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(54) FOLDING MACHINE FOR FOLDING FLAPS OF A WRAPPER

FALTMASCHINE ZUM FALTEN VON LASCHEN EINER VERPACKUNGSHÜLLE

MACHINE DE PLIAGE PERMETTANT DE PLIER DES RABATS D'UN EMBALLAGE

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Description

[0001] This invention relates to a machine for folding an end of a wrapper. In particular, a machine for folding the end of a partially wrapped package, including an unwrapped trailing end.

[0002] Overwrapping is commonly used in an industrial wrapping process; examples include wrapping foil around a bundle of cigarettes or creating a cellophane wrapper around a package. In this process a leading end of a package is passed through a web of wrapping material. Ploughs or folders are provided to fold the wrapping material along the sides of the package. Once the side folds have been completed a cuboidal package will be covered on five of its six surfaces. A challenge in the overwrapping process is how to create folds on the sixth surface, which is the trailing end.

[0003] Figure 1 shows a bundle of cigarettes 2 that have been through the beginning of an overwrapping process so that they are partially wrapped in a metal-laminated wrapper 4. In Figure 1 the wrapper covers five of the six surfaces of the bundle and only the trailing end 6 has yet to be folded. Figure 2 shows the same bundle of cigarettes in which the folding process has been completed on the trailing end 6. An object of this invention is to produce a machine that will form these folds on the trailing end 6.

[0004] A variety of techniques address this problem, and an example of one machine for producing a wrapper around cigarette blocks is described in US 6,328,152. In this machine a partially wrapped block of cigarettes, like the package shown in Figure 1, is transported by a chain conveyer. Pushers receive the partially wrapped package from the chain conveyer and fold flaps over the trailing end surface. The pushers then transport the wrapped package along a movement path towards a folding turret for the next stage in assembly. In this apparatus a complex gear mechanism is provided for executing the movements of the pushers in a turning loop.

[0005] GB 1525715 A discloses a process of forming and filling a flip top packet using a turret rotatable about a vertical axis and having upwardly and radially outwardly open pockets. A punch plate pushes a blank into a pocket such that the rear wall of the blank lies on the bottom of the pocket, the end wall, front wall and lateral flaps are folded into an upright position at the radial inner end of the pocket, and lateral flaps are folded upwardly from the rear wall. After the folding of the blank has been completed the packet is passed around a rotary turret arrangement to allow the glue on the packet to set.

[0006] An object of the invention is to provide a simpler and more cost effective machine for folding the unwrapped trailing end of a partially wrapped package. Another object of the invention is to facilitate improved speed of wrapping.

[0007] According to one aspect of the present invention there is provided a machine for folding an end of a wrapper as defined in claim 1.

[0008] By integrating the folders with the shuttle it is possible to achieve better synchronisation between movement of the folders and movement of the shuttle. This can increase the speed of the machine. In addition, this design simplifies the machine because there is no need for any folder that is external to the shuttle. This is advantageous because it reduces machine cost and complexity.

[0009] The second pusher is configured to contact an area of the trailing end face of the wrapped package that has not been in contact with any of the plurality of folders. In this way the folders can fold flaps on the trailing end of the package and the second pusher can eject the package without colliding with any of the folders. This allows for high speed production. The second pusher may also prevent the flaps from unfolding after the package has moved away from the folders.

[0010] Preferably a slot is provided in one of the folders, or between folders, and the second pusher is moveable within the slot to eject the wrapped package from the pocket. In this way the second pusher can act on the trailing end of the wrapped package and drive it out of the pocket. The present inventors have found that a folder can still produce an effective fold, even if it includes a slot, which may be considered counterintuitive.

[0011] The slot is preferably provided in a bottom folder and along a lower surface of the shuttle. In this way the second pusher can be provided on a conveyer belt below the shuttle.

[0012] The machine preferably includes the first pusher configured to introduce the partially wrapped package into the pocket of the shuttle. The first pusher is preferably configured to act on the unwrapped trailing end of the partially wrapped package. Preferably the first pusher is arranged to push the package through a web of wrapping material, such as paper or metal-laminated paper, at an earlier stage of the wrapping process. In this way an over-wrap may be created on the package and the shuttle is designed to fold flaps over the trailing end face.

[0013] At least one of the folders may comprise projections which complement the shape of corresponding notches on the second pusher. The projections may increase the effectiveness of the folder by increasing its lever moment on a relevant flap. In other words, the projections improve the reach of the folder away from the pivoting axis of a flap. Preferably the projections pass through the notches when the second pusher moves relative to the folder so that the second pusher can take control of movement of the package.

[0014] It is generally desirable for the second pusher to contact the end face of the package across a significant proportion of its width and length. This allows the second pusher to hold the flaps of the folded wrapper in place when the package has been moved away from the folders.

[0015] At least one of the folders may comprise notches which complement the shape of corresponding projections on the second pusher. The projections on the

second pusher may advantageously hold the folded flaps in place while the package is being ejected from the pocket. In this way the second pusher may have a structure like a television aerial or a tree, with a number of projections or branches, emanating from a central body, and notches between the projections.

[0016] Two of the folders may be arranged along opposing edges of the package and each of these folders may comprise projections which are respectively offset from one another along the length of the pocket. In this way the second pusher can include notches and projections that complement the shape of the projections on the folders. By offsetting the projections on the opposing folders the points of contact of the second pusher can be spread over a wide area on the end face. This improves the effectiveness with which the second pusher can hold the folded flaps in place. In turn this helps to create a neater folded package.

[0017] The shuttle preferably comprises top, bottom and side folders configured to fold flaps of the partially unwrapped package along respective edges of the end face. Thus, the shuttle comprises at least four integrated folders. This design reduces the complexity and cost of the machine in comparison to conventional designs. In this case, "top", "bottom" and "side" have been used as convenient labels for respective sides of the package; these labels are not limited to any particular reference frame since it would be possible to fold the package in any convenient orientation.

[0018] Preferably the trailing end face is substantially rectangular and the package is a cuboid. In the example where the package is a bundle of cigarettes, the wrapped bundle may have a substantially rectangular end face, even though the unwrapped bundle is formed by a plurality of cylindrical rods.

[0019] The shuttle may comprise two bottom folders, movable between an open position and a closed position, and a gap is preferably provided between the bottom folders in the closed position so that the second pusher can move in the gap in order to eject the wrapped package from the shuttle.

[0020] The folders are preferably operated in a sequence which is: side folders, bottom folder, top folder. It has been found that this creates a neat fold on the trailing end face of the package, with top flap folded so that it overlaps the bottom flap.

[0021] The machine preferably includes a shuttle drive mechanism configured to reciprocate the shuttle relative to a fixed base. In this way the shuttle can collect the partially wrapped package from the first pusher and complete the folds. The package can then be ejected from the shuttle and passed on to the next stage using the second pusher.

[0022] At least one of the side folders may include a track follower and the fixed base may comprise a track. The track follower may be configured to move relative to the track when the shuttle is reciprocated by the shuttle drive mechanism so that the at least one side folder can

move in order to fold a side flap on the partially wrapped package. Preferably the track and the track follower are arranged so that the movement of the side flap occurs near a mid-point of the reciprocating movement of the shuttle. In a typical sinusoidal reciprocation the speed of the shuttle is maximal at the mid-point and it is desirable to activate the side folders at this point since it can create a snappy folding action.

[0023] The machine may also comprise a top folder drive mechanism configured to reciprocate the top folder relative to the fixed base. Preferably the top folder drive mechanism is arranged out of phase with the shuttle drive mechanism. In this way the top folder drive mechanism may be designed to move the top folder at maximum speed while the shuttle is stationary, at the end of its reciprocating movement. In this way it is possible to provide rapid movement of the top folder, even when the shuttle is stationary, or nearly stationary. This may be desirable because it allows formation of an effective top fold just before the package is ejected from the shuttle.

[0024] In some arrangements the top folder drive mechanism may reciprocate at some integer multiple of the frequency of the shuttle drive mechanism. In a preferred embodiment the top folder drive mechanism reciprocates at twice the frequency of the shuttle drive mechanism.

[0025] Preferably a bottom folder drive mechanism is also provided, which runs out of phase with the shuttle drive mechanism. The bottom folder drive mechanism may lead the top folder drive mechanism slightly so that the bottom flap is folded before the top flap. This may be achieved by mounting slightly offset eccentric wheels for the bottom and top folder drive mechanisms on a common drive shaft.

[0026] The shuttle may comprise a gripper configured to grip the partially wrapped package when it is received in the pocket and to release the wrapped package so that it can be ejected by the second pusher. By integrating the gripper with the shuttle it is possible to improve the timing relationship between the gripper and the reciprocating movement of the shuttle. This decreases the cost and complexity of the design and potentially improves the speed of manufacture.

