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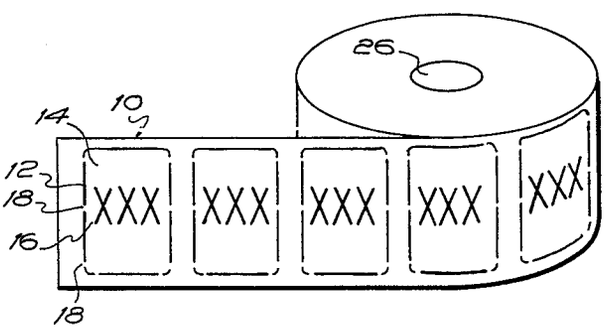
(54) Self adhesive labels and the manufacture thereof.

(57) The invention discloses the manufacture of self adhesive labels in roll form, without a backing strip: The base web material is non-fibrous and is substantially inextensible, and it is coated on one side with release material such as a polymerisable silicone resin, and on the other side with pressure sensitive adhesive. The web is die cut to define labels therein which can be removed from the remainder of the web and applied directly to products at an application station by a method and means forming part of the invention. The die cutting may be carried out prior to the application of the release coating, or subsequently, including immediately before the application station. The invention also includes a method of making the labels using relatively small dimensioned curing and/or drying ovens for the release coating and adhesive, and also release coaters and adhesive applicators.



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Self Adhesive Labels and the Manufacture thereof.

This invention relates to self adhesive labels and the manufacture thereof, and in particular concerns labels which are supplied in roll form. The labels will mainly be for application, using suitable machinery, to individual articles or objects and to this end the invention also provides a method of and means for applying labels to articles or objects, or the labels may simply be for detachment individually by hand as is the case when labels are provided, for example, for office use.

It is in fact in the field of produce marketing that pressure sensitive labels find widest application because, for example, in supermarkets and other stores the products on sale are typically priced by means of a small pressure sensitive label which is applied to the product, and frequently these labels have to be changed because of price change, making consumption of the labels enormous.

Also, huge quantities of labels which are applied to containers such as bottles and cans are used, and indeed there are many areas of application for pressure sensitive labels.

Typically, pressure sensitive labels are mounted on a carrier or backing web which is normally a web of paper coated with a suitabale release material such as a silicone compound. The adhesive labels are applied to this carrier or backing web for transportion, storage and utilisation, but the labels can readily be peeled from the backing web as there is much a stronger bond between the adhesive and the material of the label, than between the adhesive and the release material.

Not only is the backing web superfluous after the labels have been peeled therefrom and consumed, but the manufacture of the backing web is a specialist process, and must be performed under carefully controlled conditions. The equipment to produce the backing web is expensive, and is extremely large, so that only a very few companies are able to finance and perform the backing strip manufacture. This arises due to the fact that the release material when applied to the backing paper is largely absorbed by the paper (being a fibrous, absorbent material), and considerable quantities must be applied and in carefully controlled conditions in order to achieve an outer surface layer of the release coat material which will perform the required function. The relase coat material is a polyerisable material and requires to be heated after application to the paper. The heating time, in order to polymerise the material is related to the quantity applied, and because of the absorbency of the paper web a long period of heating is required to produce the finished product.

There have been proposals to eliminate the backing strip in adhesive labels, but such proposals have not met with any commercial success. One of these proposals as set forth in U.S. Patent No. 3,575,788 wherein a backless roll of labels is produced by printing on clay coated paper on one side with a nitro cellulose base ink, and by covering the ink with a heat - cured thermo setting silicone resin release coating, the other side having a pressure sensitive adhesive applied thereto. The silicone release coating is cured at a temperature of 350°F to 500°F.

At such temperatures, there would be a considerable tendency for the paper to wrinkle, and it is believed that for this reason, this proposal has not reached

commercialisation. In any case, the extra step of applying the nitro cellulose ink increases the plant size, time of production and cost of production. For whatever reason other proposals for backless labels do not appear to have been commercialised, because there are no backless pressure sensitive labels on the market.

The present invention is concerned with novel forms of pressure sensitive labels, and with a method for producing pressure sensitive labels which adapts itself to the utilization of relatively simple and relatively small dimension machinery, enabling the in-house production of pressure sensitive labels by the manufacturers of the basic substrate material. Such a manufacturer typically is referred to as a "convertor" in that he converts the raw material into sheets and webs. The invention also relates to machinery for producing the labels and a method of and means for applying of such labels to products.

According to a first aspect of the invention there is provided ahesive labels in roll form defined by a web of non-porous material which is substantially non-etensible, said web having at one side of the web a pressure sensitive adhesive and having at the other side of the web a pressure sensitive adhesive release coating whereby the web can be rolled up without the need for a backing strip.

The use of a non-porous web presents the considerable advantage that when the release coating is applied thereto, it can be applied in relatively small amounts, which means that the curing time for the release coating is reduced, and lower curing temperatures (as compared to the curing temperatures used in U.S. Patent No. 3,575,788 can be used). Moreover, it is not

necessary to apply a nitrocellulose base ink to the web before application of the release coating.

It is preferred that the web should be other than cellulose fibre based as cellulose fibre webs have the disadvantages as aforesaid.

The web is preferably of a relatively non-extensible material so as to enable the individual labels to be cut therefrom.

The pressure sensitive adhesive may cover the entire surface area or parts of the surface area which in certain cases minimises the risk of the pressure sensitive adhesive being squeezed from the coil of labels to interfere with the unwinding of the web and can increase the ease with which the web of labels can be applied to the product. Preferably, the web is die cut to define individual labels therein and the release coating is applied over the cuts to provide extra retention strength holding the labels together or to the remainder of the web.

The perforations or other lines of weakening caused by the die cutting may define the labels so that when the labels are removed from the web there remains a skeletal waste of the web material, but it is also within the scope of the invention that the perforations or other lines of weakening should be arranged so that the entire web area defines labels, with no surplus.

The web may be printed to define the labels, the printing being on the side of the web to which the release coating is aplied. Preferably, the web is of a synthetic resinous material containing an inorganic filler such as talc or chalk.

According to another aspect of the invention there is provided adhesive labels in roll form comprising a web of base material, a pressure sensitive adhesive on one side of the web and a pressure sensitive adhesive release coating on the other side so that the web can be rolled up without the use of a backing strip, the web having defined therein, by die cutting or the like, individual labels, which can be individually detached from the roll, and by virtue of the adhesive, attached to articles to be labelled.

In this aspect of the invention, the web may be fibrous or non-fibrous, the novel feature being that the web has individual labels defined therein for removal therefrom, each having pressure sensitive adhesive on one side and release coating material on the other web. Preferably, the release coating is applied to the web after the die cutting or the like, so that the release coating fills the cuts to lessen the tendency of the labels to detach from the web as unrolling of the web is taking place.

