(No Model.) 2 Sheets—Sheet 1.

# E. B. MEYROWITZ & F. BUCHHOP.

## PERIMETER.

No. 596,044. Patented Dec. 21, 1897.

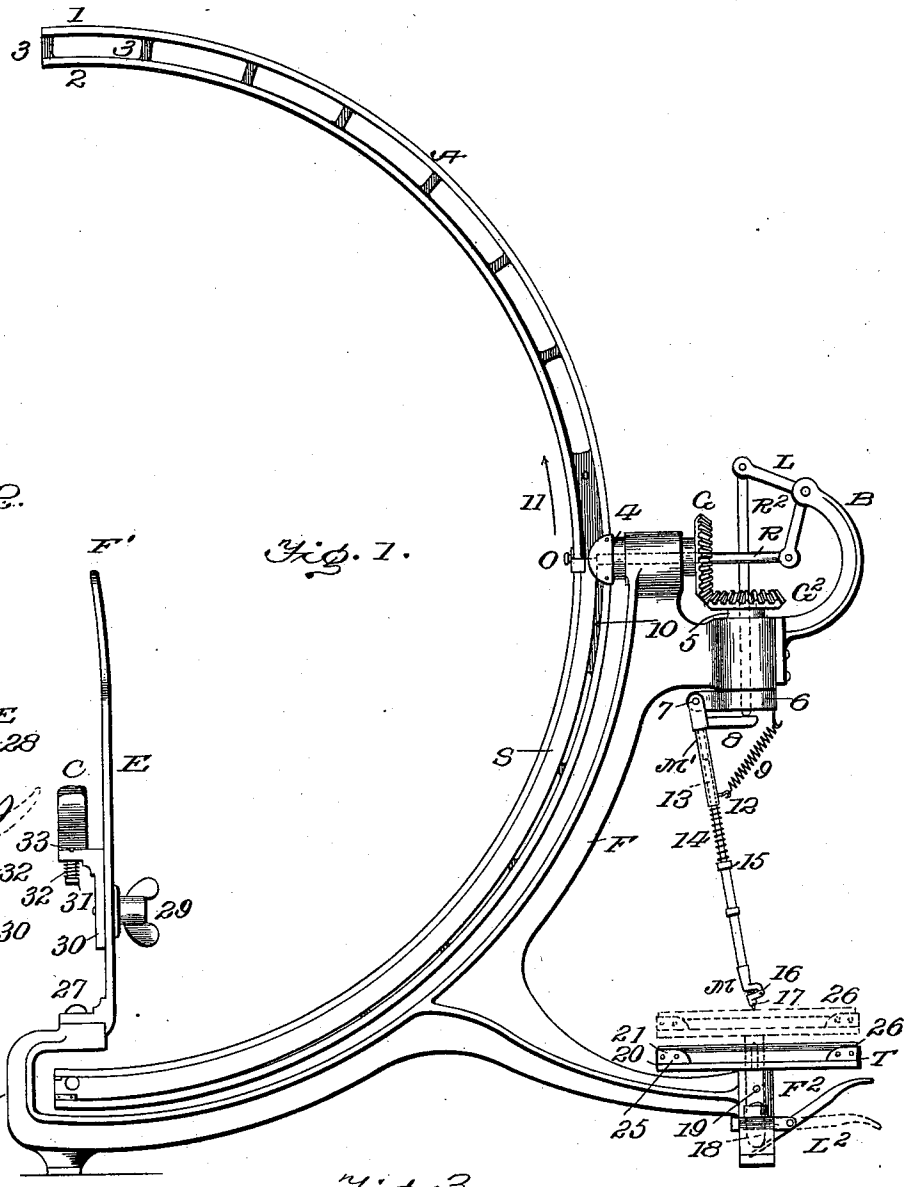
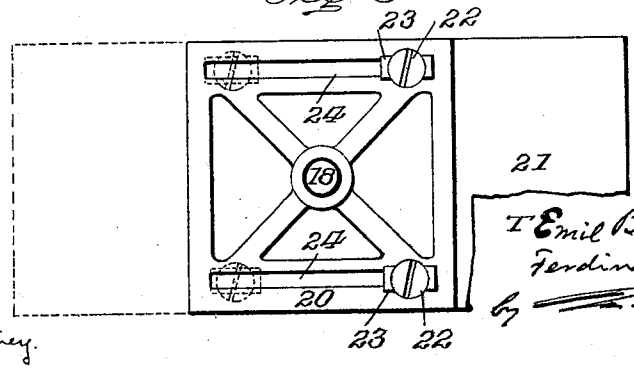



Fig. 2.




