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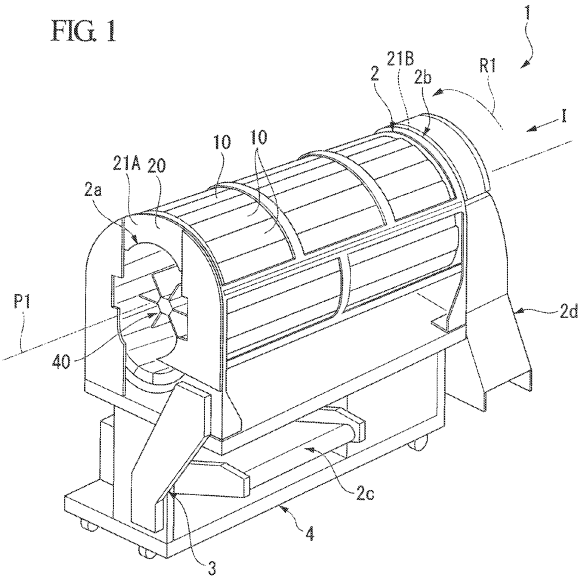
(54) Sorting apparatus

(57) A sorting apparatus has a cylindrical rotary drum (2) for sorting targets supplied to the inside thereof, wherein the cylinder axis of the cylindrical form intersects the vertical direction; and a driving system (3) for rotating the rotary drum around the cylinder axis. The rotary drum includes sorting plates (10), each of which extends along the cylinder axis, wherein the sorting plates are arranged so as to form a circle around the cylinder axis; and a forcing and supporting mechanism (20) for rotatably supporting a base end portion (11a) of each sorting plate, and forcing a head portion (11b) of the sorting plate outward in the radial direction of the rotary drum, where said end portion and said head portion are defined in the rotation direction of the rotary drum. The head portion of each sorting plate overlaps the base end portion of another sorting plate adjacent to said sorting plate in the rotation direction via a gap. In the sorting, among the targets, each having a thickness less than or equal to a predetermined value passes through the gap while each which is caught in the gap and moves upward is released from the forcing by the forcing and supporting mechanism by the weight of the head portion of the sorting plate which forms said gap, and falls down. The sorting apparatus also has a plate receiving wheel (40) which is provided inside the rotary drum, has a rotation axis which extends along the cylinder axis, and has three or more reception plates which extend from the rotation axis and are arranged circularly around the rotation axis and separately from each other. The plate receiving wheel rotates around the rotation axis in the same direction as the rotation direction of the rotary drum in a manner such that a space is provided between the plate receiving wheel and the sorting plates.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a sorting apparatus.

Description of the Related Art

[0002] For a sorting apparatus for sorting sheaves of papers such as postal matters based on the thickness thereof, a known example includes (i) a cylindrical rotary drum, where the axis of the relevant cylinder extends in a direction which intersects the vertical direction, and (ii) a driving system for rotating the rotary drum around the axis. The above rotary drum has a plurality of sorting plates each of which extends along the above axis of the cylinder, and the sorting plates are circularly arranged around the axis. In each of the sorting plates, a head portion in the rotation direction overlaps a base end portion (in the rotation direction) of an adjacent sorting plate via a gap, so as to make each sorting target having a thickness less than or equal to a predetermined value pass through a gap between the sorting plates.

[0003] Additionally, in each of the source preprocessing part, the base end portion is rotatably supported, and the head portion is forced outward in the relevant radial direction. Even if a sorting target is caught in a gap and conveyed upward, the sorting target falls off due to the weight of the relevant sorting plate (see, for example, Japanese Unexamined Patent Application, First Publication No. 2000-255761).

[0004] However, if a sorting target having a relatively large weight is caught in a gap or a step between the sorting plates, moves upward, and then falls off, the sorting target may receive an impact due to its weight and be damaged.

[0005] In such a case, a reception plate may be arranged within the rotary drum so as to relieve the impact. However, if such a reception plate is arranged close to the relevant sorting plate so as to reliably receive the sorting target, the sorting target which moves upward accompanied with the sorting plate may be pushed from the reception plate, and damaged due to buckling.

SUMMARY OF THE INVENTION

[0006] In light of the above circumstances, an object of the present invention is to prevent a sorting target from being damaged.

[0007] Therefore, the present invention provides a sorting apparatus comprising:

a cylindrical rotary drum (2) for sorting targets supplied to the inside thereof wherein the cylinder axis of the cylindrical form intersects the vertical direction; and

a driving system (3) for rotating the rotary drum around the cylinder axis,

wherein the rotary drum includes:

a plurality of sorting plates (10), each of which extends along the cylinder axis, wherein the sorting plates are arranged so as to form a circle around the cylinder axis; and

a forcing and supporting mechanism (20) for rotatably supporting a base end portion (11a) of each sorting plate, and forcing a head portion (11b) of the sorting plate outward in the radial direction of the rotary drum, where said end portion and said head portion are defined in the rotation direction of the rotary drum;

the head portion of each sorting plate overlaps the base end portion of another sorting plate adjacent to said sorting plate in the rotation direction via a gap; and

in the sorting, among the targets, each having a thickness less than or equal to a predetermined value passes through the gap while each which is caught in the gap and moves upward is released from the forcing by the forcing and supporting mechanism by the weight of the head portion of the sorting plate which forms said gap, and falls down,

the sorting apparatus is characterized by further comprising:

a plate receiving wheel (40) which is provided inside the rotary drum, has a rotation axis which extends along the cylinder axis, and has three or more reception plates which extend from the rotation axis and are arranged circularly around the rotation axis and separately from each other, wherein the plate receiving wheel rotates around the rotation axis in the same direction as the rotation direction of the rotary drum in a manner such that a space is provided between the plate receiving wheel and the sorting plates.

[0008] In accordance with the sorting apparatus of the present invention having the plate receiving wheel which rotates around the rotation axis in the same direction as the rotation direction of the rotary drum, even if a sorting target accompanied with the sorting plates is disposed between the sorting plates and a reception plate, the reception plate moves in a direction in which the sorting plates pushes the target. Therefore, the compression applied to the target is released, and it is possible to prevent the target from being damaged due to buckling.

