JOURNAL

OF THE

BRITISH SOCIETY OF SCIENTIFIC GLASSBLOWERS

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British Society of Scientific Glassblowers

Founded 1960

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EDITORIAL

TO some extent the contents of this Journal are an indicator of the vigour of the Society and editorially we are always closely watching the effect of various aspects of the Society's activities and changes in administration on its production.

As we have previously stated we still regard the reporting of activities of Sections, Council and Special Committees as one of its primary functions and we assume that members expect to see a proportion of space allotted to this type of report. If they do not appear it is almost certainly the result of communication difficulties. Either reports are not submitted or arrive too late to be usefully included, the latter being most frustrating to both the Editor and those who have submitted them.

Various attempts have been made in the past to delegate responsibility for sending in reports with only limited success and the only system which can work is to pass on information direct to the Editor as soon as possible after meetings take place rather than postpone to an indefinite date when their value may be diminished.

In fact, these delaying tactics are most dangerous, not only from the point of view of this Journal but to the Society as a whole and valuable time can be lost in furthering the objects of the Society. The position consequent on recent changes in administration should be closely watched by all members and especially by Councillors who are in a position to exert the pressure necessary for continuous progress.

The stated commitments of the Society must take priority over management procedure.

In this issue we have attempted to give a better representation of Section activities which have taken place and hope that material will be received more regularly in the future, and in the absence of official reports the receipt of Section news sheets will ensure some coverage, though of course they cannot be regarded as a source of information on Council and main Society meetings.

The last isue was of a size which would place too great a strain on our financial resources and we shall follow with less ambitious issues until reserves have been established. But do not let this statement be construed that possible material should be withheld or delayed. A steady flow is always needed and suggestions equally welcome.

J. H. BURROW

20*th May*, 1066

Final Subscription Reminder

As Treasurer of the Society it is my duty to report that many 1966 subscriptions are still unpaid. Defaulters are reminded that their names will be deleted from the Journal circulation list. Please remit immediately and save the Society the trouble and expense of sending out final appeals.

F. A. BRANFIELD, *Hon. Treas.*
15 Grosvenor Road
Forest Gate, E.7

Non-Receipt of Journal

If not due to the above cause either a change of address has not been notified or your name does not appear in the circulation list. In all cases please communicate with D. A. Henson, who is the Society Registrar, in addition being responsible for Journal distribution.

The Journal is published quarterly by the B.S.S.G. and is available free to members and at 7s. 6d. per copy (or 25s. per annum) to non-members. Editorial communications should be addressed to the Editor, c/o H. H. Wills Physics Laboratory, Royal Fort, Clifton, Bristol 8, and enquiries for advertising space to J. A. Frost, Chemistry Dept., University of Reading. Printed in Gt. Britain by E. G. Ellis & Sons, Willow Street, London, E.4.

CENTRIFUGING GLASS TUBING*

By E. G. EVANS, *Senior Scientific Glassblower,*
Chesterford Park Research Station, Saffron Walden, Essex;
Chairman, British Society Scientific Glassblowers

Introduction

THE discovery of centrifuging glass tubing was first revealed at the 2nd Symposium of the British Society of Scientific Glassblowers, during the discussion period at a lecture, given by Heathway Engineering Company on glass-working lathes.

Long before this, most prominent glass-blowers realised that tubing of large diameters (above 4 in.) had a tendency to increase in diameter, whilst it was being turned on their lathes, but only a few had thought about adopting this technique to form shapes, and indeed opinions were expressed as to what might happen if one were to throw hot glass about at high revolutions. However, four known glassblowers set about this challenge to control glass and adopt a new technique of centrifuging.

At present, no known figures have been written up on this subject and being one of the few who have achieved some results and compiled some data, I wish now to present such data to this Symposium. The details being presented will, it is hoped, further the knowledge of the Scientific Glassblower and benefit the glassblowing world as a whole. In addition, it introduces the principle used to obtain and form predetermined shapes in glass tubing with methods that are both repetitive and time-saving.

The slides which will be shown later help to present a picture of what speed, tools, machinery and flames were required to ascertain the information and the details now available.

The graph gives an indication of centrifuging speeds required to throw varying diameters of tubing into shapes.

Principle of operation

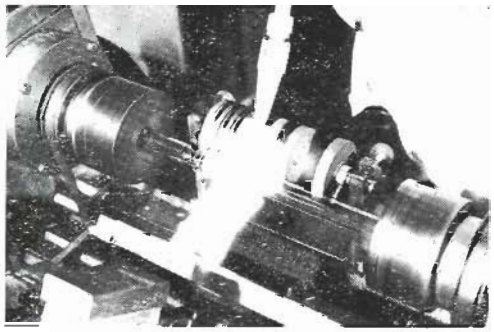
To form predetermined shapes in glass tubing (without the aid of blowing) by revolving it at very high speeds, which, when heated, will be centrifuged in an outward direction, to be controlled by and conform to the shape of the machined carbon roller.

Method and procedure

The glass tubing to be shaped is placed between the head and tail stocks of the lathe, the appropriate carbon roller being selected and placed in carriage in the required position.

The lathe is revolved at low speed to allow pre-heating of glass and to align the tube if necessary. The speed is then raised to the centrifuging speed of the glass diameter (see graph). A hot softening flame is then applied at one end of the tube. The glass on becoming soft will then centrifuge on to the carbon which will rotate on contact with the glass. The flame is then run along the length required to complete the shape. Care must be taken that the glass does not become overheated as this leads to the overlapping of glass and uneven wall thickness.

Most satisfactory results were obtained by only one application of heat, attempts to re-form by reheating resulted in disturbance of and uneven wall inside, although the outside surface remained reasonably true.



Glass Centrifuging machine

Machine and tool details

The lathe being used in my department has been modified from an old engineering lathe to a glass working lathe, by adding a tail stock and drive. A Kopp variator was introduced between the drive motor and centre shaft to enable variation in speeds. Details of the modification can be given to anyone requiring them.

The lathe I have here for demonstration purposes has been specifically manufactured by Heathway Engineering Company, who are well known throughout the world. It has been designed for high speed, precision work, and has a speed range of 60-2,000 r.p.m. with a 2 in. maximum through head and tail stock.

* Notes for Talk and Demonstrations given to the American Scientific Glassblowers Society in Boston, Mass, June, 1966

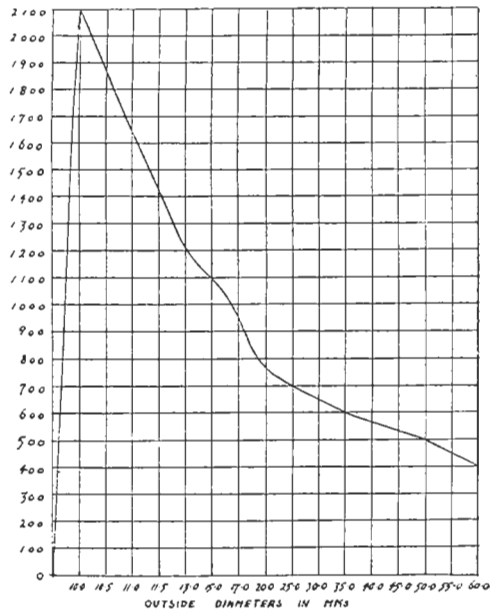
The carbons which are high grade CY 9 have been drilled and fitted with bearings, which have been "doctored", by running them in with fine grinding paste for 10 minutes. This is to allow for expansion of the races; to prevent them seizing up on becoming hot.

The burner used is a jet 7 surface mix type, using butane at 12 lb./sq. in. and oxygen at 25 lb./sq. in. approximate temperature of flame 2,100°C.

Experiments and results

It has been found that tubing under 10 mm. in diameter tends to constrict, no centrifuging takes place up to 2,100 r.p.m., it is generally thought that much higher speeds would be required, but lathe prevented this. However, on 10 mm. tubing a humped-back effect took place which indicated that this was the minimum diameter which could be moved at 2,100 r.p.m.

