

Dec. 16, 1969

J. M. HAWTHORNE

3,483,843

RETRACTABLE PROPULSION MEANS FOR SHIPS

Filed Nov. 1, 1968

2 Sheets-Sheet 1

FIG. 1

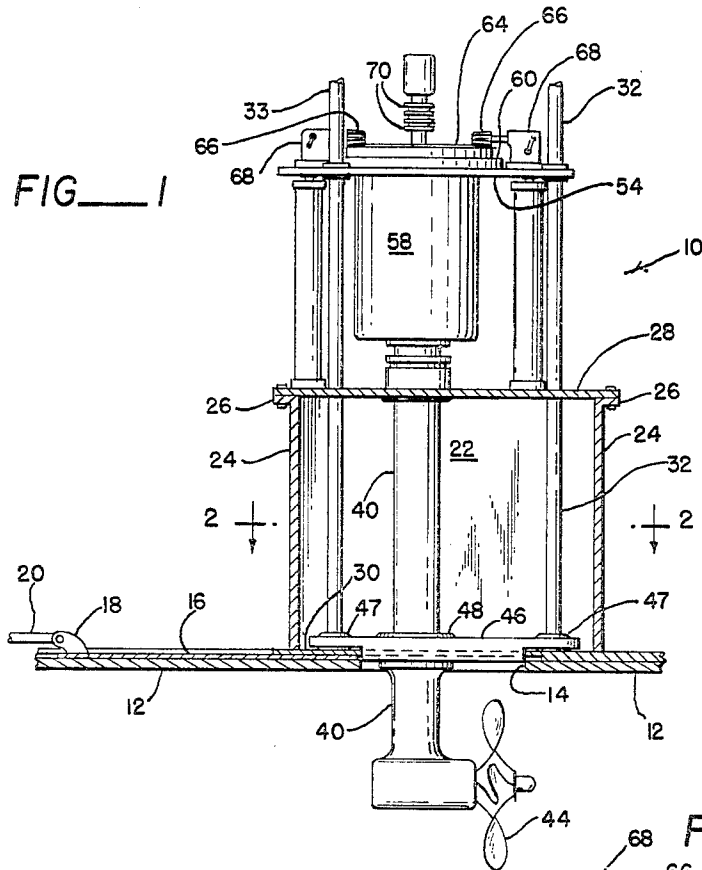


FIG. 2

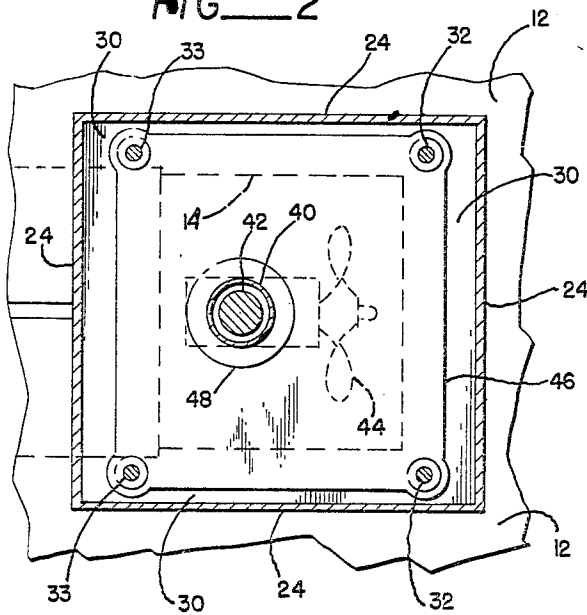
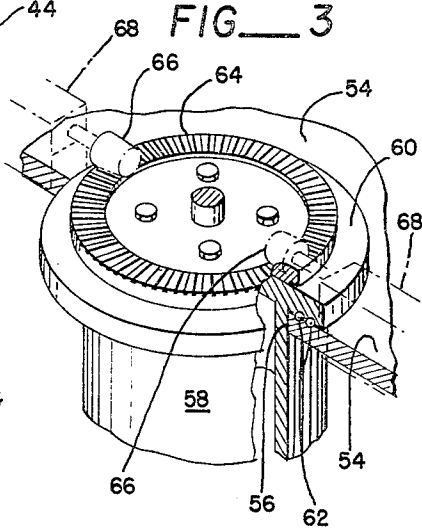


FIG. 3



JAMES M. HAWTHORNE
INVENTOR.

