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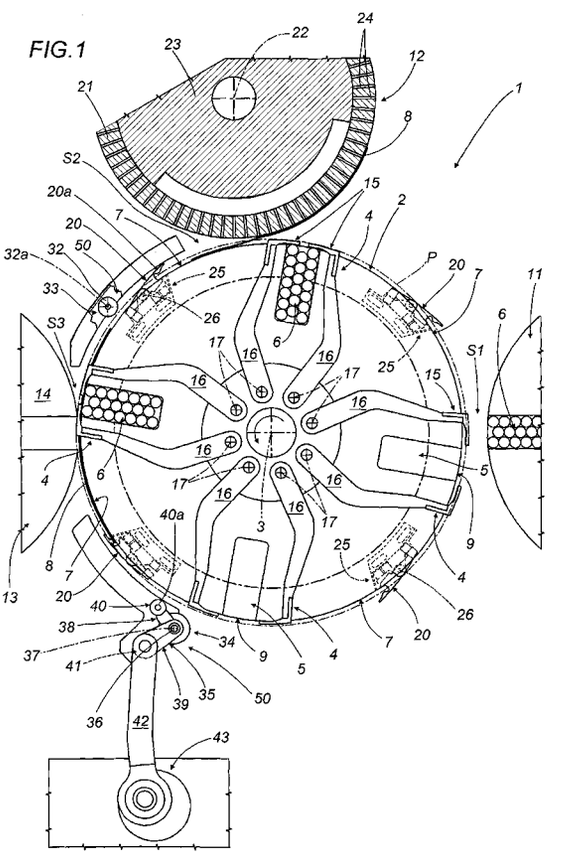
(54) A packer machine

(57) A wrapping wheel (2) forming part of a cigarette packer (1) is equipped with at least one conveying head (4) that presents a pocket (5) and is carried by the wheel (2) along a feed path (P), passing through a first station (S1) at which a product (6) is directed into the pocket (5), then through a second station (S2) at which a leaf (8) of wrapping material is laid over the pocket (5) and pinned in a predetermined position by pivoted grippers (20), and finally through an outfeed station (S3) where the product (6) is ejected from the pocket (5), paired with the wrapping leaf (8) and transferred together with the leaf (8) to a further wrapping wheel (14); the grippers (20) are operated by direct interaction with suitable transmission and shifter components (33, 34) positioned outside the peripheral compass of the wrapping wheel (2).

FIG.1



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Description

[0001] The present invention relates to a packer machine.

[0002] Reference will be made explicitly in the course of the present specification to cigarette packers, that is to say machines for assembling packets of cigarettes, albeit no limitation in general scope is implied.

[0003] Cigarette packers of prior art design typically comprise a wrapping wheel equipped with a plurality of conveying heads, each affording a pocket such as will admit and retain a product for wrapping, and a predetermined placement area in which a respective leaf of wrapping material is received and held over the mouth of the relative pocket in a predetermined position by respective retaining components.

[0004] In operation, the wheel is driven intermittently in rotation about a fixed centre axis in such a way as to advance the conveying head along a circular path passing through a first infeed station, where the product is directed into the pocket, a second infeed station where the leaf of wrapping material is positioned in the predetermined placement area, and an outfeed station where the product is ejected from the pocket, directed forcibly against the leaf of wrapping material and transferred thus together with the selfsame leaf to a further wrapping wheel.

[0005] The aforementioned retaining components consist normally in two grippers serving to hold down one end of the leaf of wrapping material, the grippers themselves being maintained in the active position by means of one or more springs.

[0006] For the retaining action exerted on the leaf of material by the gripper to be effective, the spring must be capable of applying a strong elastic force.

[0007] At the moment when the leaf of wrapping material is positioned in the predetermined placement area as mentioned above, the grippers must be held open by suitable means, that is to say maintained in a receiving position, for a given duration sufficient to allow the insertion of the leaf. The means in question must be able to overcome the force of the spring for the predetermined duration.

[0008] The prior art embraces the use of electromagnets as means by which to hold the grippers open for the necessary duration.

[0009] With springs able to exert strong elastic forces, the need arises for magnets sized sufficiently to generate even stronger magnetic forces. For reasons of construction, moreover, the magnets cannot be placed in direct contact one with another but must be separated by an air gap, and the presence of the gap signifies in turn that strong magnetic forces are still more difficult to obtain.

[0010] Consequently, packers of the type described above are not without drawbacks.

[0011] A first such drawback is that considerably strong springs are required on the one hand, whilst on the other there is the need to limit the power and bulk of the magnets opposing the elastic forces exerted by the springs. These conflicting requirements give rise to compromise solutions that tend to be far from satisfactory.

[0012] A further drawback connected with the use of conventional packers is their limited versatility, in terms of the different sizes of products that can be wrapped.

[0013] In effect, the position of the retaining means on the wrapping wheel also dictates the dimensions of the leaf of wrapping material, and only by carrying out costly and laborious modifications to alter the size of the grippers is it possible to obtain some measure of adaptability, enabling the machine to accommodate different sizes of product.

[0014] Even so, the adaptability obtained in this way is often insufficient to meet the requirements.

[0015] The object of the present invention is to provide a packer machine unaffected by the aforementioned drawbacks, such as will be effective, as well as simple and economical to implement.

[0016] The stated object is duly realized in a packer machine according to the invention, of which the features are as recited in claim 1 appended, and preferably in any one claim directly or indirectly dependent on claim 1.

[0017] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 illustrates a packer embodied according to the present invention, viewed schematically and in elevation with certain parts omitted better to reveal others;
- figures 2 and 3 show the packer of figure 1 in two different operating configurations;
- figures 4 and 5 each show a detail of the packer illustrated in figures 1 to 3, viewed partly in section and with certain parts omitted for clarity, and seen in two different operating configurations;
- figure 6 shows a detail of the packer illustrated in figures 1 to 5 viewed in perspective from above;
- figure 7 shows a detail of the packer illustrated in figures 1 to 5, viewed schematically and in elevation.

