United States Patent

van der Loos

[15] 3,643,528

[45] Feb. 22, 1972

[54] ACTUATING HANDLE ASSEMBLY

[72] Inventor: **Jan van der Loos**, Broekseweg 82, Meerkerk, Netherlands

[22] Filed: **Mar. 2, 1970**

[21] Appl. No.: **15,330**

[52] **U.S. Cl.** **74/876**

[51] **Int. Cl.** **B60k 21/00**

[58] **Field of Search** 74/872–876, 879

[56] **References Cited**

UNITED STATES PATENTS

2,804,782	9/1957	Erxleben	74/873
3,153,945	10/1964	Mitchell	74/876
3,309,938	3/1967	Pervier	74/876
3,444,765	5/1969	Des Champs	74/876

FOREIGN PATENTS OR APPLICATIONS

1,023,296	3/1966	Great Britain	74/876

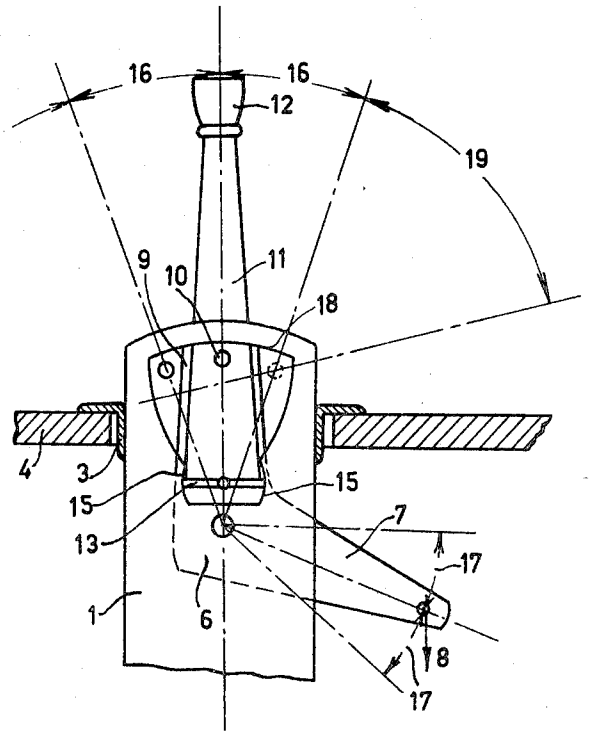
Primary Examiner—Arthur T. McKeon

Attorney—Bayard H. Michael and Joseph A. Gemignani

[57] **ABSTRACT**

An assembly for actuating the reversing gear and the gas throttle of an internal-combustion engine, comprising a first lever for actuating the reversing gear and a second lever for actuating the throttle, the first lever being rotatable around a fixed axis and the second lever being mounted on a pivot on the first lever which pivot does not coincide with said fixed axis. The second lever is also used as an operating handle. During the first part of the stroke of this operating handle on either side of the neutral position, the extremity of the second lever lying in the vicinity of the fixed axis of the first lever is guided by guiding surfaces in such a manner that both levers substantially move as a unit, but after leaving these surfaces the second lever is independently movable around its pivot and the first lever is blocked in its extreme position.

8 Claims, 11 Drawing Figures



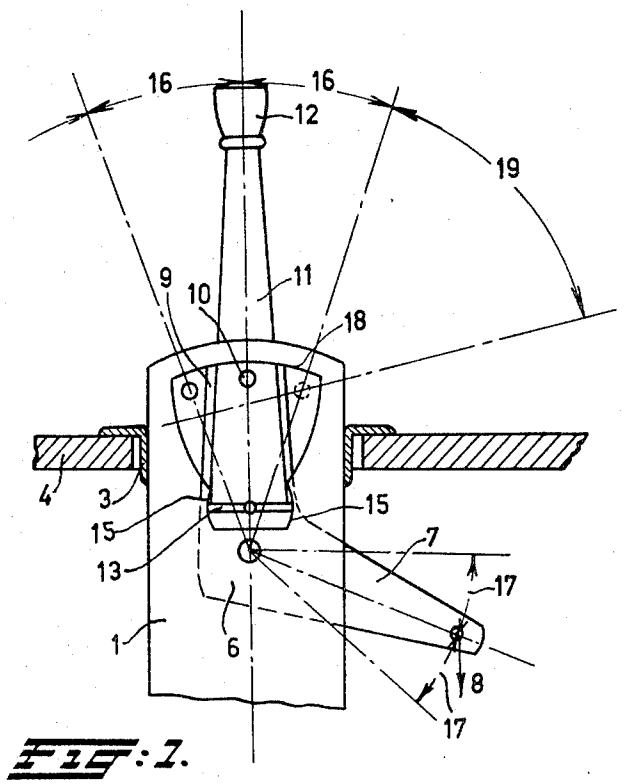


FIG: 1.

