

Government of Madras

HOME DEPARTMENT (EDUCATION).

G.O. No. 635, 14th May 1917

Glass experiments

Recording letter from the Officer in charge of the Department of Industries forwarding a copy of the resolutions of the committee appointed by Government to advise regarding the continuance of the —


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ORIGINAL

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READ—the following papers :—

I

G.O. No. 322, Home (Education), dated 8th March 1917.

The Department of Industries has been conducting experiments in the manufacture of soda-water bottles for some time past, but the results so far achieved are not encouraging. His Excellency the Governor in Council has accordingly resolved to appoint a committee to examine the existing position and to advise him whether the experiments in the manufacture of soda-water bottles should be continued and, if not, whether experiments should be made with other forms of glassware. The committee will consist of the undermentioned gentlemen :—

- (1) Mr. C. A. Innes, I.C.S., Officer in charge of the Department of Industries (Chairman).
- (2) Mr. W. A. Beardsell.
- (3) Sir Frederick Nicholson, K.C.I.E.
- (4) Sir Clement Simpson, Kt.
- (5) The Hon'ble Sir Francis Spring, K.C.I.E.
- (6) The Hon'ble Mr. M. E. Couchman, I.C.S.
- (7) The Hon'ble Rao Bahadur K. Suryanarayana-murti Nayudu Garu.
- (8) Dr. J. L. Simonsen, D.Sc.

2. The Officer in charge of the Department of Industries is requested to arrange for the meeting of the committee and forward to the Government a copy of its proceedings with his own remarks thereon at an early date.

(True Extract)

E. A. HARVEY,
Acting Secretary to Government.

To the Officer in charge of the Department of Industries.
 „ W. A. Beardsell, Esq.
 „ Sir Frederick Nicholson, K.C.I.E.
 „ Sir Clement Simpson, Kt.
 „ the Hon'ble Sir Francis Spring, K.C.I.E.
 „ the Hon'ble Mr. M. E. Couchman, I.C.S.
 „ the Hon'ble Rao Bahadur K. Suryanarayana-murti Nayudu Garu, Ootacanda.
 „ Dr. J. L. Simonsen, D.Sc.

II

Letter—from C. A. INNES, Esq., I.C.S., Director of Industries.
To—the Secretary to Government, Home (Education) Department.
Dated—Madras, the 9th April 1917.
No.—G. Cur. 52.

I have the honour to submit for the information of Government a copy of the resolutions passed by the committee appointed by G.O. No. 322, dated the 8th March 1917, to advise Government regarding the experiments in the manufacture of soda-water bottles carried on by the Department of Industries.

2. It will be seen that the committee approved my action in closing down the factory in January last and that it is not in favour of further experiments being made in the manufacture of soda-water bottles. As regards the first part of this resolution there is little for me to add to what I have already written in my report No. G. Cur. 52, dated the 20th January 1917. The conditions under which the experiments were conducted obviously were not conducive to success. The manufacture of glass is an extremely difficult technical process, nor is it easy to design a furnace capable of giving the high and regular temperature necessary for good clear glass. In neither matter had the department the advantage of expert assistance or advice, and the committee was clearly of opinion that the experiments, while with oil fuel at Rs. 70 a ton they were very expensive, were not likely to yield data of any value, much less to lead to the successful establishment of an industry. In the circumstances it considered that the experiments were rightly discontinued.

3. In deciding whether further experiments should be made with soda-water bottles the committee was influenced by a number of considerations. These considerations may conveniently be grouped under the heads (1) fuel, (2) materials, (3) labour, (4) market, and (5) general, and I will deal briefly with each head in turn.

