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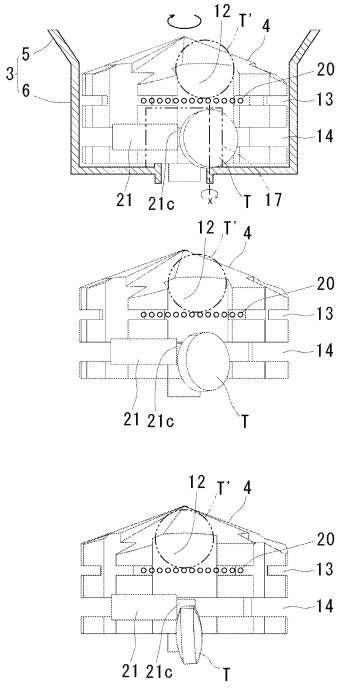
(54) TABLET CASSETTE

(57) Provided is a tablet cassette which is capable of discharging a large tablet without changing a size of a base main body to which the tablet cassette is mounted. A tablet cassette (1) includes: a tablet container (3), which has a tablet outlet (17) formed at a lower part, and is configured to accommodate a large number of tablets; and a rotor (4), which is rotatably provided inside the tablet container (3), and has a tablet guide groove (12) configured to guide tablets accommodated inside the tablet container (3) to the tablet outlet (17). The rotor (4) has a peripheral groove (14) extending in a circumferential direction. A guide member (21) configured to advance into the peripheral groove (14) is provided on a downstream side of the tablet outlet (17) of the tablet container (3) in a rotation direction of the rotor (4). The guide member (21) has an inclined guide surface (21c), which is opposed to the tablets provided in the tablet guide groove (12) in the rotation direction of the rotor (4) and faces the tablet outlet.

FIG. 7



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Description

Technical Field

[0001] The present invention relates to a tablet cassette configured to accommodate a large number of tablets and discharge a desired number of tablets one by one.

Background Art

[0002] A tablet cassette is removably mounted to a base main body (motor base) provided to a tablet dispensing apparatus. The tablet dispensing apparatus includes a large number of tablet cassettes so as to be capable of discharging various kinds of tablets. Each tablet cassette includes a tablet container and a rotor. The tablet container is configured to accommodate a large number of tablets. The rotor is rotatably provided inside the tablet container. The tablets accommodated in the tablet container are discharged from a tablet outlet through a tablet guide groove formed in the rotor. The tablets having been discharged from the tablet outlet are dispensed through a tablet discharge passage of the base main body.

[0003] The tablets have various shapes. When sizes of the tablet cassette and the base main body are determined in conformity with a large tablet, the tablet dispensing apparatus is increased in size. Thus, the sizes of the tablet cassette and the base main body are determined such that a tablet having a middle size can be dispensed. In each tablet cassette, a width and a depth of the tablet guide groove of the rotor are set in conformity with a size of the tablet accommodated in the tablet container. Meanwhile, the tablet discharge passage of the base main body is formed so as to have a uniform size regardless of the size of the tablet accommodated in the tablet cassette. Thus, when the width of the tablet guide groove of the rotor is set large so that a large tablet can be discharged, as illustrated in FIG. 13, a tablet T discharged from a tablet cassette may clog a tablet discharge passage 24 of a base main body 2.

[0004] In Patent Literature 1, there is described a drug dispensing machine including a guide portion and a sweeper. The guide portion is configured to guide tablets to a selection slot (tablet guide groove) of a circular receiver (rotor). The sweeper is provided in the vicinity of the selection slot. The sweeper is configured to perform separation so that one tablet is dispensed from the selection slot.

[0005] In Patent Literature 2, there is described a tablet dispensing machine in which a dividing groove and a supplying groove are formed in a conveyance passage (tablet guide groove) of a rotor.

[0006] In any of the drug dispensing machines of the patent literatures, it is required that the tablet discharge passage of the base main body be set large in order to dispense a large tablet.

Citation List

Patent Literature

[0007]

[PTL 1] U.S. Patent No. 9550619

[PTL 2] Korean Patent Application No. 10-2010-0036922

Summary of Invention

Technical Problem

[0008] The present invention has been made in view of the problems of the related art, and has an object to provide a tablet cassette which is capable of discharging a large tablet without changing a size of a base main body to which the tablet cassette is mounted.

Solution to Problem

[0009] In order to achieve the object described above, according to the present invention, there is provided a tablet cassette, including:

a tablet container, which has a tablet outlet formed at a lower part, and is configured to accommodate a large number of tablets; and
a rotor, which is rotatably provided inside the tablet container, and has a tablet guide groove configured to guide tablets accommodated inside the tablet container to the tablet outlet,
wherein the rotor has a peripheral groove extending in a circumferential direction,
wherein a guide member configured to advance into the peripheral groove is provided on a downstream side of the tablet outlet of the tablet container in a rotation direction of the rotor, and
wherein the guide member has an inclined guide surface, which is opposed to the tablets provided in the tablet guide groove in the rotation direction of the rotor and faces the tablet outlet.

[0010] According to the present invention, the tablets provided in the tablet guide groove are changed in direction by the inclined guide surface of the guide portion and discharged from the tablet outlet. Accordingly, the tablets are discharged without clogging the tablet discharge passage of the base main body to which the tablet cassette is mounted. Thus, a large tablet can be discharged without changing a size of the base main body.

[0011] The tablets provided in the tablet guide groove are changed in direction by the guide surface of the guide member about an axis parallel to the tablet guide groove and discharged from the tablet outlet.

[0012] The guide surface of the guide member is con-

figured to change the tablets in direction, when the rotor is viewed from the tablet outlet, from a first profile having a large projection area to a second profile having a projection area smaller than that of the first profile.

[0013] The guide member is provided, when the rotor is viewed from the tablet outlet, below a center of the first profile of the tablet.

[0014] The guide surface of the guide member is inclined toward the downstream side in the rotation direction of the rotor from an edge of the guide surface located on an inner side in a radial direction of the rotor toward an edge of the guide surface located on an outer side in the radial direction.

[0015] The edge of the guide surface located on the inner side in the radial direction of the rotor is located, when the rotor is viewed from the tablet outlet, between a center of the tablet outlet and the edge of the tablet outlet on an upstream side in the rotation direction of the rotor.

Advantageous Effects of Invention

[0016] According to the present invention, the guide member configured to advance into the peripheral groove of the rotor is provided on the downstream side of the tablet outlet in the rotation direction of the rotor, and the guide member has the guide surface, which is opposed to the tablets provided in the tablet guide groove in the rotation direction of the rotor and faces the tablet outlet. The tablets provided in the tablet guide groove are changed in direction by the guide surface of the guide member and discharged from the tablet outlet. Accordingly, the tablets are discharged without clogging the tablet discharge passage of the base main body to which the tablet cassette is mounted. Thus, a large tablet can be discharged without changing a size of the base main body.

Brief Description of Drawings

[0017]

FIG. 1 is a perspective view of a tablet cassette according to the present invention and a base main body.

FIG. 2 is an exploded perspective view of the tablet cassette, in which a rear opening portion of the tablet cassette is viewed from an oblique lower side.

FIG. 3 is a perspective view of the tablet cassette of FIG. 1 when viewed from an oblique upper side.

FIG. 4 is a perspective view of the tablet cassette of FIG. 1 when viewed from an oblique lower side.

FIG. 5(a) is a partial plan view for illustrating a position and a shape of a guide surface of a guide member, and FIG. 5(b) is a partial plan view for illustrating a modification example of the guide surface.

