



(51) International Patent Classification:
B31B 41/00 (2006.01)

(21) International Application Number:

PCT/EP2012/056459

(22) International Filing Date:

10 April 2012 (10.04.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

11162113.2 12 April 2011 (12.04.2011) EP

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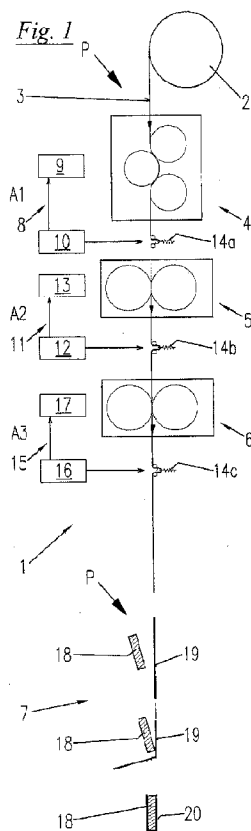
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(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: METHOD AND DEVICE FOR PRODUCING A PACKAGE FOR SMOKING ARTICLES



(57) Abstract: In the method for producing a package for bar-shaped smoking articles that has at least one outer layer intended to receive the bar-shaped smoking articles and to hold the package together, a foil strip that is suitable for the outer layer and is taken from a reel is embossed and/or provided with creasing breaks online in time with the work cadence (P) of the packaging machine and subsequently cut to size. The resulting blank is then folded around the bar-shaped smoking articles in the packaging machine. On one hand, this method allows packaging the cigarettes directly in the outer wrapper without an innerliner, and on the other hand, to strongly rationalize and simplify the entire packaging process and to apply a large variety of signs of all kinds that are perceptible visually, factually, acoustically or by olfaction.



(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

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Method and Device for Producing a Package for Smoking Articles

The present invention relates to a method and a device for
5 producing a package for bar-shaped smoking articles that has
at least one outer layer. The term "bar-shaped smoking
articles" is meant to include cigarettes, cigarillos, or
cigars. For the sake of simplicity, mostly only cigarettes
are mentioned in the following.

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According to the prior art, a cigarette package is generally
composed of an inner package that may consist of paper,
plastic material, metallized paper, or synthetic paper, in
rare cases also of an aluminum foil, and of an outer package
15 that may consist of thin cardboard as it is e.g. described
in WO-2010/012370 A1, or generally of plastic material, or
of different layers of paper and plastic material, that
offers sufficient mechanical protection, and may or not be
provided with a protecting layer that protects from
20 desiccation and/or the influence of odors. According to the
aforementioned PCT application, both the inner package and
the outer package are supplied as blanks to the packaging
machine where the cigarettes are wrapped in the inner
package and introduced into the shaped outer package.

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Furthermore, if it is a so-called innerliner, the inner
package can be embossed, i.e. satinized and provided with
logos, according to known techniques. Supplying the two
blanks synchronously to the cycle of the packaging machine
30 requires complex synchronizing means, particularly when the
inner package is being embossed and/or printed.

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Recently, increasing efforts have been made by governments and organizations to contain cigarette consumption particularly among adolescents, and attempts are being made to completely eliminate or substantially restrict publicity
5 on cigarette packets, i.e. both on the inner package or inner side and on the outer package. Simultaneously, efforts are being made by the industry to make the production of cigarette packages more rational and more cost-effective both with regard to the material and to the production
10 process.

On the background of this prior art, it is the object of the present invention to provide a method and a device for producing packages for cigarettes, cigarillos, or cigars
15 which meet the various requirements with regard to such packages without using an inner package, on one hand, and on the other hand, enable a more rational production and allow to provide the package with a large diversity of visible or virtually invisible tactually, acoustically, or olfactorily
20 perceptible signs that may also serve as authentication features. In the context of the present application, the term "sign" is meant to include any kind of logotypes, individual points, groups of points, colors, as well as combinations thereof which are produced by the embossing
25 roller(s) and are visually, tactually, acoustically, or olfactorily perceptible. This object is attained by the method according to claim 1 and by the device according to claim 7.

30 The invention will be explained in more detail hereinafter with reference to drawings of exemplary embodiments.

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- Fig. 1 schematically shows the workflow of a process
for producing a package from a foil strip and
the associated device,
- 5 Fig. 1A shows a first foil strip during processing,
- Fig. 1B shows an enlarged detail of Fig. 1A,
- Fig. 1C shows a larger foil strip during processing,
- 10 Figures 2 to 7 show six roller assemblies of an
embossing unit in a pinup-pinup
configuration,
- 15 Fig. 8 shows a roller assembly in a pinup-pindown
configuration,
- Fig. 8A shows a section according to line VIIIA - VIIIA
in Fig. 8,
- 20 Fig. 9 shows an exemplary embodiment of a creasing
roller assembly,
- Fig. 10 shows a lateral view of Fig. 9,
- 25 Fig. 11 shows an exemplary embodiment of a cutting
roller assembly,
- Fig. 12 schematically shows a folded blank,
- 30 Fig. 13 shows a portion of cigarettes,

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Fig. 14 shows the package of Fig. 12 in the closed state,

Fig. 15 shows a cigarette holder strip, and

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Fig. 16 shows an innerliner.

Fig. 1 shows a simplified flow chart of a possible device for producing a package for cigarettes as it is illustrated in Figures 12 and 14. Device 1 according to Fig. 1 comprises a foil strip reel 2 with a foil strip 3 that runs first through an embossing unit 4, then through a creasing unit 5, and finally through a cutting unit 6 in order to subsequently reach a packaging machine 7 as a blank 19.

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The packaging foil, i.e. the foil strip 3 for producing an outer package may consist of a light material, e.g. of paper, thin cardboard, of hybrid foils, i.e. foils having multiple coatings of different materials, or of plastics foils that may be metallized or otherwise coated, or for certain applications, in certain countries where it is still allowed, a metal foil. In the following, this will simply be designated by the term "foil".

25 As a first regulating unit 8, device 1 comprises a synchronizing device that serves for adapting the operating cadence A1 of embossing unit 4 to the work cadence P of the packaging process. Work cadence P may e.g. be defined by a length of packaging foil 3 that is to be fed to the packaging machine per time unit and to which operating cadence A1 of embossing unit 4 has to be adjusted in the pretreatment of foil 3. Thereto corresponds an accurate positioning of embossed surface structures on each length of

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foil 3 that is to be supplied. The surface structures may be structures of the embossed signs 23S, 24S.

Synchronizing unit 8 comprises a detection device 9 for
5 determining the operating cadence A1 of embossing unit 4.
This may e.g. include an optical detection of the position
of surface structures 23 that have been embossed on foil 3
in embossing unit 4. More specifically, the detection takes
place on the transport path between embossing unit 4 and
10 creasing unit 5.

The detected operating cadence A1 may subsequently be
adapted to work cadence P in a positioning device 10. For
this purpose, a manual and/or automated adaptation procedure
15 may be contemplated. The driven roller may be temporarily
disengaged from the drive in order to thus lengthen the
transport path of foil 3 by a desired amount that will be in
conformity with work cadence P. The demand-driven
lengthening of the transport path of foil 3 is compensated
20 by a buffer unit 14a located downstream of embossing unit 4.

In order to determine and control the operating cadence A2
of creasing unit 5, device 1 comprises a second regulating
unit 11. Regulating unit 11 comprises a comparing device 12
25 that allows detecting a quantitative deviation between
operating cadences A1 and A2 of the embossing unit and of
the creasing unit. This may e.g. be accomplished by means of
an optical representation by a lamp that is arranged to
irradiate the foil with light at regular time intervals in
30 the manner of a strobe. The irradiation frequency preferably
corresponds to work cadence P. In this manner, an optical
representation of the relative position of the surface
structures embossed in embossing unit 4 and of creasing

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breaks 21 a-e formed on foil 3, i.e. on blank 19 in creasing unit 5 is accomplished.

The obtained information is subsequently used in a positioning device 13 in order to adapt operating cadence A2 to operating cadence A1 in such a manner that the resulting creasing breaks 21 a-e are located at the desired relative positions on foil 3. Positioning device 13 may e.g. be arranged for a manual and/or automated adjustment of the circumferential position of driven creasing roller 34 relative to foil 3. For this purpose, a coupling for disengaging creasing roller 34 from roller drive 36 may be contemplated. In addition, this allows a demand-driven or process-dependent variation of the relative positions of creasing breaks 21 a-e on foil 3.