Experiments quickly established that the larger the diameter of tubing the less revolutions were required for centrifuging, although no set pattern was arrived at (see graph).



Practically any shape applied to the carbon could be formed on the glass, but it must be appreciated that the further the glass is extended outwards the less the wall thickness becomes.

Attempts to thicken the wall by the conventional method of bench hand glass working, resulted in uneven wall thickness on the finished products, but in most cases the outside wall was formed true. It is better to calculate the necessary requirements and use a heavier walled glass, than try and thicken up during the operation.

Examples

1. A piece of 17mm. Pyrex tubing was placed in chucks, carbon roller locked in position 4 mm. away, the glass pre-heated at low speed, r.p.m. increased to 900, hot flame applied, glass centrifuged to meet roller, the flame was moved along the glass for 5 ins. to produce an expanded tube of 25 mm. diameter, test showed a tolerance of 0.05 mm.

2. A more ambitious attempt was then made to produce skirted cones. To do this, carbon roller was machined to correspond to two B19 extended cones—end to end. Using 17 mm. tubing pre-heating, etc., was carried out, but before centrifuging, the centre of the tube was drawn to a lower diameter to facilitate the shaping of the skirted section.

The roller was then correctly positioned against the shanks to rotate the carbon. At 900 r.p.m. the flame was applied, starting at one end and carrying along until both cones and skirts were centrifuged. Excellent results were obtained, with close tolerances. After parting, the cones were ground with one grade of carborundum only. This was a finishing grade of 450 mesh.

Two cones were completed from start to finish in 2 minutes 10 seconds including grinding. No rocking was visible with or without lubricant. The operation is repeatable. Other items produced included syringe barrels, side arms (double), bulbs of varying sizes (pear, round, etc.), buttons, square sections and tapers.

3. Threading glass tubing presented a small problem of overlapping which was overcome by using an opposing thread to the one required, an experiment took place on these lines; a piece of 54 mm. tubing was placed in chucks and pre-heated, a carbon roller of 54 mm. diameter with a left hand thread 3 mm. deep and 4 turns to 25.4 mm. was placed in carriage, speed at 500 r.p.m. glass centrifuged

giving right hand thread of equal dimensions. Little or no distortion. For threading, carbon and glass diameters must be equal.

Obvious allowances for expansion of glass and carbon have to be made before setting up to do a run of jobs.

Carbon rollers have to be kept accurate, it is plain that for repetitive work it is advisable to have more than one set of rollers.

It is found that a great deal depends on the operator, but as the technique can easily be acquired, semi-skilled operators can be trained for the work.

Centrifuging glass has a challenging potential throughout the industry and lends itself to many applications previously lengthy and not completely repetitive. It has tremendous possibilities, which, I am sure, will be widely explored in future and it is hoped that the information presented will contribute towards the further development and application of this new technique.

TABLE 2

Centrifuging Speed Table

Tubing diameter m/ms.	*Speed r.p.m.*
10.0	2,100
10.5	1,875
11.0	1,650
11.5	1,450
13.0	1,200
14.0	1,150
15.0	1,100
17.0	950
20.0	750
25.0	700
30.0	650
35.0	600
40.0	575
45.0	525
50.0	500
55.0	450
60.0	400

TABLE 3

By centrifuging lathe	*Time*	*Results*	*By hand*	*Time reduction*
Double side arm	60 secs.	Good, constant	240 secs.	180 secs. 75%
Tapered bulb and round bulb	51.5 secs.	Good, constant	480 secs.	428.5 secs. 89%
3 buttons and 3 increasing diameter bulbs	61.5 secs.	Very good, perfectly true	480 secs.	418.5 secs. 87%
5 in. expanded cylinder true outside diameter to 0.05 mm.	37 secs.	Very good, constant	No time difficult under present conditions	100%
Syringe plungers	36 secs.	Very good, constant	No time difficult under present conditions	100%
Screw thread 4 turns × 25.4 mm.	84 secs.	Excellent, constant	No time difficult under present conditions	100%
Double B19 extended cones	79.5 secs.	Very good, constant	300 secs.	220.5 secs. 73%

ACKNOWLEDGEMENTS

The author wishes to acknowledge his colleagues Mr. K. B. Hughes and Mr. G. Hepburn for the invaluable suggestions that they have contributed; Mr. A. A. Ross for the construction of the original lathe and carbons; Mr. M. B. Payne for the slides; Heathway Engineering Co. Ltd., for supplying the newly-designed precision lathe; Fisons Pest Control Ltd. for permission to present and publish this paper.

Table 1 of Revolution Counter readings against Tachometer Readings at chucks has been omitted. Ed.

BOARD OF EXAMINERS REPORT

THE Board of Examiners met in the College of Advanced Technology, Birmingham, on 27th April, 1966. Further work was done towards finalising the "Certificate of Competence" and a report considered on an examination held on the "Introduction to Elementary Scientific Glassblowing (Non-Professional) Course."

"Introduction to Elementary Scientific Glassblowing (Non-Professional) Course"

This first examination based on the proposed syllabus was held at Bristol College of Technology. The B.S.S.G. examiner, Mr. D. W. Smith, reported a high standard achieved by the candidates and some of the best work was shown to the Board on 23rd April.

The following names are those of the successful candidates at this examination and each will receive a certificate issued by the B.S.S.G.:

Gordon James Faulkner, 57 Willoughby Road, Bridgwater.
Brian James Ashford, Old Close Farm, Daystone, Wickwar, Glos.
Mrs. Edna May Hanford, 253 Park Lane, Frampton Cotterell, Glos.
Richard Owen, 23 Dunkery Road, Bridgwater.
William Robert Wallece, 14 Mackie Avenue, Filton, Bristol.
Geoffrey Higginbottam, 72 Cotham Road, Cotham, Bristol.

The following is the syllabus as printed to technical colleges, educational authorities, etc.

Non-Professional Course—Theory

Properties of the glasses in general use—working temperatures, coefficients of expansion, annealing, thermal resistance, chemical resistance, correlation of these factors.

Cutting glass tubing. Use of cutting knife in the hand, on the bench, angle of cut, description of cut.

Blow pipes—pre-mix type and mixing at point of ignition (nozzle mix) type.

Adjustments to blow pipes.

Gas supplies—safety precautions, non-return valves. Oxygen and air supplies.

Manipulation

Cutting

Cutting glass tubes up to 12 mm. diameter by mechanical stress, thermal shock using small flame or hot spot, and the use of 'hot wire' for larger tubes.

Methods of holding glass tube in the left hand

Using glass rod, gather and flatten to make stirring rods, paddle stirrers, etc.

Using 10 mm. tubing, close end and draw spindle, gather, blow bulb on end tubing.

Explanation of right hand hold

Push up olives in rod and 10 mm. tubes, straight join in 10 mm. tubes.

Using 25 mm. tubing, pull spindles, close ends, ream open ends.

Using 10 mm. tubing, blow stubs in readiness for T joins.

Using 25 mm. tubing, blow stubs in centre of domed ends.

Reduction join 25 mm. to 10 mm. tube.

Bends and joins in 10mm. tubing

Right angle and U bends, Y pieces.

Seals

Insertion seal, internal seal—10 mm. tubing into 25 mm. tubing.

Joins

T and X.

Apparatus

All glass Liebig condenser.

Bulbs

Using 10 mm. tubing, blow 20-25 mm. diameter bulb in middle of tube.

Using 25 mm. tube, draw spindle, 150 mm. of glass between spindles, make true, blow 50 mm. bulb and form alembic.

Vocational work

Using rod and tubing.

Rod work

Tripods, pipette stands, hooks, etc.

In situ work

Use of hand torch.

