

[54] COMMUNICATIONS APPARATUS FOR
NON-VERBAL HANDICAPPED PERSONS

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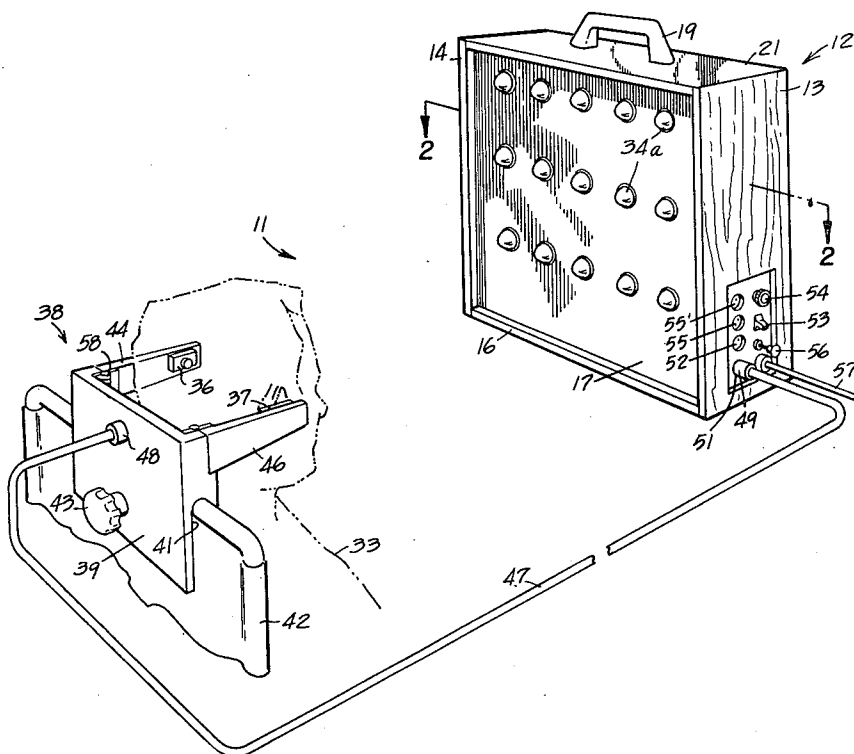
