April 23, 1957 H. SMITH ET AL 2,790,094

VOLTAGE STEP-DOWN DEVICE FOR DUAL SIGNAL ELEMENTS

Filed Dec. 5, 1952

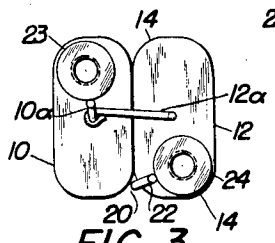


FIG. 3.

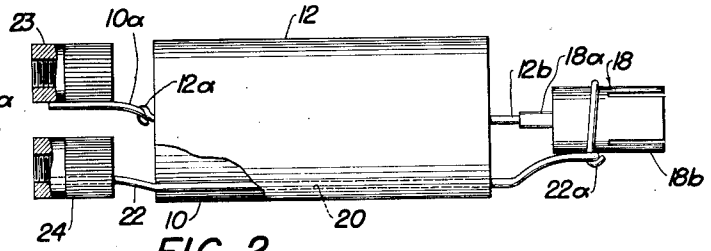


FIG. 2.

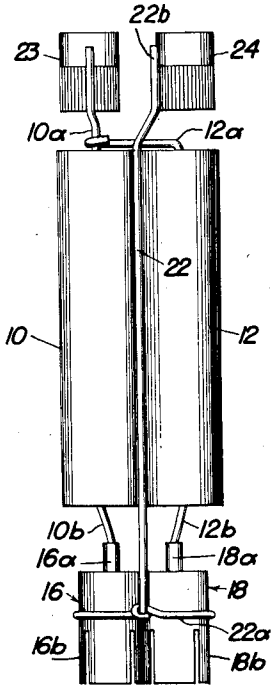


FIG. 1.

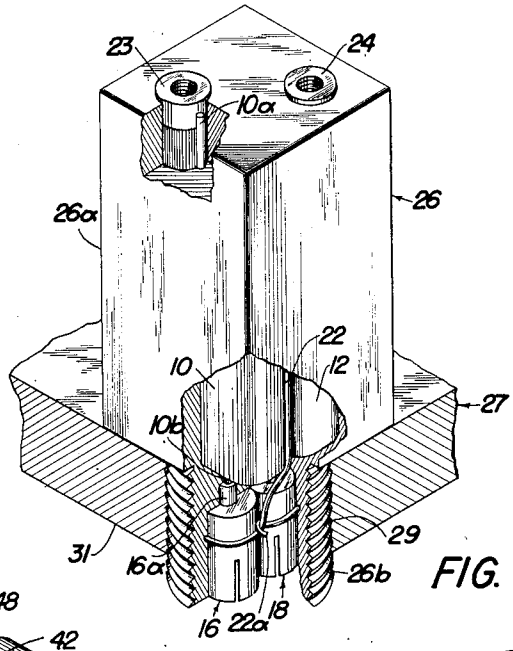


FIG. 4.

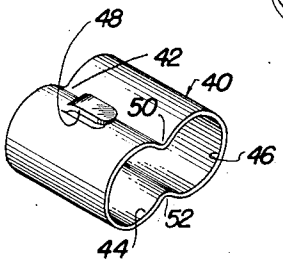


FIG. 6.

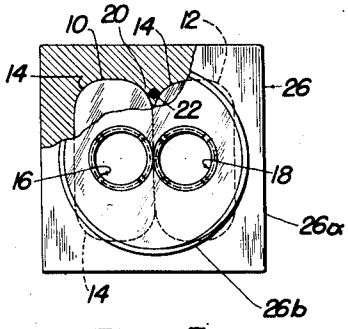


FIG. 5.

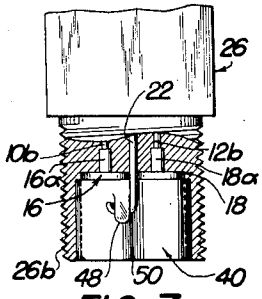


FIG. 7.

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VOLTAGE STEP-DOWN DEVICE FOR DUAL SIGNAL ELEMENTS

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4 Claims. (Cl. 307—157)

The present invention relates to signaling devices, in particular to a unitary combined mount and voltage regulator for indicator and/or alarm apparatus.

Various indicator and alarm apparatus embodying dual signal devices energized simultaneously have found widespread applications, predominately in the Armed Forces. The adoption of this type of indicator apparatus is based, in part, on the probability that both of the concurrently energized signal devices do not have the same actual life, although rated alike by manufacturers. Accordingly, when one of the signal devices is rendered inoperative, as and for example by a signal lamp burning out, the other of the signal devices will indicate either the normal or alarm condition, depending upon the operational sequence initially contemplated. Prevalent practice in the service branches is to replace both of the signal devices when one is rendered inoperative, since the other device is in all probability very close to reaching its rated life.