FIG. 6(a) shows a first profile of a tablet, and FIG. 6(b) shows a second profile of the tablet.

FIG. 7 is a front view for illustrating a state in which a large tablet is changed in direction by the guide member.

FIG. 8 is a plan view for illustrating a state in which a large tablet is changed in direction by the guide member.

FIG. 9(a) is a perspective view of the base main body of the tablet cassette according to the present invention for illustrating a state in which a large tablet is discharged through a tablet discharge passage of the base main body, and FIG. 9(b) is a sectional view thereof taken along a line A-A.

FIG. 10 is a perspective view for illustrating a modification example of a rotor of the tablet cassette.

FIG. 11 is a plan view for illustrating a modification example of the guide member.

FIG. 12(a) is a sectional view of the tablet cassette including a one-stage rotor, and FIG. 12(b) is a sectional view thereof taken along a line B-B.

FIG. 13(a) is a perspective view of a base main body of a related-art tablet cassette for illustrating a state in which a large tablet is discharged through a tablet discharge passage of the base main body, and FIG. 13(b) is a sectional view thereof taken along a line C-C.

Description of Embodiments

[0018] Now, an embodiment of the present invention is described with reference to the accompanying drawings.

[0019] FIG. 1 shows a tablet cassette 1 according to the embodiment of the present invention and a base main body 2 to which the tablet cassette 1 is mounted.

[0020] The tablet cassette 1 includes, as illustrated in FIG. 2, a tablet container 3 and a rotor 4. As illustrated in FIG. 3, the tablet container 3 includes a tablet accommodating portion 5 and a rotor accommodating portion 6. The tablet accommodating portion 5 has a substantially rectangular shape, and is configured to accommodate a large number of tablets. The rotor accommodating portion 6 has a circular shape, and is capable of accommodating the rotor 4 at a lower part. An upper opening portion 7 of the tablet accommodating portion 5 is openable and closable with a lid body (not shown). As illustrated in FIG. 1, a mounting base 8 configured to slide along and engage with mounting guides 23, which are described later, of the base main body 2 is mounted to a lower outer surface of the tablet container 3.

[0021] The rotor 4 is rotatably accommodated in the rotor accommodating portion 6 of the tablet container 3. A rotation shaft 9 is provided on a bottom surface of the rotor 4. The rotation shaft 9 passes through a shaft hole 10 formed at a bottom of the tablet container 3, and a drive gear 11 illustrated in FIG. 4 is mounted to the rotation shaft 9. The drive gear 11 meshes with a motor gear 22, which is described later, of the base main body 2 when the tablet cassette 1 is mounted to the base main

body 2. The rotor 4 has, on an outer surface thereof, a plurality of (six in the circumferential direction in the embodiment) tablet guide grooves 12 parallel to the rotation shaft 9 of the rotor 4, a partition peripheral groove 13 into which a partition portion 20a of a partition member 20, which is described later, advances, and a guide peripheral groove 14 into which a projecting portion 21b of a guide member 21, which is described later, advances below the partition peripheral groove 13.

[0022] As illustrated in FIG. 2, a rear opening portion 15 is formed so as to extend from a rear lower part of the tablet accommodating portion 5 of the tablet cassette 1 to a bottom portion of the rotor accommodating portion 6, and the rear opening portion 15 is detachably closed by an opening cover 16. The opening cover 16 has a tablet outlet 17. A slit 18 is formed above the tablet outlet 17. A cutout 19 is formed on, among side edges of the tablet outlet 17, a side edge located on a downstream side in a rotation direction of the rotor 4.

[0023] The partition member 20 is mounted to the opening cover 16, and the partition portion 20a of the partition member 20 advances into the partition peripheral groove 13 of the rotor 4, which is provided inside, through the slit 18. Further, the guide member 21 is mounted to the cutout 19 of the opening cover 16, and the projecting portion 21b, which is described later, of the guide member 21 advances into the guide peripheral groove 14 of the rotor 4, which is provided inside.

[0024] The guide member 21 includes a base portion 21a, the projecting portion 21b, and a guide surface 21c. The base portion 21a is mounted to the cutout 19 of the opening cover 16. The projecting portion 21b projects from the base portion 21a toward the rotor 4 and advances into the guide peripheral groove 14 of the rotor 4. The guide surface 21c is formed on, among side edges of the projecting portion 21a, a side edge located on an upstream side in the rotation direction of the rotor 4.

[0025] The guide surface 21c is opposed to tablets, which are moved by rotation of the rotor 4 and provided in the tablet guide groove 12, and faces the tablet outlet 17. For example, as illustrated in FIG. 5(a), the guide surface 21c is formed of a recessed surface which is inclined toward the downstream side in the rotation direction of the rotor 4 from an edge e1 of the guide surface 21c located on an inner side in a radial direction of the rotor 4 toward an edge e2 of the guide surface 21c located on an outer side in the radial direction. Further, the edge e1 of the guide surface 21c located on the inner side in the radial direction of the rotor 4 is located, when the rotor 4 is viewed from the tablet outlet 17, slightly on the upstream side in the rotation direction of the rotor 4 from a center of the tablet outlet 17.

[0026] The guide surface 21c is not required to be a recessed surface, and may be formed of a plurality of inclined surfaces as illustrated in FIG. 5(b). In this case, it is preferred that the inclination of the guide surface 21c be changed stepwise and that the inclination on the downstream side from a transition point e3 to an edge e2 be steeper than the inclination on the upstream side from the edge e1 to the transition point e3 when viewed from the rotation direction of the rotor 4. In FIG. 5(b), the guide surface 21 is formed of two inclined surfaces. However, the guide surface 21 may be formed of three or more inclined surfaces. Further, it is preferred that the edge e1 of the guide surface 21c be located, when the rotor 4 is viewed from the tablet outlet 17, between a center 17a of the tablet outlet 17 and an edge 17b of the tablet outlet 17 on the upstream side in the rotation direction of the rotor 4.

[0027] The base main body 2 is, as illustrated in FIG. 1, one of a large number of base main bodies 2 provided to a tablet dispensing apparatus in a fixed manner. A motor (not shown) configured to drive the rotor 4 of the tablet cassette 1 to rotate is built in the base main body 2, and the motor gear 22 thereof is provided in such a manner as to be exposed from an upper surface of the base main body 2. Further, the base main body 2 has the mounting guides 23 for mounting the tablet cassette 1 and a tablet discharge passage 24 through which the tablets to be discharged from the tablet cassette 1 pass.

[0028] The tablet cassette 1 accommodates a relatively large and flat tablet (for example, outer diameter of 18 mm) . That is, the tablet accommodated in the tablet cassette 1 has, as illustrated in FIGS. 6, a first profile (FIG. 6(a)) having a large projection area and a second profile (FIG. 6(b)) having a projection area smaller than that of the first profile. Thus, the tablet guide grooves 12 of the rotor 4 are each formed so as to have a large width. Meanwhile, it is not required that the tablet discharge passage 24 of the base main body 2 be formed so as to have a large width in conformity with the large and flat tablet. The tablet discharge passage 24 is formed into such a size as to be common to all of the large number of base main bodies 2 of the tablet dispensing apparatus and allow passage of a tablet having a middle size which can be dispensed from the tablet dispensing apparatus. The guide member 21 is provided, when the rotor 4 is viewed from the tablet outlet 17, below a center of the first profile of the tablet.

[0029] Next, operation of the tablet cassette according to the embodiment of the present invention is described.

