(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 224 020 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
01.09.2004 Bulletin 2004/36

(21) Application number: **00909588.6**

(22) Date of filing: **06.03.2000**

(51) Int Cl.[7]: **A63H 18/12**, A63H 18/16

(86) International application number:
PCT/IE2000/000028

(87) International publication number:
WO 2000/051699 (08.09.2000 Gazette 2000/36)

(54) **ADVANCED MODEL RACING CAR GAME**

FORTGESCHRITTENES MODELLRENNWAGENSPIEL

JEU AMELIORE DE MODELES REDUITS DE VOITURES DE COURSE

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **04.03.1999 IE 990171**

(43) Date of publication of application:
24.07.2002 Bulletin 2002/30

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(56) References cited:
DE-U- 9 200 879
US-A- 3 841 556

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Printed by Jouve, 75001 PARIS (FR)

Description

Background of the Invention

[0001] The present invention relates to wheeled vehicles and in particular to toy racing cars competing on a track and whose steering and drive functions are controlled by steering consuls attached to a controlling box which in turn is attached to the track by a pair of wires and all of which is powered by a mains adaptor which delivers a safe low voltage supply.

[0002] The inventive significance of this design over present state of the art inventions is inherent in the digital method of transmitting the control signals from these "consuls" to provide error free control of multiple vehicles and at low cost.

[0003] Moreover the small scale of the vehicles provided for in the present invention allows for the use of smaller scale track than would otherwise be necessary and so further making the game more commercially feasible.

[0004] US Pat. No. 3,841,556 Oct 15 1974 describes a system using a roadbed capable of receiving superimposed A.C. or D.C. signals from an external controller, which can be used in combination with a wheeled vehicle of the type disclosed in U.S. Pat. No. 3,590,526 July 6 1971. The problems associated with these particular designs are due to the fact that they are essentially analog based. I.e. multiple analog signals characterising the user control mechanisms outputs, are superimposed upon each other to produce a composite analog signal which is again superimposed onto the supply voltage to the track. These signals interfere with one another to some degree and thereby distort the linearity of the control signals which are fed to steering and drive motors on board the vehicles and further the number of vehicles which can be operated simultaneously is restricted due to the necessarily large separations of the bandwidths allotted to each channel.

[0005] The design described in the present application overcomes these shortcomings by virtue of using only one signal. The change in that signal denotes a bit pattern similar to that used in serial digital communications generally, and is encoded at the transmitter and decoded at the receiver to prevent distortion or interference along the way. The added advantage is that any number of vehicles can operate simultaneously without fear of distorting the control signals of an adjacent vehicle.

Field of the invention.

[0006] It is known to use a continuous slotted track of parallel dipoles to propel wheeled vehicles, which derive their power, by brushes riding on the dipole and control of the vehicle's speed is by use of hand operated throttle/s electrically connected to the track dipoles.

[0007] European Patent No. 553 555 describes an improvement in these "slot" cars whereby rigid "shoes" are used in place of "brushes" for more continuous electrical contact between car and track dipole:

[0008] European Patent No. 307659 describes a slotted track game as above but with the added advantage of permitting the vehicles to jump between adjacent tracks for the purpose of passing out other vehicles and thereby making the game more interesting.

[0009] U. S. patent **No.3, 590,526** and U. S. patent **No.3, 841,556** used together provide for a system of steer able vehicles on a flat roadbed, which provides power and analog controlling signals to the vehicles. The object being to imitate real racing cars with full steering / drive control has obvious appeal over its predecessors.

Object of the invention

[0010] The object of the present invention is to provide **cost effective error free control** of toy racing cars operating on a flat surface containing a dipole known as a track.

[0011] A most important feature of the invention is the method used to deliver the control signals from the user control consuls to the steering / drive motors on board the vehicles. A single encoded serial digital data stream produced by a modulator / controller circuit contains all the information to control the multiple of vehicles which may be driven simultaneously thereby eliminating the problems of competing signal interference inherent in previous analog patent designs. And further the digital data recovered by the vehicles is verified within the decoders before their outputs are updated and applied to the steering / drive motors thus guarding against contaminated or lost signals as frequently happens when the vehicles are in motion due to grease or other on the track surface causing intermittent disconnection between the vehicles and the track dipole.

