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Solomon

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(54) **VISUAL SPECIAL EFFECTS DISPLAY DEVICE**

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(21) Appl. No.: **09/250,384**

(22) Filed: **Feb. 12, 1999**

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(52) **U.S. Cl.** **345/31**; 345/31; 345/46; 345/82; 340/815.45
(58) **Field of Search** 345/31, 39, 40, 345/46, 82; 340/815.45, 815.53, 815.86, 815.64, 815.87, 815.88; 700/200, 213

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Primary Examiner—Lun-Yi Lao

(57) **ABSTRACT**

A visual special effects display device is presented with a control mechanism which enables the unique control and programming of one or more devices simultaneously. The display device may be incorporated into tickets at public events, promotions, toys or other applications. In one embodiment the visual elements are constructed from LEDs and controlled by a combination of a remote transmitter and local switching mechanism. The display devices may be programmed in advance and assigned a unique code which permits the programming of specific images in a large audience. Messages, images and effects may be altered or permanantly programming at any time during the event. Designs include tickets, drink coasters, wands, swords, tops, yo-yos, frisbees, batons, hats, jump ropes and other toys.

15 Claims, 23 Drawing Sheets

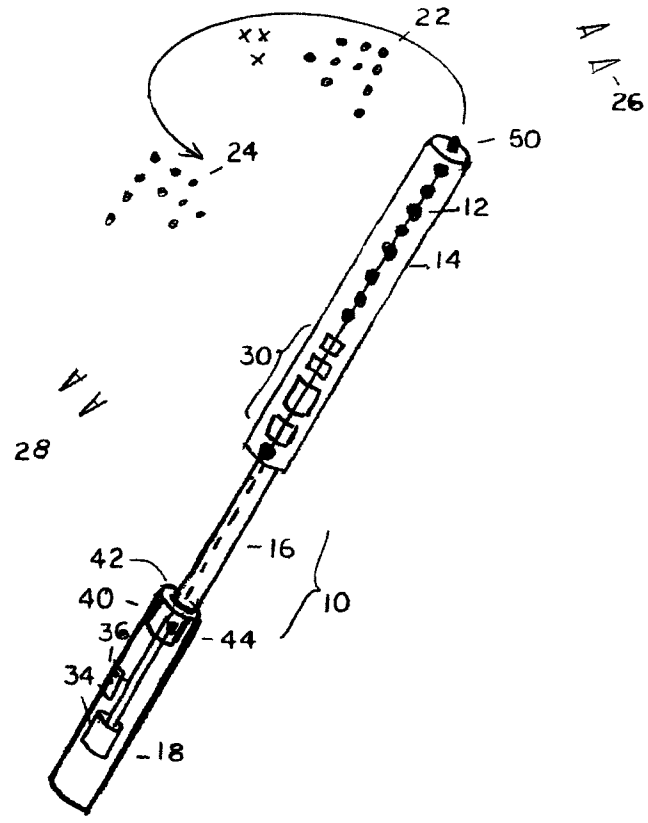


FIG. 1

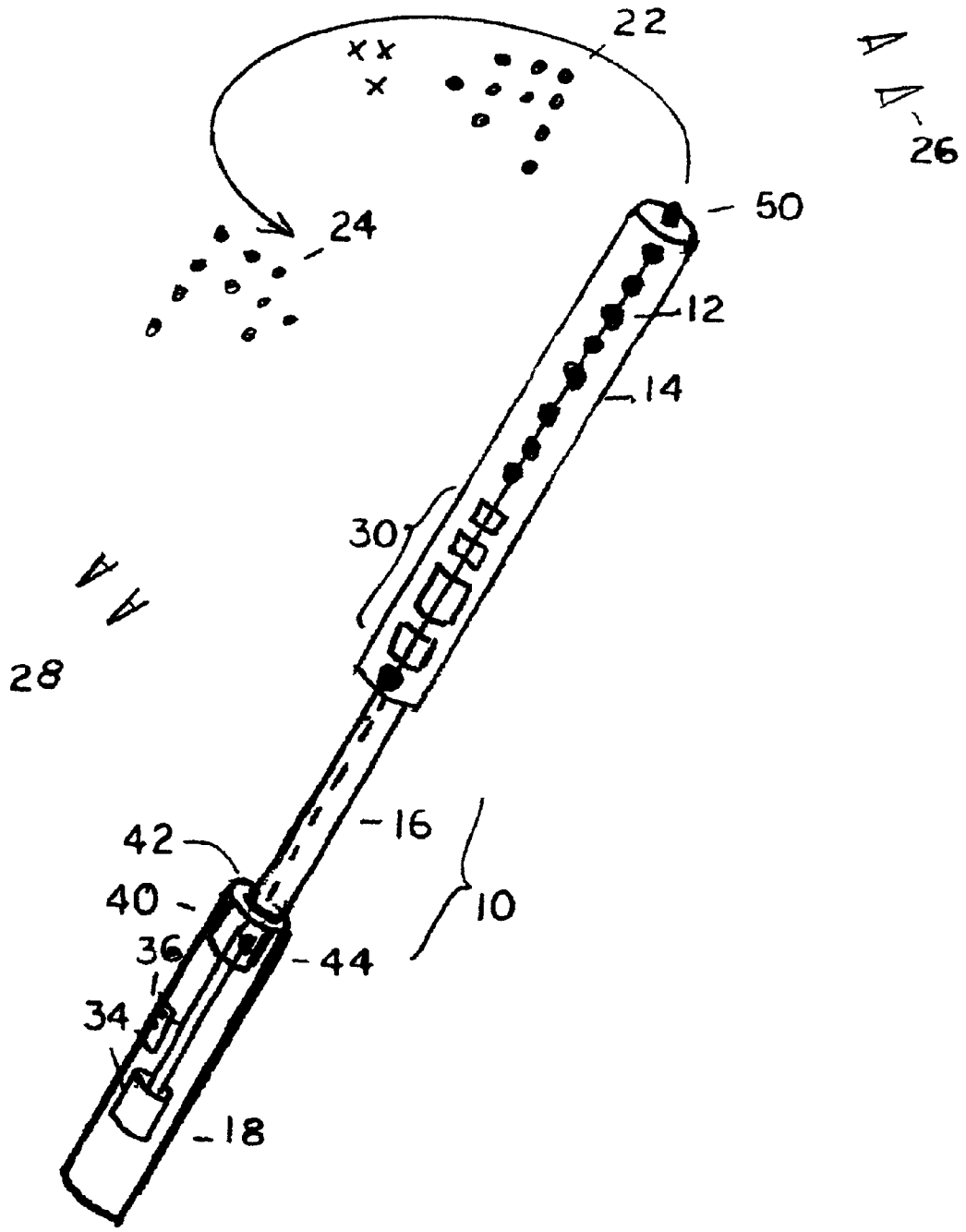


FIG. 2

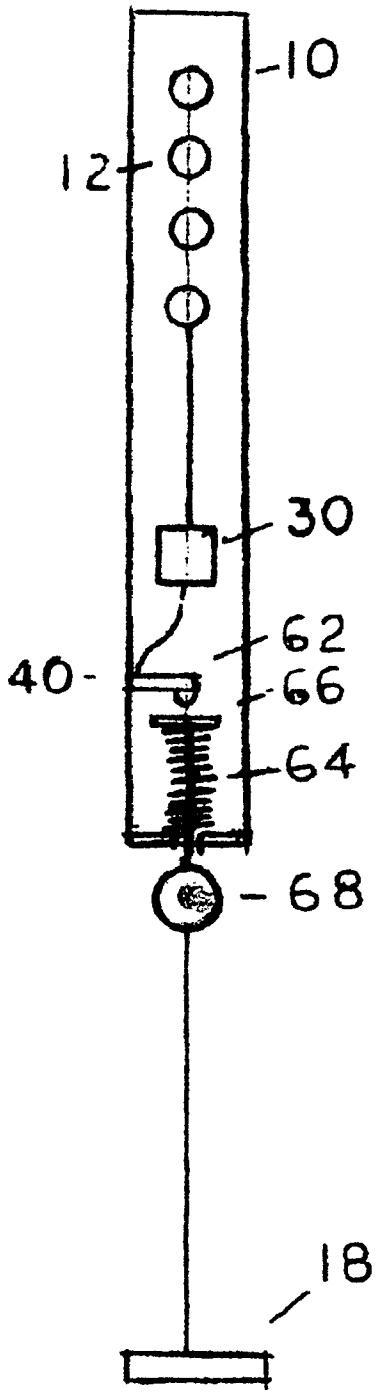


FIG. 3

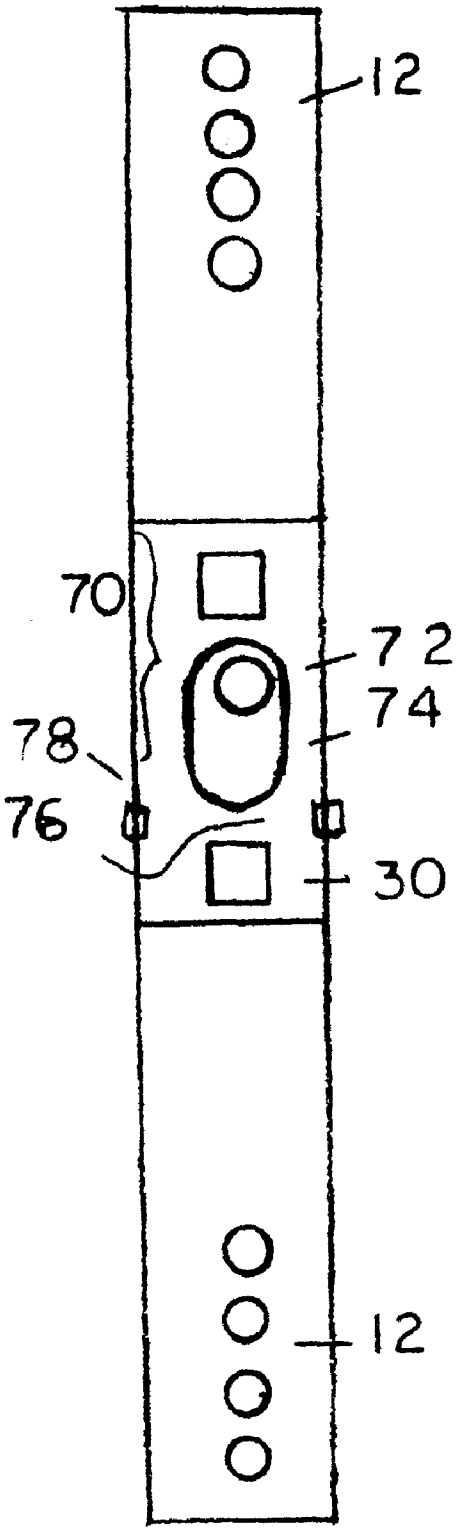


FIG. 4

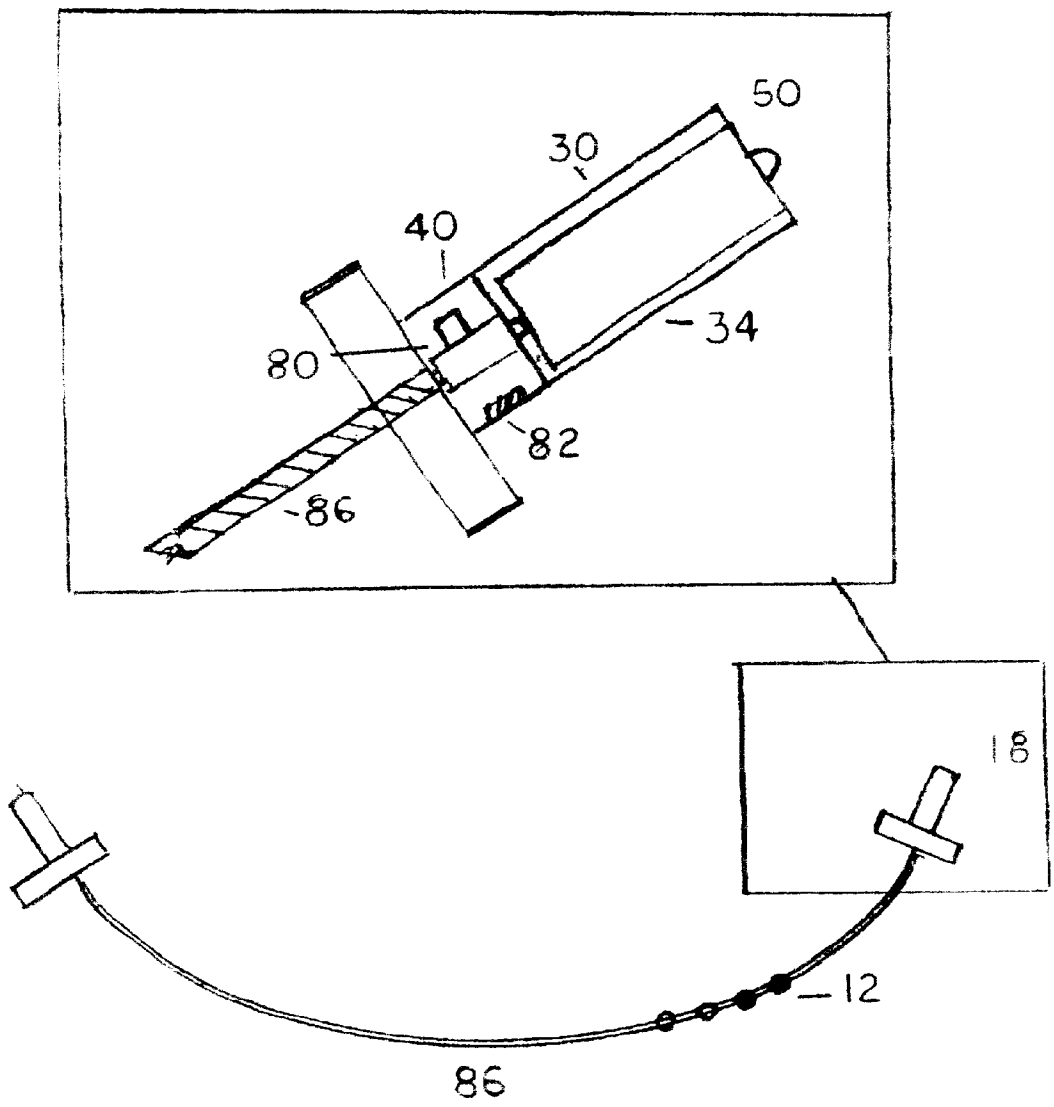


FIG. 5

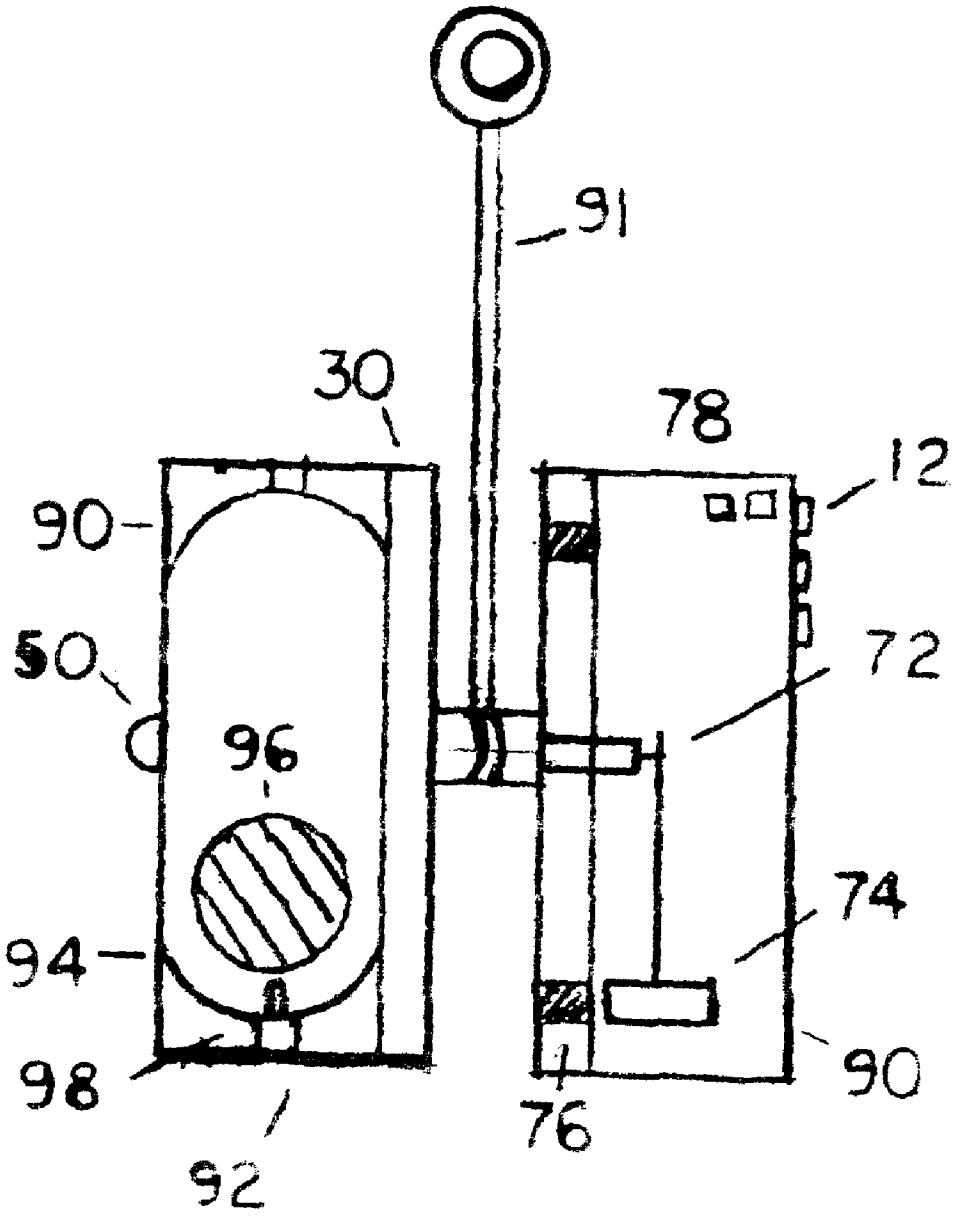


FIG. 6

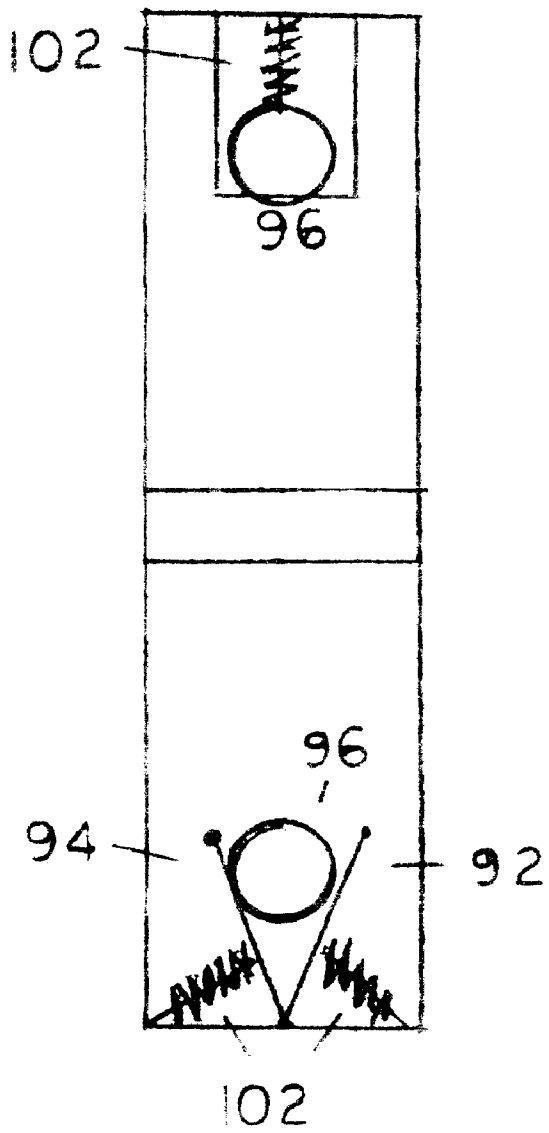


FIG. 7

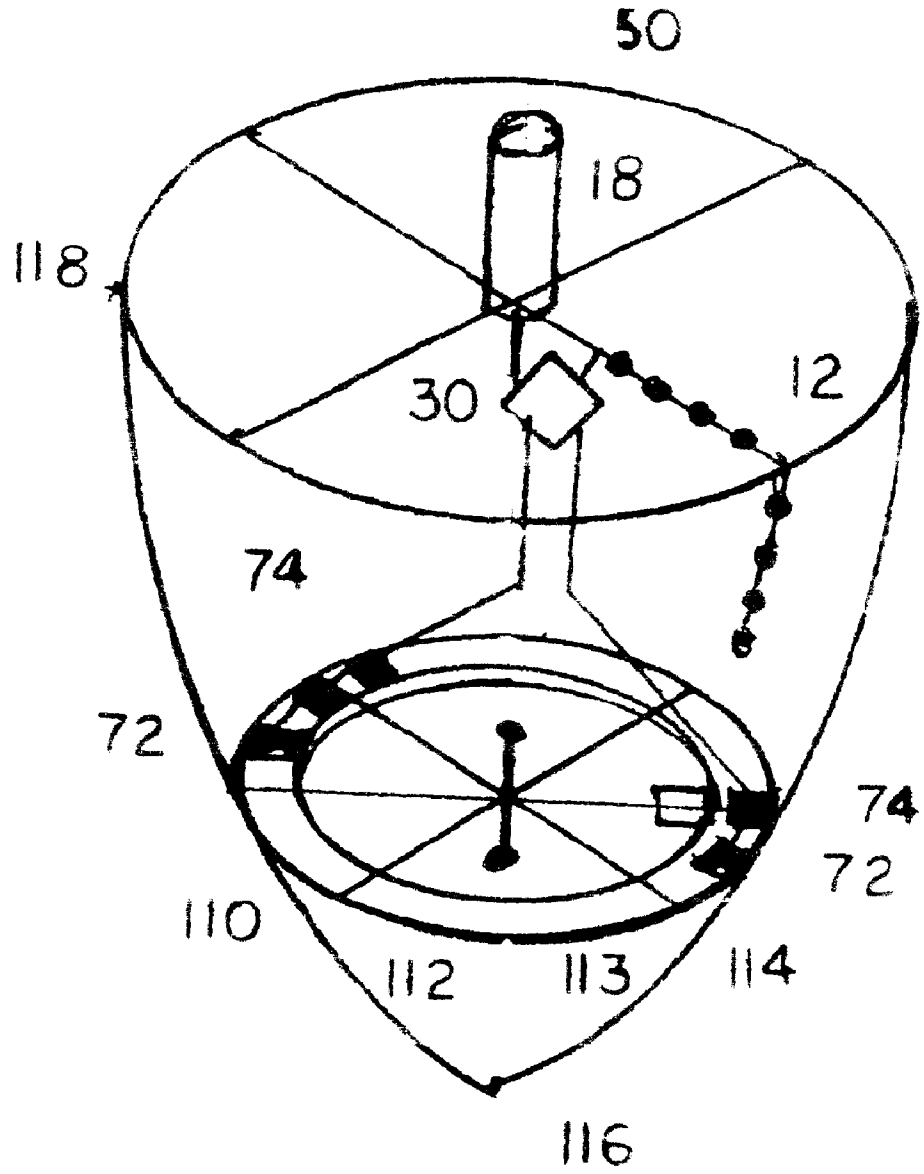


FIG. 8

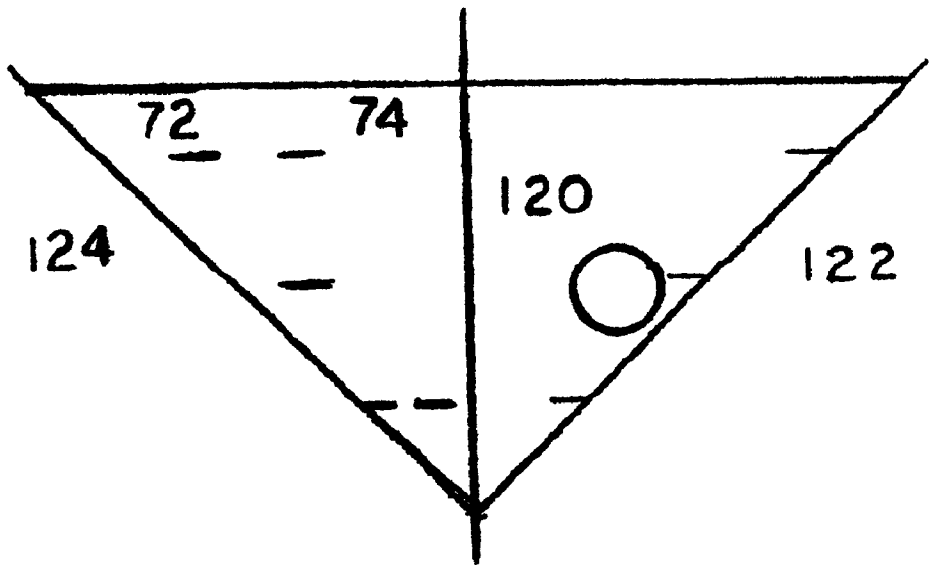


