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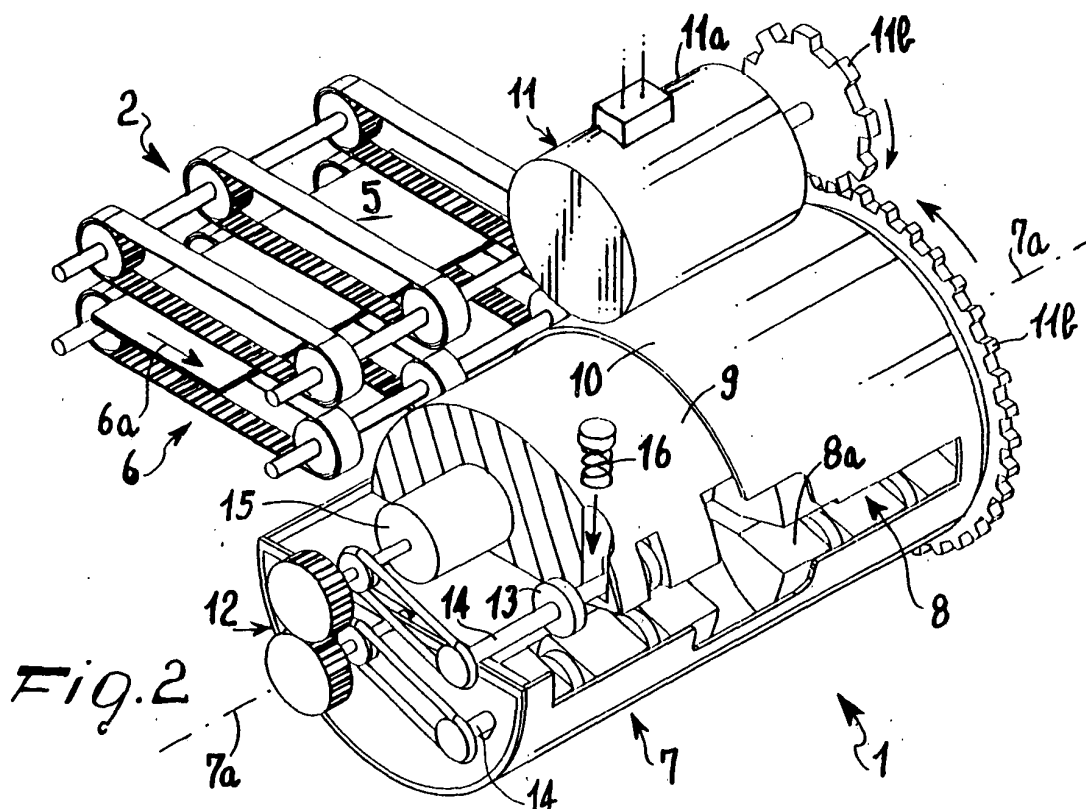
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(54) A protection device of a dispensing opening for banknotes and valuables

(57) It is provided a device comprising: a rotatable shaped block (7) which is in airtight engagement and hydraulically sealed in a casing (3) surrounding it and is placed downstream of conveyer elements (6) for banknotes and valuables; at least one pocket-shaped cavity (8) adapted to receive banknotes and valuables and

formed in the shaped block (7) and having an access aperture (8a); and drive means (11) to rotate the shaped block (7) between a loading position at which the access aperture (8a) faces the conveyer elements (6), and a dispensing position at which the access aperture (8a) faces the outside of the casing (3).



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Description

[0001] The invention relates to a protection device for a dispensing opening of banknotes and valuables, in particular for automatic banknote dispensers commonly referred to as "cash dispensers" or "Automatic Teller Machines", of the type pointed out in the preamble of the first claim.

[0002] It is known that the dispensing opening, in particular of automatic banknote dispensers, is formed in a casing that is partly or fully armour-plated, faces the regions practicable by the users and has a slot through which the required money, gathered in wads, is delivered.

[0003] Arranged immediately upstream of each slot, within the respective casing, are belt conveyors that deliver banknote wads moving them until the slot, so that a user can get hold of the banknotes.

[0004] These dispensing modalities are effective, but have a drawback: they allow execution of attempts to force open the casing through introduction of an explosive fluid (a gas or a liquid) or of various explosive substances through the opening itself.

[0005] In one of the possible attempts to force open the casings of the automatic dispensers of banknotes and valuables, in fact, a fluid or in any case an explosive substance is inserted therein, this fluid being then exploded so as to open the dispensers from the inside and make it possible to reach the banknotes and valuables kept therein.

[0006] To remedy this risk, various apparatus and devices are known that are able to detect admission of dangerous substances and also to dilute the same and/or to inhibit the action thereof.

[0007] Irrespective of the efficiency and cost of these devices, it is apparent that the maximum effectiveness is obtained by adopting precautionary measures, i.e. by preventing admission of dangerous substances.

[0008] From this point of view the banknote dispensing opening constitutes one of the points most drawing attention and more liable to be immediately attacked in the dispensing machines and said opening is therefore one of the main points to be protected.

