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Martino

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(54) **SELF-PROPELLED FOOTBALL WITH INTERNALLY DUCTED FAN AND ELECTRIC MOTOR**

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A63B 71/02 (2006.01)

(52) **U.S. Cl.** **473/570**; 473/613

(58) **Field of Classification Search** 473/570, 473/613; 273/108.4, 317.5
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,884,466	A		5/1975	MacDonald et al.
4,736,948	A		4/1988	Thomas
4,923,196	A		5/1990	Rohring
5,133,550	A		7/1992	Handy
RE34,383	E		9/1993	Rohring
5,269,514	A		12/1993	Adler et al.
5,779,576	A		7/1998	Smith, III et al.
6,010,419	A		1/2000	Rappaport et al.
6,024,660	A	*	2/2000	Romanick 473/596
6,120,398	A		9/2000	Myers
6,157,898	A	*	12/2000	Marinelli 702/141
6,669,587	B2		12/2003	Kessler

* cited by examiner

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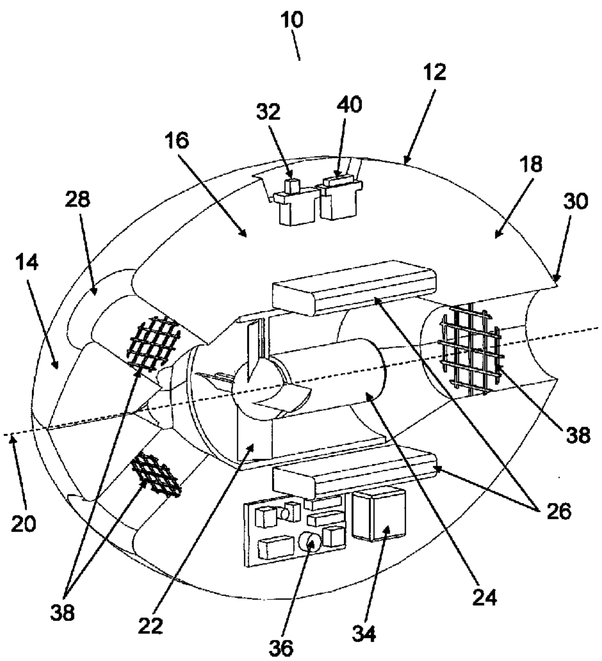
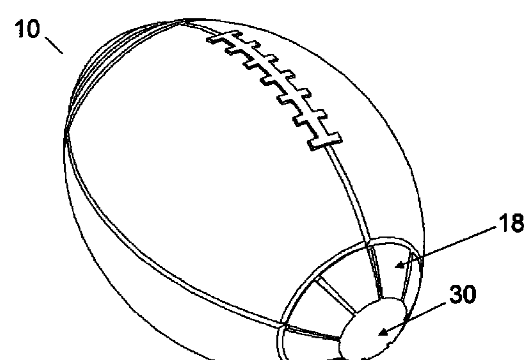
(57) **ABSTRACT**

Disclosed is a self-propelled football with an internally ducted fan and electric motor. An exemplary embodiment has an oblate spheroidal body. The body has a front section, a center section, a back section, and a longitudinal axis. The ducted fan is located within the body substantially within the center section and substantially along the longitudinal axis. The electric motor is located within the body and mechanically coupled to the ducted fan. At least one electrical power source is located within the body and electrically coupled to the electric motor. At least one air-inlet is located within the front section of the body in airflow communication with the ducted fan. At least one air-outlet is located within the back section of the body in airflow communication with the ducted fan. A means for automatic activation and deactivation of the electrical motor is located within the body.

