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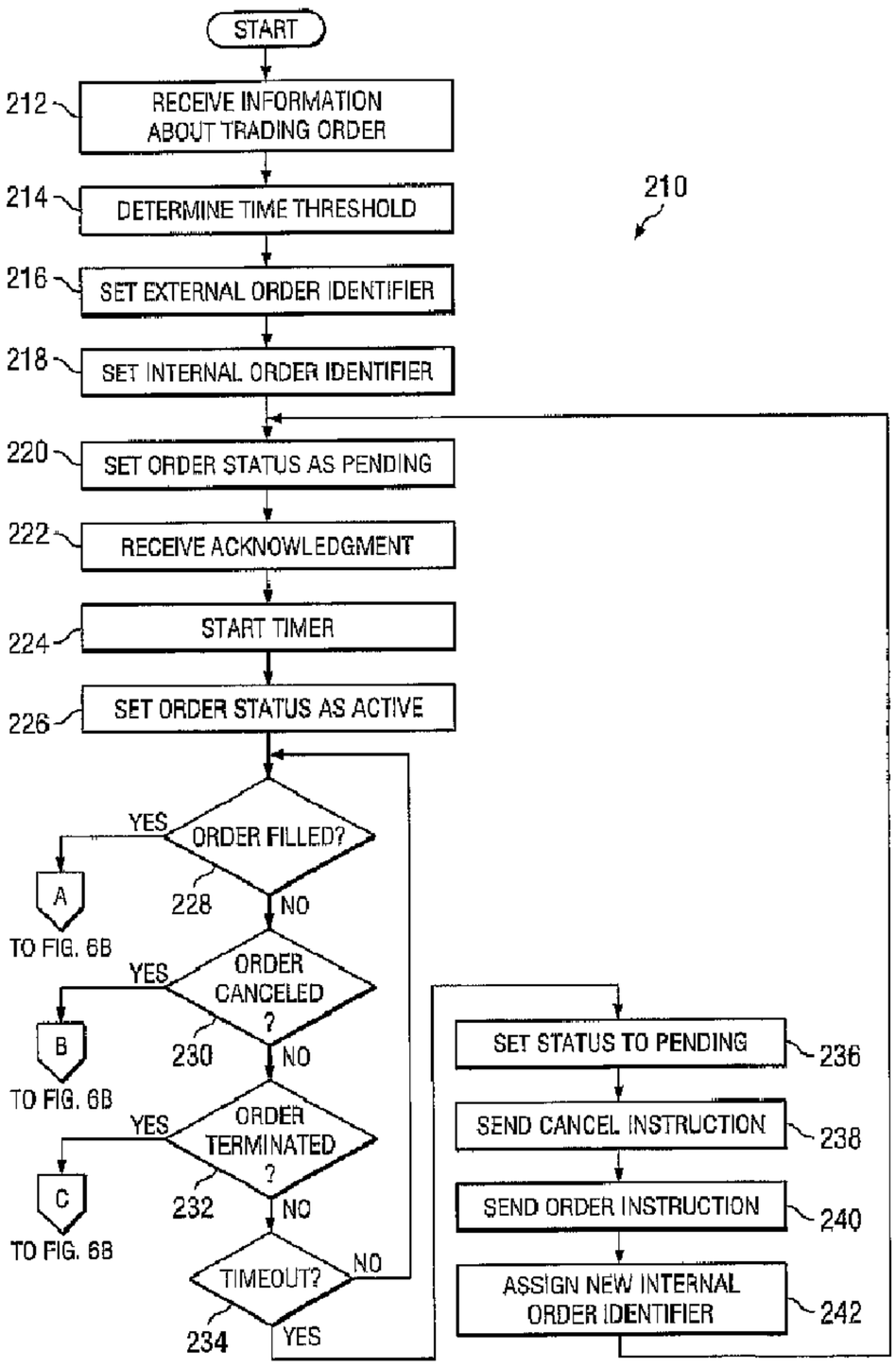
(54) **Titre : SYSTEME ET PROCEDE PERMETTANT D'EVITER LES COUTS DE TRANSACTION ASSOCIES AUX ORDRES COMMERCIAUX**
(54) **Title: SYSTEM AND METHOD FOR AVOIDING TRANSACTION COSTS ASSOCIATED WITH TRADING ORDERS**



(57) **Abrégé/Abstract:**
A system for avoiding transaction costs associated with trading orders comprises a memory and a processor. The memory stores an order identifier associated with a trading order, and a time threshold associated with the trading order. The processor monitors

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the length of time the trading order is active with a market center that is processing the trading order. The processor further determines a timeout when the length of time the trading order is active with the market center equals or exceeds the time threshold. The processor then communicates a cancel instruction for the trading order in response to determining the timeout.

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(54) Title: SYSTEM AND METHOD FOR AVOIDING TRANSACTION COSTS ASSOCIATED WITH TRADING ORDERS

(57) Abstract: A system for avoiding transaction costs associated with trading orders comprises a memory and a processor. The memory stores an order identifier associated with a trading order, and a time threshold associated with the trading order. The processor monitors the length of time the trading order is active with a market center that is processing the trading order. The processor further determines a timeout when the length of time the trading order is active with the market center equals or exceeds the time threshold. The processor then communicates a cancel instruction for the trading order in response to determining the timeout.

WO 2005/072453 A2

SYSTEM AND METHOD FOR AVOIDING TRANSACTION COSTS ASSOCIATED WITH TRADING ORDERS

TECHNICAL FIELD OF THE INVENTION

The present invention relates generally to electronic trading and more specifically to a system for avoiding transactions costs associated with trading orders.

BACKGROUND OF THE INVENTION

In recent years, electronic trading systems have gained wide spread acceptance for trading of a wide variety of items, such as goods, services, financial instruments, and commodities. For example, electronic trading systems have been created which facilitate the trading of financial instruments and commodities such as stocks, bonds, currency, futures contracts, oil, and gold.

Many of these electronic trading systems use a bid/offer process in which bids and offers are submitted to the systems by a passive side and then those bids and offers are hit or lifted (or taken) by an aggressive side. For example, a passive trading counterparty may submit a "bid" to buy a particular trading product. In response to such a bid, an aggressive side counterparty may submit a "hit" in order to indicate a willingness to sell the trading product to the first counterparty at the given price. Alternatively, a passive side counterparty may submit an "offer" to sell the particular trading product at the given price, and then the aggressive side counterparty may submit a "lift" (or "take") in response to the offer to indicate a willingness to buy the trading

product from the passive side counterparty at the given price.

SUMMARY OF THE INVENTION

Market prices may change with time - by the minute/second. People willing to trade a particular commodity may change, and the volumes bid/offered may change with time. Different trading centers may have different cost structures. A trader may know them, in broad-brush terms, but whether center A is cheaper than center B may depend upon the volume traded and the market price and the transaction costs associated therewith. The cheapest market center, after trading costs, may be difficult to evaluate. Traders may habitually just consider the market price, and exclude from the analysis other relevant factors in the selection process. Also, costs may be impossible to evaluate if the cost equation includes an element that is imponderable and unpredictable e.g. no cost if the traded products sell/trade in under a predetermined time, but a charge will be levied by the trading center if trade is not completed by then. Another reason why traders in practice may not even care to consider anything but market price is that it is just too hard to bother with. Traders may, therefore, use "instinct" and "touch-and-feel" to choose trading centers.

A lot of trading is done over the telephone. Traders can choose to call a particular market centre for personal, subjective reasons. For example, because the telephone number is in their speed dial, because they just like the reputation of the organization, or the person they habitually talk to. Similarly, a particular trading centre may be avoided for personal reasons.

Also, different trading centers have different disclosure rules regarding the identity of buyers/sellers and the trading volumes. This information can be sensitive, and can cause market fluctuations. For example, the knowledge that company A is selling Company B millions of goods or shares or instruments can alter market prices and/or trading strategies. Traders may decide not to use a particular trading centre because it has unfavorable disclosure rules. They may simply "play safe" and not use it in their mind-set, for any trades, or categories of trade, even though there may be certain categories of trade where it would be OK (e.g. less than threshold X and there would be no disclosure issue). Also, disclosure rules may change with time, and vary between trading centers. No trader wants to be out of date and disclose information they should not. This is another incentive to "play safe" and just habitually go with the trading centre with the most generous rules.

Traders are driven by speed of transactions, but they are also driven by accuracy. These factors are pulling traders in different directions.

A scenario that exists at present is that trader A likes using trading centre B and does so for many of their trades. This puts pressure on the telecom links between A and B. There is a degree of inertia in that if trading centre C is in fact a better deal, trader A needs it to be a good enough deal to disturb their comfort zone before they will switch the trading centre they use, and there is a time delay in trader A learning that centre C is cheaper. Perhaps by the time he uses them they will not be cheaper after all. Planning trades on trading centers that are less heavily used, if the deals are as good, can reduce bottlenecks in telecommunications

traffic to more heavily used centers. At present, this may not be a consideration in the mind of traders.

There are known trading system products that exist for enabling trades to be made. A problem is how to provide apparatus that routes trading orders intelligently based on one or more factors that are too difficult for a human to fully process in real-time. It is the aim of the invention to provide an alternative trading system product: an alternative solution to the problem. It is self-evident that a product which has advantages over other products will be preferred by customers. It is a common desire of many, perhaps all, manufactures to make an improved product. One way of improving a product is to make the same thing, or a comparable thing, but cheaper. Another way of improving a product is to make a product with enhanced functionality; one that can do something that a competing product cannot.

It is the aim of many embodiments of the present invention to provide an improved trading system product that can make decisions regarding trading orders using a host of factors that may be too difficult for a human to consider. Therefore, the speed and accuracy of the trading orders and the routing thereof will increase. Having a product that has superior performance or that can simply do things competing products cannot do is a common general desire of manufacturing industry. Many embodiments of the present invention comprise a product that can do things that existing products, or even humans, simply cannot do; things which have attractive advantages to purchasers of such products; things that are beyond the technical capabilities of the old products.

Many embodiments of the invention provide an alternative solution to the problem. The product has enhanced capabilities beyond conventional products: it can do new and useful things. It can, for many embodiments, be more likely to get a better deal for the trader, and may remove the luck and personal prejudices from decisions regarding which trading centre to use.

In accordance with the present invention, the disadvantages and problems associated with prior electronic trading systems have been substantially reduced or eliminated.

Certain exemplary embodiments can provide a method comprising: receiving, from a remote device via a processor within a trading exchange platform, a first trading order that comprises a desired quantity and a desired price, in which the remote device and the processor are in electronic communication over a network; matching, via the processor, a portion of the desired quantity of the first trading order with at least one internal trading order, in which the at least one internal trading order is stored in a database that is internal to the trading exchange platform; computing, via the processor, a remaining quantity of the first trading order, in which the remaining quantity comprises the desired quantity minus the portion of the first trading order that was matched with the at least one internal trading order; identifying, via the processor, at least one market center that is capable of matching the remaining quantity of the first trading order, in which the at least one market center is external to the trading exchange platform; determining, via the processor, that the at least one market center charges a fee for orders that remain unmatched for a length

of time; routing, via the processor, the second trading order that comprises the remaining quantity to the at least one market center; monitoring, via the processor, whether a second trading order is matched within the length of time, in which the monitoring begins as soon as the second trading order is routed to the at least one market center and in which the act of monitoring is performed via an electronic timer operable by the processor, which timer indicates a timeout after a predetermined amount of time lapses at which the second trading order is cancelled; in response to determining that the second trading order will exceed the timeout for a fee, canceling, via the processor, the second trading order and submitting, via the processor, a third trading order that comprises the remaining quantity to the at least one market center.

Certain exemplary embodiments can provide an apparatus of comprising: a processor; and a memory, in which the memory stores instructions which, when executed by the processor, direct the processor to: receive, in a trading exchange platform, a first trading order that comprises a desired quantity and a desired price; match a portion of the desired quantity of the first trading order with at least one internal trading order, in which the at least one internal trading order is stored in a database that is internal to the trading exchange platform; compute a remaining quantity of the first trading order, in which the remaining quantity comprises the desired quantity minus the portion of the first trading order that was matched with the at least one internal trading order; identify at least one market center that is capable of matching the remaining quantity of the first

trading order, in which the at least one market center is external to the trading exchange platform; determine that the at least one market center charges a fee for orders that remain unmatched for a length of time; route the second trading order that comprises the remaining quantity to the at least one market center; monitor whether a second trading order is matched within the length of time as soon as the second trading order is routed to the at least one market center and wherein the processor is directed to notify, via an electronic timer operable by the processor, when a timeout after a predetermined amount of time lapses at which the second trading order is cancelled; in response to determining that the second trading order will exceed the length of time for a fee, cancel the second trading order and submit a third trading order that comprises the remaining quantity to the at least one market center.

In accordance with one embodiment of the present invention, a system for routing a trading order to a market center comprises a memory and a processor. The memory stores a trading order specifying a trading product. The processor determines a plurality of market center prices for the trading product, each market center price associated with at least one of a plurality of market centers. The processor selects one of the plurality of market centers based upon the determined market center prices. The processor further determines a disclosure policy for the selected market center and routes the trading order to the selected market center according to the determined disclosure policy.

In accordance with another embodiment of the present invention, a system for routing a trading order to a market center according to price comprises a memory and a processor. The memory stores policy information, cost information, and rebate information associated with a plurality of market centers. The processor receives a trading order specifying a trading product, a plurality of market center prices for the trading order, and best price information for the trading product. The processor

adjusts at least one market center price according to the policy information of the corresponding market center and the best price information. The processor also adjusts at least one market center price according to at least one of the cost information and the rebate information of the corresponding market center. The processor then compares the plurality of market center prices, and selects a particular market center based at least in part upon the comparison.

In accordance with another embodiment of the present invention, a system for controlling the disclosure of a trading order comprises a memory and a processor. The memory stores disclosure policies associated with market centers. The processor receives a trading order for a trading product that specifies a total quantity of the trading product and a maximum disclosure quantity of the trading product. The trading order is associated with a particular market center. The processor then routes the trading order to the particular market center according to the disclosure policy associated with the particular market center.

