

[54] **HAND-HELD CONTROL MEANS** 3,052,785 9/1962 Herrmann et al. 200/157
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[22] **Filed: May 17, 1973**

[21] **Appl. No.: 361,391**

[52] **U.S. Cl. 200/157**
[51] **Int. Cl. H01h 9/02, H02b 1/08**
[58] **Field of Search 200/157, 159 R, DIG. 2, 200/60, 153 R**

[56] **References Cited**
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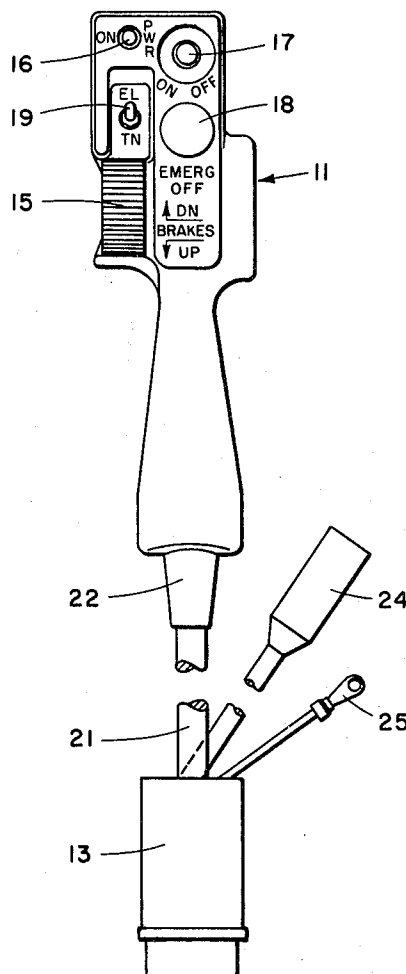
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[57] **ABSTRACT**

A hand-held device for controlling the operation of powered equipment by the natural movements of an operator's thumb is provided. The device has a lower portion which is gripped by the fingers of one hand and an upper, control portion having selected control members which are within ready reach of the thumb of the hand holding the device.

