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CONTROL APPARATUS

3,362,687

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2 Sheets-Sheet 1

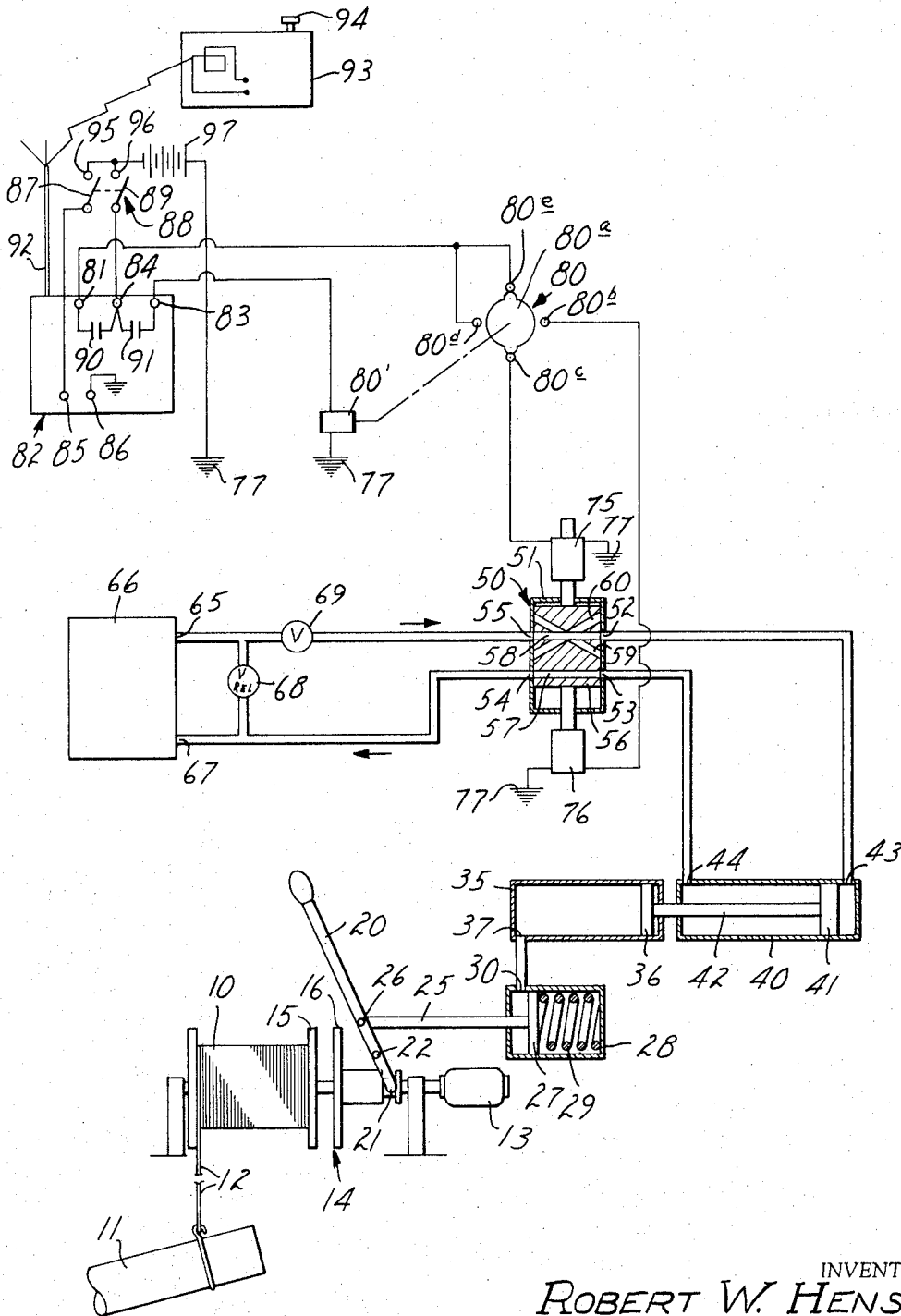


FIG. 1

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2 Sheets-Sheet 2

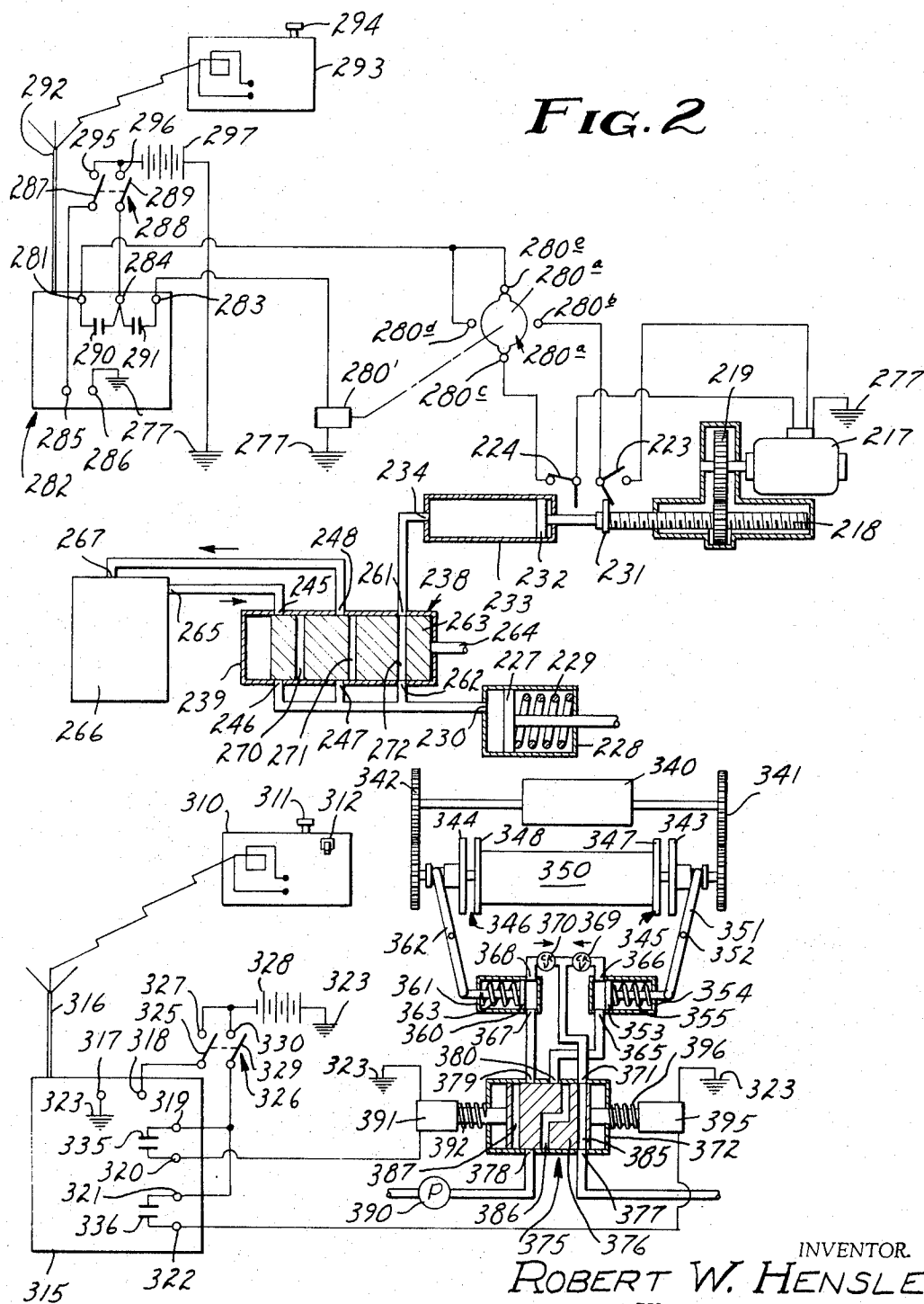


FIG. 2

FIG. 3

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CONTROL APPARATUS

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4 Claims. (Cl. 254-187)

ABSTRACT OF THE DISCLOSURE

The apparatus disclosed herein enables an operator remote from a machine, such as a winch or the like, to control the machine, especially in its winding and unwinding operations, and includes a transmitter adapted for remote operation, a receiver mounted on the machine and means controlled by said receiver and attached to said machine for control thereof.

This invention pertains to remote control apparatus, and more particularly to control apparatus for log skidding winches and the like, wherein the operator attaching a cable or other flexible member to the log or the like can operate the winch to facilitate such connections.

This invention comprises a portable transmitter adapted to be carried by an operator which is tuned to the frequency of a receiver on a machine carrying a winch, which receiver is in turn connected to control the flow of fluid in a hydraulic system connected to engage or disengage a clutch, which clutch in turn connects or disconnects a motor and the winch.

It is an object of the present invention to provide a new and improved control apparatus.

It is a further object of the present invention to provide an improved remote control apparatus.

It is a further object of the present invention to provide an improved remote control apparatus for use with log skidding winches and the like.

It is a further object of the present invention to provide a remote control apparatus for log skidding winches and the like which allows the operator to maintain both hands free to connect the winch to the logs, and the like.