Also, according to the invention there is provided a method of manufacturing labels wherein a web of non-fibrous material which is relatively inextensible is printed to define individual labels therein, a pressure sensitive adhesive is applied to one side of the web and a pressure sensitive adhesive release coating is applied to the other side of the web so that the web of labels can be rolled up without requiring a backing strip, the adhesive and release coating being subjected, if necessary, to treatment to dry/and cure the same before rolling the web into roll form.

Preferably also, the release coating is a heat curable material, and the web is passed through a hot air oven at a temperature of 110°C to cure the release coating.

It is preferred that the web should travel in a continuous path through a release coating station, a release coating curing station, an adhesive application station and an adhesive drying station, but not neccessarily in that order.

According to yet a further aspect of the invention there is provided a method of applying labels as aforesaid to articles wherein the web is advanced to a unit operating in synchronism with the feed of articles to which the labels are to be applied, said unit taking labels one by one from the web and applying same to the moving articles.

The web material defining the labels will be of a thickness consistent with the thickness of the labels as conventionally used and may be provided with sprocket feed holes at the edges thereof.

For the application of the labels which are defined in the web and are removable from the web to leave a skeletal waste, there may be an applicator arranged to punch a portion of the label from the web to cause that portion to adhere to the appropriate article, and the article and web are relatively movable from this position so that the relative movement causes the remainder of the label to be removed from the web.

Where the said labels are defined by perforations, these may be such as to leave sufficient "catchpoints" between the label and the remainder of the web so that the label will remain in position of the web until such times as it is forceably removed or displaced therefrom. The leading edge of the label, which is first attached to the product or article may be free of such catch points so that it will deflect readily out of the web to simplify application.

The release coating may be applied to the web by rollers, gravure cylinders or hot melt applicators to provide a surface having a release characteristic. The coating may for example contain non-migrant repellants, and in particular, polymerisable silicone polymers. The coating may for example be a soluent heat cured coating, an aqueous system, solvent free or UV cured, examples of the above are as follows:

Solvent Heat Cured

A) Silcolease* (TM)	425 (30%)	(ICI)	100	parts by weight
Catalyst	62A	(ICI)	4	parts by weight
Catalyst	62B	(ICI)	4	parts by weight
Toluene			200	parts by weight

Curing Time at 120°C	10 seconds
100°C	15 seconds
90°C	20 seconds

Dry off solvent prior to cure approx. 5 seconds.

B) a) Syloff 7046 Basic polymer dispersion.

b) DowCorning 7047 Curing agent for Q2-7046.

a) and b) are used in ratio of 10:1 typically.

c) Q2-7090 (Dow Corning) Premium release additive. Is used in varying proportions to lower release levelsof basic Q2-7046.

d) Q2-7089 (Dow Corning) Release modifying

d) Q2-7089 (Dow Corning) — Release modifying agent. Can be used in varying amounts to raise level of release of Q2-7046 and gives stable modified release levels.

e) Q2-7127 (Dow Corning) — Accelerator for Q2-7046. Is used in minute quantities to accelerate the cure rate of Q2-7046. Especially useful for low temperature curing on substrates such as polyethylene film.

f) Syloff 297 (Dow Corning) — Anchorage additive. Necessary to provide abrasion resistance for off-line work (except using PEK).

In the following proportions by volume.

	1	2	3	4	5
Syloff 7046	20	20	10	16	13.4
Crosslinker 7047	2	2	1	2.2	3.2
Q2-7090	-	-	-	-	2
Q2-7089	-	-	-	2	-
Q2-7127	-	-	0.04	-	0.03
Syloff 297	-	0.2	-	0.2	-
Solvent	78	78	89	80	82

Bath_1 - Standard bath for in-line use or off-line on certain substrates such as PEK.

Bath_2 - Standard bath for off-line use, using Syloff 297 anchorage additive.

Bath_3 - Special low solids bath for coating films such as polyethylene. Solvent choice important and ethyl acetate best. Uses Q2-7127 as accelerator.

Bath_4 - Controlled release bath. Features Q2-7089 as release modifier and Syloff 297 as anchorage additive.

Bath_5 - Premium release formulation involving incorporation Q2-7090 low viscosity fluid and additional Q2-7127 to restore catalyst level.

These are only typical baths and levels of accelerator, release modifier and premium release additive can all be varied to satisfy customer demands.

Curing_Conditions

Bath 1 and 2 cure in 8-12 seconds at 140°C depending on substrate nature.

Bath 3 will cure in 15-20 seconds at 70°C.

Bath 4 cures typically in 15 seconds at 140°C.

Bath 5 cures in 30 seconds at 100°C or 10 seconds at 140°C.

Aqueous Systems

A & B SYL OFF 1171* (50%) (Dow Corning) Organopolysiloxane 14 parts by weight.

C.M.C. (Carboxy methyl cellulose) 2 parts by weight.

Catalyst 1171A (Dow Corning) Organo-tin Acylate 1.4 parts by weight.

or Catalyst 164 (Dow Corning) Organo-tin Mercaptoacetate 3.5 parts by weight.

Water To give 100 parts by weight.

Cure time 10 seconds at 120°C

Solvent Free Silicone

A) Syloff 7044 (100%) (Dow Corning) 100 parts by weight.
Crosslinker 7048 (100%) (Dow Corning) 4 parts by weight.

B) Coating Q2-7069 (100%) (Dow Corning) 100 parts by weight.
Crosslinker 7048 (100%) (Dow Corning) 4 parts by weight.

Cure time A) 40 seconds at 120°C 10 seconds at 170°C.
B) 30 seconds at 170°C

U.V. Cured

A) Silicone Dehasiv VP 1502 (100%) (Wacker) 100 parts by weight.
Crosslinking Agent VP 1503 (100%) (Wacker) 4 parts by weight.
Catalyst OL (100%) (Wacker) 0.4 parts by weight.

B) Silicone X-62-7004 (100%) (Shin-Etsu Chemical Co. Ltd) 100 parts by weight.
Catalyst X-92-095 (100%) (Shin-Etsu Chemical Co. Ltd) 10 parts by weight.

Cure rate 0.6 seconds with high pressure mercury Vapour U. V. lamp (160 W/cm).

The amount of release coating applied may be in the order of 0.1 to 1.5 grams/sq. metre depending upon the web. The pressure sensitive adhesive may be applied by conventional means, and typicallay may be a solvent or water based emulsion of which the solvent or water is dried from the web after application. The pressure sensitive adhesive may for example be hot melt, water based, or solvent based, examples of which are as follows:

Hot Melt

309 Elvax *40-P (Du Pont) (Ethylene-vinyl acetate resin) - 40 parts by weight.

Piccovar* L-60 (Hercules Inc.) (Hydrocarbon resin) - 60 parts by weight.

Irganox *1010 (Ciba Geigy) (Antioxidant) - 0.5 parts by weight.

Aqueous

Indatex SE2229S (Industrial Adhesives Ltd)

Solvent

Vinalak 5150 (Vinyl Products Ltd)

The labels may be colour printed by any suitable method such as letter press, flexographic, gravure or offset litho.