4. *Fuel*.—In his Administration Report for 1914-15 Mr. Tressler stated that glass was what might be termed a fuel industry, in that the determining factor was the cost of fuel. The committee agreed generally with this remark, and Sir F. A. Nicholson mentioned actual cases within his experience where glass factories in England had been closed down and removed when the coal mines near which they had been established were abandoned. In Madras fuel of whatever kind is dear. Wood fuel need not be considered since the Madras Glass Company, in spite of being permitted to cut fuel free of charge in Government fuel plantations, found it cheaper to use coal. The present prices of coal are abnormal, and in order to get a fair criterion it is necessary to go back to some period before the war. The year 1912 may be selected, for in that year Messrs. Beardsell & Co., then Managing Agents of the Madras Glass Company, prepared an estimate for an extension of the glass factory. The estimate of cost was based on actual prices recorded in the books of the Madras Glass Company, and the price of coal was taken at Rs. 13 per ton. In the same year, according to figures published in the *Report of the Production and Consumption of Coal in India*, the average pit-head value of coal was in India Rs. 3-6-0 per ton and in the United Kingdom Rs. 6-13-0 per ton. Moreover the calorific value of coal in the United Kingdom is considerably higher than that of Bengal coal. It is obvious therefore that the Madras manufacturer starts with a considerable handicap against the English manufacturer, and that he would have little chance of success against a competitor in Bengal. The use of liquid fuel is not a solution of the difficulty. According to the Bulletin on Glass Furnaces, the calorific value of liquid fuel is rather more than double that of Bengal coal. On the other hand its normal price (Rs. 40 per ton) is nearly three times the normal price of coal in Madras (Rs. 13-15 per ton), and it is open to question whether the Department of Industries was well advised in substituting oil for coal in the glass factory.

5. *Materials*.—Glass mixtures vary according to the quality of the glass, but for soda-water bottle glass, the component parts may be said to be sand, lime, alkalis (sodium carbonate or sodium sulphate) and chemicals such as manganese dioxide. As regards sand and lime Madras is well placed. Sea-shell lime is available at moderate prices. The white sand of Ennore, the iron content of which (125 per cent) is exceptionally small, is probably as good sand as can be got in India, and even the beach sand just outside the factory gates which contains only 45 per cent of iron could probably be used for the manufacture of cheap forms of glass. But the alkalis are the expensive item in a glass mixture, as will be seen from the figures given below. The percentage of glass yielded by any given mixture varies, taking as a guide the various recipes given in Thorpe's Dictionary of Applied Chemistry, from 75 to 91 according to the composition of the mixture. Mr. Beardsell has kindly furnished details of the mixture used by the Madras Glass Company, and since the object in view is merely to ascertain the relative cost of the different ingredients, it may be taken for purposes of calculation that 3,000 lb. of mixture are required for one ton of glass. In the calculation below it is assumed that ordinary

beach sand would be used but that it would require washing and sieving. If Ennore sand were used, the cost of the sand would be four times as much as that given in the estimate. The price of sodium carbonate is taken from the estimate prepared by Messrs. Beardsell & Co. in 1912.

Estimate of the cost of the mixture required for 1 ton of glass.

Ingredients.	Quantity.	Rate per ton.		Cost.
		Lb.	Rs. A.	Rs. A.
Sand	1,800	2	8	1 12
Lime	500	17	8	3 14
Sodium carbonate	650	80	0	17 4
Sodium sulphate	40	60	0	1 1
Chemicals	...	...	...	2 1
Total	...	...	...	26 0

6. According to these figures it may be taken that given normal conditions and assuming that beach sand could be used for making soda-water bottles, the cost of the mixture required for a ton of glass would be approximately Rs. 26. If Ennore sand were used, the cost would rise to Rs. 32. The committee however does not lay stress on the actual figure of cost arrived at. The point it wishes to emphasize is the high cost of the alkalis in proportion to the total cost of the mixture. Madras is probably no worse off in this respect than any other part of India, but as against the United Kingdom it is in a disadvantageous position. Sodium carbonate and sodium sulphate are manufactured in England, and are cheaper than in Madras, at any rate by the cost of freight, landing and shipping charges and customs duty. And further there is the authority of Mr. Elland, the glass expert of the United Provinces, for the statement that in the United Kingdom glass manufacturers effect a saving whenever possible by getting their alkali in the form of refuse from the soap factories.

7. In this connection it may be mentioned parenthetically that the attention of the committee was drawn to the enquiries now being made by the Industries Department in the United Provinces into the possibility of utilizing 'Reh' or 'Sajji Mitti' for the manufacture of alkalis in India. Alkaline earths are not uncommon in the Madras Presidency, and the committee thought it advisable to record a resolution to the effect that these earths should be systematically examined and analysed. Dr. Simonsen has kindly offered to make the analyses, and it will be my business to ascertain the localities of the earths and to obtain specimens for analysis. Much work however has probably been done on these earths already by the Agricultural Chemist, and it will be necessary first to ascertain what information is already on record.

