

EUROPEAN PATENT APPLICATION

Application number: **90105104.5**

Int. Cl.⁵: **B65H 19/12**

Date of filing: **19.03.90**

Priority: **05.04.89 IT 1246589**

Date of publication of application:
10.10.90 Bulletin 90/41

Designated Contracting States:
DE FR GB

Applicant: **SASIB S.p.A.**
Via di Corticella, 87/89
I-40128 Bologna(IT)

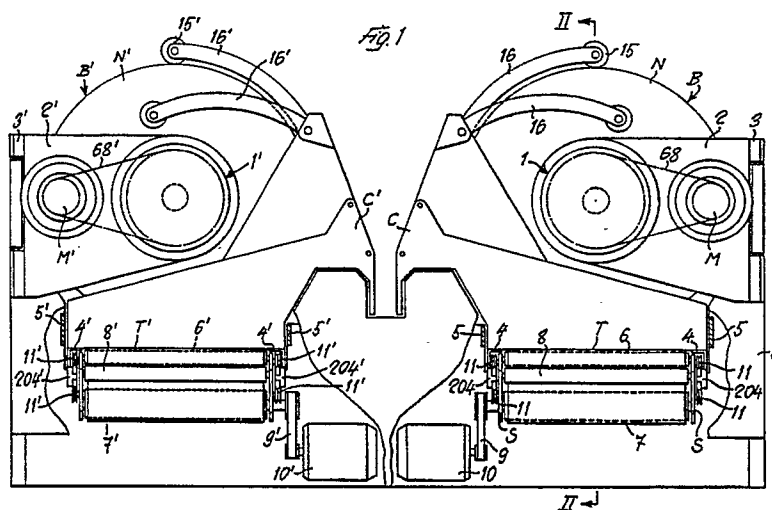
Inventor: **Manservigi, Roberto**
Via Bertalia 26/2
I-40131 Bologna(IT)

Representative: **Porsia, Bruno et al**
c/o Succ. Ing. Fischetti & Weber Via Caffaro
3/2
I-16124 Genova(IT)

Automatic device for feeding a wrapping material web, particularly bobbins of cigarette paper.

The object of the invention is a device for automatically feeding bobbins (B) of a web (N) of wrapping material, particularly bobbins of cigarette paper, to a substantially horizontal mandrel (1) provided with circularly arranged, radially movable jaws (52). The bobbins (B) are accommodated substantially coaxially to the axis of mandrel (1), in bobbin carrying cradles (C) which are advanced toward the mandrel (1), in the axial direction thereof, by a belt conveyor (T). The bobbin (B) being each time the leading bobbin in the forwardmost bobbin-carrying cradle

(C), is clamped exactly in its transfer position on to the mandrel (1) by a positioning abutment formed by the front wall (55, 355) of mandrel (1), which cooperates with the core (A) of a web material bobbin (B), and this bobbin (B) is radially and axially clamped by the jaws (52), the said jaws (52) being provided with axially clamping means (62) which cooperate with a trueing abutment (355) that determines the position, perfectly perpendicular to the axis of rotation of mandrel (1), of the plane in which should lie the bobbin (B) clamped thereonto.



The object of the invention is a device for automatically feeding bobbins of a web of wrapping material, or the like, particularly bobbins of cigarette paper, to a substantially horizontal mandrel, the said bobbins being preferably provided each with a tubular core, and being advanced the one after the other toward the mandrel, in the axial direction thereof, by means of a drivable bobbin-carrying cradle on which the bobbins are caused to rest by their lower peripheral surface, in a position being substantially co-axial to the mandrel, the mandrel being provided with circularly arranged jaws, radially movable upon control, in coaxial relation therewith, which when set in their radially drawn in position, are slipped into the core of the bobbin each time leading the set of bobbins, while when set in their radially drawn out position, engage the bobbin having been threaded thereon, and clamp the same on to the mandrel, the said mandrel and the said jaws that are associated therewith, being axially movable relative to a slipping off stationary abutment cooperating with the bobbin core, to slip off the said core from the mandrel jaws.

A known device of this type is disclosed in the document EP-A1-0269807 of the same Patentee.

In the automatic device for feeding a wrapping material web, as disclosed in the said document, the bobbin-carrying cradles are formed with a plurality of compartments, whereby a plurality of web material bobbins are accommodated side-by-side, and are fed to the mandrel by being driven only in one direction, i.e., in the forward direction toward the mandrel, the said cradles being slidably fitted on substantially straight guide means, which are parallel to the mandrel axis. The means for moving forward the bobbins toward the mandrel consist of a worm screw, with which each cradle is engaged by means of a threaded driving member connected to the respective cradle in an elastically yieldable manner. In the device according to the said document EP-A1-0269807, controlled positioning means are provided for causing the bobbin-carrying cradles to be stopped exactly in the position for transferring a bobbin on to the mandrel, and these means particularly consist of a controlled movable latch cooperating with a succession of notches for stopping a bobbin-carrying cradle, which must be indispensably synchronized with the forward movement of the cradles.

In the mandrel, which is a hollow body, in order to promote the radial movement of the jaws, the jaws are articulately connected by means of two reciprocally inclined arms, to two nut screws with contrary-handed threads, screwed on respective contrary-handed-thread sections of a shaft which is co-axially arranged at the interior of the mandrel hollow body, and which through an epicyclic reduc-

tion gear also housed at the interior of the said hollow body, is driven preferably by a pneumatic motor.

The drawbacks of the automatic device for feeding a wrapping material web according to the said document EP-A1 0269807, are apparent, and primarily reside in the considerably complex construction of the whole device, both as for what concerns the means for advancing and stopping the web material bobbins, i.e., the bobbin-carrying cradles, exactly in the position for transferring same, and as for what concerns the mandrels themselves. This results in such a complex construction being rather expensive, and involving a considerable complexity from the operational viewpoint. Owing to the fact that the jaws of the mandrel are allowed to make only a radial movement, the core of a web material bobbin can be clamped by the mandrel jaws only under the action of radial forces, that by no means will guarantee a correct positioning, perpendicular to the mandrel axis of rotation, of the plane in which the bobbins clamped on to the mandrel, should lie.

The object of the invention is to provide an automatic device for feeding bobbins of web material, of the type as described at the outset, which is of a simpler construction and operation, and so of a lower cost, whereby the need is avoided of phase-adjusting members for causing the bobbin-carrying cradles to be stopped exactly in the position for transferring the web material bobbins on to the mandrel, while a perfect perpendicularity is ensured, relative to the mandrel axis of rotation, of the plane in which the bobbins clamped on to the mandrel should lie.

The invention attains this object by the provision of an automatic device for feeding web material bobbins, of the type as described at the outset, in which the means for advancing the bobbin-carrying cradles is in form of a conveyor belt being continuously driven in the forward direction toward the associated mandrel. The conveying surface of this belt is interposed between two lateral straight guides arranged parallel to the direction of the forward movement of the bobbin-carrying cradles, which are simply caused to bear on the said belt. The abutment for positioning the bobbin-carrying cradles exactly in the position for transferring a web material bobbin on to the mandrel, is formed by the mandrel front surface which is turned toward the web material bobbins and cooperates with the cores of said bobbins, and the mandrel is provided with means for axially clamping a bobbin, which cooperate with a trueing abutment that determines the position, perfectly perpendicular to the mandrel axis of rotation, of the plane in which the bobbins should lie.

Thanks to the construction, according to the

present invention, of the automatic device for feeding bobbins of web material, the bobbin-carrying cradles can be simply caused to bear the one after the other on the conveyor belt and on the associated lateral guides. Any time the core of the leading bobbin in the forwardmost bobbin-carrying cradle is abutting against the positioning abutment formed by the mandrel front surface, this cradle will be stopped, while the conveyor belt is continuing its travel, and slips on the bottom of said cradle. The possibly provided, next-following bobbin-carrying cradle or cradles will form with the leading cradle a series of mutually contacting cradles. Thus, it is possible to avoid the use of special phase-adjusting members, since as soon as the leading bobbin has been depleted, the core of this bobbin is slipped off the mandrel, and drops into the associated compartment of its cradle. The series of bobbin-carrying cradles are automatically advanced, until the core of the successive bobbin, which is accommodated in a consecutive compartment of the same cradle, or in a compartment of a next-following cradle, will abut against the positioning abutment, i.e., against the mandrel head end, so that the series of bobbin-carrying cradles will be again automatically stopped. Moreover, the means for axially clamping the core of a bobbin, which cooperate with a trueing abutment, whose surface is perfectly perpendicularly trued relative to the mandrel axis of rotation, allow to have this bobbin simply and safely clamped on to the mandrel, in a plane for the bobbin to lie thereon, which is perfectly perpendicular to the mandrel axis of rotation, whereby a better operation of the device is ensured.

In a particularly advantageous embodiment of the automatic device for feeding bobbins of web material, according to the invention, the positioning abutment and the trueing abutment, and the abutment for slipping off the core A of a bobbin having been depleted, are formed by only one abutment surface, particularly by an annular projection provided on the mandrel front end which is turned toward the series of bobbins, so that the expense for the construction of this device is further reduced, and the bobbin-carrying cradles are suitably formed with a flat bottom, which allows the conveyor belt to easily slip thereon, a sufficient friction for the cradles to be moved forward, being at the same time ensured.

Other features further improving the above-disclosed automatic device for feeding bobbins of a wrapping material web also form the object of the invention, and are the subject of the dependent Claims.

The particular features of the said device, according to the invention, and the advantages arising therefrom, will appear more in detail from the

specification of one preferred embodiment thereof, which is shown by way of a non-limiting example in the accompanying drawings, in which:

Figure 1 is a front view in the direction of arrows I-I in Figure 2, with parts in section at the conveyor belt, showing a bobbin-changing device for bobbins of a cigarette paper web, with an automatic bobbin-feeding device being associated with either of the two mandrels

Figure 2 is a longitudinal sectional view in the direction of arrows II-II in Figure 1, showing the said bobbin-changing device.

Figures 3 and 4 are two side views respectively showing a bobbin-carrying cradle according to Figures 1 and 2.