In accordance with another embodiment of the present invention, a system for avoiding transaction costs associated with trading orders comprises a memory and a processor. The memory stores an order identifier associated with a trading order, and a time threshold associated with the trading order. The processor monitors the length of time the trading order is active with a market center that is processing the trading order. The processor further determines a timeout when the length of time the trading order is active with the market center equals or exceeds the time threshold. The

processor then communicates a cancel instruction for the trading order in response to determining the timeout.

In accordance with another embodiment of the present invention, a system for matching trading orders comprises a memory and a processor. The memory stores a plurality of bid requests for a trading product, each bid request is associated with at least one of a trader and a market center, a bid quantity for the trading product, and a bid price for the trading product. The processor receives a trading order specifying an offer request for the trading product, the trading order further specifying an offer quantity for the trading product and a target offer price for the trading product. The processor identifies at least one of the plurality of bid requests having a bid price that is greater than or equal to the target offer price. The processor then matches the offer request of the trading order with the at least one identified bid request if the identified bid request is associated with a trader, and routes the trading order to a particular market center if the at least one identified bid request is associated with the particular market center.

In accordance with still another embodiment of the present invention, a system for matching trading orders comprises a memory and a processor. The memory stores a plurality of offer requests for a trading product, each offer request associated with at least one of a trader and a market center, an offer quantity for the trading product, and an offer price for the trading product. The processor receives a trading order specifying a bid request for the trading product, the trading order further specifying a bid quantity for the trading product and a target bid price for the trading product. The processor identifies at least one of the plurality of

offer requests having an offer price that is less than or equal to the target bid price. The processor then matches the bid request of the trading order with the at least one identified offer request if the identified offer request is associated with a trader, and routes the trading order to a particular market center if the at least one identified offer request is associated with the particular market center.

Various embodiments of the present invention may benefit from numerous advantages. It should be noted that one or more embodiments may benefit from some, none, or all of the advantages discussed below.

In general, the system of the present invention optimizes the processing of trading orders by internally matching trading orders within a trading exchange platform, filling trading orders using market centers, avoiding transaction costs associated with market centers, routing trading orders to particular market centers based upon the best achievable price, and controlling the disclosure of certain details of a trading order to market centers.

Other advantages will be readily apparent to one having ordinary skill in the art from the following figures, descriptions, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and its advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 illustrates one embodiment of a trading system in accordance with the present invention;

FIGURE 2 illustrates one embodiment of a pricing module of the system of FIGURE 1;

FIGURE 3 illustrates a table of information used by the pricing module;

FIGURE 4 illustrates a flowchart of an exemplary method for routing trading orders according to price;

FIGURE 5 illustrates one embodiment of a cost avoidance module of the system of FIGURE 1;

FIGURES 6A-6B illustrate a flowchart of an exemplary method for avoiding transaction costs;

FIGURE 7 illustrates a table of information used by the cost avoidance module;

FIGURE 8 illustrates one embodiment of a size disclosure module of the system of FIGURE 1;

FIGURE 9 illustrates a table of information used by the cost avoidance module;

FIGURE 10 illustrates a flowchart of an exemplary method for controlling the size disclosure of a trading order;

FIGURE 11 illustrates one embodiment of an order matching module;

FIGURE 12 illustrates an order matching log used by the order matching module; and

FIGURE 13 illustrates a flowchart of an exemplary method for performing order matching.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS OF THE INVENTION

FIGURE 1 illustrates one embodiment of a trading system 10 that includes a trading exchange platform 12 coupled to a variety of clients 14 using network 16 and further coupled to market centers 18. In general, system 10 optimizes the processing of trading orders 20 by

internally matching trading orders 20 within trading exchange platform 12, filling trading orders 20 using market centers 18, avoiding transaction costs associated with market centers 18, routing trading orders 20 to particular market centers 18 based upon the best achievable price, and controlling the disclosure of certain details of a trading order 20 to market centers 18.

A trading order 20 comprises an order to buy a particular quantity of a particular trading product (e.g., bid request) or an order to sell a particular quantity of a particular trading product (e.g., offer request). The quantity of the trading product to be bought or sold is referred to herein as the "total quantity." Trading order 20 may further specify a "maximum disclosure quantity" which identifies all or a portion of the total quantity that may be disclosed to a market center 18 at any given time. In particular embodiments, a trading order 20 may also specify a target price (e.g., target bid price and target offer price) for the trading product. Although the following description of system 10 is detailed with respect to trading equities, the trading product that forms the basis of a given trading order 20 may comprise any type of goods, services, financial instruments, commodities, etc. Examples of financial instruments include, but are not limited to, stocks, bonds, and futures contracts.

Clients 14 comprise any suitable local or remote end-user devices that may be used by traders to access one or more elements of trading system 10, such as trading exchange platform 12. For example, a client 14 may comprise a computer, workstation, telephone, an Internet browser, an electronic notebook, a Personal

Digital Assistant (PDA), a pager, or any other suitable device (wireless or otherwise), component, or element capable of receiving, processing, storing, and/or communicating information with other components of system 10. A client 14 may also comprise any suitable interface for a trader such as a display, a microphone, a keyboard, or any other appropriate terminal equipment according to particular configurations and arrangements. It will be understood that there may be any number of clients 14 coupled to network 16. Although clients 14 are described herein as being used by "traders," it should be understood that the term "trader" is meant to broadly apply to any user of trading system 10, whether that user is an agent acting on behalf of a principal, a principal, an individual, a legal entity (such as a corporation), or any machine or mechanism that is capable of placing and/or responding to trading orders 20 in system 10.

Network 16 is a communication platform operable to exchange data or information between clients 14 and trading exchange platform 12. Network 16 represents an Internet architecture in a particular embodiment of the present invention, which provides traders operating clients 14 with the ability to electronically execute trades or initiate transactions to be delivered to exchange platform 12. Network 16 could also be a plain old telephone system (POTS), which traders could use to perform the same operations or functions. Such transactions may be assisted by a broker associated with exchange platform 12 or manually keyed into a telephone or other suitable electronic equipment in order to request that a transaction be executed. In other embodiments, network 16 could be any packet data network (PDN) offering a communications interface or exchange

between any two nodes in system 10. Network 16 may further comprise any combination of local area network (LAN), metropolitan area network (MAN), wide area network (WAN), wireless local area network (WLAN), virtual private network (VPN), intranet, or any other appropriate architecture or system that facilitates communications between clients 14 and exchange platform 12.

Market centers 18 comprise all manner of order execution venues including exchanges, Electronic Communication Networks (ECNs), Alternative Trading Systems (ATSs), market makers, or any other suitable market participants. Each market center 18 maintains a bid and offer price in a given trading product by standing ready, willing, and able to buy or sell at publicly quoted prices, also referred to as market center prices.

Trading exchange platform 12 is a trading architecture that facilitates the routing, matching, and otherwise processing of trading orders 20. Exchange platform 12 may comprise a management center or a headquartering office for any person, business, or entity that seeks to manage the trading of orders 20. Accordingly, exchange platform 12 may include any suitable combination of hardware, software, personnel, devices, components, elements, or objects that may be utilized or implemented to achieve the operations and functions of an administrative body or a supervising entity that manages or administers a trading environment. In the particular embodiment described herein, trading exchange platform 12 includes a number of interfaces, modules and databases that are executed to support the order processing activities of system 10.

Client interface 30 coupled to network 16 supports communication between clients 14 and the various components of exchange platform 12. In a particular embodiment, client interface 30 comprises a transaction server that receives trading orders 20 communicated by clients 14.

Order handling module 32 is coupled to client interface 30 and performs a number of order handling tasks within exchange platform 12. In particular, order handling module 32 records trading orders 20 in database 50 and routes trading orders 20 to various other modules or interfaces within exchange platform 12 for further processing. Market center interface 34 supports communication between exchange platform 12 and market centers 18.

Different market centers 18 provide different market center prices for particular trading products. For example, a particular market center 18 may offer a particular bid price and/or offer price for a particular trading product, while another market center 18 may offer a different bid price and/or offer price for the same trading product. Pricing module 38 selects a particular market center 18 to which to route a particular trading order 20 based upon the best market center price that may be obtained for the particular trading order 20, as described in greater detail with reference to FIGURES 2-4. In particular embodiments, pricing module 38 adjusts the market center prices of trading products according to cost information, rebate information, and/or best price information associated with market centers 18, prior to selecting a particular market center 18, as described in greater detail below.

Particular market centers 18 charge a transaction cost in order to execute a trading order 20 that remains in their order book for more than a certain length of time. Cost avoidance module 40 manages trading orders 20 that are pending with these types of market centers 18 in order to avoid these transaction costs, as described in greater detail with reference to FIGURES 5-7.

Different market centers 18 have adopted different policies regarding the disclosure to market makers of various details of a trading order 20, such as, for example, the size of a trading order 20. Size disclosure module 42 manages the disclosure of various details of a trading order 20 to market centers 18 based upon the disclosure policies adopted by those market centers 18, as described in greater detail with reference to FIGURES 8-10.

Order matching module 44 internalizes the matching of trading orders 20 within trading exchange platform 12, as described in greater detail with reference to FIGURES 11-13. In this regard, order matching module 44 may match an incoming trading order 20 specifying a bid request for a trading product with one or more stored offer requests for the trading product. Similarly, order matching module 44 may match an incoming trading order 20 specifying an offer request for a trading product with one or more stored bid requests for the trading product.

Each module described above with reference to trading exchange platform 12 comprises any suitable combination of hardware and software to provide the described function or operation of the module. For example, modules may include program instructions and associated memory and processing components to execute the program instructions. Also, modules illustrated in

FIGURE 1, and the operation associated therewith, may be separate from or integral to other modules. Furthermore, each of modules 38, 40, 42, and 44 may operate in conjunction with each other or on a stand-alone basis according to particular needs and desires.

Database 50 comprises one or more files, lists, tables, or other arrangements of information stored in one or more components of random access memory (RAM), read only memory (ROM), magnetic computer disk, CD-ROM, or other magnetic or optical storage media, or any other volatile or non-volatile memory devices. Although FIGURE 1 illustrates database 50 as internal to trading exchange platform 12, it should be understood that database 50 may be internal or external to components of system 10, depending on particular implementations. Also, database 50 illustrated in FIGURE 1 may be separate or integral to other databases to achieve any suitable arrangement of databases for use in system 10. Database 50 stores trading orders 20 and associated order identifiers 52 (e.g., internal order identifiers and external order identifiers), time thresholds 54, and order status information 56, as well as information 58 associated with market centers 18 (e.g., best price policy information, cost information, rebate information, disclosure policy information), and an order matching log 60.

It should be noted that the internal structure of trading exchange platform 12, and the interfaces, modules, and databases associated therewith, is malleable and can be readily changed, modified, rearranged, or reconfigured in order to achieve its intended operations.

Price server 70 provides pricing information to trading exchange platform 12. The pricing information may include market center prices, best bid prices (e.g.,

highest price a market center 18 is willing to pay for buying a trading product), and best offer prices (e.g., lowest price a market center 18 is willing to receive for selling a trading product). The best bid prices and the best offer prices are collectively referred to as best price information. In particular embodiments, price server 70 receives pricing information from market centers 18. In other embodiments, price server 70 receives pricing information from one or more market data vendors 72.

PRICING MODULE

FIGURE 2 illustrates one embodiment of pricing module 38 coupled to database 50 and price server 70. Pricing module 38 is illustrated separate from other elements of trading exchange platform 12 and system 10 for illustrative purposes only, and it should be understood that pricing module 38 may interoperate with one or more other components of system 10 to perform the operations described herein. Where appropriate, FIGURE 3 will be referred to in order to clarify various operations performed by pricing module 38.

Pricing module 38 receives a trading order 20 that comprises an order to buy a particular quantity of a particular trading product (e.g., bid request) or an order to sell a particular quantity of a particular trading product (e.g., offer request). However, the trading order 20 is unspecified as to which market center 18 it is to be routed. Pricing module 38 identifies particular market centers 18 to which the trading order 20 may potentially be routed. Referring to FIGURE 3 that illustrates a table 100, for example, pricing module 38 may identify five market centers 18 that could

potentially match the trading order 20 received by pricing module 38. As illustrated in table 100, the eligible market centers 18 could include: ARCA, ISLD, NITE, MWSE, and BRUT.

Referring back to FIGURE 2, pricing module 38 receives from price server 70 market center prices 102 for the trading product underlying the trading order 20. As illustrated in table 100, the market center prices 102 may be formatted as: bid price X offer price. The market center prices 102 may be valid for some or all of the specified quantity of the trading product underlying the trading order 20. Moreover, each market center 18 may have a different market center price 102 for the particular trading product.

Pricing module 38 also receives from price server 70 a best price 104 for the trading product. Best price 104 represents the best bid price 104 and best offer price 104 that is available for the trading product among all market centers 18. For example, the best bid price 104 comprises the highest price that any market center 18 is willing to pay when buying the trading product. The best offer price 104 comprises a lowest price that any market center 18 is willing to receive when selling the trading product. For the example described herein, the best price 104 for the trading product is 9.500 X 10.000 at BRUT X BRUT.

Pricing module 38 performs one or more adjustments to market center prices 102 according to market center information 58 and best price 104. The market center information 58 may include a best price policy 106, cost information 108, and rebate information 110. The best price policy 106 of each market center 18 indicates what that market center 18 will do in response to the best

price 104. For example, the market center 18 may match the best price 104, split the best price 104, or disregard the best price 104. The cost information 108 specifies a transaction cost charged by a particular market center 18 for processing the trading order 20. The rebate information 110 specifies a transaction rebate credited by a particular market center 18 for processing the trading order 20. Therefore, pricing module 38 adjusts market center prices 102 according to these factors to determine an adjusted market center price 112 for each market center 18.

Referring to table 100, for example, pricing module 38 receives a market center price 102 of 9.250 X 10.010 for ARCA and determines that ARCA disregards best price 104, charges $0.003 as a transaction cost, and does not rebate anything for processing the trading order 20. Pricing module therefore determines that the adjusted market center price 112 for ARCA is 9.247 X 10.013.