BY *Hayes, Cole & Barnard*

ATTORNEYS

Dec. 16, 1969

J. M. HAWTHORNE

3,483,843

RETRACTABLE PROPULSION MEANS FOR SHIPS

Filed Nov. 1, 1968

2 Sheets-Sheet 2

FIG 4

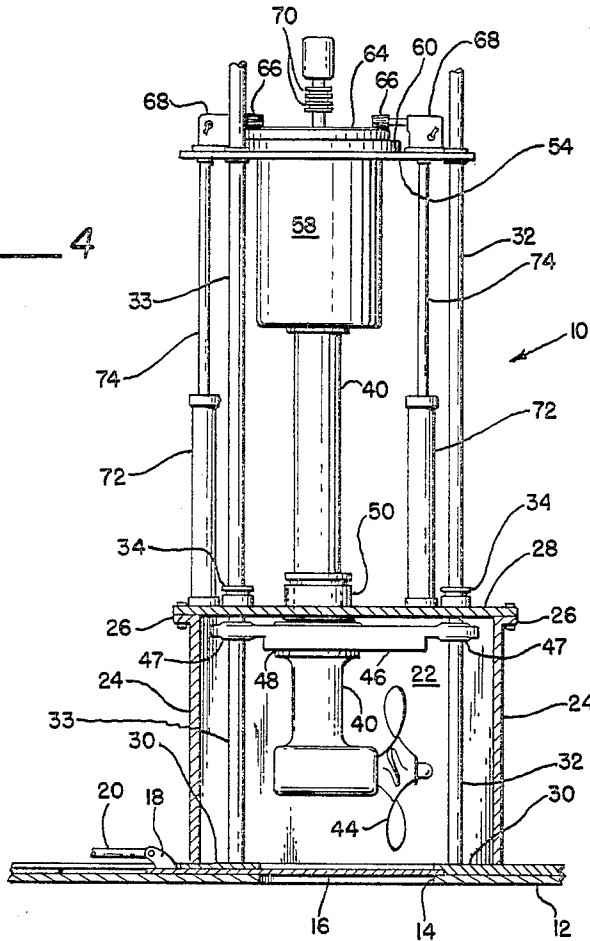
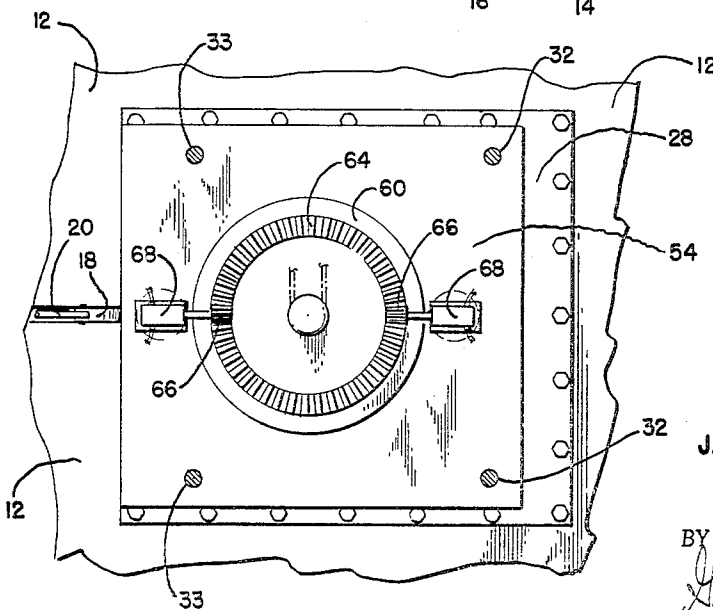


FIG 5



JAMES M. HAWTHORNE
INVENTOR.

BY
Graybeal, Cole & Barnard
ATTORNEYS

1

2

3,483,843
RETRACTABLE PROPULSION MEANS FOR SHIPS
 James M. Hawthorne, Box 603,
 South Bend, Wash. 98586
 Filed Nov. 1, 1968, Ser. No. 772,621
 Int. Cl. B63h 5/12, 5/16, 1/14
 U.S. Cl. 115—41 17 Claims

ABSTRACT OF THE DISCLOSURE

Retractable propulsion means for ships and the like, in which a maneuvering or emergency propeller is extendible to below the hull line to assist in steering or in propelling the ship. The propeller support housing and drive shaft are supported against lateral movement or force generally to the hull line when in the extending position by a bearing structure within the well area which is movable with the propulsion unit. The top of the hull well into which the propeller unit is retracted may be closed off from the water at the hull line and the cap or cover of the well removed for quick repair or replacement of the unit. The propulsion unit is rotatable through a full 360° circle.

