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(54) **An automated web reel loading apparatus**

(57) There is described a web reel loading apparatus (1) comprising: support means (22) externally supporting a stack of web reels (2) arranged coaxially with a first axis (D, E); a receiving hub (5) having a second axis (C), rotating about the second axis (C) and set in a loading position, in which it faces the support means (22) and is arranged with the second axis (C) coaxial with the first axis (D, E); and first actuator means (32) for moving the support means (22) parallel to the first axis (D, E) between a rest position, in which the stack of web reels (2) is spaced from, and faces, the receiving hub (5), and a

working position, in which at least one end web reel (2) of the stack is engaged by the receiving hub (5) in the loading position so as to be withdrawn from the support means (22); wherein the receiving hub (5) includes retaining means (45) selectively set between a release configuration, in which they allow engagement/ disengagement of the receiving hub (5) into/from a core of one web reel (2), and a retaining configuration, in which they prevent disengagement of the receiving hub (5) from the engaged web reel (2).

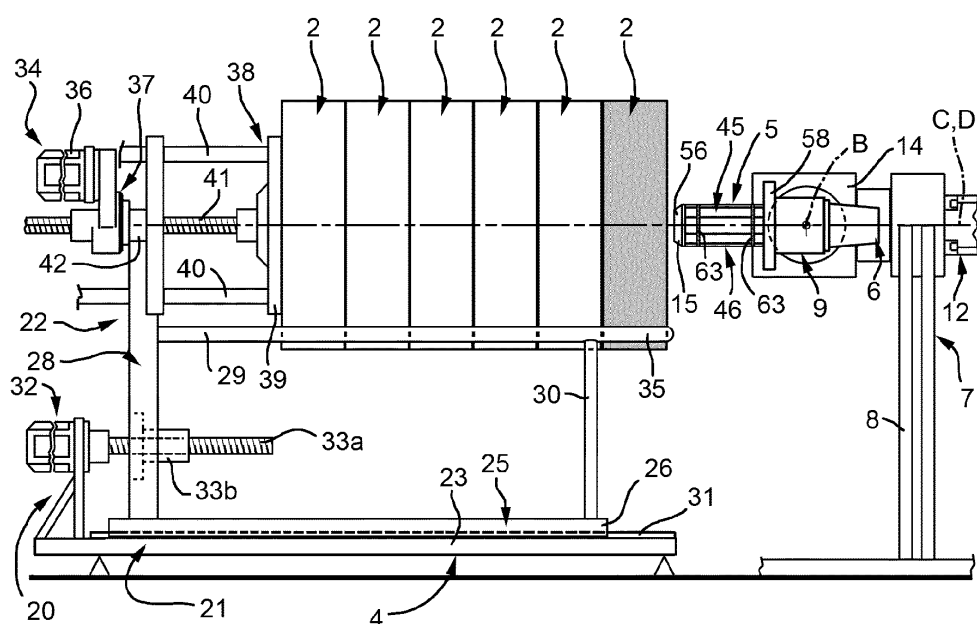


FIG. 2

Description

[0001] The present invention relates to a web reel loading apparatus adapted to automatically set reels of a web material in a working condition, in which the web material is continuously fed to a processing machine.

[0002] In particular, the present invention has advantageous but not exclusive application in the labelling field, wherein the web material comprises a succession of labels adapted to be placed on containers, for example bottles or cans, in a labelling machine. In this specific context, the web material may consist entirely in a succession of labels to be separated by means of repeated cutting of the web material itself; alternatively, the web material may be constituted by a strip support on which a succession of adhesive labels are applied, also known as "pressure sensitive labels", spaced from each other by predetermined amounts.

[0003] The present invention may be also used in the packaging field; in this specific context, the web material has a multilayer structure and is adapted to be folded, welded and cut out for achieving sealed packages, for example containing pourable food products.

[0004] The following description will make explicit reference to the labelling field, although this is in no way intended to limit the scope of protection as defined by the accompanying claims.

[0005] As known, in order to ensure an uninterrupted feeding of a web material to a processing machine, such a labelling machine, new reels of the web material need to be periodically transferred from a storing position to a working position, in which each reel is mounted on a rotatable receiving hub adapted to unwind the web material.

[0006] The transfer operation is typically performed by dedicated tools, such as carts, robotic arms, etc., which ensure a certain degree of automation of this operation even if they always require that a skilled operator be present at frequent intervals for performing specific tasks.

[0007] A need is therefore particularly felt to reduce human intervention in the operation of loading a new reel in a working condition so as to achieve higher production speeds and efficiency as well as less risks of industrial accidents.

[0008] It is an object of the present invention to provide a web reel loading apparatus, which allows to meet the above-indicated need in a straightforward and low-cost manner.

[0009] This object is achieved by a web reel loading apparatus as claimed in claim 1.

[0010] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a top plan view, with parts removed for clarity, of an automated web reel loading apparatus in accordance with the teachings of the present invention;

Figures 2 to 5 show respective larger-scale side views of the apparatus of Figure 1, in different operative conditions;

Figure 6 shows a larger-scale front view, with parts removed for clarity, of a reel receiving hub of the apparatus of Figures 1 to 5; and

Figure 7 shows a larger-scale section along line VII-VII in Figure 6.

[0011] Number 1 in Figure 1 indicates as a whole a web reel loading apparatus according to the present invention.

[0012] In particular, apparatus 1 is adapted to automatically set reels 2 of a web material 3 in a working condition, in which the web material 3 is continuously fed to a processing machine (known per se and not shown).

[0013] Apparatus 1 may be advantageously used in the labelling field, wherein the web material 3 comprises a succession of labels adapted to be placed on containers, for example bottles or cans, in a labelling machine (known per se and not shown). In this specific context, the web material 3 may consist entirely in a succession of labels to be separated by means of repeated cutting of the web material 3 itself; alternatively, the web material 3 may be constituted by a strip support on which a succession of adhesive labels are applied, also known as "pressure sensitive labels", spaced from each other by predetermined amounts.

[0014] According to another possible, non illustrated embodiment of the present invention, apparatus 1 may be also used in the packaging field; in this specific context, the web material 3 has a multilayer structure and is adapted to be folded, welded and cut out for achieving sealed packages, for example containing pourable food products.