[0009] In addition, there are three or more reception plates circularly arranged around the rotation axis at regular intervals. Therefore, after a sorting target falling down from the upper side is received by a reception plate, the target can slide on this or another adjacent reception

plate so that the target can return to a sorting plate. Therefore, the impact due to the falling can be considerably reduced, thereby preventing the target from being damaged.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a perspective view showing the general structure of a sorting apparatus 1 as an embodiment of the present invention.

Fig. 2 is a perspective view of the rotary drum 2 in the embodiment, viewed from the discharge outlet 2b toward the supply inlet 2a, along arrow "I" in Fig. 1.

Fig. 3 is an enlarged view of the rotary drum 2 in the embodiment, which shows an important part "II" in Fig. 2.

Fig. 4 is a sectional view of the enlarged view of the rotary drum 2 in the embodiment, along line III-III in Fig. 3.

Fig. 5 is a first explanatory diagram for explaining the function of the sorting apparatus 1 and the plate receiving wheel 40 in the embodiment.

Fig. 6 is a second explanatory diagram for explaining the function of the sorting apparatus 1. and the plate receiving wheel 40 in the embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Hereinafter, embodiments of the present invention will be described with reference to the appended figures.

[0012] Fig. 1 is a perspective view showing the general structure of a sorting apparatus 1 as an embodiment of the present invention.

[0013] The sorting apparatus 1 is built in a paper sheave processing system which processes sheaves of papers such as postal matters, and sorts sheaves A of papers (called "paper sheaves A", which are sorting targets) into those having a thickness less than or equal to a predetermined value (a few millimeters) and those having a thickness greater than the predetermined value. The sorting apparatus 1 has a rotary drum 2, and a driving system 3 which rotates the rotary drum 2 in a rotation direction indicated by an arrow R1. Below, the rotation direction of the rotary drum 2 is called the "rotation direction R1 ".

[0014] The rotary drum 2 is supported by a stand 4 (in more detail, the driving system 3 built in the stand 4 as explained later), and the axis P1 of a cylindrical body thereof extends in a direction which intersects the vertical direction. For the paper sheaves A, an open end in the axis of the drum functions as a supply inlet 2a, and the other open end of the drum functions as a discharge outlet 2b.

[0015] In the rotary drum 2, the axis P1 is slightly inclined with respect to the horizontal direction so that the discharge outlet 2b is positioned lower than the supply inlet 2a. During the passing of the paper sheaves A (supplied from the supply inlet 2a) through the rotary drum 2 along the axial direction thereof, those having a thickness less than or equal to the predetermined value are discharged from an outer-peripheral part of the drum, and those having a thickness greater than the predetermined value are discharged from the discharge outlet 2b.

[0016] Fig. 2 is a perspective view of the rotary drum 2, viewed from the discharge outlet 2b toward the supply inlet 2a (see arrow "I" in Fig. 1). Fig. 3 is an enlarged view of an important part "II" in Fig. 2.

[0017] As shown in Fig. 2, the rotary drum 2 has a plurality of sorting plates 10 and a forcing and supporting mechanism 20.

[0018] The sorting plates 10 each extend along the axis P1 and are arranged so as to form a circle around the axis P1. As shown in Fig. 3. each sorting plate 10 has (i) a main plate 11 which is arranged on the inner-peripheral side of the sorting plate 10, and contacts the paper sheaves A, (ii) a reinforcing rib 12 which has a honeycomb shape and is arranged at a back face 11A of the main plate 11 except for both end parts in the width direction of the plate, and (iii) two circular are attachment parts 13 (not shown in Fig. 12) which are provided at both ends in the longitudinal direction of the main plate 11 and extend in the normal direction from the back face 11 A of the main plate 11.

[0019] As shown in Fig. 3, each main plate 11 is inclined in a manner such that a base end portion 11a thereof in the rotation direction R1 (i.e., width direction) is rotatably supported, while a head portion 11 b thereof in the rotation direction R1 is positioned slightly inward (measured in the radial direction) in comparison with the tangential direction (from the base end portion 11a) of the rotation direction R1.

[0020] As also shown in Fig. 3, in each main plate 11, the head portion 11 b overlaps the base end portion 11a of an adjacent main plate 11 in the rotation direction R1 via a gap "C". In other words, regarding two adjacent main plates 11 in the rotation direction R1, the head portion 11b of the main plate 11 positioned backward in the rotation direction R1 overlaps the base end portion 11 a of the main plate 11 positioned frontward so as to form the gap C.

[0021] The above gap C is determined so as to satisfy a condition that when each sorting plate 10 is positioned on the lower side of the sorting apparatus 1, the paper sheaves A (sorting target) having a thickness greater than a predetermined value (e.g., a few millimeters) cannot pass through the gap.

[0022] The reinforcing rib 12 is provided on the whole area of the back face 11A of the main plate 11 except for areas corresponding to the base end portion 11a and the head portion 11b, and also both end parts in the longitudinal direction of the plate, thereby improving the flexural rigidity of the main plate 11.

[0023] From both ends in the base end portion 11a of

the back face 11A, the two circular are attachment parts 13 extend in the normal direction (of the back face 11A), and are respectively supported by ring members 21A and 21B of the forcing and supporting mechanism 20 via pin members.

[0024] Fig. 4 is a sectional view along line III-III in Fig. 3, where "21B(21A)" indicates that similar structures are provided at each side of the ring members 21A and 21B.

[0025] The forcing and supporting mechanism 20 includes (i) the ring members 21A and 21B (see Fig. 1) provided at both ends in the axial direction of the rotary drum 2, (ii) pin members 22 (see Fig. 3) which rotatably support the two circular arc attachment parts 13 (of each sorting plate 10) for the ring members 21A and 21B, (iii) forcing parts 23 (see Fig. 4) for forcing each sorting plate 10 outward in the relevant radial direction, and (iv) L-form stoppers 24 (see Fig. 4) respectively attached to the ring members 21A and 21B by using bolts, so as to receive the forced sorting plate 10.

