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(54) Machine and method for storing paper articles in counted piles

(57) Machine for the storage of paper articles in numbered piles, comprising:

- a unit (1) for feeding the paper articles (2);
- a unit (3) for collecting the individual articles coming from the unit (1);

also comprising a unit (4) for counting and forming numbered piles (6) of articles coming from the unit (3), comprising means for transferring the formed piles (6) to a conveyor unit (5) while continuously maintaining said piles between two lateral containment surfaces.

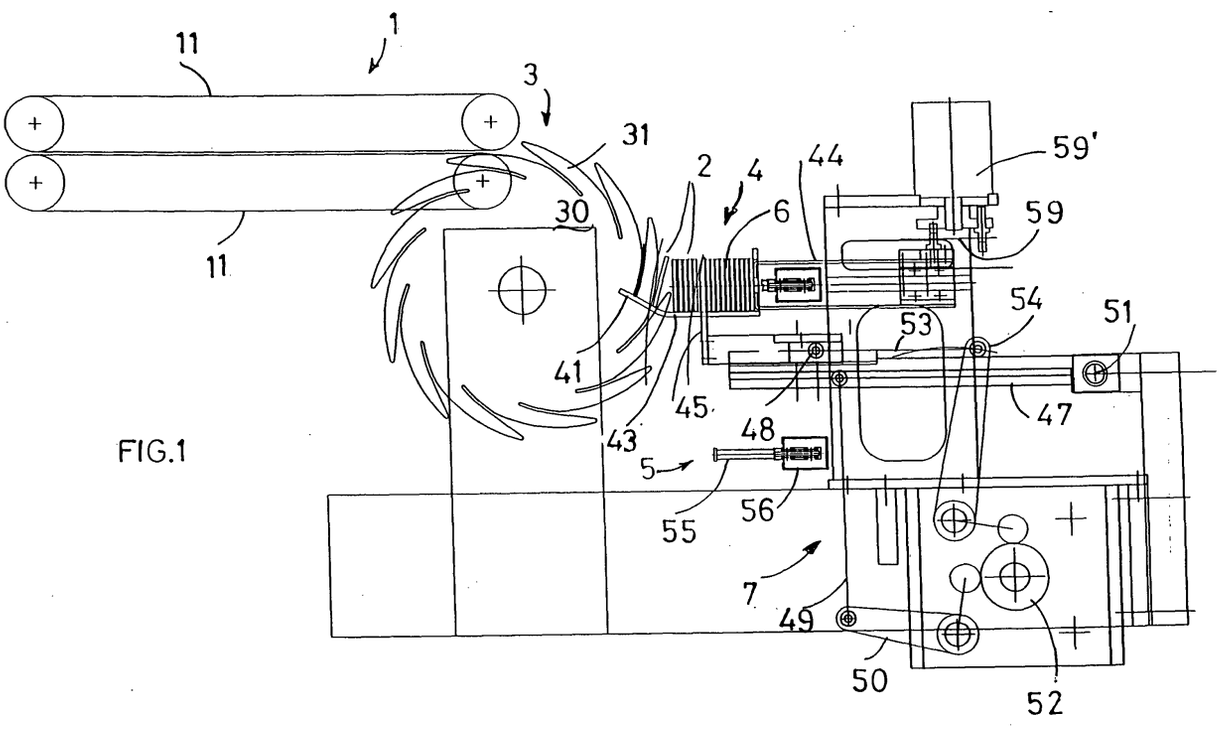

FIG.1

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Description

Sector of the invention

[0001] The present invention concerns a machine for the storage of paper articles, more precisely paper tissues or serviettes that have to be collected in counted piles for subsequent transport and packing if necessary.
[0002] In particular the invention is designed for the storage in numbered piles of paper tissues already folded in a previous folding phase.

State of the art

[0003] At present various machines are known designed to receive a succession of sheets already folded by a line upstream, count them and collect them in numbered piles ready for a transport device by means of which they are conveyed to a packing station, if necessary.
[0004] The machines currently used are limited by the relatively low productivity of the phase in which the numbered pile is formed, which affects the overall efficiency of the operation.
[0005] The machine described in the German patent DE3700930 registered in the name of Giebeler GMBH attempted to provide an initial solution to these limits.
[0006] The patent describes a machine for storing and counting paper articles fed by a sector disc.
[0007] The machine comprises a blocking element that intercepts the sheets, causing them to pile up alternatively on two moving horizontal plates positioned below, until a pile containing the required number of sheets is obtained on the plate.
[0008] The mechanism used ensures that, once the required number of sheets is reached, the second plate replaces the first one in the collecting position and the first one is lowered until it meets a conveyor belt.
[0009] The pile formed is then deposited on the belt to be moved to a subsequent packing phase if necessary.
[0010] The solution described has a number of disadvantages, however, connected with the fact that, when operating at high frequencies, for example 180-200 piles per minute, it is not possible to guarantee correct movement of the piles formed and deposited on the moving plate, which therefore tend to lose their original order making the subsequent transport and packing phases more difficult with the further risk of continuous jamming of the system.
[0011] In addition, the paper material normally used varies continuously in volume and this also causes considerable deformation of the piles.

Aim of the invention

[0012] The aim of the present invention is to solve the problems encountered with machines of the known type, proposing a machine and a method for the storage of paper articles in numbered piles with a high production rate and efficiency.

Summary of the invention

[0013] The invention achieves this purpose by providing a machine and a method for the storage of paper articles in numbered piles, as characterised in the main claims attached.
[0014] Further characteristics are illustrated in the dependent claims.

List of drawings

[0015] The advantages obtained will be evident from the following description and attached drawings, provided as a non-restrictive example, in which:

- figures 1 to 7 show a side view of a machine according to the invention in successive operating phases;
- figure 8 shows an overhead view of the same machine.