[0030] As illustrated in FIG. 7 and FIG. 8, the tablet T accommodated in the tablet container 3 advances into the tablet guide groove 12 of the rotor 4 by the rotation of the rotor 4. At this time, when an outer periphery of the tablet T is viewed from an outer side of the rotor 4, the tablet T is accommodated in the first profile in the tablet guide groove 12. When the tablet guide groove 12 approaches the tablet outlet 17, the lowermost tablet T and a tablet T' located above the lowermost tablet T in the tablet guide groove 12 are partitioned by the partition member 20. The tablet T' located above the partition member 20 is supported by the partition member 20. The tablet T located below the partition member 20 comes into contact with the guide surface 21c of the guide member 21. As the rotor 4 rotates, the tablet T is rotated by

90° about an axis "x" parallel to the tablet guide groove 12 by the guide surface 21c of the guide member 21, and is changed in direction from the first profile of FIG. 6(a) to the second profile of FIG. 6(b) when the rotor 4 is viewed from the tablet outlet 17. Then, the tablet T is discharged from the tablet outlet 17 while falling due to the gravity.

[0031] The tablet T having been discharged from the tablet outlet 17 is, as illustrated in FIG. 9, dispensed in such a manner as to roll in a vertical posture on a passage surface of the tablet discharge passage 24 of the base main body 2. Thus, as compared to the case in which the tablet T slips down in a horizontal posture on the passage surface of the tablet discharge passage 24 as in the related art of FIG. 13, the tablet T passes in a state of having a margin with respect to the width of the tablet discharge passage 24 and is discharged without clogging. Thus, a large tablet T can be discharged without increasing the size of the tablet discharge passage 24 of the base main body 2 and changing an overall width. Further, the tablet T rolls down through the tablet discharge passage 24, and hence a time period for discharging the tablet T can be shortened.

[0032] In FIG. 10, the guide peripheral groove 14 of the rotor 4 is formed at a lower end of the rotor 4 so that the guide surface 21c of the guide member 21 comes into contact with the tablet T at a part below the center of the first profile of the tablet T provided in the tablet guide groove 12. In this case, when the tablet T comes into contact with the guide surface 21c, the lower part of the tablet T is tripped so that the axis "x" of the rotation is slanted with respect the tablet guide groove 12. Accordingly, even when the tablet T somewhat rises due to an impact caused by the contact with the guide surface 21c, the tablet T is prevented from being caught by an upper edge of the tablet outlet 17. Thus, as compared to the case in which the tablet T comes into contact at the center of the first profile as illustrated in FIG. 7 and FIG. 8, the time period for discharging the tablet T can be further shortened.

[0033] The present invention is not limited to the embodiment described above and may be corrected and changed without departing from the gist of the invention described in claims.

[0034] For example, in the embodiment described above, the guide member 21 is mounted as a separate member to the tablet outlet 17 of the tablet container 3. However, as illustrated in FIG. 11, the guide member 21 may be formed integrally with the side edge of the tablet outlet 17 of the tablet container 3, and the guide surface 21a may extend outward from the tablet container 3.

[0035] Further, as illustrated in FIG. 7, the rotor 4 of the embodiment described above is a so-called two-stage rotor in which a plurality of tablets are accommodated in the tablet guide groove 12 of the rotor 4 and in which the lowermost tablet T and the tablet T' located above the lowermost tablet T in the tablet guide groove 12 are partitioned by the partition member 20. However, the invention of the present application is applicable also to a tablet cassette including a one-stage rotor.

[0036] In the tablet cassette including the one-stage rotor, as illustrated in FIG. 12(a) and FIG. 12(b), the rotor 4 includes a large-diameter outer peripheral surface 4a in a lower stage, a small-diameter outer peripheral surface 4b in an upper stage, and a step portion 4c located between the large-diameter outer peripheral surface 4a and the small-diameter outer peripheral surface 4b. The large-diameter outer peripheral surface 4a has a plurality of tablet guide grooves 12 parallel to the rotation shaft 9 of the rotor 4 similarly to the embodiment described above. However, one tablet is accommodated in the tablet guide passage 12. An annular tablet pocket 25 which is continuous in the circumferential direction of the rotor 4 is provided above the tablet guide grooves 12. The tablet pocket 25 is formed of the small-diameter outer peripheral surface 4b of the rotor 4, the step portion 4c, and an inner surface of the rotor accommodating portion 6 of the tablet container 3. Unlike the embodiment described above, the partition member 20 is not provided above the partition peripheral groove but above the step portion 4c of the rotor 4. Thus, the tablet pocket 25 shares the partition peripheral groove. One tablet is accommodated in the tablet guide groove 12 from the tablet pocket 25, and one tablet T provided in the tablet guide groove 12 and the tablet T' provided in the tablet pocket 25 that is located above the tablet T are partitioned by the partition member 20.

[0037] Also in this one-stage rotor, the guide peripheral groove 14 extending in the circumferential direction is formed in the large-diameter outer peripheral surface 4a of the rotor 4, and the guide member 21 which advances into the guide peripheral groove 14 is provided on the downstream side of the tablet outlet 17 in the rotation direction of the rotor 4. The tablet T provided in the tablet guide groove 12 is changed in direction by the guide member 21 and is discharged from the tablet outlet 17.

Reference Signs List

[0038]

1	tablet cassette
2	base main body
3	tablet container
4	rotor
12	tablet guide groove
14	guide peripheral groove
17	tablet outlet
21	guide member
21c	guide surface
25	tablet pocket

Claims

1. A tablet cassette, comprising:

   a tablet container, which has a tablet outlet formed at a lower part, and is configured to accommodate a large number of tablets; and
   a rotor, which is rotatably provided inside the tablet container, and has a tablet guide groove configured to guide tablets accommodated inside the tablet container to the tablet outlet,
   wherein the rotor has a peripheral groove extending in a circumferential direction,
   wherein a guide member configured to advance into the peripheral groove is provided on a downstream side of the tablet outlet of the tablet container in a rotation direction of the rotor, and
   wherein the guide member has an inclined guide surface, which is opposed to the tablets provided in the tablet guide groove in the rotation direction of the rotor and faces the tablet outlet.

2. The tablet cassette according to claim 1, wherein the tablets provided in the tablet guide groove are changed in direction by the guide surface of the guide member about an axis parallel to the tablet guide groove and discharged from the tablet outlet.

3. The tablet cassette according to claim 1 or 2, wherein the guide surface of the guide member is configured to change the tablets in direction, when the rotor is viewed from the tablet outlet, from a first profile having a large projection area to a second profile having a projection area smaller than that of the first profile.

4. The tablet cassette according to any one of claims 1 to 3, wherein the guide member is provided, when the rotor is viewed from the tablet outlet, below a center of the first profile of the tablet.

5. The tablet cassette according to any one of claims 1 to 4, wherein the guide surface of the guide member is inclined toward the downstream side in the rotation direction of the rotor from an edge of the guide surface located on an inner side in a radial direction of the rotor toward an edge of the guide surface located on an outer side in the radial direction.

6. The tablet cassette according to claim 5, wherein the edge of the guide surface located on the inner side in the radial direction of the rotor is located, when the rotor is viewed from the tablet outlet, between a center of the tablet outlet and the edge of the tablet outlet on an upstream side in the rotation direction of the rotor.