18 Claims, 12 Drawing Sheets





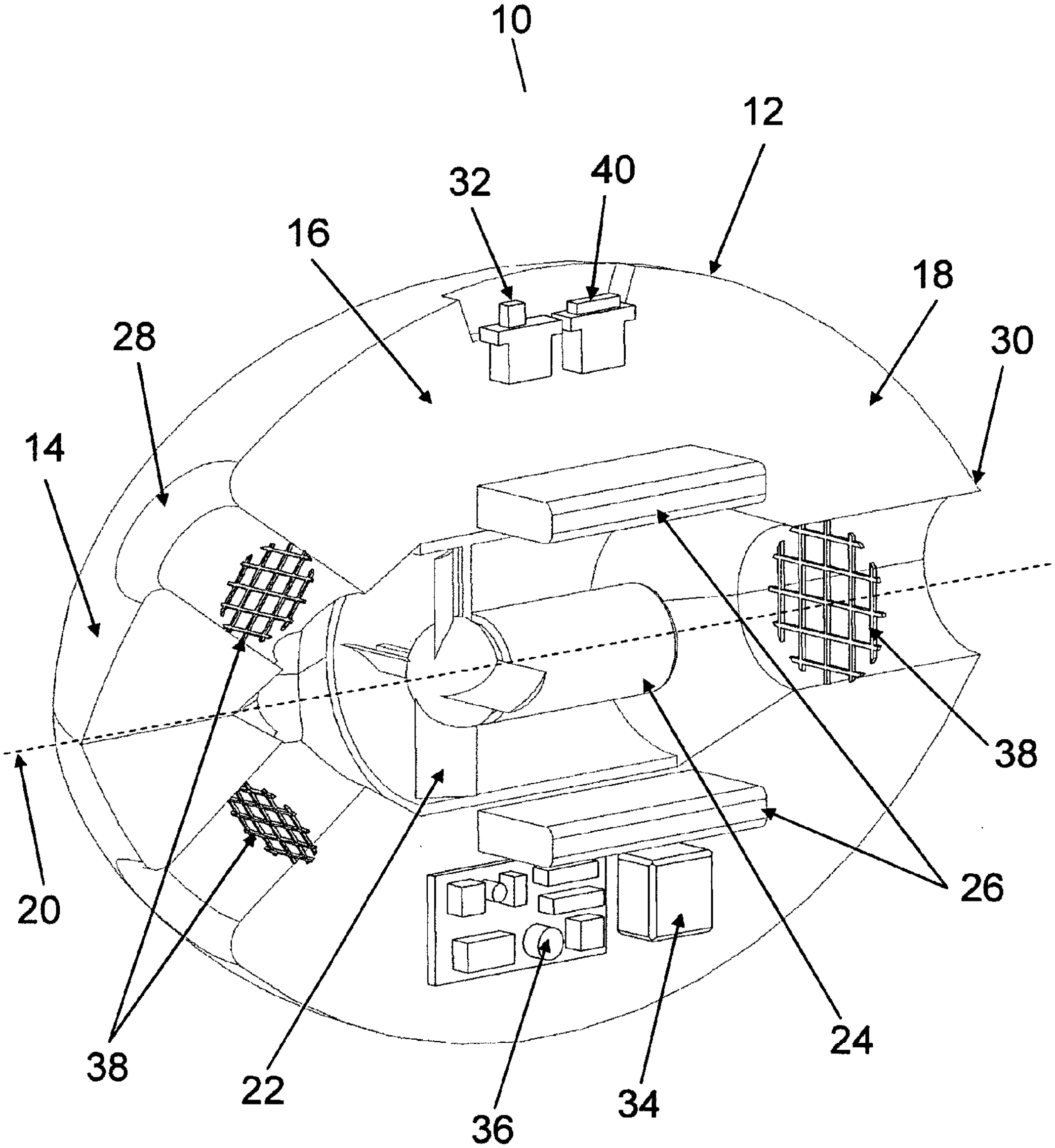


FIG. 1

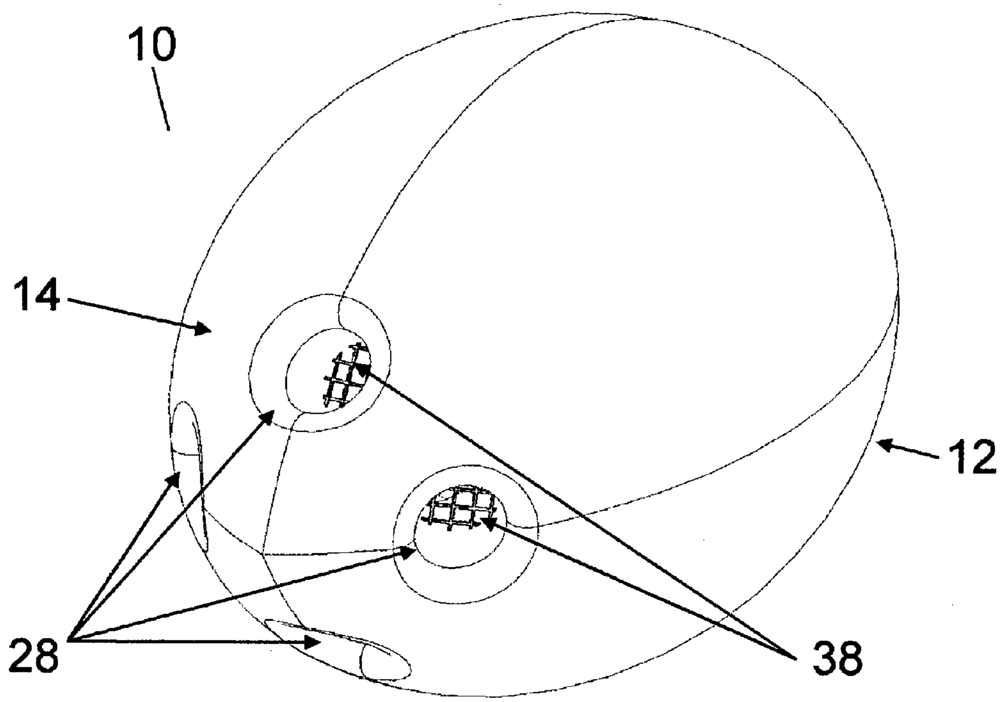


FIG. 2

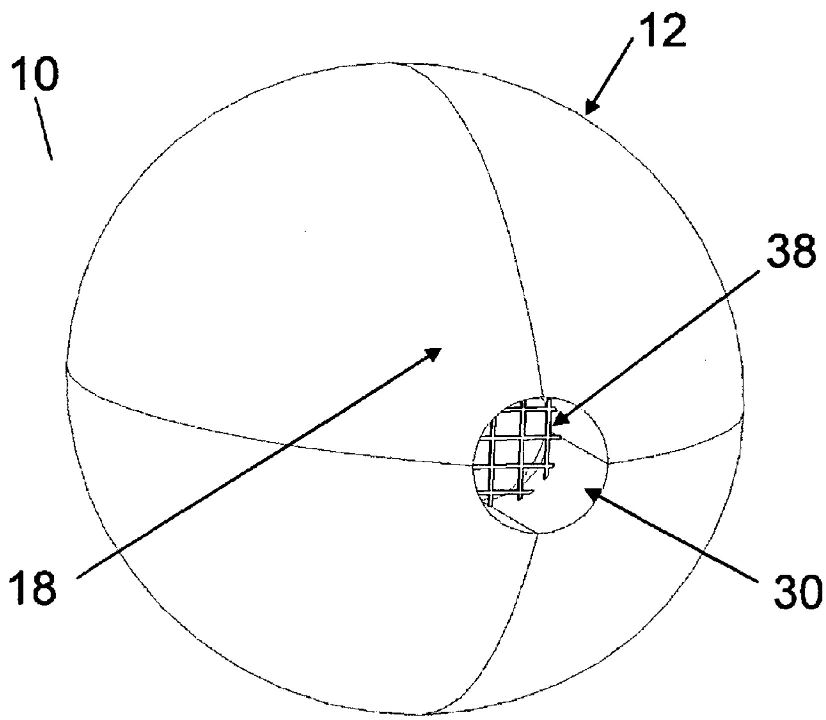


FIG. 3

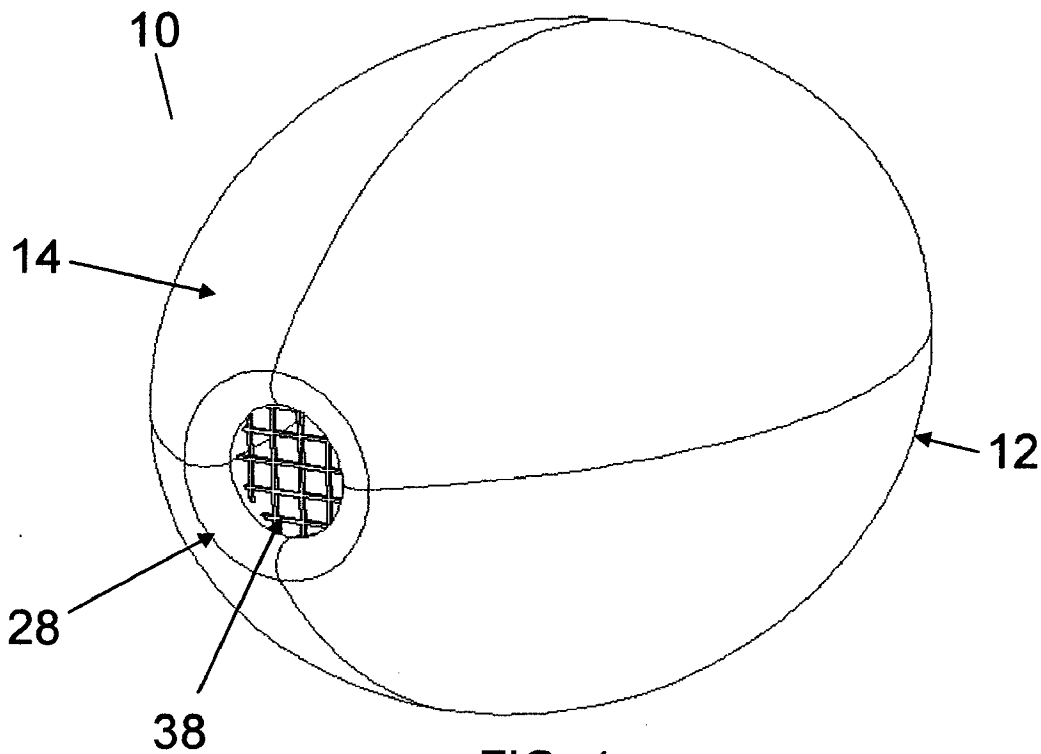


FIG. 4

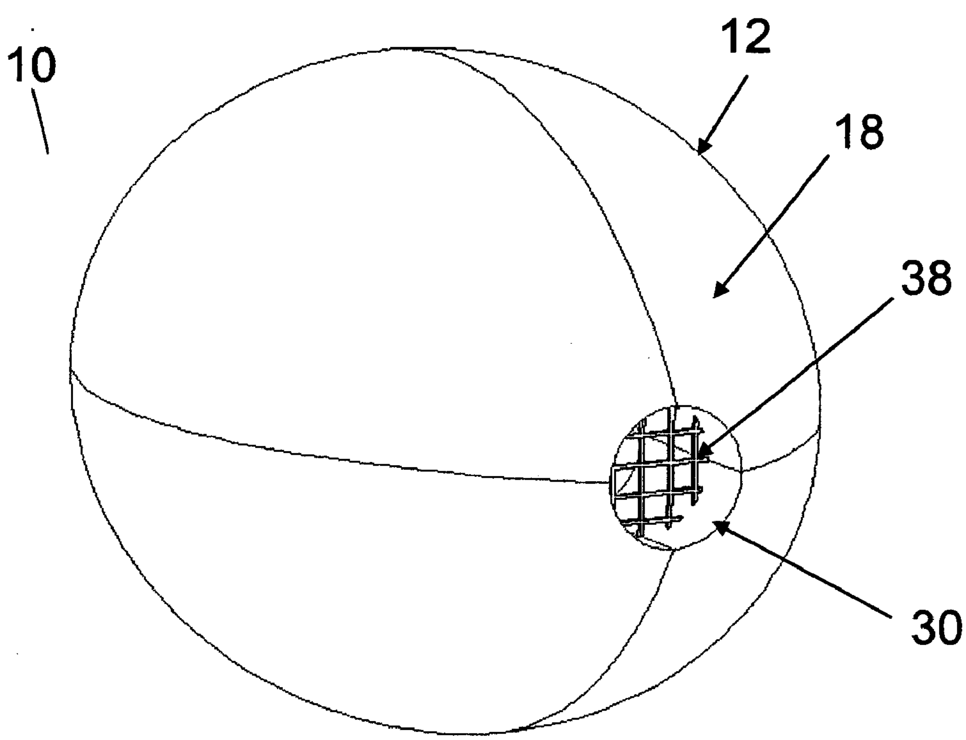


FIG. 5

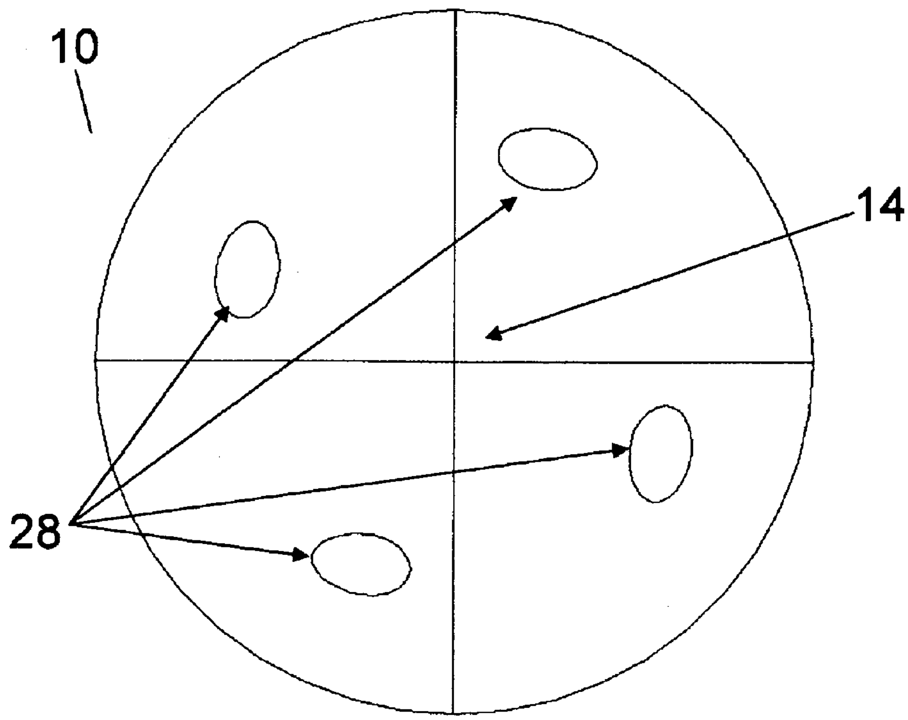


