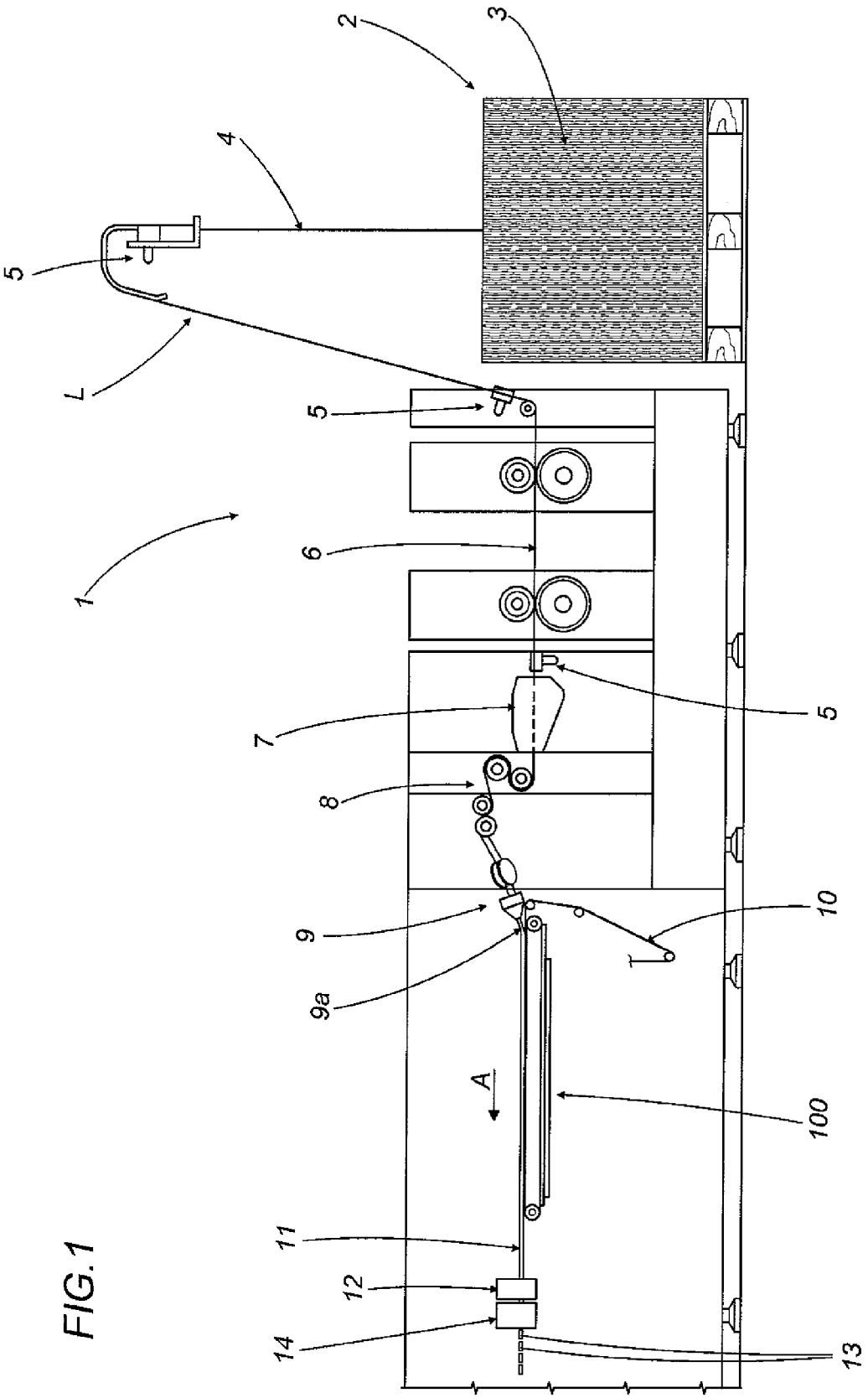


FIG.1

FIG.2

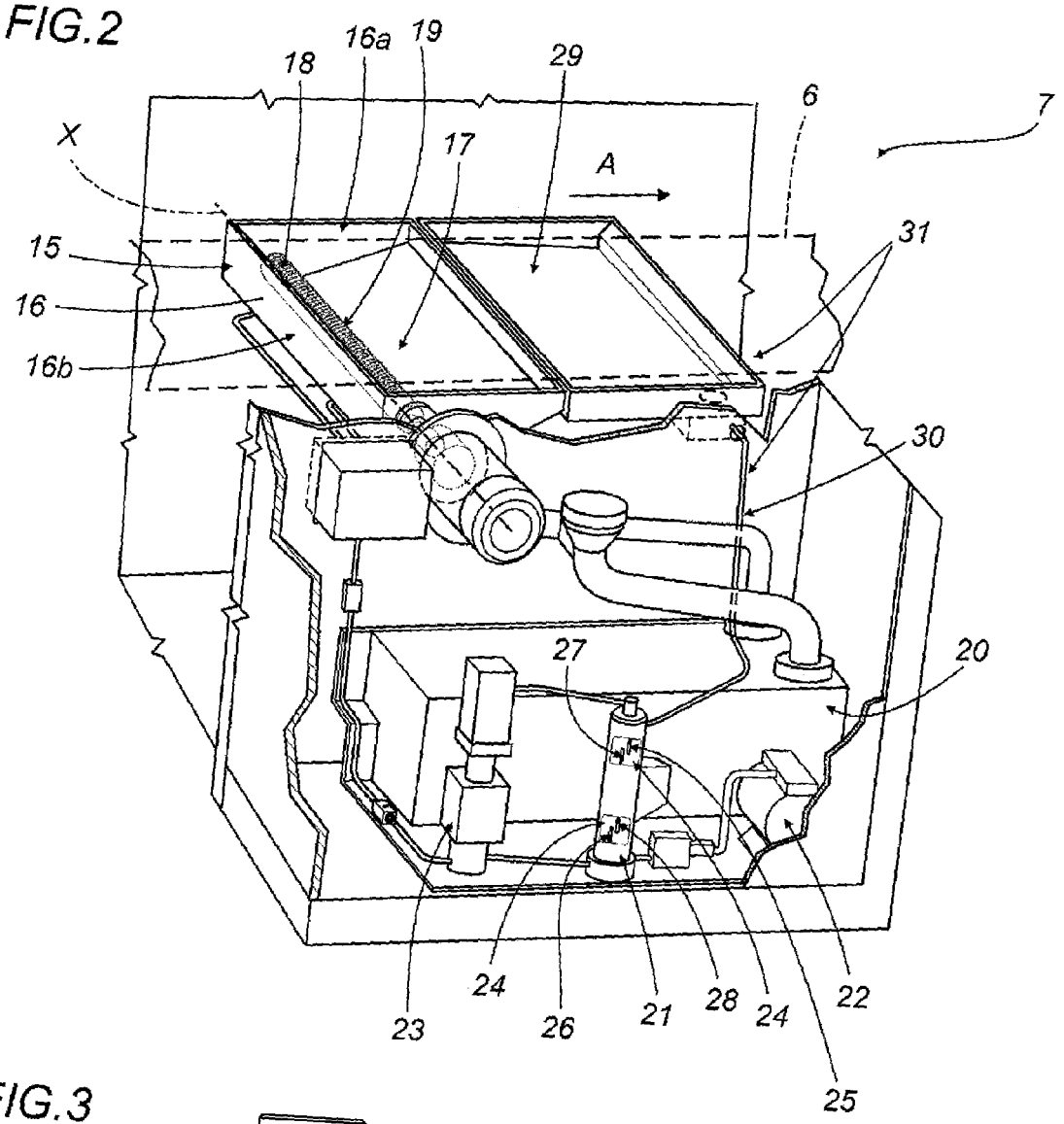

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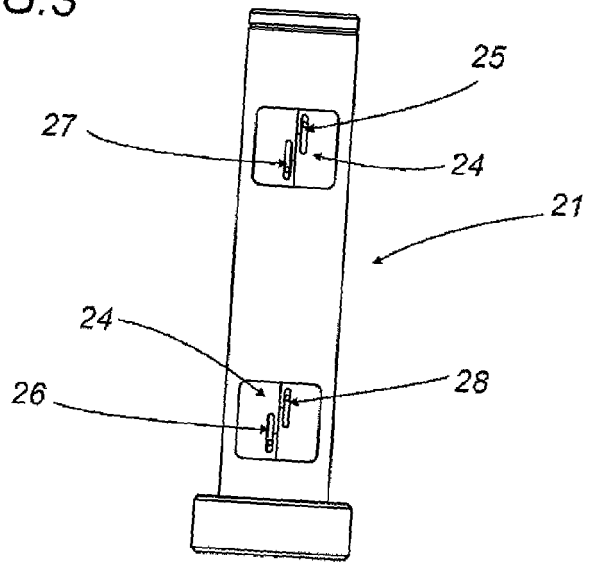
FIG.3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Application Number
EP 07 12 3904

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 April 2008	Maier, Michael

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