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(54) Storing and guide device for articles in ferromagnetic material and apparatus for removal of a protective film from packets of articles

(57) The storing and guide device (35) for flat or shaped articles (C) in ferromagnetic material, supplied in a packed condition by an apparatus for removal of a protective film from packets (P) of articles, comprises a guide channel (36) for the articles (C) having at least a first magnetic braking section (40) for the articles (C) at an inlet end (37), and a second sloped storing and guide section (41) in which the articles (C) are made to move forward in a spaced apart condition towards an outlet (38) of the guide channel (36); the sloped storing and guide section (41) has at least a first upper magnetic support bar (36A) for supporting the articles (C) in a vertical position, and at least a second and a third magnetic bars (36B, 36C), on opposite sides, for stabilization of the position of the articles (C). The device (35) also comprises vibration generating means (44) for generating vibration of the second sloped guide section (41), to move forward the articles (C) by gravity towards the outlet (38).

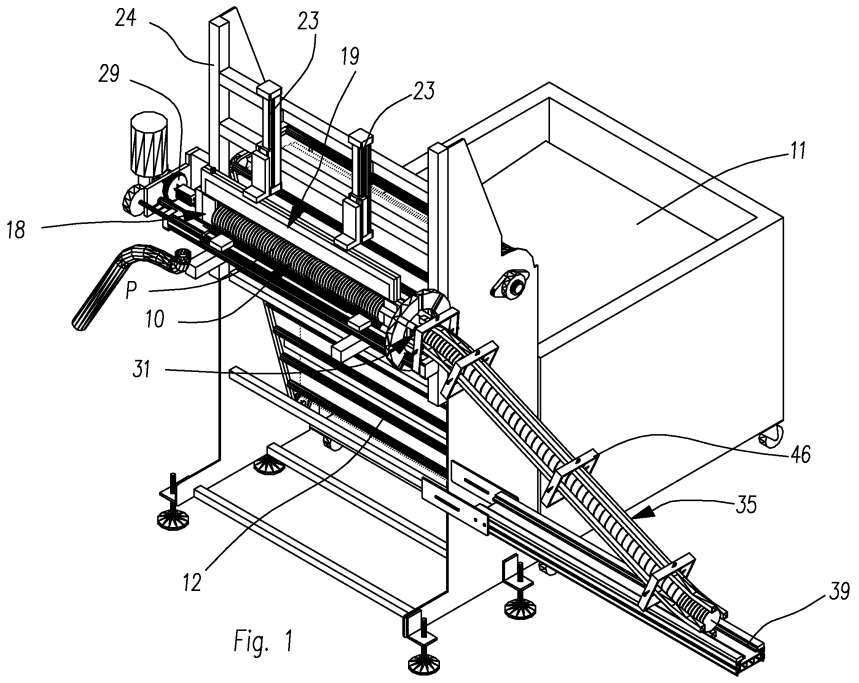

Fig. 1

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Description

BACKGROUND OF THE INVENTION

[0001] This invention concerns a storing and guide device for flat or shaped articles in ferromagnetic material, the articles being supplied in a packed condition by an apparatus for the removal of a protective film from packets of articles connectable to the device itself; this invention also concerns an apparatus for the removal of a protective film from packets of flat or shaped articles in ferromagnetic material, particularly covers for containers and similar, comprising the storing and guide device itself.

[0002] For purposes of this description, the expression "packed condition" means that the articles, once the protective film has been removed, are kept adjacent to each other, in an axially extended configuration, to be suitably supplied to the storing and guide device.

STATE OF THE ART

[0003] In the field of production and filling of metal boxes and containers in general, such as metal tins and cans for packaging foodstuffs or for products of general use, and aerosol spray cans, normally the covers for closing the metal cans are supplied in packets formed of a number of stacked covers wrapped in a protective film, thereby presenting a basically cylindrical shape with a longitudinal axis.

[0004] For the purposes of supplying the covers to a seam folding machine or another machine for closing the metal cans, it is therefore necessary to perform a preliminary operation for removal of the protective film; this operation may generally be performed manually, with high labour costs and low productivity, or automatically through use of special apparatuses for the removal of protective film from the packets.

[0005] An apparatus of this kind is, for example, illustrated in WO-A-03/091134, which comprises a packet containing store having a movable bar loading device for supplying single packets of covers to a station for cutting and removal of the protective film from the packets.

[0006] The film cutting and removal station comprises two parallel supporting rollers for the single packet received each time from the loading device, and a pair of hot air cutting heads moving longitudinally to the packet to cut the film through melting.

[0007] Through counter-rotation of the supporting rollers, the cut film is removed from beneath the packet and eliminated through an appropriate longitudinal suction slot.

[0008] Once the film is removed, the covers in the packed condition are transferred by a transversal movement to a subsequent outlet station having a side receiving seat for the covers conformed as a horizontal cradle, along which a movable pusher runs, conformed to axially push the covers in the packed condition towards a conveyor or another means for supplying the covers to a seam folding or can closing machine.

[0009] However, a similar solution is not very reliable, due to the difficulties in reaching perfect coordination between the film removal apparatus and the progress of the covers on the conveyor supplying the seam folding machine.

[0010] In fact, if the seam folding machine is subject to operative slowdown, the covers present on the supply conveyor would not be removed or advanced at the expected speed; therefore, if this situation is not correctly detected, for example in the case of malfunctioning of the sensors provided for this purpose, the apparatus for removal of the protective film from the packets, which operates by cyclically providing onto the conveyor or feeder a fixed number of covers through the movable pusher, could supply to the conveyor or feeder a quantity of covers higher than that effectively admissible on the feeder, causing derailment and falling of the covers from the feeder and consequently causing costly machine stoppages to restore the correct operative conditions.

[0011] Also, this solution for the film removal apparatus is extremely complex and costly, due to the need to comprise several actuators for cutting the film and moving the covers between the various positions, and may also lead to the risk of the film remaining pinched between the covers and being ripped during counter-rotation of the film removal rollers.

[0012] In the field of production and filling of metal boxes and containers, vertical storing or stacking devices for covers are also known, such as, for example, those described in US-A-4.623.057 and DE-A-3431308, which comprise a guide and storing channel for the covers which extends vertically between an upper inlet end for receiving from a side a single cover at a time carried by a first conveyor and a lower outlet end for the covers towards a second conveyor for feeding the covers to seam folding or can closing machines.

[0013] These storing devices also have magnetic stabilization and spacing means for the covers which extend vertically on opposite sides along the guide channel, in a manner to form a storage unit capable of compensating any transitory differences between the number of covers entering and exiting the device.

[0014] However, as said, a similar solution is designed to receive a single cover at a time from a conveyor, according to a transversal direction to the axis of the storing channel, and therefore could not be used to solve the problem indicated above relating to coordination between the film removal apparatus and the advancing of the covers on the conveyor feeding the seam folding machine, since the storing device is not suitable for receiving simultaneously a large number of covers in packed condition, as in the case of the film removal apparatus described above.

OBJECTS OF THE INVENTION

[0015] The main object of the invention is to provide a storing and guide device for flat or shaped articles in ferromagnetic material, supplied in a packed condition by an apparatus for the removal of a protective film from packets of said articles connectable to the device itself, which allows the aforementioned problem of coordination between the film removal apparatus and the advancing of the articles on the conveyor of a seam folding machine to be overcome.

[0016] Another object of this invention is to provide apparatus for the removal of protective film from packets of flat or shaped articles in ferromagnetic material with a high level of operative reliability, with particular reference to the step of feeding the covers onto the conveyor of a seam folding machine, preventing the occurrence of problems of derailment and falling of the covers from the conveyor.

[0017] A further object of this invention is to provide an apparatus for the removal of a film, of the kind indicated above, which has a simplified and less costly construction, and which simultaneously allows to reduce the time necessary for cutting the protective film and eliminate the risk of pinching and ripping of the film during its removal.

