PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : G06K 11/18 | A2

(11) International Publication Number: **WO 00/63835**

(43) International Publication Date: 26 October 2000 (26.10.00)

(21) International Application Number: PCT/US00/08886

(22) International Filing Date: 3 April 2000 (03.04.00)

(30) Priority Data:
09/295,063 20 April 1999 (20.04.99) US

(71) Applicant: ELECTRONICS FOR IMAGING, INC. [US/US]; 303 Velocity Way, Foster City, CA 94404 (US).

(72) Inventors: WOOD, Robert, P.; 233 Molton Avenue, San Carlos, CA 94070 (US). HAREL, Jacob; 2114–23rd Street, San Francisco, CA 94107 (US). HOU, Alfred, Sampson; Apartment 12C, 180 Riverside Boulevard, New York, NY 10069 (US).

(74) Agents: GLENN, Michael, A. et al.; Law Offices of Michael A. Glenn, 3475 Edison Way, Ste. L., Menlo Park, CA 94025 (US).

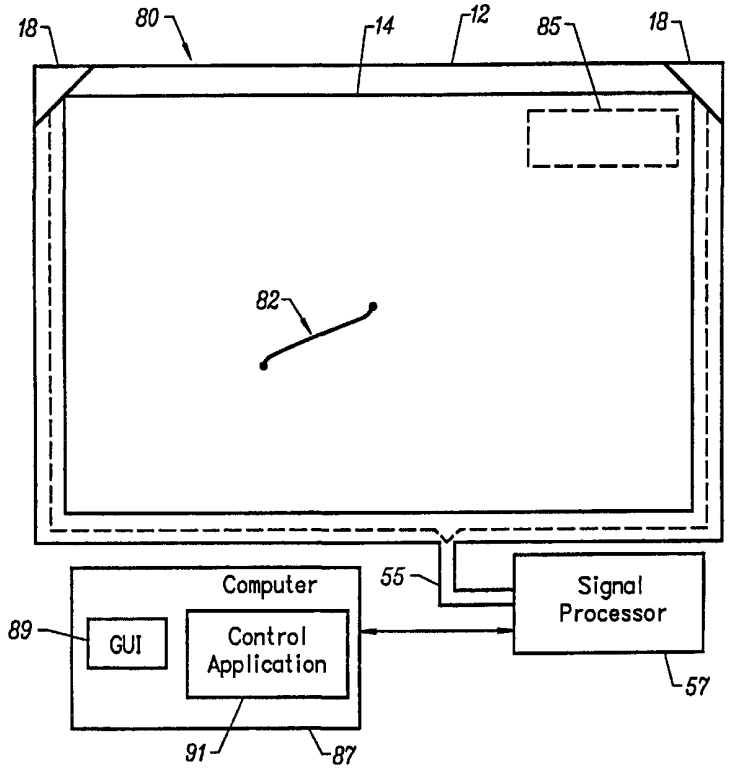
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: PRESSURE SENSITIVE STYLUS

(57) Abstract

A pressure sensitive stylus, for example, as is used in a wireless whiteboard application is provided. The stylus includes a pressure sensitive element in contact with a tip of a stylus. As the pressure on the tip is increased during use of the stylus, a line produced may be broader or narrower, or the device may switch states based on pressure. For example, pressing the stylus to the board twice can turn the stylus into a paintbrush, or an eraser, or can change the color of the line produced by the stylus.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

PRESSURE SENSITIVE STYLUS

FIELD OF THE INVENTION

The invention relates to the field of pressure sensitive devices, and more specifically, to a pressure sensitive stylus.

BACKGROUND OF THE INVENTION

Digitizing pen and whiteboard systems are used for a variety of electronic applications. These systems typically include a whiteboard, a position indicating pen, and associated electronics for determining the interaction between the whiteboard and the position indicating pen. A digital data signal is typically derived to represent the relative position of the position indicating pen and the whiteboard.

It would be advantageous to provide a means to customize or modify the digital data signal to encode supplementary information regarding various characteristics and attributes of the position indicating pen. For example, it would be advantageous for the system to provide a pressure sensitive device to measure a user's pressure of the pen to draw a thicker line when pressure is added or a thinner line when pressure is reduced.

A. D. Searby, *Electronic Graphic System*, U.S. Patent No. 5,276,787 (January 4, 1994) discloses an electronic graphic system for modifying image pixels, which include a framestore and a pipeline brush processor. Image pixels are read out of the framestore in batches and applied to an input of the brush processor.

Other data representing color shape and pressure of a line drawn by a user on a touch tablet by way of a stylus is also input to the processor. As the pixels pass through the processor they are modified by the other data. Batches of modified pixels are written back to the framestore. The reading and writing of pixels from the framestore is interleaved with the reading of pixels for display as an image on a monitor.

The system also includes an arrangement for interpolating stylus pressure to remove visible discontinuities or other changes in the drawn image resulting from significant changes in stylus pressure. Also, an improved zoom facility enables a substantially continuously variable zoom factor to be defined thereby to avoid large changes in scale during a zooming operation. An arrangement for adjusting numerical values associated with some functions or features of the system allows the user to control the values solely by movement of the stylus over the touch tablet.

While Searby provides means for a user to choose a mode of operation to modify an image, "by providing an electronic graphic system for modifying an image stores in a store, in which system a user selectable menu is displayable on a portion of a display screen, the menu displaying representations of user alterable features associated with the modification of the image, wherein a feature is selectable by placing a cursor over the representation of that feature...." Searby does not suggest modifying the system to eliminate the step of a user selecting a feature from a menu, nor does Searby suggest modifying the system to eliminate the menu to increase the amount of area on the display screen of the touch tablet.

Searby's teachings provide "an electronic graphic system for modifying image pixels, the system comprising a stylus and touch tablet combination for generating co-ordinate data and for generating pressure values representative of the pressure applied to the stylus from time to time, and a processor responsive to said co-ordinate data for selecting pixels to be modified and being arranged to interpolate between a first pressure value at a first instant and a second pressure value at a second instant and to modify the selected pixels in accordance with the interpolated pressure values."

