

# Traditional Window Glass



Written and Illustrated  
by Charles Glenn



**Nottinghamshire  
County Council**  
Planning &  
Economic Development



Heritage

## INTRODUCTION

Today we take glass for granted. It is all around us, in bewildering quantity and variety. In ages past, this was not the case. Glass for windows was produced by elaborate crafts-based techniques and was expensive. Despite its fragile nature, more of this traditional window glass has survived than you may think.

This booklet explains something of the history of glass-making, how traditional window glass may be recognised and how it should be treated.

## HISTORY OF WINDOW GLASS

Window glass has a surprisingly long history - fragments of window glass have been found on Roman sites in Britain - but in Roman times and for centuries after, only the wealthy could afford to glaze their windows. Such was its value, that in Mediaeval times, when the owner was not in residence, his window glass would be removed and put into storage to protect it from damage. At this time the more normal method of screening windows was to use horn, hide, parchment, linen or oiled paper, or simply to close them with wooden shutters. Windows of this kind were in use until the 18th Century.

Although some Roman glass was made by casting molten glass in shallow moulds, the main techniques for producing traditional window glass have been either the 'crown glass' or 'broad cylinder' methods. Both were based on glass blowing whereby a blob of molten glass was gathered on the end of a hollow iron tube and blown into a variety of shapes. Crown glass-making was the technique most widely used for window glass production in the 17th and 18th Centuries when supply of glass grew enormously. The illustration [opposite] depicts the various stages of making crown glass in the late 18th Century.

The process of making cylinder glass, sometimes known as 'broad' or 'muff' glass,

started in the same way as that of crown glass, except that, instead of a globe, the molten glass was blown into a cylindrical shape. The top and bottom were cut off and whilst still hot and soft the cylinder was split lengthways and flattened out into a sheet. The flat sheet of glass was placed in an annealing oven to cool and harden. Although larger panes of glass could be made by this process, house owners preferred crown glass. Unlike cylinder glass, it had a polish and lustre - a fire finish - which resulted from the glass never coming into contact with any other surface during manufacture.

To a large extent, architectural fashion dictated the appearance of windows but improvements in glassmaking technology also had a part to play in their changing styles. In the 16th and 17th Centuries small diamond panes set in lead 'comes' (leaded lights) were prevalent. It has been suggested that the reason for the diamond shape was that less glass was wasted in cutting individual panes of this shape from the original sheet. Rectangular panes became the norm in the later 17th Century, panes of 325 x 225 mm (13" x 9" being made by the end of that century. Throughout the 18th Century, the size of individual panes gradually increased until comparatively large sheets of glass 600 x 375 mm (24" x 15") were being fitted to windows. The increase in size of the panes was paralleled by a decrease in the number and thickness of glazing bars. It is not unusual to find in the early 19th Century, slender glazing bars of brass or iron, metal having the strength to support the large, heavy sheets of glass.

In 1832 Lucas Chance introduced an improved method of making cylinder glass. Also known as German sheet glass, the material was of a higher quality than the traditional broad-cylinder glass and panes, 1200 x 900 mm (4' x 3') could be produced. Almost immediately it superseded crown glass as owners and architects seized the opportunity offered by the larger single panes of glass to reduce the number of glazing bars which blocked sunlight and were becoming