These and other objects of this invention will become apparent to those skilled in the art upon consideration of the accompanying specification, claims, and drawings.

Referring to the drawings, wherein like characters indicate like parts throughout the figures:

FIGURE 1 is a somewhat schematic view of the present invention attached to a log skidding winch;

FIGURE 2 is a somewhat schematic view of a different embodiment of the control apparatus; and

FIGURE 3 is a somewhat schematic view of a different embodiment of the control apparatus.

In FIGURE 1, a winch 10 is illustrated connected to a log 11 by a flexible cable 12 in the usual manner. The winch 10 is operatively connected to a motor 13 through a disc-type friction clutch 14. The disc-type friction clutch 14 includes a pair of discs 15 and 16 coaxially mounted and having adjacent frictional surfaces adapted to engage and transmit rotational motion therethrough. The disc 15 is fixedly attached to one side of the winch 10 for rotation therewith, and the disc 16 is attached to the shaft of the motor 13 for rotational movement therewith but relative axial movement therealong. To engage the clutch 14 and thereby, transmit rotary motion from the motor 13 to the winch 10, the disc 16 is simply moved axially along the shaft of the motor 13 into engagement with the disc 15. It should be understood that the winch 10, the clutch 14, and the motor 13 are illustrated simply for purposes of explaining the operation of the present invention, and it is not intended that they should in any way limit the scope of this invention.

A handle 20 is pivotally attached to the disc 16 at 21

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and is further pivotally attached to a frame or the like (not shown) at a point 22 spaced a short distance from the point 21. As the handle 20 is moved to the right in FIGURE 1, the point 21 moves to the left and moves the disc 16 into engagement with the disc 15. One end of a connecting shaft 25 is pivotally attached to the handle 20 at a point 26 spaced from the pivot point 22 upwardly approximately the same distance as the point 21 is spaced from the pivot point 22. The other end of the shaft 25 is fixedly attached to a piston 27, which is operatively mounted in a hydraulic cylinder 28. A compression spring 29 is positioned between the face of the piston 27 and the rear end of the cylinder 28 to bias the piston 27 in a direction to normally maintain the clutch 14 disengaged. The cylinder 28 has a hydraulic fluid port 30 at the front end of the cylinder 28 on the opposite side of the piston 27 from the spring 29. Thus, when fluid under pressure is forced into the port 30, the piston 27 moves to the right in FIGURE 1 against the bias of the spring 29, and engages the disc 16 with the disc 15 of the clutch 14 to transmit rotary motion from the motor 13 to the winch 10. When pressure is removed from the fluid entering the port 30, the spring 29 forces the piston 27 to the left in the cylinder 28 disengaging the clutch 14 and forcing the fluid out through the port 30.

A hydraulic cylinder 35 having a piston 36 operatively positioned therein has a fluid port 37 adjacent one end thereof which port 37 is in communication with the cylinder 28. The fluid capacities of the cylinder 28 and the cylinder 35 are such that when the piston 27 is in its farthest position to the left, the piston 36 is in its farthest position to the right, and the cylinder 28 has relatively little fluid therein which the cylinder 35 is substantially full. When the piston 36 is forced to the left in the cylinder 35, the fluid is forced through the port 37 and the port 30 into the cylinder 28, and the piston 27 is forced to the right. A third cylinder 40 has a piston 41 operatively positioned therein, which piston 41 is connected to the piston 36 by a connecting shaft 42. The cylinder 40 has a port 43 at the right end thereof and a port 44 at the left end thereof, which ports 43 and 44 are always located on opposite sides of the piston 41. The pistons 36 and 41 are so positioned in the cylinders 35 and 40, respectively, that fluid under pressure applied to the port 43 forces both of the pistons 36 and 41 to the left while fluid under pressure applied to the port 44 forces both of the pistons 36 and 41 to the right.

Flow control means generally designated 50 includes a housing 51 having two outlet ports 52 and 53 and two inlet ports 54 and 55 therein, and a valve member 56 axially movably mounted within the housing 51. The valve member 56 has two passageways 57 and 58 formed therein perpendicular to the longitudinal axis thereof and spaced apart longitudinally so that the passageway 57 connects the inlet port 54 with the outlet port 53 and the passageway 58 connects the inlet port 55 with the outlet port 52 when the valve member 56 is in its upper position (as illustrated in FIGURE 1). The valve member 56 has a second pair of passageways 59 and 60 formed therein in a generally crossed relationship, and spaced from the passageways 57 and 58 so that the passageway 59 connects the inlet port 55 with the outlet port 53 and the passageway 60 connects the inlet port 54 with the outlet port 52 when the valve member 56 is in its lower position against the lower wall of the housing 51. Thus, in its upper position the valve member 56 allows fluid to flow directly through the housing 51 and in its lower position, the valve member 56 reverses the flow of fluid through the housing 51.

