Aug. 17, 1943. E. J. PANISH 2,326,796

CONTROL STATION

Original Filed June 26, 1941 3 Sheets-Sheet 1

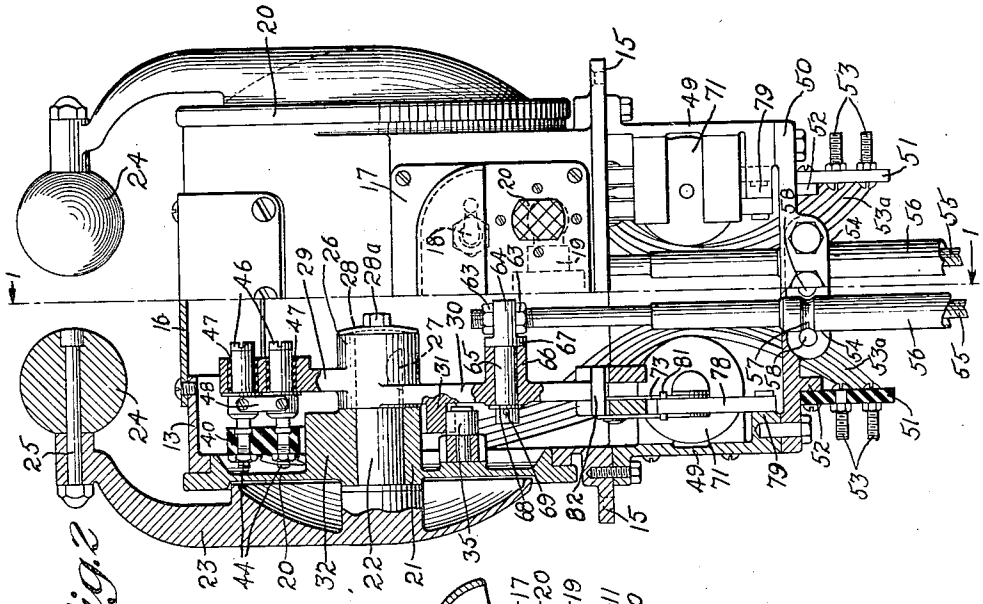


Fig. 2

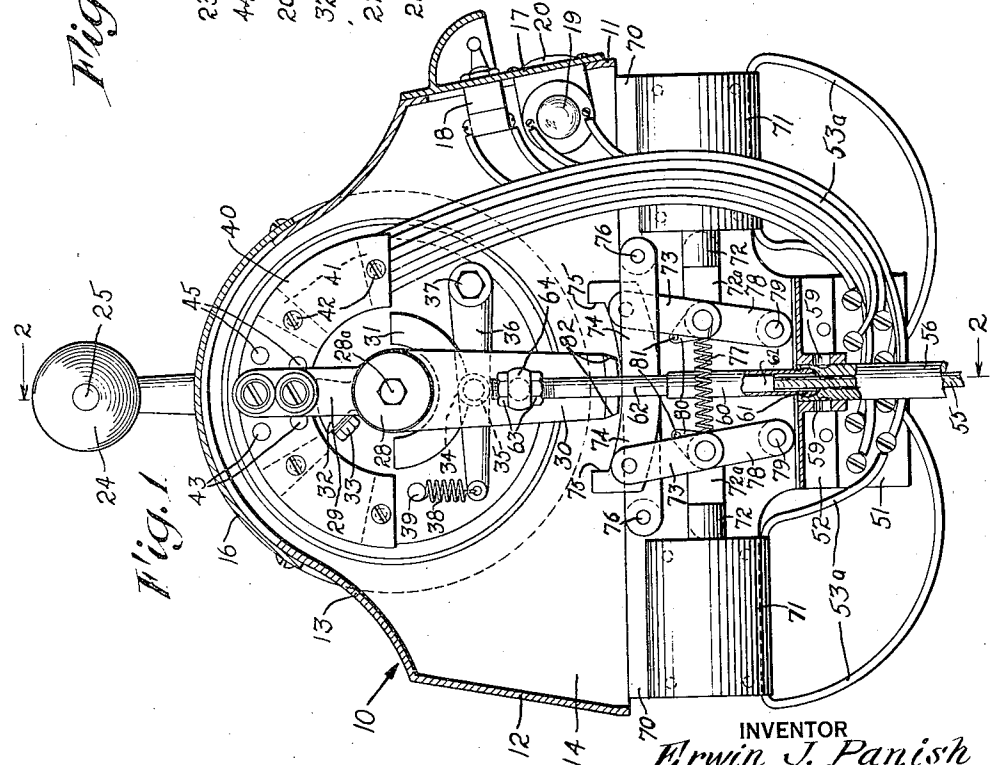


Fig. 1

INVENTOR
Erwin J. Panish
BY Johnson, Kline & Smyth
ATTORNEYS

Aug. 17, 1943. E. J. PANISH 2,326,796

CONTROL STATION

Original Filed June 26, 1941 3 Sheets-Sheet 2

Fig. 4

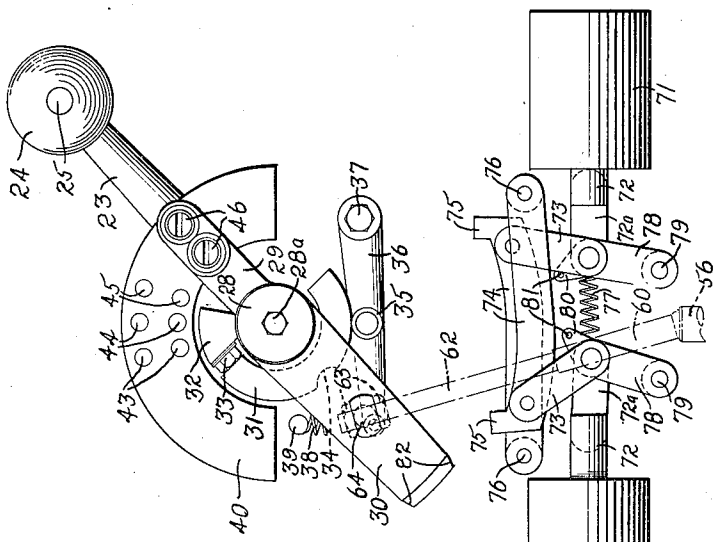
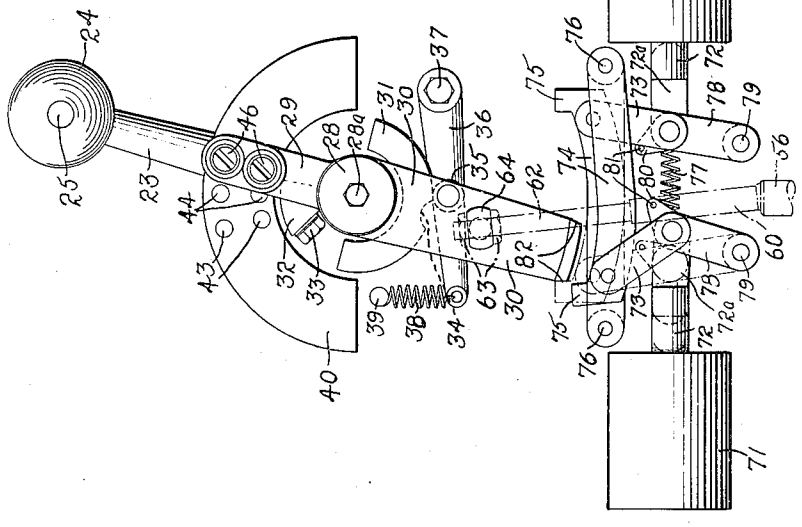