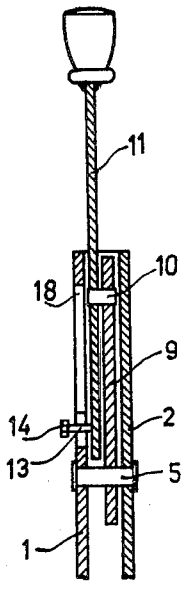


FIG: 2.

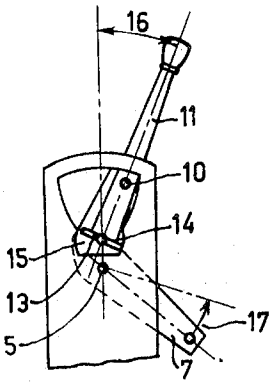


FIG: 3.

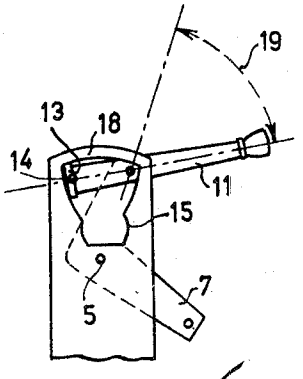


FIG: 4.

INVENTOR
Jan van der Loos
BY
Bayard H. Michael
ATTORNEY

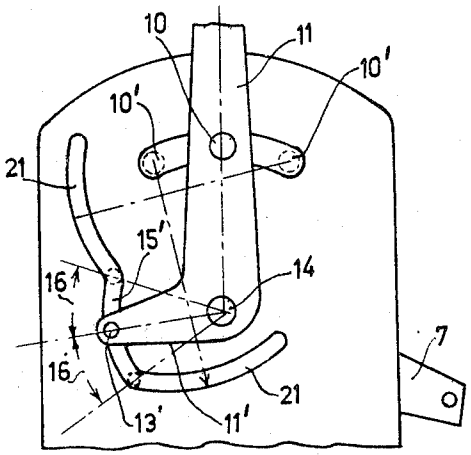


FIG: 5.

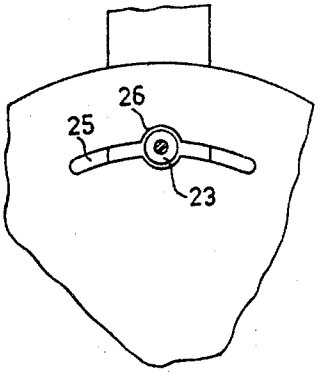


FIG: 8.

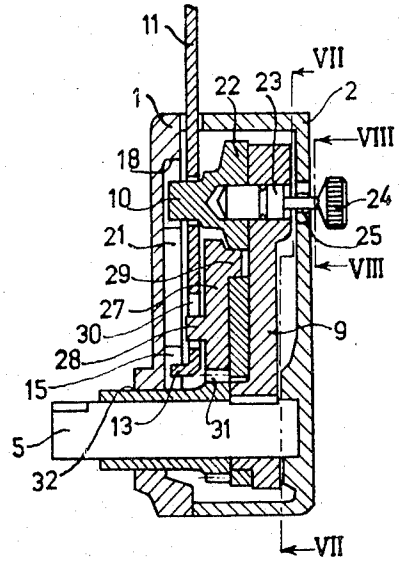


FIG: 6.

