Aug. 21, 1923. 1,465,424

E. R. DURGIN

PROCESS OF PRODUCING RIMS OF CELLULOID FOR EYEGLASSES AND SPECTACLES

Filed Aug. 1, 1922

Fig. 1.

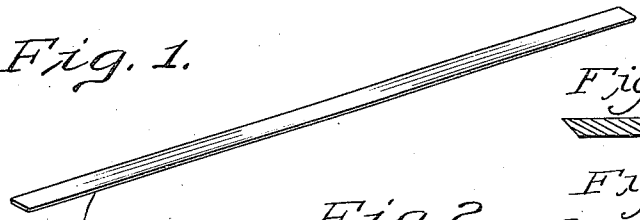


Fig. 1a.



Fig. 3.



Fig. 4



Fig. 2.

Fig. 5.

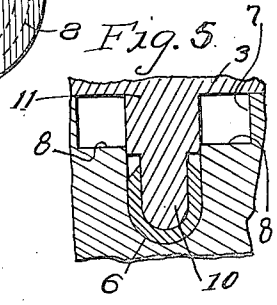


Fig. 6.

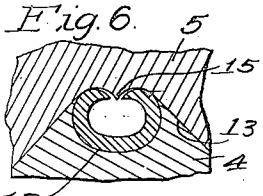


Fig. 7.

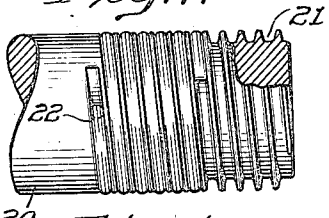


Fig. 8.

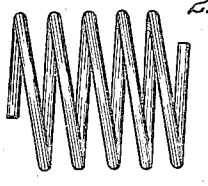


Fig. 9.

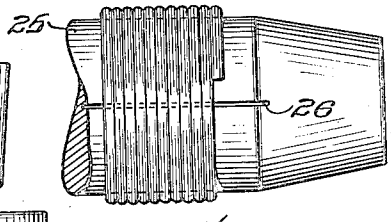


Fig. 10.

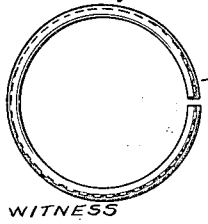


Fig. 11.

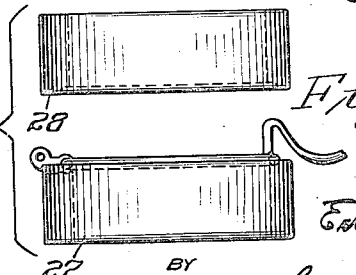
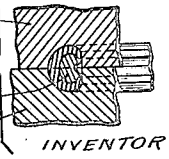


Fig. 12.



WITNESS

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BY

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UNITED STATES PATENT OFFICE.

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PROCESS OF PRODUCING RINGS OF CELLULOID FOR EYEGLASSES AND SPECTACLES.

Application filed August 1, 1922. Serial No. 576,985.

To all whom it may concern:

Be it known that I, EDGAR R. DURGIN, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented an Improvement in Processes of Producing Rims of Celluloid for Eyeglasses and Spectacles, of which the following is a specification.

My invention relates to processes for manufacturing rims of celluloid, zylonite or the like for eyeglasses and spectacles, more particularly rims which are adapted to encircle the metallic eye-wires of so-called combination metal and non-metal eyeglass and spectacle frames. The said invention is an improvement upon the process described and claimed by me in my co-pending application filed October 12, 1920, Serial Number 416,537, and the broad subject matter of invention which may be disclosed herein and not claimed is claimed in said application.

The principal object of my invention is to provide a process by the employment of which eyeglass rims of celluloid, zylonite or the like may be manufactured more expeditiously, with greater accuracy, and with better results than heretofore have been practically possible.

A further object of the invention is to provide a novel process by the employment of which such rims may be satisfactorily produced from thin (narrow) flat strips of celluloid or zylonite. In practice these strips are produced by cutting the same from a relatively wide flat sheet of material.

One advantage incident to the manufacture of rims from strips cut from sheets of thin celluloid or zylonite material is that the surfaces of the said strips as they are cut from said sheets have a finished, polished appearance, thereby rendering it unnecessary to subject the rims to a polishing operation after the formation thereof.

Other objects and advantages of my invention will be pointed out in the detailed description thereof which follows or will be apparent from such description.

For the purpose of enabling a better understanding of my invention reference may be had to the accompanying drawing in which by reference to certain tools by way of description and not of limitation the various steps thereof may be more clearly indicated and more readily understood. However, it is to be understood that my invention is not limited to the particular tools or devices illustrated in the drawing nor to the exact order of steps as described, as the relation of some of the steps to others employed may be altered or changed without any essential change in the invention or the principle thereof.