[0026] As shown in Figs. 1 and 3, the distance between the ring members 21A and 21B is shorter than the distance between the two circular arc attachment parts 13 and longer than the length of the reinforcing rib 12 in the longitudinal direction of the relevant sorting plate 10.

[0027] As shown in Fig. 3, the forcing parts 23 are provided close to the head portion 116 of each sorting plate 10, and each forcing part 23 includes a tension bolt 23a, nuts 23b and 23c, and a spring 23d.

[0028] The tension bolt 23 a is a "semi-finished bolt", where a base shaft part passes through the L-form stopper 24 and the reinforcing rib 12, and a head screw part is engaged with the nuts 23b and 23c.

[0029] The nut 23b is coupled with the L-form stopper 24 via the spring 23d whose tension is adjustable. The nut 23c restricts the displacement of the nut 23b.

[0030] In the above structure, tension is applied to the spring 23d in the outward radial directions (for the rotary drum 2), so that the tension bolt 23a pushes the reinforcing rib 12 onto the L-form stopper 24 via the nuts 23b and 23c. Owing to such a forcing and supporting mechanism 20, the head portion 11b of each sorting plate 10 is forced outward in the relevant radial direction. The tension applied to the spring 23d is set so that when the target sorting plate 10 is positioned on the upper side (e.g., within a range between +45° and -45° from the vertical axis), the corresponding gap (between the sorting plates 10) increases against the above forcing by means of the weight of the relevant sorting plate 10.

[0031] The driving system 3 is built in the stand 4, and includes a prime mover (not shown) provided in a lower part of the stand 4, and a pair of pulleys (not shown) to which the ring members 21A and 21B are attached.

[0032] In the sorting apparatus 1 having the above-described structure, when the paper sheaves A are supplied from the supply inlet 2a and displaced on a sorting plate 10 in a lower position, the paper sheaves A are conveyed diagonally upward accompanied with the movement of this sorting plate 10. Accordingly, the paper sheaves A are moved due to their weight toward a gap C formed between the sorting plates 10. Among the paper sheaves A which reach the gap C, each paper sheaf thinner than or equal to the gap C passes through the gap C, and is discharged from the outer periphery of the rotary drum 2, while each paper sheaf thicker than the gap C is discharged from the discharge outlet 2b. Therefore, each paper sheaf having a thickness less than or equal to the gap C is sorted out.

[0033] As shown in Fig. 1, the paper sheaves A discharged from the outer periphery of the rotary drum 2 are supplied to a next process by means of a conveyer 2c provided in a lower part of the sorting apparatus 1, and the paper sheaves A discharged from the discharge outlet 2b are supplied to a next process by means of a drum shoot 2d.

[0034] During the movement of each paper sheaf thicker than the gap C (between the sorting plates 10) from the supply inlet 2a to the discharge outlet 2b, the paper sheaf, which is caught by the gap C or disposed on a step between the sorting plates 10, moves upward, and then falls downward. In this process, in order to prevent the relevant paper sheaf having a relatively large weight from being damaged due to a considerable impact of falling caused by the weight the sorting apparatus 1 has a plate receiving wheel 40 provided inside the rotary drum 2.

[0035] As shown in Fig. 2, the plate receiving wheel 40 has a rotation supporter 41 having a hexagonal form, and six reception plates 42 which extend outward from the corners of the rotation supporter 41.

[0036] The rotation supporter 41 is formed by assembling plate-shape members, and extends from the supply inlet 2a to the discharge outlet 2b.

[0037] The rotation supporter 41 is supported by a supporter 45 which extends from a side of the stand 4, and is rotatable around a rotation axis P2 which extends among the cylinder axis P1. The rotation supporter 41 is driven and rotated by a prime mover 46 in the direction indicated by the arrow R2 in Fig. 2, where the angular velocity of the rotation is larger than that of the rotary drum 2. Below, the rotation direction of the plate receiving wheel 40 is called the "rotation direction R2".

[0038] The six reception plates 42 are each formed using a flexible synthetic resin plate, and are separated from each other around the rotation axis P2. Accompanied with the rotation of the rotation supporter 41, the six reception plates 42 rotate around the rotation axis P2 in the rotation axis P2 in a manner such that a space is provided between a reception plate 42 and a sorting plate 10 which are close to each other.

[0039] The rotation axis P2 of the plate receiving wheel 40 having the above structure is arranged in the upper half within the half called an upward moving region S (see Fig. 5) in which the sorting plates 10 move from the lower side to the upper side, where the diameter of the rotation locus of the heads of the reception plates 42 is larger than the horizontal length of the upward moving

region S. In addition, the minimum distance between the reception plates 42 and the sorting plates 10 when the plate receiving wheel 40 rotates in the rotation direction R2 is set to a few centimeters.

[0040] Below, the function of the above-described plate receiving wheel 40 will be explained with reference mainly to Figs. 5 and 6.

[0041] As shown in Fig. 5, when a paper sheaf A1 thicker than the predetermined gap C is caught in the gap C, moves upward accompanied with the relevant sorting plates 10, and reaches a predetermined position (45° from the vertical axis), the gap at the corresponding head portion 11 b of the sorting plate 10 increases due to the releases of the forcing (i.e., against the forcing) by the forcing and supporting mechanism 20, and the paper sheaf A1 falls.

[0042] In the above process, the paper sheaf A1 tends to fall within the half called the "upward moving region S " in which the sorting plates 10 move from the lower side to the upper side. Additionally, within the upward moving region S, the width of the displacement of the falling paper sheaf A1 is relatively small in the upper half in which the forcing by the forcing and supporting mechanism 20 is released. Here, since the plate receiving wheel 40 is arranged on the upper side of the upward moving region S, the paper sheaf A 1 is preferably caught by the plate receiving wheel 40.

[0043] The paper sheaf A1 caught by the plate receiving wheel 40 is disposed between two reception plates 42 (adjacent in the circumferential direction) and moves toward the rotation axis P2. In this process, the paper sheaf A1 slides down along the plate surface of the reception plate 42 which the paper sheaf A 1 contacts, or directly falls onto the rotation supporter 41.