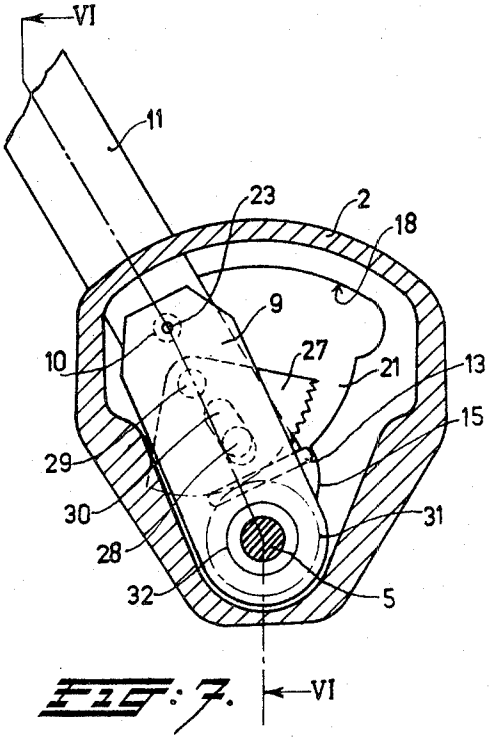


FIG: 7.

INVENTOR
Jan van der Loos
BY
Bayard H. Michael
ATTORNEY

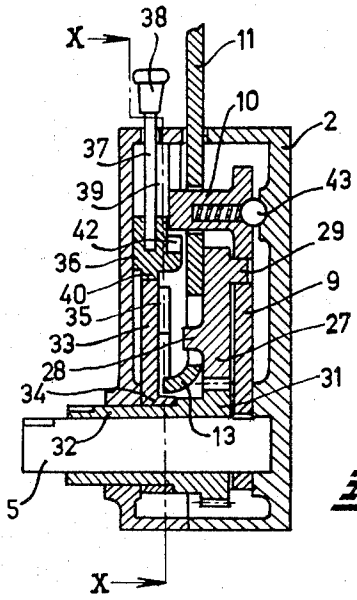


FIG: 9.

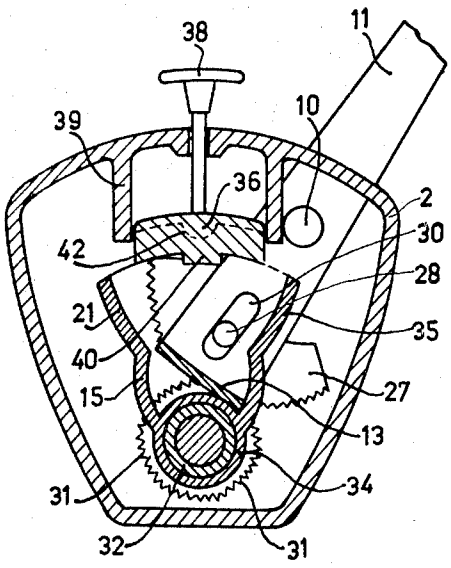


FIG: 10.

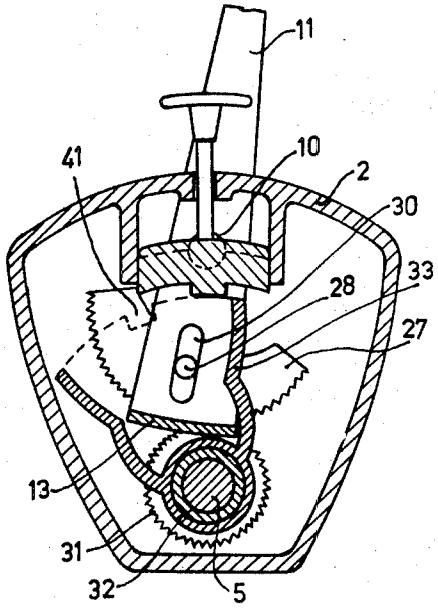


FIG: 11.

INVENTOR
Jan van der Loos
BY
Bayard H. Michael
ATTORNEY

ACTUATING HANDLE ASSEMBLY

BACKGROUND OF THE INVENTION

In smaller ships the ship's motor is connected to the screw by means of a reversing gear, which gear may be directly actuated from the helmsman's stand. It is usual to use a single handle which, at the same time, serves for controlling the speed of the motor.

Handle assemblies are known, in which the actuating handle is movable from a neutral position to either sides within an angle of about 90°, and may control the motor throttle between two extreme positions. Furthermore this handle is connected by means of a guiding cam and a lever to a push-pull cable for actuating the reversing gear, so that the first part of the movement from the neutral position is sufficient to shift this gear in one or the other sense.