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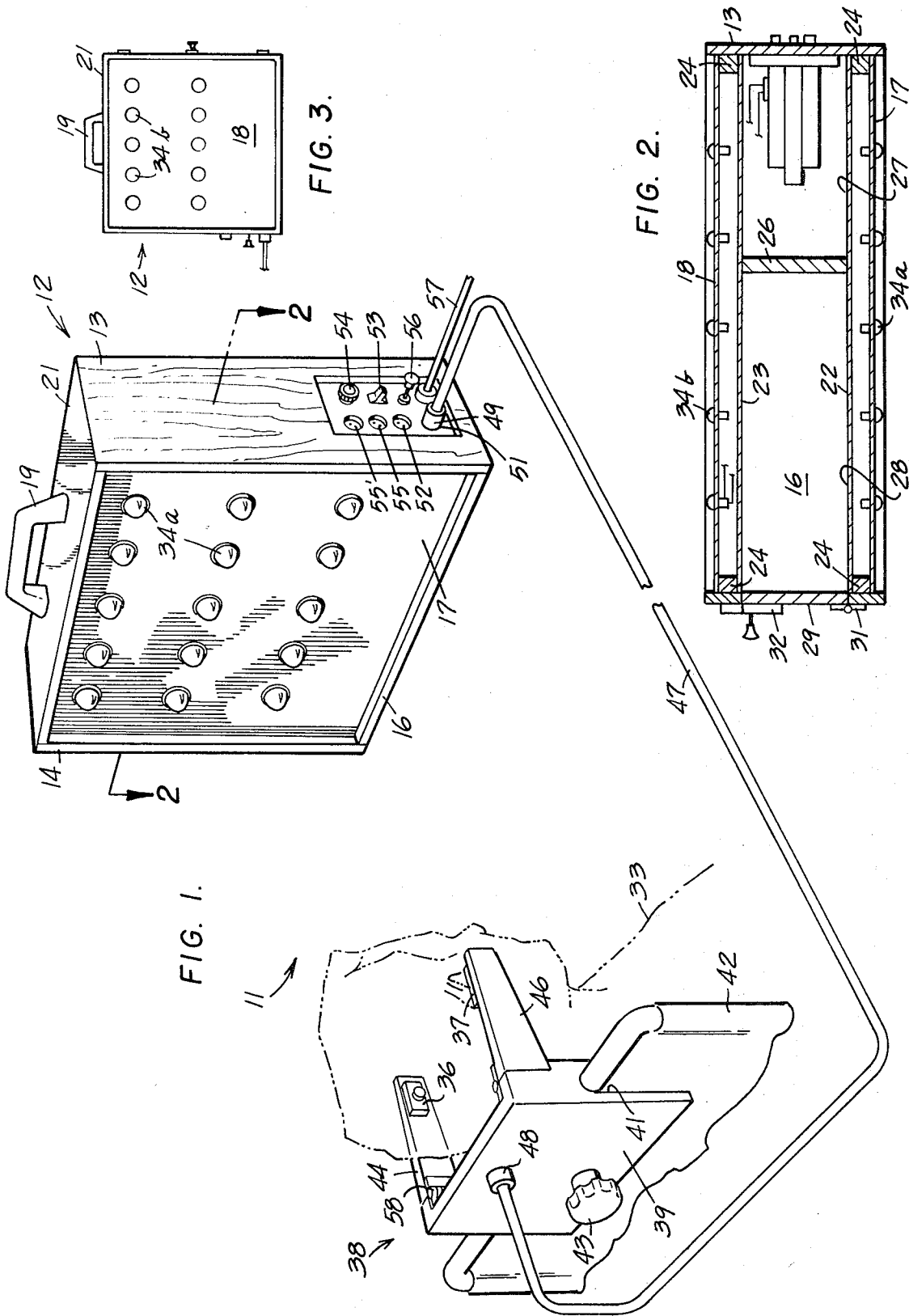
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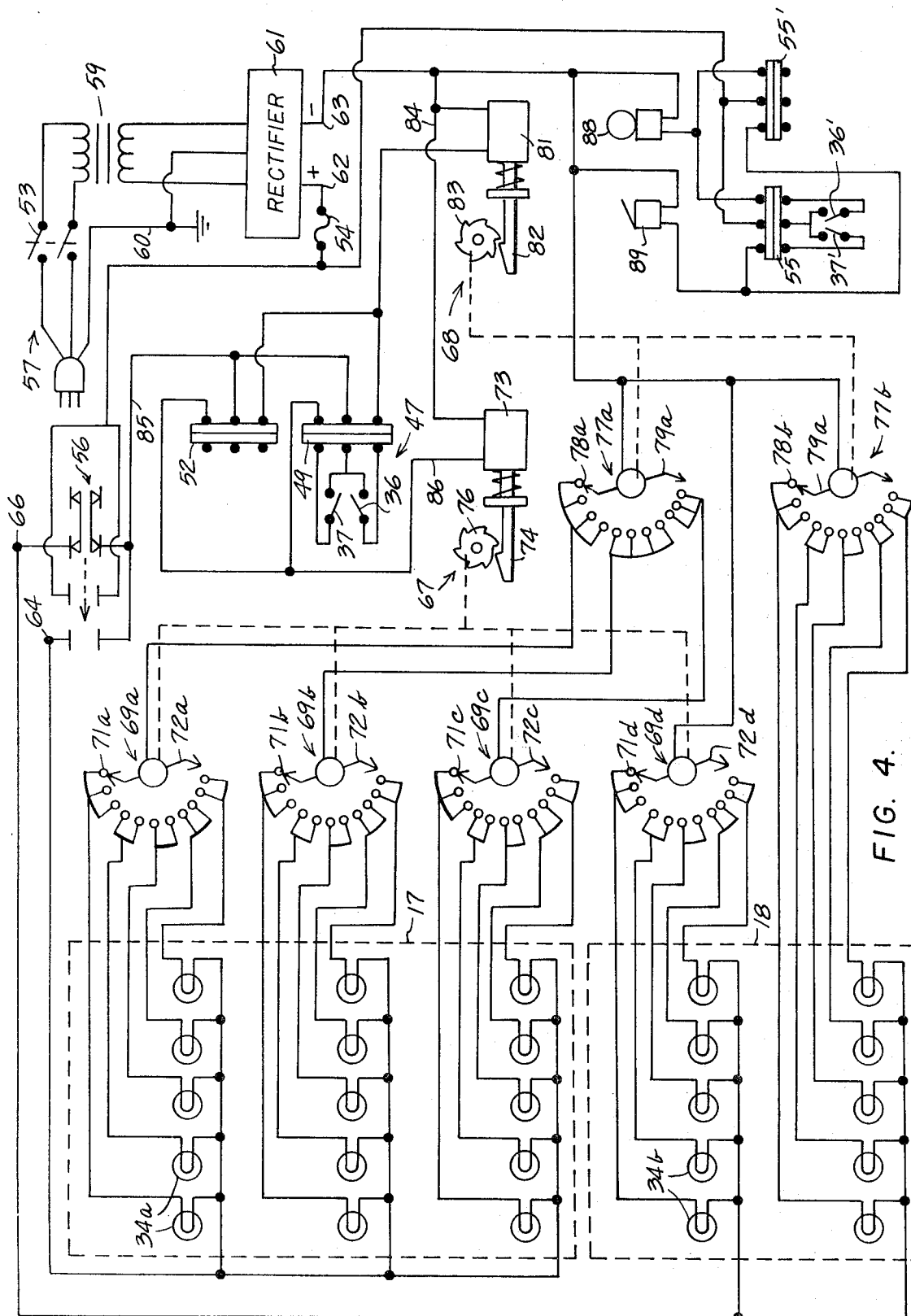
[57] ABSTRACT

