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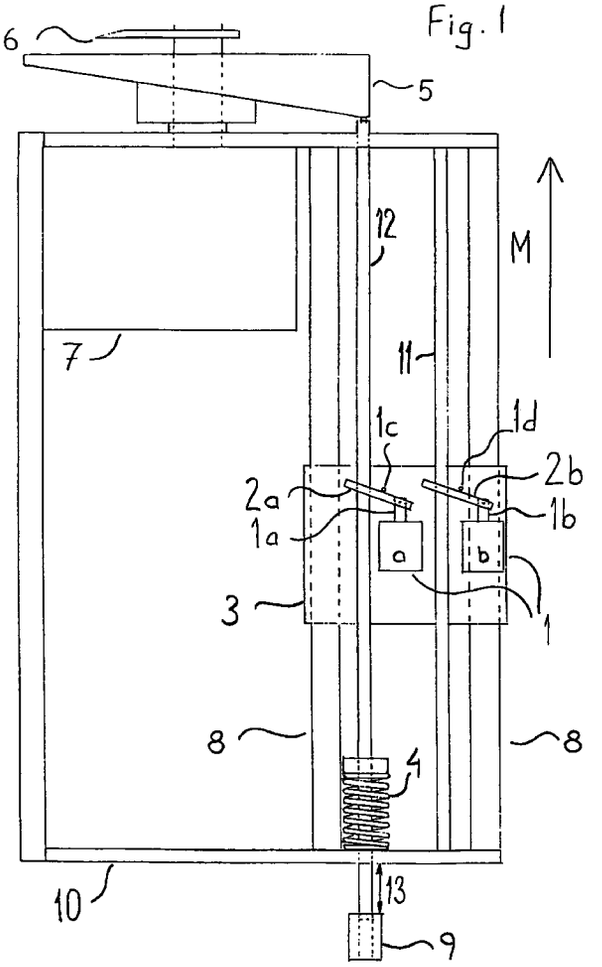
(54) Feeding device

(57) The present invention relates to a method and a device for synchronised feeding of food products, to a downstream processing device. The method comprises the steps of arranging the product to be fed on a slidable product carriage, which carriage is arranged on slide rails for sliding motion thereupon, in a feed direction M, and positioning the carriage in an initial position remote from that end to which the products are to be fed. The method is characterised by the step of driving at least one feed member in a reciprocating motion, in synchronisation with the operating cycle of the processing device, said slidable carriage being brought along, optionally, in said motion in the feed direction M, by bringing at least one locking member arranged on the slidable carriage into locking engagement with the feed member when said member is moved forward in the feed direction, said locking member being released from its locking engagement when said feed member is moved backwards against the feed direction. The device comprises a frame, a pair of parallel slide rails 8 on which a slidable carriage 3 is arranged for sliding forwardly feeding motion. It is characterised by a feed member which performs a reciprocating motion in synchronisation with the operating cycle of the processing device for related forward feeding of the slidable carriage 3, by locking member 2 provided on the carriage, with associated actuators for locking engagement with the feed member and an element which is fixed in relation to the frame respectively, and spring means biasing the feed member in the feed direction M.

Fig. 1



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Description

[0001] The present invention relates to a method and a device for feeding food products to a downstream processing device, synchronised with the operating cycle of said processing device.

[0002] It is known to provide various machines for cutting or slicing food products such as cheese, meat, bread etc, with a device which feeds the product to be cut, sliced or the like. Said devices function in a number of different ways. For example, devices controlled by means of frequency or hydraulics are known. Although such devices may be acceptable from a functional point of view, they are very expensive. Devices which constantly push the product into abutment against a fixed member of the cutting or slicing device are also known, but the function of such devices is associated with a number of drawbacks.

[0003] The object of the invention is to provide a method and a feed device for synchronised feeding of a product a pre-set distance, in a simple and inexpensive way, so that a slicing device may produce slices with a desired thickness.

[0004] The above stated object is achieved by means of a method according to claim 1, and a feed device according to claim 5.

[0005] Advantageous realisations are apparent from the dependent claims.

[0006] The invention is described in closer detail below, reference being made to the appended drawings, in which

fig. 1 shows, schematically, a plan view from above of a feed device according to the invention, in a first position,
fig. 2 is a view of a feed device according to the invention, like fig. 1, but with the feed device in a second position, and
fig. 3 shows, from above and from the side, a preferred embodiment of a locking member on a slidable feed carriage of the feed device according to the invention.

