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COMBINED WRITING DEVICE AND COMPUTER INPUT

Filed May 13, 1965

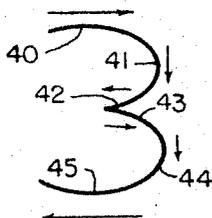
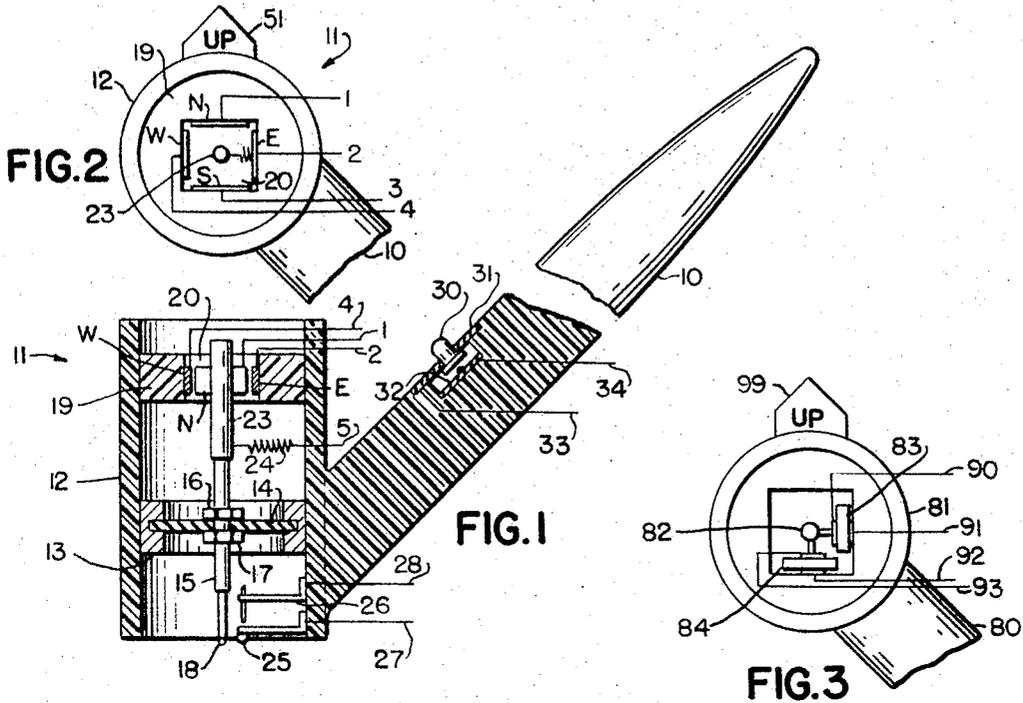


FIG. 4

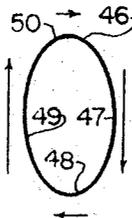


FIG. 5

FIG. 8

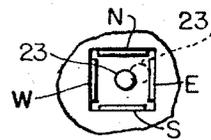
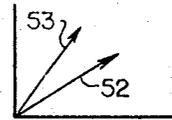