With respect to ISLD, pricing module 38 receives a market center price 102 of 9.260 X 10.020 and determines that ISLD disregards best price 104, does not charge a transaction cost, and rebates $0.003 for processing the trading order 20. Pricing module therefore determines that the adjusted market center price 112 for ISLD is 9.263 X 10.017.

With respect to NITE, pricing module 38 receives a market center price 102 of 9.000 X 10.050 and determines that NITE matches best price 104, which is 9.500 X 10.000. By matching best price 104, pricing module 38 sets the bid price 102 of NITE to the best bid price 104 of 9.500, and sets the offer price 102 of NITE to the best offer price 104 of 10.000. Pricing module 38 determines that NITE neither charges a transaction cost

nor credits a transaction rebate for processing trading order 20. As a result, pricing module 38 determines that the adjusted market center price 112 for NITE is 9.500 X 10.000.

With respect to MWSE, pricing module 38 receives a market center price 102 of 9.000 X 10.060 and determines that MWSE splits best price 104, which is 9.500 X 10.000. By splitting best price 104, pricing module 38 sets the bid price 102 and offer price 102 of MWSE to the average of the best bid price 104 and best offer price 104, which is 9.750. Pricing module 38 determines that MWSE charges $0.001 as a transaction cost but does not rebate anything for processing the trading order 20. As a result, pricing module 38 determines that the adjusted market center price 112 for MWSE is 9.749 X 9.751.

With respect to BRUT, pricing module 38 receives a market center price 102 of 9.500 X 10.000, determines that BRUT disregards best price 104, charges $0.004 as a transaction cost, and does not rebate anything for processing the trading order 20. Pricing module therefore determines that the adjusted market center price 112 for BRUT is 9.496 X 10.004.

Based upon the adjusted market center prices 112 and the side of the trading order 20 that pricing module 38 is processing (e.g., bid or offer), pricing module 38 compares market center prices 112 and identifies the market centers 18 where the best market center price 112 is available. For example, if the trading order 20 specified a bid request for a trading product, the pricing module 38 identifies the market centers 18 offering the lowest offer price 112 for the trading product. In this regard, pricing module 38 selects MWSE associated with an offer price 112 of 9.751, and routes

trading order 20 to MWSE. If the trading order 20 specified an offer request for the trading product, the pricing module 38 identifies the market centers 18 offering the highest bid price 112 for the trading product. In this regard, pricing module 38 selects MWSE associated with a bid price 112 of 9.749, and routes trading order 20 to MWSE.

Although market center prices 102 are described above as being adjusted in response to best price 104 and best price policy 106, cost information 108, and rebate information 110, it should be understood that pricing module 38 may adjust market center prices 102 according to some or all of those factors to determine market center prices 112. For example, pricing module 38 may adjust market center prices 102 according to best price 104 and best price policy 106 but not according to cost information 108 or rebate information 110. Moreover, pricing module 38 may adjust market center prices 102 according to cost information 108 and/or rebate information 110 but not according to best price 104 and best price policy 106.

FIGURE 4 illustrates a flowchart 150 of an exemplary method for routing trading orders 20 to market centers 18 according to price. The method begins at step 152 where pricing module 38 receives a trading order 20. Pricing module 38 receives market center prices 102 for the trading product underlying the trading order 20, at step 154. Pricing module 38 determines whether an adjustment to market center prices 102 is to be made according to best price at step 156. If so, execution proceeds to step 158 where pricing module 38 receives best prices 104. Best prices 104 may include best bid price 104 and/or best offer price 104.

Pricing module 38 determines the best price policy 106 of market centers 18 at step 160. In particular embodiments, best price policy 106 is stored as a part of market center information 58 in database 50. Pricing module 38 adjusts market center prices 102 accordingly at step 162. In particular, if a particular market center 18 disregards best prices 104, then pricing module 38 does not adjust the market center price 102 for that market center 18. If a particular market center 18 matches the best prices 104, then pricing module 38 sets the bid price 102 of that market center 18 to the best bid price 104, and sets the offer price 102 of that market center 102 to the best offer price 104. If a particular market center 18 splits the best prices 104, then pricing module 38 sets the bid price 102 and offer price 102 of that market center 18 to the average of the best bid price 104 and best offer price 104.

Upon adjusting market center prices 102 at step 162, or if it is determined that market center prices 102 are not to be adjusted according to best price 104 at step 156, execution proceeds to step 164 where pricing module 38 determines whether to adjust market center prices 102 according to cost information 108 and/or rebate information 110. If so, execution proceeds to step 166 where pricing module 38 determines cost information 108 and/or rebate information 110 for market centers 18. In particular embodiments, information 108 and 110 is stored as a part of market center information 58 in database 50.

Pricing module 38 adjusts market center prices 102 at step 168. In particular, if a particular market center 18 charges a transaction cost for processing a trading order 20, then pricing module 38 subtracts the transaction cost from the bid price 102 of the particular

market center 18, and adds the transaction cost to the offer price 102 of the particular market center 18. If a particular market center 18 credits a transaction rebate for processing a trading order 20, then pricing module adds the transaction rebate to the bid price 102 of the particular market center 18, and subtracts the transaction rebate from the offer price 102 of the particular market center 18. If pricing module 38 previously adjusted market center prices 102 at step 162, then at step 168 pricing module 38 adjusts the previously adjusted market prices further.

Upon adjusting market center prices 102 at step 168, or if it is determined that market center prices 102 are not to be adjusted according to cost information 108 and/or rebate information 110 at step 164, execution proceeds to step 170 where pricing module 38 compares adjusted market center prices 112. In particular, pricing module 38 identifies the lowest offer price 112 for the trading product if the trading order 20 specifies a bid request. Pricing module 38 identifies the highest bid price 112 for the trading product if the trading order 20 specifies an offer request. If market center prices 102 have not been adjusted at either of steps 162 or 168, then pricing module 38 compares market center prices 102 at step 170.

Execution proceeds to step 172 where pricing module 38 selects a market center 18 based upon the comparison performed at step 170. In particular, pricing module 38 identifies each of the market centers 18 that offer the lowest offer price 112 and/or the highest bid price 112. If more than one market center 18 qualifies, then pricing module 38 may select a particular one market center 18

according to a pre-established priority ranking of market centers 18, or according to other decision factors.

In certain instances, more than one market center 18 may offer the lowest offer price 112 or the highest bid price 112. In those instances, module 38 may identify those market centers 18 that offer the lowest offer price 112 or highest offer price 112 for a quantity of the trading product that is at least as much as a quantity specified by trading order 20. Module 38 then selects one of the identified market centers 18.

Trading exchange platform 12 routes the trading order 20 to the selected market center 18 at step 174. In particular embodiments, other modules of trading exchange platform 12 will perform processing of the trading order 20 either before or after the operation of pricing module 38. Therefore, it should be understood that other modules associated with exchange platform 12, or even market center interface 34, may route the trading order 20 to the selected market center 18 on behalf of pricing module 38. The method terminates at step 176.

It should be understood that the steps described in the flowchart of FIGURE 4, as well as in other flowcharts illustrated herein, may be performed simultaneously and/or in different orders than as shown without departing from the scope of this disclosure.

COST AVOIDANCE MODULE

FIGURE 5 illustrates one embodiment of cost avoidance module 40 coupled to database 50 and price server 70. Cost avoidance module 40 is illustrated separate from other elements of trading exchange platform 12 and system 10 for illustrative purposes only, and it should be understood that cost avoidance module 40 may

interoperate with one or more other components of system 10 to perform the operations described herein.

Cost avoidance module 40 receives information regarding a trading order 20 that is being routed to a selected market center 18. In some instances, the selected market center 18 may charge a transaction cost in order to execute the trading order 20 if it remains on the order book of the selected market center 18 for more than a certain length of time. For example, the NYSE and AMEX do not charge any floor brokerage fees for orders that they are able to execute in under five minutes. However, each charges a fee in order to execute orders that have been in their books for more than five minutes. Information about the identity of the selected market center 18 and the details of the trading order 20 may be received by cost avoidance module 40 from pricing module 38. Information about the amount and timing of the transaction costs charged by the selected market center 18 may be received by cost avoidance module 40 from either or both of pricing module 38 and price server 70.

To avoid these transaction costs, cost avoidance module 40 performs a "cancel and replace" operation. In particular, cost avoidance module 40 monitors the length of time a trading order 20 is active with a market center 18 that charges a transaction cost as described above. Cost avoidance module 40 may begin such monitoring in response to receiving an acknowledgment 200 that the trading order 20 is active with the market center 18. Acknowledgment 200 may be received by cost avoidance module 40 from any suitable component of platform 12 or directly from a particular market center 18.

Cost avoidance module 40 determines a timeout when the length of time the trading order 20 is active with

the market center 18 equals or exceeds an associated time threshold 54. Time threshold 54 specifies a length of time that is a predetermined amount of time, also referred to as buffer time, less than the length of time a particular market center 18 will process a trading order 20 before charging a transaction cost. For example, if a market center 18 charges a transaction cost for maintaining a trading order 20 active in its order book beyond five minutes, then cost avoidance module 40 may determine a timeout when the trading order 20 has been active for four minutes and fifty seconds. In this regard, the time threshold 54 is associated with the market center 18 that is processing the trading order 20.

Any suitable time threshold 54 may be selected in order to provide enough buffer time to cancel and replace a trading order 20 as further described herein. Therefore, although the time threshold 54 is described above as four minutes and fifty seconds in order to maintain a ten second buffer before transaction costs are charged at the five minute mark, an earlier or later time threshold 54 may be selected according to particular needs or desires. For example, in accordance with particular embodiments, the time threshold 54 may be set to thirty seconds (or some other suitable period of time) to automatically perform a cancel / replace operation.

In response to determining a timeout, cost avoidance module 40 communicates a cancel instruction 202 that effectively removes the trading order 20 from active status on the order book of the appropriate market center 18. Cost avoidance module 40 also communicates an order instruction 204 that essentially comprises a new trading order 20 having the same parameters of the trading order 20 that was just canceled. In this regard, the old

trading order 20 is canceled and replaced by a new trading order 20. Cost avoidance module 40 maintains order identifiers 52 (e.g., internal order identifier and external order identifier) in order to manage the cancel and replace operations described above.

Cancel instruction 202 and order instruction 204 may each be communicated to one or more components of trading exchange platform 12, such as market center interface 34, for eventual communication to the appropriate market center 18. Alternatively, either or both of instructions 202 and 204 may be communicated directly from cost avoidance module 40 to the appropriate market center 18. In a particular embodiment, instructions 202 and 204 may be communicated substantially simultaneously, or even in the same message.

Although the cancel and replace operation described above causes the initial trading order 20 to lose its position in the order book of the market center 18, it reduces transaction costs charged by the market center 18.

FIGURES 6A-6B illustrate a flowchart 210 of an exemplary method for avoiding transaction costs during the processing of trading orders 20 by market centers 18. Where appropriate, FIGURE 7 will be referred to in order to clarify various operations performed by cost avoidance module 40. The method begins at step 212 where cost avoidance module 40 receives information about a particular trading order 20. The information may include the parameters of the trading order 20, the identity of the particular market center 18 to which the trading order 20 is being routed, and an indication that this market center 18 charges a transaction cost in order to

execute the trading order 20 if it remains on the order book for more than a certain length of time.

Cost avoidance module 40 determines a time threshold 54 at step 214. Execution proceeds to steps 216 and 218 where cost avoidance module 40 sets an external order identifier 52a and an internal order identifier 52b for the trading order 20, respectively. Cost avoidance module 40 sets order status 56 to pending at step 220. Referring to table 206 of FIGURE 7, for example, cost avoidance module 40 sets external order identifier 52a and internal order identifier 52b to "1", as indicated in row 208a. Cost avoidance module 40 further determines the time threshold 54 to be "4:50", and sets the order status to "P" for pending.

Referring back to flowchart 210, cost avoidance module 40 receives an acknowledgment 200 at step 222. Acknowledgment 200 indicates that the trading order 20 is active with the market center 18. Module 40 starts a timer at step 224 to begin monitoring the length of time the trading order 20 is active with the market center 18. Module 40 sets the order status 56 for the trading order 20 to active at step 226, as indicated in row 208b of table 206.

Cost avoidance module 40 determines whether the order 20 has been filled by the market center 18 at step 228. In one embodiment, cost avoidance module 40 receives a message indicating that the order 20 has been filled. This message identifies the order 20 using the internal order identifier 52b.

If the order has not been filled, as determined at step 228, execution proceeds to step 230 where cost avoidance module 40 determines whether the order 20 has been canceled. In one embodiment, cost avoidance module

40 receives a message, such as a cancel request generated by a trader, requesting that the order 20 be canceled. This message identifies the order 20 using the external order identifier 52a.

If the order has not been canceled, as determined at step 230, execution proceeds to step 232 where cost avoidance module 40 determines whether the order 20 has been terminated. In one embodiment, cost avoidance module 40 receives a message, such as a "UR OUT" message, indicating that the order 20 has been terminated. This message identifies the order 20 using the internal order identifier 52b.

If the order has not been terminated, as determined at step 232, execution proceeds to step 234 where cost avoidance module 40 determines whether a timeout has occurred. In particular, module 40 determines a timeout when the length of time the trading order 20 is active with the market center 18, as measured for example by the timer that is started at step 224, equals or exceeds the time threshold 54 determined at step 214. If a timeout has not occurred as determined at step 234, execution returns to step 228. If a timeout has occurred as determined at step 234, execution proceeds to step 236.

At step 236, cost avoidance module 40 sets order status 56 to pending, as indicated in row 208c of table 206. Module 40 sends cancel instruction 202 at step 238 and sends order instruction 204 at step 240. Although flowchart 210 illustrates instructions 202 and 204 being sent sequentially in time, it should be understood that they may be sent at substantially the same time and/or in a single message or communication. Cancel instruction 202 effectively removes the trading order 20 from active status on the order book of the market center 18. Order

instruction 204 essentially comprises a new trading order 20 having the same parameters of the trading order 20 that was just canceled. In this regard, the cost avoidance module 40 performs a "cancel and replace" operation.

