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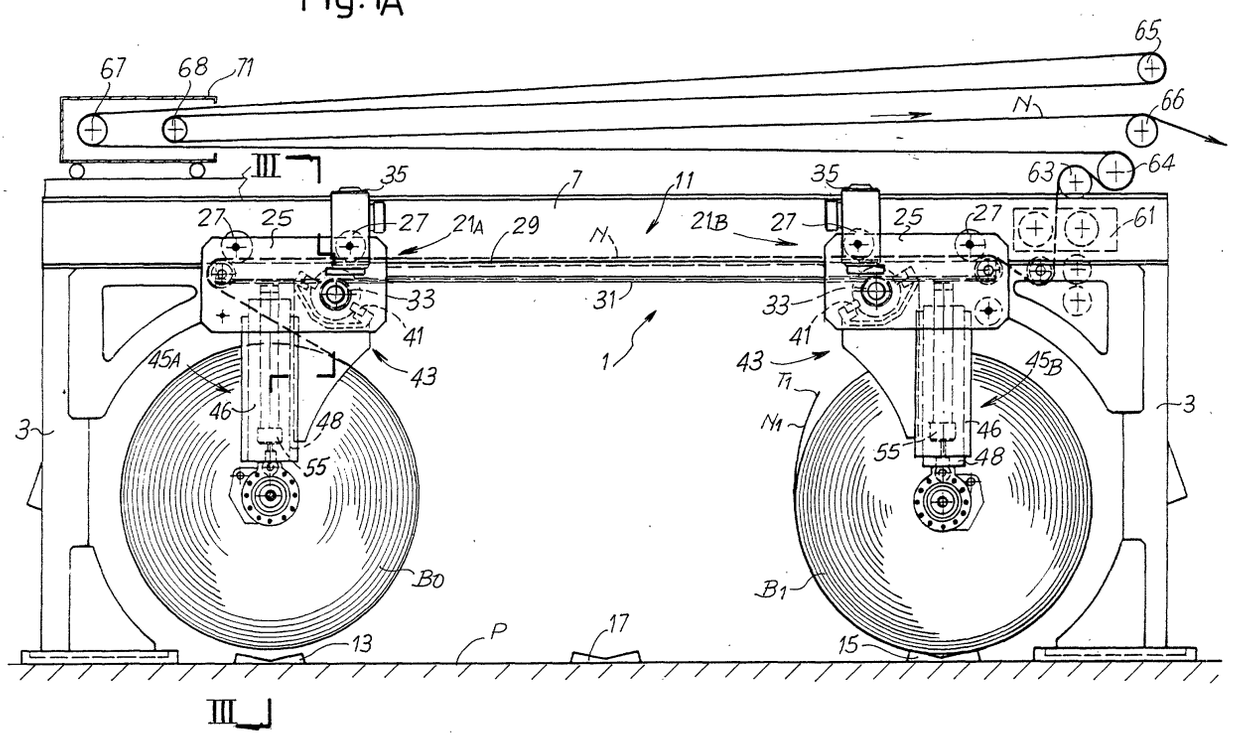
(54) Web unwinding device for web rolls

(57) The unwinding device for web rolls comprises:

- two pairs of mobile arms (45A, 45B) for supporting rolls (B0, B1, B2, B3) of web (N0, N1, N2, N3) each with members (51A, 51B) for engaging the rolls;
- a supporting structure (3, 11) for said pairs of arms;
- two lateral stations (13, 15) for loading full rolls;
- and an intermediate station (17) for unloading the used rolls.

The structure presents a supporting crosspiece (11) along which the pairs of arms (45A, 45B) translate, the crosspiece developing over said two lateral stations and said intermediate station. The arms are developed downwards from said crosspiece. Furthermore, means are provided to align the roll engagement members carried by the arms with the axis of the roll to be engaged by said members.

Fig.1A



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Description

Field of the invention

[0001] The invention refers to a roll stand, i.e. a device for unwinding rolls of web material to be fed to a production line. Particularly, but not exclusively, the invention refers to a roll stand or roll unwinding device for unwinding web to a corrugator, i.e. to a system for making corrugated cardboard.

[0002] The invention also refers to a method for unwinding web coming from rolls to a processing line and particularly to the method for handling the rolls in the unwinding device.

Description of the prior art

[0003] Continuous webs are processed in many industrial sectors to feed a continuously working processing line. The web rolls must be arranged in unwinding position and replaced with new rolls whenever the rolls are finished or need to be replaced with rolls presenting different characteristics for any reason.

[0004] In the corrugated cardboard production sector, in particular, the so-called "wet-end" section of the production line, i.e. the section gathering the machines which corrugate the paper webs, glue them to smooth webs to form the layer, or layers, of corrugated cardboard and dry the resulting web, must be fed by a number of rolls of web corresponding to the number of paper layers, or sheets, needed for form the corrugated cardboard. For example, three paper webs must be supplied at the same time to make single-wave corrugated cardboard.

[0005] The web rolls must be replaced frequently, not only when they are finished but also specifically according to the rapid succession of industrial production cycles. This is because the line often process very small jobs in this industrial sector for very short times so that the paper rolls to be fed to the corrugator must be replaced between one job and the other. Replacement is required because the different jobs may require different types of paper. The roll replacement phase is, therefore, a critical aspect of the production cycle and effects the total hourly production rate, to the extent that also a modest reduction in the time needed to replace a roll may be a considerable advantage in terms of productivity.

[0006] The rolls which are extracted from the web unwinding device to be replaced with others after processing a job and before starting the following job are reused at a later time, when required for processing other jobs. This aspect - particularly in the sector of corrugated cardboard production line web unwinding devices or roll stands - entails the additional difficulty of needing to handle rolls of considerably variable diameter with the same device. This is because a half used roll, which is unloaded after processing a job, can be reused and inserted as a new roll in a later job cycle at a later time. The unwinding device must be consequently capable of handling rolls of different diameters.

[0007] To speed up roll change either between one job and the following job or when a roll is finished during a job and needs to be replaced with a new roll, systems have been designed, in which the unwinding device comprises two lateral new roll loading stations and one central unloading station for the finished roll or the roll which needs to be replaced to process a different job with respect to the current one. Examples of unwinding devices of this kind are described in US-A-4,919,353, US-A-5,004,173, and JP-A-7-157156. These unwinding devices are equipped with two pairs of pivoting arms which take the rolls from the lateral loading stations and bring them to an unwinding position and - at the end of the job - deposit them in the unloading station.

[0008] These known systems employ roll lifting and lowering systems, in the loading stations and the unloading station to allow handling rolls with considerably variable diameters. The lifting means are arranged in a pit under the floor. This makes the system complex and costly.

[0009] In order to accelerate roll replacement, JP-A-11-11749 describes an unwinding device equipped with a pair of pivoting arms which take and lift the roll, which device is equipped with a diameter sensor, which detects the diameter of the roll to be loaded onto the unwinding device and controls the movement of the arms according to the measured diameter value.