Fig. 3.




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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

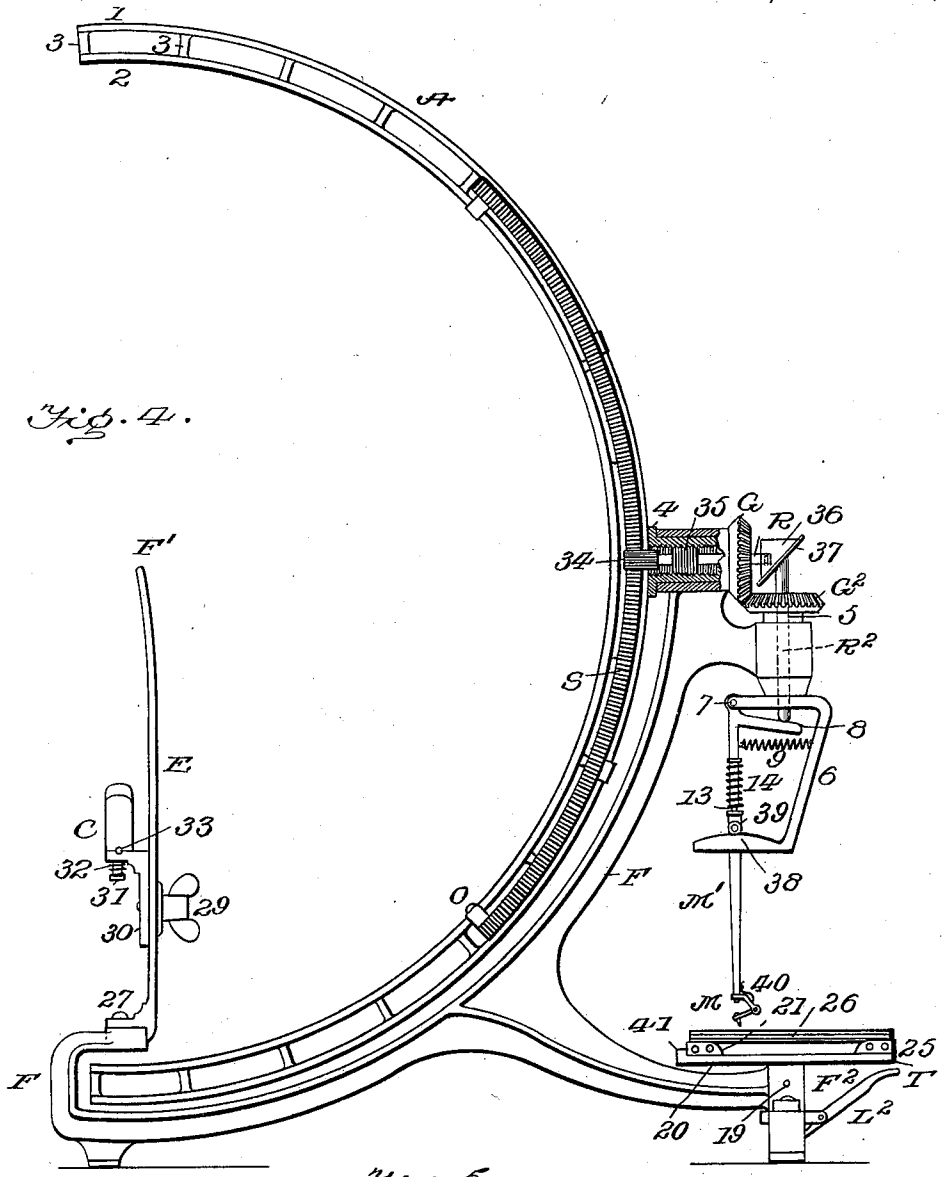
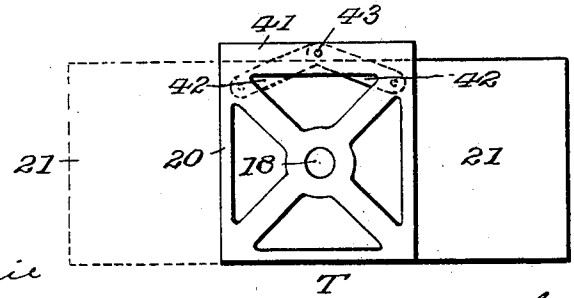



Fig. 5.




