



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.09.2017 Bulletin 2017/37

(51) Int Cl.:
A24C 5/12 (2006.01) A24C 5/28 (2006.01)

(21) Application number: **17158964.1**

(22) Date of filing: **02.03.2017**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(72) Inventors:
• **SEREN, Emanuele**
40138 Bologna (IT)
• **TRENTINI, Stefano**
40069 Zola Predosa (Bologna) (IT)
• **BIGNAMI, Mirco**
40137 Bologna (IT)
• **SARTONI, Massimo**
40139 Bologna (IT)

(30) Priority: **10.03.2016 IT UA20161489**

(71) Applicant: **G.D S.p.A.**
40133 Bologna (IT)

(74) Representative: **Bianciardi, Ezio**
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

(54) **CUTTING HEAD FOR CUTTING ROD-SHAPED PIECES IN MACHINES FOR MAKING SMOKERS' ARTICLES**

(57) A cutting head for cutting rod-shaped pieces in machines for the production of smokers' articles, comprises a circular blade (2) rotatable about an axis of rotation (X) and provided with a cutting portion (4) extending around its circular periphery and adapted to interfere, when the circular blade (2) is in a working position, with a transverse movement path of a rod-shaped piece of the tobacco industry in order to cut the piece into two parts, the cutting head (1) further comprising movement

means for setting the circular blade in rotation about the axis of rotation, a blowing member (12), acting on at least one face of the circular blade (2) to direct a cooling air jet at the circular blade (2), and scraping means (6), located at least partly operatively downstream of the blowing member (12) and at least temporarily in contact with the cutting portion (4) during a working cycle of the circular blade (2) in order to mechanically remove any residues from the cutting portion (4).

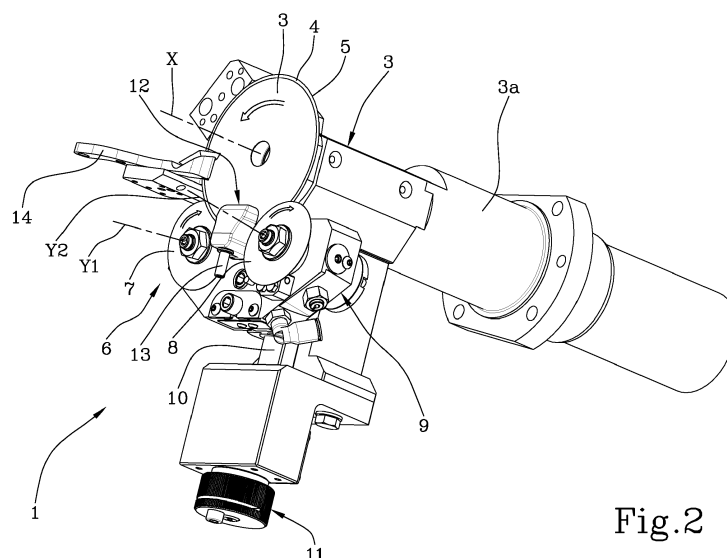


Fig.2

Description

[0001] This invention relates to a cutting head for cutting rod-shaped pieces in machines for making smokers' articles.

[0002] In the context of the invention, the expression "rod-shaped piece" preferably includes pieces of filter or cigarette processed prior to obtaining a finished cigarette.

[0003] More specifically, the cutting head of this invention can be applied to a filter tip attachment machine in cigarette making machine, where pieces of filter are applied to corresponding pieces of cigarette.

[0004] Still more specifically, the cutting head of this invention can be advantageously applied to cutting composite filters of the type which are externally covered by an impermeable plastic sheath ("filter tube").

[0005] Prior art cutting heads comprise a circular blade made of metallic material. The blade cyclically severs a double-length piece of filter or cigarette, dividing it into two single-length pieces.

[0006] Filter tip attachment machines comprise feed drums for feeding double length pieces of cigarette which are each divided into two single length pieces by a first circular cutting blade.

[0007] Next, the two pieces of cigarette thus obtained are axially spaced by a spacing drum and, in a drum following that, a double-length piece of filter is inserted between them and joined to the pieces of cigarette by wrapping in a sheet of paper material.

[0008] The double-length piece of filter is then cut into two in a yet further drum by another circular cutting blade in such a way as to obtain two cigarettes placed end to end with their filter tips.

[0009] During the cutting cycles, the blade is subject to heating which interacts negatively with the filter material which tends to stick to the surface of the blade, especially on the peripheral zone of it defining the cutting edge. Repeated cutting causes the filter material to build up on the blade, reducing the cutting properties of the blade and thus worsening the quality of the cut pieces of filter.

[0010] This negative effect is particularly marked when the pieces of filter being cut are pieces of composite filter externally covered with plastic sheathing. In effect, in this situation, the heat accumulated by the blade as a result of repeated cutting in rapid succession causes a non-negligible quantity of the plastic material to melt and to stick to the cutting edge of the blade, which quickly loses its cutting properties, making it necessary to reject the cut pieces on account of the poor quality of the cuts and to stop the machine in order to clean and sharpen or replace the blade.

[0011] In this context, the basic technical purpose of this invention is to provide a cutting head for cutting rod-shaped pieces in machines for making smokers' articles to overcome the above mentioned disadvantages of the prior art.

[0012] More specifically, this invention has for an aim

to provide a cutting head for cutting rod-shaped pieces in machines for making smokers' articles which is capable of guaranteeing lasting high cutting quality by eliminating the problem of rapid wear.

[0013] The technical purpose indicated and the aims specified are substantially achieved by a cutting head for cutting rod-shaped pieces in machines for making smokers' articles comprising the technical features set out in one or more of the accompanying claims.