Detailed description

[0016] With reference to the attached drawings, in a preferred embodiment, a machine according to the invention comprises:

- a unit 1 for feeding paper articles 2 coming from a previous working phase;
- a unit 3 for collecting the individual articles coming from unit 1;
- a unit 4 for counting and storing articles coming from unit 3 in numbered piles 6;
- a unit 5 for conveying the numbered piles of paper articles coming from unit 4 to subsequent working phases, for example packing phases.

[0017] In greater detail: unit 1 consists of a pair of opposed conveyor belts 11 which convey a succession of articles 2;
unit 3 consists of a disc 30 which is basically cylindrical and provided with sectors 31 in each of which is deposited a single article 2 coming from the belts 11;
unit 5 consists of a chain guide 56 provided at regular intervals with conveyor teeth 55 that provide for movement of the piles 6 formed in the formation unit 4.
[0018] Again, with reference to figure 1, the movement of the teeth 55 is therefore perpendicular to the plane of the drawing.
[0019] According to the invention, the pile counting and formation unit 4 consists of a fixed surface plate 41 that intersects the sectors 31 of the disc 30 in order to collect the articles 2 contained in sectors 31.
[0020] The plate 41 features a first slanting section 42 and a second horizontal section 43 so that the articles

2 run against their side, at first on section 42 and then, in a vertical position, on section 43 pushed by the external curved surface of the sectors 31.

[0021] The unit 4 also comprises a trolley 44 moved by a mechanism, in the case described a connecting rod and crank 59 and a servomotor 59' which provides for the horizontal movement of the trolley 44 in an alternating synchronised manner in order to control at each cycle the volume of the piles being formed; said unit also comprises a claw 45 driven by a complex mechanism 7.

[0022] In the embodiment described, the mechanism 7 consists of a slide 48 which is integral with the claw 45 and can slide on an arm 47 rotating in its turn around a fixed pin 51 and is connected by a rod 49 to a jointed system 50 which provides the arm 47 with alternate vertical movement.

[0023] The slide 48, in its turn, is connected by a rod 53 to a jointed system 54 which provides the slide with alternate straight-line movement along the arm 47.

[0024] Referring to figures 1-7, operation of the unit 4 for counting and forming the piles of articles 2 is described below.

[0025] Figure 1 illustrates the phase immediately prior to the discharge of a formed pile 6, performed by means of the conveyor teeth 55 of the outlet chain 56. In this phase the pile formed 6 is contained at the rear of the trolley 44 and in front of the claw 45; said claw remains at its rear stroke end, while at the rear of the pile formed, the trolley 44 maintains its programmed position according to the number of articles counted and the volume of the product being processed. In this phase a new pile forms between the claw and the external surface of the sectors 31 which deposit the articles 2 on the plate 41.

[0026] In the next phase (figure 2) the pile 6 has been removed by the conveyor teeth 55 of the chain 56 and the arm 47 is about to begin a downward movement which begins as soon as the trolley 44 has moved forward until it reaches the position of the claw 45.

[0027] In this phase the claw moves down, the slide 48 moves forward and the sheets are contained at the rear side by the trolley 44, which has replaced the claw 45, and at the front side by the curved surfaces of the sectors 31 (figures 4, 5).

[0028] At the front stroke end of the slide 48 the claw 5 reaches its insertion position (figure 6) and begins an upward movement; a new pile, now positioned between the trolley 44 and the claw 45, can now be transferred along the plane 43 (figure 7) to the discharge point of figure 1.

[0029] According to the invention, during transfer of the pile formed, to slide 48 and the trolley 44 have electronically synchronised speeds according to the number of articles and the type of initial product used, in order to maintain the shape of the pile 6.

[0030] Furthermore, the jointed systems that provide the movement to the slide 48, the arm 47 and the trolley 44 respectively, are synchronised with the disc 3 by means of an electronic control unit so that it is possible to vary both the number of articles that form the piles and the production speed of the piles formed, while maintaining continuous control of the piles.

[0031] A method for the storage of numbered piles of paper articles according to the invention comprises the following phases:

a) feeding of a continuous succession of articles;
b) collection of the articles fed;
c) counting and formation of piles of articles;
d) transfer of the piles formed to a further discharge phase;

[0032] Phase c) is performed by constantly maintaining the pile formed between two lateral containment surfaces.

[0033] Preferably:

phase a) is performed by means of a sector disc;
phase b), collection, is performed by means of a collecting plate which intercepts the articles conveyed by the sectors;
phase c), counting of the articles and formation of the piles, is performed by means of a claw element that selects a pre-set number of articles already present on the collecting plate, forming a pile in combination with a second pile containment surface;
phase d) is performed by transfer of the pile formed, constantly contained between two moving plates, to a discharge station.

[0034] The present invention has been described with reference to preferred forms of embodiment but equivalent modifications can be made while remaining within the scope of the protection afforded by the present industrial patent rights.

[0035] As an example, implementation of the mechanisms described can vary by using different elements and different arrangements; likewise the feeding and discharge phases can be obtained in an equivalent way with respect to the above.

Claims

1. Machine for the storage of paper articles in numbered piles, comprising:

   - a unit (1) for feeding the paper articles (2);
   - a unit (3) for collecting the individual articles coming from the unit (1);

   characterised in that it comprises a unit (4) for counting and forming numbered piles (6) of articles coming from unit (3) and is provided with means for transferring the formed piles (6) to a conveyor unit (5), maintaining the piles continuously comprised

between two lateral containment surfaces.