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# UNITED STATES PATENT OFFICE.

EMIL B. MEYROWITZ, OF RIDGEFIELD, NEW JERSEY, AND FERDINAND BUCHHOP, OF NEW YORK, N. Y., ASSIGNORS TO THE MEYROWITZ MANUFACTURING COMPANY, OF RIDGEFIELD, NEW JERSEY.

## PERIMETER.

SPECIFICATION forming part of Letters Patent No. 596,044, dated December 21, 1897.

Application filed March 25, 1897. Serial No. 629,219. (No model.)

*To all whom it may concern:*

Be it known that we, EMIL B. MEYROWITZ, a resident of Ridgefield, in the State of New Jersey, and FERDINAND BUCHHOP, a resident of New York, in the State of New York, citizens of the United States, have invented a new and useful Improvement in Perimeters, of which the following is a specification.

This invention relates to means for "automatically" recording the value of perimetric determinations of the visual field, of the field of perception of different colors, and of the field of fixation, and to chin-rests for perimeters and kindred apparatus; and our invention consists in certain novel combinations of parts hereinafter set forth and claimed.

The distinctive objects of this invention are, first, to automatically record the movements of an objective point or "object" across the field of vision without the inaccuracies due to the stretching of strings and the lost motion of gears, which have militated against the use of automatic perimeters as heretofore constructed; secondly, to utilize in a novel and effective manner the positive action of a lever for depressing a vertical motion-transmitting rod, which forms part of our self-recording perimeter; thirdly, to employ a marker-carrier in the form of a swinging L-shaped lever in connection with a subjacent chart-carrying table; fourthly, to equalize the pressure of the marker upon the chart; fifthly, to facilitate employing duplex chart-blanks; sixthly, to provide at once in a simple chart-carrying table for shifting duplex chart-blanks beneath a marker and for pressing the chart against the marker, and, seventhly, to so construct a reversible chin-rest that whether moved to the right or left the relation of the central point of the concavity to the point of fixation is such as to bring that point in the same relation as the chin is to the eye.

Two sheets of drawings accompany this specification as part thereof.

Figure 1 of the drawings is an elevation of an improved self-recording perimeter which embodies all the several parts of the invention. Fig. 2 is a front view of its eye-support standard and chin-rest detached. Fig. 3 is a bottom view of its chart-carrying table detached. Fig. 4 is an elevation, partly in section, of a modified perimeter; and Fig. 5 is a bottom view of a modified chart-carrying table.

Like letters and figures refer to like parts in all the views.

The principal parts of the improved perimeter in either of its forms are the customary revoluble arc A, its relatively-fixed frame F, the chart-carrying table T, the eye-support standard E, the chin-rest C, the perimetric object O, the recording-marker M, the means for transmitting to the latter the movements of said object across the field of vision in the peculiar manner which distinguishes the first part of this invention, and bevel-gears G and $G^2$, with their appurtenances for revolving the marker-carrier synchronously with the arc.

In both arrangements of the perimeter as a whole, Figs. 1 and 4, the arc A is conveniently of a skeleton structure, being composed of concentric edge bars 1 and 2 and relatively thin radial connections 3, the latter at one side of the arc or at its back, as viewed in Figs. 1 and 4. The arc is connected by a hollow horizontal hub 4 with the gear G, and the gear $G^2$ is connected by a hollow vertical hub 5 with the frame 6 of a lever-shaped marker-carrier M'. In each arrangement, moreover, the object O is carried by one end of a sliding sector S, and its movements are transmitted to the marker-carrier by means of horizontal and vertical rods R and $R^2$, working axially through the hollow hubs of said gears G and $G^2$, respectively, with positive-motion mechanical devices for converting the rearward movement of said rod R into a downward movement of the rod $R^2$, and in both arrangements said downward movement of the rod $R^2$ is converted into a swinging movement of the marker M by means of the lever-shaped marker-carrier M', which is connected with said frame 6 by a horizontal pintle 7 at right angles to a line radial to the vertical axis of the gear $G^2$ and rod $R^2$, such radial line corresponding with the radii of the arc A and with the radial lines of the customary chart-blanks. The lower end of the

