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EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.07.2002 Bulletin 2002/29

(51) Int Cl.7: B31B 1/84

(21) Application number: 02000687.0

(22) Date of filing: 11.01.2002

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: 16.01.2001 IT TO010023

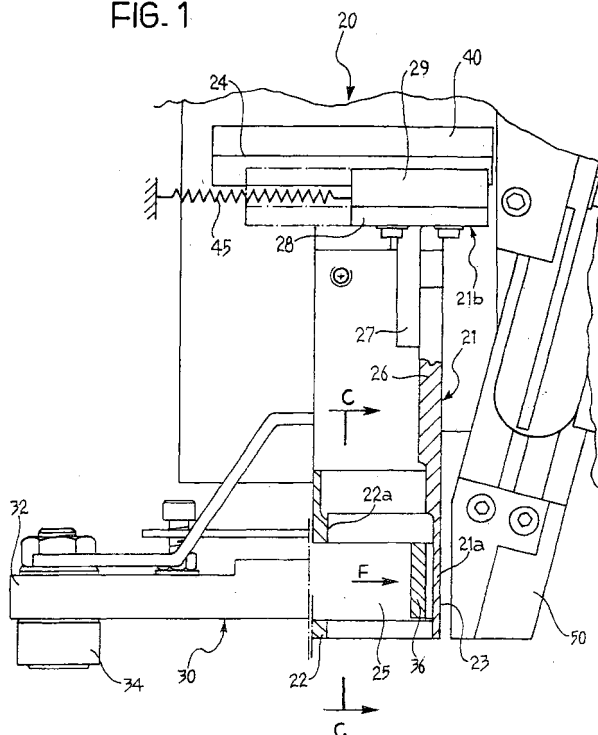
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(54) A device for inserting pouring spouts in containers

(57) An insertion device (20) for a machine for inserting pouring spouts (15) in containers (11) comprises a casing (22) with a seat (25) suitable for receiving a spout to be inserted and for guiding it during the insertion operation, and a thrust element (21) which is moved with a reciprocating rectilinear motion along the seat (25) between a retracted position in which a spout (15) can be received in the seat (25) and a forward position in which

the element (21) pushes the spout out of the seat (25) against a container. The thrust element (21) is mounted for sliding on a rectilinear guide (24) spaced from the casing (22) and preferably has a shape which is elongate in a direction perpendicular to the direction of insertion. The thrust element (21) has a first end portion (21a) which is movable in the seat (25) and which can act on a spout (15), and a second end portion (21b) which is slidable along the guide (24).

FIG. 1



Description

[0001] The present invention relates to an insertion device for a machine for inserting pouring spouts in containers, as specified in the preamble to Claim 1.

[0002] It is known that retractable elements made of cardboard or metal (usually aluminium), defined by the term pouring spouts, are commonly fitted in containers or packages, generally made of cardboard, which usually have rectangular cross-sections and are used in particular for products in granular or powder form such as, for example, soluble food products.

[0003] The spouts are formed and fitted on the respective containers by suitable insertion machines cooperating with means for transporting the containers, such as chain conveyor lines.

[0004] For a better understanding of the prior art on the subject in question and of the problems inherent therein, a known insertion machine will be described first of all with reference to Figures 4 and 5 of the drawings appended to the present application, which figures have been extracted from United States patent No. 3 673 663.

[0005] Figure 4 is a plan view of a rotary insertion machine, generally indicated 1, having a carousel structure which can be rotated by suitable drive means about a vertical axis coincident with the axis of a pin 2. The machine is positioned tangentially relative to a conveyor line, generally indicated 10, for example, with single or double chains, by means of which containers or packages 11, equally spaced on the conveyor line, are supplied at a constant speed.

[0006] The insertion machine comprises a forming mechanism (not shown) which is supplied with a suitably-shaped strip of the material, generally aluminium or cardboard, of which the pouring spouts are made. The forming mechanism cuts off a portion of strip corresponding to a single pouring spout, gives it its final shape and, finally, inserts a spout 15 thus formed in one of the insertion devices 20 which will insert the spout in a corresponding container.

[0007] The insertion devices, which are equally angularly spaced around the periphery of the rotatable structure 3 of the insertion machine 1, are controlled by cam guides 4, 5 which impart to them a path of movement and an angular orientation corresponding to those of the containers 11 transported by the line 10. The feeding speed of the containers and the angular velocity of the devices for inserting the pouring spouts are synchronized with one another so that the devices are introduced into the spaces between two consecutive containers in the working region (the extent of which is indicated schematically by the segment A-B).

[0008] Each insertion device 20 is provided (Figure 5) with a thrust element or hammer 21 which is mounted in a seat 25 in a casing 22 and which can translate with a reciprocating rectilinear motion within the seat, between a retracted position in which a spout 15 can be received in the seat and a forward position in which the

hammer pushes the spout out of the seat 25 into abutment with a container 11. The thrust element or hammer 21 also cooperates with a reaction element or anvil 50.