The port 43 in the cylinder 40 is connected to the outlet port 52 in the housing 51. The port 44 in the cylinder 40 is connected to the outlet port 53 in the housing 51. The

inlet port 55 in the housing 51 is connected to a hydraulic fluid outlet 65 in a fluid reservoir and pump 66. The inlet port 54 of the housing 51 is connected to a bleed or return inlet 67 in the fluid reservoir and pump 66. A pressure relief valve 68 is interposed between the outlet 65 and the inlet 67 of the fluid reservoir and pump 66 to prevent the pressure in the system from becoming too high. A valve 69 is interposed in the line between the connection of the relief valve 68 to the outlet 65 and the inlet port 55 of the housing 51 so that the system may be shut off without shutting off the pump 66. Thus, fluid under pressure is conducted from the outlet 65 through the flow control means 50 to the port 43 in the cylinder 40 when the valve member 56 is in the position illustrated. The fluid entering the port 43 in the housing 40 forces the piston 41 to the left and any fluid to the left of the piston 41 is forced out of the port 44, through the passageway 57 in the valve member 56 and into the inlet 67 in the fluid reservoir and pump 66. When the valve member 56 is moved into its lower position, fluid from the outlet 65 passes from the inlet port 55 through the passageway 59 to the outlet port 53 and thence to the port 44 in the cylinder 40 where it forces the piston 41 to the right. Fluid to the right of the piston 41 in the cylinder 40 is forced out through the port 43 to the outlet port 52, through the passageway 60 to the inlet port 54 and back to the inlet 67 of the fluid reservoir and pump 66. Thus, by moving the valve member 56 between its upper and lower positions, the piston 41 in the cylinder 40 can be moved to the left or to the right, which in turn eventually controls the engagement and disengagement of the clutch 14.

One end of the core of a solenoid 75 is fixedly attached to the upper end of the valve member 56 through the housing 51. One end of the core of a second solenoid 76 is fixedly attached to the lower end of the valve member 56 through the housing 51. The cores of the solenoids 75 and 76 and the valve member 56 are positioned in the housing 51 for movement relative thereto. When the coil of the solenoid 75 is energized, the core moves to the center thereof and moves the valve member 56 upwardly. Similarly, when the coil of the solenoid 76 is energized, the core moves to the center thereof and moves the valve member 56 to its lower position. One side of each of the coils of the solenoids 75 and 76 is connected to ground 77.

A rotary switch generally designated 80 includes an energizing coil 80', a rotary contact 80a and four stationary contacts 80b through e. The stationary contacts 80b through e are spaced apart approximately 90 degrees in a circle around the rotary contact 80a. The rotary contact 80a has a pair of ears extending therefrom approximately 180 degrees apart, which ears contact two of the stationary contacts simultaneously to provide a circuit therebetween. As illustrated in FIGURE 1, the rotary contact 80a is completing a circuit between the stationary contacts 80c and 80e. The energizing coil 80' is connected to the rotary contact 80a so as to cause approximately 90 degrees of rotation thereof each time the energizing coil 80' is energized. It should be noted that the rotary switch 80 is of the stepping switch type and each time a voltage is applied to the energizing coil 80', the rotary contact 80a moves 90 degrees, regardless of the length of time the voltage is applied.

The side of the coil of the solenoid 75 opposite the connection to ground 77 is connected to the contact 80c of the rotary switch 80. The side of the coil of the solenoid 76 opposite the side connected to ground 77 is connected to the contact 80b of the rotary switch 80. The contacts 80d and 80e of the rotary switch 80 are connected together and to a terminal 81 on a radial receiver generally designated 82. One side of the energizing coil 80' is connected to ground 77, and the other side thereof is connected to a terminal 83 on receiver 82. The receiver 82 has three other terminals thereon designated 84, 85, and 86. Terminal 86 is connected to the ground 77. Terminal 85 is connected to one movable contact 87 of a double

pole single throw switch generally designated 88. Terminal 84 is connected to the other movable contact 89 of the switch 88. A pair of normally open contacts 90 are connected between the terminals 81 and 84 in the receiver 82. A second pair of normally open contacts 91 are connected between the terminals 83 and 84 in the receiver 82. The two pairs of contacts 90 and 91 are connected in the receiver 82 so as to close when a signal is received thereby. The receiver 82 has an antenna 92 connected to the input thereof and adapted to receive signals from a transmitter 93, illustrated remote from the receiver 82. The transmitter 93 has a single energizing button 94 thereon, which when pushed causes the transmitter 93 to send a signal to the receiver 82 causing the two pairs of contacts 90 and 91 to close, thereby, completing a circuit between the terminals 81, 84, and 83. Two stationary contacts 95 and 96, associated with the movable contacts 87 and 89, respectively, of the switch 88, are connected together and to one side of a battery 97. The other side of the battery 97 is connected to ground 77.