FIG. 9

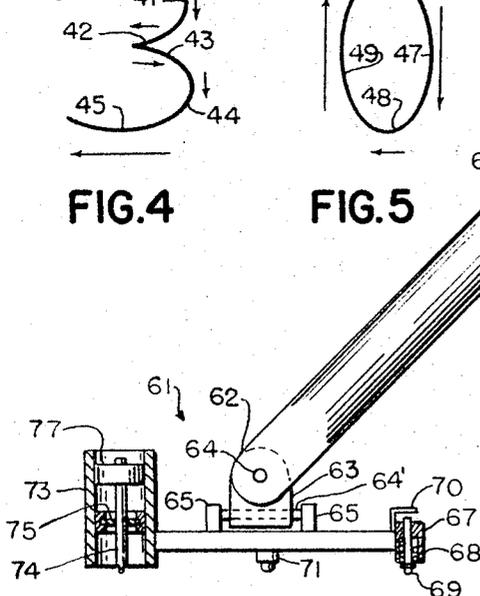


FIG. 6

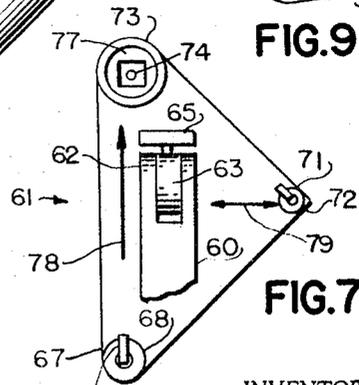


FIG. 7

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ABSTRACT OF THE DISCLOSURE

A hand held writing instrument and computer input provides signals intelligible to a computer when a conventional character is written on a surface, the writing instrument having a writing head containing a resiliently mounted writing element, analog transducer elements connected at right angles with the writing element generating signals according to the motion of said writing element within said writing head, and means ensuring that said writing element is held substantially normal to the surface written upon.

This invention relates in general to devices which feed information to computers and, more particularly, to a writing tool which may be used to write conventional alphabetical and numerical symbols on paper while generating signals corresponding to the numerals or letters written which are intelligible to a computer or which may be directly processed by a computer.

Faster and faster card readers, printers, and tape drives have been developed to match the vastly increased internal processing speeds of modern digital and analog computers. In contrast, direct man-machine communication still lags far behind machine-machine data exchange. Further, either expensive keyboard devices or specialized training on the part of an operator is often required to feed even simple information to a computer or business machine. In computer applications such as those involved in computer tabulation and regulation of inventory control, computer regulation and control of ticket sales in the transportation industry, computer control and regulation of hotel reservation systems, and the like, there are usually many input stations which should feed information to a central computer for processing. Untrained personnel such as warehousemen, ticket agents, hotel clerks, and the like should have at their disposal suitable computer input devices which they can use without special training.

It is, therefore, a main object of this invention to provide an inexpensive writing instrument which can be used with no training in a conventional manner to write numerical or alphabetical characters which are intelligible to the writer and, at the same time, the writing of these characters makes contacts which generate signals which may be fed directly into a computer.

Another object of this invention is to provide a particularly inexpensive computer input which may be used by unskilled persons without special training.

A further object of this invention is to provide a writing instrument having a writing element which is mounted in the writing instrument and connected to signal generating devices which sense the direction of motion of the writing instrument in relation to material being written upon.

Still another object of this invention is to provide a writing instrument containing a resiliently mounted writing element therein, relative motion in a given direction of the writing instrument to a surface being written upon

moving the writing element within the instrument to close a particular contact.

An additional object of this invention is to provide a writing instrument having a writing element mounted therein connected to crystal pickups disposed substantially at right angles to each other to generate signals according to the direction of motion of the writing instrument over a paper.

Many other objects, advantages and features of invention reside in the particular construction, combination and arrangement of parts involved in the embodiments of my invention and its practice otherwise as will be understood from the following description and accompanying drawing wherein:

FIGURE 1 is a side view of a first embodiment of the writing instrument of my invention with a central portion of the handle broken away and with the lower portion of the handle and the writing head shown broken away in longitudinal, vertical section;

FIGURE 2 is a top view of the writing head shown in FIGURE 1;

FIGURE 3 is a top view of a writing head formed according to a second embodiment of my invention;

FIGURES 4 and 5 show the numerical characters three and zero, respectively, with arrows placed along the characters indicating intervals when desired signals are generated within the writing instrument during the conventional hand writing of these characters;

FIGURE 6 is a side view of a modification of the mounting of the writing head of this invention with the end of the handle broken away and with writing head and paper contact switch shown broken away in vertical section;

FIGURE 7 is a top view of the writing instrument shown in FIGURE 6 with the handle broken away;

FIGURE 8 is a graph showing direction of motion of the writing instrument during the drawing of two different lines; and

FIGURE 9 is a top view of a fragment of the writing head of the first embodiment of this invention showing the writing instrument contact element positioned before the writing head is placed on a writing surface and showing, in dotted lines, the position of the writing element contact portion when a line is being made in a given direction.