[0009] During the working phase, whilst the insertion device moves forwards along a straight path substantially coincident with the path along which the containers are fed, the reaction element is translated towards the inside of a container, against the (inner) face of the respective wall opposite the (outer) face to which a pouring spout will be applied. At this point, the thrust element is moved forwards, guided by respective guide elements formed inside the casing 22, against the reaction element, so as to press the pouring spout against the container wall and to fix it (so that it is secured firmly by gluing or clinching).

[0010] Finally, the thrust element is returned into the respective casing, the reaction element is returned to the rest position outside the container, and the insertion device is moved away from the container conveyor line by the rotation of the carousel 3.

[0011] Upon completion of the working phase, the insertion device continues to be moved along a predetermined path as a result of the rotation of the carousel until it arrives in front of the forming mechanism again, where it collects another pouring spout and then reaches the working region, along which it inserts the spout in a further container, and so on, in accordance with a cyclic mode of operation.

[0012] Figures 6A and 6B of the appended drawings, which have been extracted from United States patent No. 3 385 248, show an insertion device, generally indicated 20, as is used in conventional rotary insertion machines. In particular, Figure 6A is a side view of the device and Figure 6B shows the device in a horizontal view from above, sectioned on the line C-C, as indicated in Figure 6A.

[0013] With reference to Figures 6A and 6B, it can be seen that the thrust element or hammer 21 mounted in the seat 25 in a respective casing 22 forming part of a device 20 for inserting pouring spouts 15 has a substantially prismatic shape, rectangular in plan, with a predominant dimension along the axis of insertion of the spout, indicated by the arrow F.

[0014] The hammer can be moved inside its casing, in the manner of a piston, with a reciprocating linear movement along the insertion axis. This axis is perpendicular to the plane of the working face 23 of the hammer, which has the function of pushing a spout against a corresponding container.

[0015] The casing 22 in which the hammer 21 slides has a substantially inverted U-shaped cross-section so as to be able to receive in its seat 25 a pouring spout coming from the forming mechanism (not shown). The pouring spout remains temporarily held in the seat in the hammer casing by the friction against the side walls of the casing, by virtue of the fact that its lateral fins tend to open out resiliently, thus exerting a thrust force on the walls.

[0016] During the insertion phase, the pouring spout has to be pushed against the wall 12 of the container 11 by means of the hammer which can slide along linear guides 24 formed on the internal side walls of the casing.

[0017] The operation of the hammer, which has to perform a stroke substantially equal to the dimension of the spout along the insertion axis F, is brought about by means of a control lever 30 mounted firmly on the insertion device 20. The control lever, which is pivotable about a vertical axis 31, comprises two arms 32, 33 disposed on opposite sides of its pivot axis. An idle roller 34 mounted on the end of the arm 32 engages a guide ramp 35 formed on the fixed portion of the machine in the working region, causing the lever 30 to pivot in accordance with a predetermined rule of movement. The other arm 33, the end of which is articulated to the hammer 21, exerts a thrust force on the hammer as a result of the pivoting of the control lever 30. The hammer is thus caused to move forwards in its casing 22, in the direction of the arrow F, towards the face of the wall 12 to which the pouring spout is to be applied whilst, in the meantime, the anvil 25 is moved downwards into the container 11 with a rectilinear motion along an oblique axis inclined towards the opposite face of the wall 12. When the hammer is in its furthest forward position, the pouring spout is inserted in the wall 12 of the respective container, by virtue of the fact that the spout and the wall are clamped between the hammer and the anvil.

[0018] The main disadvantage of an insertion device of this type is that it is difficult to reconcile the conflicting requirements for the hammer casing to occupy little space along the insertion axis and for the risk of the hammer jamming inside the casing to be eliminated.

[0019] The requirement for the hammer casing to occupy little space along the axis of insertion of the pouring spouts, that is, in the direction of transportation of the containers, is due to the need to reduce the gap between two consecutive packages to the minimum in order to increase the number of containers which reach the working region per unit of time, for a given linear speed of the conveyor line, and hence the productivity of the process.

[0020] As pointed out above, in rotary insertion machines, each of the devices 20 for the insertion of the pouring spouts has to be moved in a manner such as to be positioned in the gap between two consecutive containers at the start of the working region (point A), and to follow a straight path substantially coincident with the direction of movement of the containers until the insertion operation is completed.

[0021] Theoretically, the maximum dimension of the hammer casing in the longitudinal direction (the term longitudinal refers hereinafter to the direction of insertion of the pouring spouts) is represented by the gap between two consecutive containers but, in practice, is further limited by the need to "link" the circular path of the insertion device to the straight path of movement of the containers at the start of the working region (point A).

The longitudinal dimension of the hammer casing, on the other hand, is determined by the sum of the longitudinal space occupied by the hammer (its thickness) and the stroke of the hammer, the stroke being substantially equal to the longitudinal dimension of the pouring spout.