Such an assembly has several drawbacks. Since the total stroke of the handle is about 180°, its pivot point should be situated above the mounting surface, but sufficient room should be left for the fingers gripping this handle. This will lead to a rather high construction. Another drawback is that such assemblies are, in fact, developments of a throttle handle, from which by means of a cam and a stroke multiplying lever the movement required for actuating the reversing gear is derived. This causes substantial forces between the cam and the lever which gradually lead to considerable wear and increasing play. Finally it is desirable in such actuating assemblies that, during shifting of the reversing gear, the motor speed is as low as possible. However, during movement from the neutral position, the throttle is slightly actuated too, so that it is not possible to maintain a constant motor speed during shifting.

SUMMARY OF THE INVENTION

The invention provides an assembly of this kind, which does not have these drawbacks. The invention is based on the idea that actuating the reversing gear and the throttle should take place separately and by no means of parts specially adapted thereto, without requiring complex devices which are subject to failures and/or wear.

The actuating assembly according to the invention is designed for performing two different and mutually independent actions with only one handle, and especially for actuating a reversing gear and controlling the speed of the motor connected thereto, which single actuating handle, when moved from the neutral position, will provoke, initially, the first action in the corresponding sense, and subsequently and independently of the sense of movement, the second action, which assembly is characterized by a lever which is rotatable around a fixed pivot and is coupled with means for performing the first action; by an actuating handle which is rotatably mounted on one arm of this lever; by a guiding cam on this actuating handle, the distance of which to the pivot of the handle being equal to or slightly different from the distance between this pivot and the pivot of the lever; by means for performing the second action, which are coupled with this handle at least approximately at this cam; and by fixed guiding means for the guiding cam, by means of which guiding means, during the first part of the movement of the handle from the neutral position, this cam is held or guided in such a manner that the handle and the lever will move substantially concomitantly, and that, at the end of the movement of the lever required for the first action, this cam is released in such a manner that the handle may be rotated around its pivot, and the lever remains stationary in an extreme position.

More specifically this guiding means comprises two circular arcs lying symmetrically in respect of the neutral position of the handle and having a common center point coinciding with or lying at a small distance of the pivot axis of the lever.

Furthermore a second circular arc may join each circular arc of these guiding means, the center of each second arc coinciding with the pivot point of the handle in the corresponding extreme position of the lever.

The guiding cam may be directed perpendicularly and symmetrically to the longitudinal axis of the handle, and the diameter of both circular arcs may be substantially equal to the width of this cam.

In a special embodiment, in which the center of the guiding arcs is situated outside the axis of the lever, a pinion is mounted freely rotatable on the lever shaft, this pinion being coupled to means for performing the second action, and being engaged by a toothed segment, the latter being connected to the lever by means of a first pivot pin, and to the handle by means of a second pivot pin, the first pin not coinciding with the rotation axis of the handle, and the second pin not coinciding with the cam, all this in such a manner that, by the small angular displacement of the handle in respect of the lever when the cam is guided by the circular guiding arcs, this segment is displaced by both elements so that the pinion is submitted to a rotation which is substantially equal but opposite to the angular displacement of the lever or the handle, so that this pinion, during the first part of the movement of the handle, remains substantially stationary. The center of the guiding arcs is, preferably, situated substantially in the pitch circle of the pinion.

The handle may be connected, instead of to the lever, to an intermediate plate by means of a pivot, this plate being rotatable around the same axis as the lever, the latter being connected to the intermediate plate by means of a releasable lock, which lock may be released only in the neutral position in order to be able to vary the motor speed when the reversing gear is not engaged.

A preferred embodiment comprises a guiding member which is rotatable around the same axis as the lever, the guiding arcs forming part of this member, and a lock for locking this member in respect of the housing of the assembly. In this manner this lock may be displaced only in the neutral position of the handle, and is provided with a locking seat for locking the pivot of the handle in the neutral position.

DESCRIPTION OF THE DRAWINGS

The invention will now be explained in the following by reference to the drawing, in which:

FIG. 1 shows a front view of a first embodiment of the assembly according to the invention;

FIG. 2 shows a cross section along the line II—II of FIG. 1;

FIGS. 3 and 4 show simplified front views on a smaller scale of the assembly according to FIG. 1 in two positions of the actuating handle;

FIG. 5 shows a front view, corresponding with FIG. 1, of a slightly modified embodiment;

FIG. 6 shows a cross section along the line VI—VI of FIG. 7 of a modified embodiment of the assembly according to the invention;

FIG. 7 shows a cross section along the line VII—VII of FIG. 6;

FIG. 8 shows a cross section along the line VIII—VIII of FIG. 6;

FIG. 9 is a cross section of a preferred embodiment of the assembly according to the invention;

FIGS. 10 and 11 show cross sections along the line X—X of FIG. 9 in two different positions of characteristic parts of this assembly.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The assembly according to FIGS. 1 and 2 comprises a fixed housing with sidewalls 1 and 2, which housing, for example, may be mounted in an aperture 3 of a board 4 or the like.

