

July 11, 1944.

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DIAGNOSTIC HEAD SETS
Filed Sept. 14, 1940

2,353,537

2 Sheets-Sheet 1

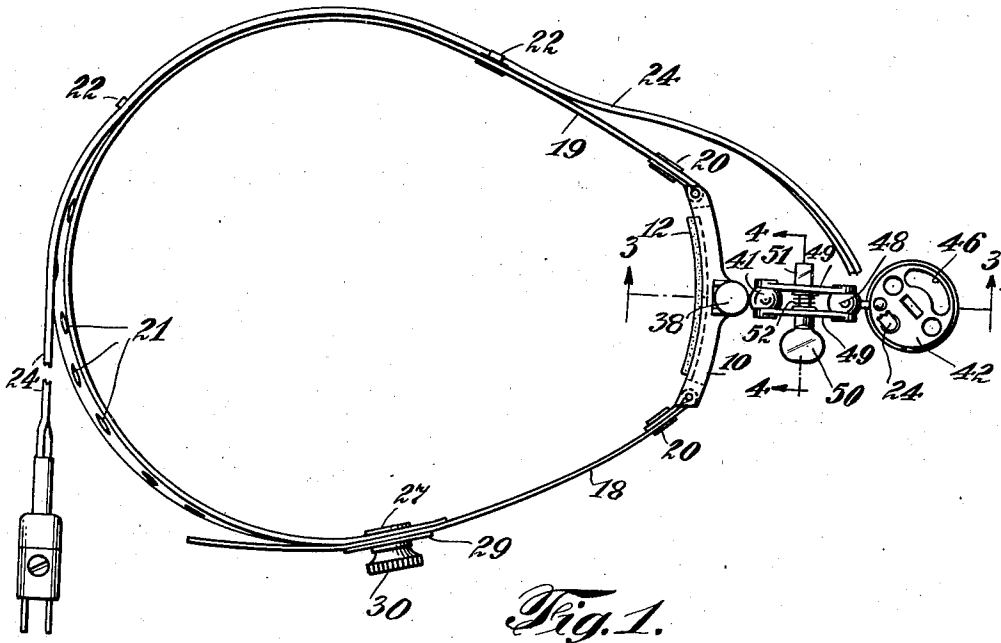


Fig. 1.

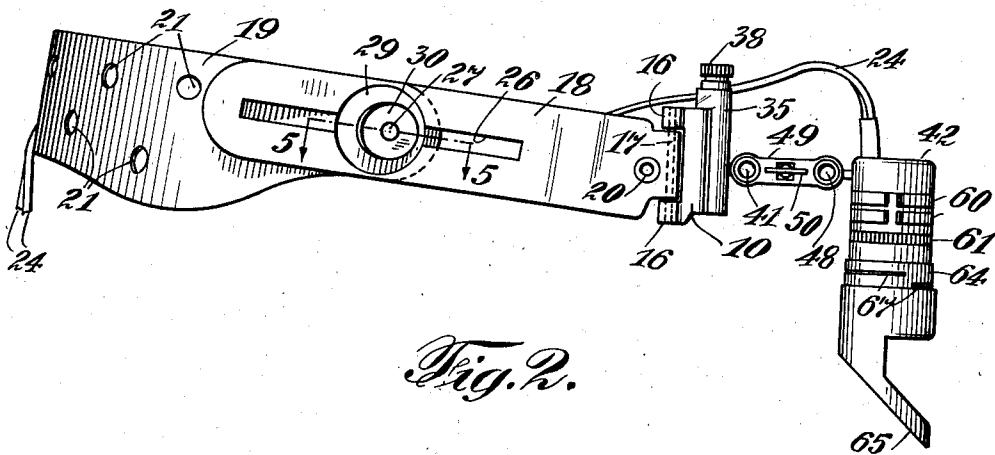


Fig. 2.