From the foregoing, it is apparent that a paramount requirement in constructing signal or alarm apparatus is reliability, met in part by the provision of dual signaling devices. Closely allied, especially for armed service use, are the further considerations of compactness, sturdiness and ease of manufacture at low unit cost. Accordingly, it is an object of the present invention to provide an indicating alarm apparatus advantageously incorporating one or more of the above enumerated features.

Apparatus of the aforesaid character are usually energized from convenient and easily accessible sources of alternate current voltage at a line frequency of sixty cycles. Provision is made for stepping down this line voltage to obtain the required potentials for the signal devices, normally rated at a fraction of the available line voltage. Heretofore, a commonplace expedient has been to employ voltage step-down transformers. As is apparent to those skilled in the art, the use of inductive impedances at the relatively low line frequency requires a large number of turns of fragile and fine wire, which means an increased risk of transformer failure, troublesome heat losses, and materially increased weight, size and manufacturing costs. Therefore, it is another object of the present invention to provide a convenient, compact and lightweight combined mount and voltage step down assembly for indicator and alarm apparatus of the dual signal type. In particular, the present invention contemplates the provision of a voltage step down arrangement rendering the indicator apparatus more reliable, decreasing the risk of failure, and minimizing heat losses.

Certain objects, advantages and features of the present invention are realized by using condensers in series with the signal devices for the purpose of providing relatively high impedances at line frequency which are capable of stepping down the voltage applied to the signal devices when connected to a source of line potential.

In accordance with a preferred embodiment of the present invention, there is provided a unitary combined mount and voltage regulator for indicating apparatus employing dual signal elements each operable concurrently

at a reduced line voltage. In the illustrative embodiment, a pair of condensers, each of a reactance selected to provide a predetermined voltage drop at line frequency are arranged in side by side relation and temporarily sub-assembled by tying a lead of one of the condensers to an adjacent lead of the other condenser. At the end of the sub-assembly, remote from the tied-together leads, there is mounted a pair of signal sockets for the signal elements, the sockets being of a known type and embodying an axially extending inner terminal and a cylindrical outer terminal concentric therewith. The sockets are conductively connected in series with the respective condensers by joining the adjacent leads of the condensers to the inner axial terminals, these conductive connections further providing, temporarily, a support for the signal sockets at a predetermined location relative to the sub-assembly of the condensers. The sockets are tied together in side by side relation by a conductive lead which is wrapped around the outer cylindrical terminals and extended toward the end of the condenser assembly contiguous to the common terminal provided by the tied-together condenser leads. Thereafter, suitable line terminals are connected to the tied-together condenser leads and to the conductive lead of the outer terminals of the sockets. The assembly thus provided is electrically complete and includes the sockets for the signal devices in parallel branches, each with a series connected voltage reducing reactance, the sockets and terminals being arranged at opposite ends of the assembly for ready access when mounted under actual operating conditions, as and for example, on a panel. In order to provide permanant support for the elements of the assembly, the electrically complete unit is potted in a suitable mass of a rigidified insulating non-corrosive material, such as a polymer, with suitable proportions of a filler, such as china clay.

The brief description and nature of the invention, as well as further features of novelty, will be more fully appreciated from the following detailed description of the illustrative embodiment, reference being made to the accompanying drawing wherein:

Figure 1 is a front elevational view of a combined mount and voltage regulating assembly for an apparatus embodying the features of the present invention;

Figure 2 is a side elevational view of the assembly of Figure 1, a fragment being broken away for clarity;

Figure 3 is a top plan view of the assembly of Figure 1;

Figure 4 is a perspective view of the electrically completed assembly of Figures 1 to 3, shown encased in a rigidified insulating and protective body, parts being broken away for clarity;

Figure 5 is a bottom plan view of the completed unit of Figure 4, with the panel removed and parts broken away for clarity;

Figure 6 is a perspective view of a retainer member for mechanically and electrically interlocking the signal element sockets of the unit of Figures 1 to 5; and

Figure 7 is a fragmentary elevational view of the device of Figure 6 shown incorporated into a completed unit, a part being broken away for clarity.

Referring now specifically to Figs. 1 to 3, there is shown the combined mount and voltage step-down assembly of the present invention, which embodies a broadly old circuit arrangement, wherein two signal devices, such as lamp bulbs, are wired in parallel and energized from a single source of potential, conventional line voltage at 60 cycles.