Figures 5 to 7 are axial sectional views in an enlarged scale of the mandrel associated with a bobbin, respectively showing the mandrel jaws in their retracted position, in the position in which the mandrel jaws are slipped into the core of a bobbin, and in the position in which the said jaws are caused to clamp the bobbin on to the mandrel.

Figures 8 and 9 show in an enlarged scale a mandrel jaw, respectively in the position in which it is slipped into the core of a bobbin, and in the position in which it is caused to clamp the bobbin on to the mandrel.

Figures 10 and 11 are side views showing the front end side of the mandrel, without and with the abutment front wall thereof.

In Figure 1, numerals 1 and 1' denote two substantially horizontal mandrels arranged in a parallel, spaced apart relation. Each mandrel 1, 1' is designed for carrying a bobbin B, B' of a web of wrapping material, such as of cigarette paper, and one of these bobbins, the bobbin B for example, will feed a machine, particularly a cigarette-making machine using a cigarette paper web, so that this one bobbin is the operative bobbin, while the other bobbin B' is a reserve bobbin. When the operative bobbin B is about to be depleted, a supply of the web N being unwound from this bobbin B, will be formed in known manner in a magazine (not shown), and the trailing end of web N from the nearly depleted bobbin B will be spliced with the leading end of the web N' from the reserve bobbin B'. Both webs N, N' are kept at this time in a stationary condition by means of a splicing device (not shown), such as, for example, the splicing device as disclosed in detail in the document EP-A1-0269807 of the same Patentee. The said splicing device is located in the median region of the automatic device for feeding bobbins of a wrapping material web, between the bobbin-carrying cradles C, C', respectively associated by their lower zone with the mandrels 1, 1'. The machine using a web of wrapping material, particularly of cigarette paper, will be then fed with the web N' from the bobbin

B', that now becomes the operative bobbin, and a fresh bobbin B will be fitted on the mandrel 1, to replace the depleted bobbin B. The cycle is then repeated with the bobbin B as the reserve bobbin. The two mandrels 1, 1' thus alternate their function of supporting the operative bobbin and the reserve bobbin.

Both mandrels 1, 1' are fitted on the same side of two cantilevered mandrel-carrying arms 2, 2', which extend toward each other from the frame S of the device, and these mandrel-carrying arms are preferably hingedly connected at 3, 3' to the said frame S, whereby the said arms are made angularly movable, and the single structural components of the mandrels and of the automatic feeding device are rendered easily accessible. The cradles C, C' and the cantilevered mandrel-carrying arms 2, 2' are so constructed that the empty cradles are allowed to pass under the mandrel-carrying arms 2, 2', so that these cradles will be automatically pushed forward, out of the device and toward the mandrel 1, 1' by the next-following cradles C, C' containing the successive bobbins B, B' of web material.

Means for moving forward the bobbins B are actually associated with each mandrel 1, 1', and consist of a conveyor belt, respectively designated by T, T'.

As clearly shown in Figure 1, the automatic device for feeding bobbins of a wrapping material web, according to the invention, is substantially symmetrically constructed relative to its vertical median plane, so that in the following description, and also in the Claims, only those structural members which are associated with the mandrel 1 will be described, and in the following of this statement the said mandrel 1 is assumed to support the operative bobbin B, while the structural members which are associated with the mandrel 1', are given - whenever these members are mentioned, the same reference numerals, with the addition of a prime mark (')

As shown in Figures 1 and 2, the conveying means for moving forward the bobbin-carrying cradles C are provided by a conveyor belt T of a width being smaller than that of the bottom of cradles C, with two stationary lateral guides 5 being arranged over the conveying plane thereof. The conveyor belt T is fitted on two guide rollers 6, and one of these rollers is placed under the cantilevered arm 2 for supporting the mandrel 1, while the other roller is located at the opposite end of frame S, the lower run of said conveyor belt T being passed by means of two associated deflecting rollers 8 around a driving roller 7. The driving roller 7 is operated through a drive 9, particularly a belt drive, by a motor 10 fixedly fitted on frame S.

A longitudinal cradle-carrying member 4 is pro-

vided at each side of the conveyor belt T, and is so mounted as to be freely slidable in both senses of the direction of the forward movement of the bobbin-carrying cradles (arrow F in Figure 2), and as to be substantially coplanar to the conveying plane of belt T. The said longitudinal cradle-carrying members 4 are provided at their respective end which is associated with the mandrel 1, with an abutment member 104 cooperating with the sides of cradles C that project laterally out of the conveyor belt T. More particularly, the said longitudinal cradle-carrying members 4 extend over about half the length of the conveyor belt T, at that section of belt T which is associated with mandrel 1, and the said members 4 are formed with rearward extensions 204, relative to the running direction of belt T, which are slidably fitted on pairs of rollers 11, which in turn are secured to the frame S of the automatic feeding device, according to the invention.

Thanks to these longitudinal cradle-carrying members 4, the empty cradles C which are pushed beyond the mandrel 1 by the next-following cradles containing the web material bobbins B waiting to be fitted on to the mandrel 1 (see Figure 2), can be gathered downstream of this mandrel 1, ready for being picked up at the convenient time, and for being filled with fresh web material bobbins B, and introduced again into the operative cycle of the machine. The longitudinal cradle-carrying members 4 are actually made of such a length that these members can accommodate a plurality of cradles C before that the same have reached their utmost drawn out position.

The web material bobbins B, i.e., the cradles C containing the said bobbins, are advanced by the conveyor belt T being continuously driven in the direction of mandrel 1, until the core A of the leading bobbin B contained in the forwardmost cradle, will come into abutment against the positioning abutment that determines the correct position for transferring this web material bobbin B on to the mandrel. The said positioning abutment is formed, as shown in Figure 2, and as it will be disclosed more in detail hereinafter, by the front end surface 55 of mandrel 1 which is turned toward the bobbins, so that the forwardmost cradle C will be stopped, while the next-following bobbin-carrying cradles C will form, as they are reaching the preceding bobbin B, a stationary series of bobbin-carrying cradles C into mutual contact. The conveyor belt T is continuing its travel, and slips under the bottom of cradles C, while the jaws 52 of mandrel 1 are clamping thereonto the leading bobbin B in the forwardmost cradle C. When the depleted condition of this bobbin B has been reached, and after that the trailing end of the web N which is unwound therefrom, has been spliced

with the leading end of the web N' from the reserve bobbin B' fitted on to the other mandrel, according to the splicing procedure as described more in detail in the document EP-A1-0269807, with the said webs and the said bobbins being kept at this time in a stationary condition, the core A of the depleted bobbin B will be disengaged from the jaws 52 of mandrel 1 which clamped this bobbin, and will be slipped off the mandrel 1, so that this core will drop down into the associated cradle C. The successive web material bobbin B lying in another compartment of the same cradle or in the next-following cradle, thus is at a distance from the front end side of mandrel 1, so that the series of mutually contacting cradles C are advanced until the successive bobbin B will come into abutment against the said front end side of mandrel 1, whereby, as disclosed above, the series of cradles C are again stopped, and any cradle C with its bobbins B being in a depleted condition, will be pushed beyond the mandrel, where such a cradle is supported by the slidable longitudinal cradle-carrying members 4 having followed the movement of said cradle, thanks to their slidable end abutment members 104 cooperating with the side edges thereof, which project out of the conveyor belt T.

The cradles C are advantageously made as shown in Figures 3 and 4, which enables to carry out the said cycle. Each bobbin-carrying cradle C consists of a box 12, preferably of plastics material, with a flat bottom 112. By means of an intermediate partition 13 the said box 12 is divided into two compartments C1, C2, which are meant for housing each one bobbin B of web material (see also Figure 2). Two supporting grooved rollers 14 are rotatably mounted near the bottom of each compartment C1, C2 of cradle C, and the respective web material bobbin B bears on these rollers 14, and is kept in its upstanding position by a third roller 15 which is associated with the upper region of a web material bobbin B and is fitted, for this purpose, in the free end of an arcuate arm 16. By its end lying opposite to the roller 15, the arcuate arm 16 is fulcrumed at 17 about the upper end of a vertical upward extension 113 of the intermediate partition 13, so as to be swingable in a vertical plane. The said arm 16 is elastically pressed against a web material bobbin B by a spring 18 provided at the fulcrum 17, whereby any small differences in diameter of a bobbin B of web material can be automatically offset. In order to limit the downward swinging of arm 16, so as to avoid that during the gradual decreasing of the diameter of a bobbin B of web material, its web may be caused to reach such a position that a cradle C will be prevented from passing beyond the mandrel 1 (see also Figure 1, in which the down position of

arm 16 is designated by 16b), the said arm 16 is provided at its end which is fulcrumed about the extension 113, with an appendix 116 cooperating with a transversal wing 19 of the extension 113, and forming a limit stop abutment. Below the transversal wing 19, the cradle C has an apron-like extension 20. The said apron-like extension 20 is provided with two web-guiding rollers 21, 22 for each compartment C1, C2, which are arranged at different levels in a spaced apart relation. The leading end of web N being unwound from a bobbin B contained in each compartment C1, C2 of a bobbin-carrying cradle C is passed over the roller 21, and is led downwards around the lower roller 22. Thereafter, the leading end of web N is received in a respective vertical channel 23 provided on the outward side of the apron-like extension 20, under the lower roller 22, the side walls of the said vertical channel 23 being formed with facing longitudinal grooves 24 in which the side edges of the leading lower end of web N are engaged. The leading end of web N is held in the said channel 23 by a spring 25, and under this spring 25, the bottom wall of channel 23 is formed with a slot 123 for the splicing heads of a splicing device (not shown), particularly of the type as disclosed more in detail in the document EP-A1-0269807, to be allowed to pass therethrough.