In the plates 1 and 2 a pivot pin 5 is mounted, around which a lever or crank 6 is rotatable. It is also possible to mount the pin 5 unilaterally in the plate 1, so that the plate 2 may be omitted. The free end of an arm 7 of this lever is connected to an actuating rod or cable for a reversing gear, which is schematically indicated at 8. The other arm of this lever is directed upwards, and is provided with a pivot pin 10 near its free end.

On the pivot pin 10 a handle 11 is rotatably mounted, the upper end of which is provided with a grip or knob 12. Below the pivot 10 the handle extends up to a small distance from the pivot pin 5, and is provided there with a traverse raised cam 13 extending over the full width of the lever, in the midpoint of which a connecting pin 14 for connecting a cable for actuating the control throttle of the motor is provided.

In the neutral position shown in FIG. 1, the edges of the cam 13 engage curved guiding edges 15 in the form of two equal circular arcs, the common center of which coinciding with or differing only slightly from the connecting pin 14. In the case shown the pin 14 and the center of the arcs 15 are lying outside the shaft 5, but with a unilateral mounting of the shaft 5 the center of the arcs 15 may be aligned with the shaft 5, which is, theoretically, better but somewhat more complex.

The operation of this assembly clearly follows from FIGS. 3 and 4. When the handle 11 is displaced from the neutral position, e.g., to the right, the edges of the cam 13 initially remain in contact with the guiding edges 15. Then the handle 11 has to move around an axis of rotation through the point 14. The lever 6 is carried along, rotating around the pivot 5, so that the arm 7 moves downward. This movement continues until the cam 13 has reached the end of the guiding arc 15. The stroke of the handle 11 is indicated at 16, and the stroke of the levers 7 and 17.

When the handle 11 is pushed still further to the right, the cam 13 will leave the guiding arcs, so that the handle, as shown in FIG. 1, may turn around the pivot 10, and the lever 6 remains stationary. The pin 14, which remained stationary during the movement according to FIG. 3, is now moving upwards until the cam 13 abuts a limiting edge 18. The stroke of the handle during the second part of the movement is indicated at 19, and the corresponding movement of the pin 14 at 20.

It will be clear that, when moving the handle from the neutral position in the opposite sense, the lever 6 will be displaced accordingly in the opposite sense, and that, eventually, the pin 14 will again be moved upward over the distance 20 at the other side. During the first part 16 of the movement of the handle, the pin 14 remains, as stated, substantially stationary, so that the motor speed remains unchanged, during which part of the movement the reversing gear is shifted. Only after the complete shifting of the reversing gear in either sense, the pin 14 will be displaced upward, so that, then the motor throttle is opened.

An important advantage of this construction is that the assembly consists, in fact, of two separate actuating levers, namely a heavier lever for actuating the gear and a lighter lever for actuating the throttle. The pivot of the heavier lever is arranged inside the housing which may be mounted sunken in a plate, board or box, but, which, nevertheless, does not prevent a stroke of the handle of about 180°, since the center of rotation of the handle, during the greater part of the stroke, is situated adjacent the upper end of the housing.

FIG. 5 shows a modification of the assembly of FIG. 1, in which the neutral relationship between the handle 11 and the lever 6 is unchanged. The handle 11, however, is provided with a hooked end 11', at the extremity of which a round cam or roll 13' is provided which is slidable in a slit 15' having its center coinciding with the center of the shaft 5, and, during the first part 16 of the movement of the handle, the pin 14 is substantially aligned with the shaft 5. The guiding slit 15' is joined at both ends by circularly arcuate slits 21. The center of these slits coincides with the pivot pin of the handle 11 as soon as the cam 13' has reached the corresponding extremity of the slit 15', these extreme positions being indicated at 10'.

The operation of the assembly according to FIG. 5 fully corresponds with that according to FIGS. 1–4. As soon as the handle has made a stroke 16, and the pivot 10 has reached the position 10', the cam 13' may pass from the slit 15' into the adjoining slit 21, and may, then, perform a circular movement around the pivot 10'. The pin 14 which remains stationary during the first part of the movement, is, then, moved upward.