In the operation of the control apparatus illustrated in FIGURE 1, the operator pushes the button 94 on the transmitter 93 to transmit a signal to the receiver 82. Upon the reception of a signal in the receiver 82, the two pairs of contacts 90 and 91 close completing a circuit from ground 77 through the energizing coil 80', the pair of contacts 91, the movable contact 89 and its associated stationary contact 96, and the battery 97 to ground 77. The application of voltage across the energizing coil 80' causes the rotary contact 80a to move 90 degrees and, assuming it has moved to the position illustrated, a circuit is completed from ground 77 through the battery 97, the stationary contact 96 and associated movable contact 89, the closed pair of contacts 90, contact 80e of the rotary switch 80, rotary contact 80a, contact 80c, and the solenoid 75 to ground 77. Completion of this circuit provides a voltage across the coil of the solenoid 75 and the core thereof is moved to the position illustrated, thereby, moving the valve member 56 to the position illustrated. When the valve member 56 is in the position illustrated, fluid under pressure is applied to the port 43 in the cylinder 40 forcing the piston 41 and the piston 36 to the left. Forcing the piston 36 to the left causes the piston 27 to be forced to the right in the cylinder 28, thereby, engaging the clutch 14 and connecting the motor 13 to the winch 10.

When the operator again pushes the button 94 on the transmitter 93, the two pairs of contacts 90 and 91 again close and the rotary contacts 80a of the rotary switch 80 moves 90 degrees to complete a circuit between the stationary contacts 80b and 80d. Completion of this circuit and the closing of the pair of contacts 90 completes a circuit through the coil of the solenoid 76 and the core thereof moves to the center position pulling the valve member 56 into its lower position. With the valve member in the lower position, fluid under pressure is applied to the port 44 of the cylinder 40, which forces the pistons 41 and 36 to the right and allows the spring 29 to return the piston 27 to its normal position. When the piston 27 returns to its normal position, the clutch 14 is disengaged and the motor 13 is no longer connected to the winch 10. It should be noted that the transmitter 93 is carried by an operator who is working at some distance from the machine on which the winch 10 is mounted. The lever 20 extends upwardly some distance above the various connections described to provide a handle with which an operator situated on the machine can engage the clutch 14.

In FIGURE 2 a second embodiment of the control apparatus is illustrated wherein a transmitter receiver and rotary switch, similar to that described, is utilized. The various parts of these components which are similar to those described in conjunction with FIGURE 1 have been designated with a similar numeral preceded by a 2 (placing them in the two-hundred series) to indicate a second embodiment. It should be noted that the trans-

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mitter 293, receiver 282, and rotary switch 280 operate in a fashion similar to that described in conjunction with FIGURE 1 and, therefore, the operation of these components will not be described in detail again.

In FIGURE 2 the numeral 217 designates an electric motor operatively connected to a mechanical screw 218 by a gear arrangement 219. Two energizing leads of the motor 217 are connected to two contacts 280b and 280c of the rotary switch 280 through a pair of limit switches 223 and 224, respectively. The extended end of the mechanical screw 218 has a collar 231 attached thereto which engages the limit switch 223 when the mechanical screw 218 has moved as far to the right as allowed, and it engages the limit switch 224 when it has moved as far to the left as is allowed. An electric circuit to the motor is completed through a lead to ground 277. Thus, when the rotary contact 280a is in the position illustrated, an electric circuit is completed from the battery 297, as previously described, to the contact 280c, through the limit switch 224 to the motor 217 and then to ground 277. The completion of this circuit energizes the motor 217 causing the mechanical screw 218 to move to the left. When the mechanical screw 218 has moved far enough to engage the limit switch 224, the circuit is broken and the motor 217 stops. When a second signal is received by the receiver 282 from the transmitter 293, the rotary switch 280 moves the rotary contact 280a 90 degrees completing a circuit from the battery 297 to the contact 280b. Since the mechanical screw 218 and collar 231 have moved to the left, the limit switch 223 is closed completing a circuit from the contact 280b through the motor 217 to ground 277. The completion of this circuit causes the motor 217 to operate in a reverse direction, thereby, moving the mechanical screw 218 to the right until the limit switch 223 is engaged.

