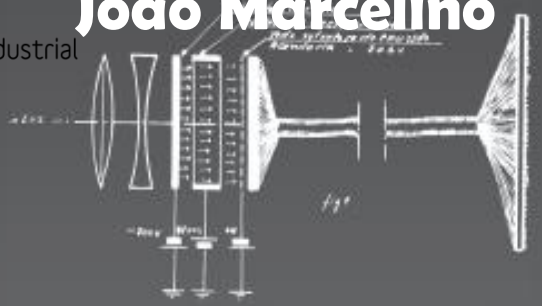
SIMPÓSIO
VIDA E OBRA DO ENG.º JAIME FILIPE

Patentes do Engº Jaime Filipe

João Marcelino

inpi instituto nacional da propriedade industrial



30 MAIO '14
UTAD

UNIVERSIDADE DE TRÁS-OS-MONTES E ALTO DOURO
40 anos utad

ORGANIZAÇÃO
CERTIC
Engenharia de Reabilitação

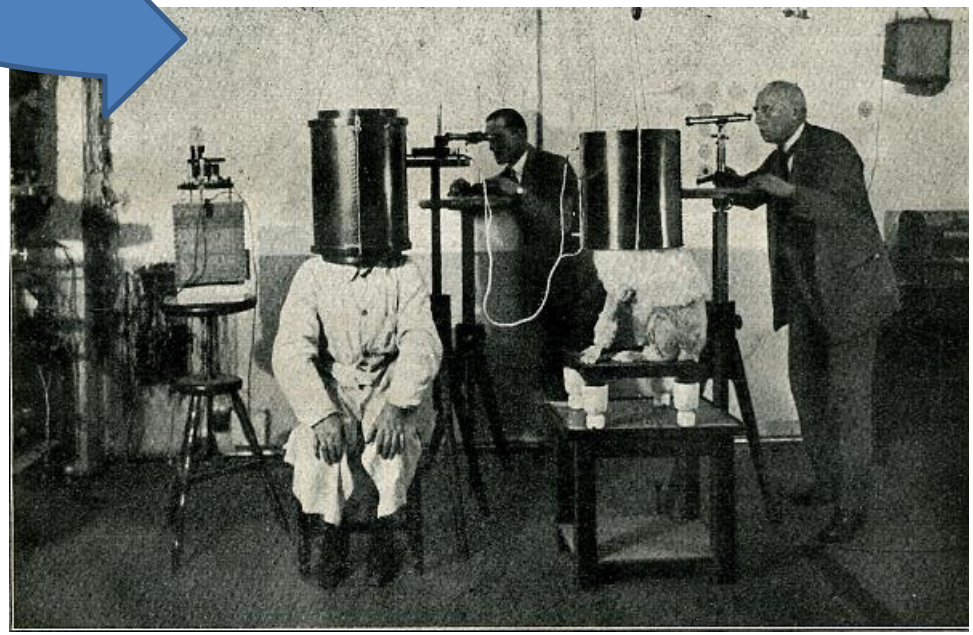
COLABORAÇÃO
FCT
RTP
PlayPlanet
inpi instituto nacional da propriedade industrial
SUPERA

Invenções

O processo de invenção:

Conceção

Redução à prática



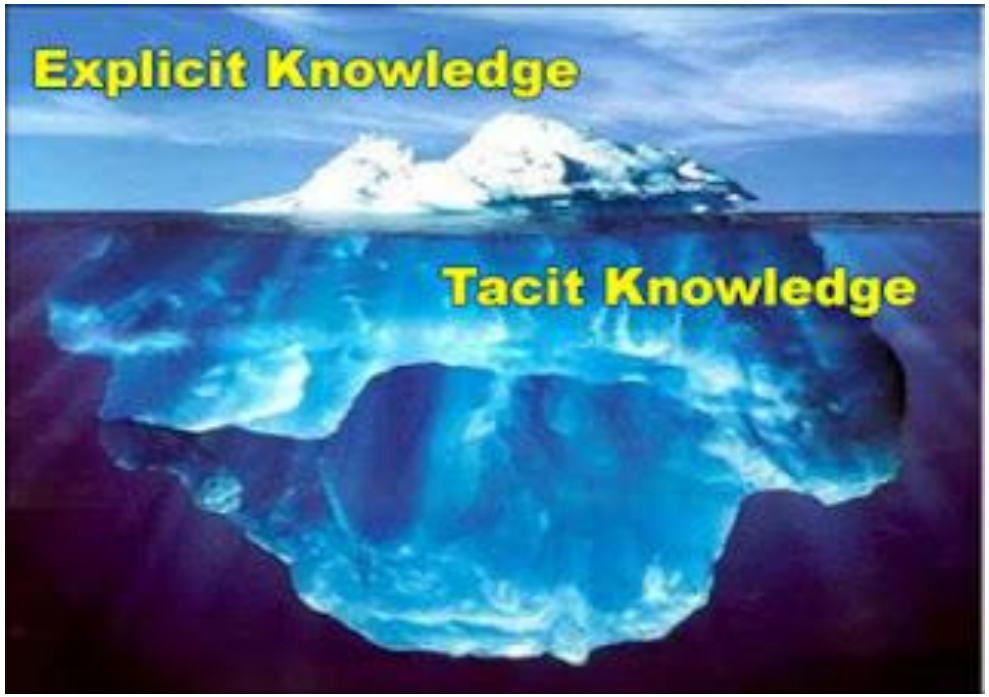
Invenções / patentes

Conhecimento explícito

Disponível para todos verem

Conhecimento tácito

Dentro das nossas cabeças



Patentes Jaime Filipe

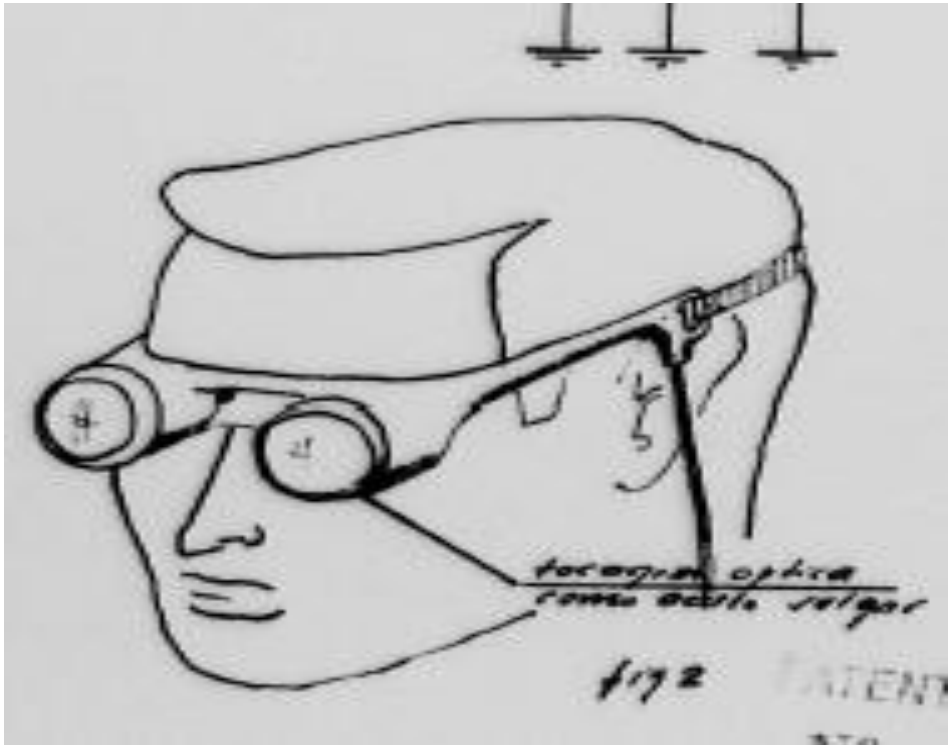
Patente nº	Data do pedido	Epígrafe
36581	27/10/1959	ELETROVISOR
62348	24/07/1974	PROCESSO PARA O ACIONAMENTO DE PRÓTESES DE MEMBROS
73002	08/05/1981	APARELHO DESTINADO A UMA PERCEÇÃO TÁTIL DE IMAGENS
77080	21/07/1983	ELEVADOR DE CADEIRA DE RODAS
80295	16/04/1985	SISTEMA ELETRÓNICO VIBRÁTIL PARA SURDOS

(lista eventualmente não exaustiva)