BRIEF DESCRIPTION OF THE INVENTION

[0018] The above can be achieved by a storing and guide device for flat or shaped articles in ferromagnetic material, supplied in a packed condition by a protective film removal apparatus for the removing a protective film from packets of said articles which is connectable to the device itself, comprising:

a guide channel for the articles which extends from an inlet end to an outlet end for the articles; and
stabilizing and spacing magnetic means for the articles which longitudinally extend on opposite sides along said guide channel;
characterized in that:

said guide channel has at least a first braking section for magnetic braking of the articles at said inlet end, and a second sloping section for storing and guiding the articles which are made to move forwards in a spaced apart condition towards the outlet of the guide channel, the inlet end being positioned higher than the outlet end;
said first braking section having first magnetic braking means which are shaped and arranged on a plurality of sides of the braking section to hold and prevent overturning of the articles entering the guide channel;
said second sloped storing and guide section having at least a first upper magnetic bar for supporting the articles in a vertical position and at least a second and a third magnetic bar, on opposite sides, for stabilization of the position of the articles, which extend longitudinally along said sloping section; and
vibration generating means being provided for generating vibration of the second sloping guide section, shaped to cause a forward movement by gravity of the articles suspended along said first magnetic bar towards the outlet of the guide channel.

[0019] According to a further aspect of the invention, the above can be achieved by a protective film removal apparatus for removing a protective film from packets of flat or shaped articles in ferromagnetic material, each packet extending along the longitudinal axis, the apparatus comprising:

a protective film cutting and removal station for cutting and removing the protective film on the packets of articles,
a store having a loading device for loading single packets of articles into the cutting station;
support means for supporting a single packet at the cutting station, the packet being received each time by said loading device,
cutting means shaped to cut the film longitudinally along the packet arranged on said support means,
cut film removing means for removing the cut film from said packet, and
thrust means for pushing the articles, shaped to move axially and feed said articles without the protective film in a packed condition towards an outlet side of the apparatus,
characterized by further comprising a storing and guide device for storing and guiding the articles without the protective film, according to claim 1,
the outlet side of the apparatus being connected to the magnetic braking section of the storing and guide device, to receive said articles without the protective film, supplied in a packed condition by said thrust means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] These and further characteristics according to this invention are clearer from the description which follows, with reference to the attached drawings, in which:

Fig. 1 is a first perspective front view of the apparatus for removal of a protective film from packets of flat or shaped articles in ferromagnetic material, having the storing and guide device for said articles, according to this invention;
Fig. 2 is a second perspective front view of the apparatus in Fig. 1;
Fig. 3 is a rear perspective view of the apparatus in Fig. 1;
Fig. 4 is a side view of the storing and guide device

for the articles, according to this invention;

Fig. 5 is an example of a magnetic diagram of the storing and guide device for the articles, seen from the side;

Figures 6, 7 and 8 are examples of magnetic diagrams of the article storing and guide device, at the respective sections 6-6, 7-7 and 8-8 of Fig. 6;

Fig. 9 is an enlarged detail of the preferential device for cutting the protective film of the packets;

Fig. 10 is an enlarged detail of the means for expulsion of the cut film; and

Fig. 11 is an enlarged detail of the pusher for advancing the covers in a packed condition.

DETAILED DESCRIPTION OF THE INVENTION

[0021] The general characteristics of this invention will be illustrated below through an exemplificative embodiment.

[0022] The storing and guide device for flat or shaped articles in ferromagnetic material, according to this invention, is particularly suitable to be connected to an apparatus for the removal of a protective film from packets of said articles; this apparatus is normally used in the field of production and filling of metal cans and packaging, to remove automatically the protective film from packets of covers and to feed said covers, without the film, on a conveyor or feeder for a seam folding machine or another machine for closing the cans.

[0023] In such a field, the covers, which may have different shapes, for example flat, truncated cone-shaped, crown-shaped, or circular, elliptical, rectangular or square, are normally manufactured using special machines, stacked and then packaged with a thermoretractable plastic protective film, to form packets with a cylindrical or parallelepiped shape, with a length ranging between 500 and 800 mm, which extend along a longitudinal axis.

[0024] As illustrated in Figures 1, 2 and 3, the apparatus for removal of the film from packets of covers comprises a protective film cutting and removal station 10 for cutting and removal of the protective film from the packets of covers, and also a store 11 having a loading device 12 for loading single packets of articles to the cutting station 10.

[0025] As better illustrated in Fig. 3, the store 11 is preferentially in the form of a rectangular steel tank or open-top container positioned behind the apparatus, having a bottom surface 13 sloped towards the apparatus itself, on which packets of covers wrapped in protective film are positioned.

[0026] On the lateral side of the store facing the apparatus, which is open, there is a loading device 12, which is preferentially in the form of a packet raising and translation unit comprising a plurality of loading bars 14 supported to be parallel and spaced apart from each other by two motorized chains 15, in order to be moved upwards along a first vertical containment plane 16 and towards the cutting station 10 along a second horizontal plane 17 for sliding of the single packets.

[0027] The distance between the adjacent loading bars 14 is such that it is possible to receive a single packet of covers at a time from those contained in the store 11; the slope of the bottom surface 13 of the store and the possibility of vertical movement of surface 13 itself allows the single packets to move and be positioned between the respective loading bars 14 and the vertical containment surface 16, in a manner to be brought towards the cutting station 10 by the stepped movement of the bars 14.

[0028] At the cutting station 10, there are suitable support means 18 for supporting a single packet P received each time from the loading device 12; in the preferential embodiment of the apparatus, the means of support, as better illustrated in Fig. 9, are, in particular, in the form of a first and a second roller 18', 18", arranged parallel and spaced apart from each other, which, for purposes of removal of the cut film, are movable in the same direction of rotation, as explained further on.

[0029] The apparatus also comprises cutting means 19 shaped to cut the film longitudinally to packet P positioned on the supporting rollers 18', 18"; preferentially, cutting means 19, as better illustrated in Fig. 9, comprise a hot air or fluid cutting device having hot air emission slots extending longitudinally to packet P and along the end sides of packet P itself, in a manner to allow rapid and reliable cutting of the film and its easy removal, and thereby to allow a significant reduction in the cutting times compared with use of normal cutting nozzles which are movable longitudinally to the packets.

[0030] In particular, the cutting device 19 comprises a first elongated upper section 20, which extends parallel to the supporting rollers 18', 18" of packet P, and a first and a second side section 21, 22 which extend at a right-angle downwards at the ends of the elongated section 20, in a manner to cut the film at the ends of the packets.

[0031] The sections 20, 21, 22 of cutting device 19, which are fluidly connected to a source of pressurised air, not illustrated, and comprise suitable air heating elements or resistances inside them, have, as said, hot air emission slots, not illustrated, which define a sort of hot air cutting blade having an overturned U-shape, such as to surround packet P to be cut on three sides.

[0032] The cutting device 19 is supported in a vertically movable way by a pair of linear actuators 23, for example of the pneumatic type, connected to frame 24 of the apparatus, in a manner to be able to move the cutting device 19 selectively between a raised position, in which a packet P may be loaded onto the supporting rollers 18', 18" and the covers free from the film can be moved forward, and a lowered position for cutting the film itself.

[0033] In order to achieve a high level of adaptability of the cutting device 19 to the different lengths possible for the packets of covers, preferentially, as illustrated in Fig. 9, at least a side section 21, 22, is adjustable longitudinally to the elongated section 20, for example through

a special pneumatic actuator or rack mechanism conformed to allow axial translation of the side section 21.

[0034] The apparatus also comprises cut film removing means for the removal of the cut film from the single packet P, which, as illustrated in Fig. 10, preferentially comprise a first and second pneumatic gripping head 25, 26, or alternatively a first and a second mechanical grippers or pliers, supported by a rotating axis 27 positioned parallel to the supporting rollers 18', 18", on a side of roller 18' opposite the other roller 18"; appropriately controlling the rotation of axis 27, the gripping heads 25, 26 or pliers are able to grip and remove the cut film from the side of packet P, in order to take it to a suction mouth or opening 28, for example connected to a source of suction or to a device for the generation of a depression through a Venturi effect, in a manner to take the removed film away.