In the drawing:

Fig. 1 is a perspective view of a strip after its opposite edges have been slightly beveled so that said strip is ready to be bent longitudinally or in the direction of its length; Fig. 1ª is a transverse sectional view enlarged of the strip shown in Fig. 1;

Fig. 2 is a view showing two pairs or couples of rolls employed for bending and shaping the strip so that in transverse section it is of general circular contour;

Fig. 3 is a transverse section of the strip enlarged taken on the line 3—3 of Fig. 2;

Fig. 4 is a similar view taken on the line 4—4 of Fig. 2;

Fig. 5 is a sectional view enlarged taken on the line 5—5 of Fig. 2 in which portions only of the primary forming rolls are shown;

Fig. 6 is a sectional view enlarged taken on the line 6—6 of Fig. 2 in which portions only of the secondary rolls are shown;

Fig. 7 is a view in side elevation of a spirally grooved arbor onto which a strip after it has been operated upon by the rolls shown in Fig. 2 is adapted to be wound;

Fig. 8 is a side elevational view of a spirally coiled strip after it has been removed from the arbor shown in Fig. 7;

Fig. 9 is a view in side elevation of a portion of an arbor having a smooth surface onto which spirally wound strips such as are shown in Fig. 8 are adapted to be wound, which arbor is provided with a longitudinally extending slot as shown;

Fig. 10 is a view in side elevation of a rim formed by cutting the spiral strip shown in Fig. 9;

Fig. 11 is a view in side elevation of a couple of complementary die members in spaced relation to each other and showing one side of a pair of spectacle frames within a seat in one of the said die members, the other die member being in position to be placed thereupon; and

Fig. 12 is a view in transverse section of portions of the said die members after the

same have been brought together and showing a combination metal and non-metal spectacle rim in cross section.

Before entering upon a detailed description of the process with reference to the drawing, I shall briefly describe the same so as to give a general view and outline thereof.

In the carrying out of the process a sheet of celluloid, zylonite or the like, about fifteen one-thousandths (.015) of an inch in thickness and of considerable width and length, usually about twenty (20) and fifty (50) inches respectively, is cut lengthwise into strips of considerable width, say about seven-eighths ($\frac{7}{8}$) of an inch. These strips are then subdivided into narrow strips of a width required to produce a rim adapted to encircle the metal eye-wires of eyeglasses or spectacles. Such strips are usually about five thirty-seconds ($\frac{5}{32}$) of an inch in width. Before cutting these last mentioned narrow strips the first named wider strips are slightly heated. Such heating has been found to facilitate the operation of cutting the narrow strips last mentioned and enables a cleaner, smoother cut.

The strips having thus been cut as described, they are then put into a shallow tank of water after which they are drawn through a set of smoothing and beveling cutters by means of which strips of the character of that shown at 1 in Fig. 1 of the drawing are produced. After having thus had their opposite edges beveled the said strips are placed in a tank of warm water after which they are bent longitudinally of their lengths by means of heated rolls so that in cross section they are of a general circular shape or contour adapted to fit around and grip the eye-wires of eye-glass or spectacle frames within which the lenses are held. After having thus bent and shaped the strips they are passed into a tank of cold water which sets them. The strips, after having set, which requires but a very short time, are removed and are allowed to season for a period say about three days in the air, after which they are coiled about a spirally grooved arbor such as is shown in Fig. 7, which results in the formation of a spiral product such as is shown in Fig. 8 of the drawing. Before removal of the spirally formed product from the said arbor it is slightly heated by frictional action. Immediately after removal of the spirally wound strip the diameter thereof is somewhat reduced by pressure and the same is plunged into cold water where it is set. One or a number of these spirals is or are then placed upon an arbor having a smooth surface upon which it or they are cut so as to produce a number of parts or sections which are adapted for use as eye-glass or spectacle rims of the character hereinbefore indicated. Before being used these parts or sections are placed in a seasoning oven which has a temperature of around one hundred and twenty degrees (120°) Fahrenheit where they are allowed to remain for about thirty-six hours in the presence of air in circulation. After removal from this seasoning oven the said parts preferably are further seasoned in the open air, but this is not essential. In fact, very good results are obtained without these seasoning operations but they are desirable because without them the material of these celluloid or zylonite rims may undergo considerable change after the rims are put into use, thereby causing trouble and annoyance in connection with the completed spectacle or eye-glass frame.

