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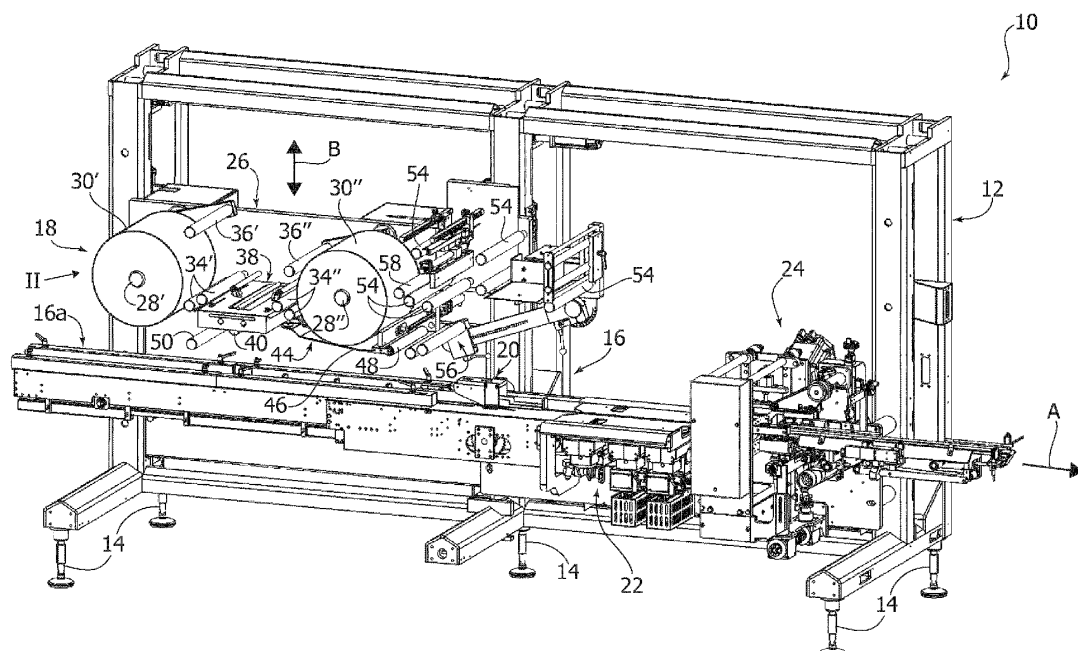
KH MA MD TN(71) Applicant: **Cavanna S.p.A.****28077 Prato Sesia (NO) (IT)**(72) Inventor: **CAVANNA, Mr. Riccardo****I-28077 Prato Sesia (Novara) (IT)**(74) Representative: **Marchitelli, Mauro****Buzzi, Notaro & Antonielli d'Oulx****Corso Vittorio Emanuele II, 6****10123 Torino (IT)**(30) Priority: **02.05.2017 IT 201700046835**(54) **A FLOW-PACK PACKAGING MACHINE**

(57) A flow-pack packaging machine comprising:

- a support frame (12),
- a horizontal conveyor (16) configured to advance a flow of products along a longitudinal direction (A),
- an unwinding unit (18) located above a portion (16a) of the horizontal conveyor (16) and configured to feed a continuous packaging film (F', F''),
- a stationary forming device (20) configured to fold said packaging film (F', F'') into the shape of a tubular element that surrounds the products (P) to be packaged,

- a longitudinal welding assembly (22) located downstream of said forming device (20) and configured to weld together opposite longitudinal edges of said tubular element, and
- a transverse welding assembly (24) configured for transversely welding said tubular element, wherein said unwinding unit (18) is movable in a vertical direction between a lowered position and a raised position, and vice versa.

FIG. 1

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Description

Field of the invention

[0001] The present invention relates to the packaging of products and regards a flow-pack packaging machine.

Description of the prior art

[0002] The flow-pack package is one of the most widely used systems for packaging food products, such as, for example, biscuits, snacks, bars, etc.