[0010] A roll stand or unwinding device for corrugators is described in US-A-4,706,905, which is equipped with two pairs of arms, which take the new rolls from mobile trolleys onto which the rolls to be replaced are also unloaded. In order to adapt to the considerably variable diameters of the rolls, the arms are equipped with a pivoting movement on a horizontal axis, which is parallel to the roll axis, and with a lifting and lowering movement of the pivoting axis of the arms. The system is complex. Furthermore, the use of two pairs of arms working in only two stations makes roll change a long operation with negative effects on the total production rate of the processing line in which the roll stands are inserted.

[0011] US-A-4,930,713 describes a roll stand or paper roll unwinding device for a corrugator which faces the problem of roll diameter variability by fitting two pairs of arms on pivoting axes, which are - in turn - equipped with an eccentric movement. In this way, the centers or cones equipping the distal ends of the arms, i.e. the ends which are opposite to the pivoting axis, can move along a vertical trajectory. Also in this case, the system is complex and, additionally does not allow high speeds during the roll change operation.

[0012] EP-A-0700854 describes an unwinding device or roll stand for corrugators in which the trolley carrying the rolls traverses in a direction which is orthogonal to the pivoting axis of the arms, in order to handle rolls of variable diameter. The translation system of the roll car-

rying trolley is particularly complex. Furthermore, also in this case, the system only presents two loading and unloading stations and the roll change operations is consequently slow.

[0013] EP-A-0968945 describes an unwinding device or roll stand for corrugators which solves the problem of handling variable diameter rolls once again by modifying the position of the horizontal pivoting axis of the arms which take and deposit the rolls. The system is complex and, also in this case, due to the presence of only two loading and unloading stations, roll replacement is slow and negatively effects the production rate.

Objects and summary of the invention

[0014] Object of the invention is to make a roll stand or roll unwinding device specifically intended for corrugators, i.e. for systems for making corrugated cardboard, which overcomes the problems of traditional devices, and which particularly reduces the time required to replace the rolls and efficiently handle rolls whose diameters may also considerably vary, employing a simple structure.

[0015] In the present description and the annexed claims the term unwinding device generically refers to a device for receiving a roll of web which is fed to a downstream system. The term thereby comprises the device commonly called "roll stand" in this specific technical field.

[0016] These and other purposes and advantages, which will be clear to experts in the field from the text that follows, are obtained in practice by a web roll unwinding device comprising in combination:

- two pairs of mobile arms for supporting rolls of web with members for engaging the rolls;
- a supporting structure for the pairs of arms;
- two lateral stations for loading full rolls;
- and an intermediate station for unloading the used rolls.

[0017] According to the invention, a device of this type is characterized in that: the supporting structure presents a supporting crosspiece along which the pairs of arms move, said crosspiece developing over the two lateral stations and the intermediate station; in that the arms are developed downwards from said crosspiece; and in that means are provided to align the roll engagement members carried by the arms with the axis of the roll to be engaged by said members.

[0018] The means for aligning the engagement members with the roll axis can consist of system for lifting and lowering the rolls arranged on floor level which lift the rolls from the floor towards the arms and vice versa. This solution achieves high production rate speeds. According to a different embodiment of the invention, the means for aligning the roll engagement members rolls carried by the arms with the axis of the roll to be engaged each time by the arms can be made in the form of an arm extending and shortening system. In other terms, the arms can extend and shorten telescopically to approach the resting plane of the rolls to be engaged and, consequently, take the engagement member to the height of the axis of the roll to be engaged, regardless of the diameter of the roll. With a device of this kind, the roll replacement cycle is extremely rapid and the vertical mobility of the arms, by respective lengthening and shortening, permits easy handling of rolls with a variable diameter, without the need for complex arm operating systems and without the need for vertical roll lifting means, which increase the cost of the system and have to be housed in pits under floor level.

[0019] According to an advantageous embodiment, the supporting crosspiece can house a splicing device for joining the trailing edge of a web of a first unwinding roll to the leading edge of a web of a second roll which is standing by. Any kind of splicing device can be used, e.g. as that described in US-A-3,858,819.

[0020] The supporting crosspiece can be supported by vertical uprights, the crosspiece and the uprights thus forming a gantry structure which contains the two lateral stations and the central station. This configuration makes the device compact and effectively delimits the working area increasing the safety of the system.

[0021] In practice, considering the large axial dimension of the rolls, the crosspiece comprises two parallel beams, each equipped with guiding means for the arms and each supported by a pair of vertical uprights.

[0022] In a possible advantageous embodiment of the invention, the arms of each pair are fastened to a transversal element equipped with a guide which is orthogonal to the supporting crosspiece, the arms of each pair being mobile along the transversal element to reciprocally approach and distance each other. Furthermore, the transversal element is mobile on said guiding means of said beams forming the crosspiece. The mobility of the arms along the transversal element confers an approaching and distancing movement with respect to the roll to the centers lowerly carried by the arms to axially either engage the roll or release it after processing.

[0023] Lengthening and shortening of the arms can be obtained with an appropriate extendible telescopic structure, which may be equipped with means which prevent reciprocal rotation of the components of said structure around the axis of the respective arm.

[0024] An unwinding device of the type herein described can be used to implement a method for feeding a web material to a corrugator for the production of corrugated cardboard, comprising the following phases:

- arranging a first roll of web in a first lateral loading station;
- engaging said first roll with a first pair of arms;
- horizontally translating said first pair of arms and said first roll towards an intermediate unloading station.

[0025] In practice, with three stations, two loading stations in lateral position and one unloading station in intermediate position, the method can comprise the following phases:

- positioning a second roll of web in a second lateral loading station, the intermediate unloading station being arranged between the first and the second lateral loading station;
- engaging said second roll with a second pair of arms;
- splicing the web of the first roll to the web of the second roll and cutting the web of the first roll when the first web roll needs to be replaced;
- vertically lowering said first roll and unloading it into said intermediate unloading stations, releasing it from the first pairs of arms;
- distancing the first roll from the intermediate unloading station;
- horizontally translating the second roll from the second loading station towards the intermediate unloading station.

[0026] If the arms are extendible, the method according to the invention foresees that the roll is engaged by the arms and consequently is raised vertically by the arms to be moved to the intermediate unloading station. Conversely, if the arms are not extendible, the roll is lifted towards the arms by the vertical lifting means and consequently engaged by the arms to be moved towards the intermediate unloading station.

[0027] Additional advantageous embodiments of the device and the method according to the invention are set forth afterwards and in the annexed claims.

Brief description of the drawings

[0028] The invention will be better understood following the description and the attached drawings, that show a practical non-limitative embodiment of the invention. In particular, in the drawing:

- Figs. 1A-1D show a lateral view of an unwinding device according to the invention, in four different operating positions;
- Fig. 2 shows a section according to the horizontal plane II-II in Fig.1A;
- Fig. 3 shows a section according to III-III in Fig.1A and
- Fig. 4 shows an enlarged section according to IV-IV of Fig. 3.

Detailed description of a preferred embodiment of the invention

[0029] The example hereof illustrates a system in which the arms telescopically elongate and the rolls are engaged by the arms and vertically lifted before being translated from the loading station to the unloading station. As previously mentioned, renouncing the advantage of additional simplicity of the system, the roll can be lifted by a vertical lifting system to take it to a height, which is essentially fixed, on which the roll engagement means carried by the arms are arranged.