vertical rod $R^2$ coacts directly in both cases with a rigid horizontal arm 8 at the upper end of the marker-carrier M', the two being kept in contact by a retracting-spring 9, which is conveniently a spiral spring stretched from said frame 6 to the vertical arm of the marker-carrier.

In the perimeter Fig. 1 the object-carrying slide S has a wedge-surface 10, which coacts with the front end of the horizontal rod R, moving it rearwardly as the object O is moved in the direction of the arrow 11. A bell-crank lever L, fulcrumed in a bracket B, connects the two rods and converts said rearward movement into a downward movement of the rod $R^2$. The lower end of the latter coacts with the horizontal arm 8 of the marker-carrier M', as aforesaid. The vertical arm of the marker-carrier projects clear downwardly below the pin 12, which attaches thereto the retracting-spring 9, and at and immediately below this point is provided with a telescopic open joint 13 and with a tensile spring 14 to equalize the pressure of the marker M against the chart-blank. The pin 12 may conveniently serve as a stop within a longitudinal slot in the inner member of the arm to prevent the separation of the parts. A collar 15 at one end of the spring 14 may be adjusted to vary the tension. The marker M is composed of two parts united by a hinge-joint 16, and the lower part provided with a pencil, pen, or pricking-point 17.

In line vertically beneath the rod $R^2$ a socket $F^2$, forming part of the frame F, is occupied by the stem 18 of the chart-carrying table T, which is rendered non-rotary by a pin 19, crossing said socket within a slot in the stem 18. Said stem carries at its upper end a spider-plate 20, completing therewith a vertically-movable support for a superposed laterally-movable top 21, said support and top being united by screws 22, Fig. 3, extending upwardly through slides 23 within slots 24 in the spider-plate into the top 21. Said top 21 is preferably and conveniently adapted by means of corner-pieces 25 to carry a pad 26, Fig. 1, of duplex chart-blanks, the respective diagrams of which are side by side on each blank and become concentric with the stem 18 in the two positions of rest of the table-top 21. (Represented by full and dotted lines in Fig. 3.) To bring either diagram into position, it is only necessary to move the table-top 21 edgewise laterally to the right or left. The table as a whole normally occupies the position in which it is represented by full lines in Fig. 1. For elevating it, as indicated by dotted lines in Fig. 1, to bring the uppermost chart-blank into contact with the marker M a finger-lever $L^2$ is hinged to said socket $F^2$ and projects rearwardly from beneath the table.

The combined eye-support standard and chin-rest, Fig. 2, is fixedly attached to the recurved front end of the frame F by a screw 27, and comprises the customary slot 28 and thumb-screw 29 for fastening the chin-rest C at different heights. A suitable fixation-point F' at its upper extremity completes the eye-support standard E.

The peculiarly-constructed chin-rest C comprises a vertically-adjustable bracket 30 to coact with said thumb-screw 29 and a superposed chin-piece or the eccentric movable chin-rest proper, the latter having at top a single concavity in which the chin centers itself and at bottom a downwardly-projecting stem 31, which is conveniently formed by a shouldered screw and is provided with a spiral spring 32 between its head and the bottom of a horizontal shelf, with which said bracket 30 terminates at top. A transverse pin 33 or an equivalent rib carried by the chin-piece interlocks with a matching groove in the top of said horizontal shelf of the bracket 30 in the respective positions of the chin-piece represented by full and dotted lines in Fig. 2, said spring 32 permitting the device to be thus locked and unlocked automatically. The chin-piece turns around the vertical axis of said stem 31 as its center, its short end clearing the front of the standard E.

The center of the concavity of the chin-rest C is located at one side of the fixation-point F' in either position of the chin-piece, as shown in Fig. 2, and said center bears the same relation to said point in the respective positions of the chin-piece as the chin bears to the eye under examination.

