

"METHOD AND APPARATUS FOR STORING CONTINUOUSLY ARRIVING
FLAT PRODUCTS, ESPECIALLY PRINTED PRODUCTS, AND PRODUCT
PACKAGE FORMED FROM SUCH PRODUCTS"

This invention relates to a new and improved method and apparatus for storing continuously arriving flat products, especially printed products, and particularly those arriving in an imbricated formation.

5 Such products commonly are conveyed in a continuous stream from a source to a storage station which includes a wind-up location equipped with a winding core.

Throughout this disclosure reference to such method and apparatus will be made in terms of measures
10 for accomplishing such storage of the printed products. Equally, while the description to follow, as a matter of convenience, refers to the processing of printed products, obviously other types of products can be conveniently handled, and therefore, the use of this
15 term is not to be construed in a limiting sense in any way whatsoever; it is merely to be viewed as an exemplary and desirable field of application for the inventive measures.

It is known to wind-up flat products of the most
20 different kinds, which arrive continuously, on a winding core, such as, for instance, disclosed in German Patent Specification 2,544,135, German Patent 1,244,656 and German Patent No. 2,207,556. If the number of products to be handled in this way exceeds the capacity
25 of the product package upon the winding core then

techniques have to be undertaken so that, if the winding core is filled, the further arriving products can be wound upon a new empty winding core during the handling operations. For example, it is possible to
5 interrupt the arrival of the products for that period of time during which the completed product package is exchanged against an empty winding core. Additionally, it is also known from German Patent Specification
2,544,135 to provide two alternatively charged winding
10 stations, of which a respective one is supplied with the products, while the completed product package is removed from the respective other winding station.

While with the last-mentioned proposal it is unnecessary to interrupt the stream of products, a
15 considerable machinery expense is however entailed in view of the required doubling of the winding stations.

Therefore, with the foregoing in mind, it is a primary object of the present invention to provide a new and improved method of, and apparatus for, storing
20 continuously arriving flat products, especially printed products, arriving particularly in an imbricated product formation in a manner not afflicted with the aforementioned drawbacks and limitations.

Another and more specific object of the present
25 invention is to enable the arriving products to be processed continuously and without interruption at a single winding station or location.

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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 manifested by the features that, in each case a first leading portion of the products is infed with a time-delay to the winding location and at the same time is wound-up with the second subsequent portion of the products.

In its more particular aspects, the stream of products is divided into a first portion and a second portion, said first portion constituting a leading portion of said stream of products which is delayed before being fed to the wind-up location, and the second, subsequent, or trailing portion of the stream of products being fed to the wind-up location simultaneously with the first portion.

During the delay to which the leading portion of the stream of products to the winding location is subjected, the completed product package may be exchanged against an empty winding core. Thereafter, this first portion of the stream of products is conjointly wound upon the winding core along with the subsequent second portion of the stream of products which is fed directly to the winding location. If the two product portions of the stream of products are fed to the winding core in a superimposed manner, then twin layers or double plies will form the product package

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on the winding core. However, it is also possible to wind the two portions of the stream of products in juxtaposition to each other on the winding core.

5 Preferably, the first portion of the stream of products is first supplied to an intermediate winding core to form an intermediate package, and then unwound therefrom, and in conjunction with the second portion of the stream of products, the first and the second portions of the stream of products are fed to the
10 wind-up location or station for forming the primary or main package.

As mentioned above, the invention is not only concerned with the aforementioned method aspects, but also relates to a novel construction of apparatus for
15 its performance. Generally speaking, the inventive apparatus comprises means for the delayed infeed of a first leading portion of the products to the winding or wind-up location, and means for simultaneously infeeding this first product portion of the stream
20 of products and the second trailing portion of the stream of products to the wind-up location.

To achieve the aforementioned measures the inventive apparatus for storing continuously arriving flat products, especially printed products, arriving
25 particularly in an imbricated product formation, in its more specific aspects, comprises:

a wind-up location including a winding core having an axis of rotation, said winding core winding-

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up on arriving stream of products so as to form a primary product package;

drive means for driving said winding core for rotation about the axis of rotation;

5 infeed or conveying means for feeding the stream of products to the wind-up location;

 said infeed means including delaying means for the delayed feeding of a leading first portion of the stream of products to the wind-up location, said
10 delaying means feeding the first product portion together with a second, consecutive or subsequent portion of the stream of products to the wind-up location.