[0018] Referring to figures 1, 2 and 3 of the drawings, 1 denotes a cigarette packer, in its entirety, equipped with a conveying wheel 2 power driven in conventional manner and indexed in rotation about an axis 3 normal to the viewing plane of figure 1, which carries four peripheral heads 4 spaced apart at identical angular distance around the axis 3. Each head 4 affords a pocket or first recess 5 such as will admit and retain a group 6 of cigarettes, positioned radially with respect to the axis 3, and a predetermined placement area or second recess 7 extending along the outer periphery of the wheel 2 and associated with the first recess 5; the second re-

cess 7 serves to admit and retain a leaf 8 of wrapping material in a position tangential to the periphery of the wheel 2, extending flat across a mouth 9 of the first recess 5.

[0019] Each head 4 is directed by the rotating wheel 2 along a feed path P, passing through a product infeed station S1 where a group 6 of cigarettes is directed into the relative first recess 5 from a feed wheel 11 of conventional embodiment driven in rotation intermittently about a respective axis (not illustrated) parallel to the axis 3 of the conveying wheel 2. The single head 4 is directed similarly through a wrapper infeed station S2, at which a relative leaf 8 of wrapping material is released into the placement area or second recess 7 by a wrapper feed unit 12, also through an outfeed station S3 at which the group 6 of cigarettes is ejected from the head 4, forced against the leaf 8 of wrapping material and directed together with the selfsame leaf 8 onto a downstream wrapping wheel 14 of conventional embodiment, driven intermittently in rotation about a relative axis (not illustrated) parallel to the axis 3 of the conveying wheel 2.

[0020] Each of the heads 4 comprises a gripper device 15 associated with the relative first recess 5 and serving to retain a relative group 6 of cigarettes internally of the selfsame recess 5, counteracting the centrifugal force generated by the rotation of the wheel 2. The gripper device 15 comprises two jaws 16 pivotable about respective axes 17 parallel to the axis 3 of the wheel 2 and capable thus of movement, induced by a conventional cam mechanism (not illustrated), toward and away from a retaining position in which the two jaws 16 close across the mouth 9 of the recess.

[0021] Also forming part of each head 4 is a pusher 19 of conventional embodiment, illustrated only in part in the accompanying drawings and only in the context of the outfeed station S3. The pusher 19 is driven by a cam mechanism of familiar embodiment (not illustrated), and translatable internally of the pocket or first recess 5 in such a way as to transfer a corresponding group 6 of cigarettes from the pocket to the downstream wrapping wheel 14. Likewise conventionally, this same pusher 19 will also operate in conjunction with a similar pusher (not illustrated) forming part of the product feed wheel 11, to the end of transferring a group 6 of cigarettes from the feed wheel 11 into the pocket.

[0022] Each head 4 further comprises two grippers 20 associated with the second recess 7 and serving to retain a relative leaf 8 of wrapping material in a fixed position, in direct contact with the selfsame recess 7, thus counteracting the centrifugal force generated by the rotation of the wheel 2. The two grippers 20 of each head 4 are located alongside one another in a direction normal to the viewing plane of figures 1, 2 and 3, and accordingly, only one of the two grippers 20 can be seen in these same drawings.

[0023] The aforementioned feed unit 12 supplying the leaves 8 of wrapping material is conventional in embodiment, comprising an outer wheel 21 driven in rotation about a respective axis 22 parallel to the axis 3 of the conveying wheel 2 and rolling around a fixed inner wheel 23 that constitutes the valve of a pneumatic transport system by which the single leaves 8 of wrapping material are held in contact with the outer wheel 21, retained by the force of suction generated through a plurality of holes 24 formed in the periphery of the selfsame wheel 21.

[0024] Each gripper 20 occupies a position forward of the respective second recess 7, considered relative to the direction in which the wheel 2 rotates along the feed path P. More precisely, the grippers 20 are carried each by a respective mounting 25 shown in detail in figure 7. The gripper 20 is anchored to the relative mounting 25 by way of a pivot 26 aligned on an axis 27 parallel to the axis 3 of the wheel 2, and able thus to rock on the pivot between a first stable position illustrated by the solid lines of figure 7, in which a leaf 8 of wrapping material is held in place, and a second stable position illustrated by phantom lines in figure 7, in which the leaf 8 of material is released.

[0025] In the example of the accompanying drawings, the gripper 20 is fashioned as a rocker comprising a first arm 20a and a second arm 20b positioned on opposite sides of the pivot 26.

[0026] Figure 3 illustrates the first stable position of the aforementioned rocker 20, in which a leaf 8 of wrapping material is held by the first arm 20a in contact with the second recess 7. The first arm 20a functions as a movable jaw of the single gripper 20 and serves thus to exert the retaining action on the leaf 8.

[0027] Figure 2 illustrates the second stable position of the rocker 20, in which a leaf 8 of wrapping material can be both taken up at the second infeed station S2, and released at the outfeed station S3.

[0028] With reference now to figures 4 and 5, each of the grippers 20 comprises a first portion 28 of ferromagnetic material associated with the first arm 20a.

[0029] The mounting 25 comprises a second portion 29 of ferromagnetic material facing the first portion 28.

[0030] Still observing figures 4 and 5, each gripper 20 also comprises a third portion 30 of ferromagnetic material associated with the second arm 20b, whilst the mounting 25 comprises a fourth portion 31 of ferromagnetic material facing the third portion 30.

[0031] The packer 1 further comprises two rollers 32 rotatable about a common axis 32a disposed parallel to the aforementioned axis 3 and located beyond the periphery of the conveying wheel 2, occupying a fixed position between the two stations denoted S2 and S3. Each roller 32 is designed to engage one of the two respective grippers 20 associated with each head 4. As mentioned previously in the case of the grippers 20, only one of the two rollers 32 can be seen in figures 1, 2 and 3, given that the rollers are located alongside one another in a direction normal to the viewing plane. Each such roller 32 functions as a transmission component 33 for one gripper 20, by which the gripper is intercepted

in a manner to be described in due course.