While Searby discloses a system to measure pressure by a user on a stylus, Searby does not suggest modifying the system to capture more accurately the continuous change in pressure on the stylus to enhance the system. Searby does not cite the advantage of modifying the system to measure the pressure on the stylus by a user and to interpret the pressure data to change a feature on the monitor of the host computer.

R. M. McDermott, and A. M. Scialdone, *Dynamic Pressure Adjustment of a Pressure-Sensitive Pointing Device For a Digitizer*, U.S. Patent No. 5,635,683 (June 3, 1997) disclose "an apparatus and a method which self-adjust the pressure response of a digitizer pointing device or other device incorporating a pressure transducer according to the characteristics of the particular device and/or particular user of the device." "Certain pressure parameters of the device are not set on a fixed basis, which would provide for an average, typical or generic pressure range and resolution. Instead, the particular range and/or sensitivity of the device are automatically, or semi-automatically adjusted to provide a suitable pressure range and maximum resolution for the particular user."

While McDermott and Scialdone disclose that a user may "use the pointing device differently indifferent applications. For example, the user may use different writing styles in simulated brush and in simulated chalk...." The disclosure necessarily includes an elaborate pressure adjust feature, which automatically adjusts the pressure-sensitivity and range of a pressure sensitive pointing device" for a particular user.

"The pressure adjust feature may always be enabled, or may be enabled by the user...." The processor determines "whether the stylus pressure-adjustment feature is enabled." "If the stylus pressure-adjustment feature is enabled, the program in a sub-routine... checks and dynamically adjusts" minimum and maximum values and converts the signal accordingly. During the conversion, signals within the pressure range are also converted. "Thus, the range and sensitivity are automatically adjusted...." The inclusion of the above described pressure adjust feature necessitates a great deal of overhead.

It would be advantageous to provide a means to customize or modify the digital data signal to encode supplementary information regarding various characteristics and attributes of the position indicating pen without significant overhead.

SUMMARY OF THE INVENTION

A pressure sensitive stylus, for example, as is used in a wireless whiteboard application is provided. The stylus includes a pressure sensitive element in contact with a tip of a stylus. As the pressure on the tip is increased during use of the stylus, a line produced may be broader or narrower, or the device may switch states based on pressure. For example, pressing the stylus to the board twice can turn the stylus into a paintbrush, or an eraser, or can change the color of the line produced by the stylus.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top view of a pressure measuring movable transmitter system;

Figure 2 is a partial top view of an external receiver located on a surface;

Figure 3 is a partial top view of a flex circuit adaptable for placement in the transmitter pen;

Figure 4 is a partial cutaway view of a transmitter pen having an output signal transducer;

Figure 5 is a detailed cutaway view of the pointing tip of a transmitter pen having an output signal transducer;

Figure 6 is a partial perspective view of the pointing tip of a transmitter pen having a plurality of output signal transducers;

Figure 7 is schematic view of the transmission of the output signal;

Figure 8 shows a single short pulse waveform, measured in voltage versus time in milliseconds, of a typical output signal sent from a transmitter pen;

Figure 9 is a top view of a transcribed path of a transmitter pen from sequential locations within the writing area of a surface;

Figure 10 shows a typical output signal for a transmitter pen in a pressure on state; and

Figure 11 shows an output signal that indicates a pressure on state using three pulses and encoded supplementary information.

DETAILED DESCRIPTION OF INVENTION

Figure 1 is a top view of a pressure measuring movable transmitter system 10a, in which a transmitter pen 30 is adapted to be pressure sensitive and is located within the writing area 14 of a surface 12, in which the transmitter pen 30 repeatedly sends an output signal 60 to an external receiver 18. The surface 12 is typically a whiteboard, a blackboard, a drafting table or an overhead projector, or any kind of presentation surface.

Figure 2 is a partial top view of an external receiver 18 located on a surface 12. The external receiver 18 includes an output signal sensor 25 and includes a signal connection 55 towards a signal processor 57 (FIG. 9). The external receiver 18 preferably is placed at the periphery of the writing area 14.

Figure 3 is a partial top view of a flex circuit 40 adaptable for placement in the transmitter pen. The flex circuit comprises a transducer element 44. In a preferred embodiment the element 44, preferably an electromagnetic or infrared transmitter, transmits an output signal 60 from the transmitter pen 30 (FIG. 1) to the output signal sensor 25 (FIG. 2). In one embodiment, the first output signal sensor 25 is an infrared photodiode, Part No. SFH 205FA, manufactured by Siemens Microelectronics, Inc., of Cupertino, California.

A second element of the flex circuit 40 is a force sensor 45 to measure the force a user exerts on the transmitter pen 30. In one embodiment, the force sensor 45 is a SURFACE MOUNT Design UniForce Sensor, manufactured by Force Imaging Technologies, of Chicago, Illinois. The UniForce sensor functions similar to a variable resistor in an electrical circuit. As force is exerted on the sensor, the resistance changes in relationship to the applied force, in real-time. With no load present on the sensor, its resistance is very high. As force increases, the resistance decreases. As force decreases, the resistance increases.

A third circuit element 43 of the flex circuit 40 applies a driving voltage to the sensor 45 and then digitizes the resulting analog voltage level to give a digital value. A battery element 41 is provided, which supplies power to the flex circuit 40. The force sensor 45 is folded over the battery 41 before placing into the transmitter pen 30.

Pressure Measuring Transmitter Pen Process. The pressure measuring transmitter pen process, which uses the force sensor 45 and the output signal 60 to measure the pressure applied to the transmitter pen 30, comprises the following steps:

i) repeatedly measuring from a force sensor 45 a force value applied to the transmitter pen 30;

ii) repeated sending an output signal 60 from the transmitter pen 30 to an external receiver 18, wherein the output signal corresponds to the force value;

iii) determining the pressure value based on the output signal 60 from the transmitter pen 30 to the receiver 18.

Transmitter Pen. Figure 4 is a partial cutaway view of a transmitter pen 30 having an output signal transducer 44. While the transmitter pen 30 is described as a pen, it can be any sort of movable transmitter device. The transmitter circuitry 40, connected to the output signal transducer through leads 42a and 42b, excites the output signal transducer 44, to produce an output signal 60.