The complete syllabus as printed for distribution to technical colleges, educational authorities, etc., will be published in the next issue of the Journal.

Certificate of Competence (Professional)

An account of the standard of practical ability and a list of test pieces for the above examination was published in the Journal, Vol. 2, No. 4, last December. For the oral examination on Theoretical Knowledge a comprehensive list of elementary questions is being compiled from which the examiners may choose at their discretion. The list of actual questions will not, of course, be published but it is stressed that they will be of a very elementary nature and covered by the following list of sub-headings:

1. Identification of glasses.
2. Outstanding characteristics of glasses in common use.
3. Recognition of faults in glass.
4. Temporary and permanent stress in glass, including toughened glass.

THE SIXTH ANNUAL COLLOQUIUM OF THE BRITISH SOCIETY OF SCIENTIFIC GLASSBLOWERS

to be held at the Hotel Metropole, Leeds, on the 24th September, 1966

Provisional programme

GLASS: ITS HISTORY. ITS MANUFACTURE AND USE. ITS FUTURE IN RESEARCH

10 to 10.30 a.m. ...	Registration and Coffee
11 a.m.	Welcoming of Members by Mr. H. Butler, Chairman of North-Eastern Section
11.5 a.m.	**The History of Glass,** by a well-known personality in the Glass Industry (name to be announced later). Introduced by Mr. H. Butler
1 p.m.	Lunch
	Judging of Students' Exhibits by Examiners
2 p.m.	**The Manufacture and Use of Glass,** by Mr. A. Sedgwick, Industrial Glass Development Officer, James Jobling and Co. Ltd. Introduced by Mr. J. Burrow, B.Sc., University of Bristol
3 p.m.	**The Future of Glass in Research,** by Mr. N. Payne, I.C.I. Ltd., Plastic Division. Introduced by Mr. J. Frost, of the University of Reading
4 p.m.	Tea and Biscuits
4.30 p.m. ...	Question Time. Chairman, Mr. J. Frost
5 p.m.	" My Visit to the American Symposium " by Mr. E. G. Evans, Chairman of the Society. Introduced by Mr. H. Butler
5.45 p.m. ...	Presentation of A. D. Wood Cup to the outstanding Student Member of the year by Guest or Mr. E. G. Evans
	Closing remarks by the Chairman, Mr. E. G. Evans

Trade exhibitors

Heathway Machinery Co. Ltd.
Jencons Scientific Ltd. (2)
Fisons Scientific Apparatus
W.S.A. Engineering Ltd.
Quickfit and Quartz Ltd.
James A. Jobling Ltd.
Lab. Plant Ltd.
Thermal Syndicate Ltd.

To date, ten trade stands have been taken.

Registration Forms and finalised programme will be circulated to Members of the Society but non-Members are invited to attend. In these cases, however, there will be an increased fee.

Communications should be addressed to: R. G. EUSTANCE, I.C.I. Fibres Ltd., Harrogate, Yorks.

9th May, 1966

BOARD OF EXAMINERS—continued

5. Cutting and parting glass.
6. Glass to glass seals.
7. Glass to metal seals, matched and unmatched.
8. Ground joints and stopcocks.
9. Elementary line marking of glass tubes.
10. Elementary chemical metallic coating of glass.
11. Elementary vacuum pumps and vacuum measurements.
12. Burners.
13. Gas cylinders and regulators, including hazards.
14. Liquid fuel and compressed fuels gases.

It is intended to publish in the Journal a series of concise articles outlining the basic principles and elementary techniques covered by these subheadings.

At the Society's A.G.M. in April it was agreed to amend Rule 5 : 1 so that this examination will be put into effect from 1st August, 1966.

N. H. COLLINS
Hon. Secretary to the Board of Examiners

ABSTRACTS

ANALYSIS

(250) **Decimilligram Procedures for the Determination of Carbon Hydrogen, Nitrogen, Oxygen, Sulphur, Phosphorous and Halogens in Organic Samples.**
Merz and Pfab, *Microchemical Journal*, Vol. 10, Nos. 1-4, page 346, January 1966.
Description and diagram of apparatus for determinations on ultra-micro scale, 17 refs. S.D.F.

(251) **Modified Kjeldahl Determination of Nitrogen in Potassium Metal.**
Kirtchik, *Analytical Chemistry*, Vol. 37, No. 10, pp. 1287-1288, September 1966.
Detailed drawing of distillation assembly. E.G.E.

(252) **Continuous Chloride Ion Combustion Method Applied to Determination of Organochlorine Insecticides Residues.**
Gunther, Miller and Jenkins, *Analytical Chemistry*, Vol. 37, No. 11, pp. 1386-1391, October 1965.
Block diagram and detailed drawing with information on chloride-ion detection system. E.G.E.

(253) **Microdetermination of Water Using Rapid Controller Potential Coulometry in a Karl Fischer System.**
Linkbeck and Freund, *Analytical Chemistry*, Vol. 37, No. 13, pp. 1647-1650, December, 1965.
Detailed drawing and information on method. E.G.E.

BALANCES

(254) **Thermomicrobalance for Study of Kinetics of High-temperature Corrosion in Sulphur containing Atmospheres.**
Whittle, *J. Sci. Instru.*, Vol. 43, No. 3, p. 150, March 1966.
Description of construction and operation. Silica used tor beam assembly ; sensitivity approx. 1 x 10–6g. Diagrams. D.A.H.

(255) **Torsion Balances of High Efficiency.**
Gorbacch, *Microchemical Journal*, Vol. 10, No. 1-4, p. 485, January 1966.
Description of torsion balances designed by author. Also a new weighing method enabling weighings to be automatically recorded. S.D.F.

BURETTES—GAS

(256) **A Constant Pressure Gas Burette.**
Taylor, *J. of Chem. Education*, Vol. 42, No. 11, p. 618, November 1965.
Method of determining the rate of uptake of gases. Illustration of reactor with magnetic stirrer and gas burette. F.G.P.

CHROMATOGRAPHY

(257) **A Spreader for T.L.C. Slides.**
Whistler, Samilern and Rowell, *J. of Chem. Educ.*, Vol. 43, No. 1, p. 28, January 1966.
Method of manufacture from glass sheet. Large batches of absorbent can be spread before binder sets. F.G.P.

(258) **Pressure Changes in Gas Chromatography.**
Scott, *Analytical Chem.*, Vol. 37, No. 13, p. 1764, December 1965.
Drawings and literature. E.G.E.

(259) **Automatic Device for Application of Evaporated Samples to the Gas Chromatogram.**
Podmore, *J. of Chromatography*, Vol. 20, No. 1. pp. 131-134, October 1965.
Detailed drawings with information. E.G.E.

CONDUCTIVITY

(260) **Electron Bombardment Induced Conductivity in Fused Silica.**
Ehrenberk, Gutan and Vodopyanov, *Brit. J. of Appl. Phys.*, Vol. 17, No. 11, pp. 63-69, January 1966.
Electric conductance induced by cathode rays and beta rays into silica has been experimentally studied. Effect is strongest in crystal and amorphorous specimens containing mainly hydroxyl as impurity, very weak in samples of fused natural quartz. S.D.F.

DEWARS

(261) **A Variable Temperature, Continuous Flow Dewar Insert for Electron Spin Resonance Experiments.**
James and Neikham, *J. Sci. Instru.*, Vol. 43, No. 4, p. 272, April 1966.
Using glass insert, continuous fluid flow-experiments can be monitored at temp. ranges—185 to + 300°C. D.A.H.

EDUCATION

(262) **Education and Training in the Glass Industry.**
Glass, Vol. 42, No. 10, pp. 487-499, October 1965.
Training facilities for the glass industry listed under :— The University of Sheffield, The Technical Colleges, The Training Board, Training in an Industrial Organisation, The Training of of Works Personnel, and General Training Facilities. S.D.F.