FIG. 1

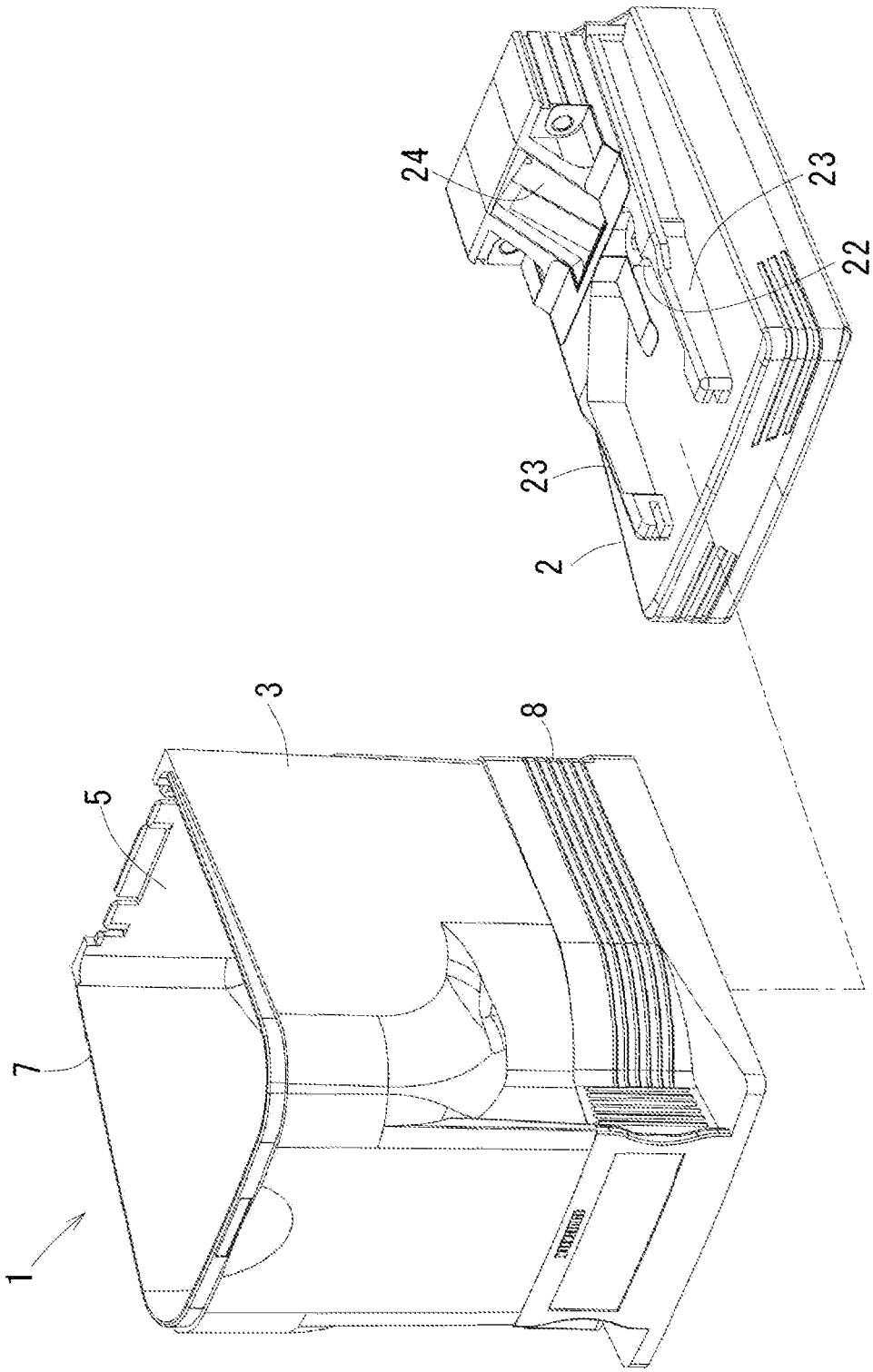
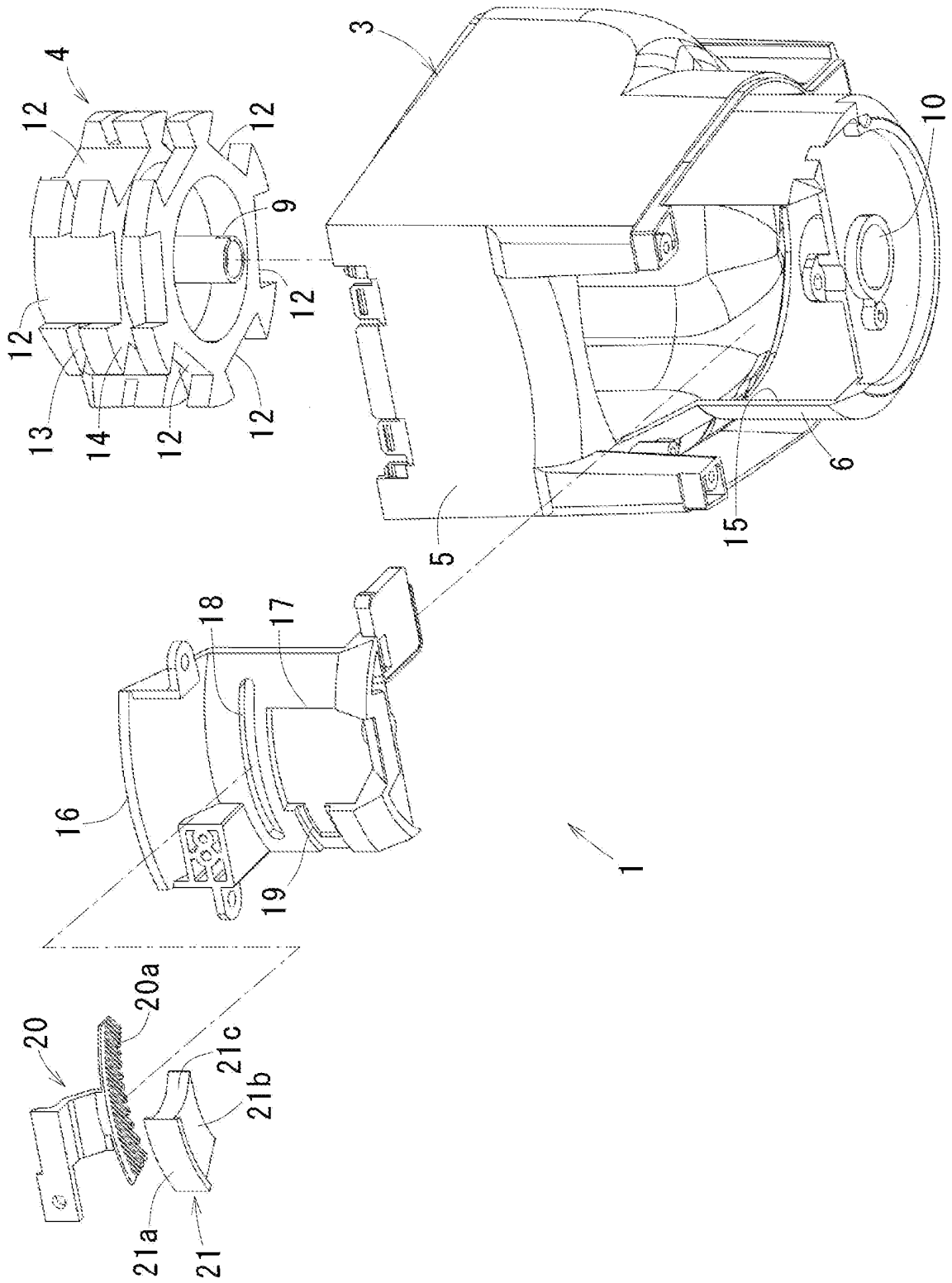