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2 Sheets-Sheet 2

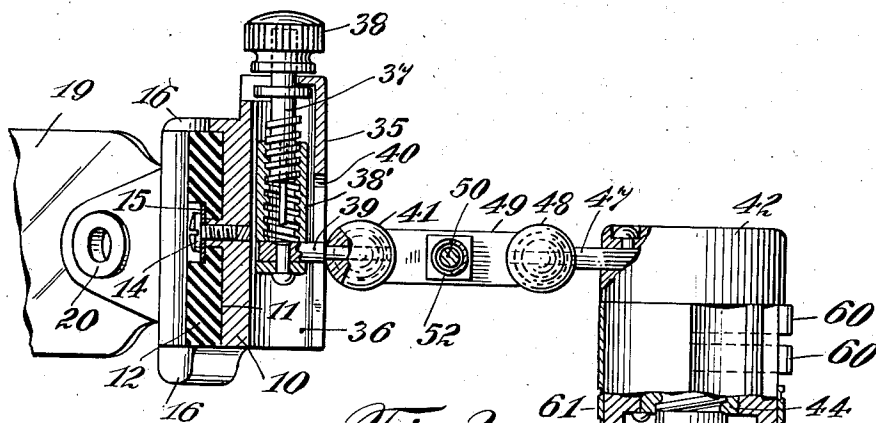


Fig. 3.

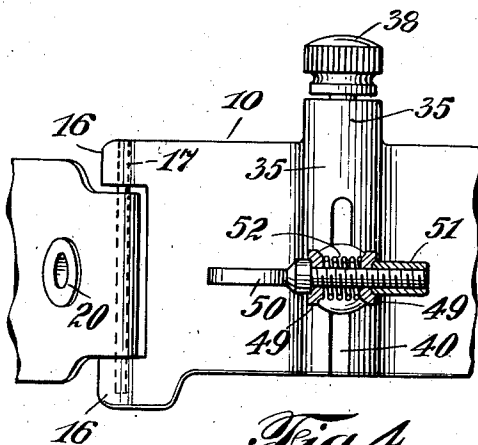


Fig. 4.

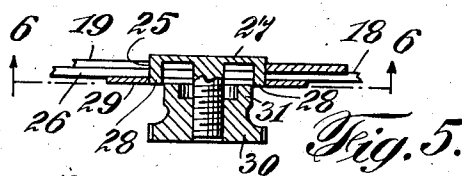


Fig. 5.

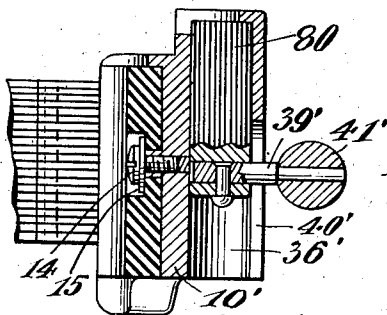


Fig. 6.

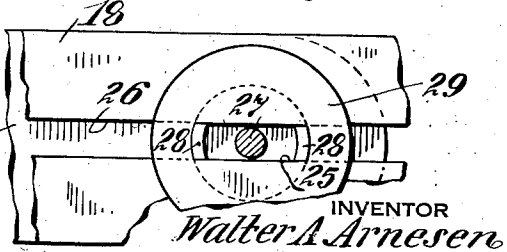


Fig. 7.

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DIAGNOSTIC HEADSET

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7 Claims. (Cl. 128—23)

This invention relates to diagnostic head sets and more particularly to improvements in mechanism incorporated in such sets which are adapted to be used both for direct illumination and for illumination combined with inspection along the axis of directed light rays.

An object of the invention is to provide a new, simple and efficient head set construction wherein adjustment of the various parts can be accomplished with the utmost simplicity.

Another object of the invention is to provide a head set in which a socket housing is connected to a supporting member by a double-ball connection whereby the housing can be adjusted in a universal fashion.

Another object of the invention is to provide in combination with the arrangement just described, a condensing lens cap which is adjustable relative to a bulb carried in the socket.

A further object is to provide a sleeve having a light reflecting member mounted therein in such fashion that rays of light from the bulb can be directed through a condensing lens on to the light bending member.

A further object of the invention is to provide means whereby the double-ball connection before-mentioned can be moved linearly vertically relative to the supporting member.

Another object of the invention is to provide an improved double-ball connection which can be assembled with a minimum of labor and time.

A still further object of the invention is to provide an improved adjusting member for securing parts of a head band in any desired position.

Further features, objects and advantages of the invention will be apparent by reference to the following detailed description of the accompanying drawings wherein

Fig. 1 is a plan view with parts broken away, of a head set embodying the invention;

Fig. 2 is a side elevation of the same;

Fig. 3 is an enlarged view, partially in vertical section taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged view, partially in vertical section taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is a section taken substantially on the line 5—5 of Fig. 2;

Fig. 6 is a section taken substantially on the line 6—6 of Fig. 5, and

Fig. 7 is a view with parts in a section similar to part of Fig. 3 through a modified form of supporting member construction.