The mount and regulator includes a pair of metallized paper condensers 10, 12, each of substantially rectangular cross-section, and including rounded corners, such as designated by the numeral 14. The condensers 10, 12 are arranged in side by side abutting relationship

to provide an overall sub-assembly of substantially square cross-section, as seen best in Fig. 3. Each of the condensers **10**, **12** includes respective leads **10***a*, **10***b*, **12***a*, **12***b*, projecting from their opposite ends. One of the leads of either of the condensers, such as lead **12***a*, is bent toward and hooked about the adjacent lead **10***a* of the other condenser to temporarily join the condensers together.

Contiguous to the end of the sub-assembly remote from the hooked-together leads **10***a*, **12***a*, there is arranged a pair of conventional signal element sockets **16**, **18** of the type embodying inner pin-like terminals **16***a*, **18***a* and outer concentric cylindrical terminals **16***b*, **18***b*. The inner terminal **16***a* of socket **16** is soldered to the adjacent lead **10***b* of condenser **10** to provide a series connection between the condenser and the socket, as well as a temporary support for the socket; similarly the inner terminal **18***a* of the socket **18** is conductively connected to the adjacent lead **12***b* of condenser **12**.

As best seen in Figs. 2 and 3, the adjacent rounded corners of the condenser **10**, **12** define a guideway **20** extending longitudinally of the condensers. Within the guideway **20** there is disposed a combined tie member and conductive connection **22** in the form of a length of wire having an end portion **22***a* wrapped around the outer cylindrical terminal of the sockets **16**, **18** with the terminal end hooked back upon itself to mechanically interlock the socket members. Since the tie member **22** is of conductive material, there is provided a common connection between the outer terminals **16***b*, **18***b* of the signal element sockets **16**, **18** serving as one terminal of the parallel branches of the electrical unit.

Contiguous to the end of the condenser subassembly **10**, **12** remote from the signal element sockets **16**, **18** there is arranged a pair of line terminals **23**, **24** each longitudinally fluted or knurled conveniently to permit effective conductive connection thereto of appropriate leads to complete the electrical unit. Specifically, the lead **10***a* of condenser **10** is soldered to line terminal **23**, serving as a support for the latter and permitting a common connection to condensers **10**, **12**. The terminal **24** is soldered to the adjacent end portion **22***b* of the tie member **22** and serves as a common connection to the outer terminals **16***b*, **18***b* of the light sockets.

The electrically completed unit is potted or encased in an encapsulating compound by well understood practices and techniques. One such compound found to be highly suitable for providing a tough, impact resistant, non-corrosive body is a mixture of a thermoplastic, such as polymerized methyl methacrylate, with a filler, such as china clay.

In the potting process, the molds are arranged to provide a body **26**, seen in Fig. 4 to include a substantially square body proper **26***a* with an integral externally threaded extension **26***b*. Accordingly, the compact voltage regulator can be mounted on a panel board **27** provided with a complementary threaded opening **29** whereby the light sockets **16**, **18** open to the front side **31** of the panel board to receive the signal devices and the line terminals **23**, **24** are accessible rearwardly thereof for connection to an appropriate source of potential.

From the foregoing, it is apparent that the construction of the present invention meets the requirement of reliability by the provision of a compact shock-resistant construction not readily subject to failure due to mechanical or electrical stressing of the components thereof, yet in a manner compatible with the requirements of low unit cost, ease of manufacture, and other equally important considerations above mentioned.

In Figures 6, 7, there is illustrated a modified construction for mechanically interlocking the lamp sockets **16**, **18** and for providing a common electrical connection to the outer shell-like terminals **16***b*, **18***b*. Specifically, shell **40** of substantially hour-glass configuration and made of conductive material is formed with a reduced medial neck **42** to provide two side-by-side transverse passageways **44**, **46** for the sockets **16**, **18**. Preferably a connection tab **48** is struck directly from the shell **40** for the purpose of providing a readily accessible contact for connection to the conductive tie member **22**. The reduced medial neck **42** provides opposed grooves or indentures **50**, **52**, which are filled with the potting material, as illustrated, thereby preventing lateral displacement of the signal element sockets **16**, **18**.