FLOWMETERS

(263) **A Simple and Precise Soap-Bubble Flowmeter.**
Frisone, *Chemist-Analyst*, Vol. 54, No. 2, p. 56, April 1965.
Precise measurement obtained by the activation of a timer by successive impringement of bubbles on electrical contacts.

GAS—ANALYSIS

(264) **Apparatus for Study of Dissociation of Gases.**
Murray, *J. of Chem. Educ.*, Vol. 42, No. 12, p. 677, December 1965.
Description and illustration of apparatus used in experiments on homogenous chemical equilibrium. F.G.P.

GAS—DENSITY

(265) **Gas Density Buoyancy Bulb Apparatus.**
Oldham and Brand, *J. of Chem. Educ.*, Vol. 42, No. 12, p. 665, December, 1965.
Illustration of apparatus and description of method using bulb on silica spring for accurate measurement of gas density. F.G.P.

GAS—KINETICS

(266) **Simple Gas Viscosity Apparatus.**
Salzberg, *J. of Chem. Educ.*, Vol. 42, No. 12, p. 663, December 1965.
Illustration and instructions of apparatus used to demonstrate kinetic molecular hypothesis in teaching labs. of N.Y. City College. F.G.P.

(267) **Laboratory Experiments in Gas Kinetics.**
Price and Baker, *J. of Chem. Educ.*, Vol. 42, No. 11, p. 615, November 1965.
Illustration of reaction vessel and method of using apparatus to demonstrate gas phase kinetics. F.G.P.

GETTERS

(268) **Gettering Properties of Barium Films in Television Tubes.**
della Porta and Michon. *Vacuum*, Vol. 15, No. 11, p. 535, November 1965.
Improved method of measuring sorption rates and capacities for barium getters. D.A.H.

GLASS

(269) **Technique for Making Glass Discs.**
Hilsdorf, *Chemist-Analyst*, Vol. 55, No. 1, p. 22, January 1966.
Compress broken plate between corks of required size and use wire gauge to chip off. D.A.H.

(270) **Kimble Borosilicate Glasses.**
Bishop, *Proc. 10th Coll. of the Amer. Sci. Glassblowers Soc.*, pp. 19-26, 1965.
A review and properties of borosilicate glasses manufactured by Kimble (Owens—Illinois), U.S.A. S.D.F.

GLASS—APPARATUS

(271) **An Improved All-Glass Fluid-Feed Atomizer.**
Marshall, *J. Sci. Instru.*, Vol. 43, No. 3, p. 198, March 1966.
Description of improvements ensuring complete vaporisation of a range of solvents at concentrations of several per cent by volume. Diagram. D.A.H.

GLASS—MECHANICAL PROPERTIES

(272) **Fundamental Investigation into the Effects of Heat-treatment on the Mechanical Properties of Glass.**
Lorant, *Glass*, Vol. 42, No. 8, pp. 393-395, August 1965.
A study of the change in relationship between the elastic modulus and the refractive index of glass following heat-treatment. S.D.F.

GLASS—JOINTS

(273) **Ball-Joint Connector.**
Ellis, *Chemist-Analyst*, Vol. 54, No. 2, p. 55, April 1965.
An easily made, adjustable connector from a length of jack chain and a number of springs. D.A.H.

GLASSWORKING

(274) **The Glassblowers' Role in Electronics and the Semi-conductor Field.**
Drechsel, *Proc. 10th Symposium of the Amer. Sci. Glassblowers* Soc., pp. 9-15, 1965.
A review of materials and methods related particularly to sealing and cutting as practised in electronics and semi-conductor field. S.D.F.

GLASSWORKING—MACHINES—METHODS

(275) **Techniques and Machinery for the Manufacture of Electric Lamps, Fluorescent Tubes and Diodes.**
Glass, Vol. 43, No. 2, pp. 60-65, February 1966.
A review of machines and methods developed by the Bader Machinery Co. Ltd. S.D.F.

(276) **Modifying a Glassworking Lathe to Graduate Glass Tubes.**
Stockton, *Lab. Practice*, Vol. 15, No. 3, pp. 314-5 and 317. 1966.
Details and photographs of modification together with method of use. D.W.S.

GRATICULES

(277) **Ruling Quartz with a Diamond.**
Robinson, *Rev. of Sci. Instru.*, Vol. 37, No. 1, p. 124, January 1966.
Evaporated metallic lead is used in method of engraving lines on fused quartz with a diamond. D.A.H.

HYDROMETRY

(278) **The Effect of Capillary Elevation in Hydrometry.**
Williams, *Journal Sci. Instru.*, Vol. 43, No. 3, p. 88, February 1966.
The shape has been computed of the surface of a liquid contained between two concentric vertical cylinders. D.A.H.

LAMPS—XENON

(279) **A Demountable High Power Xenon Arc Lamp.**
Stearn and Colliver, *J. Sci. Instru.*, Vol. 43, No. 1, p. 52, January 1966.
Description of a 10 kW. Xenon arc lamp for continuous operation. D.A.H.

PIPETTES—CALIBRATION

(280) **Calibration Device for Use with Mercury—Sintered Glass Disc Inlet Valves.**
Christian, *Chemist-Analyst*, Vol. 54. No. 4, p. 119, October 1965.
Simple device for calibrating pipettes where they are to be used with this particular valve. D.A.H.

PLASTICS

(281) **Mechanical Properties of Plastics (Part 1).**
Ogorkiewicz, *The Engineer*, Vol. 221, No. 5744, p. 299, February 1966.
Information presented and examined from the engineering point of view. S.D.F.

PUMPS—TOEPLER

(282) **A Mercury Piston Pump.**
Davis and Olgilvie, *J. Sci. Instru.*, Vol. 42, No. 2, pp. 1164-117. 1966.
Only stainless steel, tungsten carbide and mercury are exposed to the vacuum in the automatic Töepler pump described. A hydro-carbon-free backing pump was required for investigation of the bombardment of metals with inert gas ions. Pumping speed, 4 1/min., ultimate pressure 20 μ torr. D.W.S.

SPECTROSCOPY

(283) **Flexible Gas Cells for Infra-red Spectroscopy.**
Carter, *J. of Chem. Educ.*, Vol. 43, No. 1, p. 9, January 1966.
Illustration and description of cells made from polythene bags and salt windows. F.G.P.

STIRRERS—MAGNETIC

(284) **Dimpled—Bottomed Flasks for High Speed Magnetic Stirring.**
Miwa, *Chemist-Analyst*, Vol. 54, No. 4, p. 121, October 1965.
Sketch. D.A.H.

TEMPERATURE—MEASUREMENT

(285) **Techniques for Measuring Surface Temperatures (Parts 1 and 2).**
Watson, *Instru. Practice*, Vol. 20, Nos. 3 and 4, pp. 217-225, March and April 1966.
A series of articles covering many techniques for the measurement of surface temperatures of solid bodies. 380 refs. S.D.F.

TITRATION

(286) **Continuous Coulometric Titrations of Unsymmetrical Dimethylhydrazine.**
Buck and Eldridge, *Anal. Chem.*, Vol. 37, No. 10, pp. 1242-1245, September 1965.
Detailed drawing of titration cell. E.G.E.

VACUUM—GAS PRESSURE—CONTROL

(287) **The Use of a Silicon Carbide Porous Plug for the Control of Glass Flow into a Vacuum System down to 1 μ l Torr Sec. $^{-1}$.**
Christian and Leck, *J. Sci. Instru.*, Vol. 43, No. 4, p. 229, April, 1966.
Accuracy can be maintained for flow rates down to 1 or even .01 μ l Torr Sec. $^{-1}$. Sketch. D.A.H.

(288) **A Mercury-sealed Gas Transfer Device.**
Pritchard, *J. Sci. Instru.*, Vol. 43, No. 4, p. 262, April 1966.
Device described for transfer of millilitre quantities of gas into a vacuum system by diffusion through a mercury-sealed sintered-glass plug. Diagram. D.A.H.

