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Bagge

[11] **3,842,689**

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[54] **MULTIPLE STATION CONTROL SYSTEM**

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[52] **U.S. Cl.** **74/479,** 74/483, 192/.096

[51] **Int. Cl.** **G05g 5/06**

[58] **Field of Search** ..... 74/480, 479, 483, 878, 74/501; 192/.096, .098

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[57] **ABSTRACT**

A system for remotely controlling the setting of an adjustable element from a selected one of a number of control stations. The system includes an arrangement having a longitudinally movable operating slide having arranged in juxtaposed relationship on either side thereof a control slide arranged for individual movement with and parallel to the operating slide. The slides are connected to the adjustable element to be remotely controlled and are held mutually interconnected by latching means whose geometric axes meet each other in the neutral position of the arrangement. The latching elements are accommodated in channels and may be biassed axially inwardly by spring means. Between the latching elements, centrally of the operating slide, is a centre device providing indirect contact of the latching elements one with the other. The arrangement is such that activation of one slide causes similar movement of the operating slide while blocking movement of the non-activated slide.

6 Claims, 7 Drawing Figures

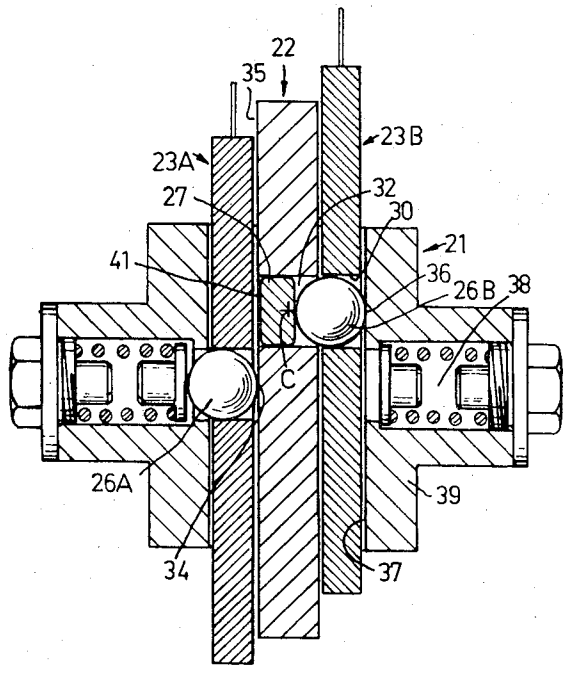


FIG.1

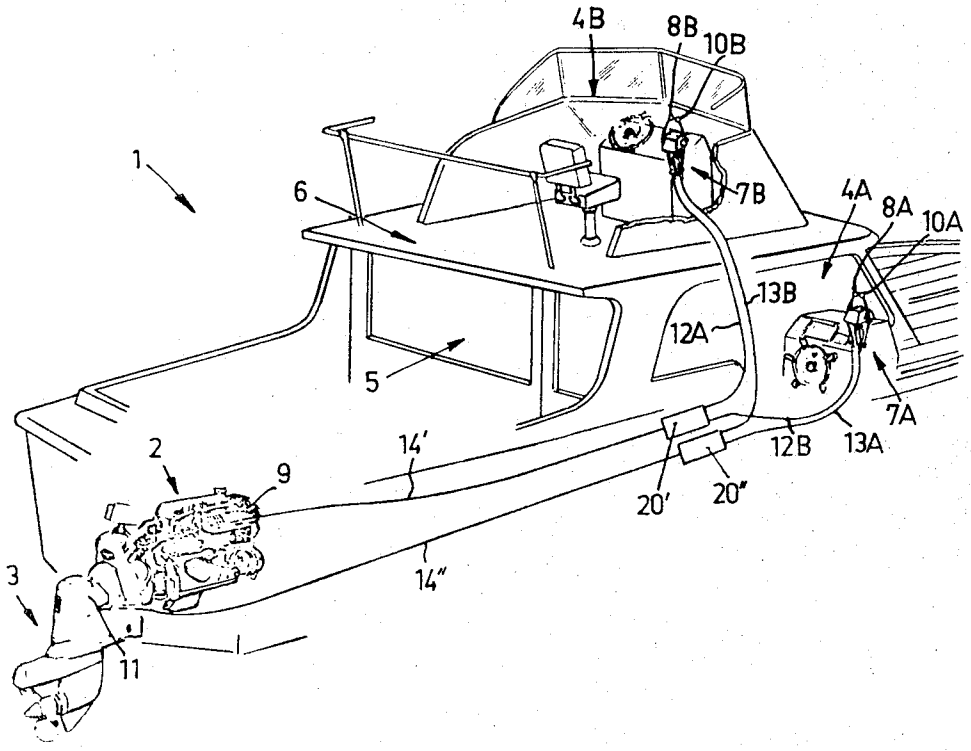


FIG.2

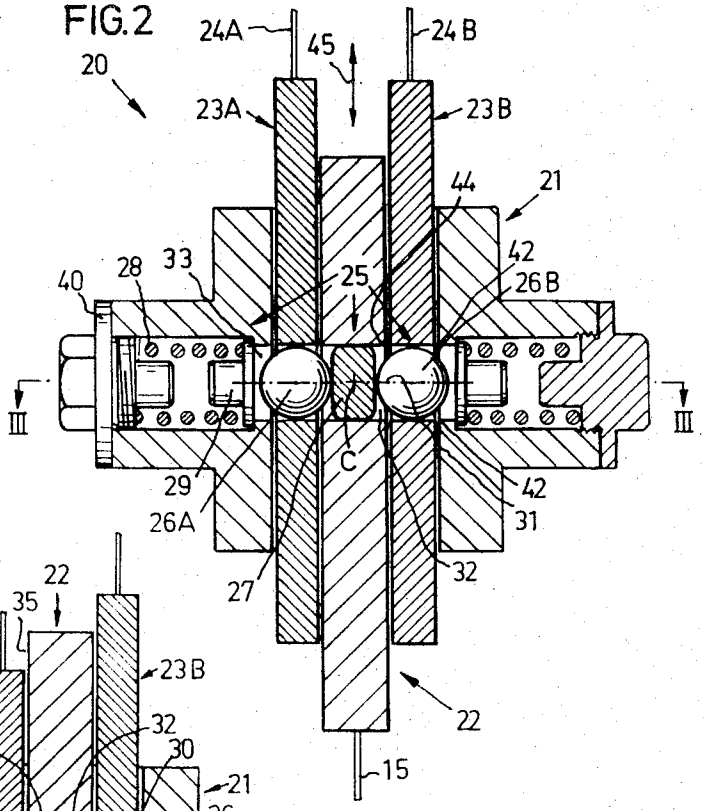


FIG.4

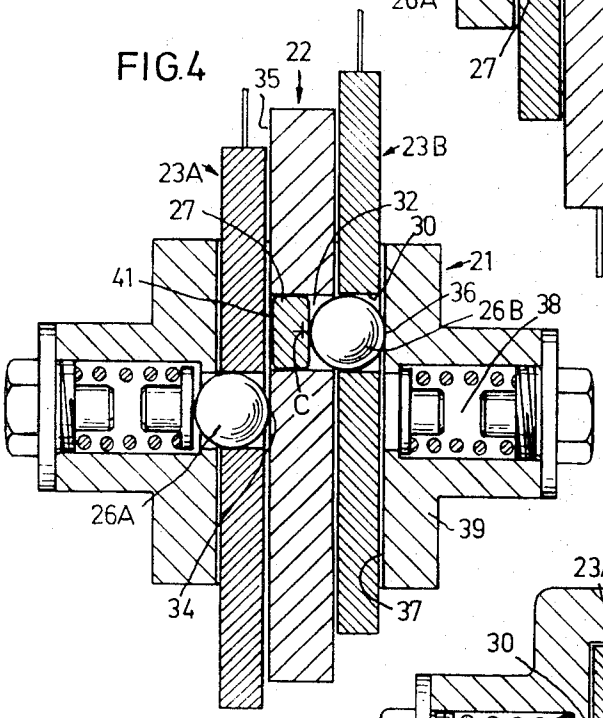


FIG.3

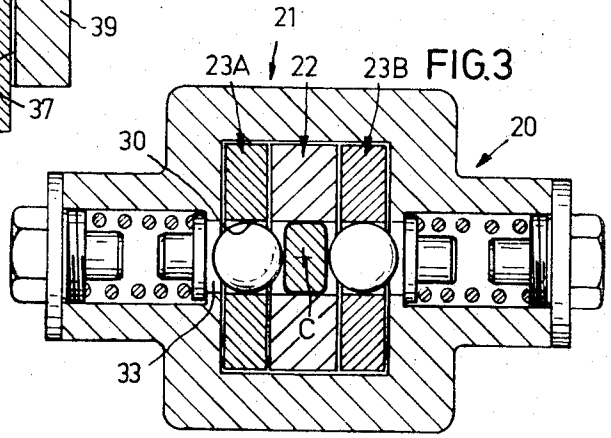


FIG.5

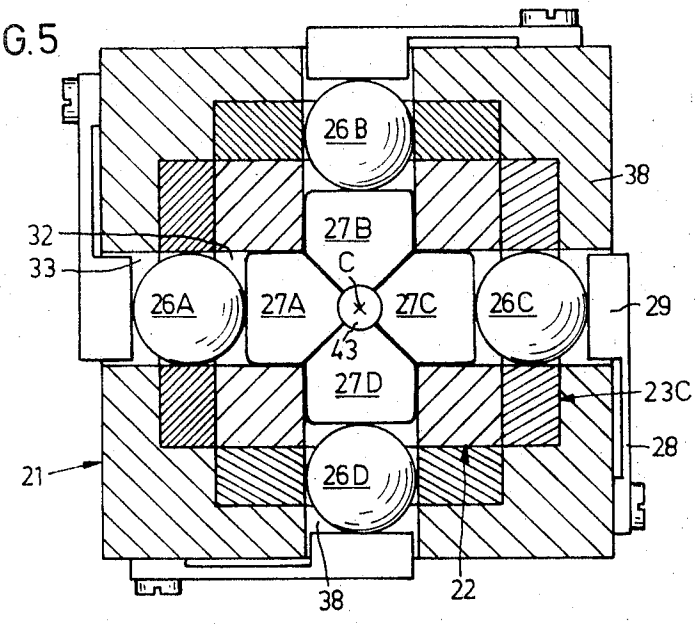


FIG.7

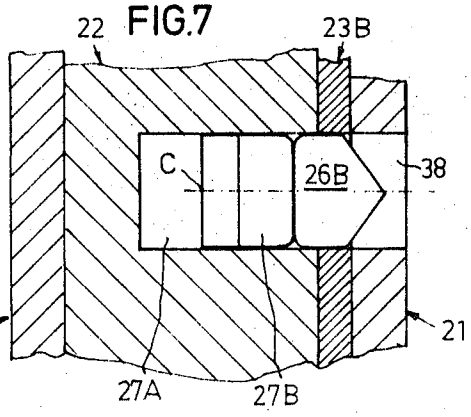
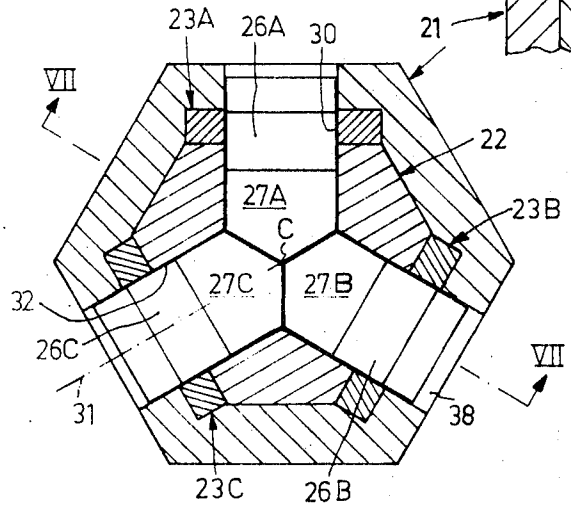


FIG.6



MUTIPLE STATION CONTROL SYSTEM

The present invention relates to a system common to at least two operating stations for enabling an adjustable element such as an engine carburetor for example to be remotely controlled from any selected one of the stations. It should be understood from this that no special measures are required to alternate the remote control action from one operating station to another.

Systems of the aforementioned type are previously known to the art. With one such system operating arms mounted at the two different operating stations are mechanically connected in parallel, whereby a change in the setting of the arm located on one station causes a corresponding change in the setting of the arm on the other station. The disadvantage with this arrangement is that whenever the system is operated it is necessary to move relatively large masses in the form of non-utilized operating arms, cables, guide rollers and the like, which in addition to the resistance offered by the accompanying masses also give rise to unnecessary frictional forces. Thus, large adjustment forces are already required at two operating stations.