For the web material, it is preferred to use polypropylene or high density polyethylene film, including substantial proportions of particulate inorganic material.

Typically, the inorganic material may be included in the range 20 to 50% of the web by volume, and in the preferred case the web is polypropylene ethylene sequential copolymer, as described in our British Patent No. (1544,143) filled with 40% talc.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, wherein:-

Fig. 1 is a perspective view of a roll of labels according to the present invention;

Fig. 2 is an enlarged sectional elevation of the web shown in Fig. 1;

Fig. 3 illustrates diagrammatically one embodiment of how the labels are applied to individual cans;

Fig. 4 shows the process of Fig. 3 in side elevation;

Fig. 5 shows a roll of labels according to a second embodiment of the invention;

Fig. 6 shows in perspective view how a roll of labels is utilised in accordance with another apsepct of the invention;

Fig. 7 illustrates how the labels of Fig. 1 are applied to box shaped products;

Fig. 8 illustrates apparatus for the coating of the web of labels with pressure sensitive adhesive and release coating according to one method;

Figs. 9 and 10 illustrate apparatus for the said coating according to two other methods, and Fig. 11 illustrates apparatus which is a modification of the Fig. 10 apparatus.

Referring firstly to Figs 1 to 6 of the drawings, in Fig. 1 there is shown a web 10 having perforations 12 defining individual labels 14, each provided with printing 16. Catchpoints 18 serve to hold the labels to the remainder of the web 10, but the catchpoints can be burst or cut to enable removal of labels 14 leaving a residual skeletal waste.

As shown in Fig. 2, the web 10 is made up of a central substrate web 20 which is of a non-fibrous and substantially inextensible material and on one side of which is applied a pressure sensitive adhesive coating 22, and on the other siee is applied a release coating 24. The web is shown in greatly enlarged dimension in Fig. 2, to illustrate the slits 12 and also to illustrate how the coating materials 22 and 24 migrate

into the said slits 12. The substratge 20, adhesive coating 22 and release coating 24 are of a nature as described herein, and the web is wound so that the adhesive coating 22 is to the inner side of each coil and contacts directly on the release coating 24 of the adjacent inner coil. This arrangement enables the web 10 to be easily unrolled. The web may be wound on a suitable core 26.

In producing the web 10 as illustrated in Fig. 1, the printing 16 (single or multi coloured and of any desired pattern and/or content) is applied to the substrate 20 prior to the appliation of the coating 24 and in audition, the perforations or slits 12 are formed prior to the application of the said coating 24. The coating 24 in fact has the effect of assisting the holding of the labels 14 in position in the web until they are removed for application to articles. The coating 24 also serves the purpose of preventing migration of the adhesive 22 though the slits 12 when the web is wound on core 26. This tendency to migrate will depend upon how tightly the roll is wound on core 26.

Figs. 3 and 4b illustrate diagrammatically how the indiviaual labels 14 may be removed from the web 10 and applied to can bodies such as can body 28. In fig. 3, the web 10 is shown as travelling round a guide drum 30 in the direction of arrow 32, with the pressure sensitive adhesive coating side outermost. Each can 28 to be labelled comes into contact with the pressure sensitive side of the web 10, and a label 14 is removed from the web 10 and applied to the can body 28, as shown in Fig. 4. How this is achieved will depend upon the design of the equipment, but it is envisaged tha the web 10 will be held by suitable sprocket wheels or rollers engaging holes at each side of the web and the

web will be indexed forwards towards the product to be labelled. The leading edge of the label, having regard to its direction of movement (arrows 32), can be released from the web by a suitable knife or by virtue of changing the direction of movement of the web sharply. The contact pressure between the pressure sensitive surface and the product being labelled can be used to effect or assist the complete removal of the label from the web. The removal may if necessary be assisted by severing the remaining catchpoints 18 by means of suitable knives positioned appropriately. The skeletal waste of the web 10 may be wound up into a suitable coil for disposal.

The web shown in Fig. 1 has the labels defined therein by the perforations or slits 12, which are arranged to leave a skeletal waste, but in the arrangemenr of Fig. 5, the slits 12 define lines of weakening extending across the entire width of the roll, so that the individual labels 14 constitute the entire web without any wastage. The feed and applicator apparatus for handling this form of web may have to be modified as there is no resulting skeletal waste, and if necessary, the corners of the labels may be profiled as indicated by reference numeral 34. The web 10 of the roll of labels shown in Fig. 5 is constructed in the same manner as the web described in relation to Figs. 1 and 2.

In the arrangement shown in Fig. 6, a web 10 carries printing 16 which repeats at pitch lengths P, but the web has no perforations or lines of weakening. The wen defines contiguous labels which have to be cut from the web by suitable cutting equipment located in the region of the application head 36 so that individual labels are cut from the web immediately prior to or during application of the label to the article 28 to which the

label is being applied. The individual labels can make up the entire web as illustrated in the arrangement of Fig. 5, or can be portions to be cut from the web as indicated in Fig. 1, but in this arrangement also no carrier sheet is required, as the web 10 will be constructed in the same fashion as the web 10 illustrated in Fig. 1. Fig. 7 shows, in somewhat greater detail how labels in roll form as shown in Fig. 1 may be applied to box shaped products 40. The roll of labels is indicated by numeral 42 and is unwound from this roll by a tractor unit 44 having a suitable sprocket feed device which engages the holes in the margins of the web 10 (the said holes are not shown in the drawings) and is fed through a removal and application station 46. The skeletal residue of the web 10 is wound into roll form as shown by numeral 48.

The adhesive side of the web 10 is the upper side and all surfaces which contact this adhesive side are required to be of a nature so as not to adhere to the adhesive. Such surfaces may be defined by silicone release material.

The removal and application station 46 comprises an upper presure nip roller 50 (silicone coated) and a lower vacuum cylinder 52 around which the web 10 laps slightly as shown in Fig. 7, and which has a plurality of circumferentially spaced ports 54 which connect with axially extending passages 55, which are selectively connectable to a source of vacuum or, when at detachment position 56, with a blast of air under pressure. A valve plate 58 at one end of the cylinder controls the connection of the passage 55 to the source of vacuum and the blast of air in that said plate 58 has an arcuate port 60 coupled to the source of vacuum and a port hole at position 56 connected to the air under pressure. In use, the cylinder 52 rotates in the

direction of arrow 62 whilst the plate 58 remains stationery and each passage 55 which registers with port 60 is connected to the source of vacuum. Each passage 55 which leaves register with slot 60 arrives first at position 56 where it receives a blast of air under pressure, and then the passage is blanked off until it once more reaches the port 60.

Operation of the unit 46 will be understood from the above. The individual labels L are detached by the vacuum at the nip between roller 50 and cylinder 52, and travel round with the cylinder 52 until they reach station 56 at which they are progresively applied to the products 40 which are moving as indicated by arrow 63, in synchronism with the feed of the labels. To this end the labels and products may be fed on an indexing or continous basis, with interlinking controls ensuring that the operation proceeds only when the presence of a label and a product has been detected.