Comparing device 21 may also be used for detecting the relative deviation of operating cadence A2 from work cadence P for an additional verification of the synchronization to the following packaging process. Furthermore, it is possible in this manner to obtain indirect indications of an involuntary deviation of operating cadence A2 from operating cadence A1 as operating cadence A1 is already synchronized to work cadence P by means of synchronizing unit 8.

For a demand-driven lengthening of the transport path of foil 3 in the case of an intervention of positioning device 13, another buffer unit 14b is provided downstream of creasing unit 5.

Second regulating unit 11 is followed by a third regulating unit 15 for synchronizing the operating cadence A3 of cutting unit 6 to work cadence P. In analogy to second

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regulating unit 11, third regulating unit 15 comprises a
comparing unit 16 that allows detecting a quantitative
deviation between operating cadences A2 and A3 of the
creasing and cutting units, respectively. The signals may be
5 acquired in analogy to the second regulating unit. The thus
obtained information is subsequently used in a positioning
device 17 in order to adapt operating cadence A3 to
operating cadence A2 in such a manner that cuts 22a - 22f
are located at the desired relative positions on blank 19.

10

Foil strip 3, 3b may be previously printed or unprinted.
However, it is also possible to arrange a printing unit
upstream of the embossing unit in order to print the foil
strip in time with work cadence P. The regulating unit
15 provided for this purpose is similar to the described
regulating units and allows synchronizing the operating
cadence of the printing unit to the operating cadence of the
other units and to the work cadence. Furthermore, a station
for applying odorants may be integrated into the device, in
20 which case an additional regulating unit ensures that this
station operates in time with work cadence P.

In the following packaging machine 7, blank 19 provided with
creasing breaks 21 a-e is continuously supplied to the
25 packaging machine in time with work cadence P. In the
latter, blank 19 is directly folded around the cigarettes 18
to be packaged. Due to creasing breaks 21 a-e, only a small
force has to be applied, whereby a destruction of the
packaged goods is effectively prevented. Creasing breaks 21
30 a-c are preferably located at the bottom of the thus formed
package, where two creasing operations are performed along
the creasing edges. In Figures 9 to 11, this operation is
schematically illustrated.

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In Figure 1C a larger foil strip 3b is illustrated that is intended to receive the cigarettes in the transversal direction. Foil strip 3b is embossed, folded, and cut in a similar manner as foil strip 3 to obtain the blank 19b with the embossed signs 24S, creasing breaks 25, and cuts 26. It is understood that both the embossing unit and the creasing and cutting units are adapted to the width of the foil strip.

10

In certain applications or depending on the foil properties it is not necessary to fold the foil strip prior to wrapping, in which case the creasing unit is not used and the regulating units are adapted accordingly. In other applications it may not be necessary to emboss the foil strip, in which case the foil strip is directly supplied from the foil strip reel to the creasing unit. The regulating units are accordingly adapted in this case also.

20 The number and the design of the rollers of embossing unit 4 is largely a function of the properties of the foil strip and of the desired kind of the embossed signs. If foils similar to innerliners are being processed, one side of which is metallized or has similar properties, known embossing rollers may be used which are defined in various patent specifications and applications to the applicant of the present invention, e.g. in WO 02/07671, and illustrated in Figures 2 and 3. The latter are rollers in a pinup-pinup constellation where the signs are created by entirely or partly removing teeth on the embossing roller. Assemblies of two or three rollers are described, but the assemblies may also comprise more than three rollers.

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The rollers that are provided with signs and possibly with individual teeth are defined as being embossing rollers whereas the remaining rollers, whether driven via synchronizing means or directly or indirectly driven, are defined as being counter-rollers. However, this does not exclude that several rollers of a device may be provided with signs and are therefore embossing rollers. Moreover it is assumed that the foil strip is always passed between the rollers in the same orientation with respect to what will be its outside.

Embossing assembly 4A comprises three rollers, i.e. an embossing roller 53 that is driven by a drive 27 and a first counter-roller 32 and a second counter-roller 33, the two counter-rollers being neither directly driven nor synchronized to the driven roller by synchronizing elements such as gearwheels, but only driven via foil strip 3.

In contrast to the large majority of roller assemblies of the prior art, the three rollers do not have the same structure. While the driven embossing roller 53 has teeth 31, the first counter-roller 32 is provided with rings 32R running around the entire circumference and arranged in parallel to each other such that the teeth 31 of embossing roller 53 engage in the grooves between the rings. Rings 32R are outwardly tapered and flattened so as to engage between teeth 31.

The second counter-roller 33 has longitudinal ridges 33L that are outwardly tapered and flattened like rings 32R in such a manner that longitudinal ridges 33L cooperate with teeth 31 of embossing roller 53. Also, the rings or longitudinal ridges, respectively, may affect the appearance of the embossing patterns produced by the embossing roller provided with teeth. By means of such embossing roller

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assemblies it is possible, by variations of teeth 31 or of rings 32R or of longitudinal ridges 33L, i.e. by altering the height, the flanks, or the edges of the teeth, rings, or longitudinal ridges, or by applying patterns to their upper
5 surfaces, to produce different embossing patterns or signs and to achieve a better breaking of the fibers of the foil paper.

Roller assembly 4B has the same drive 27 and the same driven
10 embossing roller 53 as well as a counter-roller 29 having teeth 31. Logos 23L are obtained by removing or modifying teeth 31 in the corresponding locations.

In the case of packaging foils that are not metallized and
15 are furthermore to exhibit tactile or acoustic features, as the case may be, rollers are suitable where teeth are only provided in those locations where the logo is to be created, and the teeth are preferably provided on the non-driven roller.

20 In Figures 4 to 7, four further embodiments of embossing unit 4 are illustrated. Embossing assembly 4C according to Fig. 4 is based on a pinup-pinup configuration that has been successfully used for embossing innerliners where all three
25 rollers 28, 29 and 30 are provided with teeth 31 that project from the roller cylinder and one tooth of one roller engages between four teeth of the other rollers, whereby a self-synchronization is achieved and the embossing accuracy is improved and the drive mechanism simplified. First roller
30 28 is driven by a schematically illustrated drive 27 which may also be a motor.

According to Fig. 4, three rollers are used for embossing foil strip 3. Roller 28 that is driven via drive 27 is

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provided with logo lines 23, 23A and at both edges with tooth rows 52 in order to achieve a better transmission of the driving force to the counter-rollers and to prevent a pitching movement of the embossing roller if only few
5 embossing lines or rows are provided. "Embossing lines or rows" are meant to designate lines or rows on which any signs formed of teeth 31 are arranged. In this example, counter-rollers 29 and 30 only comprise teeth 31.

10 In contrast to the embossing rollers according to Figures 2 and 3, e.g. for embossing innerliners, in a process for embossing outer foils, teeth are only provided on the corresponding embossing roller in those locations where signs are to be embossed. In this case, the teeth of the
15 counter-rollers may serve for breaking the fibers of the paper, as the case may be.

In the process of satinizing and simultaneously embossing logos on innerliners, the metallized surface of the
20 packaging foil is being embossed so that in almost all cases the driven roller is provided with the logos, whereas it may be advantageous when embossing outer foils to provide the signs on one of the non-driven embossing rollers in order to obtain positive salient signs on the foil, as illustrated in
25 Figure 5. In this manner, both tactually and acoustically acting signs can be created. In embossing assembly 4D, one of the two non-driven rollers is the embossing roller 30A that is provided with embossing lines 23, 23A.

30 This may also apply to the case where the embossing assembly 4E only comprises two rollers, as illustrated in Fig. 6 where embossing assembly 4E comprises a driven roller 28F and an embossing roller 29A that is driven by the latter and provided with logo lines 23, 23A. In the illustrated case,

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embossing roller 29A has twice the circumference of driven roller 28F.