[0003] In flow-pack packaging systems, a continuous packaging film coming from a reel is folded into the shape of a tubular element that surrounds the articles to be packaged. The tubular element of packaging material is closed by means of a continuous longitudinal weld that joins the opposite longitudinal edges of the packaging film, and by means of transverse welds that seal the tubular element at opposite sides with respect to the products.

[0004] A horizontal flow-pack packaging machine typically comprises:

- a horizontal conveyor configured to advance a flow of products along a longitudinal direction,
- an unwinding unit configured to feed a continuous packaging film,
- a stationary forming device configured to fold the packaging film into the shape of a tubular element that surrounds the products to be packaged,
- a longitudinal welding assembly located downstream of the forming device and configured to weld together opposite longitudinal edges of the packaging film, and
- a transverse welding assembly configured for transversally welding the tubular element formed by the film of packaging material.

[0005] The unwinding unit is usually located above a portion of the horizontal conveyor. Usually it is necessary to provide a free space between the unwinding unit and the horizontal conveyor to allow maintenance or cleaning operations of the conveyor. Consequently, in many cases, the unwinding unit is arranged quite high from the ground, which complicates the operations of replacing the reels of packaging film.

Object and summary of the invention

[0006] The present invention aims to provide a flow-pack packaging machine in which the unwinding unit can be arranged in an ergonomic position for the operation of changing the reels, without however hindering the cleaning or maintenance operations of the conveyor.

[0007] According to the present invention, this object is achieved by a flow-pack packaging machine having the characteristics forming the subject of claim 1.

[0008] The claims form an integral part of the disclosure provided here in relation to the invention.

Brief description of the drawings

[0009] The present invention will now be described in detail with reference to the attached drawings, given purely by way of non-limiting example, wherein:

- Figure 1 is a perspective view of a flow-pack packaging machine according to the present invention, and
- Figures 2 and 3 are front elevation views of the unwinding unit indicated by the arrow II in Figure 1, in the lowered position and in the raised position, respectively.

[0010] With reference to Figure 1, numeral 10 indicates a horizontal flow-pack packaging machine. The packaging machine 10 comprises a stationary support frame 12, which rests on the ground by means of feet 14. The machine 10 comprises a horizontal conveyor 16 carried by the frame 12. The horizontal conveyor 16 is configured to advance a flow of products in a longitudinal direction A.

[0011] The machine 10 comprises an unwinding unit 18 which extends above a portion 16a of the horizontal conveyor 16. The unwinding unit 18 is configured to feed a continuous packaging film to a stationary forming device 20 located along the path of the flow of products that advance on the conveyor 16. The forming device 20 is configured to fold the packaging film into a tubular element that surrounds the products to be packaged while they advance in the direction A. The tubular element formed by the packaging material film advances in the longitudinal direction A together with the flow of products. The machine 10 comprises a longitudinal welding assembly 22 located downstream of the forming device 20. The longitudinal welding device 22 is configured to form a continuous longitudinal weld between the opposite longitudinal edges of the tubular element formed by the packaging film.

[0012] The machine 10 also comprises a transverse welding assembly 24 configured to transversally weld the tubular element at opposite sides of the products, so as to seal the products within respective packages.

[0013] The general operating scheme of the machine 10 is that of a traditional horizontal flow-pack packaging machine, well-known in the packaging sector. The constructional details and the operating modes of the various components of the machine 10 do not require a detailed description, being well-known to those skilled in the art.

[0014] With reference to Figures 2 and 3, the unwinding unit 18 of the machine 10 according to the present invention is movable with respect to the support frame 12 in a vertical direction B between a lowered position and a raised position, and vice versa. The unwinding unit 18 is associated with actuator means (not illustrated) operable to control the vertical movement of the unwinding

unit 18 between the lowered position and the raised position, and vice versa.