The mandrel 1 that is designed for cooperating with the web material bobbins B, is shown in Figures 5 to 11 and comprises a cylindrical body 30 which is secured, particularly by means of a flange, to the cantilevered mandrel-carrying arm 2, and by an extension 130 is fitted into a respective slot in the mandrel-carrying arm 2. Provided in the cylindrical body 30 is a plurality of axial chambers, particularly three axial chambers 31 which are angularly spaced apart from each other by 120°, and which form the cylinders of an equal number of double-acting pneumatic pistons 32, the said chambers 31 being provided with ducts 131 for supplying compressed air to each one of the end sides of pistons 32. The said pistons 32 are each provided with a stem 132, and their free end extending out of the respective axial chamber 31 is secured by means of bolts 33 and with the interposition of pairs of round washers 34 to a common disc 35, whereby any problem of orienting the stems 132 relative to the common disc 35, will be eliminated. In a cylindrical through bore 36 located in the median zone of the cylindrical body 30 and being co-axial thereto, two bearings 37 and 38 are accommodated in suitable bearing housings and support a rotatable bell 39 comprised of a cylindrical section 139 situated at the mandrel-carrying arm 2, a connecting intermediate section 239 flaring in the direction of the cylindrical section 139, particularly with a stepped outer configuration and a simply

conical inner configuration, and an also cylindrical tubular section 339 in form of a hollow hub. The cylindrical section 139 has a diameter which is considerably greater than that of the tubular section 339, and a crown gear 40 into engagement with a toothed belt 68, is provided on the outside surface of said section 139. At the interior of the tubular section 339 in form of a hollow hub, a sleeve 41 is supported so as to be axially slidable and as to be rotatable co-axially to the bell 39, and at its end lying opposite to the mandrel-carrying arm 2, this sleeve 41 is rotatably fitted through a bearing 43 on a pivot 42 which by means of a bolt 44 and with the interposition of a pair of spherical washers 45, is connected to the center of the common disc 35. A centering tube 46 is axially slidably fitted in a central bore in sleeve 41, and in the said tube 46 end section lying inside the sleeve 41, a helical spiral spring 47 is received, which by its end pointing toward the common disc 35, bears against a socket-like member 48 which is integral with the sleeve 41, and is so urged as to be permanently kept in its compressed condition, the said spring 47 being supported by a guide pin 49 secured to the socket-like member 48, in co-axial relation with the centering tube 46. Pivotally connected to the end 141 of sleeve 41 which is turned toward the mandrel-carrying arm 2, are four links 50 which are angularly spaced apart from each other, particularly by 90° , and are angularly movable in the radial direction, each link 50 having its opposite end articulately connected to a lug 151 of an associated slider 51 onto which a jaw 52 is fixedly fitted. The lug 151 of each slider 51 is radially slidably engaged in a radial slot 153 in a disc 53 which is secured to a flange 146 of the centering tube 46, the radial slots 153 being each trued with the plane in which the links 50 are radially moved.

As clearly shown particularly in Figure 10, the sliders 51 are radially slidably received in radial slider-guiding grooves 253 coinciding each with a slot 153, and each having their side walls formed with shoulders 154 which are removably placed upon the side edges of the respective slider 51, and are advantageously provided by the radial edges of the respective circular sector 54, with each sector 54 being preferably a 90° sector. The said circular sectors 54 are each secured to the front surface of disc 53, symmetrically thereto (as shown also in Figure 10).

The cylindrical section 139 of bell 39 is closed at its front end by a disc 55, and a centrally arranged pin 155 for guiding the said disc is fitted into the centering tube 46. As shown in Figure 11, the disc 55 is formed with a radial opening 255 for each jaw 52 which is supported in a cantilevered manner by the slider 51. The openings 255 are of such a size that the jaws 52 are allowed to pass

therethrough, and such that the same can be radially opened and caused to clamp the respective web material bobbin B. Moreover, the front disc 55 is provided on its outward side turned toward the web material bobbins B with a projecting annular abutment member 355 of a diameter that corresponds to the diameter of the cores A of the web material bobbins B, and on its inward side the said disc 55 has rollers 56 which are respectively provided at the radially outward end of each opening 255.

The jaws 52, which are shown more in detail in Figures 8 and 9, are so made that the core A of a bobbin B will be surely clamped thereby, particularly against the projecting annular abutment member 355 of disc 55, not only by radial forces, but also by axial forces, the front surface of the said annular projection 355 being contained in a plane which is perfectly perpendicular to the axis of rotation of mandrel 1, i.e., of bell 39. Each jaw 52 actually consists of an axial hollow body 60, in which the stem 61 carrying a radial tooth 62 is so received as to be axially slidable. The said radial tooth 62 is intended for being axially positioned upon the front end edge of the core A of a bobbin B (see Figure 9), and is kept into contact with the front end wall of the axial body 60 by a compressed spring 63 which is fitted between a cap 64 threaded on the free end of the stem 61 carrying the radial tooth 62, and an internal shoulder 160 of the axial body 60, the said tooth 62 being so accommodated between two wings 260 provided in the front end wall of the said axial body 60 that this tooth will be prevented from rotating around the axis of the stem 61 carrying the same. Each jaw 52 is further provided in the region of its active section which is for radially clamping the core A of a bobbin B, i.e., at the radially outward free end side of its axial hollow body 60, with a torsion spring 65 which is secured between two radial wings 360 of its axial hollow body 60, and is formed with a rectilinear end section 165 cooperating with the radially outward wall of the said axial hollow body 60, and with a bent end section 265 fitted into a groove 162 in the radial tooth 62, the said radial tooth 62 being engaged in the said groove 162 by a pin 66 holding the same in position. Moreover, each jaw 52 is provided at the slider 51 with a radial cam 67 tapering toward the slider 51 by its radially outward end portion, and being intended for cooperating with the roller 56 of disc 55, at the time a bobbin B will be clamped on to the mandrel 1.

The operation of the mandrels clearly appears from Figures 5 to 9, in which some specific operative steps of these mandrels are disclosed.

The jaws 52 of mandrel 1 are set in their radially and axially retracted rest position, at the

interior of the cylindrical section 239 of bell 39, and the disc 35, the pistons 32, and the sleeve 41 are located in their end-of-travel position on the side of mandrel 1 lying opposite to the front disc 55, when, as disclosed above, a web material bobbin B accommodated in the forwardmost bobbin-carrying cradle C has its core A coming into abutment with the projecting annular abutment member 355 of disc 55 that forms the front end wall of mandrel 1 which is turned toward the series of bobbin-carrying cradles C (see also Figure 5), so that the forward movement of the bobbin-carrying cradles C will be stopped. Through the ducts 131 associated with the end sides of pistons 32 which are turned away from the front disc 55, compressed air is then fed into the axial chambers 31, so that the pistons 32 will drive the common disc 35 along with the sleeve 41, toward the said front disc 55, i.e., toward the series of bobbin-carrying cradles C. At the starting of such an axial movement of said disc 35 and sleeve 41, the centering tube 46, the disc 53 with the sliders 51, and so the jaws 52, will be shifted as a whole, that is, with no relative movement between them, together with the sleeve 41, so that the jaws 52 will be caused to come out of the cylindrical section 139 of bell 39, through the radial openings 255 in the front disc 55, and will be freely slipped into the core A of a wrapping material bobbin B bearing against the said front disc 55 (see Figure 6). Such an initial axial shiftment of said members 46, 53-51, 52 is completed as the end of the centering tube 46 is coming into abutment with the front disc 55, thus determining a drawn out limit position of the jaws 52, in which the radial teeth 62 of the jaws 52 project beyond that portion of the peripheral wall of core A which is turned away from the front disc 55. However, the pistons 32, and then the common disc 35 and the sleeve 41 are being caused to continue their axial travel, so that the spring 47 which is fitted in the centering tube 46 will be compressed, and the links 50 will be drawn apart. Such a drawing apart of these links 50 will cause the sliders 51 which are fitted in the radial guides 253 of disc 53, to be radially outwardly shifted, and so the jaws 52 to be radially opened (see Figure 7). While the jaws 52 are being radially outwardly opened, the cam 67 which is associated with each jaw 52, is brought into contact with the respective roller 56, thus causing the disc 53 to be axially shifted in the contrary direction to bobbin B, concurrently with an equal shiftment of the jaws 52. Thus, as shown more in detail in Figures 8 and 9, the radial teeth 62 will clamp the core A of bobbin B against the projecting annular member 355 of the front disc 55, by being pressed against the front side edge which is associated with said teeth, of the core A of a web material bobbin B, and that section of the jaws 52

which carries the torsion spring 63, will be radially pressed against the inner wall of the core A of bobbin B, so that the said core A is axially clamped thereby.

Owing to the fact that the front disc 55 of mandrel 1, and so the front surface of the projecting annular member 355 of said disc 55, is so oriented as to be caused to lie in a perfectly vertical plane relative to the axis of rotation of mandrel 1, the front disc 55 not only provides the abutment for positioning the bobbins B exactly in the position for transferring same on to the mandrel 1, but also performs the function of trueing abutment for a bobbin B of web material, the said disc 55 thus guaranteeing, cooperatively with the action of the jaws 52, which axially clamp the core A of bobbins B by means of the associated radial teeth 62, that the web material bobbins B will be clamped in a plane for the bobbins to lie thereon, which is perfectly perpendicular to the axis of rotation of mandrel 1.

After a web material bobbin B having been clamped on to the mandrel 1 (see Figures 2 and 7), the bell 39 can be set in rotation through the toothed belt 68 by the motor M, and also the sleeve 41, the associated links 50, and the disc 53 are set in rotation integrally therewith, thanks to the jaws 52 which are also set in rotation, by being engaged in the openings 255 in the front disc 55, fixedly fitted on bell 39.