(289) **A Porcelain Rod Gas Dosing Leak for use in Ultra-high Vacuum Systems.**
Askins, *J. Sci. Instru.*, Vol. 43, No. 4, p. 167, April 1966.
A bakable, mercury-free porcelain leak and the techniques used in its construction are described. D.A.H.

VACUUM—GAUGE—McLEOD

(290) **Automatic Mercury Positioner for McLeod Gauge.**
Legan, *Rev. Sci. Instru.*, Vol. 37, No. 1, p. 116, January 1966.
A control system designed to automatically position the mercury ready for reading. Diagrams. D.A.H.

SECTION ACTIVITIES

Southern Section

On Friday, 18th February, 1966 the third stag dinner of the Southern Section was held at the Horseshoe Hotel, Tottenham Court Road. London. As is usual on these occasions, a good time was had by all, over sixty members attended, about half the membership of the Southern Section. The Section committee were very pleased with the attendance of this function; the attendance at general meetings, however is not so pleasing, 19 members attended the annual general meeting—this number includes the full committee. The committee works very hard to arrange interesting lectures at general meetings, and are rather disappointed when so few members attend.

Mr. B. Perris of Fisons Scientific Apparatus Ltd. was guest speaker at a general meeting held on Wednesday, 9th March, 1966, in the main lecture theatre, chemistry department, Queen Elizabeth College, London. The speaker, whose subject "Grinding Glassware", was of great interest to all members, covered all aspects of the subject in a most interesting manner.

A committee meeting was held on Wednesday, 23rd March, 1966 at Imperial College, London. At this meeting a letter of resignation was received from the Section chairman, Mr. I. C. P. Smith, who is forced to reduce the work he undertakes for the Society on doctor's orders. The committee were very sad to accept the resignation and instructed the secretary to write to Mr. Smith expressing the thanks of the Section for all the work he has done, and wishing him a speedy recovery to health.

On Wednesday, 13th April, 1966, Mr. H. Thomas, of Richoux Co. (London) Ltd., presented a lecture and film show on "Glass-working Machines" in the main lecture theatre, Chemistry department, Queen Elizabeth College. Mr. Thomas introduced Mr. Loeinger, who had just arrived from Germany with films of glass-working machinery manufactured by his company. The films showed machines making articles such as egg-timers, thermometers and measuring cylinders.

The next meeting in the Southern Section programme is to be held on Wednesday, 11th May, 1966, in the main lecture theatre, chemistry department, Queen Elizabeth College. Mr. J. Campbell of Morganite Carbon Ltd. will present a lecture on "The Application of Carbon and Graphite in the Glass Industry".

A visit to the works of Messrs. Quickfit and Quartz is planned for Wednesday, 15th June, 1966.

E. WHITE

North-Western Section

A meeting was held on 4th March, 1966 at which plans for future lectures and visits were made as follows:

22nd April.—Talk on Ultra High Vacuum by Mr. Woodward of Ferranti Ltd.

4th May.—Visit to James A. Jobling. Various methods of transport were discussed and it was left to members to make private arrangements with those willing to use cars.

13th October.—Visits to Messrs. Stuart and Sons, and Plowden and Thompson's at Stourbridge. Members may be accompanied by their wives.

Also it is hoped to arrange a visit to Chance-Pilkingtons at St. Asaph, which could be late in June.

The offer by Bangor University to arrange a Colloquium for the Society was discussed and caused some concern not having been channelled through the Section, and it was felt that there were more suitable places within the Section's territory. It was agreed to suspend discussion pending further information from the Society.

Following this meeting a talk and discussion took place on the construction, silvering and evacuation of Dewars.

This will be written up for inclusion in the Journal.

Thames Valley Section

The activities of this Section are presented in the form of a monthly news sheet (No. 1 of which appeared in November, 1965) which contains items of interest to members. It has been named "Imprimatur".

On 18th November, 1965, Stan Yorke gave a very interesting lecture on Electrical Heating of Glass.

The meeting on 20th January was cancelled owing to bad weather conditions.

On 16th February Mr. J. A. Frost of Reading gave a shortened version of his very popular talk "Strain in Glass". This was followed by the Section A.G.M.

On 17th March, Dr. P. Ellis of A.W.R.E., Aldermaston, gave a lecture on Ultra High Vacuum. His talk ranged from the definition of degrees of vacuum, pumps, traps, glass and metal bakable valves, gauges and devices for measuring partial pressures, to a description of a complete ultra high vacuum installation. The examination of, and reaction of gases with clean surfaces was given as one of the present productive fields of u.h.v. research. A very informative lecture given in an easy and informal style.

On Thursday, 28th April, the Section gathered at Reading University to hear a lecture on "Giant Pulsed Ruby Lasers." Our lecturer, Mr. A. D. Beach, is a U.K.A.E.A. physicist researching the measurement of the properties of thermonuclear plasmas. The measurement of temperatures of several million degrees required a new tool. Our lecturer has developed such a tool from the ruby laser—an ultra-powerful light source.

Starting with a classification of light sources and a description of solid state and gas lasers, Mr. Beach went on to describe the principle of the ruby laser ; how the light is normally emitted in a series of pulses and how he has added a Kerr cell to obtain one giant pulse, in a fact a "rod of light about 20 feet long" with a power of 10^8 watts.

This lecture, although of high scientific content, was put over in such a manner that we all left the theatre with a considerable increase in our understanding of that modern device—the laser.

Other important dates are :

21st and 22nd April.—Jencons of Hemel Hempstead will be hosts to the U.K.A.E.A. for the purpose of demonstrating ultrasonic glass machining using diamond impregnated bits.

14th September.—Thames Valley visit to Messrs. Q and Q arriving at 1 p.m. for lunch.

1967

The Valley will be hosts for the Society Annual Colloquium.

Suggestions are required on lectures, displays, food and entertainment, etc. The Colloquium committee is as follows : Stan Fussey (chairman), John Price (secretary), Cliff Edwards, Jim Darvall and Max Noad.

Imprimatur also contains a full list of names and addresses of members of the Section, and technical items called "Infosnips".

North-Eastern Section

Owing to timing mistakes in communications no reports have been published since November, 1965, so this report will bring up-to-date the activities of the North-Eastern Section.

In November, 1965 a special meeting was held at the Mitre Hotel, Knaresborough, to report on the Education Policy of the Society and to elect the two examiners, T. Place for Billingham and R. G. Eustance for Harrogate.

The Colloquium was discussed and it was agreed to accept the responsibility for 1966.

The next meeting was held in the Glass-blowing Laboratory at I.C.I. Fibres Ltd., Harrogate.

Mr. Fletcher and Mr. Glover of Heathway Machinery Co. discussed the design of various glassworking lathes. This meeting, which was under the chairmanship of Mr. E. G. Evans, was most enthusiastically received. The workshop was packed to capacity and afterwards refreshments were served by I.C.I. and the members were very enthusiastically examining the workshop facilities. Mr. Evans, who had motored up from Cambridge, thanked people for attending and expressed satisfaction at the number which was 35 people.

The first meeting of 1966 was the A.G.M. at the Black Bull in Leeds. Mr. Watson, N.E. treasurer, decided not to stand for re-election and Mr. Flannigan was proposed and elected Treasurer and Symposium Treasurer.

This meeting was preceded by a Colloquium committee meeting which decided upon the plans for the rest of the time up to 24th September, 1966.

A most enjoyable evening was spent by members of the N.E. Section when that very colourful and enthusiastic associate member, Mr. C. H. Williams, decided to honour us with his company.