Pat nº 36581

Eletrovisor

Data do pedido: 27/10/59

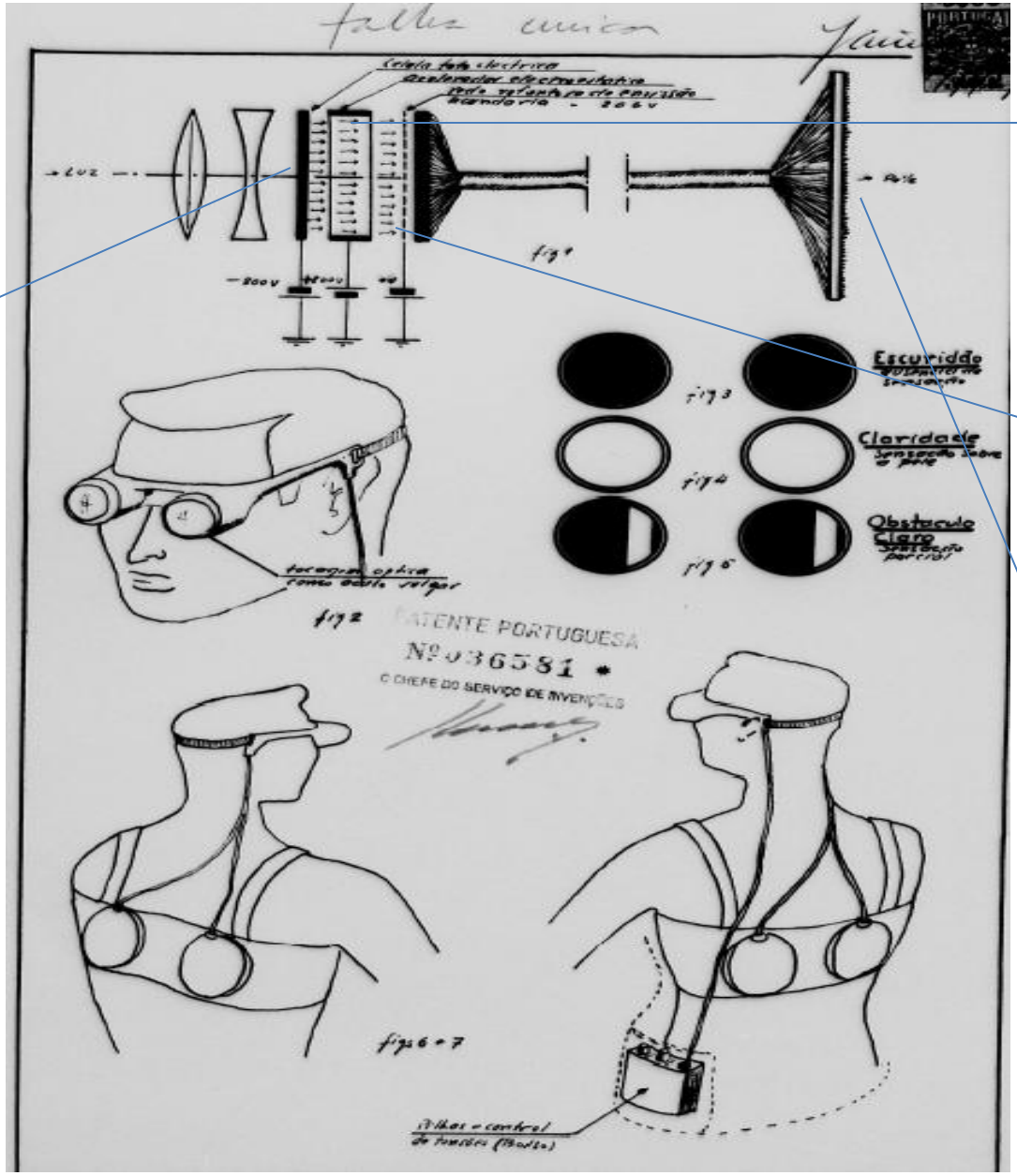


Características essenciais

A imagem focada pelas lentes, vai projetar-se sobre uma placa fotoelétrica, a qual liberta eletrões proporcionalmente à intensidade luminosa.

Os eletrões são acelerados por uma acelerador electroestático e recebidos numa placa de terminais onde está ligado um grande número de fios (e.g. 600). A cada um dos fios corresponde um ponto cujo potencial elétrico é função da maior ou menor intensidade luminosa que incidiu sobre a placa foto-elétrica, no ponto correspondente.

A placa de terminais é aplicada nas costas para sensibilizar a pele.


Célula fotoeléctica
Acelerador eletroestático
Rede retentora de emissão secundária
Péle
Escuridão
Claridade
Obstáculo claro
fig 1
fig 2
fig 3
fig 4
fig 5
fig 6 e 7
PATENTE PORTUGUESA
Nº 36581
O CHEFE DO SERVIÇO DE INVENÇÕES

Qual o contributo desta invenção para o estado da técnica?

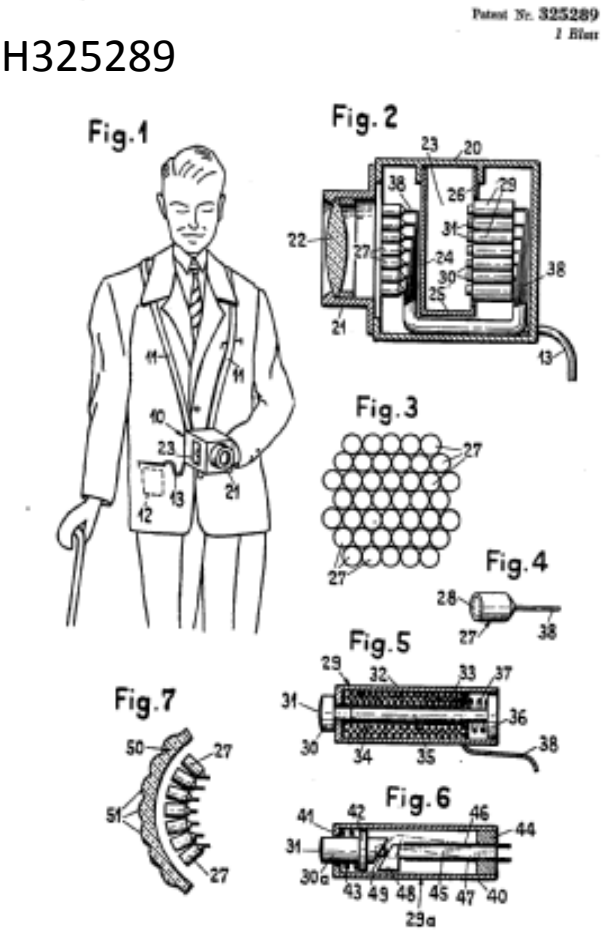
1º passo: classificação da invenção

A61F	**FILTERS IMPLANTABLE INTO BLOOD VESSELS; PROSTHESES; ORTHOPAEDIC, NURSING OR CONTRACEPTIVE DEVICES; FOMENTATION; TREATMENT OR PROTECTION OF EYES OR EARS; BANDAGES, DRESSINGS OR ABSORBENT PADS; FIRST-AID KITS** (dental prosthetics A61C)
	Treatment or protection of the eyes or ears; Substitution by other senses
A61F 9/00	**Method or devices for treatment of the eyes; Devices for putting-in contact lenses; Devices to correct squinting; Apparatus to guide the blind; Protective devices for the eyes, carried on the body or in the hand** (caps with means for protecting the eyes A42B 1/06; visors for helmets A42B 3/22; {retractors A61B 17/02; manipulators specially adapted for use in surgery A61B 19/22}; appliances to aid invalids to move about A61H 3/00; {exercisers for the eyes A61H 5/00}; eye baths A61H 35/02; sunglasses or goggles having the same features as spectacles G02C)
A61F 9/08	• Devices or methods enabling eye-patients to replace direct visual perception by another kind of perception ({walking or guiding aids for blindsA61H 3/06; teaching or communicating with blindsG09B 21/00 promoting of eye function by stimulation with electric currents using contact electrodes A61N 1/36046})

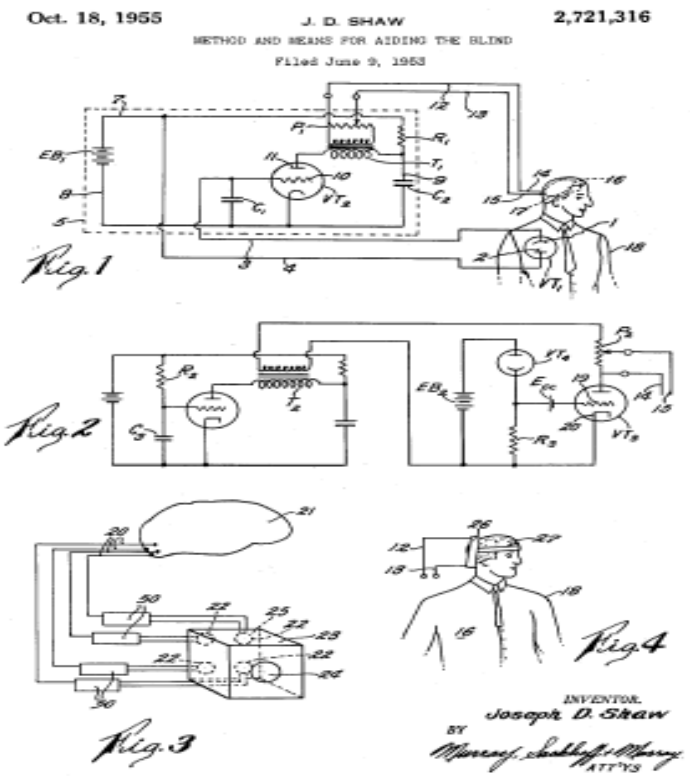
2º passo: pesquisar bases de dados, de patentes e outra documentação técnica

Determinar o estado da técnica mais próximo i.e. o documento que partilha o maior número de características técnicas com a invenção:

CH325289



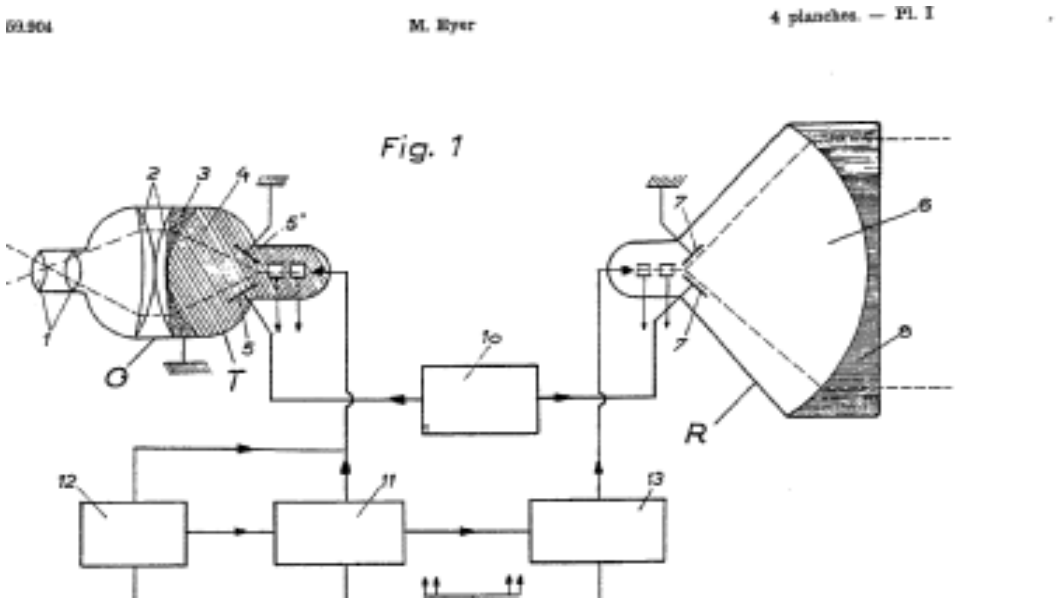
US2721316



Estado da técnica Pat. 36581

FR1059904

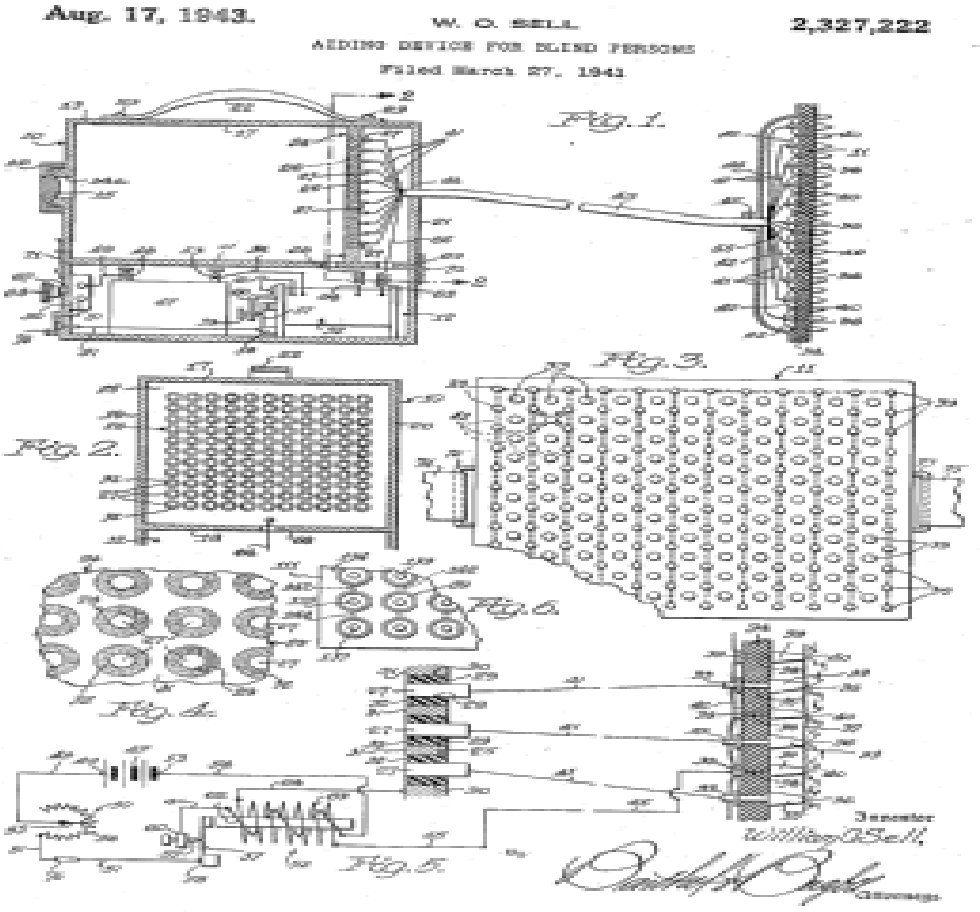
Dispositif électronique transmetteur de sensations lumineuses, notamment à l'usagedes aveugles



Estado da técnica Pat. 36581

US2327222

Aiding device for blind persons



Ideia que é retomada com recurso a novas tecnologias

CMOS Pixels for Subretinal Implantable Prothesis

Marco Mazza, Philippe Renaud, Daniel C. Bertrand, and Adrian M. Ionescu

Abstract—**This work reports on the design, fabrication, and characterization of CMOS pixels for subretinal implants, which seems to be an effective way to recover visual capabilities in some types of blindness. Two possible approaches are presented for CMOS pixel implementation: 1) an approach based on a light-controlled oscillator (LICOS) using a ring oscillator with an odd number of inverters and 2) an approach based on distributing a square signal at each pixel that filters out a number of pulses depending of the light intensity wave across the chip (WATCH). Both types of pixels fabricated in 0.35-μm CMOS demonstrate good mimic of the electrical behavior of human retina, with low-power consumption (typically 1 mW for a 14 × 14 matrix of pixels) and having small dimensions (75 × 78.5 μm² for LICOS and 70 × 50 μm² for WATCH), which make them suitable for practical implants. Experimental validation is reported on physiological solutions. Because of its characteristic, the proposed matrix of pixels could be considered as one of the first stand-alone highly integrated solutions for subretinal implant chips.**

***Index Terms*—Frequency conversion, implantable biomedical devices, low-power applications, photodiode, pixel design.**

I. Introduction

THE HUMAN retina is characterized by a series of precisely defined layers, including ganglion, amacrine, bipolar, and horizontal cells, and photoreceptors (rodes and cones), as depicted in Fig. 1. The light passes through all these layers and eventually stimulates the photoreceptors that convert it into electrical signals. The signals generated by these photoreceptors are transmitted through an intermediate layer of neurons to the ganglion cells, which relay the information to the optic nerve and then to the brain in form of action potentials.

Photoreceptor degeneration diseases, such as *retinitis pigmentosa* (RP) and *age-related macular degeneration* (AMD), affect only rodes and cones, leaving intact the remaining layers. In particular, if ganglion cells preserve their functionalities, an artificial stimulation of nervous cells and hence a recovery of visual capabilities is still possible.

In order to correctly stimulate the nervous terminations, an artificial retina able to mimic the conversion of light into nervous signals could be placed above the pigmented epithelium, a nutritive layer of the eye cells. This practical approach, known as *subretinal implantation*, was first proposed by Chow [1] and adopted by Zrenner [2], [3].

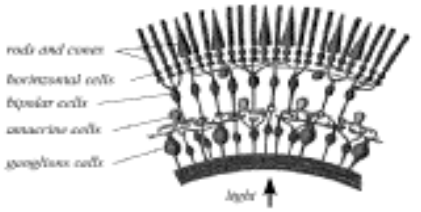


Fig. 1. Multilayer structure of human retina. In photoreceptor degeneration diseases, only rodes and cones functionality is affected.

In this paper, two different approaches on the realization of human retina compatible silicon CMOS pixel are presented. Section II introduces the stimulation problem and it is followed by a brief description of light detection and amplification techniques (Section III). Then, two pixel solutions are presented: a stand-alone one based on regulated ring oscillator called a light-controlled oscillator (LICOS; Section IV) and a clock synchronized implementation called wave across the chip (WATCH; Section V). A comparison of the performances of the two types of pixels is then proposed. Section VI reports on experimental results obtained with 14 × 14 matrix of pixels, and, finally, Section VII concludes about the obtained results and their importance for future prospects.

II. Stimulating the Nervous Cells

The response of retinal cones to a light flash is a biphasic current pulse with a pulse frequency dictated by the intensity of the light (see Fig. 2). In order to properly stimulate the retina, the implanted device should generate a similar conversion of light intensity into electrical signals.

In order to properly shape the stimulating signal, the electrical model of chip-to-retina interface should be taken into account. Since the contact between eye tissue and chip pads reveals high-pass RC filter behavior, the chip output waveform should be designed according to this derivative effect.

As depicted in Fig. 2, in order to have a biphasic characteristic for the output pulse, a square pulse with the frequency proportional to light intensity should be generated. In practice, the circuit output is a square wave with a light dependent duty cycle, driving several tens of microamperes. Particularly, the high-level time T_{ss} should be constant while the low-level time T_{sf} should vary quasilinearly to the light intensity [4]. Values of T_{ss} and T_{sf} stand from 0.1 to 8 ms (constant) and, from 8 up to 100 ms (varying with light intensity), respectively [5]–[8].

Manuscript received January 24, 2003; revised December 5, 2003. The associate editor coordinating the review of this paper and approving it for publication was Prof. Ignacio Mañas.

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Digital Object Identifier 10.1109/JSEN.2004.839895

Pat. 62348

Prótese cujos movimento são realizados por músculos artificiais constituídos por meio de bobinas… alimentadas por baterias incorporadas na prótese.