[0032] Referring to figures 1, 2 and 3, the packer 1 is also equipped with a shifter component 34 located beyond the periphery of the conveying wheel 2 and along the feed path P, at a given point downstream of the outfeed station S3.

[0033] As shown in figure 1, the shifter component 34 comprises a rocking lever 35 mounted centrally to a fulcrum pivot 36 and able thus to rock about the axis 37 of the pivot 36. The lever 35 presents a first arm 38 and a second arm 39.

[0034] The first arm 38 presents one end 40 furnished with a following roller 40a such as will engage the single grippers 20 in a manner to be described more exactly in due course.

[0035] The second arm 39 presents one end 41 connected pivotably to a connecting rod denoted 42; the rod is coupled in its turn to a cam member 43 driven in rotation by a motor of conventional type neither illustrated nor described further.

[0036] With reference to figures 4 and 6, the packer 1 comprises an element 44 associated with each of the grippers 20 and serving to house the respective mounting 25. Illustrated separately in figure 6, the element 44 in question occupies a position on the periphery of the wheel 2 during the operation of the machine, as discernible clearly in figure 4.

[0037] Each housing element 44 comprises a plurality of holes 45 such as will accept respective fastening elements 46 secured to the mounting 25 together with a relative clamp plate 47.

[0038] The holes 45 are arranged in succession along a circumferential segment of the conveying wheel 2.

[0039] Referring to figure 7, the mounting 25 presents two clearance openings 48 fashioned as slots and affording respective areas 49 through which the fastening elements 46 are insertable.

[0040] The aforementioned transmission component 33 and shifter component 34 combine to provide the packer with actuator means 50 by which the gripper 20 is operated during each successive pass, between the aforementioned first stable retaining position and second stable release position.

[0041] The wrapping wheel 14 forms a part of external conveying means 13 serving to carry the groups 6 of cigarettes downstream.

[0042] The aforementioned portions 28, 29, 30 and 31 of ferromagnetic material together constitute holding means 51 serving to ensure that each gripper 20 is retained in the first and second stable positions.

[0043] The grippers 20 combine with the holding means 51 to furnish the packer 1 with respective means 52 by which the single leaves 8 of wrapping material are retained in the respective second recesses 7.

[0044] In an alternative embodiment of the invention, not illustrated in the drawings, each gripper 20 could be fashioned entirely from ferromagnetic material, in which case there will be no distinct first and third portions 28 and 30 of the selfsame material by reason of their being incorporated directly into the structure of the gripper 20.

[0045] In other embodiments of the invention, likewise not illustrated, the shifter component 34 operating the grippers 20 might comprise a pneumatic or hydraulic actuator or a magnetic repulsion device. To advantage, the magnetic repulsion device could comprise an electromagnet designed, in operation, to generate a magnetic field acting on the arm 20b of a gripper 20 in such a way that this same arm will be distanced from the magnet and held in the release position to free the leaf 8 of wrapping material.

[0046] The operation of the cigarette packer 1 will now be described, referring to figures 1, 2, and 3 and following the progress of one head 4, starting from the moment when the head 4 in question is brought into the first infeed station S1 by the rotation of the conveying wheel 2 about its axis 3, turning anticlockwise as viewed in the drawings.

[0047] The head 4 pauses at the station S1 to allow the transfer of a group 6 of cigarettes into the pocket or first recess 5, in conventional manner, and is thereupon advanced toward the second station S2 by an anticlockwise movement of the wheel 2. During the initial stage of this same movement toward the station S2, the jaws 16 of the relative gripper device 15 are drawn into the retaining position to hold the group 6 in the recess 5.

[0048] As the head 4 reaches the second station S2, the relative grippers 20 will be in the second stable position, allowing the second recess 7 to admit a corresponding leaf 8 of wrapping material supplied by the feed unit 12 in familiar manner.

[0049] Once the leaf 8 of material has been placed in the recess 7, the wheel 2 rotates further in the anticlockwise direction and the freely revolving rollers 32 enter into contact with the respective first arms 20a of the corresponding grippers 20, thereby causing each gripper 20 to pivot on its axis 27 toward the first stable position in which the leaf 8 of material is pinned between the first and second portions 28 and 29 of ferromagnetic material.

[0050] During the passage of the gripper 20 from the second position to the first, the mechanical force induced by the contact between the roller 32 of the transmission component 33 and the first arm 20a of the gripper 20 will overcome the force of magnetic attraction generated between the third and fourth portions 30 and 31 of ferromagnetic material.

[0051] As illustrated in figure 3, which shows the first retaining position of the gripper 20, the first and second portions 28 and 29 of ferromagnetic material are attracted to one another and drawn as a result substantially into mutual contact, separated only by an interposed portion of the leaf 8 of wrapping material.

[0052] The head 4 is advanced further along the feed path P as the wheel 2 resumes its anticlockwise rotation, and reaches the outfeed station S3. Once the head 4 is in alignment with the station S3, as illustrated in figure

2, the wheel 2 pauses and the gripper 20 is caused by the shifter component 34 to move from the first stable position, in which the leaf 8 is retained, to the second stable position allowing the release of the leaf 8, whereupon the leaf 8 can be distanced from the recess 7 through the forcing action of the group 6 of cigarettes when transferred to the downstream wheel 14 by the ejecting stroke of the pusher 19.

[0053] In particular, observing figure 2, a rotation of the cam member 43, driven as aforementioned by a motor not illustrated, will shift the rod 42 and produce a corresponding movement of the lever 35 about the relative axis 37. During the rotation of the lever 35, the following roller 40a carried by the end 40 of the first arm 38 engages and pushes against the second arm 20b of the gripper 20.

[0054] The force exerted by the cam-driven linkage has the effect of overcoming the magnetic force of attraction between the first portion 28 and the second portion 29 of ferromagnetic material, which in the absence of any external overriding action will maintain the gripper 20 in the first stable retaining position. Thus, the first and second portions 28 and 29 of ferromagnetic material are pulled apart by the movement of the gripper 20 as it rocks on the pivot axis 27, and the leaf 8 of wrapping material is freed.