BACKGROUND OF THE INVENTION

The invention relates generally to the art of propeller for propulsion units as employed in the driving and maneuvering of ships. More particularly does the invention relate to an auxiliary propulsion and steering system which may be employed in addition to the main propulsion engines and propellers of a ship or which could be employed independently thereof in order to assist in maneuvering and propelling the vessel.

The marine and shipping industry has long recognized the need for a practical retractable auxiliary propulsion and steering unit. The need for a workable bow propulsion and steering unit has been of particular concern and the problem of maneuvering ships and other vessels under trying conditions has been the subject of much study. Many devices have been provided with the intention of assisting in the maneuvering and propelling of vessels, as in landing or departing from a dock, assisting in maneuvering through confined passageways especially under unusual wind and tide or current conditions, and in increasing the maneuverability and tactical capability of naval vessels. Among the problems associated with prior devices has been their lack of proper stressing to the hull. Some retractable bow propeller units have been installed in ships having a moment arm in excess of 10 feet from the extended propeller unit to the nearest side thrust bracing. Another problem inherent in heretofore known bow propeller units has been the necessity for dry docking the vessel in order to repair or replace the unit. Thus if the bow propeller unit has damaged or lost, the vessel was disabled to that extent until it reached a repair yard. Another common problem of prior art units has been their design requiring many specially made parts thus increasing both complexity and expense of a unit.

Among the prior art references considered to be most pertinent are United States Patents Nos. 2,885,990, 3,030,910 and 2,302,795. Such prior art units as identified in the above patents are distinct both structurally and in principles of operation.

SUMMARY OF THE INVENTION

The invention generally comprises a well opening at the hull line and extending up into the vessel. The well

space defined by the well walls can be opened and shut by a sliding door arrangement so that the inside of the well can be isolated from the outside of the hull. The well at the top is capped by a removable plate or other structure which is watertight. A plurality of guide columns are anchored to the hull inside the well cavity and the columns extend upwardly through the well cover and into the interior of the vessel. A propulsion shaft housing or torque tube and drive shaft extend downwardly from above the cap or well cover through appropriate bearing means in the cover and into the well. At the bottom end of the shaft and housing in the propeller means. Immediately above the propeller and connected to the housing and slidably received on the columns is a movable thrust support structure for stressing the propeller, the drive shaft and its housing to the hull at the closest possible point to the extended propeller. At the upper end of the shaft housing is a propulsion motor which is also raised and lowered with the propeller means. Appropriate steering apparatus is provided atop the propulsion motor so that the propeller can be rotated. Lifting means are also provided to raise and lower the unit.

It is among the features of the invention therefore to provide a uniquely simple propulsion propeller for the bow of a ship which can assist a vessel in close maneuvering without the aid of tugboats. It can in an emergency steer and propel the vessel in the event of loss of the main propulsion engines and propellers and furthermore can assist in the event of a flooded main engine room, loss of rudder or lost or damaged steering equipment. Such a unit could bring a vessel to port as fast as any tugboat of comparable power to the bow propeller propulsion motor. A bow propeller unit such as the instant invention gives a vessel the added steering capability or maneuverability which may be necessary in high seas and winds for preventing the vessel from floundering or turning broadside to the waves. It is among other features of this invention to make the unit removable and thus replaceable in the vessel without taking it to a dry dock. Furthermore this type of bow propeller unit can be repaired or replaced at sea, thus making for convenient repair and maintenance of the unit. Additionally, a bow propulsion unit according to this invention may be designed for a wide size range of vessels and can be further designed in such a way that several different size or rated horsepower units may be adapted to fit into the propulsion well of a single vessel. The parts for this propulsion unit may be generally standard components and thus readily available with only slight modifications, if any.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a side elevational view of the device, partially in cross section, showing the propulsion unit in an extended or down position;

FIG. 2 is a cross sectional view taken along the line 2—2 of FIG. 1 and further disclosing details of the propulsion unit within the well cavity;

FIG. 3 is a partial view in perspective showing gear means at the upper end of the propulsion motor which is engaged by steering pinions driven by hydraulic steering motors for turning the propulsion unit through a complete circle;

FIG. 4 is another side elevation view, part of which is in cross section, showing the propulsion unit retracted so that the propeller is in the well cavity and the hull line door means closed so as to seal off the well area from the exterior of the vessel; and

FIG. 5 is a top plan view of FIGS. 1 and 4 showing additional details of the upper structure of the propulsion unit.