[0030] The unwinding device shown in the drawing illustrating this example comprises a supporting gantry structure, generally indicated by reference numeral 1. The gantry structure comprises four uprights 3, 5, arranged on the vertexes of a rectangular plan of the device. The uprights 3 are reciprocally joined by a beam 7, while the uprights 5 are reciprocally joined by a beam 9. The two beams 7 and 9 form a crosspiece, which is generally indicated by reference numeral 11, of the gantry structure comprising four uprights 3, 5.

[0031] Three stations for letting web rolls in and out are arranged under the crosspiece 11 within the rectangular plan delimited by the four uprights 3, 5. Reference numerals 13 and 15 indicate two lateral stations, which will hereof be called "lateral loading stations", and reference numeral 17 indicates an intermediate station arranged between the two lateral loading stations, which will be hereof called "lateral unloading station".

[0032] The rolls are inserted in each lateral loading station by means of any handling device, not illustrated in detail, e.g. by means of a trolley arranged approximately on floor level P, or by means of any other system. A similar arrangement is provided for extracting the rolls from the intermediate unloading station. As shown in Fig. 2, the rolls are inserted in the lateral loading stations 13, 15 by means of a movement which is parallel to the axis of the rolls and come from the same side of the gantry structure 1 according to the arrows f13 and f15. The rolls intended to leave the intermediate unloading station 17 can be extracted in the same direction according to which they are inserted in the lateral loading stations, or in the opposite direction, as shown by the arrows f17 and f17'. The second solution is adopted when the device is arranged near an obstacle which prevents the free access to the stations 13, 15, 17 from one of the sides of the device, e.g. when the device is arranged near a perimetral wall of the plant.

[0033] Two transversal elements 21A and 21B, one of which (21A) is particularly visible in Fig. 3 and will be described in greater detail below, translate along the two beams 7, 9 that define the corsspiece 11. The element 21B is essentially symmetric and will not be described in detail. In the example shown, the transversal element 21A comprises a hollow tubular beam 23 to whose ends respective plates 25 are applied. The two plates 25 carry idle rollers 27, which roll on a guide 29 integral with the respective beam 7 or 9. The guide 29, integral with the beam 7, forms a rack 31, which is meshed by a pinion 33 operated by a geared motor 35, in the lower part. A torsion bar 37, coaxial to the hollow tubular beam 23, transmits movement to a pinion, also indicated by reference numeral 33, which meshes a rack, again indicated

by reference numeral 31 and is integral with guide 29 fastened to the beam 9.

[0034] A guide 41 is integral with the tubular beam 23, orthogonal to the crosspiece 11 formed by the beams 7, 9, to which two slides 43 are connected. The two slides move on the slide 41 by effect of a cylinder-piston actuator, or other appropriate actuator (not shown) so to reciprocally approach and distance each other along the guide 41.

[0035] Each slide 43 carries an extendible arm. The two arms carried by each of the two transversal elements 21 are generally indicated with reference numerals 45A and 45B. Each are developed vertically downwards under the crosspiece 11. Each extendible arm 45A, 45B is formed by two tubular elements, an external tubular element 46 and an internal tubular element 48 respectively. Key 49, integral with the external tubular element 46, engages a longitudinal recess 47 on the internal tubular element 48 to prevent the relative rotation of the two telescopic tubular elements. Roll engagement members are carried by the lower end of the extendible arms 45A and 45B, the members in this embodiment consisting of respective centers 51 A, 51 B for engaging the tubular core of a web roll. Each of the two extendible arms 45A, 45B is equipped with a hydraulic cylinder-piston actuator 55 which controls the elongation and the shortening of the respective arm 45A and 45B whose cylinder is fastened to the slide 43 and whose piston rod is fastened to the respective center.

[0036] A splicing device, i.e. a device for joining the two webs from two different rolls and cutting the web from one of the two rolls to be replaced, is arranged inside the crosspiece 11. The splicing device, schematically indicated with reference numeral 61, is not illustrated in detail, and can be made using any known solution, e.g. according to that described in US-A-3,858,819.

[0037] Fixed idle rolls 63, 64, 65, 66 for the web and two mobile guiding rollers 67, 68 fastened on a carriage 71, which translates in parallel to the crosspiece 11 on the two beams 7, 9, are arranged over the crosspiece 11 for the purposes indicated below.

[0038] The operation of the device described to this point will now be described with reference to Figs. 1A-1D. Fig.1A shows a situation in which a roll B0 has just been arranged in condition to feed the web N0, which is wound on it, to a corrugator (not shown). The roll B0 is engaged by the arms 45A, 45B of the first pair and has been lifted from the handling device, which took the roll to the lateral loading station 13. In this way, the roll B0 can turn freely by pulling the web N0.

[0039] A roll B1 of web N1 is inserted in the lateral loading station 15 during an appropriate phase. The leading edge of the web, indicated with reference T1 (in the configuration shown in Fig. 1A), has not yet been arranged for being spliced to the web N0 of the roll B0.

[0040] After starting to unwind the web B0, the arms 45A, 45B which support said roll move from left to right passing from the lateral loading station 13 to the intermediate unloading station 17, as shown in Fig. 1B. In this position, the roll B0 continues to feed the web N0, which is wound on it, to the corrugator. In the example shown, the roll B1 was inserted in the lateral loading station 15 before the translation of the arms 45A, 45B which support the roll B0 from the station 13 to the station 17, it is understood that the roll B1 can also be inserted after the translation of the roll B0. In Fig.1B, the leading edge T1 of the web N1 wound on the roll B1 was arranged in the splicing device contained in the crosspiece B0 for splicing at a later time when the roll B0 must be replaced with the roll B1. To arrange the web N1, the roll B1 is engaged by the centers of the respective arms 45A, 45B and lifted by shortening the arms. In this way, the roll B1 is free to turn on its axis to take the leading edge T1 of the web N1 into the splicing device.

[0041] Fig. 1C shows a subsequent phase in the working cycle in which the roll B0 is arranged on the handling device associated to the intermediate unloading station 17 by means of a vertical elongation stroke of the arms 45A, 45B. In Fig. 1C, the arms are shown in their maximum extension position. This means that, in this example, the roll B0 was unloaded after being used up. However, this situation is only one of those which can occur. The roll B1 is unwinding its web N1, because between the configuration shown in Fig. 1B and the configuration shown in Fig. 1C, the web N0 has been spliced to the web N1. This operation is known *per se* and does not require particular description herein.

[0042] In Figs.1B and 1C, the arms 45A, 45B which support the roll B1 are shown in an essentially retracted position because the roll B1 has a high diameter. However, as mentioned above, the rolls handled by the device according to the invention can have any diameter. Consequently, the roll B1 (as the roll B0 in Figs. 1A, 1B) can have any diameter. It can be easily engaged by the arms 45A, 45B and carried to the lifted position by shortening the arms.

[0043] Again in Fig.1C, an additional roll B2 of web, which at the time is still resting on the handling device, has been arranged in the lateral loading station 13 in the meantime. The roll will be grasped by the arms 45A, 45B of the left pair (in the drawing) as soon as they release the finished roll B0 in the intermediate unloading station, shorten and translate horizontally towards the lateral loading station 13. This movement also releases the finished roll B0, which can be moved away from the intermediate unloading station 17. References N2 and T2 indicate the web wound on the roll B2 and the leading edge of the web, respectively.