As a web material bobbin B has reached its depleted condition, the core A of the depleted bobbin B will be slipped off the jaws 52 of mandrel 1 - however after the trailing end of its web N having been spliced with the leading end of the web N' from a reserve bobbin B' fitted on to the other mandrel 1', by the jaws 52 being axially moved in the opposite direction, and thanks to the mandrel front disc 55 being caused to cooperate with the said jaws 52 and performing, in this instance, the function of slipping-off abutment. Such a slipping off of the core A of a depleted bobbin B will be carried out simply by feeding compressed air into the axial chambers 31, through the ducts 131 which are associated with the end sides of pistons 32 that are turned toward the front disc 55, so that the pistons 32, and then the members being associated therewith, will be moved in the direction in which the web material bobbins B are advanced, i.e., in the opposite direction to the front disc 55 of mandrel 1. Thus, the sleeve 41 will be moved in the said opposite direction and will bring about in a similar manner, the radial shiftment in the reverse direction of the jaws 52, toward the central axis of mandrel 1, and the consecutive retraction of these jaws into the bell 39, so that the core A of the depleted bobbin B will be slipped off the jaws 52 of mandrel 1, and will drop down into

the associated compartment C1, or C2 of a bobbin-carrying cradle C. The series of bobbin-carrying cradles can be again moved forward until the successive bobbin B has reached the front disc 55 of mandrel 1. The entirely or partly empty bobbin-carrying cradle C will be pushed by the bobbin-carrying cradles lying therebehind in the forward direction beyond the mandrel, by being supported by the slidable longitudinal cradle-carrying members 4, as disclosed above by referring to Figures 1 and 2.

The advantages of the automatic device for feeding bobbins of web material, according to the invention, clearly appear from the foregoing disclosure. These advantages mainly reside in a considerably simpler and economical construction of this device, which are attained particularly by avoiding the use of phase-adjusting members for the bobbin-carrying cradles C to be timely advanced and stopped in the correct position for transferring the web material bobbins B on to the mandrel, and with an accurate orientation of the bobbins B, which must be perpendicular to the plane for the bobbins B to lie thereon, relative to the mandrel axis.

Of course, the invention is not limited to the just described and shown embodiments, and the same may be widely changed and modified, the more so in construction. The device according to the invention may be then applied not only to the field of the art relating to cigarettes, but also to other fields in which the feeding is required of a paper web, or of any like material, to a machine using the same. The whole without departing from the leading principle as set forth above, and as claimed hereinafter.

Claims

1. An automatic feeding device for feeding bobbins of a wrapping material web, or the like, particularly bobbins of cigarette paper, in which the web material bobbins (B) that are preferably provided each with a tubular core (A), are advanced the one after the other toward a mandrel (1, 1') in the axial direction thereof, by means of drivable bobbin-carrying cradles (C), on which the bobbins (B) are caused to rest by their lower peripheral surface, in a position which is substantially coaxial to the mandrel (1), the mandrel (1) being provided with circularly arranged coaxial jaws (52), radially movable upon control, which when set in their radially drawn in position, are slipped into the core (A) of the bobbin (B) each time leading the set of bobbins (B), while when set in their radially drawn out position, engage the bobbin (B) having been threaded thereon, and clamp the same on to the

mandrel (1), the mandrel (1) and the associated jaws (52) being axially movable relative to a slipping off stationary abutment (55) cooperating with the core (A) of bobbin (B), to slip off its core from the jaws (52) of mandrel (1), characterized in that the means for advancing the bobbin-carrying cradles (C) is in form of a conveyor belt (T) which is continuously driven in the forward direction toward the associated mandrel (1), with the conveying surface of its belt being interposed between two rectilinear lateral guides (5), which are directed parallel to the forward direction thereof, and are for guiding the bobbin-carrying cradles (C), which are simply caused to bear on the said conveyor belt (T), the abutment for positioning the bobbin-carrying cradles (C) exactly in the position for transferring web material bobbins (B) on to the mandrel (1), being formed by the front surface (55, 355) of mandrel (1), which is turned toward the bobbins (B) and is caused to cooperate with the cores (A) of the web material bobbins (B), and the mandrel (1) being provided with radially clamping means and with axially clamping means (62) for a bobbin (B) to be clamped thereby, which are caused to cooperate with a trueing abutment (55, 355) that determines the position of the plane for the bobbins (B) to lie thereon, which must be perfectly perpendicular to the axis of rotation of mandrel (1).

2. The device according to Claim 1, characterized in that the slipping off abutment, the abutment for positioning the web material bobbins (B) in the correct position for transferring same on to the mandrel (1), and the trueing abutment for trueing the web material bobbins (B) in a plane for the bobbins to lie thereon, which must be perfectly perpendicular to the axis of rotation of mandrel (1), are formed by only one abutment surface, particularly by a projecting annular member (355) provided at the front end of mandrel (1) which is turned toward the bobbins (B).

3. The device according to any one of Claims 1 or 2, characterized in that the conveyor belt (T) is continuously driven, and the bobbin-carrying cradles (C) are formed with such a bottom that the conveyor belt (T) is allowed to slip thereon when the said cradles are stopped by the positioning abutment (355).

4. The device according to any one or more of the preceding Claims, characterized in that the means for axially clamping a bobbin (B) consist of a radial tooth (62) which is associated with each jaw (52), and is caused to cooperate with that side edge portion of the core (A) of a web material bobbin (B) which is opposite to the front end side (55) of mandrel (1).

5. The device according to any one or more of the preceding Claims, characterized in that the mandrel (1) is hollow, and at the interior thereof

means (41, 46, 53) are provided for axially moving the jaws (52) from a position at the inside of mandrel (1) to a drawn-out end position, in which the jaws (52) are caused to project beyond the front end surface (55) of mandrel (1), through the associated apertures (255), and are slipped into the core (A) of a bobbin (B), the said jaws (52) projecting beyond the said front end surface (55) of mandrel (1) to such an extent that the radial teeth (62) will project axially beyond that side portion of the edge of core (A) which is opposite to the front end (55) of mandrel (1), and still provided at the interior of mandrel (1) are the means (41, 46, 50, 51, 53, 55) for causing the jaws (52) having been set in their drawn out end position, to be radially opened against the inner wall of the the core (A) of a bobbin (B), and the means (67, 56) for axially drawing in the jaws (52) and the radial teeth (62) against that side portion of the edge of core (A) which is opposite to the front end (55) of mandrel (1), during or on completion of the radial opening of the said jaws (52).

6. The device according to Claim 5, characterized in that the means for axially moving the jaws (52) from a position at the interior of mandrel (1) to a drawn out end position outwardly of mandrel (1), and the means for radially opening the jaws (52) having been set in this drawn out end position, consist of two cylindrical tubular members (46, 41) which are telescopically connected the one into the other and can be elastically pressed against each other, and which are coaxially fitted into the mandrel (1, 39), so as to be axially slidable therewithin, at first with no relative movement between them, up to an abutment (55), particularly up to the mandrel (1) front end (55) cooperating with the smaller diameter cylindrical member (46), and then relative to each other, a disc (53) being fixedly fitted on to the end of the said smaller diameter tubular member (46) which is turned toward a web material bobbin (B), and being provided with radial guides (253) for guiding the sliders (53) carrying the jaws (52), and a link (50) being pivotally connected to each slider (51), and being fulcrumed about the end of the greater diameter cylindrical member (41) which is turned toward the front end of mandrel (1), so that this link (50) is angularly movable in the radial direction, during the relative movement of the cylindrical members (41, 46).

7. The device according to Claims 5 and 6, characterized in that the means for axially drawing in the jaws (52), during or on completion of the radial opening of said jaws, consist of a cam (67) which is fitted between the slider (51) and the associated jaw (52), the said cam (67) cooperating with a stationary roller (56).

8. The device according to Claims 5 to 7, characterized in that the mandrel (1) comprises a

stationary cylindrical body (30) with an axial through bore (36), in which a bell (39) is housed so as to be rotatable around the central axis thereof, the means for axially moving and for radially moving the jaws (52) and the means for axially drawing in the jaws (52) being accommodated at the interior of said bell (39), and the said bell (39) being closed at its side turned toward the web material bobbins (B), by a disc (55) provided with openings (255) for the jaws (52) to be allowed to pass therethrough.

9. The device according to Claim 8, characterized in that the means for axially moving the cylindrical members (46, 41) which are telescopically connected to each other, consist of cylinders (31) being arranged in an angularly equispaced relation at the interior of the stationary cylindrical member (30) of mandrel (1), and in the said cylinders (31) double-acting pistons (32) are housed, with their stems (132) being connected to a common disc (35), the greater diameter cylindrical member (41) being connected to the central area of said common disc (35), so as to be rotatable around its axis.

10. The device according to Claim 9, characterized in that on the outer wall of bell (39) a crown gear (40) is provided, and is engaged with a toothed belt (68) driven by a motor (M), and the means for axially moving and for radially opening the jaws (52) as well as the means for axially drawing in the said jaws (52), are rotated integrally with the said bell (39).

11. The device according to any one or more of the preceding Claims, characterized in that the radial teeth (62) are so mounted as to be elastically slidable in the axial direction of the jaws (52), means (260) being provided for preventing the radial teeth (62) from rotating in a plane perpendicular to the axis of rotation of mandrel (1).

12. The device according to any one or more of the preceding Claims, characterized in that on the side of body (60) of each jaw (52), which is associated with the inner wall of the core (A) of bobbins (B), an elastic member (65), particularly a torsion spring, is provided.

13. The device according to any one or more of the preceding Claims, characterized in that the roller (56) associated with each cam (67) for the jaws (52), is provided at the radially outward end of the openings (55) in the front end of mandrel (1).

14. The device according to any one or more of the preceding Claims, characterized in that the radial grooves (253) for the sliders (51) carrying the jaws (52), are formed with a removable lateral shoulder (154) which is placed upon the side edges of said sliders (51).

15. The device according to any one or more of the preceding Claims, characterized in that in the bobbin-carrying cradles (C) two web material bobbins (B) are accommodated, the said cradles (C)

being divided into two compartments (C1, C2), and having a flat bottom (112).

16. The device according to Claim 15, characterized in that each compartment (C1, C2) in the bobbin-carrying cradles (C) is provided at its bottom with two supporting rollers (14), particularly with two grooved rollers, and a third roller (15), particularly a grooved roller, is pressed against a bobbin (B) supported by the associated rollers (14), in the region of the upper half thereof, and is fitted on the free end of an arm (16) which is elastically articulated in an adjoining relation with each compartment (C1, C2) of the bobbin-carrying cradles (C).

