MESSRS. WHITELEYS, LONDON.

FIRE-RESISTING GLAZING IN MODERN STORES

Modern Shop fronts consist mainly of large sheets of plate glass behind which articles, often of a highly inflammable character, are exhibited. To illuminate these articles numerous electric lamps are used, and a short circuit in the lighting system is likely to ignite some highly inflammable article and spread in a few moments to everything inflammable in the vicinity of the outbreak. Unless the show materials in such windows are effectively shut off from the rest of the floor, the fire spreads rapidly into the building with often calamitous results. Such fires also, in a few minutes, cause collapse of the plate glass windows and the flames spreading outwards and upwards pass through the windows of the floor above, thus speedily carrying destruction to the whole building.

All risk of danger from this source is avoided by the use of Luxfer Fire-Resisting Screens forming separate enclosures for display purposes, and by glazing the windows of all upper stories with Luxfer Fire-Resisting Glass.

This efficient means of fire protection has been employed in Messrs. Whiteley's Stores and other large modern buildings.

16, Hill Street, Finsbury, London, E.C.2

Telephone: Clerkenwell 0444. Inland Telegrams: Luxfer, Finsquare, London. Foreign Telegrams: Luxfer, London

The British Luxfer Prism Syndicate Ltd.

LUXFER FIRE-RESISTING GLAZING

Fire-Resisting Glazing for windows was unknown prior to 1898 when the Luxfer Company introduced an entirely new process of mounting glass in electro deposited copper frames. Its potential value as a means of localising fires in buildings where people congregate in large numbers was speedily recognised and Public Authorities introduced regulations making its use obligatory in certain positions in the case of Theatres and many other buildings. It is now used all over the world and has proved one of the chief factors in preventing the spread of fires in densely populated areas where loss of property and of life have at times been calamitous.

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BEHAVIOUR OF ORDINARY GLASS SUBJECTED TO FLAMES

When ordinary glass is subjected to flame or great heat it cracks in all directions and quickly falls to pieces. All window glass cracks under such conditions, but experience has shown that small pieces of glass when mounted in a strong frame of incombustible material and in such manner that all edges of the glass are securely gripped by the frame, will not collapse even when split into fragments by the action of fire and water. When mounted in this manner the glass, as the heat increases in intensity, continues to crack and break up into small and still smaller fragments, but these fragments do not fall away until the glass begins to melt.

In order that the glass shall not collapse until the melting point has almost been reached, its superficial area must not exceed 64 times its thickness. Provided the area of the glass is kept within these limits, and every edge is held as in a vice, the broken fragments are tightly compressed into a species of mosaic formed of irregular fragments of glass with jagged interlocking joints which maintain the whole assemblage intact. *But immediately the glass is free to move at the edges the pressure on the various fragments is reduced and collapse takes place.*

The first essential of a glazing of this type is thus seen to be perfect contact between the metal frame and glass all around the edges of each piece of glass.

Absolute contact between glass and metal is necessary ; a more or less imperfect fit with the interstices filled with mastic or other bedding material is of no real value.

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WHAT IS LUXFER FIRE-RESISTING GLAZING?

Luxfer Fire-Resisting Glazing consists of ordinary glass, not less than a quarter of an inch in thickness, mounted in a framework of copper electrically deposited. Glazing made by this process is called *Electro-Glazing*.

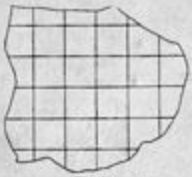

Fig. 1.

PROCESS OF MANUFACTURE

In the first process of Electro-Glazing the pieces of glass, after having been cut and accurately ground to size, are assembled in the desired form upon a table, with flat strips of copper between their edges (Fig. 1). The inter-sections of the copper strips are touched with solder, and the plate thus formed is transferred to great copper baths for the second process.

Fig. 2.

Fig. 2 shows an enlarged section of one of the copper strips at this stage. The strip is perfectly flat; the pieces of glass are pressed tightly up against it, but are held in place only by friction and can easily be pushed out.

Fig. 3.