Referring to the drawing in detail, the first embodiment of my invention has a conventional handle 10 which may be suitably scaled and suitably shaped to accommodate the hand of a user as is the barrel of a pen or other writing instrument. Fixed to or integrally formed with the lower end of handle 10 is a cylindrical writing head 11. Writing head 11, if desired, may have its cylindrical portion 12 formed from transparent plastic so that a user may more easily see characters as he writes them. A mounting ring 13 is pressed, glued, or otherwise secured near the lower end of the cylindrical portion 12. Mounting ring 13 has a resilient and elastic diaphragm 14 crimped or otherwise secured to stretch across it. A writing element 15, which may be a ball point pen, a pencil, or the like, transfixes diaphragm 14 and is secured thereto by means of two nuts 16 and 17 which are turned toward each other about the writing element 15. The nuts 16 and 17 secure the writing element 15 so that its writing tip 18 extends slightly below the bottom of the cylindrical portion 12.

An insulating contact mount 19 is glued or otherwise fitted in the upper end of the cylindrical portion 12. Four contacts, designated by the letters N, E, S, and W, are made of a suitable metal and fixed within a square aperture 20 in mount 19. Electrical leads 1, 2, 3 and 4 are connected to the contacts N, E, S, and W, respectively.

A lead 5 extends to a contact portion 23, which is of a suitable conducting metal, of the writing element 15. Lead 5 has a coiled portion 24 which allows free movement of the writing instrument 15.

The switch elements 25 and 26 are connected to leads 27 and 28. When the writing instrument of my invention is placed on a writing surface, switch element 25 is deflected upwards to make contact with element 26 to indicate the fact that the writing instrument is in writing position. The flexible element 25 extends close to the writing tip 18 so that it may send an accurate "on paper" signal.

A finger manipulated switch button 30 may be placed in handle 10 to be manipulated by a finger of a user of this device. When button 30 is depressed, it closes a contact between the plates 31 and 32 which are connected to the leads 33 and 34. Button 30 may be depressed to send a signal during the writing of each character to convey this information to a computer.

The first embodiment of my invention, as shown in FIGURES 1 and 2, may be used and operates in the following manner. Handle 10 is grasped by a user as is the handle of any writing instrument. The bottom of writing head 11 is placed on a paper and a numerical or alphabetical character is written in the usual manner while button 30 is depressed.

A button 30 may be used to indicate upper or lower case letters, it may be depressed twice in succession to indicate a space between words being written, it may be used to transmit information as to whether the letter "O" or the numeral zero is being written, and it may be used to transmit other vital information. The positioning of one or more buttons 30 on handle 10 enables such information to be most easily and effectively transmitted from a hand held writing instrument and computer input.

When writing head 11 is placed on a paper or other writing surface, switch 25 indicates that the writing head 11 is on the writing surface in a level position. If writing head 11 could be tilted to have writing element 15 contact a writing surface at an angle, a false signal could be sent as the angle would displace the resiliently mounted writing element 15. Thus the lower edge of cylindrical portion 12 and the central location of switch element 25 therein ensures that writing element 15 is substantially normal to a writing surface.

As shown in FIGURE 4, if a three is written, the upper portion 40 of the character three will require that the writing head 11 be moved, generally, to the right. The movement of writing head to the right will cause writing element 15 to pivot in the elastic diaphragm 14 until contact portion 23 closes a circuit with contact E. Leads 2 and 5 may thus send a signal to a computer (not shown).

As portion 41 of the character three is written, writing head 11 will move downward on the paper so that writing element 15 will further pivot so that its contact 23 will contact element N to allow a second signal to pass through leads 5 and 4. As portions 42, 43, 44 and 45 of the character three are written, contact 23 will successively contact the contacts W, E, S and E.

In a like manner, referring to FIGURE 5, when the character zero is written, element 23 is moved to successively contact the contacts E, S, W, N and E as portions 46, 47, 48, and 49 and 50 are drawn starting from the top of the character. This will send an appropriate sequence of identifiable signals to a computer to signify that the character zero has been written. Thus it may be seen that, when any conventional character is written, a given sequence of contacts will be made which will close circuits so that a computer, suitably programmed, can identify the characters written.