8. *Labour*.—Labour is notoriously one of the difficulties in a glass factory and from Mr. Oertel's notes on the Glass Industry in Europe, it appears not only that it takes two years to train a skilled glass worker, but also that the workers when trained are a very restless class and constantly move from one factory to another. Mr. Narayanamurthi's report makes it clear that the former difficulty has already been experienced in India, and it is a point to notice that loss must be expected in any new glass factory during the period in which the workers are being trained. Another point brought out by Mr. Beardsell is that if a continuous tank furnace were installed, and if work were carried on day and night, it would probably be essential to house at least the night workers on the premises. As regards the comparative efficiency of Indian and English labour, certain facts were placed before the committee which deserve to be placed on record. Messrs. Forster & Sons of St. Helens informed Mr. Beardsell in a letter dated the 12th October 1912 that at their factory at St. Helens six machines turned out 240 gross of soda-water bottles per week. Assuming a twelve hour day and six days a week, these figures indicate an output of eighty bottles an hour, and Messrs. Forster & Sons estimated that with Indian labour and in the Indian climate two-thirds of this output would be attained or about fifty bottles an hour. But the maximum output attained by the Madras

Glass Company working eight hours was only 26,000 bottles in a month or not much more than 20 bottles an hour. It is legitimate to assume however that these figures would have been improved upon with further practice. In the first place, though only 26,000 bottles were turned out in the month, 44,000 were put into the annealing lehr, the large percentage of breakages being due according to the St. Helens expert not to want of skill on the part of the workmen, but to the fact that the arch over the furnace had been partially rebuilt of unsuitable bricks obtained from Calcutta. These bricks disintegrated and fragments of them dropped into the melt with the result that when bottles with fragments of brick in them were put into the annealing lehr, the contraction of the glass was different from that of the brick and the bottles burst or cracked. Further these results were attained in the month of September 1911 only three months after Forsters' patent compressed air bottle-making machine had been installed in the factory, and with longer training the workmen might have done better.

9. In the letter to which I have already referred Messrs. Forster & Sons informed Mr. Beardsell that in their factory at St. Helens metal and melting cost them on an average Rs. 2-4-0 per gross of bottles. Fortunately materials exist for comparing the cost of the same items in the factory of the Madras Glass Company. As has already been mentioned, Messrs. Beardsell & Co. prepared in 1912 an estimate for a large glass factory in Madras equipped with a continuous tank furnace and with sixteen machines. The estimate was based on the output obtained in September 1911 with six machines and an eight hour day, viz., 26,000 bottles, and it was estimated that with sixteen machines working continuously an output of 203,000 bottles a month or in round figures two million a year would be reached. The estimate of consumption and cost of materials was taken from actuals as recorded in the company's books. There is an omission in the estimate in that no mention is made of lime, and I have supplied it, taking the quantity of lime on the basis of its proportion in the company's mixture and its price at Rs. 17-8-0 per ton. From the figures in this estimate, which are as near actuals as it is possible to get, the following may be taken to be approximately the cost to the Madras Glass Company of the materials and fuel used for the manufacture of a gross of soda-water bottles:—

	ES.	A.	P.
Coal	...	...	2 8 0
Liquid fuel (for neck making)	...	...	0 12 0
Alkali	...	...	1 6 0
Lime	...	...	0 2 6
Sand	...	...	0 8 0
Total	5	4	6

It will be seen that on these figures the cost of materials and melting is considerably more than double that in the United Kingdom. Nevertheless, as against the home manufactures, the figures are not unflattering. For, in the first place, with an increase in output, which might legitimately be expected as the workmen become better trained, the cost at any rate of fuel would decrease. Secondly, according to figures supplied by Mr. J. O. Robinson, before the war the cost of freight, landing and shipping charges, insurance and other similar charges on English soda-water bottles delivered in Madras was as much as Rs. 5-9-0 per gross. There is no means of comparing the relative cost in England and in India of labour supervision, interest charges, marbles, rubber rings and the like. The Madras Glass Company, it may be noted however, obtained fire bricks for their furnace from England. Glass furnaces require constant reconstruction, and fire bricks, if it were necessary to obtain them for each reconstruction from the United Kingdom, would be a heavy item of expense.