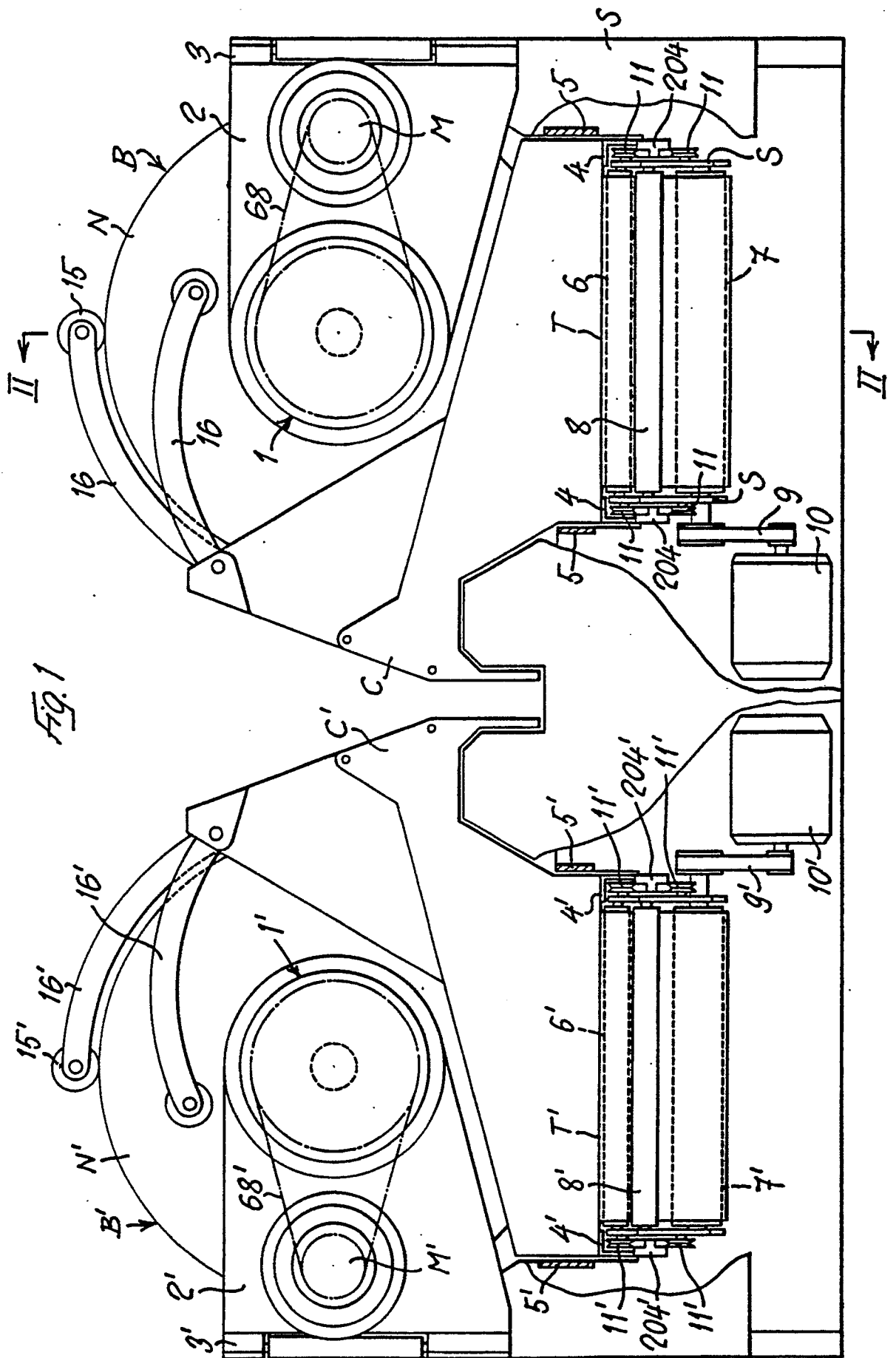
17. A device for automatically feeding bobbins of a web of wrapping material, particularly bobbins of cigarette paper, according to any one or more of the preceding Claims, in which the mandrel (1) is secured to a cantilevered mandrel-carrying arm (2) being made integral with the frame (S) of said device, the said cantilevered arm (2) and the bobbin-carrying cradles (C) being so constructed that the bobbin-carrying cradles (C) carrying depleted web material bobbins (B), are caused to pass under the mandrel in the direction of the forward movement of said cradles (C), characterized in that the bottom of the bobbin-carrying cradles (C) protrudes beyond the longitudinal sides of the conveyor belt (T), and a longitudinal cradle-carrying member (4) for the empty bobbin-carrying cradles (C) is arranged at each longitudinal side of said conveyor belt (T), and is freely slidable in the direction of the forward movement of the bobbin-carrying cradles (C), with the supporting surface of said cradles (C) being substantially coplanar to the conveying surface of the conveyor belt (T), and an abutment member (104) is provided at the end side of said belt (T), which cooperates with the associated section of the bottom (112) of a bobbin-carrying cradle (C) protruding beyond the conveyor belt (T), and the arm (16) for each bobbin-carrying cradle (C) is provided with an abutment member (116) for limiting the downward angular movement of said arm (16) to its position (16b).

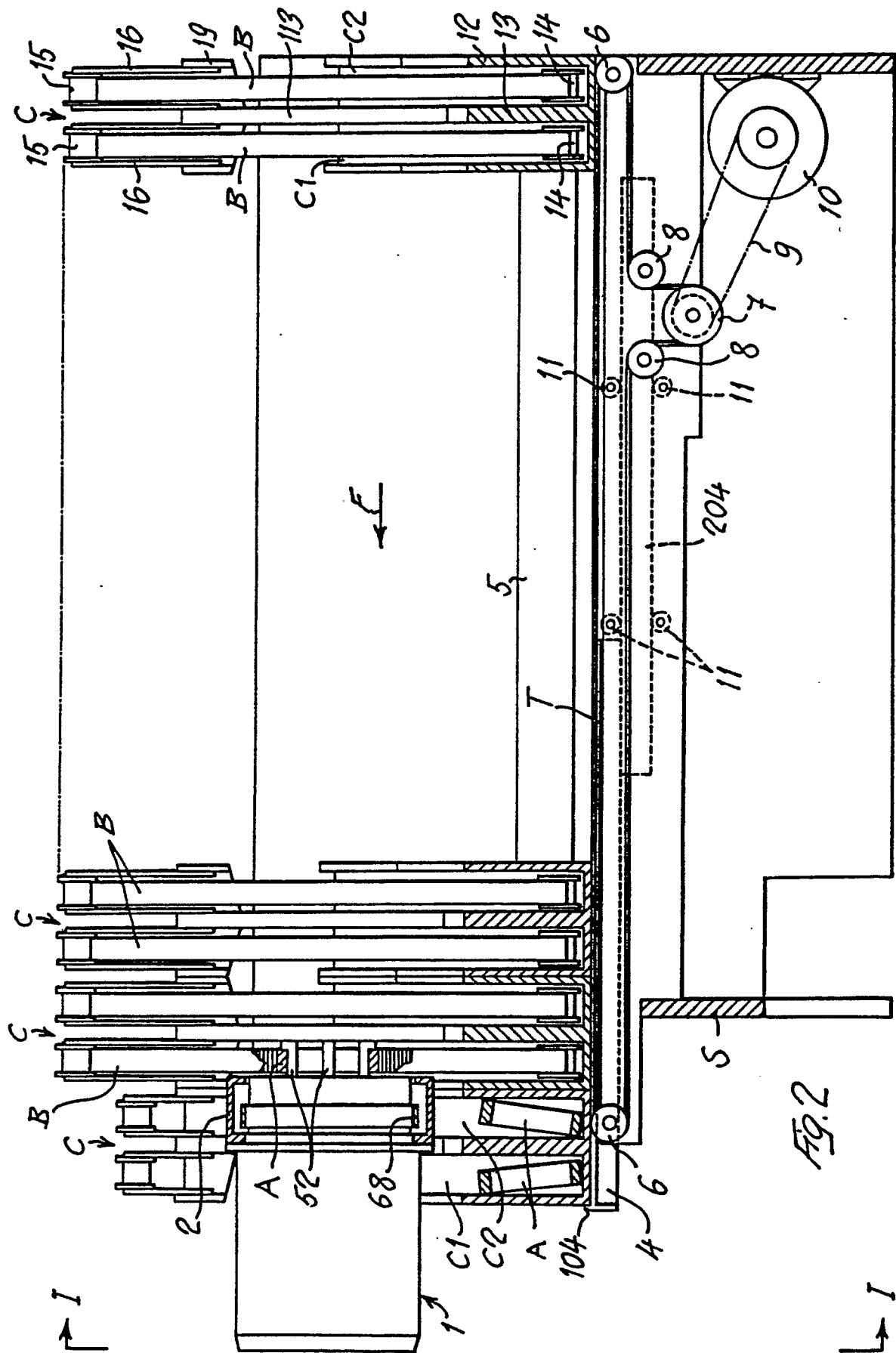
18. The device according to any one or more of the preceding Claims, characterized in that the mandrel-carrying arm (2) is hingedly connected (as at 3) to the frame (S) of said device.