Summary of the invention

[0012] According to the invention, there is provided:

a) A smooth partially conductive track containing a dipole upon which wheeled vehicles with a multiple of shoes/brushes attached can travel on to any part of the track whilst receiving signals, and power by virtue of contact between the shoes and the dipole.
b) A means to generate electrical signals in response to mechanisms such as steering wheel / throttle etc. being activated by the user/s.
c) Means within an external controller to produce an encoded digital serial data stream by scanning multiple such signals sequentially and transmitting same along with a low voltage supply to the track and vehicles using known modulation techniques.
d) Means to convert mains electricity supply to low voltage supply for use by the game components.

e) Means within the vehicle/s to recover by demodulation, decoding etc. the original signals produced by the respective control mechanisms in b) above for use in controlling drive motor/s and steering apparatus of the vehicle/s.

f) Means to generate a characteristic signal by the vehicle/s and transmit same via semiconductor L. E.D. to stationary receiving diodes positioned at strategic locations around the track for the purposes of lap counting etc. of the respective vehicle/s.

Advantages of the invention

[0013] The digital design of the present invention allows for **more cost effective,** error free control of even **smaller** scale vehicles and track than presently Patented designs are capable of achieving. Moreover, **the number of vehicles** and thereby competitors which can simultaneously be accommodated is not limited as in previous designs due to their inherent bandwidth restrictions. Finally as is the case in most digital systems as opposed to analog designs, **reliability** is far superior in the former and indeed **component tolerances** which might otherwise affect analog circuitry performance is much less of a problem in digital designs generally.

Detailed description of the Invention

[0014] The invention relates to wheeled vehicles deriving **interference free** controlling signals and power at all locations across a smooth partially conductive track surface containing a dipole by virtue of contact **shoes** or brushes which connect with the dipole.

[0015] In prior art document **U.S. 3,841,556A** in conjunction with document **US 3,590,526** there is disclosed an invention relating to wheeled vehicles on a roadbed similar to the present invention but whose controlling signals are subject to distortion due to the **analog** method of transmitting these signals as opposed to the superior **digital** method outlined below.

[0016] In particular the invention relates to a toy racing car game whereby readily available steering consul/s are adapted for the driving control of miniature competing racing vehicle/s on a track composed of several sections so as to imitate real life Formula 1 or Rally car racing.

[0017] The invention is described with reference to drawings **Fig 1** through **Fig. 7.**

[0018] **Fig 1** illustrates a track composed of just two joined sections, **8** & **9** which can be further added to, to complete a continuous track. Lateral dipole **6** & **7** connects to the appropriate track surface segments **4** & **5** to polarise the conductive surface.

[0019] Insulation layer **10** separates the dipole being wider than the maximum shoe contact area to avoid a possible short circuit. Spring contact Shoes **2** & **3** are shown to be in contact with the dipole and it can be appreciated that alternation of the polarity is catered for due to internal rectifier diodes producing the required Direct Current (DC) supply.

[0020] Track sections are physically and electrically coupled by conductors **7** & **6**, which are in turn connected to the external controller **12** by a pair of wires **11**. Multiple

[0021] Steering/drive consuls **14** connect to controller **12** and further mains adaptor **13**, which delivers a safe low voltage supply, powers everything.

[0022] **Fig 2** illustrates a possible steering mechanism for use on such a vehicle. Servomotor **15** containing pinion wheel **16** moves a rack **17** with rod end **18** to turn wheels **19.**

[0023] **Fig 3** illustrates a drive mechanism usually found on miniature electric cars. Motor **26** with stator **24** and rotor **25** containing pinion wheel **23** geared for increased torque by gear wheel **22** which turns axial **21** and thus drive wheels **20.**

[0024] **Fig 6** and its compliment **Fig7** illustrate a practical digital design example of the circuitry necessary to implement the present invention. Potentiometer/s **14** provide digital data concerning their position to encoders **27** whose outputs are sequenced through a switch **28** controlled by oscillator/counter **29** to FSK modulator **30** which produces two tones representing a "1" and "0" logic respectively which are superimposed upon the low voltage power supply lines **11** attached to the track dipole by amplifier/adder **32**. Switch **31** is forward / reverse actuator.