10. *Markets.*—The mention of the cost of conveying English bottles to Madras leads naturally to the question of markets. Messrs. Forster & Sons advised the Madras Glass Company that economy in fuel could not be secured unless an output of 200,000 bottles a month or allowing ten months work a year, two million bottles a year was attained. As explained in my letter of the 20th January last, soda-water

bottles are not shown separately in the Sea Customs returns prior to the year 1912-13, and the imports, since the war began, are quite abnormal. The imports therefore of only two normal years, 1912-13 and 1913-14, are available, and in these two years an average of 6,559 gross were imported into the Presidency. The figures are not much to go upon but they are the only figures available, and it may be inferred that under normal conditions the Madras Presidency could not absorb more than one million soda-water bottles per annum. Thus even if a local factory could capture the whole of the trade, a very doubtful assumption, it would have to find an outside market for at least half of its production. The railway freight on soda-water bottles is impossibly heavy, but it might be possible to find a market in Calcutta. But an outside market would involve expenditure in crates, and unless it were possible to send the bottles in coal steamers returning empty to Calcutta, freight and other incidental charges would be heavy. At any rate it seems clear that, having regard to the greater cost of production in Madras and to the cost of conveyance to Calcutta, the greater part of the margin of Rs. 5-9-0 per gross referred to above would disappear in respect of soda-water bottles placed on the market in Calcutta. And such soda-water bottles would constitute at least half and probably three-fifths of the factory's output.

11. *General considerations.*—In the above paragraphs the prospects of a factory making only soda-water bottles in Madras have been subjected to as detailed an examination as possible in the light of the information available under the heads of fuel, raw materials, labour and markets. It is obvious that the case for the factory is not strong, and other considerations also pointed to the same conclusion. The Committee was impressed by the fact that in 1912, Messrs. Beardsell & Co. and the Madras Glass Company examined the prospects of a Madras factory in the light of the expert advice at their disposal and the experience already gained. An estimate of receipts and expenditure was drawn up but it is unnecessary to give the details here. The important point to notice is that neither the firm nor the company thought it worthwhile to continue the enterprise, and this in spite of the fact that the sum of money required for further operations was not large and could have easily been found by the firm (so Mr. Beardsell informs me) had the proposition seemed attractive. In the same year a well-known brandy firm in France made enquiries as to the prospects of a glass factory in India. Mr. Beardsell got into touch with a representative of this firm and suggested that the firm should take over the existing glass factory in Madras. But the firm replied that they contemplated a factory in Bengal and expressed the opinion that the company in Madras, if it continued work, would lose more and more money. There is no doubt that the firm had in mind the relative cost of coal in Bengal near the coal mines and in Madras, and the committee was clearly of opinion that, even if a glass factory could successfully be established in Madras, its success would inevitably lead to imitation in Bengal, and that a Madras factory could not succeed in competition with one in Bengal. In the circumstances the Committee did not feel justified in advising that further attempts should be made to resuscitate the soda-water bottle industry in Madras.

12. As regards other forms of glassware the Sea Customs returns show that in order of importance the chief forms of glassware imported into the Madras Presidency are:—

	Average value in the 3 years before the war. Rs.
Glass bangles	7,80,000
Beads and false pearls	3,09,000
Sheet and plate glass	2,33,000
Lampware, including chimneys, etc.	2,27,000
Bottles and phials	1,15,000
Tableware and other forms of glassware	1,75,000

13. *Glass bangles.*—It will be seen that from the commercial point of view glass bangles are considerably the most important form of glassware imported into the Presidency, and for this reason, as well as on account of the fact that hereditary bangle makers still survive in different parts of the Presidency, the committee

devoted special attention to the question whether anything could be done to resuscitate what was once a flourishing industry. A note on the subject which was submitted by me to the Committee is appended to this letter. The fact of the decline of the industry in the Madras Presidency, though it cannot be exhibited by any reliable figures, is undisputed, and there is little doubt that, among the causes contributing to this decline, two of the most important were the importation of an article of much higher quality from Austria and the increasing difficulty of obtaining cheap fuel. The Committee offers no opinion whether these causes are remediable, but it considers that the question should be examined by the Department of Industries, and that a survey of the indigenous bangle industry should be carried out on the lines suggested in paragraph 8 of the note. With the information collected in this survey before it, the department, it is thought, will be in a position to decide whether Government can do anything to revive the industry, and if so, what line of action should be taken.