[0027] The shuttle drive mechanism may include a cam and the gripper may include a cam follower so that a relative movement of the cam and the cam follower is configured to drive the gripper from a releasing position towards a gripping position. Equally, movement of the cam relative to the cam follower may be arranged to drive the gripper from its gripping position towards its releasing position. In this way the drive mechanism for the gripper can be linked to the drive mechanism for the shuttle. This can ensure synchronisation between the shuttle and the gripper which allows increased speed of operation. In addition, this reduces the complexity of the design since there is no need for any separate drive mechanism for the gripper.

[0028] The machine may be arranged to wrap a pack-

age such as a bundle of cigarettes in metal-laminated wrapping paper. However, the machine may also be arranged to wrap other types of package in other materials, including cellophane.

[0029] According to another aspect of the invention there is provided a method of folding an end of a wrapper as defined in claim 13.

[0030] Method features may be provided as corresponding apparatus features and *vice-versa*.

[0031] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a bundle of cigarettes that are partially wrapped in a wrapper;

Figure 2 is a perspective view of a wrapped bundle of cigarettes;

Figure 3 is a perspective view of a machine in an embodiment of the invention;

Figure 4 is a perspective view of the machine in Figure 3 without its outer casing;

Figure 5 is a cross-sectional view of a machine in an embodiment of the invention;

Figure 6 is a top perspective view of a shuttle in an embodiment of the invention;

Figure 7 is a bottom perspective view of the shuttle shown in Figure 6;

Figure 8 is a perspective view of a pusher configured to eject a wrapped bundle from a shuttle in an embodiment of the invention.

Figure 9 is a perspective view of a track in the machine of Figure 1;

Figure 10 is a perspective view of the top and bottom folder drive mechanisms usable in the machine of Figure 3; and

Figure 11 is a detailed perspective view of the machine in Figure 3 showing the mechanism for driving a gripper in a shuttle.

[0032] The present invention will now be described with reference to Figures 3 to 11, which depict aspects of a machine 8 for wrapping a bundle of cigarettes in metal-laminated paper. In this arrangement a bundle of twenty cigarettes are wrapped, and these cigarettes are generally arranged in three layers with seven, six and seven rods respectively.

[0033] An overwrapping apparatus (not shown) is provided for pushing a leading end of the bundle through a

web of wrapping paper and forming side folds on the bundle. This partially wrapped bundle has an unwrapped trailing end and it is conveyed towards the machine 8. A pusher 17 on a conveyer belt 21 is arranged to act on the unwrapped trailing end of the bundle so that it is received in the machine through a channel 10.

[0034] The channel 10 includes a slot 12 in a bottom surface. The pusher 17 is arranged to extend through the slot 12 so that it can push the unwrapped trailing end of the package along a direction of travel. The slot 12 is arranged off-centre in the channel 10 such that it is provided between cigarettes in the bottom layer of the bundle. Generally the slot 12 is provided between the third and fourth cigarettes on the bottom layer of the bundle. In this way the bundle can remain tightly packed because none of the cigarettes in the bundle can drop downwards into the slot 12.

[0035] The machine 8 comprises a shuttle 14 configured to receive the partially wrapped bundle when it is pushed through the channel 10 by the pusher 17. Specifically, the partially wrapped bundle is received in a pocket 16 of the shuttle 14. The shuttle 14 also includes a gripper 19 which is moveable in order to reduce the height of the pocket 16 to grip the partially wrapped bundle. The mechanism is timed so that the gripper 19 moves downwardly just as the partially wrapped bundle is inserted into the pocket 16 by the pusher 17. At this point the partially wrapped bundle is securely gripped by the shuttle 14 which then accelerates away from the pusher 17 so that the trailing end can be folded.

[0036] The shuttle 14 comprises runners 26 mounted on stationary rails 24 in the machine 8. A shuttle driving mechanism includes a rotor 30 and an arm 32 for moving the runners 26 back-and-forth along the rails 24. In this way the shuttle 14 can be reciprocated along a horizontal axis 28. The reciprocating movement is arranged so that the partially wrapped bundle of cigarettes is pushed into the pocket 16 by the pusher when the shuttle 14 is stationary at one extreme end of its reciprocal motion. The trailing end of the bundle is then wrapped while the shuttle 14 moves towards the other extreme end of its reciprocal motion and the wrapped bundle is ejected from the pocket 16 by a pusher 94.

[0037] A plurality of pushers 94 are provided at spaced intervals on a conveyer belt 96 which runs in a loop below the shuttle 14. Each pusher 94 comprises a base 98 which is fixed to the conveyer belt 96 and a central stem 100 that extends away from the belt 96. Above the stem 100 is a branched contact member including upper projections 102 and upper notches 104, and lower projections 106 and lower notches 108. The upper projections 102 are offset from the lower projections 106 along the width of the pusher. The endmost upper projections 110 are turned outwards to the sides; these endmost projections 110 help to hold folded side flaps in place once the package has moved away from the side folders 20.

[0038] The reciprocating shuttle 14 comprises a top folder 18, two side folders 20 and two bottom folders 22.

All of the folders 18, 20, 22 are integrated with the shuttle 14 so that they move with it on the runners 26. Each of the folders has an open position to allow the partially wrapped package to be inserted into the pocket 16. The folders 18, 20, 22 are all moveable from their open position to a closed position in order to fold a flap on the trailing end face of the bundle of cigarettes. This allows a neat folded package to be produced, as shown in Figure 2.

[0039] The top folder 18 and both of the bottom folders 22 have a crenellated shape with projections and notches. The projections on the top folder 18 are offset from those on the bottom folders 22 across the width of the pocket 6. The projections on the folders satisfy competing interests. Firstly, the projections facilitate a large lever moment on a flap so that the fold is executed neatly, and secondly the notches allow a second pusher 94 to act across a large span on the trailing edge of the wrapped bundle, which is useful for holding the folded flaps in place. The effectiveness of this is improved yet further by offsetting the projections on the top folder 18 with respect to the projections on the bottom folder 22; this allows the pusher 94 to contact the end face with contact points that are spread over a wide area, and this helps to hold folded flaps in place.

[0040] The base 34 of the pocket 16 is in two portions with a slot 36 in the middle. A gap 38 is provided between the bottom folders 22 in their closed configuration which is aligned with the slot 36. The slot 36 is provided so that the pusher 94 can push the trailing end of the wrapped bundle of cigarettes out of the pocket 16 without colliding with any other components of the shuttle 14.

[0041] In use, one of the pushers 94 on the conveyer belt 96 is arranged to accelerate towards the wrapped trailing end of a bundle as the reciprocating shuttle 14 slows down, towards an extreme end of its reciprocating movement. At this point the top and bottom folders 18, 22 are in their closed configurations and the stem 100 of the pusher 94 passes between the gap 38 in the bottom folders 22. The upper projections 102 of the pusher 94 pass through notches in the upper folder 18 and the lower projections 106 of the pusher 94 pass through notches in the bottom folders 22. Thus, the pusher 94 contacts the folded trailing end face of the bundle and moves it away from the top and bottom folders 18, 22. The aerial-like shape of the branched contact member holds the folded flaps in place on the trailing end face. The stem 100 then passes through the slot 36 in the bottom of the pocket 16 so that the wrapped bundle can be ejected and moved on to the next phase in the wrapping process.

The side folders 20 are biased towards their open position, and they are pivotal with respect to the main body of the shuttle 14 about respective pins 42. Respective track followers 40 are provided as roller bearings for following a pair of parallel fixed tracks 74 on the machine 8. Thus, when the shuttle 14 is reciprocated the track follower 40 moves relative to the track 74 so that the side folders can move from their open position to their closed

position, folding side flaps on the trailing end of the bundle. After the side folds have been completed the side folders 20 re-open so that they can move out of the way of the top and bottom folders 18, 22. The track 74 is shaped with two flat sections 76, 78 that are parallel to the rails 24 on which the shuttle 14 reciprocates, and a bulge 80. The bulge 80 is arranged so that the track follower 40 causes the side folders 20 to create folds towards the middle of the reciprocating movement of the shuttle 14. This improves control over the movement of the side folders 20 so that an effective fold can be created. The bulge 80 causes the side folders 20 to tuck the side folds in and then to move back to their open position so that they do not collide with the top and bottom folders 18, 22 which are operated subsequently.

