Feb. 22, 1955 J. F. MORSE 2,702,615

DUAL CONTROL FOR MARINE CRAFT

Filed June 15, 1951 5 Sheets-Sheet 1

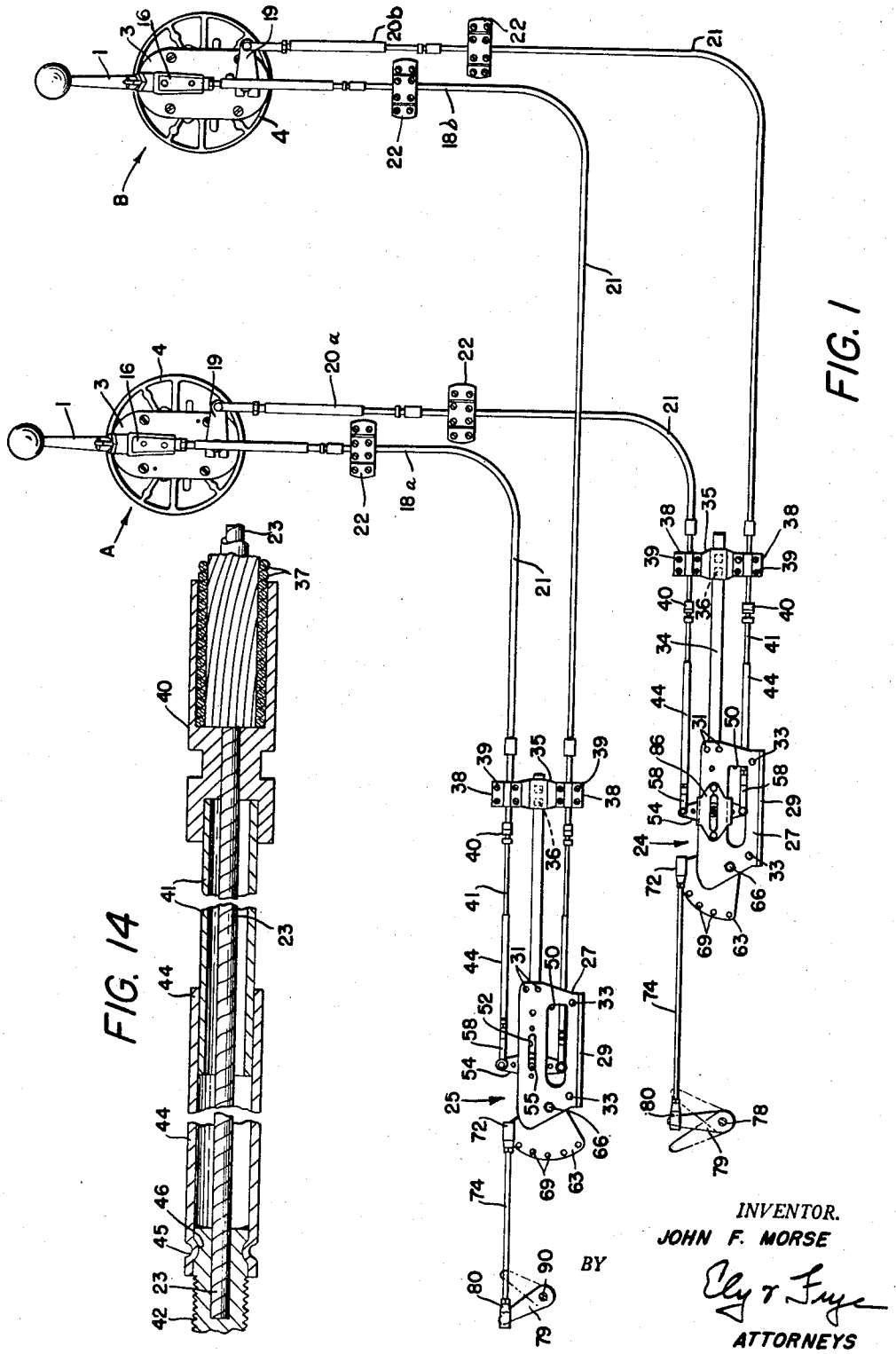


FIG. 1

FIG. 14

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DUAL CONTROL FOR MARINE CRAFT

Filed June 15, 1951

5 Sheets-Sheet 2

FIG. 3

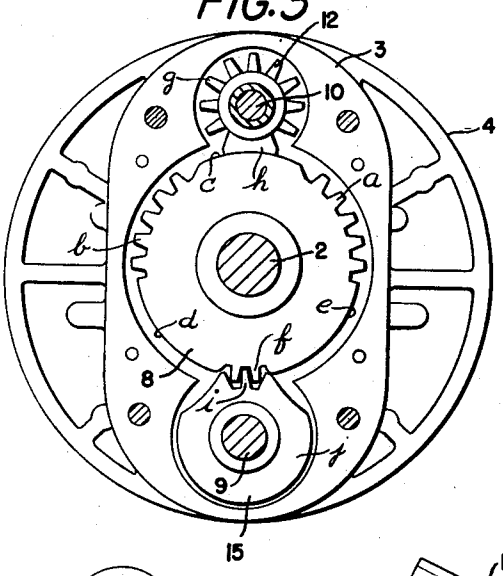
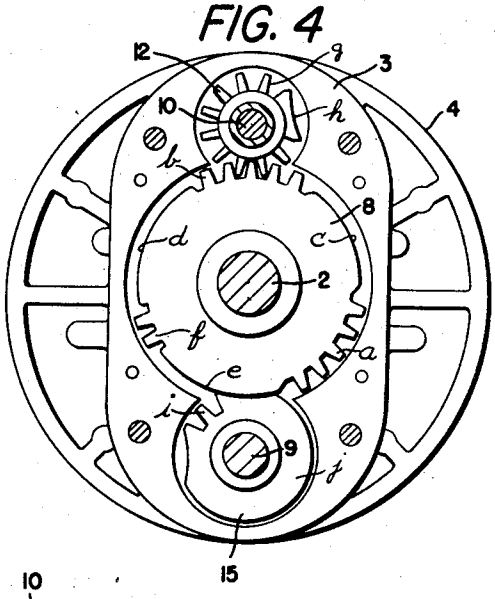