[0022] Since the dimensions of the pouring spout are fixed, a reduction in the longitudinal space occupied by the hammer casing mounted on the insertion device necessarily involves a reduction in the longitudinal dimension of the hammer itself, which favours jamming of the hammer within its sliding seat with consequent risks of reduced production in the event of interruption of the process.

[0023] The jamming phenomenon is due to the necessary presence of clearance between the hammer and its guides and to the fact that the thrust force exerted on the hammer by the control lever during its pivoting movement is not purely longitudinal, but has also transverse components.

[0024] As is well known to any person skilled in the art, to eliminate the risk of jamming in operation it would be necessary to increase the longitudinal dimension of the hammer, but this is incompatible with the need to reduce the gap between two consecutive containers.

[0025] The object of the present invention is to provide a device for inserting pouring spouts which occupies little space longitudinally and is free of risks of jamming of the thrust element inside its casing, in order to increase the productivity of the insertion process.

[0026] These and other objects and advantages which will become clearer from the description of the present invention, are achieved by means of a device for inserting pouring spouts according to the invention, having the characteristics defined in the appended claims.

[0027] The invention will be described in greater detail below, purely by way of non-limiting example, with reference to the appended drawings, in which:

Figure 1 is a partially-sectioned side view of a device for inserting pouring spouts according to the invention,

Figure 2 is a partially-sectioned front view of the device of Figure 1, and

Figure 3 is a partially-sectioned plan view of the device of Figure 1.

[0028] In the following description, only the elements which are of specific importance and interest for the purposes of an understanding of the invention will be described in detail; with regard to the elements and parts which are not mentioned or examined, however, reference should be made to known solutions such as those described, for example, in United States patent No. 3 673 663, already mentioned. To facilitate an understanding of the invention, the same reference numerals

have been associated with parts and elements identical or corresponding to those already described in connection with Figures 4, 5, 6A and 6B.

[0029] With reference to Figures 1 and 2, a device 20 for inserting pouring spouts for rotary insertion machines comprises a thrust element or hammer 21, a casing 22 provided with a seat 25, a linear guide 24, a control lever 30, and a reaction element or anvil 50.

[0030] The hammer 21 comprises two elements 26 and 27, that is, a lower element and an upper element, respectively, having the form of elongate plates of substantially rectangular cross-section, extending substantially vertically, and connected to one another, in conventional manner, by means of screws.

[0031] The upper element 27 is welded perpendicularly to or formed integrally with a plate-like element 28 extending horizontally and in turn secured to a movable element or slide 29 which can slide on the linear guide 24. The set of elements 27, 28 and 29 constituting the upper portion of the hammer 21 is indicated 21b in Figures 1 and 2. The movable element or slide 29 preferably has sliding surfaces 29a, 29b made of material with a low friction coefficient.

[0032] The linear guide 24, which is mounted, in conventional manner, on a support structure 40 fixed to the hammer casing 22, can be significantly longer than the longitudinal space' occupied by the casing 22 since it is disposed outside the working region and is therefore not subject to the dimensional constraints connected with the need to ensure that it can be inserted in the gap between two consecutive containers.

[0033] It is therefore possible to use a slide 29 of a length such as to prevent risks of jamming, for example, a slide advantageously having a longitudinal dimension of the sliding surface which is comparable to or greater than its transverse dimension, as can be seen in Figures 1 and 2.

[0034] The element 26 of the hammer 21 has a substantially rectangular longitudinal section with gradually reducing thicknesses towards its lower end. As a result, in the region of a lower portion 21a of the hammer, where it slides within the internal side walls of the seat 25 in the casing 22, pushing a pouring spout towards a respective container (not shown) by means of its face 23, the thickness of the hammer is significantly less than the thickness to be seen at the level of the region in which it is fixed to the upper element 27. It is therefore possible to achieve the objective of reducing the longitudinal space occupied by the casing 22 and hence the gap between two consecutive containers.

[0035] The working stroke of the hammer is controlled by the lever 30 which comprises two arms 32 and 33 and can pivot about a vertical axis 31. An idle roller 34 mounted on the free end of the arm 32 engages a ramp-like guide (not shown) mounted on the fixed portion of the machine in the working region in which the insertion device is guided along a straight path substantially coincident with that of the movement of the containers. A

blade-like element 36 formed at the free end of the other arm 33 engages the lower portion 21a of the hammer.

[0036] In rest conditions, the hammer is held in the retracted position inside its casing 22 by means of a resilient biasing element 45 such as, for example, a helical spring (shown schematically in Figure 1). The resilient element is preferably mounted between the movable element or slide 29 of the hammer and a fixed part of the insertion device 20. Similarly, the control lever 30 is held in the rest position (indicated A in Figure 3) by means of a resilient biasing element 37 such as, for example, a helical spring.

[0037] In this rest configuration, the lower portion 21a of the hammer is held in abutment against the vertical internal wall 22a of the casing 22 remote from the insertion region (as shown by dashed lines in Figure 3), thus leaving the seat 25 inside the casing free to receive a pouring spout coming from the forming mechanism (not shown).