In the exemplary embodiments, teeth 31 are pyramidal with a square horizontal projection while their tips may be flattened up to 25 %. However, a number of further pyramidal teeth having a variety of other horizontal projections and shapes are known in the art, e.g. pyramidal teeth having a rectangular horizontal projection which may e.g. have a longer footprint in the direction of the longitudinal axis than in the other direction. Alternatively, for certain applications where the counter-rollers are driven via synchronizing means, frustoconical or conical teeth may be provided. The teeth may have a pitch, i.e. a distance between tips, of 0.05 mm to 0.4 mm, for a theoretical height without the flattened portions of 0.03 mm to 0.3 mm. Furthermore, individual teeth or groups of teeth may be differently shaped, as it is known from the prior art.

Figure 7 illustrates an embossing assembly 4F having a similar roller configuration as in Fig. 2, the driven embossing roller 28 cooperating with a first counter-roller 32 having rings 32R and with a second counter-roller 33 having longitudinal ridges 33L. In contrast to the embodiment according to Fig. 2, embossing roller 28 is only provided with teeth 28 in those locations where embossing lines or rows 23, 23A are to be created.

The described and other embossing rollers that are known in the art *per se* allow embossing signs that are visible to the eye as patterns, colors, color patterns, or are almost invisible, serve as authentication features, are tactually perceptible, or may produce acoustic signals.

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In Figures 2, 4, 5, or 7 it is symbolically indicated that both counter-rollers interlock with the embossing roller, but this is not necessarily always the case. It is also possible that the first or the second counter-roller,
5 respectively, only interlocks or is only engageable with the first or the preceding roller, respectively. Furthermore it may be advantageous for certain applications to provide more than a total of three rollers having different surface structures. Furthermore, both the diameter and the length of
10 the individual rollers may differ. In addition to the metal rollers, soft rollers may be used.

Figure 8 illustrates a roller assembly 4G in a so-called pinup-pindown configuration, the raised embossing elements
15 23R being provided on the driven roller 54 and the corresponding hollow embossing elements 23H on the counter-roller 55. The counter-roller is driven via synchronizing gears 56, 57. Elevations 23R and pits 23H are illustrated in sectional view 8A.

20

In Figures 9 and 10, a possible arrangement of a creasing unit 5 is illustrated. This creasing unit comprises two creasing rollers 34 and 35, creasing roller 34 being driven by a drive 36. The second creasing roller 35 is driven and
25 synchronized via synchronizing gears 41 and 42. The two creasing rollers are substantially smooth and are provided with mutually complementary structures in order to obtain the desired creasing breaks. Creasing roller 35 is provided with both circular rings 37 and longitudinally arranged
30 ridges 38 a-e which engage in corresponding circular grooves 40 and longitudinal grooves 39 a-e of creasing roller 34.

It is possible additionally to provide the creasing rollers with embossing elements, e.g. teeth or groups of teeth that

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may be arranged on one or on both rollers as in Figures 2 to 7, or embossing elements according to the roller assembly of Figures 8, 8A where the raised embossing elements 23R are arranged on creasing roller 35 having the creasing tools and
5 the hollow embossing elements 23H on the other creasing roller 34.

Both the shape and the cross-sections and dimensions of the rings or ridges and of the grooves may differ depending on
10 the material to be folded. Fig. 10, a lateral view of Fig. 9, illustrates the mutual engagement of the longitudinal ridges and longitudinal grooves.

In Fig. 11, a possible arrangement of a cutting unit 6 is
15 depicted. In the present case, the latter consists of two cutting rollers 43 and 44, cutting roller 43 being driven via a drive 45 and driving the second cutting roller 44 via synchronizing gears 46 and 47. In the present example, first cutting roller 43 is smooth while second cutting roller 44
20 has cutting blades 48 and 49 a-e that are arranged so as to cut blank 19 according to Fig. 1A or 1B. Also, like the creasing rollers, the cutting rollers may be provided with embossing teeth and/or embossing elements.

25 Both the creasing rollers and the cutting rollers may be provided with means for preventing a pitching movement thereof, these means e.g. being rings or teeth.

In Figures 12 to 14, the operation of packaging machine 7 is
30 schematically illustrated. Fig. 12 illustrates the operation of creasing blank 19 to receive cigarettes 18, and Fig. 14 the finished package 20. If necessary, the cigarettes can be held together in a holder 50 according to Figure 15 and/or

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in an innerliner 51 according to Figure 16 that fits into the package 20.

As follows from the description, this device is particularly
5 suitable for the online production of packages for smoking
articles, the foil strip supplied from the reel being
printed, embossed, and/or folded, as the case may be, and
subsequently cut and the blank being folded, filled, and
10 wrapped around the cigarettes, all these operations being
performed in time with the cycle of the packaging machine.
Moreover, an online processing of thin cardboard, paper, or
plastics materials is facilitated, or made possible in the
first place, by the counter-roller(s) which fold and break
15 the fibers of those materials. The device may be provided
with an integrated odorizing unit that applies odorants
online prior to creasing. From the description of the
rollers it is understood that any desired combination of
embossing, creasing, and cutting elements on rollers is
possible.

20

Since all units operate in time with the cycle of the
packaging machine, particularly the creasing and cutting
operations require no additional positioning means as the
package blank is synchronously embossed, folded, and cut
25 directly from the reel.

In the description it is assumed that the device either
processes an outer or an inner package, but it is possible
to use at least one more device online so that both a foil
30 strip for the outer and a foil strip for the inner package
are processed and both foil strips are folded in the
packaging machine so as to form a double layer package. To
this end, the regulating units are equipped accordingly so

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as to ensure the necessary synchronization to the operating cadences and the work cadence.

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Claims

1. Method for producing a package for bar-shaped smoking articles that has at least one outer layer, characterized in
5 that the outer layer of the package is adapted to receive the bar-shaped smoking articles and to hold the package together, whereby a previously printed or unprinted foil strip that is suitable for the outer layer and is taken from a reel is online embossed and/or provided with creasing
10 breaks in time with the work cadence (P) of the packaging machine and subsequently cut to size, and the resulting blank is folded around the bar-shaped smoking articles in the packaging machine.
- 15 2. Method according to claim 1, characterized in that the embossing operation produces signs on the foil strip that are visually and/or tactually and/or acoustically perceptible and/or serve as authentication features.
- 20 3. Method according to claim 1 or 2, characterized in that the outer layer of the package consists of a light material such as paper, thin cardboard, hybrid foils, foils having multiple coatings of different materials, or paper or plastic foils that may be metallized or otherwise surface-
25 coated, or is a metal foil.
4. Method according to any one of claims 1 to 3, characterized in that the smoking articles, which are cigarettes, cigarillos, or cigars, are inserted into the
30 package consisting of the outer layer without an inner packaging.

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5. Method according to any one of claims 1 to 4,
characterized in that the operating cadence (A1) of the
embossing unit is synchronized to the work cadence (P) of
the packaging machine, the operating cadence (A2) of the
5 creasing unit or the operating cadence (A3) of the cutting
unit to the operating cadence (A1) of the embossing unit,
and the operating cadence (A3) of the cutting unit to the
operating cadence (A2) of the creasing unit or to the
operating cadence (A1) of the embossing unit.

10

6. Method according to any one of claims 1 to 4,
characterized in that the operating cadence (A2) of the
creasing unit is synchronized to the work cadence (P) of the
packaging machine and the operating cadence (A3) of the
15 cutting unit to the operating cadence (A2) of the creasing
unit.

7. Method according to any one of claims 1 to 6,
characterized in that the foil strip is printed prior to
20 embossing, the operating cadence of the printing unit being
synchronized to the work cadence (P) of the packaging
machine and to the operating cadences of the other units.

8. Method according to any one of claims 1 to 7,
25 characterized in that more than one device is used in order
to process both a foil strip for the outer package and a
foil strip for the inner package and to assemble them into a
multi-layer package in the packaging machine online in time
with the work cadence (P).

30

9. Device for implementing the method according to any
one of claims 1 to 8, characterized in that it comprises a
foil strip reel (2), an embossing unit (4) and/or a creasing

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unit (5) and a cutting unit (6), and is operatively connected to a packaging machine (7), the device comprising control and synchronizing elements (8, 11, 15) in order to process a foil strip (3, 3b) online in time with the work
5 cadence (P) of the packaging machine and to wrap the produced blank (19, 19b) around bar-shaped smoking articles (18).