Referring to the drawings 10 indicates a supporting member of generally plate-like form curved to conform to the normal curvature of the human brow. The inner surface of the member 10 is indented as at 11 to form a seat for a pad 12 of sponge rubber or other suitable material which can act as a cushion interposed between the plate and an operator's brow. The pad 12 has a counterbored opening therein for the passage of a screw 14 threaded into an aperture in the member 10 and having a washer 15 therearound in contact with the pad 12.

The opposite ends of the member 10 have upper and lower ear-like prolongations 16 to receive pins 17 utilized to retain the complementary head band members 18 and 19. These members 18 and 19 have loops in their ends through which the pins 17 pass, the loops being maintained by eyelets 20. The part 18 is of relatively short length as compared to the part 19 and that latter part is of increased width opposite the supporting member 10 to adapt it to an operator's head. The part of increased width is provided with a plurality of openings 21 for ventilation.

Secured to the part 19 are two or more clips 22 which serve to retain an electric cable 24 in assembly with the band. The part 19 is provided near one end with a longitudinal slot 25 (Figs. 5 and 6) while the part 18 is provided with a longitudinal slot 26 of considerable length. The slot 26 is of the same width as the slot 25. In conjunction with these two slots, use is made of a screw member 27, having a round flat head to rest against the inner surface of part 18. The circularity of this head is indicated by dotted lines in Fig. 6. The threaded shank of member 27 passes through the two slots 25 and 26 and which screw member has a pair of oppositely extending flange members 28 which fit snugly in the slot 25 and which extend completely through the slot 26. The members 28 fit in the slot 25 with sufficient friction as to retain the screw member 27 normally in assembly with the member 19. Use is also made of a washer 29 having a slot therein of substantially the same dimensions as the slot 25 so that this washer can receive the members 28 also with frictional grip. A knurled nut 30 is in threaded engagement with the shank of the screw 27 and has a compression part 31 small enough to fit within the confines of the parts 28. Thus, the nut 30 can be tightened sufficiently to lock the two parts 18 and 19 between the round flat head of member 27 and washer 29 in any adjusted position within the limits determined by the length of the slots 25.

The supporting member 10 is provided with a vertically extending enlargement 35, which enlargement is hollowed out as at 36. In the form of the invention shown in Figs. 1 to 4, inclusive, a rotatable screw member 37, having a head 38, is held captive with the threaded part of the screw member within the opening 36. As shown in Fig. 3 member 37 is held captive by a short flange at the top of enlargement 35, which flange extends into an annular groove in 37. Associated with this threaded part of the member 37 is an internally threaded sleeve 38 to the end of which is fastened a stud 39 extending through an opening 40 in the enlargement 35 and terminating in a ball 41. By proper rotation of the head 38 and consequently the threaded part of the member 37, it is possible to move the stud 39 linearly vertically within the slot 40.

A socket housing 42 has an electric light bulb socket 44 secured therein to which socket the cable 24 is electrically connected. The socket 44 receives an electric light bulb 45. The housing 42 is preferably made of some insulating material such as a phenol condensation product or other similar material. The housing is of general tubular form but is provided with a plurality of axially extending grooves in the surface thereof, certain grooves of which communicate with an opening 46 in the upper end of the housing. Parts of some of the grooves are shown in housing 42 above and to the right of bulb 45 in Fig. 3. These grooves and the opening serve as part of an arrangement for affording ventilation to the electric light bulb to reduce the accumulation of heat therefrom. A stud 47 is rigidly secured to the housing 42 and like the stud 39, terminates in a ball 48.

In association with the ball formations 41 and 48, use is made of two metallic leaf spring members 49. These leaf spring members 49 have openings in the two ends of each, which openings are provided with concave enlargements to cause them to engage the two balls with a snug fit. A wing screw member 50 passes through apertures intermediate the ends of the springs 49 and engages with a nut 51 located exteriorly of one of the members 49. An expansion spring 52 surrounds the part of the wing screw located between the two springs 49. It will be evident that tightening of the wing screw serves to draw intermediate portions of the two springs closer together thereby setting up increased friction between the balls 41 and 48 and the openings in the ends of the springs 49. Spring 52 is utilized for maintaining the springs 49 spread apart so that assembly with the balls can be accomplished more readily than if the spring 52 were not present. One manner in which this spring can be so utilized is as follows: The two leaf springs 49 are connected together by the screw member 50 with the spring 52 in place, as shown in Fig. 1, and these parts are so positioned that the members 49 are in substantial parallelism with their inner surfaces apart a distance slightly less than the diameter of either of the balls 41 or 48. When so positioned, one of such balls can be inserted in place, since the ends of the springs can be separated with the opposite ends being drawn together and with the spring 52 acting more or less as a fulcrum. When one of the balls has been inserted in place, thumb and finger pressure can be applied to that end of the springs 49 to force the ball into the concave enlargements in the spring ends, causing the opposite ends of springs 49 to be spread apart again with the

spring 52 as a fulcrum. The other ball is then introduced between the spread-apart ends of members 49 and thumb and finger pressure released, with the result that the spring 52 restores members 49 to substantial parallelism lightly entrapping both balls between the springs 49. The thumb screw 50 can then be tightened to apply the desired tension to the leaf springs.