FIG. 4



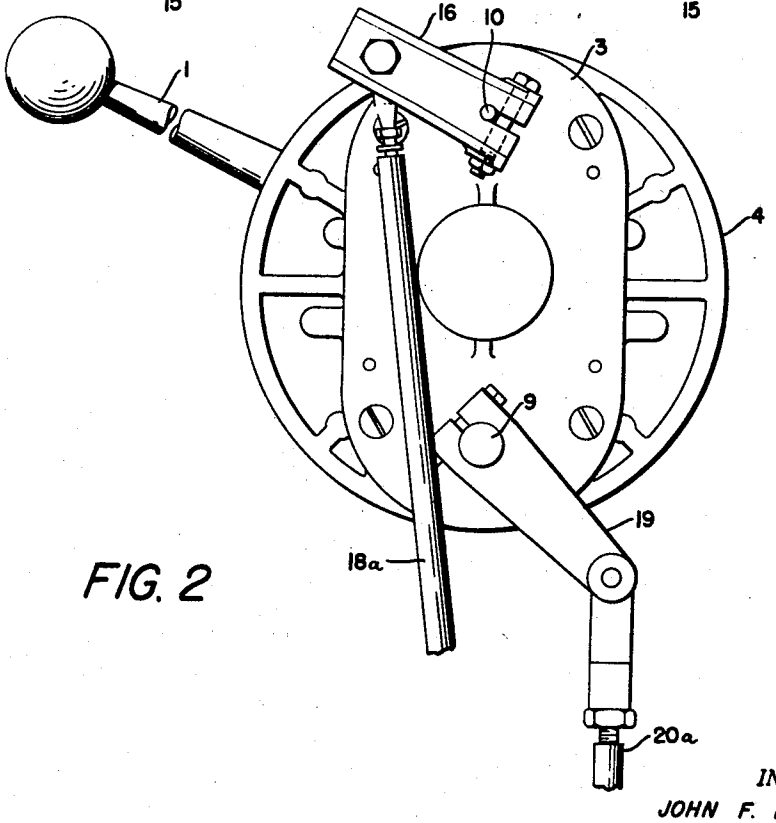




FIG. 2

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Feb. 22, 1955 J. F. MORSE 2,702,615