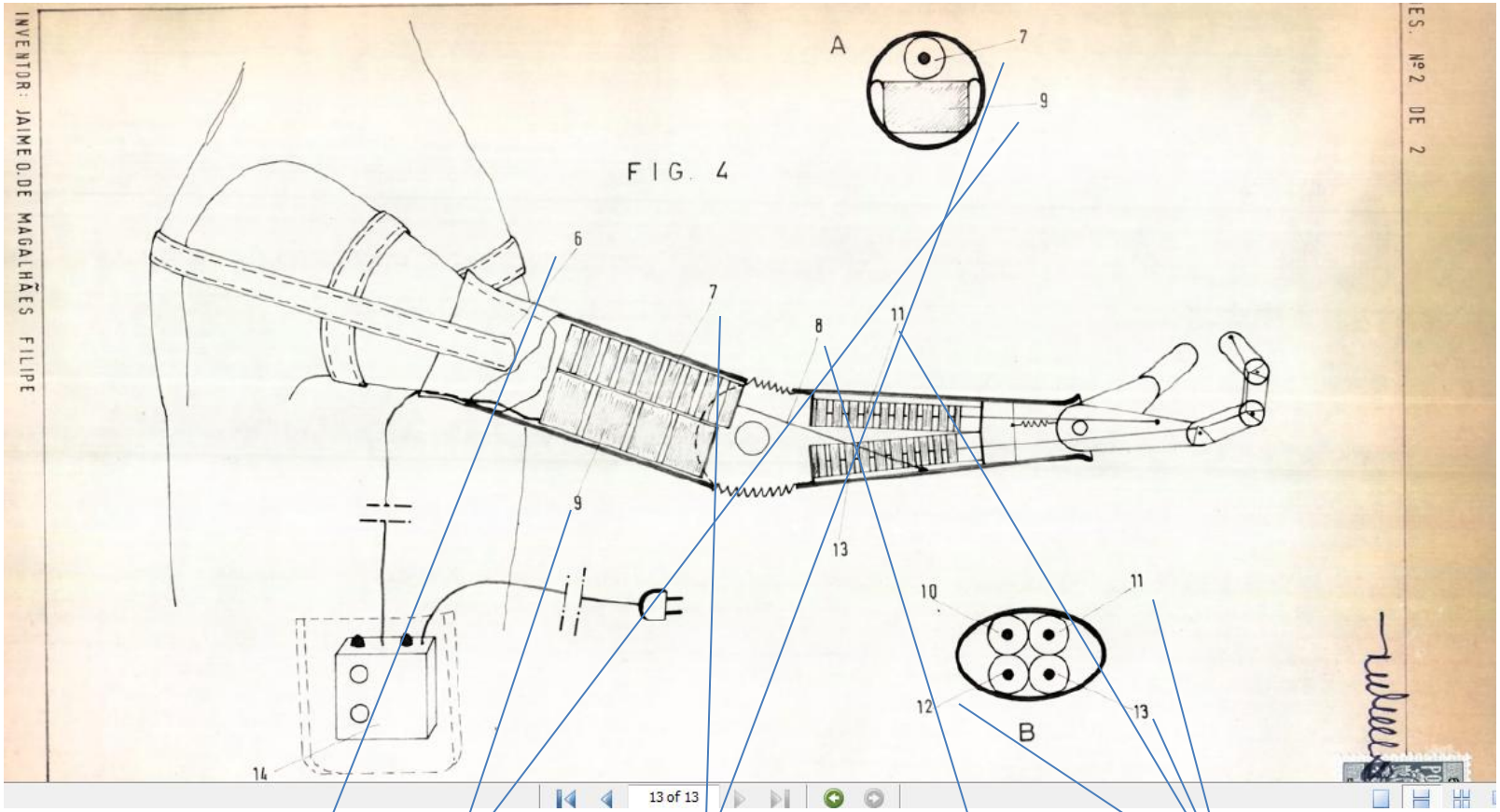
A passagem da corrente elétrica nas bobinas que constituem o músculo artificial provocam a formação de campos magnéticos que determinam o aparecimento de polaridades contrárias nas faces das várias bobinas, do que resulta uma atração mútua entre as as mesmas bobinas, sendo o movimento transmitido à parte da prótese que se pretende acionar por meio de um cabo de aço, nylos ou outro material adequado.

Bobinas mergulhadas em óleo.

Comandos por células piezoleléctricas com sinais ampliados para permitir que bobinas se atraiam.

Ritmo de passada das pernas controlado por interruptor manual.