[0055] Finally, as a combined result of the pivoting movement about the axis 27 induced by the forcing movement of the lever 35, and the mutual force of attraction occurring between the third and fourth portions 30 and 31 of ferromagnetic material, the gripper 20 reassumes the second stable position allowing the release of the leaf 8.

[0056] With reference to figure 7, the element 44 which houses the mounting 25 is fashioned in such a way as to determine a plurality of different angular positions assumable by the mounting 25 relative to the axis 3 of the wheel 2, each one allowing the placement area or second recess 7 to accommodate a different size of leaf 8.

[0057] In other words, should there be a change in size of the group 6 of cigarettes, signifying that the relative leaf 8 of wrapping material must also be replaced with a leaf 8 of different dimensions, it suffices simply to remove the fastening elements 46 and the clamp plate 47, and the mounting 25 can be repositioned in such a way as to resize the second recess 7 and ensure the grippers 20 are positioned to exert a firm hold on the new leaf 8 of material occupying the selfsame recess 7.

[0058] The mounting 25 is repositioned in practice by inserting each fastening element 46 in one of a plurality of different holes 45 to obtain a first approximate position. The exact position can then be selected utilizing the margin for adjustment afforded by the slots 48.

[0059] In accordance with alternative embodiments not illustrated in the drawings but falling nonetheless within the scope of the present invention, the transmission component 33, positioned outside the peripheral compass of the conveying wheel 2 and designed to intercept the gripper 20, need not necessarily be a roller 32 but could be embodied equally well as a fixed profile such as a cam, or a movable locating element of substantially familiar type.

[0060] In accordance likewise with further alternative embodiments not illustrated in the drawings but falling nonetheless within the scope of the present invention, the positioning slots might be formed directly in the wheel 2 rather than in a movable housing element 44, whilst the mounting 25 might afford simple threaded holes, or use could be made of other fastening elements secured directly to the mounting 25.

Claims

1. A packer machine comprising:

- a conveying wheel (2) affording at least one pocket (5) in which to accommodate a product (6) and at least one predetermined placement area (7) in which to accommodate a leaf (8) of wrapping material destined to envelop the product, set in rotation about a centre axis (3) in such a way as to advance the product (6) and the leaf (8) of wrapping material along a feed path (P);
- retaining means (52) by which a relative leaf (8) of wrapping material is held in contact with the predetermined placement area (7);
- a first infeed station (S1) located along the feed path (P), at which a product (6) is directed into the pocket (5); a second infeed station (S2) located along the feed path (P), at which a single leaf (8) of wrapping material is directed into the predetermined placement area (7), and means (19) by which a product (6) is ejected from the conveying wheel (2) and transferred together with a relative leaf (8) of wrapping material to external conveying means (14),**characterized in that** the retaining means (52) comprise at least one gripper (20) capable of movement between a first stable position, in which the leaf (8) of wrapping material is retained and held in contact with the predetermined placement area (7), and a second stable position in which the leaf (8) of wrapping material is released.

2. A packer as in claim 1, wherein the gripper (20) is positioned on the wheel (2) and fulcrumed to a respective axis (27) in such a way as to pivot between the first stable retaining position and the second stable release position.

3. A packer as in claim 1 or 2, wherein the retaining means (52) comprise holding means (51) designed to ensure the gripper (20) is maintained in the stable

positions.

4. A packer as in claim 3, wherein the holding means (51) comprise at least a first portion (28) of ferromagnetic material associated with the gripper (20) and a second portion (29) of ferromagnetic material rigidly associated with the wheel (2), the first and second portions (28, 29) of ferromagnetic material being attractable one to another.

5. A packer as in claim 4, wherein the first and second portions (28, 29) of ferromagnetic material are disposed substantially in contact one with another when the gripper (20) occupies the first stable retaining position, separated only by an interposed leaf (8) of wrapping material.

6. A packer as in claims 3 to 5, wherein the holding means (51) further comprise a third portion (30) of ferromagnetic material associated with the gripper (20) and a fourth portion (31) of ferromagnetic material rigidly associated with the wheel (2), the third and fourth portions (30, 31) of ferromagnetic material being attractable one to another.

7. A packer as in claim 6, wherein the third and fourth portions (30, 31) of ferromagnetic material are disposed substantially in contact one with another when the gripper (20) occupies the second stable release position,

8. A packer as in claims 1 to 7, comprising actuator means (50) by which the gripper (20) is caused to alternate between the first stable retaining position and the second stable release position.

9. A packer as in claim 8, wherein actuator means (50) comprise a transmission component (33) positioned outside the dimensional compass of the conveying wheel (2) and in such a way as to intercept the movable gripper (20) when occupying the second stable position, substantially at the moment when the leaf (8) of wrapping material is directed into the predetermined placement area (7).

10. A packer as in claim 9, wherein the transmission component (33) is a roller (32) freely rotatable about an axis (32a) substantially parallel to the centre axis (3) of the wheel (2).

11. A packer as in claims 8 to 10, wherein actuator means (50) comprise a shifter component (34) such as will engage the movable gripper (20) when occupying the first stable position and force it to assume the second stable position in which the leaf (8) of wrapping material is released.

12. A packer as in claim 11, wherein the shifter component (34) comprises a lever (35) operated by a respective motor.

13. A packer as in claim 11, wherein the shifter component (34) comprises a pneumatic or hydraulic actuator.

14. A packer as in claim 11, wherein the shifter component (34) comprises magnetic repulsion means.

15. A packer as in claim 14, wherein magnetic repulsion means comprise at least one electromagnet installed on a part of the machine outside the dimensional compass of the conveying wheel (2), fixed relative to the selfsame wheel (2) in a position facing the second arm (20b) of the gripper (20) and designed to exert a magnetic repulsion force on the selfsame arm.