10. Device according to claim 9, characterized in that the
10 embossing unit (4) comprises a roller assembly (4A - 4G) having at least two rollers (28, 29A, 30A, 53, 54) provided with logos (23L), teeth (31), or raised embossing elements (23R) that are arranged in lines or rows or individually in order to emboss signs (23S, 24S) on the foil (3, 3B).

15

11. Device according to claim 10, characterized in that rollers (28, 28F; 29, 29A; 30, 30A, 53) are provided with teeth (31) that project from the roller cylinder.

20 12. Device according to claim 10, characterized in that one roller (54) is provided with raised embossing elements (23R) and the counter-roller (55) with corresponding indentations (23H).

25 13. Device according to claim 10, characterized in that one of the counter-rollers (32) is provided with circumferential rings (32R) and/or one of the counter-rollers (33) with longitudinal ridges (33L).

30 14. Device according to any one of claims 9 to 13, characterized in that the creasing unit (5) comprises two creasing rollers (34, 35) that are provided with mutually

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complementarily shaped creasing tools (37, 38a - 38e; 39a - 39e, 40).

15 15. Device according to claim 14, characterized in that one creasing roller (34) is provided with circumferential grooves (40) and longitudinal grooves (39a - 39e) and the other creasing roller (35) with circumferential rings (37) and longitudinal ridges (38a - 38e).

10 16. Device according to any one of claims 9 to 15, characterized in that the cutting unit (6) comprises two cutting rollers (43, 44) of which one (43) is a smooth roller and the other roller (44) is provided with cutting tools (48, 49a - 49e).

15 17. Device according to any one of claims 14 to 16, characterized in that rollers are provided with creasing or cutting and/or embossing teeth or embossing elements.

20 18. Device according to any one of claims 9 to 17, characterized in that at least the embossing rollers (28, 29A, 30A), the creasing rollers, or the cutting rollers are provided with means (52) for preventing a pitching movement thereof.

25 19. Device according to any one of claims 9 to 18, characterized in that the synchronizing and control elements comprise regulating units (8, 11, 15) in order to synchronize the operating cadences (A1, A2, A3) of the printing, embossing, creasing, cutting (4, 5, 6), and
30 odorizing units to the work cadence (P) of the packaging machine (7) and to one another.

- 21 -

20. Device according to claim 19, characterized in that the second and third regulating units (11, 15) comprise positioning devices (12, 16) for adjusting the circumferential positions of the creasing rollers (34, 35) and of the cutting rollers (43, 44) relative to the packaging foil (3, 3b).

21. Device according to claim 19 or 20, characterized in that the second and third regulating units (11, 15) comprise comparing devices (13, 16) for detecting quantitative deviations between the operating cadences (A1, A2, A3) of the embossing unit (4), the creasing unit (5), and the cutting unit (6).

22. Device according to any one of claims 19 to 21, characterized in that upstream and/or downstream of the creasing unit and the cutting unit, at least one buffer unit (14a, 14b, 14c) is arranged for the demand-driven deflection of the packaging foil.

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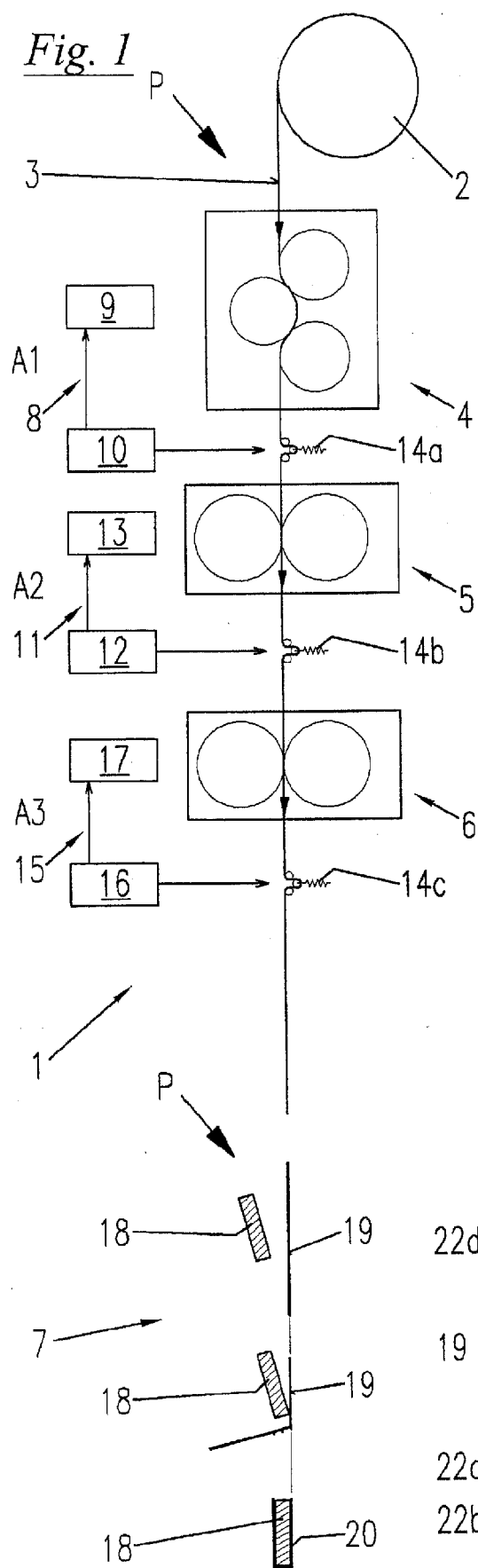
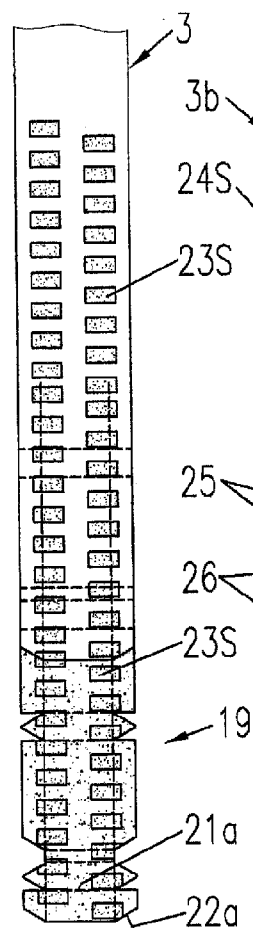
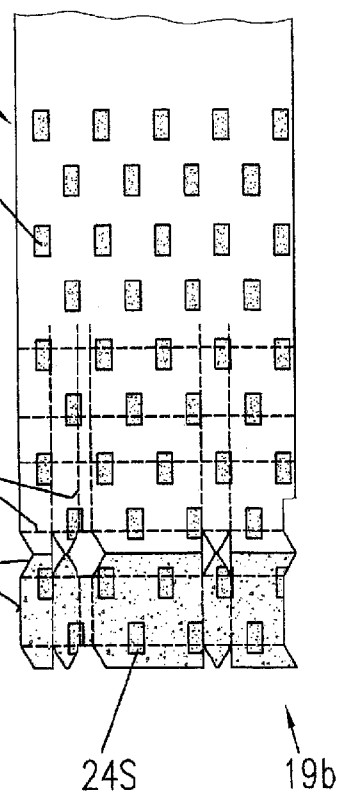
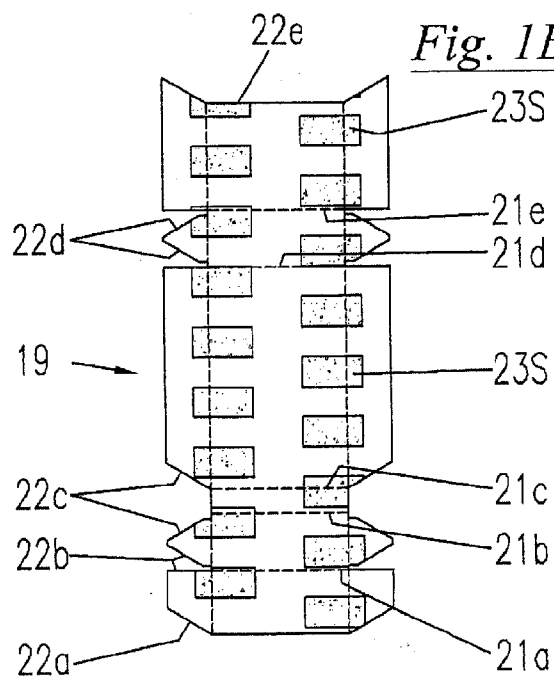
Fig. 1*Fig. 1A**Fig. 1C**Fig. 1B*