The arrangement shown in Fig. 7 could be modified to handle a roll of labels such as shown in Fig. 6, which are required to be cut from the web, and a suitable die cutting means would be provided in the region of the application station.

It is estimated that the apparatus shown in Fig. 7 will be capable of applying labels at the rate of approx. 200/min in part because the label roll has no backing strip.

Reference is now made to Figures 8 to 11, which shows methods of manufacturing labels according to the invention.

Referring to Fig. 8 of the drawings, a roll 110 of stock material in which labels are to be formed may

suitably be of a width of 450 millimetres and thickness 80 micron, the material may be a blown film manufactured from a filled plastics material of the nature set out in British Patent No. 1,554,143, but in any event should be a non-fibrous and substantially non-extensible material. The web passes from roll 110 through silicone compound coating assembly 112 at which release coating is applied to one side (the first side) of the web, and then the web travels through a heating chamber 116 which is divided into two compartments 118 and 120 by means of a horizontal partition 122. The release coating is cured by passing the web back and forth through the chamber 118 with the first side initially face downwards then face upwards. The web emerges from the chamber 118, after a traverse time of 20 seconds in an enviroment maintained at 120°C, and the web is engaged by a pair of guide rolls 124 and 126.

The web next passes through a pressure sensitive adhesive coater assembly 128 of the form shown which applies pressure sensitive adhesive composition to the other and second side of the web. The web is led by means of feed conveyor 130 into the upper heating chamber 120 which is maintained at 110°C, in order to drive off the solvents of the adhesive coatings, to dry same. The emergent web passes over guide rolls 132 and 134 (134 being silicone coated so that it will not stick to the adhesive side of the web which it contacts) and then passes through die cutting rolls 35, 138 (138 being silicone coated) which define the individual labels in the web, and the web is wound into roll 140.

Compared to conventional methods of applying silicone coating to webs for the production of labels, the above equipment is extremely simple and can be operated by

convertors of raw material on an in-house basis, the entire treatment having a cyle time of no more than half a minute to one minute and the overall length of the apparatus being no greater than 8-10 metres. The web material 110 will usually be pre-printed to define the label printed matter, and the silicone composition is applied over the printed side of the web. The rollers 124 and 126 may be the rotary die cutting rollers in order to define the individual labels in the web by cutting through the web to define the labels but also to leave catch points whereby the labels remain connected to the web stock material until displaced therefrom, instead of rollers 134 and 136.

In the arrangement shown in Fig. 9, the silicone release coating is an ultra violet curable material, and therefore after the coating is applied, the web is passed through an ultra violet dryer 140, which is quicker and less expensive than hot air drying. The adhesive is applied and dried as before.

In the arrangement of Fig. 10, both the silicone release coating and the adhesive are ultra violet curable and therefore there are two ultra violet driers 140 and 142 respectively for the silicone release coating and the adhesive, through which the web passes in turn after application of the respective coatings. Fig. 11 shows an arrangement similar to Fig. 10 in that ultra violet dryers are used. Only the path of travel of the web is different. The parts of the apparatus in Figs 9, 10 and 11 already referred to in Fig. 8 are designated with the same reference numerals. In each of the arrangements shown in Figs 8 to 11, the web travels first through the silicone coater 112 and second through the adhesive coater. This order could be reversed if desired. Also, an arrangement wherein a UV dryer is used for the adhesive and a hot air dryer

is used for the release coating can be adopted. another form of dryer which can be used at least for the adhesive is a radio frequency dryer.

In the production flow path in any of the apparatus of Figs 8 to 11, after the stage of application of the adhesive, all of the rollers which contact the adhesive side are provided with a silicone coating in order to prevent sticking of the rollers to the adhesive, and of course it is possible in accordance with the invention directly to wind the web 110 after the adhesive and silicone materials have been applied in that the silicone side of the web will not adhere to the adhesive in the coiling and uncoiling of the web.

The speed and simplicity of production is achieved by selecting a web material which is non-fibrous and therefore will not absorb excessive of amounts of the silicone material, which happens when paper webs are coated as in the conventinal method of producing adhesive labels.

The web 110 may be provided with apertures in the margins thereof to enable the feeding of the web in the apparatus for removal of the labels from the web for application to articles before or after being coated. The said apertures may also serve for the driving of the web through the equipment shown in Figs 8 to 11.

When the silicone coating is heat cured, the temperature at which the curing of the silicone coating takes place will be dictated in fact by the material of the web, the speed of the web and the thickness of the coating. Clearly, although the curing time can be reduced by increasing the curing temperature, the temperature cannot be so high as to cause disintegration of the web material itself.

It is preferred that the operation will proceed on a continuous basis, but it can be arranged to take place on a step by step basis with dwell times during which the silicone is cured and the adhesive is dried.

Any suitable form of pressure sensitive adhesive can be used.

The thickness of the web can depend upon the application, but typically labels are manufactured in a thickness of approximately 25 to 250 microns, with the filled plastics material web being typically 80 microns. The quantity of silicone coating which is required for such labels typically would be as little as 2 gms. per square metre, whereas with paper webs as much as 40 gms. per square metre may be required.

As concerns the method of producing the labels, an advantage of the preferred method of the invention resides in that the polymerisable release coating, which may be a silicone compound, can be polymerised in a relatively short time by virtue of the fact that the substrate web material is non-fibrous and therefore will not absorb the release coat material when applied. This means that only a fraction of the amount of release coat material normally applied will be used (as little as 5% as compared to the conventional method) and correspondingly the curing time is significantly reduced. With a slow curing time, correspondingly simpler and therefore smaller machinery can be employed for the manufacture of the labels.

Tests using a silicone release coating material applied in amounts of 2 gm/sq metre have shown that 10 seconds in a chamber heated to 120°C achieves satisfactory cure of the silicone release coat material.

CLAIMS

1. Ahesive labels in roll form defined by a web of non-porous material which is substantially non-etensible, said web having at one side of the web a pressure sensitive adhesive and having at the other side of the web a pressure sensitive adhesive release coating whereby the web can be rolled up without the need for a backing strip.

2. Adhesive labels according to claim 1, wherein said web has either perforations defining individual labels which can be removed one by one, or having no cuts or other lines of weakening therein.

3. Adhesive labels according to claim 1 or 2, wherein the web is die cut to define individual labels therein and the release coating is applied over the cuts to provide extra retention strength holding the labels together or to the remainder of the web.

4. Adhesive labels according to claim 1, 2 or 3, wherein the web is of a synthetic resinous material containing an inroganic filler such as talc or chalk.

5. Adhesive labels according to any preceding claim, wherein the labels are printed prior to the application of the release coating.

6. Adhesive labels according to any preceding claim, wherein the release coating is a silicone based, polymerisable coating.

7. Adhesive labels according to any preceding claim, wherein the release coating is applied in quantities in the order of 2 grams per sq. metre.