FIG. 6

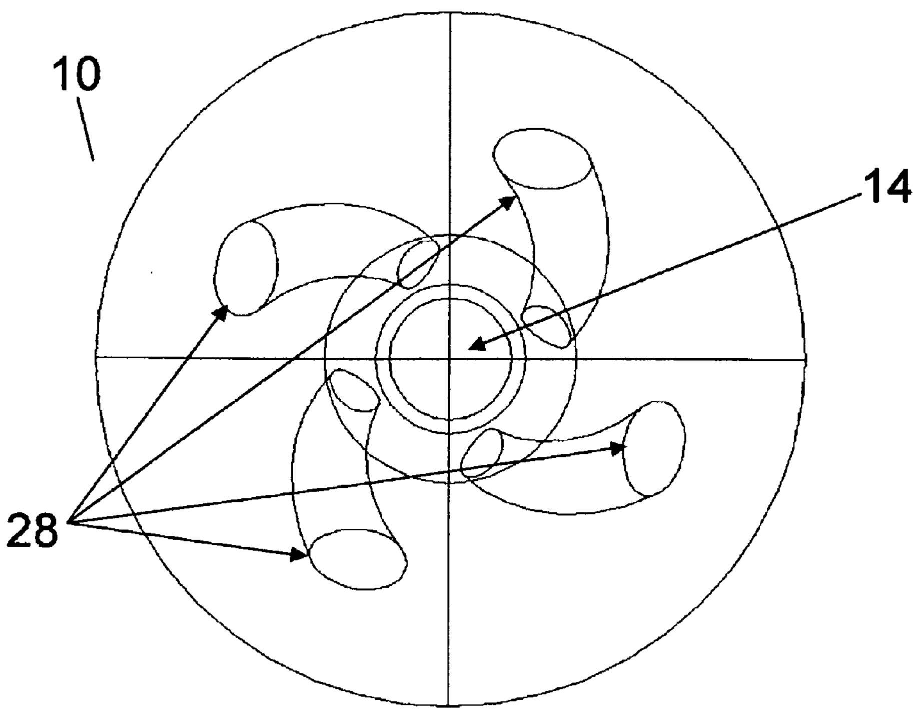


FIG. 7

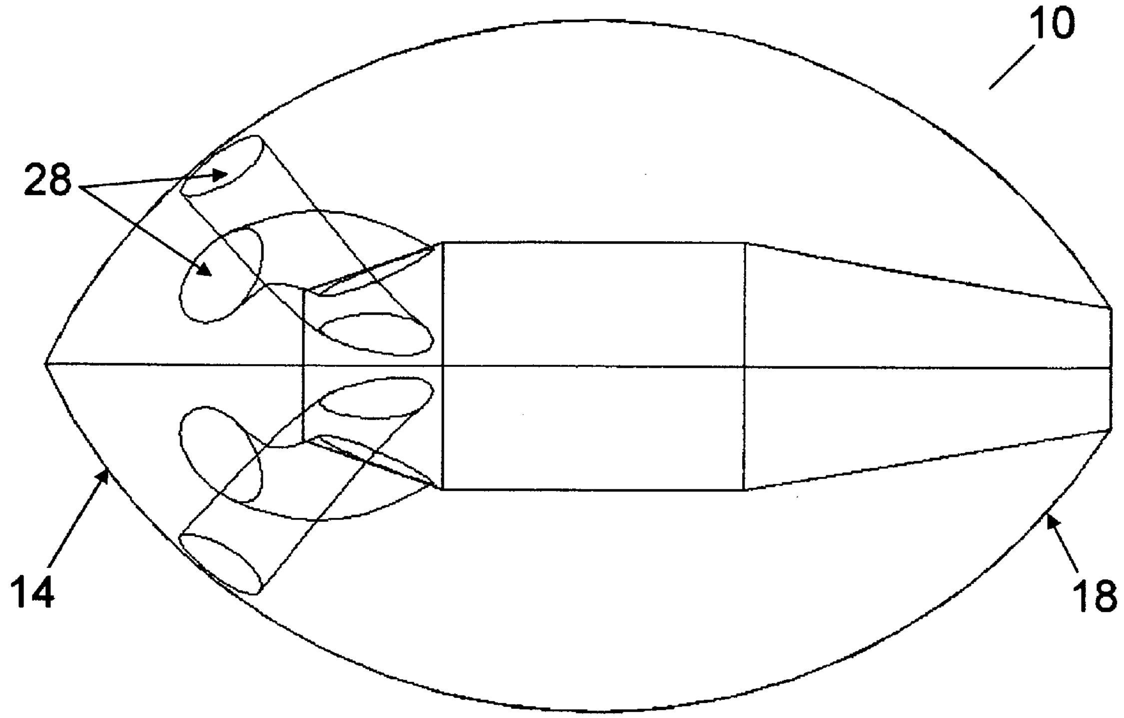


FIG. 8

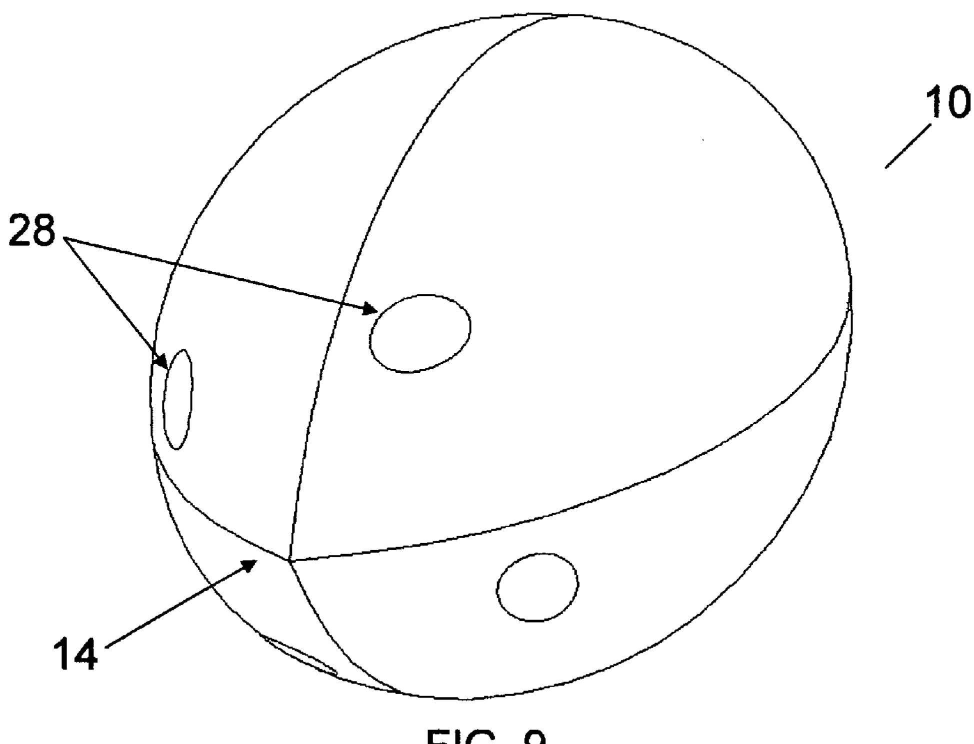


FIG. 9

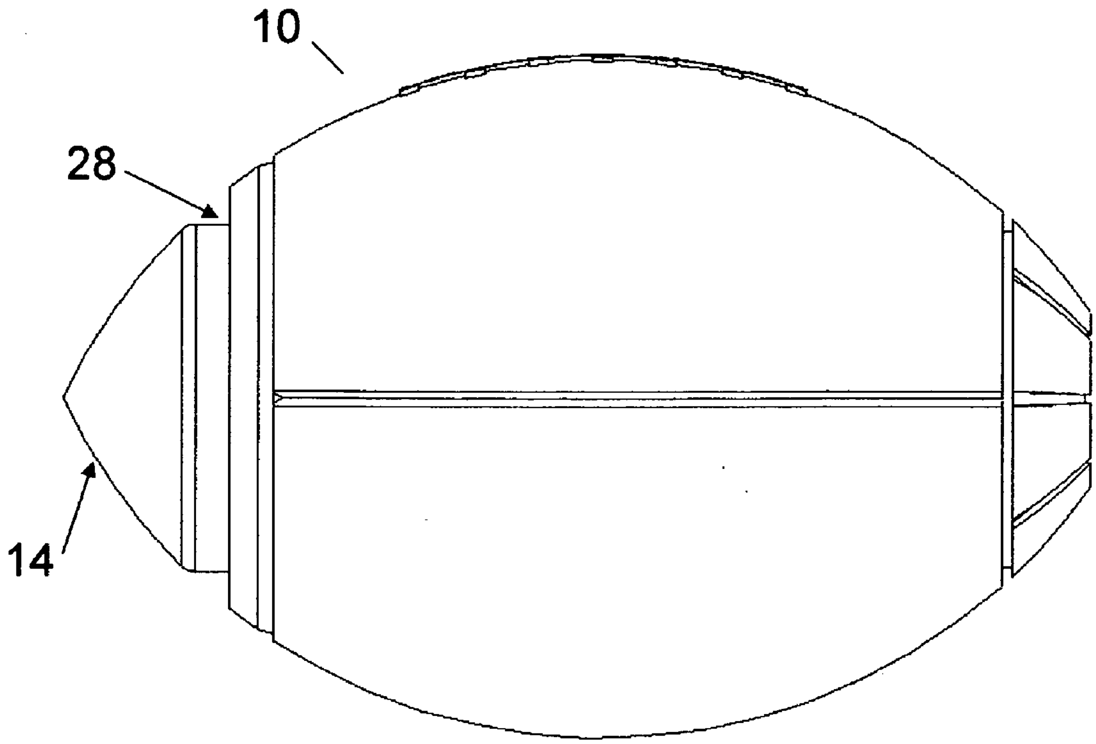


FIG. 10

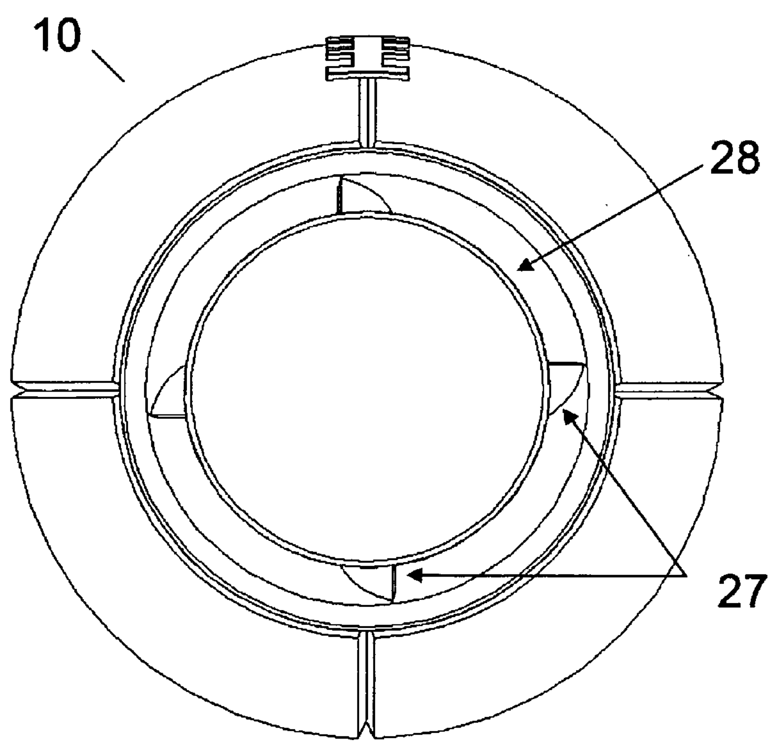


FIG. 11

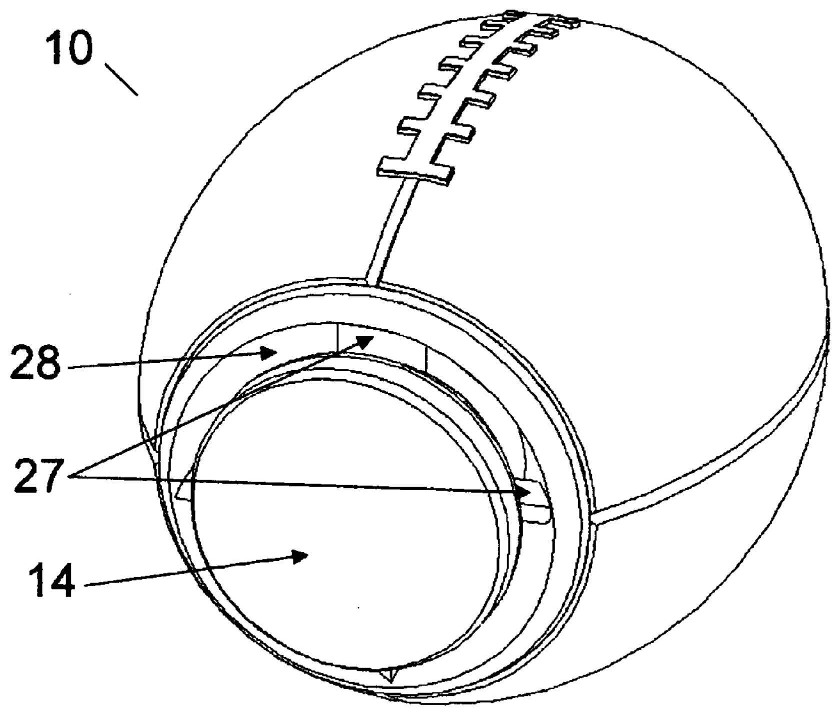


FIG. 12