DUAL CONTROL FOR MARINE CRAFT

Filed June 15, 1951 5 Sheets-Sheet 3

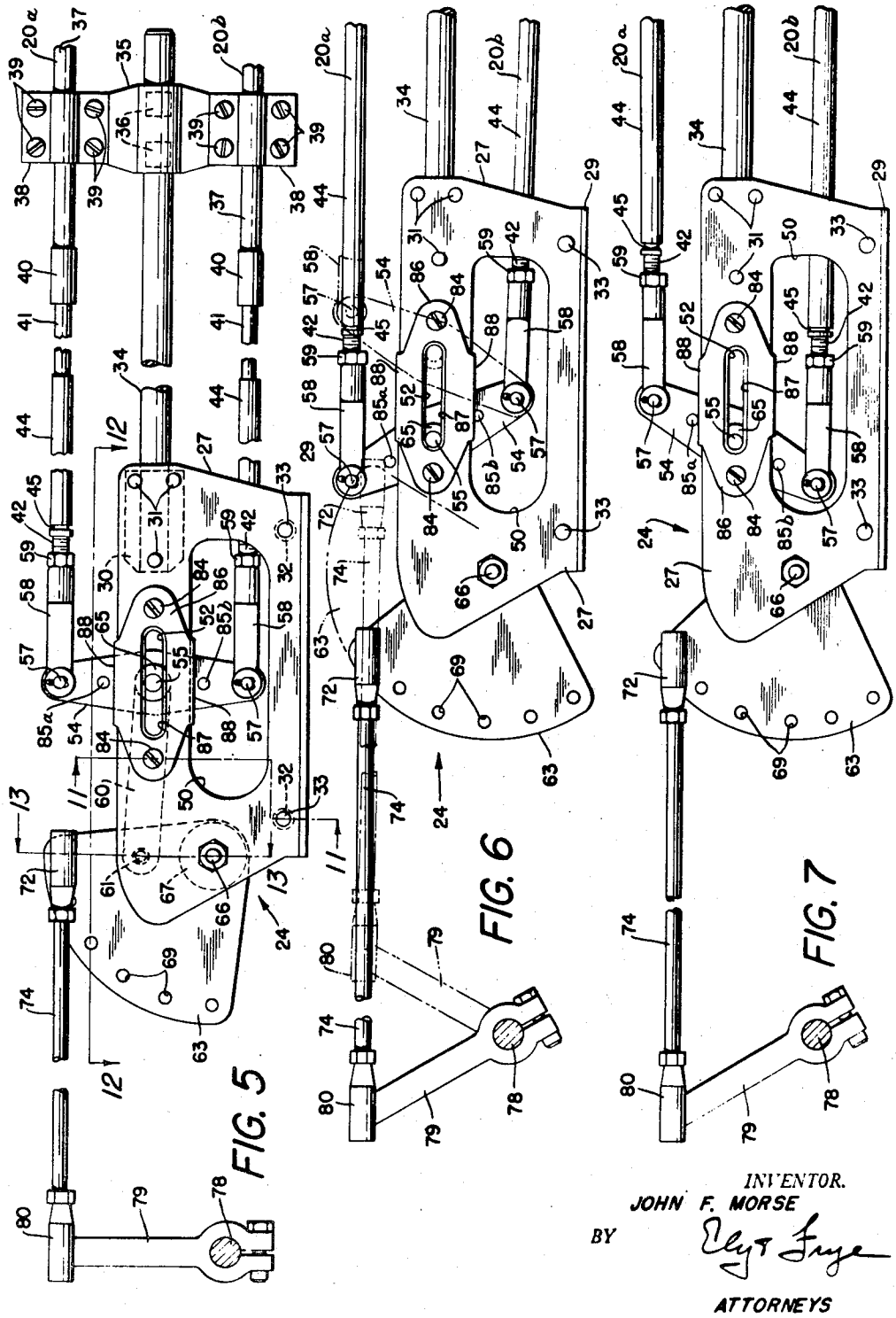


FIG. 5

FIG. 6

FIG. 7

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Feb. 22, 1955 J. F. MORSE 2,702,615

DUAL CONTROL FOR MARINE CRAFT

Filed June 15, 1951 5 Sheets-Sheet 4

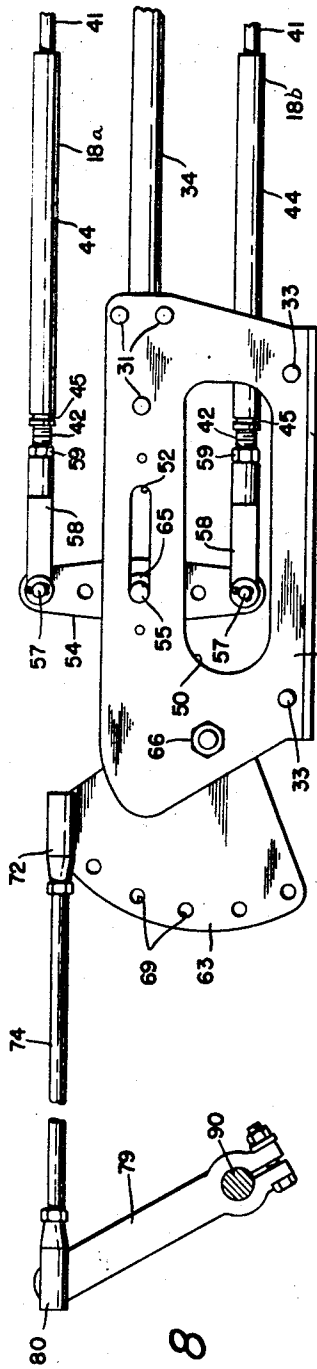


FIG. 8

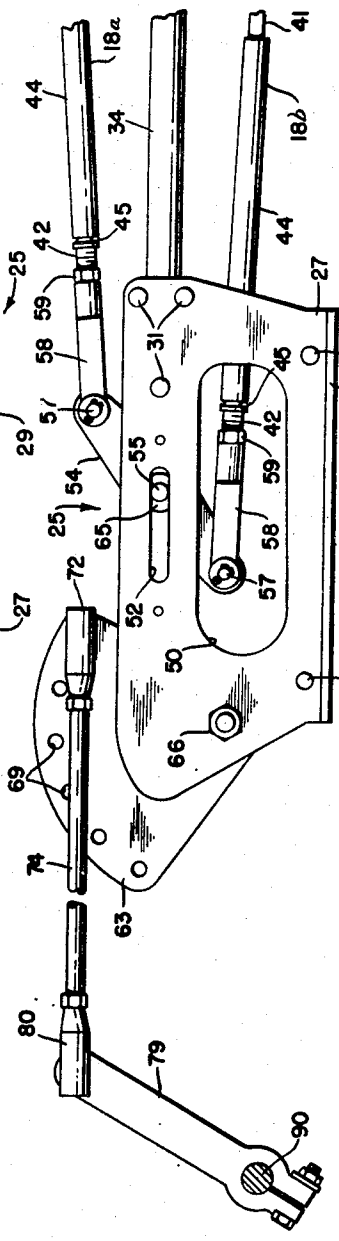


FIG. 9

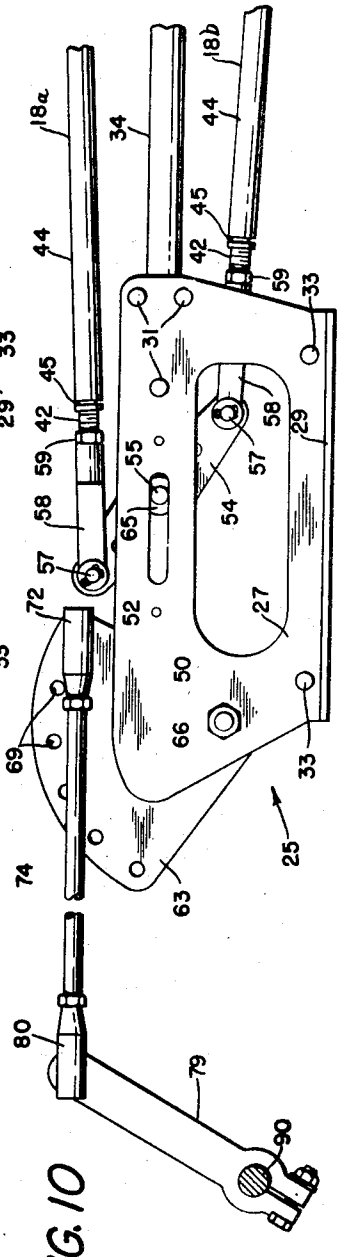


FIG. 10

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Feb. 22, 1955 J. F. MORSE 2,702,615