[0035] The removal of the film from the side of packet P is performed not only by the traction or drawing action exercised by the gripping heads 25, 26 rotating around axis 27, but also by selectively controlling the rotation of the supporting rollers 18', 18" in the same direction of rotation, as mentioned above; this is performed by imposing, through an electric motor, a rotation to a rubber coated control wheel 29 operatively connected to rollers 18', 18".

[0036] By removing the film in this way, the risk of the film remaining pinched between the covers and being torn is avoided, thereby preventing problems linked with the presence of residual pieces of film during the cover seam folding operations.

[0037] The apparatus also comprises thrust means 30 for the covers from which the protective film has been removed, which are conformed to move axially and to supply the covers in a packed condition towards an outlet side 31 of the apparatus, starting directly from the cutting station 10.

[0038] As better illustrated in Fig. 11, the thrust means 30 preferentially comprise a pneumatic cylinder 32 positioned parallel and spaced apart on one side of the supporting rollers 18', 18", the cylinder 32 comprising a longitudinally movable slider 33 to which a fork thruster 34 is attached which extends between the supporting rollers 18', 18',' to push the covers in a packed condition axially to bring them directly towards the outlet side 31; in this way, the construction of the apparatus is simplified, since there is no longer a separate receiving area or seat for the covers in which the advancing or feed of the covers towards the outlet is performed.

[0039] In order to achieve the purposes mentioned above in the description, on the outlet side of the apparatus, it is necessary to provide a cover storing and guide device 35, according to this invention, which is suitable for receiving the covers free from the protective film, which are supplied in a packed condition by the apparatus.

[0040] The device 35, better illustrated in Figures 4 to 8, comprises a guide channel 36 for guiding the covers C which extends between an inlet end 37, designed to receive the covers C from the outlet side 31 of the apparatus, and an outlet end 38 for feeding the covers C towards a conveyor, of which only the sliding guide 39 of the movable belt is shown in the figures, for supply to a seam folding machine, not shown.

[0041] The guide channel 36 according to the invention has at least a first magnetic braking section 40 for the covers near inlet end 37, and also a second sloped storing and guide section 41 for the covers which are made to move forward in a spaced apart condition towards the outlet 38 of guide channel 36; in particular, the sloped section 41 may be straight, as in the figures, or variously curved, with the inlet end 37 positioned higher or at a greater height than the outlet end 38.

[0042] In the case of straight sloped section 41, the preferential slope is comprised between 20° and 45°.

[0043] The first braking section 40 has first magnetic braking means 42 shaped and positioned on several sides of the braking section 40 itself for holding and preventing overturning of the covers C entering the guide channel 36.

[0044] The second sloped storing and guide section 41 according to the invention has at least a first upper magnetic bar 36A for supporting the covers C in a vertical position, and at least a second and a third magnetic bar 36B and 36C, on opposite sides, for stabilization of the position and spacing of covers C, which extend longitudinally along sloped section 41 itself.

[0045] Preferentially, the guide channel 36 is formed as a whole of a plurality of guide bars 36A, 36B, 36C, 36D, at least three of which form the magnetic bars 36A, 36B and 36C of the sloped section 41 of the channel 36.

[0046] The guide bars 36A, 36B, 36C, 36D, which are made in non-magnetic material, such as stainless steel, extend longitudinally along channel 36, in a manner to define between them a substantially cylindrical passage for the covers, having a cross dimension just larger than the section of the covers themselves, for having a minimum clearance to allow their longitudinal movement.

[0047] In the preferential embodiment illustrated, there are four guide bars 36A-36D, which are hollow and have a square cross section; in particular, there is a first upper guide bar 36A, which in the sloped section 41 defines the first magnetic support bar 36A for supporting the covers C, a second and a third lateral guide bar 36B, 36C, which form the magnetic stabilization bars 36B, 36C of the sloped section 41 of channel 36, and a fourth lower guide bar 36D, which are equidistant and angularly spaced apart along guide channel 36, in a manner to be basically tangential to four generatrix lines of the cylindrical space for passage of the covers.

[0048] Preferentially, as illustrated in Figures 5, 6 and 7, the magnetic braking means 42 of the first section 40 of the channel comprise a plurality of permanent magnets 42' housed inside the hollow guide bars 36A-36D, in which each bar 36A-36D comprises a succession of permanent magnets 42' having alternatingly opposite pole

faces and turned at right angles to the axis of guide channel 36, and in which the polarities are displaced or different between magnets of adjacent bars.

[0049] On the other hand, as illustrated in Figures 5 and 8, preferentially the upper magnetic bar 36A and lateral magnetic bars 36B, 36C are formed of the respective hollow guide bars in non-magnetic material, in which permanent magnets 43 are housed having pole faces turned at right angles to the axis of guide channel 36, in a manner that each magnetic bar 36A, 36B, 36C has the same polarity along its entire longitudinal extension, possibly displaced or different with respect to the adjacent magnetic bars.

[0050] In particular, as illustrated, preferentially the upper magnetic bar 36A has a first polarity, for example N, along its entire longitudinal extension, whereas the side magnetic bars 36B, 36C have an opposite polarity, in this case S, along their entire longitudinal extension; the lower guide bar 36D, on the other hand, is neutral.

[0051] It is possible for magnetic bars 36A, 36B, 36C to have inverted polarities or all to have the same polarity.

[0052] It is also possible for the sloped section 41 of the channel 36 to be configured differently, for example by comprising two upper magnetic supporting bars, which could be particularly suitable for supporting elongated rectangular covers, and also having a different arrangement of the magnetic bars, provided that there are at least one upper magnetic supporting bar and at least two magnetic stabilization and spacing bars for the covers on opposite sides of the sloped section.

[0053] The storing and guide device 35 according to the invention also comprises vibration generating means for generating vibration of the second sloped guide section 41, for example an appropriate vibration device 44, conformed to cause a forward movement or an advance by gravity of the covers C suspended along the first magnetic bar 36A towards the outlet 38 of guide channel 36.

[0054] As illustrated in Figures 1 and 2, the storing and guide device 35 is fixed on the outlet side 31 of the film removal apparatus, in a manner that the cutting station 10 of the apparatus is axially aligned with inlet end 37 of the device near braking section 40, allowing in this manner direct supply of the covers in a packed condition from the cutting station 10 to the storing device 35 through advancing of thruster 34.

[0055] Since the cutting station 10 of the apparatus and the guide 39 of the conveyor, where outlet end 38 of storing device 35 comes out, are basically parallel and spaced apart from each other, the storing device 35, near inlet end 37 and outlet end 38, is shaped to have suitable radiusing curves between the cutting station 10 and the sloped section 41 of channel 36, respectively between the sloped section 41 and the guide 39 of the conveyor, as better illustrated in Fig. 4.

[0056] As better illustrated in Fig. 5, the braking section 40 of guide channel 36 is positioned at the upper radiusing curve of device 35, whereas the lower radiusing curve is defined by curved elongation of the magnetic bars of the sloped section 41 of guide channel 36.

[0057] Preferentially, as better illustrated in Figures 5, 6, 7, in order to guarantee continuity between the supporting rollers 18', 18" of cutting station 10 and the bars of braking section 40 of guide channel 36, the braking section 40 itself is divided longitudinally into two sections 40', 40", angularly spaced apart from each other; in particular, the first section 40' has two lower bars 45C, 45D, axially aligned to respective supporting rollers 18', 18", and two upper bars 45A, 45B, in which these bars 45A-45D extend longitudinally in part between bars 36A-36D which define the second section 40" of braking section 40 and which extend to define the sloped section 41 of guide channel 36.

[0058] The position and reciprocal distance of guide bars 36A-36D of guide channel 36 are maintained thanks to a plurality of supporting rings 46 for the bars, which are positioned axially spaced apart from each other along guide channel 36; preferentially, the guide bars 36A-36D are connected to the supporting rings 46 in a radially adjustable manner, for example through adjustment screws, in order to be able to adapt guide channel 36 to receive covers having different dimensions, on the basis of production requirements.