[0009] Protection of the dispensing opening to prevent admission of dangerous fluids or others thereto, is however a technical problem of difficult solution. In fact, an easy passage of the banknotes through the whole dispensing machine must be allowed and at the outside of the machine the drawing operations by the authorised users must not be hindered or made difficult or unclear.

[0010] In addition, it is not convenient from an economic and practical point of view to greatly modify either the inner structure of present automatic banknote dispensers or the structure and overall dimensions of same as regards the part turned towards customers.

[0011] Among other things, the outer spaces adjacent the dispensing opening are already taken up by a check window or monitor, keyboards and/or different controls.

Furthermore the banknotes under distribution can be in partial disorder and above all accidentally provided with an electrostatic charge making it more difficult to carry out all handling, sorting and treatment operations on the banknotes themselves.

[0012] In addition, protection of the banknote dispensing opening is required to be carried out also on already existing automatic dispensers that are in great number and that now and then suffer from damages exactly due to introduction of explosive substances through said opening.

[0013] Under this situation, the technical task underlying the present invention is to conceive a protection device for a dispensing opening of banknotes and valuables, in particular for an automatic banknote dispenser, capable of obviating the mentioned drawbacks.

[0014] Within the scope of this technical task, it is an important aim of the invention to conceive a particularly efficient device, capable of inhibiting insertion both of gases and liquids, and more obviously, of powders and solid elements, into the casing provided with said dispensing opening.

[0015] Another important aim of the invention is to conceive a device with a reliable structure and therefore not requiring special controls and servicing operations and in addition capable of treating wads that may be supplied in partial disorder and banknotes possibly having an electrostatic charge tending to hinder movements of same.

[0016] It is a further aim of the invention to conceive a flexible device capable of immediately adapting itself to banknotes of different sizes and banknote wads of different thickness.

[0017] A still further aim of the invention is to conceive a device that can be applied to current automatic banknote dispensers without substantially modifying the dispensing members thereof and that therefore can be easily applied to already existing dispensers.

[0018] A further important aim of the invention is to conceive a device to be used without the authorised users being required to carry out manoeuvring and drawing operations different from those presently performed.

[0019] The technical task mentioned and the aims specified are achieved by a protection device for a dispensing opening of banknotes and valuables as claimed in the appended Claim 1.

[0020] Preferred technical solutions are pointed out in the sub claims.

[0021] The description of preferred embodiments of a device in accordance with the invention is now given by way of non-limiting example and illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of the device, seen from the outside in a position of dispensing banknotes to a user, and placed close to belt conveyors being part of the structure of an automatic banknote dispenser;

Fig. 2 is similar to the preceding one and is a perspective view partly in split of the device when it is about to rotate to be ready to receive a new wad of banknotes carried by said belt conveyors;

Fig. 3 is a section view of the device already rotated to the new just coming banknote wad;

Fig. 4 is similar to the preceding one and shows insertion of said new wad into the device;

Fig. 5 shows the device rotated again so as to exhibit the wad turned towards a user; and

Fig. 6 is a section view of the device and the banknote wad substantially in the same position as in Fig. 1.

[0022] With reference to the drawings, the device in accordance with the invention is generally denoted at **1**.

[0023] Said device is shown when applied to an automatic banknote and valuables dispenser of a type known by itself and commonly called "cash dispenser" or "Automatic Teller Machine" and identified with reference numeral **2** in Fig. 1.

[0024] The automatic dispenser **2**, among other things has an outer casing **3** and a dispensing opening **4**, through which an authorised user receives banknotes or valuables **5**.

[0025] Only a portion of the outer casing **3** is shown in Fig. 1, i.e. the portion where the dispensing opening **4** is provided.

[0026] Internally, the automatic dispenser **2** has conveyer elements **6** known by themselves and defined by a plurality of small conveyer belts for example, that are adapted to press a wad **5** of banknotes and valuables between them and to impart an ejection direction **6a** to the same towards the dispensing opening **4**. Provided downstream of the conveyer elements **6** and immediately contiguous thereto, is a rotatable shaped block **7** having a rotation axis **7a** transverse to the ejection direction **6a** and also parallel or transverse to the main faces of the banknotes and valuables **5** during the dispensing step, at the conveyer elements **6**.

[0027] The shaped block **7** internally comprises at least one pocket-shaped cavity **8** having an access aperture **8a**, a bottom **8b** and side walls **8c**.

[0028] The pocket-shaped cavity **8** is suitably sized so as to be able to receive a banknote wad **5**.

[0029] It is possible for the shaped block itself to define the dispensing opening **4** by means of the pocket-shaped cavity **8** and the cavity access aperture **8a**. Preferably however, the dispensing opening **4** is a through slot formed in casing **3** and having a major extension direction **4a** perpendicular to the ejection direction **6a** and parallel to the main faces of the banknotes **5**, as they are positioned by the conveyer elements **6**.