[0025] **Fig 7** details the vehicle circuitry necessary to compliment **Fig 6.** There are shoes **2**&**3**, which pick up power and signals from the track. The DC (Direct Current) is derived by rectifiers **33** and is fed to regulator **34** for voltage stabilisation. The signals are isolated from the power lines by capacitor/s and fed to limiter / shaper amplifier **35**.

[0026] The sinusoidal tones are fed to FSK demodulator **36** and resulting encoded digital serial data fed to decoder **37** and parallel digital data is converted to an analog signal via D/A converter **38**. Comparator **39** compares voltage from servo potentiometer and produces resulting servo drive voltage for steering via pinion wheel **16**.

[0027] The speed control voltage is derived by D/A converter **38A** and direction is obtained by switching relay **40** whose coil **41** is energised by digital line from decoder. Motor **26** is geared to produce required torque to turn the wheels.

Claims

1. A game comprising wheeled vehicle/s (1) having drive motor (26), steering apparatus (Fig 2) and other onboard circuitry, and having a multiple of shoes (2,3) in contact with a smooth partially conductive surface (8,9) containing a continuous electrically conductive dipole (4,5) known as a track so that said

vehicle/s receive power from said dipole at all locations across said track surface for the purpose of powering said drive motor, steering apparatus and other onboard circuitry, **characterised in that** said vehicle/s employ digital circuitry comprising Decoders (37,37A) and Digital to Analog converters (38,38A) to recover control signals contained in an encoded digital serial data stream which are further used to control said drive motor and steering apparatus onboard said vehicle/s.

2. A game as in claim 1 having means to generate electrical signals in response to mechanisms such as steering wheel, throttle etc. (14) being activated by user/s which are further converted to digital and encoded to produce a single said encoded digital serial data stream which is sequentially updated by means of a switch (28) controlled by clock counter (29)

3. A game as in claim 1 and claim 2 having means (30,32) to modulate said encoded digital serial data stream onto the low voltage power supplying lines attached to the track dipole. And said vehicle/s comprise means (35,36) to demodulate said encoded digital serial data stream from said track dipole.

4. A game as in claim 1 whereby each vehicle (1) generates a characteristic signal and transmits same via semiconductor Light Emitting Diode/s (LEDs) to stationary receiving diode/s on selective parts of said track (8,9) for the purpose of monitoring progress / lap counting etc. of said vehicle/s.

Patentansprüche

1. Den Ein einschließendes Spiel Fahrzeug/S (1) gedreht hat, hat Antriebsmotor (26), Apparat (Abb 2) und anderer onboard Stromkreis, und steuernd ein mehrfaches von Schuhen (2,3) in Kontakt mit einem teilweise leitfähige Oberfläche (8,9) Enthalten eines ununterbrochenen elektrisch leitfähigen Dipol (4,5) bekannt als eine Spur, damit gesagt hat, daß Fahrzeug/S Kraft von saud Dipol überhaupt Orte accross empfängt, gesagt hat hat glättet, daß Spur zwecks Betreibens auftaucht, treibt hat gesagtApparat und anderer onboard Stromkreis, die in charakterisiert worden sind, daß hat gesagt daß Fahrzeug/S digitalen Stromkreis Einschließen Decoder (37,37A) und digitalanalog Konverter (38,38A) einstellt, Steuersignale wiederzuerlangen, die in einem codierten digitalen Seriendatenbach enthalten werden, der weiter benutzt ist, gesagten Antriebsmotor zu kontrollieren, und steuernden Apparat onboard hat Fahrzeug/S gesagt.