With another known system of the type envisaged an output operating cable connected to an engine is coupled to the middle of a link bar arranged transversely of the longitudinal direction of the cable. To each end of the link bar is connected a cable drawn in the opposite direction, each cable being connected in turn to its respective one of two different operating stations. The non-utilized operating arm is fixed in position in the operating cockpit by a snap-in device and hence when the system is operated, the link bar will rotate around the corresponding connecting point of the operating cable in the link bar. The output cable is thus moved through a distance which mathematically reaches to only half the distance moved by the input cable. In practice, however, unavoidable play is obtained. Since the point of rotation of the link rod is also moved, the result is that the play of all three operating cables is accumulated. Large movements and large setting forces are therefore also unavoidable with this system.

A primary object of the present invention is therefore to provide a system of the type envisaged which is not encumbered with the disadvantages presented by the previously known constructions. Another object of the present invention is to provide an arrangement which requires only relatively small setting forces and which presents but a relatively small amount of play, thereby permitting a smoother and more balanced manipulation of the arrangement and thereby also providing for greaer reliability.

This is achieved with a system constructed in accordance with the present invention by the fact that the system includes an arrangement having a control slide which is accommodated in a housing and connected with the adjustable element and capable of being adjusted between a neutral position, corresponding to a zero-setting of the arrangement, and control positions determinative of the setting of the adjustable element, and that the arrangement further includes operating slides, each of which is connected with a respective operating lever arranged at each operating station. The operating slides are arranged adjacent the control slide for movement parallel with the movement path thereof and are capable of being adjusted by means of the operating levers between zero position corresponding to

neutral position of the control slide and to operating positions corresponding to the control positions. The arrangement also includes a latching and dogging mechanism having latching means capable of hooking into or engaging the control slide and the inner walls of the housing and arranged for movement in the operating slides, the latching means propelling or dogging the control slide with a selective operating slide movement and therewith latching the remaining operating slides in their zero positions.

With a preferred arrangement according to the invention, each operating slide also presents at least one of the latching elements of the latching and dogging mechanism, the latching element being arranged for limited movement in a bore extending transversely through the operating slide. The latching element has a greater extension in the longitudinal direction of the bore than the opeating slide, so that when the arrangement is set to zero the latching element occupies an inactive position in which the latching element engages cavities arranged in the control slide and the housing and opening towards the operating slide.

Other objects and features of an arrangement constructed in accordance with the invention will be evident from the following and from the accompanying claims.

The invention will now be described with reference to preferred embodiments thereof illustrated in the accompanying drawings. In the drawings FIG. **1** illustrates a system comprising two arrangements according to the invention mounted in a marine craft. One arrangement is connected to the throttle of the engine while the other is connected to the gear shift mechanism of the propeller unit. FIG. **2** is a section through an embodiment of the arrangement according to the invention and illustrates the arrangement in a zero setting. FIG. **3** is a cross section taken through the line III—III of the arrangement illustrated in FIG. **2**. FIG. **4** is a sectional view corresponding to that in FIG. **2** but with the arrangement illustrated in an active operative condition. FIG. **5** is a section corresponding to FIG. **3** but with a second embodiment according to the invention intended for four different operating stations. Similarly, FIG. **6** is a section corresponding to FIG. **3** but illustrating a third embodiment of the arrangement intended for three different operating stations. Finally, FIG. **7** is a sectional view taken through the line VII—VII in FIG. **6** on an enlarged scale.

In FIG. **1** there is illustrated a motorboat **1** provided with an inboard propeller motor **2** and a propeller unit **3** suspended externally of the stern transom and intended for driving the propeller. The boat is provided with two different operating stations, one station, **4A**, being situated in the cabin and the other, **4B**, being located on the bridge **6** of the boat. Respective operating cockpits **7A**, **7B** of the operating stations are provided with two operating levers, these being levers **8A**, **8B** for remote control of the throttle **9** of the motor **2**, and levers **10A**, **10B** for remote control of the gear shift mechanism **11** of the propeller unit **3**.

To enable the throttle **9** and the gear shift mechanism **11** to be selectively controlled from either of the two operating stations, arrangements **20'**, **20''** are positioned in accordance with the invention between the operating levers and the drive unit **2**, **3**. Thus, the operating levers **8A**, **8B** by means of respective remote control cables **12A** and **12B** are connected to the arrange-

ment 20', while the operating levers 10A, 10B are connected to the arrangement 20'' by means of respective cables 13A and 13B. In turn, the arrangement 20' has an output remote control cable 14' extending to the engine and the arrangement 20'' has a corresponding cable 14'' extending to the propeller unit. For the sake of completeness it should also be noted that the arrangements 20', 20'' are preferably separate embodiments of the arrangement according to the invention, although they may have principally a similar construction.