[0014] The invention is described below with reference to the accompanying drawings, which illustrate a non-limiting embodiment of it and in which:

- Figure 1 is a perspective view of a cutting head for cutting rod-shaped pieces in machines for making smokers' articles according to this invention;
- Figure 2 is another perspective view of the cutting head of Figure 1 with some parts cut away in order to better illustrate others;
- Figure 3 is a top view of a part of the cutting head according to the view of Figure 2;
- Figures 4-6 are schematic views from three directions at right angles to each other, showing some of the components of the cutting head according to the invention;
- Figure 7 is a schematic view of the components of Figure 4 to highlight the section plane VIII-VIII;
- Figure 8 is a cross sectional view of the components of Figure 7 through the section plane VIII-VIII;
- Figure 9 is a perspective view of another part of the cutting head of Figure 1.

[0015] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a cutting head for cutting rod-shaped pieces in machines for making smokers' articles according to this invention.

[0016] The cutting head 1 comprises a circular blade 2 mounted on a supporting frame 3 and driven in rotation about its axis "X" by drive means which, for example, comprise a motor (not illustrated) inside the supporting frame 3 or other means for connecting it to drive means (not illustrated).

[0017] The cutting head 1, shown in the accompanying drawings with some parts cut away in order to better illustrate the invention, is preferably located at a filter tip attachment machine where pieces of filter are attached to pieces of cigarette. More in detail, the cutting head 1 is adapted to operate on rod-shaped articles (not illustrated in the accompanying drawings) transported in the suction flutes of a drum transversely to the axis of extension of the rod-shaped articles themselves. In this situation, the cutting head 1 is positioned with the circular blade 2 oriented with its axis "X" parallel to the axis of the rotary drum and thus parallel to the axis of the rod-shaped articles so that the position plane of the circular blade 2 is perpendicular to the rod-shaped articles, enabling the circular blade 2 to cut the articles into two parts.

[0018] As shown in Figures 1 and 2, the circular blade

2 is located at the end of a substantially tubular portion 3a of the supporting frame 3, aligned with the axis "X" of the circular blade 2.

[0019] The circular blade 2, which is of essentially known type, is defined by a metallic disc which is substantially flat except for an outer circular crown defining a cutting portion 4 which is tapered towards the cutting edge 5 in such a way as to define a rake angle "S" relative to the flat front surfaces of the circular blade 2 (Figure 8). Preferably, the rake angle "S" is between 2° and 40°.

[0020] Advantageously, as better illustrated in Figure 2, the cutting head 1 comprises scraping means 6 which are at least temporarily in contact with the cutting portion 4 of the circular blade 2 during a working cycle of the blade 2 in order to mechanically remove any residues from the cutting portion 4.

[0021] In the embodiment illustrated, the scraping means 6 comprise at least one scraping disc 7 rotatable about a respective axis of rotation "Y1" and having a peripheral portion which is kept in contact with the cutting portion 4 of the circular blade 2.

[0022] In a preferred embodiment and as shown in the accompanying drawings, the scraping means 6 comprise a pair of scraping discs 7, 8 disposed on opposite faces of the cutting portion 4 of the circular blade 2 so that any residues are removed from both sides of the cutting portion 4.

[0023] Preferably, as shown in Figures 4-6, the two scraping discs 7, 8 have respective axes of rotation "Y1", "Y2" which are inclined in opposite directions, and still more preferably by the same quantity, relative to the axis of rotation "X" of the circular blade 2.

[0024] The axis of rotation "Y1", "Y2" of each scraping disc 7, 8 is inclined relative to the axis of rotation "X" of the circular blade 2 in such a way that the scraping disc 7, 8 can be kept in contact with the cutting portion of the circular blade along a contact line belonging to the cutting portion.

[0025] Preferably, the axis of rotation "Y1", "Y2" of each scraping disc 7, 8 is inclined relative to the axis of rotation "X" of the circular blade 2 at an angle of between 2° and 40°.

[0026] Still more preferably, the axes of rotation "Y1", "Y2" of the scraping discs 7, 8 are skew to each other.

[0027] Further, as may be inferred from Figures 4-6 as a whole, in the zone of contact with the cutting portion 4 of the circular blade 2, each scraping disc 7, 8 is contained in a plane which is inclined oppositely to the rake angle relative to the plane containing the circular blade 2. Advantageously, each scraping disc acts on an annular band of the cutting portion 4 whose radial extension is between 0.2 and 10 mm. Preferably, each scraping disc 7 is idle and is driven in rotation about its axis "Y1" by frictional interaction with the circular blade 2. In effect, as shown in Figure 7, the frictional interaction between the circular blade 2 and the scraping discs 7, 8 is only partly tangential and also has a radial component. The tangential components drive the scraping discs 7, 8 in

rotation, while the radial components produce the scraping action on the cutting portion 4.

[0028] Advantageously, the scraping means 6 are mounted on a supporting member 9 which is designed to adopt an adjustable position relative to the circular blade 2, in particular according to a translational movement towards and away from it. This is accomplished by mounting the supporting member 9 on the frame 3 by means of a stem 10 which can be driven with precision using a micrometric screw 11. That way, it is possible to compensate for any clearances between the scraping means 6 and the circular blade 2 as a result of wear.

[0029] In the particular embodiment illustrated, the supporting member 9 is a rigid, cradle-shaped element which supports the two scraping discs 7, 8 on each side of it and which is connected, centrally, at the bottom of it to the upper end of the stem 10, whose lower end is coupled to the frame 3 and is connected to the aforementioned micrometric screw 11.

[0030] According to a further advantageous aspect of the invention, the cutting head 1 also comprises a blowing member 12 acting on at least one face of the circular blade 2 to direct a cooling air jet at the circular blade 2 and, in particular at least at the cutting portion 4 of the circular blade 2. Preferably, the blowing member is configured in such a way as to direct a cooling air flow at both faces of the circular blade 2.