16. A packer as in claims 1 to 15, wherein the gripper (20) is carried by a respective mounting (25), and the conveying wheel (2) comprises means (44) by which to house the mounting (25), located on a peripheral area of the selfsame wheel and designed to establish a plurality of different angular positions assumable by the mounting (25) relative to the axis (3) of the wheel (2), each such position allowing the predetermined placement area (7) to accommodate a different size of wrapping leaf (8).

17. A packer as in claim 16, wherein housing means (44) comprise a plurality of holes (45) arranged in succession along a circumferential segment of the conveying wheel (2), such as will accept respective fastening elements (46) designed to engage the mounting (25).

18. A packer as in claim 17, wherein the mounting (25) affords an area (49) engageable by the fastening means (46).

19. A packer as in claim 18, wherein the engageable area (49) comprises at least one clearance opening (48) through which the fastening means (46) are insertable.

20. A packer as in claim 18, wherein at least one clearance opening (48) is fashioned as a slot allowing fine adjustment of the position of the mounting (25) relative to the wheel (2).

21. A packer as in claims 1 to 20, wherein the conveying wheel (2) is driven intermittently in rotation about the centre axis (3) and equipped with a plurality of grippers (20) equispaced around its developable peripheral and circumferential length.

FIG.1

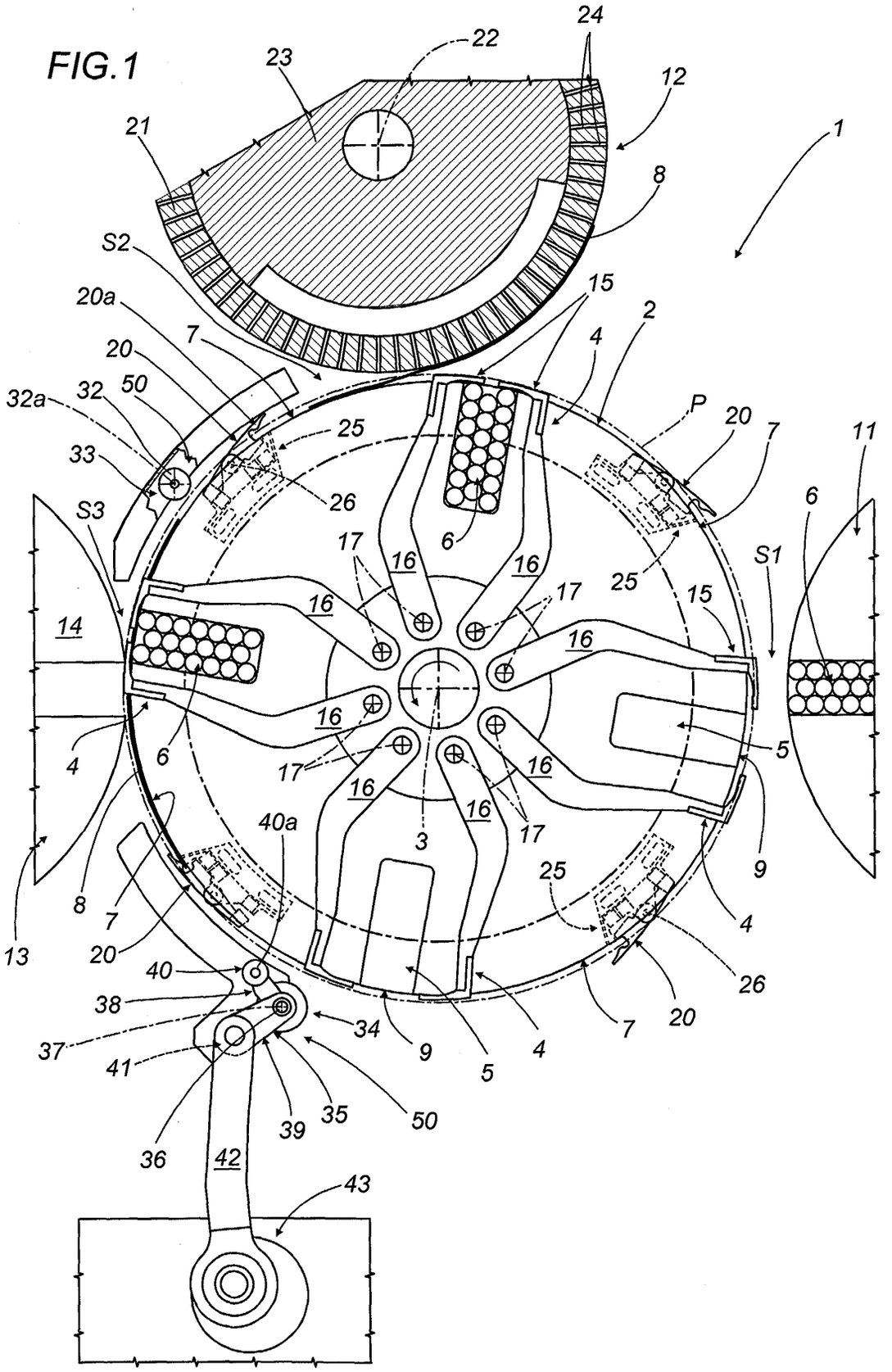
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FIG.2