[0044] Fig. 1D shows a subsequent configuration in which the roll B2 is engaged by the respective arms 45A, 45B and lifted from the handling device which carried it to the lateral loading station 13. The leading edge T2 of the web N2 has been arranged in the head of the splicing device, which for this purpose has been previously translated towards the left extremity of the supporting structure and consequently rightwards. A few meters of

the web N2 is thus unwound to allow the leading edge T2 to be arranged in the splicing area of the two webs N1 and N2.

[0045] Fig. 1D shows that the roll B1 was moved horizontally along the crosspiece 11 by the respective arms 45A, 45B from the lateral loading station 15 to the intermediate loading station 17. After this transfer, the lateral loading station 15 is free to insert an additional roll B3. The latter is drawn with a dotted line in Fig. 1D to indicate that it can be inserted at a later time. Furthermore, by the way of an example, the roll is shown with a diameter which is smaller than above. References N3 and T3 indicates the web and the respective leading edge.

[0046] The following operation consists in splicing the free leading edge T2 of the web N2 to the web N1 from the roll B1 and cutting the end of the latter. The residual roll B1 (or its finished tubular core) will then be lowered by telescopically extending the respective arms 45A, 45B in the intermediate unloading station, so that the arms 45A, 45B are available to engage the roll B3. The residual roll B1 is distanced from the intermediate unloading station 17 to allow moving the roll B2 from the lateral loading station 13 to the central station 17 from where unwinding of the web N2 continues.

[0047] As described, it is clearly understood that, on one hand, the device according to the invention can be used to handle rolls B of any diameter simply by lengthening and shortening the arms 45A, 45B. Reciprocally approaching and distancing the arms 45A, 45B of each pair is used on the other hand, in a way known *per se* to axially engage rolls also of variable axial length.

[0048] Furthermore, the presence of three stations arranged side by side and the possibility of translating the arms along the crosspiece 11 is used to carry out extremely rapid roll change cycles with considerable benefits in terms of hourly production rate.

[0049] The possible alignment of the rolls which can present the axis not perfectly parallel to the union line of the axes of the centers 51A, 51B can occur by using independent actuators for the translation movement of the arms 45A, 45B along the respective transversal element 21, in the following way: the arms are lengthened or shortened to take the centers or cones 51A, 51B to the height of the rolls axis and are kept at a reciprocal distance which is higher than the axial length of the roll. One of the two arms (e.g. arm 45A) at this point is approached to the roll to insert the respective center 51A in the core of the roll. The transversal element 21A (or 21B) is moved by dragging the roll with the corresponding center to turn it on a vertical axis. The opposite end of the roll is approximately stationary. The movement ceases when the other center 21B (or 21A) is aligned with the respective end of the tubular winding core of the roll and can be engaged in it.

[0050] It is understood that the drawing shows a possible embodiment of the invention and that numerous changes can be implemented to the construction and arrangement without departing from the scope of the present invention. The possible presence of reference numerals in the annexed claims has the purpose of facilitating comprehension of the claims with reference to the above description and the attached drawings and does not limit the scope of protection represented by the claims.

Claims

1. A web roll unwinding device comprising

- two pairs of mobile arms (45A, 45B) for supporting rolls (B0, B1, B2, B3) of web (N0, N1, N2, N3) each arm being provided with members (51A, 51B) for engaging the rolls;
- a supporting structure (3, 11) for said pairs of arms;
- two lateral stations (13, 15) for loading full rolls;
- and an intermediate station (17) for unloading the used rolls,

characterized in that said structure presents a supporting crosspiece (11), along which said pairs of arms (45A, 45B) translate, said crosspiece developing over the two lateral stations and the intermediate station; **in that** said arms are developed downwards from said crosspiece; and **in that** means are provided to align the roll engagement members carried by the arms with the axis of the roll to be engaged by said members.

2. Unwinding device according to claim 1, **characterized in that** said arms can be lengthened or shortened, the lengthening and shortening of the arms forming the means for aligning the roll engagement members with the axis of the rolls.

3. Unwinding device according to claim 1 or 2, **characterized in that** said supporting crosspiece houses a splicing device for splicing the trailing edge of a web of a first unwinding roll to the leading edge of a web of a second roll which is standing by.

4. Unwinding device according to claim 1, 2 or 3, **characterized in that** said supporting crosspiece is supported by vertical uprights (3), the crosspiece and the uprights forming a gantry structure which contains the two lateral stations and the central station.

5. Unwinding device according to one or more of the previous claims, **characterized in that** said crosspiece comprises two parallel beams (7, 9) each equipped with guiding means (29) for said arms.

6. Unwinding device according to claim 5, **characterized in that** the arms of each pair are connected to each other by a transversal element (21A; 21B)

equipped with a guide (41) which is orthogonal to said crosspiece (11), the arms of each pair being mobile along the transversal element to reciprocally approach and distance each other; and **in that** said transversal element (21A; 21B) is mobile on the guiding means (29) of said beams (7, 9).

7. Unwinding device according to one or more of the previous claims, **characterized in that** each of said arms is equipped with an actuator (55), which controls the vertical lengthening and shortening movement, and present a telescopic structure (46-49) with an external tubular element (46) and an internal tubular element (49), the upper part being fastened to said transversal element (21) and the lower end being equipped with a center (51A, 51B) for engaging the roll.

8. Unwinding device according to claim 7, **characterized in that** said telescopic structure comprises means (47, 49) for avoiding the reciprocal rotation, on the axis of the respective arm, of said internal and external tubular elements.

9. A method for feeding a web to a corrugator for making a web of corrugated cardboard, comprising the following steps:

- arranging a first roll (B0) of web in a first lateral loading station (13);
- engaging said first roll with a first pair of arms (45A, 45B);
- vertically lifting said first roll with said first pair of arms (45A, 45B);
- horizontally translating said first pair of arms and said first roll towards an intermediate unloading station (17).

10. Method according to claim 9, comprising the following steps:

- positioning a second roll (B1) of web in a second lateral loading station (15), the intermediate unloading station (17) being arranged between the first and the second lateral loading station;
- engaging said second roll (B1) with a second pair of arms (45A, 45B);
- vertically lifting said second roll (B1) with said second pair of arms;
- joining the web of the first roll to the web of the second roll and cutting the web of the first roll when the first web roll (B0) needs to be replaced;
- vertically lowering said first roll and unloading it into said intermediate unloading station, releasing it from the first pairs of arms;
- distancing the first roll from the intermediate unloading station;
- horizontally translating the second roll from the second loading station towards the intermediate unloading station.

11. A method for feeding a web to a corrugator for making a web of corrugated cardboard, comprising the following steps:

- arranging a first roll of web in a first lateral loading station;
- vertically lifting said first roll to a height of the roll engagement members carried by a first pair of arms;
- engaging said first roll with said engagement members;
- horizontally translating said first pair of arms and said first roll towards an intermediate unloading station.