 — Preferably, the infeed or conveying means may
15 comprise a first branch containing the delaying means for the delayed feeding of the first product portion and a second branch for the direct feeding of the second product portion of the stream of products to the wind-up location, and switching means for selectively
20 supplying either one or the other of the two branches. The first branch may include a winding core adapted to be driven in each of two opposed rotational directions, and an intermediate product package is formed thereon by taking-up the first portion of the
25 stream of products upon this winding core.

 The invention should be better understood from the following detailed description by reference to the accompanying drawings wherein:

Figure 1 is a schematic side view of a winding station according to the invention and depicted in an intermediate stage of operation; and

5 Figure 2 is a side view of the winding station shown in Figure 1 at a later operational stage.

Referring now to the drawings, it is to be understood that only enough of the construction of the winding station has been shown as is needed for those skilled in the art readily to understand the underlying principles and concepts of the present development, while simplifying the showing of the drawings. Thus in Figure 1, there has been schematically illustrated a winding station 1 containing infeed or conveying means 2 and following thereat a winding location 3. 10 There is disposed at the winding location 3 a winding and storage unit 4 which is described in detail in our co-pending British Patent application 82 29 129, entitled "Apparatus for the Storage of Flat Products Arriving in an Inbrication Formation, Especially Printed Products" to which reference may be had and the disclosure of which is incorporated herein by reference. 20

The winding and storage unit 4 comprises a mobile frame 5 forming a pedestal or support unit. A shaft 25 6 of a substantially cylindrical winding core 7 is rotatably journaled within the frame 5. The winding core 7 is driven by any conventional drive means in the direction of the arrow A. Furthermore, a band

spool member 8 with a winding band 9 and defining a storage for such winding band is journaled in the frame 5. The winding band 9 constitutes a separation band composed of a tension-resistant material, for example, a synthetic or plastics material, one end of the winding band 9 being fixedly connected to the winding core 7. Upon rotation of the winding core 7 the winding band 9 is withdrawn from the spool member 8. Conventional means (not shown) such as, for example, a suitable brake, are provided in order to maintain the winding band 9 under tension as it is wound upon the winding core 7.

The infeed or conveying means 2 comprises a conventional feeder or infeed device 10 which has only been illustrated schematically and which is formed, for instance, in the present case, by two band or belt conveyors. The infeed device or feeder 10 is followed by switching or directing means 11 which is conventional in nature and therefore has only been schematically shown. The switching means 11 permits the infeed device or feeder 10 to be selectively connected either to a first branch 12 or to a second branch 13 of the infeed or conveying means.

A frame 14 is arranged below the switching means 11, and a shaft 15 of a further intermediate winding core 16 is rotatably journaled therein. One end of an additional winding band 17 is connected to

the winding core 16 and the winding band 17 is wound on to a supply roller or roll 18 defining a storage and which is also retained in the frame 14. A conveyor belt rocker or balance 19 defining a support element is mounted in the frame 14 below the winding core 16 for pivotal movement about a pivot shaft or axis 19a. A pressing or contact mechanism 20 acts on the conveyor belt rocker 19; this pressing mechanism 20 comprises a loaded spring or spring storage or equivalent structure and is secured to the frame 14 so as to urge the rocker 19 towards the winding core 16 or, as the case may be, against the product package forming at the winding core 16. At the end opposite the winding core 16 a conveyor belt 21 follows the conveyor belt or band rocker 19. Intermediate the conveyor belt 21 and the winding core 7 of the winding and storage section 4 there is arranged another conveyor belt rocker 22, likewise defining a support element, for pivotal movement about a pivot shaft or axis 22a in the frame 14. The conveyor belt rocker 22 also extends below the winding core 7 and is urged against the winding core 7 or, as the case may be, against the product package forming thereon by means of a pressing or contact mechanism 23 which also includes a loaded spring or spring storage.

The winding station 1 as hereinbefore described operates as follows:

The printed products 24 to be wound upon the

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winding core 7 arrive in an imbricated product formation, i.e. in a superimposed configuration in the manner of tiles on a roof. The infeed device or feeder 10 conducts the printed products 24 to the
5 switching or directing means 11. The switching means 11 directs the leading first portion 25 of the printed products 24 to the first branch 12 of the infeed or conveying means 2 as shown in Figure 1. The winding core 16 is driven in the direction of the arrow B by
10 conventional drive means not shown in detail. The printed products 24 of the first portion 25 are fed in an undershot way i.e. from below to the winding core 16 in the direction of the arrow D by means of the conveyor belt rocker 19 and are wound thereon.
15 Simultaneously, the separation winding band 17 maintained under tension is wound up therewith and forms a separation layer between the individual layers or piles. As shown in Figure 1, the printed products 24 are wound upon the winding core 16 with their folding
20 edge 24a leading.