FIG. 2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16
19
1
20
20a
21c
21b
21a
21

FIG. 3

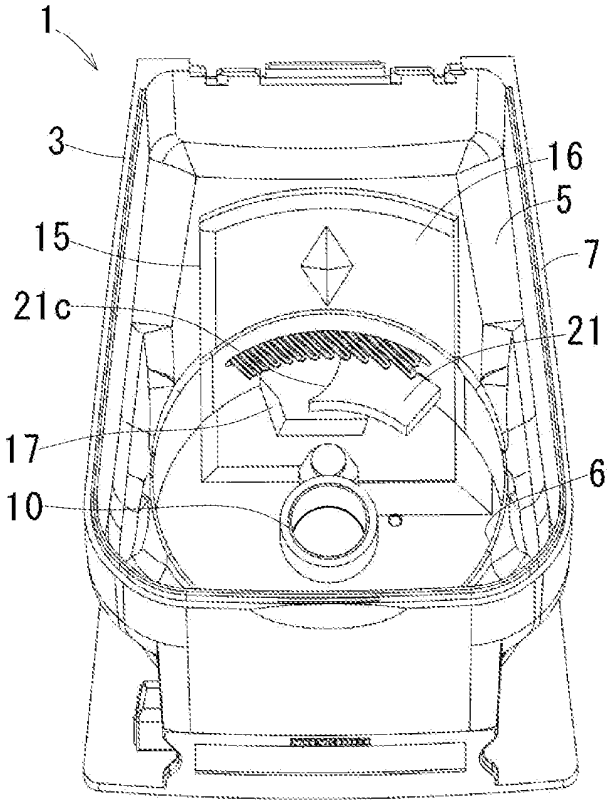


FIG. 4

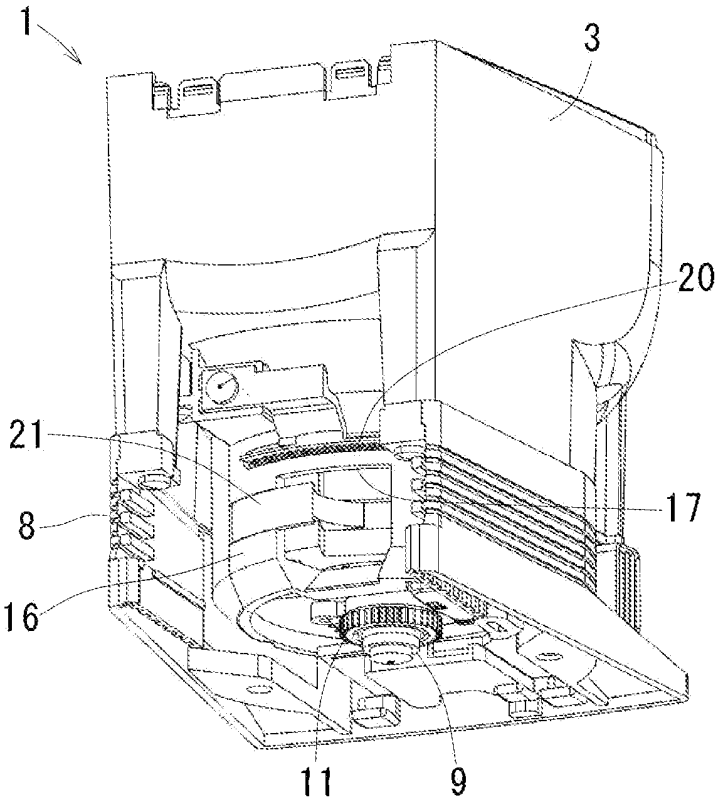
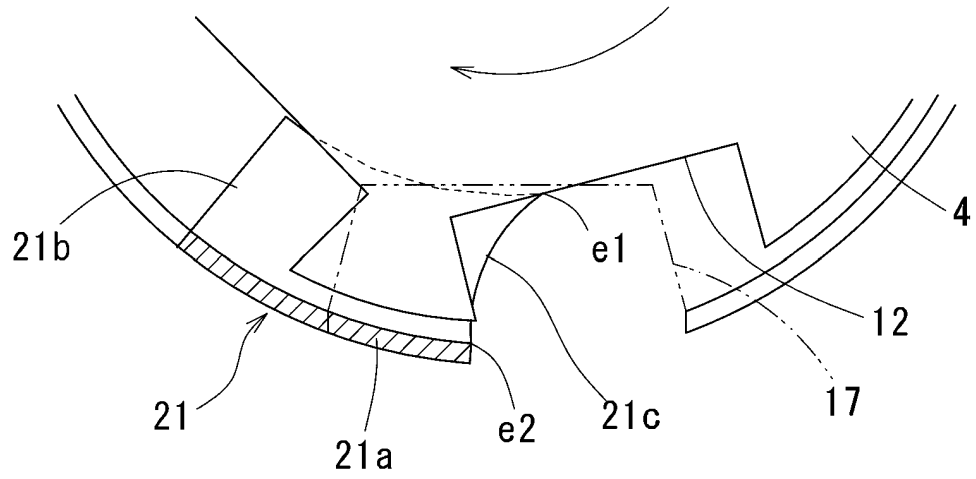


FIG. 5

(a)



(b)

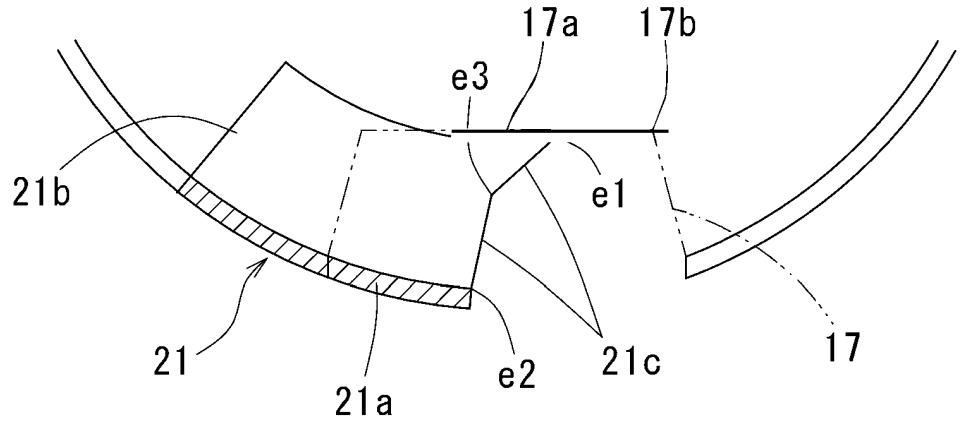


FIG. 6

(a) (b)