12. Method according to claim 11, comprising the following steps:

- positioning a second roll of web in a second lateral loading station, the intermediate unloading station being arranged between the first and the second lateral loading station;
- vertically lifting said second roll to a height of the roll engagement members carried by a second pair of arms;
- engaging said second roll with the engaging members of said second pair of arms;
- joining the web of the first roll to the web of the second roll and cutting the web of the first roll when the first web roll needs to be replaced;
- vertically lowering said first roll and unloading it into said intermediate unloading station;
- distancing the first roll from the intermediate unloading station;
- horizontally translating the second roll from the second loading station towards the intermediate unloading station.

13. Method according to one or more of the claims from 9 to 12, **characterized in that** after the first roll (B0) is transferred from the first lateral loading station to the intermediate unloading station, a third roll (B2) of web is arranged in said first lateral loading station.

14. Method according to claims 10, 11 or 12, **characterized in that** after said second roll (B1) of web is transferred from the second loading station to the intermediate unloading station, a fourth roll (B3) of web is positioned in said second lateral loading station.

15. Method according to one or more claims from 9 to

14, in which the web rolls are arranged in said lateral loading stations and distanced from said intermediate unloading station with a movement that is parallel to its axis.

Fig.1A

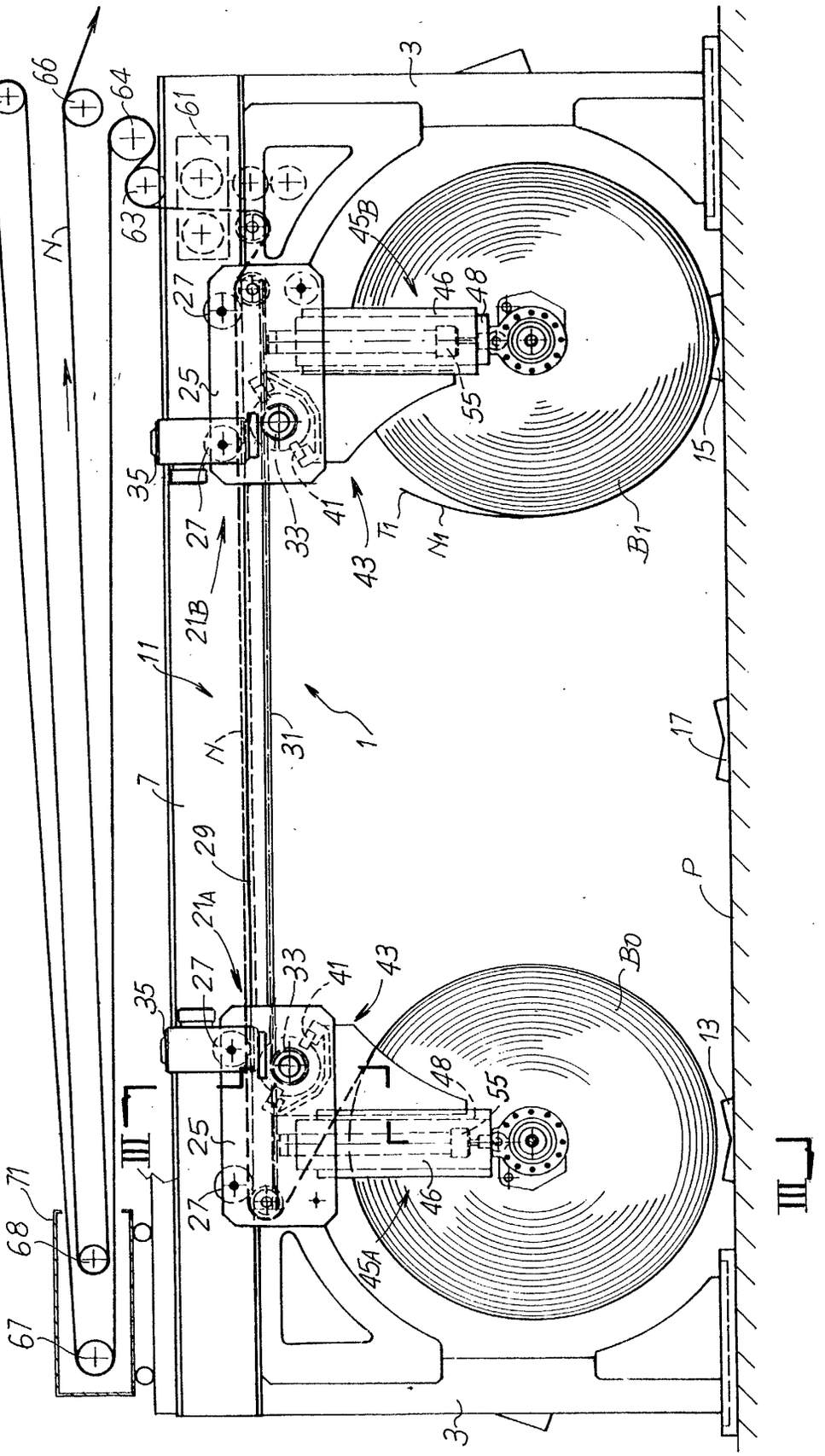
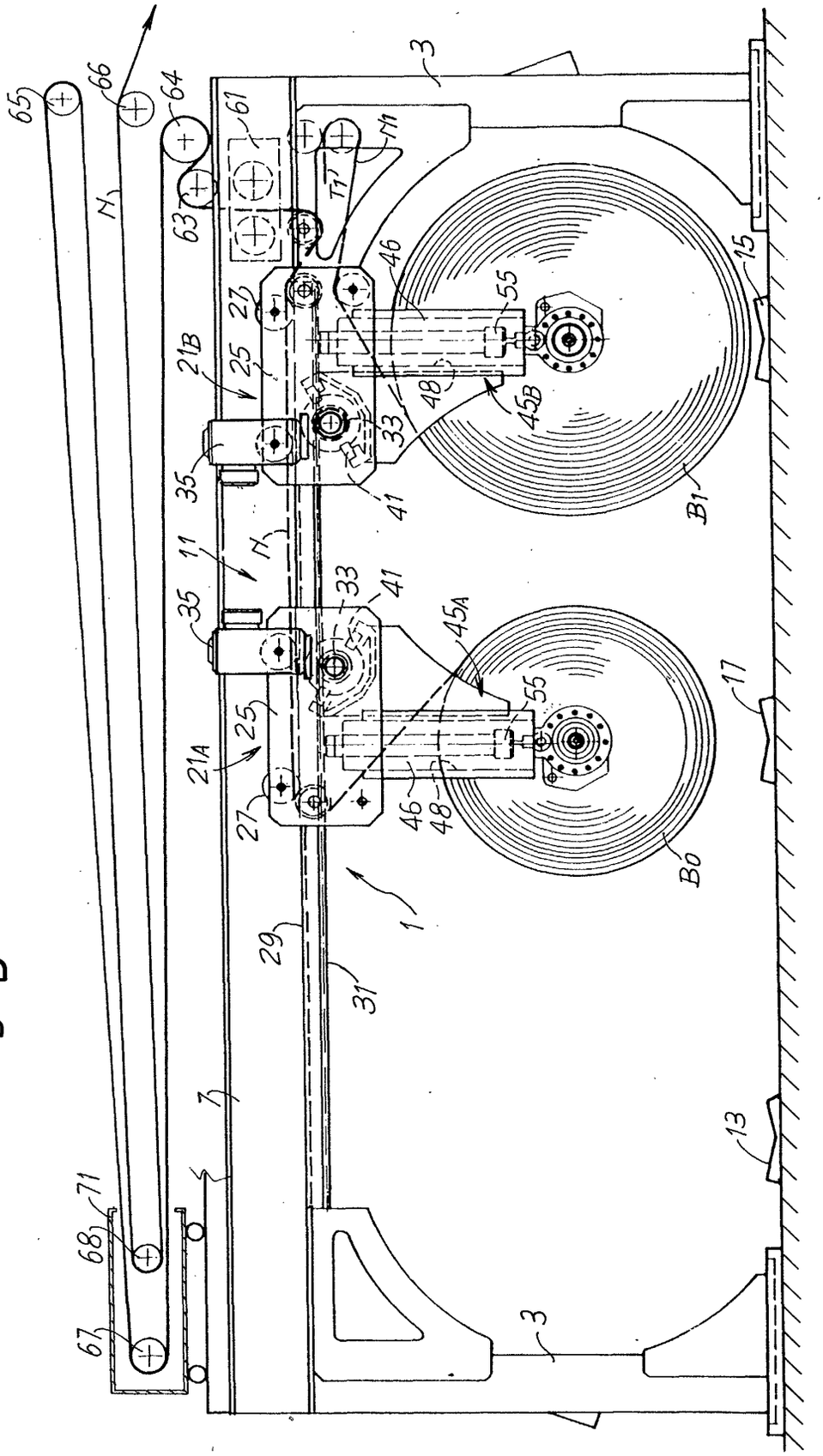