[0031] In the embodiment illustrated, the blowing member 12 is a U-shaped element having a central housing which receives a peripheral part of the circular blade 2 whose peripheral part is thus enclosed in the blowing member 12. Preferably, the peripheral part of the circular blade 2 acted on by the blowing member 12 extends in a radial direction from the cutting edge 5 for between 0.2 and 10 mm.

[0032] Advantageously, the blowing member 12 is also mounted to the supporting member 9 and, in order to supply compressed air to the blowing member 12, at least one pneumatic fitting 13 is provided for connection to a compressed air supply hose (not illustrated). Preferably, the blowing member 12 is operatively located upstream of at least one of the scraping means 6 (that is, of at least one of the scraping discs 7, 8).

[0033] In other words, the scraping means 6 are operatively located at least partly downstream of the blowing member 12.

[0034] The advantage of this is that the plastic residues are dried and cooled before being reached by the scraping disc, whose effectiveness is thus increased.

[0035] In the embodiment illustrated, the blowing member 12 is located at an intermediate position between the two scraping discs 7, 8.

[0036] According to a further aspect of the invention, the cutting head 1 may also comprise at least one auxiliary scraping member 14 operatively positioned substantially in contact with at least one face of the circular blade 2 further on the inner side of the cutting portion 4 and adjacent to the cutting portion 4. In the embodiment

illustrated, there are two auxiliary scraping members 14 acting on opposite faces of the circular blade 2.

[0037] Preferably, the auxiliary scraping members 14 act on a different annular zone of the circular blade 2 from that acted upon by the scraping means 6, in particular on a zone in which the faces of the circular blade 2 are parallel to each other and perpendicular to the axis of rotation "X" (that is to say, further in than the cutting portion 4 with the rake angle "S"). Each auxiliary scraping member 14 thus has a scraping edge which is preferably rectilinear and parallel to the plane defined by the respective face of the circular blade 2 it acts on.

[0038] Advantageously, the auxiliary scraping members 14 are located upstream of the two scraping discs 7, 8 relative to the feed direction of the circular blade 2, that is to say, at a position between the cutting area (labelled "A" in Figure 1 and corresponding to the zone in which the circular blade 2 cuts the rod-shaped articles) and the scraping discs 7, 8.

[0039] Preferably, the width of the annular band of the circular blade 2 acted on by the auxiliary scraping members 14 substantially coincides with the annular band acted on by the blowing member 12.

[0040] In the embodiment illustrated, the auxiliary scraping members 14 are mounted on a fixed part of the cutting head, in particular on the frame 3, and are therefore not applied to the adjustable supporting member 9.

[0041] Preferably, also, the auxiliary scraping members 14 are of adjustable type: in particular, they can be moved towards and away from the faces of the circular blade 2 by tilting about respective hinge axes "Z1", "Z2" in order to vary the distance between them and the circular blade 2 and/or to enable or disable their scraping action.

[0042] The cutting head 1 according to the invention also comprises protective elements to cover at least part of the working zone of the circular blade 2. More specifically, the protective elements, shown in Figure 1, comprise a face guard 15 covering the zone of interaction between the scraping discs 7, 8 and the circular blade 2 and/or curved protective guards 16 placed around the scraping discs 7, 8. Variants of the invention described in the foregoing are also imaginable without departing from the scope of the inventive concept. In particular, there may be a different number of scraping discs, mounted as required at suitable positions relative to the circular blade.

[0043] Also, the parts of the circular blade acted on by the auxiliary scraping members and/or the blowing member may also differ from each other and from what is described above.

[0044] This invention achieves the preset aim thanks to the distinctive interaction between the action of the scraping discs to remove the residues and the cooling effect of the blowing member on the circular blade, which combine to improve blade cleaning efficiency, thereby increasing blade working life without requiring frequent maintenance to clean or change the blade and with ob-

vious advantages in terms of productivity. This effect is particularly important for cutting plastic covered filters because it avoids the build-up of molten plastic residues resulting from the cutting action.

[0045] Moreover, the other additional features of the invention described contribute positively to further improving this benefit.

10 Claims

1. A cutting head for cutting rod-shaped pieces in machines for the production of smokers' articles, comprising a circular blade (2) rotatable about an axis of rotation (X) and provided with a cutting portion (4) extending around its circular periphery and adapted to interfere, when the circular blade (2) is in a working position, with a transverse movement path of a rod-shaped piece of the tobacco industry in order to cut the piece into two parts, the cutting head (1) further comprising movement means for setting the circular blade in rotation about the axis of rotation, **characterized in that** it comprises a blowing member (12), acting on at least one face of the circular blade (2) to direct a cooling air jet at the circular blade (2), and scraping means (6), located at least partly operatively downstream of the blowing member (12) and at least temporarily in contact with the cutting portion (4) during a working cycle of the circular blade (2) in order to mechanically remove any residues from the cutting portion (4).
2. The cutting head according to claim 1, **characterized in that** the scraping means (6) comprise at least one scraping disc (7, 8) rotatable about a respective axis of rotation (Y1, Y2) and having a peripheral portion which is kept in contact with the cutting portion (4) of the circular blade (2).
3. The cutting head according to claim 2, **characterized in that** the axis of rotation (Y1, Y2) of the at least one scraping disc (7, 8) is inclined relative to the axis of rotation (X) of the circular blade (2) in such a way that the scraping disc (7, 8) can be kept in contact with the cutting portion (4) of the circular blade (2) along a contact line belonging to the cutting portion (4).
4. The cutting head according to claim 2 or 3, **characterized in that** the at least one scraping disc (7, 8) is idle and is made to rotate by the rotation of the circular blade (2).
5. The cutting head according to any one of claims 2 to 4, **characterized in that** the axis of rotation (Y1, Y2) of the at least one scraping disc (7, 8) is inclined relative to the axis of rotation (X) of the circular blade (2) at an angle of between 2° and 40°.