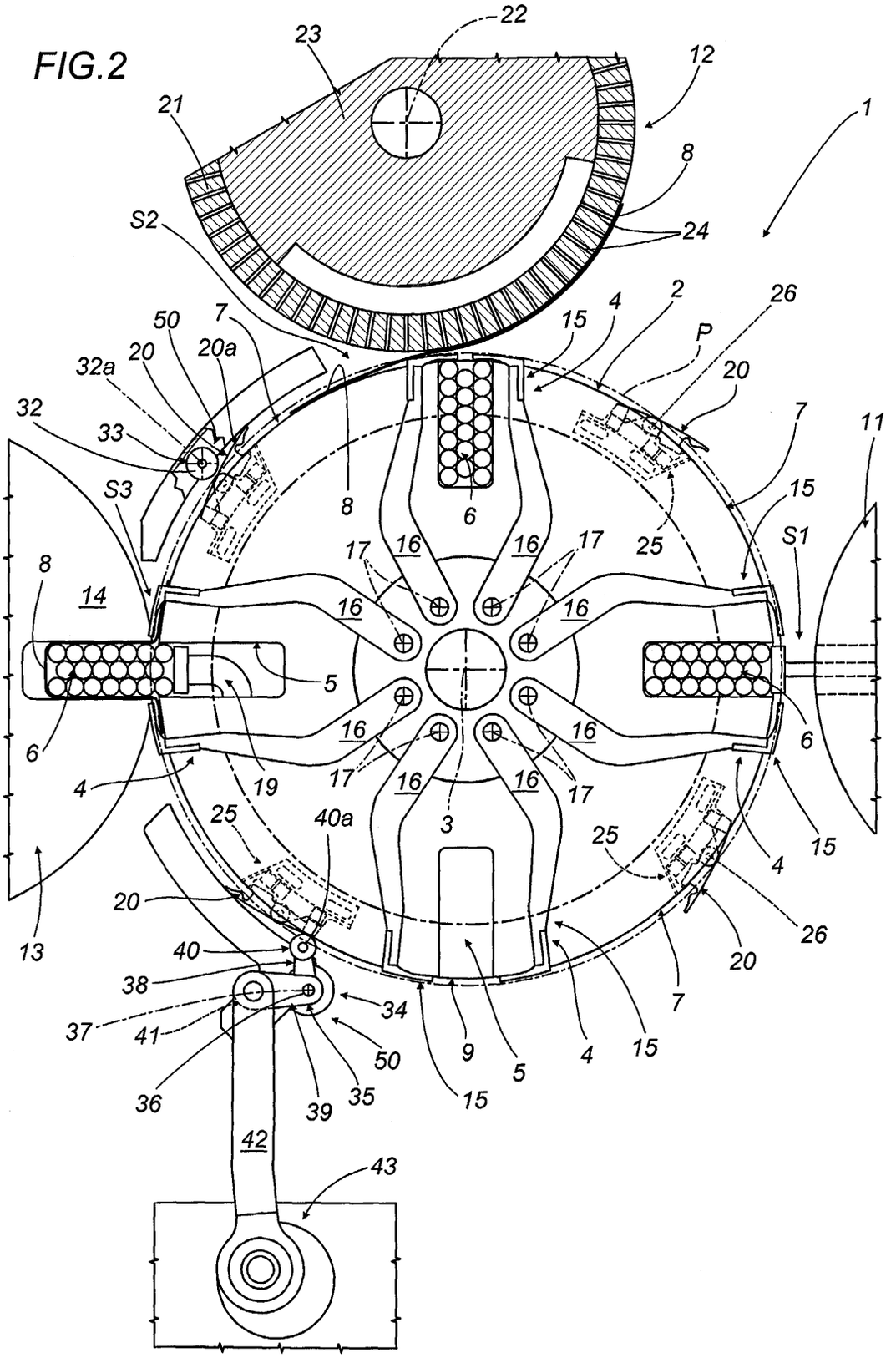
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FIG.3

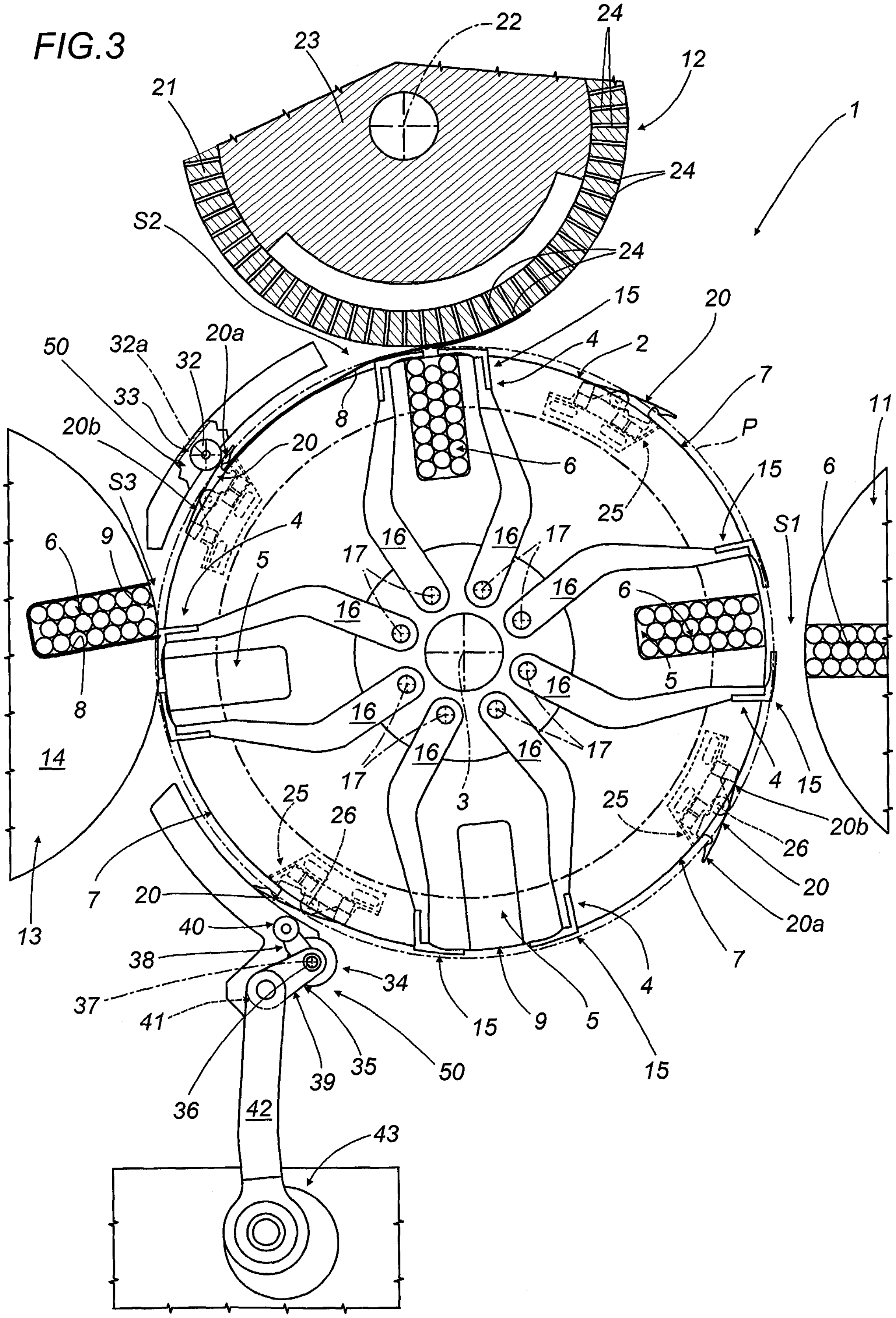
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FIG.4

