

"METHOD OF, AND APPARATUS FOR, REMOVING FLAT PRODUCTS,  
ESPECIALLY PRINTED PRODUCTS, FROM A WINDING CORE".

This invention relates to a new and improved method of, and apparatus for, removing flat products, especially printed products, from a winding core.

In its more particular aspects the method and apparatus  
5 for removing such products is of the type in which the products are unwound from a primary product package and delivered to respective destinations.

Unwinding apparatus for removing products from a product package which has been formed by winding-up a  
10 product formation have been described and are known from German Patent Specification 2,526,432 and from German Patent 1,244,656. It is a problem with such type of equipment that after discharging the products the empty winding core has to be replaced by a new product package,  
15 and thus the removal of the product is interrupted during this exchange operation. The problem may be remedied by providing two unwinding locations, wherein a respective one is operative while the other is charged or loaded with another product package. This solution, however,  
20 has the disadvantage that a considerable expense with respect to the equipment is required.

Another construction of apparatus in this field of technology has been disclosed in German Patent Specification 2,544,135.

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Therefore, with the foregoing in mind it is a primary object of the present invention to provide an improved method of, and apparatus for, removing substantially flat products, especially printed products, particularly arranged in an imbricated product formation, from a winding core in a manner which requires only one unwinding location.

Another and more specific object of the present invention is the provision of a new and improved method of, and apparatus for, removing substantially flat products, especially printed products, preferably arranged in an imbricated product formation, from a winding core, in which a continuous stream of the products to be removed is ensured with but one unwinding location.

A further significant object of the present invention is the provision of a new and improved method of, and apparatus for, positively and efficiently removing flat products, especially printed products, from a winding core, which apparatus is relatively simple in construction and design, quite economical to manufacture, extremely easy to use, and not readily subject to breakdown or malfunction.

Now in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the method of the present development is characterised by the steps of unwinding the products from the winding core and separating the products into a first

product formation and a second product formation,  
the first product formation being directly trans-  
ported away after unwinding, and the second product  
formation being transported with a time delay following  
5 the transporting away of the first product formation.

In the apparatus aspects of the invention, there  
is provided a first product formation and a second  
product formation upon the winding core, as well as  
unwinding means for simultaneously unwinding the first  
10 and second product formations from the product package,  
and removing means for removing the unwound products.  
The removal or removing means contains means or structure  
for the direct removal or transporting away of the  
first product formation of both of the simultaneously  
15 wound-up product formations and for the delayed removal  
of the second product formation following the first  
product formation.

Both of the product formations simultaneously  
unwound from the winding core are subjected to different  
20 treatments or manipulations. The first product formation  
is transported away directly from the product package,  
whereas the transporting away of the second product formation  
occurs with a time-delay. During the subsequent

removal of the second product formation, an empty  
25 winding core may be exchanged against a new product  
package without any interruption occurring in the stream  
of the removed products.

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Preferably, the second product formation after unwinding thereof and prior to its removal or transporting away is wound upon an intermediate winding core. Thus the delay in the removal of the second product formation is achieved by re-winding the same prior to the actual removal or transporting away thereof.

According to a further aspect of the invention, prior to winding of the products into a product package upon the winding core, a first leading portion of the products is initially wound so as to form an intermediate package and subsequently is unwound from such intermediate package and then wound together with a second, subsequent or trailing portion of the products into a primary product package. During a later simultaneous unwinding of both of these product portions the first product portion of the products can be directly transported away or removed, and the second portion of the products is wound into a further intermediate package and from such, following the transporting away of the first portion of the products, is subsequently unwound from such further intermediate package and removed. Due to the winding of each of both product portions into an intermediate package there is afforded the possibility of imparting to the products in the transported away product formation the same position as they originally possessed in the product formation delivered to the winding station.

The invention should be better understood from the following detailed description by reference to the

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accompanying drawings wherein:

Figure 1 is a side view of the apparatus, specifically illustrating the unwinding station, according to the invention in one operational state;

5           Figure 2 is a side view of the apparatus shown in Figure 1 in another operational state;

Figure 3 is a side view of a winding station in the apparatus according to the invention in one operational state; and

10           Figure 4 is a side view of the winding station in the apparatus shown in Figure 3 in a different operational state.