6. The cutting head according to any one of claims 2 to 5, **characterized in that** the scraping means (6) comprise two scraping discs (7, 8) located on opposite faces of the cutting portion (4) of the circular blade (2) and having respective axes of rotation (Y1, Y2) which are oppositely inclined relative to the axis of rotation (X) of the circular blade (2). 5
7. The cutting head according to claim 6, **characterized in that** the axes of rotation (Y1, Y2) of the scraping discs (7, 8) are skew to each other. 10
8. The cutting head according to any one of the preceding claims, **characterized in that** the cutting portion (4) is defined by a peripheral portion of the circular blade (2) which is tapered towards a cutting edge (5) of the circular blade (2) and which defines at least one rake angle (S) relative to a plane containing the circular blade (2). 15
9. The cutting head according to claim 8, **characterized in that**, in the zone of contact with the cutting portion (4) of the circular blade (2), the at least one scraping disc (7, 8) is contained in a plane which is inclined oppositely to the rake angle (S) relative to the plane containing the circular blade (2). 20
10. The cutting head according to any one of the preceding claims, **characterized in that** the scraping means (6) act on the cutting portion (4) in an annular band whose radial extension is between 0.2 and 10 mm. 25
11. The cutting head according to any one of the preceding claims, **characterized in that** it comprises a supporting member (9) on which the scraping means (6) are mounted, the supporting member (9) being positionable precisely and adjustably relative to the circular blade (2) in such a way as to adjust the position of the scraping means (6) relative to the circular blade (2) following wear of the cutting portion (4) of the circular blade (2). 30
12. The cutting head according to claim 11, **characterized in that** it further comprises an adjustment stem (10) connected to supporting member (9) to move the supporting member (9) towards and away from the circular blade (2), the stem (10) being coupled to a micrometric screw (11) for adjusting the position of the supporting member (9) relative to the circular blade (2). 35
13. The cutting head according to claim 11 or 12, **characterized in that** the blowing member (12) is also mounted on the supporting member. 40
14. The cutting head according to claim 13, **characterized in that** the scraping means (6) comprise two scraping discs (7, 8) located on opposite faces of the cutting portion (4) of the circular blade (2); the blowing member (12) being also mounted on the supporting member and located, with reference to a direction of rotation of the circular blade (2), in an intermediate zone between the two scraping discs (7, 8). 45
15. The cutting head according to any one of the preceding claims, **characterized in that** it further comprises at least one auxiliary scraping member (14) operatively positioned in contact with at least one face of the circular blade (2) further on the inner side of the cutting portion (4) and adjacent to the cutting portion (4). 50
16. The cutting head according to any one of the preceding claims, **characterized in that** the blowing member (12) is positioned in such a way as to direct a cooling air flow at the cutting portion (4) of the circular blade (2). 55
17. The cutting head according to any one of the preceding claims, **characterized in that** the blowing member (12) is configured in such a way as to direct a cooling air flow at both faces of the circular blade (2).