The plate remains in the copper bath from thirty to forty hours and copper is deposited along the edges of the flat strips, forming a bead-like flange (Fig. 3) which completely envelops every edge of each glass, fits close up against the surface of the glass and holds each piece with a vice-like grip.

The strength and Thermal endurance of an electro-glazed plate is very remarkable. Its secret is the intimate contact made between the glass and the copper deposit. This contact is so close, that where a glass is broken it is almost impossible to separate the slivers of glass from the copper deposit, even after the body of the glass is all broken out.

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This remarkable property is illustrated in the subjoined photograph of an electro-glazed plate (Fig. 4), in which one of the glasses has been smashed with a hammer.

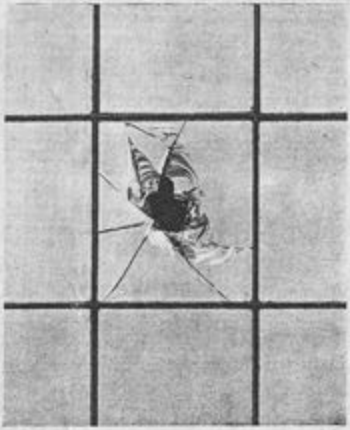

Fig. 4.

BONA FIDE ELECTRO-GLAZING CANNOT FAIL TO BE EMINENTLY FIRE-RESISTING.

The process of building up the copper framework in Luxfer Fire-Resisting Glazing by electro-deposition ensures absolute contact of copper and glass along every edge of each piece of glass and the plate when taken from the copper bath is a rigid unit which will not collapse when the glass is repeatedly cracked by any cause whatever. Every such plate must always be eminently fire-resisting; it cannot be otherwise.

CHEAP IMITATIVE SUBSTITUTES FOR ELECTRO-GLAZING POSSESS NO REAL FIRE-RESISTING PROPERTIES.

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The necessary accurate grinding of glass and heavy copper deposit in Electro-Glazing is expensive. A much cheaper form of glazing is that produced by a method of mounting glass in copper "cames" of "I" section. Glazing of this type is marketed under the generic term of *Copper-lights*. In appearance this glazing is very like Electro-Glazing; indeed, so much alike are the two products that only those familiar with the peculiar appearance of copper deposited in mass can distinguish the genuine article; and the substitute material is frequently sold as "Luxfer."

Glazing built up of "I" section cames, *with glasses accurately fitted and heavily deposited* so as to fill entirely the space between the glass and flanges of the "I" cames is a real fire-resisting glazing. But much of the glazing now sold as Copper-lights consists of glass mounted in copper cames of "I" section, soldered at the intersections and then immersed in a copper bath for a period of time only sufficient to mask the soldered joints. The costly processes of fine grinding of glass necessary to ensure accurate fitting and long period deposition are dispensed with. Under these heads alone the cost of production of the simplest forms of glazing is reduced by 1s. 6d. per foot super. Such glazing has practically no fire-resisting properties. The plate is made weather-tight and the separate pieces of glass are held in correct position by a cement worked into the crevices along the edges of the copper cames. *When a piece of glass is broken all the fragments fall away.*

It cannot be too clearly understood that unless the metal framework will hold securely in position the slivers of glass remaining after a hole has been driven through a section as illustrated in Fig. 4, the glazing will not withstand fire to a degree approaching anywhere near to that demanded by Public Authorities, nor afford more than a trivial fraction of that measure of protection which the user of fire-resisting glazing is led to rely upon. Architects have thus available a simple and sure means of satisfying themselves as to the Thermal endurance of any specimen of fire-resisting glazing submitted for their approval.

Electro-deposition is the only practical means of securing that intimate contact between copper and glass which is necessary to secure stability in the glazing when subjected to great heat or flames.

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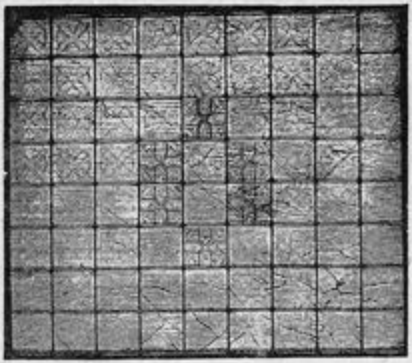
THERMAL ENDURANCE OF LUXFER GLAZING

Luxfer Fire-Resisting Glazing will withstand fire and flame until the glass actually melts. It has proved its value over and over again in actual fires, where it has kept windows intact and prevented the spread of fire for a period long enough to enable people inside the building to escape and the usual fire-fighting machines to be brought into action.