Referring now to the drawings, it is to be understood that in order to simplify the illustration, only enough of the construction of the apparatus has been shown as is needed for those skilled in the art readily to understand the underlying principles and concepts of the invention. Referring specifically to Figures 1 and 2, there has been illustrated therein an unwinding station 1 containing an unwinding location 2 and removing or transport means 3. A storing means or unit 4 is arranged at the unwinding location 2, the structure of which is, for example, disclosed in greater detail in our co-pending British patent application 25 82 29129 filed 12th October, 1982, entitled "Apparatus for the Storage of Flat Products Arriving in

an Imbricated Formation, Especially Printed Products".

The storing means comprises a mobile frame or pedestal 5 in which a shaft 6 of a substantially cylindrical winding core 7 is journalled for rotation. The winding core 7 carries a primary product package 8, the structure of which will be hereinafter discussed more fully.

Furthermore, a band spool member 9 for a separation band 10 is rotationally journalled in the frame or pedestal 5. The separation band 10 is wound between the wound-up layers or plies of the product package 8 and it is connected to the winding core 7 at one of its ends.

The primary product package 8 is formed by two superimposed imbricated product formations 11 and 12 which are wound upon the winding core 7. In each of the imbricated product formations 11 and 12 the printed products 14 are superimposed in the manner of the tiles of a roof. Thus, each wound layer or ply comprises a twin-layer. Formation of such a primary product package 8 can be achieved in various ways. In the following disclosure, a preferred technique of product package formation is described briefly with reference to Figures 3 and 4.

Figures 3 and 4 shown a winding station 15 which is the subject of and has been described in detail in the aforementioned British Patent Application 8235099, filed 9th December, entitled "Method and Apparatus for Storing Continuously Arriving Flat

Products, Especially Printed Products. The winding station 15 comprises a winding location or means 16 at which the empty storing or storage means 4 is located (see Figure 3). The printed products 14 to be stored on the winding core 7 are supplied by in-feeding or feeding means 17. Furthermore, a stationary winding core 18, which is appropriately journaled for rotation about its lengthwise rotational axis, is present in the winding station 15. One end of a separation band 19 which is wound on a band spool or supply member 20 is secured to the winding core 18. Formation of the primary product package 8 on the winding core 7 proceeds as follows.

A first leading product portion 21 of the stream of products to be wound is supplied to the winding core 18 by the infeed or feeding means 17 as shown in Figure 3. Thus, the products 14 in the first product portion 21 are wound upon the bi-directionally driven winding core 18 to form an intermediate product package 13, the separation band 19 being wound between the different layers in the intermediate product package 13. As shown in Figure 3, the printed products 14 are wound upon the winding core 18 with their folding edge 14a in the leading position.

Contrary thereto, a second trailing product portion 22 of the stream of products is directly supplied to the winding core 7 by the infeeding or

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feeding means 17. At the same time the first product portion 21 of the stream of products is unwound from the intermediate product package 13 and is wound upon the winding core 7 conjointly with the second product portion 22 as shown in Figure 4. The printed products 14 of the second product portion 22 are thus superimposed upon the printed products 14 forming the first product portion 21. Between the individual layers or plies of the primary product package, which thus form twin layers, there is wound the separation or partition band 10.

As further shown in Figure 4, the printed products 14 of the first product portion 21 are now wound upon the winding core 7 with their open side 14b in the leading position. On the other hand, the printed products 14 of the second product portion 22 are wound with the folding edge 14a in the leading position.

When the primary product package 8 is completed, the further supplied printed products 14 are again delivered to the intermediate winding core 18 to form again an intermediate product package 13. During formation of each of the intermediate product packages 13 the storing means or unit 4 can be exchanged against another storing means or unit having an empty winding core 7.

The further structure of the unwinding station 1 is now described with reference again to Figures 1 and 2.