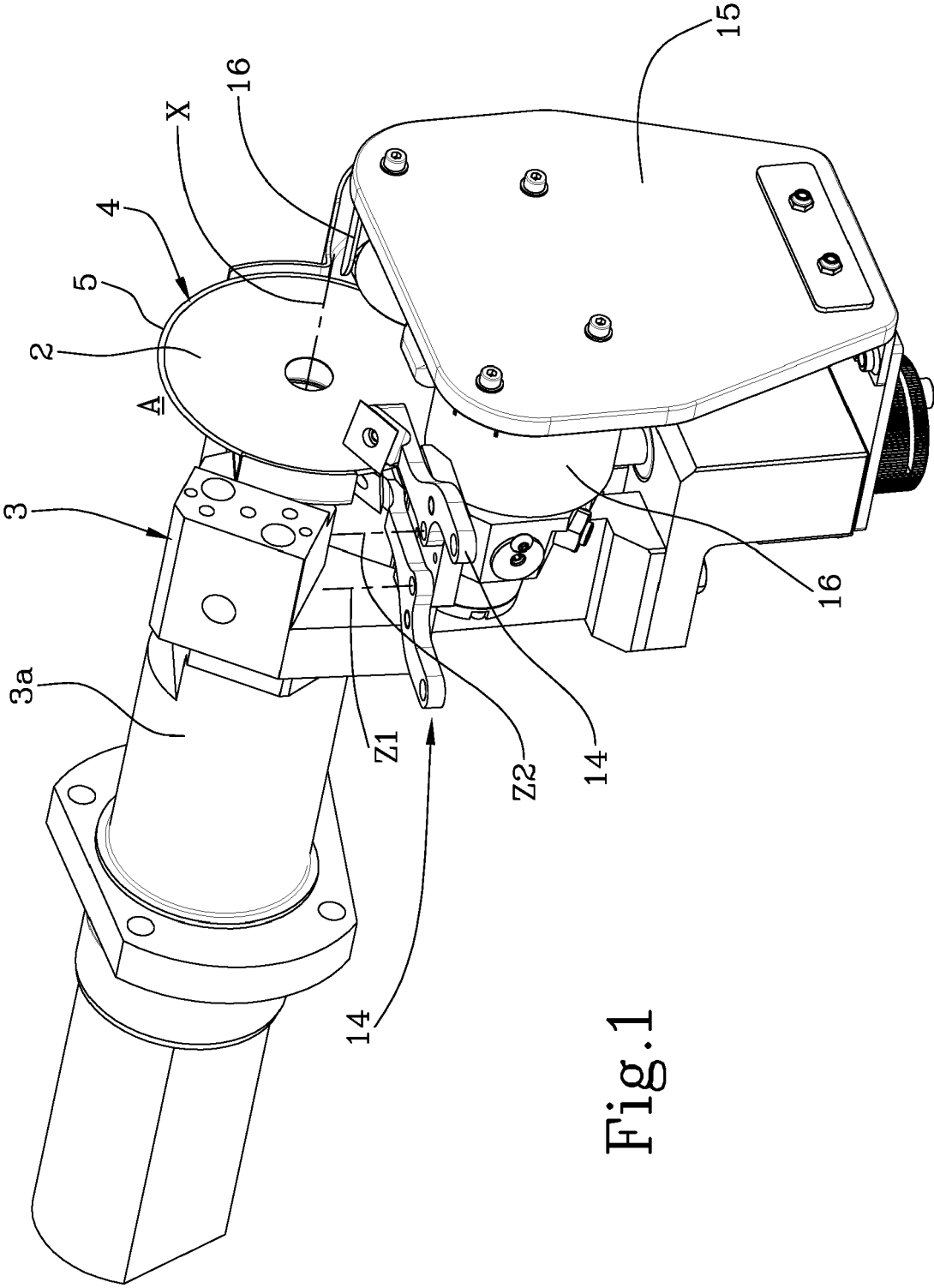


Fig.1

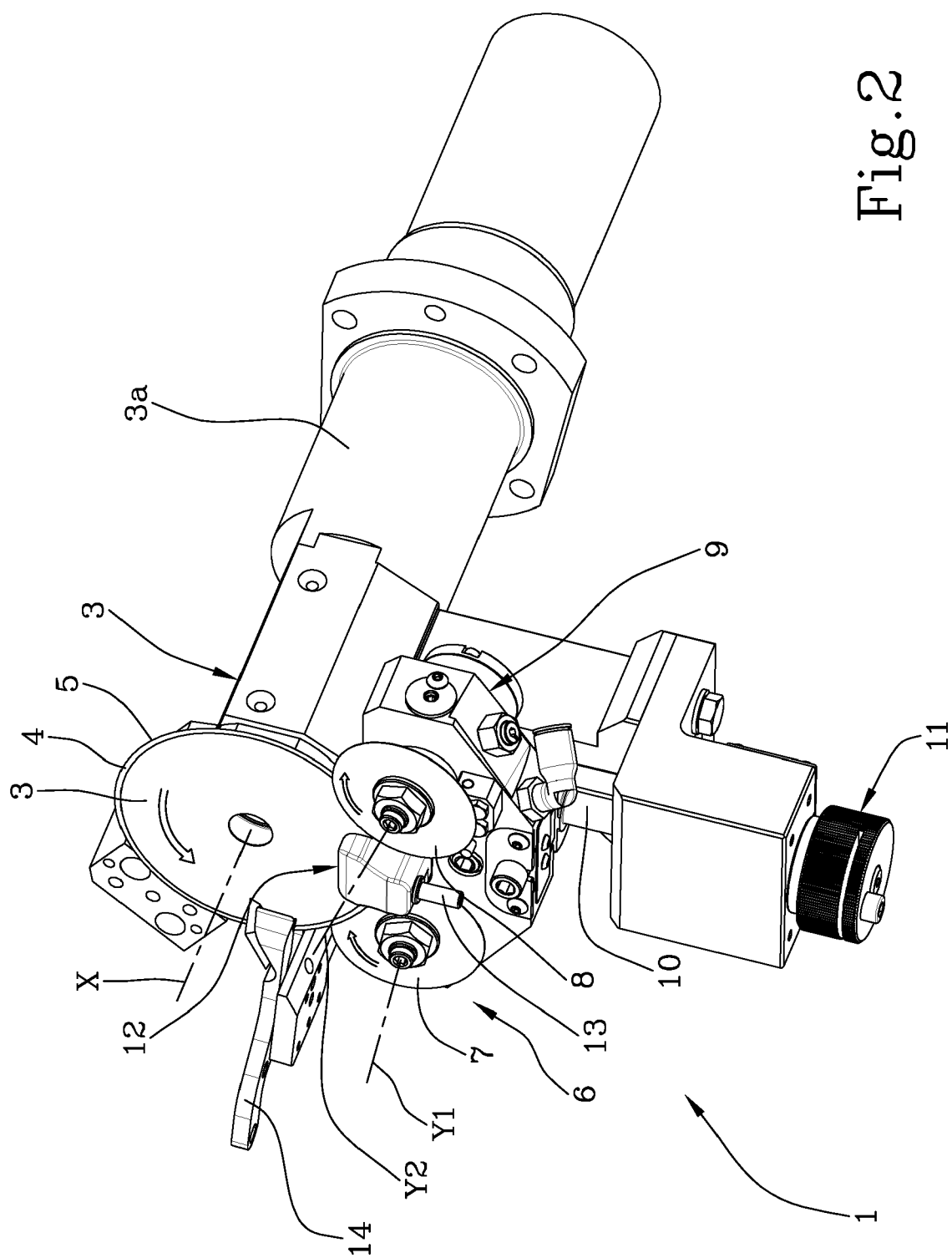