65
66
64
61
63
3
45B
46
48
55
15
B1
N1
T1
43
41
33
35
27
25
21B
11
31
1
7
29
21A
17
P
B0
13
45A
68
71
67
III

Fig.1B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B0
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1
31
7
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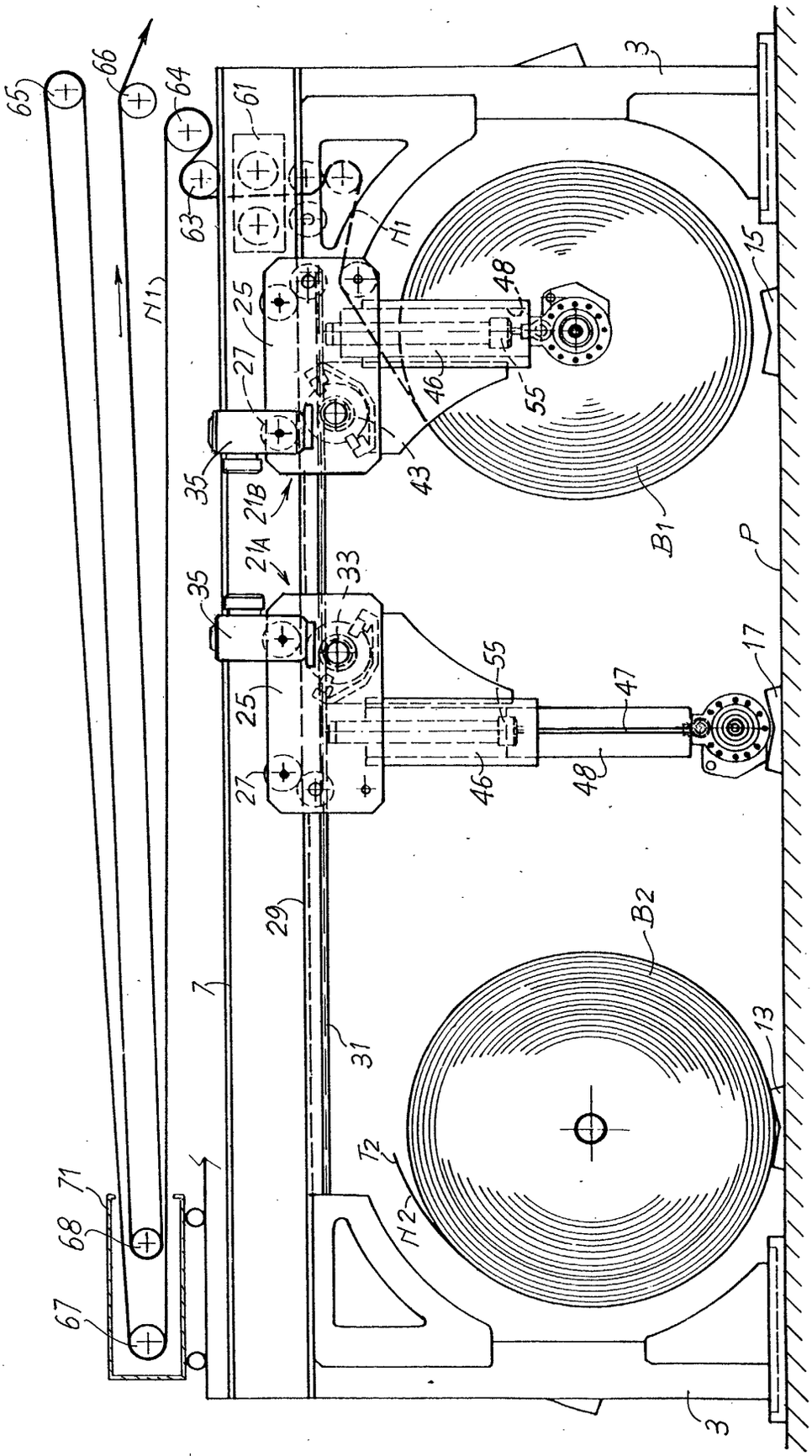
68
67