[0038] When an insertion device reaches the working region during its rotary movement together with the carousel of the insertion machine, the interaction between the roller 34 of the control lever 30 and the guide ramp bring about pivoting of the lever about the axis 31 from the initial position A to the final position B (Figure 3). As a result of the thrust which the blade-like element 36 of the control lever exerts on the lower portion 21a of the hammer, this rotation brings about forward movement of the hammer along the insertion axis, within the seat 25 in the casing 22, the hammer being guided in this movement by the linear guide 24. The pouring spout is thus pushed against the outer face of the container wall to which it is to be applied whilst, in the meantime, the reaction element or anvil 50 is translated downwards towards the hammer, along a substantially oblique axis (Figure 1).

[0039] Upon completion of the insertion operation, the control lever and the hammer finally return to their respective rest positions by virtue of the biasing forces exerted by the respective resilient elements 45 and 37.

[0040] Naturally, the principle of the invention remaining the same, the forms of embodiment and details of construction may be varied widely with respect to those described and illustrated purely by way of non-limiting example, without thereby departing from the scope of the invention as defined in the appended claims.

Claims

1. An insertion device (20) for a machine for inserting pouring spouts (15) in containers (11), the device comprising:

a casing (22) with a seat (25) suitable for receiving a spout to be inserted and for guiding it during the insertion operation, and

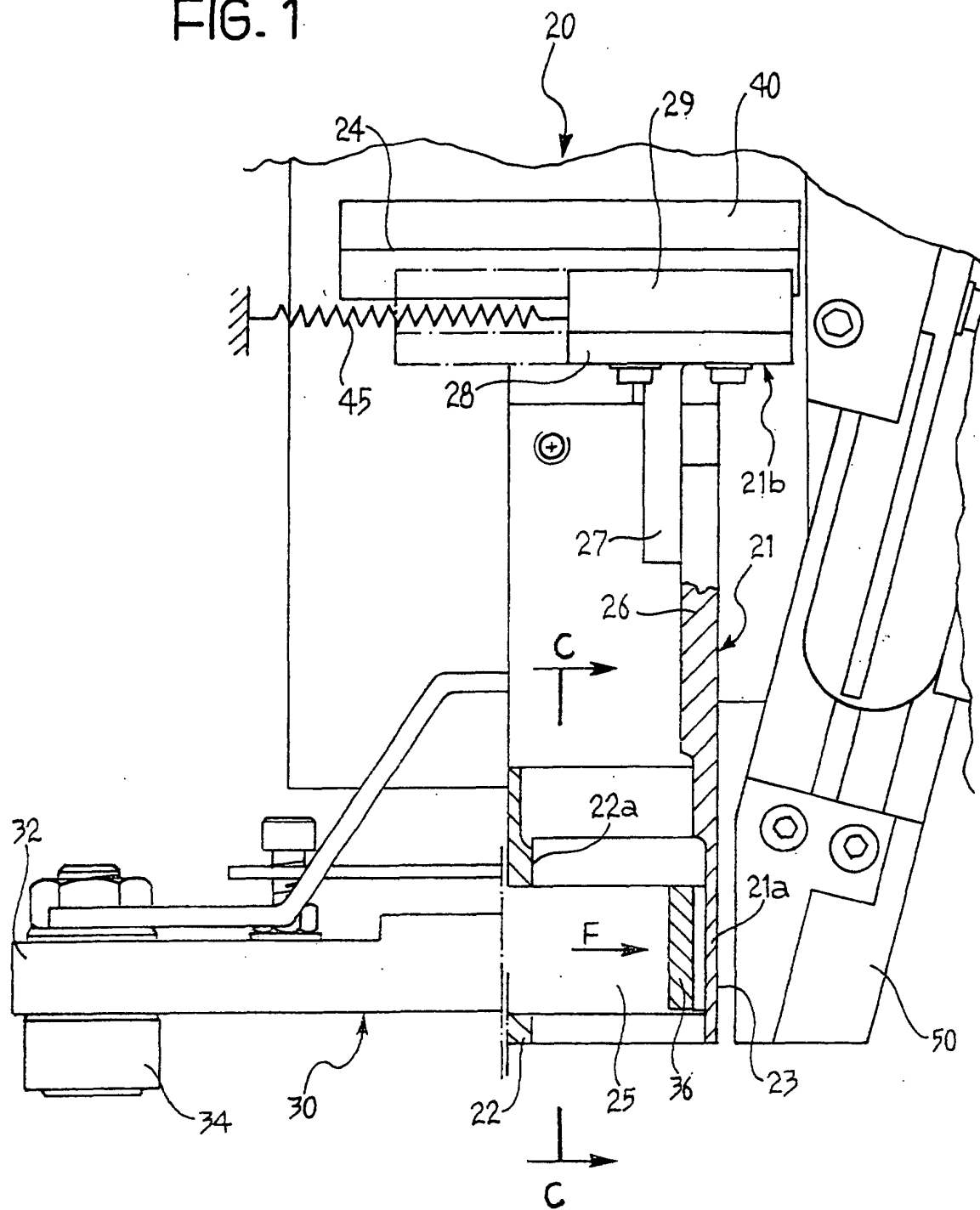
a thrust element (21) which is moved with a reciprocating rectilinear motion along the seat (25) between a retracted position in which a spout (15) can be received in the seat (25) and a forward position in which the element pushes the spout out of the seat (25) against a container (11),

nal dimensions of the first end portion (21a) and of a pouring spout (15).

characterized in that the thrust element (21) is mounted for sliding on rectilinear guide means (24) spaced from the casing (22).