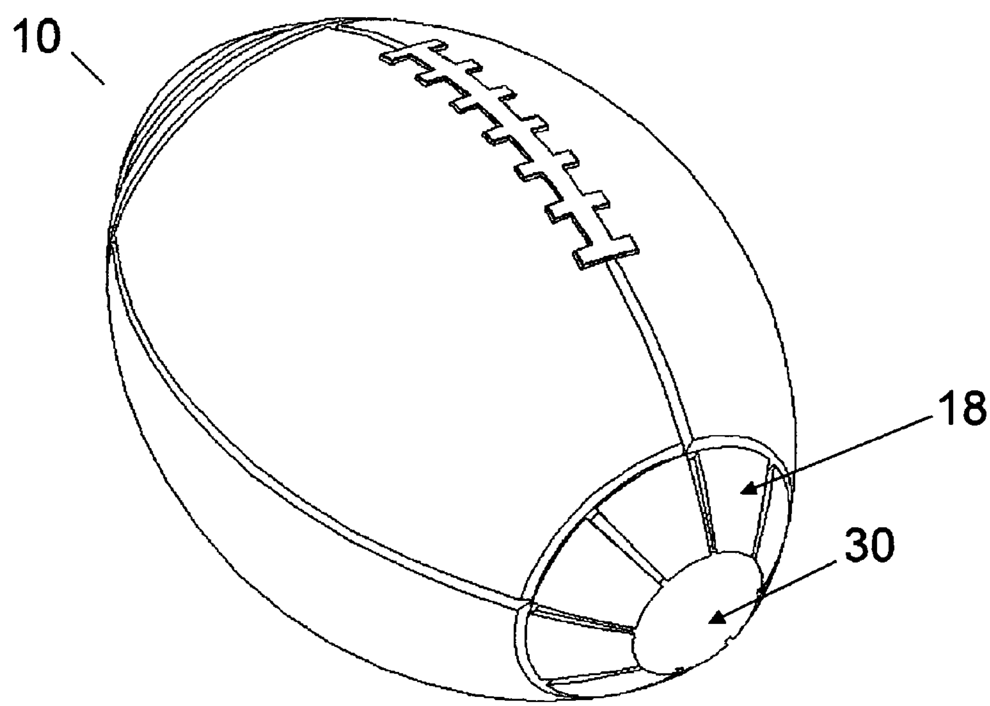


FIG. 13

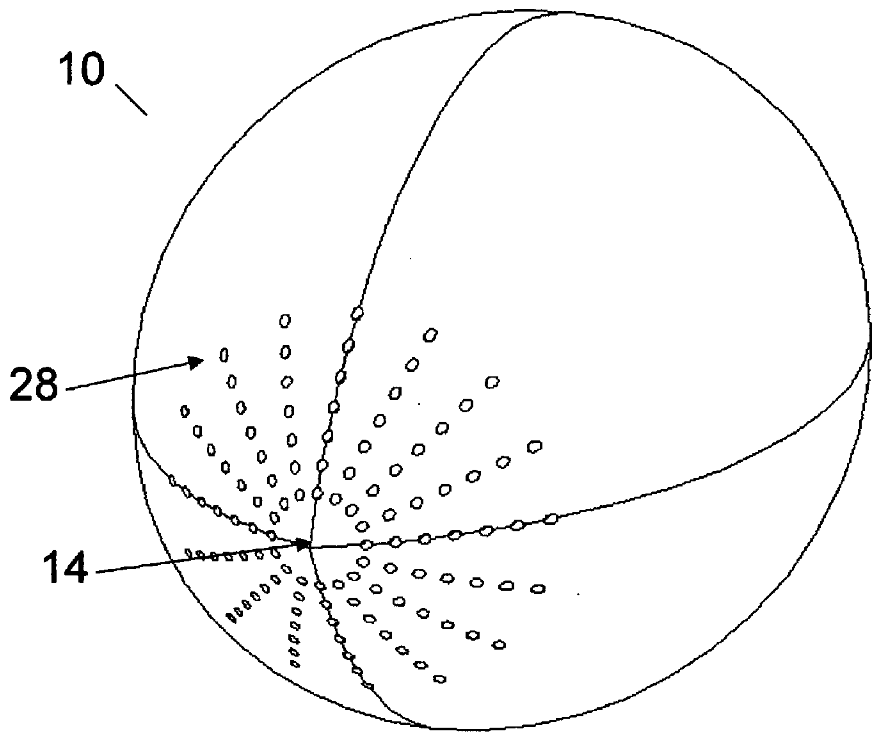


FIG. 14

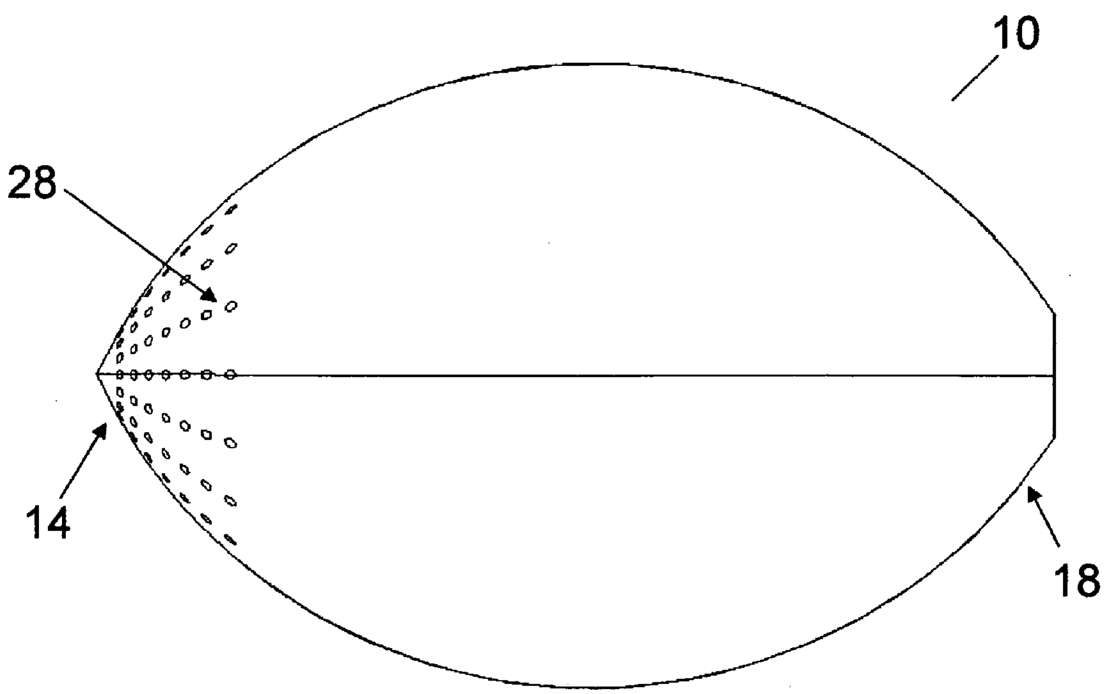


FIG. 15

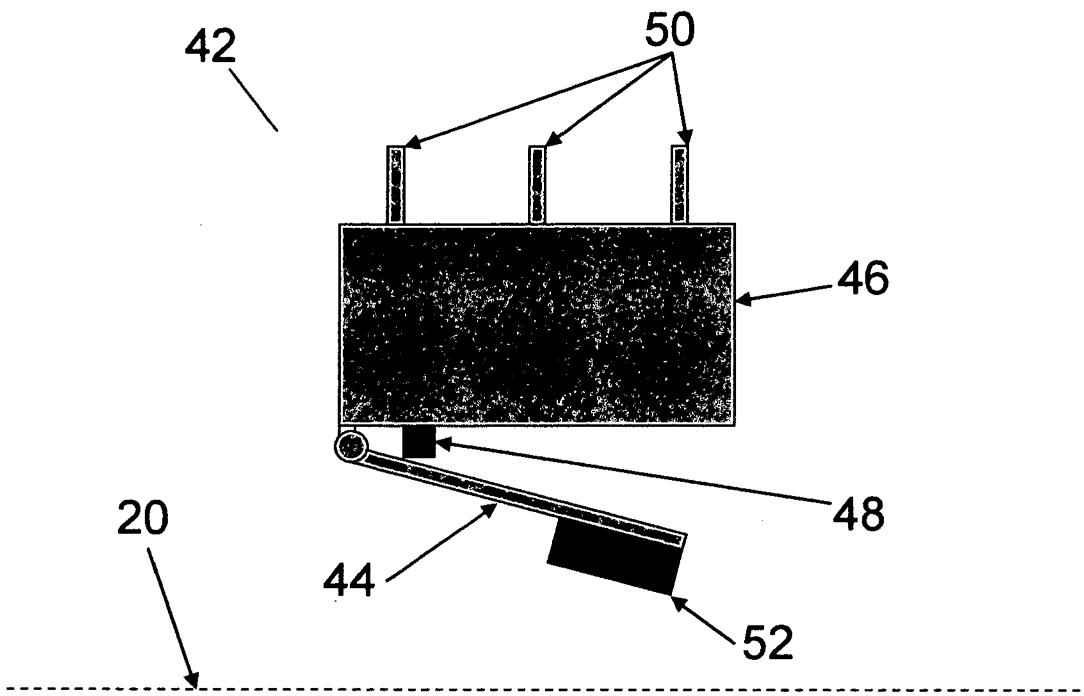


FIG. 16

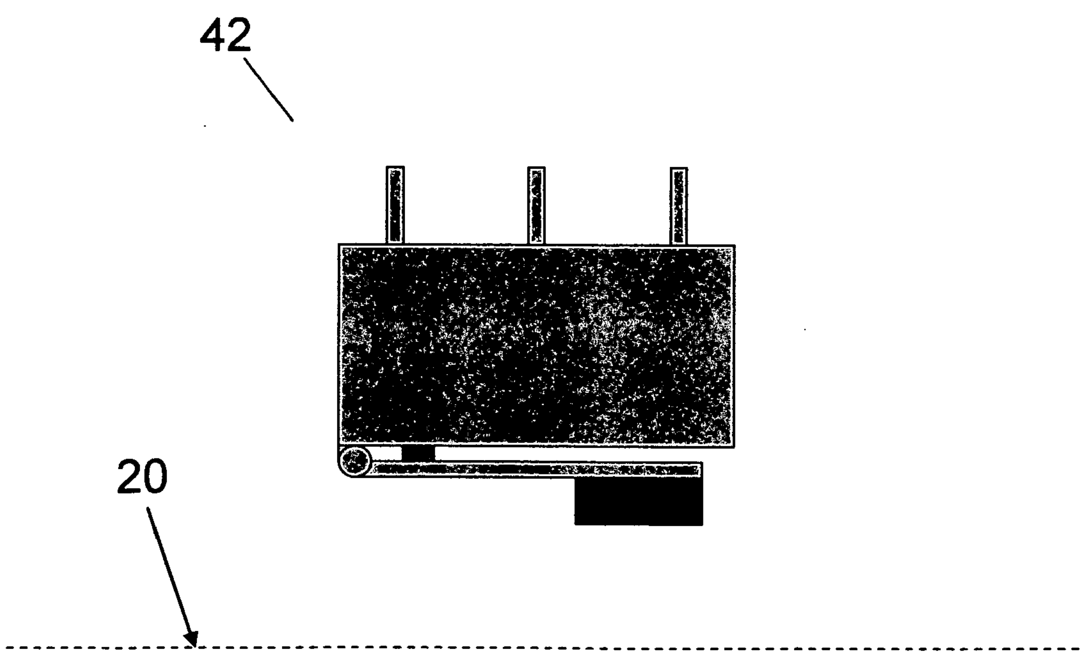


FIG. 17

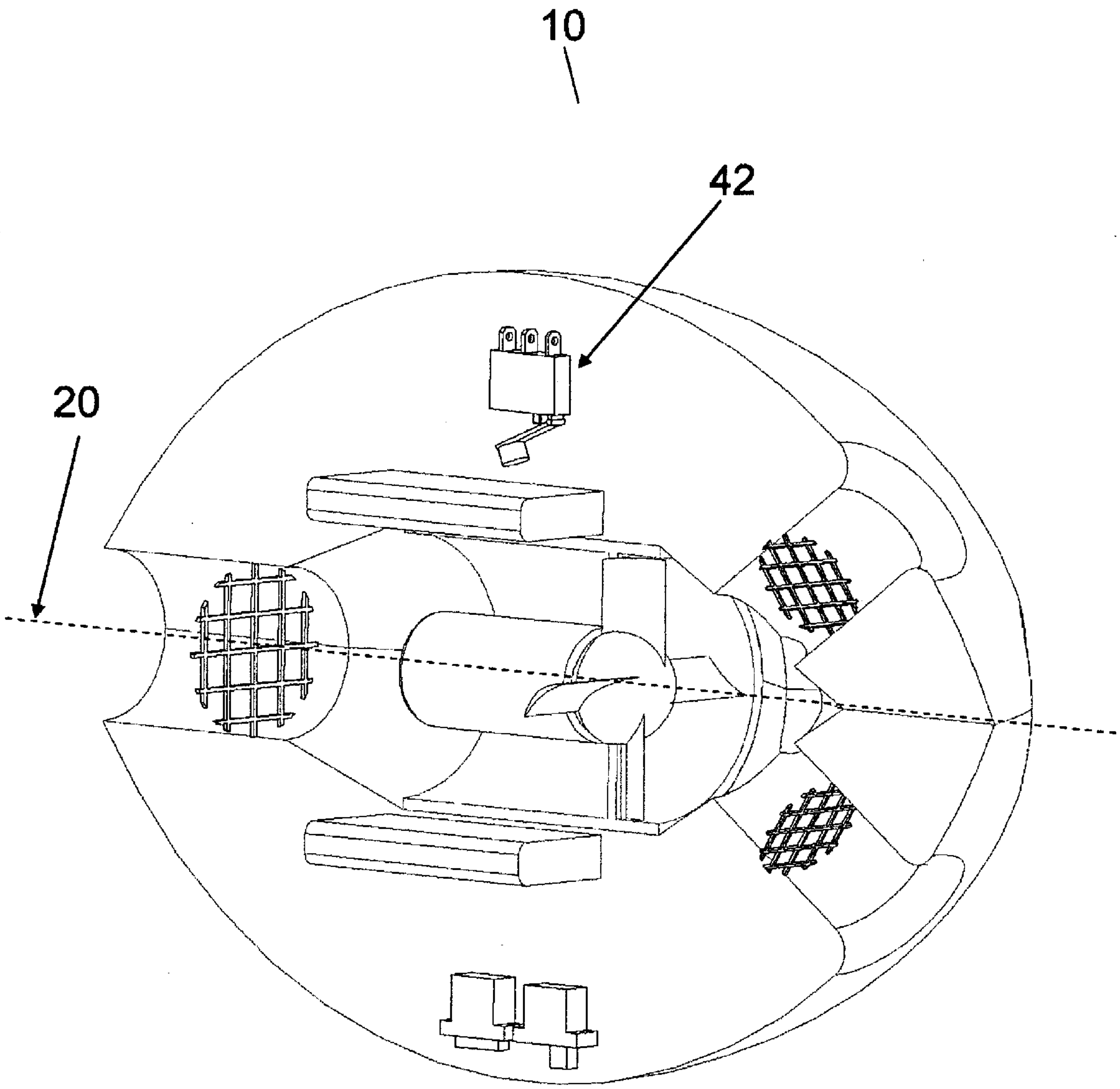


FIG. 18

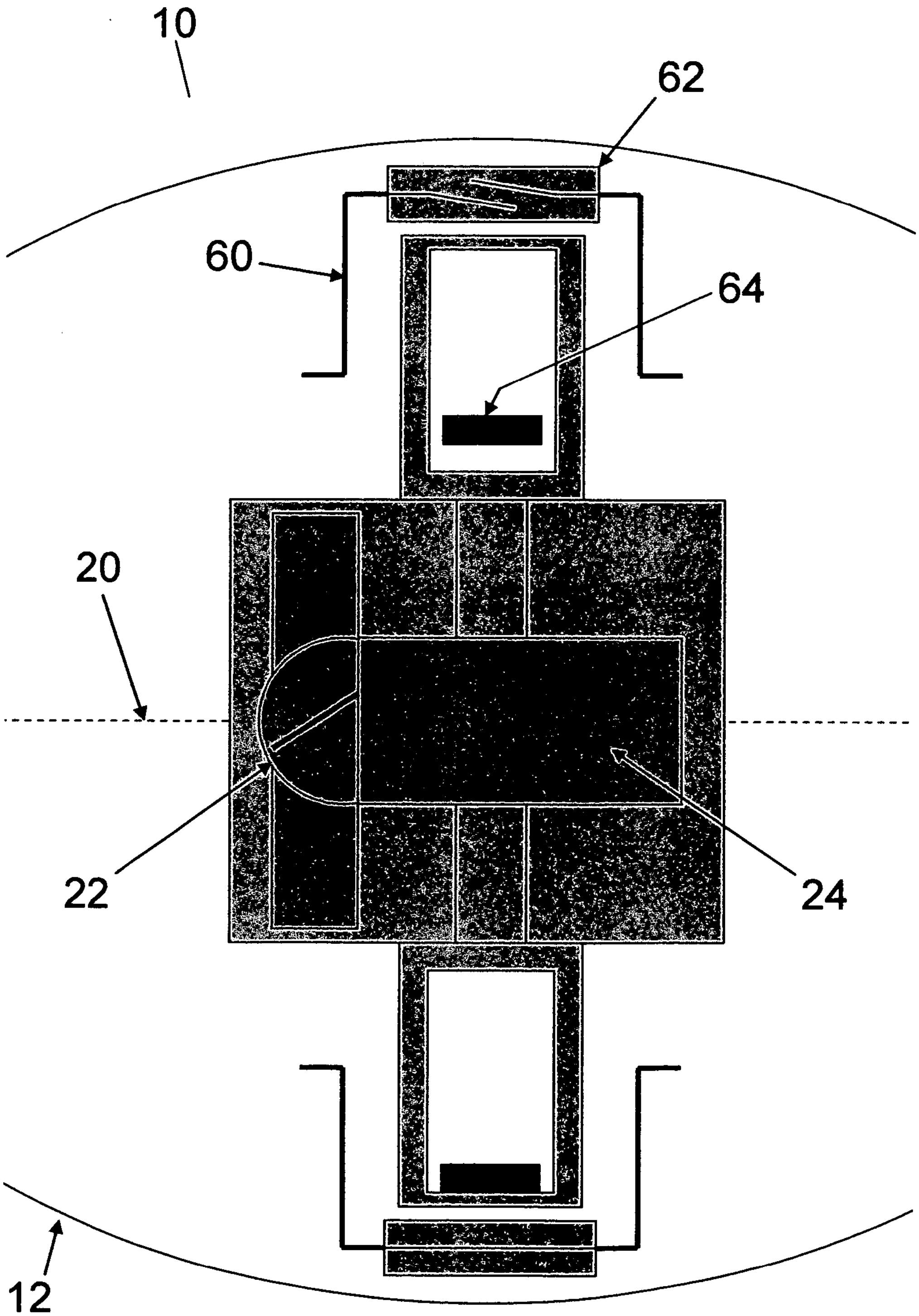