Fig.1C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H2
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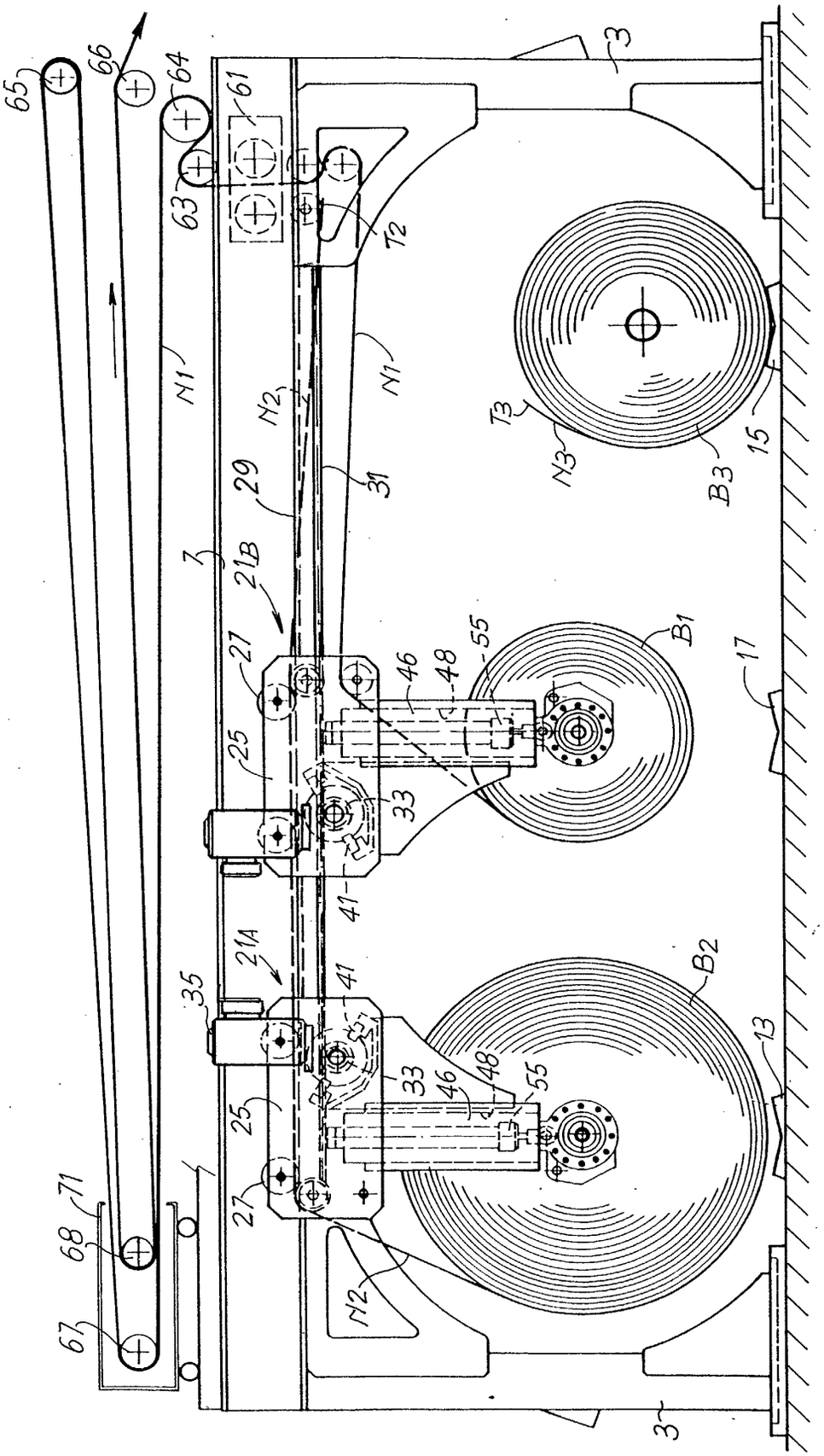
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N1
N2
N1
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B3
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21B
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46
48
55
B1
17
25
33
41
21A
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41
B2
13
33
46
48
55
25
27
12
71
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67
3

Fig. 1D

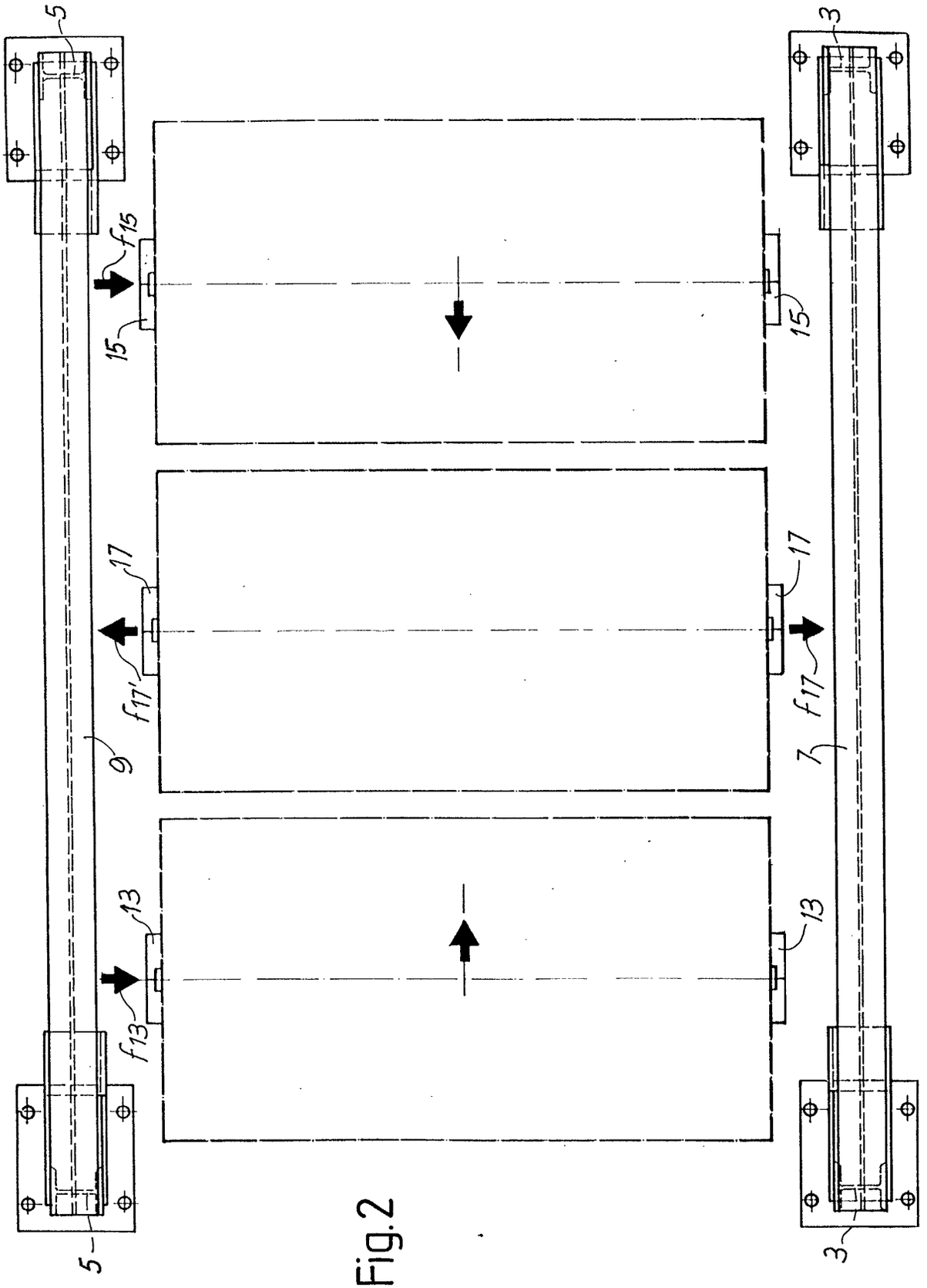
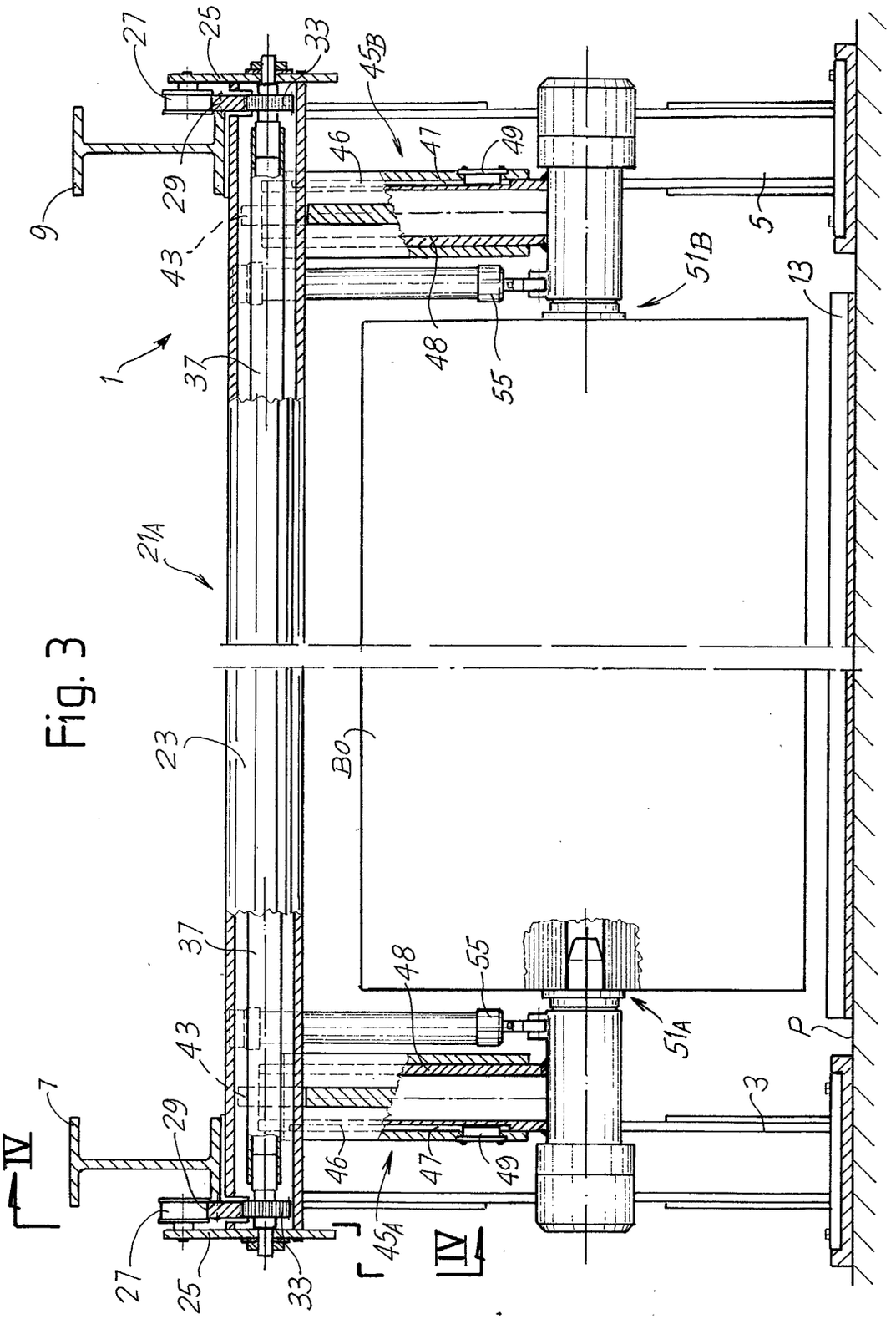