Figure 5 is a detailed cutaway view of the pointing tip 36 of a transmitter pen 30 having an output signal transducer 44. Figure 6 is a partial perspective view of the pointing tip 36 of a transmitter pen 30 having a plurality of output signal transducers 44. An optional finger guard 38 protects the output signal transducers 44.

Output Signal Transmission. Figure 7 is schematic view 50 of the transmission of the output signal 60.

The output signal 60 is typically an infrared output signal, which is transmitted from one or more infrared transducers 44 located near the pointing tip 36 of the transmitter pen 30. Figure 8 shows a single short pulse waveform 66, measured in voltage 62 versus time in milliseconds 64, of a typical output signal 60 sent from a transmitter pen 30. In one embodiment, the infrared transducers 44 are Part No. SFH426, manufactured by Siemens Microelectronics, Inc., of Cupertino, California. While only one infrared transducer 44 is required, the use of more than one infrared transducer 44 is preferred, since it allows better line-of-sight transmission of the output signal 60 to each of a plurality of the external receivers 18, such that the transmitter pen 30 can be rotated by the user.

Figure 9 is a top view 80 of a transcribed path 82 of a transmitter pen 30 from sequential locations within the writing area 14 of a surface 12. As the transmitter pen 30 is moved by a user across the writing area 14 of the surface 12, the repeated transmission of output signals 60 is received at the external receivers 18. The receivers 18 are connected 55 to a signal processor 57, which calculates the pressure applied to the transmitter pen 30. The pressure applied to the transmitter pen 30 is transferred by the signal processor 57.

In a preferred embodiment, a functional area 85 is defined in the whiteboard 12. Selective activation of the transmitter pen 30 within the functional area 85 is used to send function commands to the signal processor 57, or to a computer 87 connected to the signal processor 57. Function commands can be used to print the displayed image path 82, save the image path 82, create a new page, or to control functions on the connected computer 87, such as by activating pull-down menus on a graphic-user interface (GUI) 89 on the connected computer 87. Or, for example, tapping the transmitter pen 30 twice in the functional area 85 can convert the transmitter pen into an eraser.

In another preferred embodiment, a programmable control application 91 within the computer 87 communicates with the signal processor 57, to control system options, such as waveform comparison algorithms. The programmable control application 91 (FIG. 9) is typically controllable and updateable, allowing the signal processor 57 to be updated, and to be easily adapted to different transmitter pens 30, different surfaces 12, and different receivers 18.

Communication of Supplementary Information. The output signal characteristics of the circuitry 40 and characteristic transmitter output signals 60 can optionally communicate secondary information to the external receivers 18. Such supplementary information can include pen activation status, or pen types, such as different colored pens, or for pens of different widths, or to convert the pen into an eraser, or even for calculated line types, such as for dashed lines. In systems where more than one user is writing on the writing area 14 of the surface 12, either sequentially of concurrently, the transmitter pens 30 can optionally communicate the designated user of each transmitter pen 30.

Pen Activation. Figure 10 shows a typical output signal 60 for a transmitter pen 30 in a pressure on state. The output signal 60 is modified to designate whether the activated pen is in a pressure on or pressure off state. In Figure 10, the output signal 60 includes three infrared pulses 66a, 66b, and 66c, measured in voltage 62 versus time in milliseconds 64, to designate a pressure on state. The activated pen in a pressure on state 66c typically means that the pen tip 36 is in contact with either the writing area 14 of the surface 12, or with another writing surface placed within the writing area 14, such as a piece of paper.

As the pen 30 is moved along a path 82 in the pressure on state 66c, a series of output signals 60 are received and processed by the receivers 18, from which the successive pressure values are determined to produce a representation of the path 82 with the appropriately applied characteristics of the transmitter pen 30.

In a preferred embodiment the pressure on state corresponds to a higher pressure value while the pressure off state corresponds to a lower pressure value. Human beings begin a typical writing process with harder or greater force and end the writing process with less force. For example, in the embodiment, the pressure on threshold corresponds to 75 grams of force while the pressure off threshold corresponds to 50 grams of force.

The presently preferred embodiment provides an advantage over typical, off-the-shelf binary switches that turn on and off with the same force. In writing soft dashes during a typical writing process, the binary switch might turn off because the pressure exerted by the user is below the threshold corresponding to the pressure off state. In the presently preferred embodiment using the force sensor 45, the transmitter pen 30 is still on because the pressure exerted by the user is above the threshold corresponding to the pressure off state.

Another advantage of the presently preferred embodiment is in the application of writing in specialized styles, such as but not limited to Kanji, the Japanese characters, wherein the thickness and variation of the written stroke is important.

Another advantage of the presently preferred embodiment is a user can pick up the transmitter pen 30 and begin writing in a natural way, such that the force the user uses on the transmitter pen is the same as with a ball-point ink pen. The writing process feels natural to the user.

Calculated Pen Attributes. The transmitter pen 30 can optionally include circuitry 40 for a given pen type, or can include switching or continuous adjustment control to produce a transmitter signal 60 for different pen attributes. For example, a transmitter pen 30 which contains a single writing tip 36 having one color of ink, such as black ink, may be selectively adjusted by the user to produce an output signal 60 that corresponds to drawn paths 82 of varying colors, widths, or line styles. While the user draws or writes upon a writing surface 14 of a surface 12, such as a white board 12, displaying a black path 82 (FIG. 9), such as figures or letters, the transmitted and processed signal for the path 82 is dependent upon the pen characteristics chosen by the user.

As shown in Figure 11, the output signal 60 can optionally provide supplementary information to the receivers 18. Figure 11 shows an output signal 60 that indicates a pressure on state using three pulses 66a, 66b, and 66c and encoded supplementary information 66d-66f. The supplementary information 66d-66f provides bit information, which defines pen characteristics, such as designated color, width, line type, or user identification (*e.g.* author). That is, the determined color for a transmitter pen 30 can be encoded in the output signal 60, such as within multiple infrared pulses 66a-66f.