FIG. 19

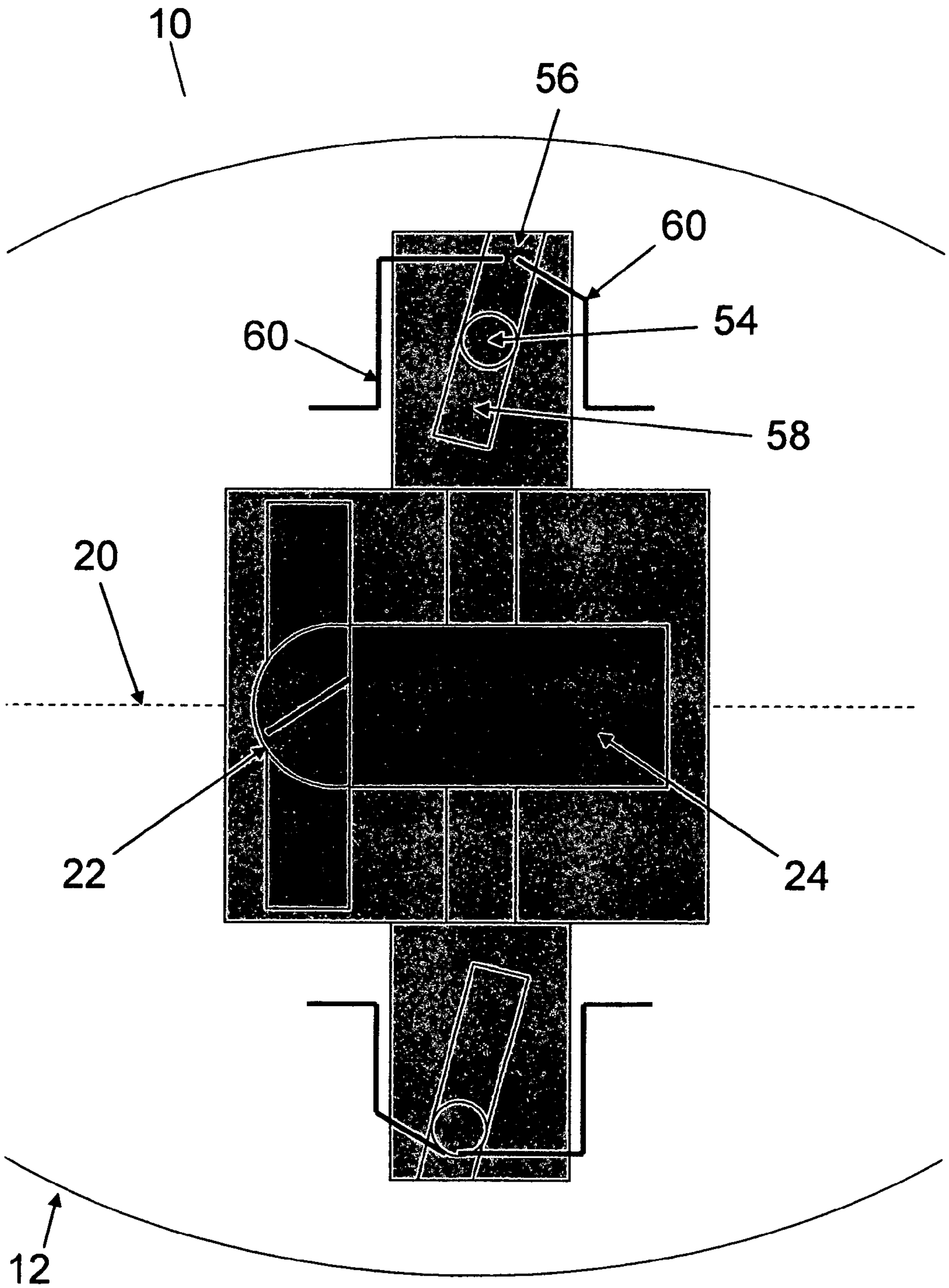


FIG. 20

SELF-PROPELLED FOOTBALL WITH INTERNALLY DUCTED FAN AND ELECTRIC MOTOR

FIELD OF THE INVENTION

The present invention relates in general to a football, and in particular to a self-propelled football with an internally ducted fan and electric motor.

