Sept. 29, 1925. 1,555,508

L. R. McDONALD

STEREOSCOPIC X-RAY APPARATUS

Filed Aug. 28, 1922

Fig. 3

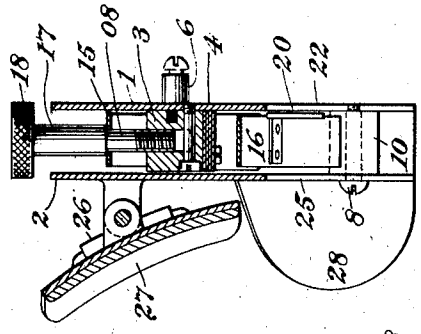


Fig. 1

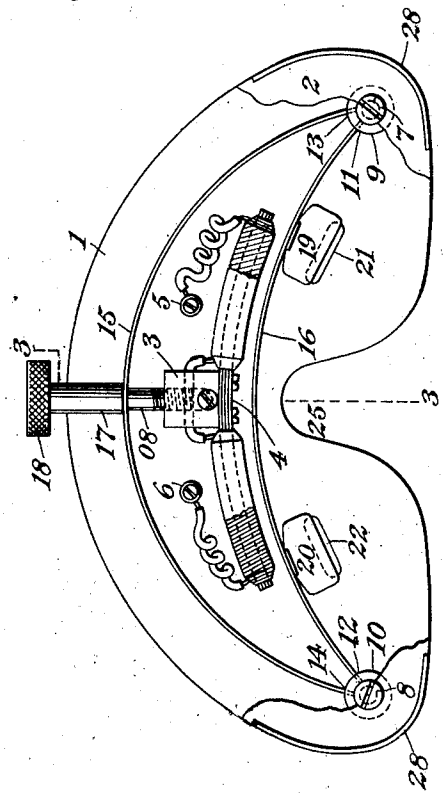
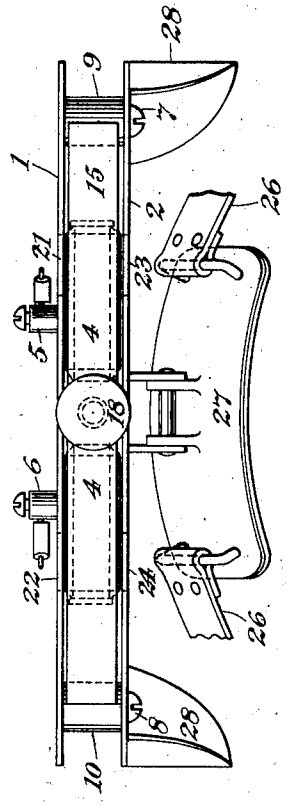


Fig. 2



Inventor,
Leslie R. McDonald.
By his Attorney
Andrew Wilson.

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UNITED STATES PATENT OFFICE.

LESLIE R. McDONALD, OF MONTREAL, QUEBEC, CANADA.

STEREOSCOPIC X-RAY APPARATUS.

Application filed August 28, 1922. Serial No. 584,658.

To all whom it may concern:

Be it known that I, LESLIE R. McDONALD, a citizen of the United States, residing at Montreal, Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Stereoscopic X-Ray Apparatus, of which the following is a specification.

My invention relates to improved means for observing conditions revealed by the use of the X-ray in the system which may be spoken of as X-ray stereo-fluoroscopy; and my improvements are directed particularly to the production of a lighter and simpler device than any heretofore proposed, which may be attached to and carried by the head of the observer, and through which he may obtain a stereoscopic view of an object under observation, my improvements being directed particularly to the means whereby the line of vision may be alternately cut off from one eye or the other while a succession of images are simultaneously produced for observation.

In the drawings, in all the figures of which similar parts are referred to by similar reference numerals, Fig. 1 is a plan view, with the head rest and part of the back plate removed; Fig. 2 is an edge view, taken as looking up on Fig. 1; and Fig. 3 is a vertical sectional view taken as on the line 3—3 of Fig. 1, looking to the left.

The parts of my improved palmoscope are assembled upon a front plate 1 and a back plate 2, between which is mounted a fixed block 3 carrying an electromagnet 4, preferably built up of laminated iron, and wound continuously in one direction in the usual way so that one end may become a positive pole when the magnet is energized by an electrical impulse of one polarity and the other end when energized by an impulse of the other polarity, the ends of the winding wire being carried to suitable binding posts 5, 6 through which connections may be made with a source of alternating current.

On pins 7, 8, carried by the plates 1 and 2, and preferably screwed into the plate 1 as shown, are mounted rotatable sleeves 9, 10, provided respectively with socket slots 11, 13, and 12, 14, the opposite ends of a curved spring 15 being inserted respectively in the sockets 13, 14; while the opposite ends of a light, reed-like spring 16 are inserted respectively in the sockets 11, 12.