Fig. 3



INVENTOR
Erwin J. Panish
BY Johnson, Klein & Singleton
ATTORNEYS

Aug. 17, 1943. E. J. PANISH 2,326,796

CONTROL STATION

Original Filed June 26, 1941 3 Sheets-Sheet 3

Fig. 5

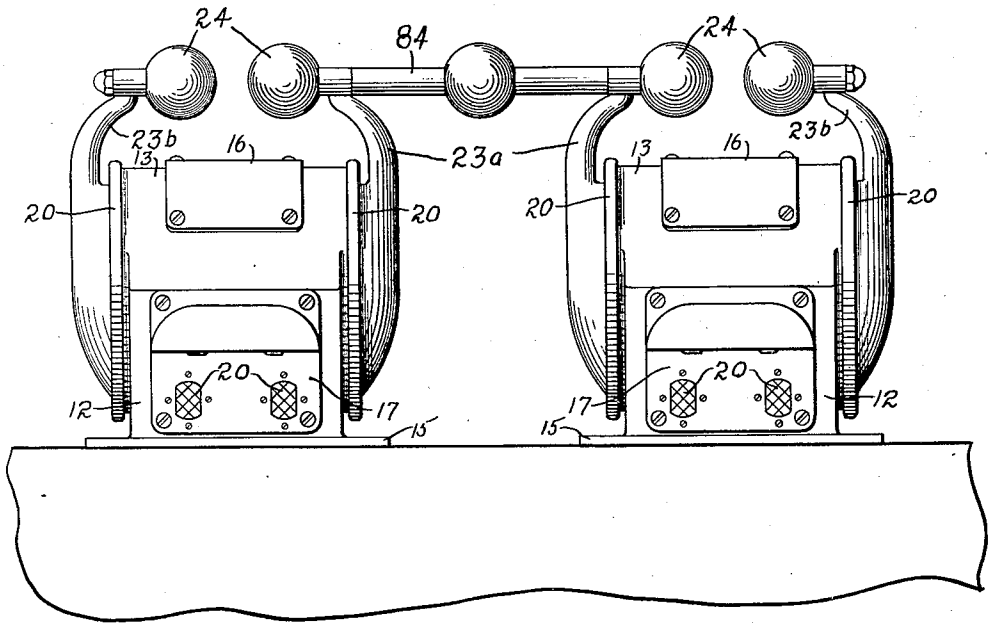
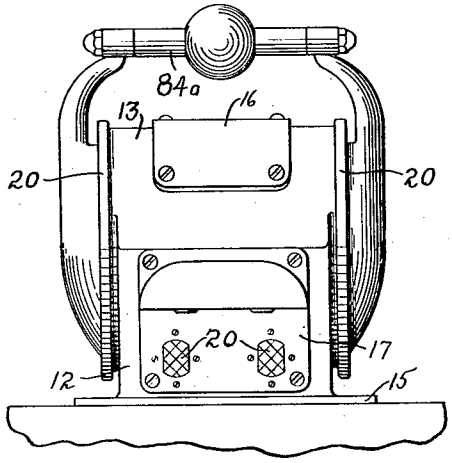


Fig. 6



INVENTOR
Erwin J. Panish
BY Johnson, Brown & Smyth
ATTORNEYS

Patented Aug. 17, 1943 2,326,796

UNITED STATES PATENT OFFICE

2,326,796

CONTROL STATION

Erwin J. Panish, Bridgeport, Conn.