A drive mechanism 50 is provided for the top and bottom folders 18, 22, which is separate to the drive mechanism 30, 32 for the shuttle 14. The drive mechanism 50 includes a drive shaft 52 and an eccentric wheel 54 which drives the top folder 18. Two eccentric wheels 56 are also provided to drive the respective bottom folders 22. The eccentric wheel 54 for the top folder 18 is connected to an arm 58 and a guide 60. The guide 60 is fixed to the arm 58 at one end 62 and is pivotal relative to the fixed machine 8 at its other end 64. Rotation of the eccentric wheel 54 causes the arm 58 to move the one end 62 of the guide 60 up and down, causing it to pivot relative to the other end 64. Thus, the inclination of the guide 60 is varied relative to the fixed machine. The eccentric wheel 54 is arranged to provide drive for the guide 60 which is out of phase with the drive produced for the shuttle 14 by its drive mechanism 30, 32. Thus, movement of the guide 60 relative to a fixed base is maximal when movement of the shuttle is minimal and *vice-versa*. In this embodiment the frequency of movement of the guide 60 is twice that of the shuttle 14.

[0042] The top folder 18 includes a roller bearing which is arranged to run in a slot in the guide 60 while the shuttle 14 is being reciprocated. The top folder 18 is pivotal about an axis 21 depicted with a thick dash-dot line in Figure 6. Thus, the top folder 18 is arranged to pivot about the axis 21 when the guide 60 is pivoted by the arm 58 and the eccentric wheel 54. In this way the top folder 18 can be closed when the shuttle 14 is near an extreme end of its reciprocating movement, just before the bundle is ejected. This is advantageous because it provides a technique for closing the top folder 18 even when the shuttle 14 is nearly stationary relative to the fixed machine 8. A similar mechanism is provided for each of the bottom folders 22. In this regard, the eccentric wheels 56 are each connected to respective arms 66 and guides 68. The guides 68 are fixed to the arms 66 at one end 90 and are pivotal relative to the fixed machine 8 at their other ends 72. Rotation of the eccentric wheels 56 causes the arms 66 to move the one end 70 of the guides 68 up and down, causing them to pivot relative to the fixed machine 8. Each bottom folder 22 includes a roller bearing 23 which is arranged to run in a respective guide 68 while

the shuttle 14 is being reciprocated. The bottom folder 18 is pivotal about an axis 23 depicted with a thin dash-dot line in Figure 7. Thus, the bottom folders 22 are arranged to pivot about the axis 23 when the guide 68 is pivoted by the arm 66 and the eccentric wheel 56.

The eccentric wheel 56 for the bottom folders 22 is arranged to lead the phase of the eccentric wheel 54 for the top folder. In this way the bottom folders 22 are closed slightly before the top folder 18. This allows the bottom flap to be folded underneath the top flap, ensuring that the flaps do not collide with one another during the folding process.

As discussed, the shuttle 14 includes a gripper 19 which is moveable in order to reduce the height of the pocket 16 to grip the partially wrapped bundle. The gripper 19 is activated by a partial rotation of a shaft 82 by a cam follower 84. The cam follower 84 is a roller bearing that is designed to run on a surface 86, which acts as a cam, assembled to the end of the arm 32 that is used to reciprocate the shuttle 14.

[0043] The cam follower 84 is arranged to move between two main sections 88, 90 of the cam 86, respectively defining a gripping position and a releasing position for the gripper 19. The cam 86 includes an angled section 92, and when the cam follower 84 is on the angled section the gripper 19 is in transition between its gripping and releasing positions.

[0044] The driving mechanism for the gripper 19 is integrated with the driving mechanism 30, 32 for the shuttle 14. Thus, the movement of the gripper 19 from its releasing position to its gripping position is synchronised with the movement of the shuttle 14. It is therefore possible to drive the gripper 19 from its released position to its gripped position when the shuttle 14 is at one extreme end of its reciprocating movement, just at the moment that a partially unwrapped package is inserted in the pocket 16. Equally, the gripper 19 can be driven from its gripped position to its released position at the other end of the reciprocating movement of the shuttle 14 so that the wrapped package can be released and ejected by the pusher 94. By integrating the driving mechanism for the gripper 19 with that of the shuttle 14 it is possible to reduce machine complexity and improve synchronisation, especially at high running speeds.

Claims

1. A machine (8) for folding an end of a wrapper, comprising:

a shuttle (14) comprising a pocket (16) for receiving a partially wrapped package from a first pusher (17), wherein the partially wrapped package includes an unwrapped trailing end and the shuttle comprises a plurality of folders (18, 20, 22) configured to fold flaps of the partially wrapped package along respective edges of the

end face and to produce a wrapped package in the pocket; and

a second pusher (94) configured to eject the wrapped package from the pocket of the shuttle, **characterised in that:**

the second pusher (94) comprises a plurality of notches (104, 108) and at least one of the folders (18, 22) comprises projections which complement the shape of corresponding notches on the second pusher, or the second pusher (94) comprises a plurality of projections (102, 106) and at least one of the folders (18, 22) comprises notches which complement the shape of corresponding projections on the second pusher; and

the second pusher (94) is configured to contact an area of the trailing end face of the wrapped package that has not been in contact with any of the plurality of folders (18, 20, 22).

2. The machine of claim 1 wherein a slot is provided in one of the folders, or between folders, and the second pusher (94) is moveable within the slot to eject the wrapped package from the pocket.
3. The machine of claim 1 or claim 2 wherein the first pusher (17) is configured to introduce the partially wrapped package into the pocket (16) of the shuttle.
4. The machine of claim 3 wherein the first pusher (17) is configured to act on the unwrapped trailing end of the partially wrapped package.
5. The machine of any of the preceding claims wherein two of the folders (18, 22) are arranged along opposing edges of the package and each of these folders comprises projections which are respectively offset from one another along the length of the pocket.
6. The machine of any of the preceding claims wherein the shuttle comprises top (18), bottom (22) and side (20) folders configured to fold flaps of the partially unwrapped package along respective edges of the end face.
7. The machine of claim 6 wherein the shuttle comprises two bottom folders (22), movable between an open position and a closed position, wherein a gap (38) is provided between the bottom folders in the closed position, and wherein the second pusher (94) is arranged to move in the gap in order to eject the wrapped package from the shuttle.
8. The machine of any of the preceding claims comprising a shuttle drive mechanism (30, 32) configured

to reciprocate the shuttle relative to a fixed base.

9. The machine of claim 8 wherein at least one of the side folders includes a track follower (40) and the fixed base comprises a track, wherein the track follower is configured to move relative to the track when the shuttle is reciprocated by the shuttle drive mechanism so that the at least one side folder (20) can move in order to fold a side flap on the partially wrapped package. 5 10
10. The machine of claims 8 or 9 further comprising a top folder drive mechanism (50) configured to reciprocate the top folder (18) relative to the fixed base, wherein the top folder drive mechanism is arranged out of phase with the shuttle drive mechanism. 15
11. The machine of any of claims 8 to 10 wherein the shuttle comprises a gripper (19) configured to grip the partially wrapped package when it is received in the pocket and to release the wrapped package so that it can be ejected by the second pusher. 20
12. The machine of claim 11 wherein the shuttle drive mechanism includes a cam and the gripper includes a cam follower (84) so that a relative movement of the cam and the cam follower is configured to drive the gripper from a releasing position towards a gripping position. 25 30
13. A method of folding an end of a wrapper, comprising the steps of:
 - introducing a partially wrapped package with an unwrapped trailing end into the pocket (16) of a shuttle (14) using a first pusher (17); 35
 - folding the unwrapped trailing end of the package while it is received in the pocket using a plurality of folders (18, 20, 22) that are integrated with the shuttle to produce a wrapped package; 40
 - and
 - ejecting the wrapped package from the pocket of the shuttle using a second pusher (94),
 - characterised in that:** 45
 - the second pusher (94) contacts an area of the trailing end face of the wrapped package that has not been in contact with any of the plurality of folders (18, 20, 22). 50

Patentansprüche

1. Maschine (8) zum Falten eines Endes einer Einwicklung, die Folgendes umfasst: 55
 - eine Pendelvorrichtung (14), umfassend eine Ablage (16) zum Aufnehmen einer teilweise eingewickelten Packung von einem ersten Schie-

ber (17), wobei die teilweise eingewickelte Packung ein nicht eingewickeltes hinteres Ende umfasst und die Pendelvorrichtung eine Vielzahl von Faltvorrichtungen (18, 20, 22) umfasst, die dazu konfiguriert sind, Laschen der teilweise eingewickelten Packung entlang jeweiliger Ränder der Endfläche zu falten und eine eingewickelte Packung in der Ablage zu erzeugen; und einen zweiten Schieber (94), der dazu konfiguriert ist, die eingewickelte Packung aus der Ablage der Pendelvorrichtung auszustoßen, **dadurch gekennzeichnet, dass:**

der zweite Schieber (94) eine Vielzahl von Einkerbungen (104, 108) umfasst und mindestens eine der Faltvorrichtungen (18, 22) Vorsprünge umfasst, die die Form entsprechender Einkerbungen an dem zweiten Schieber ergänzen, oder der zweite Schieber (94) eine Vielzahl von Vorsprüngen (102, 106) umfasst und mindestens eine der Faltvorrichtungen (18, 22) Einkerbungen umfasst, die die Form entsprechender Vorsprünge an dem zweiten Schieber ergänzen; und der zweite Schieber (94) dazu konfiguriert ist, mit einem Bereich der hinteren Endfläche der eingewickelten Packung, die sich mit keiner der Vielzahl von Faltvorrichtungen (18, 20, 22) in Kontakt befunden hat, in Kontakt zu gelangen.