Since the contacts N, E, S and W must be oriented with respect to the writing of the characters, an orientation indicator, such as the arrow 51, may be mounted on

the writing head 11. Further, the actual motion of the writing element 15 within the writing head 11 may be very small compared to the possible motion shown in FIGURE 1 to make the desired contacts. The length of the writing element 15 above the diaphragm 14 may amplify motion of the writing tip 18 so that it is hardly noticeable to a user. If the diaphragm 14 is made of a desired stiffness, a considerable deviation from a line extending to the right may be drawn with the contact 23 only contacting the element E. Thus, referring again to FIGURE 4, when the portion 40 of the character three is drawn, the moderate up and down curved motion of the writing head 11 will not close contacts with the elements S and N but only with the element E.

As shown in FIGURES 8 and 9, when a line 52 is drawn, element 23 will move to the position shown in dotted lines at 23'. Element 23 will not slide upward along contact E to touch contact N as line 52 is drawn due to the selection of a diaphragm 14 of sufficient stiffness. However, should the angle of line 52 be varied to that shown at 53 in FIGURE 8, element 23 will slide upward to successively contact element N. Thus the computer using information from the first embodiment of my invention responds to the sequence of successive contacts made while a character is being written.

Here follows the sequence of contacts made when writing the numerical characters 1-9. The asterisk indicates the writing head has been lifted from the writing surface opening the switch elements 25 and 26. The space between the quotation marks indicates that button 30 is being depressed during the writing of a character.

1—"S"
 2—"E, S, W, S, E"
 3—"E, S, W, E, S, W"
 4—"S, E, *, S"
 5—"S, E, S, W, *, E"
 6—"W, S, E, N, W"
 7—"E, S"
 8—"E, S, W, S, E, N, W, N, E"
 9—"W, N, E, S, W"

Here follows the sequence of contacts made when writing the alphabetical characters A-Z in capitals according to a possible practice of this invention.

A—"S, *, S, *, E"
 B—"S, *, E, S, W, E, S, W"
 C—"W, S, E"
 D—"S, *, E, S, W"
 E—"S, *, E, *, E, *, E"
 F—"S, *, E, *, E"
 G—"W, S, E, N, *, E"
 H—"N, *, N, *, E"
 I—"N"
 J—"S, W, N"
 K—"S, *, S, *, S"
 L—"S, E"
 M—"N, S, N, S"
 N—"N, S, N"
 O—"W, S, E, N, W"
 P—"S, *, E, S, W"
 Q—"E, S, W, N, E, *, S"
 R—"S, *, E, S, W, S"
 S—"W, S, E, S, W"
 T—"S, *, E"
 U—"S, E, N"
 V—"S, N"
 W—"S, N, S, N"
 X—"S, *, S"
 Y—"S, *, S, *, S"
 Z—"E, S, E"

It is to be noted that the "I" is written from the bottom to the top to differentiate it from the "1." Also the sides of the "H" are written upward to differentiate the

"H" from the "A." Other than using one set way to write conventional characters, angled or inclined lines such as the sides of the "A" should be drawn within 30 degrees of the vertical so that only contact S will be contacted when they are drawn.

It is also to be understood that these particular characters and the succession of contacts made when they are written are purely exemplary as many other techniques of writing could be used with a different succession of contacts being made. For example, eight contacts could be placed about the element 23 to sense the drawing of inclined lines. It is even possible to devise a system whereby conventional characters may be written to be intelligible to a computer with only three contacts disposed in writing head 11.

Referring now to FIGURES 6 and 7, a modification of the first embodiment of my invention has a handle 60 connected to a triangular writing head support 61 by means of a universal joint 62. Universal joint 62 has an element 63 which pivots about an axle 64 fixed in handle 60. The triangular writing head support 61 is pivotally secured to element 63 by means of the axis 64' and the lugs 65. The axle 64 and 64' are disposed at right angles to each other and they are friction tight so that the triangular writing head support 61 requires a slight force to move it relative to handle 60. This gives a user very good control of the writing head support as he holds the handle 60.