I shall now describe the invention more specifically by reference to the drawing. The opposite edges of the strips 1 are beveled, as shown clearly in Fig. 1 of the drawing, after which they are placed in a tank containing water of a temperature of about ninety degrees (90°) Fahrenheit. Upon removal of the strips from this tank one by one they are subjected directly to the action of slightly heated rollers 2 and 3 and 4 and 5, which rollers are arranged in pairs or couples in tandem relation as shown. The roller 2 is provided with a groove situated centrally of its periphery, the lower or inner portion 6 of which is of considerable depth relatively and is relatively narrow as compared with the upper or outer portion 7 so that the portions 6 and 7 are separated by shoulders 8 as indicated. These shoulders constitute supports for the opposite side portions of the strips which are inserted between the rollers 2 and 3. The roller 3 is provided with a circular projecting portion, comprising the parts 10 and 11, which projects outwardly from the center of its periphery and which extends entirely around said periphery. The outer part 10 thereof is relatively thin so as to adapt it to enter the reduced portion 6 of the groove in the periphery of the roller 2 and leave sufficient space between the surfaces thereof and of the groove 6 to accommodate the material of the strip being operated upon by the rollers. The strip passes from the rollers 2 and 3 directly to the rollers 4 and 5. The periphery of the roller 4 is provided at its center with a groove 12 which is approximately semi-circular in cross section and the said periphery, upon opposite sides of the groove, is inclined or sloped outwardly as shown in Fig. 6, thereby forming two annular surfaces which converge as shown. The co-operating roller 5 is provided with a groove 13 in its periphery, the opposite sides of which are adapted to contact and co-operate with the opposing converging sides of the periphery of the roller 4. The converging sides of the groove 13 merge into

the lower edges of the opposite sides of an annular ridge 15 situated at the bottom of the groove 13.

It will be observed that after the strip has passed through the rollers 2 and 3 it is substantially of U-shape in cross section, the sides slightly flaring outwardly, as shown in Fig. 3, due to the elasticity of the material, and that after it has been subjected to the action of the rollers 4 and 5 it is of substantially the shape or contour in cross section, as shown in Fig. 4, the edges thereof being closer together than in Fig. 3 so that the distance between the same is less than the distance between the inner surfaces of the opposing sides of the bent strip at any point below a plane through the edges thereof. In other words, the rollers 2 and 3 and 4 and 5 acting upon the flat strip 1 bend and shape it so as to form an undercut groove within which the metal eye-wires 16 of eyeglass or spectacle frames are adapted to be seated and held.

Each strip, after it has been acted upon by the rollers aforesaid, is passed directly into a tank of cold water, after which it is spirally coiled by means of an arbor 20 having a spiral groove 21 thereon. The said arbor is provided at or adjacent the inner end of the spiral groove 21 with a hole 22 into which one end of a bent and shaped strip is inserted. The arbor is rotated toward the left; that is, in anti-clockwise direction, and preferably away from the person holding the strip, to bend or coil the same around the arbor 20 within the spiral groove 21. The opposite sides of the walls of the spiral groove 21 are inclined outwardly so that the groove is of greater width as it approaches the top than it is at the bottom. By reason of this relationship the opposite sides of the spiral groove exert pressure upon the opposite sides of a strip as it is wound within said groove so that the edges thereof are pressed slightly toward each other or at least are prevented from spreading as the strip is coiled around the arbor. The said edges face the bottom of the groove. After a strip has been wound within the spiral groove 21 the operative holds a piece of leather or other suitable frictional lining for his hand against the coiled strip upon the arbor while the latter is rotated to produce heat by friction for slightly heating the said strip. This having been done the direction of rotation of the arbor is reversed so as to facilitate the removal of the spirally coiled strip therefrom. After its removal it is pressed manually or otherwise so as to decrease the diameter of the coil and while still warm and so compressed is plunged into a body of cold liquid, such as water. This sets the coil to a diameter slightly less than that of the arbor 20 upon which it was originally coiled. Thereafter the coil is placed upon an arbor 25 and by reason of having been previously set at or to a reduced diameter it grips tightly around the said arbor. The arbor 25 is provided with a slot 26 extending longitudinally thereof and is adapted to move longitudinally in proximity to a rotating cutter the edge of which operates in the plane of the slot 26 which extends longitudinally of the said arbor to cut the spiral coil or coils which may be situated thereon. There may be a number of spiral coils upon a single arbor.

The rim sections thus produced are then placed in a seasoning oven heated to a temperature of approximately one hundred and twenty degrees (120°) Fahrenheit and are kept therein in the presence of air in circulation for about thirty-six (36) hours, after which they preferably should be allowed to season for a further period in atmosphere at room temperature.

The purpose of these seasoning operations is to produce a rim which will undergo the smallest possible practical change after the rim has been completed and placed in use as the encircling non-metallic member of a combination metal and non-metal eyeglass or spectacle frame. Such seasoning operations are desirable also in case the non-metal rim sections should be employed alone as rims for the lenses of eyeglasses.