[0015] With reference to Figure 1, apparatus 1 comprises one or more reel magazines 4, three in the example shown, and one or more receiving hubs 5, two in the example shown, each of which is adapted to receive one reel 2 at a time from a respective magazine 4 and is controlled by a respective actuator assembly 6 to unwind the web material 3 from the reel 2 itself and to feed it to a following processing machine.

[0016] As shown in Figure 1, receiving hubs 5 are mounted on a central support device 7, whilst magazines 4 are arranged in three distinct positions around support device 7.

[0017] In particular, support device 7 comprises a fixed frame 8 and an oscillating arm 9, protruding from opposite sides of the fixed frame 8 and centrally connected thereto in a rotatable manner about a horizontal axis A. In practice, axis A defines a fulcrum for a central portion 10 of oscillating arm 9.

[0018] More specifically, oscillating arm 9 has a longitudinal axis B, orthogonal to axis A, and carries, at its opposite end portions 11, the respective receiving hubs 5.

[0019] Rotation of oscillating arm 9 about axis A is con-

trolled by an actuator assembly 12, for instance an electric motor, supported by frame 8.

[0020] Oscillating arm 9 is normally set in a horizontal configuration and is rotated of 180° about axis A to exchange the positions of the receiving hubs 5.

[0021] As visible in Figures 1 to 5, receiving hubs 5 protrude orthogonally from respective end portions 11 of oscillating arm 9. In particular, each receiving hub 5 has a longitudinal axis C, orthogonal to axis B, and is mounted onto the relative end portion 11 of oscillating arm 9 in a rotatable manner about its axis C and about axis B. More specifically, rotation of each receiving hub 5 about its axis C is controlled by respective actuator assembly 6, which preferably comprises an electric motor carried by oscillating arm 9 and protruding from the latter on the opposite side of the receiving hub 5 itself; as already explained above, rotation of each receiving hub 5 about its axis C allows to unwind the web material 3 from the relative reel 2 and to feed it to the following processing machine.

[0022] Rotation of each receiving hub 5 about axis B is controlled by a respective actuator assembly 13, preferably an electric motor, carried by a stirrup 14 protruding laterally from oscillating arm 9.

[0023] During its rotation about axis B of oscillating arm 9 arranged in the horizontal configuration, each receiving hub 5 can be set in four different positions, two of which defining a horizontal configuration of the receiving hub 5 and the other two defining a vertical configuration thereof.

[0024] In particular, in its horizontal configuration, each receiving hub 5 has its axis C parallel to axis A and has its free end 15 arranged on one side of oscillating arm 9 or on the opposite side thereof.

[0025] As it will be explained in greater details hereafter, each receiving hub 5 is set in a loading position (Figure 2), i.e. in a position in which it is adapted to receive a reel 2 from one of magazines 4, when it extends horizontally and has its free end 15 facing the magazine 4 from which it is destined to receive the reel 2.

[0026] In its vertical configuration, each receiving hub 5 has its axis C orthogonal to axes A and B and its free end 15 arranged above (Figure 4) or below oscillating arm 9 so respectively defining a reel seating position or a reel discharging position.

[0027] In particular, as it will be explained in greater details hereafter, in the reel seating position, the reel 2 loaded on the receiving hub 5 can be arranged in its final condition (Figures 4 and 5) with respect to the receiving hub 5 itself; in the reel discharging position, the receiving hub 5 allows discharge of the exhausted reel 2 by gravity.

[0028] As shown in the example of Figure 1, two of magazines 4 are placed on one side of support device 7 and oscillating arm 9, whilst the third magazine 4 is placed on the opposite side of support device 7 and oscillating arm 9 with respect to the first two magazines 4 and in a position facing one of the latter.

[0029] More specifically, the two facing magazines 4 support respective stacks of reels 2 arranged coaxially with a common axis D parallel to axis A, whilst the third

magazine 4 supports a relative stack of reels 2 arranged coaxially with an axis E parallel to axes A, D and arranged on the opposite side of axis A with respect to axis D.

[0030] In practice, the two facing magazines 4 are aligned with axis D, whilst the third magazine 4 is aligned with axis E.

[0031] As shown in Figures 1 and 2, in their loading positions, receiving hubs 5 face respective magazines 4 and have their axes C arranged coaxially with axes D and E, respectively.

[0032] Receiving hubs 5 are adapted to cooperate with a web splicing device 18 to allow an uninterrupted feeding of the web materials 3 of the various reels 2, carried sequentially by the receiving hubs 5 themselves, to the following processing machine.

[0033] In particular, web splicing device 18 is adapted to splice the web material 3 of a new reel 2, mounted on one of the receiving hubs 5, to the web material 3 of an almost exhausted reel 2 in use, mounted on the other receiving hub 5.

[0034] In the example shown, web splicing device 18 is located adjacent to the receiving hub 5 coaxial with axis E in its loading position; web splicing device 18 is also located adjacent to the magazine 4 aligned with axis E. In particular, web splicing device 18 is placed on the opposite side of axis E with respect to axis A and laterally faces the web material 3 of the reel 2 mounted on the receiving hub 5 coaxial with axis E in its loading position.

[0035] Web splicing device 18 is not described in further detail as it does not form part of the present invention.

[0036] Apparatus 1 further comprises a discharge conveyor 19, which, in the example shown, is located below the receiving hub 5 interposed between the magazines 4 aligned with axis D; discharge conveyor 19 is adapted to receive the exhausted reels 2 from the superiorly-located receiving hub 5 by gravity and to move them to a discharge station (not shown).

[0037] With reference to Figures 1 to 5, each magazine 4 comprises a support structure 20 externally supporting a stack of reels 2 arranged coaxially with relative axis D, E and adjacent to one another.

[0038] As magazines 4 are all identical and only differ from one another for the position they have in apparatus 1, i.e. aligned with axes D or E, only one of magazines 4 aligned with axis D will be described hereafter for the sake of simplicity; it is however clear that the following description will apply to any magazine 4, including the magazine 4 aligned with axis E; in this latter case, all features referring to axis D should be read as referred to axis E.

[0039] Support structure 20 of magazine 4 comprises a base 21 and an upper supporting portion 22 carrying in use the relative stack of reels 4 and movable with respect to base 21 along axis D towards and away from the facing receiving hub 5 in its loading position.