A portable apparatus provides for indication of needs, answering of questions and expression of other data by persons who are unable to speak and unable to make use of sign language or other conventional communicating techniques. A cabinet has arrays of indicator lamps and has acoustical devices together with circuit means connectable with switches which are operated by movement of some portion of the person's body to energize selected lamps, combinations thereof, or the acoustical devices. In one mode of operation, repeated actuations of one switch lights successive lamps in a first row while another switch similarly controls a second row. In another operational mode, one switch selects a particular row of lamps while another switch selects a particular lamp in the selected row. Preferably more than one actuation of the switches is required to progress from one lamp to the next or from one row of lamps to the next row to reduce errors from involuntary movements.

5 Claims, 4 Drawing Figures







COMMUNICATIONS APPARATUS FOR NON-VERBAL HANDICAPPED PERSONS

BACKGROUND OF THE INVENTION

This invention relates to apparatus for facilitating communication by persons who are unable to speak.

Some persons who are unable to verbalize data because of physiological handicaps, injury or other causes may also be unable to make adequate use of alternative means of expression such as writing or sign language. In cases of extensive paralysis, muscular dysfunction, and the like the individual may be unable to execute the necessary hand movements needed for writing or sign language.

Non-verbal individuals who cannot use these other techniques of expression are subjected to extreme mental stress in addition to the physical hardships which such a condition imposes. The individual may not only be unable to communicate basic needs and conditions such as thirst, hunger or pain, but also it is widely recognized that communication with other persons is important to the psychological well-being of most humans. In part because of communication difficulties, there is a regrettable tendency to give such persons only minimum custodial care. Such persons have sometimes been treated as being beyond integration into normal human activities thereby adding to the physical and mental distress accompanying such handicaps.

Very often, such persons retain some degree of voluntary control of one or more particular muscles. Such muscle movement has been used to enable the individual to express needs or answer questions. At best, expression of anything other than very simple information is slow and subject to considerable error of interpretation on the part of the observer.

Attempts have heretofore been made to make use of an electrical switch positioned where it may be operated by the handicapped person with some part of his anatomy over which he has at least a degree of control. Typically, such devices enable him to operate an indicator lamp or bell or the like. Heretofore, such systems have been undesirably limited with respect to the speed of data expression, complexity of expressed data and susceptibility to error.

One pronounced problem is that very often the handicapped person may have highly imperfect control over the muscular movement which is used to operate the switch with the result that the apparent message is not what was intended. The person may, for example, involuntarily operate the switch twice when only one operation was intended. Although he may be aware that an error has been made he may not be able to readily call attention to that fact.

One of the more elaborate prior devices of this general type is provided with a series of indicator lamps visible to the handicapped person and which are sequentially lighted by a timing circuit. In theory, the handicapped person may stop the cycling of lamps at any particular selected lamp by operating his switch at the appropriate time. This is less satisfactory than it might seem to be from the point of view of a non-handicapped person as it depends upon good timing of a particular muscular movement. Many handicapped persons lack good control of timing of the necessary movement and thus errors, not necessarily apparent to the interpreter, can be frequent. Severe anxiety can be experienced by the handicapped person attempting to

operate such a time dependent system. Prior systems of this general kind are subject to still other difficulties which may not be immediately apparent to a non-handicapped person.

Little, if anything, has been done to enable such persons to communicate with each other. As such persons are often situated together, in specialized schools for example, effective intercommunication can be very desirable.

Thus, viewed simply as a form of communication system, prior devices and techniques for enabling communication by non-verbal handicapped persons are severely limited with respect to the speed of data transmission and information content capability and are subject to considerable error, the presence of which may not be apparent to the observer. Such systems may be a source of stress and adverse psychological reaction to the person it is intended to serve.

SUMMARY OF THE INVENTION

This invention is an apparatus with which a non-verbal handicapped person may express data relatively rapidly, conveniently, in relative comfort and in which the possibility of error is greatly reduced. By actuating an electrical switch, the person may successively energize individual ones of an array of indicator devices such as lamps.