BACKGROUND OF THE INVENTION

American football is a very popular sport in the United States. Footballs come in a multitude of shapes, sizes, and materials. Some footballs are replicas of the leather footballs used in the collegiate and professional leagues. Other footballs may be made of an elastic foam which is resilient and compressible. This foam lessens the impact of the football making it safer for use. Some footballs may be geometrically sized and shaped to improve the distance they are able to be thrown.

One attempt to improve travel distance included a propeller enhanced football. This football has fins extending from the rear of the football where a propeller is externally located. The propeller is soft, so as not to injure a player. This is necessitated because the propeller is exposed and not internally located within the football. The football doesn't behave like a normal football, as it has fins extending out the back and an external propeller. The football is suited only for throwing. It is not intended to be played in a football game where handoffs, lateral passes, pitches and kicks occur. Furthermore, since the propeller is exposed and soft, the power produced by the football is weak at best and not much self-propulsion truly occurs.

Some have developed an engine-spiraled, stabilized football through an internal combustion engine. This football has the internal combustion engine located within the football that drives a propeller housed within a gyroscopic propeller ring. The internal combustion engine requires a fuel. Therefore, players must put into the football a combustible fuel, like gasoline. Combustible fuels and footballs don't go well with each other. Gasoline is a dangerous chemical that is not suited for a children's toy. Furthermore, an internal combustion engine produces heat which could present a fire hazard. The internal combustion engine could also burn a player when the football is handled. Compounding these dangers are the exhaust gases produced by the internal combustion engine. Playing with a football that emits toxic fumes is highly undesirable. Also, there is no control technology devised in the football that allows the football to easily self activate and deactivate when thrown. Therefore the engine must be started and left running while in use. Also, an external starter is needed to start the motor before the engine will operate. For all of the aforementioned reasons and others not discussed, the internal combustion engine should not be placed within a football intended for use by people, especially children.

SUMMARY OF THE INVENTION

A self-propelled football is disclosed. An exemplary embodiment of the self-propelled football has an oblate spheroidal body. The body has a front section, a center section, a back section, and a longitudinal axis. A ducted fan is located within the body substantially along the center section and substantially along the longitudinal axis. An electric motor is located within the body and is mechanically coupled to the ducted fan. At least one electrical power source is located within the body and electrically coupled to the electric motor. At least one air-inlet is located within the front section of the body in airflow communication with the ducted fan. At least one air-outlet is disposed along the back section of the body in airflow communication with the ducted fan. A means for automatic activation and deactivation of the electrical motor by detecting an in-flight condition and a not-in-flight condition is located within the body.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the drawings in which like reference numbers represent corresponding parts throughout:

FIG. **1** illustrates an embodiment of a self-propelled football in a cross-sectional isometric view.

FIG. **2** illustrates the embodiment of FIG. **1** in an isometric view from the front.

FIG. **3** illustrates the embodiment of FIG. **1** in an isometric view from the back.

FIG. **4** illustrates another embodiment of a self-propelled football in an isometric view from the front.

FIG. **5** illustrates the embodiment of FIG. **4** in an isometric view from the back.

FIG. **6** illustrates an embodiment of a self-propelled football body in a front view.

FIG. **7** illustrates the embodiment of FIG. **6** in a wire frame front view.

FIG. **8** illustrates the embodiment of FIG. **6** in a wire frame side view.

FIG. **9** illustrates the embodiment of FIG. **6** in an isometric view from the front.

FIG. **10** illustrates another embodiment of a self-propelled football in a side view.

FIG. **11** illustrates the embodiment of FIG. **10** in a front view.

FIG. **12** illustrates the embodiment of FIG. **10** in an isometric view from the front.

FIG. **13** illustrates the embodiment of FIG. **10** in an isometric view from the back.

FIG. **14** illustrates another embodiment of a self-propelled football in an isometric view from the front.

FIG. **15** illustrates the embodiment of FIG. **14** in a side view.

FIG. **16** illustrates an embodiment of a rotational sensing device in a simplified representational view in the open position.

FIG. **17** illustrates the embodiment of FIG. **16** in a simplified representational view in the closed position.

FIG. **18** illustrates the embodiment of FIG. **16** in a cross-sectional isometric view.

FIG. **19** illustrates another embodiment of a rotational sensing device in a simplified representational view.

FIG. **20** illustrates another embodiment of a rotational sensing device in a simplified representational view.

DETAILED DESCRIPTION

In the following description of the exemplary embodiments, reference is made to the accompanying drawings that form a part hereof, and in which is shown merely by way of illustration. It is to be understood that other embodiments may be used and structural changes may be made without departing from the scope of the present invention.

An embodiment of a self-propelled football is shown in FIGS. **1-3**. The self-propelled football **10** has a body **12** defined as having a front section **14**, a center section **16**, a rear section **18** and a longitudinal axis **20**. The body **12** is football-shaped. Football-shaped may be described as an oblong spheroidal body or as having a convex outer surface and generally pointed ends along the longitudinal axis **20**. The longitudinal axis **20** may also be described as a rotational axis. When a football is thrown in a proper spiral, the football has a substantially parabolic flight trajectory from a passer to a catcher. As the football travels along this parabolic flight trajectory, the football translates forward along the longitudinal axis **20** while also rotating about the longitudinal axis **20**. The rotation of the football about the longitudinal axis **20** helps to stabilize the football in flight. This spin (rotation/spiraling) makes the throw more accurate.

A ducted fan **22** is located within the body **12** along the center section **16**. An electrical motor **24** is mechanically coupled to the ducted fan **22**. The electrical motor **24** rotates the blades of the ducted fan **22** thereby producing a forward trust. Power for the electrical motor **24** comes from an electrical power source **26**. The electrical power source **26** can be any suitable battery capable of storing and releasing electrical energy. Some examples of batteries used for similar applications are Nicad or NiMh packs. However, recent advances in lithium-polymer technology has lead to LiPo (lithium-polymer) packs that have twice the capacity at about half of the weight of comparable Nicad or NiMh packs. The technology of electric ducted fans and batteries have improved due to the increase in popularity of radio controlled model airplanes. Scale models of jet aircraft utilizing electric motors and batteries are capable of flying well over 150 miles per hour while being extremely light and lasting for longer run times than ever before.

Near the front section **14** are air-inlets **28** which converge to form an opening ahead of the ducted fan **22**. The air-inlets **28** are located along front section **14** and converge together to form a common opening to the ducted fan **22**. The air-inlets **28** allow an airflow to enter from the surrounding atmosphere to inside the football thereby supplying the airflow for the ducted fan **22**. Air-inlets can be formed in a multitude of shapes and sizes.

Another embodiment of an air-inlet design is shown in FIGS. **4-5**. The air-inlet **28** is a single opening along the longitudinal axis **20**. This embodiment would allow the use of the football by either a right-handed user or a left-handed user. The right-handed user induces a clockwise spiral on the football when it is thrown. The left-handed user induces a counter-clockwise spiral on a football when it is thrown. A single opening along the longitudinal axis **20** would allow air to enter easily for either a clockwise or counter-clockwise spiral.

Another embodiment of an air-inlet design is shown in FIGS. **6-9**. A plurality of air-inlets **28** converge to the ducted fan **22** in a decreasing spiral radius beginning at the front section **14** and reducing in radius to form a common opening to the ducted fan **22**. FIGS. **7-8** are shown in a wire frame view with the internal mechanisms removed to better see the decreasing spiral radius shape. Air-inlets **28** converge to ducted fan **22** while also being twisted in the direction the football will rotate when thrown. This decreasing spiral radius shape would take advantage of the spiral induced during a throw to better channel in airflow to the ducted fan **22**. As the football spirals and travels forward during a throw, a corresponding air-inlet shape which takes advantage of the spiral would more efficiently channel airflow to the ducted fan **22**. This embodiment would be right-hand biased or left-hand biased, as the decreasing spiral radius would need to be in the right orientation to effectively channel airflow during either a clockwise or counter-clockwise rotation.

Another embodiment of an air-inlet design is shown in FIGS. **10-13**. The air-inlet **28** is a ring opening along the front section **14** that converges to form a common opening to the ducted fan **22**. The volumetric airflow capacity of the ring opening can be designed to provide sufficient airflow capacity to the ducted fan **22** while minimizing deviation from the traditional football shape. In a further embodiment, structural supports **27** for the ring opening can be constructed to be right-hand biased or left-hand biased. The structural supports **27** would be shaped to effectively channel airflow during either a clockwise or counter-clockwise rotation.

Another embodiment of an air-inlet design is shown in FIGS. **14-15**. The air-inlet design is comprised of a multitude of air-inlets **28** in the form of small holes within the front section **14**. The small holes would converge to a common opening ahead of the ducted fan **22**. The front section **14** would have perforations all along its outer surface while still retaining an outer surface form of a traditional football. As can be seen, a multitude of air-inlet designs can be devised to provide airflow to the ducted fan **22**. This specification is not intended to limit the configuration to any one of the exemplary embodiments.

Near the rear section **18** is air-outlet **30**. Air-outlet **30** starts behind the ducted fan **22** and converges to a common opening exiting out the rear section **18**. Airflow is able to exit through the air-outlet **30** thereby providing thrust for the self-propelled football **10**. The air-outlet **30** can be formed in a multitude of shapes and sizes similar to the air-inlet designs previously discussed. Furthermore, the air-outlet **30** can be shaped to induce rotation of the self-propelled football **10** thereby increasing the spiral effect for better in-flight stability. The air-outlet shape would be either right-hand biased or left-hand biased, depending upon the desired spin. Alternatively, the air-outlet **30** may be shaped to counter any torque effect the electric motor **24** may have on the self-propelled football **10**. This configuration would allow a self-propelled football **10** to be thrown by either hand. As can be seen, a multitude of air-outlet designs can be devised. This specification is not intended to limit the air-outlet design to any one of the exemplary embodiments.

It may be desirable to have a self-propelled football **10** which can easily activate and deactivate, and there are a multitude of ways to accomplish this. In one embodiment, activating and deactivating the football can be accomplished with on-off switch **32**. The on-off switch **32** can control not only the activation, but also the speed of the electric motor **24** with a hi-low functionality, or some other combination thereof. In another embodiment a power level switch can be added to control the hi-low functionality, while leaving the on-off switch **32** to only control activation and deactivation of the electric motor **24**.

In another embodiment, it may be desired for the self-propelled football **10** to automatically detect when there is an in-flight condition and a not-in-flight condition. The in-flight condition is when the football has been thrown by the user. The not-in-flight condition is when the football is not in use or being thrown, has been caught or has struck the ground or another object which has stopped its flight. A means for automatic detection would allow the football to automatically activate and deactivate the electrical motor thereby producing thrust only when needed. The user would not have to activate and deactivate a switch during every throw, but would only have to throw the self-propelled football **10** like a traditional football. There are multitude of means for automatic activation and deactivation of the electrical motor by detecting the in-flight condition and the not-in-flight condition, and this specification is not meant to be exhaustive or to limit the means to the precise form disclosed. Many modifications and variations are possible in light of this teaching.

