(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 474 250 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
23.04.2014 Bulletin 2014/17

(21) Application number: **03707489.5**

(22) Date of filing: **22.01.2003**

(51) Int Cl.:
B07C 5/00 *(2006.01)* ***B07C 5/04*** *(2006.01)*

(86) International application number:
PCT/US2003/001953

(87) International publication number:
WO 2003/078081 (25.09.2003 Gazette 2003/39)

(54) **A method for transporting mail items based on their shape**

Verfahren zum Transport von Poststücken in Abhängigkeit von deren Form

Procédé de transport des objets du courrier, dépendant de leur forme

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT SE SI SK TR

(30) Priority: **22.01.2002 US 349379 P**

(43) Date of publication of application:
10.11.2004 Bulletin 2004/46

(73) Proprietor: **United States Postal Service**
Washington, DC 20260-1135 (US)

(72) Inventors:
- **Shah, Pranab**
  Washington, DC 20260-1135 (US)
- **Vogel, Paul**
  Washington, DC 20260-1135 (US)

(74) Representative: **Viering, Jentschura & Partner**
Patent- und Rechtsanwälte
Grillparzerstrasse 14
81675 München (DE)

(56) References cited:
DE-A1- 4 429 469
DE-C1- 19 650 875
US-A- 4 136 780
US-A- 5 050 078
US-A- 5 051 914
US-A- 5 051 914
US-A- 5 216 620
US-A- 5 229 932
US-A- 5 703 783
US-B2- 6 554 123

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 474 250 B1

Description

Field of the Invention

[0001] This invention relates generally to systems and methods for the efficient transportation of objects from an origination point to a destination point including, more particularly and in one embodiment, an integrated system and method for transporting and distributing mail objects from an origination point to a destination point.

Background of the Invention

[0002] US-A-4,136,780 discloses a system for culling and singulating mixed mail pieces including flats comprising: at least one receiving station, an input conveyor for depositing said mail pieces in said receiving station, a delivery station disposed in contiguity with said receiving station, common transport means linking said receiving station to said delivery station, the portion of said transport means within said receiving station being so situated and having physical dimensions such that it captures a limited number of predetermined types of the mail pieces deposited within said receiving station, and conveys them to said delivery station, said receiving station including means for selectively precluding the capture of any mail pieces by said transport means, a chute disposed below said receiving station for catching those mail pieces not captured by said transport means, means coupling said chute to said input conveyor for continuously recirculating at least a portion of the uncaptured mail pieces to said receiving station, singulator means comprising an inclined slide coupled to said delivery station for receiving the mail pieces furnished to said delivery station by said transport means, said singulator means separating said last mentioned pieces from the other to effect a stream of individual pieces down said slide, a size detection station located along said slide and downstream from said singulator means for measuring the dimensions of said mail pieces and thereby determining the respective mail categories.

[0003] German Patent Application DE 44 29 469 Al relates to a routing control for the dynamic routing of mail items. Mail items are diverted according to the kind of mail items and the structure of mail items, and then, suitable transportation capacities are reserved. The route is the temporal and local order in which the respective nodes of the logistic network accept, process and pass certain amounts of mail items. At the sorting points, processing of the mail items is performed, whereby processing is performed according to the four basic shapes of mail items in Germany, which are "Standardbrief" (standard letter), "Kompaktbrief" (compact letter), "Großbrief" (large letter) and "Maxibrief" (maxi-letter).

[0004] German Patent DE 196 50 875 C1 discloses a method for sorting mail items. It is described that for different kinds of mail items having different sizes and weights, there exist different types of sorting machines, with each type of sorting machine being adapted to a specific type of mail items, like e.g. standard letter, oversize letter, etc.

[0005] US Patent 5,051,914 relates to a system and method for optimizing mail delivery of batch mail. A network is established interconnecting plural batch mailers, a data center, and the postal service. To expedite processing of batch mail, logistics planning, carrier selection and routing aspects are described.