FIG. 9

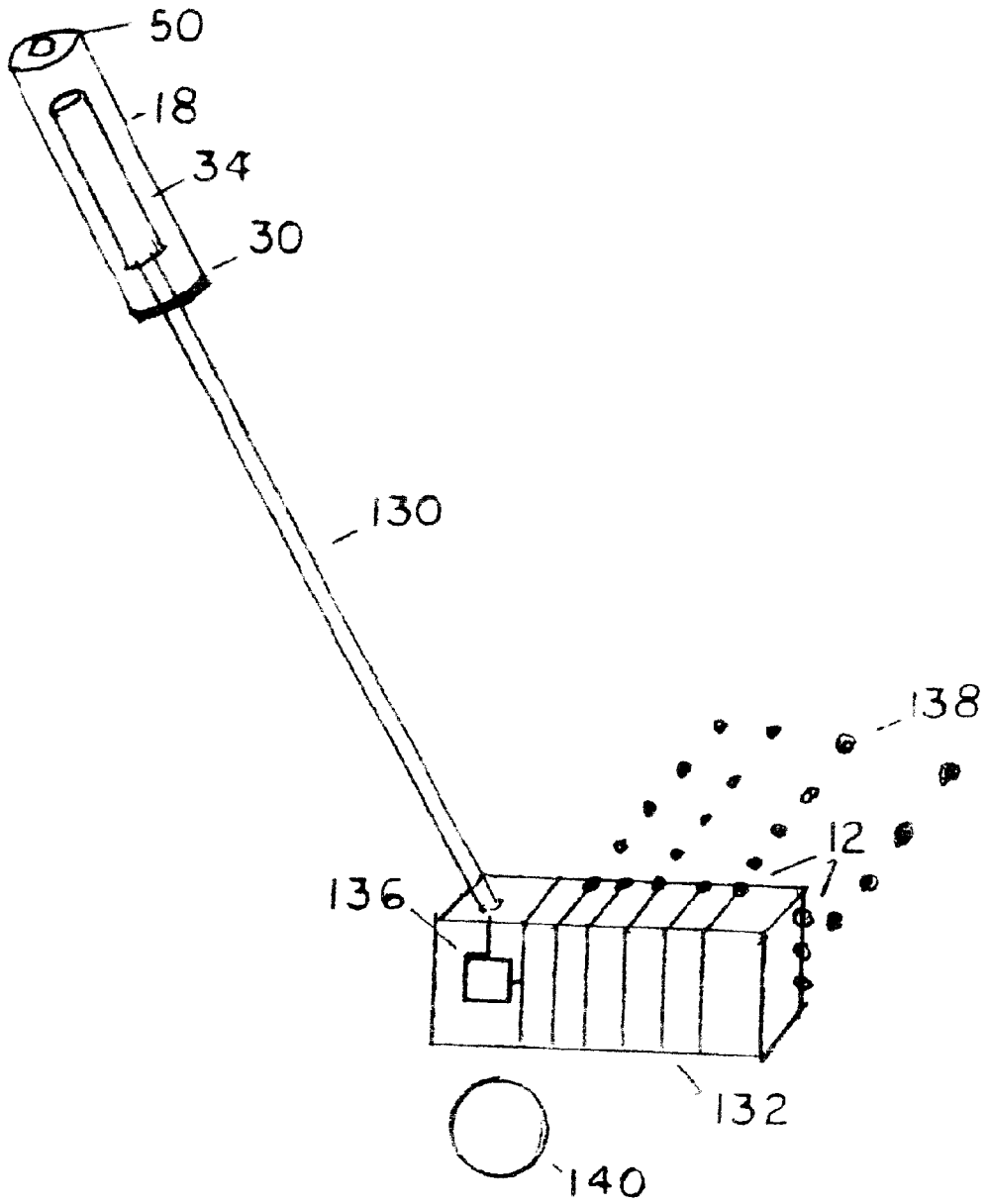


FIG. 10

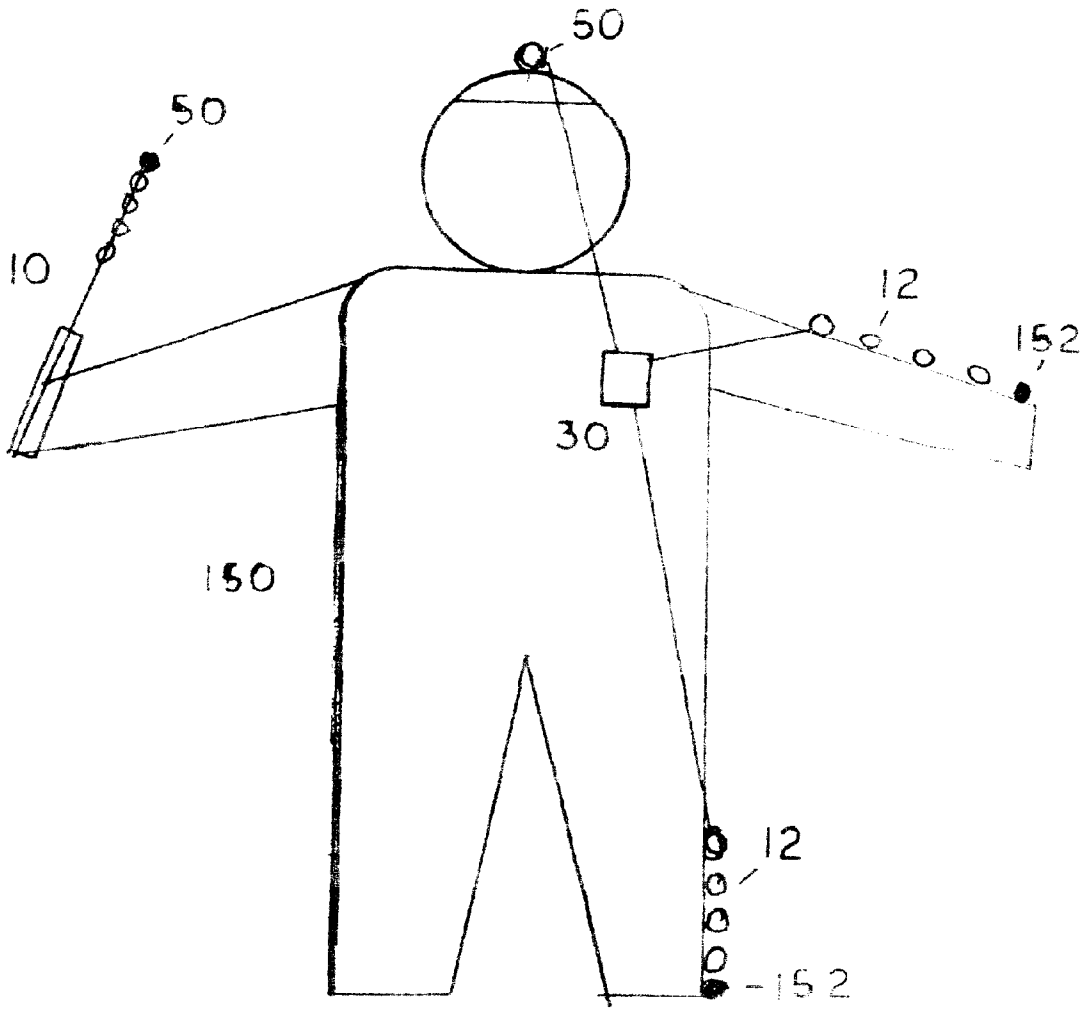


FIG. 11

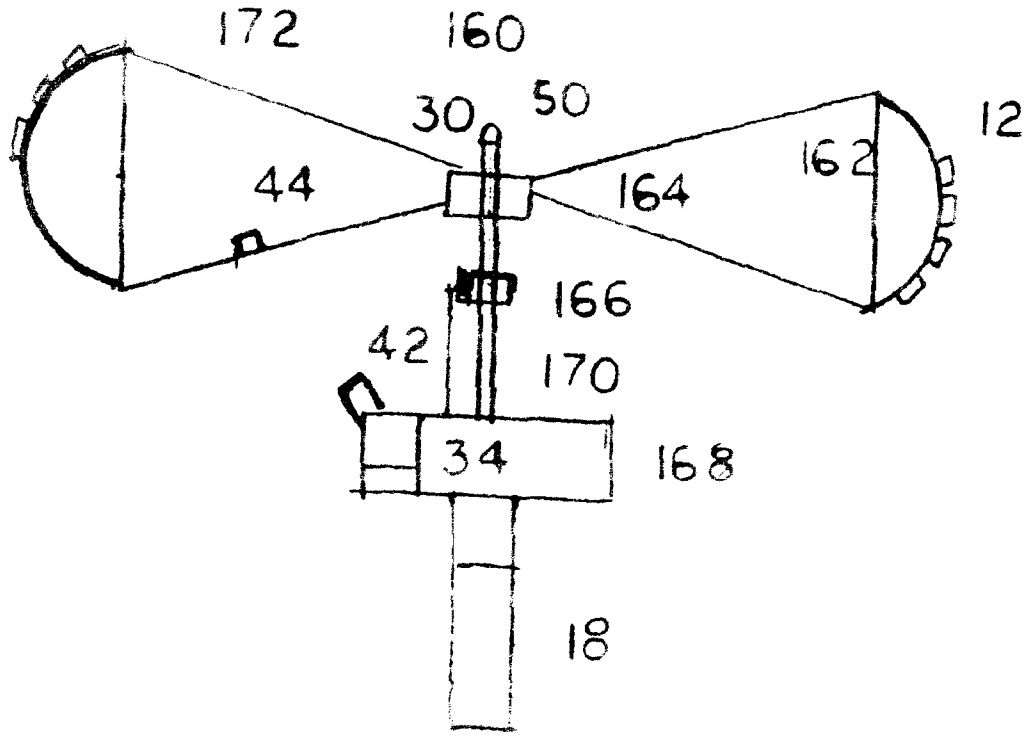


FIG. 12

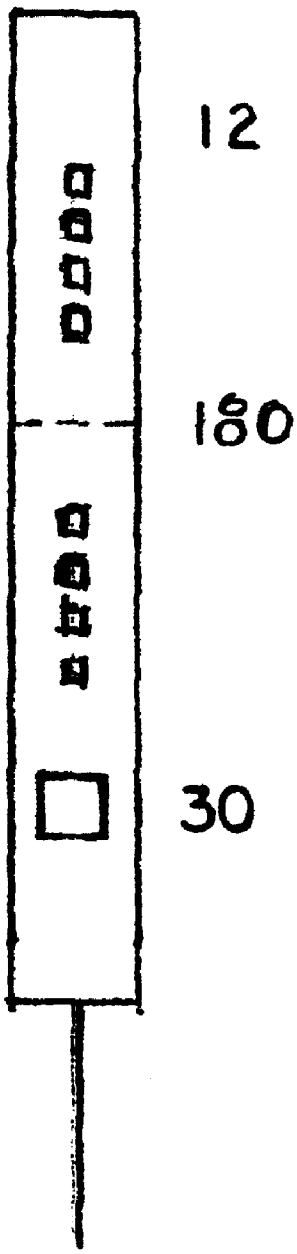


FIG. 13

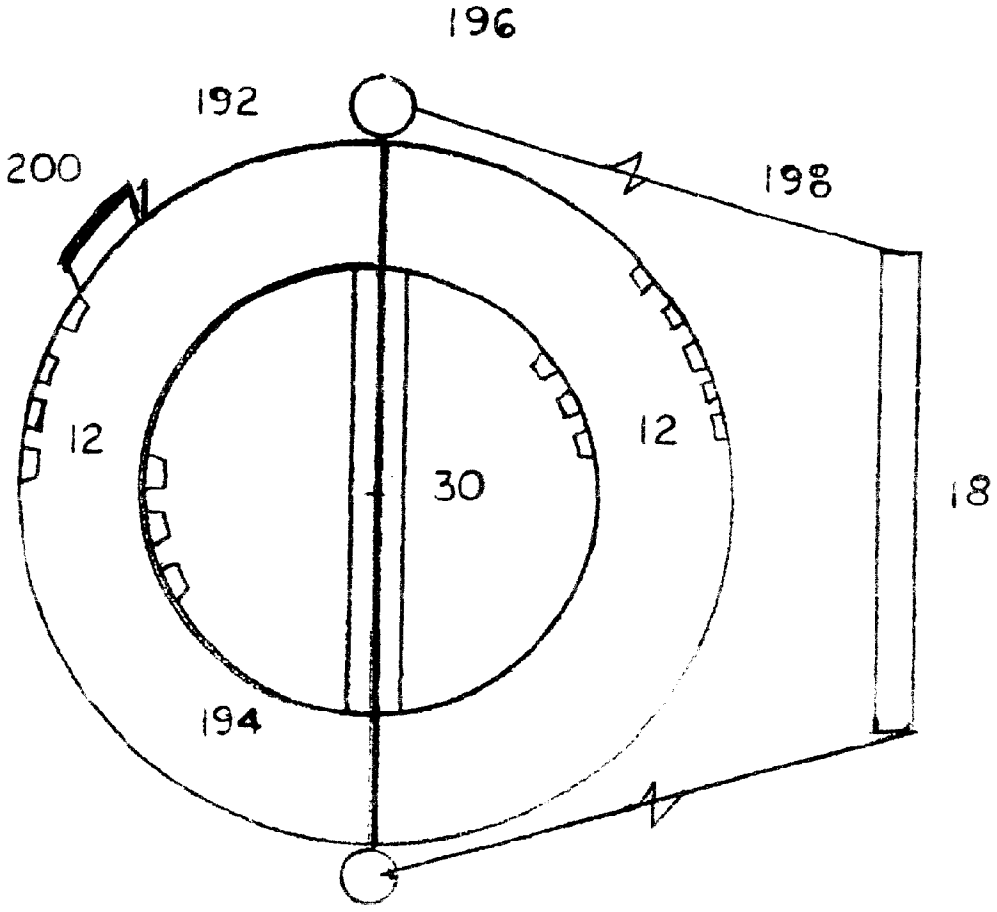


FIG. 14

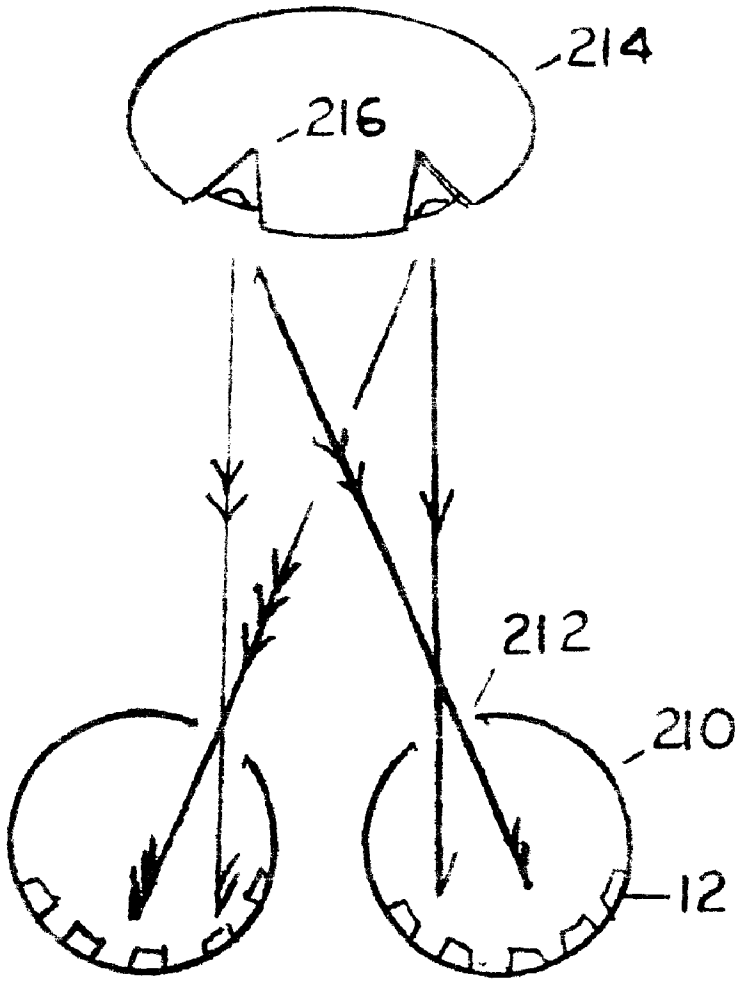


FIG. 15

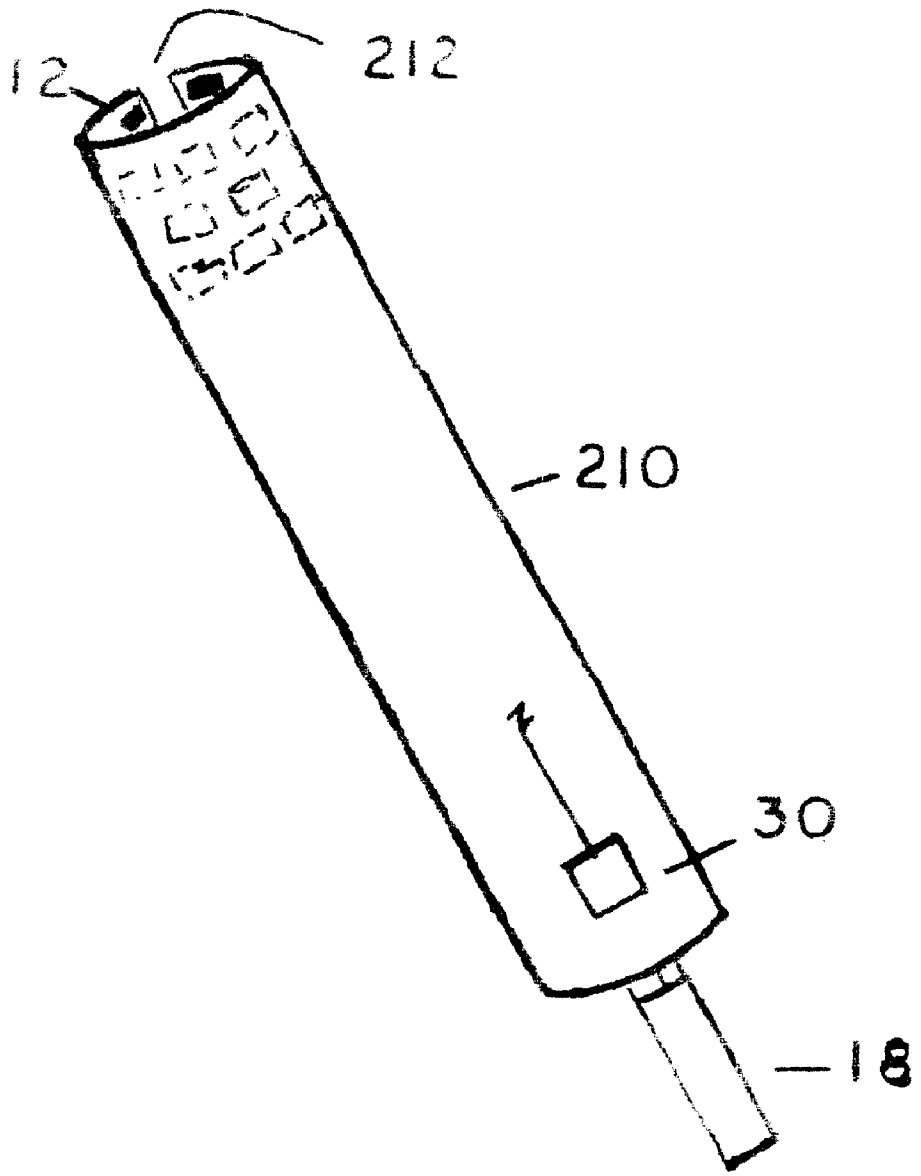


FIG. 16

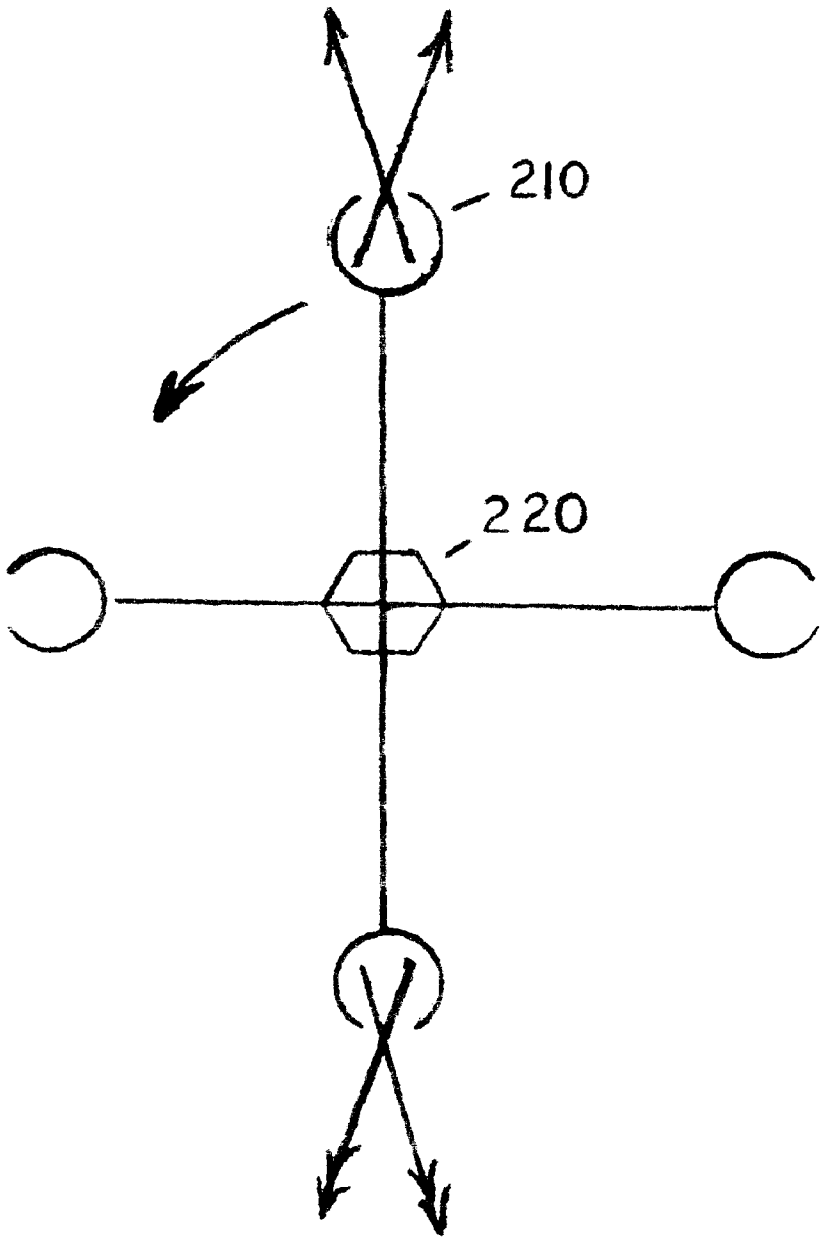


FIG. 17

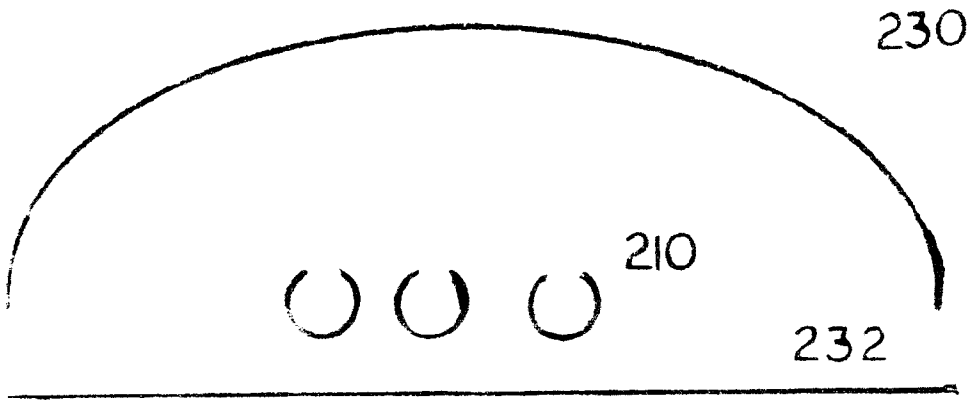


FIG. 18

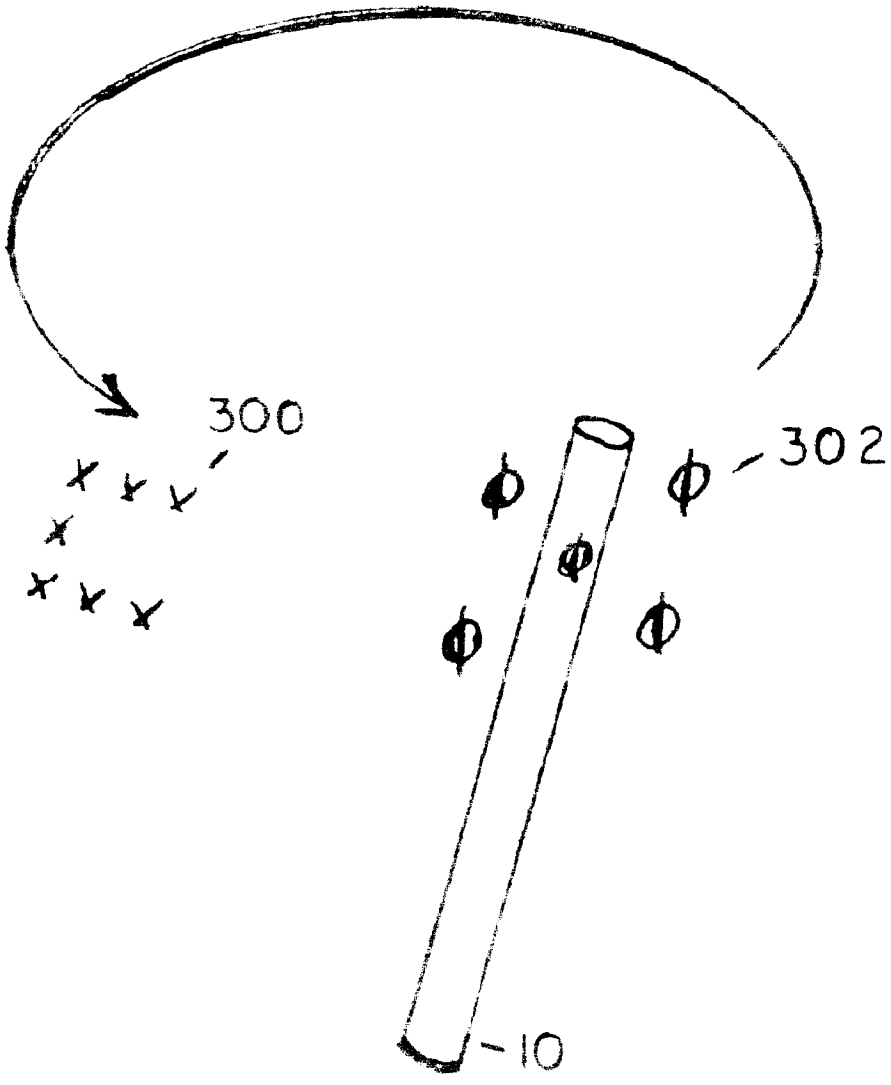


FIG. 19

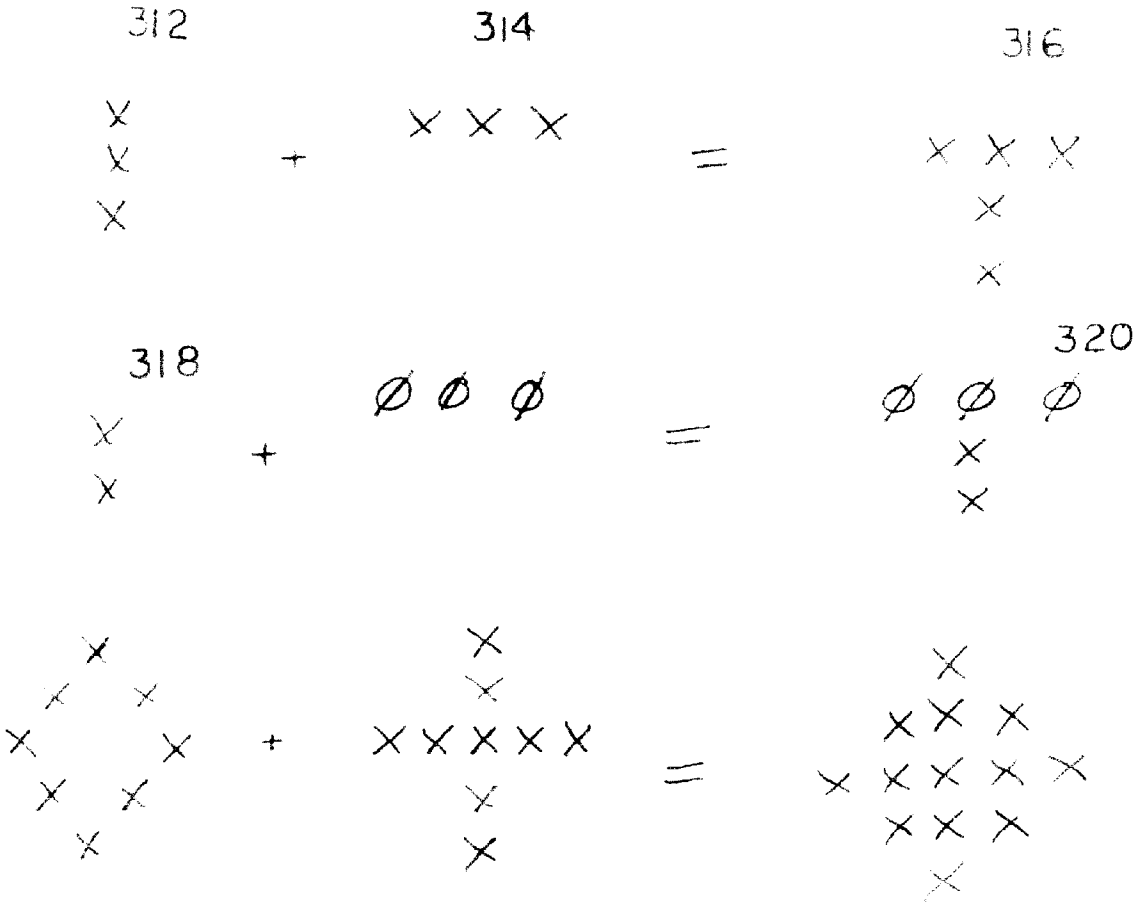


FIG. 20

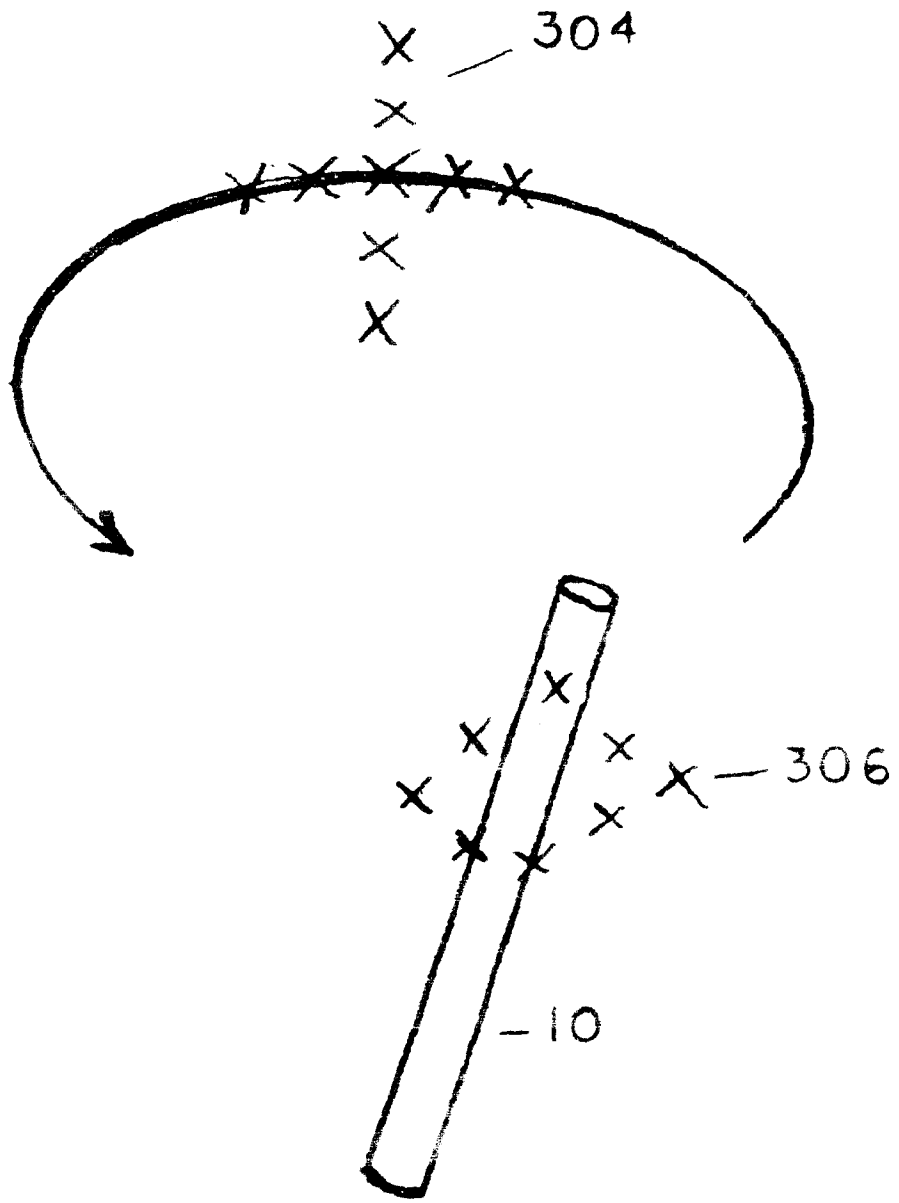


FIG. 21

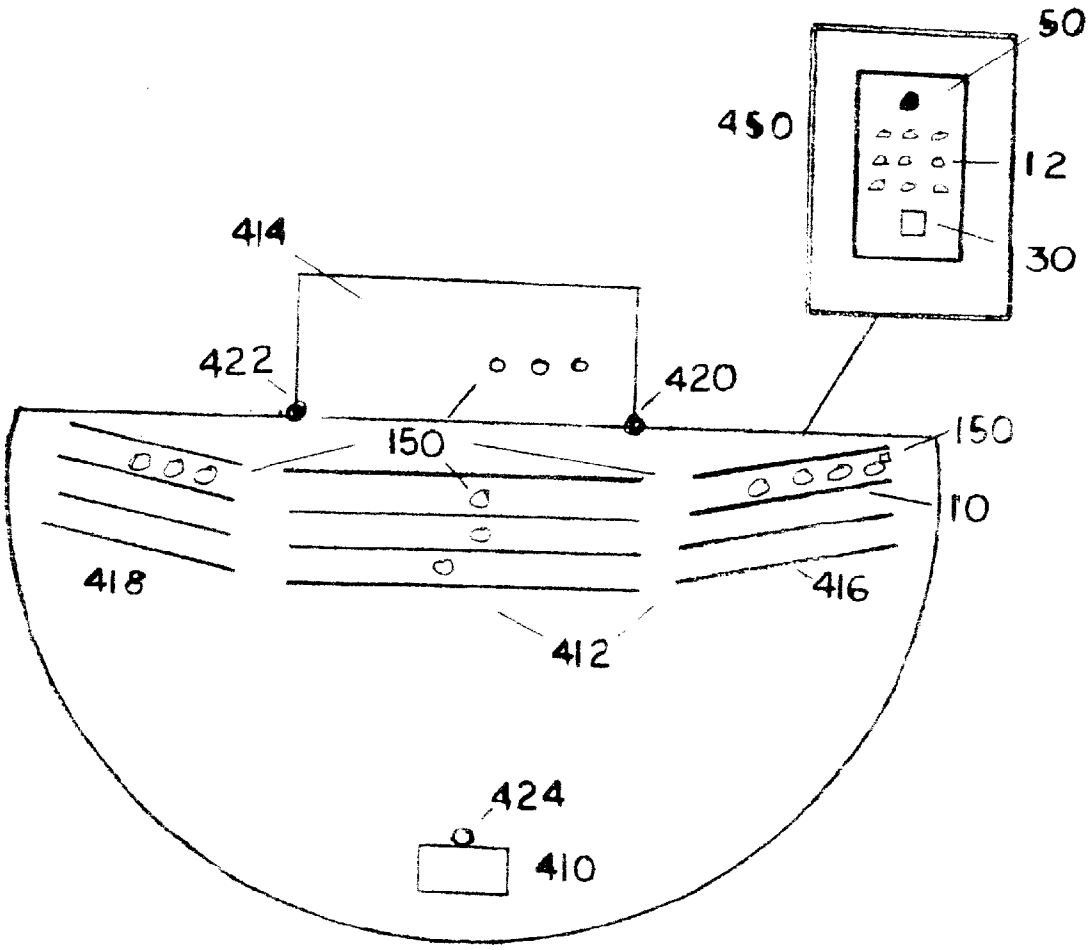


FIG. 22

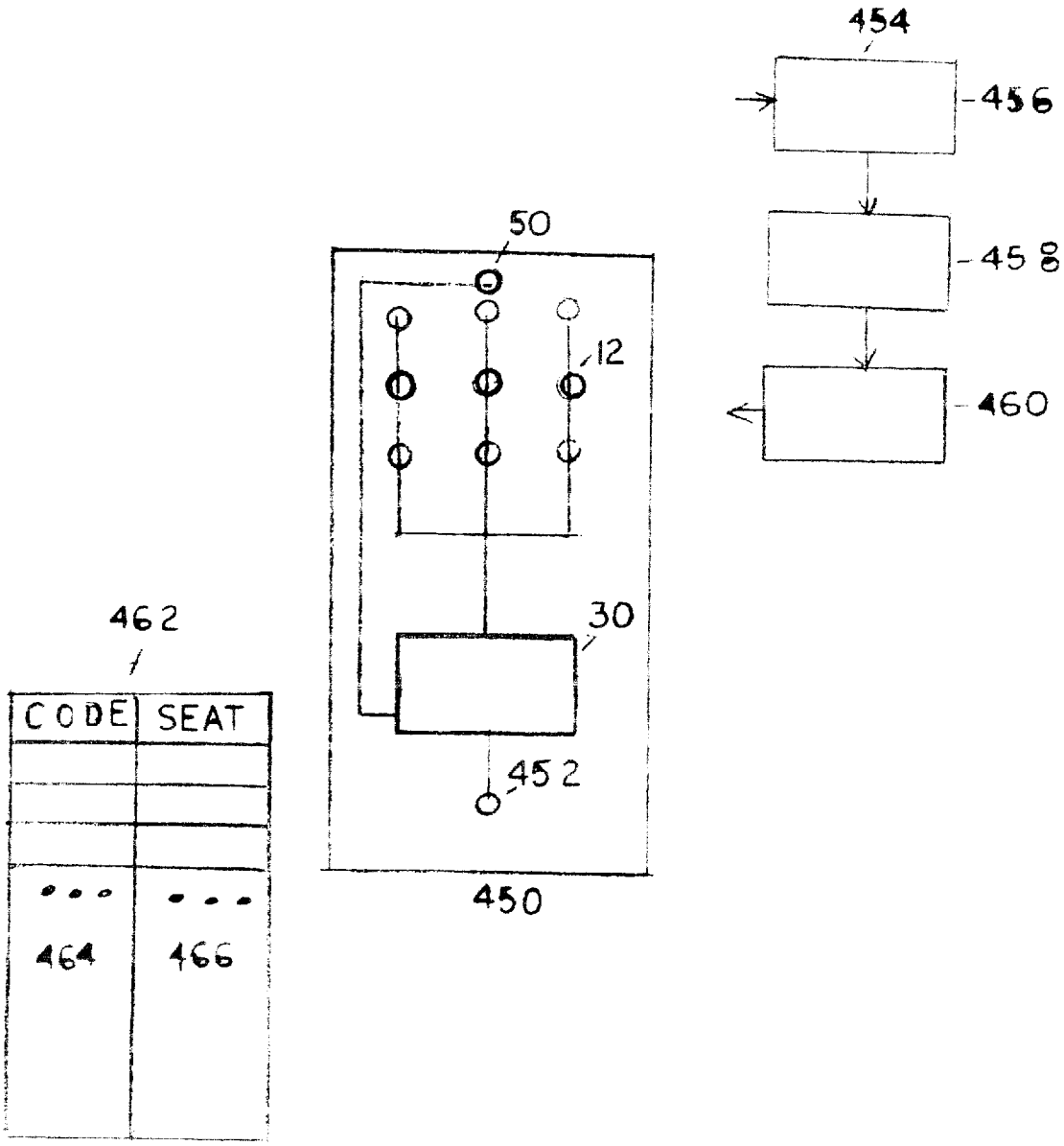
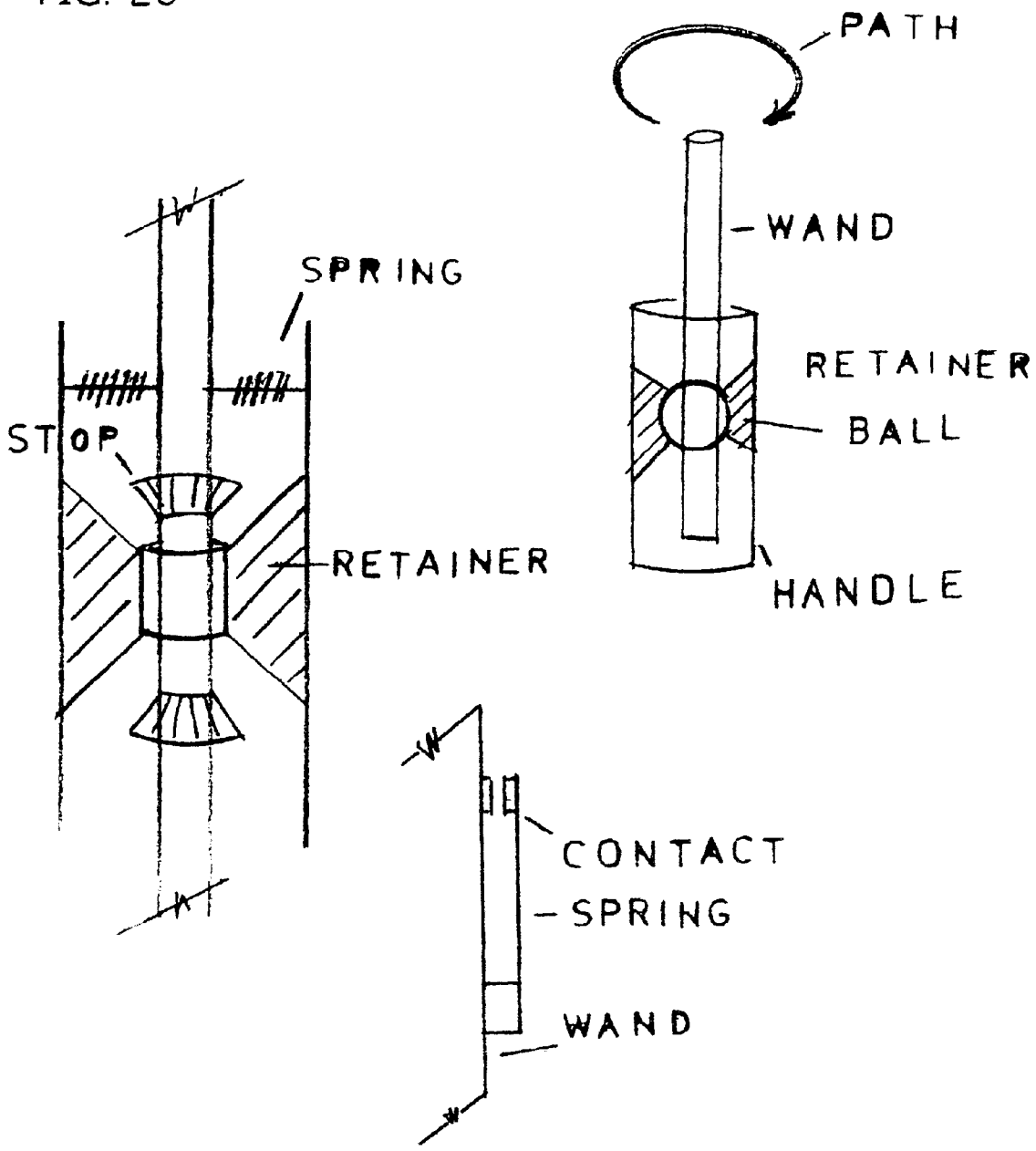


FIG. 23


PATH
WAND
SPRING
RETAINER
BALL
STOP
RETAINER
HANDLE
CONTACT
SPRING
WAND

VISUAL SPECIAL EFFECTS DISPLAY DEVICE

DESCRIPTION

1. Technical Field