14. As regards the remaining forms of glassware the general sense of the Committee was that, owing to the absence of cheap fuel, Madras could not be considered a suitable centre for glass making industry. At the same time it was felt that sufficient information was not before the committee to justify it in expressing the same definite opinion as it expressed as regards the soda-water bottle industry, and the Committee decided merely to enter a caveat against any experiments with any form of glassware being undertaken without a careful preliminary enquiry into the commercial prospects of the industry contemplated. It considers also that experiments in glassware should not be undertaken without expert advice. It may be noted, in this connection, that there is in Madras at present an Indian who claims to have studied in Japan the art of making Japanese silky bangles, and it is probable that he has sufficient general knowledge of the process of glass making to enable him to advise as regards the manufacture of such elementary forms of glassware as bottles for ink and gum and small containers for fish paste.

15. All members of the Committee have agreed to this report.

ENCLOSURES

(1)

Resolutions.

1. On the evidence before it the Committee considers that the experiments in the manufacture of soda-water bottles at the glass factory were rightly discontinued, and it is not in favour of their being begun again.

2. As regards the question whether the Department of Industries should experiment with other forms of glassware, the Committee desires to place on record its opinion that experiments of this kind should not be undertaken unless, after a careful survey of economic and commercial conditions, the department is satisfied that the experiments are likely to lead to the successful establishment of an industry in the Madras Presidency. It deprecates also the inaction of any experiments in glass making except under expert guidance and, in view of the difficulty of obtaining experts at the present time, it is unable to recommend that any experiments should be undertaken at present.

3. The Committee however recommends that a survey should be made by the Department of Industries of the alkaline earths in the Presidency and that samples of these earths should be analysed with the object of determining whether commercial alkali can be obtained from them.

4. The Committee also suggests that a preliminary survey should be made of the indigenous bangle industry in the Madras Presidency and that, in the light of the information obtained by this survey, it should be considered whether the department could do anything to assist the industry either by supplying the bangle makers with block glass or by giving them technical instruction in bangle making. At the same time the Committee recognises that it is doubtful whether indigenous bangles will be able to survive the competition of Austria unless protected by heavy import duties.

(2)

A note on the Bangle Industry of the Madras Presidency.

There is very little information in my office regarding the indigenous glass bangle making industry of the Presidency. Mr. E. B. Havell, who was placed on special duty in 1885 to report upon the arts and industries of the Presidency, did not consider the bangle industry to be worthy of his attention, and practically the only information on record is that scattered about in the different gazetteers.

2. There is no doubt however that the industry was once a flourishing one and that it is now at a very low ebb. Owing to changes in classification it is not possible to exhibit the decline by statistics taken from the census reports, but the present insignificance of the industry is shown by the fact that in the report of 1911 makers of bangles are lumped together with makers of "rosaries, beads and other necklaces, spangles, lingams and sacred threads," and that even so only 9,821 persons in the whole Presidency returned themselves under this head. In 1894 there were, according to the gazetteer written by Sir Harold Stuart, 4,419 persons in the North Arcot district subsisting by the manufacture of bangles. According to the census of 1911 the number of such persons in the North Arcot and Chittoor districts together had sunk to 125. In 1880 Mr. Gamble found in the villages of the Penubanda taluk in the Anantapur district 95 kilns for bangle manufacture. Only 18 of them were working, it is true, but in 1911 there were only 77 bangle makers in the whole district. From the gazetteers however it appears that the industry still survives in a number of districts among which may be mentioned Nellore, North Arcot, Trichinopoly, Bellary, Vizagapatam, Ganjam and Chingleput.