[0006] In fiscal year 2000, the United States Postal Service delivered approximately 208 billion pieces of mail. The average daily volume of mail delivered during fiscal year 2000 was 500 million pieces.

[0007] At present, the process of delivering the mail is a relatively complicated one. That process can be broken down into two components: (a) transportation and (b) distribution. The term "transportation" as used herein is intended to refer to the nodes and routes, which define the flow of mail (or other objects) between plants/processing facilities (or other sorting points). Transportation includes the inter-plant transportation network and the plant to delivery unit networks. (A delivery unit is a post office, station or branch that has mail delivery functions to the point of final delivery for a mail item.) It does not include activity within the plants themselves.

[0008] The term "distribution" as used herein refers to the combination of equipment, processes and plants that sort mail (or other objects). Distribution generally takes place between the point at which originating mail is picked up from its point of origin and the point at which it reaches its point of final delivery.

[0009] The transportation of mail is assisted by the use of five and preferably nine digit zip codes, which refer to defined geographic areas. The first three numbers in a zip code define zip code areas, and currently there are 932 different zip code areas within the U.S. mail system. The zip code area defines a larger geographic area than a five digit zip code, and the five digit zip code defines a larger geographic area than the nine digit zip code. For a nine digit zip, the area that it defines will be within both the five digit and three digit codes that it contains. To date, the transportation of mail items has not been configured around three digit zip code areas. (It should be noted that references herein to zip codes and zip code areas are not intended to be limited to the current system employed by the United States Postal Service, but instead is meant to include the use of any geographic code system, according to which geographic areas are defined, and preferably at increasing levels of specificity, through the use of a code system.)

[0010] It must also be noted that mail items come in varying shapes. Examples of current mail shapes include flat-size, letter-size, parcels, and outsides. Currently, plants process more or less all shapes of mail. However, because mail-processing equipment is generally shape-specific; i.e., can only process one shape of mail item, it is inefficient to locate in each plant every type of processing equipment. Moreover, currently, transportation of

mail is organized according to mail class, rather than according to mail shape.

[0011] A need continually exists to improve and further optimize the transportation and distribution process where a large number of objects must be processed, including particularly in one example a large number of mail objects. Such improvement may rely on the use of three digit zip code areas, or the like, in optimizing plant location. In addition, or alternatively, such improvement may rely on the use of shape-based criteria in organizing the transportation of mail items (or the like) between plants and their distribution within plants.

[0012] The present invention satisfies these needs and provides other, related, advantages.

Summary of the Invention

[0013] It is an object of the present invention to provide an improved system and method for transporting and distributing large numbers of objects in which plant locations are optimized using three digit zip code areas, or the like.

[0014] It is a further object of the present invention to provide an improved system and method for transporting and distributing large numbers of objects in which shape-based criteria are utilized to organize the transportation and/or distribution of mail items or the like.

Brief Description of the Preferred Embodiments

[0015] The present invention provides a method according to claim 1.

[0016] An embodiment of the invention is described in the dependent claim.

[0017] The foregoing and other objects, features, and advantages of the invention will be apparent from the following, more particular, description of the preferred embodiments of the invention, as illustrated in the accompanying drawings.

Brief Description of the Drawings

[0018]

Figure 1 is a flow-style chart illustrating the mail supply chain.

Figure 2 is a block diagram illustrating the mail processing system at a general level.

Detailed Description of the Preferred Embodiments

[0019] This invention is concerned with a system and method for the efficient transportation of objects from an origination point to a destination point. Preferably, the objects pass through an intermediate sorting point, and are there sorted so as to aid in the efficient transportation of the objects through the system. In one embodiment, the objects are mail pieces. However, other, non-mail objects, could also be transported from an origination point to a destination point using the system and method of the present invention.