5 The storing means or unit 4 is followed by a conveyor belt rocker or balance 23 which is journalled for pivotal movement about a pivot shaft or axis 23a at one of its ends in a stationary frame 24. A pressing or contact mechanism 25 comprising a loaded spring or spring storage acts on the conveyor belt  
10 rocket 23 and urges the same against the primary product package 8. A branching or branch location 26 is located at one end of the conveyor belt rocker 23. The removing or transport means 3 are divided into a first branch 27 and a second branch 28 at this  
15 location.

The first branch 27 comprises two belt or band conveyors 29 and 30 following the conveyor belt rocket 23. In the second branch 28 there is arranged a conveyor belt 31 which is followed by a conveyor belt  
20 rocker or balance 32. The conveyor belt rocker 32 is of conventional design and can conveniently be positionally adjusted in any appropriate manner. Above the conveyor belt rocker 32 there is located a winding core 33, and a bi-directionally driveable shaft 34  
25 thereof is journalled for rotation in the frame 24. One end of a separation or partition band 35 is secured to the winding core 33. The separation band 35 is

wound upon a band spool or supply member 36 which is rotatably journaled beneath the conveyor belt rocker 32. Furthermore, the second branch 28 includes a deflecting roller 37 journaled for rotation in the frame 24; a pressing band 38 co-acts with the deflecting roller 37 and defines a conveying gap in conjunction therewith.

The operation of the unwinding station 1 is as follows:

Unwinding of both product formations 11 and 12 from the primary product package 8 is perfected in the manner described, for example, in the aforementioned co-pending British Patent Application 82 29 129 as well as in German Patent Specification 3,123,888 and the corresponding British Patent Specification 2,081, 230. By suitable drive means (not shown) the band spool member 9 is driven in such a rotational sense that the separation band 10 is withdrawn from the primary product package 8. Hence, the slightly braked winding core 7 is rotated in the direction of the arrow B. The unwound product formations 11 and 12 reach the branching or branch location 26 via the conveyor belt rocker or balance 23 and thereafter remain separated from each other.

The first product formation 11, which corresponds to the first leading portion 21 of the stream of products supplied to the winding station 15

(see Figures 3 and 4), is directly removed by means of the conveyor belts or belt arrangement 29 and 30 in the direction of the arrow C. Again the folding edges 14a of the removed products 14 form the leading edge, just as was the case for the imbricated product formation supplied to the winding station 15 (see Figures 3 and 4).

The second imbricated product formation 12, following the branch location 26, reaches the winding core 33, which is driven in the direction of the arrow D, by means of the conveyor belt 31 and the conveyor belt rocker 32. Thus the second product formation 12 is wound upon the winding core 33 to form an intermediate product package 39. The individually wound layers or plies are separated from each other by the separation band 35 which is wound in conjunction therewith. Since the band spool or supply member 36 is slightly braked, the separation or partition band 35 is wound under tension (see Figure 1). The conveyor belt rocker 32 follows the increase in the diameter of the wound intermediate product package 39 and is pressed against it in any suitable known manner. As will be further evident from Figure 1, the printed products 14 of the second product formation 12 leave the primary product package 8 with their open side 14b in the leading position and they are wound upon the winding core 33 in this position.

After discharging or emptying the primary product package 8, the conveyor belt rocker or balance 32 is switched in its position so as to provide a connection between the intermediate product package 39 and the  
5 deflecting roller 37 as shown in Figure 2. Subsequently, the printed products 14 are unwound from the intermediate product package 39. Therefore, the band spool member 36 is driven so that the separation band 36 is withdrawn from the intermediate product package  
10 39. The slightly braked bi-directionally driveable or rotatable winding core 33 is thus rotated in the direction of the arrow E. The unwound printed products 14 are fed by the conveyor belt rocket 32 to the not particularly referenced conveying gap formed between the  
15 deflecting roll or roller 37 and the pressing band 38, and thus are deflected through an angle of about 180°. The printed products 14 leaving the mentioned conveying gap reach the conveyor belt or band 30 by means of which they are then removed in the direction of the  
20 arrow C. As shown in Figure 2, the leading edge of the printed products 14, unwound from the intermediate product package 39, is formed by its folding edge 14. Thus, after deflecting roller 37, the printed products 14 in the stream of products having an imbricated  
25 formation, possess the same position as the printed products 14 of the first product formation 11 which have been removed or transported away prior thereto.