A lens cap 55 of generally tubular form has a condensing lens 56 secured in one end thereof. The cap may be metallic or may be made of any other suitable material. One end of the cap 55 is spun over, or otherwise formed, as at 57 to aid in retaining the lens 56 in place. The retention is completed by a washer 58 held against the lens by a cylindrical shell 59 staked in the interior of the cap 55. The upper part of the cap 55 is provided with a plurality of spring fingers 60 formed integrally with the cap by the removal of material therefrom to permit these fingers to be spaced apart. The fingers are divided axially of the cap and their extent is approximately 180°. These fingers may be normally displaced inwardly to so frictionally engage the housing as to maintain the cap in any adjusted position either axially of the housing or rotatable thereof. To aid in adjusting the cap, a portion of its periphery is knurled as at 61.

In addition to the lens cap, use can be made of a sleeve carrying a light reflecting member. This sleeve is composed of a cylindrical shell 62 of suitable metal to which is secured a member 64 of some composition material, which member 64 has a cylindrical part encircling a part of the shell 62 and an extension part 65 which extends downwardly at a suitable angle. The part 64 can be moulded directly on to the shell 62. The upper end of the metallic shell 62 is slit circumferentially with the slits staggered and spaced apart axially as at 67 so that parts of the shell can be distorted out of true round to provide the necessary friction between shell 62 and cap 55. In this manner it is possible to maintain the sleeve in adjusted position relative to the lens cap, which adjustment can be either axially of the cap or rotatably thereof. A part of the composition material portion 64 extends inwardly as at 68 to provide a shoulder limiting axial movement of the sleeve relative to the lens cap. Instead of using metal and composition material for the parts 62 and 64, this structure can be all composition material or all metal even including an integral metallic mirror.

The downwardly extending part 65 is recessed in the upper surface thereof to receive a mirror 70, one end of which fits in an undercut part of the top surface and the other end of which is held in place by a metallic spring member 71 permanently seated in this part 65. The mirror 70 has reflecting material 72 on the underside thereof with an open part 74 centrally disposed so that this part can serve as an inspection opening, or a metallic mirror can be used.

Light rays from the bulb 45 are condensed by the lens 56 and directed on to the mirror 70. These rays are then directed outwardly through the open part 75 and can be focused upon any surface or part of a body under examination.

In a modification of the invention, the member 10' of Fig. 7 is constructed in the same manner as the member 10 previously described and the parts associated therewith are likewise of similar construction with the exception that the stud 39' and ball 41' are permanently

held in place instead of being capable of vertical reciprocation. For this purpose a rod member 80 has the periphery thereof vertically knurled to fit firmly in the opening 36' of the member and the stud 39' is attached to this member 80.

In the form of the invention shown in Figs. 1 to 6 inclusive, the instrument is capable of versatile uses depending upon the requirements of the operator. For example, if the operator desires to illuminate intensely a part of a body for inspection purposes and to inspect the illuminated part along the axis of the directed light rays, then the complete assembly of Fig. 3 is used, adjustment being made to permit the operator to look through the clear part 74 of mirror 70. In this fashion the inspection can be accomplished axially of the light rays reflected outwardly by the mirror 70 and the mirror carrying sleeve can be adjusted to permit such inspection. In addition, the lens cap can be adjusted to converge or diverge the light rays depending upon the area under examination. The double-ball connection between the socket housing and the supporting member permits wide variations in the positioning of the housing and associated parts. At the same time, it is possible to move the double-ball connection linearly vertically relative to the supporting member to aid in obtaining the best positioning of the mirror relative to an eye of the operator.

If inspection along the axis of the light rays is not particularly desirable and intense illumination of a part of the body is desirable, then the mirror carrying sleeve can be removed from the lens cap and the housing and lens cap adjusted as a unit to direct light rays from the condensing lens in any desired direction. Again the double-ball connection and the mechanism whereby linearly vertical movement thereof can be accomplished, cooperate in obtaining the position best adapted for the operator's purpose.