The extended end of the mechanical screw 218 is connected to a piston 232 positioned for axial movement within a cylinder 233. The opposite end of the cylinder 233 has a port 234 therein for the passage of hydraulic fluid therethrough. As the mechanical screw 218 is moved to the left or right by the motor 217, the piston 232 is moved to the left or right within the cylinder 233 causing fluid to be forced out or drawn in through the port 234.

A flow control means generally designated 238 includes a housing 239 having six ports therein 245, 246, 247, 248, 261, and 262, and a valve member 263 positioned therein for axial sliding movement. The valve member 263 has a rod 264 connected thereto and extending through one end of the housing 239, which rod 264 is adapted to have connected thereto some means for moving the valve member 263 through three various positions that will be explained presently. The fluid reservoir and pump 266 and the cylinder 228 with the port 230 therein are similar to the like numbered components in FIGURE 1, and operate in a similar fashion. The piston 227 contained within the cylinder 228 is connected to apparatus, not shown, similar to that illustrated in FIGURE 1. The port 245 in the housing 239 of the flow control means 238 is connected to the outlet 265 of the fluid reservoir and pump 266. The port 248 in the housing 239 is connected to the inlet port 267 in the fluid reservoir and pump 266. The port 261 in the housing 239 is connected directly to the port 234 in the cylinder 233. Ports 246, 247, and 262 in the housing 239 are each connected together and to the port 230 in the cylinder 228. The valve member 263 has three passageways 270, 271, and 272 therethrough. The passageway 270 is positioned so that it connects the port 245 with the port 246 when the valve member 263 is in the extreme left position. The passageway 271 is positioned so that it connects the port 248 with the port 247 when the valve member 263 is positioned centrally between the two ends of the housing 239. The passageway 272 is positioned so that it connects the ports 261 with the port 262 when the valve member 263 is in the extreme right position. Each of the passageways

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270, 271, and 272 are spaced apart so that only one passageway connects its two associated ports at any one time. Therefore, when the valve member 263 is in the extreme left position, fluid from the reservoir and pump 266 leaves the port 265 and passes through the passageway 270 to the port 230 in the cylinder 228. When the valve member 263 is in the central position, fluid leaves the cylinder 228 through the port 230 and passes through the passageway 271 to the inlet port 267 in the fluid reservoir and pump 266. When the valve member 263 is in the extreme right position, the passageway 272 completes a passage between the port 230 in the cylinder 228 and the port 234 in the cylinder 233 so that the piston 227 automatically follows the movement of the piston 232. It should be noted that the means connected to the rod 264, which moves the valve member 263, will in general be some device such as a manual lever and a safety feature should be associated therewith so that the valve member 263 must stop momentarily in the central position to allow fluid to be bled from the cylinder 228 before moving to either of the other positions. Also, the safety feature should include means for preventing movement of the valve member 263 from the extreme right position when the piston 227 is at its extreme right position in the cylinder 228, or the clutch 214 (not shown) associated therewith is engaged. Thus, this second embodiment illustrated in FIGURE 2 discloses the use of an electric motor 217 as a transducer for changing electrical energy to mechanical movement, and manual means for controlling the hydraulic fluid rather than the clutch directly.

In FIGURE 3 a third embodiment of the present invention is illustrated wherein the three-hundred series of numbers is utilized to indicate the various components, however, it should be understood that the numbers similar to numbers in the other figures do not necessarily indicate like parts. The numeral 310 indicates a transmitter having two channels or frequencies therein, one of which is activated by a push-button switch 311, and the other of which is activated by a toggle-type switch 312. A receiver 315 also has two channels therein with a frequency similar to those in the transmitter 310 and adapted to receive the frequencies from the transmitter 310 by way of antenna 316. The receiver 315 has a plurality of terminals 317 through 322. The terminal 317 is connected to ground 323 and the main circuitry of the receiver (not shown) is connected between the terminals 317 and 318. The terminal 318 is also connected to a movable contact 325 of a double pole single throw switch generally designated 326. A stationary contact 327 associated with the movable contact 325 is connected to one side of a battery 328 the other side of which is connected to ground 323. The contacts 319 and 321 of the receiver 315 are connected together and to a second movable contact 329 of the switch 326. A stationary contact 330 associated with the movable contact 329 is connected to the stationary contact 327. A pair of normally open contacts 335 are connected between the terminals 319 and 320 of the receiver 315. The contacts 335 are closed by the receiver 315 when a signal is received thereby from the transmitter 310 through the actuation of the channel controlled by the push-button 311. A second pair of normally open contacts 336 are connected between the terminals 321 and 322 of the receiver 315. The contacts 336 are closed by the receiver 315 when a signal is received thereby from the transmitter because the channel therein controlled by the toggle switch 312 is actuated.