2. An insertion device according to Claim 1, **characterized in that** the thrust element (21) has a shape which is elongate in a direction substantially perpendicular to the direction of insertion, with a first end portion (21a) which is movable within the seat (25) in the casing (22) and which can act on a spout (15), and with a second end portion (21b) which is slidable along the guide means (24).
3. An insertion device according to Claim 2, **characterized in that** the second end portion (21b) is provided with a movable element (29) with sliding surfaces (29a, 29b) spaced apart transversely from one another and having a longitudinal dimension comparable to or greater than their transverse spacing.
4. An insertion device according to Claim 3, **characterized in that** the movable element (29) has sliding surfaces (29a, 29b) made of a material with a low friction coefficient.
5. An insertion device according to Claim 3 or Claim 4, **characterized in that** the movable element (29) is of the sliding-shoe type.
6. An insertion device according to Claim 1, **characterized in that** the thrust element (21) is associated with a resilient biasing element (45) which tends to return it to the retracted position.
7. An insertion device according to Claims 2 and 6, **characterized in that** the resilient biasing element (45) is connected to the second end portion (21b) of the thrust element (21).
8. An insertion device according to Claim 2, **characterized in that** the first end portion (21a) of the thrust element (21), inside the seat (25) in the casing (22), has the shape substantially of a plate with a short longitudinal dimension in comparison with its transverse dimension.
9. An insertion device according to Claim 8, **characterized in that** the casing (22) has a dimension substantially corresponding to the sum of the longi-