When fitted in *teak* frames the glazing will not permit the passage of flame until after the teak has been completely destroyed to a depth of more than an inch.



LUXFER PLATE FROM BARBICAN FIRE, APRIL, 1902.
NOTE.—The glass though cracked remains in position.

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TESTS

Electro-Glazing has been thoroughly tested all over the world, and approved and adopted as a fire-preventing or fire-stopping material for doors and windows where fireproof doors and windows are required by Municipal and other regulations. Such tests have been made by Municipal and State Officers, Public and Scientific Societies, and by intending purchasers in the United States and Canada, in various parts of Great Britain, in France, Belgium, the German Empire, Austria and elsewhere, invariably with the result of satisfying everybody that **Electro-Glazing** as made under our patents, whether the glass itself be **stained, plain, or prismatic,** is **fire-resisting** and an invaluable protection against fire wherever used in either doors, windows or partitions of buildings.

THE TEST OF THE BRITISH FIRE PREVENTION COMMITTEE

On April 19th, 1899, in the presence of a number of distinguished officials, the British Fire Prevention Committee carried out a severe test at their testing station, in London, to prove the fire-resisting qualities of Copper Electro-Glazing. The results were highly gratifying, as will be seen from the following extracts from the report of the Committee :—

Object of Test.

"To record the effect of fire and water upon Electro-Glazed Sheets of Luxfer Window Prisms built into teak casements.

"The duration of the test was to be 40 minutes. The first 15 minutes the temperature was to be gradually raised to 1,000° Fahr. Water was then to be turned on to the outside of the Prisms for a period of two minutes. The temperature for a further period of 25 minutes was to be gradually increased to 1,500° Fahr. At the expiration of this period, water was to be applied on the inside for three minutes."

Summary of Effect.

"The Luxfer Window Prisms, in squares of 4 in. × 4 in., remained in position. No glazing bars were broken or appreciably oxydized."

At STUTTGART, December 3rd, 1902.

Temperature between 800 and 900 degrees Centigrade.

Summary of Effect.

"The test has shown that Electro-Glass Windows are extraordinarily fire-proof and sufficiently withstand the pressure of water.

"Apart from cracks there was no alteration in the shape nor in the joining of the panes."

At DRESDEN, July 17th, 1902.

Temperature 1,200 degrees Centigrade.

Result of the Test.

"That the three kinds of Glass in their frames are fire-resisting and fire-checking.

"That Luxfer Diamond Glass, 20 millimetres thick, in squares of 15 × 10 centimetres, even at the highest temperature will resist a strong jet of water."

At PRAGUE, November 13th, 1901.

"The test showed that Electro-Glass and Luxfer Prisms are fire-proof at a temperature below 1,000° Centigrade."

Other Tests have been made at Munich, Paris, Boston, Chicago, Leipzig, Charlottenburg, and other important centres in Europe and America.

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REGULATIONS OF PUBLIC AUTHORITIES

As a result of tests of Luxfer Manufactures, Electro Copper Glazing was scheduled as a fire-resisting material in the London Building Act and by the Fire Offices Committee.

Every other Public Authority accepts Luxfer Glazing as a fire-resisting material.

L.C.C. REGULATIONS

No plate shall exceed 2 feet in either dimension. No piece of glass shall exceed 16 square inches. Thickness of glass shall not be less than $\frac{1}{4}$ inch.

The Board of Trade permit the use of Luxfer Fire-Resisting Glazing in fire-resisting bulkheads, partitions and doors on passenger-carrying steamships.

BOARD OF TRADE REGULATIONS

Luxfer Glazing capable of withstanding a fire of considerable fierceness and a temperature of 1,500° Fahr. for one hour.

Minimum thickness of glass $\frac{3}{8}$ inch.

The regulations of Public Authorities vary somewhat, so that it is desirable in cases under their control to obtain their sanction.