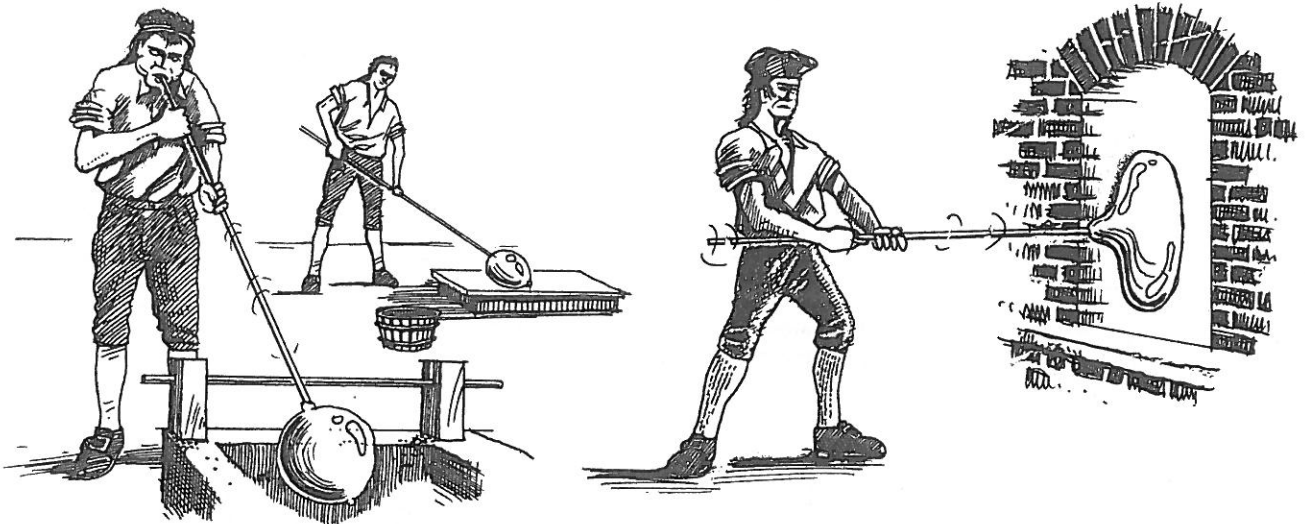
distinctly old fashioned in an age when light and airy structures were in vogue.

In 1851, Chance Brothers supplied this kind of glass for the Great Exhibition which was housed within a revolutionary new structure of glass and iron. In essence an enormous greenhouse, it became known as the Crystal Palace. Perhaps more than any other, this building inspired the Victorian and Edwardian fashion for the fully glazed conservatory.

Advances in glass-making technology continued apace in the 19th and early 20th Centuries but what really eluded the manufacturers was the ability to draw perfectly flat sheets of glass straight from the furnace. However, in 1959, Pilkingtons invented the float glass process by which a strip of molten glass was drawn from the furnace over a bed of molten tin, giving a perfect surface to the glass. At last polished glass could be supplied relatively cheaply in a wide range of sizes and thicknesses.

## MAKING CROWN GLASS

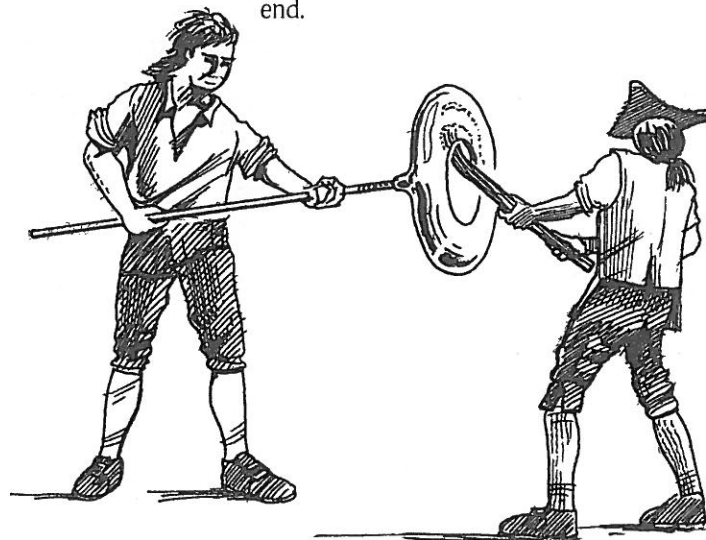
In the background, molten glass is formed into a pear shape at the end of a blowpipe by rolling on a "marver" - a polished iron slab.

