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Section 29

AUSTRALIA
Patents Act 1990

PATENT REQUEST : STANDARD PATENT

I/We, being the person(s) identified below as the Applicant(s), request the grant of a Standard Patent to the person(s) identified below as the Nominated Person(s), for an invention described in the accompanying complete specification.

**Applicant(s) and
Nominated Person(s):** FERAG AG

Address: ZURICHSTRASSE 74, 8340 HINWIL
SWITZERLAND

Invention Title: PROCESS AND APPARATUS FOR CHANGING,
TRANSFERRING AND TEMPORARILY STORING PRINTED
PRODUCT ROLLS.

**Name(s) of Actual
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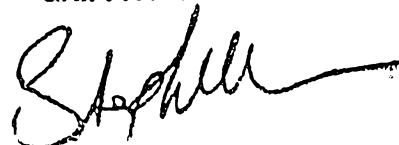
BASIC CONVENTION APPLICATION DETAILS

Application No	Country	Country Code	Application Date
02400/91-7	SWITZERLAND	CH	13 August 1991

Drawing number recommended to accompany the abstract: 10

DATED this 28th day of July 1992

FERAG AG
GRIFFITH HACK & CO



Patent Attorney for and
on behalf of the Applicant

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NOTICE OF ENTITLEMENT

I/We FERAG AG

of ZURICHSTRASSE 74, 8340 HINWIL
SWITZERLAND

being the applicant(s) in respect of an application for a patent for an invention entitled
PROCESS AND APPARATUS FOR CHANGING, TRANSFERRING AND
TEMPORARILY STORING PRINTED PRODUCT ROLLS., state the following:

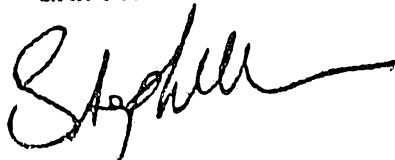
1. The nominated person(s) has/have, for the following reasons, gained entitlement from the actual inventor(s):

THE NOMINATED PERSON WOULD BE ENTITLED TO HAVE ASSIGNED
TO IT A PATENT GRANTED TO THE INVENTOR IN RESPECT OF
THE SAID INVENTION.

2. The nominated person(s) is/are the applicant(s) of the basic application(s) listed on the patent request form.
3. The basic application(s) listed on the request form is/are the first application(s) made in a Convention country in respect of the invention.

DATED this 28th day of July 1992

FERAG AG
GRIFFITH HACK & CO



Patent Attorney for and
on behalf of the applicant(s)



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PROCESS AND APPARATUS FOR CHANGING, TRANSFERRING AND TEMPORARILY STORING
PRINTED PRODUCT ROLLS

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(56) Prior Art Documents
AU 61680/80 B65H 67/06
US 4941798
US 4752176

(57) Claim

1. A process for exchanging empty roll cores and printed product rolls on a winding-up station, on which printed products are wound onto cores positioned with horizontal winding axis to form rolls, and for storing rolls and cores in a storage area, the method comprising the steps of, providing a manipulation and transportation means, with said manipulation and transportation means at a time transporting one roll from the winding-up station to a stationary transfer device the transfer device being accessible from a winding station side and a storage side and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores with horizontal winding axis, and depositing the roll from the winding station side in the roll deposition position of the transfer device, and removing a core from the winding station side of the core deposition position of the transfer device, transporting the core to the winding-up station and mounting the core at the winding-up station; providing a fork lift truck having two forks movable toward

and away from each other and movable together reciprocatingly along a vertical path, with the fork lift truck at a time, taking at least one core from the storage area by clamping it between the two forks and depositing the at least one core from the storage side in the core deposition position of the transfer device by separating the forks, and removing at least one roll from the storage side of the roll deposition position of the transfer device by clamping it with the forks, transporting the at least one roll to the storage area and depositing the at least one roll in the storage area by separating the forks, wherein said roll deposition position and said core deposition position of said transfer device are disposed relative to each other such that the forks of the fork lift truck need only be moved along said vertical path from the core deposition position to the roll deposition position between depositing cores and removing rolls.

3. A process for exchanging empty roll cores and printed product rolls on a winding-off station, on which printed products are unwound from printed product rolls positioned with horizontal winding axis to form a scale flow of printed products, and for storing rolls and cores in a storage area, the method comprising the steps of, providing a manipulation and transportation means, with said manipulation and transportation means at a time transporting one core from the winding-up station to a stationary transfer device the transfer device being accessible from a winding station side and a storage side and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores with horizontal winding axis, and depositing the core from the winding station side in the core deposition position of the transfer device, and removing a roll from the winding station side of the roll deposition position of the transfer device, transporting the roll to the winding-off station and mounting the roll at the winding-off station; providing a fork lift truck having two forks movable toward

and away from each other and movable together reciprocatingly along a linear, vertical path, with the fork lift truck at a time, taking at least one roll from the storage area by clamping it between the two forks and depositing the at least one roll from the storage side in the roll deposition position of the transfer device by separating the forks, and removing at least one core from the storage side of the core deposition position of the transfer device by clamping it with the forks, transporting the at least one core to the storage area and deposition the at least one core in the storage area by separating the forks, wherein said roll deposition position and said core deposition position of said transfer device are disposed relative to each other such that the forks of the fork lift truck need only be moved along said linear, vertical path from the roll deposition position to the core deposition position between depositing rolls and removing cores.

5. A transfer device cooperating with a manipulation and transportation means and a fork lift truck with two forks movable toward and away from each other and movable together reciprocatingly along a vertical path, for carrying out the method of exchanging empty roll cores and printed product rolls on a winding-up or unwinding station, on which station printed products are wound onto cores positioned with horizontal winding axis to form rolls, or printed products are unwound from rolls positioned with horizontal axis, and for storing rolls and cores in a storage area, said transfer device being positioned stationary between the winding-up or unwinding station and a storage location and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores with horizontal winding axis, which two deposition positions are accessible by the manipulation and transportation means for depositing or removing one roll or one core at a time from a winding station side and by the fork of the fork lift truck for depositing or removing at least one roll or at least one core at a time

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from a storage side and wherein the roll deposition position and the core deposition position are located vertically above each other, such that the forks of the fork lift truck need only be moved along said vertical path from the core deposition position to the roll deposition position between depositing and removing.

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COMPLETE SPECIFICATION
STANDARD PATENT

Applicant(s): FERAG AG
Invention Title: PROCESS AND APPARATUS FOR CHANGING,
TRANSFERRING AND TEMPORARILY STORING
PRINTED PRODUCT ROLLS.

The following statement is a full description of this
invention, including the best method of performing it known
to me/us:

The invention is in the field of the further processing of printed products and relates to a process and an apparatus used for the changing, transferring and intermediate or temporary storage of printed product rolls or reels.

5 In the prior art printed products, preferably folded printed products, which have been brought into a scale formation by any previous processing stage such as a rotary press and which are to be temporarily stored prior to the following processing stage, are passed to a winding station
10 (with a winding-up function), where they are wound onto a roll core with the aid of a winding band. The resulting rolls are temporarily stored in a vertical or horizontal manner with or without storage assistance means, such as pallets and when required are supplied to a winding station
15 (with an unwinding function), where they are unwound and supplied in scale formation again to a further processing stage.

Winding stations for the winding up or off of printed products in scale formation are described in European
20 patents 161569, 230677 and 281790 (US patents 4601436, 4769973 and 4898336) assigned to the assignee of the present application or in Swiss patent applications 791/90 and 3128/90 also assigned to the assignee of the present application. These stations are designed in such a way
25 that they are always processing, i.e. winding up or off one roll, while a second roll is being changed. Manipulations and transportation between the winding station and store through which the product to be removed (full rolls from winding-up stations/empty roll cores from unwinding
30 stations) are brought from the winding station into the store and the product to be used (empty roll cores for winding-up stations/full rolls for unwinding stations) are brought from the store to the winding station, are carried out with the assistance of various aids and methods and require either complicated equipment or complicated



switching operations with manual work.

For example, use is made of displaceable magazines, which
contain the roll core and the winding band and which
transported with the aid of a store vehicle between the
5 winding station and store. Such

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magazines are e.g. described in Swiss patent 652699 or European patent 243837 of the ~~same~~ Applicant. The magazines serve as movable apparatus ~~both~~ as part of the winding station, as well as as a transportation means and storage means. For changing or replacement purposes a magazine must be accurately positioned at the winding station and then serves as part of the latter. Magazines with product to be removed or introduced are transported with a transportation vehicle to or away from the store and are introduced into or removed from the latter. Such a process requires a separate magazine for each roll or roll core to be stored and a relatively large storage location is required for each magazine. However, with regards to equipment and shape no special demands must be made on the storage location and the overall store can also be formed from any random free locations which are large enough for a magazine. A large amount of space is also required in the vicinity of the winding stations, because at the time of magazine change at least two magazines must always be deposited there (cf. also description regarding Fig. 2) and the vehicle with the magazines must be ~~manoeuvrable~~ ^{maneuverable} there. The working process with the magazines is not only complicated, but can scarcely be automated, but has the advantage that there is no need for a specially equipped storage area and only one transportation means has to be used between the winding station and the store, i.e. the product to be introduced and removed does not have to be "transferred" from one transportation means to another.