FIG. 1



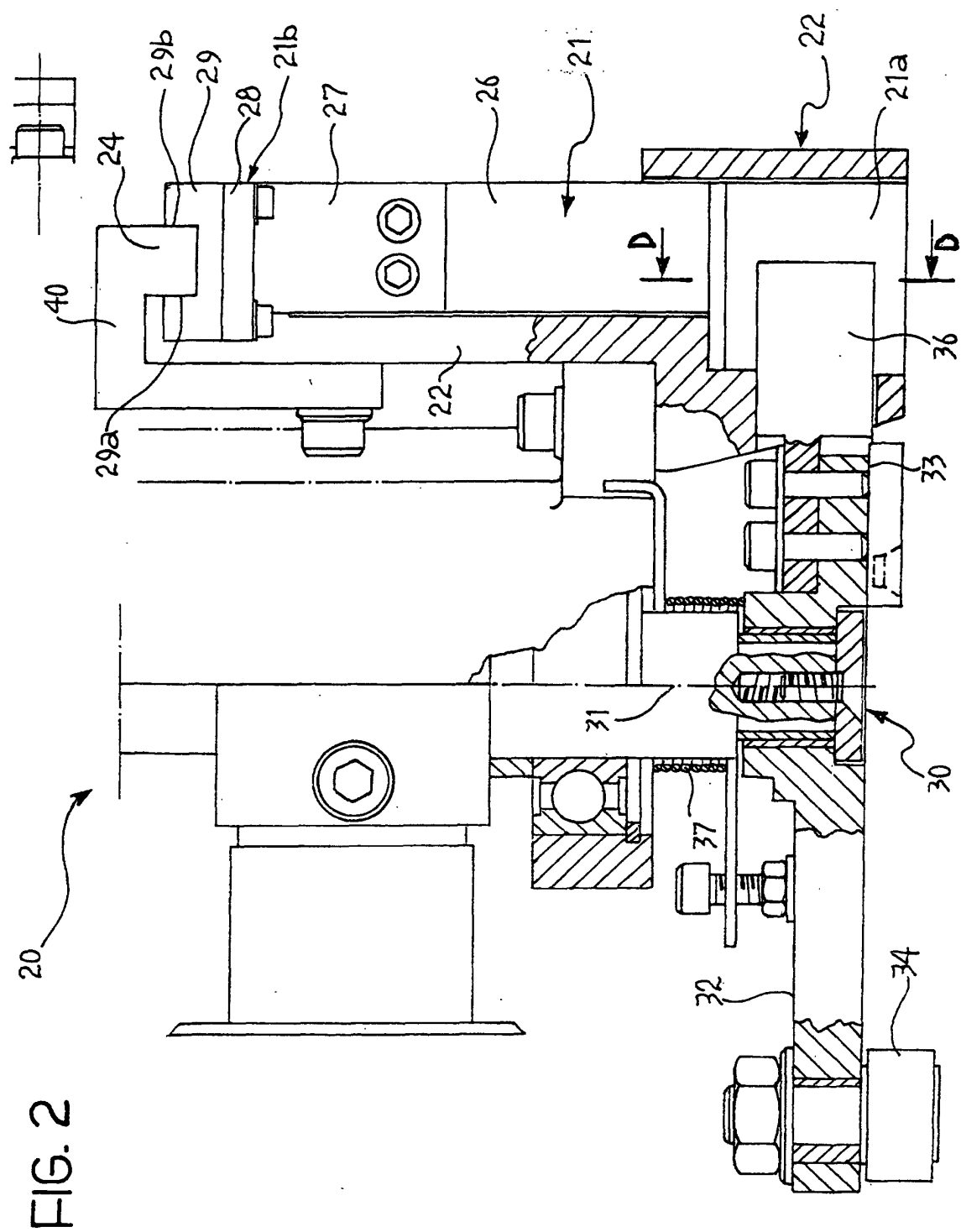
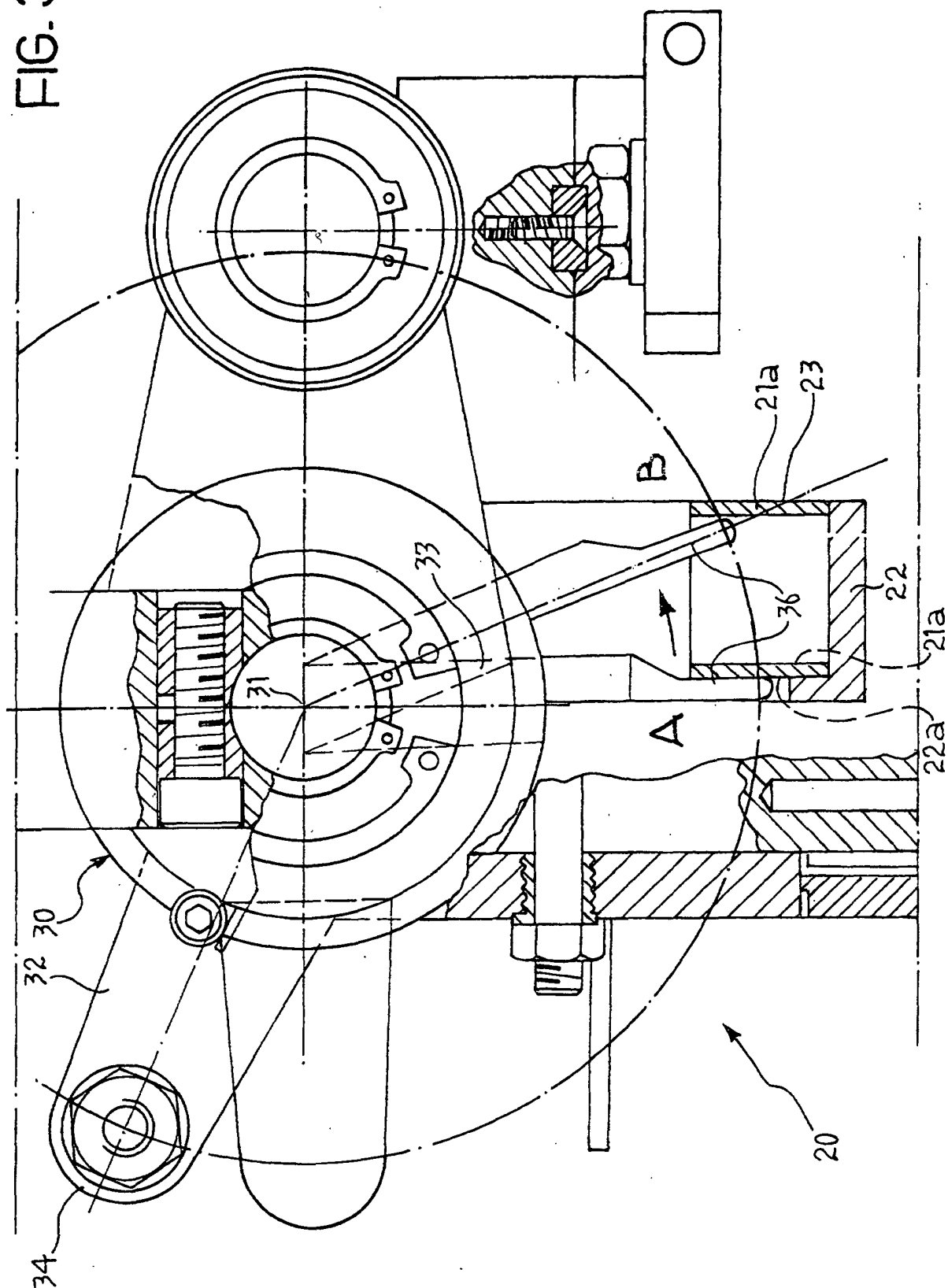