DUAL CONTROL FOR MARINE CRAFT

Filed June 15, 1951 5 Sheets-Sheet 5

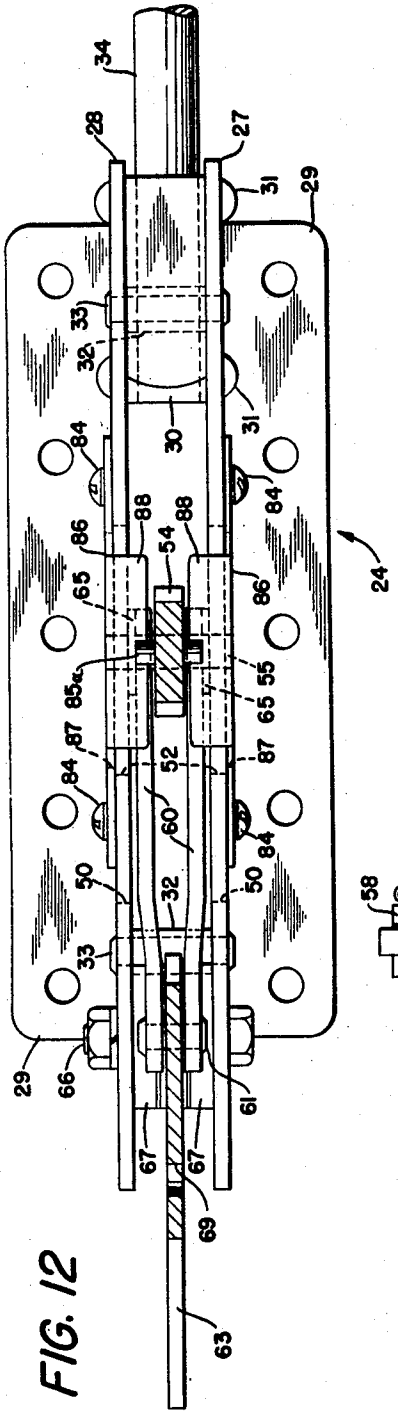


FIG. 12

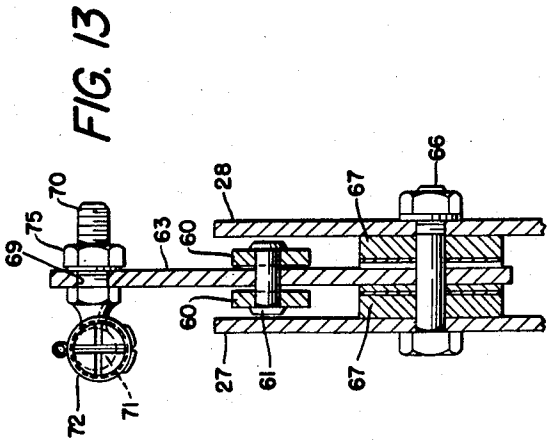


FIG. 13

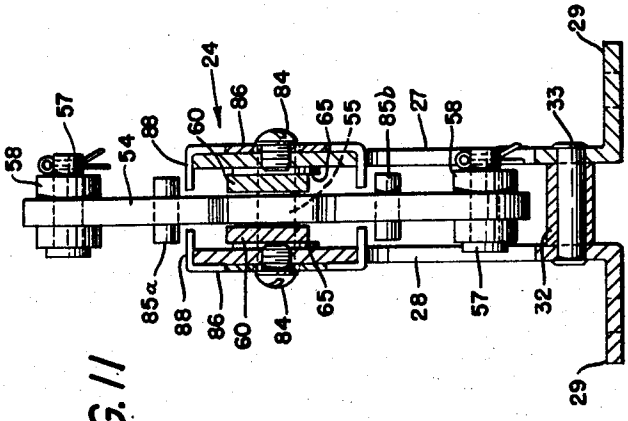


FIG. 11

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United States Patent Office 2,702,615 Patented Feb. 22, 1955



2,702,615

# DUAL CONTROL FOR MARINE CRAFT

John F. Morse, Hudson, Ohio

Application June 15, 1951, Serial No. 231,781

14 Claims. (Cl. 192—.096)

The present invention relates to control mechanism to be used primarily for the operation of the clutch and throttle of marine engines and, while it is shown and described as installed and operated on a power boat, the principles thereof may be applied to other uses than the control of marine engines.

In my prior application Serial No. 78,029, filed February 24, 1949, now Patent No. 2,588,650, there is shown and described a mechanism for controlling the operation of the clutch and the throttle of the engine by a single lever with interlocking and control devices which insure that the clutch is operated while the throttle is at low idling speed, the speed of the engine being regulated by continued movement of the lever after the clutch has been shifted to forward or reverse. The invention to which the present application is directed is primarily intended for use in combination with a control mechanism similar to that shown in the said prior application. While sufficient details of the mechanism shown in the prior application are incorporated in the present application to complete the operative combinations, reference is made to the said prior application for such further details as may be desirable or necessary to a complete understanding of the present invention.

The purpose of the present invention is to devise a control mechanism which will be used where two stations are provided on the boat from which the engine may be operated selectively. It becomes necessary under certain conditions to install one control unit in one part of the boat and a second or auxiliary control unit in another part of the boat. This occasion usually arises where one control is on the bridge and the second control is in the closed cabin.