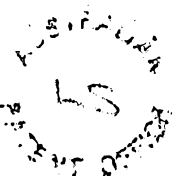
In order to simplify such complicated operations and make automation possible, roll changing and storing processes have been developed, in which the product to be removed is removed from the winding station by a manipulating/transportation means and is deposited on a stationary transfer mechanism, where it is e.g. fetched by a shuttle vehicle travelling on a rail. The product to be introduced is brought by the same shuttle vehicle onto the stationary transfer mechanism and is deposited there and is then brought to the winding station by the manipulation/transportation means. The latter is generally constituted by an automated travelling crane. With a corresponding design of the transfer mechanism and the shuttle vehicle it is possible with only two positioning steps on the part of



the vehicle to deposit the product to be introduced and
take up the product to be removed. Such processes and
apparatuses are e.g. described in Swiss patent application
888/91 of the Applicant and in DE-OS 3602320 (Grapha-
5 Holding AG).

Processes with stationary transfer mechanisms,
manipulation/transportation means between the winding
station and transfer mechanism and shuttle vehicles between
the transfer mechanism and the store, which can serve
10 several winding stations moving on a rail, compared with
the aforementioned processes with magazines save a
considerable number of transportation paths, numerous
maneuvers and various manipulating movements and can
therefore be more easily automated. However, they are more
15 complicated with respect to the necessary equipment and in
particular the storage location. The store must either be
equipped with storage means similar to the transfer
mechanisms, i.e. it is no longer possible for it to be
formed from various locations as and when they become
20 available and it must be accessible to the shuttle vehicle,
i.e. must be close to and reachable from a rail (DE-OS
3602320). Alternatively the product to be removed and
introduced must be transferred to a further store vehicle
or mechanism for storage on a further transfer location
25 (Swiss application 888/91).

An object of the invention is to provide a process having
the advantages of the aforementioned processes for the
changing and temporary storage of printed product rolls to
be combined and while bringing about maximum elimination of
30 their disadvantages. According to the inventive process,
which can be applied to both winding-up and winding-off
stations, roll changes and temporary storage operations are
to be performed with minimum transportation paths,
maneuvering operations and manipulating movements.
35 According to the invention process, full rolls and empty



roll cores are to be manipulated in the same way and without mechanical aids and it is possible to store rolls and cores with a single transfer maneuver at a storage location, where there are minimum requirements as regards size and no requirements as regards equipment and position. As the process is intended to offer maximum freedom with respect to the storage location, the process is little automated, but still performable with a minimum of personnel and vehicles.

10 A further object of the invention is to provide a transfer mechanism for performing the inventive process permitting, between the winding station and store, the making available of printed product rolls and roll cores in correct manipulation manner and for a roll-side and store-side manipulation/transportation means. The transfer mechanism must be simple, favourable to manufacture and space-saving.

Accordingly, the present invention resides in a process for exchanging empty roll cores and printed product rolls on a winding-up station, on which printed products are wound onto cores positioned with horizontal winding axis to form rolls, and for storing rolls and cores in a storage area, the method comprising the steps of, providing a manipulation and transportation means, with said manipulation and transportation means at a time transporting one roll from the winding-up station to a stationary transfer device the transfer device being accessible from a winding station side and a storage side and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores with horizontal winding axis, and depositing the roll from the winding station side in the roll deposition position of the transfer device, and removing a core from the winding station side of the core deposition position of the transfer device, transporting the core to the winding-up

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station and mounting the core at the winding-up station;
providing a fork lift truck having two forks movable toward
and away from each other and movable together
reciprocatingly along a vertical path, with the fork lift
5 truck at a time, taking at least one core from the storage
area by clamping it between the two forks and depositing
the at least one core from the storage side in the core
deposition position of the transfer device by separating
the forks, and removing at least one roll from the storage
10 side of the roll deposition position of the transfer device
by clamping it with the forks, transporting the at least
one roll to the storage area and deposition the at least
one roll in the storage area by separating the forks,
wherein said roll deposition position and said core
15 deposition position of said transfer device are disposed
relative to each other such that the forks of the fork lift
truck need only be moved along said vertical path from the
core deposition position to the roll deposition position
between depositing cores and removing rolls.

20 The invention also resides in a transfer device cooperating
with a manipulation and transportation means and a fork
lift truck with two forks movable toward and away from each
other and movable together reciprocatingly along a vertical
path, for carrying out the method of exchanging empty roll
25 cores and printed product rolls on a winding-up or
unwinding station, on which station printed products are
wound onto cores positioned with horizontal winding axis to
form rolls, or printed products are unwound from rolls
positioned with horizontal axis, and for storing rolls and
30 cores in a storage area, said transfer device being
positioned stationary between the winding-up or unwinding
station and a storage location and having a roll deposition
position for deposition of a plurality of rolls with
horizontal winding axis and a core deposition position for
35 deposition of a plurality of cores with horizontal winding



axis, which two deposition positions are accessible by the manipulation and transportation means for depositing or removing one roll or one core at a time from a winding station side and by the fork of the fork lift truck for depositing or removing at least one roll or at least one core at a time from a storage side and wherein the roll deposition position and the core deposition position are located vertically above each other, such that the forks of the fork lift truck need only be moved along said vertical path from the core deposition position to the roll deposition position between depositing and removing.

The central idea of the invention is to provide a stationary transfer mechanism associated with at least one winding station and on which, for the case of the winding-up station, full rolls (product to be removed) from the station and empty cores (product to be introduced) from a

store and, in the case of a winding-off station empty cores
(product to be moved) from the station and full rolls
(product to be introduced) from a store can be deposited in
such a way that a substantially commercially available
5 manipulation/transportation vehicle, which brings the
product to be introduced from a store, only has to be
accurately positioned once in the vicinity of the transfer
mechanism for interchanging the product to be introduced
against the product to be removed using a single
10 translatory and preferably linear movement of its
manipulating tool. The manipulation/transportation vehicle
can e.g. be a commercially available forklift truck, whose
forks can be moved towards and away from each other for
gripping/releasing and can be moved jointly in at least the
15 vertical direction for manipulation purposes.

The loading of the transfer mechanism with product to be
removed from the winding station and the loading of the
winding station with product to be introduced from the
transfer mechanism is e.g. performed with the aid of a
20 travelling crane and can be full automated. However, the
manipulation/transportation vehicle bringing the product to
be introduced to the transfer mechanism and the product to
be removed from the latter is operated manually. In this
way the manipulation/transportation vehicle can move up to
25 any desired available storage location in order to deposit
or grip a load.

Therefore the inventive process links the advantage of a
simple change in accordance with the storage process using
the shuttle vehicle with the advantage of a not specially
30 equipped and a not specially located storage location
according to the storage process with magazines. The
inventive process can carry out roll changes and storage
with a single transfer manoeuvre, but by means of a further
transfer manoeuvre can be combined with more complicated,
35 e.g. fully automated storage processes. There is a minimum

space requirement in the vicinity of the winding stations.

The inventive transfer mechanism essentially comprises a frame with a location for at least one full roll and at least one empty roll core. The two locations are
5 positioned in such a way that on the one hand (winding stations side) they can be reached from the winding station travelling crane and on the other (store side) from the manipulation tool of the manipulation/transportation vehicle and namely from the same vehicle position. The two
10 locations are so positioned that the manipulation tool of the manipulation/transportation vehicle only has to be moved in a single direction between the depositing of the product to be introduced and the gripping of the product to be removed.

15 The inventive process and transfer mechanism are described in greater detail hereinafter relative to the drawings, wherein:

Fig. 1 is a schematic diagram showing a general process for changing and temporarily storing printed product rolls with
20 winding-up and winding-off stations;

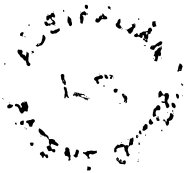
Fig. 2 is a schematic diagram illustrating a process for roll-changing and temporary storage using magazines according to the prior art;

Fig. 3 is a schematic diagram illustrating the process of
25 roll-changing and temporary storage in accordance with the invention;

Fig. 4 is a schematic side elevation of a winding-up station showing one embodiment of a transfer mechanism in accordance with the invention;

30 Fig. 5 is a schematic side elevation of a winding-off station showing one embodiment of a transfer mechanism in accordance with the invention;

Figs. 6A-6F are sequential schematic side elevations of a winding-up station showing the cooperation between the
35 transfer mechanism and a manipulation and transportation



vehicle in accordance with the invention;

Figs. 7A-7F are sequential schematic side elevations of a winding-off stations showing the cooperation between the transfer mechanism and a manipulation and transportation vehicle in accordance with the invention;

Fig. 8 is a schematic side elevation of a printed product roll store in accordance with an embodiment of the present invention;

Fig. 9 is a schematic side elevation of a store for empty roll cores in accordance with an embodiment of the present invention;

Figs. 10A and 10B are front and side elevations, respectively, of an embodiment of a transfer mechanism for a winding-up station in accordance with the invention; and Figs. 11A and 11B are front and side elevations, respectively, of an embodiment of a transfer mechanism for a winding-off station in accordance with the invention.