[0030] Practically, the major extension direction **4a** is substantially horizontal, as shown in Fig. 1. In this case, the shaped block **7** is inserted into the automatic dispenser **2** between the slot and the conveyer elements **6**.

[0031] The shaped block **7** has an outer rotation sur-

face and is of spherical or cylindrical shape, as shown in the drawings.

[0032] Then, said block has a main axis coincident with the rotation axis **7a** and therefore, depending on the position of the rotation axis **7a**, the shaped block **7** is substantially a horizontal cylinder, the main axis of which is parallel to the extension direction **4a**, or a vertical cylinder the main axis of which is perpendicular to the major extension direction **4a**.

[0033] In the figures provision is always made for a shaped block **7** defining a horizontal cylinder or at all events a cylinder extending parallel to the dispensing opening **4**. This is the preferred technical solution because a main or rotation axis **7a** parallel to the extension direction **4a** allows a wider pocket-shaped cavity **8** to be formed and also allows said pocket to be concealed in a more efficient manner during rotation of the cylinder.

[0034] From a structural point of view, the shaped block **7** comprises an inner shaped body **9** and a tubular outer body **10** surrounding the inner body **9** and coaxial therewith.

[0035] The outer body **10** is made of a material having a higher resistance to mechanical and thermal stresses than the inner body **9** and in addition it is preferably fitted on the inner body **9** by only exerting a weak force so as to rotate relative to the latter, under stress.

[0036] Drive means **11** is then provided which is adapted to rotate the shaped block **7** around the rotation axis **7a** to selectively and alternately dispose the shaped block **7** to a loading position at which the access aperture **8a** faces the conveyer elements **6** (Figs. 3 and 4) and to a dispensing position at which the access aperture **8a** faces the outside of the automatic dispenser **2** (Figs. 1, 2, 5, 6).

[0037] The drive means **11** preferably consists of an electric motor **11a** and gear connections **11b** extending between said shaped block **7** and the electric motor **11a**.

[0038] Also provided is loading means **12** at the inside of the shaped block **7** and active at the pocket-shaped cavity **8**, said means being adapted to promote insertion therinto of banknotes and valuables **5** delivered by the conveyer elements **6**. The loading means **12** can be variously structured and in the embodiment shown in the drawings it comprises dragging small wheels **13** opening into the pocket-shaped cavity **8** and at least partly powered.

[0039] The small wheels **13** are in fact mounted on shafts **14** disposed internally of the shaped block **7** and said shafts are driven in rotation by an electric motor **15**, preferably disposed inside the shaped block **7** too, as shown in Fig. 2. The electric motor **15** acts through gears and transmission belts.

[0040] The small wheels **13** are preferably disposed in two or more opposite rows that are at least partly oscillating moving close to and away from each other, against the action of spring elements **16**. In addition, the small wheels **13** of each row carry out a counter-rotation with respect to those of the opposite row, so that they

all act in the same direction with respect to the banknotes 5 engaging the pocket-shaped cavity 8.

[0041] In Figs. 3 to 6 four rows of small wheels are provided on the whole.

[0042] The small wheels 13 can then altogether define continuous and opposite rollers tending to close the access aperture 8a when a banknote wad is not inserted between them.

[0043] As highlighted in Figs. 3 to 6, the loading means 12 can possibly comprise, in combination with or as an alternative to the small wheels 13, sucking members 17 opening at least close to the bottom 8a of the pocket-shaped cavity 8.

[0044] The sucking members 17 comprise at least a first duct 18 that is movable together with the shaped block 7 and extends from the pocket-shaped cavity 8 passing through the shaped block 7, a second fixed duct 19 formed in the automatic dispenser 2 and consecutive to the first duct 18 when the access aperture 8a of the pocket-shaped cavity 8 faces the conveyer elements 6 (Figs. 3 and 4), and an exhaust fan 20 connected with the second duct 19; said exhaust fan can be made in a manner known by itself and is herein diagrammatically embodied by a small suction pump.

[0045] The sucking members 17 are advantageous because they can also perform a second important function: by insertion of appropriate sensor members, known by themselves and denoted at 20a, therein, they can detect the possible presence of dangerous substances, when suction of the air takes place, and therefore they can trigger the alarm signal.

[0046] From this point of view it is convenient that the exhaust fan 20 should be maintained in operation also when no banknote wads are inserted in the pocket-shaped cavity 8.

[0047] An important feature of device 1 is that the shaped body 7 is in air-tight engagement and hydraulically sealed with respect to casing 3. In fact the shaped body 7 has a size fitting a casing portion and is surrounded by the casing 3 itself over an important circumferential length thereof. In addition, sealing rings 21 are inserted between casing 3 and the shaped body 7.

[0048] Device 1 is then provided with different sensing elements adapted to control the steps involved in the operation of dispensing banknotes and valuables.

[0049] Shown in Fig. 1 by way of example are first photoelectric cells for control and accident-prevention 22 placed at the dispensing opening 4 and active in parallel to the extension direction 4a of the dispensing opening itself.