Fig. 2

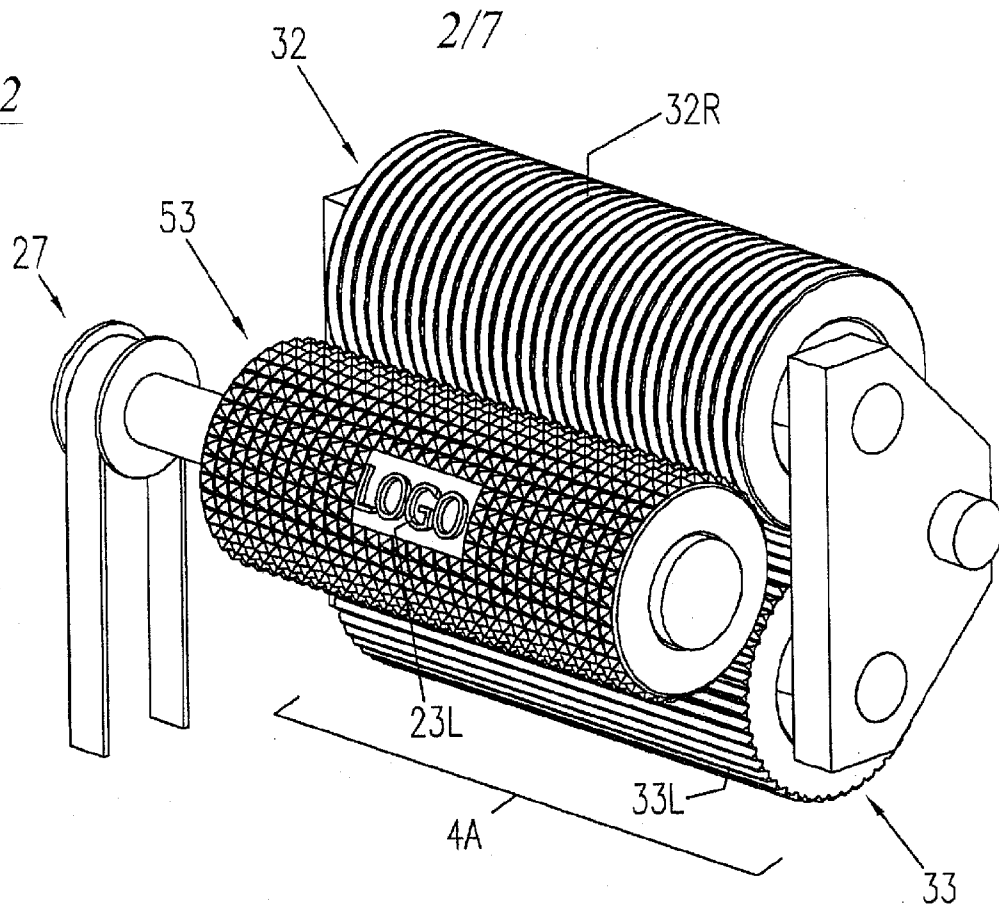


Fig. 3

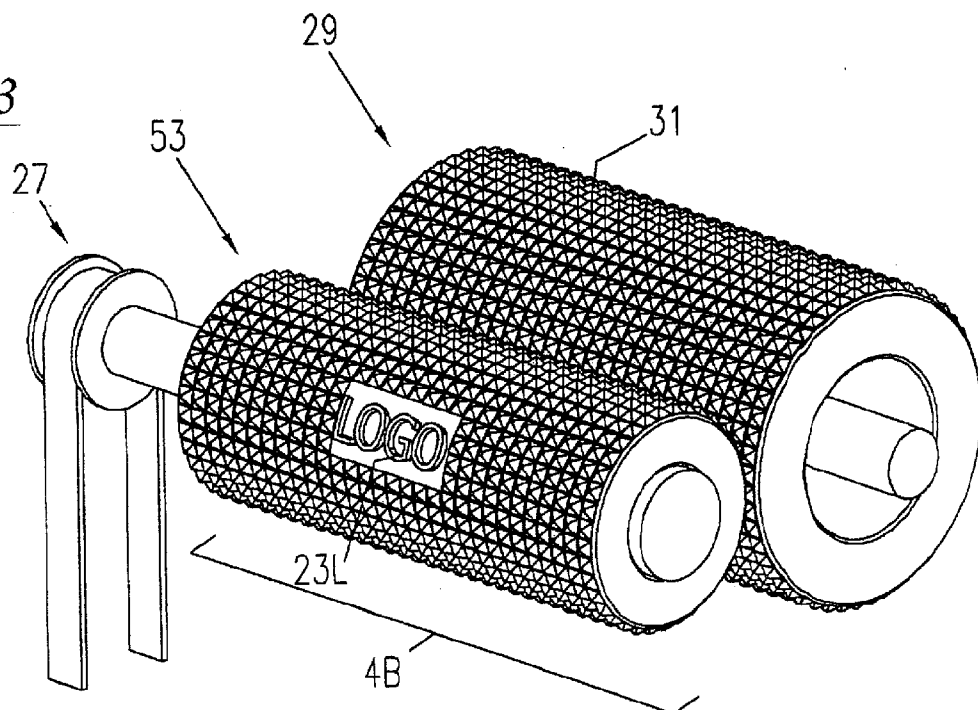


Fig. 4

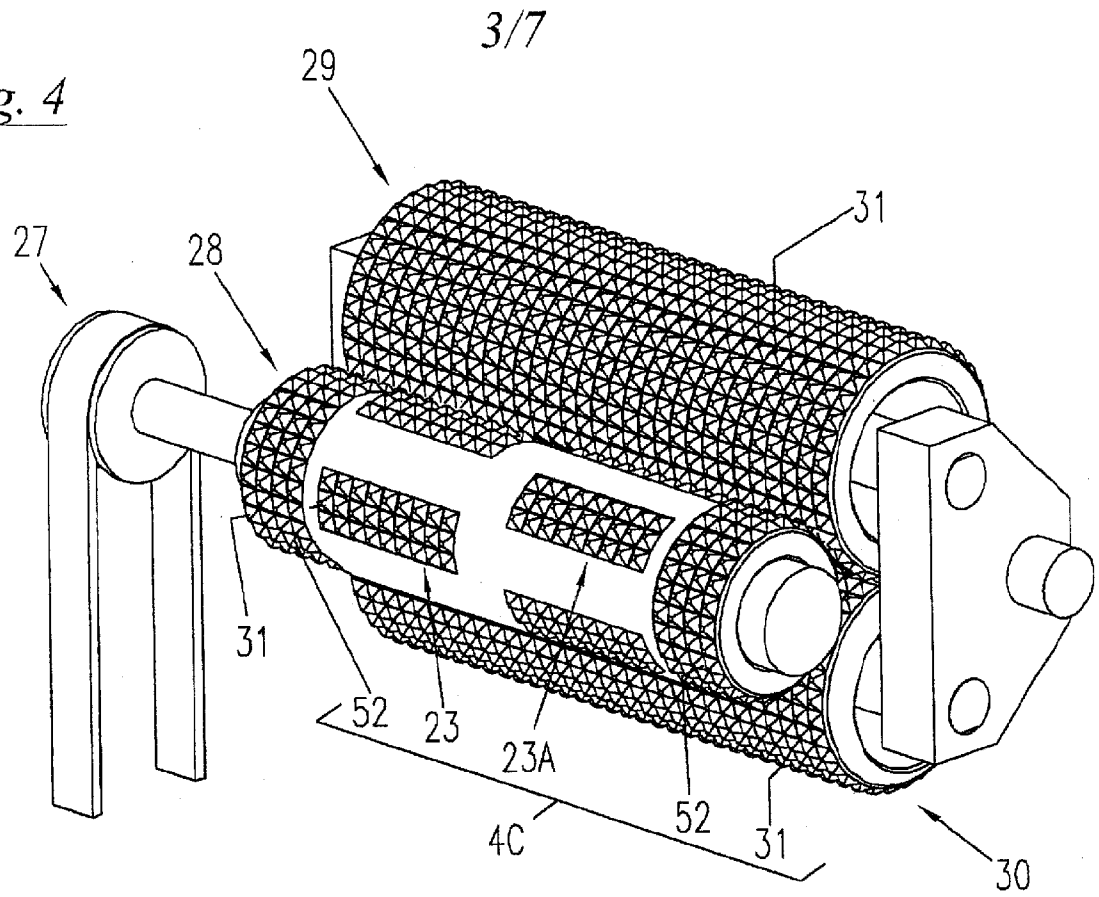