Fig. 1 diagrammatically shows a general process for the changing, transferring and temporary storing of printed products rolls W and roll cores WK with a winding-up station 50 entered by a scale flow ST and a winding-off station 55 exited by a scale flow ST. Both winding stations have winding positions A and B for two rolls whereof one (position A in the drawing) can be wound up or off, while the other (position B in the drawing) is changed. In position B of the winding-up station a full printed product roll W (product to be removed) is replaced by an empty roll core WK (product to be introduced) and in the winding-off station 55 an empty roll core WK (product to be removed) is replaced by a full roll W (product to be introduced). The product to be removed is transported from the winding station 50 or 55 to a store L and is stored there, while the product to be introduced is removed from the store L and transported to the winding station 50 or 55. Between the winding station and the store, advantageously closer to the former, is provided at least

one transfer location UM associated with one or more winding stations and on which the product to be introduced and removed is temporarily deposited. The manipulation and transportation of the rolls and roll cores between the winding station and the transfer locations are advantageously performed by a fully automatable manipulation/transportation means, e.g. a travelling crane. The manipulation and transportation of rolls and roll cores between the transfer location and the store can be performed by any random second manipulation/transportation means, advantageously a manipulation/transportation vehicle, and it is possible to introduce a further transfer location and third manipulation/transportation means.

Fig. 2 diagrammatically shows the working sequence between the winding station and the store for a prior art process working with magazines. Box 1 represents a random storage location. Box 2 represents a clearly defined loading/unloading location, on which the magazine is positioned and on which it serves as part of the winding station, in that a roll is wound directly onto the magazine or unwound from the same. Box 3 represents a first and box 4 a second deposit location in the vicinity of the winding station.

The working sequence for a transportation vehicle for the transportation of magazines serving to prevent empty journeys to the store is typically as follows: a: first magazine (with full rolls for the unwinding station and empty for the winding up station) is transported from the store to the deposit location 3 and deposited; b: followed by moving to the loading/unloading station, the positioning of the vehicle and the gripping of the second magazine; c: the second magazine is transported to the setting down location 4 and deposited; d: movement takes place to the setting down location 3, the vehicle is positioned and the first magazine gripped; e: the first magazine is



transported to the loading/unloading station 2, the vehicle
positioned and the magazine positioned; f: movement to the
setting down location 4, the vehicle is positioned and the
second magazine gripped and g: the second magazine is
5 transported to the storage location. In certain
circumstances it is possible by using aid, to remove the
second magazine manually from the loading/unloading station
and to position the first magazine there, which simplifies
the working sequence of the vehicle, but requires more
10 personnel.

A process using magazines which is simpler with regards to
the working sequence, but much more complicated regarding
the apparatus expenditure is described in European patent
242607 of the Applicant. The loading/unloading station
15 therein is designed for two magazines and the
loaded/unloaded magazine is automatically moved from the
first to the second location, where it can be gripped by
the _____



transportation vehicle, after the latter has positioned the replacement magazine at the first location and deposited it.

Fig. 3 shows the corresponding working sequence according to the inventive process. Box 5 once again represents a random storage location, box 6 a transfer location, which is equipped with an inventive, stationary transfer mechanism and box 7 a winding station. The working sequence is as follows: h: the product to be produced is transported with the manipulation/transportation vehicle from the storage location 5 to the transfer location 6, the vehicle is accurately positioned, the product to be introduced is deposited on the transfer mechanism; i: the manipulation means of the manipulation/transportation vehicle is moved in one direction, the product to be removed is gripped and transported to the store. The transportation and manipulation between the winding station 7 and the transfer location 6 is performed completely automatically, e.g. by a travelling crane.

A comparison of Figs. 2 and 3, shows the clear advantages of the inventive process with a stationary transfer mechanism compared with the prior art process using magazines. Another advantage which is not apparent from the drawings is that for the transportation of the rolls or roll cores according to the process of the invention a smaller manipulation/transportation vehicle, such as e.g. a forklift is sufficient, whereas a larger vehicle is required for the much heavier magazines.

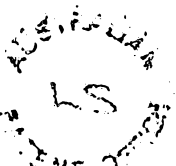
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Figs. 4 and 5 show winding stations, ~~10.1 or 10.2~~ with a travelling crane and 10.1 or 10.2 for the changing, ~~or~~ replacement of rolls and roll cores and an ~~embodiment~~ ^{and} of the inventive transfer mechanism 20.1 ~~or~~ 20.2, on which the rolls W and roll cores WK are deposited at in each case one roll location 21 and one core location 22. Advantageously the transfer mechanisms are arranged in such a way that the ^{axes of} rolls deposited thereon are substantially parallel to the ^{axes of} rolls on the winding station. In the represented embodiment in each case two rolls W or two cores WK can be deposited on in each case one corresponding roll location 21 and one core location 22. It is also possible to conceive embodiments with roll and core locations, where



the deposit takes place of one roll and one core or more than two rolls and an equal number of cores.

The deposited rolls essentially have the same spatial position as the rolls on the winding station, i.e. their rotation axes are substantially horizontal. Several rolls are closely side by side juxtaposed on the roll location in such a way that their rotation axes lie in the same vertical plane. The deposited cores also have substantially the same spatial position on the core location as on the winding station (horizontal rotation axis) and in the cases of several cores they are arranged successively in the transportation direction on a sloping plane, so that their order is automatically adjusted by gravity and they can be reliably gripped or deposited by the manipulation tool of the manipulation/transportation vehicle.

Fig. 4 shows the winding-up station 50. The travelling crane 10.1 removes in succession full rolls W from the winding up station and deposits them in the roll location 21 of the transfer mechanism 20.1 by gripping the roll in the inner area of the roll core. The roll location is equipped with at least one double wedge 23 and lateral support 24, so that two rolls W can be accurately positioned thereon, leaning slightly against the lateral support 24 (cf. also Figs. 10 and 11). The core location 22 is equipped with a core guide 25 which has a stop member at one end and closest to the store and another stop member at the end closest to the winding station side. Each stop member is inclined outwardly, the stop member at the store side being inclined toward the store and the stop member at the other end being inclined toward the winding station. Roll cores deposited in the core location 22 roll against the stop member on the winding station side, from where they are individually gripped by the travelling crane 10.1 and taken to the winding station. It is possible to see



two roll cores on the core location 22 and a core shown by a dashed line, which has rolled toward the winding station and abuts the winding station-side stop member of the core guide 25 and in this position can be gripped by the travelling crane 10.1.

Fig. 5 shows a winding-off station 55 with a travelling crane 10.2, corresponding to the travelling crane of Fig. 4, and an inventive transfer mechanism 20.2. Here the travelling crane removes individual roll cores WK from the winding-off station and deposits them (core shown in broken line form) on the winding station-side projecting part of the core guide 25, which in this case sinks toward the core location 22, so that the cores deposited on the core guide roll into the core location 22 and abut against the store-side stop member thereof. The two roll cores shown in continuous line form assume a position in which they can be reliably gripped by the manipulation tool of the manipulation/transportation vehicle. The travelling crane brings rolls from the transfer mechanism 20.2 to the winding-off station.

Figs. 6A-F and 7A-F show in detail the operating process described in general terms in conjunction with Fig. 3 on the store side of the inventive transfer mechanism, i.e. the cooperation between the transfer mechanism 20.1 or 20.2 and the manipulation/transportation vehicle 30, namely for a winding-up station (Fig. 6) and for a winding-off station (Fig. 7). Both sets of drawings include a time sequence of six, relative positions of the manipulation/transportation vehicle 30 and the transfer mechanism 20.1 or 20.2. The process embodiment discussed and the corresponding embodiment of the inventive transfer mechanism relate, as in Figs. 4 and 5, to the manipulation of in each case two rolls W and two roll cores WK.

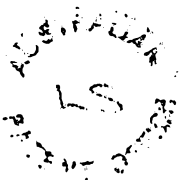
The manipulation/transportation vehicle 30 is a



commercially available forklift whose manipulation tool is constituted e.g. by two forks 31 movable toward one another and which for the represented process are juxtaposed and movable horizontally toward one another. Moreover, the
5 entire manipulation tool (both forks together) can be moved at least in the vertical direction. The transfer mechanism 20.1 or 20.2 corresponds to that of Figs. 4 and 5. The winding location 21 and core location 22 are freely accessible on all sides and precisely vertically
10 superimposed.

