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Letter

Anti-Sink Ship Safety Realized by Hull Mechanical Structure Design: Mobile Carry Cargo Buoyancy Tanks

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Abstract: Ship safeties were an important problem since the ship invention. Every shipwreck cause huge hazard, which make lots of casualties, properties loss, huge economic loss, and psychic trauma of dead relatives. Consider these, many ship safety work and design have been done and try to avoid the maritime loss. This letter introduces a design that mainly included carry cargo buoyancy tank with clapboard system. This anti-sink ship design with buoyancy tanks and clap board to protect ship safety quick and efficient. The cargo can be transport in the buoyancy tanks, without wasting space. The clap board have doors can be sealed as the second bottom when ship in danger. The system can be unfold in short time to enlarge draft areas, and then make ship anti-sink. When ship in danger, to unfold buoyancy tanks and sealed clap board, which can enlarge draft area and to anti-sink in short time. This anti-sink ship design thinking that try to make the shipping more safety than before.

Keywords: Anti-Sink Ship, Buoyancy Tank, Clap Board, Safety Transportation, Mechanical Structure Design

1. Introductions

Ship in human social life has an irreplaceable role, ship to people and goods transportation [1], military [2], scientific research [3] and so on a variety of purposes [4]. Due to the ship sailing on the surface of the inevitable will encounter all sorts of dangerous situation [5], such as rocks [6], collision [7], overturning [8], the danger is likely to lead to ship sink [9], causing irreparable casualties and property losses [10]. Titanic [11] sunk in its first sailing, when collision with ice hill, which make thousands people die and huge economic loss. It was too numerous to static the ship wreck loss in history [12].

Along with standard water safety [13], float plans provide a valuable tool for potential rescue in case of an emergency. Simply hitting an uncharted rock or meet rain storm sea wave can make the shipping in great danger. Contingency plan must prepared and safety device can ensure the shipping carry out all weather.

Consider ship transportation's safety requirement [14], to design a kind of ship to anti-sink, which will save many people and retrieve lots of properties loss. This letter design a kind of ship with buoyancy tank and clap board to high limit avoid sink and keep safety marine transport [15].

2. Results and Discussion

2.1. Parts and Function

To design the anti-sink ship, one concept is to enlarge draft areas [16, 17], when ship meet danger. Unit areas received more little pressure force that can realize by enlarge draft area of ship. When ship damaged, the parts of ship machined transform into large draft area state at short time, which will avoid ship sink. Base on this principle, the activity buoyancy tank with clap board design, which can enlarge draft areas requirement.

One example show in Figure 1 and 2. There were cargo cabins in ship, while the cabins designed as buoyancy tanks with sealed wall materials, to provide as independent ship function, and supplied with roller and actuator. To ensure the cargo cabin unfold to spread as buoyancy tank, to enlarge the draft areas. Internal ship, sealed clap board was set designed to avoid leak water, and take as second bottom when ship bottom damaged. So the buoyancy tank with clap board system form the more safety ship to anti-sink.

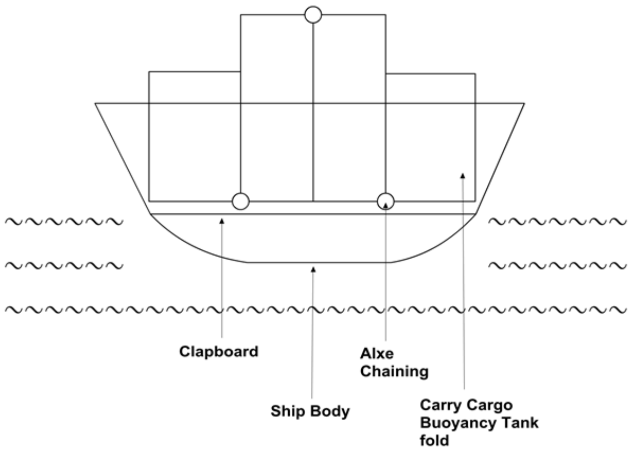

Figure 1. *At the normal transport situation, anti-sink ship have fold buoyancy tank and seal clap board. The alxe roller locked with some jacks aid fixed. The clap board have open doors for seaman check bottom cabins. The buoyancy tank can load cargos to transportation. This fold situation was similar to that of the common ships, before it unfold.*