An illustrative processing sequence in accordance with the present invention is substantially as follows: The condensers **10**, **12** are arranged in confronting and abutting relation with the sockets **16**, **18** arranged adjacent one end and within the outline of the condenser assembly and with the line terminals **23**, **24** adjacent the other end and also within the outline of the condenser assembly. Preferably, a temporary connection of the condensers **10**, **12** is achieved by hooking the lead **12***a* of condenser **12** about the lead **10***a* of condenser **10** and by soldering the hooked connection. Suitable conductive connections are provided between the inner terminals **16***a*, **18***a* of the sockets **16**, **18** and the adjacent leads **10***b*, **12***b* of the condensers **10**, **12**. Thereafter, the tie member **22** is arranged within the guideway **20** and the end portion **22***a* wrapped about the outer terminals **16***b*, **18***b* of the sockets **16**, **18**. The end portion **22***b*, remote therefrom is connected to the adjacent line terminal **24**. In encasing the electrically completed unit of Figs. 1 to 3 to arrive at the potted construction of Fig. 4, care is taken to avoid the covering or fouling of the line terminals **23**, **24** and of the sockets **16**, **18** which are to remain exposed.

In the above description, the invention has been disclosed merely by way of example and in preferred manner, but obviously many variations and modifications may be made therein. It is to be understood, therefore, that the invention is not limited to any specific form or manner of practicing same, except insofar as such limitations are specified in the appended claims.

We claim:

1. In a unitary alarm apparatus, a pair of condensers sub-assembled in side-by-side relation and each including leads projecting from the opposite ends thereof, a pair of two-terminal sockets arranged adjacent to and spaced from one end of the sub-assembly of said condensers and each adapted to receive a signal device, means conductively connecting one terminal of each of said sockets to an adjacent lead of said sub-assembly and providing a support for the respective sockets, a pair of line terminals arranged adjacent to and spaced from the other end of said sub-assembly, means conductively connecting one of said line terminals to the adjacent leads of said sub-assembly and providing a support for said one line terminal, a combined tie member and connecting lead having one end wrapped around the other terminals of said sockets and having the other end connected to said other line terminal and providing a support for said other line terminal, and a rigidified insulating casing for the assembly of said condensers, sockets, and line terminals.

2. A combined mount and voltage step-down assembly for an alarm apparatus having dual signal devices comprising a pair of condensers each substantially rectangular in cross section, said condensers being arranged to provide a substantially square sub-assembly and each including leads projecting from its opposite ends, a pair of two-terminal sockets for said signal devices arranged contiguous to one end of said sub-assembly and each having one terminal conductively connected to an adjacent lead of one of said condensers, a first line terminal arranged contiguous to the other end of said sub-assembly and conductively connected to both adjacent leads of said condensers to provide a common contact for said condensers, a second line terminal adjacent said other end of said sub-assembly, a conductive lead extend-

ing longitudinally of said sub-assembly and having one end portion connected to said second line terminal and having the other end portion wrapped around and connected to the other terminals of said sockets to provide a common electrical connection and mechanical interlock for said sockets, and a rigidified, non-corrosive, insulating support and casing for the assembly of said condensers, sockets, and line terminals.

3. A combined mount and voltage step-down assembly for an alarm apparatus having dual signal lamps comprising a pair of condensers arranged to provide therebetween a longitudinally extending guideway and each including leads projecting from its opposite ends, a pair of two-terminal lamp sockets arranged to provide therebetween opposed recessed portions, said sockets each having an outer terminal and an inner terminal conductively connected to a lead of one of said condensers, a first line terminal conductively connected to both of the remaining leads of said condensers to provide a common contact for said condensers, a second line terminal, a conductive lead arranged within said guideway and having one end portion connected to said second terminal and having the other end portion extending towards said sockets and within said recessed portion therebetween, said other end portion of the conductive lead being wrapped around and connected to the outer terminals of said sockets to provide a common electrical connection and mechanical interlock for said sockets, and a permanent support and casing for the assembly of said condensers, sockets and line terminals.

4. A combined mount and voltage step-down assembly for an alarm apparatus having dual signal lamps comprising a pair of condensers arranged to provide therebe-

tween a longitudinally extending guideway and each including leads projecting from its opposite ends, a pair of two-terminal lamp sockets each having an outer terminal and an inner terminal conductively connected to a lead of one of said condensers, a first line terminal conductively connected to both of the remaining leads of said condensers to provide a common contact for said condensers, a second line terminal, a conductive lead arranged within said guideway and having one end portion connected to said second terminal and having the other end portion extending toward said sockets, a conductive shell having a medial neck and embracing the outer terminals of said sockets, said medial neck presenting opposite indentures, said other end portion of said conductive lead extending along one of said indentures and being secured to an adjacent portion of said shell, thereby providing a common electrical connection and mechanical interlock for said sockets, and a permanent support and casing for the assembly of said condensers, sockets and line terminals, said support comprising a rigidified insulating mass, a portion of which is disposed within said indentures of said shell.

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