Fig. 5

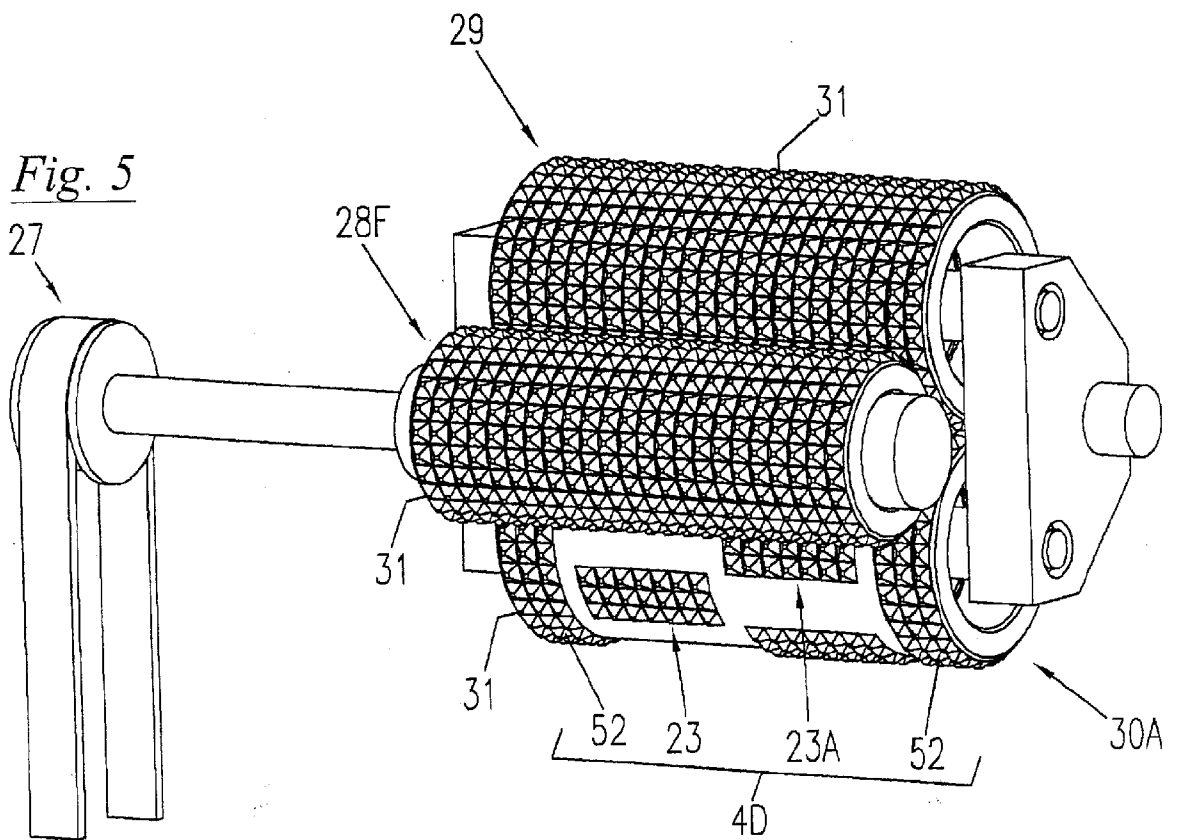


Fig. 6

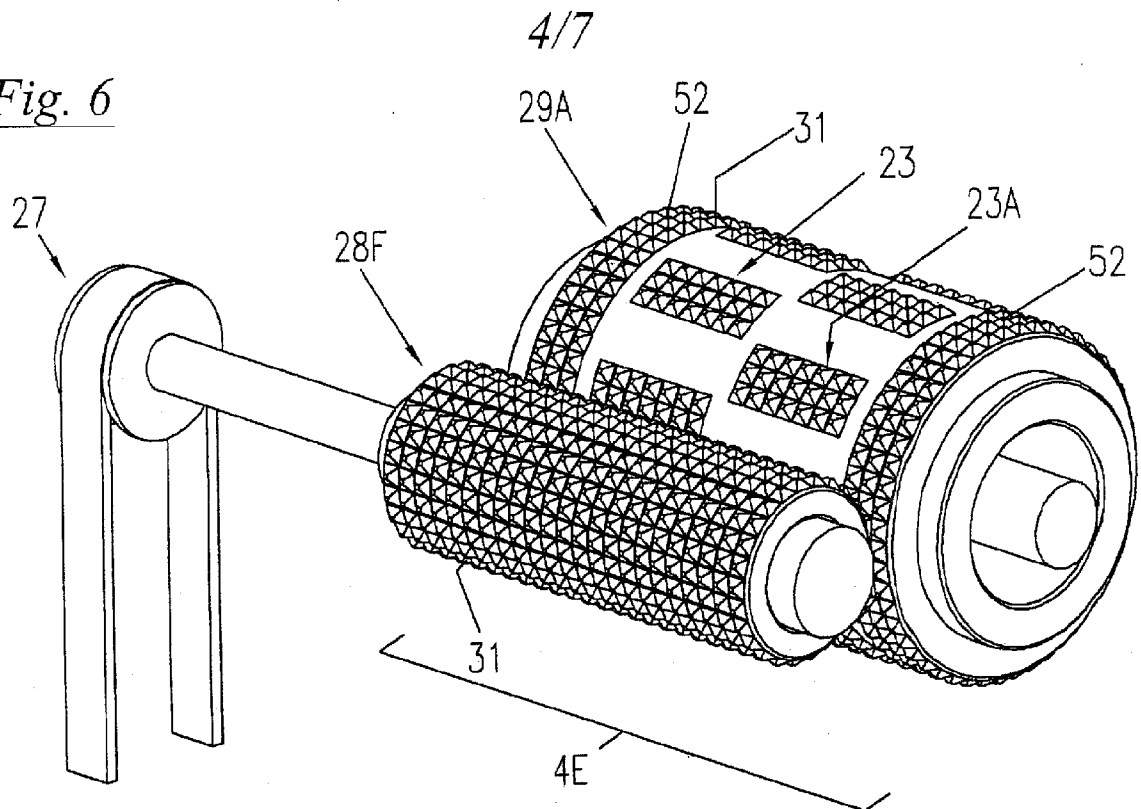
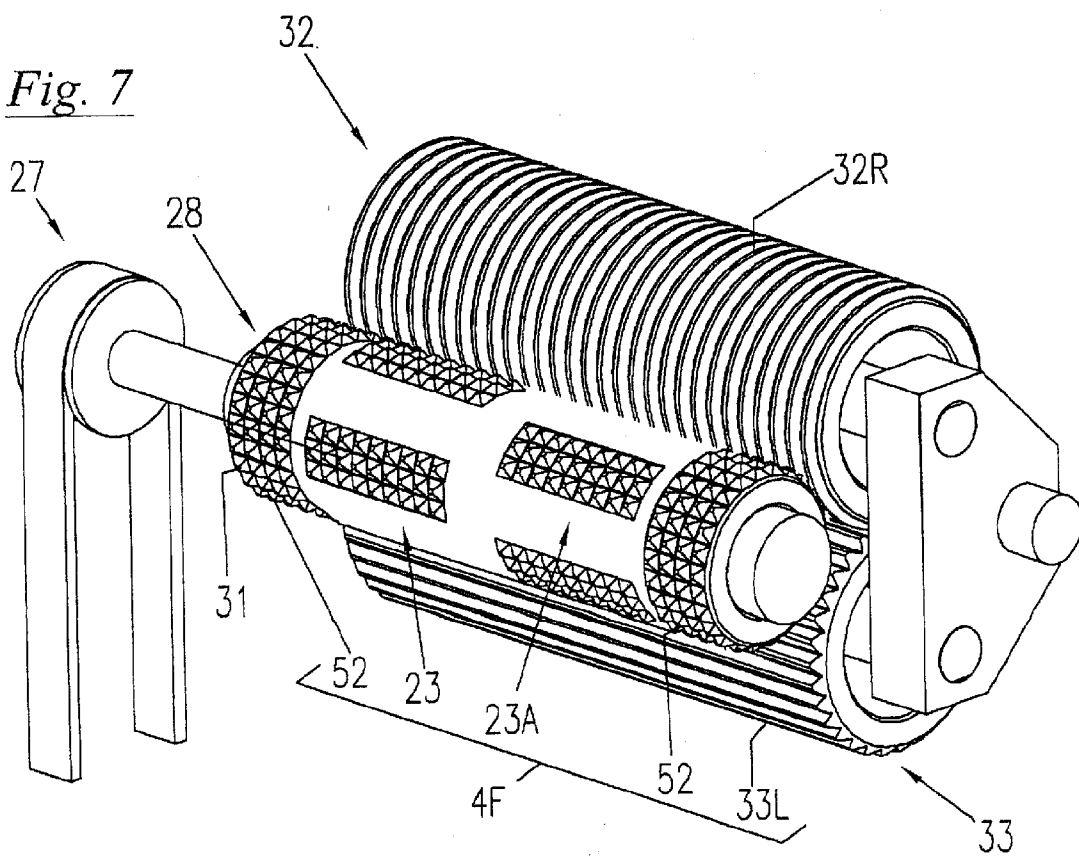