After a rather hectic meal at the "Manor House," Knaresborough," and a frantic dash to Leeds University, Mr. Williams was propelled to the front of the lecture theatre, talked about the early history of glass, and presented a film from G.E.C. Afterwards he was subjected to a barrage of questions about Jencons, even then he had a surprise up his sleeve when he showed examples of work made on the Ultrasonic milling machine. He also invited members to attend a demonstration of the machine at Hemel Hempstead, and many members accepted. We would

like to thank Mr. Williams for making the evening such a success. Thirty people attended the meeting. Mr. Williams booked three stands for the trade exhibition at the Colloquium, one of these for Kerry's (Ultrasonic) Ltd., to demonstrate the milling machine.

On 24th April Mr. Jacobs of Autoflow Ltd., helped by his most energetic companion, gave a talk on "Cold Working of Glass". The evening was started with a dinner party at the Manor House, Knaresborough, and from there another frantic drive to Leeds University School of Ceramics.

In the lecture theatre Mr. Jacobs gave one of the finest lectures we had heard. It was full of information and trade tips and it gave to all of us knowledge that will be useful and help us to look after the expensive diamond tools in our care. We would like to thank Mr. Jacobs and to show how much the people who were present appreciated his talk, we invited him to visit us again. This was done with our tongue in our cheeks as we were ashamed to have an audience of only eight members. It was felt that people had missed a very fine lecture.

It has been decided that apart from attending Council meetings and Educational sub-committee meetings no more functions would be held until the 1966 Colloquium.

For the Society A.G.M. a party from the N.E. Section hired a car to take them to Birmingham but on the Saturday snow storms made the local roads impassable so that they were unable to set out. This was with much regret as the car was hired on the Friday evening ready for a very early start on the Saturday. Unfortunately these members were unable to send apologies for absence owing to the lateness of the decision not to attend.

Annual Colloquium 1966

The programme of talks, exhibits and other arrangements is now in an advanced state, and appears on page 26 of this Journal.

One thing becomes apparent and that is the work done by previous organisers. This helps as the people who have had dealings with the Society are all very eager to help and starting with Thermal Syndicate who were most eager to exhibit and also Quickfit and Quartz, and in fact most people who advertise in the Journal have asked for stand space. This will allow members to meet representatives of all the firms who are interested.

We would like Section secretaries to invite their student members to submit examples of their work for the W. D. Wood Trophy and we hope to obtain Press coverage to publicise the generous gifts to the Society.

R. G. EUSTANCE
North-Eastern Section

Midland Section

The following programme was submitted too late for the March issue and to date no reports have been received of those meeting which have taken place.

Section meetings

Wednesday, 9th February. A.G.M. and social evening to be held at the "Airman's Rest" Hotel, Ratby Lane, Kirby Muxloe, Leics. Meet at 6.45 p.m.

Friday, 4th March. Visit to Messrs. Stewarts Ltd. Glassworks & Glass Museum, Stourbridge, Worcs. Meeting for lunch at 12.30 p.m., "Hen and Chickens" Hotel, Birmingham Road, Oldbury; car park available. Then by coach to Stourbridge, returning to car park after visit. Wives are invited on this occasion.

June. A proposed visit to Messrs. Elliott, Emil Works, Treforest, Glamorgan, has unfortunately had to be postponed for this year, due to their present commitments. An alternative visit and venue will be arranged.

September. Visit to A.E.I. Ltd., Lamp and Lighting Company, Melton Road, Leicester; after lunch, visit to the A.E.I. Ltd. Central Research Laboratory at Rugby.

November. Visit to Messrs. Fisons Scientific Apparatus Ltd., Loughborough, Leics.

Western Section

No reports have been received and the following information has been extracted from "Revue".

The February meeting of the Section was devoted to discussion of the examination for the Society Certificate of Competence and the test pieces likely to be involved. Mr. R. Garrard, chairman of the Section and also a member of the Board of Examiners gave details as to how the scheme would operate and the examinations would be conducted. The appointment of examiners was freely discussed and views were expressed on what qualifications the Society examiners should possess. Members wishing to be considered as examiners were invited to submit their names. Subsequently Mr. R. Garrard

and Mr. N. Lowde were appointed Section examiners.

The March meeting was held in the lecture room at the physics department of the University of Bristol and by courtesy of Messrs. Jobling's three films were shown. Two in technicolour were of Corning origin, one of which depicted the Corning glass centre and the making of Steuben ware. A duplicate of the 200 ins. Mt. Palomar reflector was shown and also various glass manufacturing processes including the making of Vycor and photosensitive glass. The third film showed glass making and associated manufacturing processes, carried out at Messrs. Jobling's in Sunderland.

Our thanks are due to Mr. J. Prime for negotiating on behalf of the Section for the loan of the films.

At the April meeting Mr. J. H. Burrow gave a talk with demonstrations in the glass-shop of the Physics Department on small scale manufacture of stopcocks in research laboratory glass shops. The object was to demonstrate one of the items which appear in the certificate of competence for the benefit of those members who wish to qualify. He pointed out that there was a wide differerence between the methods of industry where operations were jigged and simplified to use semi-skilled labour, and our own glass shop methods. Most of the operations which formerly would have been carried out by hand in the bench blowpipe can now be transferred to the glass lathe assisted by a few simple gadgets. Although stopcocks are normally purchased from suppliers they can be efficiently produced on a small scale and they are a searching test of experience in speedy, reliable, and accurate working, but it was a fallacy to assume that high quality "specials" would be made without some experience on simpler types.

It is hoped at some stage to present this talk in a form suitable for publication.

J. H. BURROW

SECTION OFFICERS

North-Western Section

Chairman: L. Elson, Riddings Lodge, School Lane, Hartford, Northwich, Cheshire.

Secretary: J. W. Stockton, 34 Kildonan Road, Grappenhall, Warrington, Lancs.

Assistant Secretary: C. Blackurne, 40 Broomfield Crescent, Middleton, near Manchester.

Treasurer: J. Kaye, 150 Freshfield Avenue, Lever-end Lane, Bolton, Lancs.

Councillor: N. H. Collins, 8 Holden Terrace, Waterloo, Liverpool, 22.

Midlands Section

Chairman: J. A. R. Hill, 50 Charlmont Crescent, West Bromwich.

Secretary: R. S. Hanley, 107 Cloverdale, Stoke Prior, Worcs.

Treasurer (provisional): J. W. Cookson, 119 Frankley Beeches Road, Northfield, Birmingham 31.

Councillor: J. A. R. Hill, 50 Charlmont Crescent, West Bromwich.

Southern Section

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Secretary: E. D. White, 13 Perkins Road, Barkingside, Ilford, Essex.

Treasurer: L. Benge, 75 Birchen Grove, London, N.W.9.

Councillor: D. W. Smith, 62 Penine Avenue, Sundon Park, Luton, Beds.

Western Section

Chairman: R. E. Garrard, 1 Alexandra Gardens, Staple Hill, Bristol.

Secretary:

Treasurer: D. A. Jones, 7 Sunnyside, Frampton Cotterell, Glos.

Councillor: F. G. Porter, 29 Maidenhead Road, Hartcliffe, Bristol, 3.

Thames Valley Section

Chairman: J. A. Frost, 3 Grass Hill, Reading.

Secretary: M. Priem, N.I.R.D.C., Shinfield, Reading, Berks.

Treasurer: J. A. Frost/M. Priem.

Councillor: J. Price.

North-Eastern Section

Chairman: H. Butler, Physics Department, University of Leeds.

Secretary: R. G. Eustance.

Treasurer: A. Flanigan.

Councillor: H. Butler.

GLASSMAKING AT STOURBRIDGE

This report was originally submitted by Mr. Porter for inclusion in the Journal in June 1964, *and was referred to in Vol.* 1, *No.* 3 (*Section activities.*) *As sections still enjoy the hospitality of Messrs. Stuart & Sons, and Messrs. Plowden & Thompson, the value of this contribution remains unaltered.*

THE May (1964) meeting of the Western Section took the form of a visit to the glassworks of Messrs. Stuart & Sons at Stourbridge, and the Dial Glassworks, owned by Messrs. Plowden & Thompson.