[0040] In particular, supporting portion 22 of magazine 4 is movable along aligned axes C, D between a rest position, in which the relative stack of reels 2 is spaced

from the facing receiving hub 5 in the loading position, and a working position, in which one free end reel 2 of the stack of reels 2 is engaged by the receiving hub 5 in the loading position so as to be withdrawn from the magazine 4.

[0041] Base 21 preferably comprises a pair of longitudinal bars 23, parallel to axis A, D, and two or more transverse bars 24, connecting longitudinal bars 23 to each other and extending orthogonally thereto.

[0042] Supporting portion 22 substantially has a cradle-like structure and comprises:

- a horizontal frame 25 superimposed on base 21, sliding with respect to the latter along axis D and including two longitudinal sides 26, parallel to axis A, D, and two transverse sides 27, orthogonal to axis A, D and connected to the longitudinal sides 26;
- a plate element 28 protruding vertically from the farthest transverse side 27 of frame 25 with respect to support device 7;
- a pair of horizontal supporting bars 29 protruding orthogonally from plate element 28 towards support device 7; and
- a pair of columns 30 connecting the respective supporting bars 29 to the closest transverse side 27 of frame 25 with respect to support device 7.

[0043] In the example shown, longitudinal sides 26 of frame 25 are coupled in a sliding manner with respective guiding rails 31 protruding from the upper surface of base 21 and extending parallel to axis D as well as on the opposite sides thereof.

[0044] Columns 30 are preferably slanted with respect to supporting bars 29 and converge to each other starting from frame 25.

[0045] As shown in Figures 1 to 5, the reels 2 of each stack are placed adjacent to one another and have respective lower portions resting on supporting bars 29.

[0046] The movement of supporting portion 22 is controlled by an actuator assembly 32, preferably an electric motor, supported by base 21 and having an externally threaded output shaft 33a engaging a nut screw 33b carried by plate element 28.

[0047] With reference to Figures 2 to 5, magazine 4 further comprises an actuator assembly 34 to move the relative stack of reels 2 towards support device 7 along axis D and with respect to supporting portion 22 in order to recover the space previously occupied by the withdrawn reel 2. In practice, actuator assembly 34 is selectively activated to move forward the stack of reels 2 so that the free end reel 4 of the stack is carried to the same position as the one previously occupied by the end reel 2 withdrawn by the receiving hub 5. In the example shown, the movement of the stack of reels 2 with respect to the supporting portion 22 carries the free end reel 2 of the stack, destined to be withdrawn by the adjacent receiving hub 5, onto free end portions 35 of supporting bars 29 (Figure 3).

[0048] Actuator assembly 34 basically comprises an actuator 36, preferably an electric motor, supported by plate element 28, and transmission means 37 to transform the rotational movement of an output shaft (known per se and not shown) of the actuator 36 into a translational movement, along axis D, of a pushing member 38 cooperating with an end reel 2 of the stack of reels 2, opposite to the free end reel 2 destined to be first withdrawn by the adjacent receiving hub 5.

[0049] Pushing member 38 comprises a plate element 39, cooperating with the stack of reels 2 and extending parallel to plate element 28, and a plurality of guiding rods 40 protruding orthogonally from plate element 39 and engaging, in a sliding manner parallel to axis D, respective through holes formed in the plate element 28 itself.

[0050] Transmission means 37 comprise a screw 41 having one end connected to plate element 39 of pushing member 38, and a nut screw 42 supported by plate element 28 and engaged by screw 41.

[0051] With reference to Figures 6 and 7, each receiving hub 5 further comprises retaining means 45 selectively set between a release configuration (Figure 6 and 7, left sides), in which they allow engagement/disengagement of the receiving hub 5 into/from a core of the reel 2 to be withdrawn from the relative magazine 4, and a retaining configuration (Figure 6 and 7, right sides), in which they prevent disengagement of the engaged reel 2 from the receiving hub 5.

[0052] As receiving hubs 5 are identical to one another, only one of them will be described hereafter for the sake of simplicity; it is however clear that the following description will apply to both receiving hubs 5.

[0053] Retaining means 45 are advantageously defined by an outer wall 46 of receiving hub 5, which is selectively expanded/retracted in a radial direction with respect to axis C.

[0054] In particular, outer wall 46 of receiving hub 5 comprises a plurality of radially outer sectors 47, which are radially movable with respect to axis C between a retracted position (Figures 6 and 7, left sides), in which they define the minimum outer diameter of receiving hub 5 so allowing engagement/disengagement of the receiving hub 5 into/from the core of a respective reel 2, and an expanded position (Figures 6 and 7, right sides), in which they define the maximum outer diameter of the receiving hub 5 so retaining the reel 2 onto the outer surface of the receiving hub 5 itself.

[0055] Retracted position of sectors 47 corresponds to release configuration of retaining means 45, whilst expanded position of sectors 47 corresponds to retaining configuration of retaining means 45.

[0056] In greater details, receiving hub 5 comprises:

- a support shaft 48 of axis C;
- an inner core 50, mounted onto support shaft 48 in an axially displaceable manner along axis C and having one or more outer conical mating surfaces 51 of

- axis C, two in the example shown; and
- sectors 47, each of which has one or more inner conical mating surfaces 52 cooperating in a sliding manner with the respective outer conical mating surfaces 51 of inner core 50 to transform an axial movement of the inner core 50 along axis C and with respect to support shaft 48 into a radial movement of the sectors 47 themselves.

[0057] In order to allow rotational movement of the entire receiving hub 5 about axis C, inner core 50 is angularly coupled with support shaft 48, whilst sectors 47 are angularly coupled with inner core 50.

[0058] Axial displacements of inner core 50 along axis C are preferably achieved by feeding/removing a pressure fluid, such as air, into/from a sealed chamber 53 formed into receiving hub 5 between inner core 50 and support shaft 48.

[0059] In particular, pressure fluid is fed or removed into/from sealed chamber 53 through an axial channel 54, formed into support shaft 48, and a plurality of radial passages 55, also formed into support shaft 48 and extending from one closed end of channel 54 to the sealed chamber 53.

[0060] As shown in Figure 7, receiving hub 5 also comprises a first radially-protruding annular flange 56, fitted to one end of support shaft 48 and defining free end 15 of the receiving hub 5 itself, and a second radially-protruding annular flange 58 secured to support shaft 48 in a position spaced from flange 56 and adapted to define in use an abutment surface for the relative reel 2 in its final condition.