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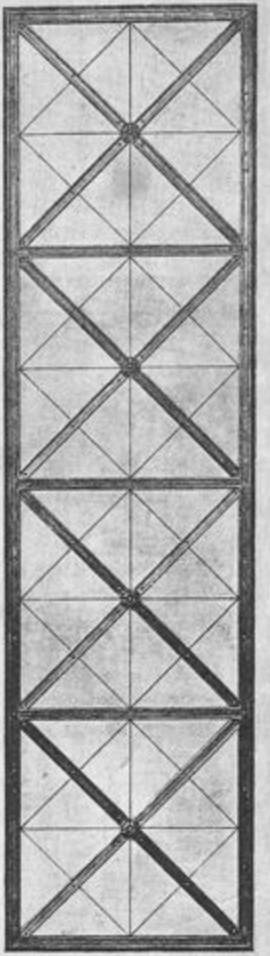
THE L.C.C. REGULATION limiting the size of Luxfer Plates does not preclude the use of this glazing in large windows or screens, as an ordinary framework of hardwood or metal may be used to receive the glazing. The Architect thus has a large measure of freedom in design.

The illustration shows Luxfer Glazing mounted in a metal frame, making one large panel for use in Swing Doors.

The frame here shown is of steel faced with copper, with bronze rosettes at the intersections.

Luxfer have various sections in bronze, copper, and steel for the making of frames to divide up large areas of Electro Glazing.

Hardwood astragals 2 in. thick with ½ in. rebate for glass may be used.



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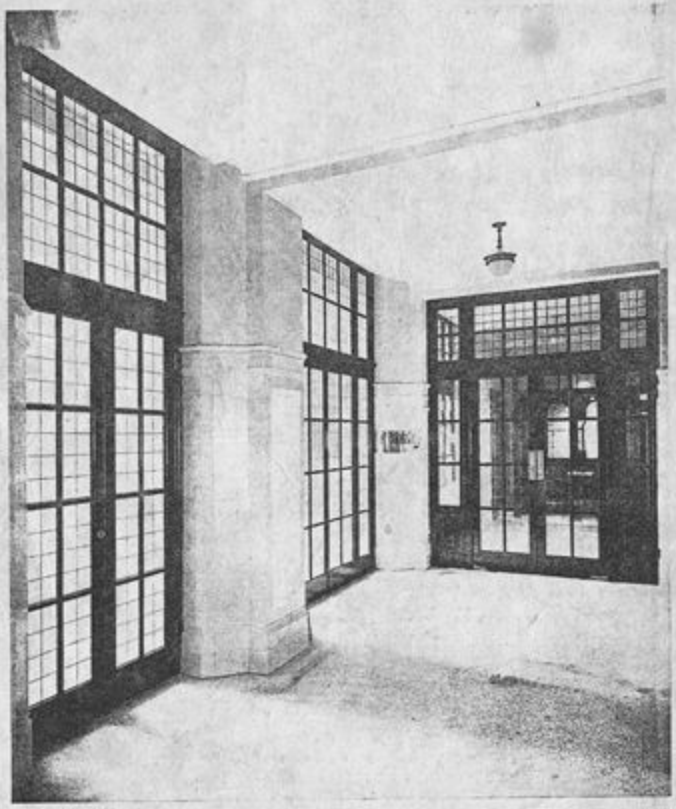
The British Luxfer Prism Syndicate Ltd.

LUXFER FIRE-RESISTING PARTITIONS

L.C.C. REGULATIONS

Hardwood framing not less than 1¾ ins. finished thickness.
Glazing rebates in frames ½ in.
Electro glazed plates not to exceed 2 ft. in either dimension.



LUXFER FIRE-RESISTING GLAZING TO PARTITIONS AND DOORS
AT PINNERS HALL, E.C.

