

B. C. V. BOURDEAUX.
ARTIFICIAL EYE.
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1,379,741.

Patented May 31, 1921.

Fig. 1.

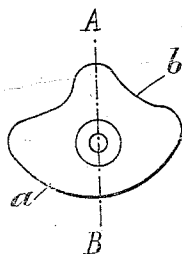


Fig. 3.

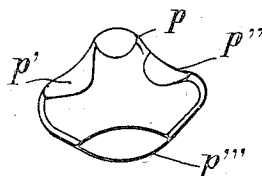
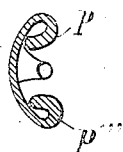


Fig. 2.



INVENTOR.

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By [Signature] ATTORNEY.

UNITED STATES PATENT OFFICE.

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ARTIFICIAL EYE.

1,379,741.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, BRUNO CAMILLE VICTOR BOURDEAUX, a citizen of the French Republic, and resident of Evreux, Eure, France, have invented certain new and useful Improvements in Artificial Eyes, of which the following is a specification.

The present invention concerns an apparatus of the orbital prosthesis called "artificial eye" and which, owing to its general shape, the particularities of its outlines, its dimensions and the particular arrangement of its rear portion, fits better the orbital cavity as this latter is shaped after removal of the natural eye, this removing being done either by exenteration or by incising and expelling (enucleation).

The principles leading to the particular construction of the apparatus according to the invention, are the following ones:

The shape of the orbital cavity, after the operation by incising and expelling, made according to the usual rules of surgery, is determined by the play of constant forces composing themselves in a constant way. Said forces are produced by the straight muscles which, maintained in mutual connection by means of the capsular ligaments, and adhering to the conjunctiva, pull the latter rearward by their tonic action, and give the latter a shape which is not defined geometrically, but showing, as a whole, a cavity, the rear summit of which is nearly centrally disposed, provided the muscles are in a state of statical equilibrium.

The shape is nearly the same in case the natural eye was removed by exenteration with coming off of the conjunctiva, but greatly different in case of simple exenteration.

Nevertheless, whatever may be the nature of the surgical operation, whatever may be the shape of the bottom of the cavity, its outlines are more or less the same, because they are produced by the fixed insertions, on fixed points, of the conjunctiva.

These points are the palpebral commissures, the most distant edges of the tarsus. The conjunctiva may thus be considered as a flexible bag fixed by its edges on the edges of a rigid clasp and pulled rearwardly by means of a force applied toward the bottom, which force is partly balanced by the resistance of the soft portions of the socket,

which portions are inserted in a not extensible bony funnel.

If the shape of the rear part of the socket, and of this rear part only, differs according to the operation, in any case, when a dynamic modification of the muscular balance occurs, the shape of the cavity is modified in an identical manner.

Upon the inserting surface of the contracted muscle is formed a depression, while on the implantation zone of the antagonist is produced a big swelling.

Finally the dimensions of the cavity vary according to the conformation of the orbital base, or at least according to the position of the natural eye with respect to the latter.

Now, before and after the removing of the eye by enucleation or incision, the variations in the position of the eye produce variations of the dimensions of the palpebral cleft. And this may be easily understood. When the eye ball is placed at the forward part of the orbital base, it projects outwardly. The palpebral surface is large, consequently the conjunctiva is developed and the conjunctival bag, after the ball has been removed, is of great dimensions. On the contrary when the eye is sunken, the eyelids and conjunctiva are small, the conjunctival bag reduced.

It may be readily understood that, taking in account the above principles, it is easy to find out a prosthetic apparatus of constant shape, of defined dimensions and fitting the part intended for being hidden.

The prosthetic member according to the above principle is shown in the accompanying drawing, in which:

Figure 1 is a front view of the artificial eye;

Fig. 2 is a section on line A—B of Fig. 1; Fig. 3 is a rear view of same.

In Fig. 1, *a* is the lower portion of the outline, in shape of a half moon or segment corresponding to the lower bag passage, the upper portion *b* of the outline is more or less of triangular shape, with its upper summit rounded and with curved sides, the whole corresponding to the upper bag passage, the longitudinal axis nearly coinciding with the cleft or slit between the eyelids, the front surface being convex, such convexity comprising three curvatures, the radius of the two lateral curvatures being small and the

middle curvature being of elliptical shape with a transversely directed long axis.

The rear face (Fig. 3) shows on the edges four unequal and irregularly globular projections, two of said projections, p' , p''' , at the ends of a vertical axis, the two other ones p and p'' at the ends of a horizontal axis.

Said projections have for their object to rest on the bottom of the conjunctiva bag providing deep supports for the artificial eye.

Furthermore the position of said projections corresponds to the surfaces of implantation of the muscles. When the contraction of a muscle carries with it the above mentioned play of constant forces above mentioned (depressions and swellings), the said projections avail themselves of said play in the following manner:

To the projection corresponding to the swelling zone is imparted an impulsion, which, increased by the projection, is transmitted to the artificial eye; the projection in front of the depressed zone penetrates within the latter. The combination of both said effects results in that the eye may move freely with an intenseness which is increased by the muscular contractions, that is to say, by the motions of the eye on the opposite side.

The general shape, the outlines and the arrangement of the muscular projections remaining constant, the dimensions of the apparatus vary, because the dimensions of the cavities proper may vary, such variations corresponding more or less to those of the cleft of the eye lids.

As to the nature of the materials used in constructing the device, it does not influence the invention, the particular features of the novel device being obtained by using any convenient materials, more especially plastic substances, resins, rubber, glass, metals and the like.

Having now fully described my said invention, what I claim and desire to secure by Letters Patent, is:

1. An artificial eye comprising a front portion formed to present a lower part of regular segmental outline and an upper part of substantially triangular shape with rounded upper summit, the side portions of the triangular part being curved, the major longitudinal axis corresponding substantially to the slit between the closed eyelids.

2. An artificial eye comprising a front portion formed to present a lower part of regular segmental outline and an upper part of substantially triangular shape with rounded upper summit, the side portions of the triangular part being curved, the major longitudinal axis corresponding substantially to the slit between the closed eyelids, the said front part being convex with the central portion of such convex face being of elliptical shape and the lateral portions being on reduced radii.

3. An artificial eye comprising a front portion formed to present a lower part of regular segmental outline and an upper part of substantially triangular shape with rounded upper summit, the side portions of the triangular part being curved, the major longitudinal axis corresponding substantially to the slit between the closed eyelids, the said front part being convex with the central portion of such convex face being of elliptical shape and the lateral portions being on reduced radii, the rear portion of the eye being made up of four globular projections, these projections being respectively unequal and arranged in diametrically-opposed pairs.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

BRUNO CAMILLE VICTOR BOURDEAUX.

Witnesses:

**CLEMENT S. EDWARDS,
JOHN F. FEENEY.**