Cost avoidance module 40 assigns a new internal order identifier 52b to be associated with the new trading order 20. Referring to row 208d of table 206, the new internal order identifier 52b is "2" and it is cross-referenced with the original external order identifier 52a of "1". Execution returns to step 220 where module 40 sets the order status 56 to pending.

Upon receiving an acknowledgment 200 associated with the new trading order 20 at step 222, module 40 starts a timer at step 224 and sets the order status 56 to active at step 226. In this regard, module 40 begins monitoring the length of time that the new trading order 20 is active in the order book of the market center 18. Row 208e of table 206 indicates that the new trading order 20 has an order status 56 of active.

Execution again proceeds through steps 228, 230, and 232 in order to determine whether an order has been filled, canceled, or terminated. If it is determined at step 228 that the trading order 20 has been filled, such as, for example, in response to a message from market center 18 indicating that the order 20 is filled, then execution proceeds to step 250. At step 250, module 40 identifies the internal order identifier 52b associated with the filled order 20. As described above, identifier 52b may be specified by the message from market center 18 indicating that the order 20 is filled. At step 252, module 40 determines the external order identifier 52a that is associated with the internal order identifier

52b identified at step 250. For example, module 40 may refer to row 208e of table 206 in order to determine the appropriate cross-reference between external order identifier 52a and internal order identifier 52b. Module 40 sends a status message for communication to the trader indicating that the order 20 is filled, at step 254. The status message uses the external order identifier 52a in order to identify the trading order 20 to the trader. Execution terminates at step 280.

If it is determined at step 230 that the trading order 20 has been canceled, such as, for example, in response to a message from a trader requesting that the order 20 be canceled, then execution proceeds to step 260. At step 260, module 40 identifies the external order identifier 52a associated with the canceled order 20. As described above, identifier 52a may be specified by the message from the trader requesting that the order 20 be canceled. At step 262, module 40 determines the internal order identifier 52b that is associated with the external order identifier 52a identified at step 260. For example, module 40 may refer to row 208e of table 206 in order to determine the appropriate cross-reference between external order identifier 52a and internal order identifier 52b. Module 40 sends a cancel instruction 202 for communication to the market center 18, at step 264. Cancel instruction 202 effectively removes the trading order 20 from active status on the order book of the market center 18. The cancel instruction 202 uses the internal order identifier 52b in order to identify the trading order 20 to the market center 18. Execution terminates at step 280.

If it is determined at step 232 that the trading order 20 has been terminated, such as, for example, in

response to a message from market center 18 indicating that some or all of the order 20 is terminated, then execution proceeds to step 270. At step 270, module 40 identifies the internal order identifier 52b associated with the terminated order 20. As described above, identifier 52b may be specified by the message from market center 18 indicating that the order 20 is terminated. At step 272, module 40 determines the external order identifier 52a that is associated with the internal order identifier 52b identified at step 270. For example, module 40 may refer to row 208e of table 206 in order to determine the appropriate cross-reference between external order identifier 52a and internal order identifier 52b. Module 40 sends a status message for communication to the trader indicating that some or all of the order 20 is terminated, at step 274. The status message uses the external order identifier 52a in order to identify the trading order 20 to the trader. Execution terminates at step 280.

SIZE DISCLOSURE MODULE

FIGURE 8 illustrates one embodiment of size disclosure module 42 coupled to database 50. Size disclosure module 42 is illustrated separate from other elements of trading exchange platform 12 and system 10 for illustrative purposes only, and it should be understood that size disclosure module 42 may interoperate with one or more other components of system 10 to perform the operations described herein. Where appropriate, table 300 of FIGURE 9 will be referred to in order to clarify various operations performed by size disclosure module 42.

Traders that submit large trading orders 20 may not wish for all market participants to view the total size of their orders 20 but are unlikely to want to enter a series of smaller orders 20. Size disclosure module 42 addresses this problem by allowing a trader to specify in a trading order 20 a total quantity of a trading product to buy or sell as well as a maximum disclosure quantity of the trading product to display to the market participants at any one time. Size disclosure module 42 determines the size of the trading order 20 to disclose to particular market centers 18 based at least in part upon the disclosure policies of those market centers 18, as described more fully herein.

Referring to FIGURE 9 that illustrates a table 300, for example, size disclosure module 42 may identify the disclosure policies 302 of different market centers 18. As illustrated in table 300, the market centers 18 could include at least three different disclosure policies 302: PROP, IOC, and NOIOC.

PROP

A market center that has a disclosure policy 302 of "PROP" has a proprietary reserve capability whereby the market center 18 allows trading exchange platform 12 to send reserve trading orders 20. Reserve trading orders 20 are orders that specify the total quantity of the trading product to be traded (e.g., total number of shares of a stock to be bought or sold), and the maximum disclosure quantity of the trading product to be disclosed to the public at any one time (e.g., maximum number of shares of a stock to publicly disclose as being bought or sold). These market centers 18 will fill up to the total quantity but will not disclose more than the

maximum disclosure quantity specified in the reserve trading order 20.

Many market centers 18 do not support a proprietary reserve capability. Moreover, the best price 104 available for the trading order 20 may be at a market center 18 that does not provide a proprietary reserve capability. Therefore, size disclosure module 42 is able to control the size disclosure of a trading order 20 even when the market center 18 does not offer a proprietary reserve capability.

IOC

A market center 18 that has a disclosure policy 302 of "IOC" does not disclose IOC orders 20 to market participants. An IOC order 20 comprises an order that the market center 18 attempts to fill immediately, on a best efforts basis, and cancels what portion they are not able to fill immediately. In this regard, "IOC" stands for Immediate Or Cancel. With regard to these market centers 18, size disclosure module 42 initially communicates an IOC trading order 20 specifying a total quantity of the trading product. The market center 18 may or may not fill the entire IOC trading order 20, but will respond accordingly.

For example, if the trading order 20 received by module 42 specifies a total quantity of 50,000 shares of stock X and a maximum disclosure quantity of 10,000 shares of stock X, then the IOC trading order 20 communicated by module 42 may comprise: "BUY 50,000 shares of stock X," and the response from the market center may be, for example: "BOUGHT 2,000 shares of stock X; UR OUT 48,000 shares of stock X." The "UR OUT" portion of the response is shorthand notation indicating that the market center 18 has released the trader from

the legal liability associated with having placed an order 20 in their order book.

If the response from the market center 18 contains a "UR OUT" message, as above, size disclosure module 42 communicates a DAY order 20 for the lesser of the maximum disclosure quantity (e.g., 10,000 shares of stock X) and the remaining quantity for the order 20 (e.g., 48,000 shares of stock X). A DAY order 20 comprises an order that remains on the order book of the market center 18 for the remainder of the current trading day, or until it is canceled or filled. Therefore, the DAY order 20 may comprise: "BUY 10,000 shares of stock X."

When the DAY order 20 is completely filled, size disclosure module 42 communicates another IOC order 20 for the remaining quantity of the trading order 20 (e.g., 38,000 shares of stock X). The process of alternating the communication of IOC orders 20 and DAY orders 20 to the market center 18 is repeated until either the trader cancels the order 20 or the order 20 is completely filled.

NOIOC

A market center 18 that has a disclosure policy 302 of "NOIOC" discloses IOC orders 20 to market participants. With regard to these market centers 18, size disclosure module 42 communicates a DAY order 20 for the maximum disclosure quantity. When the DAY order 20 is completely filled, module 42 sends another DAY order 20 for the lesser of the specified maximum disclosure quantity and the remaining quantity of the trading order 20. This process of sending DAY orders 20 is repeated until either the trader cancels the order 20 or the order 20 is completely filled.

FIGURE 10 illustrates a flowchart 310 of an exemplary method for controlling size disclosure of trading orders 20 to market centers 18. The method begins at step 312 where size disclosure module 42 receives trading order 20 that specifies a total quantity of a trading product and a maximum disclosure quantity of the trading product. Trading order 20 may be received from any suitable component of trading exchange platform 12 and specifies a particular market center 18 to which it is to be routed. Size disclosure module 42 identifies the particular market center 18 at step 314 and determines the disclosure policy 302 associated with the identified market center 18 at step 316 using, for example, table 300.

Depending upon the type of disclosure policy 302 adopted by the identified market center 18, size disclosure module 42 performs a number of operations. Module 42 determines whether the disclosure policy 302 is a proprietary reserve policy at step 318. If so, execution proceeds to step 320 where module 42 sends a reserve order 20 specifying the total quantity of the trading product to be bought (or sold) and the maximum disclosure quantity of the trading product. The reserve order 20 may be sent to the market center 18 identified at step 314 by module 42 or by any suitable component of trading exchange platform 12 on behalf of module 42. This is the case with all such communications, such as trading orders 20, sent by module 42. Execution terminates at step 344.

If it is determined at step 318 that the disclosure policy 302 of the identified market center 18 is not a proprietary reserve policy, execution proceeds to step 322 where module 42 determines whether the disclosure

policy 302 of the identified market center 18 is an IOC policy. If so, execution proceeds to step 324 where module 42 sends an IOC order 20 specifying the total quantity of the trading product to be bought (or sold). Module 42 receives a response at step 326 and if it is determined at step 328 that the response does not contain a "UR OUT" message, then the entire IOC order 20 was filled by the market center 18 and execution terminates at step 344.

If the response received at step 326 does indeed contain a "UR OUT" message as determined at step 328, then execution proceeds to step 330 where module 42 sends a DAY order 20 specifying the lesser of the maximum disclosure quantity and the remainder of the total quantity of the trading order 20 received at step 312. The DAY order 20 remains pending at the market center 18 until it is determined at step 332 that it has been filled. Execution then proceeds to step 334 where module 42 sends another IOC order 20 specifying the remainder of the total quantity of the trading order 20 received at step 312. Execution then returns to step 326. Steps 326 through 334 are repeated until the entire trading order 20 is filled, as determined by not receiving a "UR OUT" message at step 328.

If it is determined at step 322 that the disclosure policy 302 of the identified market center 18 is not an IOC policy, execution proceeds to step 336 where module 42 determines whether the disclosure policy 302 of the identified market center 18 is an NOIOC policy. If so, execution proceeds to step 338 where module 42 sends a DAY order 20 specifying the maximum disclosure quantity of the trading product to be bought (or sold). The DAY order 20 remains pending at the market center 18 until it

is determined at step 340 that it has been filled. Execution then proceeds to step 342 where module 42 sends another DAY order 20 specifying the lesser of the maximum disclosure quantity and the remainder of the total quantity of the trading order 20 received at step 312. Execution terminates at step 344.

ORDER MATCHING MODULE

FIGURE 11 illustrates one embodiment of order matching module 44 coupled to database 50 and price server 70. Order matching module 44 is illustrated separate from other elements of trading exchange platform 12 and system 10 for illustrative purposes only, and it should be understood that order matching module 44 may interoperate with one or more other components of system 10 to perform the operations described herein. Where appropriate, FIGURE 12 will be referred to in order to clarify various operations performed by order matching module 44.

Order matching module 44 receives a trading order 20 that comprises an order to buy a particular quantity of a particular trading product (e.g., bid request) at a target bid price, or an order to sell a particular quantity of a particular trading product (e.g., offer request) at a target offer price. However, the trading order 20 is unspecified as to which market center 18 it is to be routed. For example, order matching module may receive a trading order 20 from Trader 1 that comprises an order to sell 100,000 shares of XYZ stock at a target price of 9.98.

Order matching module 44 manages an order matching log 60 stored in database 50 in order to match the incoming trading order 20 with one or more stored requests for the trading product. Referring to FIGURE 12

that illustrates log 60, for example, order matching module 44 may match an incoming trading order 20 specifying an offer request, such as the one identified above, with one or more stored bid requests for the trading product illustrated in columns 404. Similarly, order matching module 44 may match an incoming trading order 20 specifying a bid request for a trading product with one or more stored offer requests for the trading product illustrated in columns 406.

Entries in columns 404 comprise information associated with stored bid requests such as product 410, bid quantity 412, source 414, bid price 416, and status 418. Entries in columns 406 comprise information associated with stored offer requests such as product 420, offer quantity 422, source 424, offer price 426, and status 428. Product 410 and 420 refers to a particular trading product, such as XYZ stock, that may be the subject of a trade. Bid quantity 412 and offer quantity 422 refer to the amount of the trading product that is being sought to buy or being offered for sale, respectively. Source 414 and 424 refers to the party seeking to buy or sell the trading product, such as a particular market center 18 or a particular trader operating within system 10. Price 416 and 426 refers to bid price and offer price, respectively, that may be unadjusted prices 102 or adjusted prices 112. Status 418 and 428 refers to the status of a particular bid request or offer request, respectively.

Upon receiving trading order 20 from Trader 1 specifying an order to sell 100,000 shares of XYZ stock at a target price of 9.98, order matching module 44 refers to columns 404 associated with stored bid requests for XYZ stock in order to find a match. In general,

order matching module 44 seeks to fill the trading order 20 in a manner that will result in the best price for the traders involved. In this regard, order matching module 44 seeks entries in columns 404 identifying the highest bid price 416 for XYZ stock.

Each of Trader 2 and Trader 3 have submitted a bid request for XYZ stock at a bid price 416 of 10.02 which is higher than Trader 1's target offer price of 9.98. In the event multiple traders have submitted a trading request at the same bid price (or offer price), such as the case with Trader 2 and Trader 3, order matching module 44 fills the bid requests (or offer requests) in a particular order depending on one or more of the bid quantity (or offer quantity) of each request, the order that each request was received, the identity of the trader, or any other suitable factor used to prioritize among traders. Order matching module 44 may fill the bid/offer request of a trader ahead of the bid/offer request of a market center 18 having the same bid price or offer price in order to promote liquidity and reduce transaction costs.