In the modified perimeter, Fig. 4, the slide S is provided on its exposed side with spur-teeth in mesh with a pinion 34 on the front end of the horizontal rod R. An endless screw or worm 35 is carried by said rod R within the hollow hub of the gear G, and said hub is internally screw-threaded to coact with said worm, so that as the slide S is moved lengthwise in shifting the object O the pinion 34 and therewith the rod R and worm 35 are rotated, and said rearward movement of the rod results from the coaction of said worm and said internal screw within the hub of the gear G. At its rear end said rod R is swiveled to a prism 36, having an inclined plane at bottom which coacts with a plate 37, fast on the upper end of the vertical rod $R^2$, to convert said rearward movement of the rod R into a downward movement of the rod $R^2$, as before described. The modified marker-carrier M' has its open joint 13 and tensile spring 14 located above a gage 38, forming part of the frame 6 of the marker-carrier, and is provided with a roller or rollers 39 to coact with the curved gage-surface, which raises and lowers the subjacent portion of the marker-carrier, and therewith the marker, as required to equalize the height of the latter in the respective angular positions of the marker-carrier, and the marker M is composed of two parts united by a hinge and the lower part acted on by a spring 40, so as to render its contact with the chart-blanks yielding.

The modified chart-holding table, Fig. 5, is substantially identical with the one above de-

scribed except that its support is provided at one edge with a flange 41 and is connected with the laterally-movable table-top by a swinging link 42, having its fixed pivot 43 at said flanged edge, so that the table-top may be swung edgewise from one position of rest to the other.

The eye-support standard E and chin-rest C represented in Fig. 4 are the same as those shown in Figs. 1 and 2 and already described.

A straight guide may take the place of either arc A. A crank-wheel may take the place of the bell-crank lever L. The marker-carrier M′, Fig. 4, may be substituted for the marker-carrier M′, Fig. 1, and the modified chart-carrying table, Fig. 5, may be substituted for the chart-carrying table, Fig. 3, either or both, in connection with the transmitting devices shown in Fig. 1, and other like modifications will suggest themselves to those skilled in the art.

Having thus described the said improved perimeter, we claim as our invention and desire to patent under this specification—

1. The combination with a perimetric object and means for converting its movement across the field of vision into a horizontal rearward movement, of a vertical-motion-transmitting rod, means for converting said rearward movement into a downward movement of said rod, a lever-shaped marker-carrier acted on by said rod, a chart-carrying table subjacent to said marker-carrier, and suitable supports for the moving parts, substantially as hereinbefore specified.

2. The combination with a perimetric object and means for converting its movement across the field of vision into a horizontal rearward movement, of a downwardly-pressing lever which receives said movement, a vertical sliding rod acted on by said lever, a lever-shaped marker-carrier acted on by said rod, a subjacent chart-carrying table, and suitable supports for the moving parts, substantially as hereinbefore specified.

3. The combination with a perimetric object and means for converting its movement across the field of vision into a horizontal rearward movement, of a vertical-motion-transmitting rod, means for converting said rearward movement into a downward movement of said rod, a swinging marker-carrier acted on by said rod, a spring retracting said marker-carrier, a subjacent chart-carrying table, and suitable supports for the moving parts, substantially as hereinbefore specified.

4. The combination with a perimetric object of means for transmitting its movement across the field of vision to a recording-marker comprising a swinging marker-carrier in the form of an L-shaped lever, and a subjacent chart-carrying table, movable upwardly to press the chart against said marker; the vertical arm of said marker-carrier being provided with an open joint and with a pressure-equalizing tensile spring, substantially as hereinbefore specified.

5. In a self-recording perimeter, a chart-carrying table having two positions of rest for diagrams side by side corresponding with the respective eyes, and movable laterally from one position to the other.

6. In a self-recording perimeter, a chart-carrying table comprising a laterally-movable top, a vertically-movable support for said top, and means for elevating said support to press the chart against a marker above the same.

7. A chin-rest composed of a bracket having a fixed support and an eccentric movable chin-piece, supported on said bracket, having a concavity at top the center of which is located to one side of and bears the same relation to the point of fixation in the respective positions of the chin-piece as the chin bears to the eye under examination.

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