2. Ein Spiel als in Anspruch 1, der Mittel hat, elektrische Signale in Antwort auf Mechanismen zu erzeugen, wie zum Beispiel steuernden Rad, Drosselklappe usw. (14) Werden hat durch Verbraucher/S, der weiter in digital umgewandelt wird, aktiviert und, ein herzustellen, hat gesagt codiert digital Seriensata Bach codiert heraushebt, der sequentiell mittels ein Schalter (28) kontrolliert durch Uhr gegen (29) aktualisiert wird.

3. liniert Ein Spiel, während in Anspruch 1 und 2 beansprucht, die Mittel (30,32) haben, gesagten codierten digitalen Seriendatenbach auf das Niederspannungsnetzteil zu regulieren, befestigt zum Spur Dipol. Und gesagt Fahrzeug/S schließt Mittel (35,36) ein, gesagten codierten digitalen Seriendatenbach von gesagtem Spur Dipol zu demodulieren.

4. Ein Spiel, während in Anspruch 1 wobei jedes Fahrzeug (1) ein charakteristisches Signal erzeugt, und gleich sendet über Halbleiter LED S (LEDS) zu feststehendem empfangendem Diode/S auf auswählend Teil gesagter Spur (8,9) zwecks Überwachung von Fortschritt / Schoß Zählen usw. von gesagtem Fahrzeug/S.

Revendications

1. UN comprendre de jeu a poussé le véhicule/s (1) ayant le moteur d'unité (26), dirigeant l'appareil (la Figue 2) et les autres circuits de onboard, et avoir un multiple de souliers (2,3) dans le contact avec une surface partiellement conductrice lisse (8,9) contenant un dipôle électriquement conducteur continu (4,5) connu comme une piste pour que le véhicule/s dit reçoivent le pouvoir du dipôle de saud à tous emplacements que accross a dit que la surface de piste dans le but de propulse l'unité diteAppareil et autres onboard circuits, **caractérisés dans que** dit véhicule/s emploie numériques circuits comprenant Décodeurs (37,37A) et Numérique à Analogue convertisseurs (38,38A) retrouver signaux de commande contenus dans une codé numérique en série données ruisseau qui sont plus ample ont utilisé régler dit unité moteur et direction appareil onboard a dit véhicule/s.

2. UN jeu comme dans la réclamation 1 moyens ayant pour engendrer des signaux électriques en réponse aux mécanismes tels que volant de direction, étrangler etc. (14) étant activé par utilisateur/s qui sont plus ample converti à numérique et a codé produire un seul dit codé numérique en série sata ruisseau qui de façon séquentielle est mis à jour au moyen d'un commutateur (28) réglé par horloge compteur (29)

3. UN jeu comme dans réclamation 1 et réclame 2 ayant moyens (30,32) moduler dit codé numérique en série données ruisseau sur les bas tension alimentation lignes attachées à la piste les de pour de de du le le le la. Et dit véhicule/s comprend moyens (35,36) démoduler dit codé numérique en série données ruisseau de dit piste dipôle.

4. UN jeu comme dans la réclamation 1 qui prévoit que chaque véhicule (1) engendre un signal caractéristique et transmet même via la Lumière de semiconducteur Emettant le Diode/S (LEDs) au diode/s de réception à l'arrêt sur les parties sélectives de piste dite (8,9) dans le but de l'interception de progrès/ les genoux comptant etc. de véhicule/s dit.