Figs. 6A and 7A each show the manipulation/transportation tool 30, which transports the product to be used to the transfer mechanism 20.1 or 20.2, the approach taking place from the side opposite to the winding station. As a
15 function of the product to be introduced (roll cores WK or rolls W) the forks are oriented level with the roll location 21 (Fig 7A) or the core location 22 (Fig. 6A) of the transfer mechanism. The rolls or roll cores are held by the forks in the same reciprocal position which they are
20 to assume on the transfer mechanism, i.e. two rolls with horizontal rotation axes located in a vertical plane or two successive roll cores in the transportation direction with parallel, horizontal rotation axes.

Figs. 6B and 7B each show the introduction of the product to be introduced into the corresponding location of the transfer mechanism and for this purpose the manipulation/transportation vehicle, on abutting, is laterally oriented in an optimum manner with the transfer mechanism. If the manipulation tool is also horizontally
25 displaceable (both forks together), the lateral position can be finely adjusted by a lateral movement of the manipulation tool. The height is adjusted by the vertical movement of the manipulation tool when the rolls are somewhat higher than the predetermined depositing position,
30 because it is first necessary to pass over the double wedge
35



23 and only then can the rolls be lowered into the depositing position.

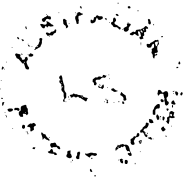
5 Figs. 6C and 7C each show the deposit of the product to be introduced. For this purpose the forks are moved apart and in this way release the rolls or roll cores. The roll cores immediately roll on the core guide 25 toward the winding station. The rolls stand on the double wedges 23 and lean against the lateral support 24.

10 Figs. 6D and 7D show the vertical movement of the manipulation tool in Fig. 6D towards the top and in Fig 7D towards the bottom. This is the only manoeuvre which is necessary between the deposit of the product to be introduced and the gripping of the product to be removed.

15 Figs. 6E and 7E show the gripping of the product to be removed. Fig. 7 shows that the two roll cores to be removed are deposited by a corresponding design of the core guide 25 in the core location 22 in such a way that they can be reliably taken up by the forks.

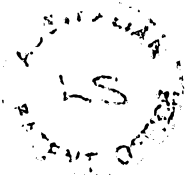
20 Figs. 6F and 7F show the manipulation/transportation vehicle moving away with the product to be removed.

25 The shape of the forks 31 of commercial forklifts is standardized and corresponds to the shape of standardized pallets. According to a particularly advantageous embodiment of the inventive process the forklift carries with it on one of its forks a pallet, while the operating sequence shown in Figs 6A-F and 7A-F takes place. A standardized Europa pallet 40 is shown in dashed lines on the side of the fork remote from the viewer. The lateral support 24 is also designed in such a way that the pallet
30 40 does not come into conflict with it when rolls are introduced as shown in Fig. 7B.



Figs. 8 and 9 show examples of stores for printed product rolls (Fig. 8) or roll cores (Fig. 9), which can be obtained with the process variant using pallets. For example, there are always two rolls W or two roll cores WK for each pallet 40. Such storage units can be stacked on one another. If such a store is to be produced, the manipulation tool of the manipulation/transportation vehicle must also be rotatable, namely by at least 90° in both directions. Therefore the manipulation/transportation vehicle necessary for this process is advantageously equipped with a manipulation tool, which by locking can grip an object, which is movable both horizontally and vertically and which is rotatable by at least 90° in both directions and such requirements can be fulfilled by commercially available forklifts and corresponding attached implements.

Figs. 6A-F to 9 illustrate the main advantages of the inventive process, particularly in the embodiment with the pallet. The product to be introduced is raised in the store in the form of a storage unit with the pallet 40, transported to the transfer mechanism and is introduced and deposited there at the corresponding location and anywhere between the store and the transfer mechanism it can be locked and rotated by 90°. Following the position of the product to be introduced, the manipulation tool with the pallet moves in a single direction to the location of the product to be removed and grips it. The product to be removed is then transported into and deposited in the store and anywhere between the transfer mechanism and the store it can be so rotated by 90° that the pallet comes to rest at the bottom of the load. As each pallet freed from the product to be introduced is immediately used for the product to be removed, no pallet need be deposited in the vicinity of the transfer mechanism. As the storage units (pallet plus roll or core) must have adequate storage stability, no equipment demands need be met at the storage



location. Therefore any available or desired free location can be used for storage purposes.

Obviously other storage methods are possible. For example the rolls can also be leaned against one another in
5 standing manner, a storage method which requires no pallets and which also requires no rotary movement on the part of the manipulation tool.

The inventive transfer mechanism and a forklift can also be used for storage processes such as are described in Swiss
10 patent application 888/91 of the same Applicant between the winding station and the store in place of the transfer mechanism and shuttle vehicle described therein. However, the forklift must then deposit or receive the rolls and roll cores in front of the store on a further transfer
15 location, where they would be collected or deposited by a special store tool. There is also no need in this case to carry the pallets.

Figs. 10A-B and 11A-B show in detail an embodiment of the transfer mechanism according to the invention, Figs. 10B
20 and 11B being side views similar to Figs. 4 to 7 and Figs. 10A and 11A being front view from the store side to which the article is moved by the manipulation/transportation vehicle. Fig. 10 shows the embodiment for cooperation with a winding-up station and Fig. 11 for that with a winding-
25 off station. In both side views it is possible to partly see the manipulation/transportation vehicle, which has just introduced roll cores in Fig. 10B and Fig. 11B grips the roll cores for transporting away.

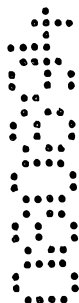
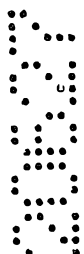
The two front views clearly show that the rolls W and roll
30 cores WK are deposited on the roll location 21 and the core location 22 of the transfer mechanism, 20.1 or 20.2. They show that in the same way single or plural roll or roll cores can be deposited. By a corresponding design of the



core guide 25, a roll core would then be positioned centrally with respect to the pallet 40 and four cores, juxtaposed in pairs would be arranged in the represented manner. According to the process described up to now the

5 cores are positioned centrally below the rolls and not on the side of the side support 24, as shown in Figs 10A-B and 11A-B. Only in the case of a central arrangement of the cores is it possible to use a forklift, whose forks are moved symmetrically against one another. A lateral

10 arrangement, as shown in Figs. 10A-B and 11A-B requires a forklift with a quasi-stationary fork and a fork movable against the latter and such a forklift can easily be produced from a commercially available forklift. Only in

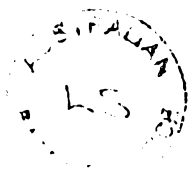


the case of such asymmetrically movable forks can the inventive process be performed with asymmetrically deposited cores, without centrally moving the cores on gripping. Seen from the store side, the cores can either be deposited to the right, as shown, or to the left. If a forklift is to be able to serve transfer stations with right and left deposited cores, it must be able to rotate its manipulation tool in both directions, so that the pallet, which must be carried along on the quasi-stationary fork, always comes to rest at the bottom for storage purposes.

10A-B and 11A-B

In the side views of Figs. ~~10 and 11~~ ^{10A-B} are shown as further details a pivot lever 26, an upper pivot angle guide 27 (Fig. ~~10~~ ^{10A-B}) and a lower pivot angle guide 28 (Fig. ~~11~~ ^{11A-B}). The pivot lever 26 is pivotably arranged about a pivot axis M on the side support 24 in such a way that on introducing rolls with the pallet it is pivoted upwards (extended position), ~~while~~ ^{while} on moving down the manipulation tool with the pallet it is pivoted downwards (broken line position) and therefore takes over part of the lateral supporting function, without coming into conflict with the inserting forks or pallet.

The upper pivot angle guide 27 at its bending point about a pivot axis N can be so pivotably fitted to the transfer mechanism 20.1 in the vicinity of the core location, that it can prevent an immediate rolling away of the cores when released from the grip of the forks. Such an upper pivot angle guide 27 is only appropriately used on a transfer mechanism 20.1 associated with a winding up station (Fig. 10). Thus, without cores, the upper pivot angle guide 27 is pivoted by gravity into a position in which its roll station-side leg 27.1 is directed downwards, whereas its store-side leg 27.2 abuts against the transfer mechanism in a substantially horizontal position (dot - dash line position). The core guide 25 is inclined against the winding station. If cores are now introduced, the upper pivot angle guides 27 move in such a way that the roll station-side leg 27.1 assumes a substantially horizontal position and the store-side leg 27.2 is directed downwards (continuous line position). The two legs of the upper pivot angle guide 27 are shaped in such a way that in this position they prevent the rolling away of the two cores. The upper pivot angle guide 27 is locked in this position. If the cores are then required for the winding station, the locking action is



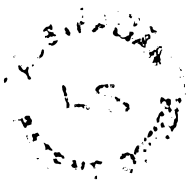
released, so that the cores roll away against the winding station (dot - dash line position of a core) and the upper pivot angle guide 27 is pivoted back again into its inoperative position.