2. Maschine nach Anspruch 1, wobei ein Schlitz in einer der Faltvorrichtungen oder zwischen Faltvorrichtungen vorgesehen ist und der zweite Schieber (94) in dem Schlitz bewegbar ist, um die eingewickelte Packung aus der Ablage auszustoßen.
3. Maschine nach Anspruch 1 oder Anspruch 2, wobei der erste Schieber (17) dazu konfiguriert ist, die teilweise eingewickelte Packung in die Ablage (16) der Pendelvorrichtung einzulegen.
4. Maschine nach Anspruch 3, wobei der erste Schieber (17) dazu konfiguriert ist, auf das nicht eingewickelte hintere Ende der teilweise eingewickelten Packung zu wirken.
5. Maschine nach einem der vorangehenden Ansprüche, wobei zwei der Faltvorrichtungen (18, 22) entlang gegenüberliegenden Rändern der Packung angeordnet sind und diese Faltvorrichtungen jeweils Vorsprünge umfassen, die jeweils entlang der Länge der Ablage gegenüber einander versetzt sind.
6. Maschine nach einem der vorangehenden Ansprüche, wobei die Pendelvorrichtung obere (18), untere (22) und seitliche (20) Faltvorrichtungen umfasst, die

dazu konfiguriert sind, Laschen der teilweise nicht eingewickelten Packung entlang jeweiliger Ränder der Endfläche zu falten.

7. Maschine nach Anspruch 6, wobei die Pendelvorrichtung zwei untere Faltvorrichtungen (22) umfasst, die zwischen einer offenen Stellung und einer geschlossenen Stellung bewegbar sind, wobei in der geschlossenen Stellung ein Zwischenraum (38) zwischen den unteren Faltvorrichtungen vorgesehen ist, und wobei der zweite Schieber (94) dazu angeordnet ist, sich in dem Zwischenraum zu bewegen, um die eingewickelte Packung aus der Pendelvorrichtung auszustoßen. 5
8. Maschine nach einem der vorangehenden Ansprüche, umfassend einen Pendelvorrichtungs-Antriebsmechanismus (30, 32), der dazu konfiguriert ist, die Pendelvorrichtung relativ zu einer festen Basis hin- und herzubewegen. 10
9. Maschine nach Anspruch 8, wobei mindestens eine der seitlichen Faltvorrichtungen einen Schienenmitnehmer (40) umfasst und die feste Basis eine Schiene umfasst, wobei der Schienenmitnehmer dazu konfiguriert ist, sich relativ zu der Schiene zu bewegen, wenn die Pendelvorrichtung von dem Pendelvorrichtungs-Antriebsmechanismus hin- und herbewegt wird, sodass sich die mindestens eine seitliche Faltvorrichtung (20) bewegen kann, um eine seitliche Lasche an der teilweise eingewickelten Packung zu falten. 15
10. Maschine nach Anspruch 8 oder 9, weiter umfassend einen Antriebsmechanismus (50) der oberen Faltvorrichtung, der dazu konfiguriert ist, die obere Faltvorrichtung (18) relativ zu der festen Basis hin- und herzubewegen, wobei der Antriebsmechanismus der oberen Faltvorrichtung gegenphasig zu dem Pendelvorrichtungs-Antriebsmechanismus angeordnet ist. 20
11. Maschine nach einem der Ansprüche 8 bis 10, wobei die Pendelvorrichtung einen Greifer (19) umfasst, der dazu konfiguriert ist, die teilweise eingewickelte Packung zu greifen, wenn sie in der Ablage aufgenommen ist, und die eingewickelte Packung freizugeben, sodass sie von dem zweiten Schieber ausgestoßen werden kann. 25
12. Maschine nach Anspruch 11, wobei der Pendelvorrichtungs-Antriebsmechanismus einen Nocken umfasst und der Greifer einen Nockenmitnehmer (84) umfasst, sodass eine Relativbewegung des Nockens und des Nockenmitnehmers dazu konfiguriert ist, den Greifer aus einer Freigabestellung in Richtung einer Greifstellung anzutreiben. 30

13. Verfahren zum Falten eines Endes einer Einwicklung, das Folgende Schritte umfasst:

Einlegen einer teilweise eingewickelten Packung mit einem nicht eingewickelten hinteren Ende in die Ablage (16) einer Pendelvorrichtung (14) unter Verwendung eines ersten Schiebers (17);

Falten des nicht eingewickelten hinteren Endes der Packung, während es in der Ablage aufgenommen ist, unter Verwendung einer Vielzahl von Faltvorrichtungen (18, 20, 22), die in die Pendelvorrichtung integriert sind, um eine eingewickelte Packung zu erzeugen; und

Ausstoßen der eingewickelten Packung aus der Ablage der Pendelvorrichtung unter Verwendung eines zweiten Schiebers (94),

dadurch gekennzeichnet, dass:

der zweite Schieber (94) mit einem Bereich der hinteren Endfläche der eingewickelten Packung, die sich mit keiner der Vielzahl von Faltvorrichtungen (18, 20, 22) in Kontakt befunden hat, in Kontakt gelangt.

Revendications

1. Machine (8) servant à plier une extrémité d'un emballage, comportant :

une navette (14) comportant une poche (16) servant à recevoir un paquet partiellement emballé en provenance d'un premier poussoir (17), dans laquelle le paquet partiellement emballé comprend une extrémité arrière non emballée et la navette comporte une pluralité d'éléments de pliage (18, 20, 22) configurés pour plier des rabats du paquet partiellement emballé le long de bords respectifs de la face d'extrémité et pour produire un paquet emballé dans la poche ; et un deuxième poussoir (94) configuré pour éjecter le paquet emballé en provenance de la poche de la navette,

caractérisée en ce que :

le deuxième poussoir (94) comporte une pluralité d'entailles (104, 108) et au moins l'un des éléments de pliage (18, 22) comporte des parties saillantes qui épousent la forme des entailles correspondantes sur le deuxième poussoir, ou le deuxième poussoir (94) comporte une pluralité de parties saillantes (102, 106) et au moins l'un des éléments de pliage (18, 22) comporte des entailles qui épousent la forme des parties saillantes correspondantes sur le deuxième poussoir ; et