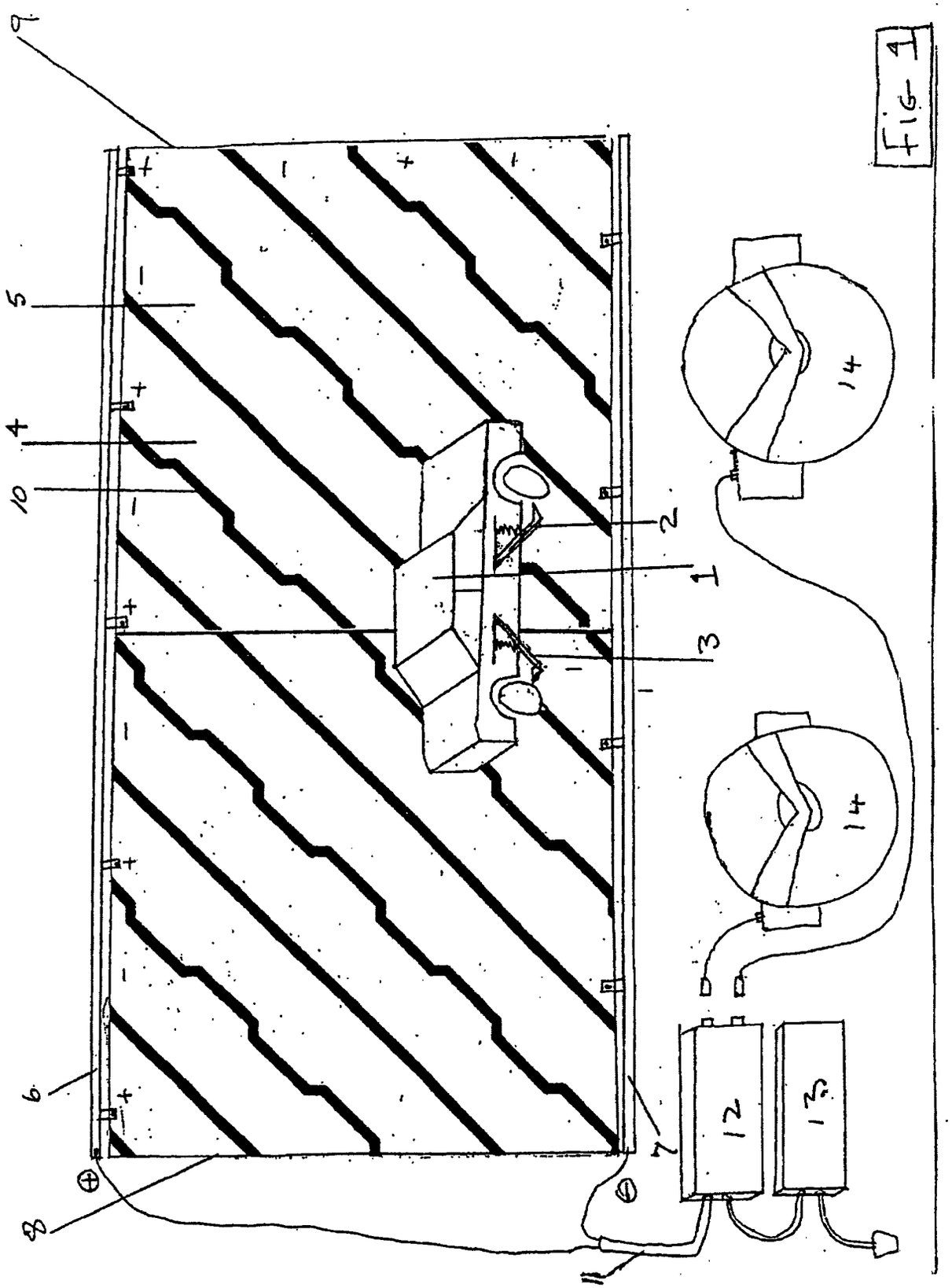


FIG 4

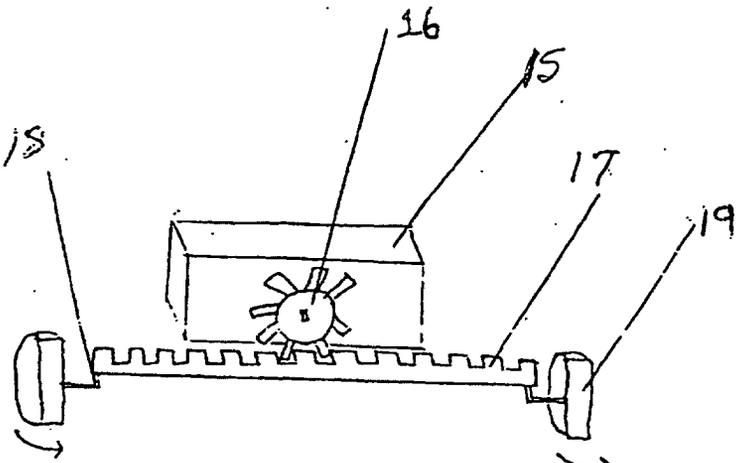


Fig 2

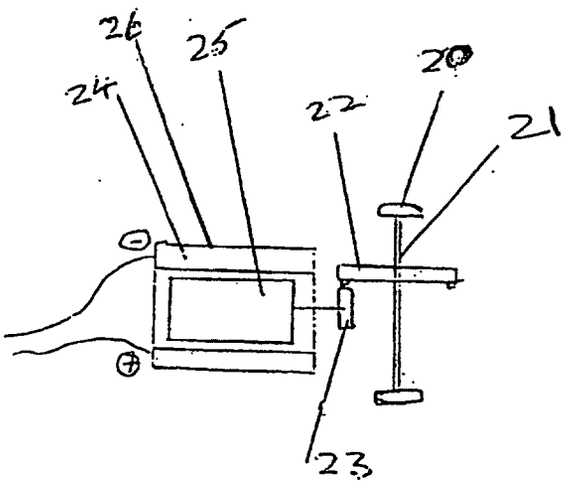


