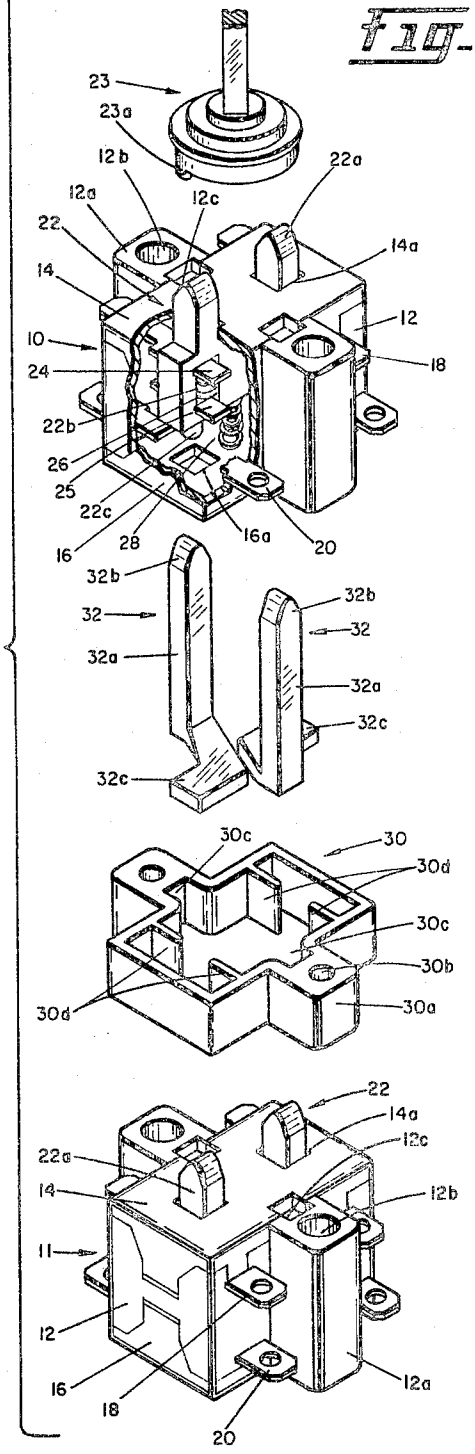
Aug. 16, 1966 J. V. MANNING 3,267,246

ACTUATING ARRANGEMENT FOR TANDEM DEVICES

Filed March 23, 1964

Fig. 1



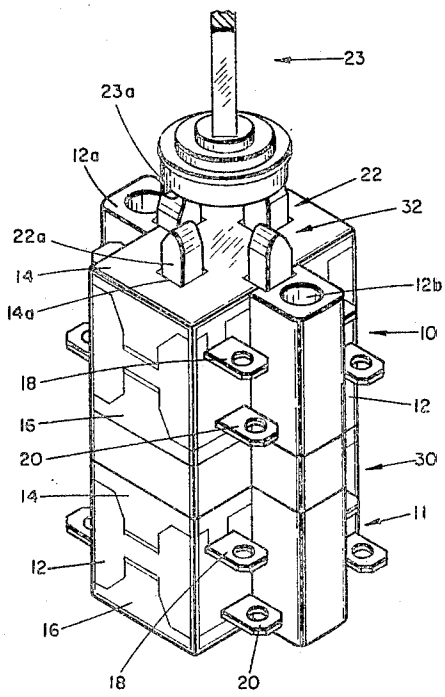


Fig. 2

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ACTUATING ARRANGEMENT FOR TANDEM DEVICES

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The present invention is directed to an actuating arrangement for use with a plurality of similar devices, and particularly switch devices, associated together in tandem whereby actuating means can cause selective operation of each device independently of others.

In some switch applications, it is desirable to simultaneously control a number of separate electrical circuits by means of a single actuating input. One way this can be accomplished is to associate in tandem separate switch devices so constructed that operation of the first switch device in the tandem arrangement causes operation of the next in line switch device and so on. Thus it has been common practice to associate switch devices of the general type described above in tandem to simultaneously control a number of separate electrical circuits as shown in FIGURE 5 of the Mullen et al. Patent 3,018,338.