le deuxième poussoir (94) est configuré

- pour entrer en contact avec une zone de la face d'extrémité arrière du paquet emballé qui n'est pas entrée en contact avec l'un quelconque de la pluralité d'éléments de pliage (18, 20, 22). 5
2. Machine selon la revendication 1, dans laquelle une fente est mise en oeuvre dans l'un des éléments de pliage, ou entre des éléments de pliage, et le deuxième poussoir (94) est mobile à l'intérieur de la fente pour éjecter le paquet emballé en provenance de la poche. 10
 3. Machine selon la revendication 1 ou la revendication 2, dans laquelle le premier poussoir (17) est configuré pour introduire le paquet partiellement emballé dans la poche (16) de la navette. 15
 4. Machine selon la revendication 3, dans laquelle le premier poussoir (17) est configuré pour agir sur l'extrémité arrière non emballée du paquet partiellement emballé. 20
 5. Machine selon l'une quelconque des revendications précédentes, dans laquelle deux des éléments de pliage (18, 22) sont agencés le long de bords opposés du paquet et chacun de ces éléments de pliage comporte des parties saillantes qui sont décalées respectivement les unes par rapport aux autres le long de la longueur de la poche. 25 30
 6. Machine selon l'une quelconque des revendications précédentes, dans laquelle la navette comporte des éléments de pliage supérieur (18), inférieurs (22) et latéraux (20) configurés pour plier des rabats du paquet partiellement non emballé le long de bords respectifs de la face d'extrémité. 35
 7. Machine selon la revendication 6, dans laquelle la navette comporte deux éléments de pliage inférieurs (22), mobiles entre une position ouverte et une position fermée, dans laquelle un espace (38) est mis en oeuvre entre les éléments de pliage inférieurs dans la position fermée, et dans laquelle le deuxième poussoir (94) est agencé pour se déplacer dans l'espace afin d'éjecter le paquet emballé en provenance de la navette. 40 45
 8. Machine selon l'une quelconque des revendications précédentes, comportant un mécanisme d'entraînement de navette (30, 32) configuré pour communiquer un mouvement de va-et-vient à la navette par rapport à une base fixe. 50
 9. Machine selon la revendication 8, dans laquelle au moins l'un des éléments de pliage latéraux comprend un suiveur de rail (40) et la base fixe comporte un rail, dans laquelle le suiveur de rail est configuré 55
- pour se déplacer par rapport au rail quand la navette est mise en mouvement de va-et-vient par le mécanisme d'entraînement de navette de telle sorte que ledit au moins un élément de pliage latéral (20) peut se déplacer afin de plier un rabat latéral du paquet partiellement emballé.
10. Machine selon la revendication 8 ou la revendication 9, comportant par ailleurs un mécanisme d'entraînement d'élément de pliage supérieur (50) configuré pour communiquer un mouvement de va-et-vient à l'élément de pliage supérieur (18) par rapport à la base fixe, dans laquelle le mécanisme d'entraînement d'élément de pliage supérieur est agencé pour être déphasé par rapport au mécanisme d'entraînement de navette.
 11. Machine selon l'une quelconque des revendications 8 à 10, dans laquelle la navette comporte un organe de préhension (19) configuré pour saisir le paquet partiellement emballé quand il est reçu dans la poche et pour libérer le paquet emballé de telle manière qu'il puisse être éjecté par le deuxième poussoir.
 12. Machine selon la revendication 11, dans laquelle le mécanisme d'entraînement de navette comprend une came et l'organe de préhension comprend un galet de came (84) de telle sorte qu'un mouvement relatif de la came et du galet de came est configuré pour entraîner l'organe de préhension d'une position de libération vers une position de saisie.
 13. Procédé servant à plier une extrémité d'un emballage, comportant les étapes consistant à :
 - introduire un paquet partiellement emballé avec une extrémité arrière non emballée dans la poche (16) d'une navette (14) au moyen d'un premier poussoir (17) ;
 - plier l'extrémité arrière non emballée du paquet alors qu'il est reçu dans la poche au moyen d'une pluralité d'éléments de pliage (18, 20, 22) qui font partie intégrante de la navette pour produire un paquet emballé ; et
 - éjecter le paquet emballé en provenance de la poche de la navette au moyen d'un deuxième poussoir (94),**caractérisé en ce que :**
 - le deuxième poussoir (94) entre en contact avec une zone de la face d'extrémité arrière du paquet emballé qui n'est pas entrée en contact avec l'un quelconque de la pluralité d'éléments de pliage (18, 20, 22).