[0059] At the sloped section 41 of guide channel 36, there are cover detecting means, for example an optical sensor 47 or of another kind, positioned at the high part of sloped section 41, said detecting means being suitable for detecting the presence of covers in the sloped storing section 41, in a manner to generate an enabling or consent signal for the film removal apparatus to supply new covers into guide channel 36.

[0060] In particular, each time the sensor 47 detects that the covers in sloped section 41 of channel 36 have fallen down below a certain level, the sensor 47 sends a consent signal to an electronic control unit of the apparatus, which controls the subsequent succession of operative steps:

- a first loading step of packet P of covers wrapped in protective film from the store 11, by actuation of the loading device 12, where the motorised chains 15 are advanced by one step, in order to bring the single packet, removed previously from store 11 by loading bars 14, towards the cutting station 10;
- a second film cutting step, in which actuators 23 move down or lower the hot-air cutting device 19, previously activated and adjusted to the suitable length, onto the packet P, in order to immediately cut the film on the upper side and at the ends of the packet;
- a third removal step for the cut film, in which the pneumatic gripping heads 25, 26 or pliers grip the film on the side of the packet, with simultaneous rotation of both the supporting axis 27 of gripping heads 25, 26 or pliers and the supporting rollers 18', 18" in the same direction, in order to remove the film from the side, immediately eliminating it through suction

into the mouth 28;
a fourth step of advancement of the covers in a packed condition, free from the film, in which, after raising the cutting device 19 through actuators 23, pneumatic cylinder 32 is actuated, which moves forward the thruster 34 to bring the covers in a packed condition into the storing device 35, with the braking section 40 which, by magnetically holding the incoming covers, prevents them from overturning and allows safe and reliable insertion of the covers in the sloped storing section 41.

[0061] Thanks to the fact that, in the sloped section 41 of the storing device 35, the covers are magnetically spaced apart from each other as a result of magnetic bars 36A, 36B, 36C, the storing device 35 according to this invention acts as a storage unit, in a manner to compensate any difference between the number of incoming covers and the number of covers leaving storing device 35, thereby resolving the problem of derailment and falling of the covers from the conveyor supplying them to the seam folding machine.

[0062] What has been described and shown with reference to the attached drawings has been provided by way of example only and to illustrate the general characteristics of the invention, and also several preferential embodiments; therefore, other variations or modifications to the storing and guide device for flat or shaped articles in ferromagnetic material, and to the apparatus for removal of protective film from packets of said articles, are possible, without deviating from the claims.

Claims

1. A storing and guide device (35) for flat or shaped articles (C) in ferromagnetic material, supplied in a packed condition by a protective film removal apparatus for removing a protective film from packets (P) of said articles (C) which is connectable to the device (35) itself, comprising:

   a guide channel (36) for the articles (C) which extends from an inlet end (37) to an outlet end (38) for the articles (C); and
   stabilizing and spacing magnetic means (36B, 36C) for the articles (C) which longitudinally extend on opposite sides along said guide channel (36);
   characterized in that:
   said guide channel (36) has at least a first braking section (40) for magnetic braking of the articles (C) at said inlet end (37), and a second sloping section (41) for storing and guiding the articles (C) which are made to move forwards in a spaced apart condition towards the outlet (38) of the guide channel (36), the inlet end (37) being positioned higher than the outlet end (38);
   said first braking section (40) having first magnetic braking means (42) which are shaped and arranged on a plurality of sides of the braking section (40) to hold and prevent overturning of the articles (C) entering the guide channel (36);
   said second sloped storing and guide section (41) having at least a first upper magnetic bar (36A) for supporting the articles (C) in a vertical position and at least a second and a third magnetic bar (36B, 36C), on opposite sides, for stabilization of the position of the articles (C), which extend longitudinally along said sloping section (41); and
   vibration generating means (44) being provided for generating vibration of the second sloping guide section (41), shaped to cause a forward movement by gravity of the articles (C) suspended along said first magnetic bar (36A) towards the outlet (38) of the guide channel (36).

2. Storing and guide device (35) according to claim 1, **characterized in that** the guide channel (36) as a whole is formed of a plurality of guide bars (36A - 36D) which extend longitudinally along the channel (36) to define between them an essentially cylindrical space for the passage of the articles (C), at least three (36A, 36B, 36C) of said guide bars forming said support and stabilization magnetic bars (36A, 36B, 36C) of the second sloping section (41) of the guide channel (36).

3. Storing and guide device (35) according to claim 2, **characterized in that** said guide channel (36) comprises a first upper guide bar (36A), which in the sloping section (41) defines said first magnetic support bar (36A) for supporting the articles (C), a second and a third side guide bars (36B, 36C) which form said side magnetic stabilization bars (36B, 36C) of the sloping section (41), and a fourth lower guide bar (36D), said guide bars (36A - 36D) being equidistant and angularly spaced from each other along the guide channel (36), and being hollow and in non-magnetic material.

4. Storing and guide device (35) according to claim 3, **characterized in that** said magnetic braking means (42) of the first channel section (40) comprise a plurality of permanent magnets (42') housed inside the hollow guide bars (36A - 36D), each bar (36A - 36D) comprising a succession of permanent magnets (42') having alternatingly opposite pole faces turned at right angles to the axis of the guide channel (36).

5. Storing and guide device (35) according to claim 3, **characterized in that** said upper magnetic bar (36A) and said side magnetic bars (36B, 36C) of the sloping section (41) are formed by respective guide bars (36A, 36B, 36C) comprising permanent mag-

nets (43) having pole faces turned at right angles to the axis of the guide channel (36), each magnetic bar (36A, 36B, 36C) having a same polarity along its longitudinal extension.

6. Storing and guide device (35) according to claim 5, **characterized in that** the upper magnetic bar (36A) has a first polarity along its entire longitudinal extension and the side magnetic bars (36B, 36C) have an opposite polarity with respect to said first polarity, along their entire longitudinal extension.

7. Storing and guide device (35) according to claim 2, **characterized in that** the braking section (40) is divided longitudinally into two sections (40', 40") having guide bars (45A - 45D; 36A - 36D) angularly staggered to each other.

8. Storing and guide device (35) according to claim 2, **characterized by** comprising a plurality of support rings (46) for supporting the guide bars (36A - 36D), arranged axially spaced apart from each other along the guide channel (36), the guide bars (36A - 36D) being connected to the support rings (46) in a radially adjustable manner.

9. Storing and guide device (35) according to claim 1, **characterized by** comprising detecting means (47) for detecting the articles (C) in said second storing and guide section (41), shaped to generate a consent signal for said film removal apparatus to provide articles (C) into inlet (37) of the guide channel (36).

10. Protective film removal apparatus for removing a protective film from packets (P) of flat or shaped articles (C) in ferromagnetic material, each packet (P) extending along the longitudinal axis, the apparatus comprising:

a protective film cutting and removal station (10) for cutting and removing the protective film on the packets (P) of articles (C),
a store (11) having a loading device (12) for loading single packets (P) of articles (C) into the cutting station (10);
support means (18) for supporting a single packet (P) at the cutting station (10), the packet (P) being received each time by said loading device (12),
cutting means (19) shaped to cut the film longitudinally along the packet (P) arranged on said support means (18),
cut film removing means (25, 26) for removing the cut film from said packet (P), and
thrust means (30) for pushing the articles (C), shaped to move axially and feed said articles (C) without the protective film in a packed condition towards an outlet side (31) of the apparatus,
characterized by further comprising a storing and guide device (35) for storing and guiding the articles (C) without the protective film, according to claim 1,
the outlet side (31) of the apparatus being connected to the magnetic braking section (40) of the storing and guide device (35), to receive said articles (C) without the protective film, supplied in a packed condition by said thrust means (30).

11. Protective film removal apparatus according to claim 10, **characterized in that** the film cutting and removal station (10) is axially aligned to the inlet (37) of said storing and guide device (35) for the articles (C).

12. Protective film removal apparatus according to claim 10, **characterized in that** said support means (18) for supporting the single packet (P) received by the loading device (12) comprise a first and a second roller (18', 18") arranged parallel to and spaced from each other, and movable in a same direction of rotation.