Fig 3

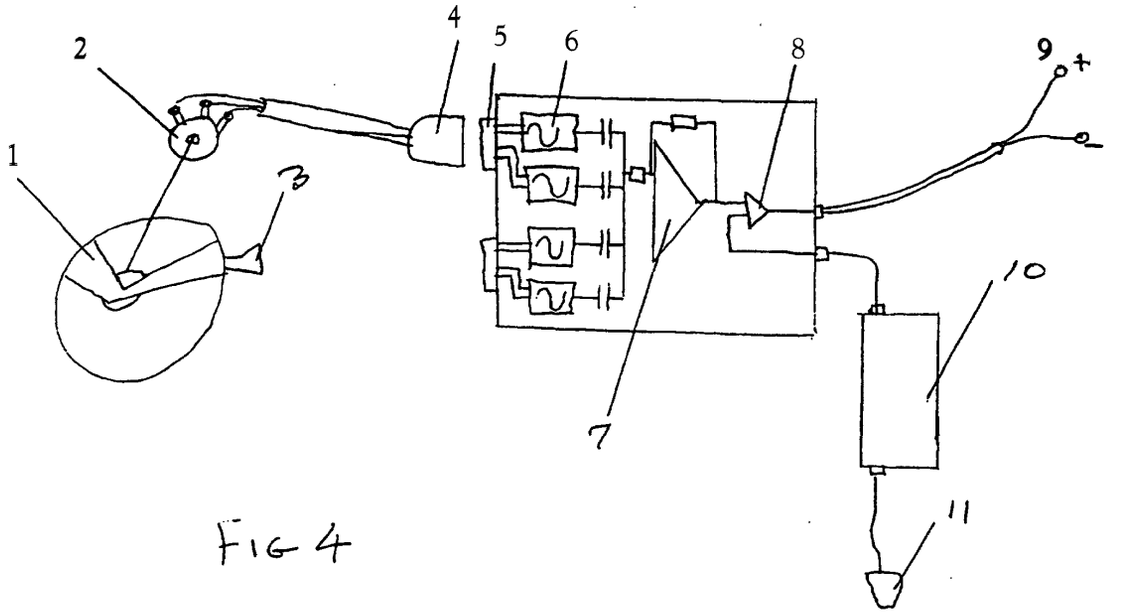


Fig 4

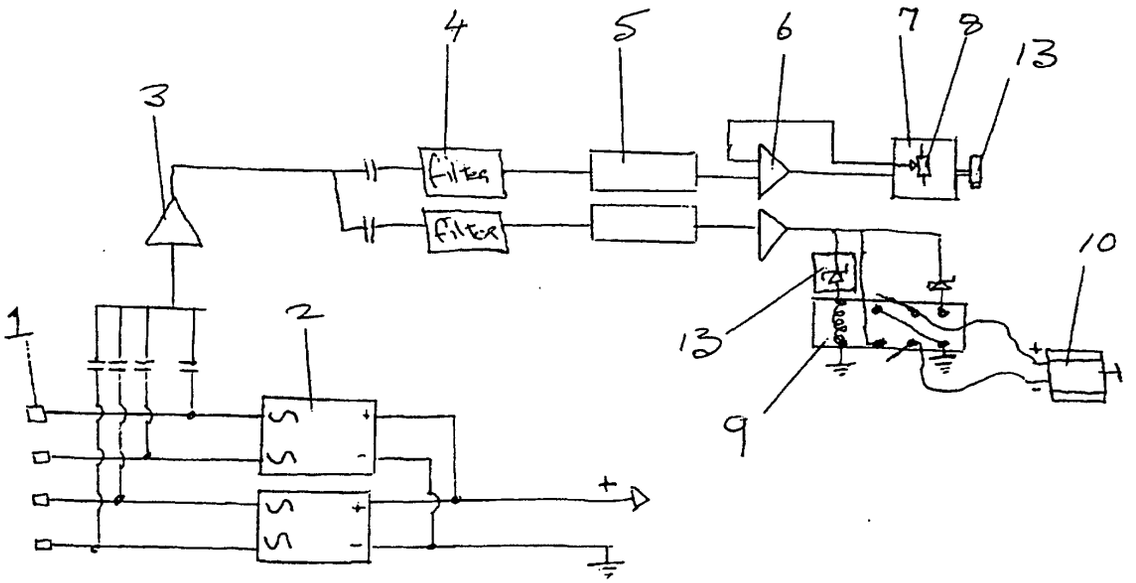


Fig 5

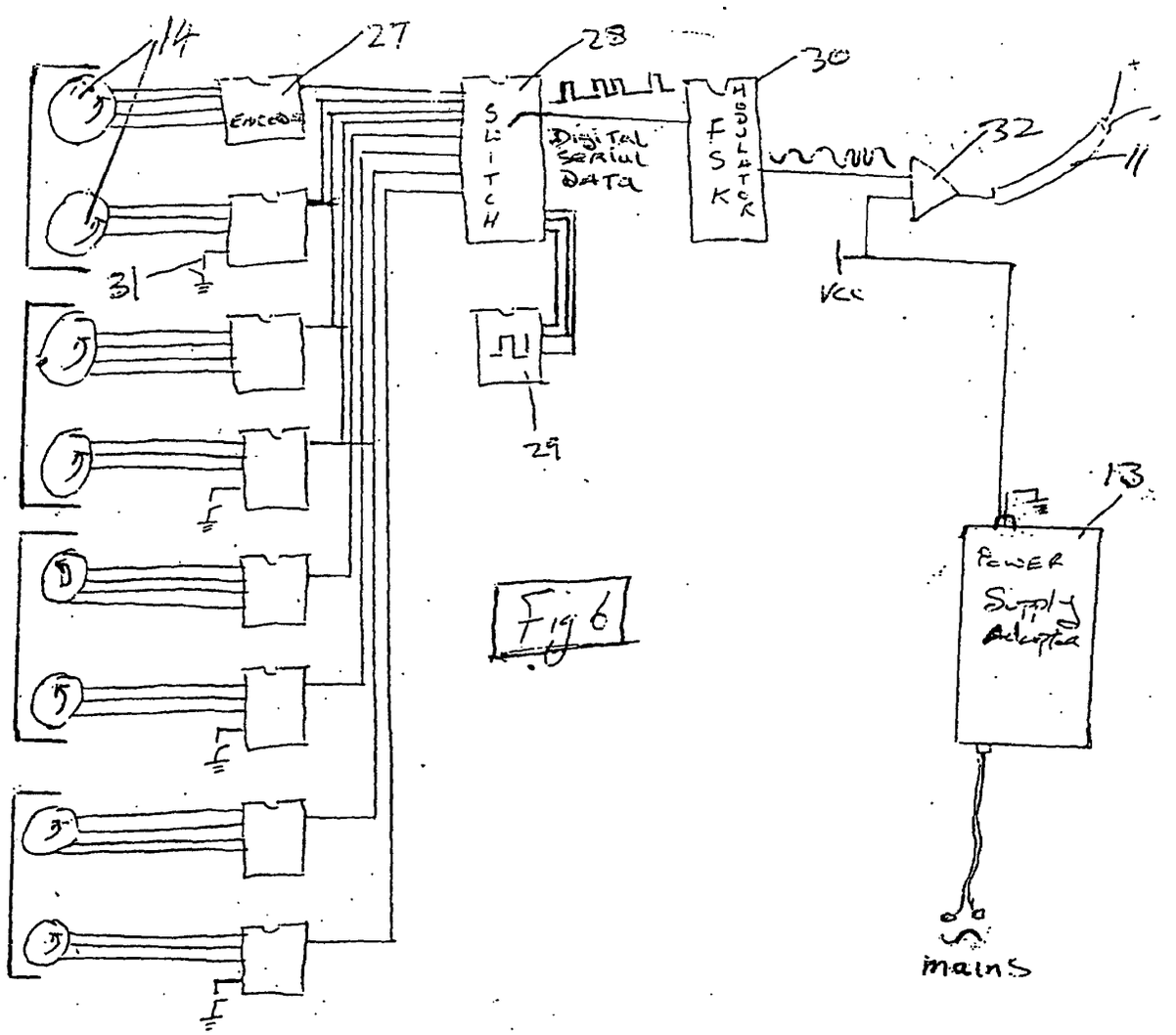