[0050] Also shown in Figs. 3 to 6 are second sensing elements consisting of second photoelectric cells 23 at the access aperture 8a of the pocket-shaped cavity 8 and third photoelectric cells 24 at the inside of the pocket-shaped cavity 8, all designed to control the position of a banknote wad 5, and also acting as a safety control. As also pointed out in the following, the sensing elements 23 and 24 prevent a return rotation of the shaped

block 7 if pocket 8 is not completely empty.

[0051] Upstream of the shaped body 7 and at the conveyer elements 6 further photoelectric cells 25 are then provided to signal arrival of a wad and the wad position.

[0052] The sensing elements are connected with electronic circuits, known by themselves, and the latter are active on the drive means 11, the loading means 12, and all the functions of the automatic banknote and valuables dispenser. Operation of the device described above mainly as regards structure, is as follows.

[0053] In a manner known by itself, the banknotes 5 preferably already disposed in the form of wads, are sent by the conveyer elements 6 to device 1 that is arranged so as to be able to receive them (Fig. 3), with the access aperture 8a of the pocket-shaped cavity 8 facing the banknotes.

[0054] Under this situation, and also in a condition of non use of the automatic dispenser 2, the dispensing opening 4 keeps occluded by the solid part of the shaped body 7.

[0055] The banknotes 5 are inserted in the pocket-shaped cavity 8 with the aid of the loading means 12: the small wheels 13 and/or the sucking members 17.

[0056] When loading has been carried out (Fig. 4) and controlled through the sensing elements, the shaped block 7 is rotated so as to bring the access aperture 8a close to the dispensing opening 4 (Fig. 5).

[0057] Then delivery of the banknotes is carried out, in an automated manner (Fig. 6) or also by simple withdrawal by a user. Under this situation too the inside of the automatic dispenser 1 is isolated and therefore it is not accessible.

[0058] Isolation is of such a nature that not only a physical and massive obstruction to attempts of force opening is caused, but also a complete obstruction or tightness to the fluids (liquids or gases) is determined, as well as to other substances such as powders, solid elements, gels and others.

[0059] Once the pocket-shaped cavity 8 has been emptied, the shaped block 7 is rotated to the starting position shown in Fig. 3.

[0060] However said return can be inhibited by the second and third sensors 23 and 24 if the latter detect insertion of substances or objects or in any case foreign bodies into the pocket-shaped cavity 8. Together with the shaped block being restrained from rotating, an alarm can also be triggered.

[0061] The invention comprises a novel process for protecting the dispensing opening of an automatic banknote and valuables dispenser.

[0062] In accordance with this process, a shaped block including a pocket-shaped cavity is provided to be sealingly inserted between the dispensing opening and the conveyer elements.

[0063] The shaped block is oscillated at an angle between a loading position at which the pocket-shaped cavity faces the conveyer elements, and a dispensing position at which said cavity faces said dispensing open-

ing.

[0064] The invention achieves important advantages.

[0065] In fact a protection device for the dispensing opening in particular of an automatic banknote and valuables dispenser has been conceived that is able to inhibit insertion both of gases and of liquids and, more obviously, of powders or solid elements, into the automatic dispenser.

[0066] Banknotes and valuables are inserted in the device by loading means set within the device itself.

[0067] In addition, special controls and maintenance operations are not required for the device and by virtue of the provided loading means the device is able to treat wads of various different sizes, also supplied under conditions of partial disorder and with banknotes possibly having an electrostatic charge tending to hinder the banknote movements.

[0068] Furthermore, the device can be easily applied to the automatic dispensers presently on the market, because it does not substantially modify the inner structure of same and it is merely inserted downstream of the already provided banknote and valuables conveying elements.

[0069] Another quality of the devices is that it does not require the authorised users to execute manoeuvring or drawing operations different from those presently in use. It is finally pointed out that the device of the invention is not only hermetically sealed to fluids, but is also very sturdy, stopping all intrusions and appearing fully reliable due to its structure defined by an inner body and a high-strength outer body.

[0070] Also advantageous is the fact that the outer body is fitted on the inner body so as to rotate relative thereto, under stress. In this manner the outer body is submitted to less stresses and possibly, by rotating, occludes the pocket-shaped cavity. The device is in particular provided for automatic banknote dispensers, but it can be also applied to other apparatus.

Claims

1. A protection device for a dispensing opening of banknotes and valuables, said dispensing opening (4) being arranged in a casing (3) housing conveyer elements (6) adapted to impress an ejection direction (6a) to banknotes and valuables (5), **characterised in that** it comprises:

- a shaped block (7) placed downstream of said conveyer elements (6) and contiguous to the latter, said shaped block (7) being rotatable and having a rotation axis (7a) transverse to said ejection direction (6a),
- at least one pocket-shaped cavity (8) formed in said shaped block (7) and having an access aperture (8a) and a bottom (8b), said pocket-shaped cavity (7) being suitably sized to receive

- said banknotes and valuables (5),
- and drive means (11) adapted to rotate said shaped block (7) to dispose the latter alternately to a loading position at which said access aperture (8a) faces said conveyer elements (6), and to a dispensing position at which said access aperture (8a) faces the outside of said casing (3).