DESCRIPTION OF PREFERRED
EMBODIMENT(S)

The invention comprises an auxiliary propulsion and steering unit generally designated by the number 10 which will in most cases be located near the forward end or bow of the vessel. For purposes of illustration only, the hull 12 has been shown without regard for precise structural characteristics, the desire being to show the invention with respect to the hull line as generally designated by reference number 12. It will be noted that hull 12 is provided with an opening 14 of such size and configuration as to permit a propeller unit to pass through. The opening is structured in such a way that a sliding door or closure plate 16 shuts the well off from the exterior of the vessel as shown in FIG. 4 when the propeller is retracted, or opens so that the propeller unit can be extended as shown in FIG. 1. A bracket 18 and rod or arm 20 connected to door 16 permit actuation or movement of the door by use of a conventional actuating mechanism such as a hydraulic or pneumatic cylinder or other conventional means.

Opening 14 is the entrance to well space 22 generally defined by upwardly extending wall structure 24 which is secured to the inside of the hull at the lower edge thereof and which at the upper portion is provided with generally horizontally disposed edge or lip 26. It should be mentioned that the well space 22 may be square as shown or round or take any other configuration as desired. A cover plate 28 attached to edge portion 26 of wall 24 defines a removable top wall for well space 22. Cover plate 28 is secured to walls 24 in such a way that watertight integrity is maintained between the well spaces and the interior of the vessel. It will be noted that well wall 24 is set back from the edge of opening 14 to leave an offset portion or ledge 30 of the hull 12 inside well area 22 generally adjacent well walls 24. Guide columns 32 are detachably secured to the offset portion or ledge 30 and extend upwardly through plate 28 and into the interior of the vessel. The columns will be provided with suitable sealing means 34 in cover plate 28, as best shown in FIG. 4. In the embodiment shown there will be seen to be four columns, one in each corner of the square well configuration. Obviously a greater or lesser number of columns may be used depending upon the size of the propulsion unit involved, the configuration of the well and other factors. The columns extend above the cover plate as will be more fully explained hereinafter and are also detachably secured at the upper ends to the inside of the vessel. The drawings, as mentioned above, show four columns 32 at the corners of a square well area. It will be appreciated that locating the auxiliary propulsion unit 10 in the bow of many vessels will necessarily involve a bottom hull line with a rounded V shape and accordingly a well cavity of confined dimensions. In such an instance the forward columns 32 and after columns 33 may be moved closely together. Thus, for instance as seen in FIG. 2, columns 32 may be moved inboard towards each other and likewise with columns 33 so long as they are spaced far enough from propeller 44 to allow the unit to rotate. It must be kept in mind that it is desirable to extend the lower ends of the columns as nearly as possible to the hull line 12. In some instances it may not be structurally feasible to extend the lower end of the columns to below the retracted propeller as shown in FIG. 2. There will however be some space available for bearing and support columns in the well area so that a movable bearing structure described more fully hereinafter can be located in the well.

Extending from above cover plate 28 and therethrough and into well space 22 is a tubular housing or torque tube 40 through which extends propeller drive shaft 42 for driving propeller 44 at the lower end of housing 40. Within well cavity or space 22 is movable bearing and thrust support plate 46, which is preferably solid and

which is slidably received on the support and guide columns 32 by sleeves or collars 47. A bearing structure 48 is mounted in plate 46 so that housing 40 may turn freely therein as propeller 44 is rotated in a generally horizontal plane. It will be seen that plate 46 will move up and down with the housing 40 but as mentioned above, said housing 40 rotates freely therein. Thus plate 46 is positioned just above propeller 44 so that with the propeller in its extended position thrust support plate 46 is generally coincident with hull 12 or at least is as near the hull line as the columns 32, 33 permit. Accordingly, the propulsion thrust of propeller 44 is stressed to the hull at a point close to and movable with the propeller thus maintaining a constant moment arm on housing 40 instead of increasing such moment arm when the unit is extended. Housing 40 as mentioned above extends through cover plate 28 through an appropriate stuffing gland 50. In its retracted position the thrust and bearing support plate 46 is generally at the upper part or top of the well space. Plate 46 when the propulsion unit is extended will shove out any accumulation of drift or other debris which may accidentally be swept into the well area.