[0061] In order to provide a guiding action for radial displacements of each sector 47 with respect to axis C, both flanges 56, 58 are provided with respective radial grooves 59, 60 engaged in a sliding manner by respective teeth 61 axially protruding from opposite axial ends of the sector 47 itself.

[0062] In practice, as a result of the coupling of teeth 61 with respective grooves 59, 60, each sector 47 is linked to flange 58 in an axially fixed position and in a radially movable manner.

[0063] Receiving hub 5 further comprises a helical spring 62, wound about support shaft 48, axially interposed between flange 58 and inner core 50 and exerting an elastic load on the inner core 50 itself to maintain it in a first axial position (Figure 7, left side) corresponding to the retracted position of sectors 47.

[0064] Inner core 50 is displaced in use, against the thrust of spring 62, into a second axial position (Figure 7, right side), corresponding to the expanded position of sectors 47, by feeding the pressure fluid into sealed chamber 53.

[0065] In the example shown, conical mating surfaces 51, 52 of receiving hub 5 converge towards flange 58, so that radial expansion of sectors 47 is achieved by axially displacing inner core 50 towards the flange 58 itself.

[0066] Receiving hub 5 also comprises one or more

elastic rings 63 extending around sectors 47 and exerting an elastic load thereon to maintain them in their retracted positions.

[0067] In the reel seating position of receiving hub 5 (Figure 4), annular flange 58 is placed below radially expandable sectors 47 so as to allow the relative reel 2 to be seated against the annular flange 58 itself by radially retracting and expanding the sectors 47.

[0068] In a completely different manner, in the reel discharging position, annular flange 58 is placed above radially expandable sectors so 47 as to allow to discharge the core of the exhausted reel 2 by gravity and by retracting the sectors 47.

[0069] Operation of apparatus 1 will now be described with reference to the transfer of one reel 2 from one of the magazines 4 aligned with axis D to the facing receiving hub 5. It is clear that similar operations can be performed for transferring the reels 2 from the other magazines 4 to the same or the other receiving hub 5.

[0070] Operation of apparatus 1 will be described as of the instant in which:

- the magazine 4 involved in the transfer carries a relative stack of reels 2 and has its supporting portion 22 in the rest position (Figures 1, 2, 4 and 5);
- the facing receiving hub 5 is in its loading position (Figure 2) with sectors 47 in the retracted positions (i.e. release configuration of retaining means 45); and
- the other receiving hub 5 is in its horizontal configuration and maintains a relative reel 2 in the working condition (Figure 1), in which it continuously feed the following processing machine with the web material 3 unwound from the reel 2 itself.

[0071] By activating actuator assembly 32, supporting portion 22 of magazine 4 is advanced, together with the stack of reels 2, towards the facing receiving hub 5, which has its sectors 47 in the retracted position (Figures 6 and 7, left sides). This movement ends when supporting portion 22 reaches its working position (Figure 3), in which the free end reel 2 of the stack is engaged by the receiving hub 5.

[0072] At this point, pressurized air is fed to sealed chamber 53 of receiving hub 5 through axial channel 54 and radial passages 55 formed through support shaft 48 (Figure 7). Pressurized air acts against the thrust of spring 62 and produces an axial displacement of inner core 50 towards flange 58. During this axial displacement, inner core 50 slides with its conical surfaces 51 along corresponding conical surfaces 52 of sectors 47, so producing a radial movement of sectors 47 outwards to their expanded positions (retaining configuration of retaining means 45).

[0073] Actuator assembly 32 is once again activated to bring back supporting portion 22 to its initial rest position. During this movement, the free end reel 2 of the stack is retained by the receiving hub 5 and therefore

withdrawn from the stack.

[0074] At this point, receiving hub 5 is rotated by the relative actuator assembly 13 about axis B to the reel seating position, in which, by releasing retaining means 45, i.e. by displacing sectors 47 to their retracted positions, the reel 2 can go down under gravity to rest on flange 58.

[0075] A new displacement of sectors 47 to their expanded positions allows to firmly secure the reel 2 onto receiving hub 5, which can therefore return to its horizontal configuration, ready to be exchanged with the other receiving hub 5 to feed the relative web material 3 to the following processing machine.

[0076] Prior to starting another loading operation, actuator 36 moves the relative stack of reels 2 towards support device 7 along axis D and with respect to supporting portion 22 to carry the free end reel 2 of the stack to the same position as the one previously occupied by the reel 2 withdrawn by the receiving hub 5.

[0077] When the reel 2 is exhausted, the receiving hub 5 is brought above discharging conveyor 19 and is rotated about axis B into the reel discharging position; by simply moving sectors 47 to their retracted positions, the exhausted reel 2 can fall under gravity on the discharging conveyor 19.

[0078] The advantages of the apparatus 1 according to the present invention will be clear from the above description.

[0079] In particular, apparatus 1 allows to load and unload reels in a completely automated way, without any need of human intervention. As a matter of fact, the reels 2 of the stack present in each magazine 4 are sequentially transferred to the relative receiving hub 5 in the predefined working position by simply moving a part of the magazine itself and the receiving hub 5.

[0080] Thanks to the fact that each receiving hub 5 can rotate, not only about its axis (C), but also about another axis (B) orthogonal to its axis (C), the reel seating of the engaged reel 2 and the discharge of the exhausted reel 2 can be made by simply displacing the receiving hub 5 into two opposite vertical positions.

[0081] In addition, by having two receiving hubs 5 mounted on the opposite ends of an arm 9 oscillating about a further axis (A) permits to maintain one receiving hub 5 in a working condition and to use the other receiving hub 5 to load a new reel 2 or to unload the exhausted reel 2.

[0082] Another significant advantage of the invention is that reels of differently-printed labelling material can be selectively used for short production runs, thereby enabling the production of small batches of differently labelled containers, in an economically viable and efficient manner. This addresses a long felt need in the industry to provide an efficient way of decorating several small sequential batches of differently labelled products. This enables the labelled container to be used for bearing promotional information, presented with numerous different designs even in short batches for a short time-period

linked to a specific promotional event, without thereby prejudicing production efficiency of the production line.