3 Claims, 4 Drawing Figures



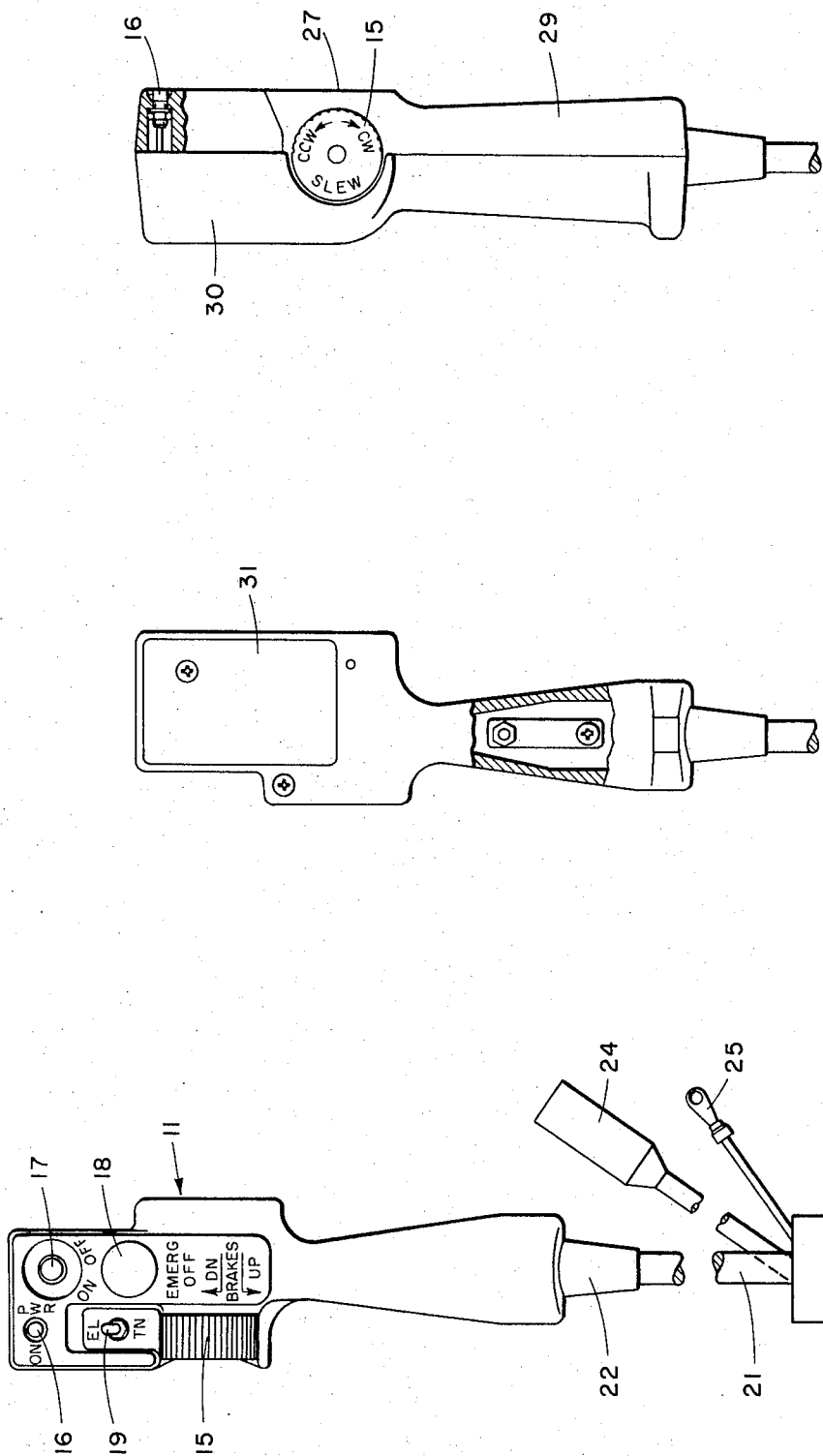


Fig. 2

Fig. 3

Fig. 1

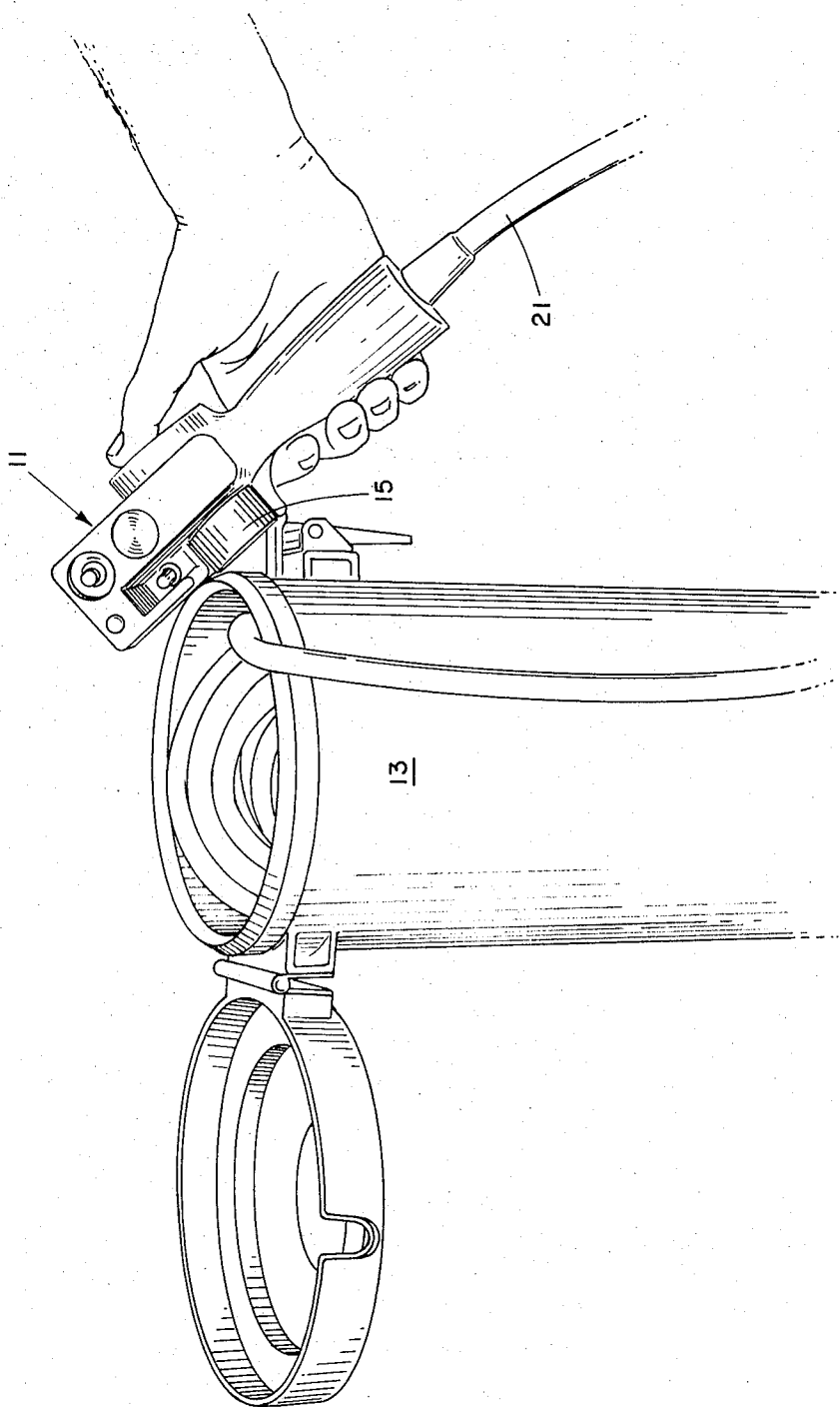


Fig. 4

HAND-HELD CONTROL MEANS

This invention relates in general to missile control means and, more particularly, to a portable control means which permits remote control of the missile loading and maintenance operations.