Even though the aforedescribed application of the system according to the invention concerns two conventional operating control functions when operating a boat, the use of a system constructed in accordance with the invention is not necessarily limited thereto. The system can be used equally as well for putting into operation other marine operational functions such as reversing the propellers etc. or for controlling the operation of land and air vehicles or the operation of stationary systems.

In FIGS. 2–4 an arrangement according to the invention is generally indicated by the reference numeral 20. The arrangement includes a substantially rectangular housing 21 which accommodates three adjustable slides arranged for movement parallel with each other, the slides comprising a centrally arranged control slide 22 and an operating slide 23A and 23B arranged on either side of the control slide and adjacent thereto. Each operating slide 23A, 23B is mechanically connected by means of a remote operating cable 13A, 13B with operating levers 10A, 10B as shown in FIG. 1. The movable elements in the cables are indicated diagrammatically in the aforementioned figures by the reference numerals 24A and 24B. The corresponding element 15 in a remote control cable 14'' connects the control slide 22 with the gear shift mechanism 11 of the propeller unit.

The control slide can be adjusted between a neutral position illustrated in FIG. 2 and control positions, of which one is shown by way of example in FIG. 4. Each of the operating slides 23A, 23B can be adjusted from respective operating stations 4A, 4B between zero positions shown in FIG. 2, and selected operating positions, although not simultaneously. FIG. 4 illustrates the operating slide 23B in a selected operating position.

As will be seen from FIGS. 2–4, the arrangement includes a latching and dogging mechanism 25 comprising latching elements 26A, 26B, guide means or centre device 27, springs 28 and spring end caps 29. By means of the mechanism 25 it is possible to control the mutual positions of the control and operating slides 22, 23A, 23B immediately an operating slide is moved from its zero position.

One latching means 26A, 26B is arranged for each operating slide 23A, 23B. Each latching element is movably arranged in a bore 30 in an associating operating slide. The bore 30 is arranged through the operating slides 23A, 23B transversely of their direction of movement, which in FIG. 2 is conceived to pass parallel with the plane of the drawing and in the direction shown by the arrow 45. The extension of the latching element 26A, 26B in the longitudinal direction 31 of the bore 30 is greater than that of the operating slide 23A, 23B. With the arrangement set at zero, as shown in FIG. 2, the latching element thus projects slightly on both sides of the operating slide and engages in a cavity 32 located in the control slide 22 and a cavity 33 located in the housing 21. The cavities 32, 33 are thus open towards the operating slides 23A, 23B.

Thus, it will be evident from FIGS. 2–4 that the latching elements 26A, 26B can only be moved to a limit extent along the bore 30 of the operating slides 23A, 23B, since movement in towards the control slide 22 is dependent on the position of the centre device 27, while when moving outwardly from the control slide the latching element must overcome the force of spring 28.

The longitudinal geometric axes 31 of the bores 30 of the operating slides 23A, 23B lie axially in register with one another. This is not a necessary feature, however. When the arrangement is set to zero, the longitudinal axes of the bores 30 suitably meet at a point C located centrally in the control slide. The point C also constitutes the centre of the latching and dogging mechanism 25. This can be seen also to be the case in the embodiments of the arrangement illustrated in FIGS. 5 and 6.

As will also be seen from FIGS. 2 and 3, the cavities 32 of the control slide 22 are located symmetrically in relation to the centre C and that these cavities are interconnected with each other in and around the centre. When the arrangement is set to zero, both the cavities 32 in the control slide and the cavities 33 in the housing are located in the geometric extension of the bores 30 in the operating slide. The cavities 32, 33 are adapted to at least partially receive adjacent latching elements 26A, 26B.

The cavities 33 suitably present extensions which form chambers 38, the chambers also opening outwardly towards the outside of the housing 39. The chambers 38 can, in this way, readily be designed to accommodate the spring means 28, 29, the force exerted by which counteracts movement of the latching elements 26A, 26B from the inactive position shown in FIG. 2 to a blocking position such as to the left in FIG. 4. This force, however, can also be obtained by means of a diaphragm with or without the assistance of hydraulic fluid or the like. The chamber 38 is closed externally by means of a suitably constructed, threaded plug 40.