[0044] As shown in Fig. 6, after the paper sheaf A1 rotates together with the reception plates 42, the paper sheaf A1 contacts a front-side reception plate 42A (among the two adjacent reception plates 42) in the rotation direction R2, slides down along the plate surface of the reception plate 42A which has gradually inclined downward, and finally falls down onto a sorting plate 10 positioned on the lower side. In comparison with a conventional state in which a paper sheaf moves upward together with the relevant sorting plates 10 and then directly falls down onto a sorting plate 10, the above process is performed via the reception plates 42 and includes sliding down (of the paper sheaf A1) along the plate surface of a reception plate 42, thereby reducing the impact due to the falling of the paper sheaf A1, and not generally damaging the paper sheaf A1,

[0045] In addition, when a paper sheaf A2 thicker than the predetermined gap C is caught in the gap C and moves upward together with the relevant sorting plates 10, even if an end of the paper sheaf A2, which is opposite to the other end caught by the gap C, contacts a reception plate 42, the paper sheaf A2 is not compressed. That is, since the rotation speed of the reception plates 42 is higher than that of the sorting plates 10, the distance between a support point b1 (see Figs. 5 and 6) between the sorting plates 10 and a contact point b2 on the relevant reception plate 42 increases on the upper half of the plate receiving wheel 40. Therefore,in the upper side where the paper sheaves A tend to fall down, even if the paper sheaf A2 is caught between the sorting plates 10 and a reception plate 42, the paper sheaf A2 is not compressed.

[0046] Additionally, when the paper sheaf A2 does not reach the upper side and slides down along a sorting plate 10, even if the paper sheaf A 1 contacts a reception plate 42, the flexible reception plate 42 softly brushes the surface of the paper sheaf A1and moves upward, so that an extremely small burden is imposed on the paper sheaf A1.

[0047] In accordance with the above-described sorting apparatus 1 having the plate receiving wheel 40 which rotates around the rotation axis P2 in the same rotation direction R2 as that of the rotary drum 2, even if the paper sheaf A2 accompanied with the sorting plates 10 is disposed between the sorting plates 10 and a reception plate 42, the reception plate 42 moves in a direction in which the sorting plates 10 pushes the paper sheaf A2. Therefore, the compression applied to the paper sheaf A2 is released, and it is possible to prevent the paper sheaf A2 from being damaged due to buckling.

[0048] In addition, the plate receiving wheel 40 has the six reception plates 42 circularly arranged around the rotation axis P2 at regular intervals. Therefore,after the paper sheaf A1 falling down from the upper side is received by a reception plate 42, the paper sheaf A 1 can slide on this or another adjacent reception plate 42 so that the paper sheaf A1can return to a sorting plate 10. Therefore, the impact due to the falling can be considerably reduced, thereby preventing the falling paper sheaf A1 from being damaged.

[0049] Furthermore, since the rotation speed of the plate receiving wheel 40 is higher than that of the rotary drum 2, the distance measured between two points defined in the upper half of the plate receiving wheel 40 increases. Therefore, no compression is applied to the paper sheaf A2, and further reliably preventing the paper sheaf A2 from being damaged due to buckling.

[0050] In addition, since each sorting plate 10 has the main plate 11 which contacts the paper sheaves A and the reinforcing rib 12 on the outside of the main plate 11 in the relevant radial direction, the main plate 11 does not easily bend, so that the predetermined size of the gap C can be secured.

[0051] Additionally, the reception plates 42 are flexible. Therefore, even if the paper sheaf A2 contacts a reception plate 42, an extremely small burden is imposed on the paper sheaf A2, thereby preventing the paper sheaf A2 from being damaged.

[0052] Furthermore, since the rotation axis P2 is positioned in the upward moving region S (in the rotary drum 2) in which the sorting plates 10 move from the lower side to the upper side, the plate receiving wheel 40 is substantially positioned in the upward moving region

where the paper sheaf A1 tends to fall down, and the falling paper sheaf A1 can be effectively caught.

[0053] In addition, since the rotation axis P2 is positioned in the upper half of the upward moving region S, the paper sheaf A1 can be effectively caught at a position where the width of the displacement of the falling paper sheaf A1 is relatively small.

[0054] Additionally, since the diameter of the rotation locus of the heads of the reception plates 42 in the plate receiving wheel 40 is larger than the horizontal length of the upward moving region S, the paper sheaves A can be effectively caught in the entire upward moving region S.

[0055] The operation procedure, the form of each structural element, or each combination between the structural elements shown in the above embodiment are examples, and additions, omissions, substitutions, and other modifications can be made without departing from the scope of the present invention. Accordingly, the invention is not to be considered as being limited by the foregoing description, and is only limited by the scope of the appended claims.

[0056] For example, the rotation axis P2 is positioned in the upper half of the upward moving region S in the above embodiment. However, the rotation axis P2 may be set so as to satisfy a condition in that the distance between the sorting plates 10 and the reception plates 42 is minimized in a section which intersects the cylinder axis P1 when the tangential direction for the rotation of the sorting plates 10 coincides with the vertical direction. In this case, it is possible to effectively prevent the paper sheaves A from passing through the space between the sorting plates 10 and the reception plates 42.

[0057] In addition, six reception plates 42 are provided in the above embodiment. However, three or more reception plates 42 can implement the sliding operation of the paper sheaves A on the reception plates 42, which can considerably reduce the above-described impact. For example, four reception plates 42 may be provided.

[0058] Although the above embodiment has the rotation supporter 41 functions as the rotation axis P2, a plurality of the reception plate 42 may be integrally formed without employing the rotation supporter 41.

[0059] Additionally, the reception plates 42 are flexible in the embodiment. However, when at least the head side of each reception plate 42 is flexible, the burden imposed on the paper sheaves A can be reduced.

[0060] Although the reception plates 42 extend from the corners of the rotation supporter 41 in the above embodiment, the reception plates 42 may extend from six sides of the rotation supporter 41.