There are various ways to include the pen color within the output signal 60. In the pulsed infrared signal 60 shown in Figure 11, the time between the pen activation pulses 66a, 66b, and 66c and the secondary information pulses 66d-66f can span a time that is specific to a particular pen color. For example, a pulse delay between the pen activation pulses 66a, 66b, and 66c and the secondary information pulses 66d-66f can specify a pen color of black, while a different pulse delay between the pen activation pulses 66a, 66b, and 66c and the secondary information pulses 66d-66f can specify a pen color of blue.

In the embodiment shown in Figure 11, a time line 64 is broken up into discreet windows 71a-71d, wherein the presence or absence of an infrared pulse 66dc-66f indicates a binary "0" or "1", which can be combined with pulses within other windows 71a-71d along the time line 64, to specify a pen color or type. In this manner, the presence of an infrared signal pulse 66 within a window 71 is identified as a bit within a number.

For example, in a three-bit number, three windows 71b-71d of 25-50 ms, 50-75 ms, and 75-100 ms are used to specify pen color. In this embodiment, the first window 71a of 0-25 ms is used to indicate the pen is in a pressure on state. In this embodiment, the three-bit number is chosen to represent pen color or type. Binary signals specify this supplementary information (*e.g.* 1= black; 2= red; 3= green; 4= blue). In the example shown in Figure 11, the binary number for the 25-50 ms window 71b is a "0"; the binary number for the 50-75 ms window 71c is a "1"; and the binary number for the 75-100 ms window 71d is a "1". This yields a binary number of "011", or a "3", which specifies a pen color of green for a transmitter pen in a pressure on state.

In another embodiment the pulse delay between the third pulse 66c relative to the second pulse 66b in the first window 71a can specify a pen color or type or other supplementary information. The advantage of using the pulse delay between the second pulse 66b and the third pulse 66c is it can represent a continuous measurement of pressure applied to the transmitter pen 30. In another embodiment the pulse delay between the third pulse 66c relative to the second pulse 66b in the first window 71 combined with a three-bit number from windows 71b-71d can specify supplementary information.

Calibration. The size of a pen inside the transmitter 30 can be large enough to exert pressure on the force sensor 45. With a typical, off the shelf binary switch, it is a common problem that a pen device inside the transmitter comes into contact with the switch and unwittingly turns on the transmitter pen system. In a preferred embodiment, the transmitter pen system 10a calibrates itself. The calibration process comprises the steps of:

i) measuring an initial pressure value;

ii) calculating a first sum of the initial pressure value and a first or threshold value;

iii) calculating a second sum of the initial pressure value and a second or threshold value; and

iv) resetting the first threshold value to the first sum and resetting the second threshold value to the second sum.

The calibration process can be performed in the flex circuit 40, or in the control application 91, but is not limited to either of the two.

Accordingly, although the invention has been described in detail with reference to a particular preferred embodiment, persons possessing ordinary skill in the art to which this invention pertains will appreciate that various modifications and enhancements may be made without departing from the spirit and scope of the claims that follow.

CLAIMS

1. A pressure measuring movable transmitter system between a movable transmitter and a receiver, comprising:

an output signal generator, wherein an output signal is transmitted by said output signal generator repeatedly from said movable transmitter to said receiver;

a force sensor coupled to said movable transmitter; and

means for measuring pressure applied to said movable transmitter, using said output signal and said force sensor.

2. The system of Claim 1, wherein said means for measuring pressure applied to said movable transmitter is programmable.

3. The system of Claim 1, wherein said output signal is an electromagnetic output signal.

4. The system of Claim 1, wherein said output signal is an infrared output signal.

5. The system of Claim 1, wherein said output signal has a signal state.

6. The system of Claim 5, wherein said movable transmitter is located in a transmitter pen, wherein said signal state corresponds to a pressure on state of said transmitter stylus and wherein absence of said signal state corresponds to a pressure off state of said transmitter pen.

7. The system of Claim 6, wherein said pressure on state corresponds to a first threshold value and wherein said pressure off state corresponds to a second threshold value, whereby said first threshold value is different from said second threshold value.

8. The system of Claim 7, wherein said first threshold value corresponds to 75 grams and wherein said second threshold value corresponds to 50 grams.

9. The system of Claim 7, further comprising means for calibration.

10. The system of Claim 9, wherein means for calibration implements the steps of:

measuring an initial pressure value;

calculating a first sum of said initial pressure value and said first threshold value;

calculating a second sum of said initial pressure value and said second threshold value; and

resetting said first threshold value to said first sum and resetting said second threshold value to said second sum.

11. The system of Claim 1, wherein said output signal corresponds to a value from a continuous set of values over a range.

12. The system of Claim 1, wherein said output signal contains encoded information regarding said movable transmitter.

13. The system of Claim 12, wherein said encoded information includes a determined color of said movable transmitter.

14. The system of Claim 12, wherein said encoded information includes a determined line width of said movable transmitter.

15. The system of Claim 12, wherein said encoded information includes a determined line style of said movable transmitter.

16. The system of Claim 12, wherein said encoded information includes a user identification of said movable transmitter.

17. The system of Claim 1, further comprising:

a wireless connection between said receiver and said means for measuring pressure applied to said movable transmitter.

18. The system of Claim 1, further comprising:

a defined functional area, whereby said movable transmitter is selectively activated to send functions to a computer.

19. The system of Claim 1, further comprising:

a plurality of receivers, whereby said output signal being transmitted repeatedly from said movable transmitter to at least one of said plurality of receivers.

20. The system of Claim 19, further comprising:

a wireless connection between said plurality of receivers and said means for measuring pressure applied to said movable transmitter.

21. A pressure measuring system, comprising:

a surface having a writing area and a receiver;

a movable device adapted to be located within said writing area of said surface, said movable device adapted to detect a force applied to said movable device, and said movable device adapted to send an output signal repeatedly from said movable device to said receiver; and

a signal processor connected to said receiver, said signal processor processing said output signal to calculate a pressure value relative to said force applied to said movable device.

22. The system of Claim 21, wherein said signal processor is programmable.

23. The location system of Claim 21, wherein said surface is a white board.

24. The system of Claim 21, wherein said output signal is an electromagnetic output signal.

25. The system of Claim 21, wherein said output signal is an infrared output signal.

26. The system of Claim 21, wherein said output signal has a signal state.

27. The system of Claim 26, wherein said movable device is located in a transmitter pen, wherein said signal state corresponds to a pressure on state of said transmitter pen and wherein absence of said signal state corresponds to a pressure off state of said transmitter pen.