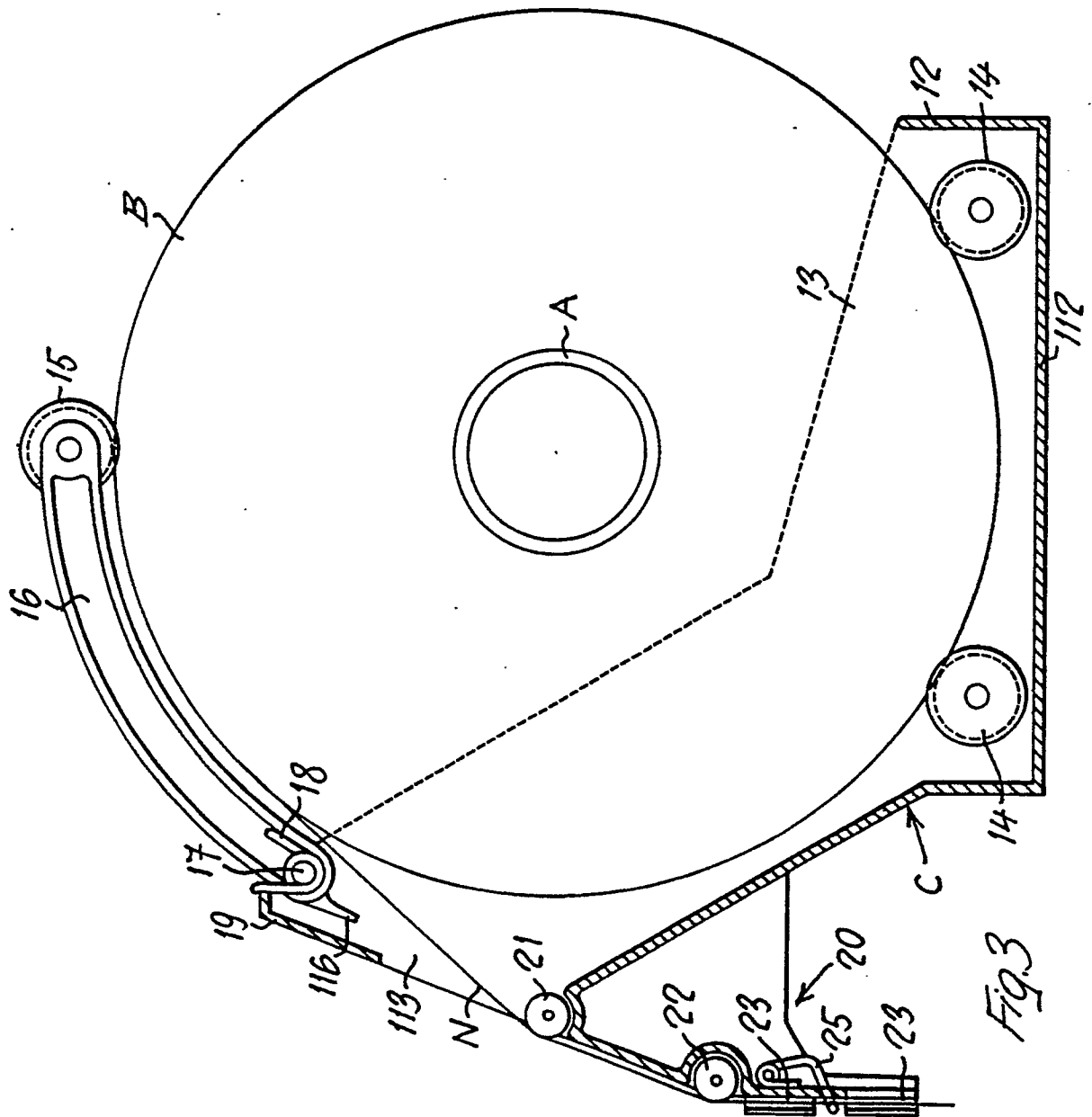
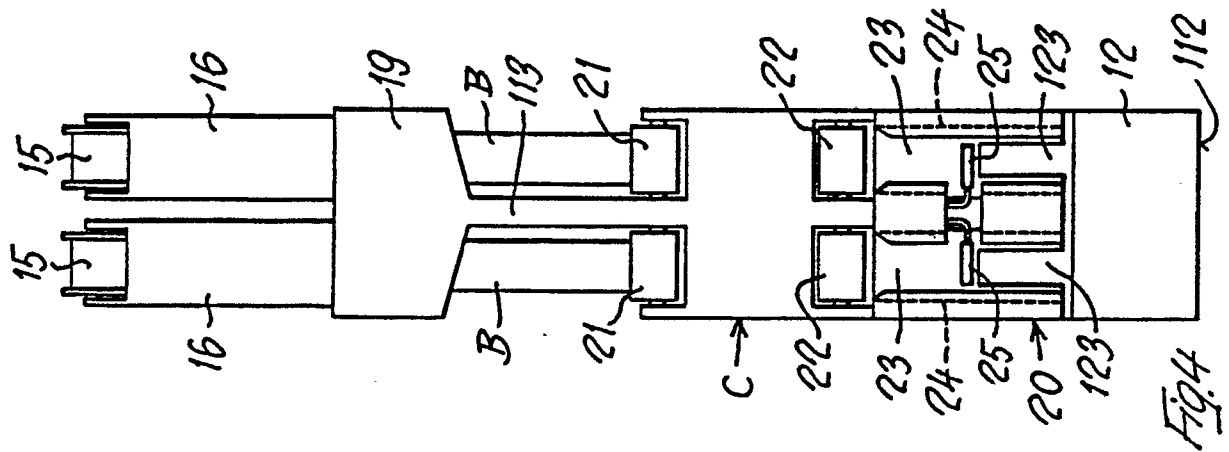
19. The device according to any one or more of the preceding Claims, characterized in that the said device may be applied to the feeding of a wrapping material web being unwound from a bobbin of web material to any machine using such a web.

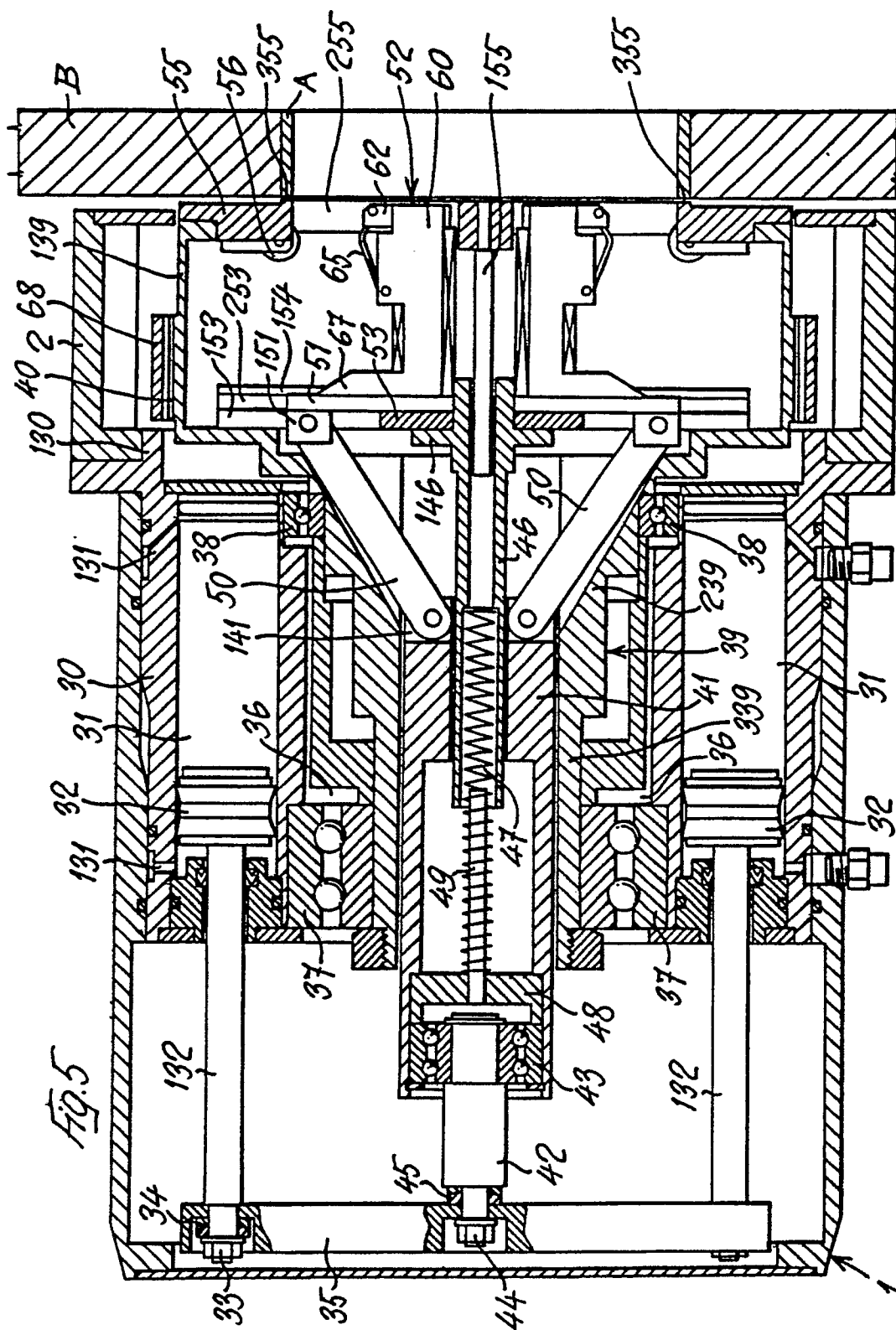
20. The device according to any one or more of the preceding Claims, characterized in that the said device is duplicated, and so it is provided with two mandrels (1, 1') which are associated each