FIGS. 6 and 7 show still another embodiment of the assembly according to the invention. As the assembly of FIGS. 1 and 2, the former comprises a handle 11 and a lever corresponding with the lever 6 of FIG. 1, but only comprising the arm 9 which is keyed on the shaft 5. A separate actuating lever may be connected to this shaft. The handle 11 comprises at its lower end a transverse raised cam 13, which, during part of the movement of the handle, engages a circularly arcuate guide 15, and when reaching a given position, may leave this guide until abutting an edge 18.

The pivot pin 10 of the handle 11 is, in this case, not directly connected to the lever arm 9, but by means of an intermediate plate 22, which is freely rotatable around the shaft 5. Generally the lever arm 9 is coupled to this intermediate plate by means of a locking pin 23, an actuating knob 24 of this pin extending outward through a slit 25 of the housing wall 2. As appears from FIG. 8, a round hole 26 is provided in the middle of this slit, the diameter of this hole being such that the locking pin 23 may be pulled outward into this hole, so that the arm 9 is fixed in respect of the housing wall 2, and, at the same time, is released from the intermediate plate 22. If necessary a snap lock may be provided for determining the extreme position of this lock. In this position the arm 9 is uncoupled from the plate 22, and the handle 11 may be moved without actuating the reversing gear. This may be useful for testing the motor or for driving auxiliary devices. Such a lock may also be applied in the embodiments according to the preceding figures.

A second difference with the embodiment according to FIGS. 1 and 2 is that a toothed segment 27 is connected to the handle 11 and the intermediate plate 22 by means of pivot pins 28 and 29 resp., the former lying near the cam 13 and the latter near the pin 10. The pin 28 fits into an oblong slit 30 in the handle 11. This segment 27 engages a pinion 31 which is freely rotatable on the shaft 5 and is provided with a sleeve 31 protruding outside the housing, to which sleeve an actuating lever for the throttle may be connected.

The operation of this assembly clearly follows from FIG. 7. When the handle 11 is displaced from the neutral position, the lever arm 9 is carried along. Since, however, the lever rotates around the shaft 5, and the handle around the center of the guiding arcs 15, the latter center lying higher that the center of the shaft 5, a small relative angular displacement between both will take place which is transferred to the toothed segment. The distance between the points 28 and 29 is chosen in such a manner that the rotation of the segment 27 leads to a rotation of the pinion 31 which is substantially equal and opposite to the rotation which is communicated to this pinion by the displacement of the handle, so that the pinion and the sleeve 32 connected thereto remain stationary as long as the cam 13 engages the guiding arcs 15. As soon as the cam 13 has left these guiding arcs, the arm 9 remains in the extreme position, and the toothed segment 27 drives the pinion 31, and, thus, the sleeve 32, thus providing an adjustment of the throttle.

FIGS. 9–11 show a preferred embodiment of the assembly according to the invention, which essentially corresponds with the embodiment of FIGS. 6–8, but in which a different type of locking mechanism is used. Corresponding parts are indicated with the same reference numbers as in the preceding figures, and will not be described again when the operation does not differ from that of the assembly of FIGS. 6–8.

In the embodiment of FIGS. 9–11, the intermediate plate 22 and the locking pin 23 have been omitted. The pivot 10 is directly mounted on the lever arm 9, and the pin 29 of the segment 27 fits in a hole in the arm 9.

An important difference with the preceding embodiment is that the guiding arcs 15 and 21 are not formed in the housing 2, but form a part of a guiding member 33, having a bearing collar 34 which is freely rotatable on the sleeve 32. This member comprises a sector-shaped disc with raised border ridges 35, the inner faces of the latter forming the guiding arcs 15 and 21.

Furthermore this embodiment comprises a locking block **36** mounted on an axially slidable stem **37** with an actuating knob **38**, and being vertically guided in fixed guides **39** of the housing **2**. This block is, at its lower side, provided with a locking cam **40**, which, in the position shown in FIG. **10**, fits in a corresponding slot **41** in the member **33**, and at the back side of this block a concave locking seat **42** is provided, which, when the block is pulled upward as shown in FIG. **11**, first around the pivot pin **10** for immobilizing the latter.