[0007] The invention consists in the provision of a method and a device for synchronised feeding of food products to a downstream processing device. The method according to the invention comprises arranging said food product on a slidable feed carriage, arranged to carry said product. The slidable feed carriage is arranged for sliding motion on mutually parallel rails. Said carriage is set into motion from its initial position, in which it is located in its most remote position from the feed end, said end being, in the specific embodiment shown in fig. 1, the rightmost position, said motion being directed in a feed direction M. This is accomplished by driving a feed member in reciprocating motion, said motion being synchronised with the operating cycle of a downstream processing device. The carriage will feed the product step by step to the other end of the feed device, in the feed direction M, in pace with the reciprocating motion of the feed member.

[0008] In order to achieve said motion of the slidable feed carriage, at least a first locking member arranged on the carriage, is brought into locking engagement with the feed member during that part of the motion of the feed member which is directed in the feed direction M, so that the carriage is brought along in this motion. When the feed member returns, and thus moves backwards, the engagement of said locking member is released, thus releasing the carriage. I order to secure this function, a second locking member is, in a preferred embodiment, brought into locking engagement with an element with a fixed position relative to the frame or a structure in which the device is supported, so that the carriage is unable to move in a backwards direction in relation to the feed direction M. When the slidable carriage member is moved forward by the feed member, the second locking member is released from its locking engagement, to allow the unobstructed forward movement of the slidable feed carriage.

[0009] In a preferred embodiment of the present invention, the reciprocating motion is transferred to the feed member by said feed member being spring-biased against a cam disc, which is so designed, that it, when it is rotated, to the feed member transfers the reciprocating motion.

[0010] The invention also provides a device for feeding products, preferably food products, synchronised with the operating cycle of a downstream processing device. A such device according to the invention comprises a frame, a pair of mutually parallel rails, and a slidable feed carriage, slidably arranged on said rails. The device has a feed member, which in the simplest case may be comprised of the rails, which feed member performs a reciprocating motion, which is synchronised with the operating cycle of the downstream processing device, which station is receives products from the feed device. Said reciprocating motion is used for moving the slidable feed carriage 3 forward in an indexing way.

[0011] In an illustrative embodiment of the invention, said reciprocating motion is used for feeding the carriage by means of first and second locking members with associated actuating means, arranged on the carriage, said first locking member being brought into locking engagement with the feed member when the feed member moves in a forward direction as defined, in order to transfer, by means of said engagement, the force directed in the feed direction, and said second locking member being brought into locking engagement with an element having a fixed position in relation to the frame. In the simplest embodiment, the second rail constitutes said fixed element. It is advantageous to design the locking members in such a way, that they, by way of the motion of the feed member automatically locks and releases the carriage, respectively, and brings said carriage forward in the feed direction and prevents it from

moving backwards, against the feed direction M.

[0012] The reciprocating movement of the feed member is in a preferred embodiment brought about by said feed member being spring-biased against a cam disc, the rotation of which cam disc is synchronised with the operating cycle of the downstream processing device, said cam disc having a shape which in rotation gives rise to the reciprocating motion of the feed member. In order to improve the flexibility of the feeding device, the feeding device is preferably provided with adjustment means which the advantageous capability of that limiting the movement of the feed member in the feed direction. By means of said adjustment means, the feeding step distance, or, in the case where the processing device is a cutting or slicing device, the thickness of the slices being cut, may be adjusted in an easy manner.

[0013] Below, a preferred embodiment of the device according to the invention will be described, with reference to the drawing figures 1, 2 and 3.

[0014] Fig. 1 shows, schematically, a preferred embodiment of the present invention, comprising a frame 10, in which are arranged two mutually parallel slide rails 8. A slidable feed carriage 3 is arranged for slidable reciprocating movement, parallel to the slide rails 8. The carriage 3 is provided with a locking arrangement which, in a preferred embodiment is comprised of a first and a second locking arm 2a and 2b respectively. Said first and second locking arms 2a and 2b are in this embodiment connected with a respective actuator 1. In feeding position said arms rest against a fixed element or rod 11 and a feed rod 12, thereby locking the movement of the carriage in a direction which is the opposite to the feed direction M. In fig. 3 the locking engagement which is obtained by means of one specific embodiment of a locking arm is shown. Other arrangements, such as a gear lock mechanism, automatically locking in one direction and opening in the other direction, or other equivalent arrangements may of course be used instead of the type of self-locking members shown in the drawings. In the presently described embodiment, the actuating means are electromagnetic means 1, with spring return means. These may of course be replaced by pneumatic actuators, or some other type of mechanically operable arrangement, or be actuated in some other conventional manner.