Original application June 26, 1941, Serial No. 399,951. Divided and this application June 26, 1941, Serial No. 399,949

18 Claims. (Cl. 74—471)

This invention relates to a control station for correlated remote control of a plurality of operations and the present application is a divisible part of the invention disclosed in my copending application Serial No. 399,951, filed June 26, 1941.

It is an object of the present invention to provide a control station having a plurality of independent control members so disposed as to be similarly operated with one hand, and more particularly, a pair of such members adapted for similar or differential operation with one hand.

Another object of the invention is to provide a remote control station having a control member adapted to effect a plurality of correlated control operations, especially for effecting a quantitative control correlated with a directional control.

A further object is to provide a control station having a control member directly controlling one operation and adapted to initiate another control operation, said station also having means for limiting the scope of the first control operation until the second operation is completed by separate automatic means.

The specific embodiment of the invention herein described is especially designed and adapted for use in marine installations to operate the clutch or reverse gear, and the throttle of one or more engines driving the propeller shafts of a vessel, the complete system being described in my aforesaid copending application. However, the control station of the present invention is similarly applicable for other types of installations requiring correlated control of a plurality of operations.

Features of the invention include the provision of a plurality of control members for effecting independent control operations movable in adjacent nonintersecting paths such as, for instance, parallel, coaxial arcuate paths, and adapted to effect similar control operations upon similar motion of the various members.

The control members are so disposed so as to be grasped by one hand for simultaneous operation or for differential operation in pairs by twisting the hand. By provision of detent means and stop means for positioning said members and for limiting manipulation, operation with one hand for effecting desired variations is facilitated.

In the preferred form of the invention wherein it is desired to limit the range of one control operation pending completion of another control operation initiated by the same control member, another feature is the provision of latch means for retaining the control member within the desired limits and automatic means for releasing the said latch means upon completion of the initiated control operations. The said latch means is provided with automatic means for moving it to inoperative position when released and is preferably also adapted to be moved, when released, to inoperative position by pressure applied to the manual control member in latch-opposing direction. Thus, if the said automatic means for moving the latch to inoperative position fails to operate for some reason, when released for operation, the control member nevertheless may be moved beyond the latched position upon application of manual force thereto in latch-opposing direction.

A preferred embodiment of the invention is described hereinafter and illustrated in the accompanying drawings, in which:

Figure 1 is a central vertical cross-section of the control station of the present invention along the line 1—1 in Fig. 2.

Fig. 2 is a partial transverse vertical cross-section along the line 2—2 in Fig. 1, half of the station being shown in front elevation.

Fig. 3 is a view in side elevation of a control lever, latch and detent mechanism of the control station in one position.

Fig. 4 is a view similar to Fig. 3 showing another position of the control lever and associated mechanism.

Fig. 5 is a view in front elevation of a pair of dual control stations showing means for controlling three independent systems.

Fig. 6 is a view similar to Fig. 5 of one control station showing means for controlling one system.

The control station illustrated in the drawings is adapted to control a pair of independent systems as, for instance, the respective reverse gears and throttles of a pair of marine engines. The control station comprises an integral casing 10 having a front wall 11, a rear wall 12, a curved top wall 13, and flat side walls 14. The latter are provided with base flanges 15 for securing the control station to a supporting surface, and for securing independent portions of the control mechanism in position.

An opening is provided in the top wall giving access to the interior of the casing and a removable cover 16 is secured over the opening. The front wall 11 is also provided with a rectangular aperture over which a cover plate 17 is secured carrying a master switch 18 for the electric circuits of each control system and a pair of signal

lamps 19 which are disposed behind colored glass windows 20 to provide a visible signal during the operation of the control system.

The side walls 14 are each provided with a large circular aperture for receiving a bearing plate 20 in snugly fitting relation. Both sides of the control station are identical.

A main bearing 21 is provided in the center of each of the bearing plates 20 for receiving the main shafts 22 of a pair of control levers 23 which extend radially therefrom on the exterior of bearing plate 20, beyond the upper surface of the casing 10. At their upper ends, the control levers 23 are curved inward above the center of the casing and carry a pair of inwardly projecting spherical grip handles 24 secured to the control levers 23 by means of horizontal pins 25 about which they are adapted to rotate more or less freely.

When the control levers 23 are similarly positioned to extend in the same direction from their common axis, the two grip members 24 are adjacent each other so that they may both be simultaneously gripped with one hand for moving both levers together in either direction or by twisting the hand for moving the levers in opposite or differential directions or amounts.

An enlarged hub 26 is keyed to the inner end of the control lever shaft 22 by means of a key 27 and secured in position by a friction washer 28 and a bolt 28a. The hub 26 carries a radial contactor arm 29 extending upward substantially in the same direction as the operating lever and a mechanical operator arm 30 extending radially downward in the opposite direction. The latter carries an integral arcuate segment 31 extending over the end of the hub of the bearing 21 and curving about the axis of the shaft 22. A cooperating segment 32 or stop lug is formed on the hub of the said bearing so that motion of the control lever 23 about its axis is limited by engagement of opposite ends of the segment 31 with the opposite sides of the lug 32. An adjustable bolt 33 may be provided at one end of the fixed stop lug for varying one of the limiting positions of the motion of the control lever if desired.

