

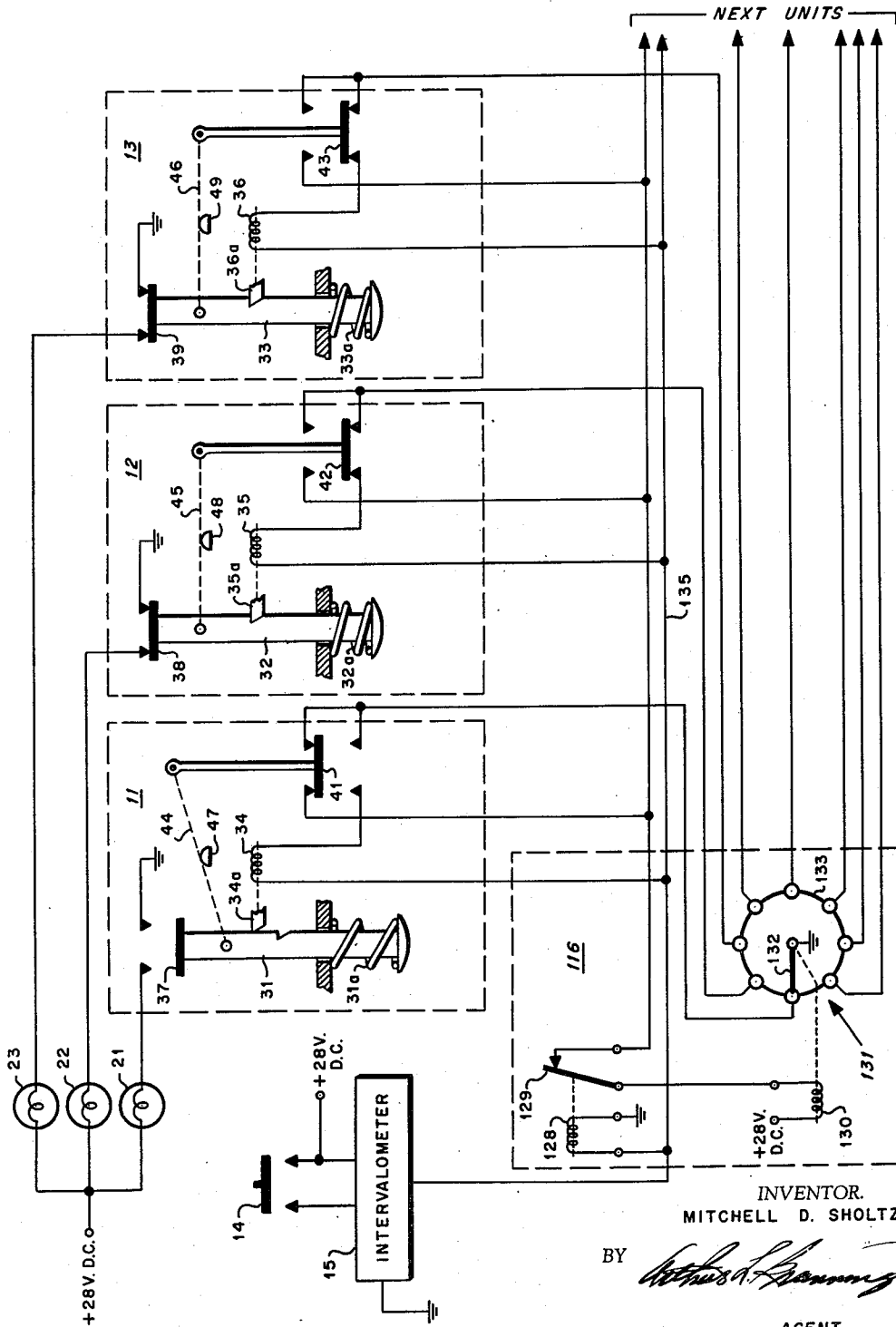
Feb. 20, 1962

M. D. SHOLTZ

3,021,758

ELECTRICAL SYSTEM FOR BOMB RELEASE MECHANISMS

Original Filed Sept. 29, 1959



1

3,021,758

ELECTRICAL SYSTEM FOR BOMB RELEASE MECHANISMS

Mitchell D. Sholtz, 211 Carolina Ave., Mounted Route, Phoenixville, Chester County, Pa.