One embodiment of self-activation of the electrical motor **24** is with a microcontroller **36**. The microcontroller **36** is in electrical communication with the electrical motor **24** and can control the activation and speed of the electrical motor **24**. The microcontroller **36** can be configured to detect when the self-propelled football **10** has been thrown and automatically activate the electrical motor **24**. Likewise, the microcontroller **36** can detect when the self-propelled football **10** has been caught or has hit the ground and deactivate the electrical motor **24**.

In another embodiment, detecting when the self-propelled football **10** is being thrown or caught can be achieved by using an accelerometer **34**. Accelerometer **34** detects g-forces due to gravity, acceleration, and rotation of the football during flight. Accelerometer **34** can be a single axis, double-axis or triple-axis accelerometer. Information from accelerometer **34** is sent to the microcontroller **36**. The microcontroller **36** processes the information received from the accelerometer **34** through code preprogrammed into the microcontroller **36**. The microcontroller **36** allows the self-propelled football **10** to self-detect when the self-propelled football **10** is being thrown or caught.

There are a multitude of different accelerometer combinations and code that can be devised to self-detect an in-flight condition. Generally speaking, during the beginning of a throw, the self-propelled football **10** is accelerated in a translational direction along the longitudinal axis **20**. An accelerometer can be oriented to detect this translational acceleration. Likewise, when the self-propelled football **10** is caught or strikes the ground a deceleration along the longitudinal axis **20** can be measured.

Furthermore, when the self-propelled football **10** is thrown, a spiral motion occurs as the self-propelled football **10** rotates about the longitudinal axis **20**. An accelerometer can be oriented to detect the centrifugal force created by the rotation. Code can be devised and preprogrammed into the microcontroller **36** to process the different information provided by accelerometer **34**. This specification is not intended to limit itself to any specific embodiment of an accelerometer design and orientation, or microcontroller code.

In yet another embodiment, the microcontroller **36** and accelerometer **34** may be replaced with a device which has a means for detecting centrifugal acceleration caused by the rotation of the self-propelled football **10** about the longitudinal axis **20**. As the self-propelled football **10** rotates during a spiral, centrifugal forces are outwardly exerted throughout the body **12** of the self-propelled football **10**. A device can be constructed and oriented to sense these centrifugal forces, thereby activating and deactivating the electrical motor **24**.

One embodiment of such a device is an electromechanical switch configured to detect centrifugal forces. An electromechanical switch is an electronic switch that controls the flow of current that is activated through mechanical means, such as an acceleration force or g-force. One embodiment of such an electromechanical switch is a submini lever switch **42**, or also called a basic type snap switch, shown in FIGS. **16-18**. The lever switch **42** has a cantilevered lever **44** protruding from switch body **46**. Underneath the lever **44** near the pivot point of the lever **44** is button **48**. When a force is exerted on the lever **44**, it forces the button **48** to depress and activate an electrical circuit. The lever switch **42** is wired to various devices through electrical connection stubs **50**.

A weight **52** may be bonded or attached near the end of the lever **44**. The lever switch **42** is oriented in the self-propelled football **10** such that the lever **44** is facing towards the longitudinal axis **20**. As the self-propelled football **10** is thrown and spirals, centrifugal acceleration exerted on the weight **52** will exert a centrifugal force on the lever **44** forcing the button **48** to be depressed. This will then activate the electrical motor **24**. Once the self-propelled football **10** is caught or strikes the ground, spiraling and centrifugal acceleration will slow or stop and the button **48** will release. This can be accomplished by using internal springs located within the switch body **46**. The weight **52** will have to be calibrated appropriately to cause activation and deactivation at desired centrifugal forces to overcome the internal spring force of the lever switch **42**. There are a multitude of ways of creating an electromechanical switch to detect centrifugal acceleration. This embodiment is merely one specific type of an electromechanical switch and is not meant to be exhaustive or to limit the means for detecting centrifugal acceleration to the precise form disclosed. Many modifications and variations are possible in light of the above teaching.

Another embodiment of a device which has a means for detecting centrifugal acceleration is through the use of a reed switch **62** and permanent magnet **64**, shown in FIG. **19**. A reed switch is an electrical switch that is controlled with a magnetic field. Reed switch **62** has two reeds placed in parallel with a small gap in between. These reeds are sensitive to magnetic fields, and can either close or open in the presence of a magnetic field. Normally, the reed switch **62** in the default state is open and not allowing current to flow. When permanent magnet **64** is positioned close to the reed switch **62**, the magnetic field from the permanent magnet **64** causes the reed switch **62** to close and thereby allow current to flow through the electrical circuit **60**. The self propelled football **10** can have permanent magnets **64** attached in a way that allows the centrifugal forces during a spiral to move the permanent magnet **64** closer to the reed switch **62**, thus activating the circuit. As can be seen, there are a multitude of methods of using permanent magnets and reed switches to automatically activate and deactivate the self-propelled football **10** during flight. This specification is not intended to limit the design to any one embodiment.

Another embodiment of a device for detecting centripetal acceleration is shown in FIG. **20**. The use of a conductive mass **54** completes an electrical circuit **60** by bridging a circuit gap **56**. The self-propelled football **10** has a cylindrical hole **58**, or chamber, substantially perpendicular to the longitudinal axis **20**. In one embodiment the conductive mass **54** can be shaped as a sphere and placed within the cylindrical hole **58**. Two ends of the electrical circuit **60** at placed at the outermost end of the cylindrical hole **58** with a small gap. When the self-propelled football **10** rotates, centrifugal force moves the conductive mass **54** to touch both ends of the electrical circuit **60**, thus bridging the electrical gap. The electrical circuit **60** is then completed and the electrical motor **24** and ducted fan **22** are activated. When the self-propelled football **10** is caught or hits the ground, centrifugal forces cease and the conductive mass **54** moves away from the circuit gap **56** and deactivates the electrical motor **24**. The self-propelled football **10** may have several of these devices oriented about the longitudinal axis **20** to prevent inadvertent activation when the self-propelled football is placed in various orientations. As can be seen in FIG. **20**, a slight angle to the cylindrical hole **58** helps to reduce the circuit being activated while the self-propelled football **10** is being handled and only activate when thrown. As can be seen, there are a multitude of methods of using different conductive masses and holes configurations to automatically activate and deactivate the self-propelled football **10** during flight. This specification is not intended to limit the design to any one embodiment.

When the conductive mass **54** comes into contact with the electrical circuit **60**, an arching affect may occur resulting in damage due to welding or corrosion. Also, as current passes through the conductive mass **54** and electrical circuit **60**, the flow of current can cause electrical stiction which will hold the conductive mass **54** against the electrical circuit **60** even after the self-propelled football **10** has come to rest. To prevent and reduce these problems, the conductive mass **54** may be formed from a copper alloy, which is then nickel plated and later gold plated. This reduces corrosion on the contacts, contact resistance, electrical stiction, and welding on the contacts.

The conductive mass **54** may also be comprised of mercury. Mercury switches can handle higher electrical loads and will not corrode over time as a solid conductive mass would. As the self-propelled football **10** is thrown, the conductive mass **54**, comprised of mercury, would move towards the electrical circuit **60** and complete the circuit allowing current to flow to the electrical motor **24**. Many configurations of mercury switches can be devised to activate and deactivate the electrical motor. This specification is not intended to limit the design to any one embodiment.

A relay may also be used to prevent and reduce corrosion, contact resistance, electrical stiction, and welding on the contacts. A relay is an electrical switch that controls the activation and deactivation of a high electrical current through the control of a low electrical current. The centrifugal switch would be wired to the low power side of the relay, whereas the electrical motor **24** would be wired to the high power side of the relay. When the centrifugal switches are activated on the low power side, it would activate the relay and turn on the high power to the electrical motor **24**. Therefore, a much lower current would flow through the conductive mass **54** and lessen corrosion, contact resistance, electrical stiction, and welding on the contacts.

In yet another embodiment, the electrical motor **24** may be controlled by the user during flight through radio controlled technology. This embodiment would employ the same technology used today in radio-controlled cars and aircraft. The user sends a signal from a transmitter through a radio frequency signal to the self-propelled football **10**. The self-propelled football **10** has a receiver configured to receive the radio frequency signal. As the self-propelled football **10** travels through the air, the user is able to control the electrical motor **24**, thereby controlling the thrust throughout flight. It would be desirable to create a transmitter that could be controlled with one hand while allowing the other hand available to throw the self-propelled football **10**. It would also be desirable to create a transmitter that would allow the user to also catch the self-propelled football **10** by allowing both hands to remain free and open. One such embodiment may be to integrate the transmitter into a glove for the user to wear. This would allow both hands to remain open to catching a football as opposed to holding onto a transmitter. As can be seen, there are a multitude of transmitters designs that could be configured for controlling the self-propelled football **10**. This specification is not intended to limit the design to any one embodiment.

In another embodiment, the body **12** may be made from a compressible, flexible and resilient material. One such material is plastic-foam. This plastic-foam material is elastic and lessens the impact from a missed catch. Also, the material would lessen the impact on the internal mechanisms within the self-propelled football **10**. Many such materials are already in use today, especially for various children toys. Some examples of these materials can be constructed from polyethylene, polyurethane, neoprene, polystyrene, sponge rubbers and various other materials. As can be seen there are a multitude of suitable foams for the body **12**. Furthermore, the body **12** may be comprised of a multitude of varying foam types. In an exemplary embodiment, the body may be comprised of a stiff-type foam that is substantially lighter in density. Then, an elastic foam would comprise an outer shell of the body. This configuration would allow for an overall lighter body than could be made from just one type of foam. This would help reduce overall weight while retaining an impact absorbing outer shell. As can be seen, there are a multitude of foam configurations that could be desirable. This specification is not intended to limit the scope to any one particular configuration or material type.

In another embodiment an air-permeable structure **38** can be located within the air-inlet **28** and air-outlet **30**. The air-permeable structure **38** can be made of a mesh material, a netting material, or any similar construction that allows air to pass through while stopping foreign particles. The air-permeable structure **38** acts as a filter and prevents foreign particles from entering the ducted fan and causing a clogged condition or internal damage. Also, the air-permeable structure **38** would prevent a user from sticking objects into the self-propelled football **10**, such as fingers or twigs.

In another embodiment, it would be desirable for all the components of the self-propelled football **10** to be designed to keep the weight at or below the weight of a traditional football. It is also desirable to balance the self-propelled football **10** so the center of gravity is at or near the center of the football. Proper weight and balance will allow the user to throw the self-propelled football **10** in the same manner as one would throw a traditional football.

In another embodiment a charging port **40** would be located on the body **12**. A typical electric ducted fan airplane can fly for about twenty minutes. The ducted fan **22** within the self-propelled football **10** would only be in operation when thrown. This would allow the playing time to be extended well beyond twenty minutes. Once the electrical power source **26** was depleted, the self-propelled football **10** would be plugged into a charger through the charging port **40** and be ready for use once again. It is desirable to locate the charging port in a location that is easy to access and does not require disassembling the self-propelled football **10**.