2. A device as claimed in Claim 1, wherein said shaped body (7) is at least partly surrounded by said casing (3) and in air-tight engagement with and hydraulically sealed to said casing (3).

3. A device as claimed in Claim 2, wherein between said shaped body (7) and casing (3) sealing rings (21) are inserted.

4. A device as claimed in Claim 1, wherein said dispensing opening (4) is a slot formed in said casing (3), and wherein said shaped block (7) is inserted between said dispensing opening (4) and conveyer elements (6).

5. A device as claimed in Claim 1, wherein said shaped block (7) is substantially of cylindrical shape and has a main axis coincident with said rotation axis (7a).

6. A device as claimed in Claim 1, wherein said shaped block (7) comprises a shaped inner body (9) and an outer body (10) surrounding said inner body (9), wherein said outer body (10) is made of a material having a higher resistance to mechanical and thermal stresses than said inner body (9), and wherein said outer body (10) is rotatable with respect to said inner body (9), under stress.

7. A device as claimed in Claim 1, wherein loading means (12) is provided that is active at said pocket-shaped cavity (8) and is adapted to promote insertion therein of banknotes and valuables (5) dispensed by said conveyer elements (6), and wherein said loading means (12) is set within said shaped block (7).

8. A device as claimed in Claim 7, wherein said loading means (12) comprises small dragging wheels (13) opening internally of said pocket-shaped cavity (8) and wherein an electric motor (15) is provided to drive rotation of at least part of said small wheels (13).

9. A device as claimed in Claim 8, wherein opposite small wheels (13) are provided that are at least partly oscillating moving close to and away from each other.