[0015] The unwinding unit 18 comprises a vertical plate 26, which is movable in the vertical direction B along vertical guides carried by the support frame 12. The vertical plate 26 carries two idler unwinding shafts 28', 28" projecting cantileverly in a horizontal direction from the vertical plate 26. Two reels 30', 30" of packaging film are intended to be mounted on respective unwinding shafts 28', 28". The unwinding unit 18 comprises a first and a second tensioning unit 32', 32", each of which comprises two stationary rollers 34', 34" and a movable roller 36', 36", all carried by the vertical plate 26.

[0016] The unwinding unit 18 comprises a junction unit 38 carried by the vertical plate 26.

[0017] The unwinding unit 18 comprises a motorized roller 40 located below the junction unit 38 and cooperating with an idler roller 42.

[0018] The unwinding unit 18 comprises a transverse alignment assembly 44 including a support 46 free to pivot in a horizontal plane and carrying a return roller 48. Another return roller 50 is arranged between the motorized drive roller 40 and the return roller 48 of the alignment device 44. The motorized drive roller 40, the alignment device 44 and the additional return roller 50 are all carried by the vertical plate 26.

[0019] The packaging film F' that unwinds from the first reel 30' and the packaging film F" that unwinds from the second reel 30" pass through the respective tensioning units 32', 32" and arrive together at the junction unit 38. During operation, only one of the reels 30', 30" feeds the respective film F', F" while the other reel is stationary, on hold. Only the packaging film coming from the reel that is being unwound leaves the junction unit 38, for example, the film F' coming from the first reel 30'. The packaging films F', F" cooperate with respective sensing devices 52', 52", which detect the presence or absence of the respective films F', F" upstream of the junction unit 38. When one of the two sensing devices 52', 52" detects the absence of the respective film F', F", the junction unit 38 is activated to perform the junction between the films F' and F". The junction unit 38 carries out the junction between the tail of a first film F' with the head of a second film F".

[0020] The film F' or F" at the outlet of the unwinding unit 18 passes onto an assembly of stationary guide rollers 54 carried by the support frame 12. Downstream of the guide roller assembly 54, the packaging film F' or F" passes through a roller assembly 56 and from there it is fed to the stationary forming device 20. The roller unit 56 allows setting of the approach angle of the film F', F" to the stationary former 20.

[0021] Between the unwinding unit 18 and the stationary return roller assembly 54, a compensation roller 58 is arranged, which is movable in the vertical direction B, independently of the vertical plate 26. The compensation roller 58 imparts a U-shaped path to the packaging film F' or F" upstream of the first of the stationary guide rollers

54. The compensation roller 58 is movable between a lowered position corresponding to the lowered position of the unwinding unit 18 and a raised position corresponding to the raised position of the unwinding unit 18.

5 **[0022]** When, during the course of unwinding, the reel 30' or 30" finishes, the junction unit 38 performs the junction of the packaging film tail coming from the finished reel, with the packaging film head coming from the remaining full reel. Changing from the finished reel to the remaining full reel can be carried out without interrupting operation of the machine 10. While the machine 10 operates with the packaging film coming from the new reel, an operator replaces the finished reel. The replacement operation envisages removal of the core of the finished reel from the shaft 28', 28", assembly of a new reel on the shaft, positioning of the initial part of the packaging film of the new reel through the rollers 34', 36' or 34", 36", positioning of the head end of the film within the junction unit 38, and application of a layer of double-sided tape on the head portion of the new packaging film, which serves for joining to the tail of the film being unwound. For performing these operations, the vertical plate 26 of the unwinding unit 18 is positioned in the lowered position illustrated in Figure 2. In this position, the unwinding shafts 28', 28", the rollers 34', 36', 34", 36" and the junction unit 38 are in an ergonomic position that favors the operator. After replacing a reel as previously described, the unwinding unit 18 can be left in the lowered position illustrated in Figure 2 or it can be moved to the raised position illustrated in Figure 3. The machine 10 is able to operate without interruptions and without discontinuity even during the transition of the unwinding unit 18 from the lowered position to the raised position, and vice versa.