[0020] The system and method of the present invention is intended to accommodate the transportation and, in one embodiment, the distribution, of extremely large numbers of objects. In one preferred embodiment, the system and method may be used in the efficient transportation and distribution of extremely large numbers of mail items. The system and method of the present invention, in one embodiment, is intended to optimize the delivery of mail objects in such volumes as those experienced by the U.S. Postal Service in fiscal year 2000. The system and method integrates the transportation and distribution aspects of object delivery to achieve improved efficiency -- and specifically an efficiency level greater than that provided if transportation and distribution are created in a non-integrated manner.

[0021] Referring now to Figure 1, an illustration of the full mail supply chain 10 is shown. It begins with mailing activities 20, which relates to the mailing of mail pieces from the point of origin. The next link in the chain is induction/collection 30, where mail enters the mailstream. The mail is then processed for transportation at outbound processing 40. The next step is transportation 50 in the direction of the point of final delivery. The mail is then subjected to inbound processing 60 and delivery 70. Finally, receiving activities 80 refers to those in connection with the receipt of the mail at its point of final delivery. Each step in the mail supply chain 10 is necessary in the accurate and efficient delivery of large volumes of mail items.

[0022] In one embodiment, the system and method of the present invention utilizes three digit zip code areas to aid in efficient transportation and distribution of mail items. Although there are a number of other components, the backbone of the mail transportation and distribution system is the plant/processing facility. It is in these facilities that mail distribution, i.e., sorting, takes place. Currently, there are approximately 450 plants in the system. The efficient transportation of mail to plants improves the efficiency of both the transportation and distribution systems. By ensuring that mail is routed to the optimally located plant, transportation costs are reduced and delays limited. Moreover, by ensuring that plants are distributing mail within a proper region (as defined by the assignment of specific three digit zip code areas to plants), as opposed to distributing mail from beyond the proper region, the distribution process as well proceeds in a more efficient manner.

[0023] In order to utilize plants optimally within the transportation and distribution system, mail items are preferably routed to plants based on the three digit zip code area of the mail items. Thus, each three digit zip code is preferably assigned to a single plant for origination processing (or for separation to a concentrator, discussed below). Each three digit zip code is also assigned to one plant for destinating processing (or transportation to a disperser, discussed below). In this regard, plants

are preferably receiving mail within one or more three digit zip code areas, with the particular zip code areas chosen being those most efficiently reached utilizing the transportation system. In most cases, the zip code areas will be those in the closest geographic proximity to the particular plant but, where transportation efficiencies require otherwise, these considerations will take precedence.

[0024] Optimal routing of mail to plants takes place at two points along the mail supply chain 10. It takes place first at outbound processing 40, where outgoing mail from three digit zip code areas using optimization criteria is preferably routed to the desired plant, based on the three digit zip code area of the sender. It takes place a second time at inbound processing 60, where inbound mail from three digit zip code areas using optimization criteria is preferably routed to the desired plant, based on the three digit zip code area of the recipient. Thus, for example, a mail item from three digit zip code area 123 that is travelling to three digit zip code area 456 may be routed to plant A for inbound processing 40 because zip code area 123 has been assigned to plant A, and to plant B for outbound processing, because zip code area 456 has been assigned to plant B. (That mail item may pass through intermediate processing facilities between the outbound and inbound plants, as discussed below.)

[0025] As an additional element, the shape of the items transported preferably also forms at least a component of process of optimally locating and assigning plants, in addition to or instead of the use of three digit zip code areas. Mail items come in varying shapes. Examples of current mail shapes include: (a) flat-size mail - mail that is within the dimensions of 15 inches long, 12 inches high, and 3/4 of an inch thick; (b) letter-size mail - mail that is within the dimensions of 11 and 1/2 inches long, 6 and 1/8 inches high, and 1/4 inch thick; (c) parcels - mail items outside the dimensions of flats and letter-sized and fitting within a mail sack or container; and (d) outsides - mail that cannot be placed into a sack or container because of its size, weight, shape or contents. (Of course, it should be recognized that other shapes may be introduced in the future, or may be practiced in other mail systems or in integrated transportation/distribution systems of non-mail items.)