Moreover, intermediate its ends, the segment 31 is arcuately recessed as indicated at 34, the recess being adapted to engage a roller 35 carried by a transverse detent arm 36 secured by a pivot 37 at one end to the bearing plate 20 and urged toward the segment 31 by a tension spring 38 at its opposite end secured to a pin 39 projecting from the bearing plate 20. Cooperation of the roller 35 with the recessed segment surface forms a yieldable detent means for accurately positioning the control lever 23 in a predetermined intermediate position when the roller 35 engages the recess 34. However, upon application of operating force of the control lever, the detent means yields to permit motion of the lever toward either of its limiting positions.

Each bearing plate 20 carries a semicircular contact plate 40 of insulating material secured to a number of ribs 41 at its inner surface by means of bolts 42. Three pairs of contacts 43, 44 and 45 are secured to the insulating plate in suitable apertures provided therein and arcuately spaced one from the other. One member of each of the said pairs is disposed equidistant from the axis of the shaft 22, while the other members are similarly disposed at a different radial distance therefrom. The contactor arm 29 projecting radially from the hub 26 on the shaft 22 of the operating lever carries a pair of radially spaced spring contactors 46 insulated from the arm by means of bushings 47 of insulating material. A bridging member 48 of conducting material forms a connection between the said contactors. The contactors 46 are so spaced from the axis of the shaft 22 as to be adapted to bridge the respective pairs of contacts successively upon angular motion of the control lever 23 about the axis. Preferably, the middle pair 44 of contactors is bridged when the yieldable detent means above described is engaged, yieldably retaining the control lever 23 in the aforesaid intermediate position, while the other contacts 43 and 45 are angularly spaced an equal distance on opposite sides of the middle pair of contacts by an angle considerably less than the angle through which the lever 23 must be moved to reach either of its limiting positions from detent-engaging position.

A supporting frame is secured to the base of the control station comprising a pair of side plates 49 and a bridging plate 50, the former being secured to the base flanges 15 of the side walls 14 of the casing, and the latter to the lower extremities of the side plates 49.

On its lower surface, the bridging plate 50 carries a pair of terminal plates 51 of insulating material fastened to a pair of ridges 52 adjacent the two ends of the bridge and carrying a number of threaded terminals 53 secured through apertures in the terminal plates for the attachment of electrical conductors 53a joining the terminals with the windings of solenoids 71 and contacts 43, 44 and 45.

A pair of mechanical operators for control of a mechanical device, for instance, the throttle of an internal combustion engine, extends upward through a pair of apertures 54 symmetrically disposed along the axis of the bridge 50. These operators are shown as adapted to control a pair of Bowden wires 55 having sheathes 56 terminating at the said apertures. The Bowden wire sheaths are secured respectively in the apertures by means of an annular groove 57 adjacent the end of the sheaths 56, opposite sides of which engage a pair of bolts 58 extending through a pair of perforated ridges 59 integral with the bridge plate 50 on opposite sides of the apertures 54.

A sleeve 60 protrudes from the end of each of the Bowden wire sheaths and is held therein by means of a ball and socket joint 61 so as to be movable about the center thereof. A rigid operating rod 62 fitting telescopically into each sleeve is joined to the end of the Bowden wire 55. Its upper end which is threaded is secured by means of a pair of lock nuts 63 to a boss 64 on the end of a pin 65 pivotally supported in a bearing 66 on the operator arm 30 extending radially downward from the hub 26 on the operating shaft 22 and retained in said bearing 66 by a shoulder 67 at one end, and a washer 68 and retaining pin 69 at the other.

Thus, upon angular displacement of the operating lever 23, the Bowden wire 55 is moved longitudinally in its sheath, the ball and socket joint 61 and sleeve 60, permitting free lateral as well as longitudinal motion of the rod 62. Preferably, when the contact arm 29 engages the middle pair of contacts 44 and the yieldable detent 35 is engaged, the rod 62 is radially disposed with reference to the hub 26 so that the Bowden wire 55 is projected to the limit of its motion through the sheath 56. Equal motion of the operating lever 23 to either side of this position withdraws

the Bowden wire 55 through its sheath to the same extent regardless of the direction in which the lever 23 is moved.

At each end, each of the two side plates 49 is provided with a yoke 70 to support two pairs of solenoids 71, the pair carried by each side plate being coaxially aligned. Each of the solenoids carries a loosely movable core piece or armature 72 projecting toward the center of the side plate 49. The inwardly projecting ends of the armature links 72a each carries a pivotal link 73 extending upward and pivotally joined to the end of a horizontal link 74 which is secured by a pivot 76 at its opposite end to a portion of the side plate 49 adjacent the opposite coaligned solenoid. The movable or linked end of the horizontal link 74 is provided with a projection 75 adapted to extend into the path of the lower end of the radial operating arm 30 projecting downward from the hub 26, said projections 75 acting as latches or stop means for arresting motion of the control lever 23 toward either limiting position.

The latches of opposite coaligned armatures are preferably disposed to arrest the motion of the control lever at equal distances from the midposition in which the yieldable detent is engaged, such that the motion of the lever is arrested when contact is made with one or the other pairs of contacts 43 or 45 on opposite sides of the central pair of contacts 44.