Claims

1. A sorting apparatus comprising:

a cylindrical rotary drum (2) for sorting targets supplied to the inside thereof, wherein the cylinder axis of the cylindrical form intersects the vertical direction; and

a driving system (3) for rotating the rotary drum around the cylinder axis,

wherein the rotary drum includes:

a plurality of sorting plates (10), each of which extends along the cylinder axis, wherein the sorting plates are arranged so as to form a circle around the cylinder axis; and

a forcing and supporting mechanism (20) for rotatably supporting a base end portion (11 a) of each sorting plate, and forcing a head portion (11b) of the sorting plate outward in the radial direction of the rotary drum, where said end portion and said head portion are defined in the rotation direction of the rotary drum;

the head portion of each sorting plate overlaps the base end portion of another sorting plate adjacent to said sorting plate in the rotation direction via a gap; and

in the sorting, among the targets, each having a thickness less than or equal to a predetermined value passes through the gap while each which is caught in the gap and moves upward is released from the forcing by the forcing and supporting mechanism by the weight of the head portion of the sorting plate which forms said gap, and falls down,

the sorting apparatus is **characterized by** further comprising:

a plate receiving wheel (40) which is provided inside the rotary drum, has a rotation axis which extends along the cylinder axis, and has three or more reception plates which extend from the rotation axis and are arranged circularly around the rotation axis and separately from each other, wherein the plate receiving wheel rotates around the rotation axis in the same direction as the rotation direction of the rotary drum in a manner such that a space is provided between the plate receiving wheel and the sorting plates.

2. The sorting apparatus in accordance with Claim 1, **characterized in that**:

the rotation speed of the plate receiving wheel is higher than the rotation speed of the rotary drum.

3. The sorting apparatus in accordance with Claim 1 or

2, **characterized in that**:

each of the sorting plates has a main plate (11) which contacts the targets, and a reinforcing rib (12) on the outside of the main plate in the radial direction.

4. The sorting apparatus in accordance with any one of Claim 1 to 3, **characterized in that**:

at least the head portion of each sorting plate is flexible.

5. The sorting apparatus in accordance with any one of Claim 1 to 4, **characterized in that**:

the rotation axis is positioned in an upward moving region (S) in which the sorting plates move from the lower side to the upper side of the rotary drum.

6. The sorting apparatus in accordance with Claim 5, **characterized in that**:

the rotation axis is positioned in the upper half of the upward moving region.

7. The sorting apparatus in accordance with Claim 5, **characterized in that**:

the rotation axis is set so as to satisfy a condition **in that** the distance between the sorting plates and the reception plates is minimized in a section which intersects the cylinder axis when the tangential direction for the rotation of the sorting plates coincides with the vertical direction.

8. The sorting apparatus in accordance with Claim 5, **characterized in that**:

the diameter of the rotation locus of the heads of the reception plates in the plate receiving wheel is larger than the horizontal length of the upward moving region.