Preferably at least two switches are provided for actuation by opposite movements of some controllable portion of the person's body to enable relatively complex expressions of information to be expressed quickly. For example, one switch may be used to select a particular row of indicators while the other switch is used to select a particular indicator in that row. In an alternate mode of operation, each switch selects a particular indicator in a separate row so that appropriate combinations of predetermined data may be indicated simultaneously. A plurality of sets of control switches may be provided to enable two handicapped persons to communicate with each other.

To reduce error from involuntary movements, the circuit is preferably arranged so that more than one actuation of a switch is required to change the condition of the array of indicators. If, for example, two successive actuations of a switch are required in order to de-energize one indicator and energize the next, an involuntary actuation does not disrupt the data expression.

Also, in the preferred form, the indicators are mounted on a compact portable cabinet which provides storage space for the actuating switches and connector cables and means are provided for operating the single unit in any selected one of a plurality of the above discussed modes of operation. In the preferred form, both visual indicators and sound-emitting devices are provided.

Accordingly, it is an object of this invention to facilitate the expression of information by non-verbal persons who are unable to write or utilize sign language or other customary means of communication.

It is another object of the invention to provide apparatus of the kind discussed above which provides a handicapped person with a more positive and reliable control over an array of data indicator means and which provides for a more rapid expression of data.

The invention together with further objects and advantages thereof will be better understood by reference

to the following description of a preferred embodiment taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a perspective view of a communications apparatus embodying the invention,

FIG. 2 is a plan section view of the cabinet portion of the apparatus of FIG. 1 taken along line 2—2 thereof,

FIG. 3 is a view of the cabinet means of FIG. 1 taken from an opposite direction and showing an additional array of indicator lamps thereon in differing arrangement from the array of indicator lamps appearing in FIG. 1 to provide for two alternate modes of data expression, and

FIG. 4 is a schematic diagram of the electrical circuit of the apparatus of FIGS. 1 to 3.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring initially to FIGS. 1 and 2 in conjunction, the communication system 11 includes a cabinet 12 of suitable size to be readily portable. Cabinet 12 may be formed by side panels 13 and 14, a base panel 16, front face board 17 and a back face board 18 shown in FIG. 3. A handle 19 may be provided on top panel 21 to facilitate carrying of the apparatus.

As shown in FIG. 2 in particular, a front inner wall 22 is situated a small distance inward from board 16 and a back inner wall 23 is similarly situated inward from board 18, frame members 24 being provided to which the above described elements of the cabinet 11 are secured. A transverse partition 26 extends between the inner walls 22 and 23 in parallel relationship to side panels 13 and 14.

Partition 26 divides the interior region of the cabinet into a circuit component compartment 27, adjacent side panel 13, and a storage compartment 28 adjacent side panel 14. To provide access to the storage compartment, side panel 14 is provided with a door 29 attached thereto by hinges 31 and which may be held closed by a releasable latch 32.

To enable a non-verbal handicapped person 33 to express data, a first array of indicator lamps 34A are mounted on front face board 17 in a plurality of rows and columns. The number of lamps 34A in each row and the number of rows may be varied according to the complexity of the data which is to be expressed as will hereinafter be discussed in more detail. In the present example, three rows are provided with five indicator lamps 34A in each row. Usually it is desirable that the lamps 34A be widely spaced apart both horizontally and vertically so that a symbol indicative of data to be expressed, which may range from letters or numbers to pictorial drawings indicative of needs such as a picture of a glass of water, may be attached to the front face board 17 adjacent each lamp 34. As will hereinafter be described in more detail in connection with the electrical circuit of the invention, the array of lamps 34A on front board 17 is arranged so that the handicapped person 33 may select a specific lamp in a specific row for energization by repeated movements of some portion of his body.

While the communications apparatus 11 may be provided with the single array of indicator lamps 34A de-

scribed above, versatility of the instrument may be greatly enhanced by providing for a second mode of operation in which the person 33 may more simply control a first row of indicators with one body movement and a second row of indicators with another body movement. For this purpose, as shown in FIG. 3, the back face board 18 may be provided with a second array of indicator lamps 34B arranged in only two horizontal rows, five such lamps 34B being present in each row in this particular example.