2. Machine according to claim 1, **characterised in that** said unit (3) consists of a basically cylindrical-shaped disc (30) provided with sectors (31) in each of which is deposited a single article (2) coming from the unit (1) and said counting and storage unit (4) consists of:

- a fixed surface plate (41) that intersects the sectors (31) of the disc (30) in order to collect the articles (2) contained in the sectors (31);
- a trolley (44) that can run with an alternate horizontal movement between said surface plate (41) and said discharge unit (5);

and a claw (45) operated by means of a mechanism (7) in order to define a pile (6) with a pre-set number of articles (2) and transfer said pile to the discharge unit (5), in co-operation with a surface of said trolley (44).

3. Machine according to claim 2, **characterised in that** the mechanism (7) consists of a slide (48) which is integral with the claw (45) and can slide on an arm (47) rotating in its turn around a fixed pin (51) and is connected by a rod (49) to a jointed system (50) which provides the arm (47) with alternate vertical movement.

4. Machine according to claim 3, **characterised in that** the slide (48) is in its turn connected by a rod (53) to a jointed system (54) that provides the slide with alternate straight-line movement along the arm (47).

5. Machine according to claim 2, **characterised in that** said trolley (44) is moved by a mechanism featuring connecting rod and crank (59) and servomotor (59') which provides the horizontal movement of the trolley (44) in an alternate and synchronised manner in order to control at each cycle the volume of the piles being formed.

6. Machine according to claim 3, **characterised in that** during transfer of the bundle formed, the slide (48) and the trolley (44) have synchronised speeds in order to maintain the shape of the bundle (6).

7. Machine according to the previous claims, **characterised in that** the jointed systems that provide movement to the slide (48), arm (47) and trolley (44) respectively are synchronised with the disc (3) by means of an electronic control unit, so that it is possible to vary both the number of articles that form the bundle and the production speed of the bundles formed, while maintaining continuous control of the bundles.

8. Method for the storage of numbered bundles of paper articles comprising the following phases:

a) feeding of a continuous succession of articles;
b) collection of the articles fed;
c) counting and formation of bundles of articles;
d) transfer of the bundles formed to a further discharge phase.

Phase c) being performed by constantly maintaining the bundle formed between two lateral containment surfaces.

9. Method according to claim 8, in which:

phase a) is performed by means of a sector disc;
phase b), collection, is performed by means of a collecting plate which intercepts the articles conveyed by the sectors;
phase c), counting of the articles and formation of the bundles, is performed by means of a claw element that selects a pre-set number of articles already present on the collecting plate, forming a bundle in combination with a second bundle containment surface;
phase d) is performed by transfer of the bundle formed, constantly contained between two moving surfaces, to a discharge station.