Fig.2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IV
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25
33

Fig. 3

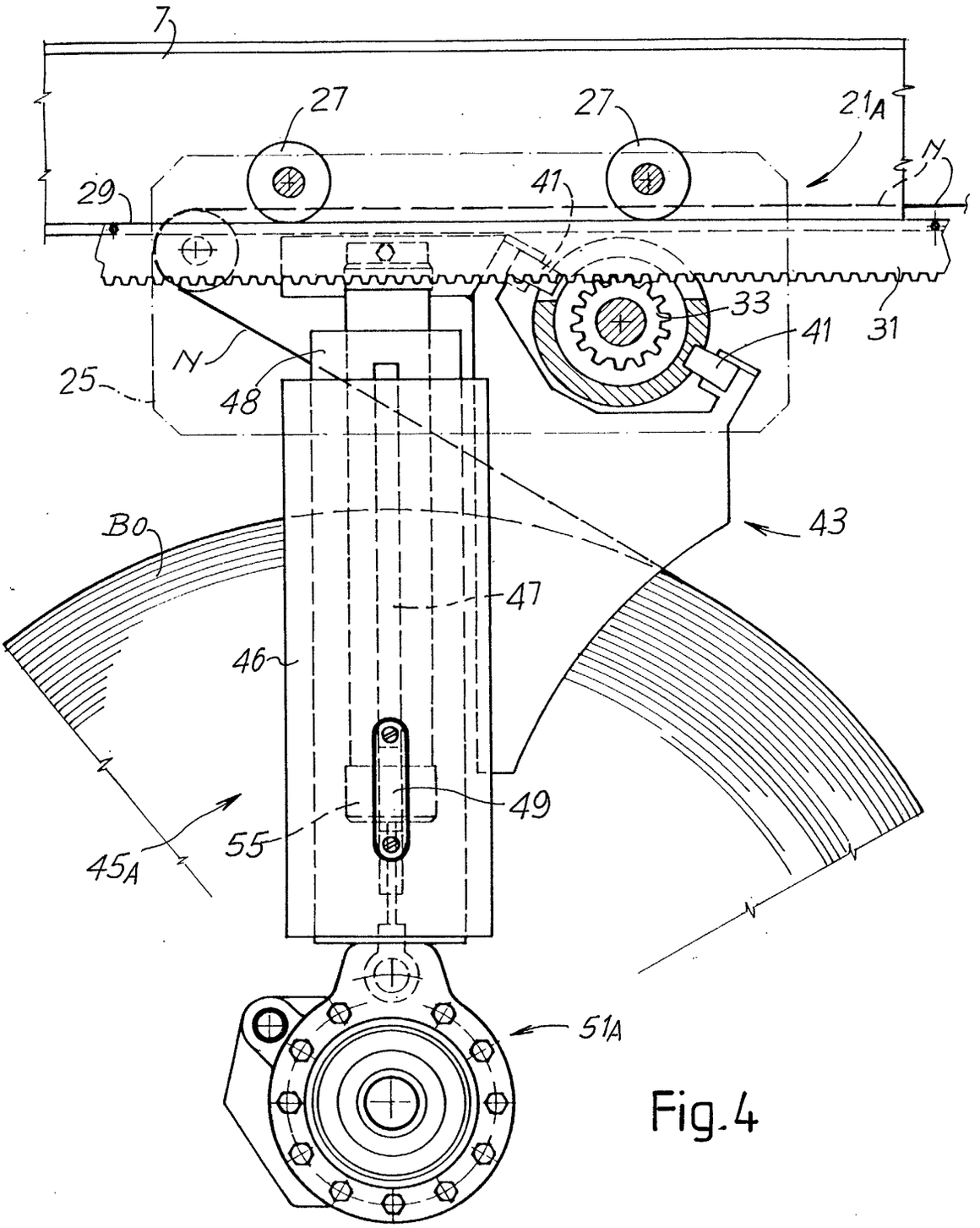

Fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 02 42 5197

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27 August 2002	Haaken, W

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