28. The system of Claim 21, wherein said output signal contains encoded information regarding said movable device.

29. The system of Claim 28, wherein said encoded information includes a determined color of said movable transmitter.

30. The system of Claim 28, wherein said encoded information includes a determined line width of said movable transmitter.

31. The system of Claim 28, wherein said encoded information includes a determined line style of said movable transmitter.

32. The system of Claim 28, wherein said encoded information includes a user identification of said movable transmitter.

33. The system of Claim 21, further comprising:

a wireless connection between said receiver and said means for measuring pressure applied to said movable device.

34. The system of Claim 21, further comprising:

a defined functional area, whereby said movable device is selectively activated to send functions to a computer.

35. The system of Claim 21, further comprising:

a plurality of receivers, whereby said output signal being transmitted repeatedly from said movable transmitter to at least one of said plurality of receivers.

36. The system of Claim 35, further comprising:

a wireless connection between said plurality of receivers and said means for measuring pressure applied to said movable transmitter.

37. A process for calculating a pressure value from a force applied to a transmitter pen relative to a surface, comprising the steps of:

repeatedly measuring a force value from said force applied to said transmitter pen;

determining if said force value is greater than a threshold value;

repeatedly sending an output signal from said transmitter pen to an external receiver, wherein said output signal contains said force value when said force value is greater than said threshold value; and

determining said pressure value based on said output signal from said transmitter pen to said receiver.

38. The process of Claim 37, wherein said surface is a white board.

39. The process of Claim 37, wherein said output signal is an electromagnetic output signal.

40. The process of Claim 37, wherein said output signal is an infrared output signal.

41. The process of Claim 37, wherein said output signal has a signal state.

42. The process of Claim 41, wherein said signal state corresponds to a pressure on state of said transmitter pen and wherein absence of said signal state corresponds to a pressure off state of said transmitter pen.

43. The process of Claim 37, wherein said output signal contains encoded information regarding said transmitter pen.

44. The process of Claim 43, wherein said encoded information includes a determined color of said movable transmitter.

45. The process of Claim 43, wherein said encoded information includes a determined line width of said movable transmitter.

46. The process of Claim 43, wherein said encoded information includes a determined line style of said movable transmitter.

47. The process of Claim 43, wherein said encoded information includes a user identification of said movable transmitter.

48. The process of Claim 37, further comprising the step of:

defining a functional area on said surface, whereby said transmitter pen is selectively activated to send information to a computer.

49. A system for measuring a pressure value from a force applied to a movable transmitter, comprising:

an output signal sensor for receiving a repeated output signal from said movable transmitter;

a force sensor connected to said movable transmitter to detect said force applied to said movable transmitter; and

a signal processor in communication with said output signal sensor, whereby said signal processor calculates a pressure value relative to said force applied to said movable device.

50. The system of Claim 49, wherein said signal processor is programmable.

51. The system of Claim 49, wherein said output signal is an electromagnetic output signal.

52. The system of Claim 49, wherein said output signal is an infrared output signal.

53. The system of Claim 49, wherein said output signal has a signal state.

54. The system of Claim 53, wherein said movable transmitter is located in a transmitter pen, wherein said signal state corresponds to a pressure on state of said transmitter pen and wherein absence of said signal state corresponds to a pressure off state of said transmitter pen.

55. The system of Claim 49, further comprising:

a defined functional area, whereby movable transmitter is selectively activated to send functions to a computer.

56. The system of Claim 49, wherein said output signal contains encoded information regarding said movable transmitter.

57. The system of Claim 56, wherein said encoded information includes a determined color of said movable transmitter.

58. The system of Claim 56, wherein said encoded information includes a determined line width of said movable transmitter.

59. The system of Claim 56, wherein said encoded information includes a determined line style of said movable transmitter.

60. The system of Claim 56, wherein said encoded information includes a user identification of said movable transmitter.

61. The system of Claim 49, further comprising:

a plurality of output signal sensors for receiving a repeated output signal from said movable transmitter; and

whereby said signal processor is in communication with at least one of said plurality of output signal sensors.