Pat. 62348



coto

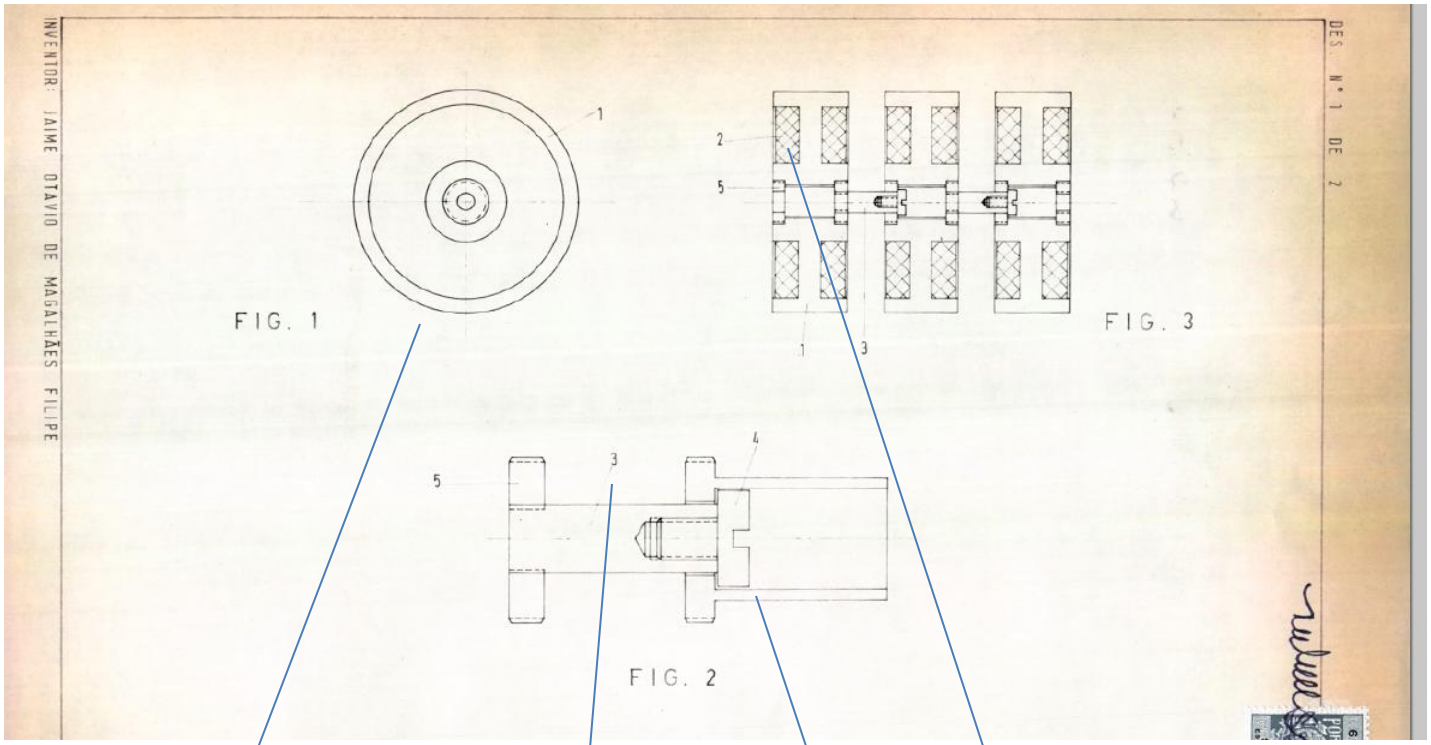
Baterias

músculo artificial

cabo

Músculos artificiais formado por bobinas

Pat. 62348



vista frontal de bobina

núcleo

cabeça

enrolamento de fio condutor

Estado da técnica Pat. 62348

FR2107244 A5 19720505

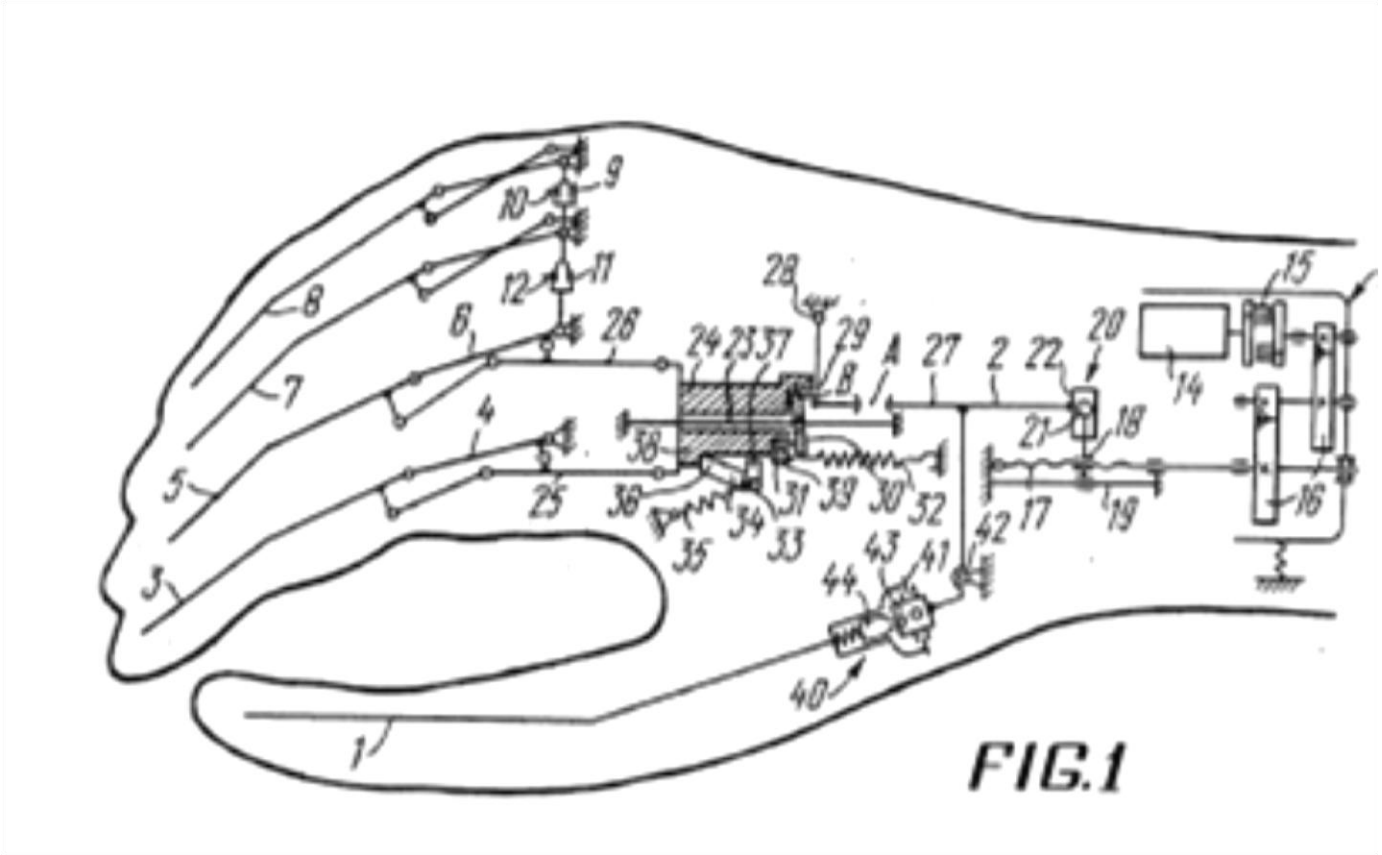
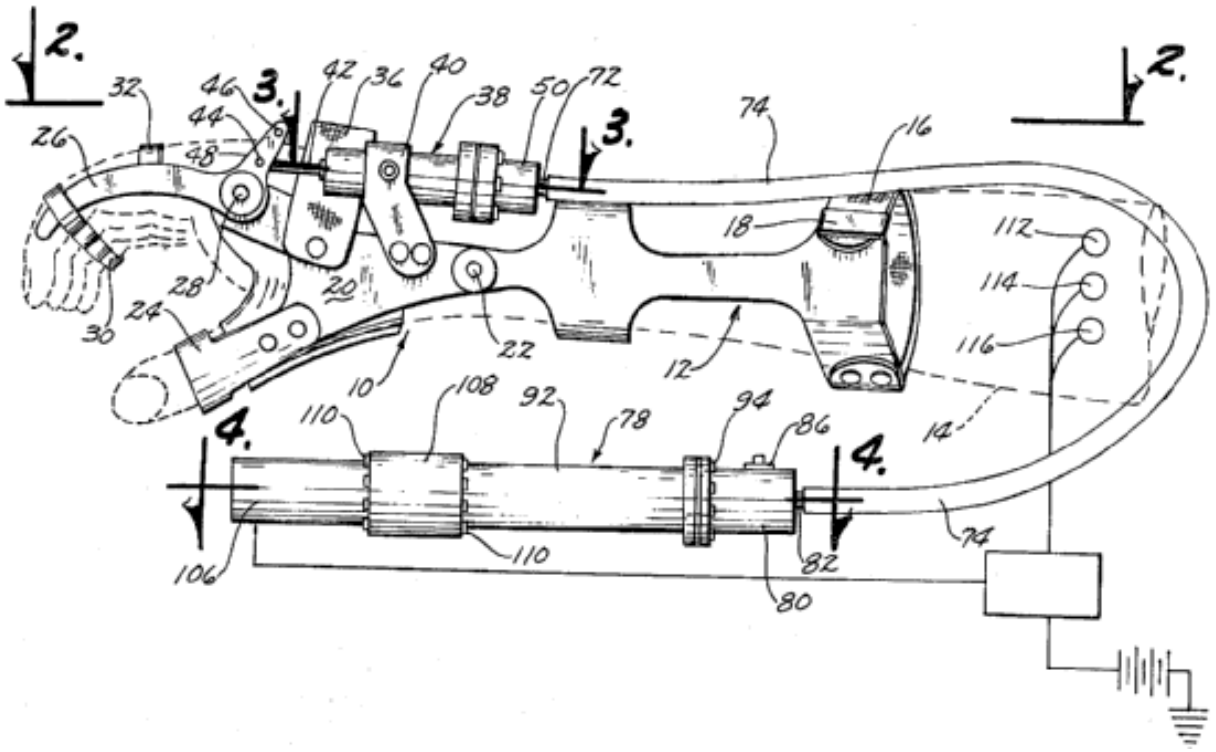


FIG.1

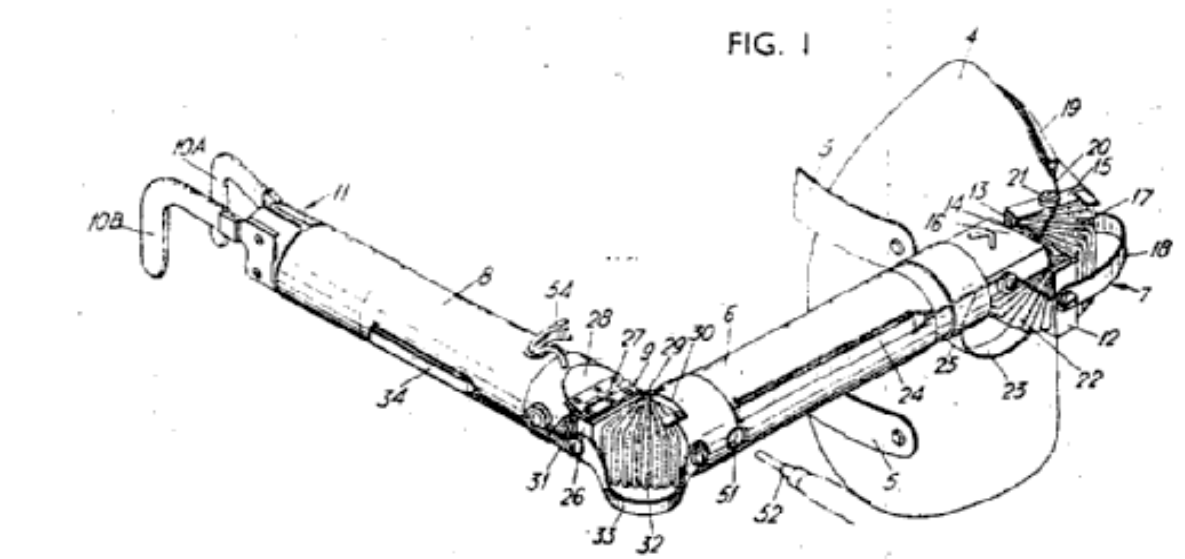
Estado da técnica Pat. 62348

US3631542 A 19720104
MYOELECTRIC BRACE



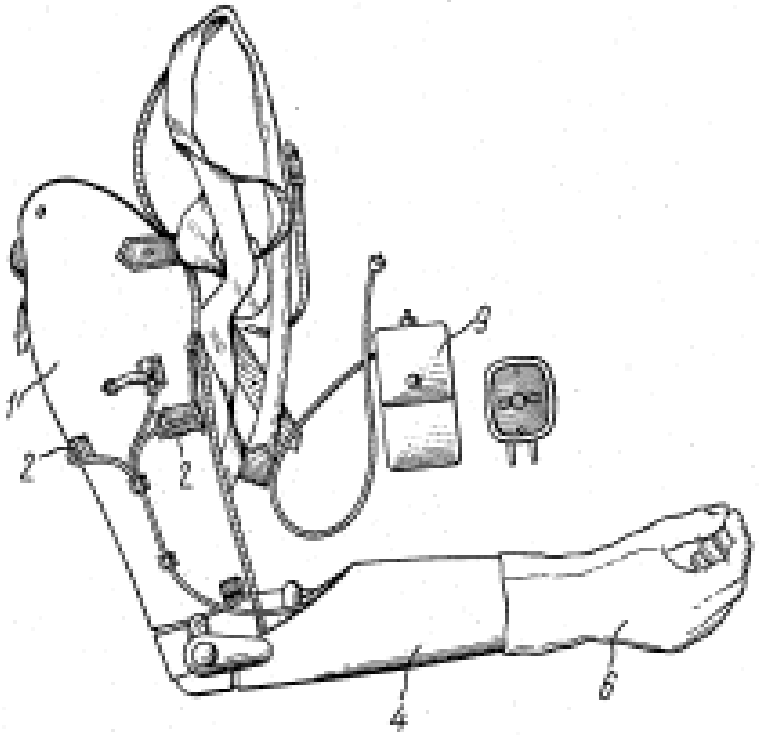
Estado da técnica Pat. 62348

GB1286821 A 19720823
MANIPULATING DEVICE



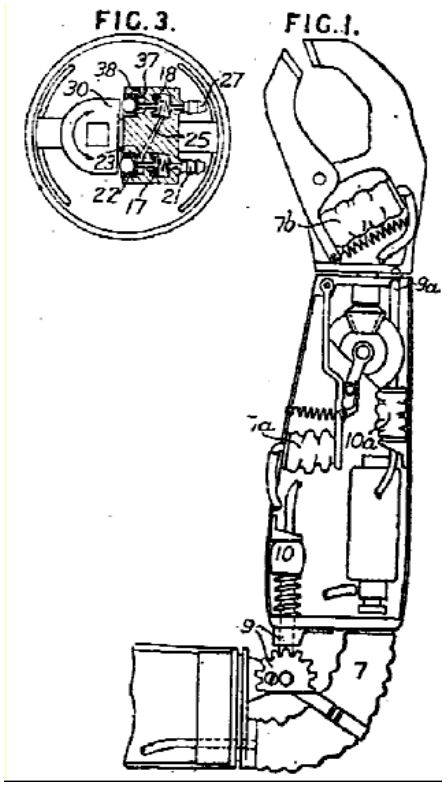
Estado da técnica Pat. 62348

US3491378 A 19700127
ARTIFICIAL ARM HAVING BIOELECTRICALLY CONTROLLED FINGER MOVEMENT AND HAND ROTATION RESPONSIVE TO SHOULDER MUSCLE IMPULSES