In other switch applications, it is desirable to selectively control a number of separate electrical circuits by means of a single actuating input. While this can be accomplished in a number of ways, it is often desirable that switch devices of the general type described above be capable of being arranged in tandem to provide such an arrangement. It is with such a switch actuating arrangement that the present invention is concerned.

As disclosed in the present invention, two switch devices of the general type described above, while associated in tandem, are separated one from the other so that the operation of the first switch in the tandem arrangement does not cause operation of the second switch device. Further, an auxiliary actuator is disposed proximate the first switch device so that one extremity thereof is proximate the operating plunger of the first switch device and the other extremity is proximate the operating plunger of the second switch device whereby actuating means associated with the plunger of the first switch device and the auxiliary actuator can be moved selectively to operate the first and second switch devices, respectively. Of course, it will be appreciated that by properly constructing the actuating means, the switch devices could be operated simultaneously at one time and selectively at another.

While the above discussion has been with respect to switch devices which can be arranged in tandem so that operation of the first switch device in the tandem arrangement causes operation of the next adjacent switch, there are switch devices of this general type which are not constructed to be normally mounted in tandem, for example as shown in the Frank Patent 2,669,616. However, by utilizing the teachings of the present invention, switch devices of this character could be associated in tandem and the switch devices selectively operated. Of course the teachings of the present invention could be utilized with switch devices of the type shown in the forementioned Frank patent to provide simultaneous operation thereof. Further, by properly constructing the actuating means, the devices could be operated selectively at one time and simultaneously at another.

Such switch actuating arrangements as just described allow for space saving with a resultant cost saving insofar as panel mounting is concerned since more switch devices and electrical circuits can be simultaneously and/or selectively controlled, as the case may be, than was previously possible. Further cost savings are realized since such switch actuating arrangements require but a single actuating input to operate the devices simultaneously and/or selectively, as the case may be.

Therefore, it is an object of the present invention to provide an actuating arrangement for separate devices associated in tandem which is capable of selectively and/or simultaneously operating such devices.

This and other objects will become more apparent from a reading of the following specification and appended claims taken in conjunction with the drawing wherein:

FIGURE 1 is an exploded view of an actuating arrangement, and particularly a switch actuating arrangement, utilizing the present invention; and

FIGURE 2 is an assembly view of the switch actuating arrangement of FIGURE 1.

In the drawing, identical switch blocks or devices **10** and **11** each include a housing **12** formed of insulating material having two mounting ears **12***a* with openings **12***b* through which fasteners, not shown, can be disposed. Upper cover **14** and lower cover **16** also formed of insulating material are snap fastened or otherwise appropriately secured to each housing **12** so as to provide an enclosed casing and substantially flush surfaces between the outer surfaces of covers **14** and **16** and the upper and lower extremities of the mounting ears **12***a*. Each housing **12** and covers **14** and **16** cooperate to maintain fixed upper terminals **18** and fixed lower terminals **20** in place. Two identical operating plungers **22** formed of insulating material are appropriately guided in each of the housings **12** and include upper portions **22***a* which extend through openings **14***a* in upper covers **14** and therebeyond to the same extent to thereby allow for engagement by actuating means, for example, rotating cam member **23**. Each plunger **22** carries in opening **22***b* a pair of movable bridging arms **24** and **25** formed of conductive material biased away from each other by spring **26** as is best shown with respect to upper switch device **10** of FIGURE 1. A return spring **28** is associated with each of the plungers **22** to normally bias plungers **22** outwardly to the position shown in FIGURE 1.

Upper terminals **18**, lower terminals **20**, and plungers **22** with bridging bars **24** and **25** cooperate to provide two switch mechanisms in each switch device. As shown with respect to upper switch device **10** of FIGURE 1, bridging bar **24** engages upper terminals **18** to provide a first electrical circuit. Upon inward movement of plunger **22**, bridging bar **24** is disengaged from upper terminals **18** followed by engagement of bridging bar **25** with lower terminals **20** to provide a second electrical circuit.

Lower covers **16** each include openings **16***a* which correspond to openings **14***a* of upper covers **14** and are provided for reasons which will be given presently. Further, housings **12** each include a pair of openings **12***c* (and covers **14** and **16** include corresponding cutouts) disposed midway between plungers **22** and equidistant about a line connecting plungers **22**, the function of which will be commented below.