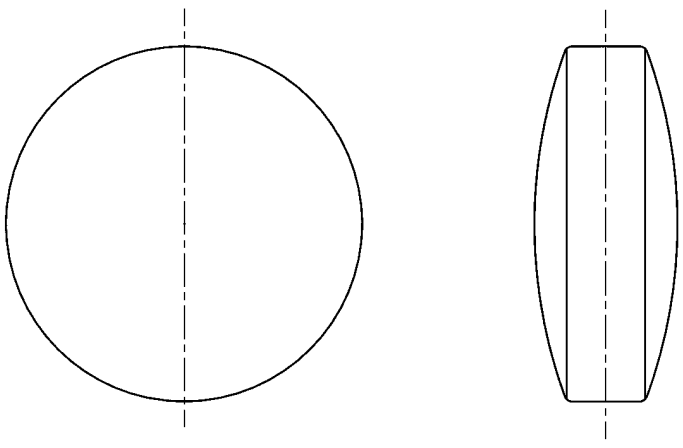


FIG. 7

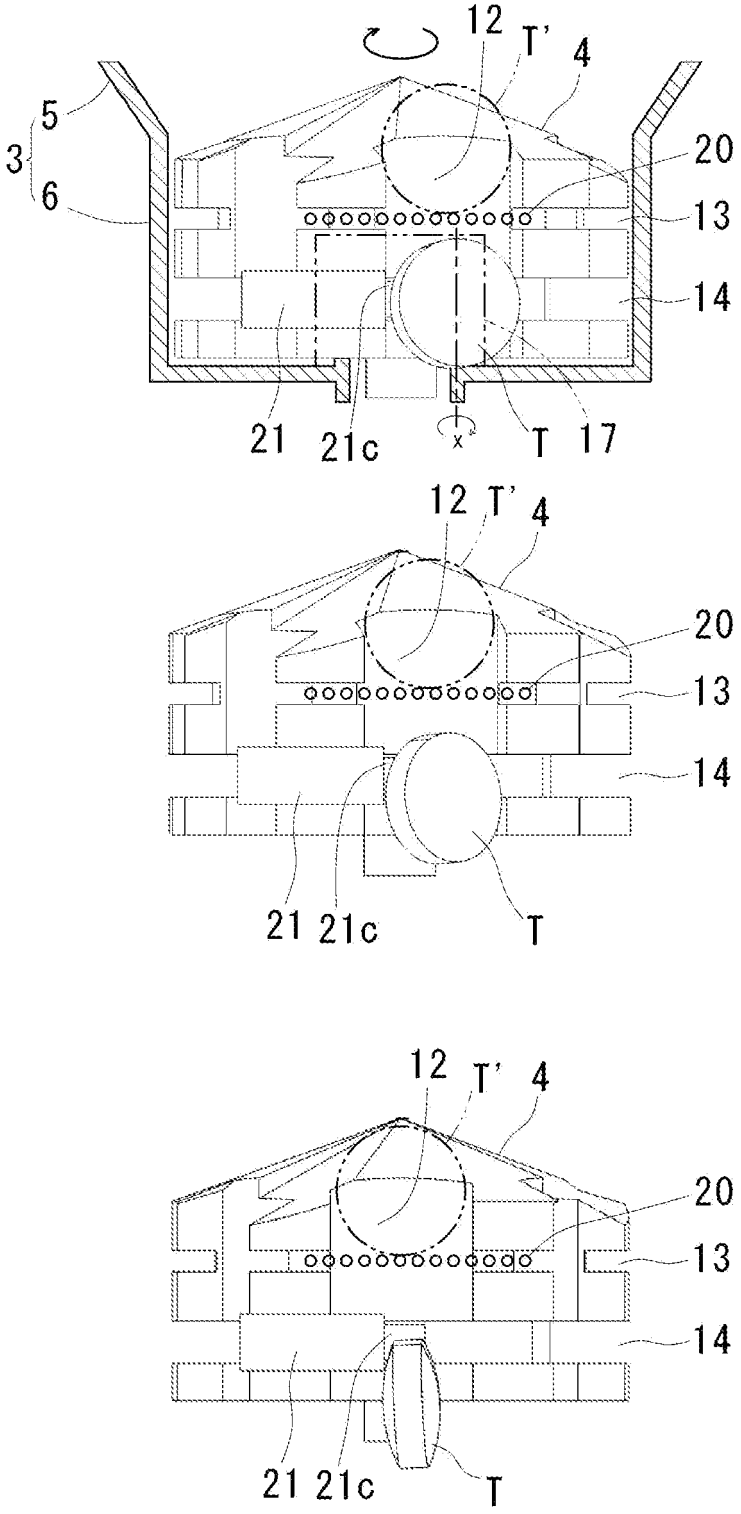

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FIG. 8

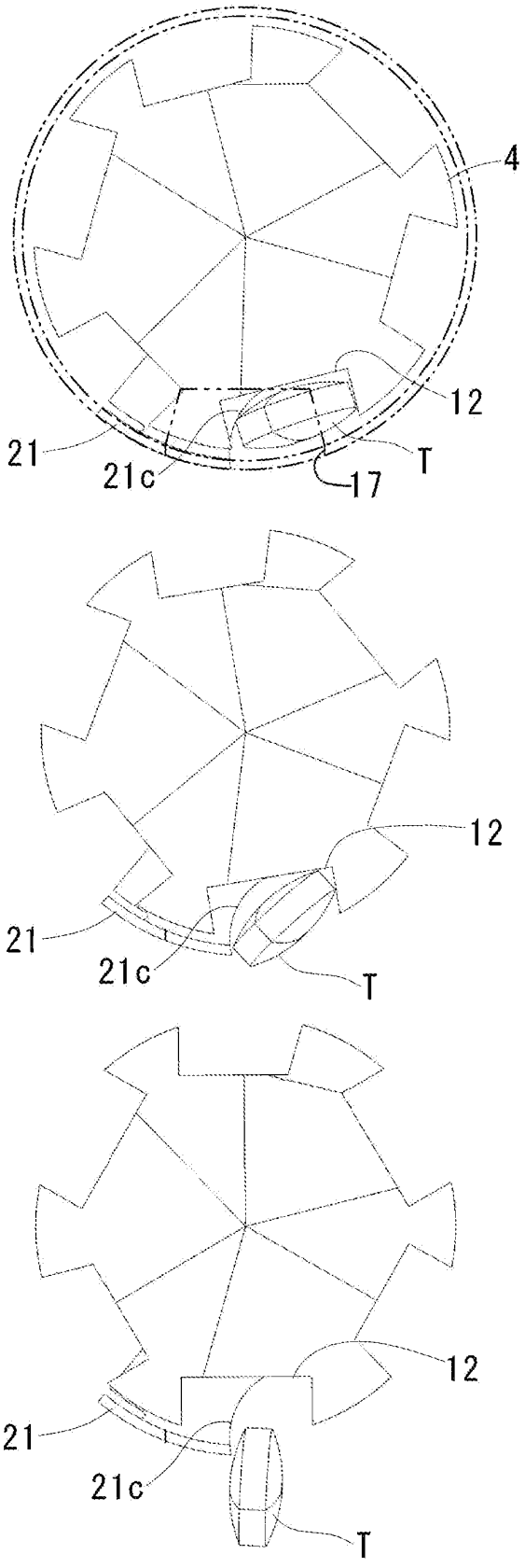
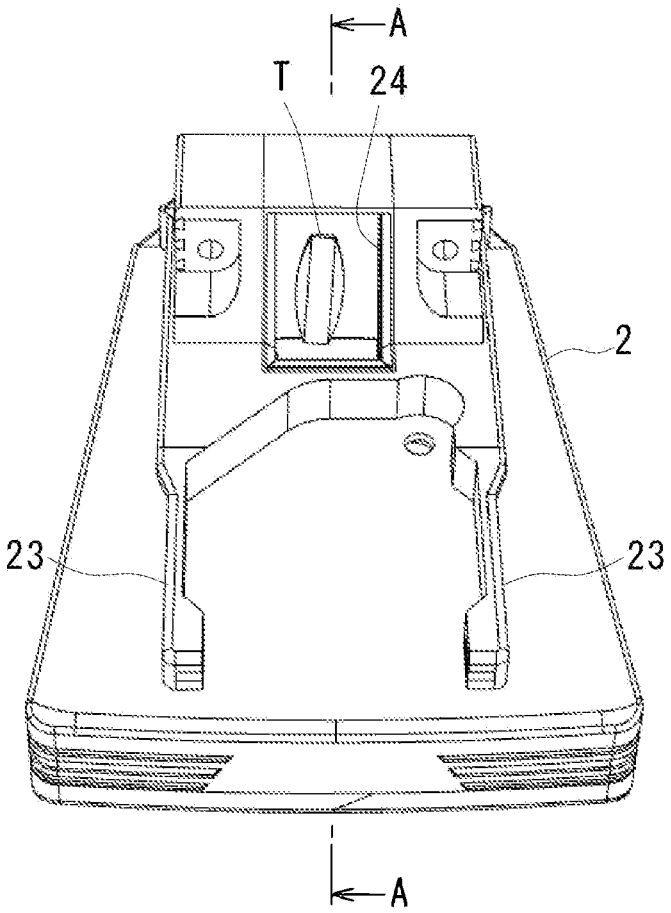