10. A device as claimed in Claim 7, wherein said loading means (12) comprises sucking members (17) opening at least close to said bottom (8b) of said pocket-shaped cavity (8).
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11. A device as claimed in Claim 10, wherein said sucking members (17) comprise at least one first duct (18) extending from said pocket-shaped cavity (8) and passing through said shaped block (7), said first duct being movable with said shaped block (7); a second fixed duct (19) formed in said casing (3) and consecutive to said first duct (18) when said access aperture (8a) of said pocket-shaped cavity (8) faces said conveyer elements (6); and an exhaust fan (20) connected with said second duct (19).
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12. A device as claimed in Claim 1, wherein said drive means (11) comprises an electric motor (11 a) and gear connections (11 b) extending between said shaped block (7) and electric motor (11a).
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13. A device as claimed in Claim 1, wherein sensing elements (23, 24) are provided at said pocket-shaped cavity (8) which are adapted to inhibit rotation of said shaped body (7) in the presence of elements inserted in said pocket-shaped cavity (8).
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14. A protection process for a dispensing opening of banknotes and valuables, said opening being arranged in a casing associated with conveyer elements adapted to impress an ejection direction to banknotes and valuables, **characterised in that** it consists in sealingly inserting a shaped block including a pocket-shaped cavity between said dispensing opening and conveyer elements, and in causing the angular oscillation of said block between a loading position at which said pocket-shaped cavity faces said conveyer elements and a dispensing position at which said pocket-shaped cavity faces said dispensing opening.
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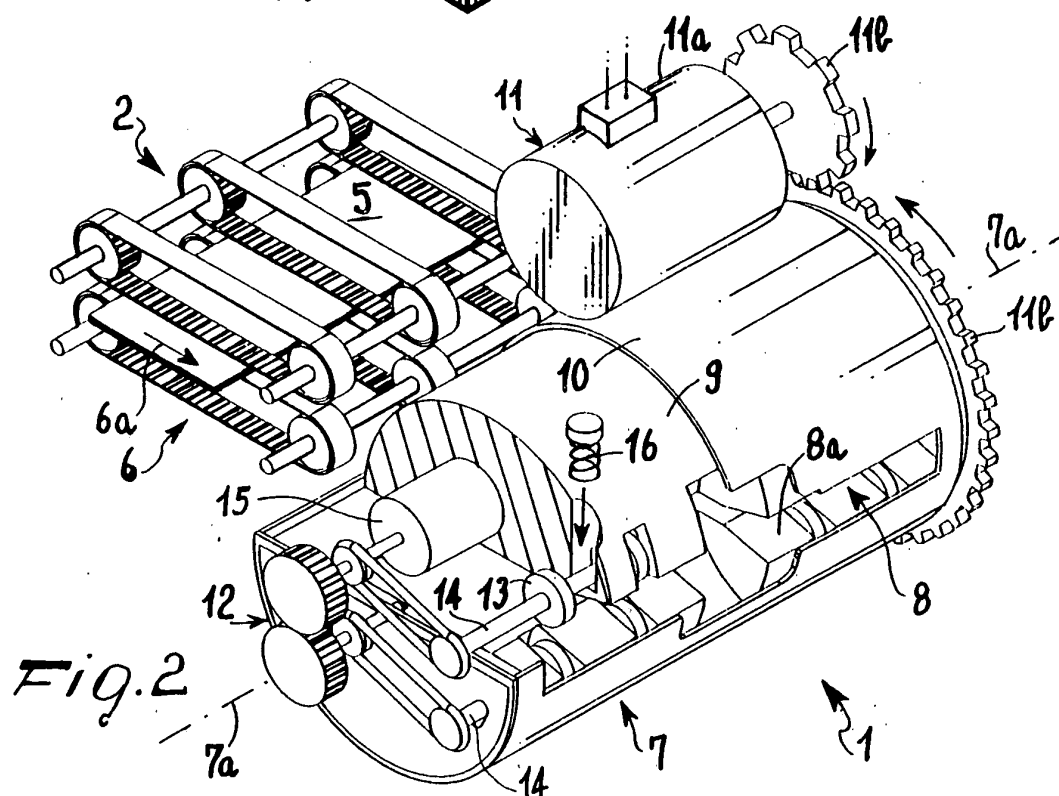
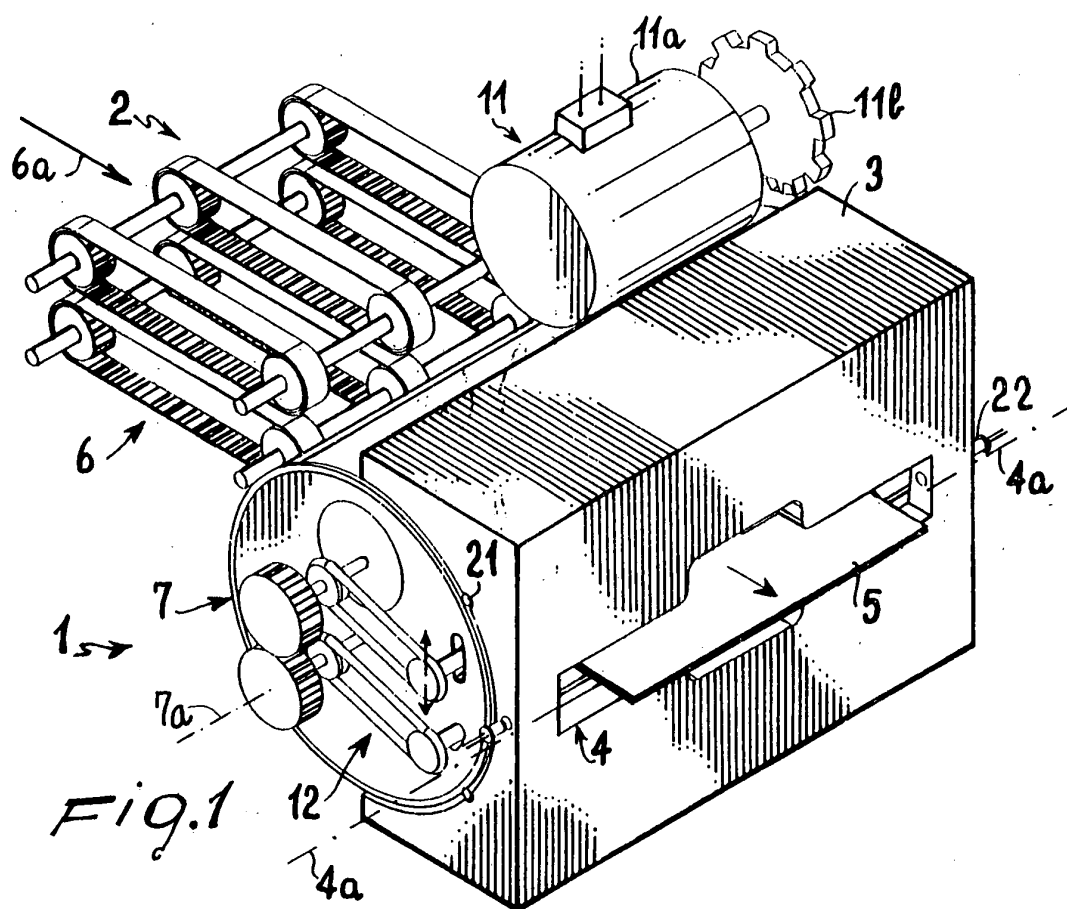