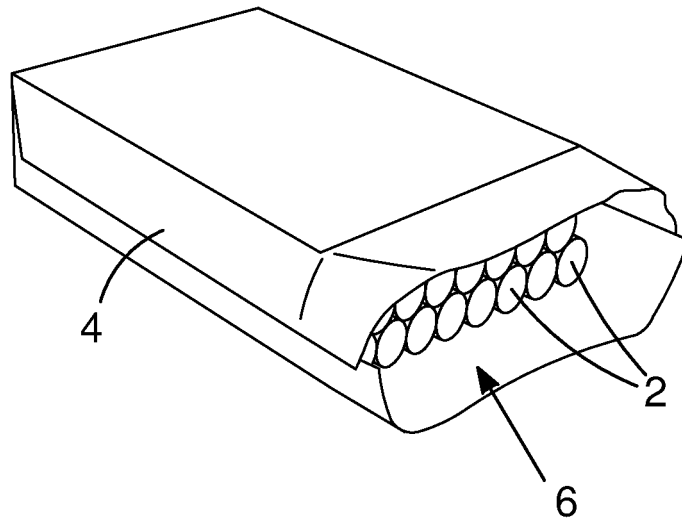


FIG.1

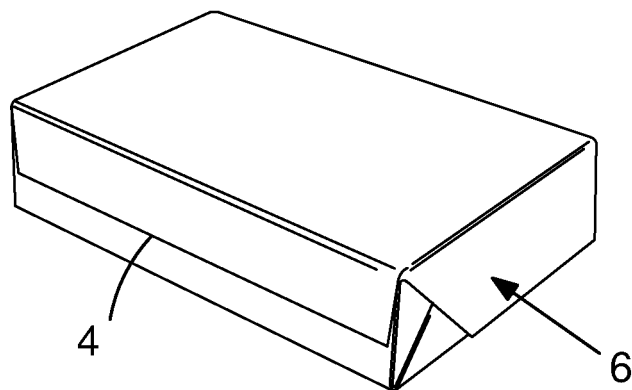


FIG.2

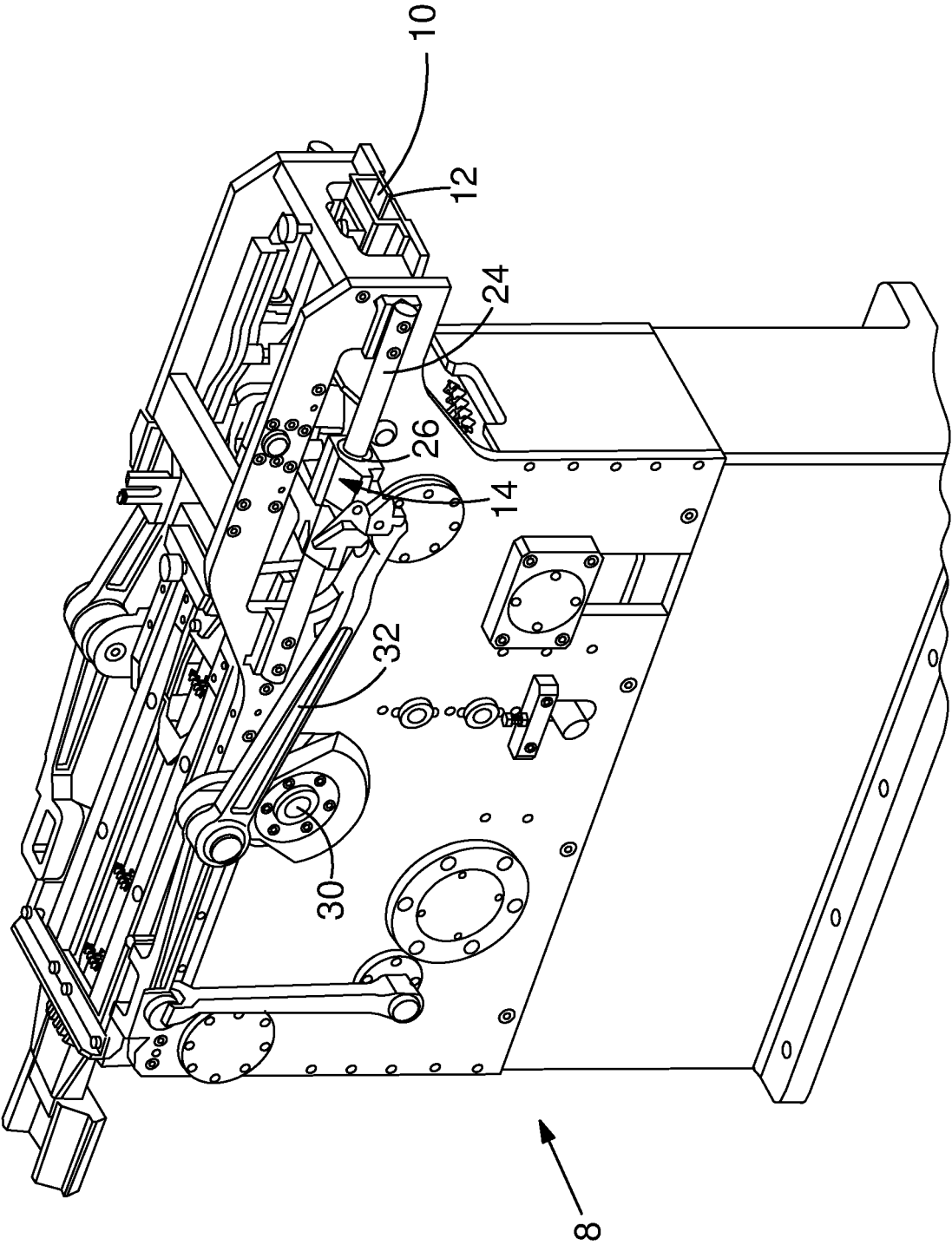


FIG.3

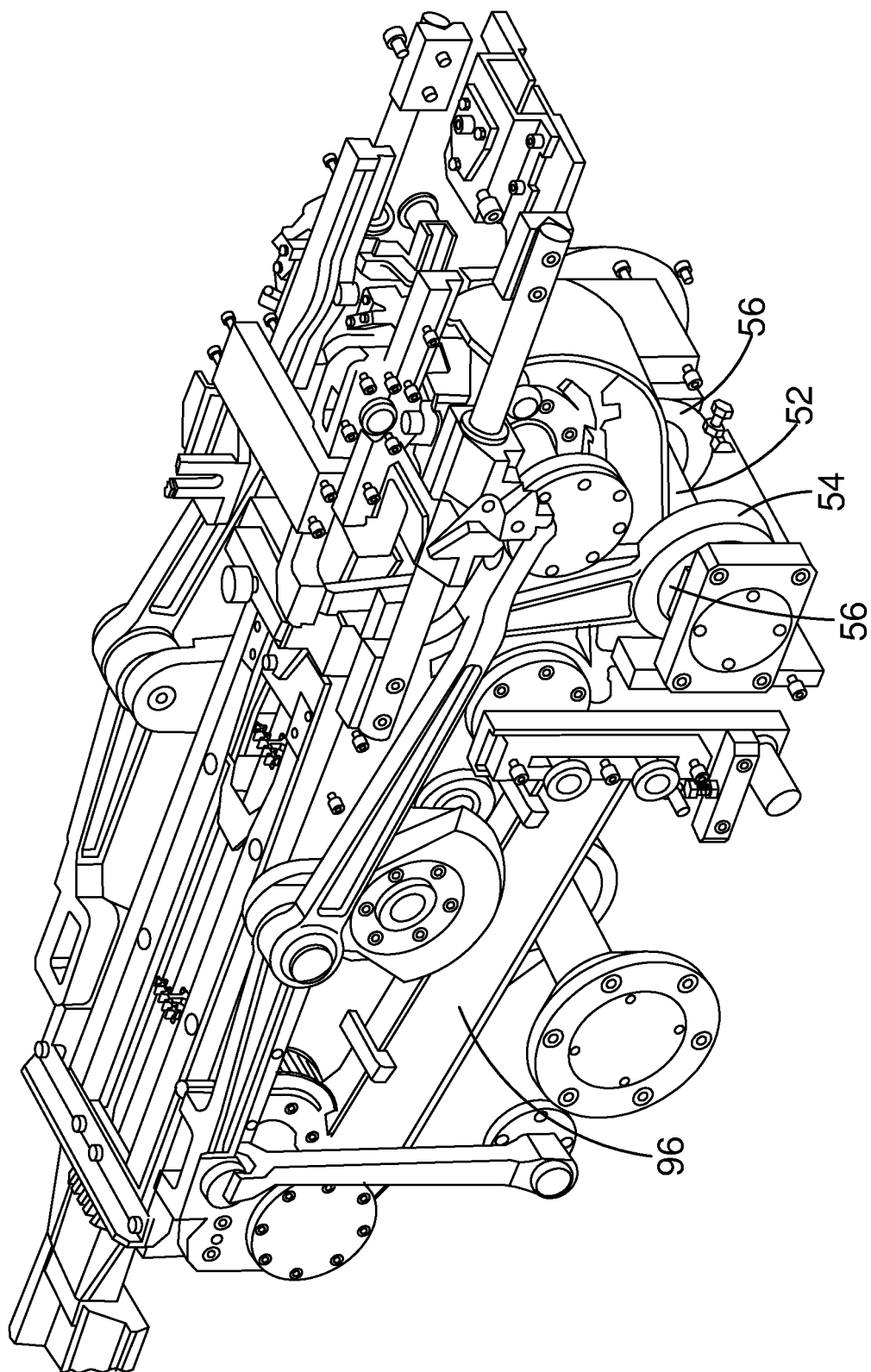


FIG. 4

