

## CLUSTER KEY ARRANGEMENT

### BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a cluster key arrangement which provides a user with the ability to select one of a plurality of key elements representing numbers, letters, symbols, functions, etc., in a mutually exclusive manner.

[0003] 2. Description of the Related Art

[0004] The touch-tone dial system has become the standard dialing system for conventional telephones, largely replacing the older rotary dial. The standard touch-tone dials have push-buttons arranged in a rectangular matrix pattern. Each button activates a switch to energize a tone generator of unique frequency. In addition, the push-buttons are arranged to activate a common switch for disconnecting the transmitter while a tone generator is operating.

[0005] Use of a telephone keypad with a telephone keypad matrix as a data terminal for the input of alphanumeric characters into a computer system, using or via a telephone line which further in turn forwards the message from the terminal to a service provider computer, such as a paging system, facsimile device, e-mail and/or voice mail system, or Personal Digital Assistants (PDAs) which have the ability to store schedules, memos, etc., and further have the ability to upload and download information from a base computer which are operated on an on-board battery with an operating life of many days for a monochrome display, and an operating life of on the order of six hours for displays with color capability which are increasingly desirable for clarity and user friendliness, and cellular phones with desirable code division multiple access (CDMA) technology which provides for better voice quality and security having only about two to three hours of CDMA talk time are some of the trends in this area.

[0006] The most obvious form of elementary clustering is noticed in the standard 102 or 104 key personal computer keyboards in the grouping of the directional arrows. Other than copying this ideal on some cellular telephone models, this has not resulted in any clustering of other keys either in patents or in commercially available products. Thus, what is being proposed here is not a mere extension of the preceding, which would be obvious to those skilled in the art. Rather, what is being proposed here derives from an identification of the deficiencies of the prior art and an invention that overcomes those deficiencies.

[0007] It is worthwhile to review contradictions between standards that have come about due to their divergent origins but nonetheless find themselves in a convergent path due to emergence of technology driven changes. The most obvious example is the "789" arrangement of the calculator industry and the "123" arrangement of the pushbutton telephone. The horizontal "1234567890" derived from the "QWERTY" typewriter keyboard forms the backbone of computer data entry with the "789" calculator still present on the right handy side as a rarely used vestigial organ. Most of the numerical entries are done on the QWERTY side. Other non-QWERTY approaches, although better in concept have not really taken off. The preceding is mentioned also to reinforce that certain consumer "corporate memory" driven

preferences will prevail as in QWERTY and in other cases the "123" of the telephone has clearly become more dominant instead of the "789" of the calculator. However, the same, "123"'s additional alphabet assignments, upon "force fitting" them for additional uses such as for paging and e-mails have not been user friendly.

[0008] Most cell phones serve the purpose of audio(voice) interaction and are often used in unsafe but widely prevalent "while driving in an automobile mode". Typically numbers are punched in or a received call is answered by pressing a button most often with the thumb. Thus, user friendliness based on ergonomic features is a must. Thus, making the individual number buttons as large as possible is a must. In reality all products in the market have seen a trend toward miniaturization of the keycap size, driven by factors such as: (1) relentless downsizing in width (Ericsson KH668 is 1 $\frac{3}{4}$ " for example contrasted with Nokia 2190 at 2 $\frac{1}{4}$ " and Casio's CP-850 cordless telephone is 2 $\frac{1}{4}$ "). Product sleekness can still be achieved by better utilization of the space available; (2) "Real Estate" requirements for the liquid crystal display and the control keys have made the keypad size shrink further in the top vertical direction, typically being 1 $\frac{1}{2}$ " for the primary keys (1, 2, 3, 4, 5, 6, 7, 8, 9, 0, \*, and #). In most cell phones, the control keys comprising ON/OFF and NO/END are in one button (in Ericsson KH668), the SEND or YES (to answer an incoming call) is a second button, a CLEAR button along with two forward and backward arrows make up five keys. An additional switch may be located on the side surface. Conceptually, the prior art deficiency stems from on the one hand mindless and unimaginative miniaturization of the human interface in attempting to keep up with electronic miniaturization and assuming wrongly that all the control keys need to be associated with the display and consequently are better positioned at the top in one separate row which happens to take up the most space. In actuality, the two largest keys (ON/OFF and NO/END) and (SEND/YES) have more functional association with the primary function of the telephone without a display. The minimal set of keys for the display are three, i.e. CLEAR, and two arrow keys. The related art is represented by the following patents of interest.

[0009] U.S. Design Pat. No. 397,694, issued on Sep. 1, 1998 to Nicholas Mischenko et al., shows an ornamental design for a faceplate having a keypad cover for a portable telephone. Mischenko et al. do not suggest a cluster key arrangement according to the claimed invention.

[0010] U.S. Pat. No. 4,370,528, issued on Jan. 25, 1983 to a Louis F. Aschenbach, describes a miniature sealed toggle switch. Aschenbach does not suggest a cluster key arrangement according to the claimed invention.

[0011] U.S. Pat. No. 4,418,247, issued on Nov. 29, 1983 to Kaj B. Hansen, describes an electrodynamic transducer which has an additionally improved sensitivity and can be produced almost completely automatically. Hansen does not suggest a cluster key arrangement according to the claimed invention.

[0012] U.S. Pat. No. 4,439,647, issued on Mar. 27, 1984 to Nick Calandrello, describes a capacitive keyboard which uses a standard printed circuit board provided in various locations with spaced conductor pairs. Calandrello does not suggest a cluster key arrangement according to the claimed invention.