[0083] Clearly, changes may be made to apparatus 1 as described and illustrated herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. A web reel loading apparatus (1) **characterized by** comprising:

- support means (22) externally supporting a stack of web reels (2) arranged coaxially with a first axis (D, E) ;
 - a receiving hub (5) having a second axis (C), rotating about said second axis (C) and set in a loading position, in which it faces said support means (22) and is arranged with said second axis (C) coaxial with said first axis (D, E); and
 - first actuator means (32) for moving said support means (22) parallel to said first axis (D, E) between a rest position, in which said stack of web reels (2) is spaced from, and faces, said receiving hub (5), and a working position, in which at least one end web reel (2) of said stack is engaged by said receiving hub (5) in said loading position so as to be withdrawn from the support means (22);
- wherein said receiving hub (5) includes retaining means (45) selectively set between a release configuration, in which they allow engagement/disengagement of said receiving hub (5) into/from a core of one web reel (2), and a retaining configuration, in which they prevent disengagement of said receiving hub (5) from the engaged web reel (2).

2. The apparatus as claimed in claim 1, further comprising second actuator means (34) selectively activated for moving the relative stack of web reels (2) towards said receiving hub (5) along said first axis (D, E) and with respect to said support means (22) in order to recover the space previously occupied by the withdrawn web reel (2) and to carry the free end web reel (2) of the stack to the same position as the one previously occupied by the web reel (2) withdrawn by the receiving hub (5) .

3. The apparatus as claimed in claim 1 or 2, wherein said retaining means (45) comprise an outer wall (46) of said receiving hub (55) which is selectively expanded/ retracted in a radial direction with respect to said second axis (C).

4. The apparatus as claimed in claim 3, wherein said outer wall (46) of said receiving hub (5) comprises a

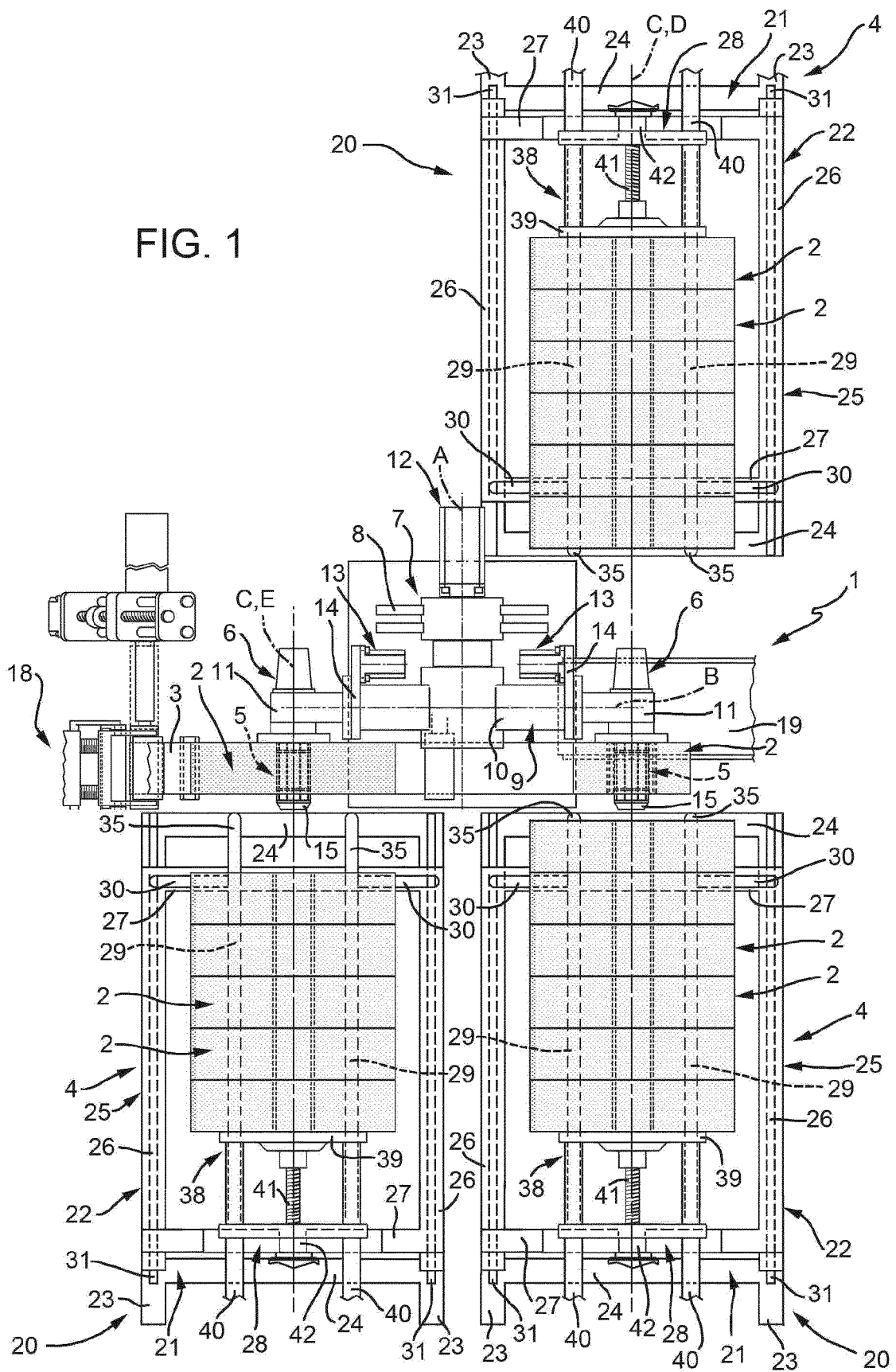
plurality of radially outer sectors (47), which are radially movable with respect to said second axis (C) between a retracted position, in which they define the minimum outer diameter of said receiving hub (5) so allowing engagement/disengagement of the receiving hub (5) into/from the core of a web reel (2), and an expanded position, in which they define the maximum outer diameter of the receiving hub (5) so retaining the engaged web reel (2) onto the outer surface (46) of the receiving hub (5) itself.