The lower pivot angle guide 27 serves as a store-side stop for the core guide 25, when the latter is inclined against the store side (for a winding off station). It prevents cores rolling in the core location from rolling away against the manipulation/transportation vehicle, but pivoting away must be possible so that the cores can be transported away. A lower pivot angle guide 28 is appropriately used in a transfer mechanism 20.2 associated with a winding off station (Fig. 11). The lower pivot angle guide 28 has a winding station-side leg 28.1 and a store-side leg 28.2. Between the legs it is pivotable about a pivot axis Q in the lower area of the core location, being arranged in such a way that in its one pivoting position (continuous line position) the store-side leg 28.2 can stop against cores rolling on the core guide 25 rising against the winding station and in its other pivoting position (broken line position) it does not impede the moving out of the cores. The lower pivot angle guide 28 can be locked in its stopping position for as long as cores are deposited on the core guide by the traveling crane. The locking action is released if the cores deposited in the core location are gripped by a manipulation tool and moved out. The cores are laterally guided in that the core guide 25 has a central slot 29, in which runs the winding band WB rolled centrally on the core.

All the drawings show the inventive transfer mechanism with the roll location at the top and the core location at the bottom, but a reversal of these positions would also be possible.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

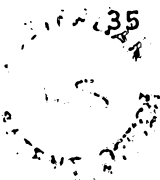
1. A process for exchanging empty roll cores and printed product rolls on a winding-up station, on which printed products are wound onto cores positioned with
- 5 horizontal winding axis to form rolls, and for storing rolls and cores in a storage area, the method comprising the steps of, providing a manipulation and transportation means, with said manipulation and transportation means at a
- 10 time transporting one roll from the winding-up station to a stationary transfer device the transfer device being accessible from a winding station side and a storage side and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores
- 15 with horizontal winding axis, and depositing the roll from the winding station side in the roll deposition position of the transfer device, and removing a core from the winding station side of the core deposition position of the transfer device, transporting the core to the winding-up
- 20 station and mounting the core at the winding-up station; providing a fork lift truck having two forks movable toward and away from each other and movable together reciprocatingly along a vertical path, with the fork lift truck at a time, taking at least one core from the storage
- 25 area by clamping it between the two forks and depositing the at least one core from the storage side in the core deposition position of the transfer device by separating the forks, and removing at least one roll from the storage side of the roll deposition position of the transfer device
- 30 by clamping it with the forks, transporting the at least one roll to the storage area and deposition the at least one roll in the storage area by separating the forks, wherein said roll deposition position and said core deposition position of said transfer device are disposed
- 35 relative to each other such that the forks of the fork lift truck need only be moved along said vertical path from the



core deposition position to the roll deposition position between depositing cores and removing rolls.

2. A method according to claim 1 wherein a plurality of pallets is provided, in the storage area one or a
5 plurality of rolls or one or a plurality of cores are stored on one pallet, the step of removing a core or cores from the storage area and transporting them to the transfer device and the step of transporting a roll or a plurality of rolls from the transfer device to the storage area and
10 depositing them in the storage area include removing, transporting and deposition a pallet also and the pallet is moved with the forks on the vertical path between deposition of the core or cores on the transfer device and removal of the roll or rolls from the transfer device.

15 3. A process for exchanging empty roll cores and printed product rolls on a winding-off station, on which printed products are unwound from printed product rolls positioned with horizontal winding axis to form a scale flow of printed products, and for storing rolls and cores
20 in a storage area, the method comprising the steps of, providing a manipulation and transportation means, with said manipulation and transportation means at a time transporting one core from the winding-up station to a stationary transfer device the transfer device being
25 accessible from a winding station side and a storage side and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores with horizontal winding axis, and depositing the core from
30 the winding station side in the core deposition position of the transfer device, and removing a roll from the winding station side of the roll deposition position of the transfer device, transporting the roll to the winding-off station and mounting the roll at the winding-off station; providing a fork lift truck having two forks movable toward



and away from each other and movable together reciprocatingly along a linear, vertical path, with the fork lift truck at a time, taking at least one roll from the storage area by clamping it between the two forks and depositing the at least one roll from the storage side in the roll deposition position of the transfer device by separating the forks, and removing at least one core from the storage side of the core deposition position of the transfer device by clamping it with the forks, transporting the at least one core to the storage area and deposition the at least one core in the storage area by separating the forks, wherein said roll deposition position and said core deposition position of said transfer device are disposed relative to each other such that the forks of the fork lift truck need only be moved along said linear, vertical path from the roll deposition position to the core deposition position between depositing rolls and removing cores.

4. A method according to claim 3 wherein a plurality of pallets is provided, in the storage area one roll or a plurality of rolls or one core or a plurality of cores are stored on one pallet, the step of removing a roll or rolls from the storage area and transporting them to the transfer device and the step of transporting a core or a plurality of cores from the transfer device to the storage area and depositing them in the storage area include removing, transporting and deposition a pallet also and the pallet is moved with the forks on the vertical path between deposition of the roll or rolls on the transfer device and removal of the core or cores from the transfer device.

5. A transfer device cooperating with a manipulation and transportation means and a fork lift truck with two forks movable toward and away from each other and movable



together reciprocatingly along a vertical path, for carrying out the method of exchanging empty roll cores and printed product rolls on a winding-up or unwinding station, on which station printed products are wound onto cores
5 positioned with horizontal winding axis to form rolls, or printed products are unwound from rolls positioned with horizontal axis, and for storing rolls and cores in a storage area, said transfer device being positioned stationary between the winding-up or unwinding station and
10 a storage location and having a roll deposition position for deposition of a plurality of rolls with horizontal winding axis and a core deposition position for deposition of a plurality of cores with horizontal winding axis, which two deposition positions are accessible by the manipulation
15 and transportation means for depositing or removing one roll or one core at a time from a winding station side and by the fork of the fork lift truck for depositing or removing at least one roll or at least one core at a time from a storage side and wherein the roll deposition
20 position and the core deposition position are located vertically above each other, such that the forks of the fork lift truck need only be moved along said vertical path from the core deposition position to the roll deposition position between depositing and removing.

25 6. A transfer device according to claim 5, wherein the roll deposition position is equipped with holding means for holding a plurality of rolls with horizontal winding axis in a substantially coaxial position and the core deposition position is equipped with means for supporting a
30 plurality of cores equal in number to the plurality of rolls in the roll deposition position.

7. A transfer device according to claim 6, wherein said holding means includes oppositely inclined wedges



holding said rolls therebetween, a lateral support and a pivot lever for retaining said rolls.

8. A transfer device according to claim 7, wherein
said means for supporting includes an inclined core
5 retainer projecting out of said transfer device.

9. A transfer device according to claim 8, wherein
said means for supporting further includes a pivotable
angled guide contacting said empty roll cores to control
rolling thereof.