A shaft 17, is provided with a milled head 18, a reduced shank 08 passing through a hole in the spring 15 and being threaded into the block 3; so that, by screwing the shaft down or up in the block, more or less tension may be applied to the spring 15, to cause it to turn the sleeves 9, 10 outward or inward, thereby correspondingly increasing or diminishing the tension of the spring 16.

The spring 16 carries two light shutters 19, 20, associated with laterally elongated peep holes 21, 22 in the front plate, registering with corresponding holes 23, 24 in the back plate.

Hence, when a wave-like vibration or undulation is produced in the spring 16, the shutters 19, 20 will be alternately raised and lowered sufficiently to open and close their respective peep holes. This may be accomplished through the influence of the electromagnet 4 when energized by an alternating current, producing undulations in the spring and opening and closing the peep holes in synchronism with the impulses of the current.

If the same current is employed in the well known way to produce two alternating series of X-ray images, taken from different angles, the images of one series will be exposed to observation by the lifting of one shutter, and the images of the other series by the lifting of the other shutter, the shutter operating means being in circuit with the projecting means, and a clear, stereoscopic view of the object under observation will be obtained.

The natural period of vibration of the spring 16 may be modified, through the influence of the spring 15 and its governing screw, so as to adjust it harmoniously to the impulses of the alternating current. For the tension placed upon the spring 16 by rotating the sleeves 9, 10 forward or backward may be diminished or increased so that the spring will respond more or less readily to the attraction of the magnet, and a degree of tension may readily be obtained at which the spring will pulsate normally in harmony with the electrical impulses.

The framework of the palmoscope is so shaped and proportioned that its recess 25 will receive the bridge of the wearer's nose, and the peep holes will register with his normal lines of vision, the instrument being

held in this position by suitable means, such as a strap 26, the ends only of which are shown in the drawings, proportioned to pass around the head of the wearer and to hold the hinged head rest 27 securely against his forehead, the hinged construction permitting the palmoscope to be turned up out of the wearer's line of vision without removin the head rest from his forehead.

Suitable shields, as 28, 28, may be placed so as to prevent side lights from dazzling the wearer's eyes or interfering with his vision through the peep holes.

By means of my improvements I obtain a simple and efficient instrument for stereoscopically observing X-ray images, in which the shutters are lifted and dropped vertically instead of being moved horizontally, with the advantage of affording a comparatively wide arc of observation through each peep hole much more quickly than is practicable with laterally moving shutters, thus giving the observer a clearer, more distinct and broader vision of the X-ray images than would otherwise be obtainable.

It will be understood that details of construction of the palmoscope may be modified, as by the use of mechanical equivalents and the like, without departing from the scope of my invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

1. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a bent spring having separated terminals and carrying shutters, terminal supports for the spring, and means for producing undulations therein.

2. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element normally under tension and provided with shutters, means for producing undulations in the flexible element and tension regulating means for varying its responsiveness to such undulation producing means.

3. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, moveable terminal supports for the flexible element, and means for producing undulations in the flexible element.

4. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, moveable terminal supports for the flexible element, means for moving such supports and means for producing undulations in the flexible element.

5. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, moveable terminal supports for the flexible element, resilient means for moving such supports and means for producing undulations in the flexible element.

6. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a strip like flexible element fixed at each end and carrying a pair of shutters, and means embodying an electromagnet for producing undulations in the flexible element.

7. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a bowed flexible element fixed at both ends and carrying shutters, and means for producing undulations in the flexible element.

8. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, moveable terminal supports for the flexible element, bowed resilient means for moving such supports, and means for producing undulations in the flexible element.

9. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, rotatable terminal supports for the flexible element, means for rotating such supports and means for producing undulations in the flexible element.

10. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, tension producing means, common moveable terminal supports for the flexible element and the tension producing means, and means for producing undulations in the flexible element.

11. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element provided with shutters, tension producing means embodying a resilient bowed element and means for applying pressure thereto, common moveable terminal supports for the flexible element and the tension producing means, and means for producing undulations in the flexible element.

12. In an apparatus for observing X-ray images, the combination, with a casing provided with laterally elongated peep holes therethrough, of a single flexible element carrying a pair of vertically moveable shutters, and a plurality of electromagnets acting alternately upon separated points of the flexible element and constituting means for producing undulations in the flexible element.

13. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a single resilient element carrying a pair of shutters, and means for raising one shutter and causing undulations to pass to and fro along the resilient element, thereby simultaneously depressing the other shutter.

14. In an apparatus for observing X-ray images, the combination, with a casing provided with peep holes therethrough, of a flexible element constituting an electric armature provided with shutters, and means operating alternately on separated points of the flexible element for producing undulations in the flexible element.

LESLIE R. McDONALD.