When the arrangement is set to zero, the latching elements 26A, 26B are in indirect contact with each other, owing to the fact that they both abut the centre device 27. Thus, one latching element cannot be moved in towards the centre C without the centre device 27 and the other latching element accompanying such movement. When centre devices are provided, such devices are thus capable of being moved along the cavities 32 of the control slide.

Another feature of the centre device 27 is that it is provided with a contact path 41 suitably designed for each latching element 26A, 26B, the contact paths ensuring that the latching elements upon relative movement thereof in the direction of movement 45 of the control slide 22 at least retain their mutual distance apart transversely of this direction of movement. The contact path 41 is suitably rectilinear in the direction of movement of the control slide 22.

As is evident from FIG. 2, the cavities 33 are provided with shoulders 42 intended to serve as abutment surfaces for the latching elements 26A, 26B when a control slide is moved from its zero position.

FIGS. 5 and 6 illustrate cross sectional views corresponding to the views of FIG. 3 showing two other embodiments of the arrangement according to the invention. All elements corresponding to those of the arrangements illustrated in FIGS. 2–3 have been identified by the same reference numerals, although such elements need not have other similarities than the principle functions of the elements aforedescribed. A detail description of the elements is thus not thought to be necessary.

The embodiments illustrated in FIGS. 5-6 are provided with a plurality of centre devices. For example, in the embodiment of FIG. 6 three centre devices 27A, 27B, 27C are provided, while in FIG. 5 five such devices are arranged, since in this latter instance in addition to the devices 27A–27D there is also provided a device 43 against which the remaining devices abut when the arrangement is set to zero. The arrangement illustrated in FIG. 5 is intended to serve four alternative operating stations, while the arrangements of FIG. 6 is intended to serve three such stations.

In all the figures of the drawing, with the exception of FIG. 6, the latching elements 26A, 26B, 26C, 26D have been shown as spherical balls. That the invention is not restricted to this particular configuration of the latching elements is illustrated in FIGS. 6 and 7, in which the latching elements 26A, 26B, 26C have a shape reminiscent of a conventionally built house. Further, it is assumed that the latching elements have the same configuration as associated centre devices 27A, 27B, 27C. The centre devices, however, are rotated 90° in relation to the latching elements around the longitudinal axis 31 of the bores 30 passing through the control slides 23A, 23B, 23C.

The arrangement according to the invention operates in the following manner:

The motorboat 1 is assumed to be at sea, the operating station 4B being used for steering and manipulating the boat. The engine 9 is assumed to be idling and the propeller of the propeller unit 3 is assumed to be disengaged. The operating levers 8A, 8B, 10A, 10B are herewith set to zero, which is also applicable to the arrangement 20 according to the invention exemplified in FIGS. 2–4, which is thus assumed to correspond to the arrangement 20'' indicated in FIG. 1. The arrangement 20 is thus in the position illustrated in FIG. 2.

If the pilot now moves the operating lever 10B towards a forward position for the purpose of rotating the propeller for movement ahead, the following sequence of events takes place. The operating slide 23B connected with the operating lever 10B is caused to move in a corresponding direction, assumed to be an outward direction, simultaneously as the operating lever moves. The slide will only move through an insignificant distance before the latching element 26B arranged in the bore 30 of the operating slide abuts the abutment surface 42 of the housing 21 and, approximately at the same time, against a corresponding abutment surface 44 arranged in the control slide. Since the abutment surface 44 of the control slide yields slightly, the abutment surface 42 on the housing will force the latching element 26B towards the cavity 32 of the control slide 22 and thus also towards the centre device 27. In turn, the centre device will then force against the latching element 26A which is thereby caused to move against the force exerted by spring means 28, 29 along the bore 30 in the operating slide 23A towards the cavities 33 in the housing 21. Owing to the engagement of the latching element 26B with the abutment surface 44 during continued movement of the former in an upward direction, the control slide 22 will also be carried with the movement of the operating slide. When the latching element 26B has been moved to the left as seen in FIG. 2 to such an extent that, similarly with the case illustrated in FIG. 4, its right hand edge 36 is in line with the inner wall 37 of the housing 21, the left hand contact path 41 of the centre device is in register with the left hand defining wall 35 of the control slide 22, which thus also applies to the right hand edge 34 of the latching element 26A, which edge 34 initially abuts the contact path 41. Thus, there is now nothing to prevent the operating slide 23B from being caused to move upwardly to a further extent, as seen in FIG. 4, i.e., provided the control slide 22 accompanies the movement. Owing to the fact that the latching element 26B has now passed far into the bore 32 on the control slide, the control slide is forced to accompany the movement until it adopts a control position for forward movement of the boat. This position is conceived to correspond to the position illustrated in FIG. 4. The gear shift mechanism 11 is caused to take a corresponding position by the remote control cable 14''. The propeller has thereby begun to rotate.