Fig. 7



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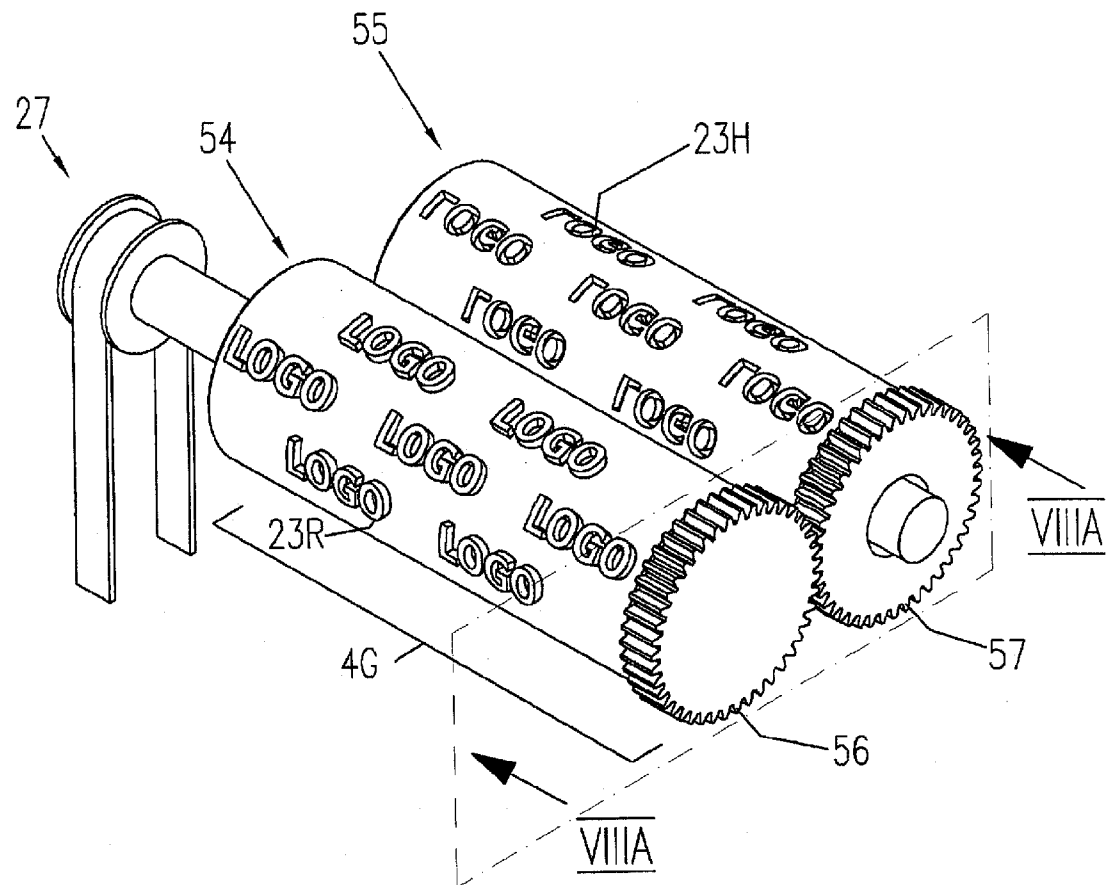
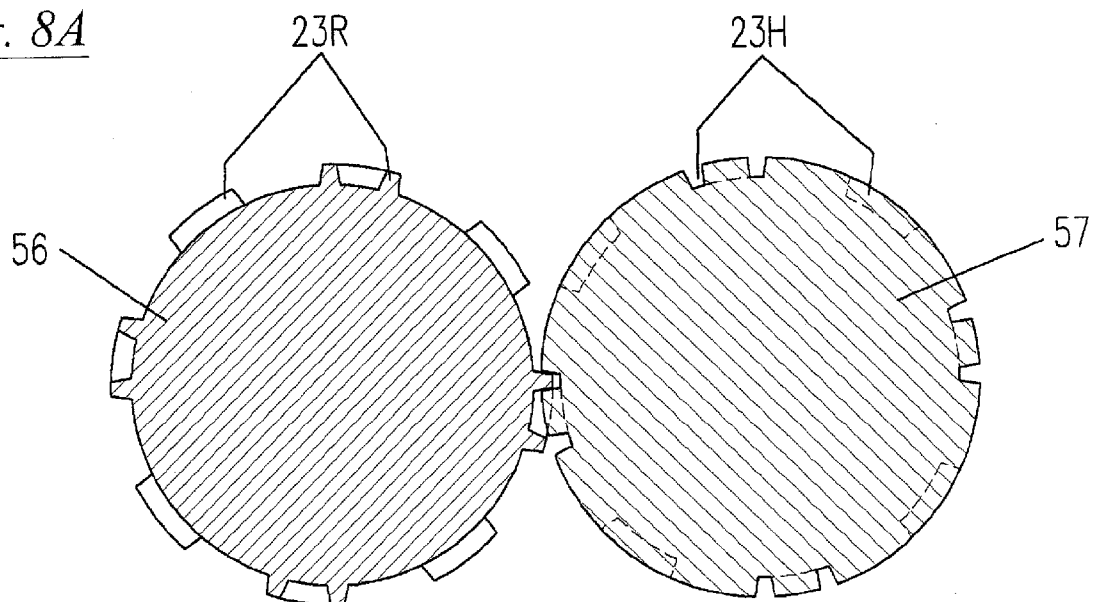
Fig. 8Fig. 8A