Estado da técnica Pat. 62348

GB835283 A 19600518
Improvements in servo-motor actuated artificial limbs



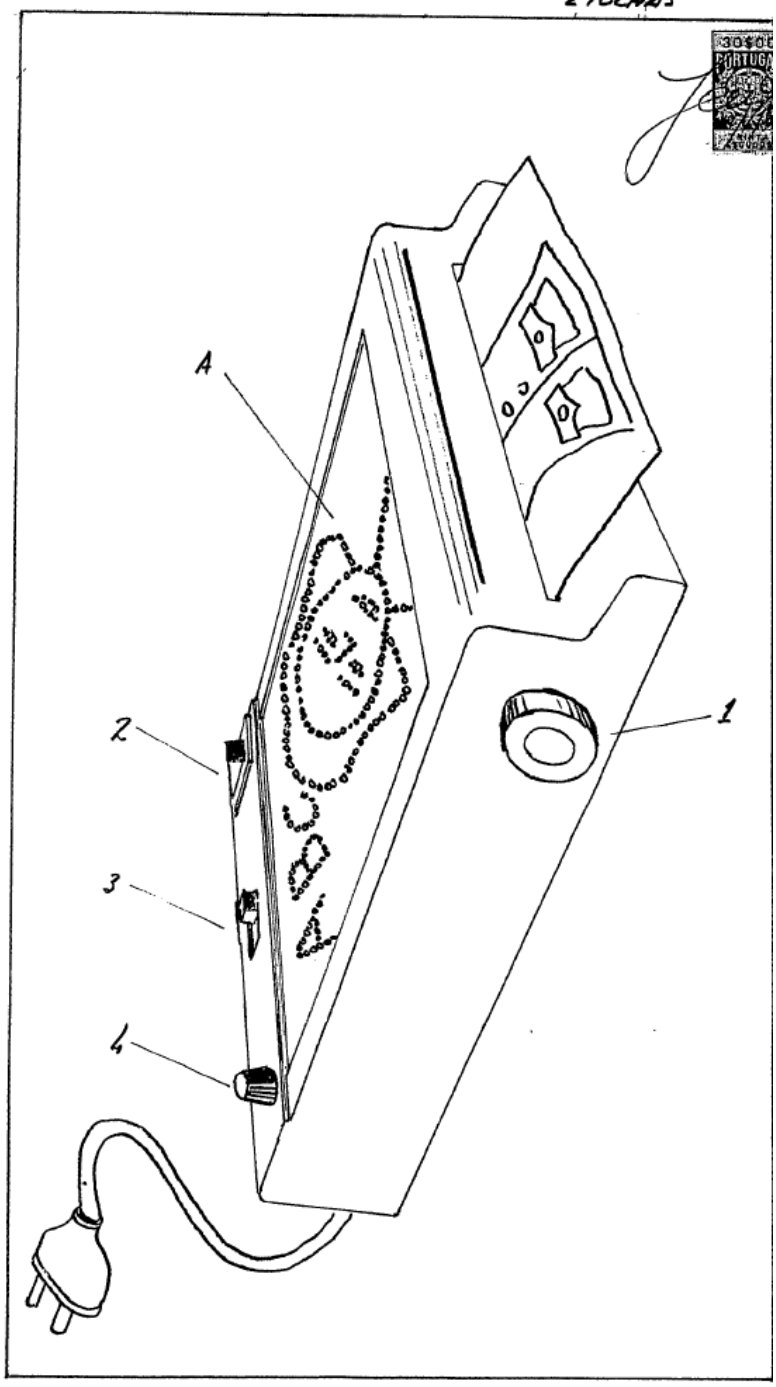
Pat. 73002

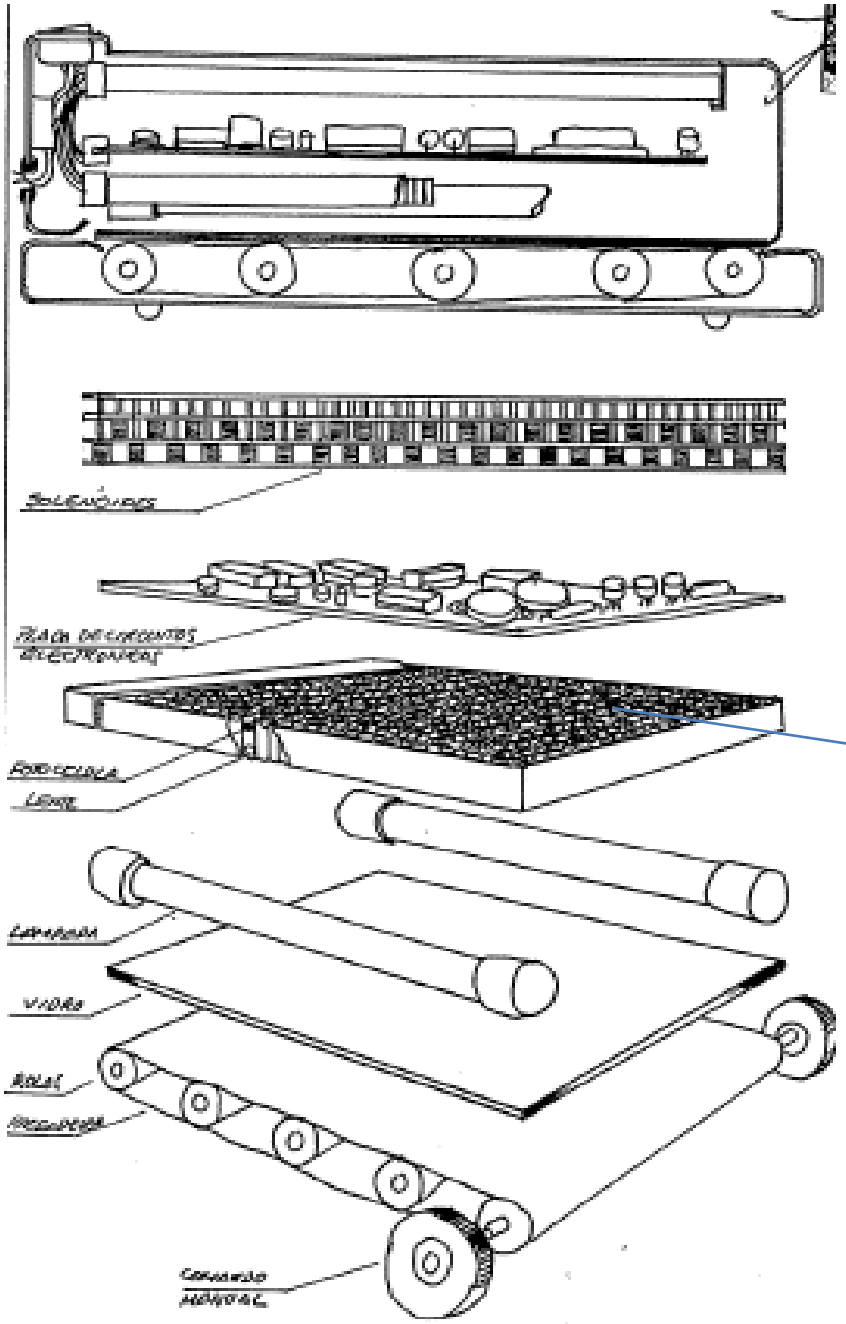
Aparelho destinado a uma percepção táctil de imagens-impressas, desenhos, letras de grandes dimensões ou fotografias muito contrastadas por parte de pessoas cegas.

Aparelho baseado nos princípios da fotoelectricidade e electromagnetismo, mas tendo como carácter inovador a possibilidade de permitir delinear em relevo os contornos de imagens simples desenhadas ou impressas a negro sobre papel branco ou vice-versa por meio de pinos (pequenos cilindros), metálicos que se tornam salientes por ação da luz, da fotoelectricidade e de um conjunto de solenóides que contêm os pinos no seu núcleo. Pode-se também encarar a utilização de pinos de cristal piezoeléctrico extensível por estimulação eléctrica.

Desta forma as pessoas cegas, uma vez introduzida a imagem gráfica na ranhura do aparelho e colocada numa posição de enquadramento em relação ao painel de leitura (A), sentirão por contacto direto das mãos sobre o referido painel os contornos da imagem, por correspondência dos pinos salientes com a imagem original.