[0026] Because mail-processing equipment is generally shape-specific; i.e., can only process one shape of mail item, it is inefficient to locate in each plant every type of processing equipment. Accordingly, a component of the system and method of the present invention is that plants process only mail of one or more (though less than all) shapes. For example, one plant may only process parcels, another may only process flats, yet another may process flats and letters, and so on. (Because of the similarity of their shape, it will be preferred to treat letters and flats in like manner.) This differentiation allows advantage to be taken of economies of scale that may be achieved by having mail of similar shape be processed in dedicated plants. For less populous areas, it may be preferred to provide plants that process most or all mail shapes. However, preferably, more than a majority of plants in the system and method of the present invention process mail based on shape, with the plant processing fewer than all possible shapes.

[0027] When distribution is optimized based on shape by focusing plants on only one or more but fewer than all mail shapes, it can be seen that transportation between plants should also be determined at least in part based on the shape of the items being transported.

[0028] It follows from the use of shape-based distribution that, where used in combination with three digit zip codes to optimize transportation and/or distribution, it is preferred to assign mail items from particular three digit zip code areas to more than one plant, depending on the shape of the mail item. For example, flats from zip code area 123 may be assigned to plant A, while parcels from zip code area 123 may be assigned to plant B. (Plant B, in this situation, may also be considered a concentrator, discussed below, to the extent that it receives parcels from zip code areas other than 123.) On the other hand, it is preferred that all mail for a particular three digit zip code first be transported to its assigned plant for shape separation, with separated mail of particular shapes being transported to other plants (or concentrators) for further processing as necessary. Thus, in the example, both flats and parcels from zip code area 123 would first go to plant A for separation, with flats remaining in plant A for further processing and parcels being transported to plant B for further processing.

[0029] Accordingly, the assignment of mail items to plants and plant location is preferably based both on the three digit zip code area and shape of mail items processed therein -- though it may be based on only one of these criteria.

[0030] Plant location and assignment according to three digit zip code areas and shape is preferably determined through a four step modelling approach. In Step 1, a preliminary network design is developed. In this step, the optimal level of shape differentiation is determined, as well as three digit zip code assignments -- with cost driving the process.

[0031] While the plants are the backbone of the system and method, the network preferably has other components as well. As part of this analysis, the role of other actors should also be considered. Referring now to the block diagram of Figure 2, illustration is made at a general level of the mail processing system 200. From an originating plant and distribution ("P&DC") 202, mail may be transported to a processing concentrators 204 (facilities that receive originating mail from plants for processing), then to a transportation concentrator 206 (facilities that receive originating mail for the purpose of consolidating transportation), next to a transportation disperser 208 (facilities that receive destinating mail from multiple origination points for dispersement to local processing dispersers or plants), from there to a processing disperser 210 (facilities that receive destinating mail and perform

destinating sorting for a set of plants), and then to a destinating P&DC 212. The optimal number and location of concentrators 204 and 206 and dispersers 210 and 212, as well as their assignment to particular plants, is preferably determined as part of Step 1.

[0032] In Step 2, the strategic direction is refined based on scenario analyses and feedback from management in the field. During this step, assumptions and results are validated, and overall strategic direction for the remainder of the modelling process is determined.

[0033] In Step 3, implementation modelling occurs, with a finalized network being developed. Step 4 is a simulation, in which the outputs of Steps 1-3 are tested using simulation modelling. The modelling process yields a network having desired efficiency for an acceptable cost. The modelling process should, preferably, be software-assisted, given the complexity of the problem and the large number of potential variables. It should also consider different "what if" scenarios that might impact on the network, including for example the unanticipated closing of a plant or other facility.