FIG. 1

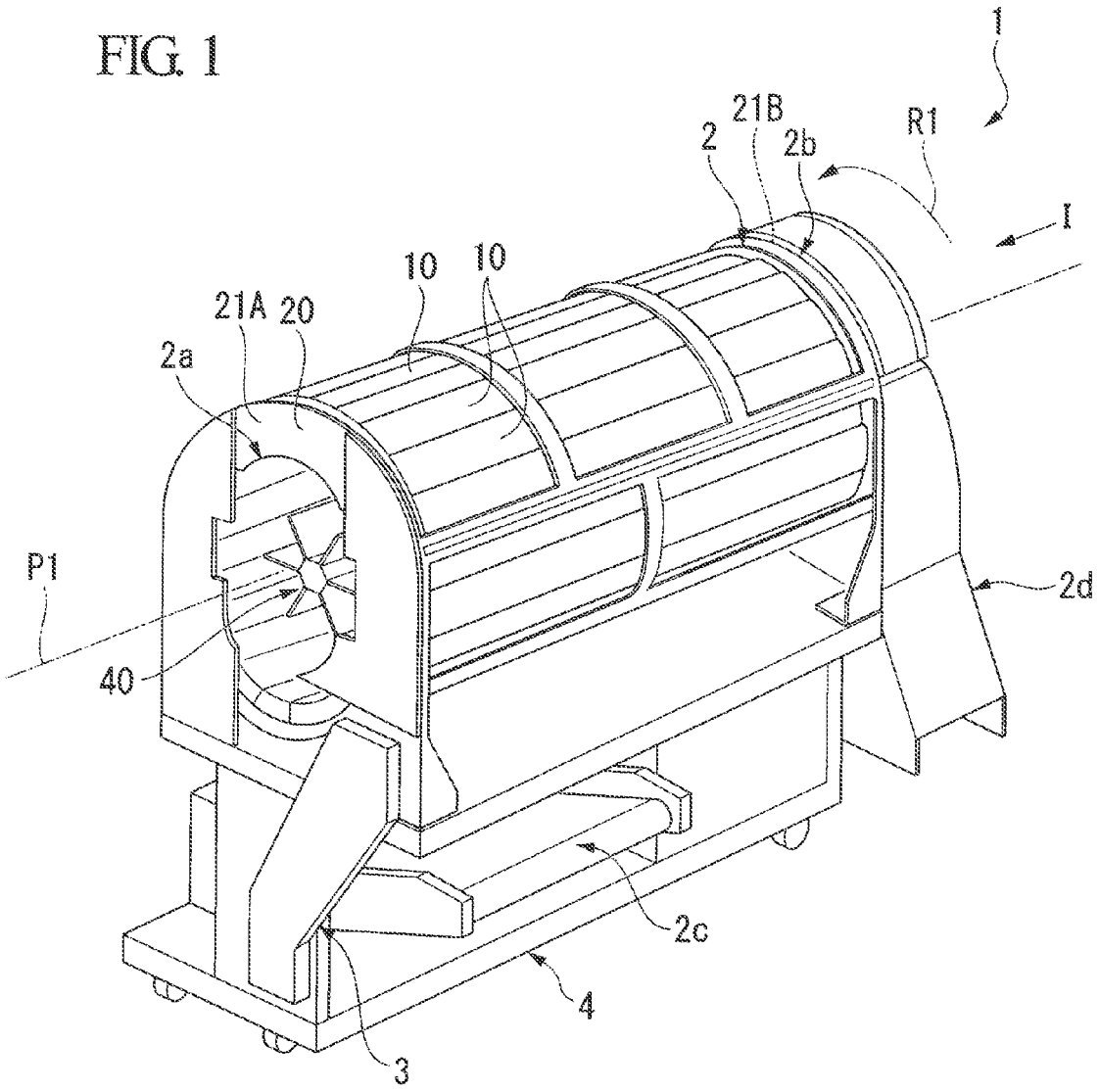
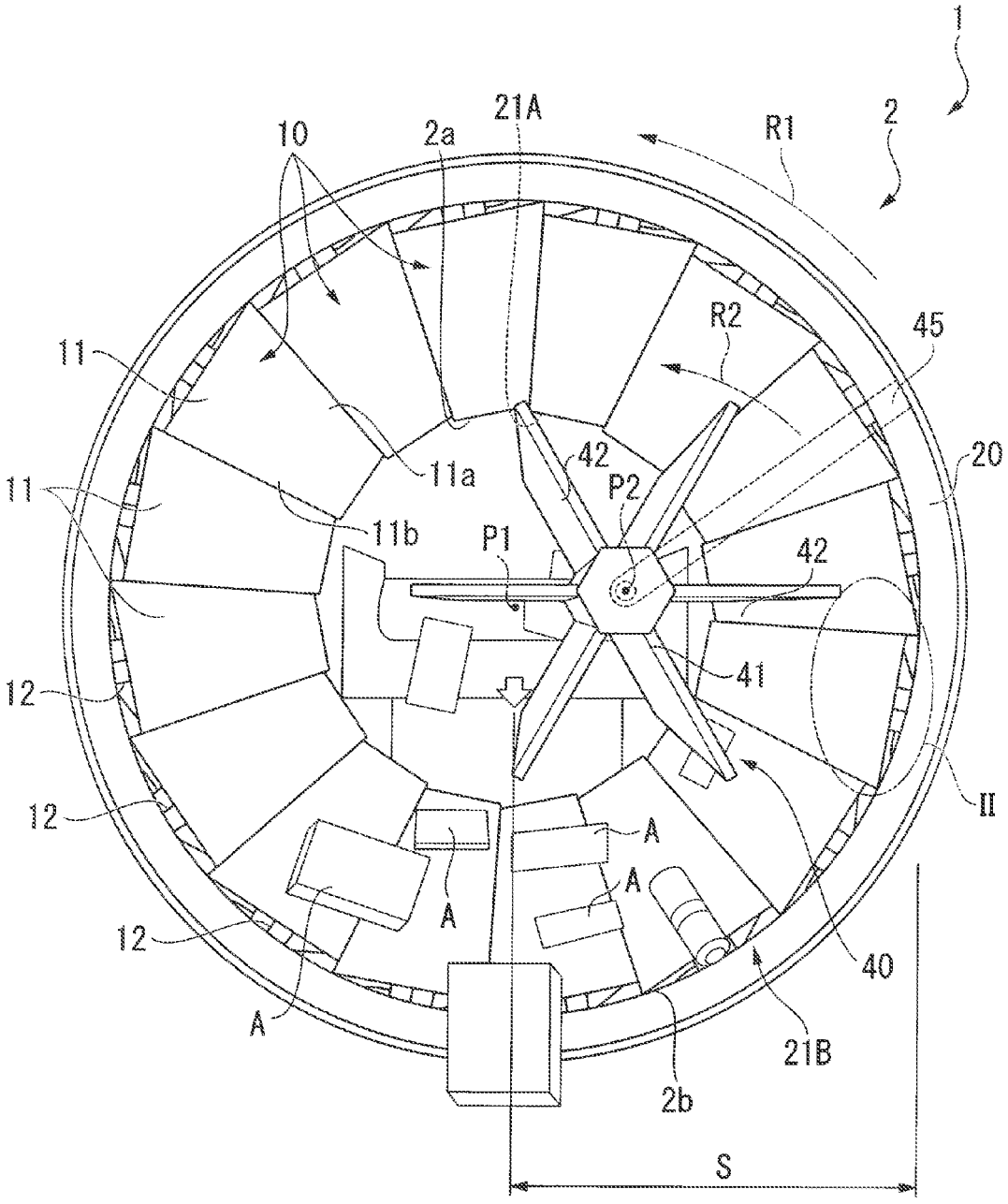


FIG. 2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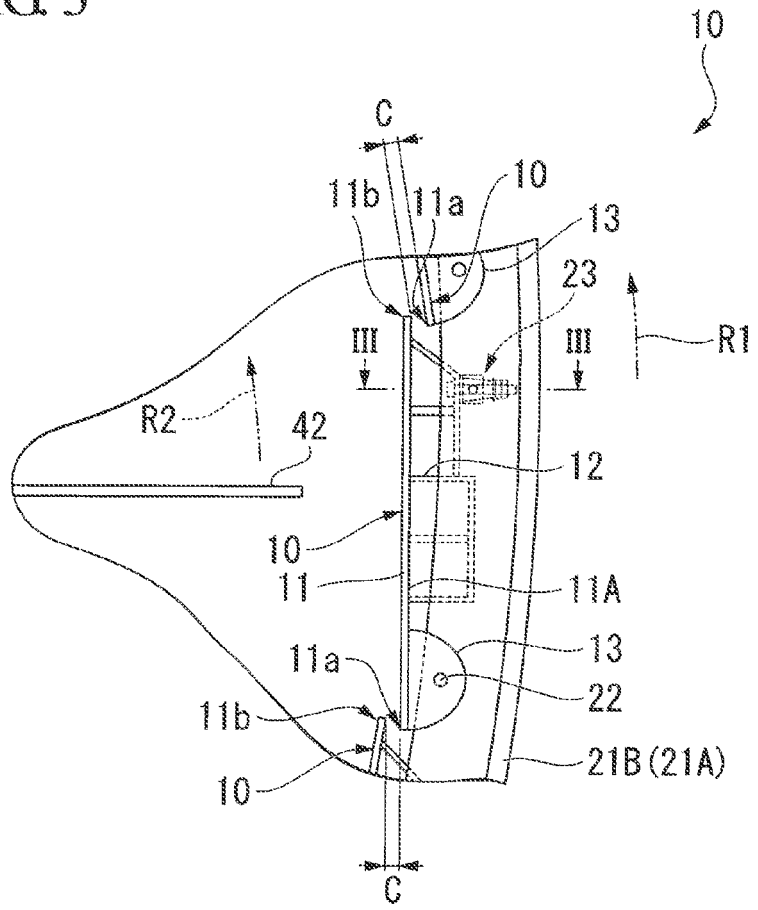
2
21A
10
2a
R1
R2
45
11
20
42
P2
11a
11b
P1
42
41
12
II
A
A
A
12
12
40
21B
2b
S