This invention relates generally to display devices and more particularly to volumetric imaging devices created by moving light emitting elements.

2. Background Art

The presentation of visual images by moving display elements has a long and expansive history. Numerous inventions have been proposed which have generally been too complicated to be reliable, expensive to manufacture, without sufficient resolution, or sufficient stability to gain wide acceptance. Following the development of light emitting diodes (LEDs), a large variety of displays, A games, wands and yo-yos have been manufactured, publicly presented and patented. These inventions strobe arrays of individual light elements or pixels as the array is displaced cyclically, producing an image or pattern due to the persistence phenomenon of human vision. Sinclair in U.S. Pat. No. 3,846,784 closes one such device. Francis Duffy in his U.S. Pat. No. 3,958,235 discloses linear wand of LEDs oscillated by a door buzzer electromagnetic actuator. He anticipated that a manual actuator may be used, and subsequent to his publication numerous manual devices were produced. Edwin Berlin in his U.S. Pat. No. 4,160,973 extended the work of Duffy to both 2 & 3 devices using "rotational" or "short-distance oscillatory motion" with extensions of Nipkow's disc television. Berlin also disclosed the use of moving digital memory and electronics and a "single pulse (per cycle) . . . which adjusts the frequency of a dock (controlling the timing of each LED)". Berlin also disclosed an infrared LED data receiver including onboard memory. Berlin built a number of devices including manually activated "spinning top" type toys. Bill Bell is his U.S. Pat. No. 4,470,044 disclosed a single stationary array of LEDs with "saccadic eye movement" timing with non-claimed references to applications including wands, tops and bicycles. The Bell invention, sold by the MIT Gift Shop in the 1980s, was widely applied to spinning objects including frisbees, vehicle wheels, fans, tops, etc. Marhan Reysman in his U.S. Pat. No. 4,552,542 discloses a spinning disc toy with a centrifugal switch causing a light to be illuminated. It follows a line of inventions related to tops and yo-yos. Hiner is his U.S. Pat. No. 4,080,753 discloses a toy flying saucer with a centrifugal motion sensor.

This inventor, in his U.S. Pat. No. 4,983,031 discloses a method of data display control and method for the proper display of images to all observers in both directions for projection and LED moving displays. Numerous related hand-activated toys or educational devices incorporating centrifugal on/off switches and the IR communication method of Berlin were built and publicly displayed at the Museum of Science, the Children's Museum in Boston and the Exploratorium in San Francisco.