Because the trading order 20 submitted by Trader 1 requested to sell 100,000 shares, each of the bid requests submitted by Trader 2 and Trader 3 are matched, resulting in a first matched trading order between Trader 1 and Trader 2 for 1,000 shares of XYZ stock, and a second matched trading order between Trader 1 and Trader 3 for 2,000 shares of XYZ stock. The price for each of these matched trading orders, referred to as the matched price, is based at least in part upon the bid price 416 of the bid request and the offer price specified by the trading order 20. For example, the matched price may comprise 10.02 (bid price 416 of the bid request), 9.98

(offer price specified by the trading order 20), or any price therebetween such as, 10.00, the average of 9.98 and 10.02. The status of the bid requests associated with Trader 2 and Trader 3 is indicated with a flag, such as "Matched". Alternatively, a bid request that is matched may be removed from log 60 to indicate that it has been matched.

The trading order 20 now has a remaining offer quantity balance of 97,000 shares of XYZ stock (e.g., 100,000 shares - 1,000 shares - 2,000 shares = 97,000 shares). Order matching module 44 determines that ARCA has quoted a bid price 416 of 10.01 for 6,000 shares of XYZ stock, which is higher than Trader 1's target offer price of 9.98. In one embodiment, order matching module 44 therefore routes a trading order 20 to ARCA comprising an order to sell 6,000 shares of XYZ stock at 10.01.

In other embodiments, order matching module 44 determines a quantity of the trading product to route in a trading order 20 to ARCA, also referred to as a market center quantity, based upon the bid quantity quoted by the market center 18 (e.g., 6,000 shares of XYZ stock) and a quantity multiplier associated with the particular market center 18. For example, the quantity multiplier applied by the order matching module 44 for ARCA may be 3X resulting in a trading order 20 routed to ARCA that comprises an offer to sell 18,000 shares of XYZ stock at 10.01. The status 418 of the bid request associated with ARCA is now listed as "Pending" to indicate that the trading order 20 is currently pending with ARCA. In one embodiment, the trading order 20 routed to market centers 18 comprises an IOC trading order 20. In other embodiments, the trading order 20 routed to market

centers 18 comprises a type of order determined by size disclosure module 42.

Order matching module 44 determines the quantity multiplier for each market center 18 based upon a current or recent "fill percentage" associated with the market center 18 for the particular trading product. The "fill percentage" may be determined based upon a moving average of the percentage of shares filled by a market center 18 for a particular trading product at a particular price. In particular embodiments, a 3X quantity multiplier is associated with a fill percentage of 83%.

Assuming order matching module 44 applies a quantity multiplier, trading order 20 now has a remaining offer quantity balance of 79,000 shares of XYZ stock (e.g., 97,000 shares - 18,000 shares = 79,000 shares). Order matching module 44 next determines that ISLD has quoted a bid price 416 of 10.01 for 7,000 shares of XYZ stock, which is higher than Trader 1's target offer price of 9.98. In particular embodiments, order matching module 44 may determine that a particular market center 18 has already received more than a predetermined maximum number of pending trading orders 20 from platform 12. In such a case, platform 12 will not send further trading orders 20 until the current number of pending trading orders 20 associated with that market center 18 falls below the predetermined maximum number allowed. In the example operation described herein, it is assumed that ISLD has exceed the predetermined maximum number of pending trading orders 20 allowed and, therefore, order matching module 44 does not send a trading order 20 to ISLD. The status 418 of the bid request associated with ISLD is therefore listed as "Open".

Order matching module 44 next determines that ARCA has quoted a bid price 416 of 10.00 for 2,000 shares of XYZ stock, which is higher than Trader 1's target offer price of 9.98. In particular embodiments, order matching module 44 may determine that if a particular market center 18 has already received a trading order 20 for a particular trading product, that it will not then send another trading order 20 to that same market center 18 for that same trading product. In other embodiments, order matching module 44 may communicate yet another trading order to the same market center 18 for the same trading product in a quantity equal to the bid quantity 412 or equal to the bid quantity 412 adjusted by the appropriate quantity multiplier. In the example operation described herein, it is assumed that order matching module 44 does not send another trading order 20 to ARCA. The status 418 of the bid request associated with ARCA is therefore listed as "Open".

Order matching module 44 next determines that Trader 4 has submitted a bid request for 50,000 shares of XYZ stock at 10.00, which is higher than Trader 1's target offer price of 9.98. The bid request submitted by Trader 4 is matched with the trading order 20 submitted by Trader 1, resulting in a third matched trading order between Trader 1 and Trader 4 for 50,000 shares of XYZ stock. As described above, the matched price for this matched trading order can be 9.98, 10.00 or any price therebetween. The status 418 of the bid request associated with Trader 4 is listed as "Matched" or, alternatively, the bid request is removed from log 60 to indicate that it has been matched.

The trading order 20 now has a remaining offer quantity balance of 29,000 shares of XYZ stock (e.g.,

79,000 shares - 50,000 shares = 29,000 shares). Order matching module 44 determines that no other bid requests for XYZ stock are stored in log 60. As a result, module 44 stores an offer request in log 60 on behalf of Trader 1 for 29,000 shares of XYZ stock at 9.98.

Although the operation of order matching module 44 has been detailed with reference to matching an offer request with stored bid requests, it should be understood that order matching module 44 may apply similar operational principals in order to match a bid request with stored offer requests.

A particular advantage of order matching module 44 is that it attempts to match incoming trading orders 20 with requests submitted by other traders, where appropriate and possible, so that the order fulfillment process of system 10 is internalized within trading exchange platform 12. When such an order 20 is filled internally within platform 12, order matching module 44 may communicate one or more acknowledgments 402 to the appropriate traders specifying the details of the filled orders. When at least a portion of an incoming trading order 20 is not filled internally, order matching module 44 may communicate one or more trading orders 20 to one or more market centers 18.

FIGURE 13 illustrates a flowchart 450 of an exemplary method for performing order matching. The method begins at step 452 where module 44 receives a trading order 20 comprising an order to buy a particular quantity of a particular trading product at a target bid price, or an order to sell a particular quantity of a particular trading product at a target offer price. Execution proceeds to step 454 where module 44 determines whether a corresponding request can be identified in

order matching log 60. For example, if the trading order 20 comprises an offer request for a particular trading product, then module 44 determines whether a corresponding bid request for the particular trading product may be identified in log 60. If the trading order 20 comprises a bid request for a particular trading product, then module 44 determines whether a corresponding offer request for the particular trading product may be identified in log 60. In particular embodiments where module 44 identifies more than one corresponding request for a particular trading product, execution proceeds with one of the identified requests that have the best price, such as the highest bid price or the lowest offer price.

If a corresponding request is identified at step 454, module 44 determines whether the request is associated with a trader at step 456. If so, execution proceeds to step 458 where module 44 matches the trading order 20 with the request identified at step 454 to form a matched trading order. If a quantity balance of the trading order remains, as determined at step 460, execution returns to step 454 where it is determined whether another corresponding request is identified.

If the request identified at step 454 is not a trader request as determined at step 456, then execution proceeds to step 462 where module 44 determines whether the request is associated with a market center 18. If so, module 44 determines whether the market center 18 has already received more than a predetermined maximum number of pending trading orders 20 from platform 12 at step 464. If so, execution returns to step 454. If not, execution proceeds to step 466 where module 44 determines an appropriate quantity multiplier for the particular

market center 18. Module 44 communicates a trading order 20 bound for the particular market center 18 at step 468.

If a quantity balance of the trading order remains, as determined at step 470, execution returns to step 454 where it is determined whether another corresponding request is identified. If another corresponding request is not identified at step 454, execution proceeds to step 472 where various parameters of the trading order 20 are stored as a request in order matching log 60. For example, if the trading order 20 specified a bid request, then module 44 stores a bid request for the remaining quantity balance in log 60 at step 472. If the trading order 20 specified an offer request, then module 44 stores an offer request for the remaining quantity balance in log 60 at step 472. Upon storing the request at step 472 or upon determining that a quantity balance of trading order 20 does not remain at steps 460 or 470, execution proceeds to step 474 where the method terminates.

Although the present invention has been described in several embodiments, a myriad of changes and modifications may be suggested to one skilled in the art, and it is intended that the present invention encompass such changes and modifications as fall within the scope of the present appended claims.

CLAIMS:

1. A method comprising:

receiving, from a remote device via a processor within a trading exchange platform, a first trading order that comprises a desired quantity and a desired price, in which the remote device and the processor are in electronic communication over a network;

matching, via the processor, a portion of the desired quantity of the first trading order with at least one internal trading order, in which the at least one internal trading order is stored in a database that is internal to the trading exchange platform;

computing, via the processor, a remaining quantity of the first trading order, in which the remaining quantity comprises the desired quantity minus the portion of the first trading order that was matched with the at least one internal trading order;

identifying, via the processor, at least one market center that is capable of matching the remaining quantity of the first trading order, in which the at least one market center is external to the trading exchange platform;

determining, via the processor, that the at least one market center charges a fee for orders that remain unmatched for a length of time;

routing, via the processor, the second trading order that comprises the remaining quantity to the at least one market center;

monitoring, via the processor, whether a second trading order is matched within the length of time, in which the

monitoring begins as soon as the second trading order is routed to the at least one market center and in which the act of monitoring is performed via an electronic timer operable by the processor, which timer indicates a timeout after a predetermined amount of time lapses at which the second trading order is cancelled;

in response to determining that the second trading order will exceed the timeout for a fee, canceling, via the processor, the second trading order and submitting, via the processor, a third trading order that comprises the remaining quantity to the at least one market center.

2. The method of claim 1, further comprising:

assigning an internal identifier to the second trading order.

3. The method of claim 2, in which the act of cancelling the second trading order further comprises:

transmitting the internal identifier of the second trading order to the at least one market center in order for the at least one market center to identify the second trading order.

4. The method of claim 1, further comprising:

assigning an external identifier to the second trading order.

5. The method of claim 4, further comprises:

transmitting a message that the second trading order has been cancelled to a trader; and

transmitting the external identifier of the second trading order to the trader.

6. An apparatus of comprising:

a processor; and

a memory, in which the memory stores instructions which, when executed by the processor, direct the processor to:

receive, in a trading exchange platform, a first trading order that comprises a desired quantity and a desired price;

match a portion of the desired quantity of the first trading order with at least one internal trading order, in which the at least one internal trading order is stored in a database that is internal to the trading exchange platform;

compute a remaining quantity of the first trading order, in which the remaining quantity comprises the desired quantity minus the portion of the first trading order that was matched with the at least one internal trading order;

identify at least one market center that is capable of matching the remaining quantity of the first trading order, in which the at least one market center is external to the trading exchange platform;

determine that the at least one market center charges a fee for orders that remain unmatched for a length of time;

route the second trading order that comprises the remaining quantity to the at least one market center;

monitor whether a second trading order is matched within the length of time as soon as the second trading order is routed to the at least one market center and wherein the

processor is directed to notify, via an electronic timer operable by the processor, when a timeout after a predetermined amount of time lapses at which the second trading order is cancelled;

in response to determining that the second trading order will exceed the length of time for a fee, cancel the second trading order and submit a third trading order that comprises the remaining quantity to the at least one market center.

7. The apparatus of claim 6, in which the memory stores instructions which, when executed by the processor, direct the processor to:

assign an internal identifier to the second trading order.

8. The apparatus of claim 6, in which the act of—cancel the second trading order further comprises:

transmitting the internal identifier of the second trading order to the at least one market center in order for the at least one market center to identify the second trading order.

9. The method of claim 3, in which the memory stores instructions which, when executed by the processor, direct the processor to:

assign an external identifier to the second trading order.

10. The apparatus of claim 6, in which the memory stores instructions which, when executed by the processor, direct the processor to:

transmit a message that the second trading order has been cancelled to a trader; and

transmit the external identifier of the second trading order to the trader.

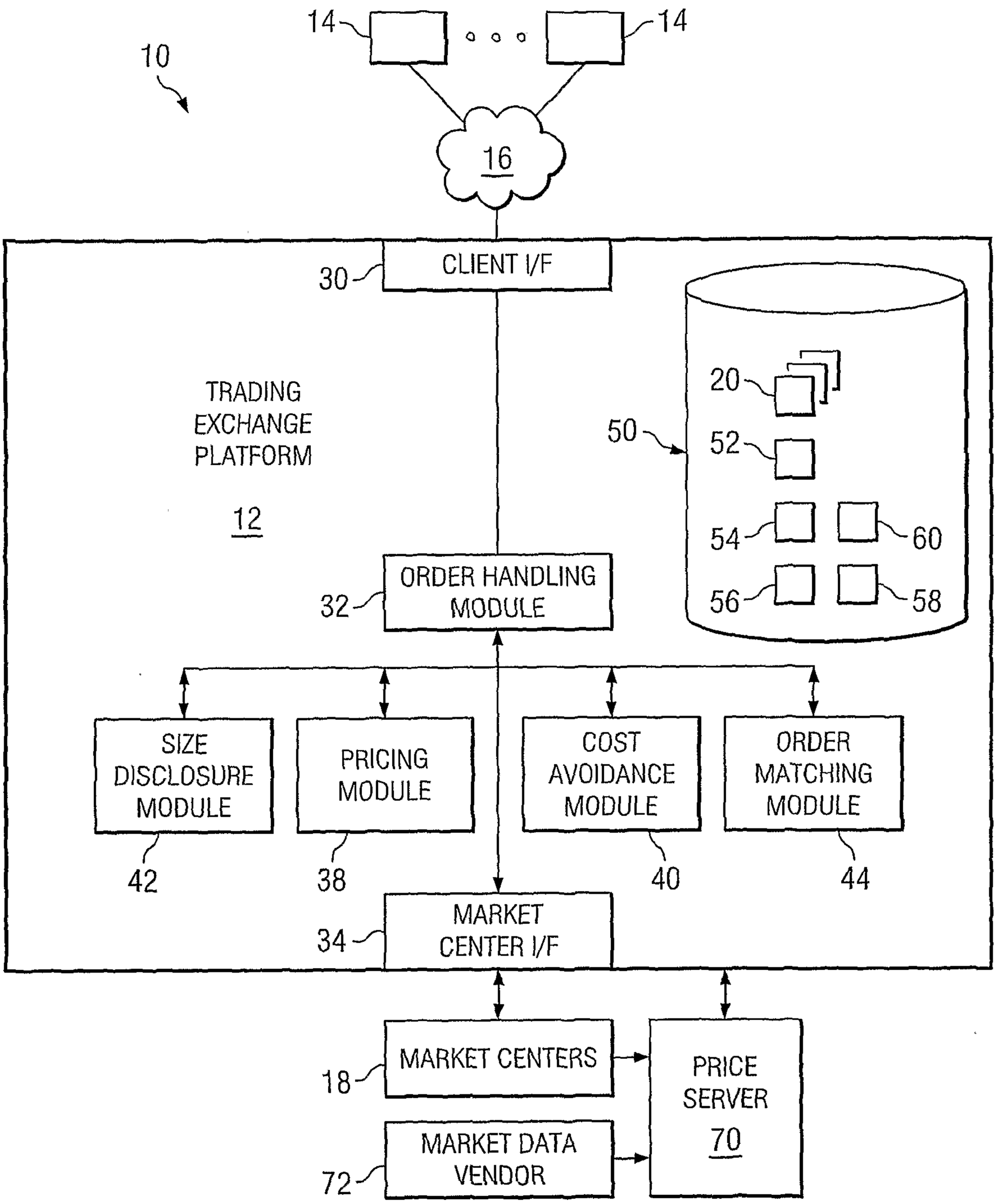

14
14
10
16
30
CLIENT I/F
TRADING EXCHANGE PLATFORM
12
50
20
52
54
60
56
58
32
ORDER HANDLING MODULE
SIZE DISCLOSURE MODULE
PRICING MODULE
COST AVOIDANCE MODULE
ORDER MATCHING MODULE
42
38
40
44
34
MARKET CENTER I/F
18
MARKET CENTERS
MARKET DATA VENDOR
72
PRICE SERVER
70