Original application Sept. 29, 1959, Ser. No. 843,318, now Patent No. 2,991,700, dated July 11, 1961. Divided and this application Jan. 28, 1960, Ser. No. 5,316

2 Claims. (Cl. 89-1.5)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to material dispensing apparatus and more particularly to electrical control system for bomb release mechanisms.

This is a division of applicant's copending application Serial No. 843,318 filed September 29, 1959, now U.S. Patent No. 2,991,700, entitled "Electrical Systems for Bomb Release Mechanisms."

Prior electrical control systems for bomb release mechanisms required the generation of an electrical pulse from an intervalometer for activating a release solenoid, powder charge, or spring-loaded plunger and, in addition, required individual relay-operated transfer switches to sequentially direct each pulse to a different bomb release mechanism after a preceding mechanism has been fired.

Several significant disadvantages rendered the prior art bomb release control system unsatisfactory. For example, vibrations in an aircraft would cause the transfer switches to chatter and result in accidental operation of the bomb releases. The transfer relay switch was also found to be too slow and unreliable in operation under normal and test conditions for the rapid sequential release of a bomb load by modern high speed aircraft.

One of the principal objects of the invention, therefore, is to provide a bomb release electrical control system which is not so susceptible to the accidental release of a bomb due to vibrations causing the closing of relay contacts. This is accomplished by bodily segregating the transfer switch function from the bomb release mechanism and preferably providing a novel transfer relay unit which can be cushioned against vibrations and/or positioned in a relatively vibration-free portion of an aircraft.

Another object of the invention is to provide a bomb release control system wherein only one bomb release mechanism will be fired in response to one pulse.

Another object of the invention is to speed up the sequential operation of a plurality of bomb release mechanisms for decimating the actuating pulse duration normally generated by an intervalometer instead of depending upon the decay of an intervalometer-generated pulse before the next sequentially-connected bomb release mechanism is put into circuit. One of the advantages of this feature of the invention is that there is less danger of a pilot operated bomb release pickle switch being held down too long when only one bomb is desired to be released. Faulty operation of the pickle switch in the prior art control system could result in a greater number of bombs being released than desired. The pulse decimating feature provides the pilot with a greater time interval in which to release the switch. The intervalometer contemplated will generate electrical pulses in timed sequence so long as the pickle switch is held closed.

Still another object of the invention is the provision of a novel lightweight, economically manufactured and maintained, and generally fail-safe electrical control system for a plurality of bomb release mechanisms.

Another object of the invention is the provision of an

2

improved and highly reliable electrically-operated bomb release control system having a reduced number of parts.

The invention further resides in certain novel features of construction, combinations and arrangements of parts, and further objects and advantages of the invention will be apparent to those skilled in the art to which it pertains from the following description of the present preferred embodiments thereof described with reference to the accompanying drawings, which form a part of this specification, and in which:

The figure is a schematic electrical diagram of another form of the invention with the first of the bomb release mechanisms being fired and the remaining two mechanisms being cocked.

It is to be understood that the invention is not limited to the details of construction of the release mechanisms and arrangement of parts shown in the drawings and hereinafter described in detail, but is capable of being otherwise embodied and of being practiced or carried out in various ways. It is to be further understood that the phraseology or terminology employed herein is for the purpose of description and there is no intention to herein limit the invention beyond the requirements of the prior art.