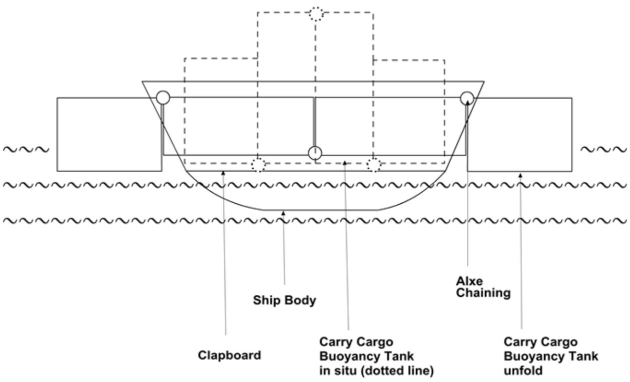

Figure 2. *The buoyancy tank unfold to enlarge draft areas, and sealed clap board to anti water leak, when the anti-sink ship in danger. The roller alxe can make unfold more quickly. The bottom cabin enter water and the clap board sealed to prevent the water leak upwards. The draft areas were about double time than fold situations.*

Parts of anti-sink ship. One is buoyancy tank, this part were fold when normal transport. When ship meat danger, for example ship damage and water leak in, and then turn on the machine actuator and arranger to make buoyancy tank unfold. The unfold buoyancy tanks will high limit enlarge draft areas and save the ship. The buoyancy tank may load cargo, with seal and high strength materials, which can carry as independent ship function. The actuator and arranger can take action as soon as possible, before sink and further damages of ship.

Second part was the clap board design. The clap board set into the lower part of ship, which can be sealed when ship bottom leak water. In normal shipping, the seaman can check bottom cabins by through doors on clap board. The clap board can afford second bottom functions, and cooperate with the buoyancy tanks' unfold. If necessary, the clap board may designed and set as more than one layer, to more safety requirement.

Another key parts were the actuator and arranger to aid unfold buoyancy tanks. The normal transport time, the buoyancy tanks were fixed with lock and jacks, to ensure common carry actions. When ship meet danger, the actuator and arranger started and unfold the buoyancy tanks in short time. The actuator often decide the buoyancy tank unfold time, which must quick than sink or damage speed. So the actuator and arranger should be well designed and care maintained. These actuator and arranger were the mainly mechanical structure design, which in high degree decide the anti-sink system carry out successfully.

Detectors and alarm equipment were also important [18]. The detectors can quick found danger or damages at first time, and to inform seamen. The alarm system to warn the people on ship move to stay in safety areas, with take necessary safety equipment, such as life jackets. So to ensure people know the danger and take quick actions, the detectors should work 24h and all weather, and with period checked.

The buoyancy tank, clap board, actuator, and detectors, these several parts form the anti-sink system. These need detailed design and practice work. Varieties of designed schemes can be alternative based on this anti-sink concept. One example in Figure 1 and 2 to illuminate the how the anti-sink system work.