If the sections as above formed should be too long they may be cut in the usual known manner. After the rims have been formed as described they are ready for use and may be placed in encircling relation with respect to the metal eye-wires of eyeglass or spectacle rims after which preferably a drop of cement is applied to the edges thereof in known manner, and after this has been done the completed rims with the non-metal rims encircling the metal eye-wires or rim portions should be subjected to the action of complementary dies 27 and 28, as indicated in Figs. 11 and 12 of the drawings.

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

1. The process of producing eyeglass and spectacle rim members, which consists in forming a thin strip of suitable material, pressing the said strip so as to bend the same longitudinally to form an under-cut groove in one side thereof, shaping the said strip to helical form, and thereafter cutting the same into required lengths to form the said rim members.

2. The process of producing eyeglass and spectacle rims, which comprises the forming of an under-cut groove longitudinally of an elongated thin flat member, shaping the said member to helical form, and thereafter cutting the same to the required lengths to form the said rims.

3. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles or eyeglasses or to engage and hold the lenses thereof, which comprises the bending and shaping of a narrow flat strip of suitable material so as to form an undercut groove longitudinally thereof, thereafter coiling the same helically about a cylindrical member and simultaneously compressing the same laterally.

4. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles and eyeglasses or to engage and hold the lenses thereof, which comprises the formation of a thin narrow flat strip of suitable non-metallic material having beveled edges upon one side, bending and shaping the same to form an undercut groove longitudinally thereof, thereafter coiling the same helically about a cylindrical member and simultaneously compressing the same laterally to thereby cause the edges of the groove to approach each other.

5. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles or to engage and hold the lenses thereof, which comprises the heating of a narrow thin flat strip of suitable non-metallic material to a temperature at which it is bendable, thereafter bending and shaping the same to form an under-cut groove longitudinally thereof and simultaneously maintaining the same at a temperature at which such bending and shaping may be effected, thereafter coiling the same helically about an arbor and simultaneously confining the opposite sides thereof against outward lateral displacement.

6. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles or eyeglasses or to engage and hold the lenses thereof, which comprises the placing of a narrow thin flat strip of non-metallic material in warm water, thereafter pressing and bending and shaping the same to form an undercut groove extending longitudinally thereof, immediately thereafter subjecting the said strip to the action of a cooling fluid, thereafter coiling the same helically about an arbor and simultaneously pressing the opposite sides thereof toward each other.

7. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles and eyeglasses or to engage and hold the lenses thereof, which comprises the formation of a thin narrow flat strip of suitable non-metallic material such as celluloid, placing the said strip in warm water, removing the same from the said water and subjecting it to pressure to bend and shape the same to form an under-cut groove extending longitudinally thereof, thereafter cooling the same, and thereafter coiling the same helically about an arbor and simultaneously pressing the opposite sides thereof toward each other, and thereafter quickly cooling the same.

8. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles or eyeglasses or to engage and hold the lenses thereof, which comprises the formation of a thin narrow flat strip of suitable material such as celluloid, subjecting said strip to pressure to bend and shape the same to form a longitudinal groove extending lengthwise thereof, and simultaneously maintaining said strip at a temperature at which it may be so bent and shaped, thereafter coiling the same about an arbor and simultaneously exerting pressure upon the opposite sides thereof, and thereafter removing the said coiled strip from the said arbor and cutting the same into rim lengths.

9. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles or eyeglasses or to engage and hold the lenses thereof, which comprises the bending and shaping of a thin narrow flat strip of suitable non-metallic material, such as celluloid, while heated to form a longitudinally extending groove upon one side thereof, coiling the said grooved strip helically about a forming member, thereafter heating the said strip and removing it from the said forming member and then compressing it so as to reduce the diameter of the coil and while so compressed quickly cooling the same, cutting the said helical strip into rim lengths, thereafter subjecting them to heat within a chamber in the presence of air in circulation, and thereafter allowing the said rim members to season in the air at room temperature.

10. The process of producing eyeglass and spectacle rim members which are adapted to encircle the eye-wires of spectacles and eyeglasses or to engage and hold the lenses thereof, which comprises the formation of a thin narrow flat strip of suitable non-metallic material, bending and shaping the same to form an undercut groove longitudinally thereof, and thereafter coiling the same in a groove about a cylindrical member with the sides thereof in contact with the opposite sides of said groove.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this 28th day of July, A. D. 1922.

EDGAR R. DURGIN.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,465,424, granted August 21, 1923, upon the application of Edgar R. Durgin, of Newark, New Jersey, an error appears requiring correction as follows: In the grant and in the heading to the printed specification, title of invention, for "Processes of Producing Rings of Celluloid for Eyeglasses and Spectacles" read *Processes of Producing Rims of Celluloid for Eyeglasses and Spectacles;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of October, A. D., 1923.

[SEAL.]

WM. A. KINNAN,
Acting Commissioner of Patents.