Thus, the printed products 14 assume the same position which they had in the imbricated stream of products which was fed to the winding station 15 (see Figures 3 and 4).

5           In the manner hereinbefore described the second product formation 12 can be removed via the conveyor belt 30 continuously and practically without any gap following the first product formation 11.

          During unwinding of the second product formation  
10 12 from the intermediate product package 39 the empty storage or storing means 4 may be exchanged for another storing means having a full primary product package 8. At the moment when the winding core 33 of the intermediate product package 39 has been emptied, the other  
15 primary product package 8 can be unwound in the manner hereinbefore described. This means that despite the necessity of exchanging the storing means or unit 4 a practically continuous stream of products is removed or transported away from the unwinding station 1.

20           As hereinbefore described, the imbricated product formation conveyed by the conveyor belt 30 has the same structure or configuration as the imbricated product formation which is supplied to the winding station 15 (see Figures 3 and 4). In other words, the position  
25 of the printed products 14 within the entire imbricated configuration or assembly is not changed in conjunction with the winding and unwinding processes. However, it

is also possible to effect a change in the structure of the removed imbricated product formation by a corresponding design of the infeed or feeding means 17 or the removing means 3, respectively.

5           Formation of the primary product package 8 from two superimposed product formations 11 and 12 may also occur in ways other than in the manner described with reference to Figures 3 and 4. For example, two product formations supplied directly to the winding core 7 may  
10 be simultaneously wound-up.

          Furthermore, it is possible to process product packages in the manner described in which the two product formations are not superimposed, but are wound upon the winding core 7 in juxtaposition to each other.  
15 It is to be understood that in such case the removing or transport means 3 will have to be designed differently from the arrangement shown in the drawings.

          The two product formations may also be inter-correlated or interleaved with respect to one another  
20 in such a way that the products of the two product formations are arranged alternately in the wound configuration or assembly. Upon unwinding the products, means will have to be provided at the branching of branch location 26 again to separate the two inter-  
25 correlated or interleaved products from each other.

          In the manner described, other substantially flat products may also be processed such as sheets of paper,

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sacks and the like. It is not absolutely required that the products should be arranged in an imbricated configuration. Each product formation may comprise, instead of a number of individual products, a single  
5 elongated material web, like for instance a paper web.

While there have been shown and described presently preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and  
10 practised within the scope of the appended claims.



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CLAIMS:

1. A method of removing substantially flat products, especially printed products, from a winding core, comprising the steps of:

unwinding said products from said winding core  
5 and separating the products into a first product formation and a second product formation;

directly transporting away said first product formation after unwinding the same; and

transporting away said second product formation  
10 with a time-delay following the transporting away of said first product formation.

2. A method as claimed in claim 1, further including the step of winding up the second product formation into an intermediate package following the unwinding thereof  
15 and prior to transporting away the second product formation.

3. A method as claimed in claim 2, further including the step of unwinding both the first and second product formations off the winding core from below such winding  
20 core.

4. A method as claimed in claim 1, further including the step of unwinding both the first and second product formations off the winding core from below such winding core.

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5. A method as claimed in claim 1, further including the step of unwinding both the first and second product formations from a product package wound upon the winding core by withdrawing a separation layer  
5 which has been wound between wound layers of the product package.

6. A method of handling continuously arriving substantially flat products, especially printed products, particularly arriving in an imbricated  
10 product formation, comprising the steps of:

winding-up a first portion of said products upon a first winding core to form an intermediate product package;

unwinding said first portion of said products  
15 from said first winding core;

feeding said first portion unwound from said first winding core together with a second portion of said products to a second winding core;

winding said first and second portions of said  
20 products upon the second winding core to form a primary product package;

simultaneously unwinding both said product portions from said second product package;

directly transporting away said first portion of  
25 said products immediately after unwinding both of said product portions;

winding-up said second portion of said products to



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form an intermediate product package; and

transporting away said second portion of said products following the transporting away of said first portion of said products by unwinding the second portion of said products from said intermediate product package.