The link is so disposed that the latch is raised and rendered operative when the armature 72 associated therewith, is retracted by energization of the solenoid 71, and to be lowered upon motion of the armature 72 outward from the solenoid 71 rendering the latch inoperative. A tension spring 77 joining the ends of the coaligned armature normally tends to bias the latch to inoperative position.

A third link 78 is pivotally secured to a boss 79 near the lower edge of the side plate 49 and is also pivotally attached near its upper end to the end of the armature link 72a. The link 78 carries a projection 80 having a stop means shown as a pin 81 projecting into the path of the link 73 for engaging the side thereof. Engagement of the said pin with the side of the link 73 limits retracting motion of the armature 72 into the solenoid 71. When the said limiting position is reached, the two links 73 and 78 are so arranged as to make an angle slightly less than a straight angle so that upon application of a downward force on the end of the latch link 74 the two links 73 and 78 will collapse in latch-releasing, armature-projecting direction.

The end of the operating lever 30, which is engaged by the latch, is provided with cam surfaces 82 adapted, to apply latch-depressing force to the projection 75 on the end of the latch link 74 when the control lever 23 is pushed toward its limiting position in latch-opposing direction. As long as the solenoid 71 is energized, the tendency to release the latch is insufficient, but when the solenoid is deenergized, cam 82 is adapted to depress the latch 74 and withdraw the armature from the solenoid by virtue of the above-described link arrangement, regardless of the latch-releasing effect of the spring 77. Thus, if the spring should break or fail to operate when the solenoid is deenergized, the latch is still adapted to release the control lever 23, the release merely requiring a slight additional manual effort on the part of the operator.

Both coaligned solenoids 71 are normally energized, rendering the latches operative to limit motion of the control lever 23 in either direction, at positions in which one or the other pair of contacts 43 or 45 on opposite sides of the middle pair 44 are bridged. Upon motion of the control lever 23 in either direction from detent-engaging position to latch-engaging position, the electrically connected contactors 46 of the contactor arm 29 are adapted by bridging contacts 43 or 45 respectively, to close a pair of circuits to initiate direction control operations, such as the operation of the reverse gear-actuating mechanism to move the reverse gear to one or the other of its engaged positions from neutral position. Upon completion of either of the said direction control operations, automatic switch means, operated by said actuating mechanism, opens the circuit of the solenoid 71 controlling the engaged latch 75, releasing the latch and permitting further motion of the control lever 23 toward its limiting position. Preferably, the operation of the mechanism also renders the initiating circuit, originally closed by contactors 46, inoperative as long as the reverse gear continues engaged. Thus, during this period, the operating lever 23 is free to move over the entire range between the neutral position and the limiting position without affecting the reverse gear-actuating mechanism by repeated bridging of contacts 43 or 45.

Upon returning the operating lever 23 to the middle or detent-engaging position, a circuit is closed by bridging of the middle pair of contacts 44, causing the reverse gear-actuating mechanism to disengage the reverse gear. During disengagement the automatic switch means of the actuating mechanism again closes the energizing circuit of the deenergized solenoid 71 and resets the inoperative latch to operative condition.

While one latch is inoperative as long as the reverse gear is engaged for operation in one direction, the opposite latch still remains operative. Thus if it is desired to engage the reverse gear or other mechanism for opposite directional engagement by motion of the control lever 23 to the opposite latch-engaging, circuit-closing position, the second latch 75 is operative to prevent further motion of the control lever 23 toward the opposite limiting position. The inoperative or released latch 75 is reset during motion of the reverse gear to disengaged or neutral position, while the second latch 75 is released by the automatic circuit control means of the reverse gear-actuating mechanism upon completion of reverse gear operation for opposite engagement in the manner hereinbefore described.

As stated above, the Bowden wire 55 secured to each control lever is adapted to effect a quantitative control, such as the control of the throttle of an internal combustion engine. When the control lever 23 is in detent-engaging midposition, the throttle is preferably set for idling speed, and the throttle setting is progressively increased upon motion of the operating lever toward either limiting position.

The latch-engaging, circuit-closing positions in which the operating lever 23 is adapted to initiate engagement of the reverse gear on opposite sides of the midposition are preferably spaced from the midposition so that the corresponding throttle settings are not materially advanced, whereby the engine operates at moderate operating speed suitable for engagement of the reverse gear. Engagement at higher engine speeds

would tend to shear the propeller shaft or cause lurching of the vessel.

Since the reverse gear is disengaged by moving the control lever 23 to midposition, disengagement occurs substantially at throttle setting for idling speed, avoiding possible damage by racing of the engine upon disengagement of the reverse gear. Motion of the control lever 23 from one to the other reverse gear-engaging position is limited by the opposite latch 75 so that the throttle cannot be advanced materially beyond adjustment for a moderate operating speed until after the reverse gear is engaged, thus avoiding all possibility of damage during the reversing operation to the engine or propeller shaft.

Since it is usually not desired, when the reverse gear is engaged for "astern" operation of the vessel, to operate the engine at full speed, the stop means comprising the lug 32 on the hub 21*a* of the bearing 21 is adapted to cooperate with the end of the arcuate segment 31 carried by the downwardly projecting operating arm 30, to limit maximum displacement of the control lever 23 on the reverse-engaged side of neutral to somewhat less than full-speed throttle adjustment. The bolt 33 provides means for adjusting this limit.