[0034] Another aspect of the system and method concerns the physical transportation of mail (or other objects) within the network. In this connection, it must be noted that mail items are currently differentiated, in addition to by originating zip code, destinating zip code, and shape -- by classification. Mail classes presently include first-class mail, Priority Mail, Express Mail, Periodicals, Standard Mail (A) and Standard Mail (B), though of course these may change and/or other mail classes may be introduced to the system. Different mail classes have different transportation needs. For example, Express Mail items need to be delivered faster than first-class mail items. (Because mail processing machines can efficiently process different classes of mail of a certain shape, plants should preferably not be limited by class unless efficiency will be promoted by such assignment in a particular situation.)

[0035] As noted above, concentrators and dispersers are preferably used between plants to assist both with transportation and distribution. To provide for more efficient transportation, it is preferred to assign to each plant a concentrator and disperser for each mail item class, unless the plant handles that class itself.

[0036] While, in a preferred embodiment, the system and method of the present invention may be utilized for the transportation and distribution of mail items, it should be understood that it could be used for the transportation and distribution of non-mail items as well. In the event of such application, certain substitutions to the elements of the method and system of the present invention will be made, as necessary, to permit use with non-mail items. For example, instead of three digit zip codes, some other designation may be used to identify origination and/or destination of items -- including for example state or geographic region (e.g., city, county, country, multi-state region, etc.), store or other component in the network, or the like -- for purposes of assigning shipment items to plant locations. Instead of shape, processing may be differentiated by some other criteria concerning the non-mail item and/or its packaging that will allow economies of scale to be effectively utilized, such as weight, shelf-life, or the like.

Claims

1. A method for transporting and distributing a large number of mail items from an origination point to a destination point comprising the steps of:

   providing a plurality mail items to be delivered from an origination point to a destination point;
   wherein a subset of said plurality of mail items has a first shape;
   wherein a subset of said plurality of mail items has a second shape;
   providing a transportation and distribution system having a plurality of plants and adapted to transport mail items having one of a plurality of possible shapes therebetween, and wherein each possible shape of said mail items is assigned to at least one said plant within said transportation and distribution system;
   transporting at least a portion of said plurality of mail items from a first said plant to a second said plant wherein an identity of said second plant is decided at least in part based on said shape of said at least a portion of said plurality of mail items having said second shape; and
   distributing said at least a portion of said plurality of mail items having said first shape within said first plant,
   wherein plants process only mail of one or more, though less than all, shapes further comprising the steps of:

      assigning to substantially all of said plurality of mail items an originating geographic code and a destinating geographic code; **characterised by**
      determining an identity of said second plant at least in part based on said originating geographic code.

2. The method of Claim 1 wherein said plurality of geographic codes comprises a listing of three digit zip code areas.

Patentansprüche

1. Verfahren zum Transportieren und Verteilen einer großen Anzahl von Postobjekten von einem Ursprungspunkt zu einem Zielpunkt aufweisend die Schritte:

Bereitstellen einer Mehrzahl von Postobjekten, die von einem Ursprungspunkt zu einem Zielpunkt geliefert werden sollen;
wobei eine Teilmenge der Mehrzahl von Postobjekten eine erste Form hat;
wobei eine Teilmenge der Mehrzahl von Postobjekten eine zweite Form hat;
Bereitstellen eines Transport- und Verteilungssystems mit einer Mehrzahl von Anlagen, das eingerichtet ist,
Postobjekte mit einer Form einer Mehrzahl von möglichen Formen dazwischen zu transportieren und wobei jede mögliche Form der Postobjekte mindestens einer der Anlagen innerhalb des Transport- und Verteilungssystems zugewiesen ist;
Transportieren mindestens eines Teils der Mehrzahl von Postobjekten von einer ersten Anlage zu einer zweiten Anlage, wobei über eine Identität der zweiten Anlage zumindest teilweise basierend auf der Form des mindestens eines Teils der Mehrzahl von Postobjekten mit der zweiten Form entschieden wird; und
Verteilen des mindestens eines Teils der Mehrzahl von Postobjekten mit der ersten Form innerhalb der ersten Anlage,
wobei Anlagen nur Post mit einer oder mehreren aber nicht allen Formen verarbeiten
ferner aufweisend die Schritte:

Zuweisen zu im Wesentlichen allen der Mehrzahl von Postobjekten eines geographischen Ursprungscodes und eines geographischen Zielcodes; charakterisiert durch Ermitteln einer Identität der zweiten Anlage zumindest teilweise basierend auf dem geographischen Ursprungscode.