10 DATED THIS 23RD DAY OF NOVEMBER 1994

FERAG AG
By Their Patent Attorneys

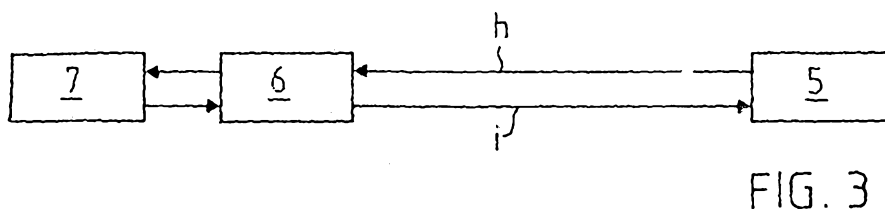
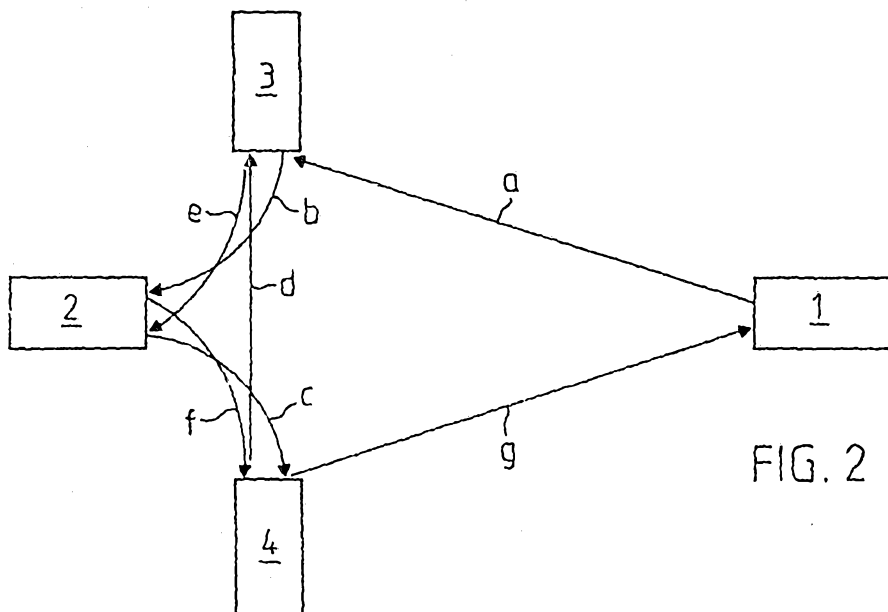
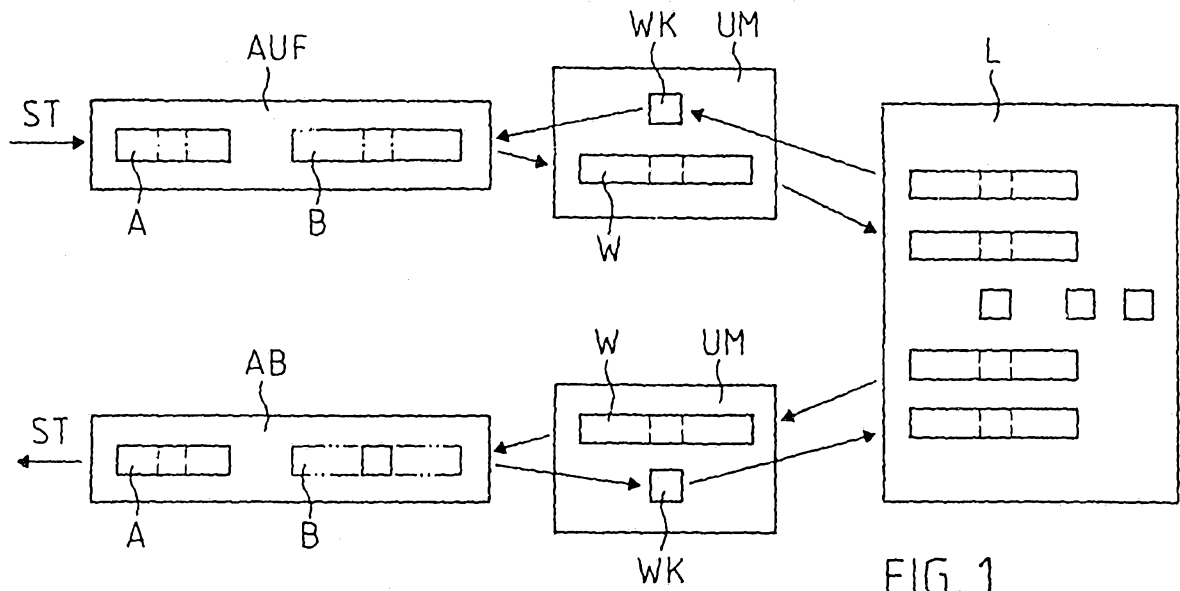
15 GRIFFITH HACK & CO
Fellows Institute of Patent
Attorneys of Australia



ABSTRACT

Product to be removed from winding stations (full rolls from winding up stations, roll cores from winding off stations) are deposited by a manipulation/transportation means on a transfer mechanism (20.1) and are transported from there with a manipulation/transportation vehicle (30) to a storage location. Product to be introduced at the winding stations (empty roll cores for the winding up station, full rolls for the winding off station) are transported by the same manipulation/transportation vehicle (30) from a storage location to the transfer mechanism and are deposited there and are introduced at the winding station by the manipulation/transportation means. The transfer mechanism (20.1) is designed in such a way that the manipulation/transportation vehicle (30) can deposit the product to be introduced from a single position and can take up the product to be removed. Between the two operations it is merely necessary for the manipulation tool to perform a single translatory movement. In the preferred process variant a forklift truck is used as the manipulation/transportation vehicle and in each case two rolls are placed on a pallet (40) and in each case two roll cores are stored on a pallet as storage units. Such a storage unit is transported to the transfer mechanism (20.1) being rotated by $\pm 90^\circ$ and is deposited there without the pallet (40). The pallet is moved with the forks of the forklift to the product to be removed in the transfer mechanism, is transported away with the latter by said mechanism and the forks are again rotated by $\pm 90^\circ$ and introduced as a storage unit together with the product to be removed.

(Fig. 10)



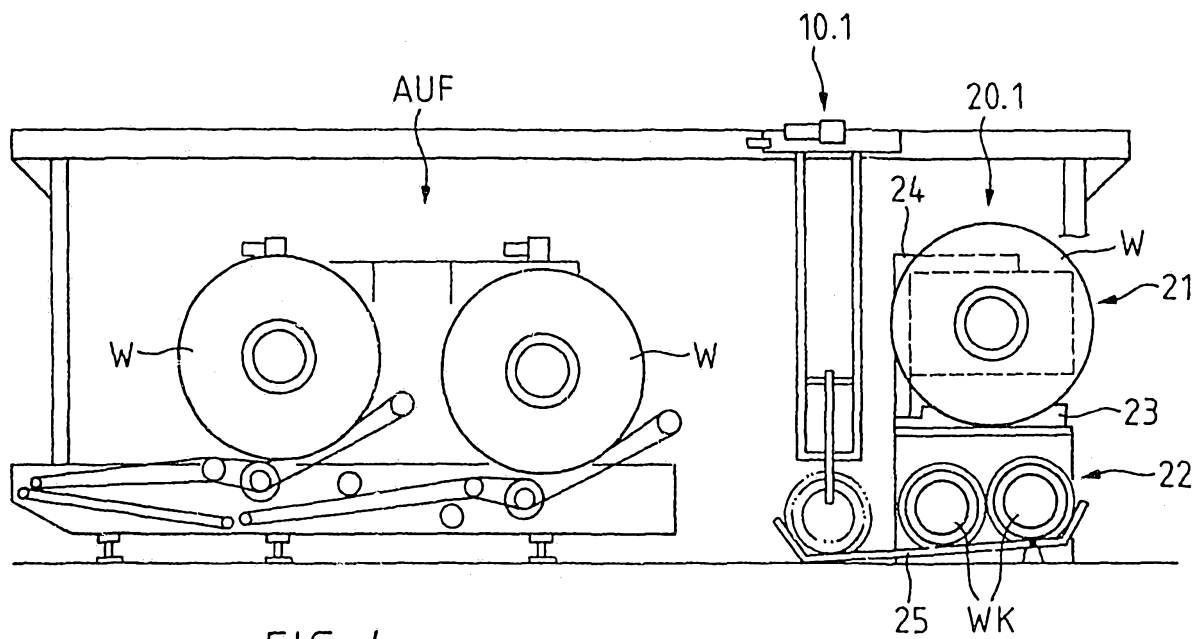


FIG. 4

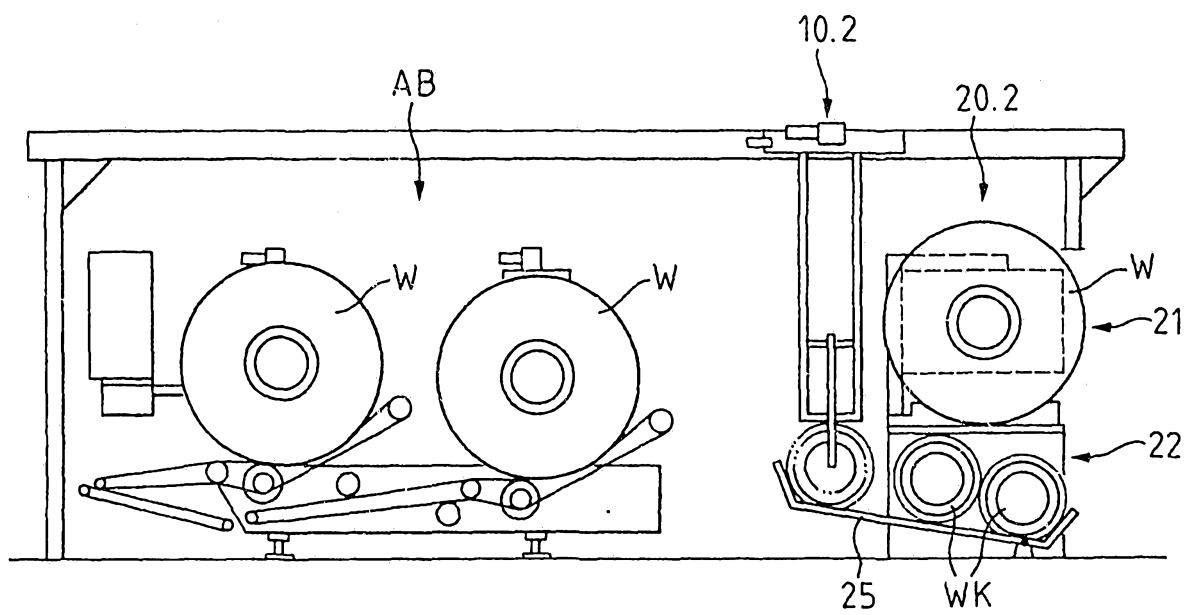


FIG. 5

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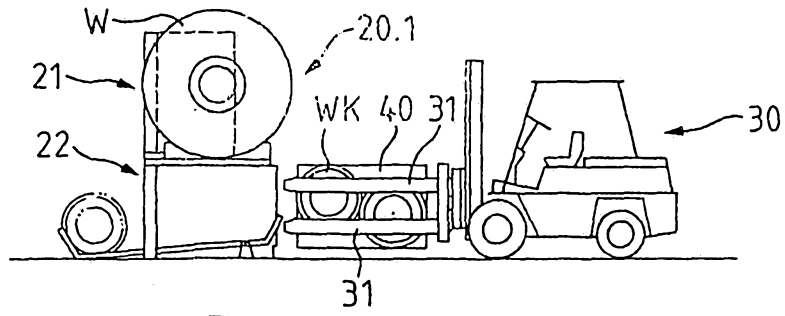