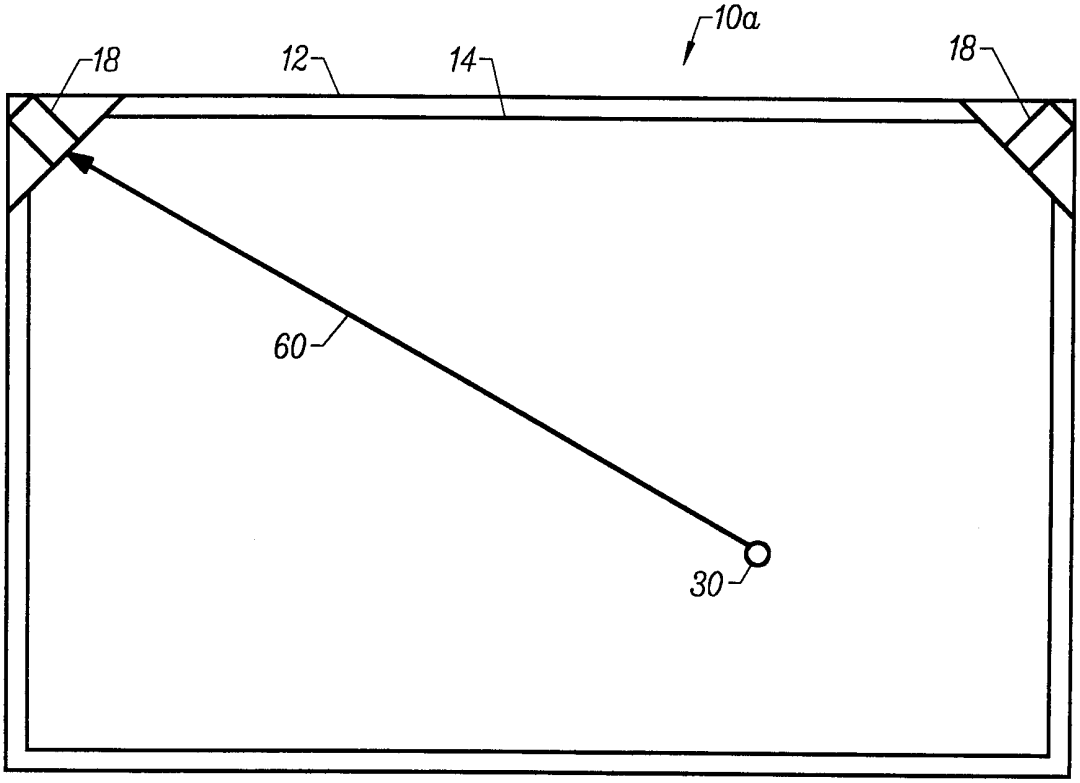


FIG. 1

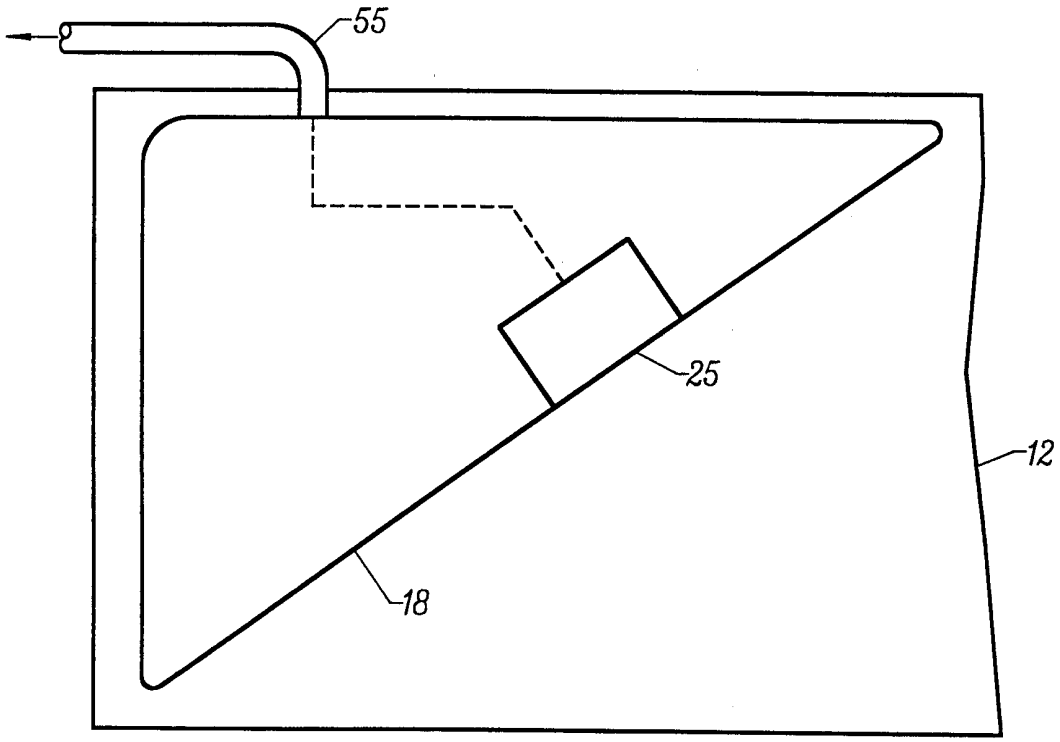


FIG. 2

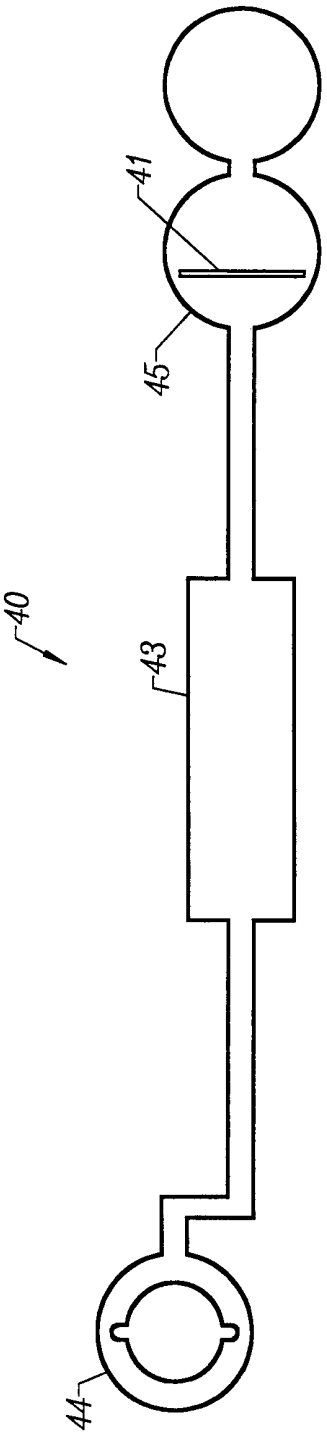


FIG. 3

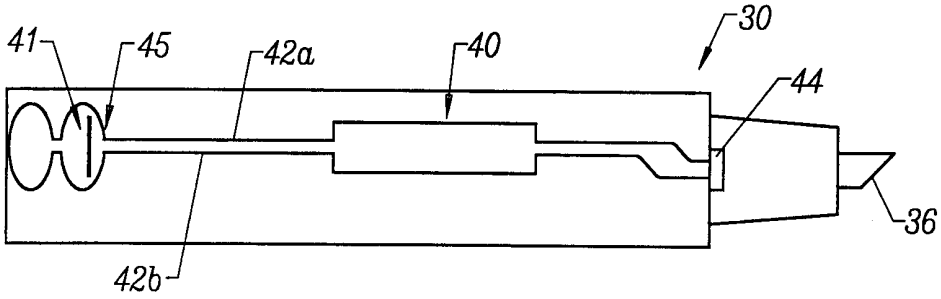


FIG. 4

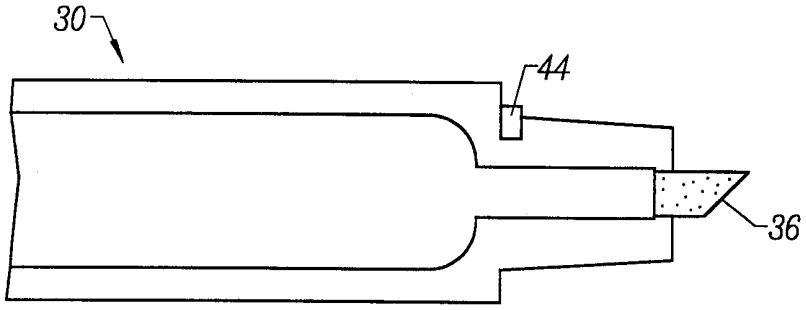


FIG. 5

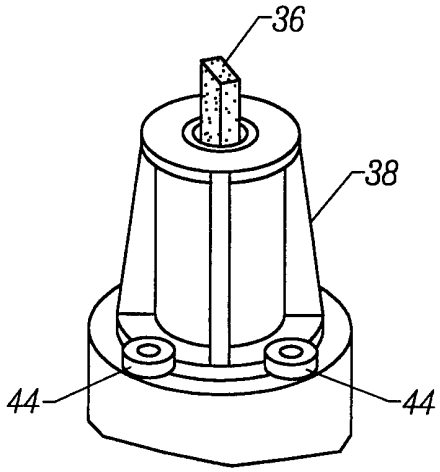