5. The apparatus as claimed in claim 4, wherein said receiving hub (5) comprises a support shaft (48), an inner core (50) mounted onto said support shaft (48) in an axially displaceable manner along said second axis (C) and having one or more outer conical mating surfaces (51); and wherein each of said sectors (47) of said outer wall (46) of said receiving hub (5) has one or more inner conical mating surfaces (52) co-operating in a sliding manner with the respective outer conical mating surfaces (51) of said inner core (50) to transform an axial movement of the inner core (50) along said second axis (C) and with respect to the support shaft (48) into a radial movement of said sectors (47).
6. The apparatus as claimed in claim 5, wherein said inner core (50) is angularly coupled with said support shaft (48) and said sectors (47) are angularly coupled with said inner core (50).
7. The apparatus as claimed in claim 5 or 6, wherein axial displacements of said inner core (50) are obtained by feeding/removing a pressure fluid into/from a sealed chamber (53) formed into said receiving hub (5) between said inner core (50) and said support shaft (48).
8. The apparatus as claimed in any one of claims 5 to 7, wherein said receiving hub (5) also has a radially protruding annular flange (58) secured to said support shaft (48) and adapted to define in use an abutment surface for the engaged web reel (2).
9. The apparatus as claimed in claim 8, wherein said receiving hub (5) comprises spring means (62) axially interposed between said annular flange (58) and said inner core (50) and exerting an elastic load on said inner core (50) to maintain it in a first axial position corresponding to said retracted position of said sectors (47); and wherein said inner core (50) is displaced in use, against the thrust of said spring means (62), into a second axial position, corresponding to said expanded position of said sectors (47), by feeding said pressure fluid into said sealed chamber (53).
10. The apparatus as claimed in claim 8 or 9, wherein each of said sectors (47) is linked to said annular

flange (58) in an axially fixed position and in a radially movable manner.

11. The apparatus as claimed in any one of claims 4 to 10, wherein said receiving hub (5) also comprises one or more elastic rings (63) extending around said sectors (47) and exerting an elastic load on said sectors (47) to maintain them in their retracted positions.
12. The apparatus as claimed in any one of the foregoing claims, also comprising second support means (8) supporting said receiving hub (5) in a rotatable manner about a third axis (B) orthogonal to said second axis (C).
13. The apparatus as claimed in claim 12, wherein said receiving hub (5) has said second axis (C) arranged horizontally in said loading position; and wherein said receiving hub (5) is selectively rotated in use about said third axis (B) in a first vertical position, in which said annular flange (58) is placed below said radially expandable sectors (47) so as to allow the engaged web reel (2) to be seated against said annular flange (58) by radially retracting and expanding the sectors (47) themselves, and a second vertical position, in which said annular flange (58) is placed above said radially expandable sectors (47) so as to allow to discharge the core of the exhausted web reel (2) by gravity and by retracting the sectors (47) themselves.
14. The apparatus as claimed in claim 12 or 13, comprising two said receiving hubs (5) mounted on the opposite end portions (11) of an oscillating arm (9) extending along said third axis (B) and connected, at an intermediate portion (10), to said second support means (8) in a rotatable manner about a fourth horizontal axis (A) parallel to said first axis (D, E).