A gear box and motor 340 has a shaft extending outwardly from either end thereof, which shafts operate gear assemblies 341 and 342. Each of the gear assemblies 341 and 342 in turn operate an axially movable disc 343 and 344, respectively, in clutches generally designated 345 and 346. Each of the clutches 345 and 346 has a second disc 347 and 348, respectively, adapted to frictionally engage the axially movable discs 343 or 344.

The discs 347 and 348 of the clutches 345 and 346 are fixedly attached to either end of a winch 350 which is adapted to have a flexible cable or the like attached thereto. It should be understood that the present embodiment of the winch and motor are illustrated simply for explanatory purposes and many variations might be made therein, all of which come within the scope of this invention.

One end of a connecting rod 351 is pivotally attached to the axially movable disc 343 of the clutch 345 for movement thereof, and the rod 351 is pivoted at the center thereof to a fixed point 352. Therefore, pivotal movement of the rod 351 about the point 352 moves the disc 343 axially into engagement or out of engagement with the stationary disc 347 of the clutch 345. The opposite end of the rod 351 is pivotally connected to a piston 353 positioned in a cylinder 354 for axial movement. A spring 355 in the cylinder 354 biases the piston 353 to its innermost position in the cylinder 354. In this position of the piston 353, the clutch 345 is disengaged. In a similar fashion the axially movable disc 344 of the clutch 346 is connected to a piston 360 positioned in a cylinder 361 by a connecting rod 362. A spring 363 in the cylinder 361 acts on the piston 360 to force it to its innermost position and cause the clutch 346 to be disengaged.

The cylinder 354 has an inlet port 365 and an outlet port 366 positioned at the end thereof so as to always be to the left of the piston 353. The cylinder 361 has an inlet port 367 and an outlet port 368 positioned at the end thereof so as to always be to the right of the piston 360. The outlet port 366 of the cylinder 354 is connected to a check valve 369 which limits the flow of fluid from the cylinder 354 so that it can only flow into the port 365 and out through the port 366. The port 368 of the cylinder 361 is connected to a check valve 370 which limits the flow of fluid so that it can only flow in through the port 367 and out through the port 368. The outlets of the check valves 369 and 370 are connected together and to a port 371 in a housing 372. The housing 372 is a portion of a flow control means generally designated 375, which also includes a valve member 376. The housing 372 also has ports 377, 378, 379, and 380 therein. The valve member 376 has three passageways 385, 386, and 387 therethrough which are adapted to connect the various ports in the housing 372 together, as will be described presently. The valve member 376 has three positions, a left position, a central position, and a right position. In the left position the port 380 is connected to the port 378 through the passageway 386. In the central position the port 371 is connected to the port 377 through the passageway 385. In the right position the port 379 is connected to the port 378 through the passageway 387. The port 379 is connected to the port 367 in the cylinder 361. The port 380 is connected to the port 365 in the cylinder 354. The port 378 is connected to a fluid pump 390, which is in turn connected to a reservoir, not shown. The port 377 is connected to the bleed or return line of the reservoir, not shown. The core of a solenoid 391 is connected to the left side of the valve member 376 for axial movement thereof. The core of the solenoid 391 has a compression spring 392 coaxially mounted therearound to bias the core of the solenoid 391 toward its outermost position. The core of a second solenoid 395 is connected to the opposite end of the valve member 376 for movement thereof, and has a compression spring 396 coaxially mounted therearound for biasing said core into its outermost position. Thus, the springs 392 and 396 on the cores of the solenoids 391 and 395 bias the valve member 376 normally into its center position, which connects the ports 371 and 377 together through the passageway 385 and allows any fluid in the cylinders 354 and 361 to return to the reservoirs. With the fluid removed from the cylinders 354 and 361, the clutches 345 and 346 are disengaged by the biasing action of the springs 355 and 363. One side of the coil of the solenoid

391 is connected to ground 323 while the other side is connected to the terminal 320 of the receiver 315. One side of the coil of the solenoid 395 is connected to ground 323 while the other side is connected to the terminal 322 of the receiver 315.