Switch devices of the type just described can be associated together in tandem with the plungers **22** in line so that portions **22***a* of plungers **22** of lower switch device **11** extend through openings **16***a* of cover **16** and into housing **12** of upper switch device **10** whereby inward movement of a plunger of upper switch device **10** results in actuation of the plunger of the lower switch device **11** disposed therebelow. Thus, referring to FIGURE 1, lower extension **22***c* of plunger **22** of upper switch device **10** would engage portion **22***a* of plunger **22** of lower switch device **11** if the switch devices **10** and **11** were mounted in tandem. The plungers **22** are constructed so as to allow for a plunger of upper switch device **10** to move and to cause sufficient movement of the appropriate plunger of lower switch device **11** and there-

by operation of the corresponding switch mechanism in each switch device.

In the switch actuating arrangement of the present invention, a tubular spacer member **30** having mounting ears **30***a* with openings **30***b* through which fasteners, not shown, can be disposed is arranged to be located between switch devices **10** and **11**. Associated with tubular member **30** and switch devices **10** and **11** are a pair of auxiliary actuators or drivers **32** formed of insulating material and of generally L-shape. Actuators **32** include upright portions **32***a* which are arranged to be guided in cutouts **30***c* of tubular member **30** and openings **12***c* of housing **12** (and past corresponding cutouts of covers **14** and **16**) of upper switch device **10**. Actuators **32** also include portions **32***b* which extend beyond upper switch device **10** to substantially the same extent as portions **22***a* of plungers **22** of upper switch device **10** when switch devices **10** and **11**, tubular member **30**, and auxiliary actuators **32** are associated together as shown in FIGURE 2. Leg portions **32***c* of auxiliary actuators **32** are arranged to be guided by ribs **30***d* of tubular member **30** and arranged to overlie the upper extremities of portions **22***a* of plungers **22** of lower switch device **11**.

With switch devices **10** and **11**, tubular member **30**, and auxiliary actuators **32** associated together as shown in FIGURE 2, cam lobe **23***a* of rotating cam member **23** can be moved to selectively actuate plungers **22** of upper switch device **10** and auxiliary actuators **32** to selectively operate the switch mechanisms and electrical circuits of switch devices **10** and **11**. This can be done in sequence in either direction. Further, rotating cam member **23** can be arranged to be moved outwardly so as not to engage either plungers **22** or auxiliary actuators **32** upon rotary movement of cam lobe **23***a* to a new position whereupon such rotary movement is followed by an inward movement which causes operation of the engaged plunger or the auxiliary actuator, as the case may be. Similarly, if rotating cam member **23** is so designed that cam lobe **23***a* can be selectively disposed between plungers **22** and auxiliary actuators **32**, an inward movement of rotating cam member **23** would cause simultaneous actuation of plungers **22** and auxiliary actuators **32**, thereby providing the same function which could result if switch devices **10** and **11** were mounted in tandem without tubular member **30** and auxiliary actuators **32**. Other combinations will be apparent to those skilled in the art.

As was mentioned above, the switch actuating arrangement of the present invention can be applied to switch devices which normally are not suitable for mounting in tandem (for example, as shown in the forementioned Frank patent) and with such an arrangement the switch devices can then be operated selectively and simultaneously as desired.

While a particular switch actuating arrangement has been disclosed including a particular form of the auxiliary actuators and a particular manner of guiding the auxiliary actuators and a particular manner of spacing the switch devices, any number of modifications is possible as will be apparent to those skilled in the art. Therefore, the scope of the invention should be determined from a reading of the following claims in which I claim:

1. An actuating arrangement, the combination comprising: a first switch block and a second switch block each including a plurality of switch mechanisms therein each having an operating plunger associated therewith extending side by side and beyond said switch blocks to the same extent; said first switch block including a pair of openings disposed therethrough centrally between the plungers thereof and equally spaced on either side about a line connecting said plungers; said first switch block separated by a tubular spacer member from and located above said second switch block with the respective plungers in line and extending in the same direction; and said switch blocks and spacer member fastened together and associated with a pair of auxiliary L-shaped drivers the upright portions thereof disposed in the openings in said first switch block and extending therebeyond to the same extent as the plungers thereof and the leg portions thereof disposed within the spacer member and overlying the plungers of said second switch block so that a rotating cam member associated with the plungers of said first switch block and said drivers can move each of the plungers of said first switch block and said drivers independently of the others to operate each of said switch mechanisms separately.