FIG. 3



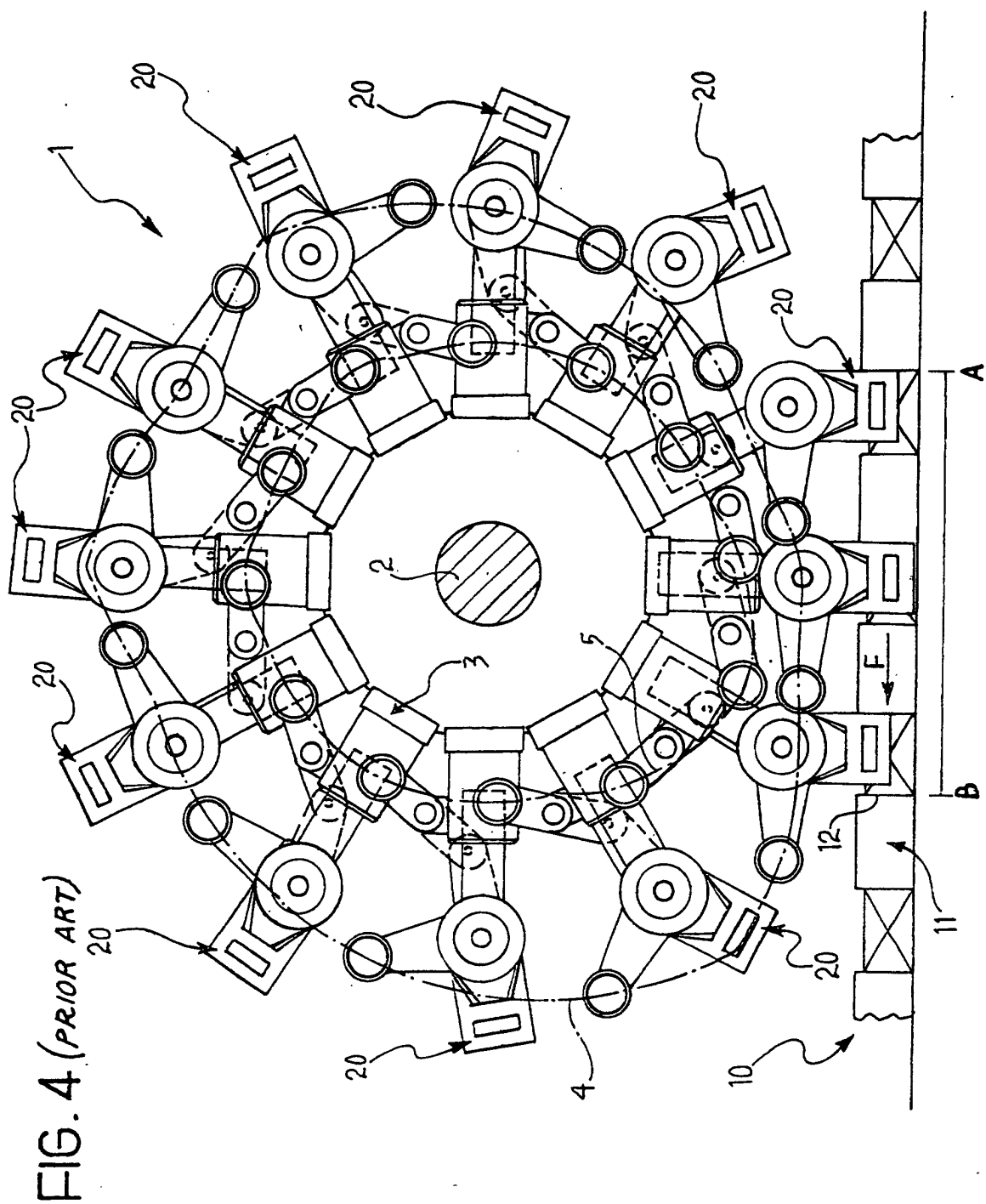


FIG. 5 (PRIOR ART)