Recently, the techniques of Duffy, Berlin, Bell and Solomon were applied to handheld wands differentiated from the prior art by the specific detailed centrifugal switch designs. Tokimoto is his U.S. Pat. No. 5,406,300 discloses a display wand with a hall effect acceleration sensor. Sako in his U.S. Pat. No. 5,444,456 uses an inertial sensor having "a pair of fixed contacts and a moveable contact" to adjust the clock of the display electronics. While inventive and functional, the Sako design remains awkward and requires considerable energy to maintain an image. For these reasons,

it is unsuitable for entertainment, marketing and game applications. U.S. Pat. No. 5,791,966 appears to restate the teaching of Bell, Berlin, and Hiner patents in a mechanical top—a combination which has publicly constructed in the 1980s—with the addition of a combination incorporating a bar code reader for reprogramming. This narrow improvement using a bar code reader has considerable utility for low cost games and novelty items. Like the Tokimoto and Sako patents, the Capps patent demonstrates the importance of precise and limited element improvements to a crowded art.

A number of problem have remained including the development of switching methodology which permits a static on-off state, display freedom from inertial changes and a frame of reference to global orientation. None of the more recent wand patents would work properly if the wand were twirled in the air as a nightstick or a baton, or the revolution direction reversed.

SUMMARY OF THE INVENTION

The present invention discloses an improved method of creating a visual display with moving elements including an improved switching technology of greater utility, lower cost and increase performance.

Another object of the invention is an improved switching method with includes a frame of reference to global orientation.

Another object of the invention is an improved switching method with includes a direction of revolution frame of reference.

Another object of the invention is a reduction in the energy required to sustain a image.

Another object of this invention to provide a game method which enhances hand-eye coordination and other skills

A further object is the application of the method of the present invention to entertainment devices and games.

Another object is the application of the method to artistic presentations,

The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed disclosure of specific embodiments of the invention, especially when taken in conjunction with the accompanying drawings, wherein:

FIG. **1** shows a perspective view of the general wand embodiment of the present invention,

FIG. **2** shows a cross sectional view of the radial swing embodiment of the present invention,

FIG. **3** shows a cross sectional view of the baton embodiment of present invention,

FIG. **4** shows a cross sectional view of the jump rope embodiment of present invention,

FIG. **5** shows a cross sectional view of the yoyo embodiment of present invention,

FIG. **6** shows a cross sectional view of the further mechanism of the yoyo embodiment of present invention,

FIG. **7** shows a cross sectional view of the top embodiment of the present invention,

FIG. **8** shows a cross sectional view of the detailed of a top embodiment of the present invention,

FIG. **10** shows a perspective view of an interactive, remote programmed embodiment of the present invention,

FIG. **11** shows a cross sectional functional view of a pin-wheel embodiment of the present invention,

FIG. **12** shows a cross sectional functional view of a construction of the present invention,

FIG. **13** shows a cross sectional view of a multiple ring embodiment of the present invention,

FIG. **14** shows a top view of an autostereoscopic embodiment of the present invention,

FIG. **15** shows a perspective view of an autostereoscopic embodiment of the present invention,

FIG. **16** shows a top view of a rotating autostereoscopic embodiment such as a pin wheel, drum, or bicycle,

FIG. **17** shows a perspective visual pattern view of the game embodiment of the present invention,

FIG. **18** shows another visual pattern view of the game embodiment of the present invention,

FIG. **19** shows front view of displayed patterns of the game embodiment of the present invention

FIG. **20** shows another visual pattern view of the game embodiment of the present invention,

FIG. **21** shows an top stage and audience embodiment of the present invention,

FIG. **22** shows a front view of the ticket embodiment of the present invention.

FIG. **23** shows a perspective view of construction of the handle, wand and contact embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention improves the utility, cost of manufacture, performance and functionality of displacement emitter and volumetric technology by inventing a velocity-based timer interval display algorithm and a direction-based image algorithm method and developing a enabling device.

FIG. **1** shows a perspective view of the wand embodiment of the present invention. Referring to the diagram, the wand apparatus **10** supports one or more arrays of LEDs **12**, **14**, which may mounted or attached to a middle member **16** which may be of a flexible or articulated material. The middle member **16** may be a tube or other shape, constructed from an elastic nylon or other material. A handle **18** is attached to the flexible member **16**.

The LED arrays **12**, **14** are driven by image computer **30** which is constructed from components generally found in related devices are a computational unit **32** such as a microprocessor, a memory unit such as EEPROM **34**, a power source **34** such as a battery, solar cell, etc., an on/off switch.

An optical infrared, electromagnetic, radio frequency, acoustic or other known data link **50** may be employed to program or communicate between the wand **10** and a base unit not shown. Common protocols may be used.

In operation, the wand **10** is cyclically displaced in a revolution **20**, which may vary irregularly in shape from approximately linear to circular, During the dis placement LED array **12** is driven by the image computer **30** and creates a virtual image **22** by instantaneous changes in the intensity of each LED. The LEDs **12**, **14** may be arranged in distinct and complex patterns on the wand **10** including that where output **22** of LED array **12** is directed generally towards observer **26** and the output **24** of LED array **14** is directed generally towards observer **28**.

A direction and position switch **40** identifies the direction of motion and the cycle period. Many switch embodiments are envisioned and discussed further. In one illustrative preferred embodiment of the switch **40**, one or more conductive regions **42** is affixed or integrated in the middle member **16** and connected to one or more inputs of the image computer **30**. One or more conductive regions **44** are affixed to the handle **18** and to the image computer **30**, in such a manner that the deflection of the middle member **16** causes the conductive regions **42** and **44** to be displaced relatively and thereby transmit a differential signal to the image computer **30**. It should be understand that the signal transmit to the image computer may include a power on/off signal.

By measuring the differential input signal which may be voltage or current controlled, a relative measure of position and direction may be calculated. This information is then used to compute the proper spacing and initiation of the image display.

Many types of switch mechanisms may be employed. Examples include spring contacts, one or more magnets affixed to the handle **10**, with Hall type sensors or reed switches are attached to the middle member **16**, or optical encoders. The opposite orientation may also be used, where a single magnet is attached to the middle member **16**. Other alternative switch element uses a strain gauge type material to provide a differential signal. The middle member **16** may be constructed of a solid string or braided cord.

An integrated or separate circuit and switch **40** may provide an absolute position reference in the manner taught in the Berlin patent.

It should be noted that any known or new light emitting element with sufficient switching speeds and brightness may be substituted for the LEDs in arrays **12**, **14**. The switch **40** may include additional parallel or integrated motion or orientation devices such as an accelerometer, gravity direction indicator, inertial gyroscope, velocity meter, timer, photocell and other known environmental and motion monitors, which contribute to the control of information to the image computer **30**. In operation, when the invention is in motion, the switch **40** would provide these additional signals to the image computer **30**.

One or more external switches or ports **36** may be provided to permit the activitation, programming, or control by physical contact such as well known push button programming found on watches, and similar devices where the display scrolls through options, or electronic contact to a computer serial port. This external switch may be applied to all of the embodiments of the present invention.

FIG. **2** shows a simplified switch of the present invention for swing wands held by hand or a string where the switch elements include a device for measuring the force applied to the wand, which may include a mechanical switch comprised of one or more contacts **62** connected to the computer **30**, a trigger contact **66** shown as a plunger pressed against computer contacts **62**, a spring **64** which applies a pressing force, an attachment point **68** which when pulled in the direction of string handle **18** causes the trigger contact **66** to change state. An alternative embodiment may use a Hall effect, magnetic reed or optical switch proximal to the plunger in a digital threshold mode and in a measurement mode a fixed a strain gauge material. Other known methods of measuring the force applied to the wand **10** by the string handle **18** may be used.

FIG. **3** presents a preferred implementation as a entertainment wand **10** such a baton (a center symmetrical wand) may be configured where the LEDs **12**, image computer **30**, and switch **70** containing an accelerometer, an orientation/position device, and a velocity meter are incorporated. A

preferred simple embodiment of the switch design **70** for a global orientation includes a pivot point **72**, a offset mass **74**, and one or more sensors **76, 78**. In operation, the offset mass **74** pivots about pivot point **72** as the wand **10** is displaced relative to the earth's frame of reference under certain displacements, causes sensors **76, 78** to be triggers. The combination of environmental, orientation, and motion signals are used to control the text or image, direction, period and intensity of the display. In cyclical reversing operation, the start, stop and maximum times are stored and used to adjust the period of the image timing to a display a predetermined message, such as a whole word, phrase, etc., during a single cycle. Each change or stop may be used to change the message to the next word/image. In cyclical circular operation the maximum acceleration or velocity may be used as a timing period reference causing the message to be displayed within one period or a predetermined part thereof

FIG. **4** shows a cross-sectional view of a jump rope embodiment of the present invention. The handle **18** of the jump rope may contain the power supply **34**, the image computer **30** driving LEDs **12** attached to the moving rope **86**. The switch **40** may be placed at the junction between the handle **18** and the rope **86**. It may be of any of the embodiments discussed herein including an embodiment with a central rotating magnet or cam **80** and one or more sensors **82** connected to the image computer **30**. Both incremental position methods where the rope **86** or its attachment turns in relation to the handle **18** thereby incrementing the position register or period position monitoring may be employed. Gravitational sensors may be used to adjust the display of the image.

FIG. **5** shows an preferred embodiment of the present invention applied to yo-yo type devices where the yoyo disk **90** support a freely pivoted mass **74** about a low friction pivot **72** such that as the yoyo spins, the mass **74** maintains a generally fixed geocentric orientation and causes sensors **76, 78** affixed to the spinning disks **90** to send a position and direction trigger signal to the image computer **30** controlling the LED array **12**. The classic string **91** of a Yo-yo is shown. An optical (reflective or interrupter), mechanical, magnetic or other switch may be used. The same inventive combination may be applied to balls, batons, Frisbees, wands and other freely rotating or rolling devices. The mass may in form of a uniform or eccentric disk with upper and lower axial bearing, thereby functioning as a geocentric reference to the spinning device.

Another embodiment of a gravitational switch is shown on the left disk **90** using a rolling ball **96** in a cavity bounded by one or more sensor elements **92, 94**. The sensor elements may be activated by the ball **96** closing a circuit, Hall effect proximity, optical interrupt, differential signal, etc. Alternatively, an optical, conductive, or mass liquid with corresponding sensors may be used with a similar effect A gyroscope, mechanical, electronic or optical may also be placed therein, floating in the switch cavity or with external frame attachments. A force activiated switch **98** or sensor may be included as a spin indicator.

FIG. **6** shows a velocity sensor using a measuring element **102** such as a strain gauge, incremental switch, optical position sensor or other known device for measuring the force applied by ball **96** on the containing supports **92,94**. As the velocity of the yoyo, top, wand or other embodiment of the present invention increases, a corresponding variable signal is sent to the image computer **30** which responds by appropriately varying the image display rate.

FIG. **7** shows a simplified geocentric switch of the present invention applied to tops, frisbee and similar rotating devices where a centrally located, geostationary mass **110** provides a reference signal to the computer **30**. In operation, the mass **110** serves as a relatively stable spatial reference point for one or more sensors **72, 74** to provide positional and direction signals to image computer **30**. The image displayed by LED array **12** will maintain a stable spatial radial reference permitting visual image reinforcement, timing and direction ajustments.

On method that may be applied to the sensor signals **72, 74** placed close to each, is to record the sequence of sensor activation, measure the time difference between three signals (**72,74,72** for example), compute the intrasensor difference and compare. If the time difference between **72** to **74** is shorter than **74** to **72**, the n the direction of rotation of the top is clockwise from the top and the angular velocity is arc distance between **72** and **74** over the time difference. These computation may then be used to adjust the image display rates, if a sequence of signals is not received within a defined interval then the image computer may enter a sleep state.

The construction of the stable mass **110** may vary. In one preferred embodiment the mass **110** is suspended on as **112** an d bearings **113**. The sensors **72, 74** interaction may be a magnet **114** and Hall effect or magnetic activated switches. Alternatively, the sensors may be mechanically switches, field effect coils, optical encoder tpe interactions, or other known sensor device. An infrared or radio link **50** may be included to permit continuing programming.

FIG. **8** shows another preferred embodiment using a solid **120** or liquid **122** in a conical chamber **124** to trigger sensors **72, 74**. As the angular velocity increases, the movable trigger liquid **120, 122** in forced from a resting position making contact with the trigger sensors **72, 74**.