We were met at Stuart's by two hostesses, and dividing into two parties, started our tour of the works. First we were given a short history of the craft.

For 6,000 years the craft has been practised, spreading from ancient Babylonia and Egypt, through Europe, to reach England in the reign of Queen Elizabeth I. The first family at Stourbridge to start glassmaking was that of Paul Tyzach and Jacob Henzie. The main reason for choosing Stourbridge was because suitable coal was available for the furnaces and the high grade clay was obtainable for making the pots. The first Stuart came to Stourbridge as a boy of eleven and joined as an apprentice learning all the skills and crafts of glassmaking, until eventually, through dedication to perfection of standard and through hard work, be became a director of the Stuart Glassworks. The high standard he set is being maintained by the present fifth generation of Stuarts.

Our tour started in the Silver Sand Stores. Here the special sand " mined " in Scotland is first sieved to obtain a medium grade sand, next it is washed, dried by hot air, and finally tumbled over a magnetic table to remove all iron. The sand is then weighed accurately and emptied into a mixer where red lead is added, then potash and saltpetre. After this the " secret " ingredients of the Stuarts are added and the batch is mixed for 30 minutes. The batch is added to that in the pots in the furnace, and melted for approximately 30 hours.

Next we went " upstairs " to watch the teams of glassworkers. A team consists of three men, the footmaker, servitor and workman or " gaffer." The footman gathers a small quantity of " metal " on the pipe and proceeds to marver it on a smooth metal slab, swinging and blowing to get the first shape. The servitor takes over, adds glass and forms the stem and foot. On cooling, he cracks off the glass from the iron and clamps it by the foot in a special clamp, and hands it to the workman. This clamp is quite simple, a spring loaded platform pressing against a split ring. The workman reheats the glass and with simple pearwood shapers, he fashions the bowl. Each glass is identical. The finished article is placed on a moving belt and goes through the lehr where annealing takes place. After spending a most entertaining time here, we were left wondering how such repetitive accuracy and uniformity could be achieved without the aid of moulds or measuring devices. On being told that we were scientific glassblowers, these boys certainly rose to the occasion and, with huge grins on their faces, " played to the gallery " like seasoned troupers.

We next moved on to the marking out section where the guide lines were painted on, using a type of dividing head. Here girls skilfully applied the marking ink, working to a sample pattern.

We then visited the grinding and cutting department, where the glasses are finally ground by the " rougher," who cuts the rough deep facets of the pattern with his wheel. The wheels themselves are of mixed shapes and sizes, some with flat edges, bevelled edges, dished edge wheels, some wheels diamond, some aloxite ; fast wheels, slow wheels, a really amazing series of machines. The operators could cut the facets with unerring accuracy. Once the glasses were roughed they went on into the hands of the smoothers, who went over *every cut* made and gave the surface a smooth matt finish.

Next time you see a crystal wineglass count the number of cuts, and double it, and imagine the work that has gone into making the design. All the grinding was done free hand, truly a remarkable feat. Some of the members, including myself, tried our hand at this but apart from ground finger nails we failed dismally !

The next process was carried out in the engraving rooms where the intaglio work is done, all the fine engraving such as leaf and flower patterns being worked freehand using copper and stone wheels. Some examples of vine leaf and fern were absolutely fantastic. Here indeed was beauty in the making ! Lettering and family crests were executed with amazing dexterity by men who had a lifetime of skill and care in their fingers.

The final stage in the manufacture of crystal glassware is the acid treatment room. Here the

articles are placed in a mixture of sulphuric acid and hydrofluoric acid to give a brilliant surface to the ground facets and to impart the lustre which is associated with lead crystal ware. Our hostess took us to the retail shop, where we were invited to purchase their products. Some beautiful examples of work, "seconds" by their high standards, were offered half price. Most members seized the opportunity to take home a souvenir.

After thanking our hostesses, we boarded our coach and moved off to Messrs. Plowden & Thompson at Dial Glassworks, where we were met by Mr. Threlfall and his son. Mr. Threlfall, to whom we are indebted for arranging the visit to Stuart Glassworks (we were told at Stuarts that the waiting list is now two or three years for visiting parties), gave us an outline of the type of glass made by his company. Tube and rod of soft lead—soda—borosilicate from ½ mm. M.P. tubes in soda to 4 in. cylinders in Kodial.

Here we saw men hand drawing 1 in. soda tube, a truly fascinating operation. The footmakers gathers a gob of glass and marvers it, and then reheats and gathers more glass until a gob of about 20 lb. is built up. After forming by blowing into a cylindrical shape, the next operator attaches a "punty" and so the first pull is made, slowly at first, until by virtue of the experienced eye of the "gaffer" the exact viscosity is reached. Without further ado the operator runs backwards down a long cave, blowing all the while until a 60-foot length is made. During this operation a third operator is cooling and measuring the tube as it comes from the main gob. A truly wonderful sight. A tube is placed in the "ladder" and then cut in the requisite lengths using a wet iron.

We were shown some 4 in. cylinders of Kodial which Mr. Threlfall told us, with some pride, were for making special valves for use in experiments in the "Year of the Quiet Sun." The cylinders were for Kovar seals, and were required to be tapered in wall thickness and to have 6 in. of good glass in the length.

A visit to the tube stores next, where we saw a collosal stock of tubes of many types and colours. Shellback, neon tube, coloured rod and of course the special tungsten sealing glasses for which they are famous.

We were invited to take free samples of coloured rod, and of course members were not slow to "load up." Mr. Threlfall went on to tell us that Bluesil was now available in tube form and that "Uranium" glass, hitherto obtainable only from America, was now made by him and was available from stock in limited size and quantity. Some members asked for data sheets, and these were made available before we left. One member was fortunate enough to get a copy of that excellent monograph by Mr. Threlfall, given to the Chemical Society. By now we realised that our own scientific world owed a lot to people like Mr. Threlfall, who told us that he would try his best to make any type of glass wanted for the scientific glassblower. He said he hoped to hear from us in the future, and we took our leave feeling we had found a real ally in the glassmaking fraternity.

We returned to Bristol via the Malvern Hills, taking a pleasant, though bewildering route, and as the weather was glorious, we stopped for refreshment at Upton-on-Severn, where we once again recalled the events of the day and the marvels we had seen.

F. PORTER

Bristol University

Safety hint. A member has suggested a method of reducing the hazard occasioned by pushing glass tubes through bored rubber bungs.

First the bung is bored to the correct size to receive the tube and a larger size cork borer is selected through which the tube will slide. If well wetted with water it is possible to introduce this borer into the hole and enlarge it so that the glass can be inserted into position. The borer is then withdrawn leaving the glass tube in position and during the process at no time is the glass subjected to stress.

CITY & GUILDS OF LONDON INSTITUTE

Mr. G. C. Ward, Training Development Officer of the Glass Manufacturers' Federation, 19 Portland Place, W.1, has forwarded details of a City and Guilds course "Glass Manufacturing and Processing—Part I". The syllabus is itemised as follows:—(1) Definition of nature of glass; (2) Raw materials; (3) Types of glasses and their properties; (4) Melting; (5) Fuels; (6) Manufacturing methods; (7) Annealing; (8) Processing which includes laboratory glassworking.

It is visualised that the course will be attended by a wide cross section of employees and technicians from laboratories and firms associated with glass.