2 FOLHAS




Fotocélula

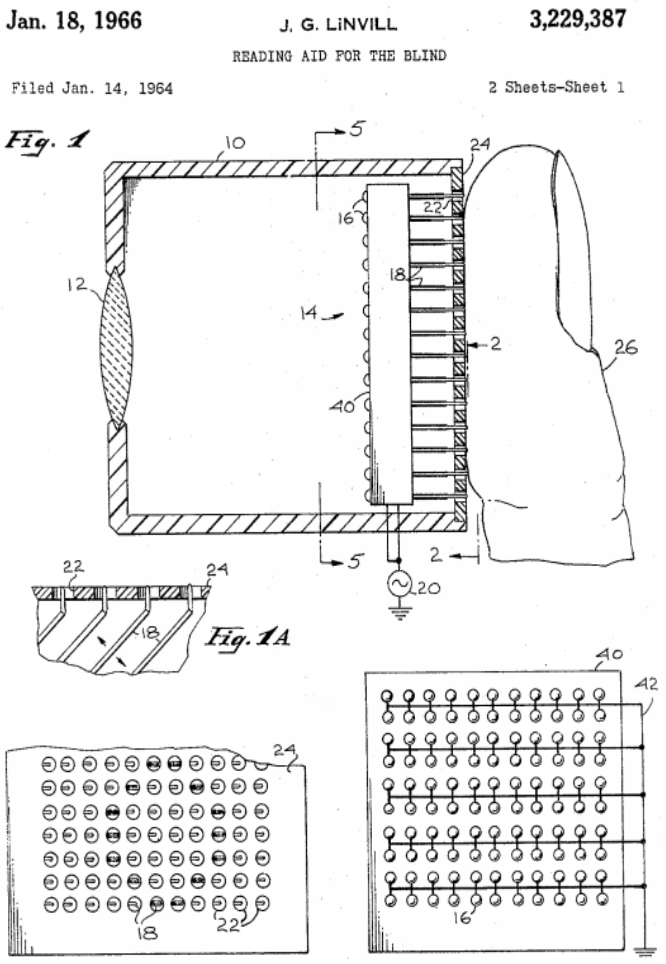
Classificação

Search for g09b21/003 Search View section | Index | A | B | C | D | E | F | G | H | Y |

CPC [...] 2000 « G09B19/00 G09B23/00 »

Symbol	Classification and description
	Instruments
G09	**EDUCATION; CRYPTOGRAPHY; DISPLAY; ADVERTISING; SEALS**
G09B	**EDUCATIONAL OR DEMONSTRATION APPLIANCES; APPLIANCES FOR TEACHING, OR COMMUNICATING WITH, THE BLIND, DEAF OR MUTE; MODELS; PLANETARIA; GLOBES; MAPS; DIAGRAMS** (devices for psychotechnics or for testing reaction times A61B 5/16; games, sports, amusements A63; projectors, projector screens G03B)
G09B 21/00	**Teaching, or communicating with, the blind, deaf or mute** (audible presentation of material to be studied G09B 5/04; devices or methods for replacing direct visual or auditory perception by another kind of perception A61F 9/08, A61F 11/04; audible indication of meter readings or of colour G01D 7/12; watches for blind persons G04B 25/02; methods or arrangements for reading or recognising printed or written characters G06K 9/00; speech analysis, speech recognition G10L ; sound-recording or reproducing, per se G11B)
G09B 21/001	•{Teaching or communicating with blind persons } ({G09B 21/02 to G09B 21/06 take precedence})
G09B 21/003	••{using tactile presentation of the information, e.g. Braille displays}
G09B 21/004	•••{ Details of particular tactile cells, e.g. electro-mechanical or mechanical layout}
G09B 21/005	•••{ Details of specially-adapted software to access information, e.g. to browse through hyperlinked information}

Patente do Optacon



Jan. 18, 1966 J. G. LiNVILL 3,229,387

READING AID FOR THE BLIND

Filed Jan. 14, 1964 2 Sheets-Sheet 1

Fig. 1

Fig. 1A

(fonte: wikipedia)

Optacon

From Wikipedia, the free encyclopedia

The **Optacon** (OPtical to TActile CONverter)[1] is an electromechanical device that enables blind people to read printed material that has not been transcribed into Braille.

Contents [hide]

1 Description
2 History
3 Previous History of Blind Reading Machine Development
4 Funding for Optacon Research and Development
5 Development of the Optacon
6 Optacon Integrated Circuit Development
7 Optacon Electronics, Optics, and Packaging
8 Optacon Training
9 From Commercialization to Discontinuance
10 References
11 External links

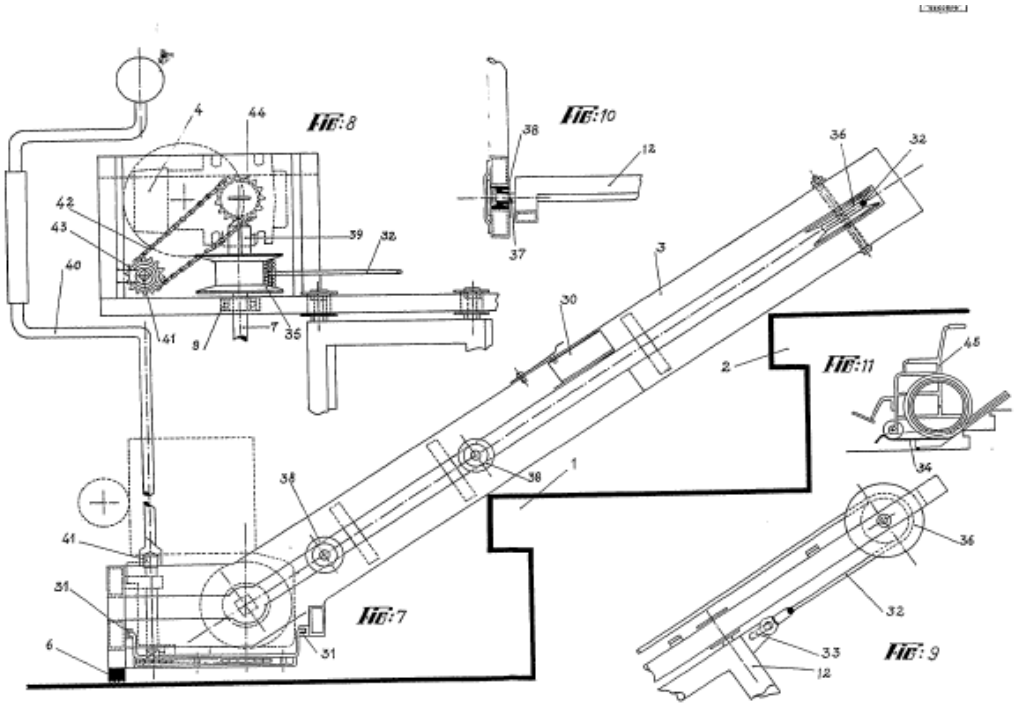
Optacon

- https://www.youtube.com/watch?v=_b0J1sI-DOo

Pat. 77080

Elevador de cadeira de rodas

2 calhas, motor, correntes



Cooperative Patent Classification

Search for b66b9/083 Search

View section | Index | A | B | C | D | E | F | G | H | Y |

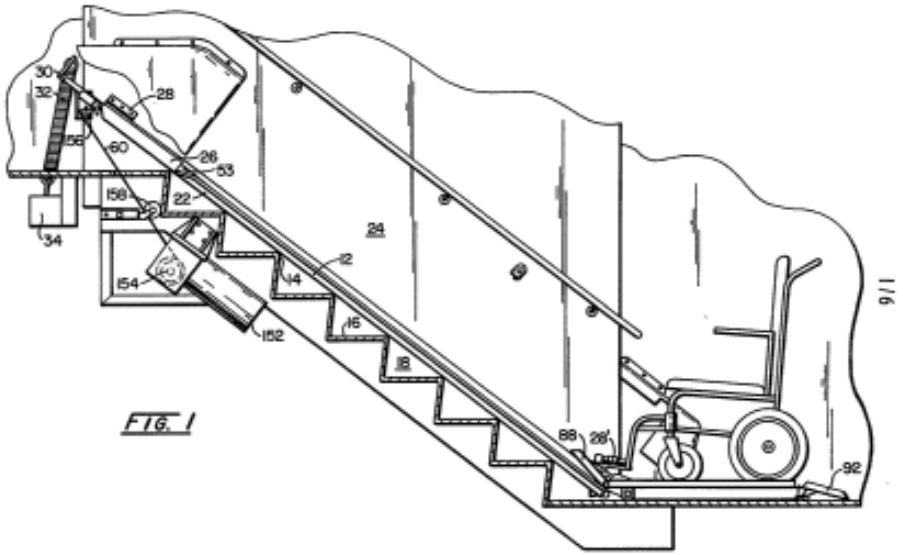
CPC 2000

« B66B7/00 B66B11/00 »

	Symbol	Classification and description
☐	B	PERFORMING OPERATIONS; TRANSPORTING
		Transporting
☐	B66	HOISTING; LIFTING; HAULING
☐	B66B	ELEVATORS; ESCALATORS OR MOVING WALKWAYS ({ apparatus for raising or lowering persons on theatrical stages or the like A63J 5/12 } ; funicular railbound systems with rigid ground-supported tracks and cable traction, e.g. cliff railways, B61B 9/00 ; arrangements of ammunition handlers in vessels B63G 3/00 ; hoists, lifts, or conveyers for loading or unloading in general B65G ; braking or detent devices controlling normal movements of winding drums or barrels B66D ; ship-lifting devices E02C ; garages for many vehicles with mechanical means for lifting vehicles E04H 6/12 ; hoists for feeding ammunition or projectiles to launching apparatus or to loading mechanisms F41A 9/00)
		Lifts in, or associated with, buildings
▲ ☐	B66B 9/00	**Kinds or types of lifts in, or associated with, buildings or other structures** (characterised by control systems B66B 1/00 ; apparatus for raising or lowering persons on stages of theatres A63J 5/12)
☐	B66B 9/06	•inclined, e.g. serving blast furnaces
☐	B66B 9/08	••associated with stairways, e.g. for transporting disabled persons ({ facilitating access of invalids to vehicles A61G 3/02 })
☐	B66B 9/0807	•••{Driving mechanisms}
☐	B66B 9/083	••••{Pull cable, pull chain}