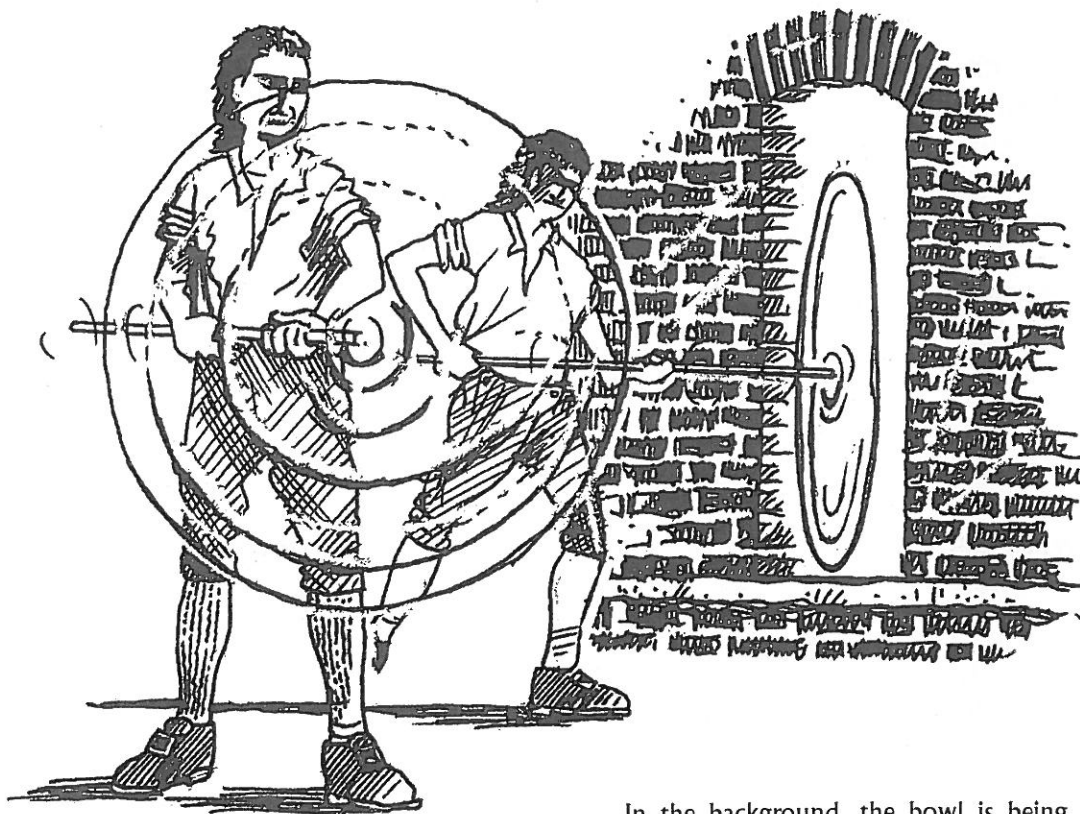


By a process combining blowing, reheating and rotating, a globe is formed at the end of the blowpipe.

The blowpipe has now been removed and a solid iron rod or "punty" has been attached. The globe is reheated in the furnace and spun rapidly, flattening one end.

The globe is opened out at one end by the young apprentice to form a bowl.





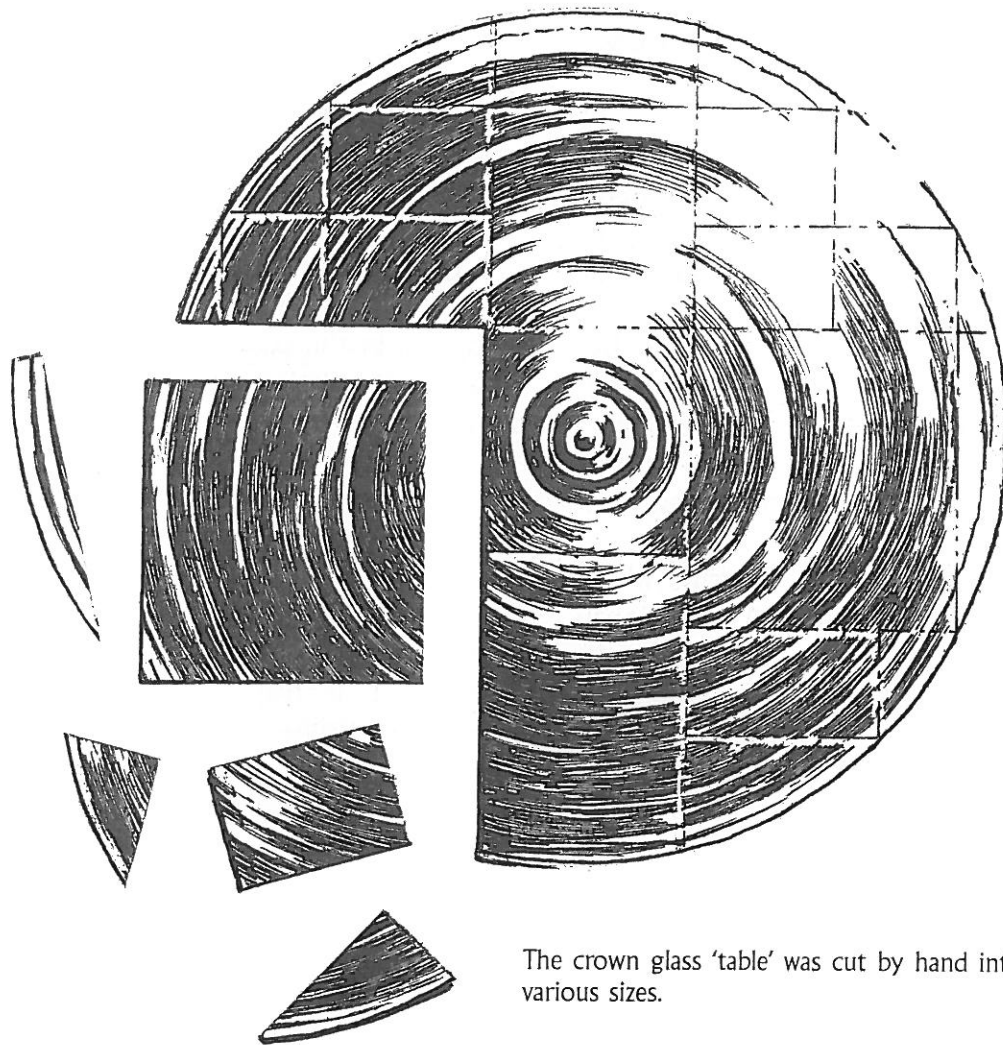
In the background, the bowl is being reheated and spun quickly. Centrifugal force has caused the bowl to flare out forming a flat disc or "table". This operation is known as "flashing".