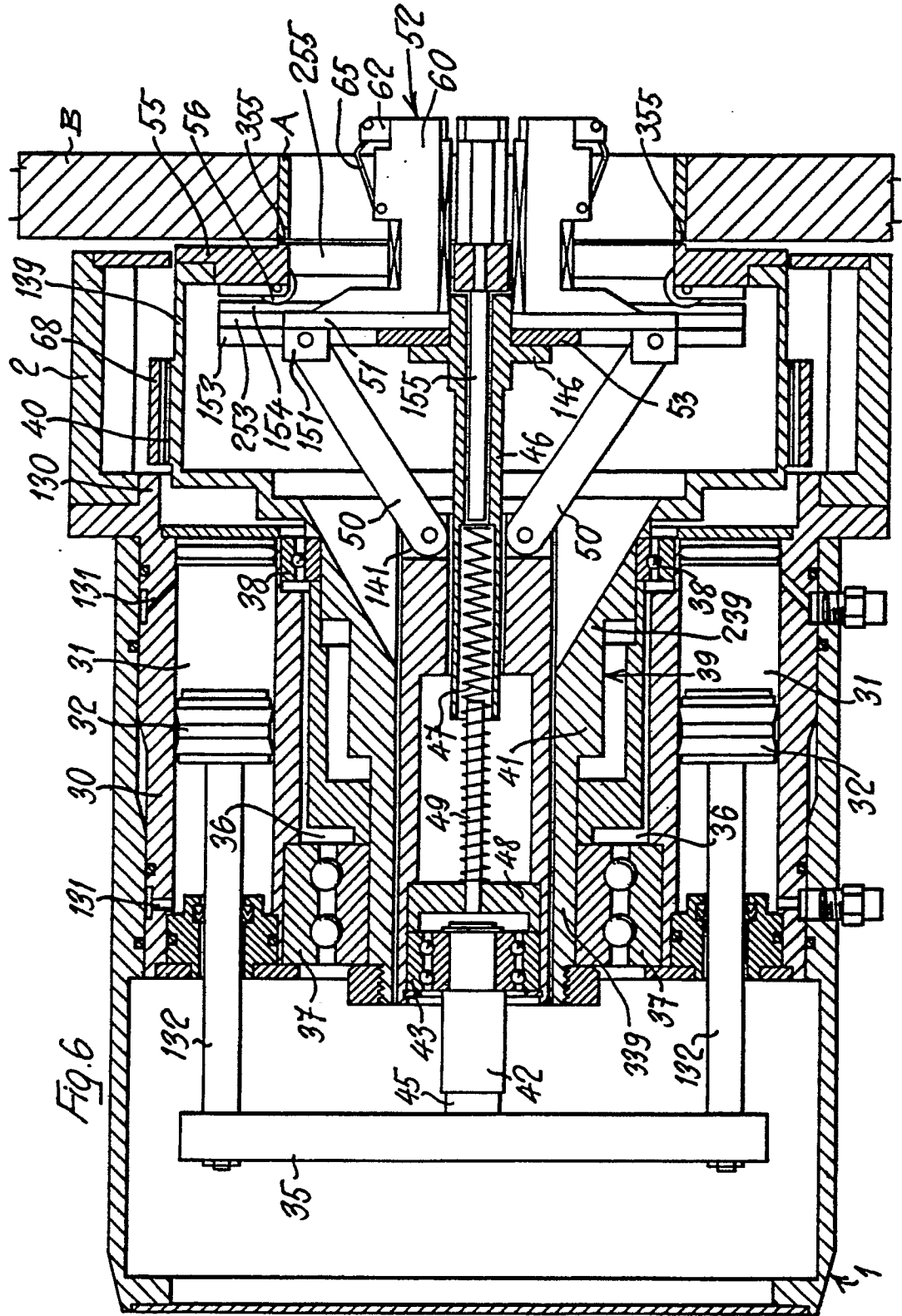
with a conveyor belt (T) for conveying a respective series of bobbin-carrying cradles (C, C') with their web material bobbins (B, B') being alternately used as operative bobbins, on a web material bobbin (B, B') associated with the oppositely arranged mandrel (1, 1') becoming depleted, a splicing device being provided for splicing the trailing end of the web (N, N') from an operative bobbin (B, B') about to be depleted, with the leading end (N', N) of a reserve bobbin (B', B).

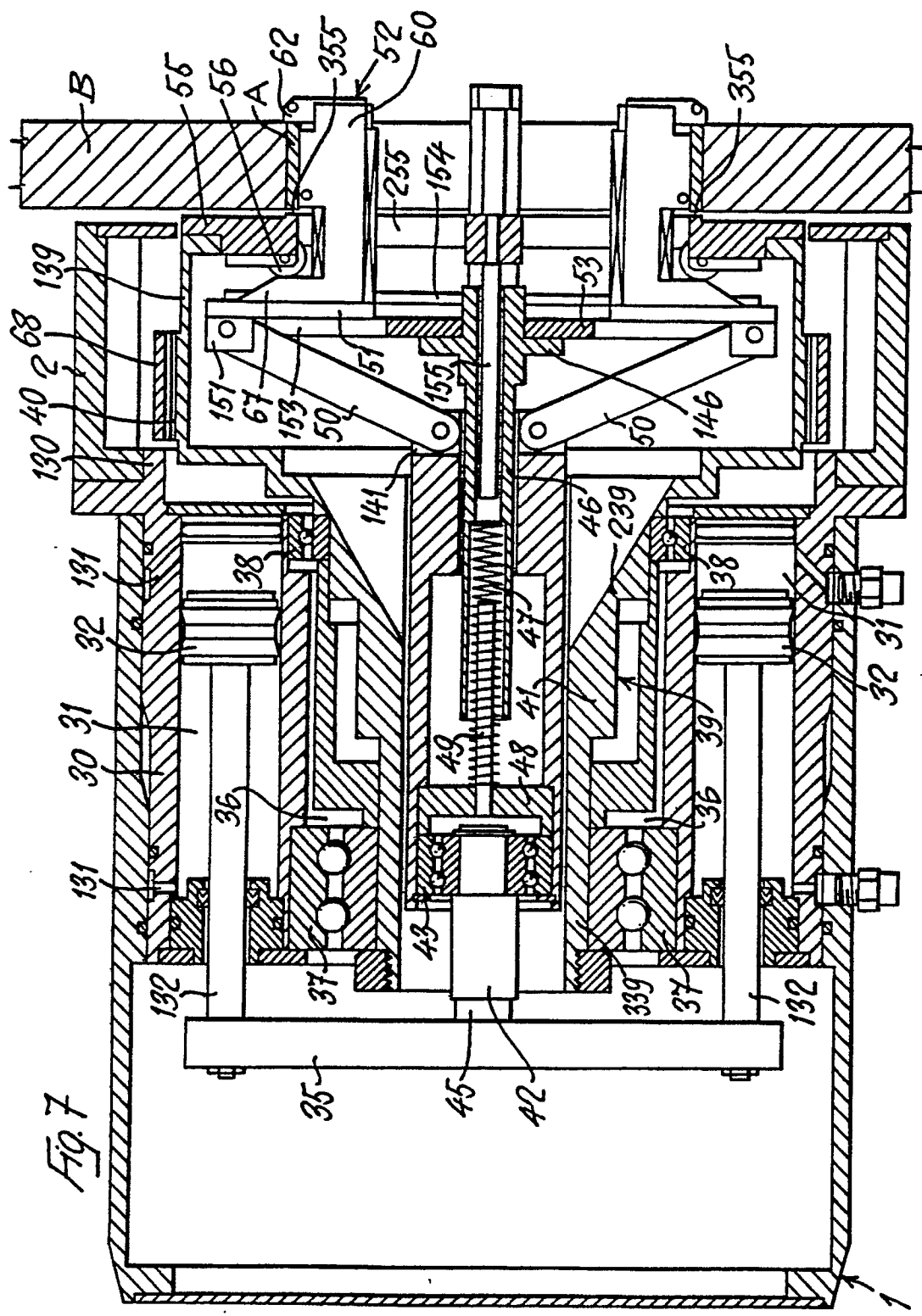


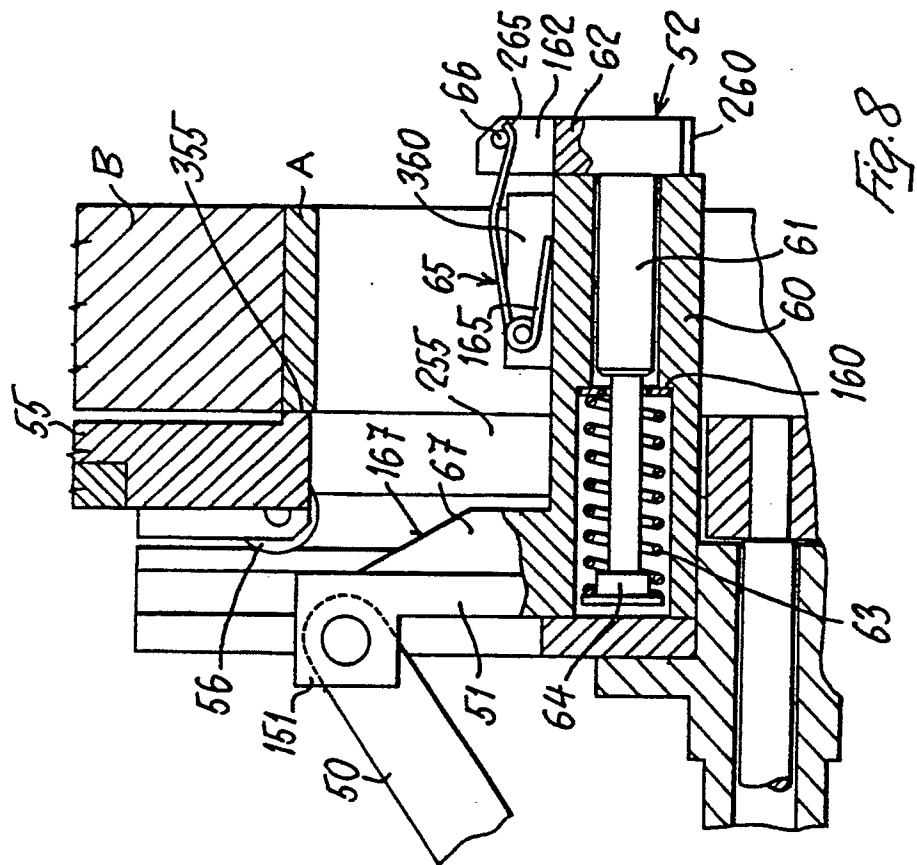
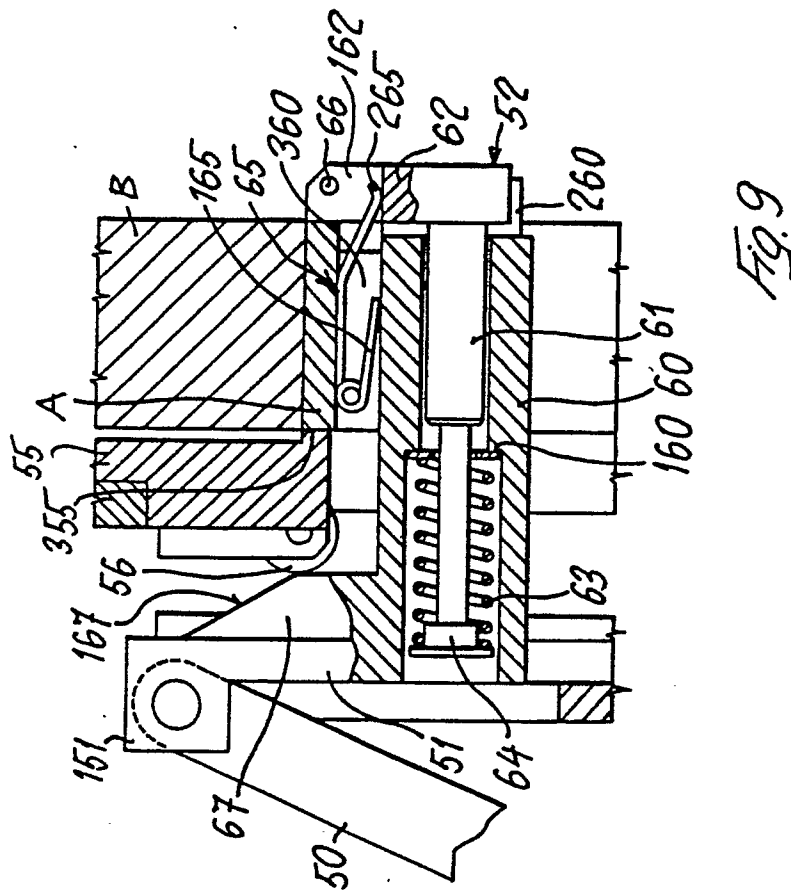