FIG. 1



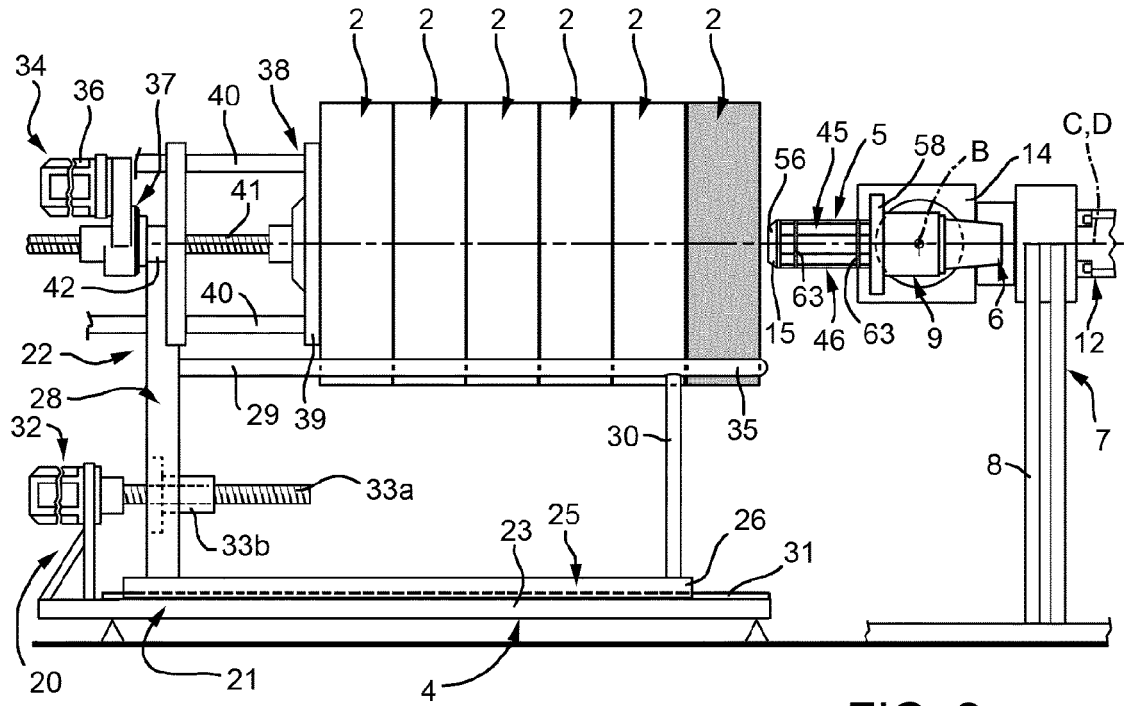


FIG. 2

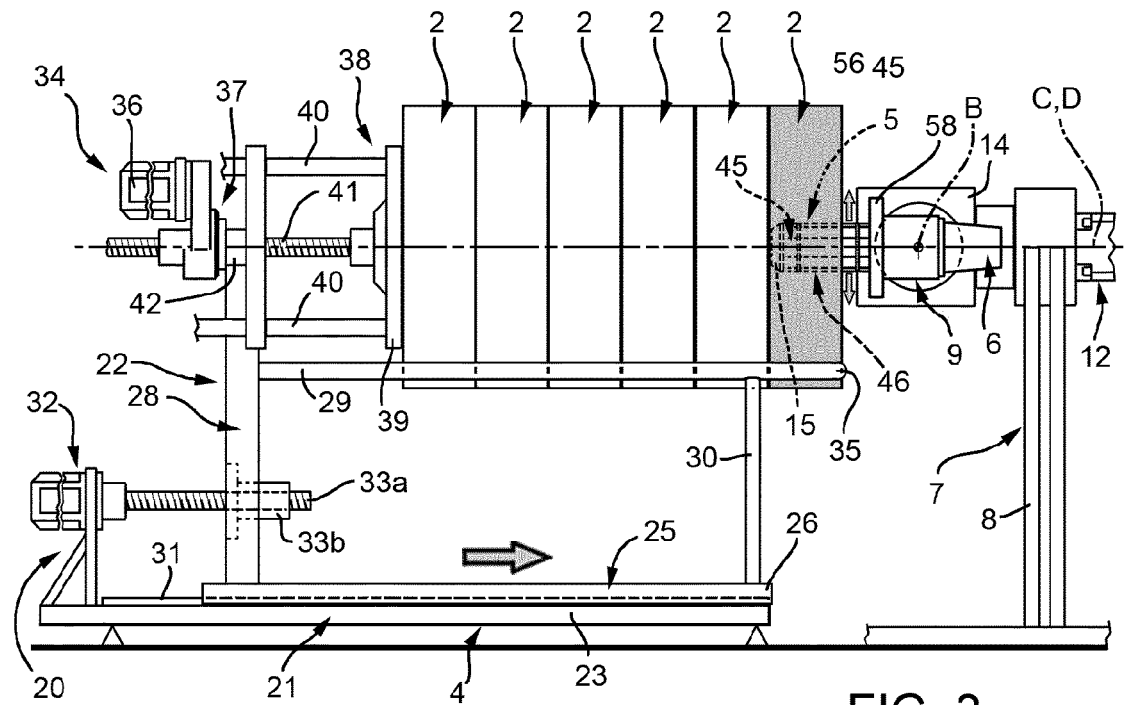


FIG. 3

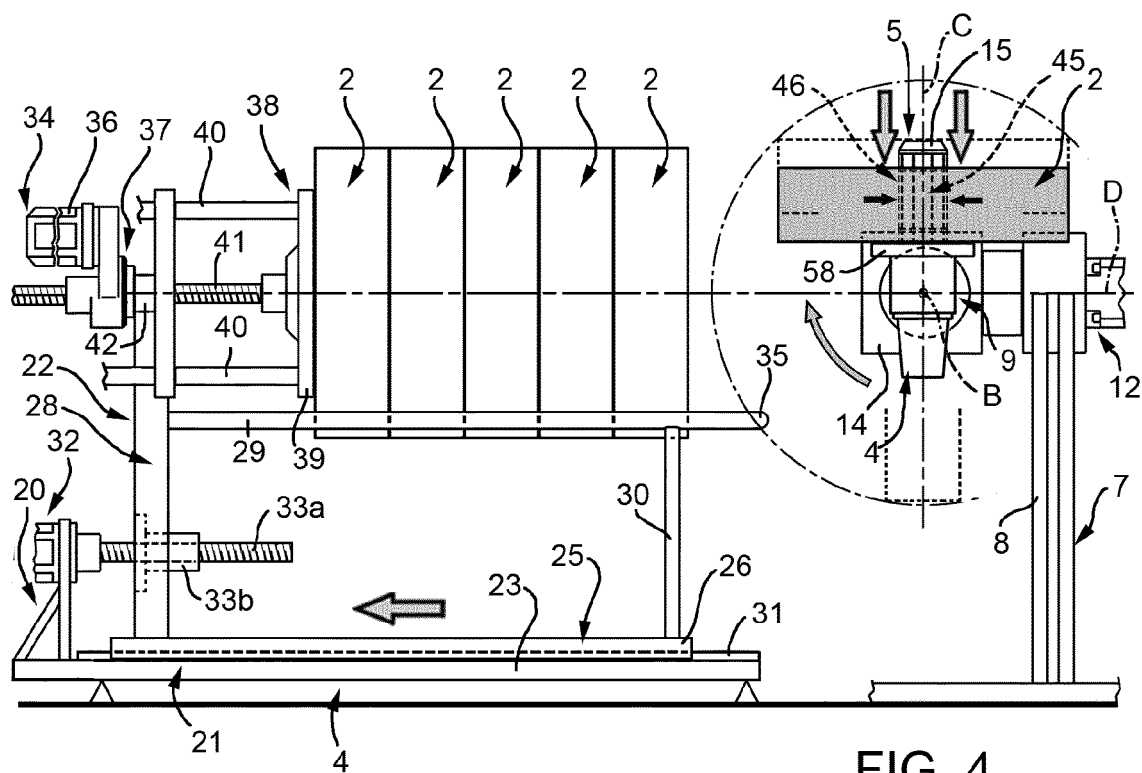


FIG. 4

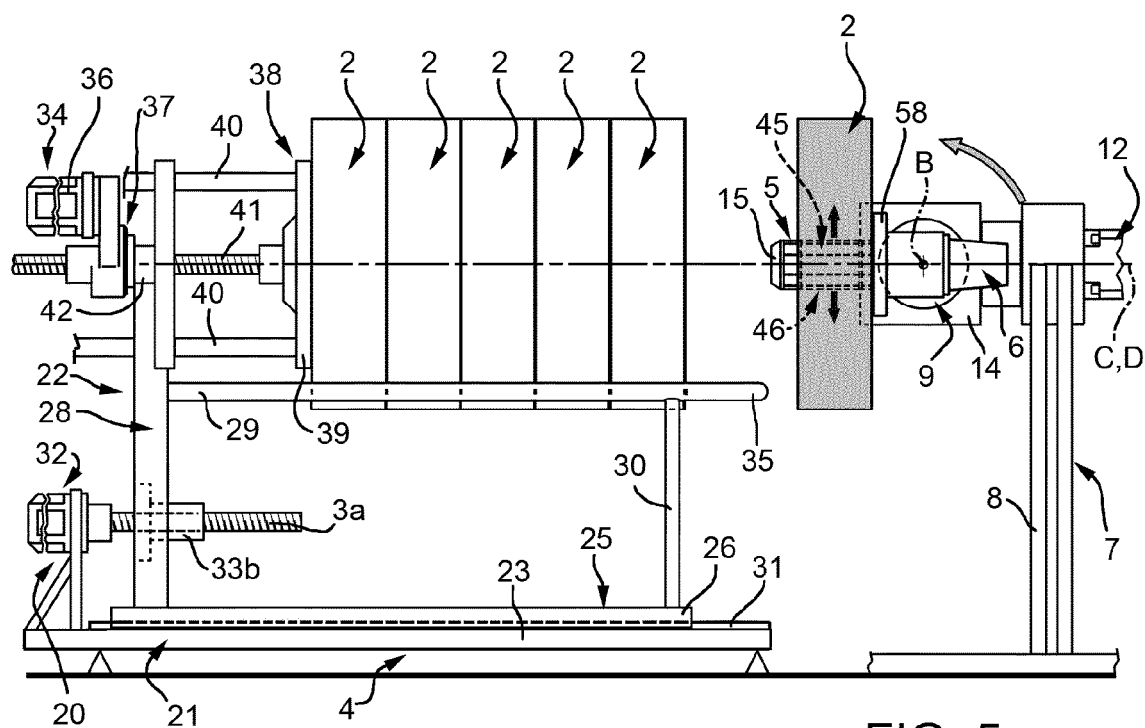