30 **[0023]** The stroke of the unwinding unit 18 from the lowered position to the raised position and vice versa is indicated by h in Figure 3. When the unwinding unit 18 is in the raised position, it is easier to access the portion of the horizontal conveyor 16a located below the unwinding unit 18 for cleaning or maintenance operations of the conveyor 16. The raised position of the unwinding unit 18 also improves the visibility of the conveyor portion 16a during operation of the machine.

35 **[0024]** The compensation roller 58 moves in the vertical direction B together with the plate 26 of the unwinding unit 18, but with a stroke that is halved with respect to the stroke of the vertical plate 26. With reference to Figure 3, the stroke of the compensation roller 58 from the lowered position to the raised position, and vice versa, is equal to $h/2$, where h is the stroke of the vertical plate 26 of the unwinding unit 18 from the lowered position to the raised position, and vice versa. This makes it possible to maintain an unchanged length of the packaging film portion between the outlet of the unwinding unit 18 and the first of the stationary guide rollers 54. It is therefore possible to move the unwinding unit 18 from the lowered position to the raised position, and vice versa, without this movement affecting the operation of the machine 10. The vertical movement of the compensation roller 18 in

the same direction and with half the stroke with respect to the stroke of the vertical plate 26 of the unwinding unit 18 allows the tension of the packaging film F' or F'' to remain unaltered, even during the vertical movement of the unwinding unit 18.

[0025] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments can be widely varied with respect to those described and illustrated, without thereby departing from the scope of the invention as defined by the claims that follow.

Claims

1. A flow-pack packaging machine comprising:

- a support frame (12),
 - a horizontal conveyor (16) configured to advance a flow of products along a longitudinal direction (A),
 - an unwinding unit (18) located above a portion (16a) of the horizontal conveyor (16) and configured to feed a continuous packaging film (F', F''),
 - a stationary forming device (20) configured to fold said packaging film (F', F'') into the shape of a tubular element that surrounds the products (P) to be packaged,
 - a longitudinal welding assembly (22) located downstream of said forming device (20) and configured to weld together opposite longitudinal edges of said tubular element, and
 - a transverse welding assembly (24) configured for transversely welding said tubular element,
- characterized in that** said unwinding unit (18) is movable in a vertical direction (B) between a lowered position and a raised position, and vice versa.

2. A packaging machine according to claim 1, wherein said unwinding unit (18) comprises a vertical plate (26) movable with respect to the supporting frame (12) in said vertical direction (B) between a lowered position and a raised position and carrying a pair of unwinding shafts (28', 28'') configured to carry respective reels (30', 30'') of packaging films (F', F''), a first and a second tensioning unit (32', 32'') and a junction unit (38) for joining the tail end of a first packaging film (F', F'') with the head end of a second packaging film (F', F'').

3. A packaging machine according to claim 1 or claim 2, comprising a stationary guide roller assembly (54) for guiding the packaging film (F', F'') coming from said unwinding unit (18) to said stationary forming device (20).

4. A packaging machine according to claim 3, comprising a compensation roller (58) movable in a vertical direction (B) between a lowered position corresponding to the lowered position of the unwinding unit (18) and a raised position corresponding to the raised position of the unwinding unit (18), wherein the vertical stroke (h/2) of the compensation roller (58) is equal to half the vertical stroke (h) of the unwinding assembly (18).