The table of glass, usually about 4' - 5' in diameter, whilst still hot, is placed flat on a bed of sand and the punty rod broken off leaving the bull's eye or bullion in the centre where the rod was attached.



The completed 'table' is placed in an annealing oven which allows it to cool gradually.





The crown glass 'table' was cut by hand into panes of various sizes.

## RECOGNISING TRADITIONAL WINDOW GLASS

Panes made from crown glass were cut from the glass disc or 'table' (see above) which, because of the way it was created, was never completely flat and often had a series of pronounced ripples. In the centre was the bull's eye or bullion, the knob of glass remaining where the disc was removed from the punty. Panes cut from this portion of the 'table' would normally have only been used to glaze windows on the rear, hidden, side of a building - modern 'bullion glass' is a much exaggerated interpretation of this feature. Like crown glass, cylinder glass was never completely flat, becoming distorted when the cylinder was cut and handled. Both crown and cylinder glass often have tiny air bubbles and striations. Standing back from a building which still has crown glass in its

windows, the difference between the dull, flat, machine-perfection of modern glass and traditional glass is immediately apparent. The crown glass catches the light and has almost the appearance of gentle rippling water; the 'polish' which made crown glass so attractive to the 18th Century eye is obvious. Traditional glass is not of a uniform thickness and is often much thinner than modern glass being typically about 2-3 mm thick. Old glass may have a slight tint which came from traces of mineral deposits accidentally getting into the basic glass mix.

## TREATMENT OF HISTORIC WINDOW GLASS

Wherever crown or cylinder glass has survived it should be retained. Unfortunately, it is vulnerable to breakage, being thinner than modern flat glass, and can easily be damaged when removing paint from glazing bars and frames, replacing decayed putties or by aggressive cleaning. If a window has to be replaced, the glass should be salvaged for glazing the new windows or kept as a 'stock' for replacing damaged window glass elsewhere.

The greatest risk of damage occurs when trying to remove the putty. A traditional linseed oil putty sets rock hard and it is tempting to use a quick method of removal such as a chisel or hot air stripper. Unfortunately, because of the brittle nature of crown or cylinder glass, it is easy to crack even if you use a shield to protect the glass when using a hot air stripper.

An alternative is to soften the putties by liberally applying solvent based paint stripper. This will act more effectively if it is kept in prolonged contact with the putty by covering it with cling film or masking tape. More than one application of stripper may be necessary to soften the putties sufficiently to allow safe removal of the glass.