FIG. 5

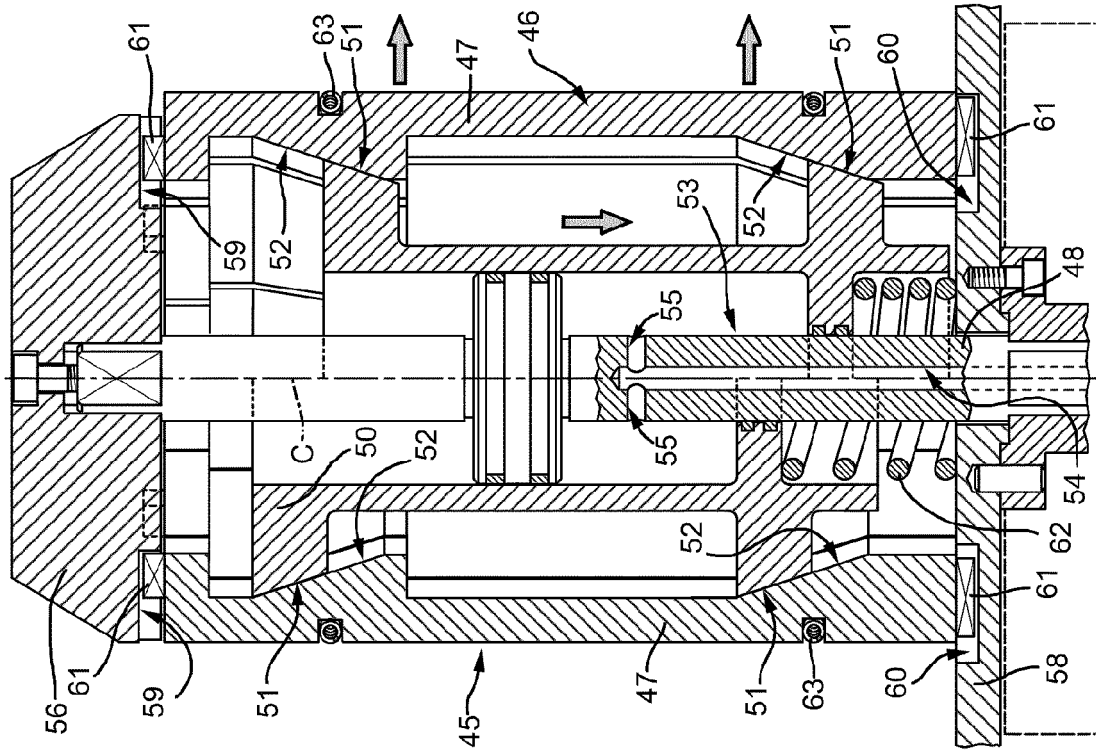


FIG. 7

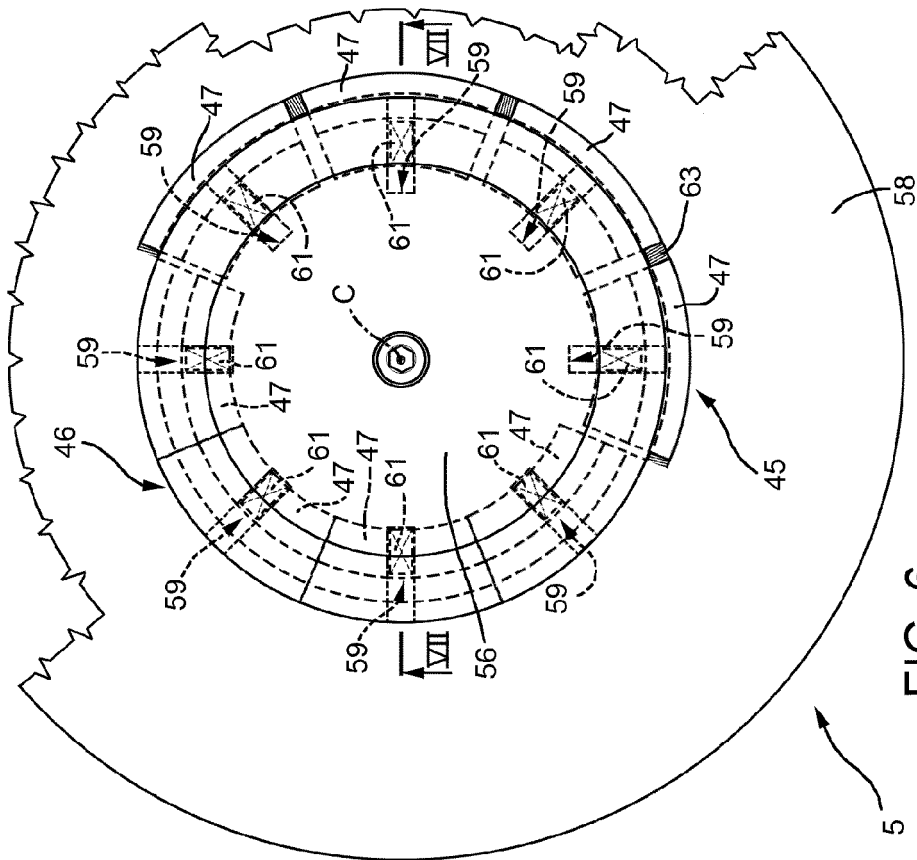


FIG. 6



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