After the last item of the printed products 24 of the leading first portion 25 has passed the switching means 11, such switching means 11 are switched or reversed in order to feed the trailing second portion 26 of the printed products 24 to the second branch
25 13 of the infeed or conveying means 2 as shown in Figure 2. Now while the products 24 of the second

product portion 26 travel towards the winding location 3, the printed products 24 of the first product portion 25 are removed from the intermediate package 27 formed at the intermediate winding core 16. Therefore, the
5 supply roller or roll 18 is driven and a slight braking force is applied to the winding core 16. In this way the printed products 24 of the first product portion 25 are unwound from the winding core 16 and arrive at the conveyor belt rocker 22 via the conveyor
10 belt 21 at which place they are joined with the printed products 24 of the second product portion 26. As shown in Figure 2, the products 24 of the second product portion 26 come to lie upon the products 24 of the first product portion 25. Thus, a twin-layer imbricated
15 product formation is supplied to the winding core 7 via the conveyor belt rocker 22. The stream of products is wound upon the winding core 7, the separation winding band 9 being interposed between each of the twin-layer wound up layers wound upon the winding core
20 7 and which separation band separates the individual wound layers. The winding of the printed products 24 upon the winding core 7 has been described in greater detail in our previously mentioned British Patent Application 82 29 129, entitled "Apparatus for the
25 Storage of Flat Products Arriving in an Imbricated Formation, Especially Printed Products", and British published specification 2,081,230 which are incorporated herein by reference.



As will be evident from Figure 2, the printed products 24 of the first product portion 25 are removed from the intermediate product package 27 with an open leading side 24b; these products 24 are fed
5 to the winding core 7 in the direction of the arrow E. That is, the folding edge 24a now forms the trailing edge. Contrary thereto, the printing products 24 of the second product portion 26 arrive at the winding core 7 with the folding edge 24a in a leading position.
10 It thus happens that the printed products 24 in each layer or ply of the twin layer wound upon the winding core 7 are differently positioned.

If the primary product package 21 formed upon the winding core 7 has achieved the intended size, the
15 switching means 11 are again switched or reversed in position. The printed products 24 which continue to arrive are then wound in the manner described upon the winding core 16 which meanwhile has been completely emptied. During formation of the intermediate product
20 package upon the winding core 16, the frame 5 including the full-sized or complete product package 28 can be removed from the winding station 1 and can be replaced by another frame 5 containing an empty winding core 7. Thus, the continuously arriving stream of products does
25 not have to be stopped during this exchange operation.

Withdrawal of the printed products 24 from the primary product package 28 may be achieved in the manner described in our co-pending British Patent

Application 82 35098 , filed 9th December
1982 , entitled "Method of, and Apparatus for,

Removing Flat Products, Especially Printed Products
From a Winding Core" (Attorneys Docket No. 7106), the
5 disclosure of which is incorporated herein by reference.
Consequently during unwinding, the printed products 24
of one layer may be removed with the folding edge 24a
in the leading position, that is to say, in the same
configuration in which they have been originally
10 supplied to the winding station 1.

It will be understood that the apparatus as
described hereinbefore, as to various ones of its
parts, may be designed differently from that described.
Some of the possible variations and modifications are
15 indicated briefly in the following description.

Although the common arrangement of the winding
core 7 and the spool member 8 for the separation wind-
ing band 9 in a mobile frame 5 is of specific advant-
age in handling the apparatus, the spool member 8 and
20 the winding core 7 may also be arranged in the station-
ary frame 14. In this case, however, the shaft 6 of
the winding core 7 will have to be conveniently journ-
aled in such a way as to be removable. Instead of
winding up the printed products 24 of the first and
25 second product portions 25 and 26 upon one other as
shown, both the portions 25 and 26 of the stream of
printed products also may be simultaneously wound upon
the winding core 7 while in juxtaposition to each other.

It should also be understood that in the manner described other flat products such as, for example, sheets of paper, sacks or the like may be wound up.

5 While there are 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 practised within the scope of the appended claims.