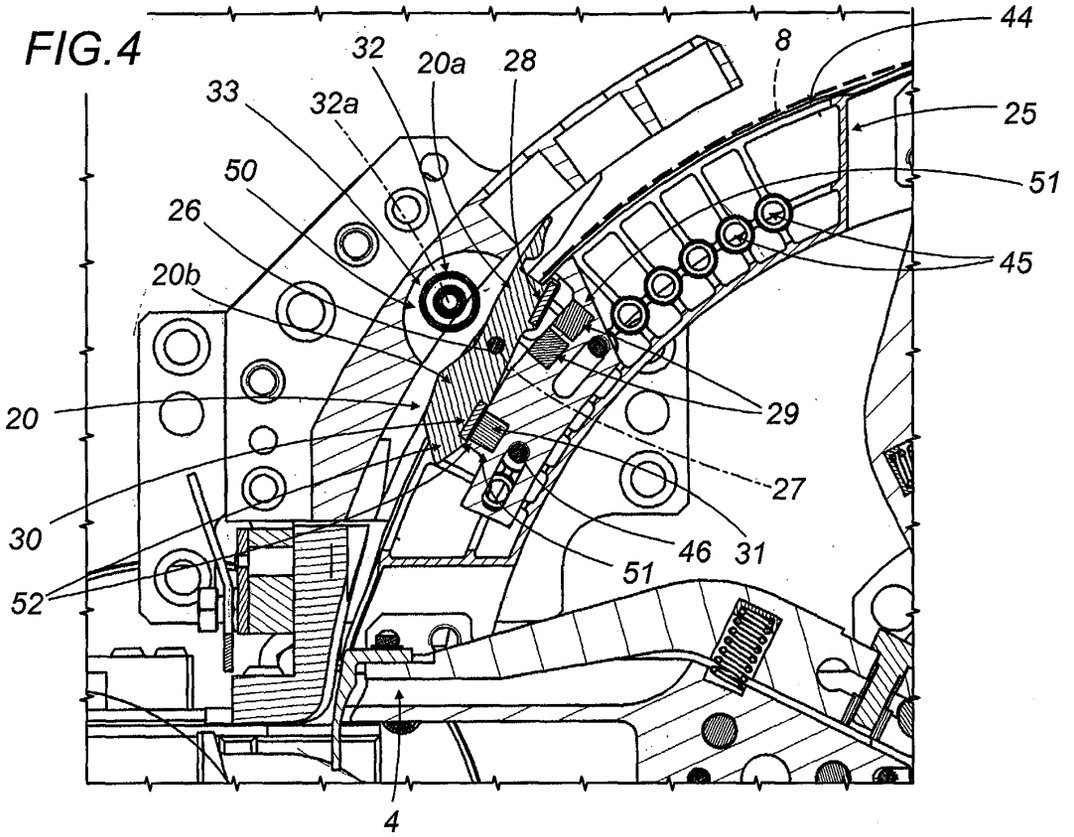
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FIG.5

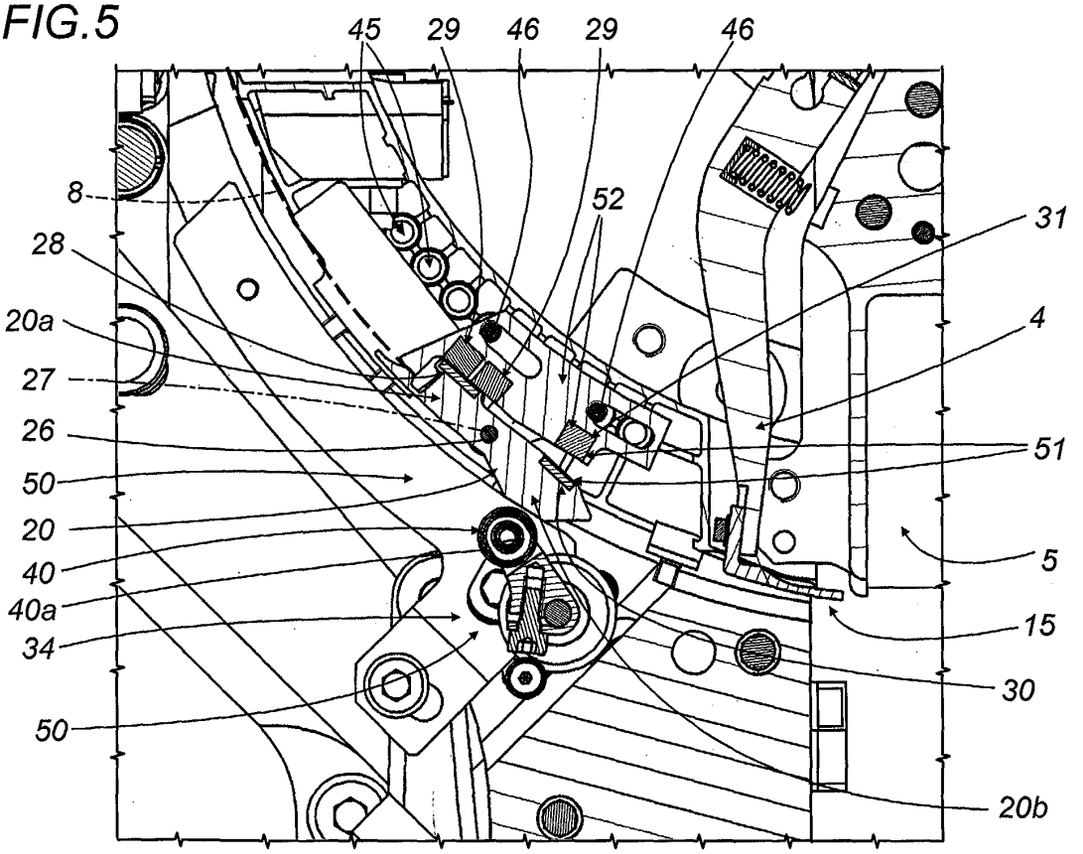
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FIG.6