Fig.3

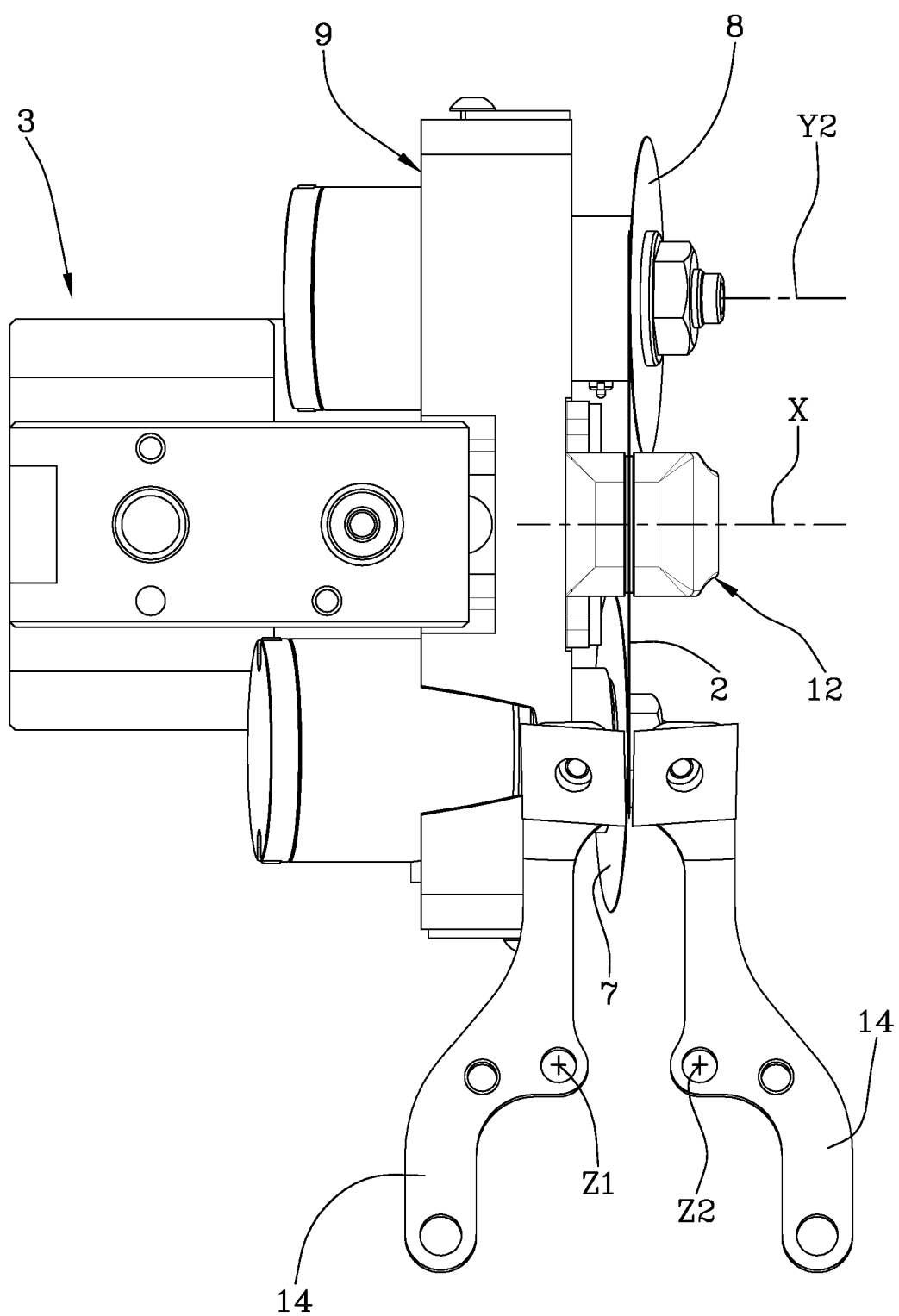


Fig.4

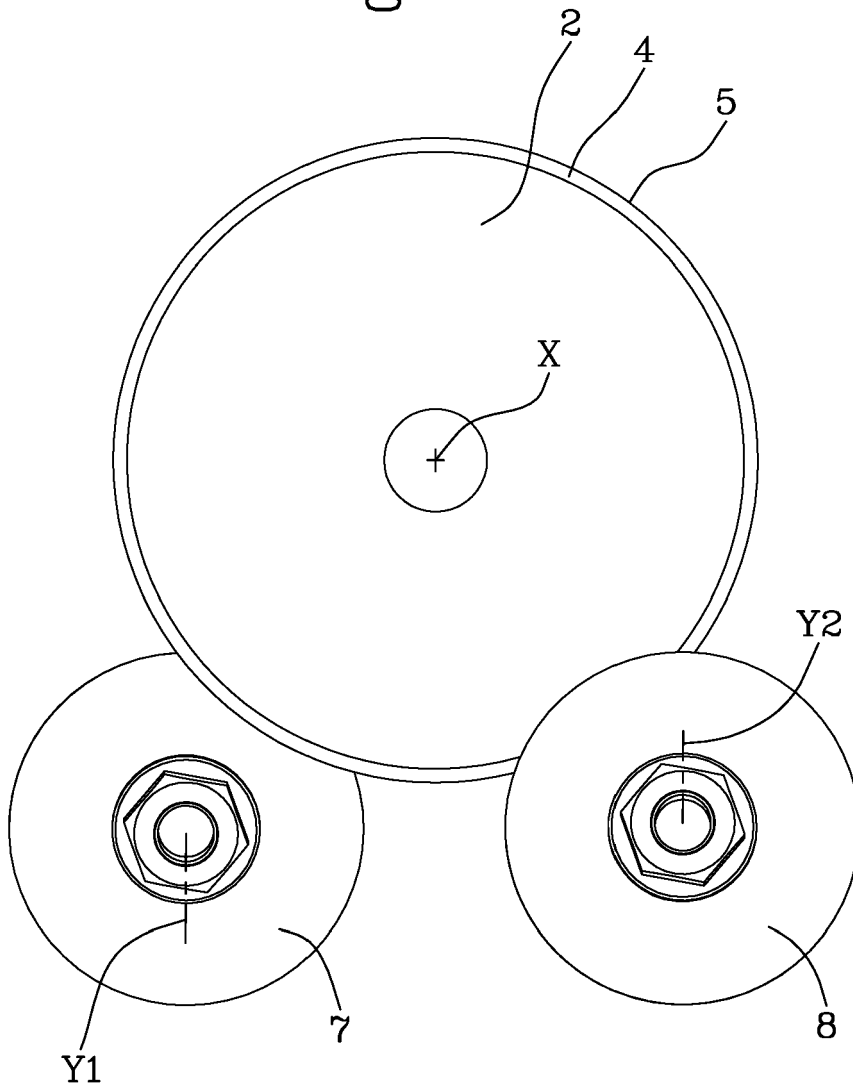