13. Protective film removal apparatus according to claim 10, **characterized in that** said cutting means (19) comprise a hot-air cutting device (19) having hot air emission slots which extend longitudinally along the packet (P) on said support means (18) and along the end sides of the packet (P) itself.

14. Protective film removal apparatus according to claim 13, **characterized in that** said cutting device (19) comprises a first upper elongated section (20) parallel to said support means (18) for the packet (P), and a first and second side sections (21, 22) extending at right angles to the first elongated section (20), said hot air emission slots extending along said sections (20, 21, 22) according to a U-shape as a whole.

15. Protective film removal apparatus according to claim 13, **characterized in that** the cutting device (19) is supported in a vertically movable manner by linear actuators (23) which are drivable to selectively move the cutting device (19) between a raised position and a lowered cutting position for cutting the film.

16. Protective film removal apparatus according to claim 14, **characterized in that** at least one side section (21, 22) of the cutting device (19) is adjustable in position longitudinally to said elongated section (20).

17. Protective film removal apparatus according to claim 12, **characterized in that** said cut film removing means (25, 26) for removal of the cut film comprise a first and a second pneumatic gripping heads (25, 26) or a first and a second pliers, supported by a

rotating axis arranged parallel to the support rollers (18', 18") for the packet (P), and drive means shaped to rotate the support rollers (18', 18") in a same direction for extraction of the film.

18. Protective film removal apparatus according to claim 12, **characterized in that** said thrust means (30) for pushing the articles (C) without the protective film comprise a pneumatic cylinder (32) parallel to and spaced apart on one side of said support rollers (18', 18"), the cylinder (32) comprising a longitudinally movable slider (33) having a thruster (34) protruding between the support rollers (18', 18") to push said articles (C) in a packed condition axially towards the outlet (31) of the apparatus.