[0015] The locking arms 2a, 2b are preferably pivotably connected to a respective actuator arm 1a and 1b respectively, said actuator arms being actuated by the electromagnetic means 1. When the electromagnetic means 1 are energised, they pull their respective actuator arm 1a and 1b in a direction which is opposite to the feed direction M, said locking arms 2a and 2b being brought into locking engagement with the feed rod 12 and fixed rod 11 respectively. The pivotable locking arm connections are preferably provided with spring means, which urge the locking arms to a position in which said arms lie parallel with the slide rails 8 in the feed direction M. Further, two pivot posts, 1c and 1d respectively, or other similar members, are also arranged adjacent to the locking arms, against which posts the locking arms rest when, at the end of a feeding cycle, the electromagnetic means 1 are de-energised, and the return spring means in each of the electromagnetic means push on the respective actuating arm 1a, 1b. The arms will, as a result thereof, be brought out of their locking engagement, and the carriage may be brought to the initial position.

[0016] As an alternative one single electromagnetic member 1 may be used for actuation of both locking arms. As yet another alternative, the second locking arm 2b may be arranged to be brought into locking engagement with one of the slide rails or any other suitable element which is fixed in relation to the frame, although in a preferred embodiment it is brought into engagement with the fixed rod 11, provided for this specific purpose.

[0017] The feeding rod 12 is arranged for reciprocating motion in the frame 10, and it is further spring biased in the feed direction by means of a feed spring 4 having a first and a second end, the first end of said spring abutting against an abutment member or the like on the feeding rod, and the other end of said spring abutting against the frame or stopping means arranged thereon. On that end of the feeding rod 12 which is located on the right side in fig. 1, and adjustment wheel 9 is arranged outside of the frame. Said adjustment wheel 9 has an abutment surface on that end which faces the frame 10, said abutment surface abutting against the frame or stopping means arranged thereon when the feed rod 12 travels in the feed direction, and thus limits the distance travelled by said feed rod 12 in the feed direction M. The distance between the adjustment wheel 9 and the stopping means, when the feed rod 12 is located at its most remote position from the frame constitutes the feed distance or length 13, which in the case of a cutting or slicing device is the resulting thickness of the slices which will be cut from the product being cut or sliced. In relation hereto, fig. 1 shows the device in the initial position when the feed rod at the lowermost position in the figure, while fig. 2 shows the device when the feed rod has been brought to the end position in its topmost position in the figure, after rotation of the cam disc 5.

[0018] The function of a preferred embodiment of a device according to the invention is as follows. A feed cycle starts with the feed rod 12 at its rightmost position in fig. 1. It is brought to this position against the biasing force of a spring by means of an appropriate member 5. Preferably said member is comprised of a rotating cam disc 5, in the preferred embodiment driven by a motor 7 which also, as an example, drives a knife 6 in rotation. The cam disc 5 rotates on a shaft which is parallel to the slide rails 8 and the rods 11 and 12, the surface of said cam disc facing the feed rod 12 is a cam surface. This results in a periodic reciprocating motion of the feed rod 12 parallel with the slide rails, said rod being spring biased in the feed direction. The two extreme position of

the feed rod are shown in figs. 1 and 2.

[0019] The motion of the feed rod 12 is limited by the abutment surface of the adjustment wheel 9 abutting against the frame 10 or a stopping member fixedly arranged on said frame. The distance between the initial position of the feed rod 12, when said rod is brought to its maximally retracted position by the member 5 and the adjustable position in which the abutment surface of the adjustment wheel 9 limits the further movement in the feed direction of the feed rod will thus constitute the feeding distance 13, which for example determines the thickness of the slices which will be cut in a cutting or slicing device (not shown).