2. An actuating arrangement, the combination comprising: a first switch block and a second switch block each including a plurality of switch mechanisms therein each having an operating plunger associated therewith extending side by side and beyond said switch blocks to the same extent; said first switch block including a pair of openings disposed therethrough centrally between the plungers thereof and equally spaced on either side about a line connecting said plungers; said first switch block separated by a spacer means from and located above said second switch block with the respective plungers in line and extending in the same direction; and said switch blocks and spacer means fastened together and associated with a pair of auxiliary L-shaped drivers the upright portions thereof disposed in the openings in said first switch block and extending therebeyond to the same extent as the plungers thereof and the leg portions thereof disposed in the space between said switch blocks provided by said spacer means and overlying the plungers of said second switch block so that actuating means associated with the plungers of said first switch block and said drivers can move each of the plungers of said first switch block and said drivers independently of the others to operate each of said switch mechanisms separately.

3. An actuating arrangement, the combination comprising: a first switch block and a second switch block each including a plurality of switch mechanisms therein each having an operating plunger associated therewith extending side by side and beyond said switch blocks to the same extent; said first and second switch blocks fixedly positioned with respect to each other; said first switch block located above said second switch block with the respective plungers in line and extending in the same direction and with the plungers of said second switch block spaced from said first switch block; and a pair of auxiliary L-shaped drivers the upright portions thereof being guided by said first switch block for longitudinal movement with respect to and extending in the same direction and therebeyond to the same extent as the plungers thereof and the leg portions thereof being disposed in the space between said first switch block and the plungers of said second switch block and overlying the plungers of said second switch block so that actuating means associated with the plungers of said first switch block and said drivers can move each of said plungers and drivers independently of the others to operate each of said switch mechanisms separately.

4. An actuating arrangement, the combination comprising: a first switch block and a second switch block each including a switch mechanism therein having an operating plunger associated therewith extending beyond the respective switch block; said first and second switch blocks fixedly positioned with respect to each other; said first switch block located above said second switch block with the plungers in line and extending in the same direction and with the plunger of said second switch block spaced from said first switch block; and an auxiliary L-shaped driver disposed proximate said first and second switch block with the upright portion thereof being guided for longitudinal movement with respect to and extending in the same direction as the plunger of said first switch block and therebeyond to the same extent thereof and the leg portion thereof being disposed in the space between said first switch block and the plunger of said second switch

block and overlying the plunger of said second switch block so that actuating means associated with the plunger of said first switch block and said driver can move the plunger of said first switch block and said driver independently of the other to operate each of said switch mechanisms separately.

5. An actuating arrangement, the combination comprising: a first switch block and a second switch block each including a switch mechanism therein having an operating plunger associated therewith extending beyond the respective switch block in the same direction; said first and second switch blocks fixedly positioned with respect to each other; said first switch block located above said second switch block with the plungers in line and with the plunger of said second switch block spaced from said first switch block; and with an auxiliary driver disposed proximate said first and second switch blocks and guided for movement with respect to and extending in the same direction as the plunger of said first switch block and therebeyond to the same extent as the plunger thereof and including a portion overlying the plunger of said second switch block so that actuating means associated with the plunger of said first switch block and said driver can selectively move the plunger of said first switch block and said driver to operate said switch mechanisms.

6. An actuating arrangement, the combination comprising: a first device and a second device each including a means to be operated therein having an operating member associated therewith extending beyond the respective devices in the same direction; said first and second devices fixedly positioned with respect to each other; said first device located above said second device with the operating members in line and with the operating member of said second device spaced from said first device; and an auxiliary driver disposed proximate said first and second devices and guided for movement with respect to and extending in the same direction as the operating member of said first device and therebeyond to the same extent as the operating member thereof and including a portion overlying the operating member of said second device so that actuating means associated with the operating member of said first device and said driver can selectively move the operating member of said first device and said driver to operate the means of said first and second devices.

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