The signal lamp 19 is preferably illuminated only during closure of the motor circuits for operation of the reverse gear-actuating mechanism. Thus, failure of the lamp 19 to go out within a reasonable time interval after operating the control lever 23 to initiate a reverse gear operation, indicates that the reverse gear-actuating mechanism has not completed its operation and that its motor is stalled across the line. If the lamp 19 fails to illuminate at all, it indicates that something is wrong with the electric system. Failure of the actuating mechanism to complete a desired reverse gear operation may be due to various causes, for instance, excessive discharge of the battery supplying power to the reverse gear-actuating mechanism. Thus, the operator at the control station is informed at all times whether or not the devices controlled thereby are operating properly.

The master switch 18 is adapted to render all of the circuits of the corresponding control lever 23, including the reverse gear control circuits, the latch solenoid circuits, and the signal light circuit, operative or inoperative at will. When it is moved to open-circuit position, the operating lever 23 is adapted to control only the throttle of the engine and is movable over its entire range since the latches 75 are released by deenergization of the solenoids 71. Thus, if it becomes necessary in an emergency to operate the reverse gear by auxiliary means, for instance, by hand, the control lever 23 may remain operative to control the throttle over its entire range, while the reverse gear is operated independently.

Simultaneous manipulation of the two operating levers by one hand which is made possible by virtue of their disposition so as to move in adjacent parallel coextensive arcuate paths, and to perform similar controls by similar movement is especially advantageous in marine construction. By virtue thereof, it makes possible the control of the reverse gears and throttles of both engines with one hand, while the other hand of the operator is free, for instance, to operate a steering device. When both control levers are similarly operated, the yieldable detent at neutral position facilitates positioning of the members in throttle-idling, reverse gear-disengaging position. The solenoid-controlled latches 75 facilitate simultaneous positioning of the operating levers 23 for smooth engagement of both reverse gears, without materially advancing the throttle of either engine during reverse gear engagement, for operating the vessel either ahead or astern. Further, during engagement of the reverse gears for operation of both propellers in the same direction, the throttle settings of the two engines may be differentially advanced or retarded for maneuvering the vessel to drive one propeller faster than the other by gripping both control levers and twisting the hand for imparting differential motion thereto.

In maneuvering, where it is desired to operate twin propellers of a vessel in opposite directions, the control levers 23 may be gripped with one hand when in detent-engaging or neutral position, and moved to opposite latch-engaging positions with great ease by twisting the hand. The latches assure accurate positioning of the two control levers in reverse gear engaging reduced throttle positions. The two levers 23 may both be returned to neutral in the same manner, the detent means accurately positioning the said levers for neutral.

If more than two mechanisms, such as two engines with reverse gears are to be controlled, for instance, three or four engines, two of the dual control stations hereinbefore described may be employed, mounted side by side as shown in Fig. 5. If three engines are to be controlled, the adjacent control levers 23*a* of the pair of juxtaposed stations respectively may be joined by a rigid grip bar 84 so that both are moved together. One of the joined control levers is a dummy, the other being operable to control the throttle and reverse gear of the central engine. The opposite or outer control levers 23*b* of each station respectively operate the port and starboard engines. While such an arrangement is not especially adapted for differential operation of all the controls, by one hand, the joined levers 23*a* and one or the other of the outer levers 23*b* may be differentially operated in the said manner, the other being operated by the other hand. Moreover, all of the levers may be simultaneously and similarly moved to either engaged position, or back to neutral position by one manipulation, either with one hand or with the forearm.

As shown in Fig. 6 when only one mechanism, for instance an engine, is to be controlled, the same casing may be used and the two levers joined by a bar 84*a* carrying a grip handle. Again, one of the levers would be a dummy, the other lever operating the mechanism as above described.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. In a manual control device, a manually operable means movable along a predetermined path from a given starting position through a range of control positions to effect a plurality of controlled operations, movement of said member to a predetermined control position initiating at least one of said controlled operations and further movement of said member beyond said control position effecting another of said operations; and releasable electromagnetic stop means for arresting said member upon movement from said starting position against further motion in the same direction at said predetermined control position, said electromagnetic stop means being

releasable to permit further motion of said member upon completion of at least a part of the first-named operation.

2. In a manual control device, a manually operable means movable along a predetermined path from a given starting position through a range of control positions to effect a plurality of control operations; electric circuit control means rendered operative upon movement of said member from said starting position to a predetermined control position for initiating at least one of said controlled operations, and alternate circuit control means rendered operative upon return of said member to the starting position, to initiate the reverse of said controlled operation; movement of said member through a range extending beyond said predetermined control position, effecting another of said controlled operations, the latter being reversed by return movement of said member toward said starting position; and releasable stop means for temporarily arresting said member against further motion in the same direction at said predetermined control position upon movement from the starting position, said stop means being releasable to permit further motion of said member upon completion of at least a part of the first-named operation and resettable during the reverse of said operation.