2. Verfahren gemäß Anspruch 1, wobei die Mehrzahl von geographischen Codes eine Liste von Postleitzahlenbereichen mit drei Ziffern aufweist.

Revendications

1. Procédé de transport et de distribution d'une grande quantité d'articles de courrier depuis un point d'origine jusqu'à un point de destination, comprenant les étapes ci-dessous consistant à :

fournir une pluralité d'articles de courrier devant être délivrés d'un point d'origine à un point de destination ;
dans lequel un sous-ensemble de ladite pluralité d'articles de courrier présente une première forme ;
dans lequel un sous-ensemble de ladite pluralité d'articles de courrier présente une seconde forme ;
fournir un système de transport et de distribution présentant une pluralité d'équipements, et qui est apte à transporter des articles de courrier présentant l'une d'une pluralité de formes possibles entre ces équipements, et dans lequel chaque forme possible desdits articles de courrier est affectée à au moins un dit équipement au sein dudit système de transport et de distribution ;
transporter au moins une partie de ladite pluralité d'articles de courrier depuis un premier dit équipement jusqu'à un second dit équipement, dans lequel une identité dudit second équipement est déterminée au moins en partie sur la base de ladite forme de ladite au moins une partie de ladite pluralité d'articles de courrier présentant ladite seconde forme ; et
distribuer ladite au moins une partie de ladite pluralité d'articles de courrier présentant ladite première forme au sein dudit premier équipement ;
dans lequel les équipements gèrent uniquement le courrier d'une ou plusieurs, mais moins que la totalité, des formes, le procédé comprenant en outre les étapes ci-dessous consistant à :

affecter, à la quasi-totalité de ladite pluralité d'articles de courrier, un code géographique d'origine et un code géographique de destination ; **caractérisé par** l'étape ci-dessous consistant à :

déterminer une identité dudit second équipement au moins en partie sur la base dudit code géographique d'origine.

2. Procédé selon la revendication 1, dans lequel ladite pluralité de codes géographiques comprend une liste de zones de codes postaux à trois chiffres.