Portable launch control means are essential on missile ships or at land launching installations where it is desired to provide a short range self-defense capability against aircraft and air-to-surface and surface-to-surface missiles. Such defenses to be adequate should have control means that are capable of on-mount stowage to provide for fast reaction setting and launching of from a few to several missiles.

The present invention permits remote control to be maintained on the deck of a ship or at a shore activity of a missile launcher during its loading and maintenance operations. A unique form of pistol "group" control is provided which is portable so that the operator is free to move about the deck or station during operation of the launcher. The pistol or deck control unit preferably is molded of pliable plastic material and all controls are recessed to avoid damage in the event the unit is dropped.

Accordingly, it is an object of the present invention to provide for site control of missile launcher operations in a system also having remote and local control thereof.

It is another object of the invention to provide for site control of missile launcher operations in a hand-held unit which is not susceptible to damage on being dropped.

A further object of the invention is to provide for a deck control of missile launchers which allows control personnel to position the launcher in azimuth and elevation during loading or unloading procedures from the immediate vicinity of the launcher.

Other objects, advantages and novel features of the invention become apparent from the following detailed description thereof when considered in conjunction with the accompanying drawings in which like numerals represent like parts throughout and wherein:

FIG. 1 is a front elevation of the hand control unit and its storage container;

FIG. 2 is a side elevation, partly in section, of the hand control of FIG. 1;

FIG. 3 is a rear elevation, partly in section, of the hand control of FIG. 1; and

FIG. 4 is a perspective view of the hand control unit and system ready for use.

Referring to FIG. 1, a hand control unit 11 is shown connected to a cable assembly 12 which when not in use is stored in a container 13. Controller 11 has a handle portion 14 of selected contour to be gripped comfortably by the fingers of the right hand of the user and a plurality of recessed controls which include a brake control knob 15 which is disposed opposite the user's thumb for operation thereby, a power ON indicator light 16, and ON-OFF pushbutton switch 17, an emergency OFF pushbutton switch 18 and an elevation-train selector switch 19. A cable 21 having a plug 22 for connection to hand unit 11 and of selected length is stored in container 13. Plug 22 preferably is secured to handle portion 14 by suitable adhesive. A control unit stowed switch 24 and a grounding strap 25 complete the components that are stored in container 13.

FIGS. 2 and 3 are side and rear views of the hand control unit of FIG. 1 and illustrate the contour of the device as well as the manner in which the various controls are recessed from the front surface of the device, indicated at 27, to prevent damage or accidental turning of the brake control handle. The lens of indicator light 16 is flush with surface 27. The components of the assembly may be serviced by removing handle sections 29 and 30, which preferably are made of conventional pliable plastic material, and from the rear by removing a panel 31.

FIG. 4 illustrates the hand controller unit removed from its container and ready for use in operating a missile launcher or other equipment. Container 13 is made of a sufficient size to receive whatever length of cable 21 is desired. Handle 14 is shown contoured to accommodate the fingers only of the user in such a way that a firm grip may be maintained while leaving the thumb of the user free to manipulate the various recessed controls in the hand unit. Slew control 15 is movable either clockwise or counter-clockwise about a neutral position. Motion in either direction about the neutral position releases the brakes of the launcher and provides an error signal to the launcher servo which results in motion about the axis selected by switch 19.

A servo control system, not shown, provides power for the launcher drives. The system consists of a servo electronics package, a silicone control rectifier (SCR), a deck (or hand) control unit (DCU) rate controller, and an interconnection and switchgear cabinet. Launcher elevation and train command signals, are initiated with slew control knob 15 when the system is in the DCU mode. Knob 15 drives a potentiometer which sends a voltage to a dc motor in the DCU rate controller. The motor speed is proportional to displacement of control knob 15. The motor drives a synchro control transmitter which sends a position signal to the servo electronics which in turn sends control signals to the primary SCR power controller and launcher drive motors.