16, Hill Street, Finsbury, London, E.C.2

Telephone: Clerkenwell 0444. Inland Telegrams: Luxfer, Finsquare, London. Foreign Telegrams: Luxfer, London

ELECTRO-GLAZING

possesses strength and artistic properties to a degree unattainable in any other form of glazing

Luxfer Fire-Resisting Glazing possesses, apart from its fire-resisting properties, remarkable strength (*see* p. 34). In its most common form the several pieces of glass are simple squares or rectangles, either of polished plate glass or some semi-obscured glass. The method of glazing, however, is peculiarly adapted to the use of every variety of glass and the formation of the most intricate designs in line. The copper cames can be varied in width from the finest lines barely exceeding one-sixteenth of an inch up to three-quarters of an inch. The Architect has thus at his command a method of glazing in which he can assemble at will glass of every tint and surface texture, and so arrange and graduate the copper cames as to secure a glazing which will form an integrant part of the decoration of the room.

Some slight idea of the variety obtainable is indicated in the illustrations shown in the following pages. No *real idea* of the more pleasing effects obtainable in the glazing can, however, be conveyed in photographs or drawings, because the subtle beauties of glass cannot be shown in drawings.

Luxfer experience in the use of this material is unique, and Architects desirous of securing fire-resisting glazing of a decorative character are invited to submit particulars of their requirements.

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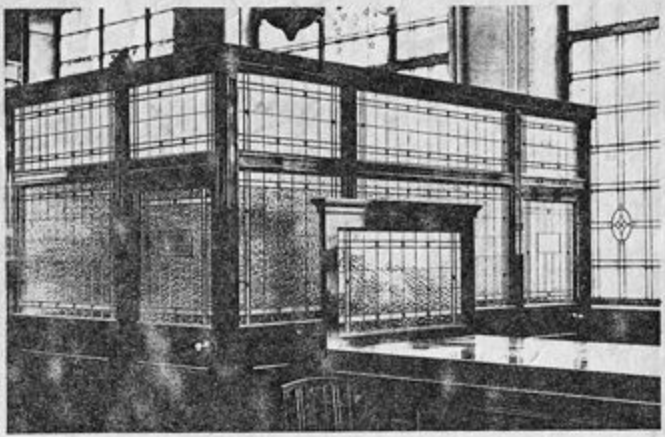
ELECTRO-GLAZING

A DECORATIVE MATERIAL

The great strength and durability in all climates of Electro-Glazing has led to a large development in the use of this glazing as a decorative material where fire-resisting properties are not essential.

No design is too intricate, and many can be executed that would be impossible in any other material. (*See* Section IV. of Luxfer Catalogue.)



MESSRS. LEWIS'S LTD., MANCHESTER.

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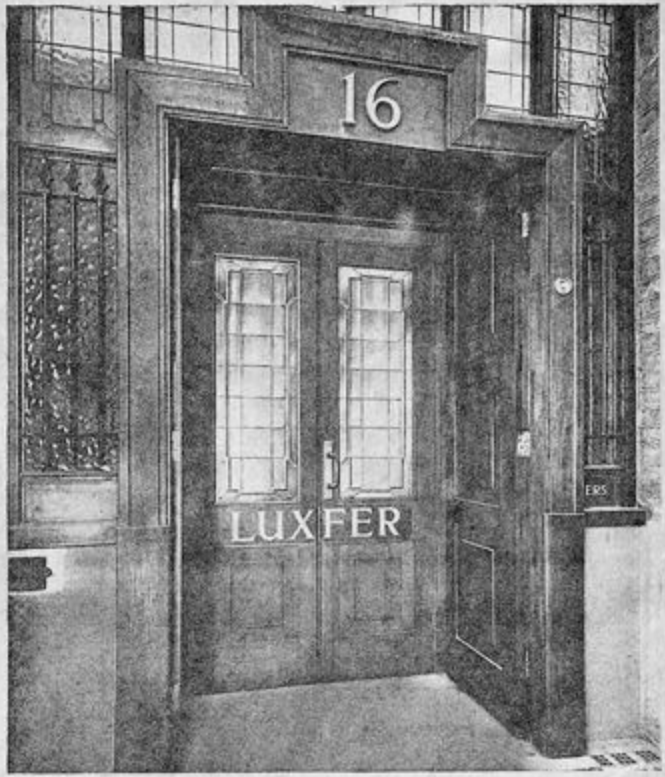
Very pleasing results are obtainable in Electro Glazing by the use of metal cames of different widths in designs of simple character. The Door Panels shown on this page and the illustrations on pages 19, 20, and 22 are examples.