2.2. Processes

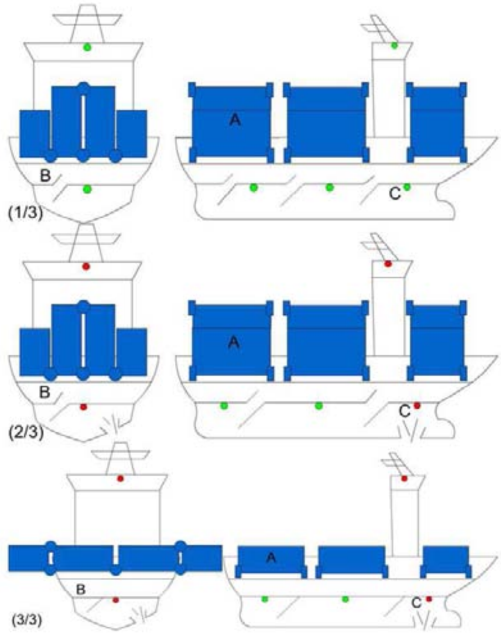

Figure 3. *Processes of anti-sink ship system [15]. 1/3 the ship normally carry cargo. A were fold buoyancy tanks; B were clapboard with doors; C were detectors with alarm. 2/3 when ship meet dangers, bottom crack and water flow into ship. Then detector response and alarmed, to make seamen take actions and shield to save areas. 3/3 A buoyancy unfold to enlarge draft areas. B clapboard doors shut down to avoid water flow to up layers. Then ship be in a relative save situation. Waited to rescue and consign. The passengers, seaman, and cargos should be safety.*

The normal sailing, the buoyancy tank folded, with cargo store in tanks. The actuator locked. The clap board have open doors for seaman check the bottom cabins. When meet danger, the bottom cracked and leak water, the detectors first detected the damages and send message to cockpit, and alarm on.

When heart alarm, people on ship must move quickly to assign safety regions. The bottom cabin seamen go upward onto clap board quickly. When people were safety and then clap board close and sealed. Actuator and arranger start up, jack lock open, rollers turning to unfold buoyancy tanks, and spread to larger draft areas. Then ship enter a more safety situations. The people and cargo should be well protected, and wait for rescue, and then the anti-sink system (Figure 3) carry out successfully.

2.3. Meanings

This buoyancy tank with clap board system can carry out in short time, before ship sink in danger. Buoyancy tank unfold enlarge the draft areas, to make ship to be safety quickly and efficient. Clap board can sealed to be second bottom, when ship bottom leak water. The clap board sealed need few time, and to match the buoyancy tank actuator to unfold, before ship sink or overturn. Ship sink usually need hours [19], while this system can unfold in half an hour, which based on the detailed design, mechanic structures [20], and cargo and seamen situations. Due to Figure 1 and 2, the roller type design, can quick unfold buoyancy tanks, to gain recue time in high limit. These anti-sink system Fig. 4 can make shipping safety in high limit.

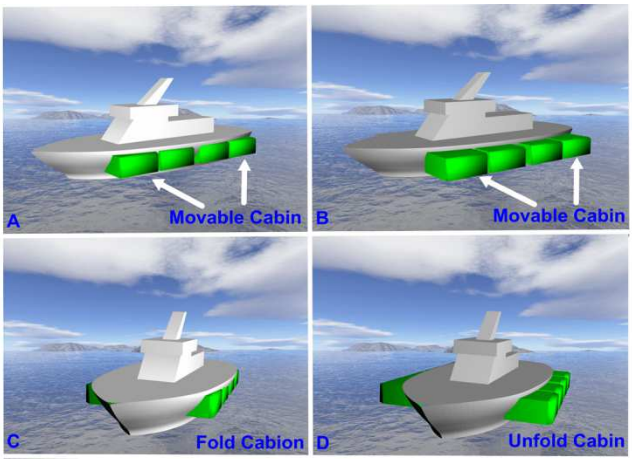

Figure 4. *The three-dimension figures. The anti-sink ship [15] with movable cabin (buoyancy tanks) unfold to enlarge draft areas when ship in danger. A, C were normal transport with movable cabins folded. B, D were movable cabin (buoyancy tanks) unfold when ship in danger.*

3. Conclusion

This anti-sink ship design with buoyancy tanks and clap board to protect ship safety quick and efficient. The cargo can be transport in the buoyancy tanks, without wasting space. The clap board have doors can be sealed as the second bottom when ship in danger. The system can be unfold in short time to enlarge draft areas, and then make ship anti-sink. This anti-sink design can make ship transport safety in high limit. And this anti-sink system can protect people and cargo more safety than before. It can retrieve loss and save more people. So this designed system have important meanings in safety sailing. This design concept must help ship-design-company for more varieties and safety ships scheme, and the economic and society values might be unpredicted.

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