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tigmatism will be surfaced upon the inner face 12, and since the major portion of the opposite finished face 17 is a plano base curve, all of such area of the lens is available and permits free use for distance vision therethrough.

In the form shown in Fig. 7, the foregoing prescription surfacing can be performed on the outer face 11 of the lens blank.

The advantages attained in the use of my improved multi-focal spectacles lens above described, may be appreciated by an examination of the diagrammatic illustration Fig. 6.

In this figure, the eye is indicated at  $y$  and my multi-focal lens is shown in operative relation thereto.

When the user looks through the non-addition portion or area 17, he can, by reason of the prescription surfaced on the inner face 12, have clear and unobscured infinity vision therethrough, and since the zones 14 and 16 are disposed eccentrically of the axis  $x$  and below the main area of the zone 17, he will have progressively closer focus as the eye, looking through the lens, moves progressively from the non-additive zone through the intermediate zone 16 to the reading or addition zone 14. In such performance, the user will experience absolutely no jump or discomfort as the zones blend imperceptibly one into the other.

Obvious practical advantages in the manufacture and use of these improved spectacles lens will be apparent to those skilled in the art. For example, after the addition or reading zone and the intermediate zones have been made, and these areas and the remaining base-curve area have been polished the face on which that work has been done remains absolutely undisturbed and unaltered during the subsequent operations required to meet the further requirements of a prescription.

Distance vision surfacing, prism and/or cylinder requirements, when specified are all performed on the face opposite to that upon which the reading and intermediate zones have been applied.

Thus the blending of the intermediate zone into the two adjacent zones are unaltered, and full advantage of the intermediate zone may be had throughout its width. On the other hand, work necessary to produce a prism requirement, with consequent tilting of the axis for this work with respect to the axis  $x$ , if done on that face having the reading and intermediate zones thereon, would destroy portions of the intermediate zone and reduce its effectiveness. This does not occur in the present case wherein the prism work is done on the other face.

In addition, the relatively large plane or base curve area which remains on the selected face, after producing the reading and intermediate zones on that face, remain as a definite predetermined value, with which the distance prescription on the opposite face can be produced to cooperate in exactly meeting the requirements of that prescription, in a simple and direct manner, and with standard apparatus.

Thus with a pair of spectacles lenses formed in accordance with this invention, a user will have improved vision during convergence, since there is no jump to mar the gradual and imperceptible change in passing from one zone to another.

Lenses of the kind herein disclosed may be made in any suitable way, as by mounting the lens blank for rotation about the axis  $x$  and providing a suitable tool having a face contour complementary to that required on the lens, which

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tool is also mounted on the same axis of rotation. Suitable abrasive, such as a strip of emery cloth may be introduced between the adjacent faces of lens blank and tool and the grinding action is proceeded with until the lens blank has the desired surface contour.

The ground face is then polished in a manner well known in the art.

Lenses constructed in accordance with this invention are of value for use by persons who have had cataracts removed, in which case, the addition zone 14 and the surrounding intermediate zone 16 are placed in the center of the finished lens. By use of such lens or lenses, these persons may have an increased field of vision through the presence of the intermediate zone on the lens, as compared with the limited field of vision offered by the central portion of the double convex lenses heretofore provided for such persons. Also a much thinner lens is provided as compared with the thickness of the double convex lenses.

By this invention, one is enabled to produce a set of semi-finished polished multi-focal lens blanks, each of a uniform index of refraction throughout, for use of manufacturing opticians and others, from which blanks may be selected to fill a prescription, the set being composed of groups of units having different selected base curves which differ progressively from one another by selected increments. The units of each group are provided, upon the face with the selected base curve, with selected addition or reading zones of different additive strengths merged into the body of the blank by intermediate distance vision zones. When the correct blanks have been selected from such a set of semi-finished blanks, it is only necessary to surface the other or unfinished or plano faces by applying the desired distance prescription and cylinder or prism corrections, when needed, then polish the blank and cut it to the desired shape.

I claim as my invention:

1. A multi-focal spectacles lens comprising a one piece lens body of light transmitting and refracting material of uniform index of refraction throughout, and having upon one face thereof a reading zone of substantial area but constituting a minor part of said face, said zone having a substantially spherical curvature formed to give the desired reading addition to the body, said body also having formed upon the same face thereof and bordering the reading zone, a plurality of intermediate addition curved areas of relatively narrow width arranged side by side and adjoining one another, and of weaker addition power progressively away from said reading zone to provide multi-focal vision zones, the innermost of said intermediate zones adjoining said reading zone and the outermost of said intermediate zones adjoining said one face, the addition curved areas being formed to blend the addition zones gradually into one another and into the remaining area of said face to provide a smooth surface free of abrupt changes in direction joining the reading zone and the remaining area of said face.

2. A multi-focal spectacles lens comprising a one piece lens body of light transmitting and refracting material of uniform index of refraction throughout and having upon one face thereof a reading zone of substantial area but constituting a minor part of said face, said zone having a substantially spherical curvature formed to give the desired reading addition to the body, said body also having formed upon the same face