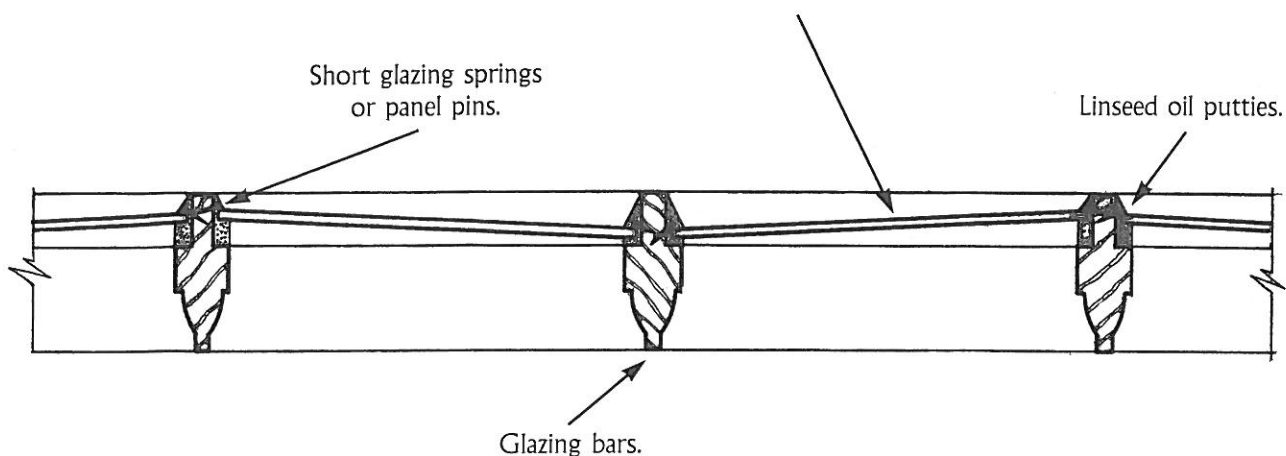
A more high tech solution has recently become available in the form of a special lamp which uses infra-red heat to soften the putties without the risk of damaging the glass.

If you need to replace broken crown or cylinder glass, or even replace modern glass with the authentic type, crown glass is now being made for the first time since the 1930's, in England, in the traditional way.

Horticultural glass, which because it is thinner and less 'perfect' than modern float glass, has, in the past, been recommended as replacement glazing in old windows. The drawing below shows how by setting the glass at an angle in the frames, you can reproduce some of the effect of light reflecting off traditional crown or cylinder glass. However, the quality of most horticultural glass is improving rapidly to the extent that you should inspect the material before you buy; in many cases it may end up looking little different to ordinary window glass.

Replacement glass should be fixed using traditional linseed oil putties. Never use timber beads.

2mm horticultural glass panes set at slightly different angles to each other and within the sash frame. (angles are exaggerated on the drawing)



## CONCLUSION

You may consider all of this a lot of trouble and expense - after all, glass is just there to keep the draughts out and let the light in. It is, however, the small subtle things about old houses that give them their special character and make them such an important record of long vanished craft-skills. Hand-blown crown or cylinder glass complements the handmade bricks, roof tiles and windows which are so much a part of the architectural heritage of Nottinghamshire.

## TRADITIONAL WINDOW GLASS: BIBLIOGRAPHY & FURTHER READING

I. Burgoyne & R Scobie,	"Two Thousand Years of Flat Glass Making".	Pilkington Glass Museum	1983
Alec Clifton Taylor,	"The Pattern of English Building".	Faber & Faber	1987
M. Archer,	"English Stained Glass"	Victoria & Albert Museum	1985
Dan Cruckshank,	"Balancing Act".	<u>Old House Journal</u> ,	Nov 1991 (P.16-22)
B. Claxton & J. Collings,	"Glass for Glazing".	<u>Period House and its Garden</u> ,	July 1992 (P.20-29)
S. Cackett,	"Glass for Windows".	<u>Traditional Homes</u> ,	May 1987 (P.10-16)
Iain McCaig,	"Old windows: Saving the Glass".	<u>Traditional Homes</u> ,	Feb 1988 (P.58-59)
R. Dodsworth,	"Glass and Glassmaking".	Shire Publications	
F. Palmer Cook,	"Talk to Me of Windows".	W.H. Allen,	1971

*Cover illustration:*

*In the foreground, the first stages of making crown glass. In the background an eighteenth century glassworks. A reconstruction based on a detail of a 1751 view of Nottingham.*



## The Heritage Team

Planning & Economic Development  
Trent Bridge House  
Fox Road  
West Bridgford  
Nottingham  
NG2 6BJ

Tel: (0115) 9772155  
Fax: (0115) 9772418