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CLAIMS

1. A method of storing continuously arriving substantially flat products, especially printed products, preferably arriving in an imbricated product formation, comprising steps of:

5 conveying a continuous stream of products towards a winding station including a winding location equipped with a winding core;

 forming from said stream of products a leading first product portion and a subsequent second product
10 portion;

 delaying said first product portion before delivering the same to said winding location; and

 simultaneously winding-up said first product portion and said second product portion of said stream
15 of products at said winding location.

2. A method as claimed in claim 1, and further including the step of:

 initially winding the first product portion into an intermediate package; and

20 thereafter infeeding the first product portion of the intermediate package in conjunction with the second product portion to the winding core.

3. A method as claimed in claim 2, further including the step of winding the first and second product



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portions while superimposed upon one another.

4. A method as claimed in claim 1, further including the step of winding the first and second product portions while superimposed upon one another.

5 5. A method as claimed in claim 1, further including the step of infeeding the first and second product portions from below to said winding core.

6. A method as claimed in claim 1, further including the step of winding-in at least one separation layer
10 between windings of both said first and second product portions during winding thereof.

7. A method as claimed in claim 6, further including the step of using as the separation layer a tensioned separation layer.

15 8. An apparatus for storing continuously arriving substantially flat products, especially printed products, preferably arriving in an imbricated product formation, comprising:

20 a winding location including a drivable winding core;
an infeed device for infeeding the products towards the winding location; and



5 said infeed device including means for the delayed infeed of a first leading portion of the products to the winding location and for simultaneously infeeding said first portion of the products and a second subsequent portion of the products to the winding location.

9. Apparatus as claimed in claim 8, wherein:
said means of said infeed device comprises:
a first branch for the delayed infeed of the
10 first portion of the products to the winding location;
a second branch for the direct infeed of the second portion of the products to the winding location;
and

15 switching means for the selective charging of one of the branches with products.

10. Apparatus as claimed in claim 9, wherein said first branch contains a bi-directionally drivable winding core for forming an intermediate package from the first portion of the products.

20 11. Apparatus as claimed in claim 10, further including at least one storage means for a separation band; and wherein said separation band has one end connected with said bi-directionally drivable winding core and is windable between wound plies of the
25 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.

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

10 14. Apparatus as claimed in claim 10, wherein said first branch includes a support element arranged forwardly of and below the bi-directionally drivable winding core; and said support element serves for infeeding the products from below to the bi-directionally drivable winding core.

15 15. Apparatus as defined in claim 11, wherein said first branch includes a support element arranged forwardly of and below the bi-directionally drivable winding core; and said support element serves for infeeding the products from below to the bi-directionally drivable winding core.

16. Apparatus as claimed in claim 8, further including at least one storage means for a separation



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band; and wherein said separation band is connected at one end with the winding core of said winding location and is windable between wound plies of a primary product package wound upon said winding core
5 of said winding location.

17. Apparatus as claimed in claim 16, wherein said storage means comprises a supply roll for said separation band.

18. Apparatus as claimed in claim 9, further
10 including at least one storage means for a separation band; and wherein said separation band is connected at one end with the winding core of said winding location and is windable between wound plies of a primary product package wound upon said winding core
15 of said winding location.

19. Apparatus as claimed in claim 9, wherein said second branch includes a support element arranged forwardly of and below the winding core of the winding location for infeeding the products from below
20 to said winding core of said winding location, and said support element is common to said first and second branches.

20. Apparatus as claimed in claim 8, wherein said winding core of said winding location serves to wind



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thereon a primary product package and including a mobile frame means in which there is mounted said winding core of said winding location.

21. Apparatus as claimed in claim 20, further including
5 storage means for a separation band to be wound between wound product plies of the primary package; and wherein said storage means is mounted at said mobile frame means.

22. A product package composed of two simultaneously
wound flat superimposed imbricated product formations
10 situated upon a winding core, with at least one separation layer wound between said formations.

23. A product package as claimed in claim 22, wherein said separation layer is a tensioned separation layer.

24. A product package as claimed in claim 22, wherein
15 the products within the one formation have a folding edge in a leading position whereas the products within the other formation have their folding edge in a trailing position.



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25. A method of storing continuously arriving substantially flat products arriving in an imbricated product formation, substantially as hereinbefore described with reference to the accompanying drawings.

- 5 26. Apparatus for storing continuously arriving substantially flat products arriving in an imbricated product formation, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.
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