The operation of this assembly is mainly identical with that of the preceding embodiments. In the position of FIGS. **9** and **10**, the member **33** is fixedly coupled to the housing **2**, and the arm **9** may be moved from the neutral position which is determined by a snap lock **43**, the arm **13** of the handle **11** being guided by the arcs **15**. As soon as the pivot **10** has left the neutral position, the locking block **36** cannot be pulled upward anymore.

When, however, the locking block **36** is pulled upward in the neutral position of the handle **11**, the pivot **10** is locked in respect of the housing **2** and the guiding member **33** is liberated. When being displaced, the handle **11** must rotate around the fixed pivot **10**, so that the cam **13** is laterally moved, and thus, causes the guiding member **33** to rotate in the opposite sense. The slot **41** will be laterally displaced, so that the locking cam **40** rests upon the upper rim of the member **33**, and the block **36** is locked in its upper position.

In the embodiment of FIGS. **6–8** all forces act on the locking pin **23**. In the case of play in the holes for this pin, jamming of the arm **9** and the plate **22** by tilting thereof may easily occur. In the embodiment according to FIGS. **9–11**, on the other hand, the locking block **36**, which may be of a much heavier construction, will take up the loads, and, moreover, the interposition of the pivoting member **33** will reduce the forces on this lock by lever action.

The construction of FIGS. **9–11** may also be applied in the embodiment of FIGS. **1** and **2**.

In the manner described above, it is possible to obtain an actuating assembly for small ships motors and reversing gears of such motors, which requires little space, is easily mounted and actuated, and, furthermore, satisfies all requirements. Of course such an assembly may also be used for other purposes, when two actuating actions should be performed with one handle.

Within the scope of the invention many other modifications are possible.

The embodiments according to FIGS. **6–11** may be manufactured from parts made of plastics.

I claim:

1. Single handle control mechanism for a ship's engine having a reversing gear and throttle means comprising,

a handle rotatable around a first pivot to either side of a neutral position,

a lever coupled to said gear and pivoted on a fixed second pivot not coinciding with said first pivot,

said first pivot being mounted on said lever,

said lever moving about the second pivot in a direction corresponding with the direction of movement of said handle in a first stroke range on either side of the neutral position,

said handle being adapted for moving a throttle actuating means in second stroke ranges at either side of said first range irrespective of the direction of movement of said handle,

said handle extending toward said second pivot and being provided with a guiding extension,

guiding means having first arcuate surfaces, the center of curvature of which coincides with the center of the junction between the handle and said extension when said handle is in the neutral position and is aligned with or slightly displaced from the second pivot,

said extension engaging said first surfaces in the first stroke range for maintaining said junction stationary relative to said second pivot,

said guiding means including second arcuate surfaces comprising two parts each joining the first surfaces at opposite ends of the latter and being circular arcs, the center of curvature of which coincides with the position of the first pivot in the position of the lever at the corresponding end of the first range,

stop means for stopping the lever at the ends of the first stroke range of the handle,

said guiding extension of the handle after leaving the first arcuate surfaces following the corresponding part of the second surfaces to allow the handle to rotate around the first pivot while presenting return movement of the lever, and

throttle actuating means connected to the handle and actuated thereby only in the second stroke range.

2. The mechanism according to claim **1** in which

the guiding means is part of housing means supporting the second pivot,

the guiding extension extending perpendicularly to the handle and the longitudinal axis of the handle,

said first arcuate surfaces being formed by two circular ridges symmetrically positioned in respect of the longitudinal axis of the handle when it is in the neutral position,

said second surfaces being two further circular ridges each joining one of the first circular ridges and being symmetrically positioned in respect of the longitudinal axis of the handle when it is in the neutral position, and

the throttle actuating means being connected to the midpoint of said guiding extension.

3. The mechanism of claim **1** in which

the guiding extension is substantially coplanar with the handle and is provided at its free extremity with a guiding pin or roller,

the guiding means being part of housing means supporting the second pivot,

the first arcuate surfaces are formed by the concentric edges of an arcuate slot in said guiding means,

the second arcuate surfaces being formed by concentric edges of two arcuate slots in said guiding means joining the first slot at either end, and

the throttle actuating means being connected to the junction between the handle and the extension.