FIG. 6

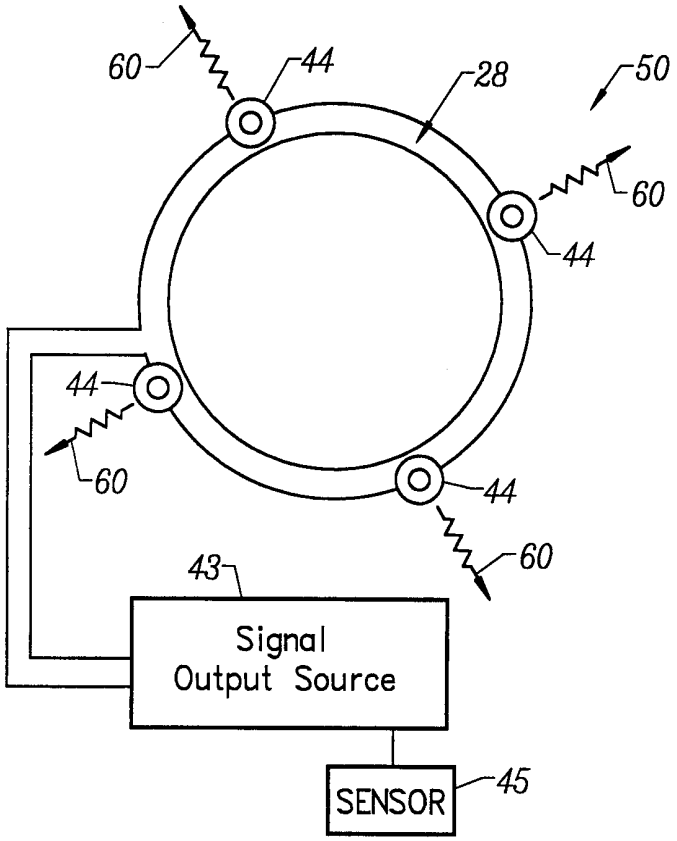

60
44
28
50
60
44
44
60
44
60
43
Signal
Output Source
SENSOR
45

FIG. 7

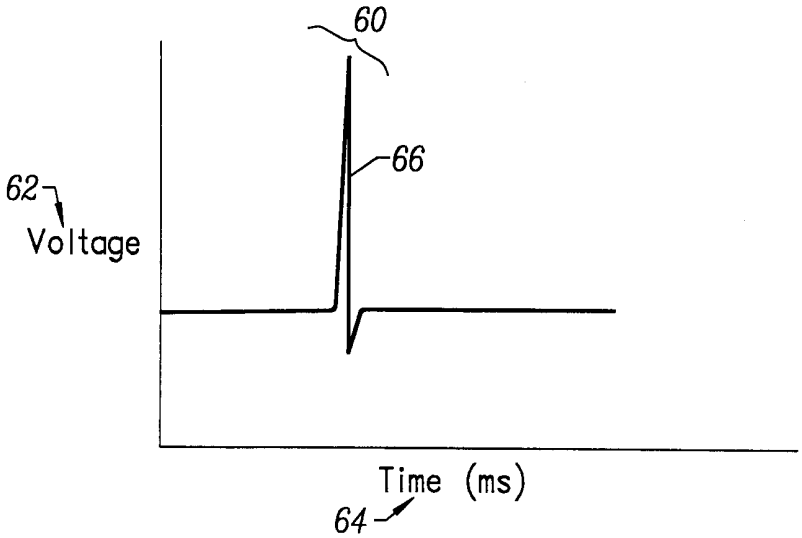

60
66
62
Voltage
Time (ms)
64

FIG. 8

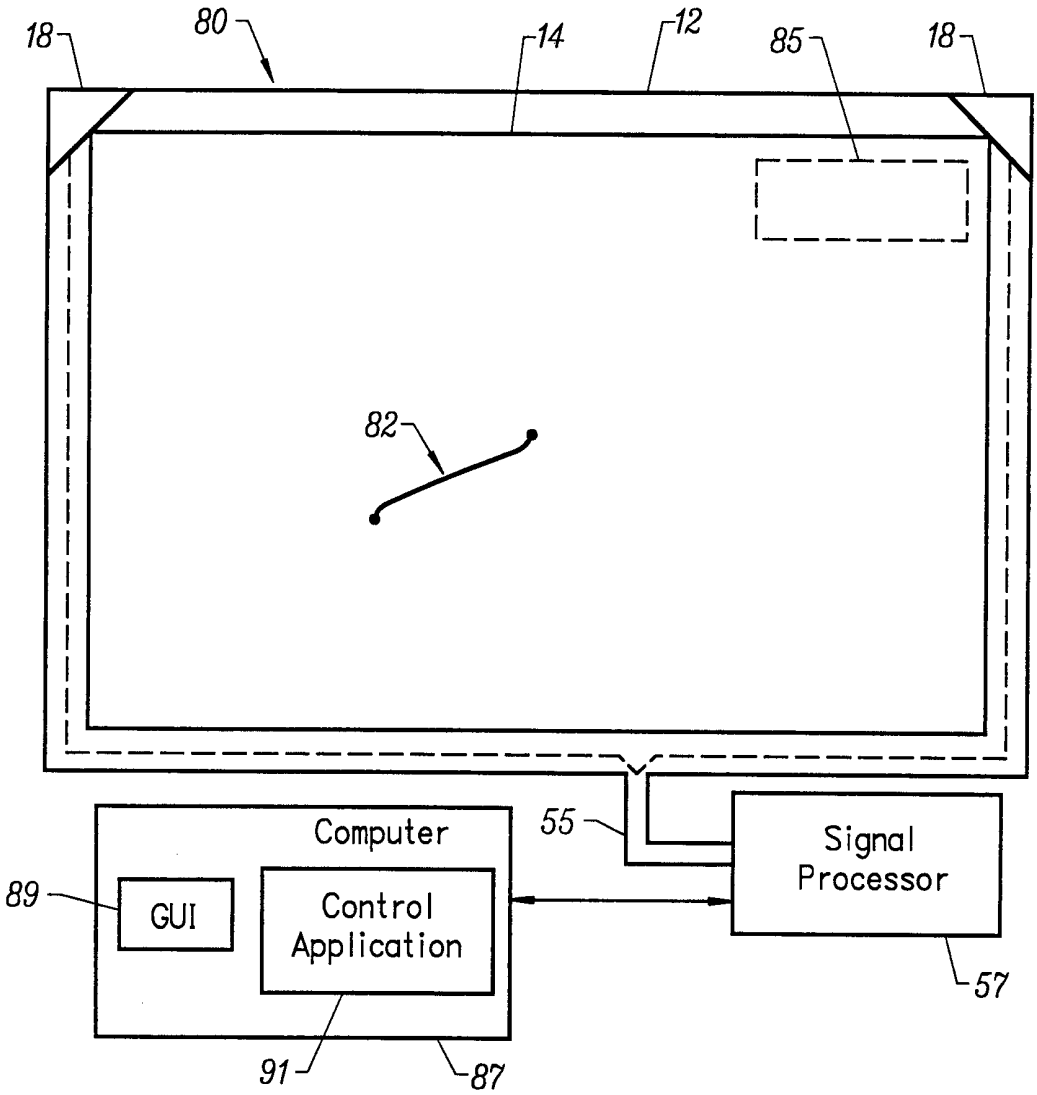

18
80
14
12
85
18
82
Computer
55
Signal Processor
