(57) Abstract: A system for rapid, secure transport of cargo by sea includes a monohull fast ship and an arrangement for loading and unloading cargo through an opening in the stern of the ship and along a driving surface of a cargo carrying deck of the ship. The arrangement includes a self-propelled, automatically guided vehicle for carrying cargo to be transported during loading and unloading of the ship and a self-contained security scanning system on the vehicle for maintaining control and surveillance of cargo in transit on the vehicle. The ship includes a reader grid of ship communication system on the cargo carrying deck to which continued control and surveillance of the cargo can be handed off from the vehicle scanning system.

FIG. 6
AMENDED CLAIMS
[received by the International Bureau on 25 August 2008 (25.08.08)]

1. A system for rapid, secure transport of cargo by sea comprising:
   a ship including
   a hull producing a high pressure area at a bottom portion of a stern which rises from a point of maximum depth forward of a longitudinal center of the hull to a point of minimum draft at a transom which produces hydrodynamic lifting of the stern at a threshold speed above a length Froude Number of 0.40;
   sides of the hull at the datum waterline are non-convex in plan with reference to a centerline of the ship;
   a length-to-beam ratio at the datum waterline is between 5 and 7.5 and a displacement to length ratio equal to a displacement of the hull divided by a cube of the length divided by 100 during operation of the hull in carrying fuel and payload is between 60 and 150 and a maximum operating Froude Number is between 0.42 and 0.9;
   a weather deck closing a top of the hull, at least one cargo carrying deck disposed below the weather deck and having a driving surface for self propelled, automatically guided vehicles transporting cargo to and from the ship through an opening in the stern of the ship and at least one lower deck disposed below the at least one cargo carrying deck;
   at least one water jet disposed within the hull with each water jet having an inlet in a bottom portion of the stern which produces high pressure during motion of the ship;
   at least one power unit disposed on one of the at least one lower deck coupled to the at least one water jet for powering the at least one water jet to cause water to be drawn into the inlet of the at least one water jet to produce forward motion of the hull; and
   an arrangement for loading and unloading cargo through the opening in the stern of the ship and along the driving surface of the at least one cargo carrying deck, the arrangement including
   at least one self-propelled, automatically guided vehicle for carrying cargo to be transported through the opening in the stern of the ship during loading and unloading of the ship;
a self-contained security scanning system on the at least one vehicle, for maintaining control and surveillance of cargo in transit on the vehicle wherein the security scanning system includes a reader and a field unit on the at least one vehicle, the reader being capable of reading identification means on a cargo carried by the vehicle and in turn communicating with the field unit, the field unit being capable of communicating with a ship server, a dockside server and a global data center by way of a dockside network.

2. The system according to claim 1, wherein the arrangement for loading and unloading further includes a plurality of platforms for supporting cargo to be transported, the at least one vehicle carrying the platforms and cargo supported on the platforms.

3. (Canceled)

4. The system according to claim 1, wherein the ship includes a reader grid having a plurality of readers in different, spaced locations on transverse bulkheads of the ship along the at least one cargo carrying deck for reading identification means on cargo on the deck and for communicating readings from the individual cargo identification means to a ship communication system.

5. The system according to claim 4, wherein the ship communication system includes the ship server which communicates with global and local information centers, a super base on each cargo carrying deck which is linked to the ship server, and a plurality of base stations on each cargo carrying deck communicating with respective ones of a plurality of groups of readers of the reader grid on the cargo carrying deck.

6. The system according to claim 1, wherein the ship further includes at least one exhaust and at least one air intake associated with each of the at least one power unit which extend from the at least one power unit upward
past the at least one cargo carrying deck and outboard of the driving surface of the at least one cargo carrying deck.

7. A ship for rapid, secure transport of cargo by sea comprising:

a hull producing a high pressure area at a bottom portion of a stern which rises from a point of a maximum depth forward of a longitudinal center of the hull to a point of minimum draft at a transom which produces hydrodynamic lifting of the stern at a threshold speed above length Froude Number of 0.40;

sides of the hull at the datum waterline are non-convex in plan with reference to a centerline of the ship;

a length-to-beam ratio at the datum waterline is between 5 and 7.5 and a displacement to length ratio equal to a displacement of the hull divided by a cube of the length divided by 100 during operation of the hull in carrying fuel and payload is between 60 and 150 and a maximum operating Froude Number is between 0.42 and 0.9;

a weather deck closing a top of the hull, at least one cargo carrying deck disposed below the weather deck and having a driving surface for self propelled, automatically guided vehicles transporting cargo to and from the ship through an opening in the stern of the ship and at least lower deck disposed below the at least one cargo carrying deck;

at least one water jet disposed within the hull with each water jet having an inlet in a bottom portion of the stern which produces high pressure during motion of the ship;

at least one power unit disposed on one of the at least one lower deck coupled to the at least one water jet for powering the at least one water jet to cause water to be drawn into the inlet of the at least one water jet to produce forward motion of the hull;

a reader grid having a plurality of readers in different, spaced locations on transverse bulkheads of the ship along the at least one cargo carrying deck for reading identification means on cargo on the deck and for communicating readings of the individual cargo identification means to a ship communication system, wherein the ship communication system includes a ship server which communicates with global and local information centers, a
super base on each cargo carrying deck which is linked to the ship server, and a plurality of base stations on each cargo carrying deck communicating with respective ones of a plurality of groups of readers of the reader grid on the cargo carrying deck.