Referring to the figure, an electrical aircraft bomb release control system embodying the invention comprises a plurality of bomb release mechanisms of the spring-loaded plunger type generally indicated by the reference numerals 11, 12 and 13, a bomb release pickle switch 14, an intervalometer 15, and a relay unit 16. Additional release mechanisms can be added in the manner shown. Only three release mechanisms have been shown for illustrating and describing the inventive concept.

Normally, lighted panel lights 21, 22, 23 are provided for indicating when the respective release mechanisms 11, 12, 13 are loaded and ready for dispensing or releasing an article such as a bomb. As each mechanism 11, 12, 13 is actuated, the respective panel lights 21, 22, 23 are deenergized and go out and thereby indicate the instant that the respective mechanisms 11, 12, 13 have been fired or actuated. The FIGURE shows the mechanism 11 fired and its panel light 21 out. The mechanisms 12, 13 are cocked and the respective panel lights 22, 23 thereof are lighted.

The relay unit 16 forms a compact package that can be conveniently stowed in a relatively vibration-free part of the aircraft away from the bomb release mechanisms 11, 12, 13 which are usually conventionally mounted above the suspended bombs, not shown. The pickle switch 14 is preferably mounted on an instrument panel in a conventional manner within easy reach of the operator or pilot.

The intervalometer 15 is a conventional unit which emits time-spaced electrical pulses upon the closure of the pickle switch 14, one terminal of the pickle switch 14 being hot as it is connected to a standard 28 v. D.C. aircraft electrical power supply.

The series-connected and arranged release mechanisms 11, 12, 13 each comprises a spring-loaded plunger 31, 32, 33, respectively, adapted to be fired to a bomb release position by means of a grounded solenoid coil 34, 35, 36 which withdraws a trigger or locking member 34a, 35a, 36a. Each of the locking members 34a, 35a, 36a are adapted to fit into a notch in the respective plungers 31, 32, 33 for holding the same in cocked position against the biasing action of the compressed springs 31a, 32a, 33a. The firing of each plunger 31, 32, 33, operates to open a normally-closed light switch 37, 38, 39 and respectively disconnects the electrical ground of the panel lights 21, 22, 23. At the same instant, a normally closed relay switch 41, 42, 43 opens by the energization of the

respective solenoid coils 34, 35, 36 each via a pivotally-connected mechanical linkage 44, 45, 46 which is respectively fulcrumed at 47, 48, 49.

The relay unit 116 comprises a grounded mechanically-held transfer relay coil 128. Energization of the coil 128 opens its normally-closed transfer switch 129 for putting a solenoid coil 130 of a conventional stepping relay, indicated generally by the reference numeral 131, into circuit by grounding the same through a grounded dial pointer 132 in a manner to be described. The stepping relay 131 has a pointer 132 adapted to be moved relative to a fixed dial face 133.

In operation, an electrical pulse is emitted from the intervalometer 15 upon the closure of the pickle switch 14 and is conducted via a line 135 directly to the solenoid coil 34 of the release mechanism 11. When the mechanism 11 is in a closed position, the pulse is transmitted through the closed switch 41 to the grounded stepping relay pointer 132. Since the pointer 132 is at the ground position shown in FIG. 1, the solenoid coil 34 is energized and the release mechanism 11 is fired. Hence, the switch 41 is moved upwardly by means of the plunger 31 and linkage 44 to put the next release mechanism 12 into the firing circuit with the intervalometer 15. As pointed out in the description of FIG. 1, the downward movement of the plunger 31 opens the switch 37 and disconnects the panel light 21 from its ground, thereby deenergizing the light 21.