Fig. 3

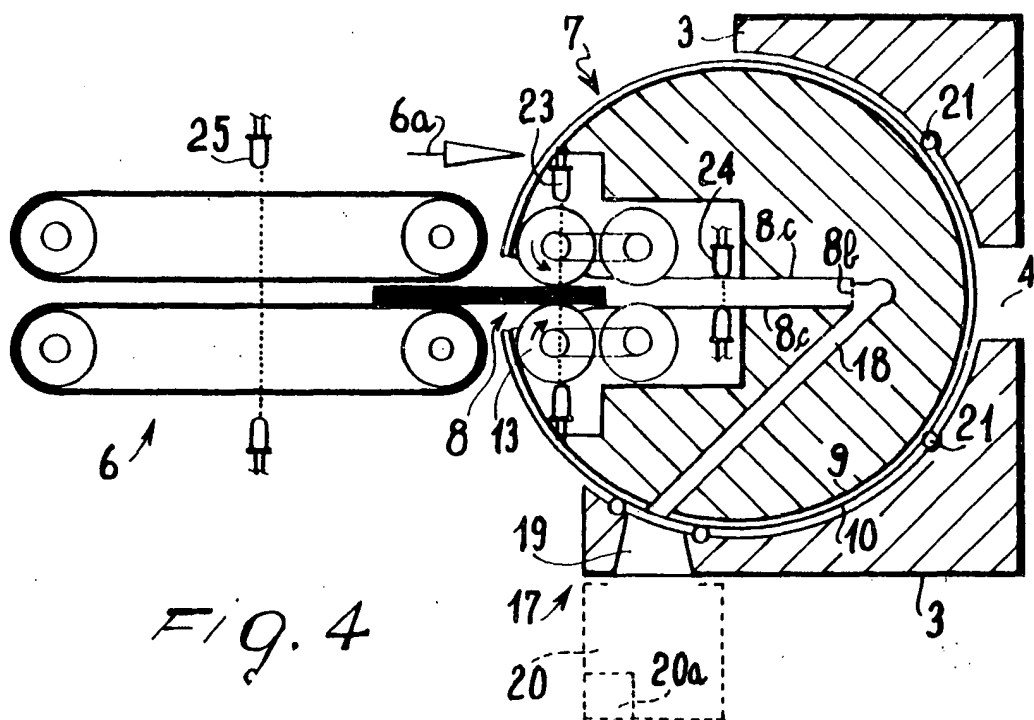
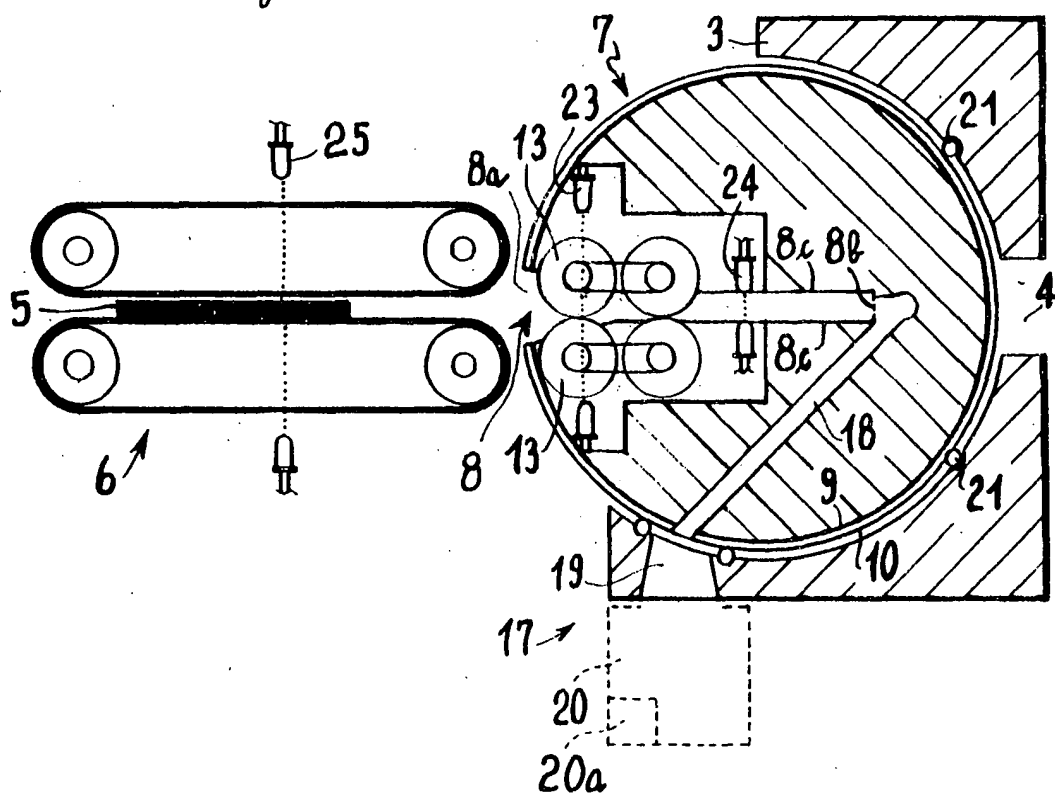