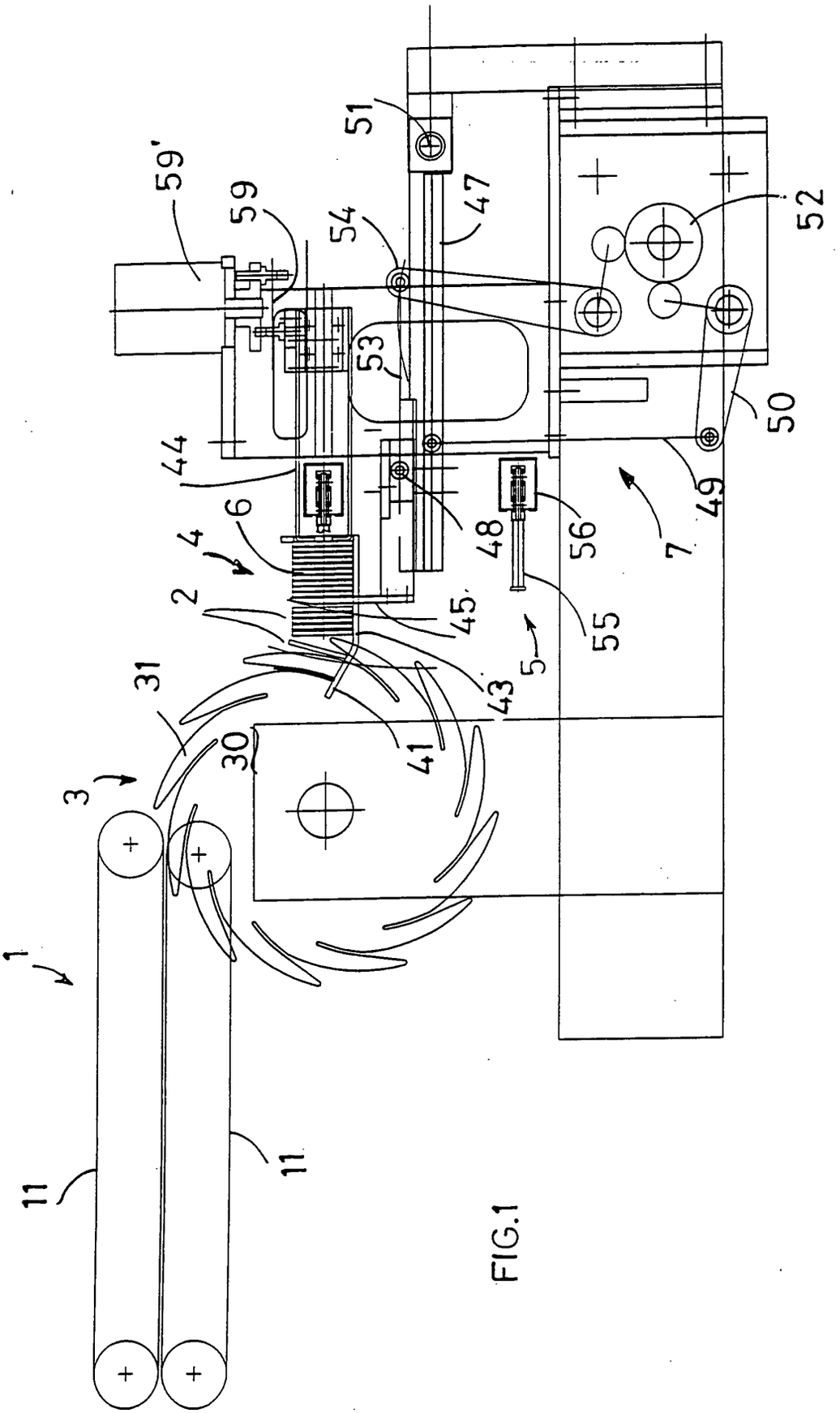

FIG.1

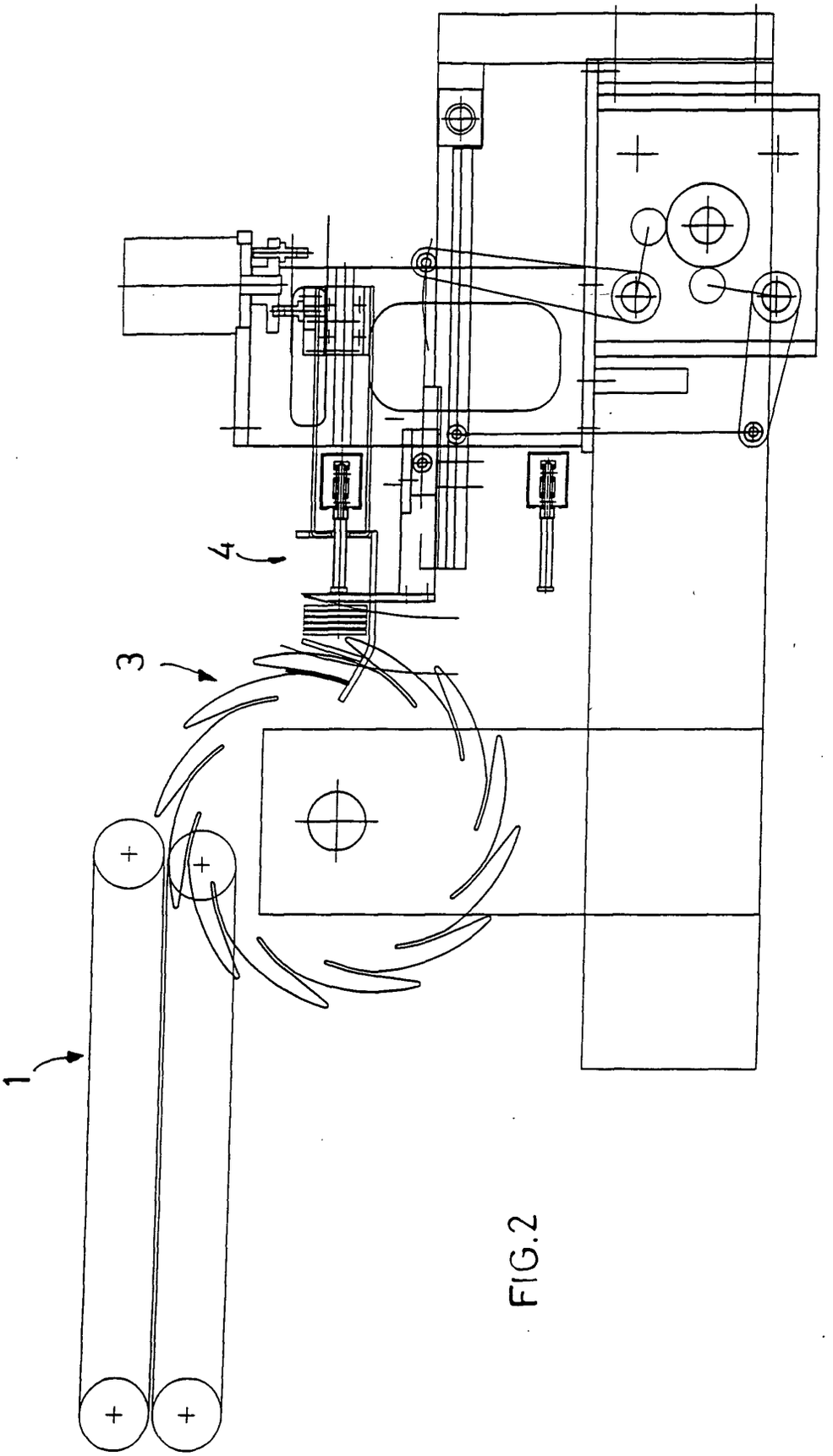

FIG.2

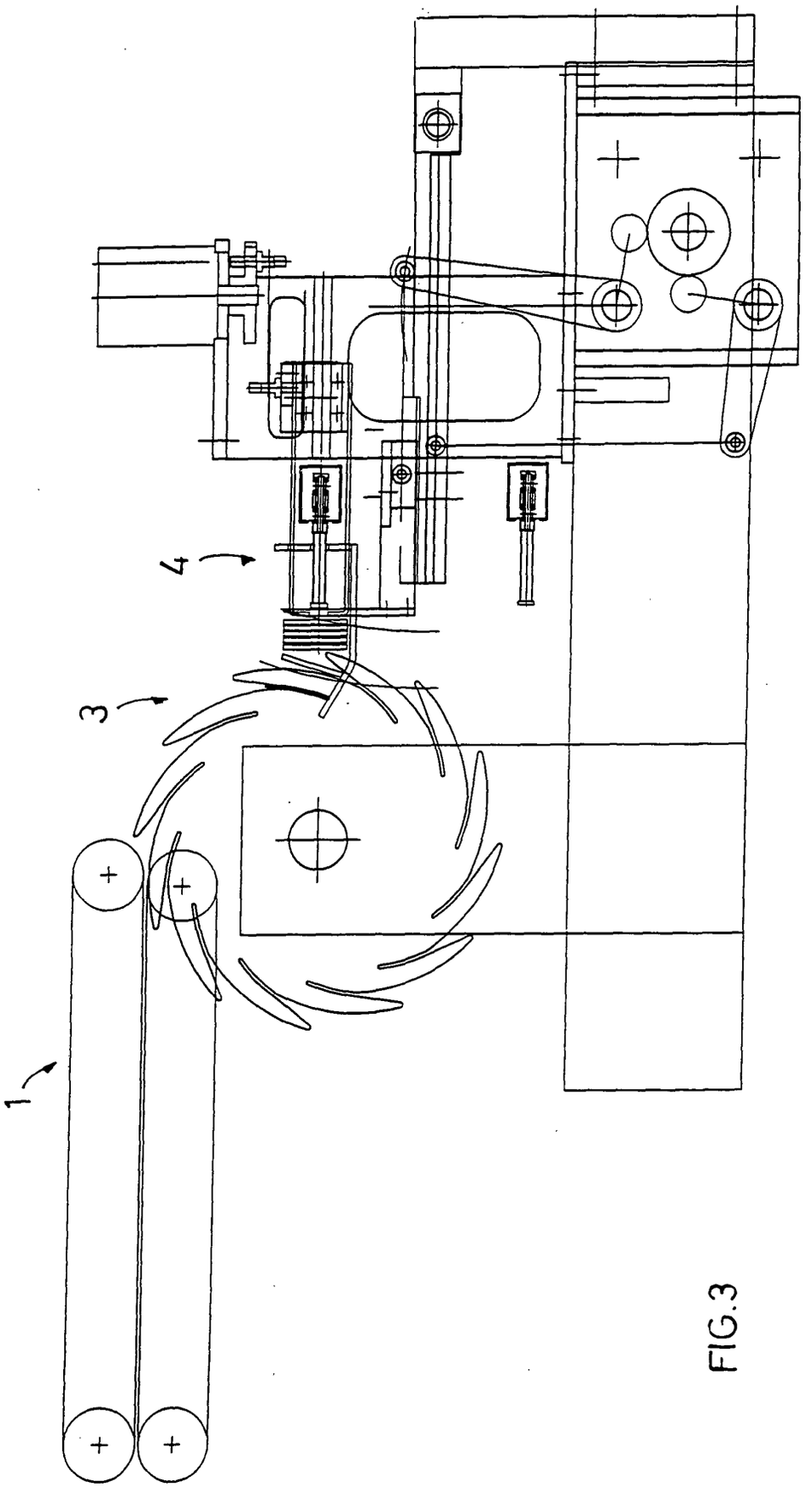

FIG.3

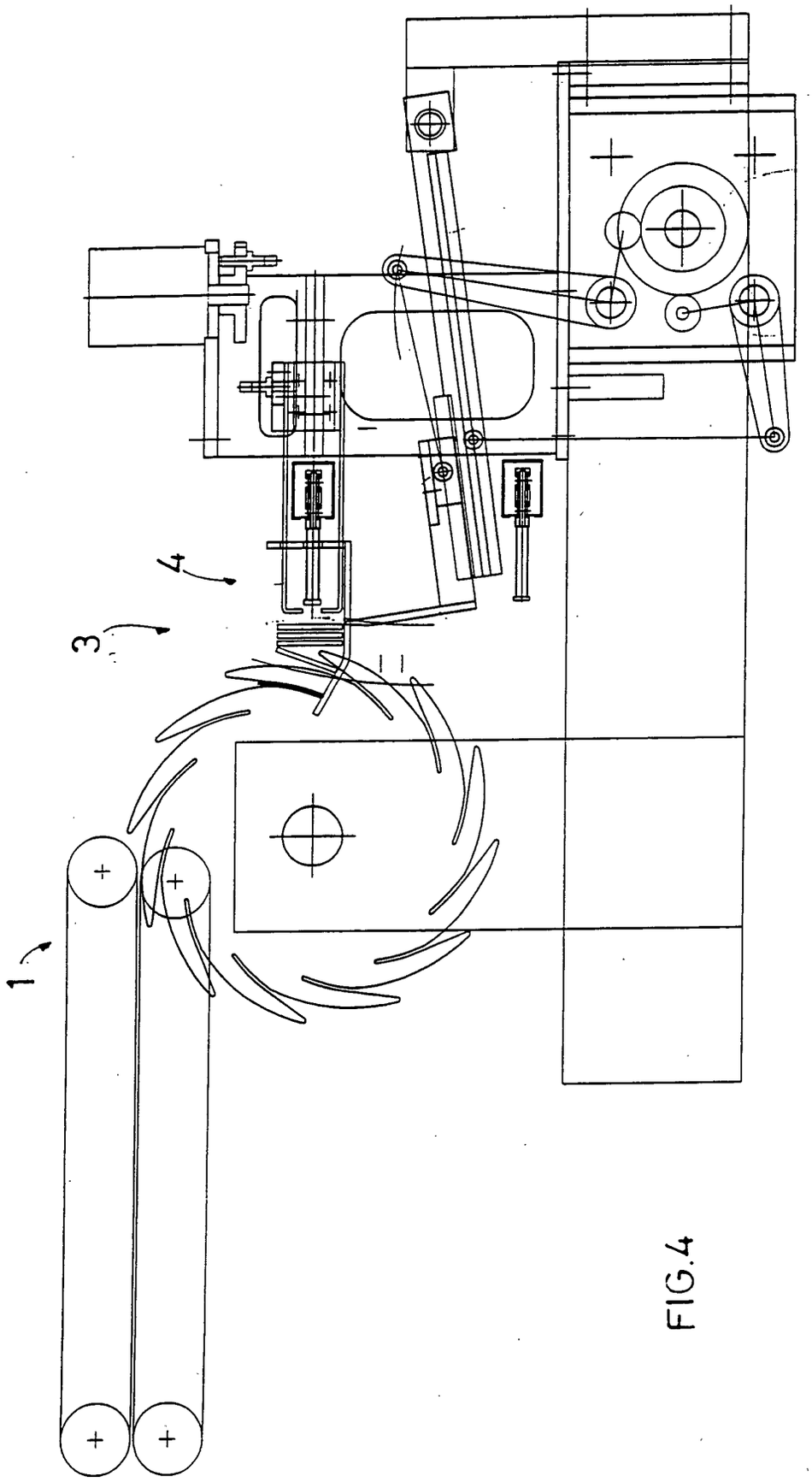

FIG.4