FIG. 1

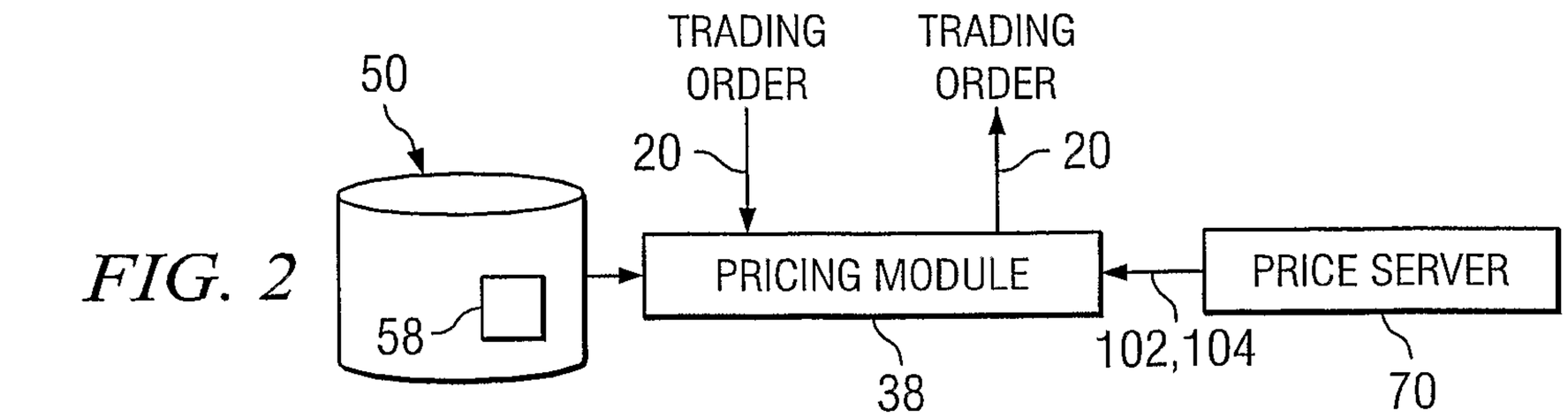


FIG. 2

100

18 MARKET CENTER	102 UNADJUSTED MARKET CENTER PRICE	106 BEST PRICE POLICY	108 COST INFORMATION	110 REBATE INFORMATION	112 ADJUSTED MARKET CENTER PRICE
ARCA	9.250 x 10.010	NONE	0.003	0.000	9.247 x 10.013
ISLD	9.260 x 10.020	NONE	0.000	0.003	9.263 x 10.017
NITE	9.000 x 10.050	MATCH	0.000	0.000	9.500 x 10.000
MWSE	9.000 x 10.060	SPLIT	0.001	0.000	9.749 x 9.751
BRUT	9.500 x 10.000	NONE	0.004	0.000	9.496 x 10.004

58

FIG. 3

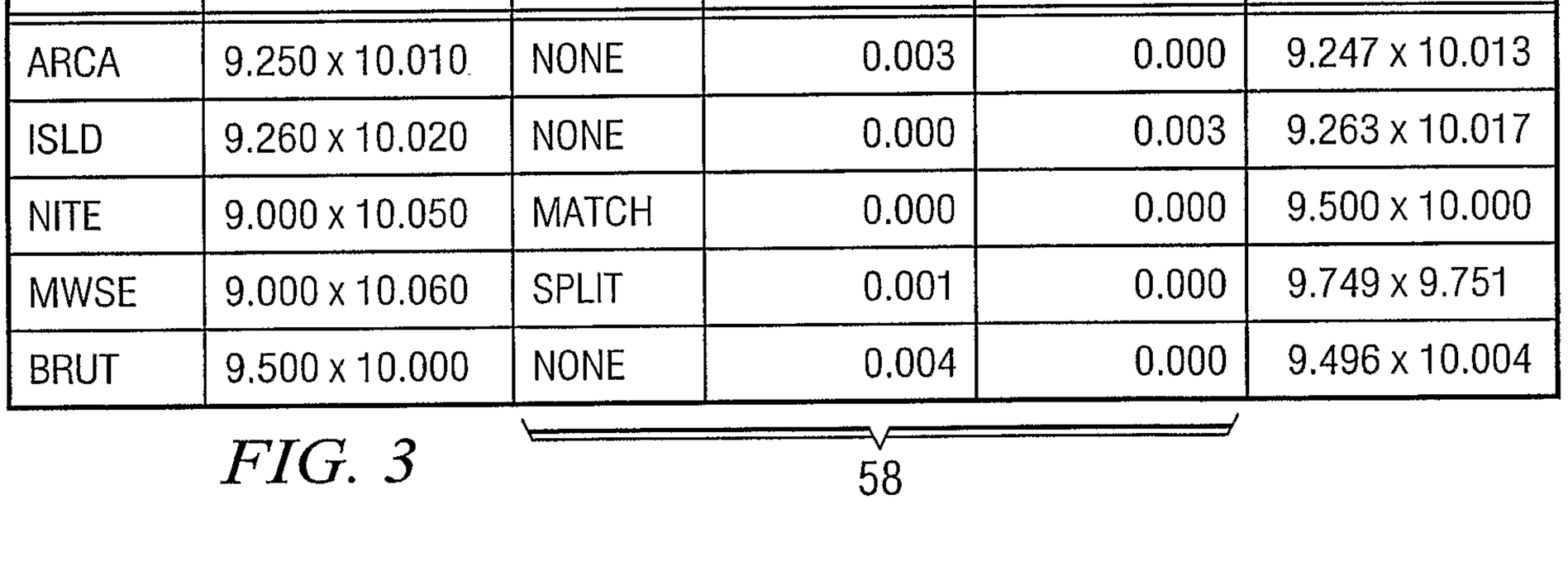


FIG. 5

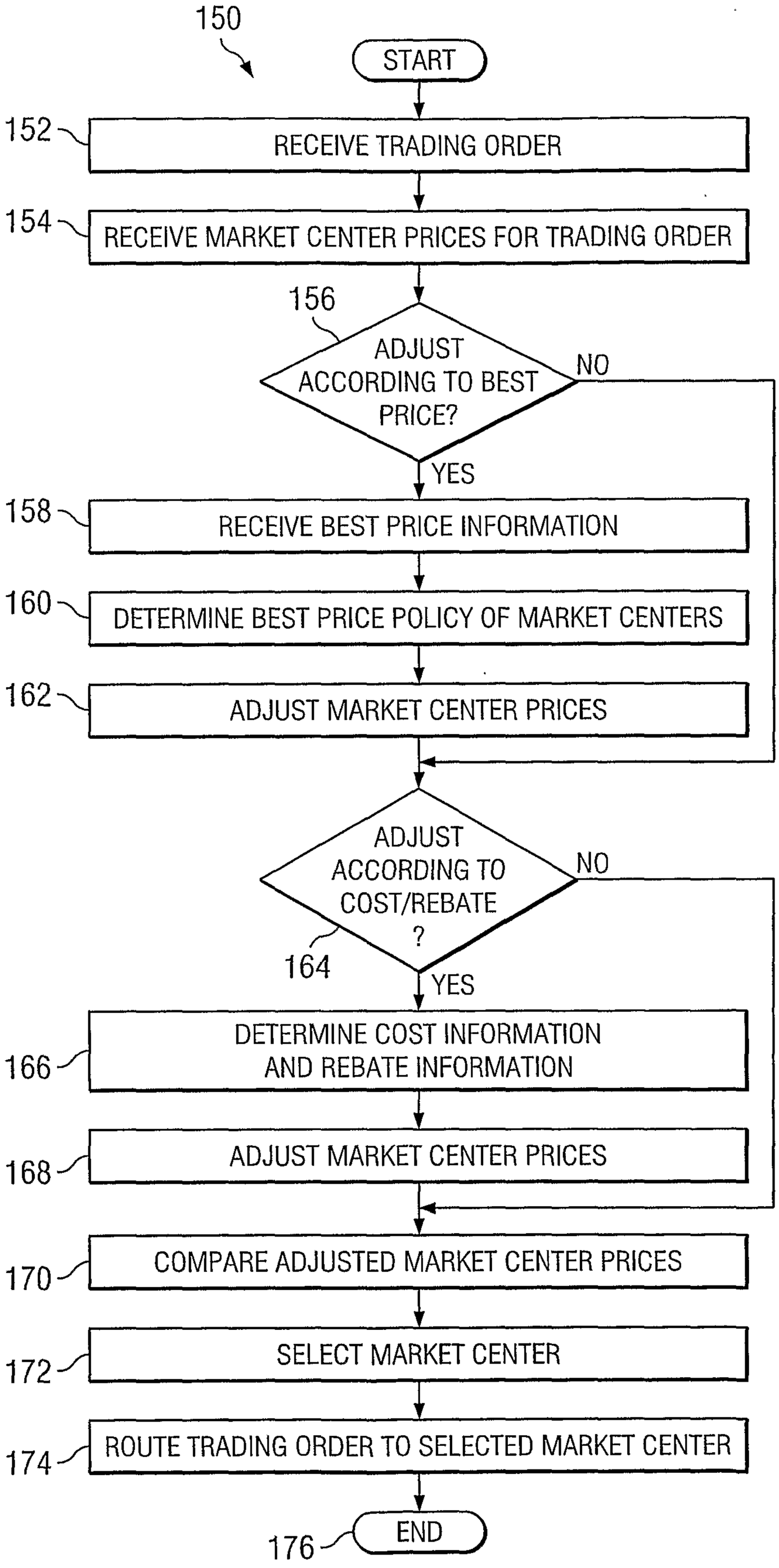

150
START
152
RECEIVE TRADING ORDER
154
RECEIVE MARKET CENTER PRICES FOR TRADING ORDER
156
ADJUST ACCORDING TO BEST PRICE?
NO
YES
158
RECEIVE BEST PRICE INFORMATION
160
DETERMINE BEST PRICE POLICY OF MARKET CENTERS
162
ADJUST MARKET CENTER PRICES
ADJUST ACCORDING TO COST/REBATE ?
NO
164
YES
166
DETERMINE COST INFORMATION AND REBATE INFORMATION
168
ADJUST MARKET CENTER PRICES
170
COMPARE ADJUSTED MARKET CENTER PRICES
172
SELECT MARKET CENTER
174
ROUTE TRADING ORDER TO SELECTED MARKET CENTER
176
END