Referring again to Fig. 1, the person 33 controls energization of the lamps 34A or 34B by actuating switch means which in this example includes a pair of normally open manually operable switches 36 and 37 secured to a switch mounting means 38. The form of the switch mounting means 38 may be varied to accommodate to the physical capabilities of the handicapped person 33 and in this example is of a form adapted for use by persons who can exercise control over sideward movement of their head. For this purpose, the mounting means 38 may have a bracket portion 39 with a slot 41 which may be fitted onto the back of a wheel chair 42 immediately behind the person's head and which is provided with a suitable releasable clamping means 43 for rigidly securing the bracket portion to the chair. The switches 36 and 37 are secured to arms 44 and 46 respectively which extend forwardly from the bracket portion 39 along each side of the person's head in order to position the switches where one may be actuated by a leftward movement of the person's head and the other may be actuated by a rightward movement of the head.

To transmit switch actuation signals from switches 36 and 37 to the cabinet 12, a flexible electrical cable 47 has one end disengageably coupled to a connector 48 in mounting means bracket portion 39 and the other end is disengageably received in a connector 49 at a control plate 51 mounted in side panel 13. Other components mounted at the surface of control plate 51, which will be hereinafter discussed in more detail in connection with the electrical circuit, include a second cable connector 52 for enabling use of the apparatus 11 for intercommunication by two handicapped individuals, two additional cable connectors 55 and 55' for operating acoustical devices to be described, an on/off switch 53, a protective fuse 54, an operational mode selector switch 56 and a disengageable power cord 57 for connection to a utility alternating current outlet.

The above described components of the communications apparatus 11 are depicted in FIG. 1 in an arrangement which may be employed while the apparatus is in use. An advantage of the above described construction is that when the communications apparatus 11 is not in use, the switch mounting means 38 and other elements such as cables 47 and 57 may be disposed in the storage compartment 28 of cabinet 12 to facilitate carrying the apparatus and to avoid the risk of damage or loss of such components. If, as in this example, the switch mounting means 38 is larger in some direction than the storage compartment 28, it may be formed with an articulated construction to reduce its size to a form where it may be conveniently received in the compartment. In this example, the arms 44 and 46 are attached to the base portion 39 through hinges 58 which are preferably of the spring biased form to urge the arms toward the operating position but which provide for folding the arms back against bracket portion 39 when the mount-

ing means is to be stored in the storage compartment of the cabinet.

Considering now a suitable electrical circuit for enabling control of the indicator lamps 34A and 34B by actuations of the switch 36 and 37, reference should be made to FIG. 4.

As previously discussed, electrical power for operation of the communications apparatus may be obtained from a standard AC utility power source by connecting the power cord 57 therewith through an available wall outlet. The power conductors of the cord 57 in this example are connected with the primary winding of a step-down transformer 59 through the on/off switch 53. Transformer 59 reduces the voltage which is typically 115 volts in the United States to a lower value and the secondary windings of the transformer are connected to a rectifier 61 so that a DC voltage difference, which may typically be 28 volts, is provided between the positive and negative output terminals 62, and 63, respectively, of the rectifier. Power cord 57 is preferably of the form having a ground conductor 60 for maintaining a circuit ground midway between the positive and negative voltages of rectifier terminals 62 and 63. Positive terminal 62 is connected, through the fuse 54, to the operational mode switch 56 which is a slide switch in this example.

Mode switch 56 may be manually shifted from an open position to a first position at which positive power is transmitted to a terminal 64 connected with one side of all of the indicator lamps 34A on front face board 17 and may be manually shifted to a third position at which positive power is supplied to a terminal 66 connected to one side of all lamps 34B on back face board 18. Thus the mode switch 56 provides for selecting either lamps 34A or lamps 34B for use at a particular time. At either of the active settings of the mode switch 56, the handicapped person may determine the particular lamp 34A or combination of lamps 34B which is actually energized by actuating the switches 36 and 37 as will now be described.

Selection of particular ones of the indicator lamps 34A or 34B for energization is provided for by a first stepping relay 67 and a second stepping relay 68 both of which may be of known construction. Stepping relay 67 is of the form having four active bank levels 69A, 69B, 69C and 69D having output terminals 71A, 71B, 71C and 71D respectively and each of which has a rotatable wiper 72A, 72B, 72C and 72D respectively. Each bank level 69 has eleven of the output terminals 71 in this example. The wiper 72 at each bank level 69 progresses, in steps, from contact with a particular one of the output contacts 71 at that bank level into contact with the next of the output contacts 71 at that bank level in response to each successive energization of a stepping solenoid 73. Typically such a stepping solenoid may have a spring biased armature 74 which retracts into the solenoid during each energization and turns a ratchet wheel 76 which in turn rotates the wipers 72 of each bank level 69 one step, suitable detailed mechanical constructions for such stepping relays being well known to the art.