Returning now to the latching element 26A in FIG. 4, it will be seen that the element is retained in its left hand position by the defining wall 35 of the control slide, which means that the operating slide 23A is prevented from moving relative the housing 21. The latching element 26A thus blocks this operating slide. Thus, in this position it is not possible to effect a counter manoeuvre from the operating station 4A. Thus, it is impossible to move the control lever 10A before the operating slide 23B has been returned to zero position. Return of the slide 23B to zero position is effected by carrying out the aforedescribed sequence in reverse.

It will be apparent that movement of any one of the four operating slides, such as slide 23C of the FIG. 5 arrangement will result in dogging of each of the other three, and that, similarly, the result of movement of any one of the slides, such as slide 23C, of the FIGS. 6 – 7 arrangement causes camming inwardly of latching element 26C and the corresponding outward displacemhnt of elements 26A and 26B to lock or dog their respective slides. Thus, in order to release any one of the control slides in each of these arrangements, it is necessary that each of the other slides be moved by their respective control levers into neutral position.

It will be understood that spring arrangements such as those shown at 28, 29 in FIG. 5, should also be provided in the arrangement of FIG. 6, being omitted from the drawing for clarity.

Although the invention has been described with reference to a limited number of embodiments thereof, it will be understood that the invention is not restricted thereto, but that modifications can be made within the scope of the accompanying claims.

I claim:

1. In a two station control system, two operating slides connected for operation from respective said stations, a control slide, each said slide having a neutral position, latch means carried by one of said operating slides for operatively engaging said control slide when said one slide is moved from its neutral position, and means responsive to said movement of said one slide to

dog the other said operating slide in its neutral position.

2. A system according to claim 1, characterized in that each said operating slide carries a respective latch means, said control slide comprises two side faces disposed respectively toward said respective operating slides, said latch means of each said operating slide being moved inwardly toward said control slide upon movement of the respective operating slide from its neutral position, latch-engageable means outwardly of each said operating slide, said control slide comprising means responsive to such inward movement of one said latch means to move said latch means of the other operating slide into dogging engagement with said latch-engageable means.

3. A system common to a respective operating lever at each of two operating stations for enabling an adjustable element to be remotely controlled by said levers, characterized in that the system includes a housing which accommodates a control slide connected with the adjustable element and capable of being moved between a neutral position corresponding to a zero position of said element and control position corresponding to a control setting of said element, two operating slides each connected with a respective one of said levers for movement thereby, said operating slides being arranged adjacent said control slide, said element and slides having parallel paths of movement, each said operating slide having a neutral position corresponding to said zero position, and a latching and dogging mechanism having latching elements operatively engaging between said control slide and said operating slides, said latching elements being arranged in response to movement of a selected one of said operating slides from its said neutral position to dog the other said operating slide in its said neutral position.

4. A system according to claim 3, characterized in that each of said slides has opposite faces and an aperture therethrough extending between said faces thereof, said latching elements being disposed in said respective apertures and having a dimension through said aperture greater than the distance between said faces of the respective slide, said control slide being disposed between said operating slides with one of said faces of each operating slide disposed theretoward, an aperture through said control slide, a housing having inner faces disposed toward the opposite ones of said faces of each operating slide, said inner faces being provided with apertures therein aligned, when said slides are in said zero and neutral positions, with said apertures of said slides, said inner faces being operative upon displacement of one of said operating slides to move the respective latching element thereof inwardly of said aperture of said control slide.

5. A system according to claim 4, characterized in that said apertures in said inner faces are provided with biasing means for opposing movement thereinto of the respective said latching element, and said inward movement of either said latching element moves the other said latching element out of said aperture in said control slide and into its respective inner face aperture against the bias of said biasing means.

6. A system in accord with claim 4 wherein said latching means have inclined outer surfaces disposed toward said inner faces and said inner wall apertures are defined by shoulders for camming the respective said latching means inwardly of said control slide aperture upon movement of either of said operating slides from such neutral position.

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