8. Adhesive labels in roll form comprising a web of base material, a pressure sensitive adhesive on one side of the web and a pressure sensitive adhesive release coating on the other side so that the web can be rolled up without the use of a backing strip, the web having defined therein by die cuting or the like, individual labels, which can be individually detached from the roll, and by virtue of the adhesive, attached to articles to be labelled.

9. Adhesive labels according to claim 8, wherein the release coating is applied to the web after the die cutting or the like, so that the release coating fills the cuts to lessen the tendency of the labels to detach from the web as unrolling of the web is taking place.

10. Adhesive labels according to claim 8 or 9, wherein the labels are defined in the web by die cutting, leaving catch points holding the labels to a skeletal remainder of the web.

11. A method of manufacturing labels wherein a web of non-fibrous material which is relatively inextensible is printed to define individual labels therein, a pressure sensitive adhesive is applied to one side of the web and a pressure sensitive adhesive release coating is applied to the other side of the web so that the web of labels can be rolled up without requiring a backing strip, the adhesive and release coating being subjected, if necessary, to treatment to dry/and or cure the same before rolling the web into roll form.

12. A method according to claim 11, wherein the adhesive is solvent based and the web, after the adhesive has been applied, is passed through a heating oven to drive off the solvent in the adhesive.

13. A method according to claim 11 or 12, wherein the release coating is an ultra violet curable material and the web is passed through an ultra violet oven to cure said release coating.

14. A method according to claim 10 or 11, wherein the release coating is a heat curable material, and the web is passed through a hot air oven at a temperature of 110°C to cure the release coating.

15. A method according to claim 13, wherein the dwell time in the release coating curing oven is of the order of 10 seconds.

16. A method according to any of claims 11 to 15, wherein the web travels in a continuous path through a release coating station, a release coating curing station, an adhesive application station and an adhesive drying station, but not necessarily in that order.

17. A method according to claim 14, wherein there is also a die cutting station in the said path, for cutting the individual labels in the web for removal at a later date.

18. A method according to claim 14, wherein the die cutting station is before the release coating station.

19. A method according to any preceding claim wherein the web is a synthetic plastics web containing an inorganic filler and is of thickness in the order of 80 microns.

20. Apparatus for manufacturing labels according to the method of any of claims 11 to 19.

21. A method of applying labels to articles using a web of labels according to any of claims 1 to 10, wherein the web is advanced to a unit operting in synchronism with the feed of articles to which the labels are to be applied, said unit taking labels one by one from the web and applying same to the moving articles.

22. A method according to claim 21, wherein the unit removes the individual labels from the web, said labels having previously been cut in the web.

23. A method according to claim 21, wherein the unit removes the individual labels from the web after cutting the labels from the web.

24. A method according to claim 22 or 23, wherein the unit has a drum of which the periphery is perforated, and the interior is selectively connected to a source of vacuum so that the labels are removed by vacuum from the web, are retained by the drum for part of a revolution thereof, and then are applied to the articles.

25. A method according to claim 24, wherein the perforations in the drum periphery are selectively connectible to the source of vacuum.

26. A method according to claim 22, 23, 24, or 25, wherein the web is indexed along said path as the labels are applied to the articles.

27. A method according to any preceding claim 11 to 19 or 21 to 26, wherein the web has sprocket holes therein at each side, and these are engaged by tractor feeds for the guiding and feeding of the web in any instance when the web is required to move either in the

application of the release coating and/or adhesive or in the application of the labels to the articles.

28. Apparatus for applying labels in accordance with the method of any of claims 21 to 26.

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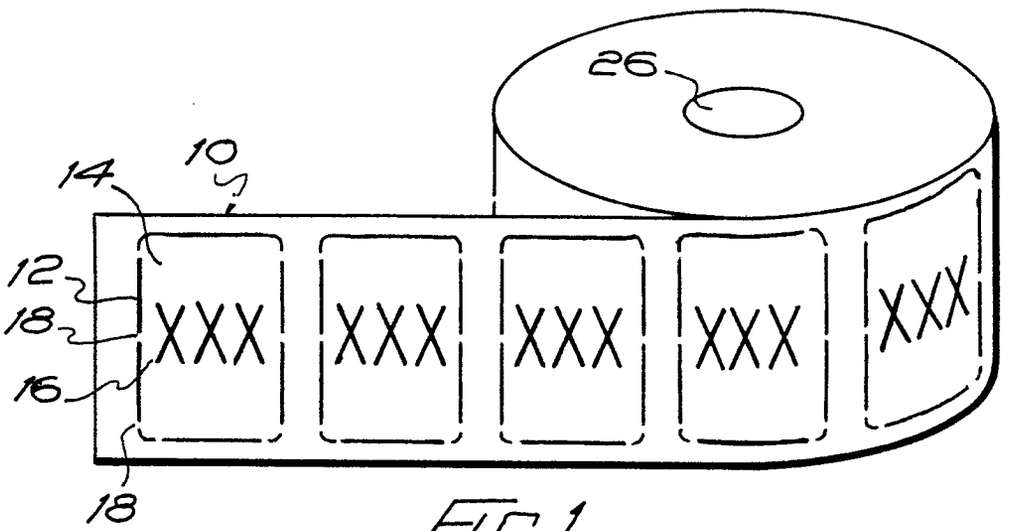


FIG.1

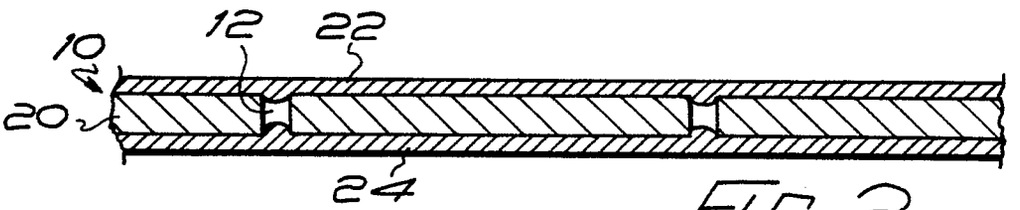
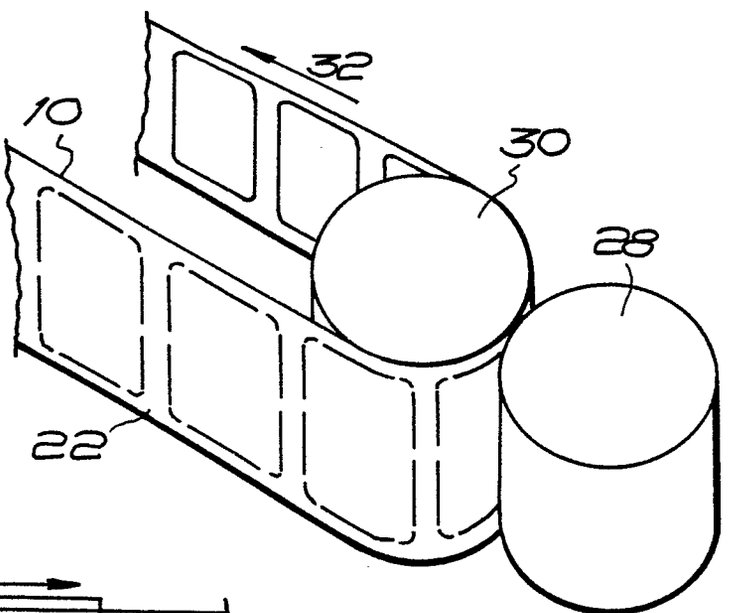