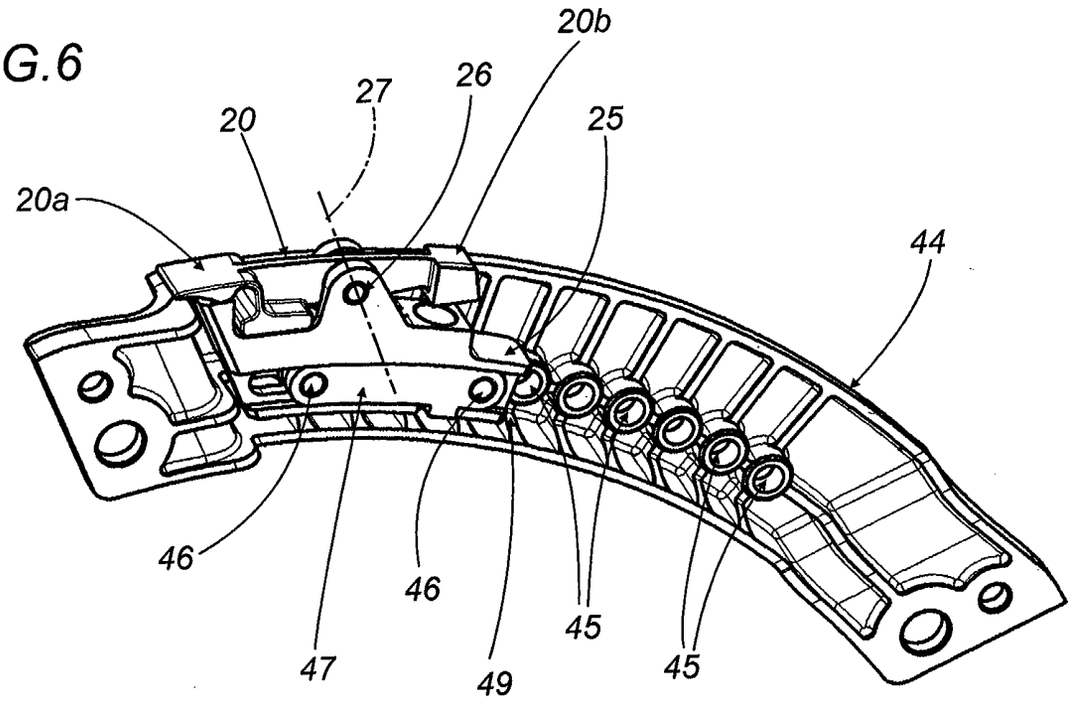
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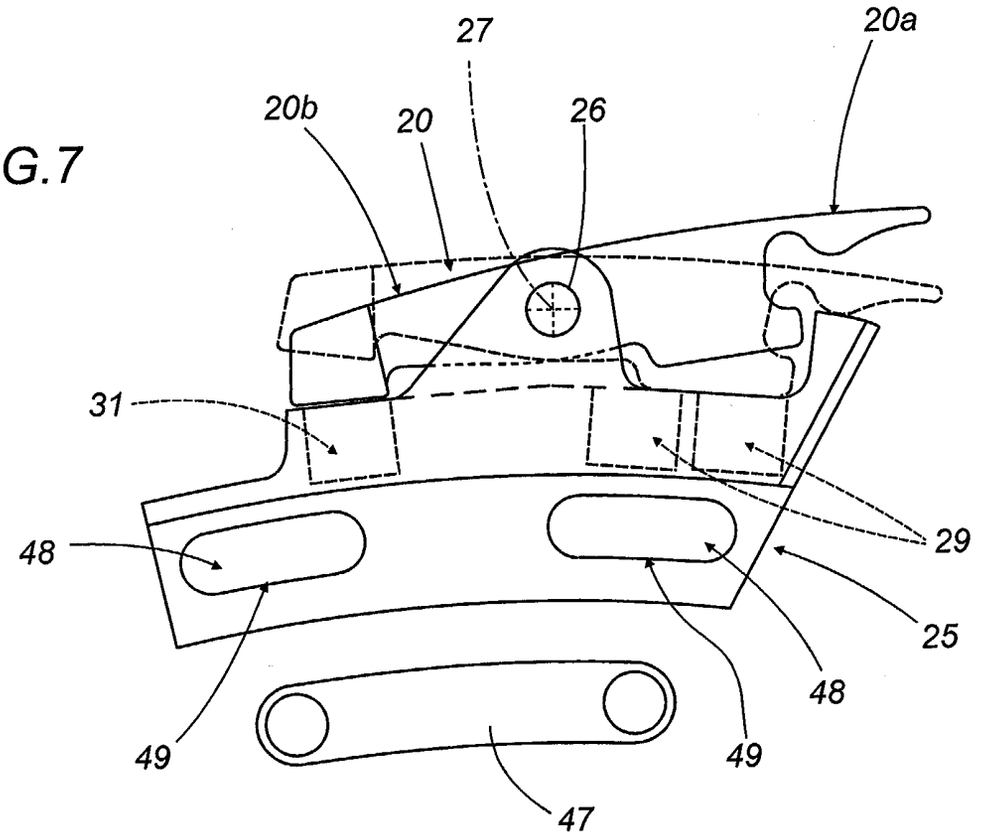
FIG.7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