Outside the well area and above cover plate 28 there is provided a generally horizontally disposed elevatable control and prime mover support platform structure 54. Platform 54 is also slidably received on guide and support columns 32. The support platform 54 does not have to take the precise configuration shown. The support platform is provided with an opening 56 as best shown in the breakaway part of FIG. 3 so that a propulsion motor and gear box unit 58 may be removably supported. The propulsion motor and gear box 58 has an outwardly extending ledge section 60 at the upper end of the unit. The ledge portion 60 prevents the motor and gear box unit from passing on through opening 56 in support frame 54. Appropriate bearing structure is provided between support frame 54 and the ledge portion 60 of the propulsion and gear box unit 58. It must be kept in mind that the weights involved may make the matter of bearing support on the support frame 54 substantially more complex than that shown, depending of course upon the size of the motor and gear box unit involved. Propulsion unit 58 is connected to the upper end of housing 40 and drive shaft 42. It will be understood that the manner of supporting the propulsion and gear box unit 58 on platform 54 may vary. The propulsion unit may have a hydraulic prime mover instead of an electric motor and the controls may be located below rather than above the prime mover as shown. It is only necessary that the motor and steering system be raisable and lowerable with the propeller 44 and bearing and thrust support plate 46.

In order to rotate the propulsion unit and propeller through a full 360° circle, the upper end of the propulsion unit will be provided with a removable gear means such as ring gear 64 driven by generally opposed steering pinions 66. The pinions 66 are in turn actuated by hydraulic motors 68 which are controlled by the ship's steering system. Double steering motors and pinions are provided in order to prevent chatter when propeller 44 is rotated. Collector rings 70 provide suitable leadins for conducting current to the propulsion motor in unit 58 if it is electric.

Platform 54 is raised and lowered by conventional lifting means such as hydraulic cylinders 72 and pistons 74. The platform when raised can be locked so that the entire movable portion of the unit can be held in retracted position by means other than the lifting cylinders. The steering mechanism has been shown to traverse through a full 360° circle. However, it may be that some installations will not require this much versatility. Certainly, other types of steering systems will be readily designed by those skilled in the art such as a worm gear drive. It will be appreciated that the columns 32 might be beams or other form of guide structure including the compart-

ment walls themselves, so long as the bearing support 46 is movable and stresses the bearing 48 to the hull as shown and described. It should also be mentioned that the guide and support means within the compartment used not be the same as above the cover as is shown.

While the preferred form of the invention has been illustrated and described it is, of course, recognized that various other forms will be apparent to one skilled in the art and, therefore, the invention is not to be limited to the preferred embodiments.

What is claimed is:

1. A retractable maneuvering propulsion means for ships, comprising:

(a) a compartment generally disposed within the hull of said ship having side wall structure and top wall structure and extending upwardly into said ship and sealed from the interior of said ship,

(b) an opening in the hull defining an outside access port into said compartment,

(c) generally vertically disposed side guide and support means within said compartment extending generally from said top wall structure to hull structure below and in spaced relation to said top wall structure so that the lower ends of said support means are secured as near the external hull line as possible,

(d) bearing support means in said compartment slidably received for up and down movement on said side guide and support means,

(e) propulsion means located within and extendable out of said compartment and connected to said bearing support means for up and down movement therewith and also rotatable relative to said bearing support means, and

(f) propulsion drive and steering means in the interior of said ship and connected to said propulsion means located in said compartment.

2. The retractable maneuvering propulsion means of claim 1 and wherein at least said propulsion means, bearing support means, propulsion drive and steering means are rotatably mounted and raisable and lowerable as a substantially unitary structure.

3. The retractable maneuvering propulsion means of claim 1 and wherein in said compartment said top wall structure is detachable.

4. The retractable maneuvering propulsion means of claim 1 and wherein said side guide and support means comprise a plurality of spaced apart and generally parallel disposed columns.