7. A method of handling continuously arriving substantially flat products, especially printed products, particularly arriving in an imbricated formation, comprising the steps of:

10 feeding a first portion of said products with a time-delay to a winding location;

simultaneously winding-up said first portion together with a second portion of said products at said winding location;

15 simultaneously unwinding said first and second portions of said products;

directly transporting away one of said first and second portions after unwinding thereof; and

transporting away the other of said first and second portions with a delay and consecutively to said transported-away one portion.

8. An apparatus for removing substantially flat products, especially printed products, from a winding core, comprising unwinding means for unwinding said products so as to define a first product formation and a second product formation

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from the winding core;

transport means for outfeeding the unwound first and second product formations;

said transport means comprising:

5 first means for the direct transporting away of the first product formation of both said simultaneously wound-up product formations; and

second means for the delayed transporting away  
of the second product formation following the trans-  
10 porting away of the first product formation.

9. Apparatus as claimed in claim 8, wherein: said first means comprises a first branch for the direct transporting away of the first product formation; and

said second means comprises a second branch for  
15 the delayed transporting away of the second product  
formation.

10. Apparatus as claimed in claim 9, wherein said second branch has a bi-directionally driveable winding core for forming an intermediate package from the second product formation.

11. Apparatus as claimed in claim 10, further including at least one storage means for a separation band, one end of said separation band being connected with said bi-directionally winding core, and said separation band being windable between wound layers of said intermediate package.



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12. Apparatus as claimed in claim 11, wherein said at least one storage means comprises a supply spool for the separation band.

13. Apparatus as claimed in claim 11, wherein said  
5 separation band comprises a tensioned separation band.

14. Apparatus as claimed in claim 10, further including support means arranged forwardly of and below said bi-directionally driveable winding core;

said support means infeeding the products from  
10 below to the bi-directionally driveable winding core.

15. Apparatus as claimed in claim 11, and further including support means arranged forwardly of and below said bi-directionally driveable winding core; said support means infeeding the products from below to the  
15 bi-directionally driveable winding core.

16. Apparatus as claimed in claim 8, wherein the first and second product formations are wound into a primary product package upon the winding core, and said unwinding means comprises an unwinding device for with-  
20 drawing at least one separation band from the primary product package and which has been wound between wound layers of said primary product package.

17. Apparatus as claimed in claim 16, wherein said unwinding device contains a driveable band spool for  
25 winding-up the separation band which is connected at one end with the winding core.

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18. Apparatus as claimed in claim 9, wherein the first and second product formations are wound into a primary product package upon the winding core, and said unwinding means comprises an unwinding
- 5 device for withdrawing at least one separation band from the primary product package and which has been wound-up between wound layers of said primary product package.
19. Apparatus as claimed in claim 18, wherein said
- 10 unwinding device contains a driveable band spool for winding the separation band which is connected at one end with the winding core.
20. Apparatus as claimed in claim 8, and further including mobile frame means on which there is mounted
- 15 the winding core.
21. Apparatus as claimed in claim 20, wherein the first and second product formations are wound into a primary product package upon the winding core; said unwinding means comprising an unwinding device for
- 20 withdrawing at least one separation band from the primary product package and which has been wound between wound layers of said primary product package; said unwinding device containing a band spool for the separation band; and said band spool being mounted at
- 25 said mobile frame means.
22. Apparatus as claimed in claim 9, further including a support element arranged beneath the winding core at



which there is formed a primary product package from said product formations for transporting away from below the product formations of the primary product package; and said support means being common to both  
5 branches of said transport means.

23. A method of removing substantially flat products from a winding core substantially as hereinbefore described with reference to the accompanying drawings.

24. Apparatus for removing substantially flat  
10 products from a winding core substantially as hereinbefore described with reference to the accompanying drawings.

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