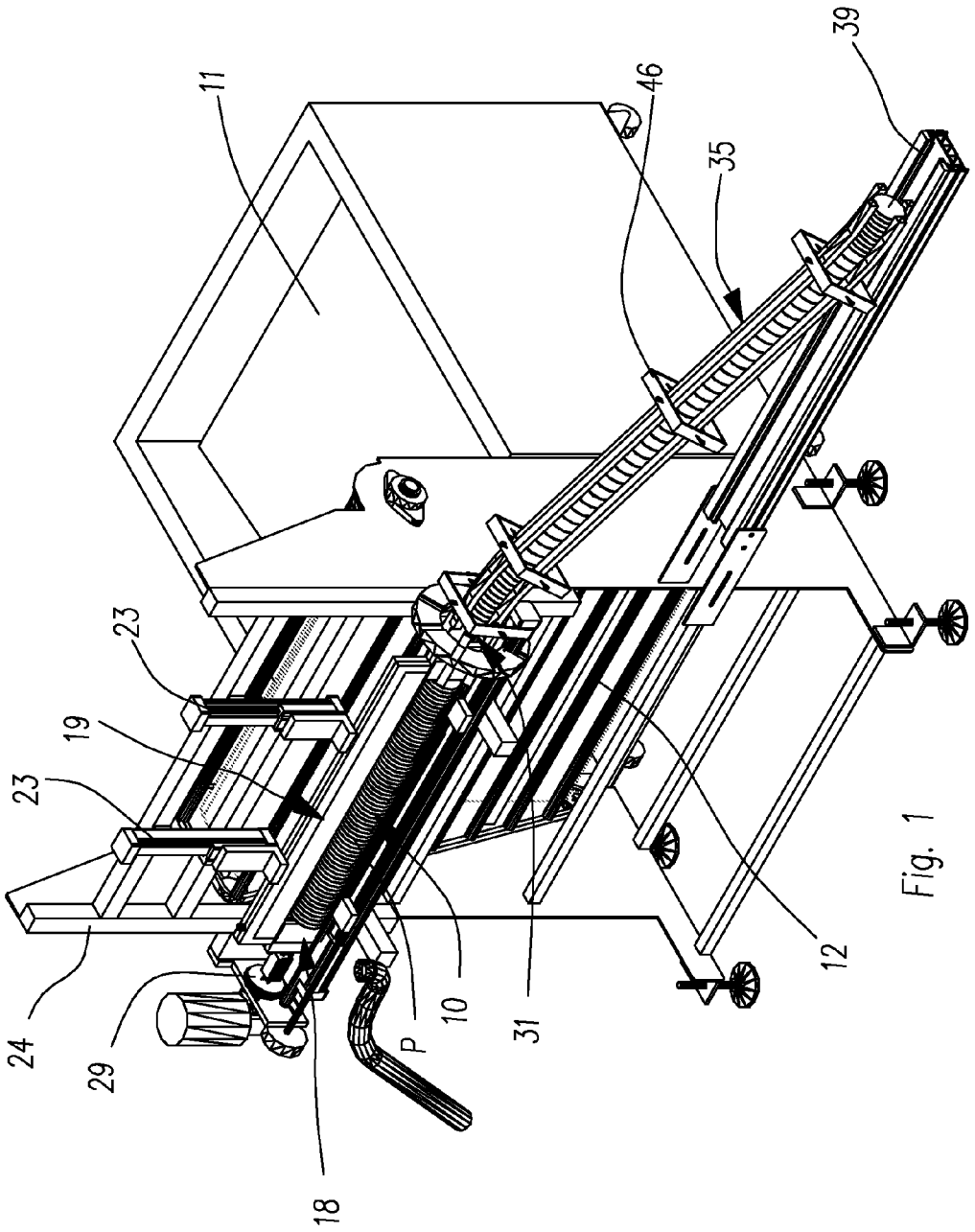

Fig. 1

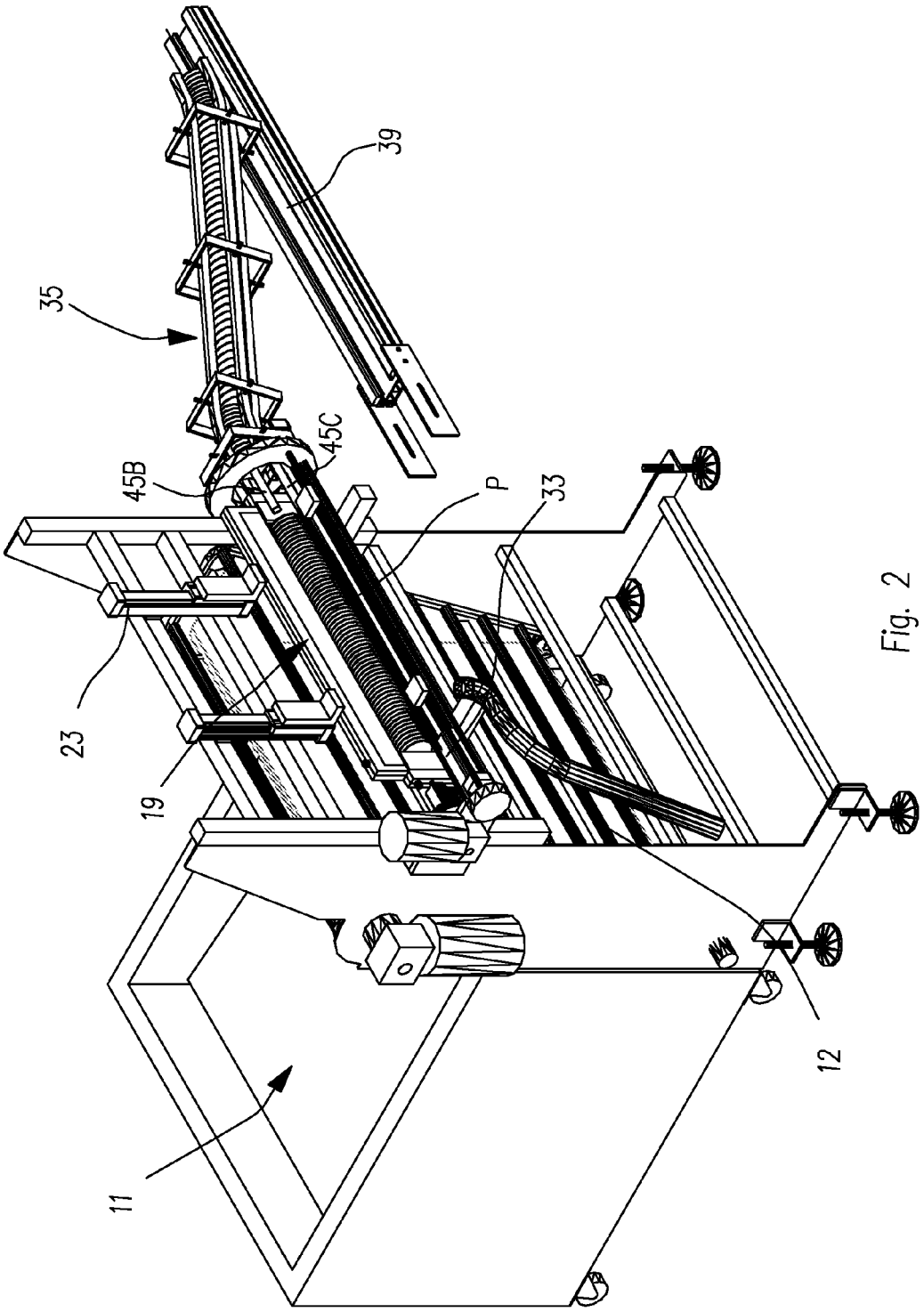

Fig. 2

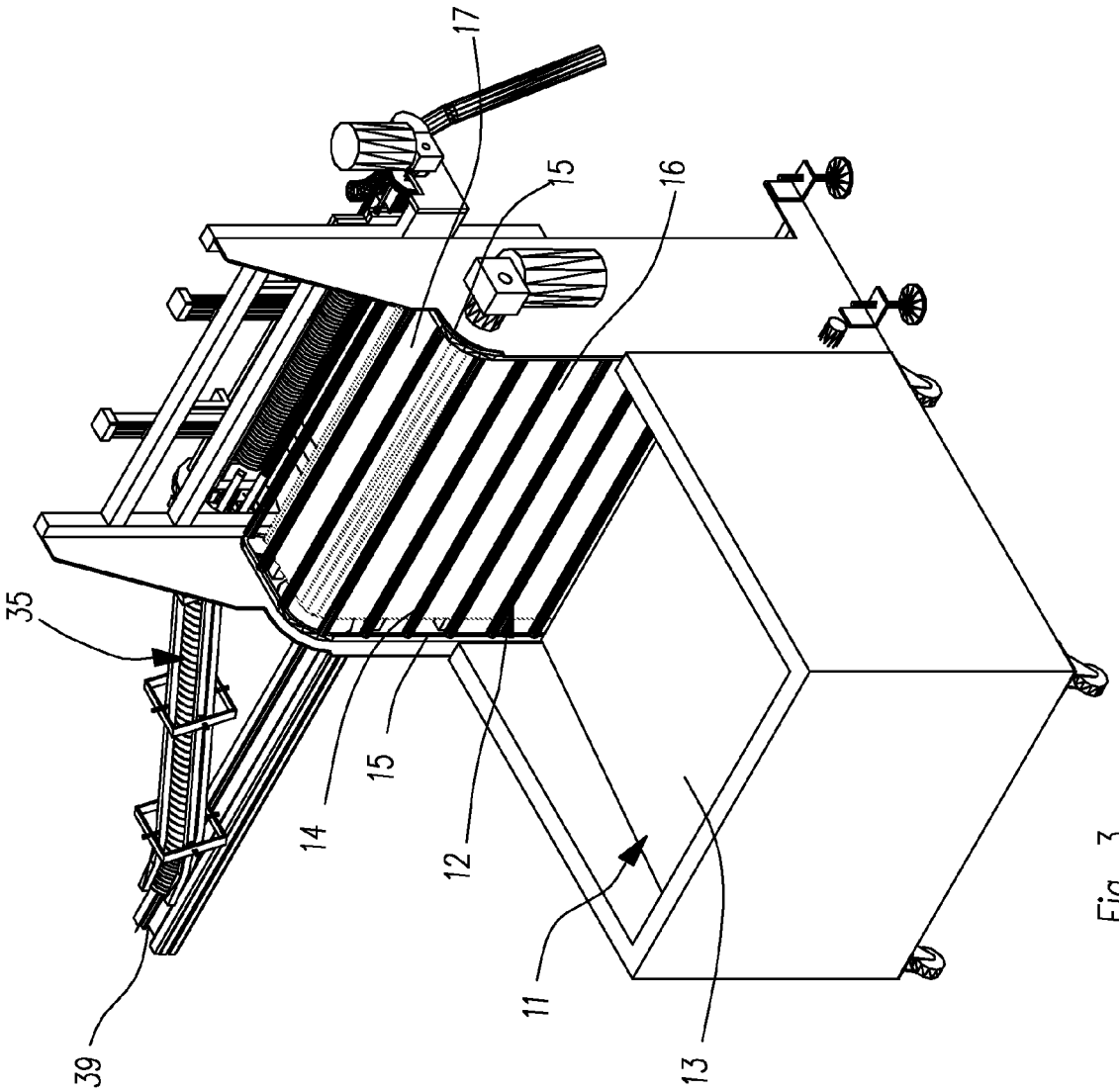

Fig. 3

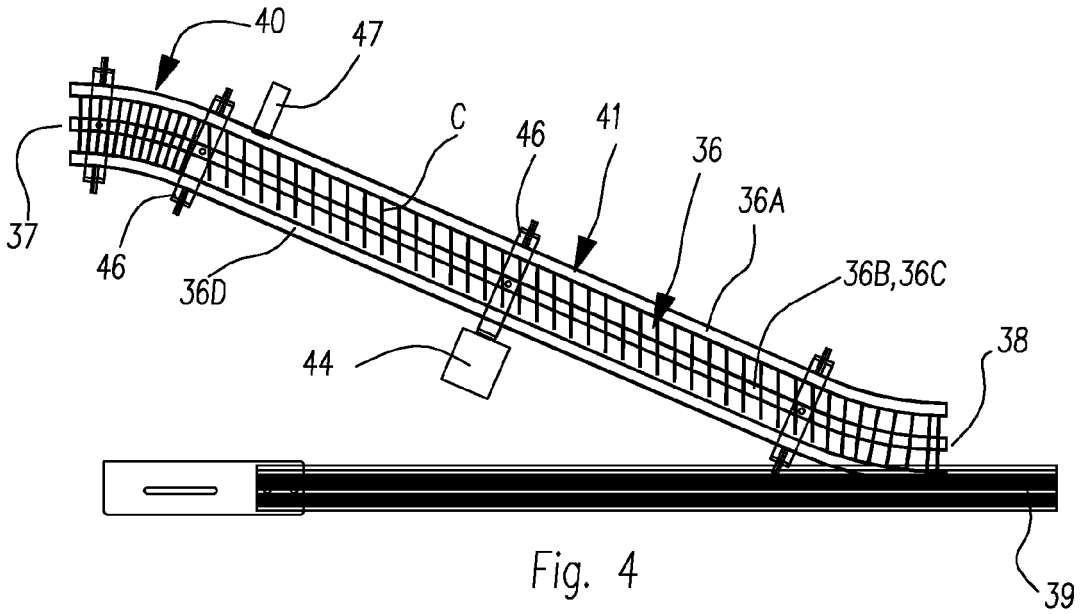

Fig. 4

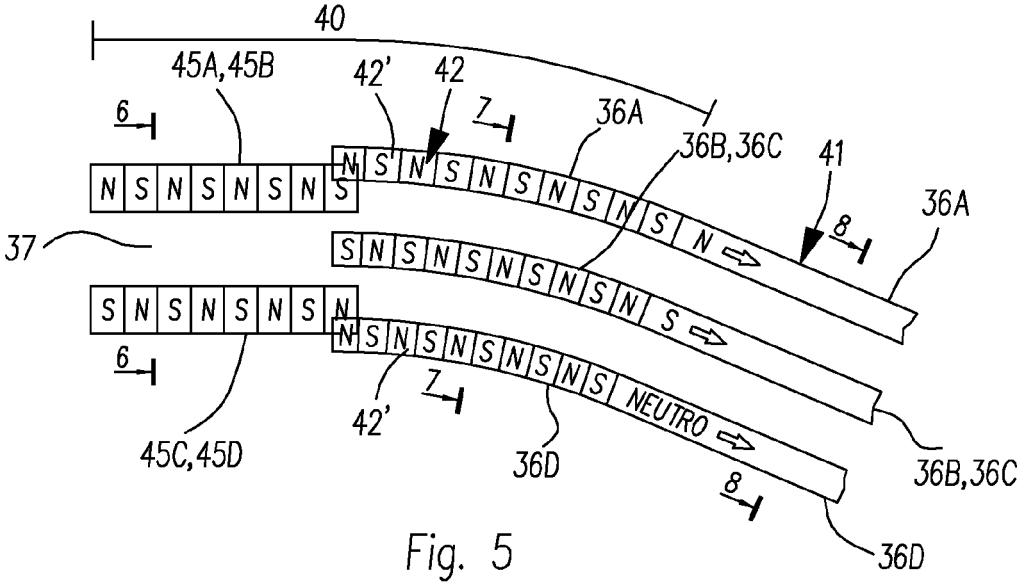

Fig. 5

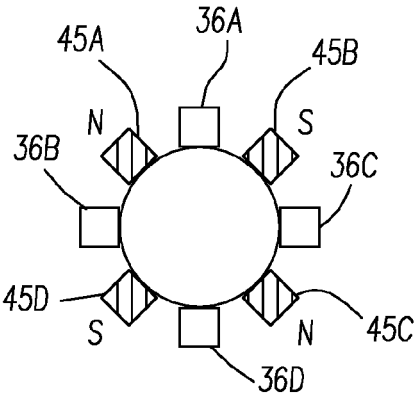

Fig. 6

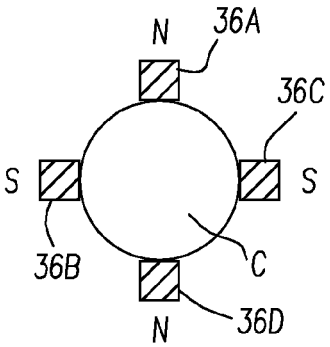

Fig. 7

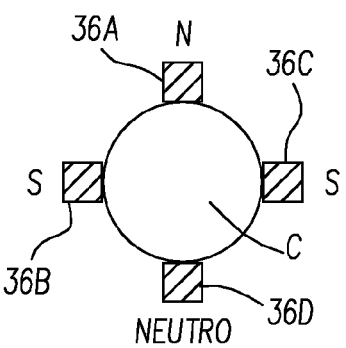

Fig. 8

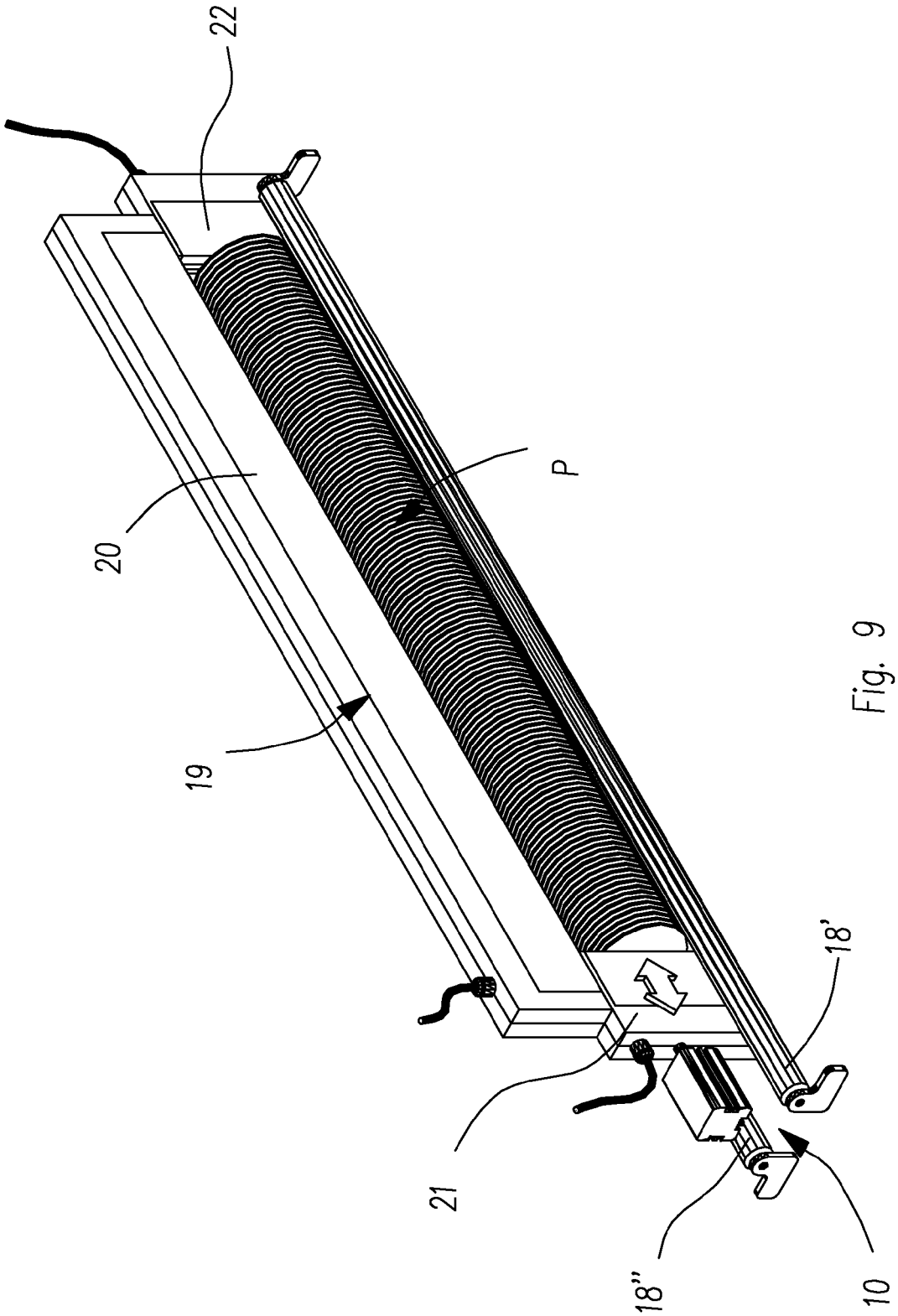

Fig. 9

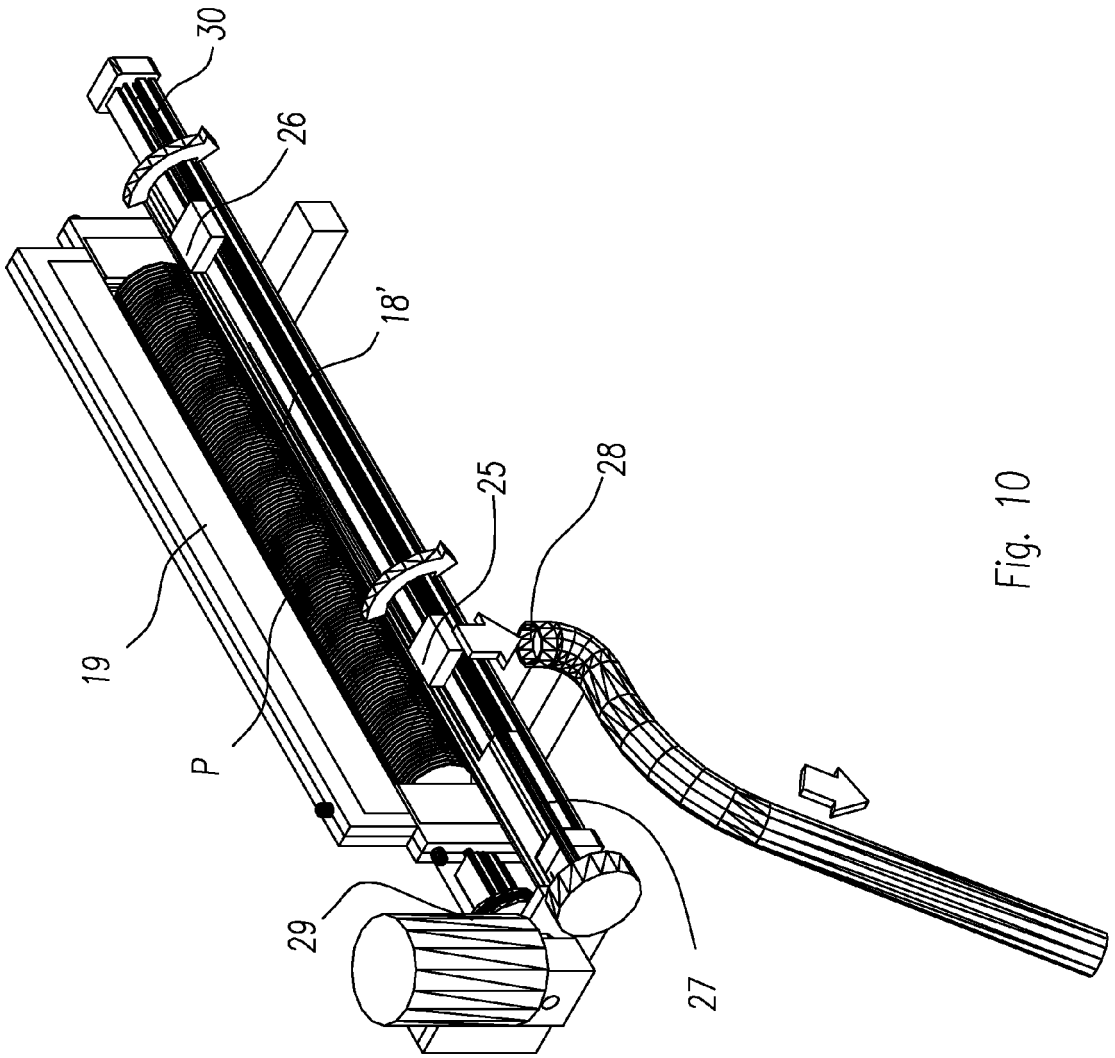

Fig. 10

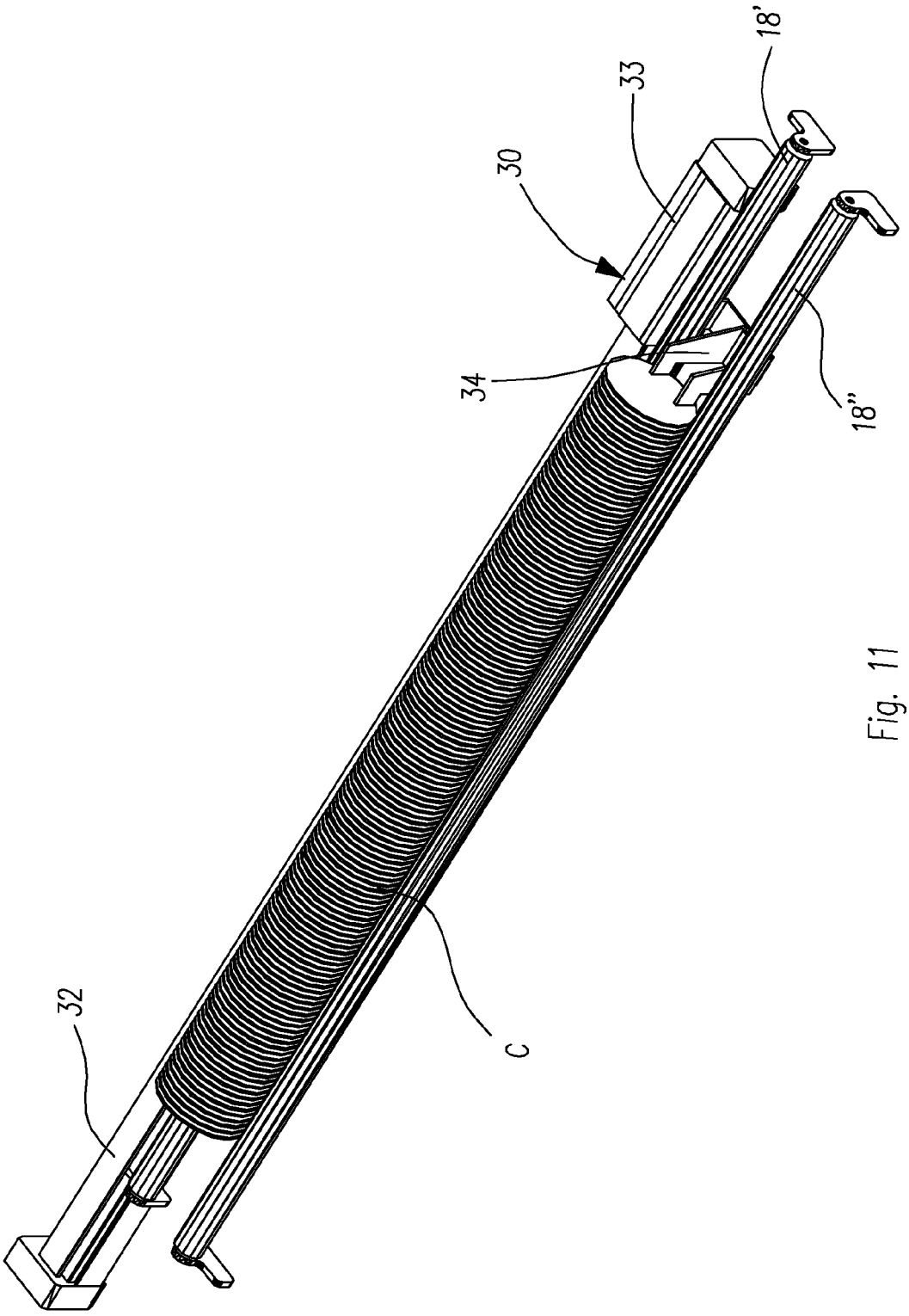

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 4262