At the lower corner 67 of support 61 there is mounted a writing surface contact switch 68 which has a spring mounted contact 69 and a fixed contact 70. Thus when contact 69 is on a writing surface, it closes a circuit with contact 70. A similar contact switch 71 is mounted at the side corner 72 of the triangular support 61. A cylindrical writing head 73 is disposed at the upper corner of writing head support 61. Writing head 73 contains a writing element 74 mounted through a diaphragm 75 in the manner described for the first embodiment of this invention. If desired, an "on paper switch" (not shown) similar to the contacts 25 and 26 of FIGURE 1 may be provided in the writing head 73. If such a switch is connected in series with the switches 68 and 71, these switches can indicate to a computer when the modification of this invention shown in FIGURES 6 and 7 is properly positioned flat upon a writing surface.

Contacts are mounted in a contact mount 77 in the manner shown for the first embodiment of this invention. The indicating lines 78 and 79 serve to help a user keep the writing instrument properly oriented.

A second embodiment of this invention is shown in FIGURE 3. A handle 80 has a cylindrical writing head 81 fixed to it. A writing element 82 is secured within a resilient diaphragm as in the first embodiment of this invention. Two piezo-electric crystal pickups 83 and 84 are mechanically coupled at right angles to the upper end of the writing element 82. Leads 90 and 91 extend from the pickup 83 and leads 92 and 93 extend from the pickup 84. Pickup 83 will generate a signal when writing head 81 moves right and left on a writing surface and pickup 84 will generate a signal when writing head 81 moves up or down on a writing surface. The mechanical stress placed on the pickups 83 and 84 when writing a character can generate signals intelligible to a computer. If a given minimum threshold signal must be generated to have the computer respond to it, pickup 83 will sense movements which are substantially to the right or left and pickup 84 will sense substantially vertical movements in the same manner as did the contacts N, E, S and W for the first embodiment of my invention.

Further, the writing instrument shown in FIGURE 3 may be used to put freehand graphical information into a computer memory which may be displayed by means of a cathode ray tube.

While I have shown and described my invention is the best forms known to me, it will nevertheless be understood that these are purely exemplary and that modifications may be made without departing from the spirit and scope of the invention except as it may be more limited in the appended claims wherein I claim:

1. A writing instrument and computer input which provides signals intelligible to a computer when a conventional character is written, said writing instrument and computer input comprising, in combination, a writing head containing a writing element resiliently mounted in said writing head to contact a writing surface, means responsive to forces moving said writing element within said writing head when said writing element is moved on a writing surface, said means providing signals intelligible to a computer indicating direction of motion of said writing element within said writing head, a triangular writing head support, said writing head being mounted at one corner of said writing head support, two writing surface contacts disposed at the other corners of said triangular writing head support, a handle, and universal joint means connecting said handle to the center of said triangular writing head support.

2. A hand held writing instrument and computer input which provides signals intelligible to a computer when a conventional character is written, said writing instrument and computer input comprising, in combination, a writing head containing a writing element resiliently mounted in said writing head to contact a writing surface, said writing head having an outer portion within which said writing element is centrally disposed, said outer portion having a lower edge below which said writing element slightly extends to contact a writing surface, means responsive to forces moving said writing element within said writing head when said writing element is moved on a writing surface, said means providing signals intelligible to a computer indicating direction of motion of said writing element within said writing head, a contact actuated switch element slightly below the lower edge of said outer portion adjacent to said writing element and actuated by contact with a writing surface, and a handle fixed to said writing head to be grasped by the hand of a user, said contact actuated switch element on contact with a writing surface indicating the correct positioning of said writing element on the writing surface.

3. The combination according to claim 2 wherein said outer portion of said writing head is of transparent material so that characters may be seen as they are written on a writing surface.

4. The combination according to claim 2 with the addition of finger actuated switch means on said handle actuated by the finger of a user transmitting information concerning characters being written.

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