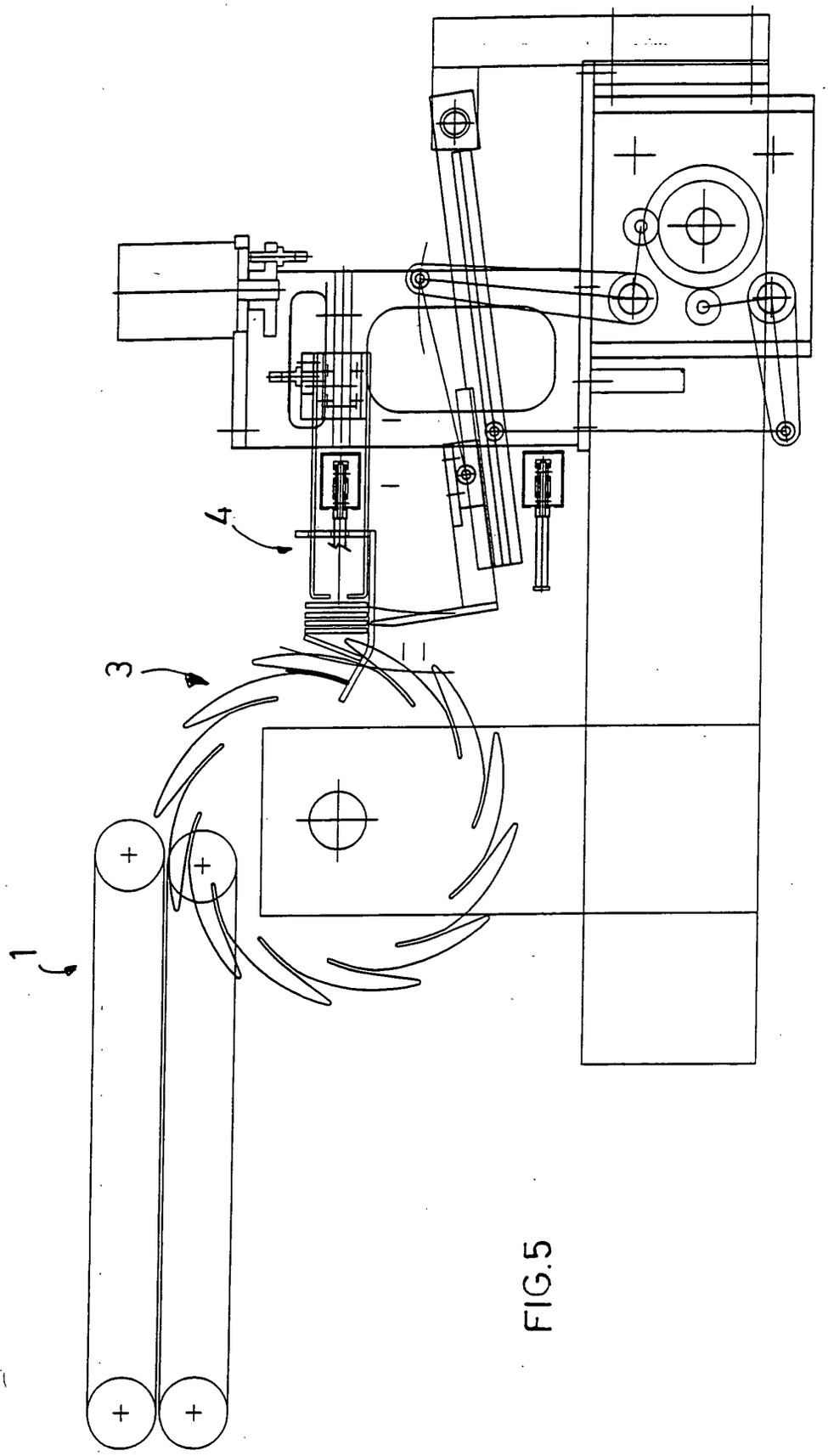

FIG.5

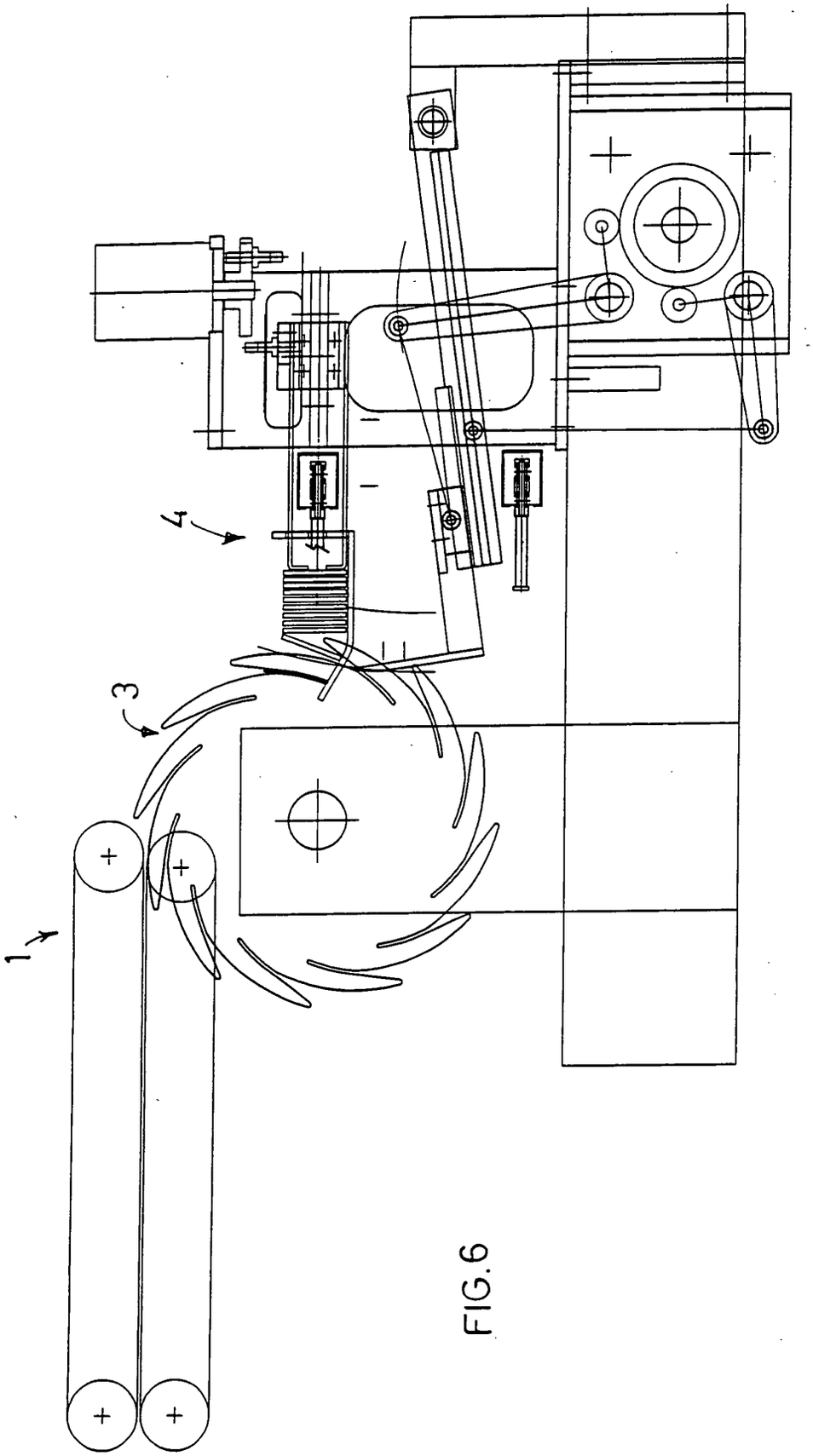

FIG.6

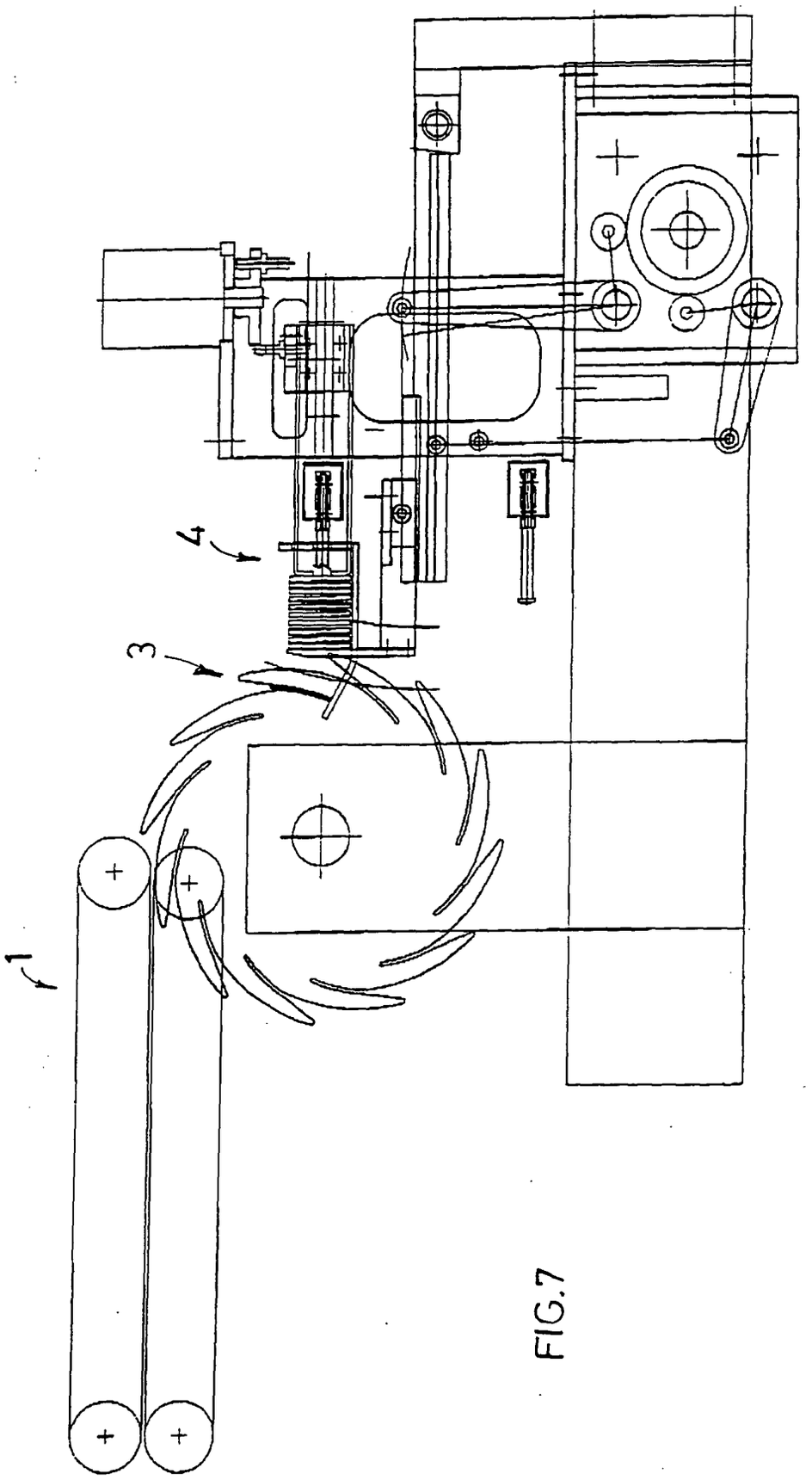

FIG.7

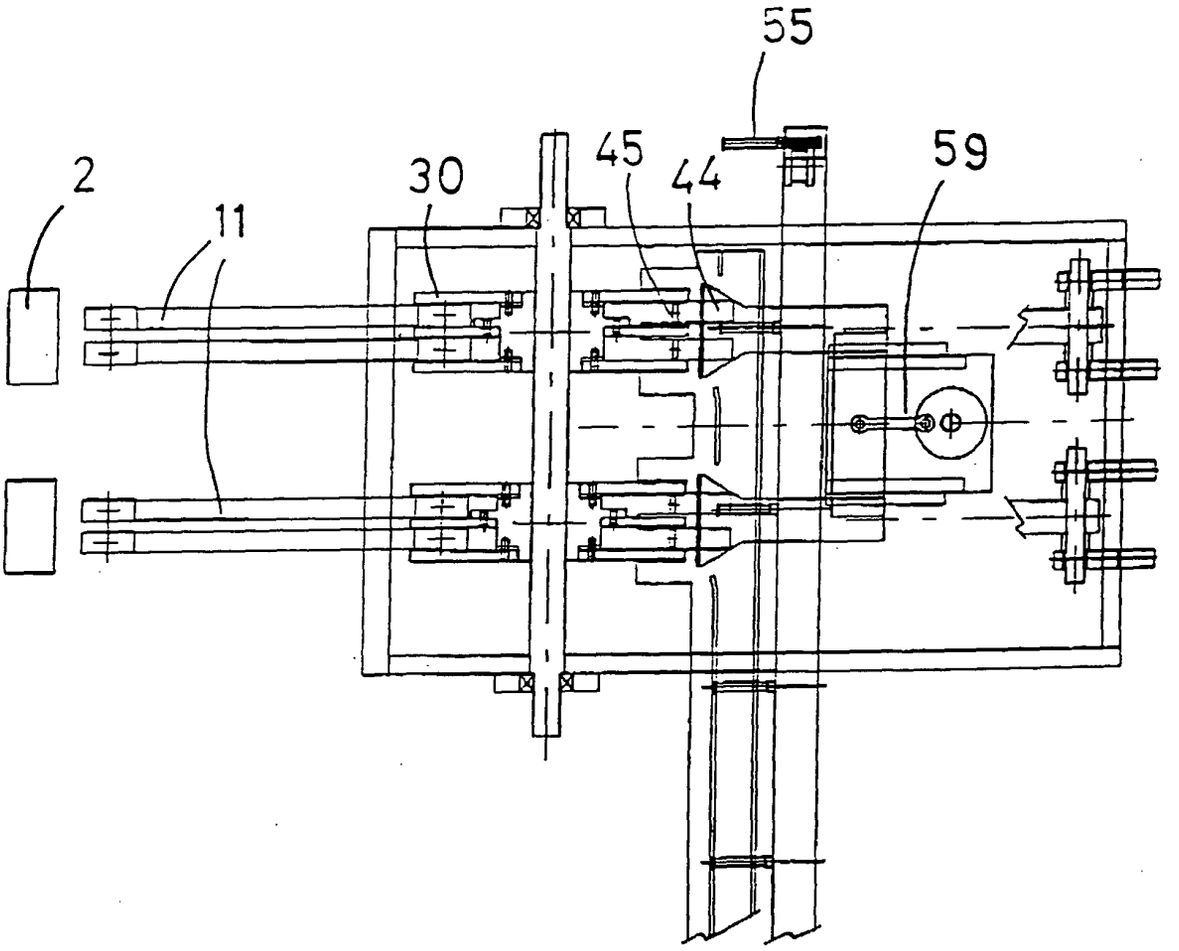

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 12 3426

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	US 3 416 286 A (CICCONE JACK M) 17 December 1968 (1968-12-17) * column 2, line 45 - column 4, line 10; figures 1,5 *	1,8,9 2	B65B25/14 B65H31/06 B65H31/18 B65H29/40 B65H33/02
Y X	EP 0 245 226 A (NIOBE OY) 11 November 1987 (1987-11-11) * page 3, paragraph 5 - page 5, paragraph 3; figures 1,2 *	2 1,8,9	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65B
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	21 December 2001	David, P

CATEGORY OF CITED DOCUMENTS

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