4. The mechanism according to claim **1** in which

the guiding means is part of housing means supporting the second pivot,

the second pivot being formed by a rotatable shaft on which the lever is keyed,

said shaft being coupled with the reversing gear,

a hollow shaft surrounding said first shaft,

a pinion mounted on the hollow shaft,

a toothed segment engaging the pinion and mounted on a third pivot which is attached to said lever and is located between the first pivot and said shaft,

said segment being connected with the handle by means of a pin and slot assembly in the handle,

the guiding extension extending perpendicularly to the handle and the longitudinal axis of the handle,

said first arcuate surfaces being formed by two circular ridges symmetrically positioned in respect of the longitudinal axis of the handle when it is in the neutral position,

said second surfaces being two further circular ridges each joining one of the first circular ridges and being symmetrically positioned in respect of the longitudinal axis of the handle when it is in the neutral position, and

the throttle actuating means being connected to said hollow shaft.

5. The mechanism according to claim **4** in which

an intermediate member carries the first pivot and one part of the pin-slot assembly,

a retractable coupling pin forming the connection between said intermediate member and the lever and guided in a slot in the guiding means, and

said slot being provided with an enlarged opening in which a part of said pin is received when retracted in the neutral position of the handle in order to disengage the handle from the lever and locking said lever in the neutral position.

6. The mechanism according to claim 1 in which

the second pivot is formed by a rotatable shaft on which the lever is keyed,

said shaft being coupled with the reversing gear,

a hollow shaft surrounding said first shaft,

a pinion on the hollow shaft,

a toothed segment mounted on a pivot attached to said lever and lying between the first pivot and said shaft and coupled with the handle by means of a pin and a slot arrangement, said segment engaging said pinion,

the guiding extension extending perpendicularly to the handle and the longitudinal axis of the handle,

said first arcuate surface being formed by two circular ridges symmetrically positioned in respect of the longitudinal axis of the handle when it is in the neutral position,

said second surfaces being two further circular ridges each joining one of the first circular ridges and being symmetrically positioned in respect of the longitudinal axis of the handle when it is in the neutral position,

said guiding means being rotatable in either direction from a neutral position and being carried by a second hollow shaft surrounding the first hollow shaft,

said housing means being provided with a slidable locking means which may be operated from outside of said housing means and being provided with a locking part engaging a complementary part of the guiding means in the neutral position of the latter,

said locking means being further provided with a locking recess complementary to the first pivot so that when not operated the locking part locks the guiding means in its neutral position and when operated said guiding means is free to rotate around said shaft and the first pivot is locked in the neutral position with the handle then being freely rotatable around said first pivot,

the throttle actuating means being connected to the first hollow shaft.

7. An engine control for operating a reversing gear and a throttle comprising

an arm mounted on a fixed pivot for movement from a neutral position to a forward position on one side of the neutral position and to a reverse position on the other side of the neutral position,

a pivot located on the arm remote from the fixed pivot,

an operating lever pivoted on said remote pivot and having a throttle control portion extending towards the fixed pivot and a handle portion extending in the opposite direction,

guide means operative to limit movement of the lever relative to the arm within the range of movement between said forward and reverse positions whereby the lever handle may be actuated to actuate the arm,

means associated with said throttle control portion of the lever and operative to transmit motion to a throttle,

the last two means being selected and located so minimal motion is transmitted to the throttle while the lever moves to actuate the arm between said positions,

said guide means being inoperative to restrain movement of the lever relative to the arm as the lever is actuated into a throttle control range of movement beyond its position corresponding to either said forward or said reverse position of said arm,

said lever pivoting around said remote pivot in said throttle control range of movement and said motion transmitting means being operative in that range to transmit motion, and

means operative to retain said arm in either its forward or reverse position when said lever is in its throttle control range of movement.

8. An engine control for operating the reversing gear and the throttle,

an arm connected to the reversing gear and pivoted on a fixed pivot and movable from neutral to a forward or a reverse position,

a second pivot on the arm spaced from the fixed pivot,

a handle pivoted on the second pivot with a handle portion projecting from the second pivot for manual actuation and another portion projecting into proximity with the fixed pivot,

means restraining movement of the handle means relative to the arm throughout the range of movement of the arm between said positions whereby the handle and arm essentially move as a unit until the arm reaches either of said positions, and

throttle control means operatively connected to a point on said another portion of the handle means,

the movement of the handle means relative to the arm as permitted by the restraining means and the location of said point and the nature of the throttle control means being mechanically and geometrically related so no actuating movement is imparted to the throttle in said range,

said restraining means being ineffective when the handle is moved beyond said range whereby movement is imparted to the throttle only after actuation of the reversing gear is completed.

* * * * *