The mechanism shown herein makes it possible to control the operation of the engine from either station selectively. One of the purposes of the invention is to provide, with the dual control device, means for preventing the operation of the engine from one station while it is being operated from the other station. The prevention of interference which would arise if the control unit at one station were not rendered inoperative while the control unit at the other station is being operated is an important feature of this invention. If, for example, the inoperative control could be moved while the operative control is in forward, with the throttle fully opened, the clutch would be disengaged, which would cause the engine to accelerate to a dangerous speed and result in severe damage to the reverse gear when the control lever was returned to neutral.

It will be seen, therefore, that in adapting the engine control device to a dual control installation it is essential for safe operation to make it impossible for the engine control to be operated from two stations at the same time.

The mechanism which is the subject of the present invention prevents any person other than the one who is in actual control of the engine from interfering with that control. In craft such, for example, as deep sea fishing boats, where, as a rule, the pilot is located on the upper deck of the cabin, it is essential for safety that the control mechanism in the enclosed cabin be rendered inoperative to prevent a passenger from tamp ing with the engine.

In the drawings and the description is shown the best known and preferred mechanism for accomplishing the purposes of the invention, but it is understood that the



invention is subject to modifications and variations within the scope thereof as set forth in the appended claims. It is also understood that the invention is not limited to use on power boats if other uses become apparent.

Referring to the drawings:

Fig. 1 is a layout of the complete installation showing the connections from the two separate control stations. In this view, one of the control units which will be designated as the bridge control is given the letter A, while the other or cabin control unit is given the letter B.

Fig. 2 is a view showing one of the control units in position when the clutch is in forward and the throttle opened for full speed ahead.

Fig. 3 is a detail of the interlocking gearing in a control unit when the clutch is in neutral and the engine idling.

Fig. 4 is a similar view showing the position of the interlocking gears when the clutch is engaged and the throttle is opened.

Fig. 5 is a view of the clutch operating unit when in neutral.

Fig. 6 is a view showing the position of the parts when the clutch has been moved to forward by the operation of the control unit A.

Fig. 7 is a view showing the position of the parts when the clutch has been moved to forward by the operation of the control unit B.

Fig. 8 is a view showing the throttle operating unit when the throttle is closed or at its low idling speed.

Fig. 9 is a view showing the position of the parts when the throttle is opened by the operation of control unit A.

Fig. 10 is a view showing the position of the parts when the throttle is opened by the operation of the control unit B.

Fig. 11 is a cross section through the clutch operating unit taken on the line **11—11** of Fig. 5.

Fig. 12 is a view looking down on the clutch operating unit, the location of the view being indicated by the line **12—12** of Fig. 5.

Fig. 13 is a section on the line **13—13** of Fig. 5.

Fig. 14 is an enlarged sectional view showing the method of anchoring the end of the core of the flexible cable to the operative devices.

*The control units*

As has been indicated above, there are provided two control units, one of which is indicated at A and the other at B. These control units are identical in construction and follow the disclosure of my prior application Serial No. 78,029, now Patent No. 2,588,650. So much of the construction of a control unit is given as will enable the present invention and its relation thereto, and the general combination, to be understood. Each control unit is characterized by the presence of a single manually operated control lever **1**, mounted on the end of a shaft **2** mounted in a housing **3**, carried on a plate **4**, which is located at the pilots' station either in the cabin or on the bridge, or other place, as explained. The power plant of the boat may therefore be operated by the pilot at either location on the boat.

Within the housing there is fixed to the shaft **2** a master gear **8**. At one side of the shaft **2**, here shown as below, is located a second shaft **9** which is connected to and operates the clutch; at the other side is a third shaft **10** which is connected to and operates the throttle, as will be described. The master gear **8** is of the Geneva type, having two toothed segments *a* and *b* separated by a smooth segment *c*. Opposite the smooth segment *c* is a shorter toothed segment *f* which is separated from the segment *b* by a smooth segment *d* and from the segment *a* by a smooth segment *e*.

On the shaft **10** is fixed a small gear **12**, the greater part of which is provided with a toothed segment *g* which is adapted to be brought into mesh with either gear segment *a* or *b* on gear **8**, depending upon the direction of rotation of the shaft **2**. There is also provided on the periphery of gear **12** a smooth segment *h* which is adapted to ride on the smooth segment *c* while the

clutch is in neutral and until it has been engaged in either forward or reverse, depending upon the direction of movement of the control lever **1**, as shown by the arrows in Fig. 1. After the clutch is fully engaged, continued rotation of the shaft **2** will cause rotation of the shaft **10** opening the throttle to the extent desired by the pilot. Usually, the throttle is set so that when the clutch is in neutral the engine will be at its low idling speed. The purpose of the control unit is to insure that the clutch is engaged while the engine is operating at the proper speed. It will also be noted that the throttle cannot be moved independently of the operation of the lever **1**.

Referring now to the clutch control. On the shaft **9** is fixed the disk **15** which is provided with a short toothed segment *i* which is in mesh with the toothed segment *f* on the gear **8** when the clutch is in neutral and the throttle at low idling speed. At the sides of the segment *i* are smooth segments *j*, one of which is adapted to ride on the smooth segment *d* or *e*, depending upon the direction in which the lever **1** is operated, after the clutch is fully engaged.

It will be seen from the foregoing that when the lever **1** is moved in one direction or the other from its upright or neutral position, the clutch will first be shifted, either to forward or reverse, and on continued movement of the lever the throttle will be opened. The clutch is held in its engaged position by the engagement of either segment *j* with segment *d* or *e*, but this does not interfere with the free operation of the throttle after the clutch is engaged.