FIG. 2

FIG. 3



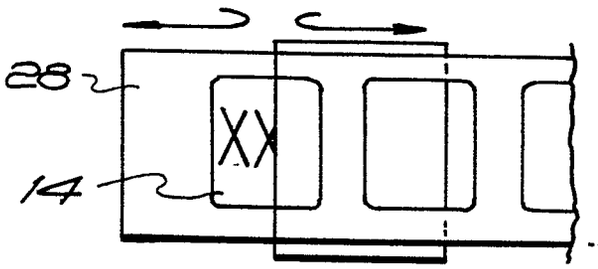


FIG.4

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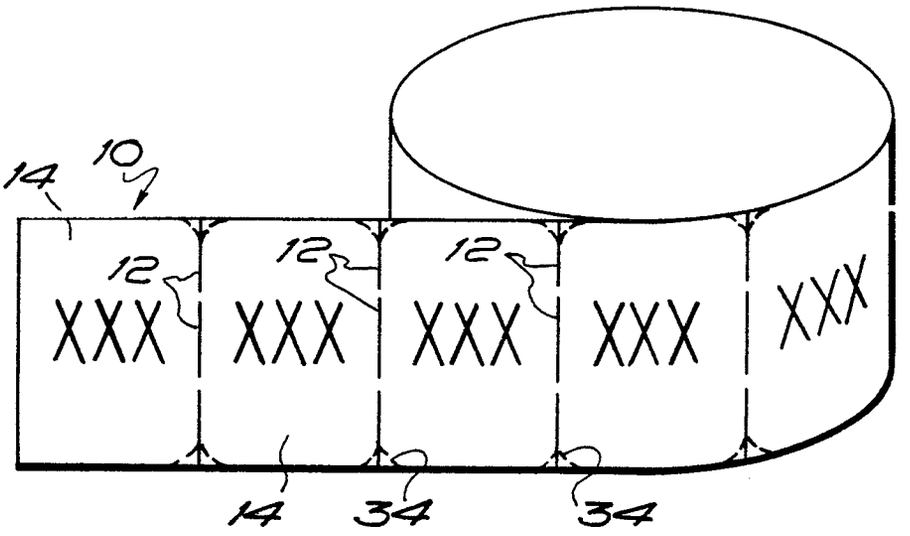