Furthermore, it may be desirable to configure the electrical motor **24** to rotate in a direction that helps to increase the spiraling effect of the self-propelled football **10** when thrown. As the electrical motor **24** spins the ducted fan **22**, this creates a torque that will either increase or decrease the spiraling effect of the self-propelled football **10**. Depending on specific configurations of the ducted fan **22** and electrical motor **24**, this force may be slight or significant. It may be desirable to increase the stability of the self-propelled football **10** by increasing the spiraling effect, not decreasing it. Attention must be paid to the rotation of the electrical motor **24** being dependent on whether the self-propelled football **10** is thrown right-handed or left-handed.

In one embodiment, it may be desirable to include a timer or to build in a preset time limit for the running of the electrical motor **24**. This is to prevent an overly long run time caused by a farther than wanted throw or when throwing the football straight up. There are many ways to achieve this functionality. In one embodiment, the microcontroller **36** can be programmed to include timing logic to detect when a preset runtime has elapsed and deactivate the electrical motor. This would prevent an over-flight condition where the user has thrown the football straight up and the self-propelled football **10** will not be caught or hit the ground to deactivate the electrical motor **24**. This functionality can also limit the amount of time the electrical motor **24** is activated during any single throw for various reasons. In another embodiment after the electrical motor **24** has been activated, a timer will automatically turn off the electrical motor **24** after a predetermined time. In another embodiment, a simplistic timing circuit may be utilized to stop the electrical motor **24** from an overly long run time. As can be seen, there are a multitude of ways of creating a timer. This specification is not intended to limit the scope to any one particular type.

In another embodiment, the self-propelled football **10** can also include lights disposed along the body **12** that light up when thrown. These lights would allow the football to be played in low light conditions. Also, special paint may be used to make the ball glow in the dark. Many paints are offered on the market that absorb light during daytime conditions and then glow at night. Also, a whistle may be integrated into the self-propelled football that creates a whistling noise as the ball is thrown. This whistle may be integrated on the outside of the body **12** or also inside the air-inlet **28** or air-outlet **30**. These described features add to the novelty of the self-propelled football **10**.

The foregoing description of the exemplary embodiments have been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Many modifications and variations are possible in light of the above teaching that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without undue experimentation and without departing from the generic concept. Therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. It is intended that the scope of the invention not be limited by this detailed description, but rather by the claims appended hereto and all equivalents thereto.

Thus the expression "means to . . . " and "means for . . . ", or any method step language, as may be found in the specification above and/or in the claims below, followed by a functional statement, are intended to define and cover whatever structural, physical, chemical or electrical element or structure, or whatever method step, which may now or in the future exist which carries out the recited function, whether or not precisely equivalent to the embodiment or embodiments disclosed in the specification above, i.e., other means or steps for carrying out the same functions can be used; and it is intended that such expressions be given their broadest interpretation.

REFERENCE NUMBER LIST

10 Self-Propelled Football
12 Body
14 Front Section
16 Center Section
18 Rear Section
20 Longitudinal Axis
22 Ducted Fan
24 Electric Motor
26 Electrical Power Source
27 Structural Supports
28 Air-Inlet
30 Air-Outlet
32 On-Off Switch
34 Accelerometer
36 Microcontroller
38 Air-Permeable Structure
40 Charging Port
42 Lever Switch
44 Lever
46 Switch Body
48 Button
50 Electrical Connection Stubs
52 Weight
54 Conductive Mass
56 Circuit Gap
58 Cylindrical Hole
60 Electrical Circuit
62 Reed Switch
64 Permanent Magnet

I claim:

1. A self-propelled football comprising:

(a) an oblate spheroidal body having a front section, a center section, a back section, and a longitudinal axis;

(b) a ducted fan located within the body substantially within the center section and substantially along the longitudinal axis;

(c) an electric motor located within the body and mechanically coupled to the ducted fan;

(d) at least one electrical power source located within the body and electrically coupled to the electric motor;

(e) at least one air-inlet located within the front section having airflow communication with the ducted fan;

(f) at least one air-outlet located within the back section having airflow communication with the ducted fan; and

(g) a means for automatic activation and deactivation of the electrical motor by detecting an in-flight condition and a not-in-flight condition, wherein such means is located within the body and in electrical communication with the electrical motor and the electrical power source.

2. The self-propelled football of claim **1**, wherein the body is comprised of a compressible and resilient material.

3. The self-propelled football of claim **2**, further including a timer located within the body in electrical communication with the electrical motor and the electrical power source, wherein the electrical motor, after activation, will automatically turn off after a predetermined time.

4. The self-propelled football of claim **3**, further including an air-permeable structure connected to the body located within the air-inlet and air-outlet, such that an airflow can be drawn through the air-inlet and air-permeable structure by the ducted fan and expelled through the air-permeable structure and air-outlet, thereby creating a forward thrust while preventing a foreign particle from traveling through the ducted fan, and further including an on-off switch connected to the body and electrically coupled to the electrical motor and electrical power source, and further including a charging port connected to the body in electrical communication with the electrical motor and electrical power source.

5. The self-propelled football of claim **4**, wherein the means for automatic activation and deactivation of the electrical motor comprises at least one hollow chamber located within the body substantially perpendicular to the longitudinal axis with an electrical circuit gap disposed at a distal end of the hollow chamber and further including a mass of mercury located within the hollow chamber, wherein centrifugal forces imparted to the mass of mercury during rotation about the longitudinal axis moves the mass of mercury in contact with the electrical circuit gap thereby activating the electrical motor.

6. The self-propelled football of claim **1**, further including a means for detecting rotation about the longitudinal axis located within the self-propelled football in electrical communication with the electrical power source and electric motor, wherein the means for detecting rotation activates and deactivates the electrical motor when the self-propelled football is in-flight and not-in-flight.

7. The self-propelled football of claim **6**, wherein the means for detecting rotation about the longitudinal axis comprises a centrifugal switch in electrical communication with the electrical motor and electrical power source, wherein the centrifugal switch is activated by a centrifugal force due to rotation about the longitudinal axis during flight.

8. The self-propelled football of claim **6**, wherein the means for detecting rotation about the longitudinal axis comprises a lever switch located within the body in electrical communication with the electrical power source and electric motor.

9. The self-propelled football of claim **6**, wherein the means for detecting rotation about the longitudinal axis comprises at least one hollow chamber located within the body substantially perpendicular to the longitudinal axis with an electrical circuit gap disposed at a distal end of the hollow chamber and further including a conductive mass located within the hollow chamber, wherein centrifugal forces imparted to the conductive mass during rotation about the longitudinal axis move the conductive mass in contact with the electrical circuit gap thereby activating the electrical motor.

10. The self-propelled football of claim **6**, wherein the means for detecting rotation about the longitudinal axis comprises at least one hollow chamber located within the body substantially perpendicular to the longitudinal axis with a reed switch disposed at a distal end of the hollow chamber in electrical communication with the electrical motor and electrical power source, and further including a permanent magnet located within the hollow chamber, wherein centrifugal forces imparted to the permanent magnet during rotation about the longitudinal axis move the permanent magnet closer to the reed switch thereby activating the reed switch through a magnetic field imparted by the permanent magnet and thereby activating the electrical motor.

11. The self-propelled football of claim **1**, further including a microcontroller positioned within the body in electrical communication with the electrical power source and electric motor, wherein the microcontroller can detect when the self-propelled football is being thrown and caught and can automatically activate and deactivate the electrical motor.

12. The self-propelled football of claim **1**, further including at least one accelerometer positioned within the body and further including a microcontroller positioned within the body wherein the microcontroller is in electrical communication with the accelerometer, the electrical power source, and the electric motor.

13. The self-propelled football of claim **1**, further including a radio frequency receiver located within the body in electrical communication with the electrical motor and electrical power supply, wherein the radio frequency receiver can receive a radio frequency signal sent by a transmitter and control the operation of the electrical motor.

14. A football, comprising:

(a) an oblate spheroidal body having a substantially symmetrical shape about a longitudinal axis and further defined as having a front section, a center section, and a back section, wherein the longitudinal axis extends from the front section, through the center section, and to the back section;

(b) a ducted fan located within the oblate spheroidal body substantially within the center section and substantially aligned with the longitudinal axis;

(c) an electric motor located within the oblate spheroidal body mechanically coupled to the ducted fan;

(d) at least one electrical power source located within the oblate spheroidal body and electrically coupled to the electric motor;

(e) at least one air-inlet disposed along the front section of the oblate spheroidal body in airflow communication with the ducted fan;

(f) at least one air-outlet disposed along the back section of the oblate spheroidal body in airflow communication with the ducted fan, such that an airflow can be drawn through the air-inlet by the ducted fan and expelled through the air-outlet thereby creating forward thrust; and

(g) a centrifugal switch located within the body in electrical communication with the electrical motor and electrical power source, wherein the centrifugal switch is activated by a centrifugal force when the football rotates about the longitudinal axis during flight.

15. The football of claim **14**, wherein the centrifugal switch comprises at least one hollow chamber located within the body substantially perpendicular to the longitudinal axis with an electrical circuit gap disposed at a distal end of the hollow chamber in electrical communication with electrical motor and electrical power source and further including at least one conductive mass located within the hollow chamber, wherein centrifugal forces imparted to the conductive mass during rotation about the longitudinal axis move the conductive mass in contact with the electrical circuit gap thereby activating the electrical motor.

16. A self-propelled football, comprising:

(a) a body shaped as an oblate spheroid having a substantially symmetrical shape about a longitudinal axis, wherein the body is further defined as having a front section, a center section, and a back section, wherein the longitudinal axis extends from the front section, through the center section, and to the back section, and wherein the body is comprised of a compressible and resilient material;

(b) a ducted fan located within the body substantially along the center section and substantially aligned with the longitudinal axis;

(c) an electric motor located within the body mechanically coupled to the ducted fan;

(d) at least one electrical power source located within the body and electrically coupled to the electric motor;

(e) at least one air-inlet disposed along the front section of the body in airflow communication with the ducted fan;

(f) at least one air-outlet disposed along the back section of the body in airflow communication with the ducted fan, such that an airflow can be drawn through the air-inlet by the ducted fan and expelled through the air-outlet thereby creating a forward thrust; and

(g) a means for automatic activation and deactivation of the electrical motor by detecting an in-flight and a not-in-flight condition located within the body and in electrical communication with the electrical motor and the electrical power source.

17. The self-propelled football of claim **16**, further including a timer located within the body in electrical communication with the electrical motor and the electrical power source, wherein the electrical motor, after activation, will automatically turn off after a predetermined time.

18. The self-propelled football of claim **17**, further including an air-permeable structure connected to the body disposed along the air-inlet and air-outlet, such that an airflow can be drawn through the air-inlet and air-permeable structure by the ducted fan and expelled through the air-permeable structure and air-outlet, thereby creating a forward thrust while preventing a foreign particle from traveling through the ducted fan, and further including an on-off switch connected to the body and electrically coupled to the electrical motor and electrical power source, and further including a charging port connected to the body in electrical communication with the electrical motor and electrical power source.

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