89
GUI
Control Application
57
91
87

FIG. 9

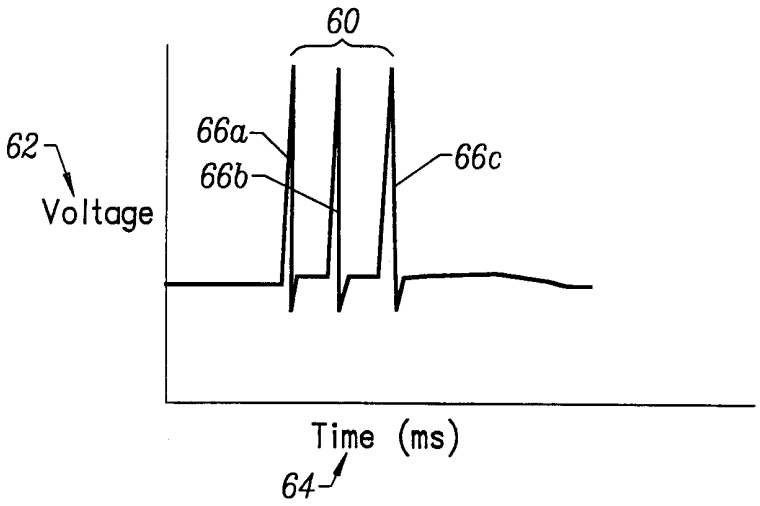

60
62
Voltage
66a
66b
66c
Time (ms)
64

FIG. 10

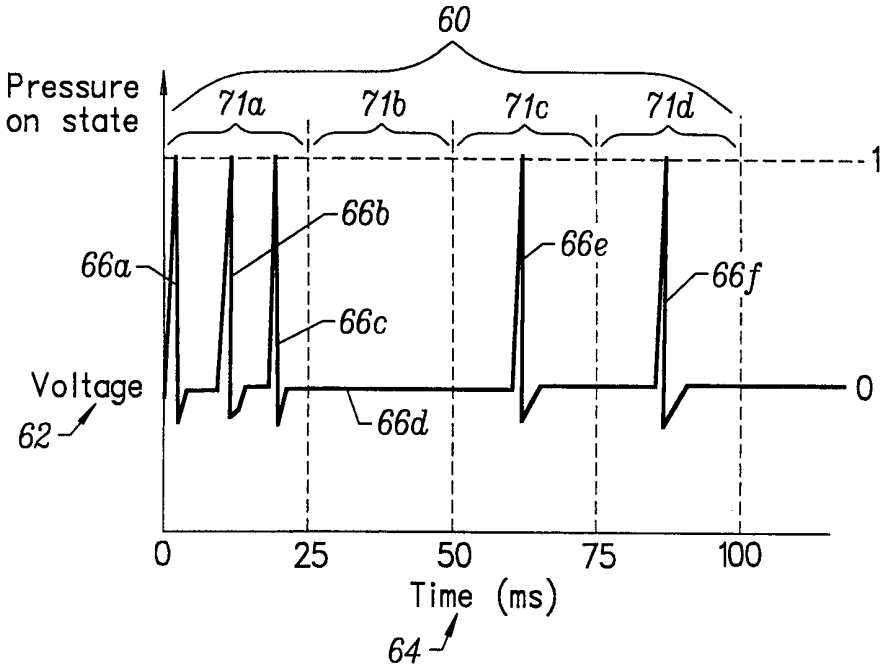

60
Pressure on state
71a
71b
71c
71d
1
66a
66b
66c
66d
66e
66f
Voltage
62
0
0
25
50
75
100
Time (ms)
64

FIG. 11