FIG. 3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C
11b
11a
10
13
23
III
III
R1
R2
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10
11
11A
13
11a
22
11b
21B (21A)
10
C

FIG. 4

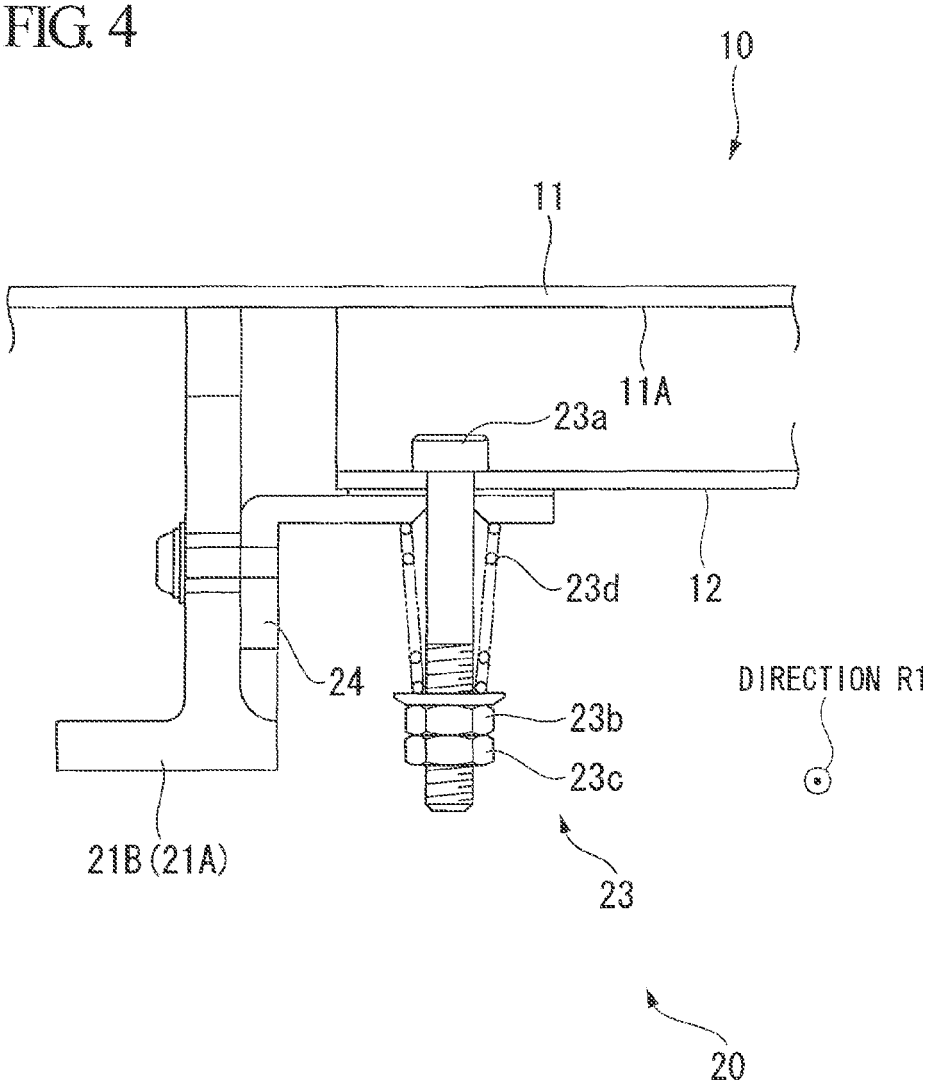


FIG. 5

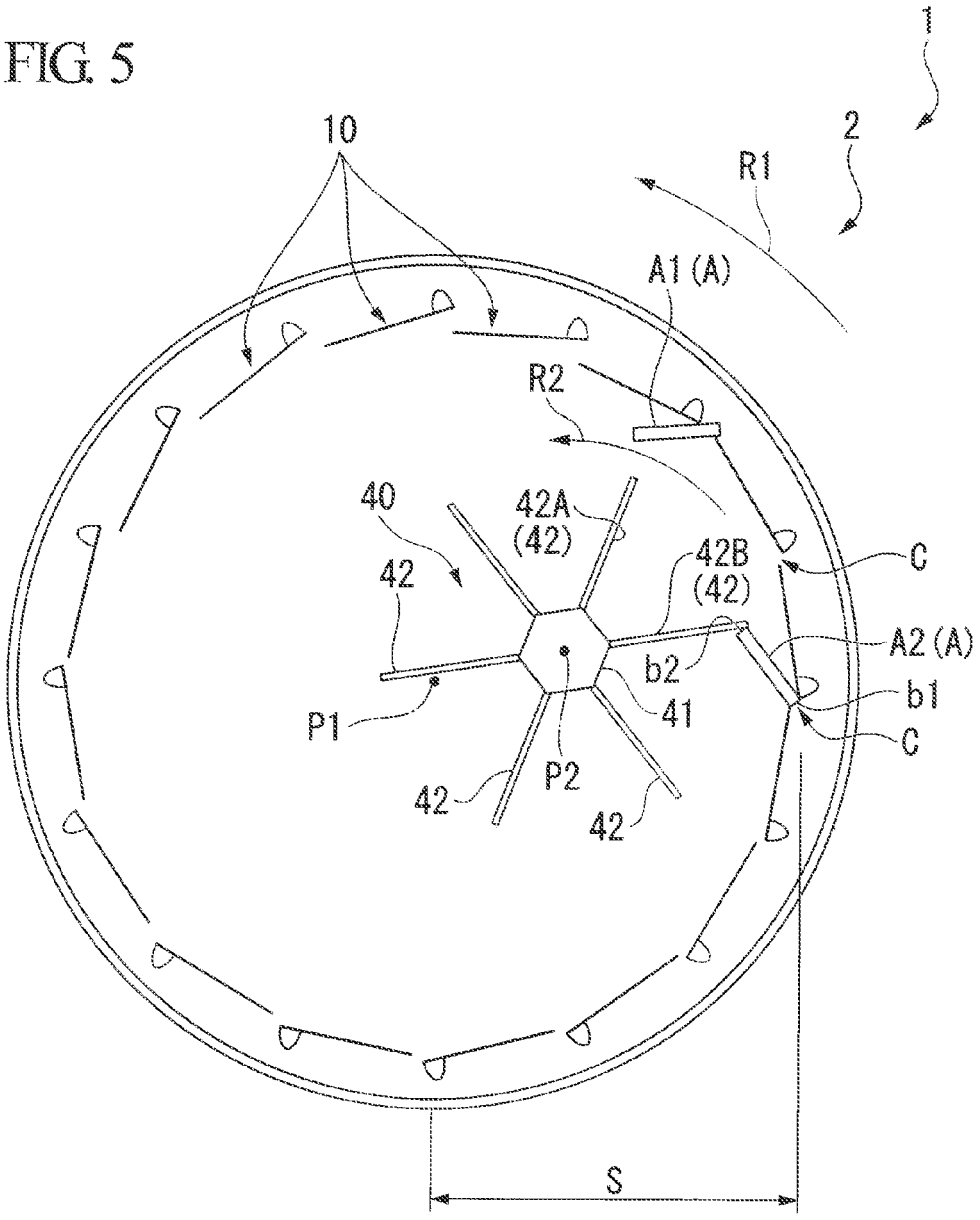
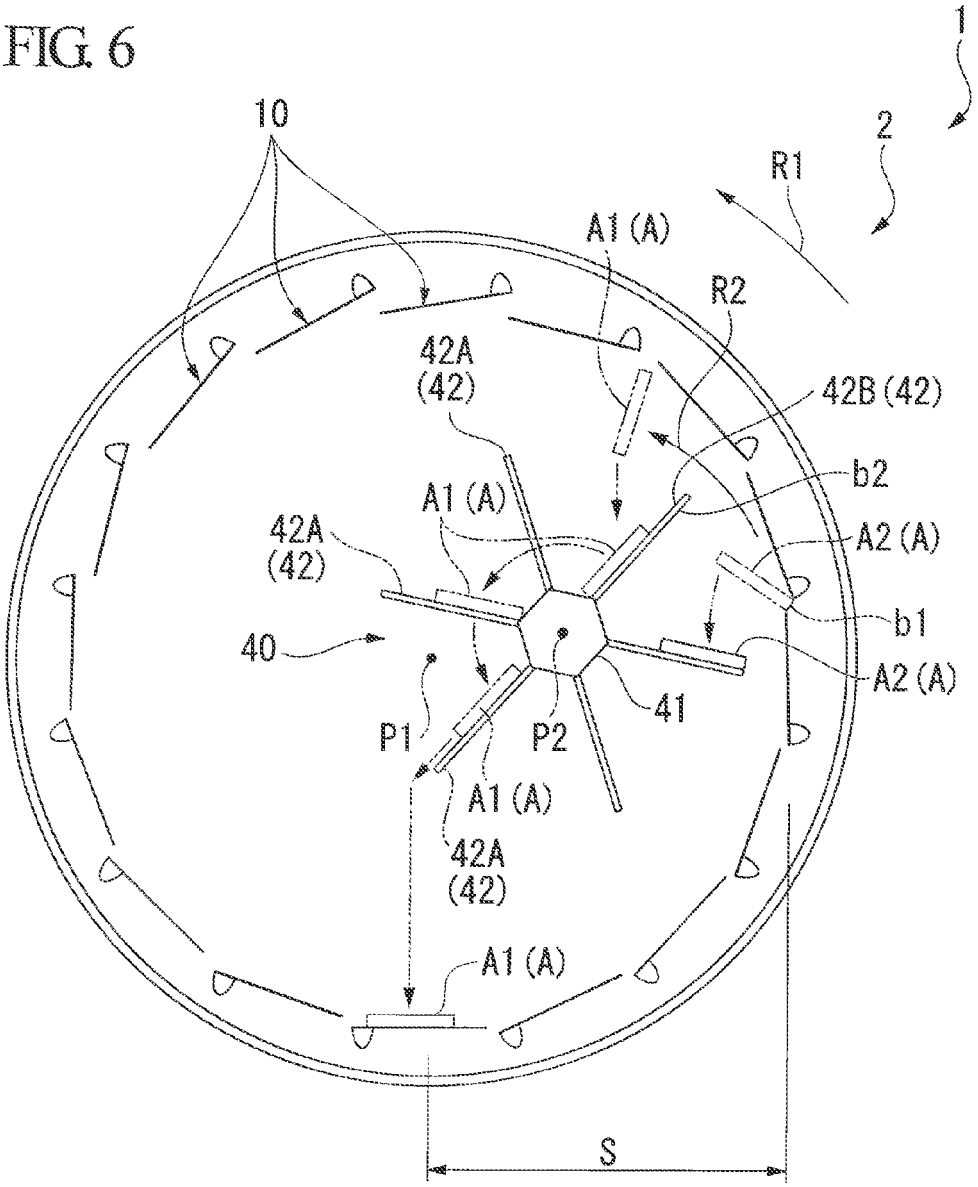


FIG. 6


1
10
2
R1
A1 (A)
R2
42A
(42)
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b2
A1 (A)
42A
(42)
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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 9107

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 100 38 690 C1 (SIEMENS AG [DE]) 26 July 2001 (2001-07-26) * claim 1; figure 1 * -----	1-8	INV. B07C5/04 B07C5/06 B07C5/12
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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	28 September 2011	Devilers, Erick

CATEGORY OF CITED DOCUMENTS

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