The modification shown in Fig. 7 and described herein differs only in that the linear vertical motion feature has been eliminated and therefore the ball connection cannot be adjusted vertically relative to the supporting member. In conjunction with this modification, use can be made either of the lens cap alone for intense illumination or, if necessary, use can also be made of the mirror carrying sleeve for examination along the axis of the light rays.

From the foregoing it will be seen that the present invention provides a new, simple and efficient head set for diagnostic purposes, which head set combines simplicity of manufacture with ease of operation. It is to be understood that the invention can be modified beyond the illustrated embodiments in view of which any limitations imposed thereupon are to be only those set forth in the following claims.

I claim:

1. In a diagnostic head set, a supporting member to engage the head of a wearer, an electric light bulb socket housing, a double-ball connection between said supporting member and said socket housing, a condensing lens cap surrounding a bulb in said socket housing and adjustably fitting over and resiliently engaging said socket housing, said lens cap being rotatable and movable longitudinally relative to said housing, and a removable sleeve fitting over the end of said lens cap with the wall of the sleeve resiliently engaging the wall of the lens cap, said sleeve having a light reflecting member at the outer end thereof, said sleeve being rotatable and movable

longitudinally relative to said lens cap with the light bending member maintained in angular disposition across the axis of the housing, lens cap, and sleeve.

2. In a diagnostic head set, a supporting member to engage the head of a wearer, an electric light bulb socket housing, a double-ball connection between said supporting member and said socket housing, a condensing lens cap adjustably fitting over and resiliently engaging said socket housing, and means for moving said connection linearly vertically as a unit relative to said supporting member.

3. In a diagnostic head set, a supporting member to engage the head of a wearer, an electric light bulb socket housing, a double-ball connection between said supporting member and said socket housing, a condensing lens cap adjustably fitting over and resiliently engaging said socket housing, a sleeve frictionally fitting over the end of said lens cap, said sleeve having a light reflecting member at the outer end thereof, and means for moving said connection linearly vertically as a unit relative to said supporting member.

4. In a diagnostic head set, a supporting member to engage the head of a wearer, an electric light bulb socket housing, a condensing lens cap adjustably fitting over and resiliently engaging said socket housing, studs extending from said supporting member and said socket housing and having ball formations at the ends thereof, leaf spring members engaging said formations to provide a double-ball connection between said supporting member and said housing, a tension member passing through said leaf spring members for adjustably tensioning said leaf spring members; and a spring surrounding said tension member and interposed and held captive between said leaf spring members and biased to hold them apart for facilitating assembly of the parts of said double-ball connection.

5. In a diagnostic head set, a supporting member to engage the head of a wearer, an electric light bulb socket housing, a condensing lens cap surrounding a bulb in said socket housing and adjustably fitted over and resiliently engaging said socket housing, said lens cap being rotatable and movable longitudinally relative to said housing and a removable sleeve adjustably fitting over the end of said lens cap with the wall of the sleeve resiliently engaging the wall of the lens cap, said sleeve being rotatable and movable longitudinally relative to said lens cap, said sleeve having a light reflecting member thereon extending diagonally the axis of the sleeve, said housing, lens cap, and sleeve being substantially coaxial.

6. In a diagnostic head set, a supporting member to engage the head of a wearer, an electric light bulb socket housing, a condensing lens cap surrounding a bulb in said socket housing and adjustably fitted over and resiliently engaging said socket housing, said lens cap being rotatable and movable longitudinally relative to said housing, a removable sleeve adjustably fitting over the end of said lens cap with the wall of the sleeve resiliently engaging the wall of the lens cap, said sleeve being rotatable and movable longitudinally relative to said lens cap, said sleeve having a light reflecting member thereon extending diagonally across the axis of the sleeve, said housing, lens cap, and sleeve being substantially coaxial, and a pivotal

connection between said supporting member and the parts associated with said housing.

7. In a diagnostic head set, a supporting member, a relatively thin flexible head band secured thereto and having overlapping end portions, said end portions having slots of substantially equal width therein, the slot in one end portion being considerably longer than the slot in the other end portion, a member having a round flat head and having a threaded shank to extend 10

through said slots, said head having spaced ears extending through said slots with a relatively close fit, a washer member having a slot therein for the passage of said shank and said ears and a nut member engaging said shank and bearing against said washer within said ears to lock the end portions of said band between the head of said attaching member and the washer.

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