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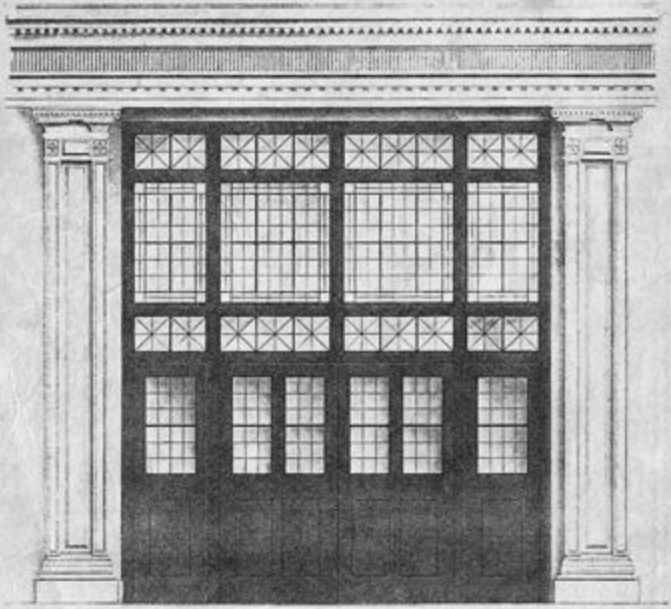
The photograph below shows a simple and effective treatment of Luxfer Glazing in hardwood framing.



The design on opposite page shows Luxfer glazed door panels as supplied to Sassoon House, Shanghai.

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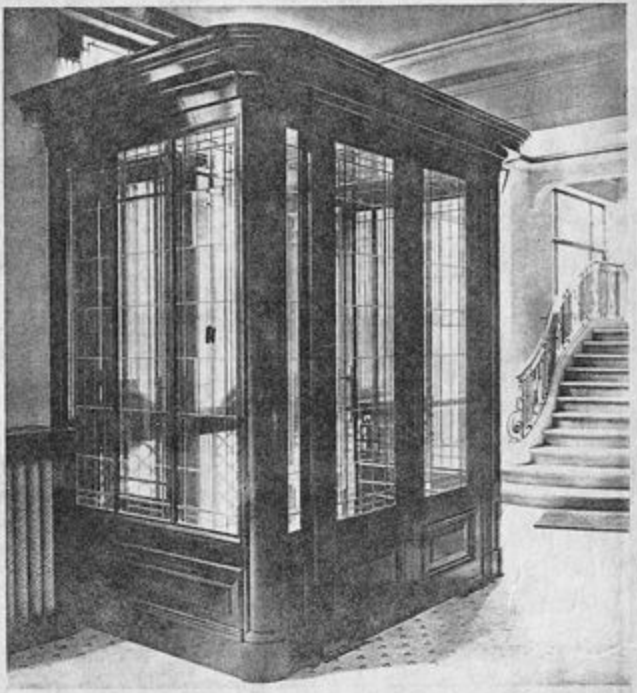
In rebuilding the Magasins du Printemps, Paris, after the destructive fire in 1922, Luxfer Glazing was employed throughout the entire building except for the Boulevard Haussman façade. The illustration on opposite page shows doors leading to a staircase.

In Paris comparatively large electro-glazed plates are allowed.

The illustration below is of an Entrance Vestibule to a Paris bank, executed by the Luxfer Company.