3. In a control device, means for effecting a quantity control; means for effecting a direction control; common manual actuating means for both of said control means, movable between predetermined limits through an intermediate "neutral" position and a pair of intermediate "control" positions on opposite sides of said neutral position, movement of said actuating means from said neutral position toward either limiting position operating said quantity control means to effect equivalent progressive variations of quantity and return movement of said actuating means toward neutral position operating said quantity control means to effect converse quantity variations; means for selectively initiating one of a pair of alternate directional control operations of said direction control means upon movement of said manual member to said respective control positions, and for initiating operation of said direction control means to neutral or inoperative condition upon movement of said manual member to neutral position from either of said control positions; and electromagnetic stop means for arresting movement of said manual actuating member from neutral toward either of said limiting positions tempararily upon reaching either of said control positions, said stop means being releasable to permit further movement of said manual actuating means toward its adjacent limiting position upon completion of at least a part of the direction control operation initiated in the control position corresponding to said stop means.

4. In a control device, means for effecting a quantity control; means for effecting a direction control; common manual actuating means for both of said control means, movable between predetermined limits through an intermediate neutral position, and a pair of intermediate control positions on opposite sides of said neutral position, movement of said actuating means from said neutral position toward either limiting position, operating said quantity control means to effect equivalent progressive variations of the quantity and return movement of said actuating member correspondingly effecting converse quantity variations; means for selectively initiating control operations of said direction control means for alternate directional adjustment respectively, upon movement of said manual member to said respective control positions, and for initiating a control operation for neutral or inoperative adjustment upon movement of said manual member to neutral position; and releasable electromagnetic stop means for arresting movement of said manual actuating member temporarily from neutral toward either of said limiting positions, in both of said control positions said electromagnetic stop means being releasable one at a time to permit further movement of said manual actuating means toward the adjacent limiting position upon completion of at least a part of the direction control operation initiated in one of the control positions and resettable during the reverse direction control operation initiated by motion of said member to neutral position or to the opposite control position.

5. In a control device, means for effecting a quantity control; means for effecting a direction control; selective circuit-closing means for initiating operation of said direction control means; common manual actuating means for said control means, movable between predetermined limits through an intermediate neutral position, and a pair of intermediate control positions on opposite sides of said neutral position, said quantity control means effecting equivalent progressive variations of the quantity upon movement of said actuating means from said neutral position toward either limiting position, and converse variations upon movement thereof toward said neutral position; said selective circuit-closing means completing circuits for initiating alternate direction control operations of said direction control means upon said manual member reaching opposite control positions respectively, and completing a circuit for initiating converse control operations of the direction control means for neutral or inoperative adjustment, upon reaching said neutral position; and a pair of releasable stop means operative to prevent movement of said manually actuating member beyond either of said control positions, said stop means being releasable one at a time to permit movement of said member beyond the control position toward the adjacent limiting position upon completion of at least a part of the direction control operation initiated in said control position, and resettable during the converse control operation of said direction control means initiated by motion of said manual member to neutral position or to the opposite control position.

6. In a control device, means for effecting a quantity control; means for effecting a direction control; common manual actuating means for both of said controls, movable between predetermined limits through an intermediate neutral position and a pair of intermediate control positions on opposite sides of said neutral position, movement of said actuating means from said neutral position toward either limiting position operating said quantity control means to effect equivalent progressive variations of quantity, and return movement of said actuating means toward neutral position operating said quantity control means to effect converse quantity variations; means for selectively initiating a pair of alternate direction control operations of said direction control means upon movement of said manual member to said pair of respective control positions, and for initiating operation of said direction control means

to neutral or inoperative condition upon movement of said manual member to neutral position from either of said control positions; releasable stop means for temporarily arresting movement of said manual actuating member from neutral toward either of said limiting positions upon reaching either of said control positions; and yieldable detent means for positioning said manual actuating means in neutral position.

7. In a control device, a manual control member movable between a starting position and a limiting position for effecting a plurality of control operations, one operation being initiated by said member reaching an intermediate control position and the reverse operation being initiated upon said member reaching starting position, and another operation being effected by movement of the member between starting position and the limiting position; and electromagnetic latch means normally preventing motion of said member beyond said control position toward said limiting position; said latch means being releasable upon completion of at least a part of said first-named operation and resettable during the converse operation.

8. In a control station, a pivotally mounted control lever movable between a pair of limiting positions through an intermediate position; a pair of spaced latch means for intercepting movement of said lever from intermediate position toward said limiting positions respectively; a pair of spaced coaligned solenoids disposed adjacent said respective latch means; an armature in each solenoid; a linkage connecting each armature to said latch members respectively, the armatures moving apart upon energization of the solenoids and thereby moving said latch means to operative position; and a tension spring joining the two armatures for urging them together to release said latches respectively upon deenergization of the corresponding solenoids.

9. In a control device, a control lever mounted for limited pivotal motion about a fixed axis; a linearly movable mechanical control member; a link having one end pivotally secured to said control lever at a point eccentric to said axis and secured at its other end to said linearly movable control member; fixed pivoted guide means slidably engaging said link adjacent the latter end thereof, whereby pivotal movement of said control lever imparts linear movement to said control member; switch means for effecting an electric control; and means on said lever for operating said switch means at a given point in the movement of said control lever.

10. In a control device, a manually operated lever movable toward a limiting position, latch means for intercepting and arresting movement of said member to said limiting position; releasable means for retaining said latch in operative position; resilient means for releasing said latch upon release of said retaining means; and alternate means on said manual operating lever for releasing said latch in response to a force tending to move said lever toward the limiting position when said retaining means is released.

