An EEG head harness for rapidly and automatically locating a plurality of EEG electrodes on the head of a patient in which the electrodes are removable and are spring biased toward the head of the patient and in which the electrode supporting frame is longitudinally separable.

7 Claims, 4 Drawing Figures
HEAD HARNESS FOR EEG ELECTRODES

THE BACKGROUND OF THE INVENTION

The present invention relates to an electroencephalogram (EEG) head harness and more specifically to an EEG head harness which permits patient mobility while automatically locating the electrodes on the appropriate region of the patient's head.

The analysis of the EEG or electrical brain wave activity signals has been long recognized as a useful diagnostic tool. Presently available clinical techniques generally utilize either surface or needle electrodes which must be individually and carefully placed on the head of the patient by a skilled physician or highly trained technician since the correct region of the head must be anatomically located to prevent the erroneous evaluation of the signals from one region of the brain as those existing in another region of the brain. Not only does the individual location of the electrodes require the use of skilled personnel, but the time involved in locating the electrodes individually is a severe impediment to the mass screening of EEG waveforms, for example, by an EEG analyzer of the type disclosed in the Reihle et al. patent, U.S. Pat. No. 3,413,546, issued Nov. 26, 1968, for "Electroencephalograph Analyzer" or the Baessler et al. pending application entitled "Method and Apparatus for Automatic Analysis of Brain Wave Signals" Ser. No. 184,825 filed Sept. 29, 1971, both assigned to the assignee of the present invention.

It is accordingly an object of the present invention to obviate the deficiencies of the prior art and to provide a novel EEG electrode harness which facilitates the rapid screening of large numbers of people by paramedical personnel through the automatic location of the electrodes on the correct region of the head of the patient.

It is another object of the present invention to provide a novel EEG electrode harness which may be rapidly and easily applied to patients of varying head sizes and configurations.

It is yet another object of the present invention to provide a novel EEG head harness which permits patient mobility.

Yet a further object of the present invention is to provide a novel EEG head harness in which the electrodes are replaceable and are automatically biased into electrical contact with the head of the patient.

Yet still another object of the present invention is to provide a novel EEG head harness which is longitudinally separable to permit easy and rapid placement thereon on the head of a patient.

These and other objects and advantages of the present invention will be readily apparent to one skilled in the art to which the invention pertains from a perusal of the claims and from the following detailed description when read in conjunction with the appended drawings.

THE DRAWINGS

FIG. 1 is a pictorial representation of one embodiment of the head harness of the present invention;

FIG. 2 is a pictorial representation of a portion of the head harness of FIG. 1 from the rear thereof;

FIG. 3 is a pictorial representation of the head harness of FIG. 1 in place on a patient's head; and,

FIG. 4 is a pictorial representation of a portion of a second embodiment of the head harness of the present invention from the rear thereof.

THE DETAILED DESCRIPTION

With reference now to the drawings where like numerals have been utilized to indicate like portions of the various figures, a suitable conventional connector 10 adapted to feed the sensed signals to any suitable device for recording, display and/or analyzing is connected by way of the individual cables of a wiring harness 12 to the plurality of suitable conventional electrodes 14 spaced around the periphery of the frame 16. The frame 16 may be made of plastic, wood, or any other suitable non-conducting material and it is adapted to conform generally to the shape of a human head. The frame 16 may be split longitudinally and the two halves thereof connected by way of a hinge 18 at the rear thereof. The hinge 18 may be secured to the two halves of the frame 16 by suitable conventional fasteners such as threaded screws 20.

At the front end of the frame 16, a strap 22 may be secured to one side of the frame 16 by any suitable conventional fasteners 24 and may be provided with a number of apertures 26 adapted to engage a projection 28 forwardly extending from the other side of the frame 16. In this manner, the frame 16 may be made to fit securely on heads varying substantially in circumference.

To facilitate the comfort of the wearer, the frame 16 may be provided with a plurality of resilient pads 30 on the radially inward surface 32 thereof. While four pads are illustrated, it is to be understood that any number may be utilized as desired.