Fig.5

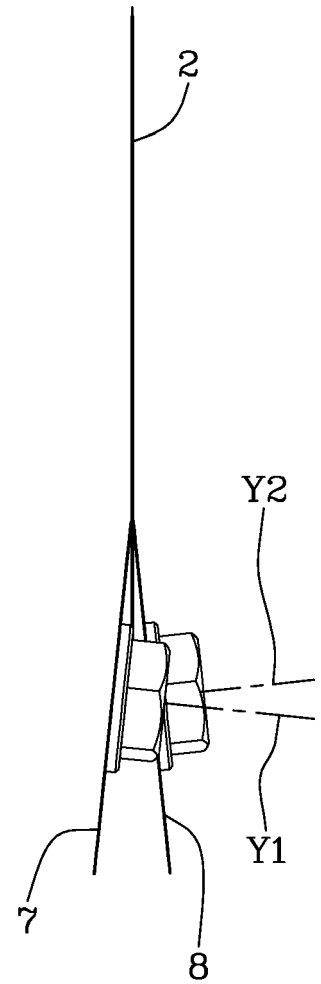
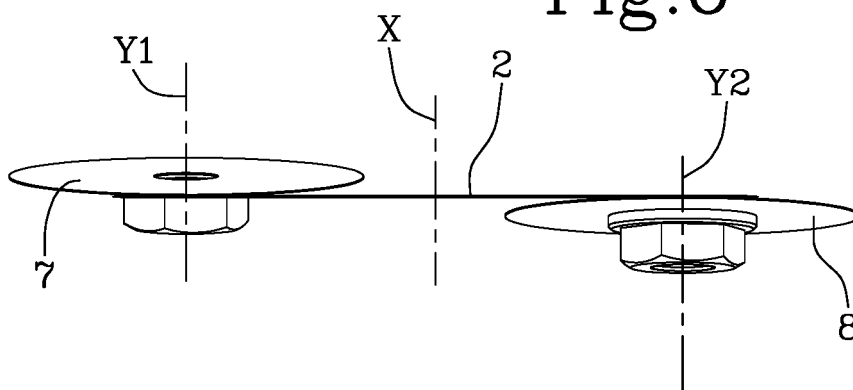