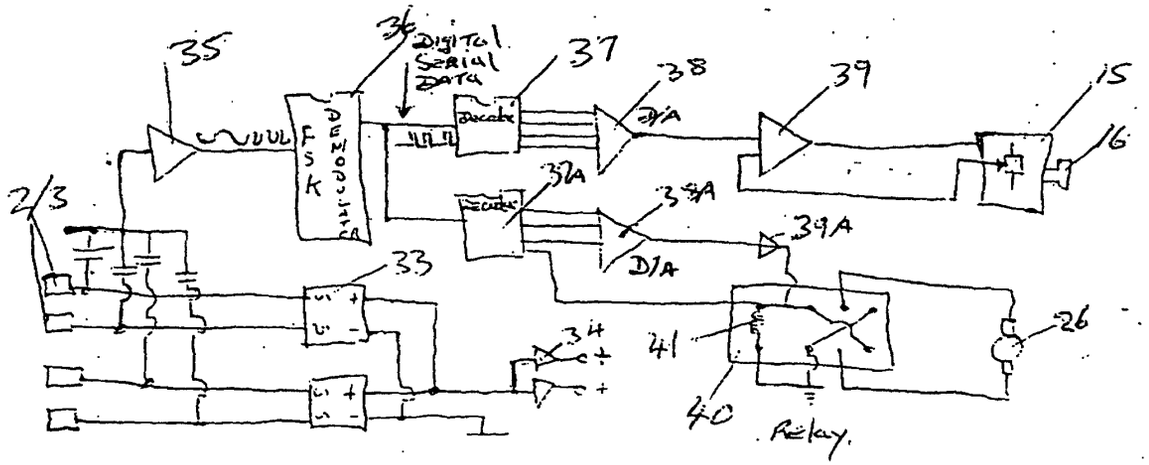

14
27
28
30
32
11
31
SWITCH
Digital Serial Data
FSK
MODULATOR
VCC
29
13
POWER
Supply
Adapter
mains

Fig 6

Fig 7


35
34
Digital Serial Data
37
38
39
15
16
FSK
DEMODULATOR
Decode
D/A
37A
38A
39A
2/3
33
34
41
40
26
Relay.