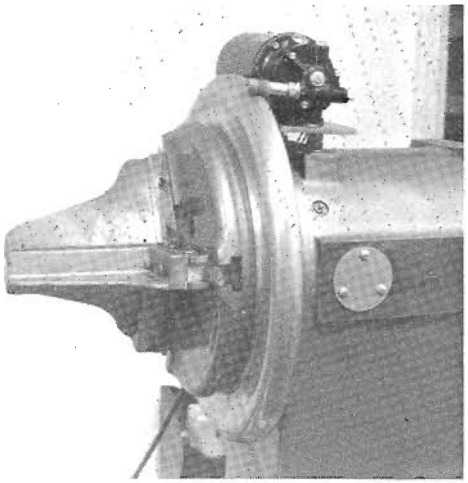
ISLEWORTH POLYTECHNIC GLASS TECHNICIAN'S CERTIFICATE

Syllabus for a day release and evening course of 570 hours has been received from E. White.

WORKSHOP NOTES

Slow-running Attachment for Lathe

Sometimes there is a need for running the tailstock of a lathe slower than the lowest standard speed supplied by the makers, and our method for making tubular Pyrex-silica seals from rod required about 1 r.p.m. To obtain low speeds, a fractional horse power DC motor is mounted on the tailstock and through a gear box reduction rotates a rubber covered shaft which is engaged on the rim of the scroll or planetary tailstock chuck.



With the main drive disengaged and a rheostat to control motor speed, the chuck can be driven at any speed up to 10 r.p.m. above which the slow drive can be removed and the main drive re-engaged.

G. STEVENS

Modification of a Cutting Machine for Glass Grinding

A glass workshop always needs to be able to grind small sections of glass such as angle drips, ends of points, tubes, rods and generally for removing surplus glass.

In our laboratory, to cope with these requirements an "Auto Flow" cutting machine has been cheaply and easily modified in a way which could be applied to other similar machines in glass shops where a separate machine for this purpose is not available. The principle is to substitute a diamond cup wheel in place of one of the two lock nuts which secure the saw blade support discs. A 3 inch diameter cup wheel with $\frac{1}{8}$ inch flat face was chosen from the list of Diagrit Electrometallics Ltd. The centre hole was tapped with the same thread as the machine spindle and the cup wheel screwed on in place of the first lock nut. A second lock nut fitting into the well of the wheel was used to secure it in position and the modification completed by directing one of the coolant jets on to the face of the wheel and adding an extra guard to prevent splashing of the coolant.

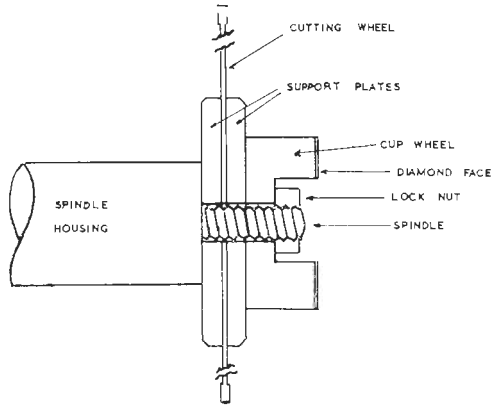


FIG 1

The major consideration is to mount the cup wheel accurately so that it runs true with no face wobble. This addition does not reduce the cutting wheel capacity as in any case the support plates on either side of the wheel restrict the depth of cut.

Note: Unless the machine is fitted with "end thrust" type bearings it is not advisable to use heavy pressure on the face of the cup wheel.

J. STOCKTON

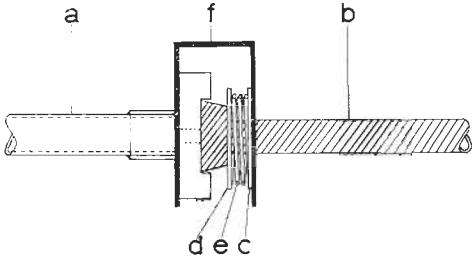
Joseph Crossfield and Sons Ltd.
Warrington

Simple Flange Holder

WITH preparative gas chromatography becoming more popular the demand for various shapes of collecting bottles is increasing and one pattern has a short flanged neck with a spring attachment. To enable this to be sealed on, a simple and efficient holder for the flange is needed

which keeps the spring in compression away from the sealing point. This can be used either by hand or in a small lathe.

The handle consists of a length of brass tubing 6 inches by $\frac{3}{8}$ inches o.d. which is soldered to a small flange drilled for blowing. The face of the flange has a circular recess to take the glass flange of the bottle neck. The spring is held in position by two washers, one split and one whole, and by means of the spring clip the flange, spring and washers are clamped to the holder. As the presence of the spring does not allow oven annealing some flame annealing must be carried out before removing the clip, handle and split washer.



(a) Brass tube handle
(b) Bottle neck 8mm diameter
(c) Split washer
(d) Whole washer
(e) Spring
(f) Clip

R. C. PERKINS
Long Ashton Research Laboratory

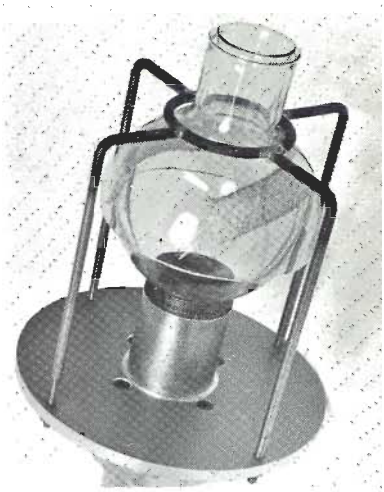
Spherical Dewars

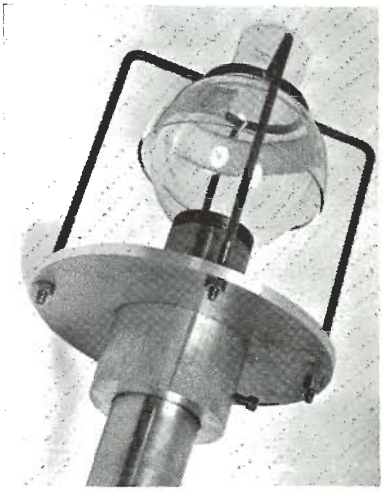
In making spherical dewars it has been our custom to split the outer flask and use a jig to hold the neck half and inner flask in position while the neck seal is made, afterwards re-joining the two outer halves. The spacing of inner and outer is controlled by a piece of asbestos rope or sleeving, this being withdrawn before the two halves are joined together.

Our previous jig, although the same in principle as the present one, involved using various packing pieces and the object of the present modification is to cut down the number of parts involved in assembling and detaching the completed unit.

A ring through which the neck passes is attached to a base plate by four bent legs of $\frac{1}{4}$-inch iron rod threaded at the end to take fixing nuts. If this is large enough most of the glass units can be inserted in position without dismantling from the plate. On the base plate a boss carries a sliding tube which serves the double purpose of pressing the inner flask, asbestos and outer half against the ring, and also allows the assembly to be gripped by the lathe chuck.

The clamping is just enough to hold the glass and still allow enough movement to centre the





necks before sealing. This operation is carried out without blowing, using a small ring burner supplemented by a hand torch directed to heat just inside the inner neck. The success of this unblown seal relies on intense local heat and sometimes an oxy hydrogen flame can be used to advantage.

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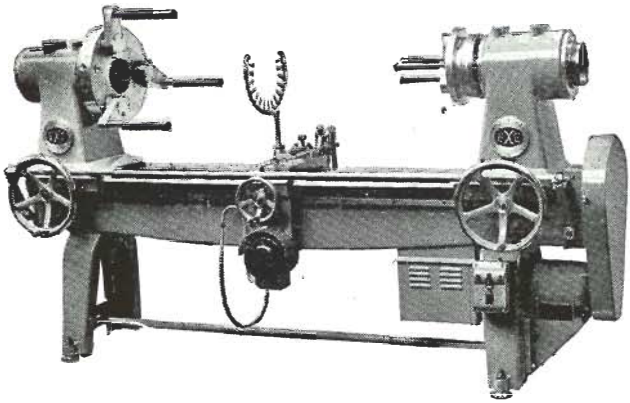

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