FIG 6A

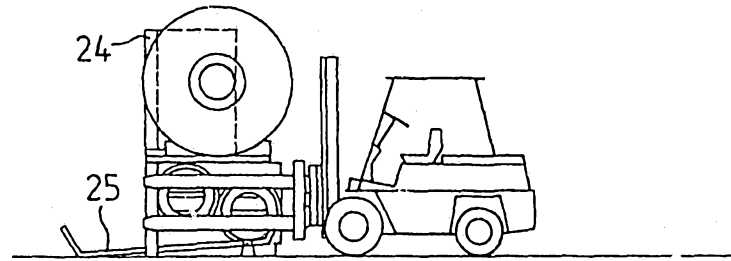


FIG. 6B

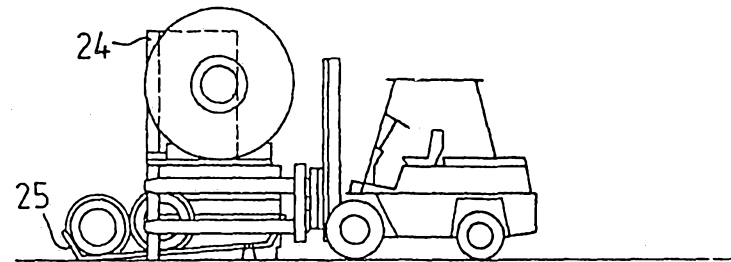


FIG 6C

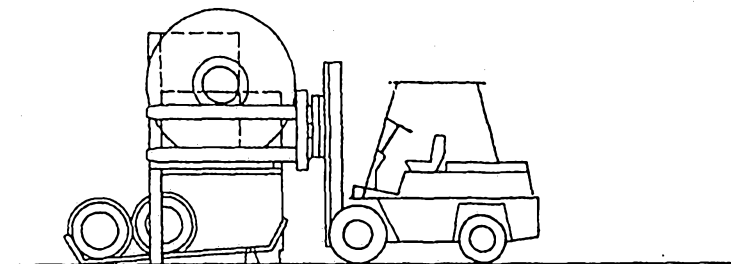


FIG 6D

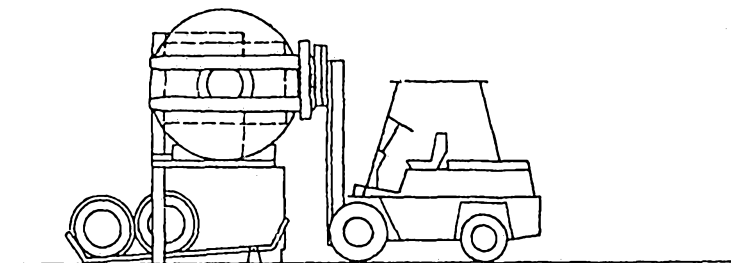


FIG 6E

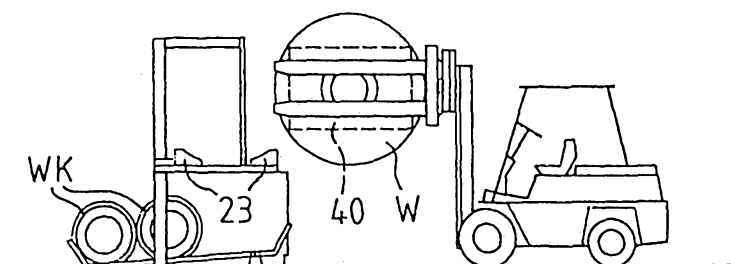
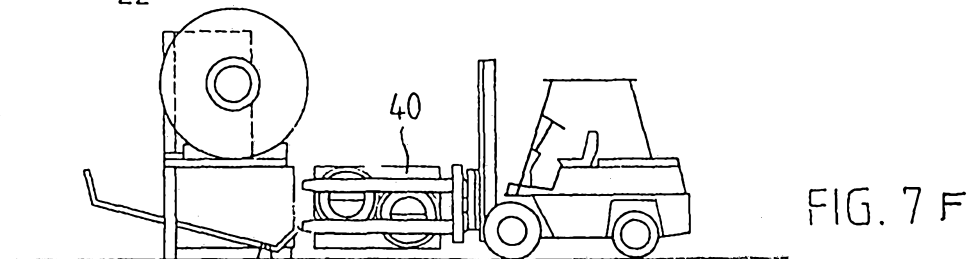
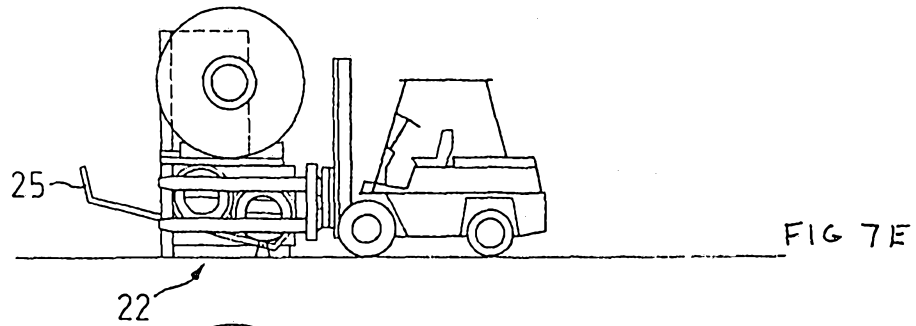
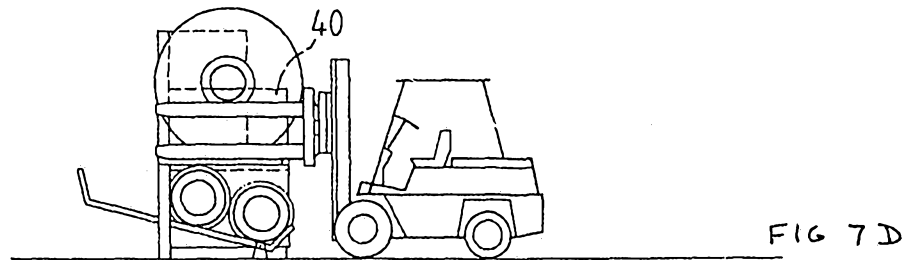
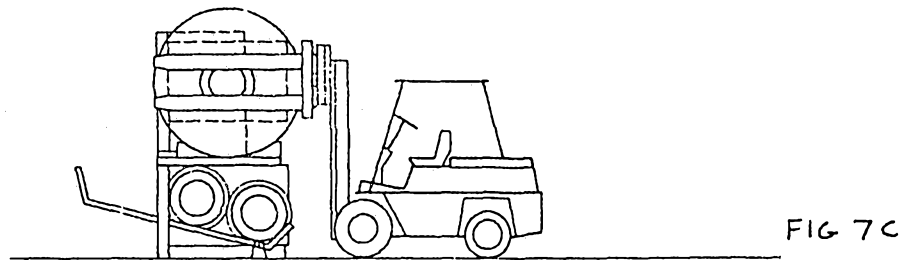
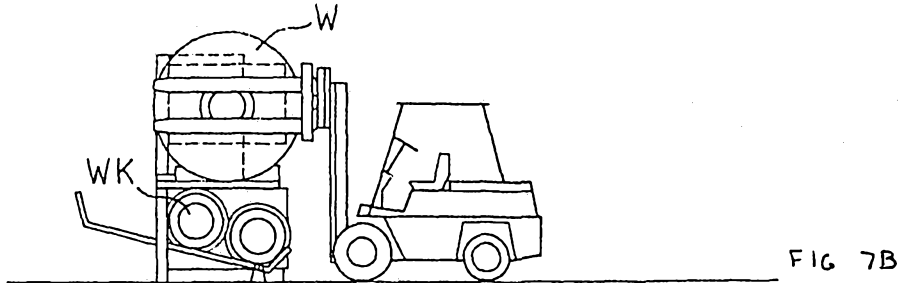
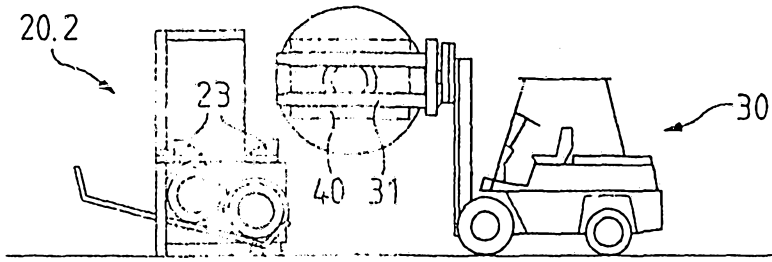


