

peres so that some of the lamps can feed the carbons rapidly enough. With these higher consumption rates, it is important that the negative be carried at its correct position because the crater face can become malformed very quickly if a poorly aligned negative is not corrected promptly.

When low-voltage power sources designed for "Suprex" type lamps and carbons are used, the new carbon can be burned from 56 to 70 amperes subject at 70 amperes to the limitations just described. In a few theaters there are still some old, high-voltage generators originally designed for *Hi-Lo* lamps. With these power sources, best results will be obtained with the new carbon if the current is maintained at or above 60 amperes.

This experimental 8-mm copper-coated high-intensity positive carbon has the best features of the present "Suprex" carbon and in addition has the advantages of greater strength, higher efficiency, steadier operation, and a wider current range, and therefore represents a significant advance over the present carbon.

REFERENCES

¹ JOY, D. B., AND DOWNES, A. C.: "Direct-Current High-Intensity Arc with Non-Rotating Positive Carbons," *J. Soc. Mot. Pict. Eng.*, **XXII** (Jan., 1934), No. 1, p. 42.

² JOY, D. B., AND GEIB, E. R.: "The Non-Rotating High-Intensity D-C Arc for Projection," *J. Soc. Mot. Pict. Eng.*, **XXIV** (Jan., 1935), No. 1, p. 47.

A MOLDED PLASTIC SCREEN WITH CONTOURED SURFACE*

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The new screen, molded of plastic, represents a departure from the conventional. Its surface is not flat, but is smoothly contoured in a system of elliptical convexities forming a toric curve around each hole. Instead of being perforated in the usual manner, it is provided with holes molded in the shape of flaring horns, the sidewalls of the holes forming part of the surface contours. The screen has no seams, being molded as a single sheet in sizes up to 30 feet wide, with the plastic contoured to its three-dimensional pattern.

This pattern is shown in Fig. 1, which represents the screen photographed normal to the surface while illuminated by a flat light striking at a 10-degree inclination. When Fig. 1 is observed for more than a few seconds, the phenomenon of alternate direct and reverse pseudoscopic vision will cause the contours to appear convex at one moment, concave the next. They are actually convex. One set of waves undulates on a right diagonal, the other on a left diagonal. A chevron pattern is formed by the position of the various crossing points of the two sets of waves.

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Fig. 2 shows the structure. These molded contours are elliptical in cross-section, sweeping in a curve from the base of one hole to the base of the next adjacent hole, and forming a modified toric curve around each hole.

Fig. 3 is a photomicrograph of a cross-section of the screen taken between two holes, showing the shape of the contour and sidewalls of the holes. The thickness is slightly under 0.025 inch, with the plastic surface bonded to a cloth backing approximately 0.010 inch thick. Forming the walls of each hole, the plastic extends in a thin ring through to the very back of the screen, thoroughly sealing the backing.

While the single sheet of plastic that forms the surface is thick enough to support its own weight, it requires reinforcement to prevent tearing under impact. Consequently, a strong cotton drill is impregnated with fire-retarding salts, a re-

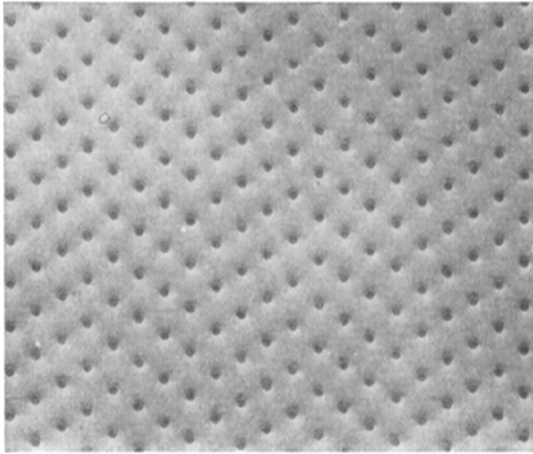


FIG. 1. Patterns of molded holes, photographed normal to the screen surface.

sin, and a bonding agent. Placed under the plastic surface and thoroughly sealed, the structure is moisture-proof. This backing comprises strips 51 inches wide running vertically, and welded together at their edges in such a manner as to leave the frontal face of the backing smooth and flush under the one-piece plastic surface.

The advantages of the plastic structure are many. Primarily, it is the only suitable medium in which these contours can be formed. Such a surface, molded as a single piece, possesses absolute uniformity from edge to edge of the entire screen. The customary seam, with its steadily increasing visibility, is eliminated. The durability of this hard, tough structure is obvious. There are no cut fibers to absorb dirt and moisture in and around the holes, thereby eliminating a great cause of deterioration.

The smooth, hard surface, contoured in easy curves, provides no lodging places for dust and dirt. Tests show that this structure collects dirt at less than half the

usual rate. Collection and impaction of dirt in the holes, so detrimental to sound transmission, are virtually eliminated by the widely flaring horn-shaped holes, permitting maintenance of sound transmission at proper levels.