5. The retractable maneuvering propulsion means of claim 4 and wherein said columns are detachably and rigidly attached at their lower ends to said hull structure.

6. The retractable maneuvering propulsion means of claim 5 and wherein said opening of said hull is provided with door means so that said compartment may be opened and closed.

7. The retractable maneuvering propulsion unit of claim 2 and wherein within the interior of said ship power means are connected to said unitary structure for raising and lowering said propulsion drive and steering means, bearing support means and propulsion means.

8. A retractable maneuvering propulsion means for ships, comprising:

(a) a compartment generally disposed within the hull lines and extending upwardly into said ship and sealed from the interior of said ship by a cover,

(b) an opening in the hull defining an outside access port into said compartment,

(c) side guide and support means within said compartment extending generally from the upper portion of said compartment and secured to hull structure below and in spaced relation to said upper portion so that the lower ends of said support means are as near the external hull line as possible,

(d) a support platform above said cover and supported

for generally up and down movement, said platform supporting propulsion drive and steering means,

(e) a shaft housing and drive shaft extending from said platform into said compartment and supporting a propeller unit, said housing, shaft and propeller unit together with said platform being generally vertically movable to extend and retract said propeller in and out of said compartment; and

(f) bearing support means rotatably mounted with respect to said housing and located above said propeller unit within said compartment and slidably received with respect to said side guide and support means so that when said propeller unit is extended said bearing structure moves downwardly to the lower ends of said side guide and support means to maintain side thrust support for said propeller unit at a point on said hull as close as possible to said propeller.

9. The retractable maneuvering propulsion means of claim 8 and wherein at least said housing, shaft, and propeller are rotatably mounted and raisable and lowerable as a substantially unitary structure.

10. The retractable maneuvering propulsion means of claim 8 and wherein said compartment includes a detachable cover means for sealing said compartment from the interior of said ship.

11. The retractable maneuvering propulsion means of claim 8 and wherein said side guide and support means comprise a plurality of spaced apart and generally parallel disposed columns.

12. The retractable maneuvering propulsion means of claim 11 and wherein said columns are detachably and rigidly attached at their lower ends to said hull structure.

13. The retractable maneuvering propulsion means of claim 12 and wherein said opening in said hull is provided with door means so that said compartment may be opened and closed.

14. The retractable maneuvering propulsion unit of claim 8 and wherein said support platform has power means connected thereto for raising and lowering said platform, propulsion drive and steering means, shaft housing and shaft, bearing support means and propeller unit.

15. A retractable maneuvering propulsion means for ships, comprising:

(a) a compartment generally disposed within the hull lines and extending upwardly into said ship and including cover means detachably sealing said compartment from the interior of said ship,

(b) an opening in the hull of said ship defining an outside access port into said compartment,

(c) a plurality of spaced apart and generally parallel disposed guide and support columns extending from above said compartment into said compartment and secured at their lower ends within said compartment to hull structure below and in spaced relation to said cover so that the lower ends of said columns are as near the external hull line as possible,

(d) a support platform above said cover and slidably received on said columns for generally up and down movement, said platform supporting propulsion drive and steering means,

(e) an elongated shaft housing and drive shaft extending from said platform through said cover and into said compartment and the lower end thereof further supporting a propeller unit, said housing, shaft and propeller unit together with said platform being generally vertically movable to extend and retract said propeller in and out of said compartment, and

(f) movable bearing support means rotatably received on said housing and located above said propeller unit within said compartment and slidably received on said columns so that when said propeller unit is extended said bearing structure moves downwardly to the lower ends of said columns to maintain side

7

thrust support for said propeller unit at a point as close as possible to said propeller.

16. The retractable maneuvering propulsion means of claim 15 and wherein said opening in said hull is provided with door means so that said compartment may be opened and closed.

17. The retractable maneuvering propulsion unit of claim 15 and wherein said support platform has power means connected thereto for raising and lowering said platform, propulsion drive and steering means, shaft housing and shaft, bearing support means and propeller unit.

8

References Cited

UNITED STATES PATENTS

2,987,027	6/1961	Wanzer.	
2,156,938	5/1939	Edwards	----- 115—35
3,030,910	4/1962	Alsager	----- 115—41

TRYGVE M. BLIX, Primary Examiner