FIG. 5

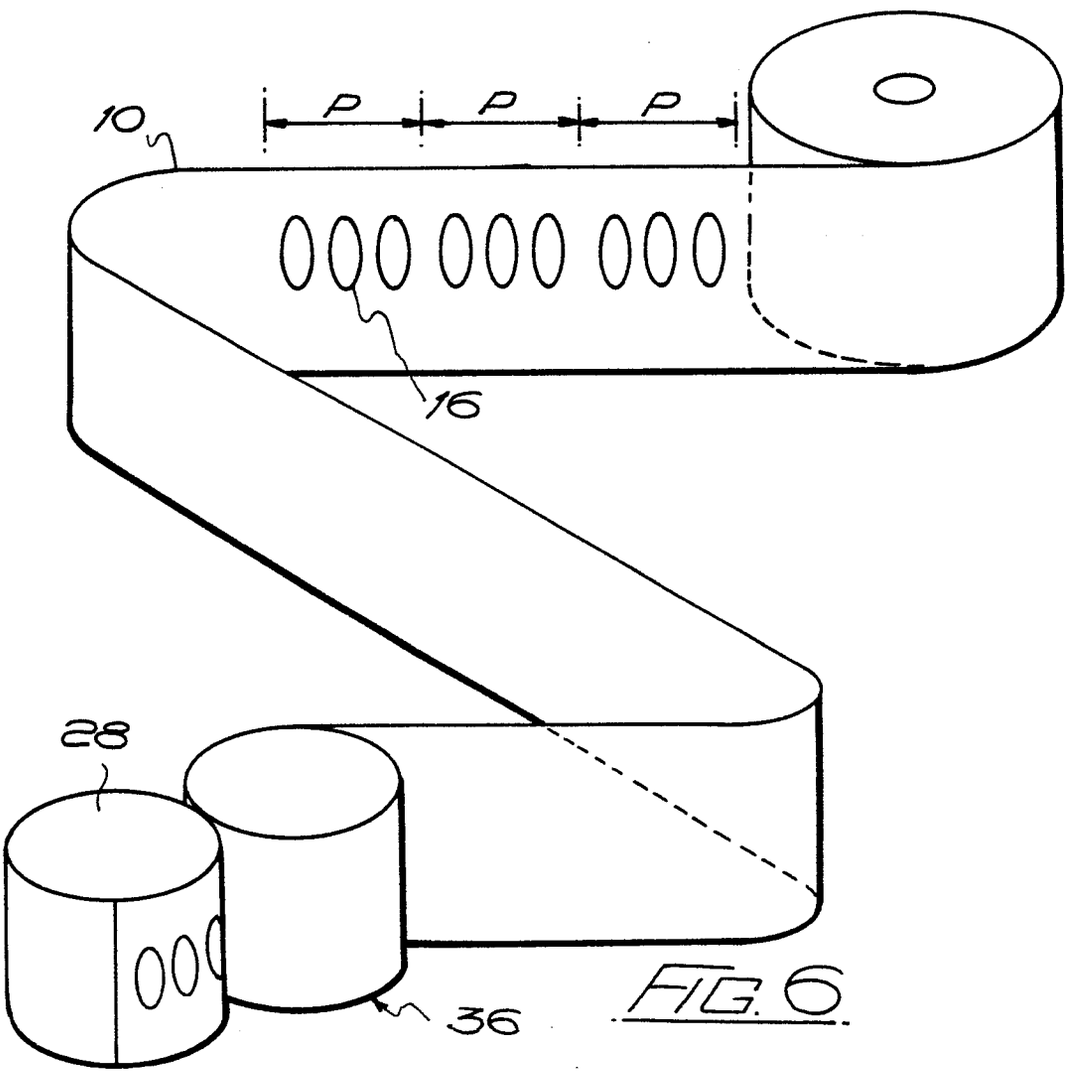

FIG. 6

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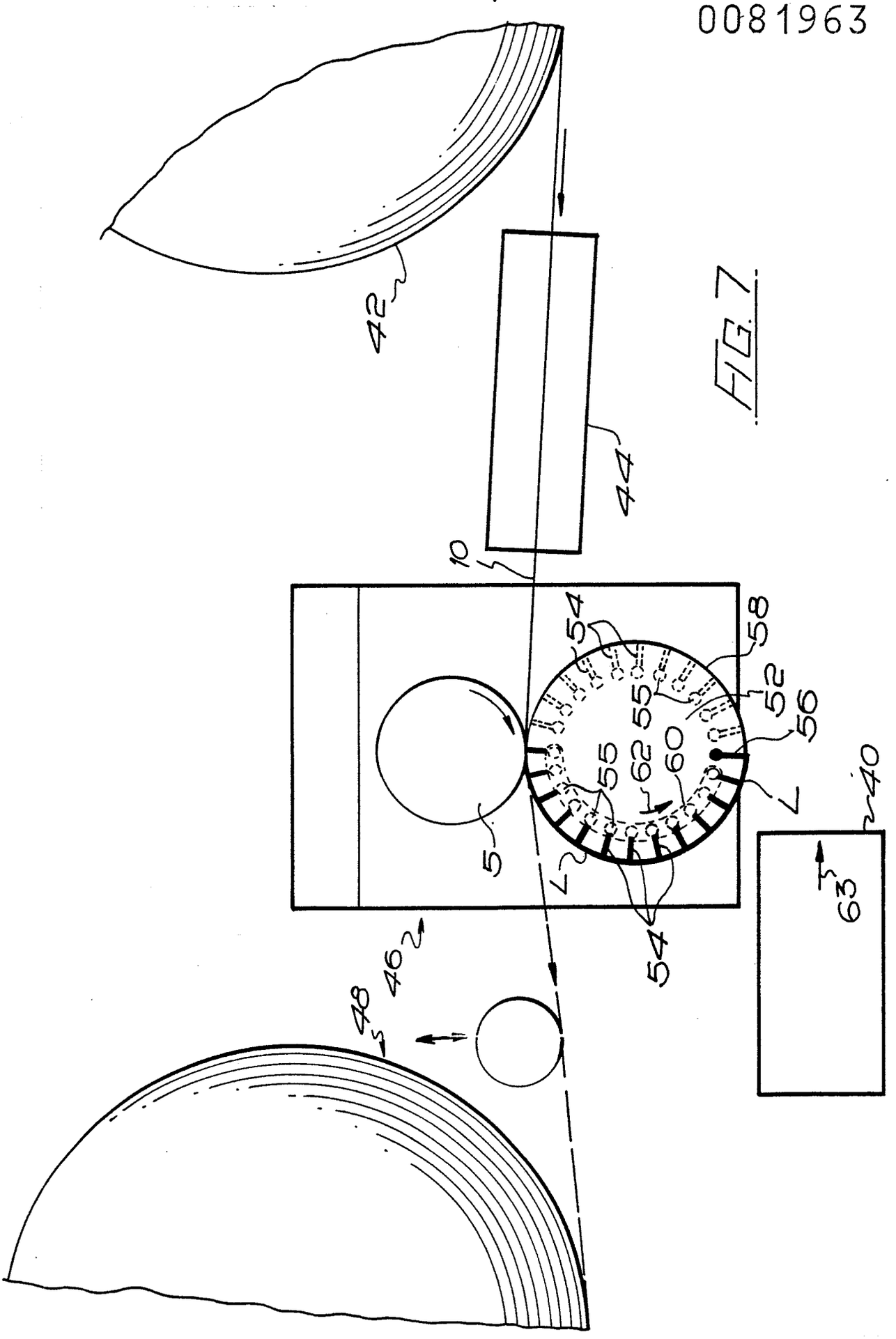


FIG. 7

FIG. 8

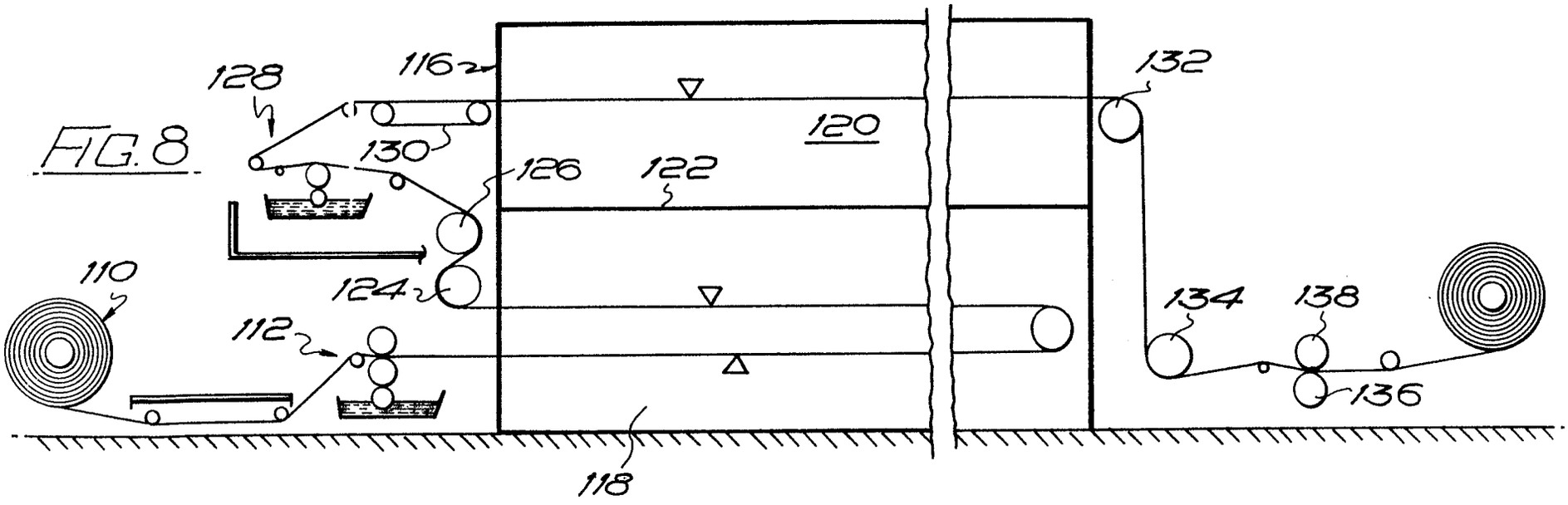
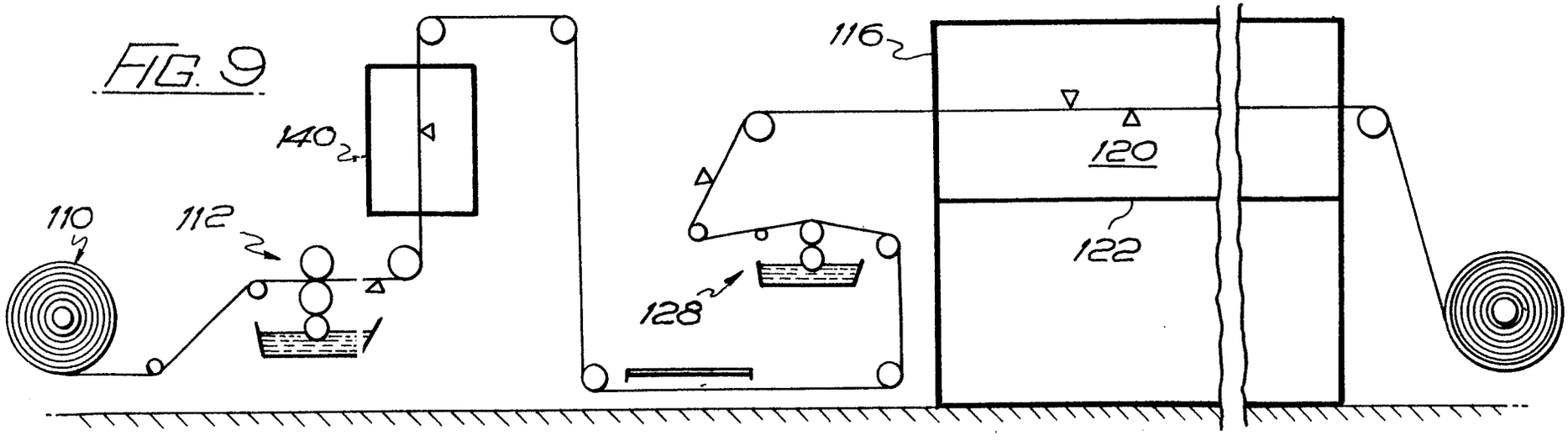