The plastic employed is moderately flexible, hard, and tough at normal temperatures. It softens at temperatures above 140°F. When cold, at temperatures below 50°F, it becomes progressively brittle. It must not be unrolled or bent when cold, but once stretched, cold will not affect it adversely. This is the familiar characteristic of all thermoplastic materials—loss of flexibility when cold. The screen is rolled for shipment in the usual manner, and is stretched by lacing within a frame in the customary fashion. Installation is no more difficult. While the plastic screen weighs three times as much as conventional types, and requires more care due to that weight, it is very easy to stretch flat, as it is molded without

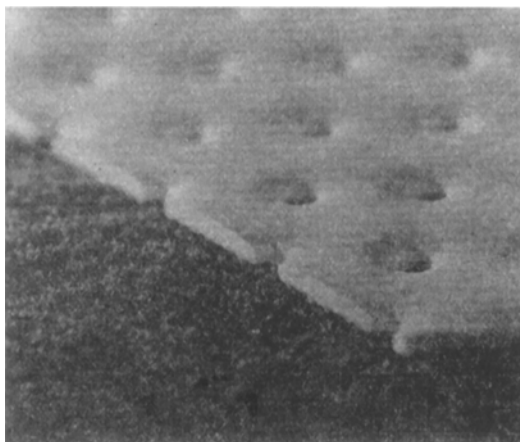


FIG. 2. Showing the structure of the screen.
The shadows show the contour of the surface.

wrinkles. Resistance to penetration is high. Damage from small missiles will be sharply reduced. Most small dents disappear in a few days. The screen is, of course, fire resistant.

The open area at the bottom of the holes, through which light is lost, amounts to 8.1 per cent of the total area. Overall reflective efficiency is 86 per cent, including the loss through the holes. The contour of the surface causes no sacrifice of light, as there is no baffle effect. It does improve distribution within the usable area. No disturbance of focus is caused, as the most critical projection lens has a depth of focus several hundred times the depth of this surface.

The high reflective efficiency of the surface does not account for the visual effect produced. More of the light normally wasted in extreme side reflection is directed diffusely within the 120 degrees of the usable area. The plastic employed is transparent and nearly colorless, with a low refractive index. It is loaded by a new technic with a combination amorphous and crystalline pigment mixture pos-

sessing a very high refractive index. The overall result is the properly balanced high spectral response necessary for correct color reproduction, with a wide latitude of tone and color.

The shape of the holes, as shown by Fig. 3, is obviously beneficial to sound transmission. The air-column load and viscosity effect common to the normal perforation is sharply reduced by the widely flaring sides of the molded hole. The rough ends of severed fibers and broken coating are replaced by a smooth plastic wall. The flaring horn shape of the hole permits improved angular distribution of sound.

In theory, the elliptical contours of this surface should produce a different kind of picture. In practice, this has been the result. As one of these screens forms part of the projection installation at this meeting, opportunity has been provided for observing what it delivers. The contoured imaging surface appears definitely to have influenced the illusion of depth. The "window effect" is increased. Technicolor shows the illusion at its best. Observers of a number of installations have commented upon a lack of flatness, apparent separation of fore and background to a greater degree, reduction in one's consciousness of the screen, and the effect of an image being formed in the air. While this surface plainly does not produce stereoscopic vision, a third dimension, or anything startling, it does produce an effect of depth that can not be evaluated but can be observed.

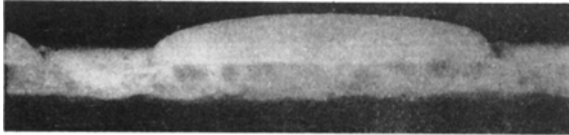


FIG. 3. Photomicrograph of section of screen showing elliptical contour in profile.

It is interesting to note the effect of this surface upon perspective, or the ability of the eye to estimate its position in space. If an observer will stand about two feet from a full-sized screen, far enough toward the center so that the masking is outside the line of vision, while the screen is illuminated by projected light or strong diffuse light, he will find difficulty in placing his finger within four inches of the correct plane of the screen after looking directly at it for thirty seconds. The finger will tend to select a point in space as the plane of the screen.

Why should these tiny elliptical and toric contours influence a perspective illusion? Our theory has been based upon the psychology of monocular vision. Close one eye and one can still perceive solidity and perspective in the image formed on the retina. Helmholtz established the principle that recognition plays a part in the image perceived. The eye is accustomed to perspective, and it will build a mental image of perspective to aid the real image, if given the slightest assistance. This surface appears to provide something which aids that mental image.

In this structure, 60 per cent of the picture falls upon the elliptically contoured area, and 40 per cent upon the toric curves surrounding each of the holes, thereby breaking the picture into a number of minute portions. These portions have varying angles in different image planes throughout the depth of the contours.

As the entire structure is uniform, these portions upon reflection must be resolved into a series of total images lying in a multiplicity of planes. Certain portions of the contours cause a difference in the angular width of the image portions as projected and as observed, due to the increase in the total surface area produced by the toric curves. The eye appears continuously to select certain minute characteristics found in normal perspective, integrate them with the image, and construct an added illusion of depth.

This effect is an illusion of the picture as a whole, and it can be destroyed by distractions. Of course, it can not be observed upon a portion or sample. It can be found on a full screen only. Too much should not be expected, as it is only another contribution to beautiful projection, moving the goal of realism a step closer.

NOTE

The camera referred to in the paper entitled "The Twentieth Century Camera and Accessories" by D. B. Clark and G. Laube, published in the January issue of the JOURNAL on p. 50 is now known as the "Cine-Simplex" camera and is being manufactured for general distribution by the Cine-Simplex Corp., Syracuse, N. Y.