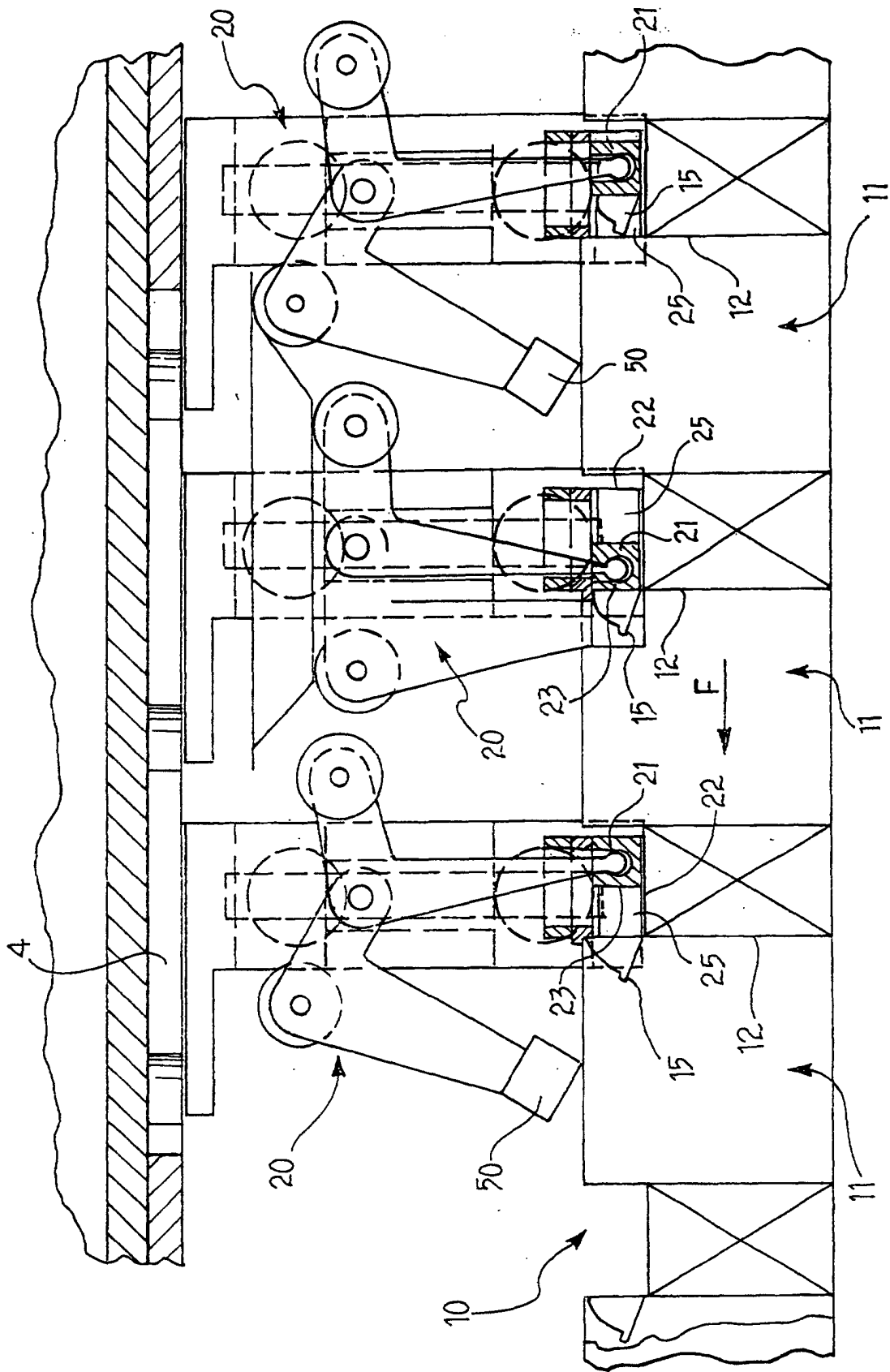


FIG. 6A (PRIOR ART)

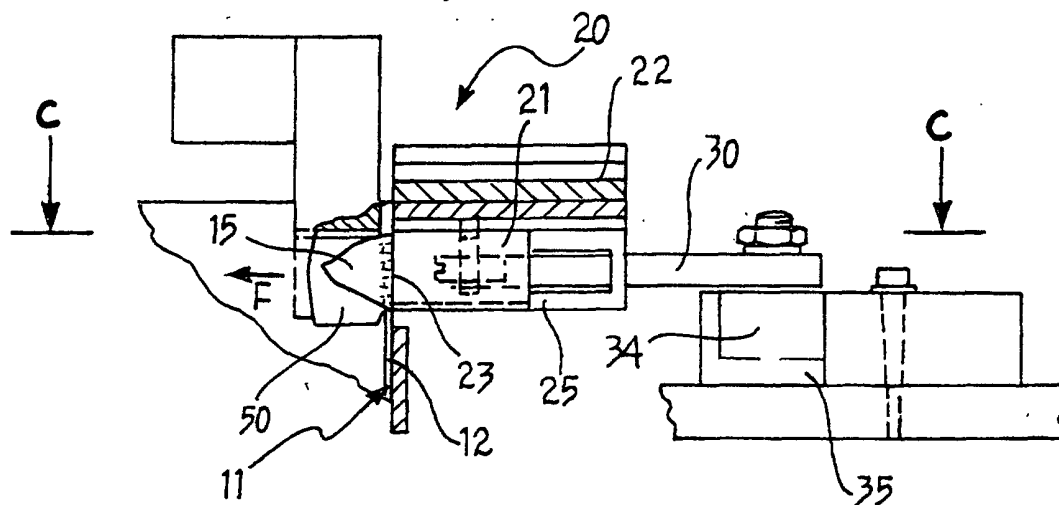


FIG. 6B (PRIOR ART)