The other stepping relay 68 has two active bank levels 77A and 77B each having eleven output terminals 78A and 78B respectively and each having a rotatable wiper 79A and 79B respectively. Wipers 79 of both banks levels of stepping relay 68 advance from contact with one of the associated output terminals 78 to the

next thereof, in response to each energization of a second stepping solenoid 81 having an armature 82 operating a ratchet wheel 83 in a manner similar to the corresponding elements of stepping solenoid 67.

Negative terminals 84 of both stepping solenoids 73 and 81 are connected to the negative terminal 63 of rectifier 61. The positive terminal 86 of stepping solenoid 73 is connected to one side of switch 37 through the connector 49 and cable 47 with the other side of switch 37 being connected to a positive power conductor 85 through connector 49. Conductor 85 is energized through mode switch 56 at both of the first and second positions thereof. Thus, closing of switch 37 energizes stepping solenoid 73 causing the wipers 72 at all bank levels of stepping relay 67 to advance one step. Similarly, the positive terminal 87 of stepping solenoid 81 is connected to one side of switch 36 through connector 49 and cable 47 with the other side of switch 36 being connected to positive power conductor 85 through the cable 47 and connector 49. Thus, actuation of switch 36 energizes stepping solenoid 81 to advance the wipers 79 of both bank levels of stepping relay 68 one step.

Considering now the further connections necessary to control operation of the lamps 34A of front board 17, the movable wiper 79A of bank level 77A of stepping relay 68 is connected to negative terminal 63 of rectifier 61. Four adjacent ones of the output terminals 78A of this bank level of stepping relay 68 are jointly connected to the wiper 72A of bank level 69A of stepping relay 67. The next group of four output terminals 78A are connected to the wiper 72B while the final group of three output terminals 78A are connected to the wiper 72C.

Thus, at any given time, only one of the wipers 72A, 72B and 72C of stepping relay 67 is energized and, by repeated actuations of switch 36, wiper 79A may be stepped to select a particular one of the wipers 72A, 72B and 72C for energization. A first group of successive output terminals 71A at bank level 69A, comprised of three output terminals in this example, are connected to the first lamp in the top row of lamps 34A at front board 17. Successive pairs of the output terminals 71A of bank level 69A are connected to successive ones of the lamps 34A of the top row. Similar output connections are provided between bank level 69B and the second row of lamps 34A on board 17 and also between the output terminals 71C of bank level 69C and the bottom row of lamps 34A on board 17.

Accordingly by repeated actuations of switch 36 the handicapped person may step wiper 79A to energize a particular selected one of the bank levels 69A, 69B or 69C thereby in effect selecting either the top, middle or bottom row of lamps on board 17. By repeated actuations of the other switch 37 the person may step the wiper 72 controlling that selected row of lamps to complete a circuit to an individual selected one of the lamps 34A in that row. It should be observed that progression from energization of one particular lamp 34A to energization of another and distant one thereof is greatly expedited in that it is not generally necessary to progress sequentially row by row through all intervening ones of the lamps 34A. In other words, by operating switch 37 the handicapped person may select a particular row of lamps and by operating switch 36 the person may select a particular vertical column of lamps and

the particular lamp at the intersection of that row and column will then be energized.

Considering now the connections necessary for operation in the second mode utilizing the lamps 34 B array on backboard 18, this alternate operational mode is initiated by shifting mode switch 56 to energize terminal 66.

Wiper 72D of stepping relay 67 and wiper 79B of stepping relay 68 are both connected to negative terminal 63 of rectifier 61. A first group of three adjacent output terminals 71D of bank level 69D are jointly connected to the first lamp 34B in the top row of such lamps on board 18 and successive adjacent pairs of the output terminals 71D are each connected to successive individual ones of the lamps 34B of the top row. Similarly, a first group of three of the output terminals 78B of bank level 77B are connected to the first lamp 34B in the bottom row thereof on board 18 and successive adjacent pairs of the output terminals 78B are connected to successive individual ones of the lamps in the bottom row.

Accordingly, by repeated actuations of switch 37, the handicapped person may light successive ones of the lamps 34B in the top row thereof on board 18 and by repeated actuations of switch 36 the person may light successive ones of the lamps 34B in the bottom row thereof on board 18.

With respect to both modes of operation, it may be observed that when repeated switch actuations have progressed all the way through a particular row of lamps, then subsequent switch actuations reenergize the initial one of the lamps in that row.