FIG. 1

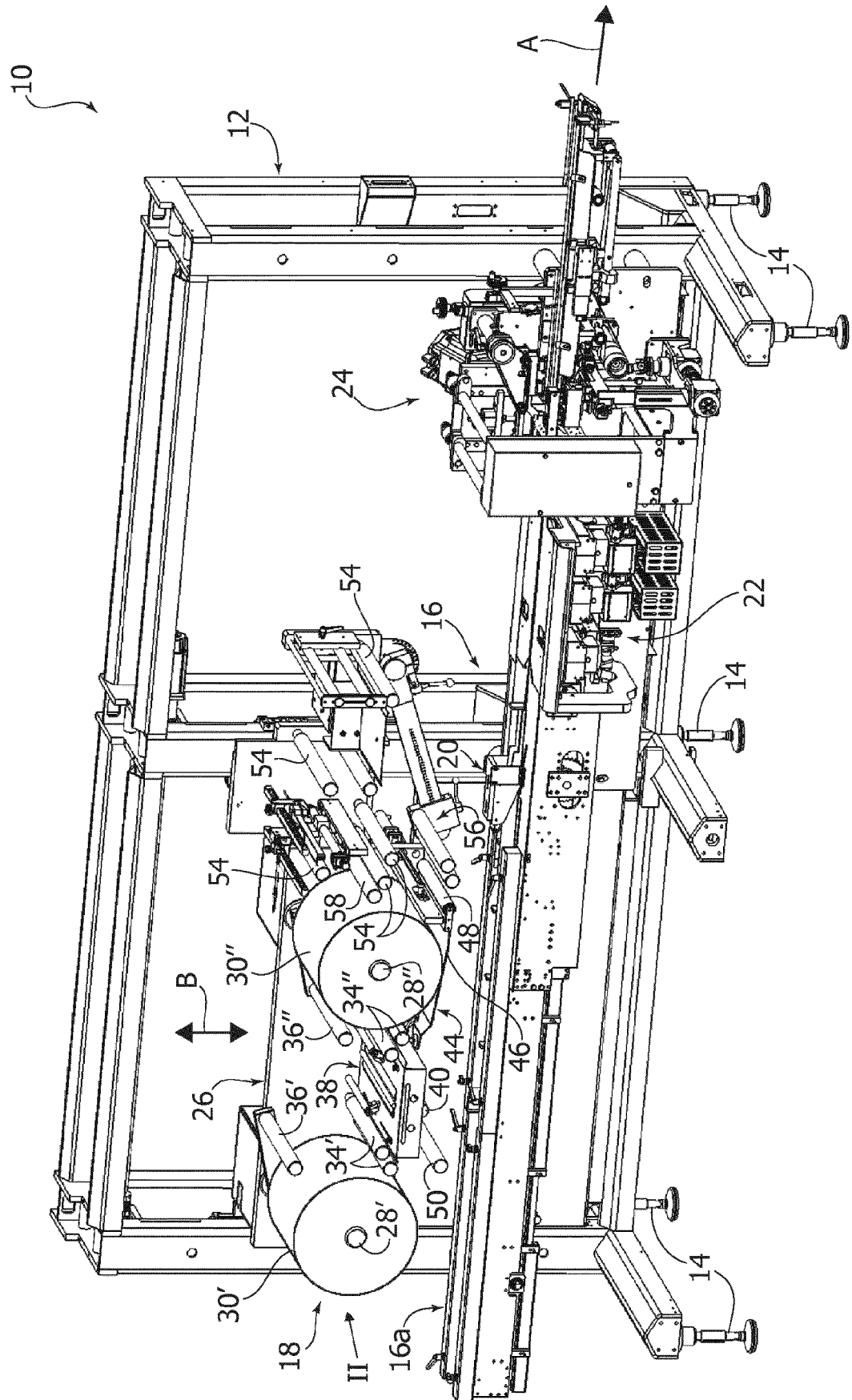


FIG. 2

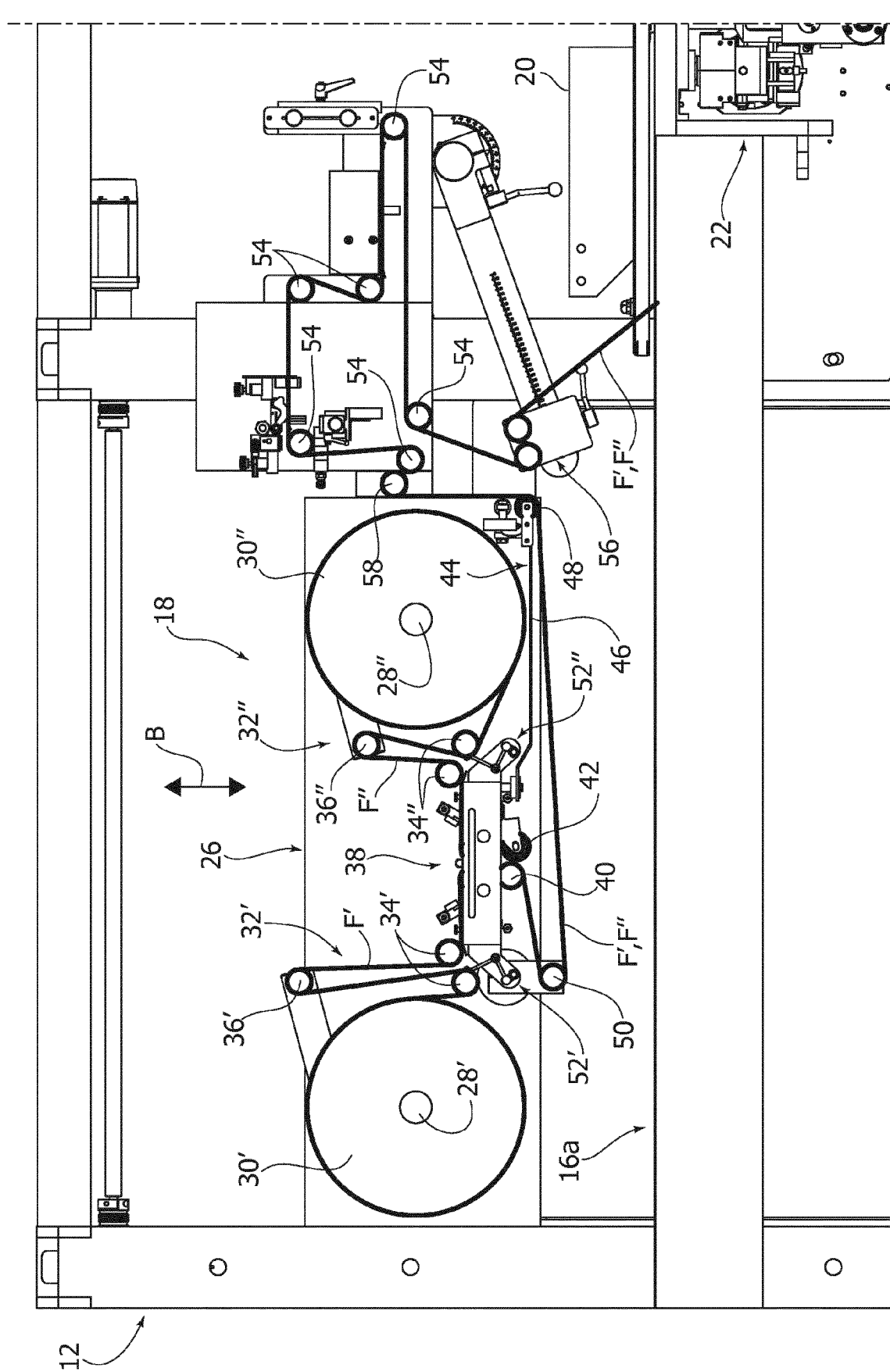
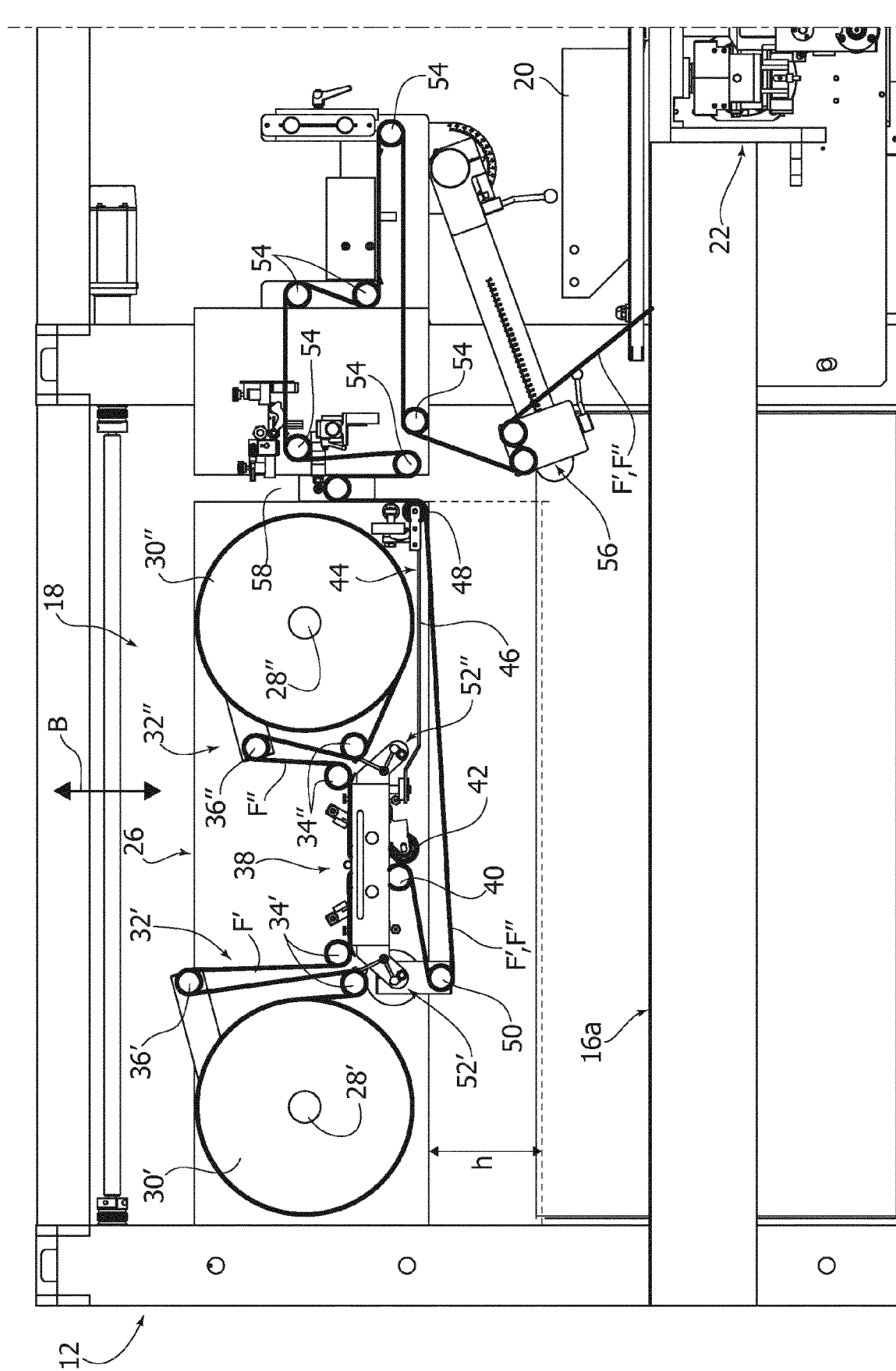


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 18 16 8184

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 September 2018	Examiner Paetzke, Uwe
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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