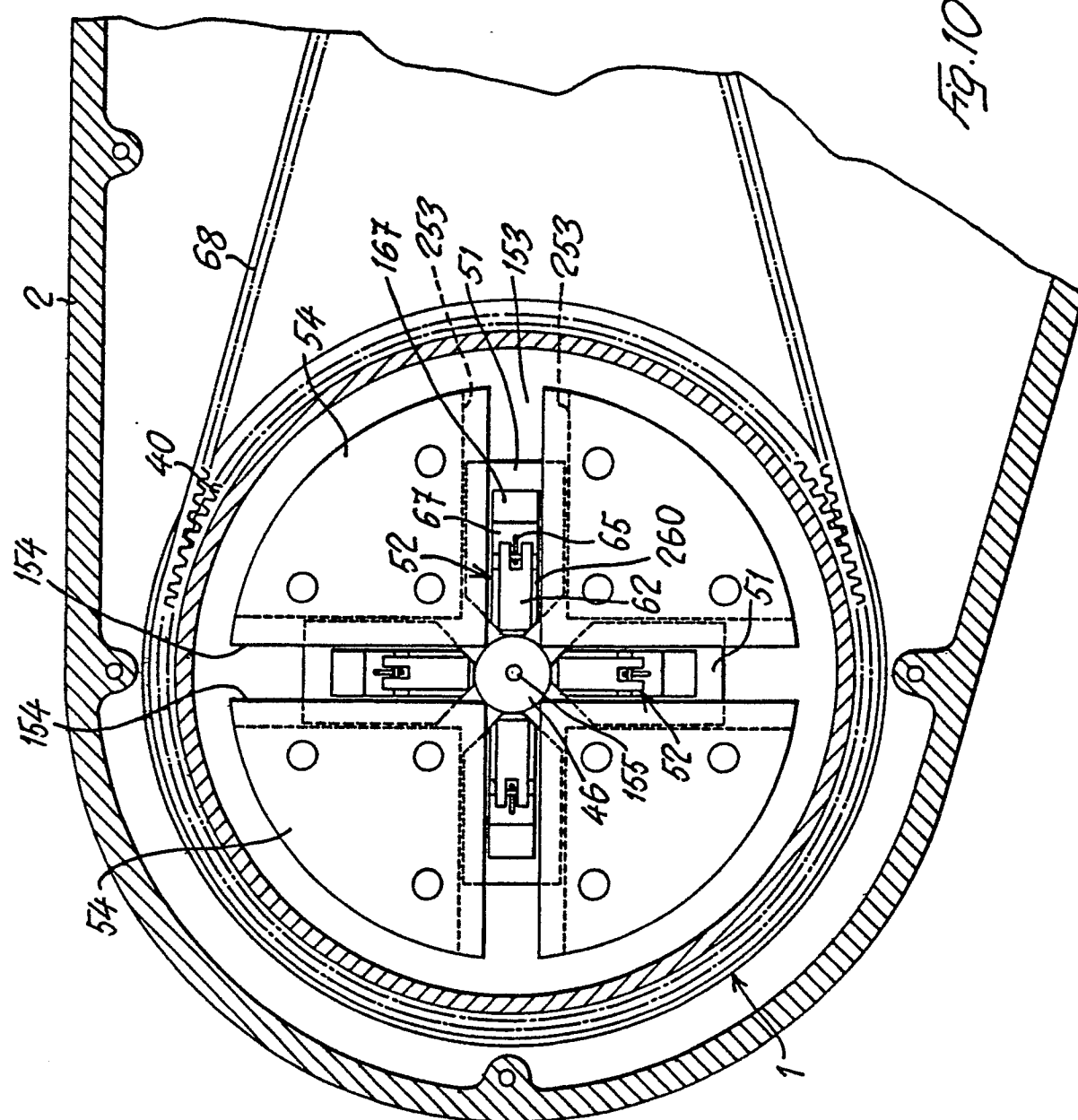


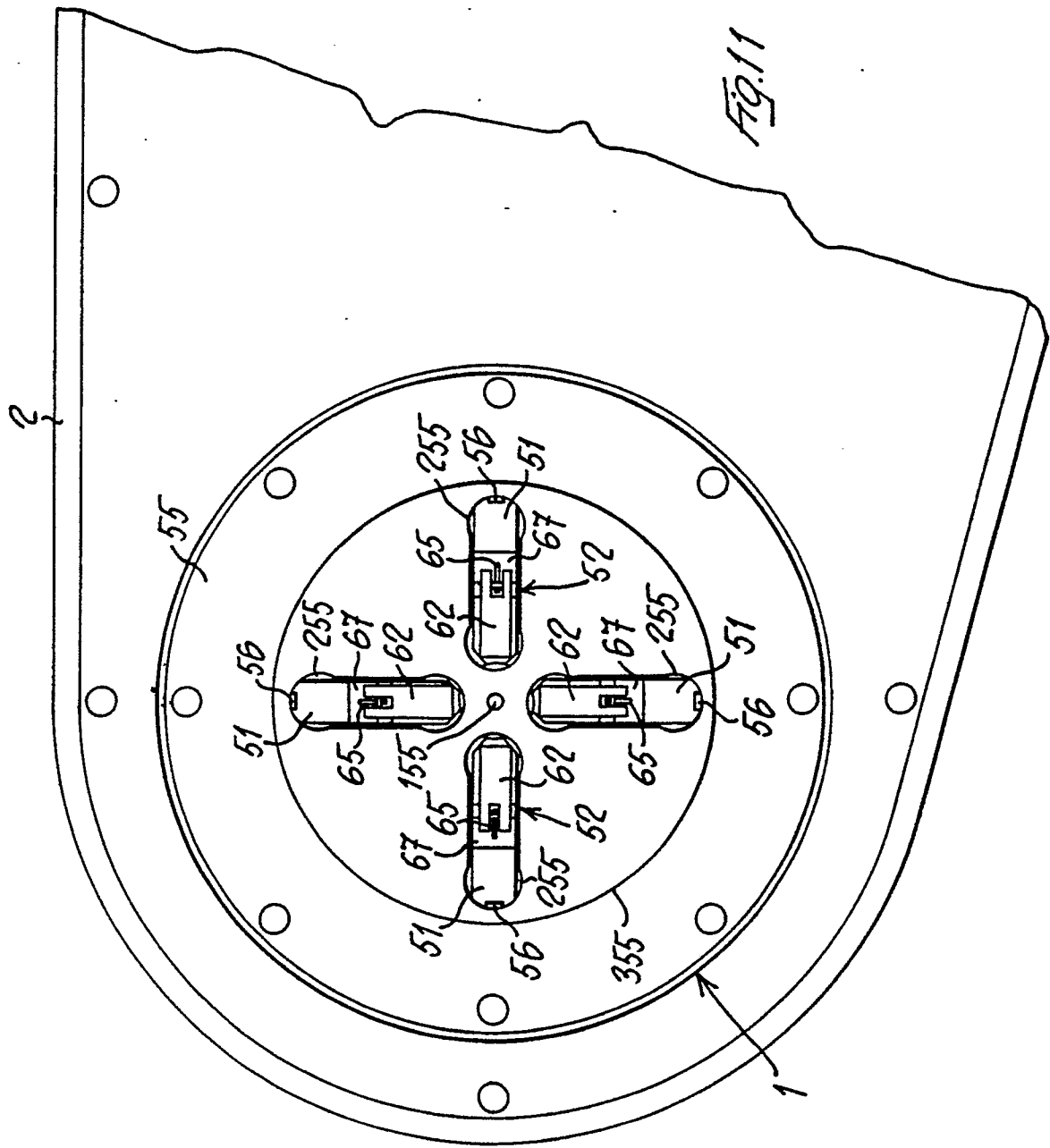














European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 10 5104

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A, D	EP-A-269807 (SASIB SPA.) * the whole document * & IT-P-12580A/86 ---	1-21	B65H19/12
A	EP-A-260453 (FOCKE & CO.) * the whole document * ---	1-21	
A	EP-A-296356 (FOCKE & CO.) * the whole document * ---	1-21	
A	GB-A-2183224 (HAUNI-WERKE KORBER & CO. KG.) * the whole document * -----	1-21	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65H A24C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 MAY 1990	Examiner DIAZ-MAROTO V.
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 I : document cited for other reasons ----- & : member of the same patent family, corresponding document	