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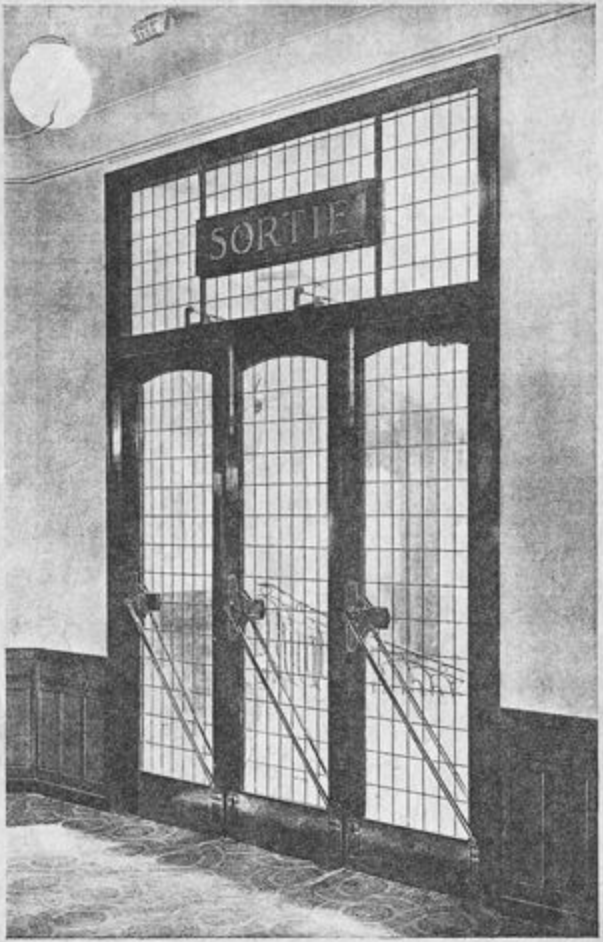

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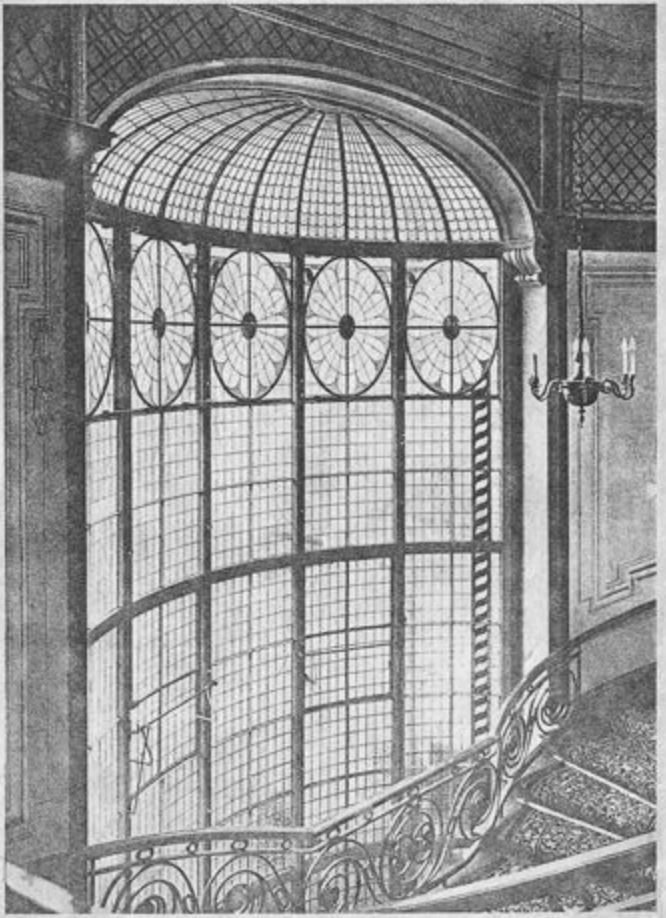
Telephone: Clerkenwell 0444. Inland Telegrams: Luxfer. Finsquare. London. Foreign Telegrams: Luxfer. London