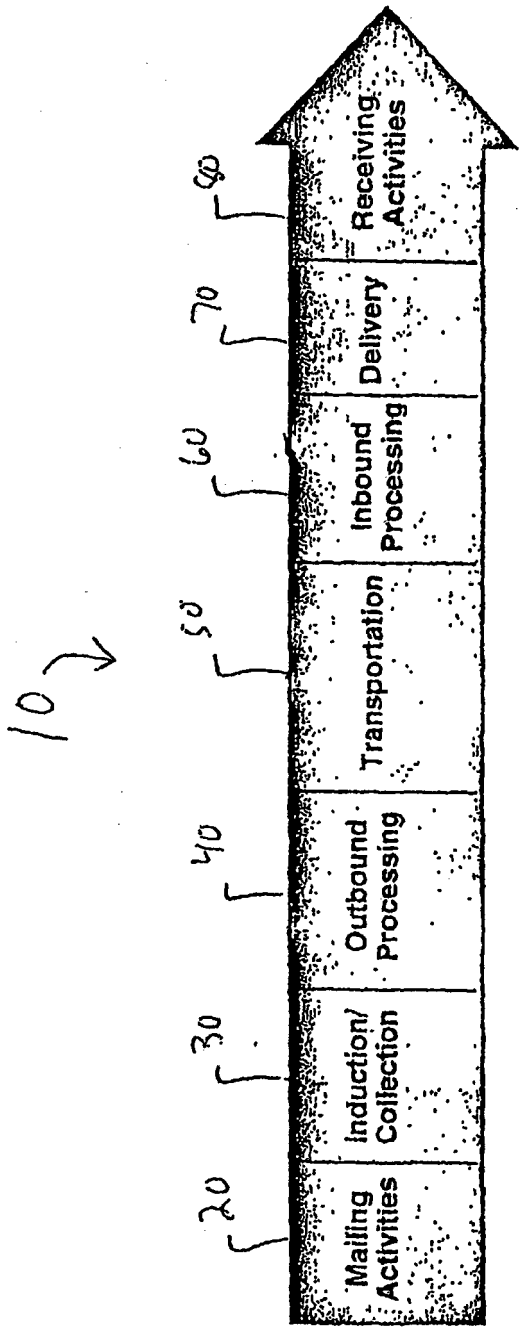

10
20
30
40
50
60
70
80
Mailing Activities
Induction/ Collection
Outbound Processing
Transportation
Inbound Processing
Delivery
Receiving Activities

Fig. 1

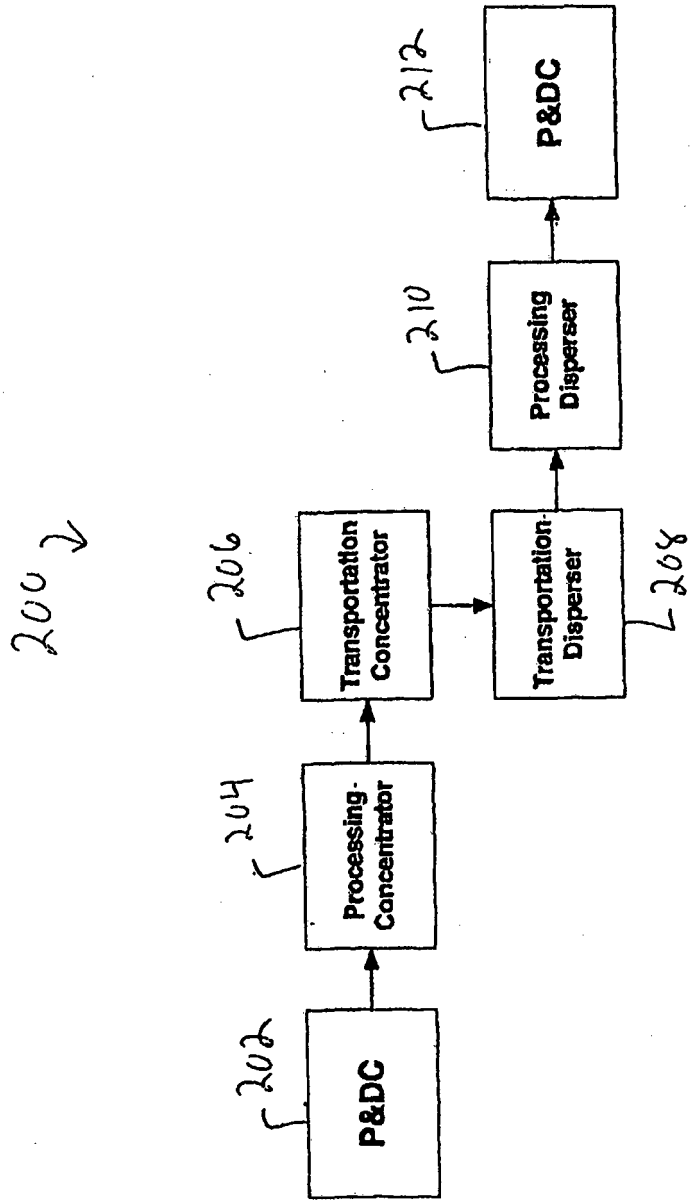

200
202
P&DC
204
Processing-Concentrator
206
Transportation Concentrator
208
Transportation-Disperser
210
Processing Disperser
212
P&DC

Fig. 2

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4136780 A **[0002]**
- DE 4429469 A1 **[0003]**
- DE 19650875 C1 **[0004]**
- US 5051914 A **[0005]**