Fig. 5

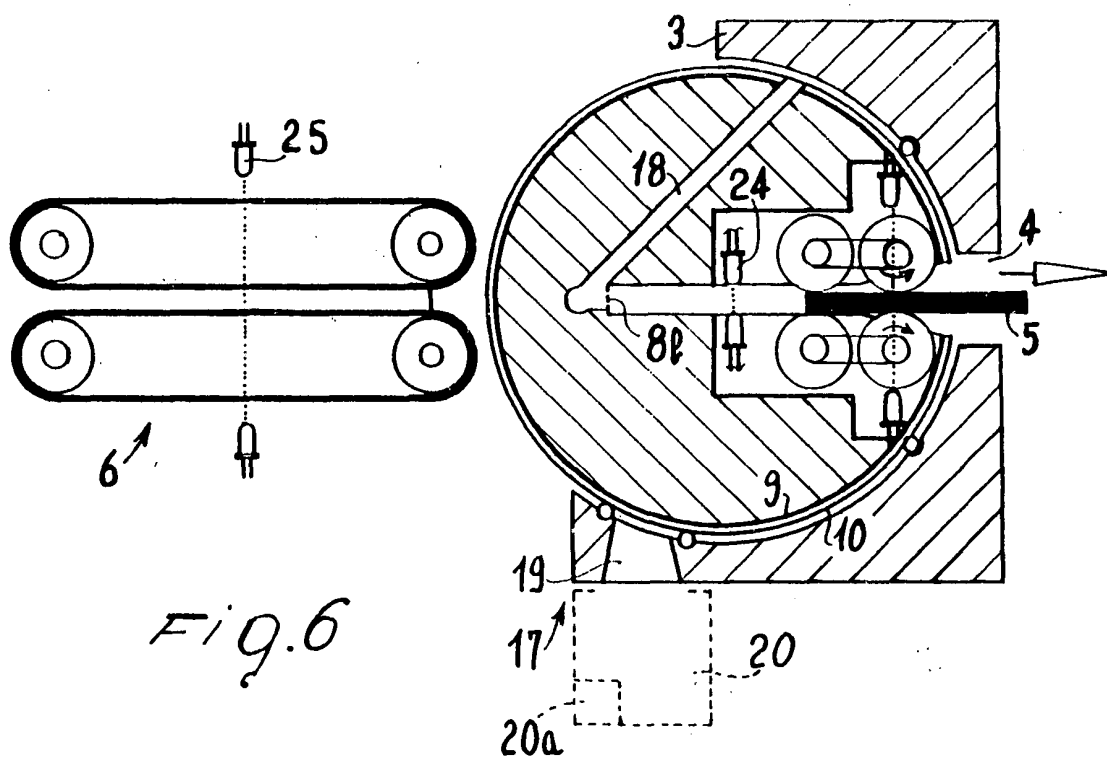
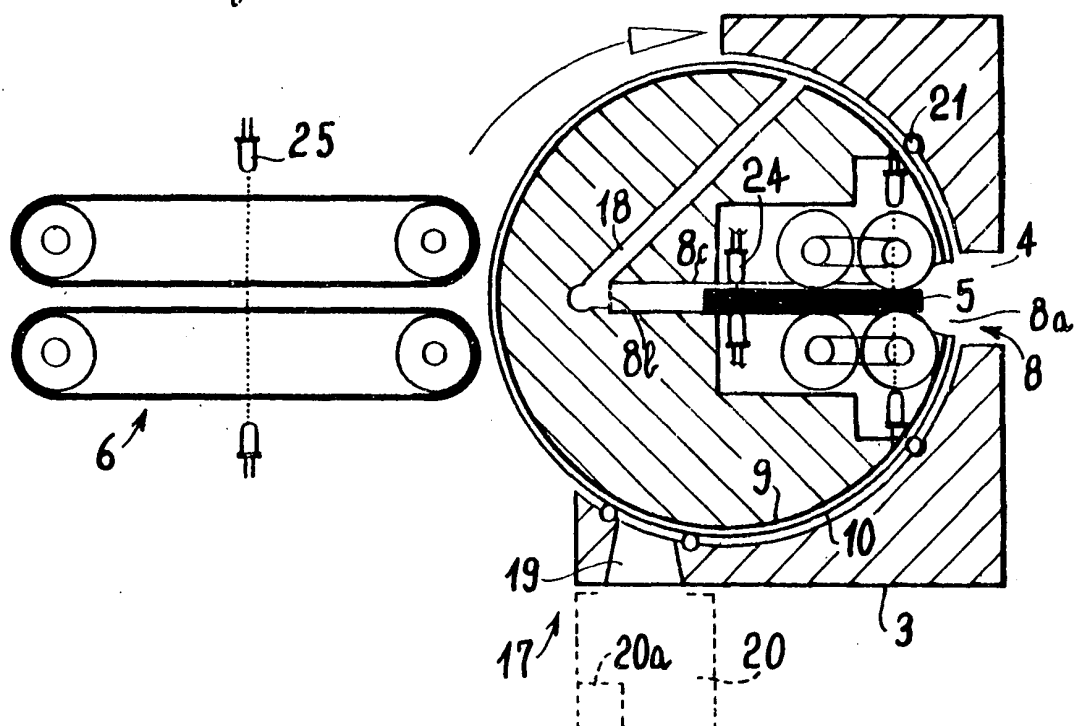


Fig. 6

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