The information which the handicapped person may express by selectively energizing a particular lamp 34A or 34B may take a wide variety of forms and in most cases a symbol or picture will be affixed to the face boards 17 or 18 adjacent each lamp to indicate to both the handicapped person and to the observer the meaning of energization of that particular lamp. The symbols may take the form of words or phrases which the handicapped person might wish to express or in the case of small children or persons with impaired mental abilities may take the form of simple pictorial symbols which such a person is capable of recognizing such as for example a picture of a glass of water or of food or other recognizable symbols indicative of personal needs. If additional lamps 34 are provided, utilizing the techniques of this example, each lamp may correspond to a particular letter of the alphabet and/or the numerical digits so that complex messages may be spelled out or numerical quantities may be expressed. Thus the apparatus has value simply as a means for enabling the non-verbal handicapped person to express fundamental personal needs and may also be used for the expression of complicated statements. The apparatus has been found to be extremely useful for teaching purposes as it enables such a person to answer questions as is generally necessary in teaching procedures. The apparatus has still another highly valuable aspect in that it makes it possible for two non-verbal handicapped persons to communicate with each other. This is the purpose of the previously described additional plug connector 52 on control panel 51 which connector 52 may have terminal connections similar to those of plug connector 49 and is thus effectively in parallel therewith. Plug connector 52 enables an additional cable 47 and set of switches 36 and 37 to be connected into the circuit in

parallel with the first set of such elements and thus it becomes possible for either of two handicapped persons to change the energization of the lamps and thereby express data to each other.

The fact that a plurality of the output terminals 71 and 78 of the several bank levels of both stepping relays are connected together, there being at least two output terminals connected to each individual lamp at each bank level 69A, 69B, 69D and 77D and at least three output terminals connected together at bank level 77A, has a very desirable effect where the handicapped person may have impaired control over the muscle which he is using to operate the switches 35 and 37. The practical effect is that more than one actuation of a switch 36 or 37 is always necessary to change the condition of the lamps. Thus, in this example, a single involuntary movement does not result in an error of data expression. If the person is severely handicapped in this respect, it will be apparent that stepping relays having still a larger number of output contacts may be employed with a greater number than two actuations being required to progress from one lamp condition to another. (The fact that each bank level in this particular example has a greater number of output contacts connected to one lamp than are connected to each of the other lamps in the same row is not significant and results only from the fact that the initial unit of the invention was constructed with available stepping relays which had eleven output terminals, which number is not evenly divisible by the number of lamps in each row.)

Adaptability of the apparatus to a variety of uses and to persons suffering from a variety of different types of handicaps may be enhanced by providing audible signaling means in addition to the indicator lamp arrays 34A and 34B. Such means enable the handicapped person to summon aid at times when no one may be observing the indicator lamps. In addition, by employing codes, the person may communicate more complex messages to others who cannot observe the lamps including transmitting messages by telephone, radio or the like.

It is generally recognized that transmitting of messages by audible signals is facilitated if at least two different signals are employed. The well known Morse code used in telegraphy takes advantage of this principle. However, where such a signaling system is to be used by persons with impaired muscular control, a system which relies on duration of a single sound to distinguish two different signals may be unsatisfactory. It is preferable that the two signals be distinguishable on some basis other than timing.

For this purpose, a bell 88 and buzzer 89, which emit distinctly different sounds, are provided in this example of the invention. Bell 88 is connected between negative terminal 63 of rectifier 61 and one terminal of the previously described plug connector 55. Similarly, buzzer 89 is connected between terminal 63 and another terminal of connector 55. The third terminal of connector 55 is connected to the positive terminal 62 of rectifier 61 through fuse 54.

Accordingly, by coupling normally open switches 36' and 37' to connector 55, the handicapped person may selectively actuate bell 88 and buzzer 89 in a manner similar to that hereinbefore described with reference to actuation of the indicator lamps. The switches 36' and 37', here shown as a duplicate of the previously de-

scribed switches 36 and 37, may if desired, be the identical switch unit. That is, the switch unit 36 and 37 including cable 47 may be disconnected from connector 49 and be coupled to connector 55 when it is desired to use the audible signaling means rather than the indicator lamps. However, the use of two sets of switches enables both the visual and audible systems to be used simultaneously.

To enable two handicapped persons to communicate with each other by audible signals and to enable an instructor to operate the bell and buzzer for such purposes as teaching the code to the handicapped person, the additional plug connector 55 is provided. Connector 55' has electrical connections similar to those of connector 55 so that by coupling a second set of switches 36' and 37' thereto, the bell and buzzer may be operated by either of two persons.

It will be apparent to those skilled in the art that variations of the circuit and mechanical structure are possible to accommodate to different particular types of handicapped persons and particular types of data to be expressed. Indicator lamps 34, for example, may be replaced with electrically operated acoustical devices emitting sounds of different pitch for use by blind persons. Similarly, the switching functions performed by the stepping relays 67 and 68 may be accomplished with solid-state circuit elements. Similarly, the apparatus may readily be adapted for operation from self-contained batteries rather than relying on an external source of utility alternating current.