Further description of the details of the control unit are not considered to be necessary, other than to state that the shaft **10** is extended through the casing **3** and is provided with a rocker arm **16** which hangs vertically when the clutch is in neutral so that movement of the lever **1** in either direction will operate a flexible control cable which extends to the throttle operating unit. In Fig. 1 the throttle cable assembly for the unit A is marked **18***a* and for the unit B is marked **18***b*. The shaft **9** likewise extends beyond the casing **3** and to it is secured the rocker arm **19** which, when the clutch is in neutral, extends horizontally but will rock up or down depending upon whether the clutch is placed in forward or reverse. The outer end of each arm **19** is connected to a clutch operating cable, that extending from the unit A being marked **20***a* and that from the unit B being marked **20***b*.

The cables are of any preferred type of flexible push pull cable, each having the usual outer covering or flexible casing **21** and the inner core or cable **23** which is movable longitudinally in the casing and is connected to the operating parts of the device at either end. The cables are attached at appropriate places to the boat or other structure by clips such as shown at **22**.

*Clutch operating unit*

The two units which have been designated as the clutch operating unit and the throttle operating unit are quite similar but, due to certain requirements peculiar to clutch operation, the clutch operating unit is modified in certain details and will be first described. The clutch operating unit is given the general reference character **24** and the throttle operating unit is given the general reference character **25**. These units are located at points adjacent the engine.

Referring to the clutch operating unit:

This unit **24** is housed and operated in a bracket composed of two oppositely turned plates **27** and **28** vertically set and spaced apart. Each plate is formed with a flange **29** along its lower edge by which the unit is fixed in its location on the boat. The two plates are held in spaced relation by a block **30** located in the upper corner of the plates and riveted to the plates at **31** and by sleeves **32** held in place by through rivets **33**. Press-fitted in the block **30** is a stout rod **34**, the outer end of which is received in a bore formed in a clamping plate **35** and held in position therein by bolts **36**. On either side of the plate **35**, coiled spring wire extensions **37** of the two cables **20***a* and **20***b* are firmly clamped by plates **38** held to the wings of the plate **35** by the bolts **39**. By this means the termini of the cables **20***a* and **20***b* are held in their proper position with respect to the clutch operating unit.

On the end of each casing **21** is swaged or otherwise fixed a collar **40** in which is rigidly supported a relatively long sleeve **41**, through which the core **23** extends. The far end of the core is secured in a thimble **42**, the outer end of which is threaded. The inner end of the thimble **42** is smooth and is rotatably mounted in a tube **44** being held from longitudinal movement with respect to the tube by a ridge **45** pressed down from the stock of the tube and entering a groove **46** in the thimble. The tube **44** is telescopically received over the sleeve **41** so that it may move thereon with the movement of the core **23**. The construction just described forms a rigid support for the end of the core so that the flexible core is prevented from buckling at or near the point of its attachment to any of the operating devices whereby a direct thrust is imparted to those devices. The coil spring extension **37** permits sufficient flexibility of the cable to allow for the rocking of the entire telescoping assembly.

The central portions of the plates **27** and **28** are cut out to form openings **50** and located above each of those openings is a long relatively narrow slot **52**. Located at these slots and between the two plates **27** and **28** is a double lever **54**, at the center of which is a pivot pin **55** extending at either side thereof and riding in the two slots **52**.

At each extremity of the rocker arm or lever **54** is pivotally attached by a pin **57** a clevis **58**, in the closed free end of which is threaded the thimble **42** which is held in the clevis by a lock nut **59**. When the unit is assembled and the clutch in neutral position, the pin **55** is located at the midway point of the slot **52**, the requisite adjustment being secured by the setting of the clamps **38** on the plate **35**. For convenience, the central point is indicated by suitable markings on the unit.

Over the pin **55** at the sides of the lever **54** are mounted links **60** which extend toward the rear of the clutch operating unit where they are received over a pin **61** which passes through a sector plate **63** located between the ends of the links. Washers **65** are located on the pin **55** between the links and the inner surfaces of plates **27** and **28**.

The sector **63** is pivotally mounted on a pin **66** in the lower rear corner of the unit, washers **67** being located at either side of the sector plate to guide it during its rocking movement. The outer rim of the sector plate is provided with a series of holes **69** in any one of which may be secured a pin **70**, on one end of which is the ball formation **71** which forms a rocking mounting for a thimble **72** mounted on the end of a connecting rod **74**. The pin **70** may be secured in any one of the holes **69** by a lock nut **75** threaded on the end of the pin. This arrangement permits the link **74** to be adjusted to the correct point for operation of the clutch.

The clutch, which is not shown, may be of any standard type with provisions for shifting from neutral to forward or reverse. It is operated by a shaft **78** from the rod **74** through the lever arm **79** clamped to the shaft **78** and attached at its outer end to the rod **74** by the clevis **80**.

Extending from the sides of the lever **54** between the pin **55** and the upper pins **57** is a pin **85***a* which extends on either side of the lever and is free to move for a limited distance in the space above the plates **27** and **28**. Located in a like position below the pin **55** and extending into the space **50** at either side of the unit is a similar pin **85***b*. It will be noted, as shown in Fig. 12, that the ends of the pins will clear the plates **27** and **28**.