FIG. 6 F



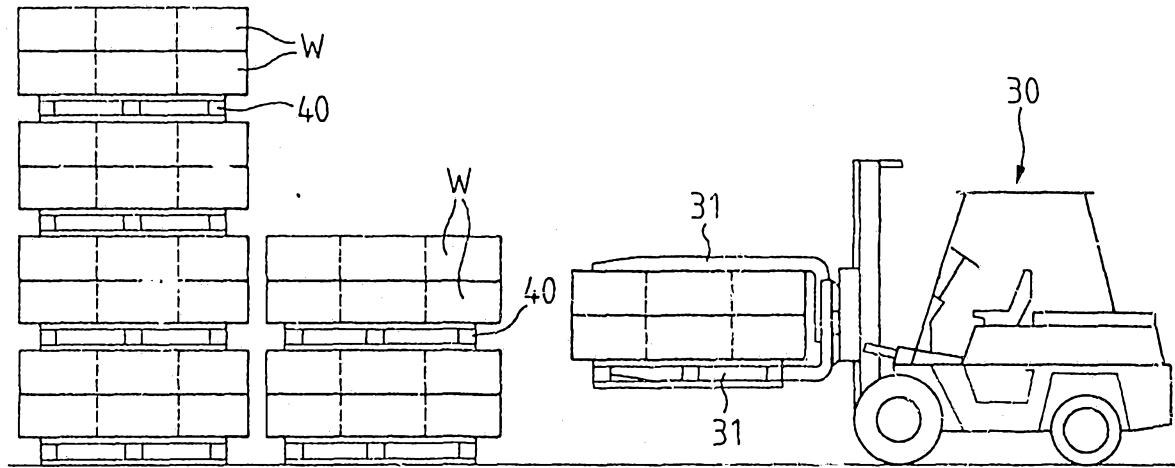


FIG. 8

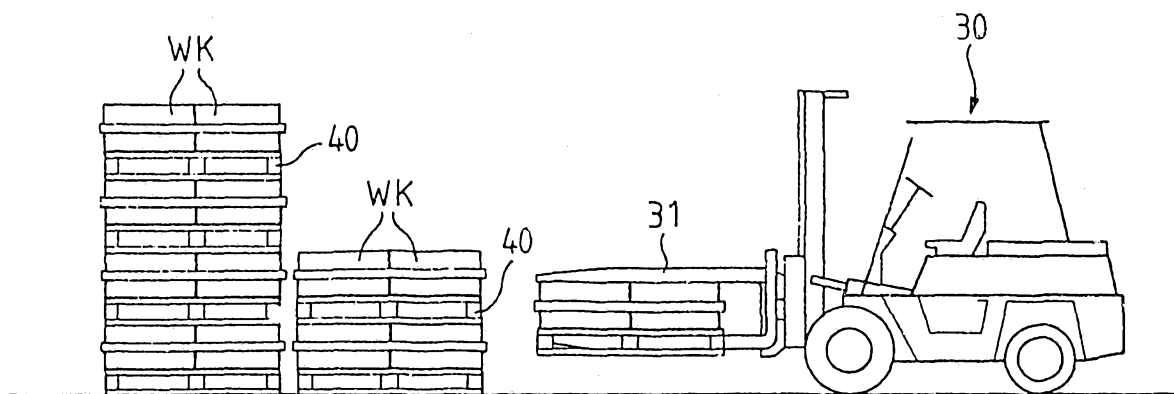


FIG. 9

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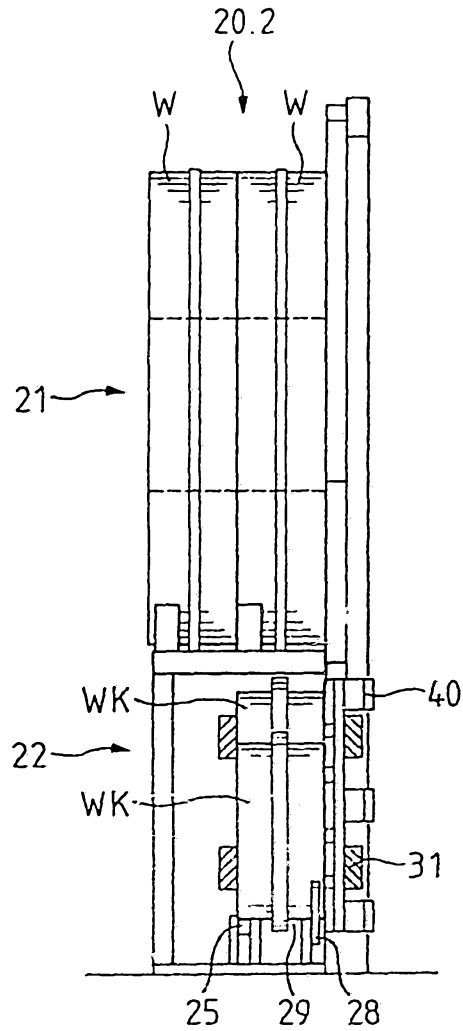


FIG 11A

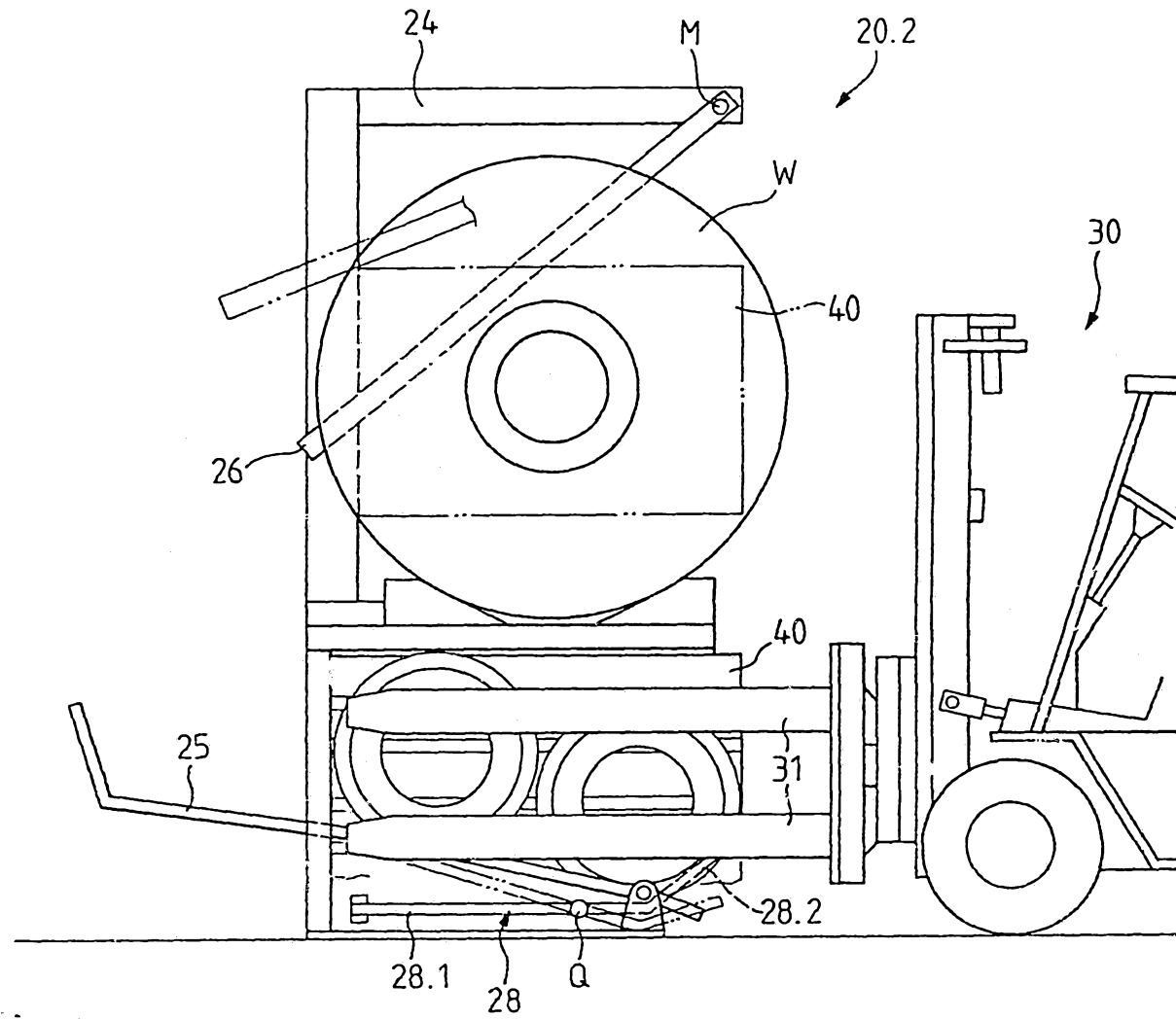


FIG 11B

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