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 2 889 073 A (NOGLE CHARLES C) 2 June 1959 (1959-06-02) * column 2, line 25 - column 3, line 2; figures 1-2 * * column 4, line 73 - column 5, line 31 *	1-18	INV. B65B7/28 B65B69/00 B65G47/26
Y	DE 199 61 650 A1 (NSM MAGNETTECH GMBH & CO KG [DE]) 5 July 2001 (2001-07-05) * column 2, line 62 - column 3, line 5 * * column 4, lines 39-47; figures 1-3 * * column 5, lines 23-41 * * column 6, lines 25-28 *	1-18	
Y	US 2 795 340 A (HOMMEL WILLIAM B) 11 June 1957 (1957-06-11) * column 3, lines 54-74; figures 1-5 *	9	
Y	EP 1 534 615 B1 (TECHNO ITALY S R L [IT]) 17 January 2007 (2007-01-17) * paragraphs [0004], [0007], [0013], [0015], [0020], [0022] - [0023], [0025], [0036], [0040], [0041], [0044], [0046], [0048] - [0050], [0052], [0056] * * paragraphs [0057], [0067], [0069], [0074], [0080], [0081], [0087], [0091], [0092], [0118], [0126]; figures 1-14 *	10-18	

TECHNICAL FIELDS SEARCHED (IPC)
B65B
B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 June 2010	Garlati, Timea

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04-06-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2889073 A	02-06-1959	NONE	
DE 19961650 A1	05-07-2001	NONE	
US 2795340 A	11-06-1957	NONE	
EP 1534615 B1	17-01-2007	AU 2002306229 A1	10-11-2003
		EP 1534615 A1	01-06-2005
		WO 03091134 A1	06-11-2003

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Patent documents cited in the description

- WO 03091134 A **[0005]**
- US 4623057 A **[0012]**
- DE 3431308 A **[0012]**