In the operation of the present embodiment when the normally open contact 335 of the receiver 315 is closed as a result of the depression of push button 311, a circuit is completed between the battery 328 and the coil of the solenoid 391. When the solenoid 391 is energized the core thereof moves to the left whereby the valve member 376 moves to its left position and a passage is opened from the pump 390 to the cylinder 354. The flow of fluid into the cylinder 354 moves the piston 353 to the right engaging the clutch 345 and causing the winch 350 to rotate in a clock-wise or winding direction. When the button 311 is allowed to return to its normal position, transmission from the transmitter 310 stops and the contacts 335 in the receiver 315 open whereby the solenoid 391 is deenergized and the valve member 376 returns to its central or normal position. Return of the valve member 376 to its central position allows the fluid in the cylinder 354 to bleed off through the check valve 369 and through the passageway 385 to the reservoir. When the operator closes the toggle-type switch 312, transmission from the transmitter 310 causes the receiver 315 to close the normally open contact 336 and complete a circuit from the battery 328 to the coil of the solenoid 395. Energizing the solenoid 395 causes the core thereof to move the valve member 376 to its right position, and complete a passage for fluid from the pump 390 to the cylinder 361. The flow of fluid into the cylinder 361 causes the piston 360 to move to the left and engage the clutch 346 whereby the winch 350 rotates in a counter clock-wise or unwinding direction. A toggle-type switch 312 is utilized to cause the winch 350 to unwind since in many instances the cable thereon will be extremely large and an operator will require the freedom of both hands in the manipulation thereof. Thus, through the use of the push button 311 and the toggle switch 312, an operator can control the winch 350 from a remote position.

While I have shown and described specific embodiments of this invention, further modifications and improvements will occur to those skilled in the art. I desire it to be understood, therefore, that this invention is not limited to the particular form shown, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of this invention.

I claim:

1. Control apparatus comprising:

- (a) a portable transmitter adapted to be carried by an operator and having means associated therewith for manually controlling the transmission of signals;
- (b) a receiver adapted to receive signals from said transmitter and having contacts associated therewith adapted to close upon the receipt of a signal;
- (c) winch means;
- (d) rotary power means;
- (e) clutch means having an engaged and a disengaged position and operatively connected to said winch means and said rotary power means for connecting said winch means to said rotary power means in the engaged position and disconnecting said winch means from said rotary power means in the disengaged position;
- (f) hydraulic activating means having a first and a second position and connected to said clutch means for moving said clutch means into said disengaged position when said hydraulic activating means is moved to said first position and for moving said clutch means into said engaged position when said hydraulic activating means is moved to said second position;
- (g) a source of hydraulic fluid connected to said hydraulic activating means for moving said hydraulic

activating means to said first position when the fluid flow is in a first direction and for moving said hydraulic activating means to said second position when the fluid flow is in a second direction;

- (h) hydraulic fluid flow control means associated with said source of hydraulic fluid for controlling the direction of flow thereof to said hydraulic activating means;
- (i) transducing means capable of converting electrical energy to mechanical movement operatively connected to said flow control means and to said contacts of said receiver for altering the direction of hydraulic fluid flow upon the reception of a predetermined signal from said transmitter.

2. Control apparatus comprising:

- (a) a portable transmitter adapted to be carried by an operator and having means associated therewith for manually controlling the transmission of signals;
- (b) a receiver adapted to receive signals from said transmitter and having contacts associated therewith adapted to close upon the receipt of a signal;
- (c) actuating means including at least one fluid cylinder having a first and a second position;
- (d) energizing means including a source of fluid under pressure; and
- (e) connecting means attached to said contacts, said actuating means and said energizing means for connecting said energizing means to said actuating means in a first configuration to move said actuating means to said first position upon reception of a first signal from said transmitter and for connecting said energizing means to said actuating means in a second configuration to move said actuating means to said second position upon reception of a second signal from said transmitter.

3. Control apparatus as set forth in claim 2 wherein the connecting means include transducing means for converting electrical energy to mechanical movement and fluid flow reversing means attached to said transducing means and the fluid cylinder for reversing the flow of

fluid to said cylinder each time said transducing means is energized.

4. Control apparatus comprising:

- (a) a portable transmitter adapted to be carried by an operator and having means associated therewith for manually controlling the transmission of signals;
- (b) a receiver adapted to receive signals from said transmitter and having contacts associated therewith adapted to close upon the receipt of a signal;
- (c) actuating means having a first and a second position;
- (d) energizing means;
- (e) connecting means attached to said contacts, said actuating means and said energizing means for connecting said energizing means to said actuating means in a first configuration to move said actuating means to said first position upon reception of a first signal from said transmitter and for connecting said energizing means to said actuating means in a second configuration to move said actuating means to said second position upon reception of a second signal from said transmitter;
- (f) a winch;
- (g) a power source; and
- (h) clutch means having an engaged and disengaged position and connected to said winch and said power source for connecting said winch to said power source in the engaged position and disconnecting said winch from said power source in the disengaged position, said clutch means further being operatively connected to said actuating means so as to move from the disengaged to the engaged position as said actuating means moves from the first to the second position.

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H. C. HORNSBY, *Assistant Examiner*.