For the clutch operating unit there is attached, by screws **84**, to the top of each plate **27** and **28** an escutcheon or stop plate **86**. This stop plate has a centrally located horizontal slot **87** which corresponds to and is located in register with the slot **52**. On the top and bottom edges of each plate **86** are inturned flanges **88** which overlie the adjacent edges of side plates. As shown in Figs. 11 and 12, these flanges project toward one another and are deep enough so that the flanges along the upper edges of the stop plates will lie in the path of the pin **85***a*. Similarly, the flanges along the lower edges of the stop plates will lie in the path of the pin **85***b*. The purpose of the pins **85***a* and **85***b* and the flanges on the stop plates is to arrest the movement of the lever **54** in the manner which will be set forth in the following description of the operation.

*Operation*

The clutch is in neutral position as shown in full lines in Fig. 1, with the lever arms **19** on the control units in horizontal position and with the pivot pin **55** at the cen-

tral position in the slot **52**, as shown by the arrows on the stop plate. It is desired now to shift the clutch into forward by the operation of the control unit A, the control unit B and its lever arm **19** being undisturbed. The pilot now moves the lever **1** on control unit A to the left, which lowers the arm **19** and a thrust to the left is exerted on the upper end of the rocker arm **54**, which, through pivoted sector **63** and link **74**, rotates the lever arm **79** to the left into the position of the parts as shown in Fig. 6. During this movement, the arm **54** has been pivoting about the lower pin **57** which is fixed at the time through its connection to the unit B. At the same time, the pin **55** has been moving to the left hand end of the slot **52**, causing the sector plate **63** to rock through the operation of the links **60**. In this operation the pin **85***a* has cleared the upper flanges on the stop plates **86** but the pin **85***b* is brought in contact with lower flanges of the stop plates at the end of the shifting movement.

The boat will now be moving forward, the speed depending upon whatever further movement is given to the lever **1**. Should some unauthorized person seek to tamper with the control unit at station B, any movement of the lever **1** at that station will be effectively blocked by the contact of the pin **85***b*.

The above is clear from the showing of the parts in Fig. 7 where the clutch has been shifted into forward by the operation of the control unit B. In this case, the movement of the lever **1** causes the lower cable **20***b* to move to the left, whereupon the upper pivot pin **57** is the fixed point, but the pin **55** again moves to the left hand end of slot **52**. In this case, the pin **85***a* moves into contact with the upper flanges on the stop plates at the end of the shifting movement.

Assuming that the parts are in the position shown in Fig. 6 and that someone is tampering with the control lever **1** at station B, he cannot move the lever **1** to shift the clutch into forward because it is already in forward. Neither can he move the control lever **1** in the other direction, which would normally cause the cable **20***b* to move to the right and the clutch to return to neutral or reverse, because the pin **85***b* cannot move to the right due to the interference of the flanges on the stop plate.

The movement of the parts on shifting from neutral to reverse is the opposite of that shown in Figs. 6 and 7, respectively. Operating from either station A or B, the appropriate control cable will move to the right, causing either end of the lever **54** to shift to the right and the pin **55** to move to the right hand end of the slot **52**. In this case likewise the pin **85***a* or the pin **85***b* will act to prevent unauthorized movement of the clutch control unit while the clutch is in reverse. The position of the parts in reverse is shown by the dotted lines in Fig. 6.

*Throttle operating unit*

With a few exceptions, the throttle operating unit **25** is of the same general construction as the clutch operating unit **24**; however, it will be noted that there is no possibility of unauthorized tampering with the throttle. This is because, due to the construction of the control unit, the throttle cannot be operated while the lever **1** is in neutral position, and it is only after the clutch has been engaged that the throttle is capable of operation. As the mechanism which has been described in connection with the clutch operating unit prevents unauthorized operation of the clutch by the unit not under control of the pilot, the throttle cannot be operated at that unit. Hence the stop plates **86**, omitted from the throttle operating unit **25**, and the pins **85***a* and **85***b* perform no function and may be eliminated if desired.

It is not necessary to give a detailed description of most of the operating parts of the throttle operating units as they are the same as for the control units and bear the same reference numerals. One difference is that the throttle operating unit is set so that the pin **55** is at the left hand end of slot **52** when the throttle, which is operated by the shaft **90**, is closed or in its low idling position. Movement of the cables to open the throttle is always to the right whether the clutch is in forward or reverse.

If the boat is being operated from control unit A, movement of the lever **1** to open the throttle will cause the lever **54** to rock about the lower pivot pin **57** in clockwise direction, the pin **55** moving to the right in slot **52** and the sector plate **63** likewise moving as shown by a comparison of Figs. 8 and 9.



On operating from station B, the upper pivot pin **57** is stationary and the lever arm **54** moves counterclockwise, but the resultant movement of the sector **63** and the throttle shaft is the same. This is shown in Fig. 10.

It is believed that the operation of the device will have been made clear by the foregoing. It will be seen that there has been created a combination of elements which prevent accidents because of the presence of two control units on a boat. The pilot who is operating the boat cannot be interfered with by tampering with the idle control unit.

Many of the details and refinements shown and described herein are subject to change and modification, and it is not intended that the invention shall be limited to the specific mechanism shown. While the type of control unit which is the subject of the copending application is preferred, other control units may be substituted therefor provided the objects and purposes of this invention are attained.

What is claimed is:

1. Control mechanism for power craft or the like having an engine provided with a clutch, said mechanism comprising two control units each having a single manual control device, clutch shifting means, means to actuate the throttle, means operated by said devices to shift the clutch of the engine from neutral to forward or reverse, said last named means including a movable arm connected to the clutch shifting means, operating connections from each control device to the arm and to the throttle actuating means, and a stop device to prevent the movement of the arm by one control unit after the arm has been moved by the other unit to shift the clutch out of neutral.