Fig.6



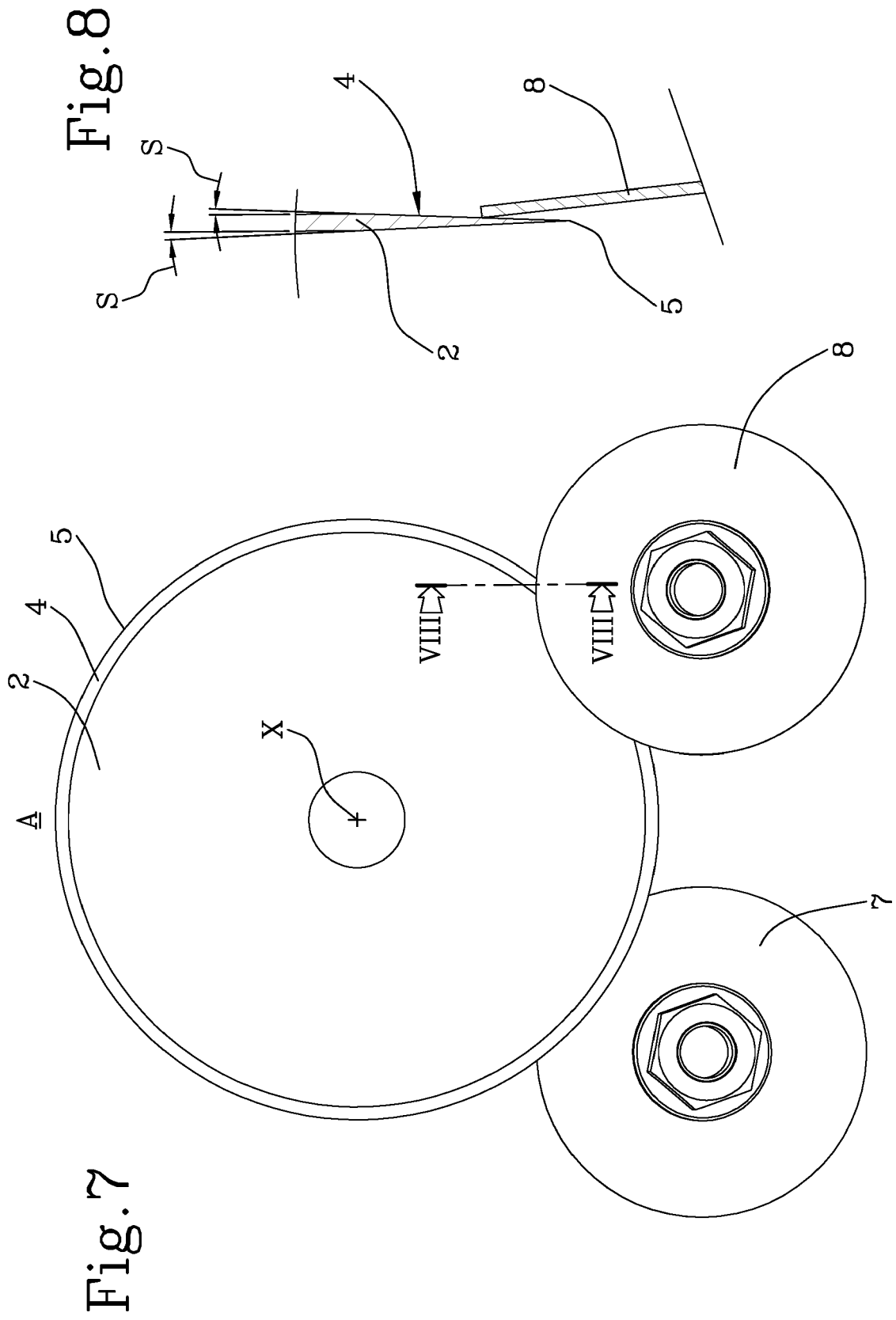
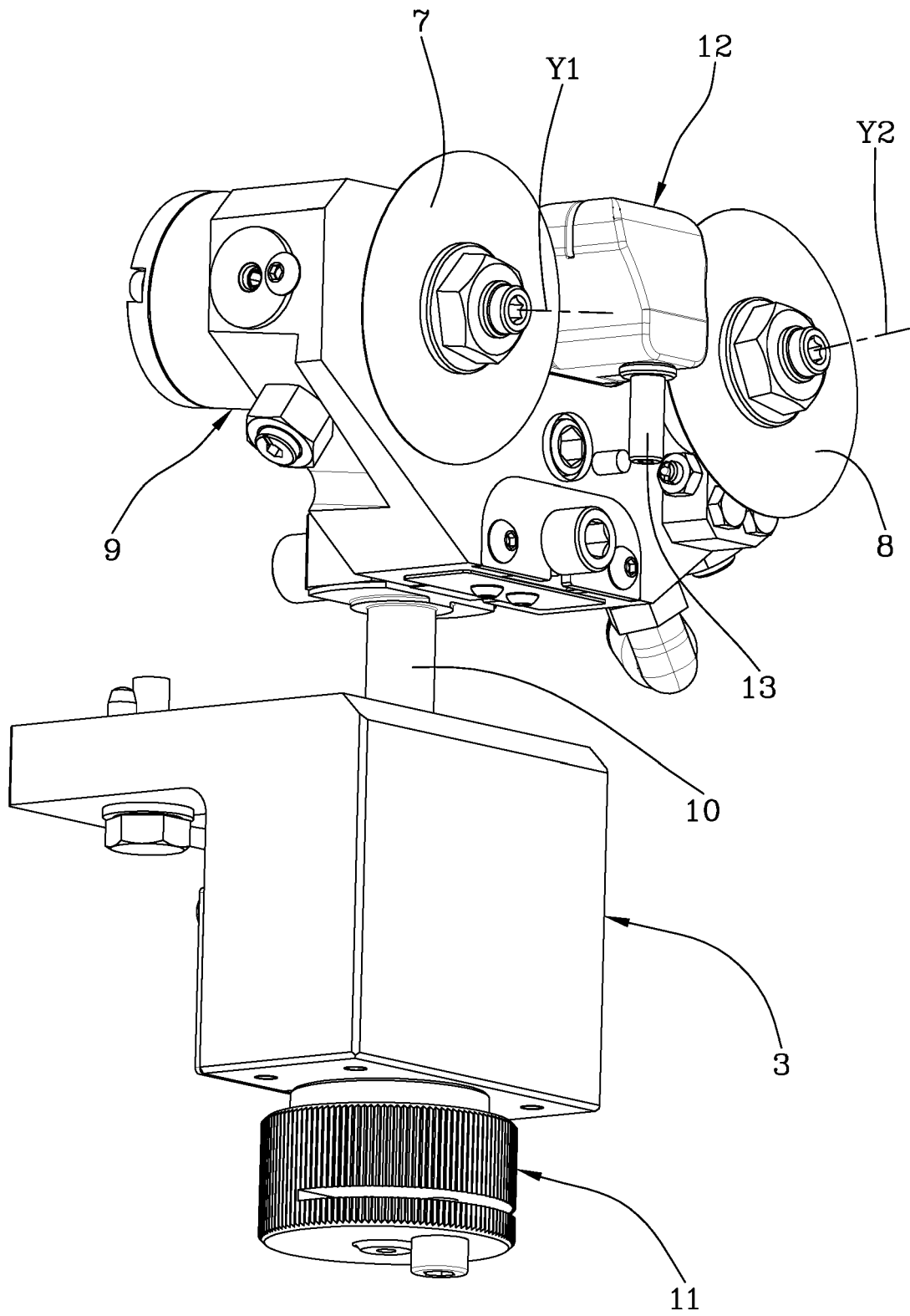


Fig.9





EUROPEAN SEARCH REPORT

 Application Number
 EP 17 15 8964

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 460 418 A (MATHE GEORGE L ET AL) 12 August 1969 (1969-08-12) * the whole document *	1-17	INV. A24C5/12 A24C5/28
A	DE 10 2009 047022 A1 (HAUNI MASCHINENBAU AG [DE]) 12 May 2011 (2011-05-12) * the whole document *	1-17	
A	EP 0 223 431 A2 (ICI PLC [GB]) 27 May 1987 (1987-05-27) * the whole document *	1-17	
A	EP 1 283 094 A2 (GAEMMERLER AG [DE]) 12 February 2003 (2003-02-12) * the whole document *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
			A24C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 July 2017	Examiner Cardan, Cosmin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
 EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 15 8964

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-07-2017

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3460418 A	12-08-1969	DE 1782447 A1 FR 1578649 A GB 1178069 A US 3460418 A	20-01-1972 14-08-1969 14-01-1970 12-08-1969
DE 102009047022 A1	12-05-2011	NONE	
EP 0223431 A2	27-05-1987	DE 3685091 D1 DK 533686 A EP 0223431 A2 ES 2030388 T3 NO 864444 A US 4818450 A	04-06-1992 09-05-1987 27-05-1987 01-11-1992 11-05-1987 04-04-1989
EP 1283094 A2	12-02-2003	EP 1283094 A2 US 2003024424 A1	12-02-2003 06-02-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82