11. In a control station, dual independent control means for effecting a plurality of control operations upon a pair of independent devices; a pair of manual grip members movable in adjacent nonintersecting paths for operating said control means respectively, conjugate motion of said members effecting similar control operations of said dual control means; yieldable detent means for positioning said members conjugatedly in an intermediate position; stop means on opposite sides of said intermediate position for limiting movement of said members away from said intermediate position, said grip members being juxtaposed so as to be simultaneously gripped with one hand for moving them conjugately to effect identical control operations of the two devices, said detent means and said stop means serving thereby to position the members respectively in intermediate position and in said stop positions, and for moving said grip members differently to effect differential control operations of the two devices by a twisting motion of the hand, said stop means serving thereby to arrest the grip members in opposite stop positions upon differential movement away from each other, and said detent means positioning the two members in intermediate position upon differential movement toward said position.

12. In a control station, dual independent control means for effecting a plurality of control operations upon a pair of independent devices; a pair of manual grip members movable in adjacent nonintersecting paths between a pair of limiting positions, through an intermediate position, for operating said control means respectively, conjugate motion of said members effecting similar control operations of said dual control means; and stop means on opposite sides of said intermediate position for limiting movement of said members away from said intermediate position toward their respective limiting positions, said stop means being releasable in response to operation of the controlled devices; said grip members being juxtaposed so as to be simultaneously grasped with one hand for moving them conjugately to effect identical control operations of the two devices, said stop means serving thereby to position the members in stop positions, and for moving said grip members differentially to effect differential control operations of the two devices by a twisting motion of the hand, said stop means serving thereby to arrest the grip members in opposite stop positions; release of said stop means permitting further movement of said grip members toward their respective limiting positions.

13. In a control device, a pivotally mounted control lever movable between a pair of limiting positions; a pair of spaced latch means for intercepting movement of said lever toward said limiting positions respectively; a pair of spaced, substantially coaligned, latch-operating members, movable between limits along a common path, motion of each of said members to its limit adjacent the other member releasing one of said latches, and to its limiting position remote from the other member rendering said latch again operative; releasable means for retaining said members in latching positions; and yieldable tension means joining said members for moving them to latch-releasing position upon release of said retaining means.

14. In a control device, a pivotally mounted control lever movable between limiting positions; a pair of spaced latch means for intercepting and arresting movement of said member toward said limiting positions respectively; a pair of substantially coaligned spaced members movable between limits along a common path, motion of each of said members to its limit adjacent the other member releasing one of said latches, and to its limiting position remote from the other member rendering said latch again operative; a pair of alternately releasable means for retain-

ing said members in latching positions; and a cam on said lever cooperating with cam surfaces on said latches to release a latch engaged thereby in response to manual force in latch-opposing direction, upon release of the corresponding retaining means.

15. In a device of the type described, a pivotally mounted control member having a radial extension movable over a predetermined angular range; a latch member pivotally supported at one end adjacent said angular range; a projection on the opposite end of said latch member, adapted to extend into the path of said radial extension to arrest movement thereof, said projection being withdrawn from said path to release said member upon pivotal movement of the latch member away from said radial extension; a latch operator, linearly movable in a path lying in the plane of motion of said latch member; a link pivotally secured at one end to said latch member adjacent said projection, and at the other end to said latch operator, said link forming an acute angle with the path of motion of the latter, and also with the line joining the supporting pivot of the latch member with the link pivot thereof, when the latch member is positioned to engage said radial extension; and a cam surface on the end of said extension for exerting a force in latch-releasing direction upon said projection when a force in latch-opposing direction is applied to said control member, a component of said force being transmitted by said link to said latch operator in the direction of motion of the latter to release the latch.

16. In a device of the type described, a pivotally mounted control member having a radial extension movable over a predetermined angular range; a latch member pivotally supported at one end adjacent said angular range; a projection on the opposite end of said latch member adapted to extend into the path of said radial extension to arrest movement thereof, said projection being withdrawn from said path to release said member upon pivotal movement of the latch member away from the radial extension; a latch operator linearly movable in a path lying in the plane of said latch member; a pair of links, each having one end secured to said latch operator at a common pivot, the opposite end of one link being supported at a fixed pivot, and the opposite end of the other link being pivotally secured to said latch member adjacent said projection, said links forming less than a straight angle when the latch member is in extension-engaging position, collapse of said links at their common point withdrawing said latch member and moving said latch operator along its linear path; stop means integral with one of said links and engaging the other link to limit the maximum angle between the links to less than a straight angle; and a cam surface on said radial extension, cooperating with said projection to transmit a component of force applied to the control member in latch-opposing direction to said links, said component force tending to collapse the two links and move said latch operator in latch-releasing direction.

17. In a control system, a single control member for effecting a plurality of separate control operations; means for temporarily limiting the control range of said member for certain of said operations according to the status of another of said operations; and common means for rendering said limiting means inoperative, and said control member inoperative to control the last-named operation, whereby said control member remains effective to control the other operations while said last-named operation is actuable independently of said control member and limiting means.

18. A plurality of control stations mounted on a support in juxtaposition, each control station comprising a housing; a pair of pivotally mounted control levers on opposite sides of each control station housing, all of said control levers pivoting about a common axis; a pair of grip members on each of said control levers, the grip members on each control station being disposed in juxtaposition so as to be grasped with one hand for conjugate movement, or by a twisting movement of the hand for differential movement; a rigid bar joining adjacent grip members on adjacent control stations for moving the control levers associated with said grip members in a similar manner; and a grip member intermediate the ends of said bar.

ERWIN J. PANISH.