FIG. 9

(a)



(b)

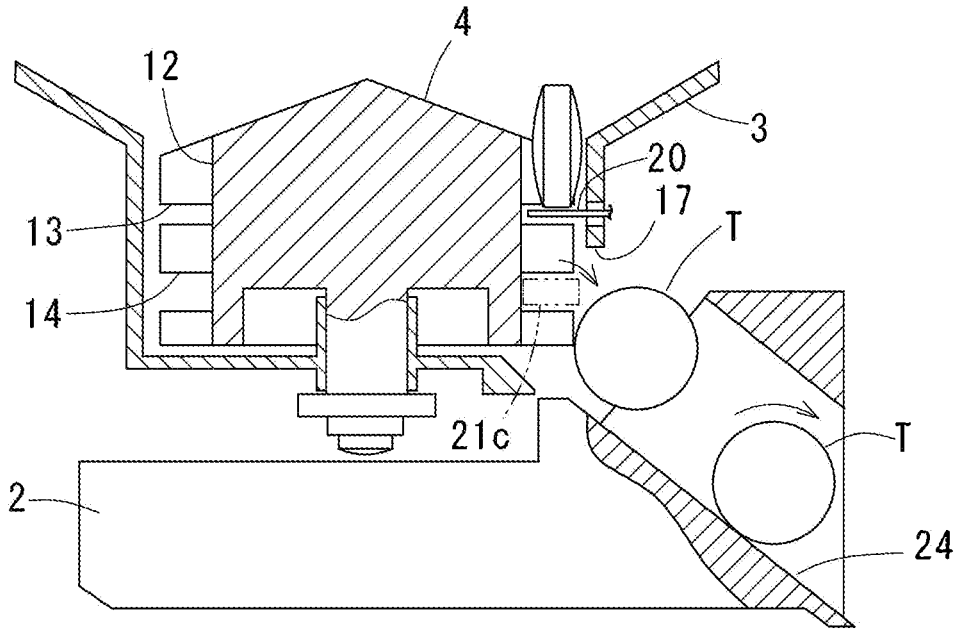


FIG. 10

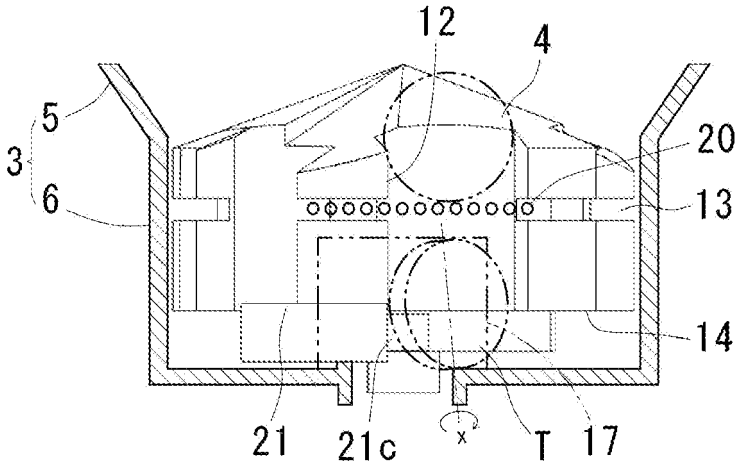


FIG. 11

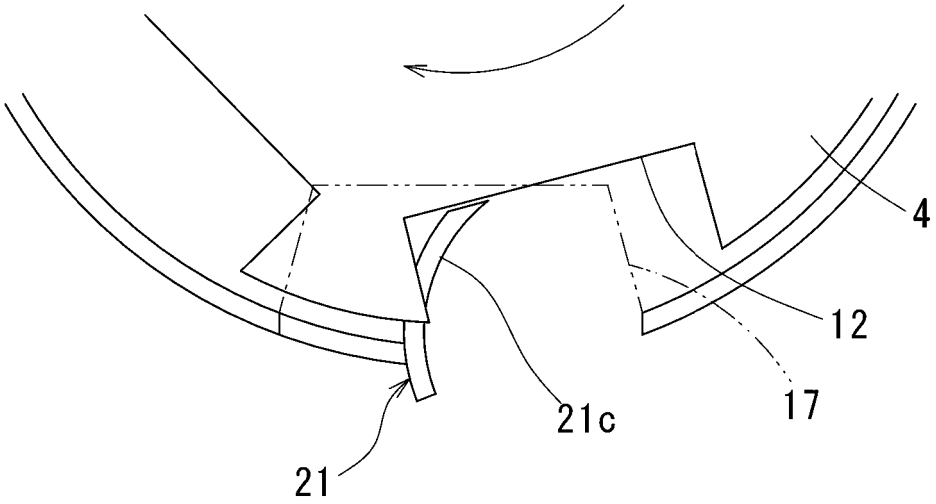
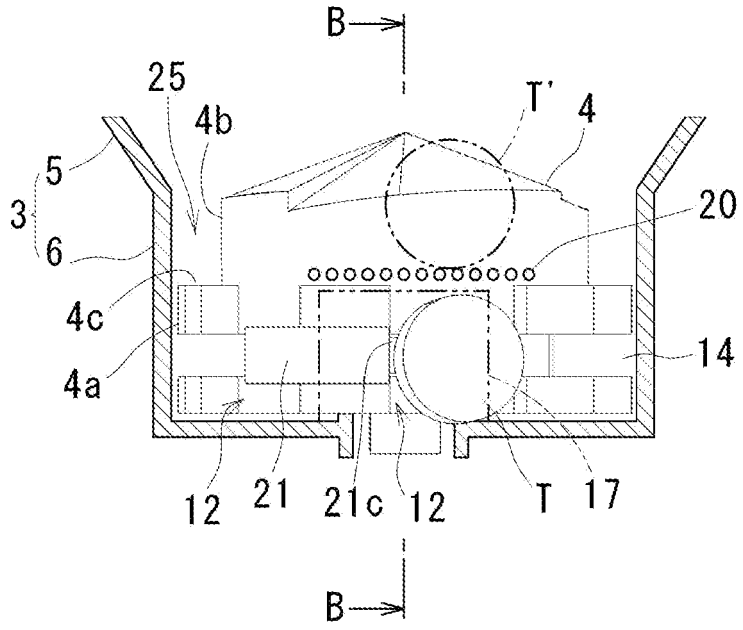


FIG. 12

(a)