FIG. **9** shows a "golf club" embodiment of the present invention where the golf club **130** includes a piezoelectric or other impact sensitive matrix **132** connected to communication **50**, computational units, centrifugal switch, motion sensor and power supply which activate and control light emitting elements **12**. In operation, the light elements **12** which may include one or more colors are switched on by centrifugal switch **136** producing a regular timed pattern where the distance between successive images **138** reflects the velocity of the swing. On impact with the ball **140**, a different color is displayed indicating the position of the impact on the matrix **138**. The light elements **12** may be arranged in an X-Y line, visible to the player or instructor. Other patterns may be used. The computational unit **30** records the impact matrix, velocity and other information. Corrective patterns may be displayed based on the information recorded. The equal timing will show the velocity, angle of the head and path to the player/instructor. One corrective pattern would vary the timing based on the "correct" velocity providing a visual clue for the player to increase the force at a certain point. Other patterns may be employed.

FIG. **10** shows another preferred embodiment of the present invention where the LED array **12** is affixed to the arms of the person **150** and controlled by motion sensors **152** affixed to the hands interconnected to the computational unit **30**. A similar approach may be used on other parts of the body. An interactive communication unit **50** may be interconnected to the computational unit **30** which permits the remote transfer of data by radio frequency, optical, acoustic or other known methods. Acoustic sensors may be triggered by audio musical states causing preprogrammed effects and messages stored in the memory of the computational unit **30**. Alternatively, the data may be transferred outside the human auditory range.

An affixed photocell may provide reserve power storage (charging of batteries) and/or intensity or operational control based on the ambient light.

This innovation may be applied as shown in FIG. **21** with a central control program station **410**, distributed or directional (to a specific group or location—IR spot light) transmitters **420, 422, 424** and multiple independent persons **150** on stage **414** or in the audience **412** with tickets **430**, wands **10**, tops, frisbees, batons, or other embodiment of the present invention. Venues include concerts, sports events, fairs, parades, amusement parks, celebrations such as July 4, and other events where a innovative visual effect is desired. A further improvement of the present invention includes encoding an individual or group identity in each program or receiver in each ticket **430** or device (wand **10**, etc.) which would permit the grouping of devices in a target audience. See FIG. **22**. Thus a show designer could cause only the wands held by the balcony audience to light up, or those on stage left **416** to be different than those on stage right **418**. Games, messages, images could be coordinated over the audience. A permanent message may be left at the close of the performance.

A coordinated sound or tactile element such as a speaker or vibrator may be included in the improved embodiment of the present invention driven the computer **30** with a message transferred by the communication mechanism.

FIG. **11** shows a preferred construction of a rotational embodiment such as a pinwheel, helicopter, desk spinner, fan or other similar design. In a further improved embodiment, the LED array **12** spins about axis **170** driven by image computer **30** receiving position and direction signals from one or more sensors **44** and triggers **42**. A flexible arm **172** may be construction in whole or part from flexible circuit board held by strut **162**. Power may be transmitted across split transformer **164, 166** from source **34** which may be batteries or wall power. Communication and programming may be provided by infrared, acoustic or radio waves to sensor **50**.

FIG. **12** shows a preferred embodiment of construction using a circuit board material which may be folded at **180** and thereby simplify the construction of a dual sided LED **12** design.

FIG. **13** presents the multiple dimension ring embodiment of the present invention where one or more rings **192, 194** are populated by light emitters **12** and the CPU/power/switch modules **30**. The rings may be articulated, rigid or flexible and free to move relative to one another. The attachment points **196** include swivel devices, and may connect to a singular line or multiple lines **198**. Shapes other than rings, such as boxes, planes, etc., may be used. Aerodynamic shapes **200** which cause the rings **192, 194** to move in complex motions may be employed. In operation, the revolution about the line **198** may be accompanied by a rotation about the swivels **196** and internal couplings producing a complex pattern of light emitters **12**.

FIG. **14** presents a top view of a preferred autostereoscopic embodiment which may be applied at any of the embodiments of the present invention. Autostereoscopy or binocular special effects is produced by the process of binocular disparity—presenting a different image to each eye of the observer. This is accomplished by using an opaque tube **210**, which has one or more apertures **212** which may be parallel to the principal axis of the tube, a series of apertures, or other configuration for specialty applications. Internally situated light emitters **12** are controlled by an image computer (not shown). At each point in time, each eye **216** of the observer **214** sees a different set of emitters **12**. As the tube **210** traverses a path, it projects multiple unique images to each angular view.

FIG. **15** presents a perspective view of a preferred autostereoscopic embodiment which may be applied at any of the embodiment of the present invention. The autostereoscopic tube **210** is opaque, has a window **212** which may be parallel to the principal axis of the tube, a series of apertures, or other configuration for specialty applications, light emitters **12** distributed internally and control electronics and power supply **30** for the light emitters **12**. The method of operation is shown in FIG. **14** where a cross section of the autostereoscopic tube **210** is shown at two tube positions. The each eye **216** of the observer **214** views different emitters **12** shown internal in the tube **210**.

FIG. **16** shows a rotational embodiment of the preferred invention where multiple tubes **210** are attached to a rotational hub **220** and rotate about and parallel to the axis of rotation. The operation is similar to the previously discussed rotational embodiments of this invention. On a bicycle implementation the tubes **210** may rotate in the plane of wheel, parallel to the axis of rotation, or some combination thereof.

FIG. **17** shows a top section of a composite shield embodiment of the present invention where multiple tubes **210** are enclosed in a fixed or portable frame (not shown) with a rear surface, opaque or a reflector flat, parabolic, ellipsoid, or complex; and an optional front transparent cover **232**. The cover **232** may be on colored or elliptically polarized material to increase the contrast and reduce the reflection of ambient light.

Another preferred embodiment of the present invention discloses a game method designed to enhance hand-eye coordination and provide entertainment. Generally, the embodiment measures the periodicity and frequency of the players wand motion while providing visual feedback.

FIG. **18** shows a two pattern embodiment of a "C" **300** and an "X" **302** whose position is controlled by the image controller **30** based on various game strategies. In one embodiment, when the user operates the wand **10** at the correct frequency for the designated period of time, the "C" will move to superimpose with the "X". In an alternative embodiment, the level of proficiency is controlled by the computational unit **30** based on the user's history. Multiple colors may be used for each pattern. Many other configurations, styles and games are envisioned.

FIG. **19** shows a limited number of alternative patterns where column **312** combines with row **314** to produce a letter T **316**. Pattern **318** in red, for example and pattern **320** in green produce a red and yellow T using the color persistence of human vision. This effect may be used to produce some complex images including moving objects in space. For example,

1. at least one patterns, displaying twice per cycle, designed to be superimposed
2. a speed & proficiency control setting (a potentiometer, timer incrementor, etc)
3. a superimposed duration memory and setting to indicate success
4. a method (pattern change, independent lights, to indicate success
5. a on/off indicator having one stationary contact and one moving contact.
6. having at least two colors
7. having an animation—pac man type

FIG. **20** shows a two pattern embodiment of a "+" **304** and an "0" **306** whose position is controlled by the image controller **30** based on various game strategies. In one embodiment, when the user operates the wand **10** at the correct frequency for the designated period of time, the "+" will distally move to superimpose with the "0".

FIG. **21** is referenced under FIG. **10**.

FIG. **22** shows a front view of the ticket embodiment of the present invention. On or embedded in each ticket **450** (or wand, coaster, bookmark, ruler, etc.) is a data receiver **50**, an computer **30**, one or more identifiable light emitters **12**, an optional speaker or vibrator element **452**, or other optional computer controlled device. The program **454** receives the common signal **456** which may be an infrared carrier frequency or other pattern, and tests its identity code. If the code matches, the ticket **450** follows the transmitted program or instructions. Each ticket **454** may be sold with a existing identity code according to seating, may be programmed live according to the seating position, or may be referenced by a lookup table **462** which associates the ticket identity code **464** to the seat location **466**. This improvement permits the show designer to develop unique and specific effects which predictably move through and are coordinated throughout the audience, the venue and the stage.

FIG. **23** shows the alternative detailed constructions of the displaceable wand and handle connection as generally shown in FIG. **1**.

Other embodiments of the mechanism are envisioned within the embodiments presented. For example, a simplified single spring reed switch of the present invention where general mounting of the single stationary contact is provided perpendicular to the general direction of translocation, a moveable reed contact which may have a local increase in mass, a non-conductive spacer and electronic leads extend to the computational control electronics. In operation, when the display is translocated in direction with sufficient acceleration or deceleration to overcome the resistance of spring reed contact the switch is closed. One advantage of this invention is that the off state of the switch is maintained regardless of orientation or normal vibration.

Summary of Embodiment Combinations

The preferred wand embodiment with acceleration/frequency/velocity/orientation measure

On a string

With 2D–>3D planar structure which rotates from airfoil

On a bicycle

With a generator

With a photocell

Programmable with Names

On pedals-under the shoe

With wings-aerodynamically extends-fiber optic tip with gravimeter

With Accelerometer

Cycle through messages

Different Messages/Patterns on increase/decrease

Sword with correct outward messages on left/right swings as a Clock

As an advertising tools

Autostereoscopic tube

as wand

as tube (multiple) on platform as TV, clock, message board

as Tube (multiple) rotating at focus of elliptical mirror/lens

as Tube (multiple) rotating at focus of parabolic mirror/lens

as Tube (multiple) rotating at focus of complex mirror/lens

A high performance, moving volumetric display method may incorporate all of the enumerated components, which together permit a substantial advance in the current technology. Improvements in the use of image memory, update and refresh rates, computer processor utilization are shown in the method. The display apparatus implements the method providing improvements in the high contract display, utilization of light emitter elements, simplicity of construction, minimization of mechanical components, and reproducible precision for static as well as moving platforms.

All the embodiments may include common toy embellishments such as coordinated sounds, multiple colors and decorative patterns.

The embodiment of the invention particularly disclosed and described herein above is presented merely as an example of the invention. Other embodiments, forms and modifications of the invention coming within the proper scope and spirit of the appended claims will, of course, readily suggest themselves to those skilled in the art.

What I claim is:

1. A handheld, swing display device comprising a plurality of light emitting

means mounted on a support member for providing a virtual image of characters or figures through a swing arc;

computer means for controlling said light emitting means;

activation means for initiating or controlling the light emitting means;

and autostereoscopic means for producing a multiplicity of views distinct to each eye of the observer.

2. A handheld, swing display device in accordance with claim **1**, further comprising a plurality of autostereoscopic means for producing a multiplicity of views to observers on different sides of the operator.

3. A handheld, swing display device in accordance with claim **1**, further comprising a means for rotating said autostereoscopic means about an axis.

4. A handheld, swing display device in accordance with claim **1**, further comprising an opaque tube means, an aperture means and a plurality of light emitting means positioned within said tube means.

5. A handheld, swing display device in accordance with claim **3**, further comprising one or more autostereoscopic means projected upon an enclosed reflective surface means.

6. A handheld, swing display device in accordance with claim **1**, further comprising an activation means having multiple conductive regions affixed to a first member and a conductive region affixed to a second members providing radial position data to said computer means.

7. A handheld, swing display device in accordance with claim **6**, further comprising a computer memory means to record a sequence of signals from said activation means.

8. A handheld, swing display device in accordance with claim **6**, further comprising a game program means wherein the motion of said device is monitored by said image computer means and the user superimposes successive virtual images created by said device.

9. A handheld, swing display device in accordance with claim **1**, further comprising a computer memory means to record a sequence of signals from said activation means.

10. A handheld, swing display device in accordance with claim 1, further comprising a game program means wherein the motion of said device is monitored by said image computer means and the user superimposes successive virtual images created by said device.

11. A handheld, swing display device in accordance with claim 1, further comprising a computer memory means to record a sequence of signals from said activation means.

12. A handheld, swing display device in accordance with claim 1, further comprising a data receiver means for receiving an external signal.

13. A handheld, swing display device in accordance with claim 12, further comprising an identity code means for encoding an identity code.

14. A handheld, swing display device comprising a plurality of light emitting

means mounted on a support member for providing a virtual image of characters or figures through a swing arc;

computer means for controlling said light emitting means;

activation means for initiating or controlling the light emitting means having multiple conductive regions affixed to a first member and a conductive region affixed to a second member, such that the deflection of the first member causes the conductive regions to be displaced relatively to the second member to provide radial position data to said computer means.

15. A handheld, swing display device in accordance with claim 14 further comprising a data receiver means for receiving an external signal.

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