FIG. 4

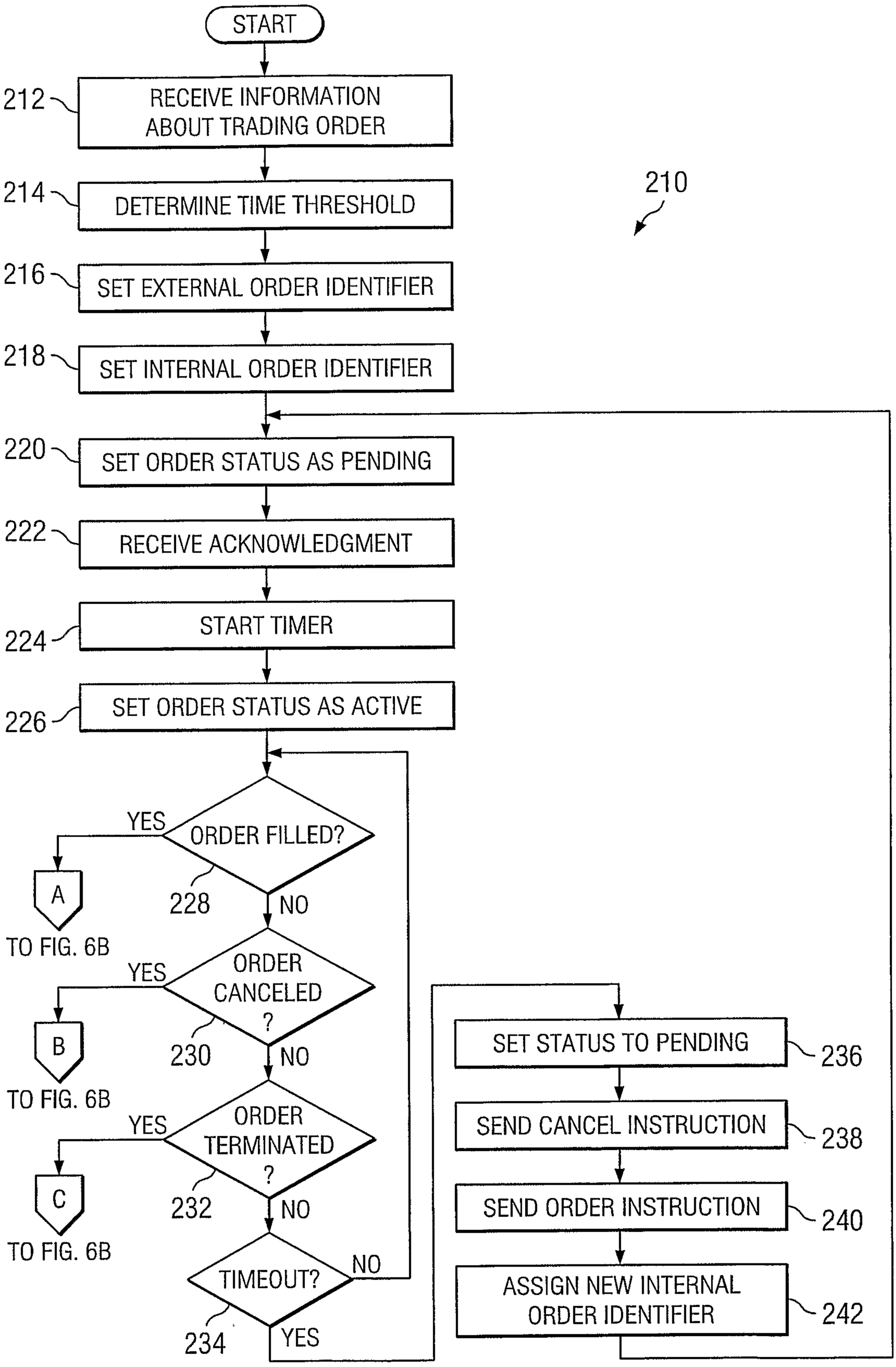

START
212
RECEIVE INFORMATION ABOUT TRADING ORDER
214
DETERMINE TIME THRESHOLD
210
216
SET EXTERNAL ORDER IDENTIFIER
218
SET INTERNAL ORDER IDENTIFIER
220
SET ORDER STATUS AS PENDING
222
RECEIVE ACKNOWLEDGMENT
224
START TIMER
226
SET ORDER STATUS AS ACTIVE
YES
ORDER FILLED?
228
NO
A
TO FIG. 6B
YES
ORDER CANCELED ?
230
NO
B
TO FIG. 6B
YES
ORDER TERMINATED ?
232
NO
C
TO FIG. 6B
TIMEOUT?
NO
234
YES
SET STATUS TO PENDING
236
SEND CANCEL INSTRUCTION
238
SEND ORDER INSTRUCTION
240
ASSIGN NEW INTERNAL ORDER IDENTIFIER
242

FIG. 6A

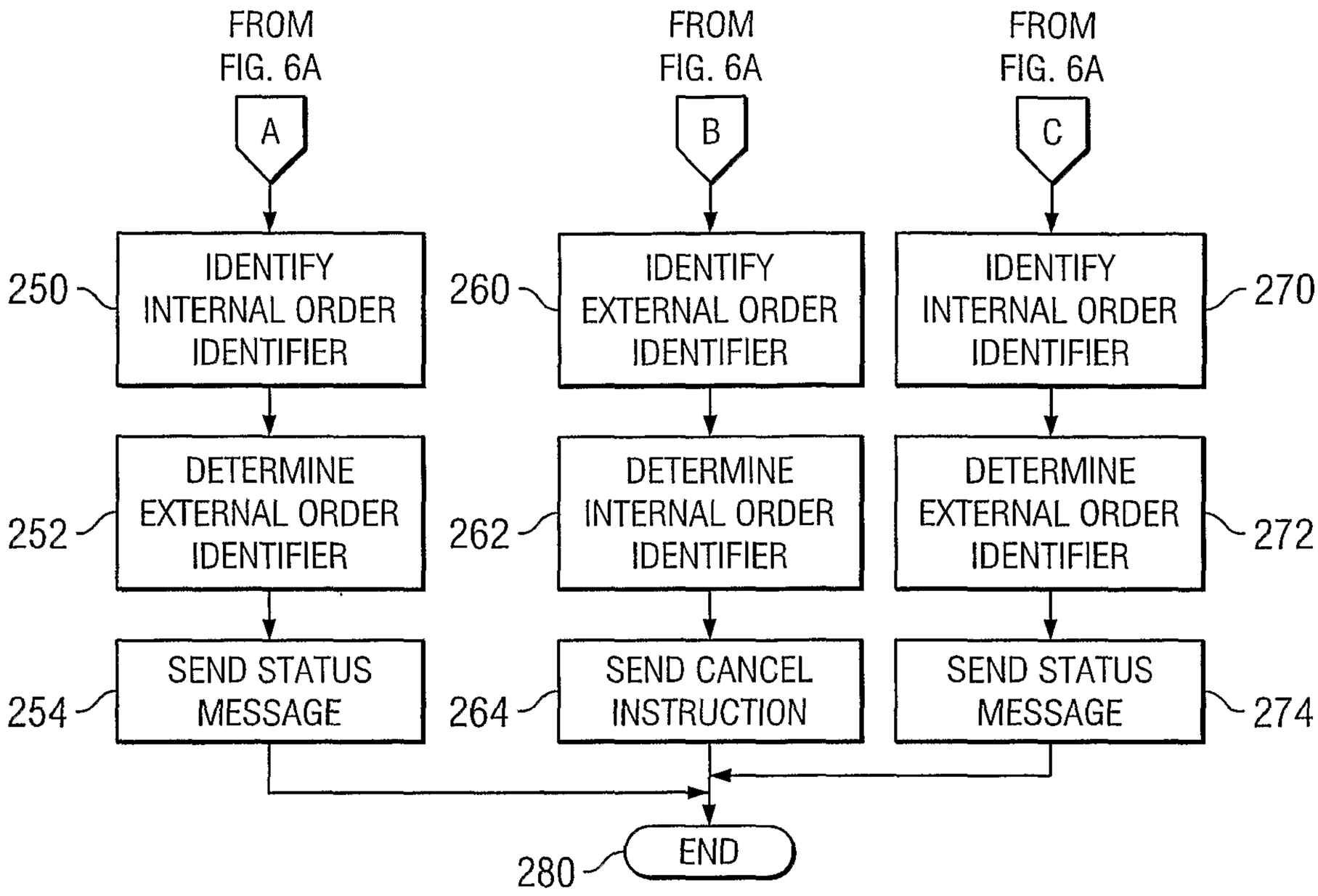


FIG. 6B

206

	52a EXTERNAL ORDER ID	52b INTERNAL ORDER ID	54 TIME THRESHOLD	56 ORDER STATUS
208a	1	1	4:50	P
208b	1	1	4:50	A
208c	1	1	4:50	P
208d	1	2	4:50	P
208e	1	2	4:50	A
	•	•	•	•
	•	•	•	•
	•	•	•	•