B
25
4b
T'
4
5
3
6
20
4c
14
4a
12
21
21c
12
T
17
B

(b)

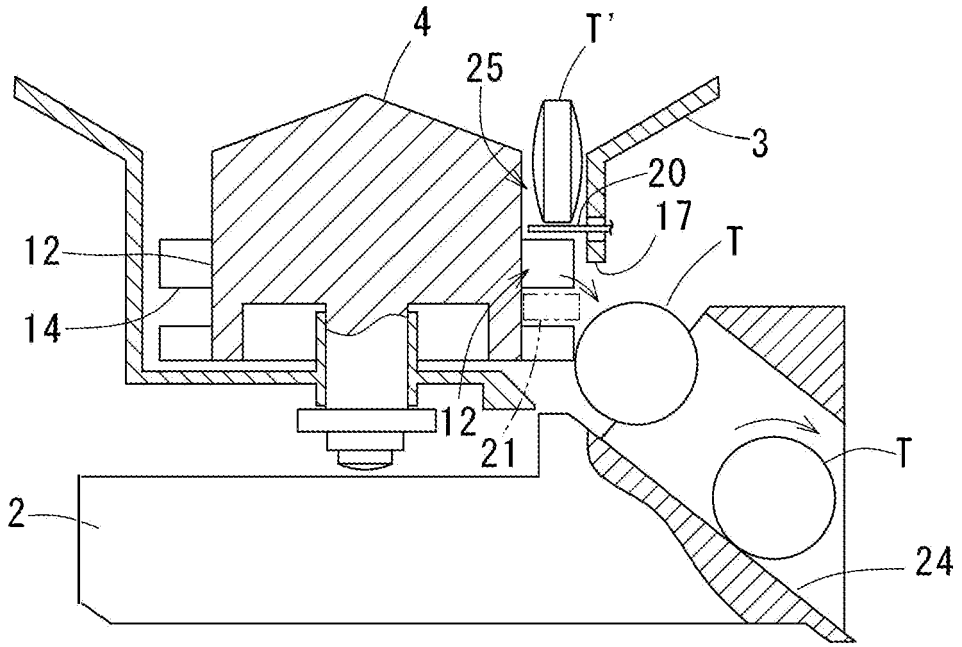
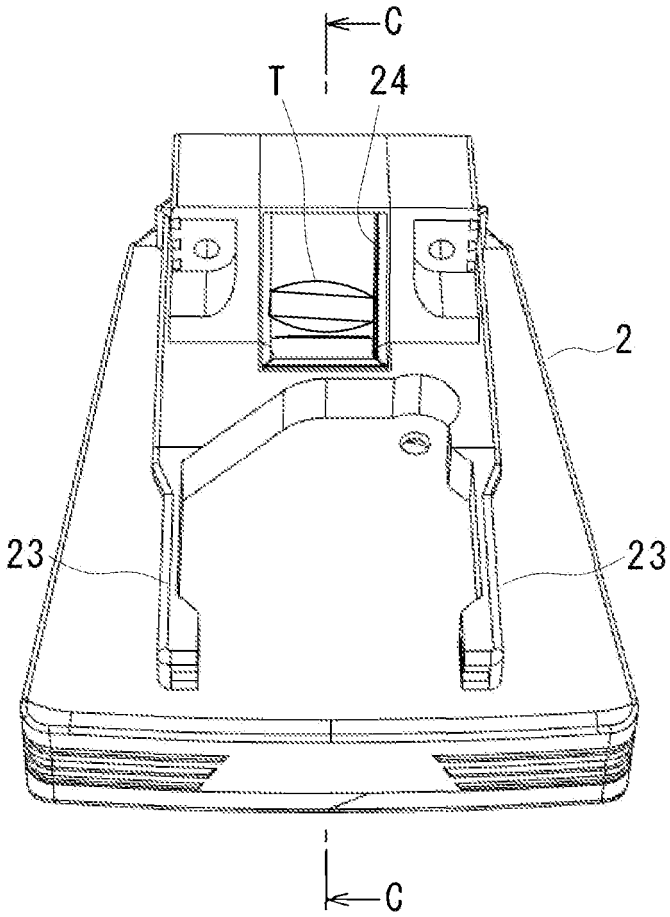
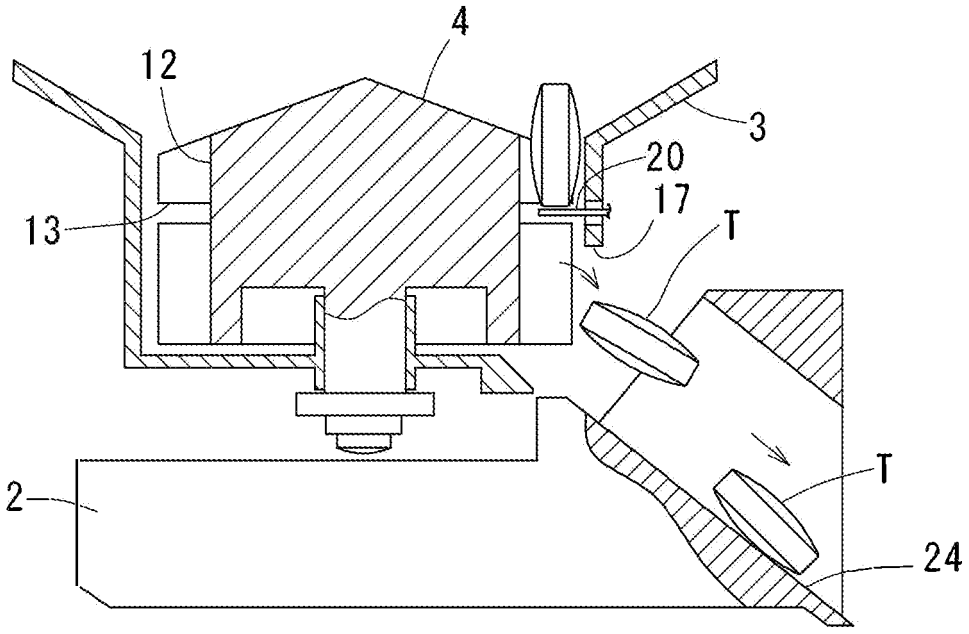

4
T'
25
3
20
17
T
12
14
12
21
T
2
24

FIG. 13

(a)



(b)



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/019407

A. CLASSIFICATION OF SUBJECT MATTER
A61J 3/00(2006.01)i
FI: A61J3/00 310F

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61J3/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan	1922–1996
Published unexamined utility model applications of Japan	1971–2020
Registered utility model specifications of Japan	1996–2020
Published registered utility model applications of Japan	1994–2020

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2017/164196 A1 (YUYAMA CO., LTD.) 28.09.2017 (2017-09-28) paragraphs [0026]-[0028], fig. 1-2A	1-3, 5-6
A	paragraphs [0026]-[0028], fig. 1-2A	4
A	US 2010/0078445 A1 (JVM CO., LTD.) 01.04.2010 (2010-04-01) fig. 8-11	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 July 2020 (03.07.2020)	14 July 2020 (14.07.2020)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/019407

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
WO 2017/164196 A1	28 Sep. 2017	US 2018/0161247 A1 paragraphs [0133]-[0135], fig. 1-2A EP 3323404 A1 CN 107613943 A KR 10-2018-012:3624 A	
US 2010/0078445 A1	01 Apr. 2010	EP 2168877 A2 KR 10-2010-00:36922 A	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 9550619 B **[0007]**
- KR 1020100036922 **[0007]**