FIG. 9



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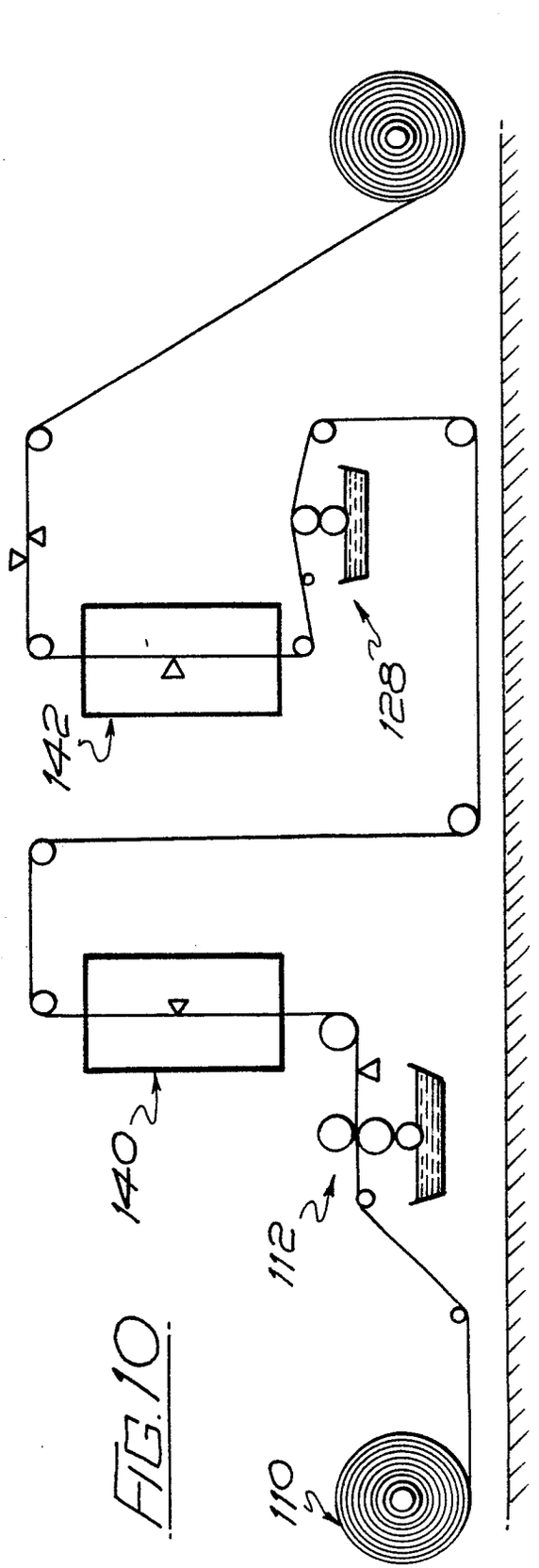

FIG. 10

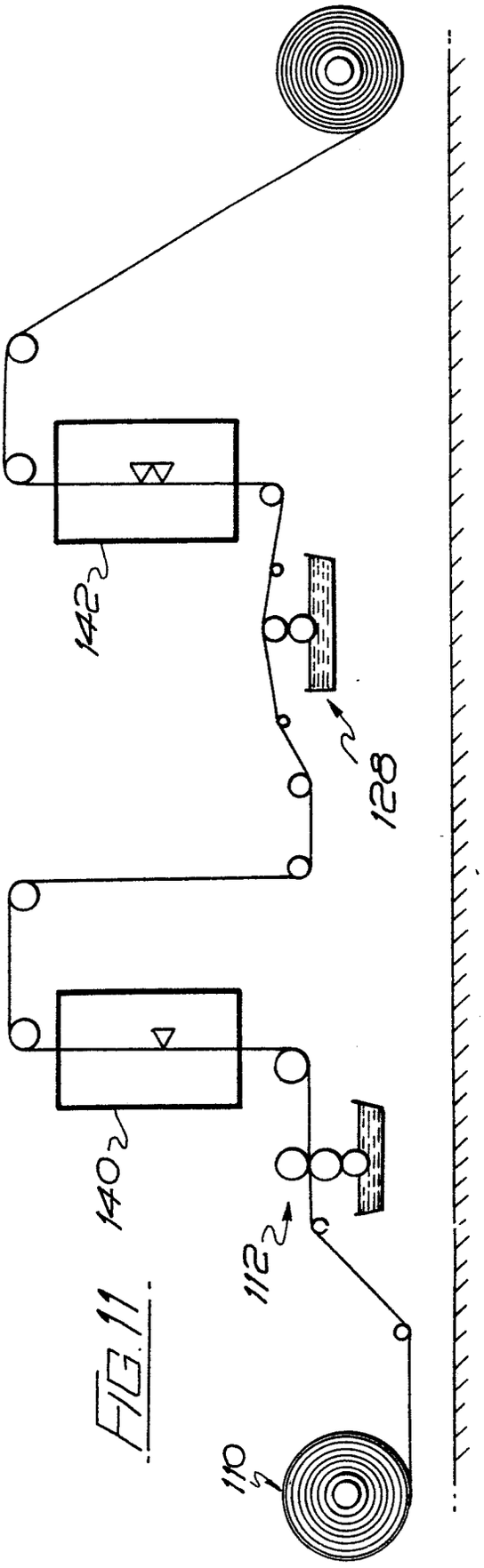

FIG. 11