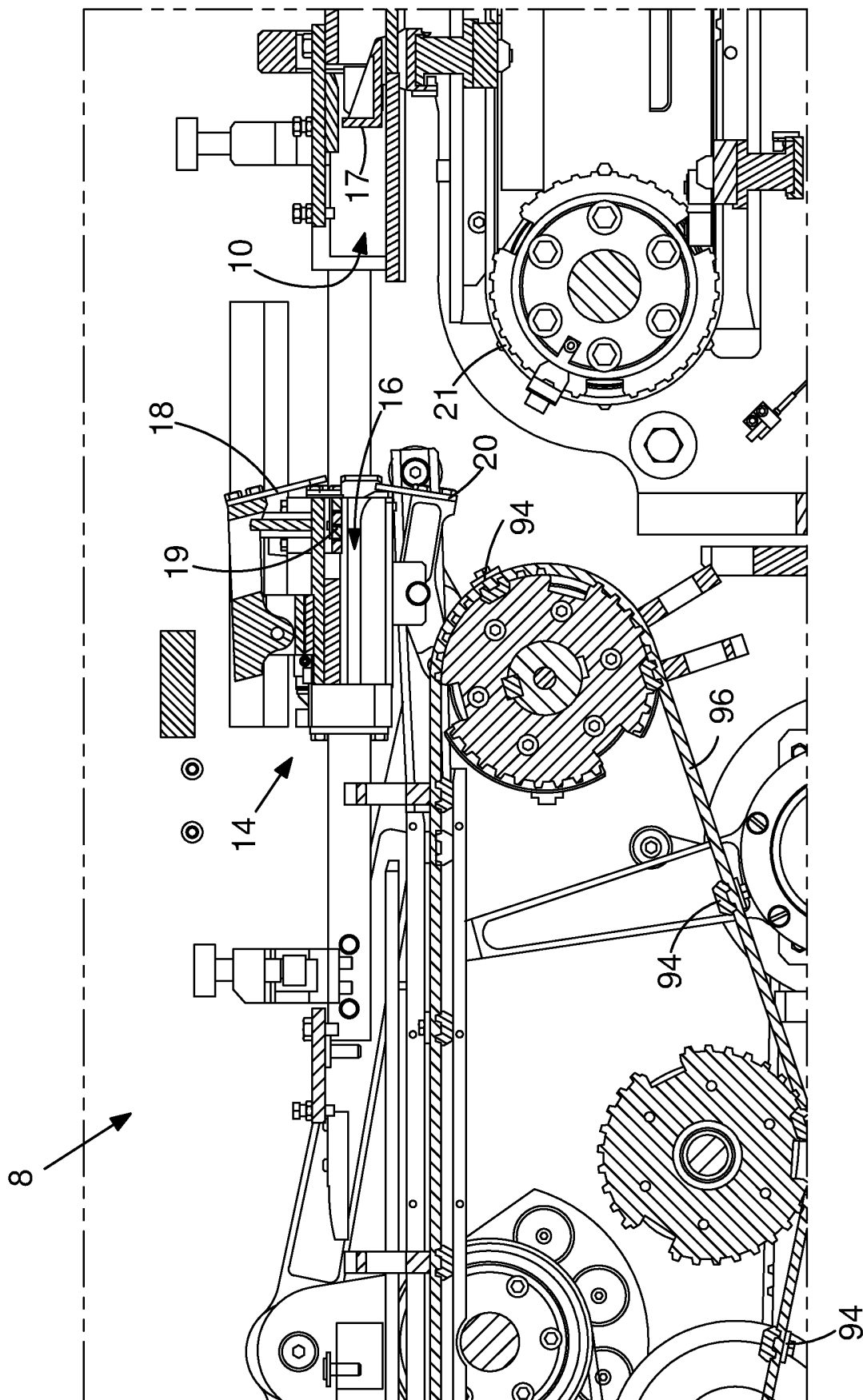


FIG. 5

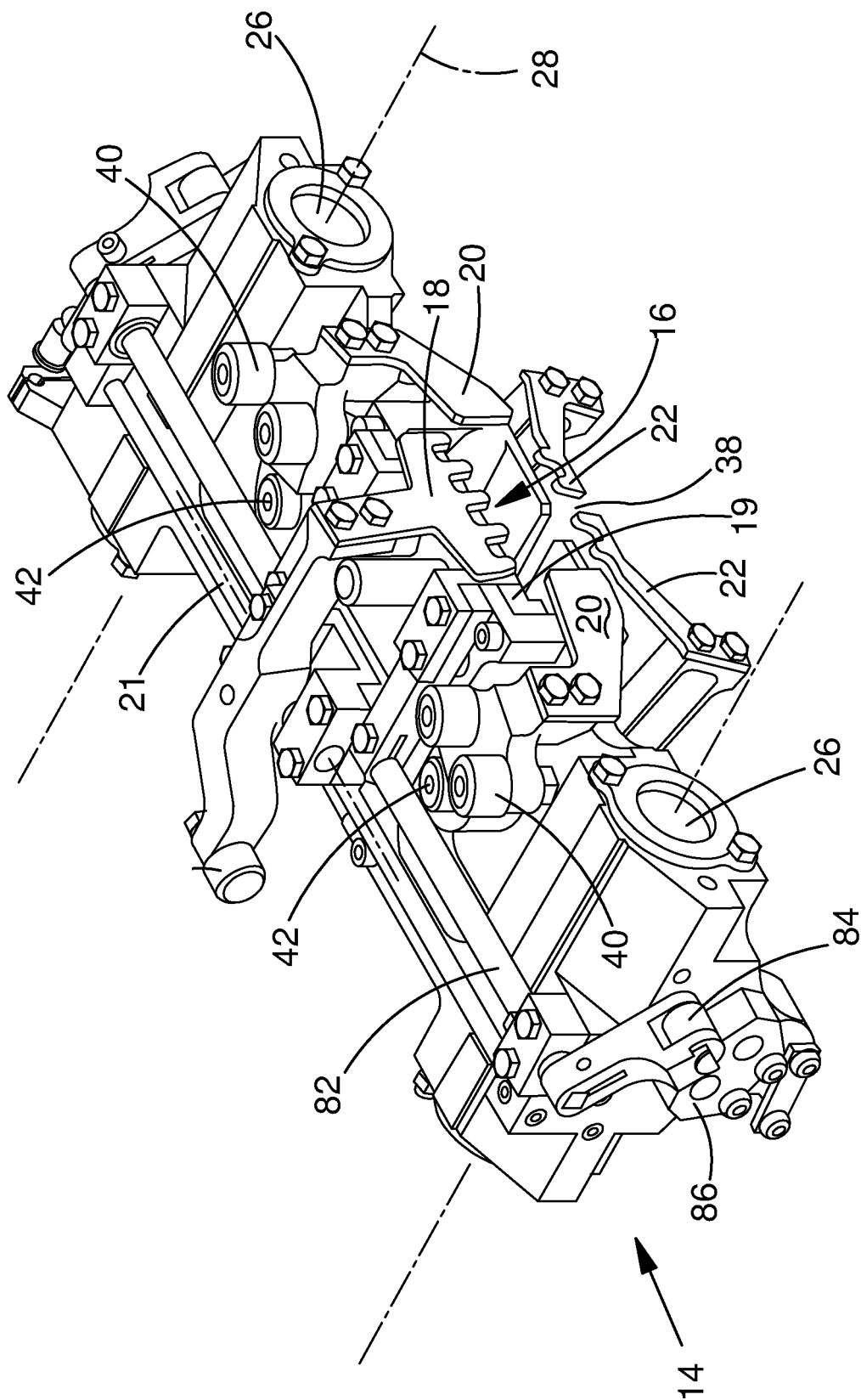


FIG.6

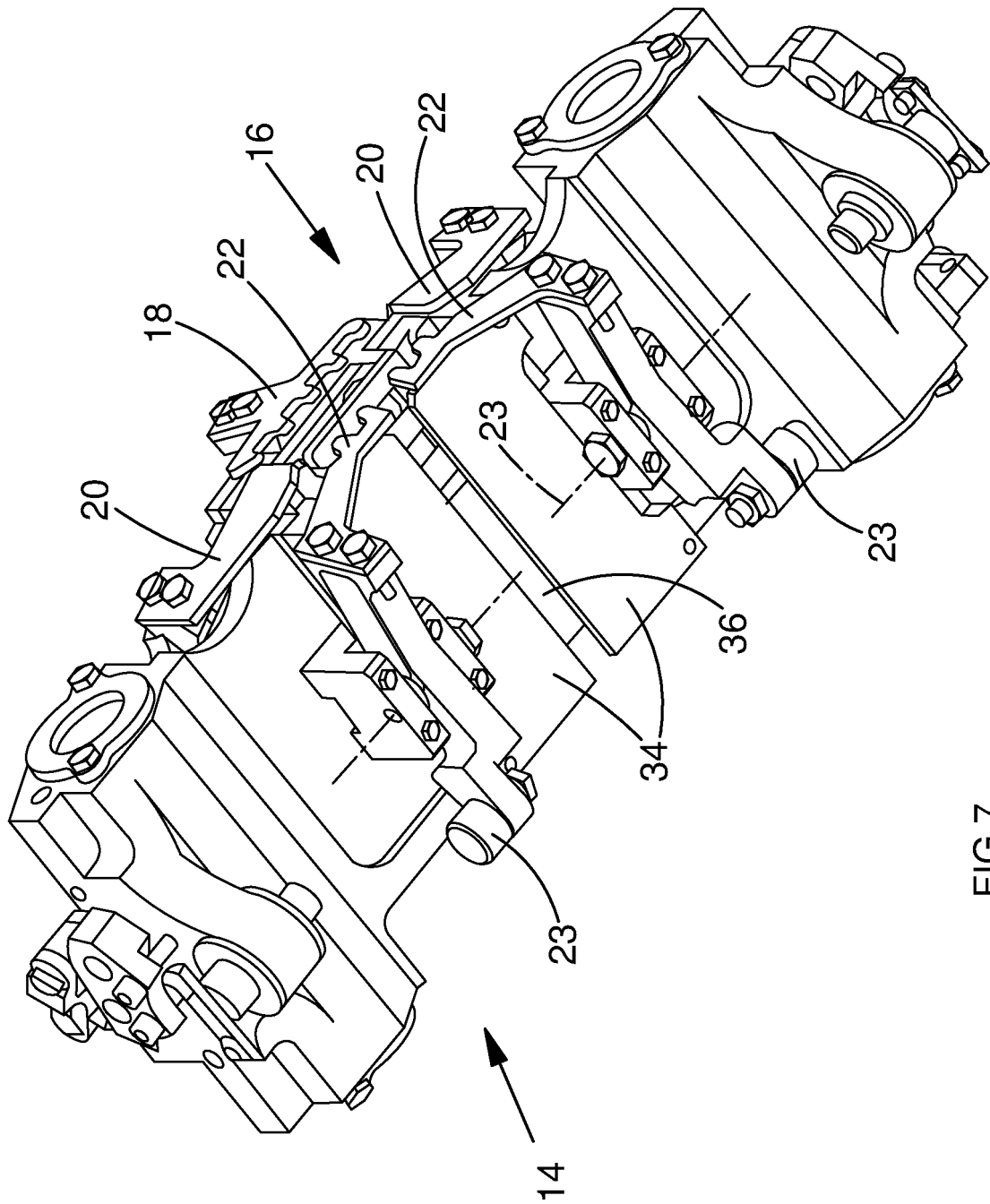
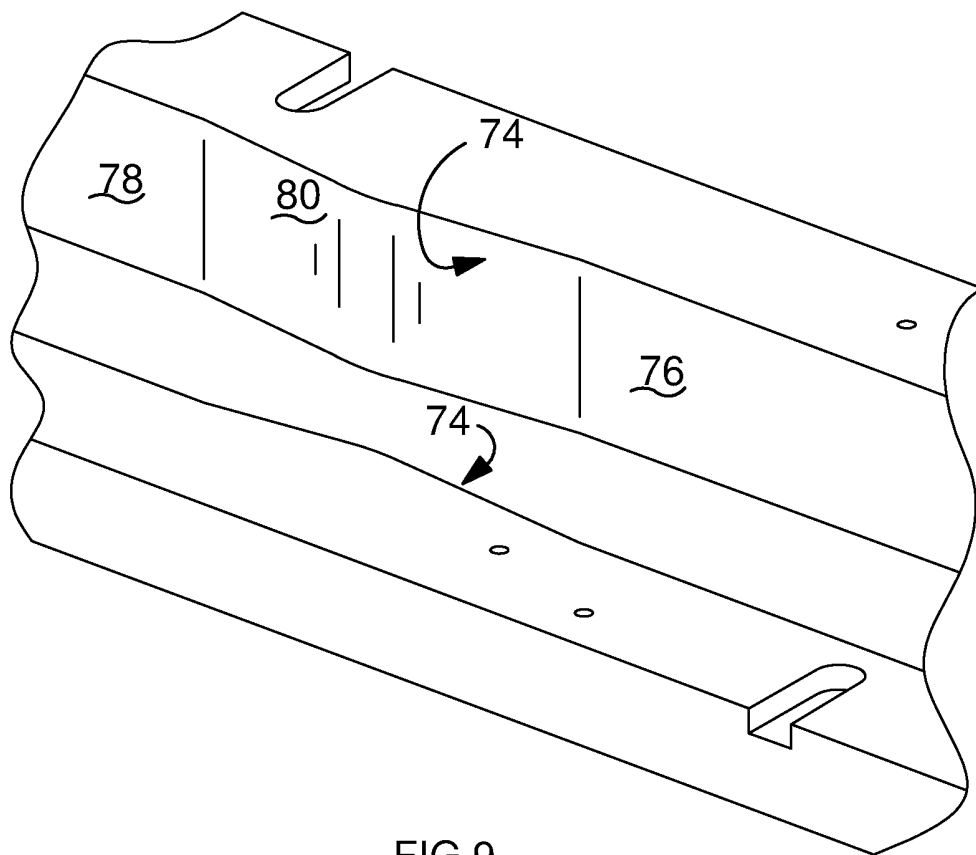
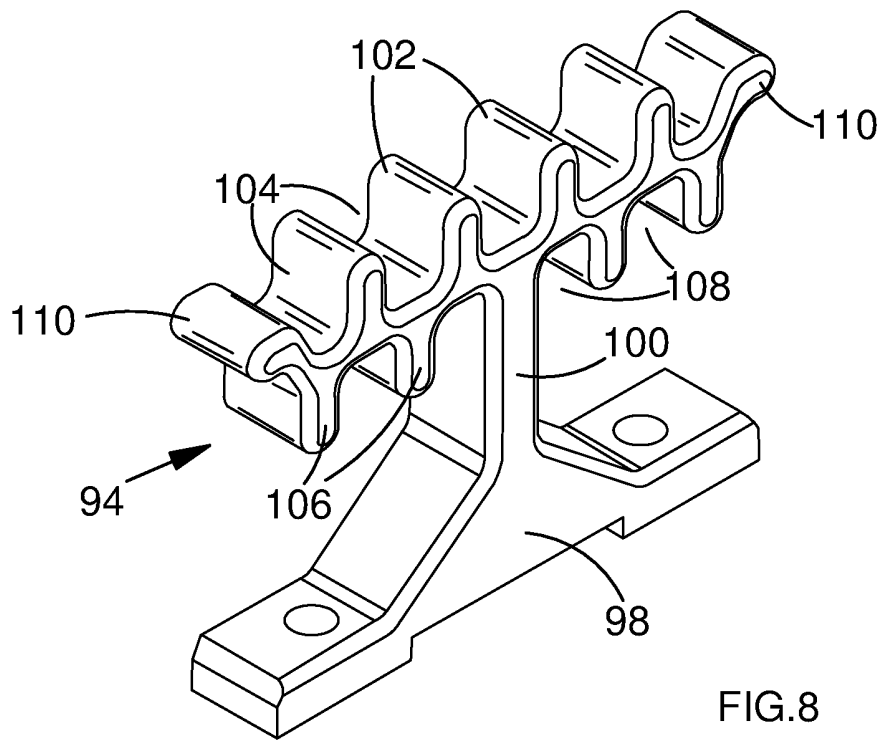