8. (Canceled)

9. The ship according to claim 7, further comprising at least one exhaust and at least one air intake associated with each of the at least one power unit which extend from the at least one power unit upward past the at least one cargo carrying deck and outboard of the driving surface of the at least one cargo carrying deck.

10. The ship according to claim 7, wherein the at least one cargo carrying deck and the driving surface of the deck extend from the opening in the stern to the bow of the ship.

11. The ship according to claim 7, wherein the driving surface includes a plurality of longitudinally extending lanes for moving and storing cargo, the lanes being distinguished from one another for automatically guided vehicles transporting cargo by at least one of lateral guide rails, grooves in the deck receiving electrical cable and optical guidance means.

12. The ship according to claim 7, further comprising guidance means on the at least one cargo carrying deck for cooperating with guidance equipment of the at least one self-propelled, automatically guided vehicle carrying cargo during loading and unloading the ship, the guidance means including at least one of guide rails, electrical cable in grooves in the at least one deck in which different frequency signals are induced, and optical guidance means.

13. An arrangement for loading and unloading cargo through an opening in a stern of a ship and along a driving surface of at least one cargo carrying deck of the ship, the arrangement comprising:
at least one self-propelled, automatically guided vehicle for carrying cargo to be transported during loading and unloading of the ship;

a self-contained security scanning system on the at least one vehicle for maintaining control and surveillance of cargo in transit on the vehicle, wherein the security scanning system includes a reader and a field unit on the vehicle, the reader being capable of reading identification means on a cargo carried by the vehicle and in turn communicating with the field unit, the field unit being capable of communicating with a ship server, a dockside server and a global data center by way of a dockside network.

14. (Canceled)

15. The arrangement according to claim 13, further comprising at least one platform for supporting cargo to be transported, the at least one vehicle carrying the platform and cargo supported on the platform.

16. A method for rapid, secure loading and unloading cargo on a ship comprising:

supporting cargo having identification means which can be remotely machine read on a self-propelled, automatically guided vehicle;

transporting with the vehicle the cargo supported on the vehicle through an opening in a stern of the ship and along a driving surface of a cargo carrying deck of the ship;

reading the identification means on the cargo during the transporting with a self-contained security scanning system on the vehicle;

communicating the reading of the identification means from the vehicle to a ship server, a dockside server and a global data center by way of a dockside network.

17. (Canceled)

18. The method according to claim 16, including further reading the identification means on the cargo when the cargo is on the cargo carrying deck of the ship using a reader of a reader grid on transverse bulkheads of
the ship along the deck and communicating the further reading to a ship communication system.

19. The method according to claim 18, wherein the communication of the further reading to the ship communication system includes communicating the further reading from a reader of the reader grid to a base station in a section on the deck which in turn communicates the further reading to a super base on the deck which is linked to the ship server.

20. The method according to claim 16, wherein the identification means is a transponder tag on the cargo which is read by a radio frequency transceiver/receiver as a reader of the security scanning system.

21. The method according to claim 16, wherein the reading of the identification means is performed using at least one of remote electronic data interpretation, remote magnetic data interpretation and optical character recognition.
The present invention is directed to an improved ship, a system, and arrangement and a method for rapid, secure loading and unloading cargo through an opening in a stern of the ship which meet the recent substantial increase in the need for accurate security and tracking of containers and monitoring of their contents and of other cargo units at all times that the containers or cargo units are in transit during loading and unloading of the ship, while at the same time reducing the time necessarily taken in port to load and unload containers/cargo units and process them through port security systems which necessarily depend on random checks.

Giles, US 5,832,856 discloses Applicant's earlier patent on a ship for high speed transit of cargo but does not offer a solution to the aforementioned need.

Johansson, et al., US 7,044,247, discloses a self-propelled, automatically guided vehicle, per se, but is not concerned with accurate security and tracking of
containers or with providing a self-contained security scanning system on the vehicle as disclosed and claimed by Applicant.

Hanson, et al., US 2005/0248454 A1 relates to a marine asset security and tracking system for a conventional displacement hull ship which is loaded through openings in the top deck of the ship with a loading crane. The disclosed system does not provide accurate security and tracking at all times during loading and unloading and does not provide a security scanning system on a self-propelled, automatically guided vehicle which moves through the stern of the ship for loading and unloading where the top, weather deck of the ship remains permanently closed, protecting the communications equipment from environmental degradation. In paragraph [0138], the patentees admit that it is difficult to locate containers in holds of the ship beyond identifying which hold they are in. In paragraph [0145], it is proposed to provide a sensitive multi-detector array scanning system on the loading crane within the shore facility for scanning the containers. However, it is stated that because of the extreme economic time pressure in loading/unloading operations, such container scans must be conducted on the fly or else off-line before (or just after) the crane-transfer operation to avoid impacting the overall container throughput. This teaches away from the present invention wherein loading and unloading cargo is through an opening in the stem of the ship with an arrangement including a self-propelled, automatically-guided vehicle for carrying cargo having a self-contained security scanning system for maintaining control and surveillance at all times during cargo transfer on the vehicle, including during loading and unloading operations. This improves loading efficiency and security scanning which can be conducted as the ship is being loaded, not just within the ship or on shore prior to transit, as suggested by Hanson, et al. The location of the cargo is constantly
known, and scanning of the container can take place at any time with the present invention.

In view of the Amendments, it is respectfully submitted that the amended claims patentably define over the cited references.