~~ROBOTIC SYSTEM TO LOCATE, IDENTIFY AND ENGAGE INTER-BOX CONNECTORS (IBC) IN A CONTAINER TRANSFER SEQUENCE~~

AUTO STEVEDORE ROBOTIC CELL

TECHNICAL FIELD

The subject matter relates to the shipping industry and the sub-field of handling sequences that includes the installation or removal of inter-box connectors (IBC). Hereby disclosed is an electro-mechanical stevedoring robot system (a combination of a multi axis industrial robot, a mechanical end effecter, optical indexing means with memory storage and a multitude of physical storage means for keeping IBC) that can locate, identify, and engage ISO standard freight containers and attached IBC.

BACKGROUND ART

With reference to the subject of this application, Cameron Hay, PCT/SG2007/000444; Kapelski, US 7779604 and our earlier application PCT/SG2005/000279 have all suggested an 'intermediate step' of utilizing a cradle (a purpose built structure) that is to be a transit / support point for the purpose of carrying out automated fixing and removal of IBC, the said cradle being accepted as a significant contribution to improvement to workplace safety. All these documents have suggested in slightly different ways, the need to scale down the use of physical labour in this field with a strong focus on occupational safety. However, heavy investments cannot be justified by marginal / restricted projected results as commerce undoubtedly uses a cost *vs* benefit approach for implementation purposes, and therefore the rate of handling containers must be considered a primary concern that is close, if not on par with safety of personnel. In consideration of the prior art, the simplest embodiment of the present invention is a self sufficient electro - mechanical alternative for one human operative typically assigned to carry out said works. Therefore, this invention affords the divisibility of large and rigid machinery found in the prior art into simple and effective standalone operative cells and offers alternative highly flexible deployment of automation for container ports to maximize benefits from technology. Of particular note is the highly hazardous environment besides the typically frenzied activity of container port operations, where the automation of as many procedures of the work as possible, is obviously desirable.

In container vessel berthing operations, containers (and therefore IBC) cannot practically be positioned (without slowing down normal flow of operations by unacceptably slow movement of the machinery involved) in an exact spot within a space