STAIRCASE

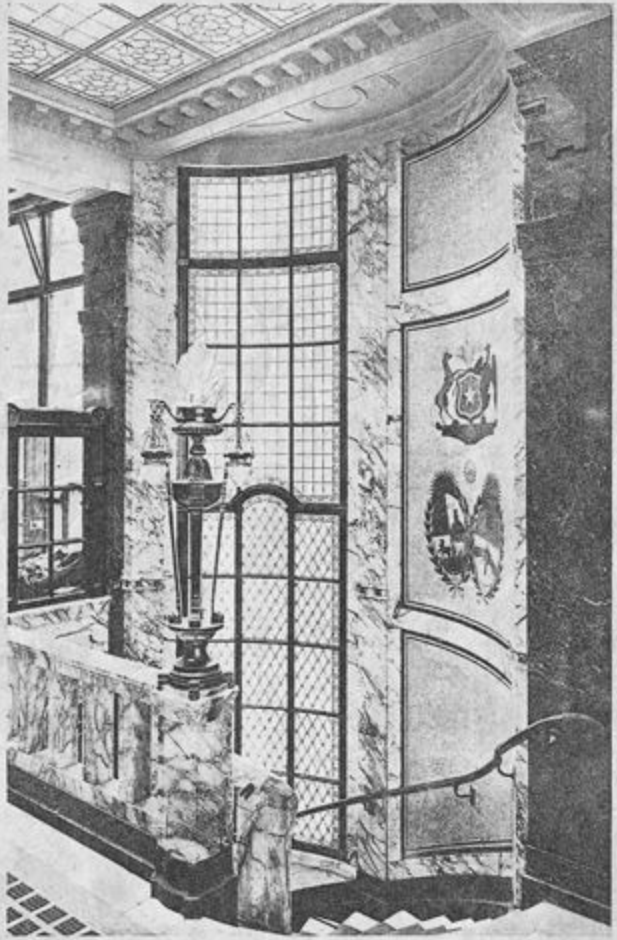
EXAMPLES OF LUXFER FIRE-RESISTING GLAZING.

The window on page 29 is a particularly fine example of Luxfer craftsmanship.



MESSRS. D. H. EVANS LIMITED, OXFORD STREET, LONDON.

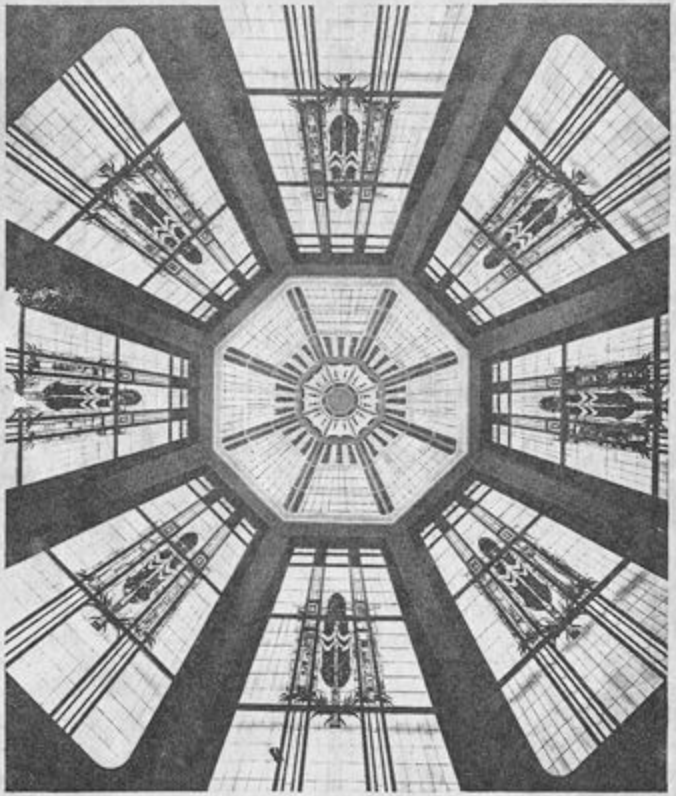
WINDOWS



ANGLO-SOUTH AMERICAN BANK, OLD BROAD STREET, LONDON.

The British Luxfer Prism Syndicate Ltd.

The plan of this Dome is an irregular octagon of **50** ft. diameter. The problem to be solved was to provide a glass which would effectively keep out the blinding Sun rays in Calcutta without recourse to blinds. This was achieved by the use of specially made neutral tinted glass with selected pot metals in which rich purple and golden tints predominated for the decorative features. No idea of the rich colouring and great beauty of this glazing can be shown in photographs. The golden hue appears black in the photograph, the rich and varied purples appear neutral, whilst the neutral tinted main body appears almost white.



BRITISH INDIA STEAM NAVIGATION CO., CALCUTTA.

Photo of central portion of Dome, looking up.