3. The existence of the industry apparently is determined (1) by plentiful supplies of *psoudu* man or alkali earth and (2) by plentiful supplies of cheap fuel. Probably the latter is the crucial point, for it is recorded that alkaline earth is taken from Nellore to certain villages of Vizagapatam where bangles are made and that in Trichinopoly some of the bangle makers obtain their glass from Kalahasti. In the Anantapur gazetteer it is stated that the furnaces were kept glowing for days on end and that the consumption of fuel was very great. The kilns were worked until all the fuel in the neighbourhood was exhausted, and then the scene of operations was shifted. So long as the bangle makers were allowed to cut fuel without let or hindrance, the industry flourished. But when forest conservancy began, and restrictions were placed on the indiscriminate cutting of fuel, it declined. The process was accelerated by increasing imports of a much higher class article from Austria. Where the industry still exists, it exists merely because the bangles produced are so cheap as to be within reach of the very poorest classes. For instance blue glass bangles from Kalampathur in the North Arcot district sell in Madras at the wholesale rate of Rs. 12 per 150 pairs, or less than one anna per dozen pairs, and rather coarse bangles from the Madurantakam taluk of the Chingleput district sell at Rs. 1-12 per 1,000. Austrian bangles before the war varied in price from As. 3 per dozen pairs for 'amber bangles' to Rs. 1-6 per dozen pairs for 'Salma' bangles. Japanese 'silky' bangles fetch As. 8 per dozen pairs. Samples of Austrian, Japanese, and indigenous bangles are produced for the inspection of the Committee.

4. The following table exhibits statistics of imports of bangles by sea into the Presidency for the last six years:—

	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.
Total	Rs. 7,39,700	Rs. 7,84,456	Rs. 6,76,435	Rs. 8,79,602	Rs. 2,00,511	Rs. 22,583
From Austria	6,03,068	7,08,533	6,48,465	7,92,370	2,23,247	225
From Germany	1,32,577	17,905	29,959	84,057	27,369	2,216
From Japan	..	..	..	..	6	6,786

It will be seen that before the war Austria had practically a monopoly of the trade. Japanese bangles are quite common in the market, and Japan is now getting a footing in the trade.

5. The following description of the method of making bangles, which is taken from the Anantapur gazetteer, though it contains obvious mistakes, may be taken as true of the whole Presidency.—The bangles made are of glass and are only of the very cheapest and most ordinary kinds. Certain varieties of alkaline earth (*soudu*) are first collected and lixiviated with water. The alkalies in the resulting liquid are left to crystallise out by solar evaporation. Where the particular kind of *soudu* required is common, this process is sometimes carried out by others than the actual banglemakers, the crystals being exported for sale to these latter. The gylasts are next mixed with a kind of flint found locally and some old broken bangles, and the whole is fused in a furnace into a vitreous mass resembling impure glass. The furnace is kept crowing for several (sometimes as many as sixteen) days continuously, and the glass is coloured while being fused—sulphate of iron being used for red, copper for green, indigo for blue and so on. This glass is next taken from the crucibles, powdered, and remelted in smaller furnaces. The bangles are made by taking a small quantity of this melted glass on the point of an iron rod which is then twirled rapidly round until the glass assumes the form of a rough ring. This ring is transferred while still glowing to a heated conical clay mould held by a boy. The boy twirls the mould quickly round with one hand while with the other he shapes the ring into a bangle with an iron instrument resembling an ordinary awl. A man and boy can make from 2,000 to 3,000 bangles in this manner in a day. The wholesale price at the place of manufacture is about Rs. 2 a maund of 2,400 bangles but this increases rapidly in a direct ratio with the distance to which they are exported.

At Kalahasti the industry is slightly different in that only the glass is made. According to the gazetteer written in 1894 blue glass was sold at Rs. 20 per candy, green at Rs. 16, blue red at Rs. 14 and red at Rs. 16. The glass is exported to other markets even as far as Trichinopoly district.

6. By way of contrast I append an extract from Mr. F. O. Oertel's notes on the Glass Industry in Europe which gives an interesting account of the glass industry in Austria.