The electrodes 14 may be any suitable conventional type and may for example be silver-silver chloride as available from the National Wire and Cable Corporation of 136 San Fernando Road, Los Angeles, California. The electrodes may be attached to the individual cables in the cable harness 12 by way of any suitable conventional connector such as a telephone jack or banana plug type connector 34 and a highly conductive wire 36. The wire 36 may be looped to provide a spring bias to urge the electrode 14 into contact with the head of the individual whose EEG signals are being evaluated. The electrode 14 need not be in direct contact with the head if one of the commercially available highly conductive pastes is utilized. Thus the head need not be shaved and sufficient electrical contact can be achieved through the paste. The wires 36 may be made of various lengths to permit contact with a specific region of the head and wires of various lengths may be substituted if necessary or desirable for individuals with different head configurations. Likewise, the number of electrodes may be varied depending on the number of signals desired.

As shown in the embodiment illustrated in FIG. 4, the hinge 18 and strap 22 of the FIG. 1 embodiment may be replaced by a single spring member 38 which urges the two portions of the frame 16 into a closed position. The bias provided by the spring member 38 is desirably such that the two portions of the frame 16 may be easily spread apart sufficiently to permit egress of the patient's head into the central area encircled by the frame 16. The bias of the spring member 38 must, however, be sufficient for retention of the frame on the head of the patient. As in the FIG. 1 embodiment, resilient pads 30 may be utilized for comfort.
ADVANTAGES AND SCOPE OF THE INVENTION

From the foregoing description of a preferred embodiment, it is readily apparent that the head harness of the present invention may be utilized with any shaped head with comfort. Through the substitution of removable electrode assemblies having various lengths, the number of signals and the area of the brain from which they are derived may readily be selected with a minimum of set-up time. It is to be understood, however, that the invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning in range of equivalency of the claims are therefore tended to be embraced therein.

What is claimed is:

1. An EEG head harness comprising:
a generally oval frame of electrically non-conducting material adapted to laterally encompass the head of a patient;
said frame being longitudinally separable to facilitate the placing thereof on the head of the patient and including means for selectively limiting the longitudinal separation of said frame;
resilient means carried by said frame radially inward thereof adapted to pressurally engage the head of the patient;
a plurality of electrodes each adapted to electrically contact the head of the patient, each of said electrodes being removably carried individually by said frame by an electrically highly conductive spring means whereby each of said electrodes is spring biased to contact the head of the patient at a point displaced from the plane of the frame;
a plural lead connector; and,
plural conductor means carried by said frame for electrically connecting each of said highly conductive spring means individually to a lead of said plural lead connector.

2. The head harness of claim 1 wherein said electrically conducting spring means comprises an electrically highly conductive wire and wherein each of said wires differs in length from at least one other of said wires.

3. The head harness of claim 2 wherein said means for limiting the longitudinal separation of said frame includes a flexible strap secured at one end to one longitudinal portion of said frame and means carried by the other longitudinal portion of said frame adapted to selectively engage said strap intermediate the length thereof.

4. The head harness of claim 1 wherein said longitudinally separable frame includes right and left frame members; and,
wherein said means for selectively limiting the longitudinal separation of said frame includes spring means secured to said right and left frame members for biasing said frame members to a closed position.

5. An EEG head harness comprising:
a frame adapted to laterally encircle a human head;
a plurality of receptacles spaced around said lateral frame;
a plural lead connector;
plural conductor means carried by said frame electrically connecting each of said receptacles to one of the leads of said plural lead connector;
a plurality of plugs each selectively received in a selected one of said plurality of receptacles;
a plurality of electrodes; and,
an electrically conductive wire connecting each of said electrodes to one of said plurality of plugs whereby said electrodes may be connected to a selected lead in said plural lead connector by the insertion of the plug associated with that electrode into the one of said plurality of receptacles to which the selected lead is connected, said electrically conductive wire biasing the one of said electrodes associated therewith to position to contact the head encircled by said frame at a point displaced from the plane of the frame.

6. The head harness of claim 5 wherein the lengths of at least two of said wires differ significantly in length whereby different regions of the head may be electrically contacted by said electrodes.

7. The head harness of claim 9 wherein said frame is longitudinally split into two sections; and,
wherein said head harness further includes means for pivotably securing said two sections at one end thereof and means at the other end thereof for limiting the pivotable movement of said sections.

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