Fig. 9

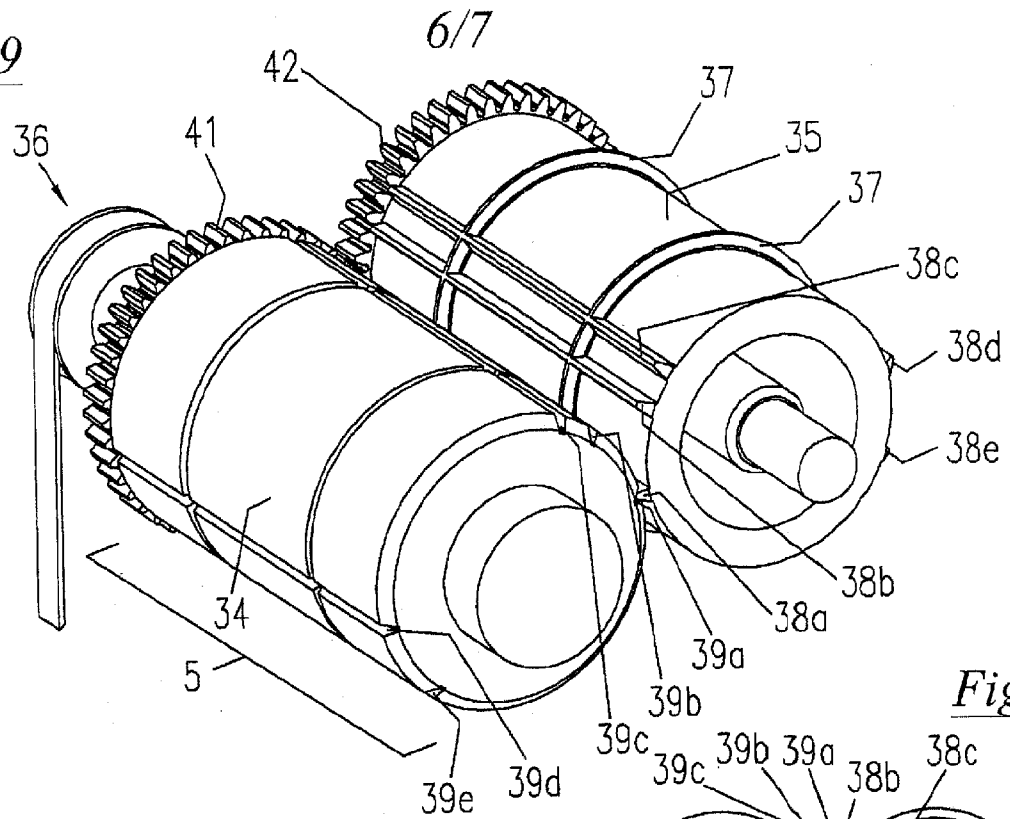


Fig. 10

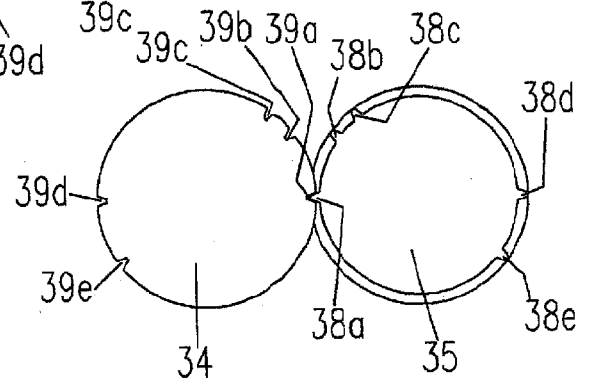
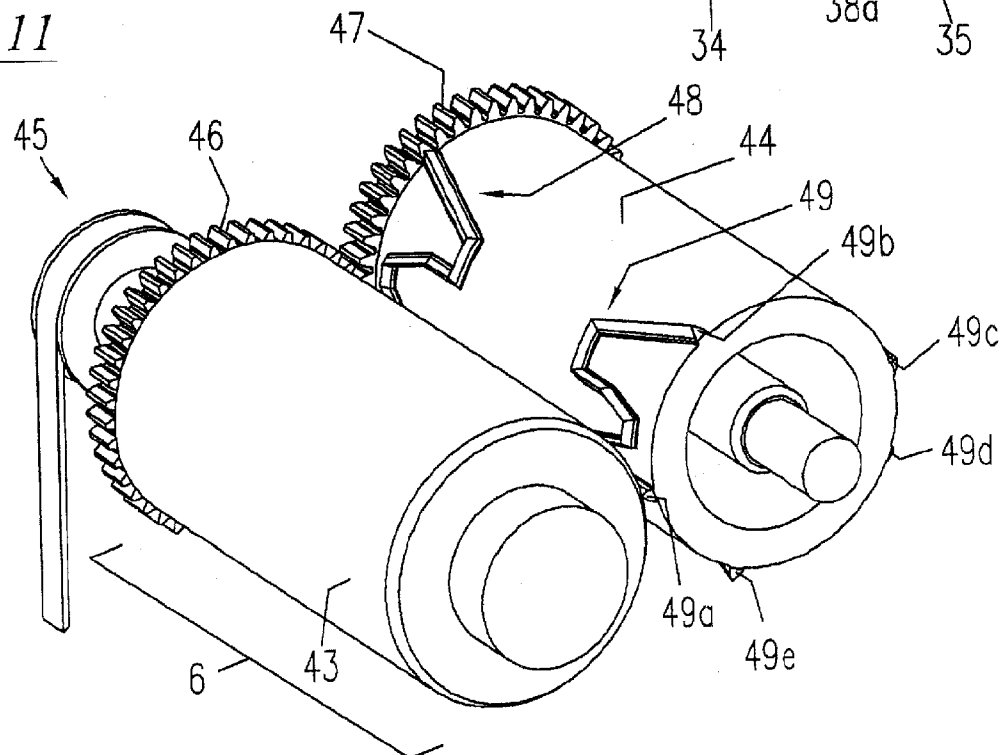


Fig. 11



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Fig. 12

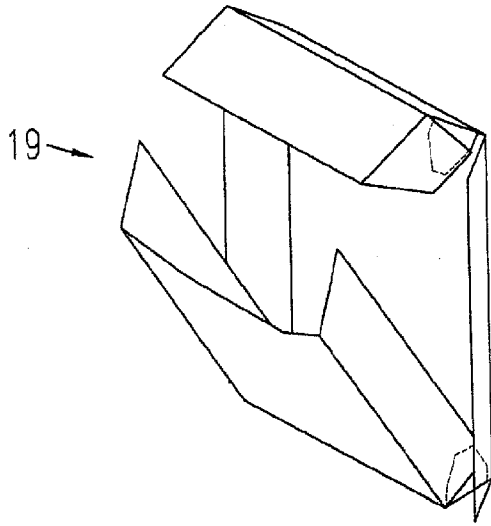


Fig. 13

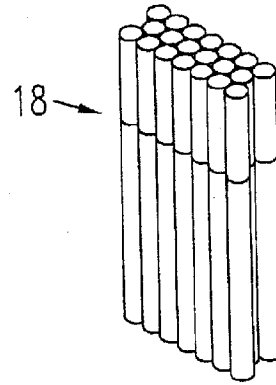


Fig. 14

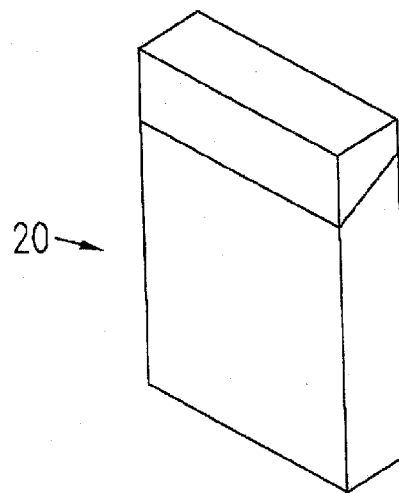


Fig. 16

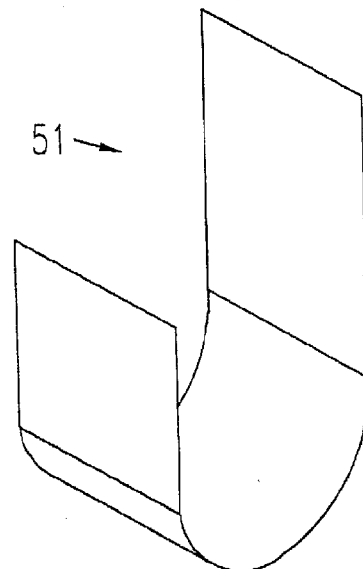
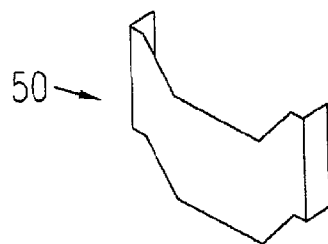


Fig. 15



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/056459

A. CLASSIFICATION OF SUBJECT MATTER

INV. B31B41/00

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B31B B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 027 994 A2 (BOEGLI GRAVURES SA [CH]) 25 February 2009 (2009-02-25) the whole document	1-22
X	GB 2 359 300 A (IND AUTOMATION SYSTEMS LTD [GB]) 22 August 2001 (2001-08-22) page 6, line 25 - page 7, line 5	1-22



Further documents are listed in the continuation of Box C.



See patent family annex.

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

22 June 2012

Date of mailing of the international search report

04/07/2012

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Authorized officer

Farizon, Pascal

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/056459

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