[0020] In the initial position the carriage 3 is locked against further movement against the feed direction M by the locking arms 2a and 2b, which arms in the preferred embodiment locks against the feed rod 12 and the fixed rod 11 respectively, by the electromagnetic means 1 being electrically energised actuates said arms into a locking position. When member 5 rotates in synchronisation with the operating cycle of the cutting or other device, the feeding rod 12 till by means of spring 4 be urged forward in the feed direction corresponding to the increased freedom for such movement allowed by the member 5 through its rotation. The force applied by the spring 4 will as a result, by means of the feeding rod 12, urge the carriage 3 forward in the feed direction. When the carriage moves in this direction the locking arm 2b, in locking position, will be pivoted around its pivot post, thus releasing its locking engagement, and the carriage will be brought forward a distance which corresponds to the feeding distance 13. When the member 5 has rotated to a position where it once again urges the feeding rod 12 backwards, the arm 2b will once again engage the slide rail 8 or the fixed rod 11 in a locking relationship, while arm 2a will release its locking engagement, and allow the bringing back of the feeding rod 12 to its initial position.

[0021] The above cycle is repeated until the carriage 3 reaches an end position, and when reaching said end position, it will actuate a switch or the like member arranged adjacent to said end position. This initiates a return cycle which results in de-energising the electromagnetic means, whereby the spring return means of the electromagnetic means will push the locking arms away from the electromagnetic means, releasing the locking engagement of said arms, thereby also releasing the carriage, which may be returned to its initial position in a way which is not shown in the drawings, for example manually. When the carriage 3 has reached its initial position, it will actuate a second switch, which again energises the electromagnetic means 1, and thus the feeding device is ready for starting a new feeding cycle.

[0022] By means of the above described invention, the initially stated objects are reached. Although the invention has been described with the reference to a cutting or slicing device, the invention may of course be put to use together with other types of processing devices in the food industry. A person skilled in the art appreciates that the invention subject to numerous variations and modifications, without deparing from the scope of the invention, which is solely defined by the appended patent claims.

Claims

1. Method for synchronised feeding of products, preferably food products, to a downstream processing device, comprising the steps of arranging the product to be fed on a slidable carriage means provided for this purpose, which carriage means is arranged on a pair of slide rails for sliding motion on said rails in a feed direction (M), and arranging the carriage means in an initial position at a distance from that end where the products are located, **characterised by** the steps of driving at least one feed member in a reciprocating motion synchronised with the operating cycle of the processing device, said carriage being set into said motion in the feed direction (M) by means of at least one locking member arranged on the carriage means being brought into locking engagement with the feed member when said feed member is urged forward in the feed direction, and said locking member being released from the locking engagement when said feed member moves backwards against the feed direction.

2. Method according to claim 1, **characterised by** the steps of bringing a second locking member to locking engagement with a member which is fixed in relation to the frame when the feed member is being moved backwards against the feed direction, and releasing the second locking member when the feed member is moved forwards to release the carriage for movement in the feed direction.

3. Method according to claim 2, **characterised by** the steps of constantly actuating the first and second locking members respectively, in such a way that they are in locking engagement with the feed member and the fixed member respectively, when a force which tends to urge the carriage backwards against the feed direction (M) in relation to the feed member or the fixed member respectively, is applied to the carriage, and arranging the locking member to open automatically when a force which tends to urge the carriage forwards in the feed direction (M) in relation to the feed member or the fixed member respectively, is applied to the carriage.

4. Method according to claim 3, **characterised by** the step of providing the reciprocating motion to the feed member by spring biasing said member in the feed direction (M) so that it abuts against a cam disc

which is designed so that it, during rotation, provides the feed member with said reciprocating motion.

5. Device for synchronised feeding of products, preferably food products, to a downstream processing device, comprising a frame (10), a pair of mutually parallel slide rails (8) on which is arranged a slidable carriage (3) for a sliding forwardly feeding motion, **characterised by** a feed member which moves, in a reciprocating way, synchronised with the operating cycle of the downstream processing device, to achieve an associated forward feeding of the carriage (3), by locking members (2) with associated actuator provided on the carriage, for locking engagement with the feed member and a member which is fixed in relation to the frame, and by a spring member which biases the feed member in the feed direction.

6. Device according to claim 5, **characterised by** adjustment means for setting a feed distance (13) by limiting the reciprocating motion of the feed member in the feed direction.

7. Device according to any of the claims 5 or 6, **characterised in** that the feed member is a separate feeding rod (12) which is biased by a spring (4) against a cam disc (5) which is driven in synchronisation with the processing device.