Thus, while the invention has been described with respect to a particular example, many modifications are possible and it is not intended to limit the invention except as defined in the following claims.

What is claimed is:

1. Apparatus for facilitating communication by nonverbal handicapped persons comprising:

- a plurality of electrically energizable indicators,
- a first manually operable switch having means for actuation by muscular movement of said handicapped person,
- a second manually operable switch having means for actuation by a muscular movement of said person,

circuit means connected between said manually operable switches and said plurality of indicators for energizing successive ones of said indicators in response to repeated actuations of said manually operable switches, wherein said circuit means has means for energizing successive ones of a first group of said indicators in response to repeated actuations of said first switch and means for energizing successive ones of a second group of said indicators in response to repeated actuations of said second switch, and

support means having said first and second switches secured thereto in spaced apart relation whereby said first and second switches may be selectively actuated by said person by opposite movements of the same portion of said person's anatomy and having clamp means for attachment to stationary structure adjacent said person.

2. The combination defined in claim 1 wherein said switch counting means includes means for situating said first and second switches in spaced apart relationship on opposite sides of said person's head whereby

said first and second switches may be selectively actuated by opposite movements of said person's head.

3. Apparatus for facilitating communication by nonverbal handicapped persons comprising:

- a cabinet having first and second compartments therein and having first and second exterior wall surfaces,

an electrical connector mounted on said cabinet, a plurality of electrically energizable indicator lamps disposed in spaced apart relationship on said wall surfaces of said cabinet wherein a first group of said lamps are disposed on a first of said wall surfaces of said cabinet in a plurality of rows thereof and a second group of said indicator lamps are disposed on said second surface of said cabinet in at least two rows thereof,

first and second manually operable switches, switch mounting means for supporting said first and second switches in spaced apart relationship for actuation by movement of a portion of said person's body,

conductor means for selectively connecting said first and second switches to said electrical connector of said cabinet, said conductor means and said first and second switches and mounting means being storable in said second compartment of said cabinet when said conductor means is disengaged from said connector,

circuit means situated in said first compartment of said cabinet and connected between said electrical connector and said indicator lamps and having means for energizing predetermined successive ones of said lamps in response to repeated actuations of said first switch and for energizing other predetermined successive ones of said lamps in response to repeated actuations of said second switch,

wherein said circuit means comprises:

- a mode switch movable to a first mode position and movable to a second mode position,

means for causing repeated actuations of said first switch to partially complete an energizing circuit to successive ones of said rows of lamps of said first group thereof in response to repeated actuations of said first switch when said mode switch is in said first mode position,

means for completing the energizing circuit to an individual one of said lamps in the partially energized row of said first group thereof in response to repeated actuations of said second switch when said mode switch is in said first mode position thereof, and

means for completing an energizing circuit to successive individual ones of said first row of lamps of said second group thereof in response to repeated actuations of said first switch when said mode switch is in said second mode position thereof and for completing an energizing circuit to successive individual ones of said lamps of the second row of said second group in response to repeated actuations of said second switch when said mode switch is in said second mode position thereof.

4. The combination defined in claim 3 wherein said circuit means further comprising:

- an electrical power source having first and second terminals, each of said indicator lamps of said first

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group having first terminals connectable to a first of said conductors by operation of said mode switch to said first mode position thereof and each of said lamps of said second group have first terminals connectable to said first conductor by operation of said mode switch to said second mode position thereof, 5

first stepping relay means having a plurality of bank levels wherein predetermined successive sets of contacts of each bank level are connected to individual ones of said lamps of individual rows of said first group thereof and wherein one of said bank levels has successive sets of contacts connected to second terminals of individual lamps of a first row of said second group thereof and wherein said first stepping relay has a movable contact connectable with successive ones of said output contacts in response to successive steppings of said stepping relay, 10 15

means for stepping said first stepping relay means in response to successive actuations of said first manually operable switch, 20

a second stepping relay means having at least a pair of bank levels of output contacts, a first of said bank levels of said second stepping relay means 25

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having successive sets of contacts connected to second terminals of successive individual ones of said lamps of said second row of said second group thereof, and a second of said bank levels of said second stepping relay means having successive sets of output contacts connected to individual ones of said movable contacts of said bank levels of said first stepping relay means, each of said bank levels of said second stepping relay means having movable contacts connected to the second of said power source terminals, and

means for stepping said second stepping relay means to successive positions thereof in response to successive actuations of said second manually operable switch.

5. The combination defined in claim 4 wherein each of said sets of output contacts of each of said bank levels of each of said stepping relay means comprise a plurality of adjacent output contacts whereby a plurality of actuations of one of said first and second switches are required to effect a change in the energization of said lamps.

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