2. Control mechanism for power craft or the like having an engine provided with a clutch, said mechanism comprising two control units each having a single manual control device, clutch shifting means, means operated by said devices including a movable arm connected to the clutch shifting means to shift the clutch of the engine from neutral to forward or reverse, means to actuate the throttle only after the clutch has been shifted from neutral, operating connections from each control device to the arm and to the throttle actuating means, and a stop device to prevent the movement of the arm by one control unit after the arm has been moved by the other unit to shift the clutch out of neutral.

3. Control mechanism for power craft or the like comprising two control units each having a single manual control arm, a clutch operating unit and a throttle operating unit each having a control lever, mechanical connections from each control unit to the clutch operating lever and mechanical connections from each control unit to the throttle operating lever, and stop means in the clutch operating unit to prevent operation of the clutch operating lever by both control units simultaneously.

4. Control mechanism for power craft or the like comprising two control units each having a single manual control arm, a clutch operating unit and a throttle operating unit each having a control lever, mechanical connections from each control unit to the clutch operating lever and mechanical connections from each control unit to the throttle operating lever, stop means in the clutch operating unit to prevent operation of the clutch operating lever by both control units simultaneously, and means in the control units for preventing operation of the throttle operating unit by both control units simultaneously.

5. Control mechanism for operating the clutch of an engine comprising a clutch operating unit having a shaft operatively connected to the clutch, a pair of manually operated control devices each connected to the clutch operating unit, said clutch operating unit having a movable element and connections from said element to the clutch operating shaft, and a stop device in said clutch operating unit to arrest reverse movement of the said element by one of said control devices after the clutch has been shifted out of neutral by the operation of the other control device.

6. Control mechanism for operating the clutch of an engine comprising a clutch operating unit having a shaft operatively connected to the clutch, a pair of manually operated control devices each connected to the clutch operating unit, said clutch operating unit having a movable element and connections from said element to the clutch operating shaft, a stop device in said clutch op-

erating unit to arrest reverse movement of the said element by one of said control devices after the clutch has been shifted out of neutral by the operation of the other control device, and a throttle operating unit and mechanical operating connections from each of said control devices to the throttle operating unit.

7. Control mechanism for operating the clutch of an engine comprising a clutch operating unit having a shaft operatively connected to the clutch, a pair of manually operated control devices each connected to the clutch operating unit, said clutch operating unit having a rocking lever, connections from said lever to the clutch operating shaft, and a stop on the lever and movable into contact with a part of the clutch operating unit when the clutch has been shifted from neutral by the operation of one of said control devices to prevent reverse movement of the lever by the other control device.

8. Control mechanism for operating the clutch of an engine comprising a clutch operating unit, a rocking lever in said clutch operating unit, a clutch operating shaft, connections from the lever to the clutch operating shaft, two manually operated control devices, a connection for rocking the lever extending from one end of the lever to one of said control devices, a second connection for rocking the lever extending from the other end of the lever to the other manually operated control device, and a stop engaging the lever after it has been rocked by either of said control devices to prevent movement of the lever by the other of said control devices.

9. Control mechanism for operating the clutch of an engine comprising a clutch operating unit, a rocking lever in said unit, a cable pivotally connected to each end of the lever, two manually operated control devices, one of said cables being connected to one of said control devices and the other cable being connected to the other control device, clutch shifting means operated by the movement of said lever by either control device, and a stop engaging the lever after it has been rocked by either of said control devices to prevent movement of the lever by the other of said control devices to shift the clutch out of neutral.

10. Control mechanism for operating the clutch and throttle of an engine comprising a clutch operating unit, a throttle operating unit, a rocking lever in each unit, clutch shifting means operated by the lever in the first said unit, a cable pivotally connected to each end of each lever, two manually operated control devices, each of said control devices being connected to the lever in the throttle operating unit and to the lever in the clutch operating unit, and means to prevent the movement of the lever in the clutch operating unit by one of said control devices after it has been moved by the other control device to shift the clutch out of neutral.

11. In a mechanism for controlling the operation of



a marine engine comprising two manually operated control devices, each of said devices having a single operating arm, a throttle operating device and a clutch operating device, means actuated by the single movement of either operating arm to actuate the clutch operating device and thereafter to actuate the throttle operating device, and a stop in the clutch operating device movable upon the shifting of the clutch out of neutral by either control device to prevent reverse movement of the clutch by the other control device.

12. In a mechanism for controlling the operation of a marine engine, a clutch operating device and a throttle operating device, two independent manually operated control devices each having a single operating arm, means operated by the movement of either arm to actuate the clutch operating device to shift the clutch from neutral to forward or reverse, and means operated after the clutch has been shifted out of neutral by a continuation of the movement of the arm to actuate the throttle operating device, and a stop in the clutch operating device movable upon shifting of the clutch out of neutral by either control device for preventing movement of the clutch by the other control device.

13. In a device for controlling the operation of a marine engine consisting of two independently operable manual control devices, a clutch operating unit and a throttle operating unit, both of said units being operable by either control device, mechanical means in each control device to shift the clutch out of neutral into forward or reverse and then to operate the throttle, and means in the clutch operating unit for inhibiting the operation of one control device after the clutch operating unit has moved the clutch out of neutral.

14. In a device for controlling the operation of a marine engine consisting of two independently operable manual control devices, a clutch operating unit and a throttle operating unit, mechanical connections between each control device and the clutch operating unit and the throttle operating unit to actuate the said units in succession, and means for inhibiting the operation of one control device after the clutch operating unit has moved the clutch out of neutral, said last named means including a stop in the clutch operating unit movable on the shifting of the clutch into position to arrest reverse movement of the clutch operating device.

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