Estado da técnica Pat. 77080

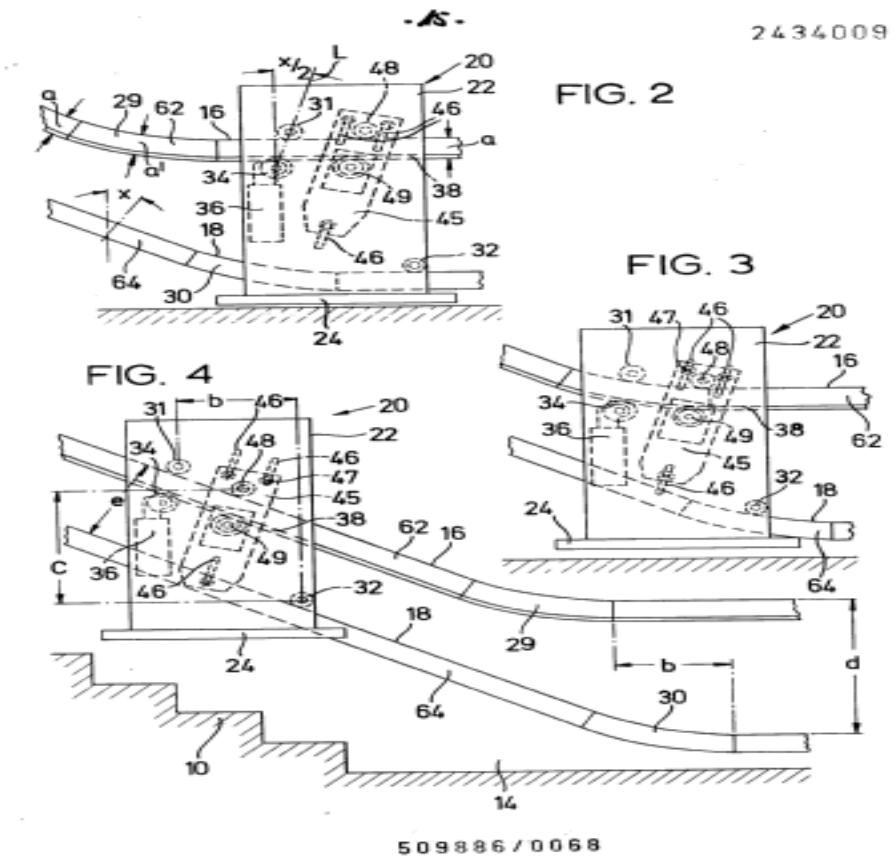
EP0047574 A1 19820317
EP0047574 B1 19860226
(A1)
Wheelchair lift.



0047574

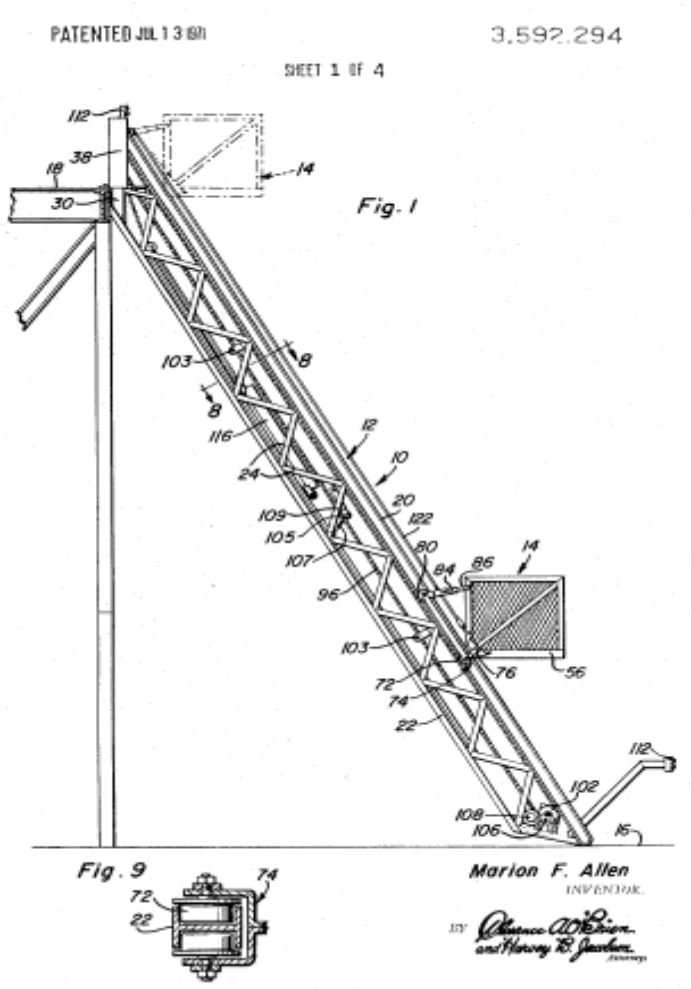
Estado da técnica Pat. Nº 77080

DE2434009 A1 19760205
LIFT



Estado da técnica Pat. Nº 77080

- **US3592294 A 19710713**
- **ELEVATOR**

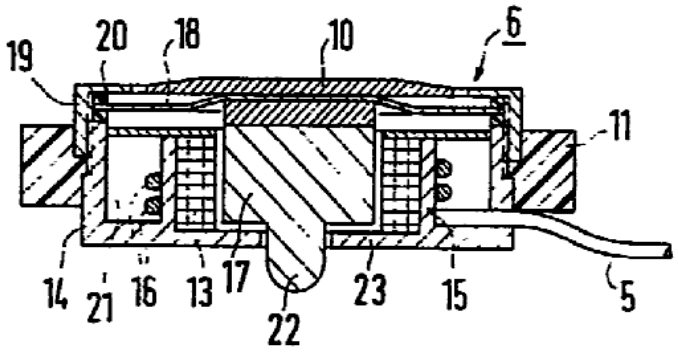


Pat. 80295
Sistema eletrónico vibrátil para surdos

Aparelho constituído por um pequeno microfone eletrónico comercial, ligado a um pré-amplificador e este a um amplificador logarítmico, e constituído por outros dispositivos eletrónicos capazes de acionar um elemento vibrador a instalar num relógio de pulso.

Estado da técnica Pat. 80295

DE3322108 A1 19841220
DE3322108 C2 19880811
(A1)
Speech alerting device



Estado da técnica Pat. 80295

EP0088154 : DE3208678 DK113883 US4728934

Transducer for deaf people - converts speech into vibration at wrist using microphone to drive electro-vibrator

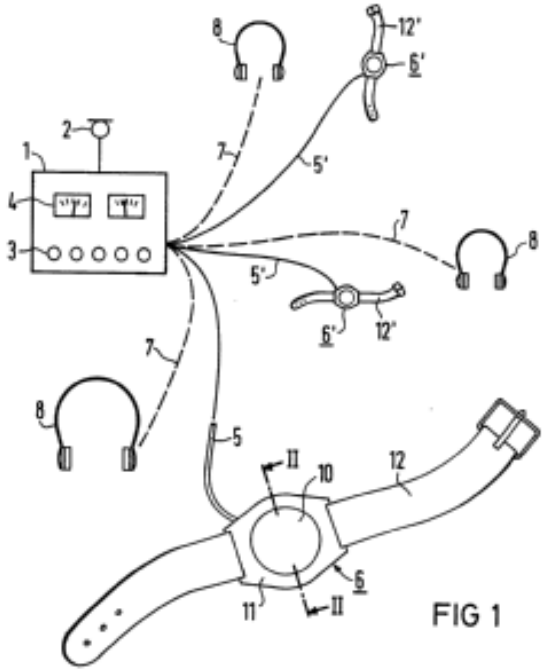


FIG 1

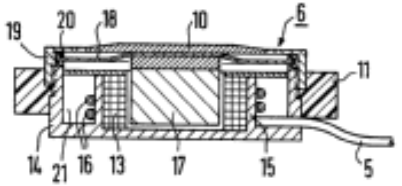
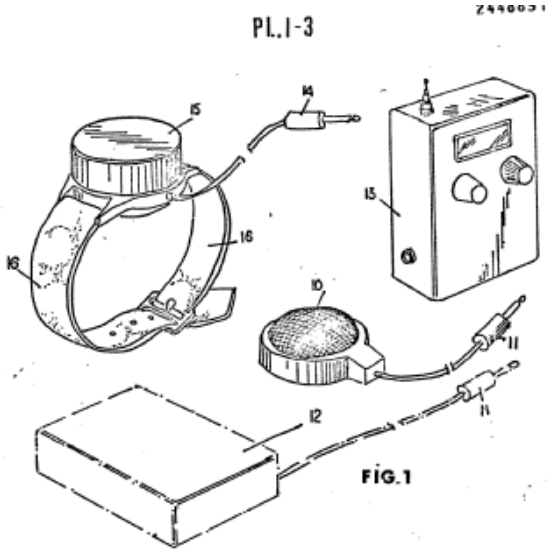
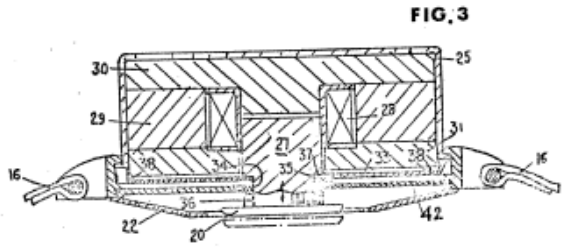


FIG 2

Estado da técnica Pat. 80295

FR2448831 A1 19800905
FR2448831 B3 19811113
(A1)
APPAREIL DE COMMUNICATION CUTANEE
(A1)





KEEP CALM AND OBRIGADO PELA ATENÇÃO