FIG. 7

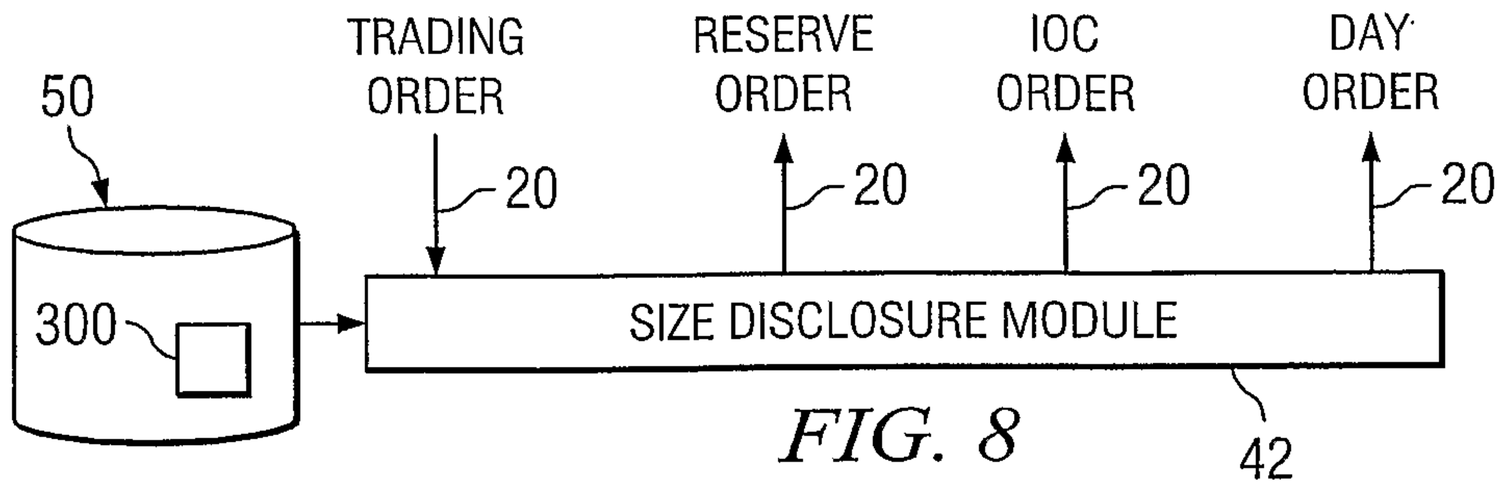


FIG. 8

300

18 MARKET CENTER	302 DISCLOSURE POLICY
ARCA	PROP
ISLD	IOC
NITE	NOIOC
MWSE	NOIOC
BRUT	IOC
⋮	⋮

FIG. 9

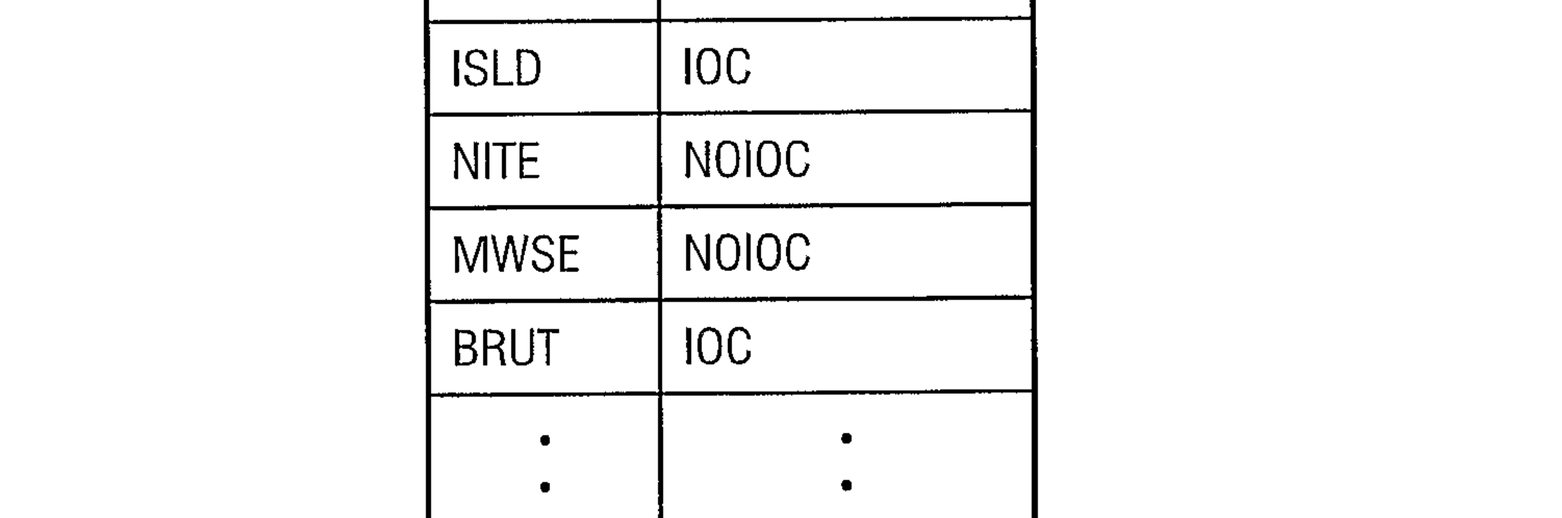


FIG. 11

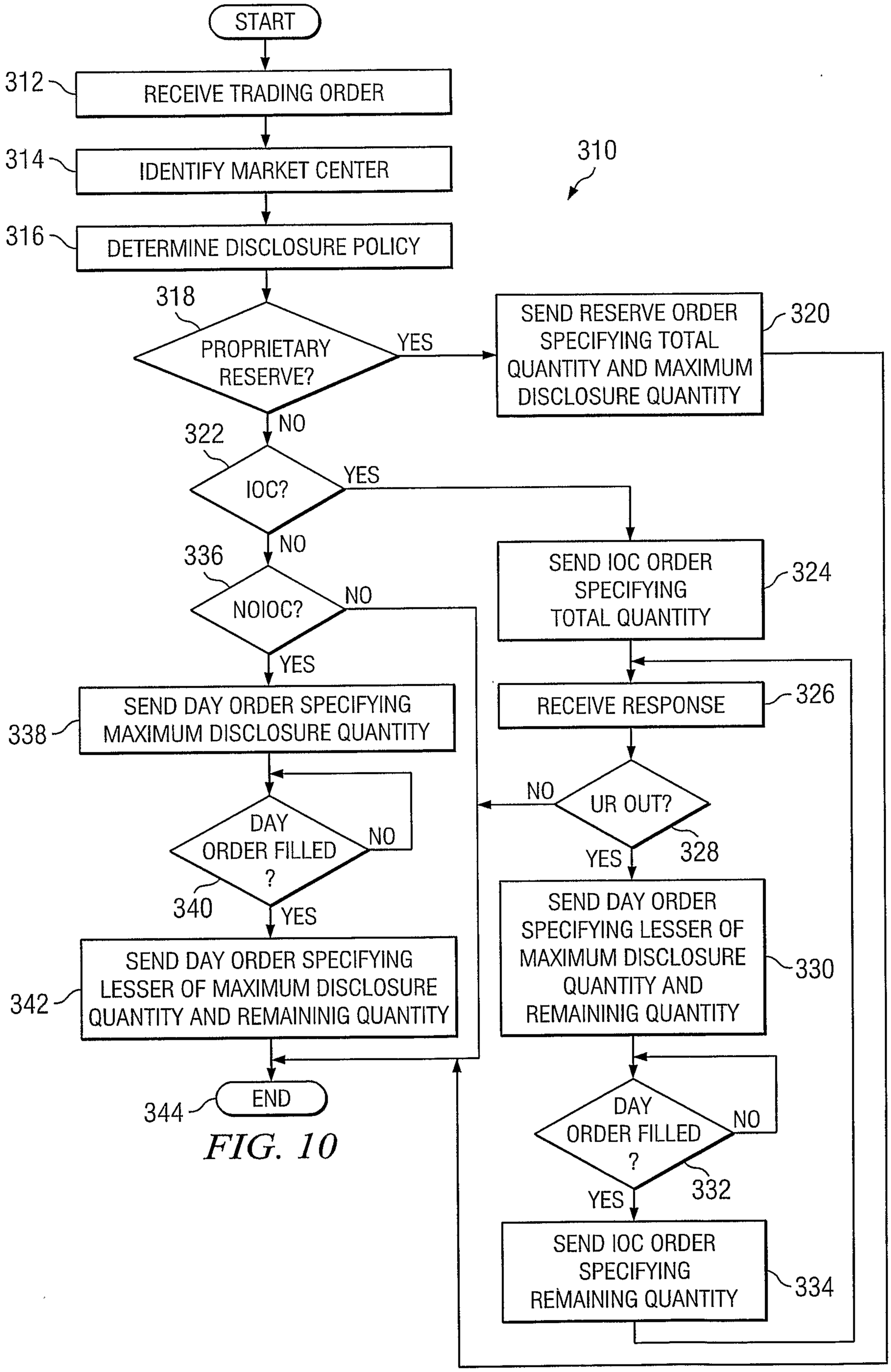

START
312
RECEIVE TRADING ORDER
314
IDENTIFY MARKET CENTER
310
316
DETERMINE DISCLOSURE POLICY
318
PROPRIETARY RESERVE?
YES
SEND RESERVE ORDER SPECIFYING TOTAL QUANTITY AND MAXIMUM DISCLOSURE QUANTITY
320
NO
322
IOC?
YES
SEND IOC ORDER SPECIFYING TOTAL QUANTITY
324
NO
336
NOIOC?
NO
YES
SEND DAY ORDER SPECIFYING MAXIMUM DISCLOSURE QUANTITY
338
RECEIVE RESPONSE
326
NO
UR OUT?
328
YES
DAY ORDER FILLED ?
NO
340
YES
SEND DAY ORDER SPECIFYING LESSER OF MAXIMUM DISCLOSURE QUANTITY AND REMAININIG QUANTITY
342
SEND DAY ORDER SPECIFYING LESSER OF MAXIMUM DISCLOSURE QUANTITY AND REMAININIG QUANTITY
330
END
344
DAY ORDER FILLED ?
NO
332
YES
SEND IOC ORDER SPECIFYING REMAINING QUANTITY
334

FIG. 10

60

410 PRODUCT	412 QUANTITY
•	•
•	•
•	•
XYZ STOCK	1,000
XYZ STOCK	2,000
XYZ STOCK	6,000
XYZ STOCK	7,000
XYZ STOCK	2,000
XYZ STOCK	50,000
•	•
•	•
•	•

404

BID

414 PRODUCT	SOURCE	416 PRICE	418 STATUS
•	•	•	•
•	•	•	•
•	•	•	•
XYZ STOCK	TRADER 2	10.02	MATCHED
XYZ STOCK	TRADER 3	10.02	MATCHED
XYZ STOCK	ARCA	10.01	PENDING
XYZ STOCK	ISLD	10.01	OPEN
XYZ STOCK	ARCA	10.00	OPEN
XYZ STOCK	TRADER 4	10.00	MATCHED
•	•	•	•
•	•	•	•
•	•	•	•

406

OFFER

420 PRODUCT	422 QUANTITY	424 SOURCE	426 PRICE	428 STATUS
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•
XYZ STOCK	29,000	TRADER 1	9.98	OPEN
XYZ STOCK	5,000	ISLD	10.05	OPEN
XYZ STOCK	2,000	ARCA	10.10	OPEN
XYZ STOCK	1,000	ARCA	10.11	OPEN
XYZ STOCK	5,000	NITE	10.15	OPEN
XYZ STOCK	5,000	MWSE	10.15	OPEN
•	•	•	•	•
•	•	•	•	•
•	•	•	•	•

FIG. 12

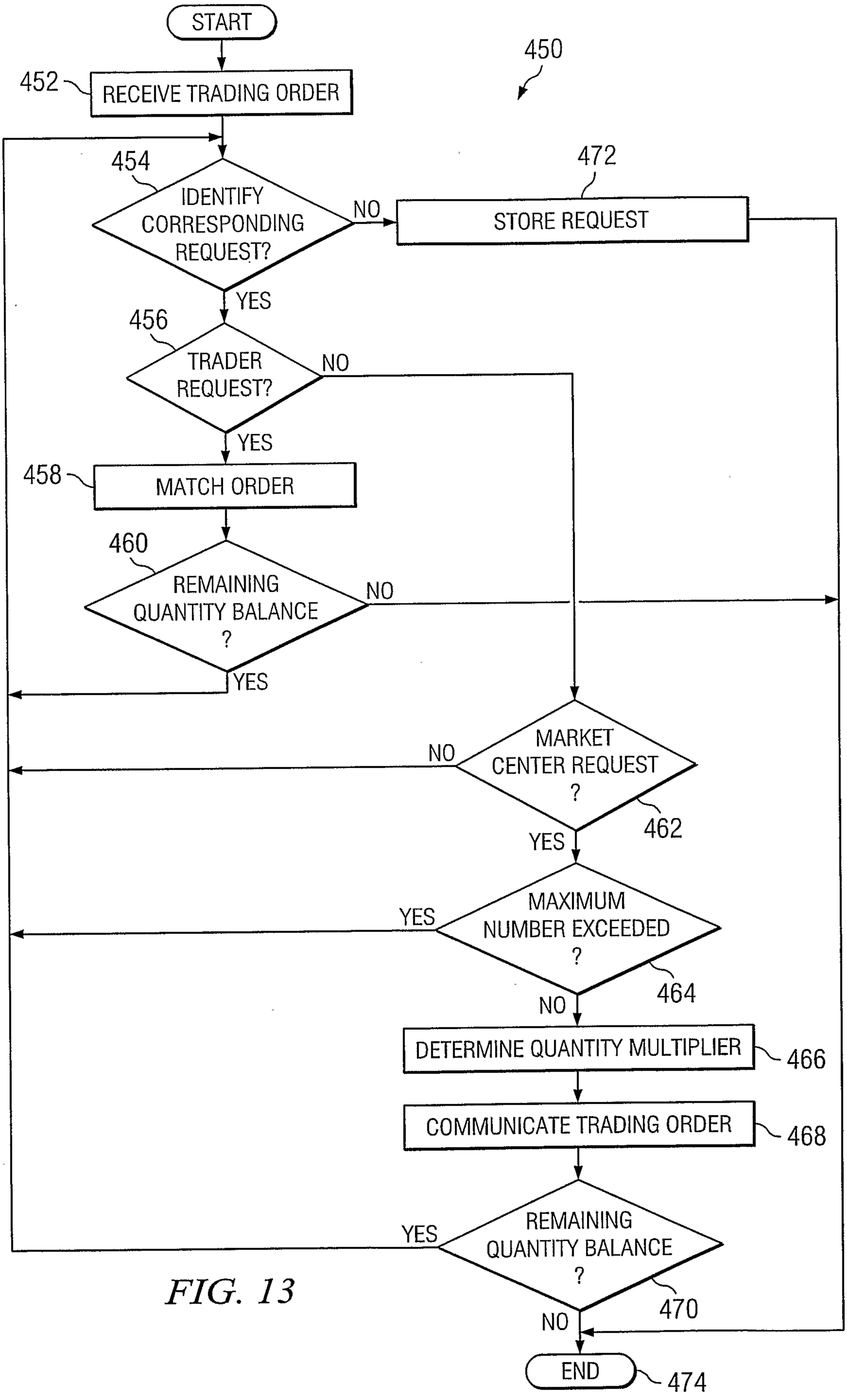
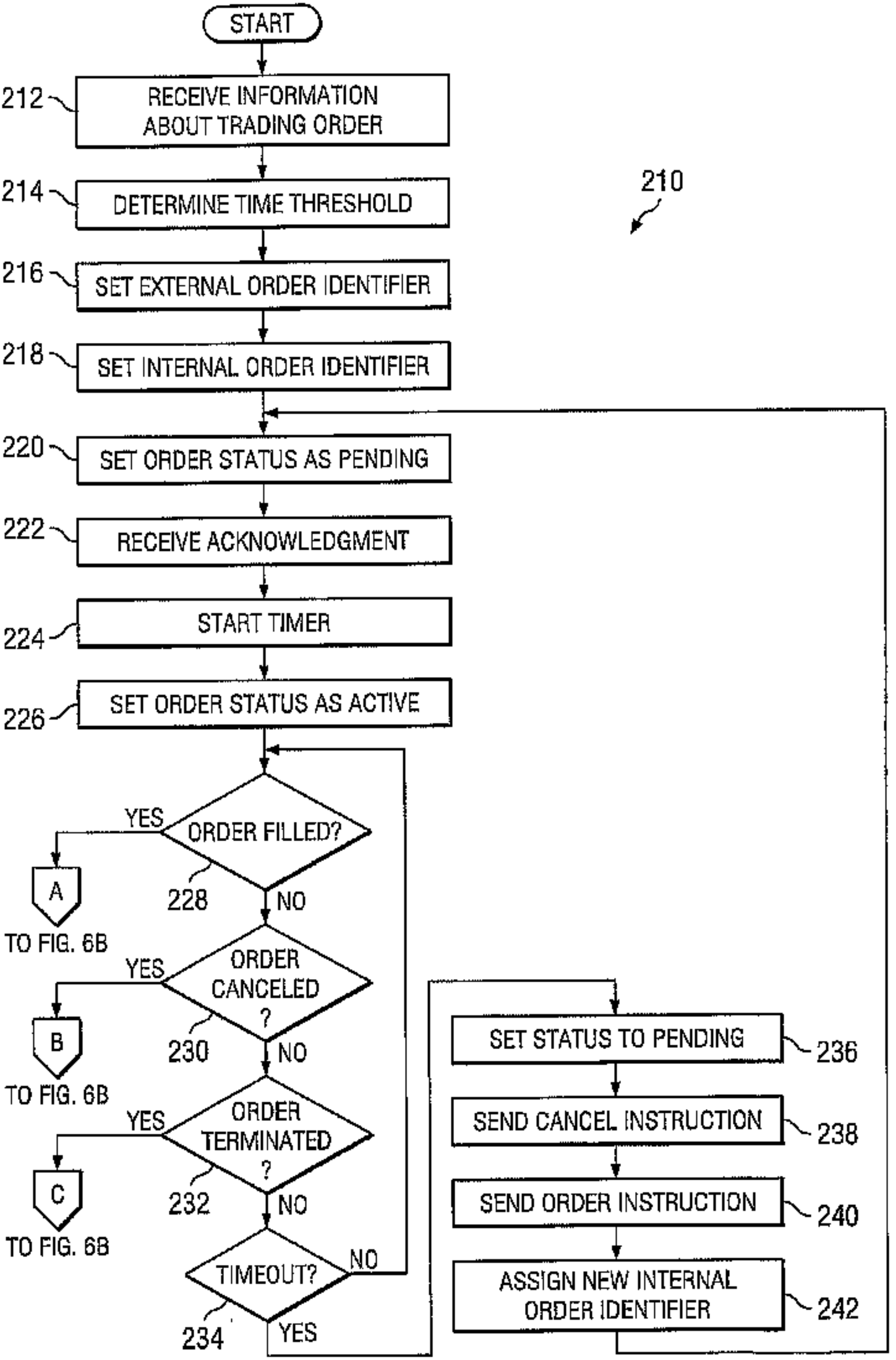

START
450
452
RECEIVE TRADING ORDER
454
IDENTIFY CORRESPONDING REQUEST?
NO
472
STORE REQUEST
YES
456
TRADER REQUEST?
NO
YES
458
MATCH ORDER
460
REMAINING QUANTITY BALANCE ?
NO
YES
NO
MARKET CENTER REQUEST ?
462
YES
MAXIMUM NUMBER EXCEEDED ?
YES
464
NO
DETERMINE QUANTITY MULTIPLIER
466
COMMUNICATE TRADING ORDER
468
REMAINING QUANTITY BALANCE ?
YES
470
NO
END
474

FIG. 13


START
212
RECEIVE INFORMATION ABOUT TRADING ORDER
214
DETERMINE TIME THRESHOLD
210
216
SET EXTERNAL ORDER IDENTIFIER
218
SET INTERNAL ORDER IDENTIFIER
220
SET ORDER STATUS AS PENDING
222
RECEIVE ACKNOWLEDGMENT
224
START TIMER
226
SET ORDER STATUS AS ACTIVE
YES
ORDER FILLED?
228
NO
A
TO FIG. 6B
YES
ORDER CANCELED ?
230
NO
B
TO FIG. 6B
YES
ORDER TERMINATED ?
232
NO
C
TO FIG. 6B
TIMEOUT?
NO
234
YES
SET STATUS TO PENDING
236
SEND CANCEL INSTRUCTION
238
SEND ORDER INSTRUCTION
240
ASSIGN NEW INTERNAL ORDER IDENTIFIER
242