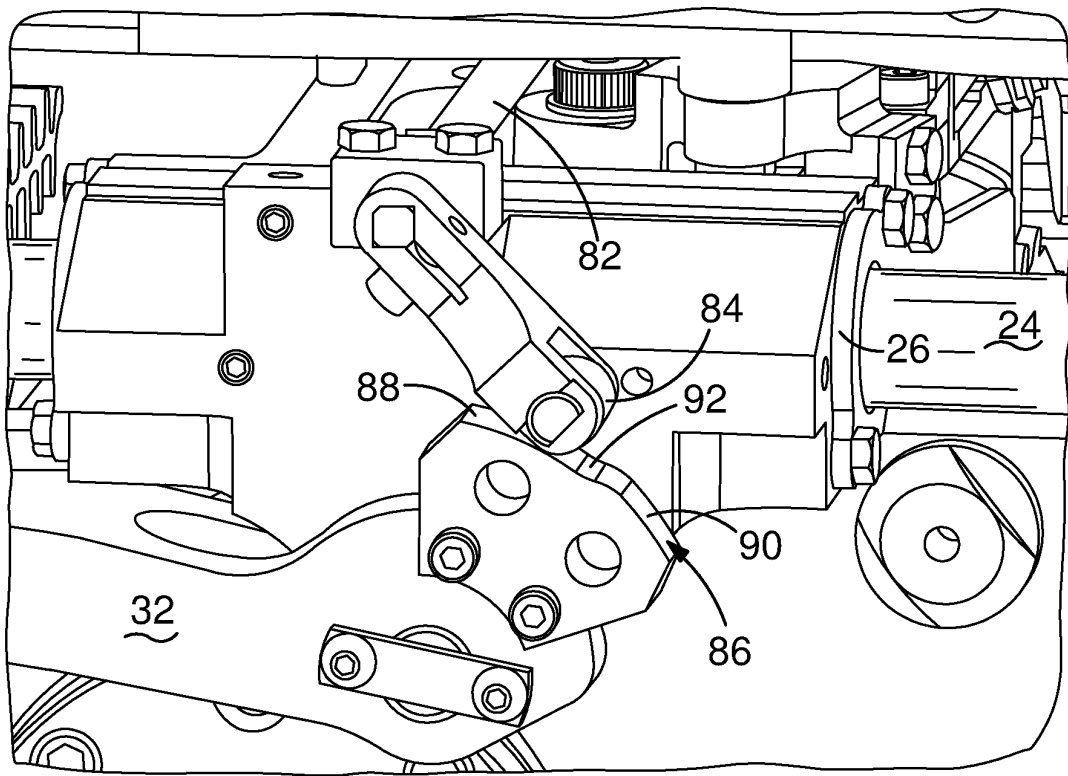
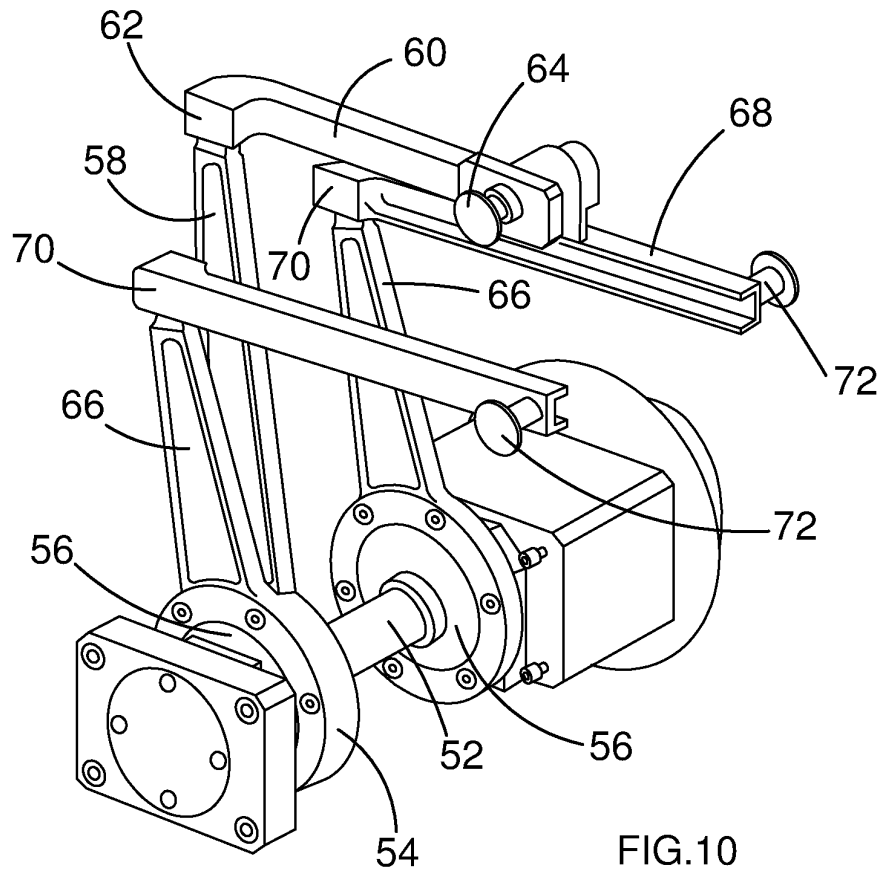


FIG.7





REFERENCES CITED IN THE DESCRIPTION

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