8. Device according to any one of the claims 5 through 7, **characterised in** that the locking members are constantly actuated to locking engagement by means of an actuator (1) during the feed cycle, whereby the force which is applied by the feed member to the locking members either directly when the feed member moves backwards against the feed direction (M) or via the carriage when said carriage is moved forward by the feed member is sufficient to overcome the force by means of which the locking members are held in their respective locking engagements by an actuator (1).

9. Device according to claim 8, **characterised in** that the actuators are electromagnetic means (1) with a return spring mechanism which are energised during the whole feeding cycle, and in that the electromagnetic means (1) are de-energised when the carriage reaches an end switch, said return spring means the releasing the engagement of the locking members.

10. Device according to any of the claims 5-9, **characterised in** that the locking members are wedge lock members (2), the first locking member (2a) being arranged to engage the feeding rod (12), and the second locking member (2b) being arranged to engage a fixed rod (11), specifically provided for this purpose.

Fig. 1

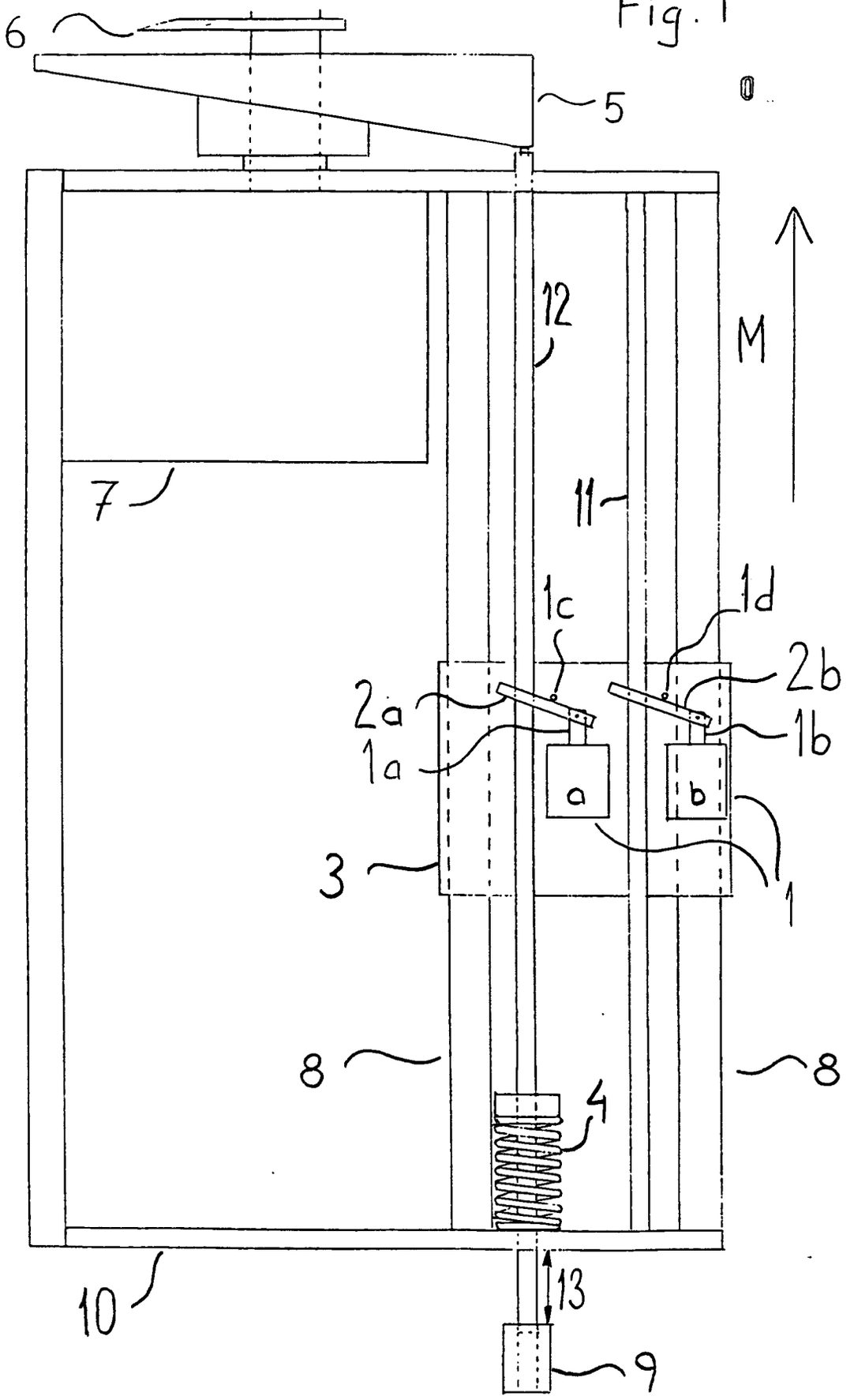

Fig. 2

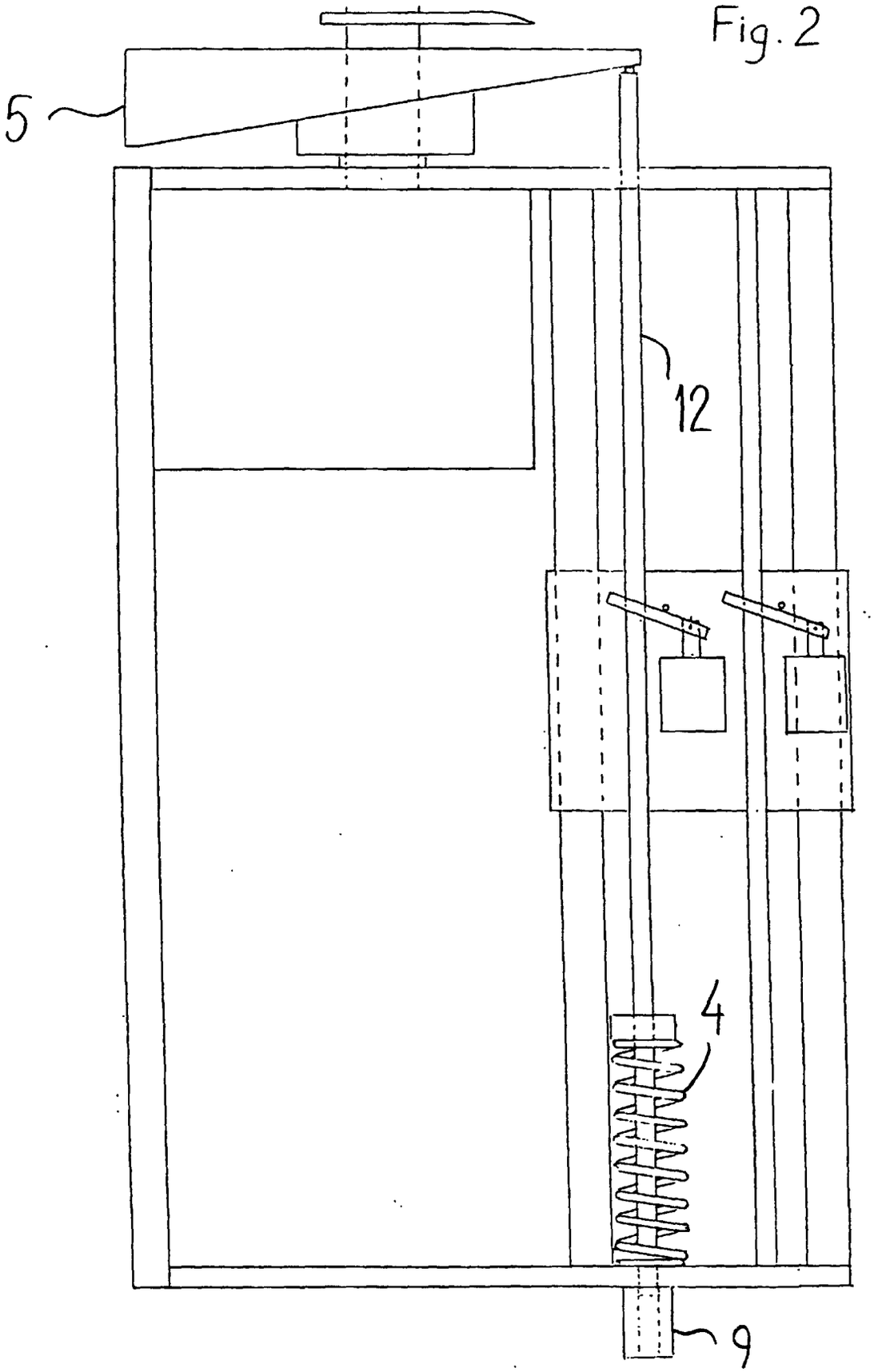

Fig 3