Simultaneously with the firing of the bomb release mechanism 11, the transfer coil 128 is energized and the transfer switch 129 is opened for the duration of the pulse. This keeps the stepping relay coil 130 from being energized until the release mechanism 11 has been fired and the switch 41 has been moved to the fired position for putting the coil 130 in circuit by grounding the same through the pointer 132. The coil 130 is directly connected to the aircraft's 28 v. D.C. power supply and needs only to be grounded to cause the dial to be ratcheted or indexed in a counterclockwise direction to the next position. In this case, pointer 132 next connects the mechanism 12 with ground, and, upon a second pulse being emitted from the intervalometer 15 after closure of the pickle switch 14, the bomb release mechanism 12 is likewise actuated. Each time that a bomb release mechanism is actuated, the next bomb release mechanism is put into the firing circuit with the intervalometer and the stepping relay completes the circuit between pulses by grounding the bomb release mechanism that has been put in circuit.

Obviously any number of bomb release mechanisms can be used with the invention.

Also, it is obvious that the relay unit 116 can be independently cushioned against shocks and vibrations in a relatively vibration free portion of an aircraft remote from the bomb racks and thereby prevent malfunction and accidental closure of the contacts in the relay unit 116. Another advantage is that in each bomb release mechanism only one mechanically-operated single-throw, double-pole switch is required. This further reduces the possibility of malfunction.

It is the intention to hereby cover not only the above-mentioned modifications of the preferred construction shown, but all adaptations, modifications, and uses thereof which come within the practice of those skilled in the art to which the invention relates, and the scope of the appended claims.

What is claimed is:

1. On a bomb release system, first bomb release means, second bomb release means, a first actuating plunger in

said first bomb release means, a second actuating plunger in said second bomb release means, a first spring biasing said first plunger from a cocked position to a fired position, a second spring biasing said second plunger from a cocked position to a fired position, first solenoid means having a first armature adapted to engage and hold said second plunger in a cocked position, first circuit means operated by said first plunger in said first bomb release means, second switch means operated by said second plunger in said second bomb release means, intervalometer means for emitting a series of pulses, first circuit means connecting said first solenoid and said second solenoid to said intervalometer means, a stepping switch having a first position to connect said first switch to ground and a second position to connect said second switch to ground, said first solenoid being responsive to a first of said pulses through said first switch to fire said first bomb release mechanism when said stepping switch is in said first position, said second solenoid being responsive to a second of said pulses through said second switch to fire said second bomb release mechanism when said stepping switch is in said second position, a third switch normally closed, a first relay coil connected through a source, said third switch and said first switch to ground when said stepping switch is in said first position, said first relay coil connected through said source, said third switch and said second switch to ground when said stepping switch is in said second position, said first relay coil operative when energized to move said stepping switch from said first position to said second position, a second relay coil connected between said intervalometer and ground and operative with receipt of a pulse from said intervalometer to open said third switch for the duration of said pulse wherein said stepping switch is inhibited from stepping from said first position to said second position until said pulse has expired and thereby insuring that said second bomb release mechanism will not be fired by said first pulse.

2. In an electrical bomb release control system, a plurality of electrically energizable bomb release mechanisms each having an electrical operating coil, each of said electrical operating coils having a first terminal and a second terminal, means for emitting electrical pulses at a predetermined rate, means coupling said pulse emitting means to said first terminal of each of said electrical operating coils of said bomb release mechanisms, stepping switch means connected to said second terminal of each of said electrical operating coils of said bomb release mechanism for sequentially connecting said electrical operating coils to ground, a source of voltage, electrical coil means for actuating said stepping switch means, switch means mechanically connected to each of said bomb release mechanisms for connecting said source of voltage to ground through said electrical coil means when one of said bomb release mechanism operating coils is energized, relay means connected to said electrical pulse emitting means, said relay means having a switch connected in circuit between said source of voltage and said electrical coil means to disconnect said source of voltage from said electrical coil means for the duration of each of said electrical pulses whereby more than one bomb release mechanism electrical coil is prevented from being energized by the same electrical pulse.

References Cited in the file of this patent

UNITED STATES PATENTS

2,144,957	Bell	July 24, 1939
2,331,058	Stick	Oct. 5, 1943
2,351,336	Hooven	June 13, 1944