In one system which incorporates the hand control unit of the present invention, a missile launcher may be operated in either one of three control modes; namely, remote, local or deck. The remote control mode is the normal operating mode, the local control mode is generally used for maintenance operations, and the deck or hand control mode is used for loading or unloading operations. The hand control mode utilizes hand control unit 11 and allows maintenance personnel to position the launcher to the required angles of elevation and train during a loading or unloading procedure from a convenient location on the deck using the deck station launcher control, not shown. The hand control mode may also be used for other maintenance procedures requiring launcher movements. The deck station launcher control contains control knob 15 to release the drive brakes and to supply rate commands for either train or elevation to the servo controller. These rate commands are attenuated in respect to normal rate commands, holding the launcher slew rate to a slower and safer limit. Once the hand control mode has been entered, only a positive action by personnel at both deck station launcher control and the Local Maintenance Panel will cause the launcher to enter into another mode. As a safety feature, the DCU controller, not shown, incorporates follow-up synchros which assure present launcher position regardless of the control

mode, i.e., local, remote or DCU. This approach prevents switch-over command errors and sudden launcher slewing with its implied safety hazards.

In one embodiment of a shipboard guided missile launcher system, operation of the launcher is accomplished by first removing the deck station launcher control from its storage container. The mode selection rotary switch, not shown, is then locked into the hand controlled mode position and elevation-train mode toggle switch 19 is switched to elevation (EL). Slew DOWN-UP brake control 15 is then rotated to UP to cause the launcher to move up or elevate. Rotating the knob to its center position causes the launcher to cease elevating and to remain fixed. The upper limit of elevation is reached by leaving the knob in the UP position until further elevation ceases. Rotating control knob 15 down (DN) causes the launcher to depress giving lower elevation, reaching the lower elevation buffer stop if held in the DOWN position. The launcher is returned to its center position by rotating thumb knob 15 to the UP position and holding until the launcher elevation indicator indicates 0°.

Operation of the device in train is similar to that in elevation except that rotating the thumb knob to the UP position, i.e., clockwise, causes the launcher to train clockwise through 360°. Turning the knob to the DOWN position in train causes the launcher to train counter-clockwise through 360°. During any control through the brake control knob, the launcher may be stopped immediately by either depressing the EMERG-OFF push-button switch or releasing control knob 15. Upon completion of use, the deck station launcher control is stored at the site of the launcher in container 13.

There is thus provided by the present invention a hand-held control unit for at least bi-directionally controlling the movement of a missile or other launch device or equipment. This unit is located at the site of the equipment to be controlled and permits a single person to cause the equipment to assume desired positions within his purview and have one free hand for other duties or for his own safety. The hand control unit is portable to the full extent of the length of its cord so that the person operating the unit may move about the vicinity of the equipment without a significant impediment to his flexibility of movement. The controls on the hand unit are all operated by the thumb of the user leaving his fingers free to maintain a secure grip on the unit. The Controls are all recessed within the periphery of the configuration of the hand controlled unit so that they cannot be accidentally actuated by dropping or by being accidentally struck during movements of the operator. The hand controlled unit preferably is molded of a pliable plastic so that not only are the controls not actuable upon dropping but the unit itself may be dropped without causing physical damage to it. The

hand control unit is primarily used to control a surface-to-air missile launcher during both loading and maintenance operations, but it will be appreciated that many modifications, variations and uses of the unit are possible in the light of the above teachings.

What is claimed is:

1. A hand-held device for controlling the operation of powered equipment by the natural movements of an operator's thumb comprising:

a handle grip member having a lower portion contoured to be comfortably gripped by the fingers of the right hand of the operator and an angular control portion extending from the handle grip lower portion and having specific control components deployed within ready reach of the thumb of said right hand;

said lower portion tapering from a wider base area remote from said control portion to a narrower area adjacent said control portion for more securely accommodating the operator's right index finger;

said control components including a rotatable control knob in the lower left quadrant of said angular control portion immediately above the operator's right thumb for permitting variable control of equipment connected thereto;

a toggle switch disposed immediately above said rotatable control knob for selecting the circuits to be thumb-controlled thereby; and

ON-OFF recessed pushbutton controls opposite said toggle switch for starting and stopping by thumb action the operation of the equipment to which said device is connected,

said control components being recessed within the outer configuration of the control portion so that accidental actuation of the control member either by the operator's thumb or by other means is avoided; and

a control cable having a plurality of connectors therein removable received axially in said lower portion at the ends thereof remote from said control portion.

2. The device as defined in claim 1 wherein said control portion is asymmetrical with respect to said lower portion and is offset toward the thumb of an operator's right hand so as to position said control knob substantially in alignment with the operator's right thumb and opposite the terminal phalanx thereof.

3. The device as defined in claim 2 wherein said control knob has an initial, neutral, central position and is rotatable clockwise or counterclockwise to control opposite directions of movement in the equipment connected thereto.

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