"Technical instruction in that country is extended to every imaginable trade and calling, such as tailoring, boot making, fur and leather work, hair dressing, book-binding, house-painting, glazing, wood and metal work, electric trades, etc., etc. Moreover, the technical schools are not confined to the large towns, but are located wherever an industry, of whatever kind it may be, is carried on; the aim being to encourage local industries and teach the workmen to excel each in his own trade. This system has been attended with surprising success; and local industries which had been almost crushed by the wholesale production in factories have revived, proving that cottage industries can often successfully compete with their larger rivals, while at the same time affording remunerative employment under much healthier conditions than can obtain in crowded factories."

"Prague.—The British Consul at Prague introduced me to the Handelskammer as well as the technical school known as the Gewerbe museum where courses are held each year lasting six or eight weeks for instruction in all the various trades. Evening classes are also provided for those who cannot attend during the day. The students are chiefly taught drawing and designing and the practical application to their trades. An industrial exhibition was being held at Prague at the time of my visit; and I found the pavilion for 'Schulwesen' of special interest. In this were exhibited specimens of work done at the various technical schools in Bohemia, including those of Prague; and I was greatly struck with the beauty of the exhibits and the facility of design on the part of the students in all branches. The Director of the technical school, who conducted me round, acknowledged that England had led the way in designing and that Ruskin and Walter Crane had first shown how to employ natural objects as models. But there can be no doubt that Austria has made the fullest use of these suggestions by taking care that not only art students but the workmen themselves shall know the true methods of design, and be able to evolve beautiful patterns from the study and combination of the parts of flowers, insects and birds. The Prague students have also the advantage of very excellent collections in the Gewerbe museum, including fine antique glass of Greek, Roman and Persian origin and mediæval glass of Spanish, Venetian and Bohemian make."

"Gablouz.—The chief district of the glass industry is in Northern Bohemia. From Prague I travelled by train to Reichenberg to deliver letters I had to the Chamber of Commerce there and drove thence through beautiful hilly country to Gablouz.

"Gablouz is the centre for manufacture of glass bangles, necklaces, hat-pins, fancy buttons and all kinds of imitation jewelry, artificial diamonds and coloured enamel work. A tremendous trade is done in these articles to all parts of the world; and the hotel at Reichenberg where I was staying was full of commercial travellers from all countries making their selections of the latest novelties in that line."

"I came to Gablouz with official instructions to Herr Ritter, the Secretary of the local Chamber of Commerce ('Gremium') who did his best to show me over some of the factories. But even under such favourable conditions I was able to see but little of the actual manufacture as this is jealously guarded against outside enquiry. There is a very large export from Gablouz to India, and they are careful to adopt designs in accordance with Indian native taste. Herr Ritter showed me specimens of Indian necklaces, bangles, anklets and armlets which he kept at his office to serve as patterns for the manufacturers' designs."

"At the Raffinerie of Herr W. Klačar, a large exporter of artificial diamonds and bijouterie, I saw large boxes of glass bangles being packed for export to India. Bead strings of all kinds are made here, including the heavy necklaces worn by horses and camels in India. Gablouz is also famed for its celluloid work. It is here that the imitation tortoise shell combs are made, set with artificial diamonds. I would have liked to see the process of manufacture, but was refused admittance to a factory, although I was in the company of Herr Ritter, who happened to be a personal friend of the owner."

"All this Gablouz glass and enamel bijouterie work is produced by home industry. The glass is made in one large factory belonging to Herr Ridal, who has gradually monopolized the supply for the whole district, crushing out of existence all smaller concerns. From his factory are obtained the blank vases which are afterwards engraved and painted in small shops; and from him are also obtained rods of coloured and variegated glass (such as 'rose-pattern') which are used for the manufacture of buttons and beads. The manufacture from these rods of the finished articles is done in the homes of the artisans. For buttons glass rods of suitable section are heated in front of small stoves and cut by the workman into short lengths, which are afterwards pressed into the proper shape by his wife and children. The buttons are afterwards finished and gilt by another workman."

"Haida.—I next went by train from Reichenberg to Haida, a town of about 3,000 inhabitants, where I visited the Kunst Gewerbliche Fachschule. This school is entirely devoted to the instruction of glass workers. There are nine teachers besides the Director or Principal, and about 300 pupils, of whom some forty-five are resident students going through a 3 years' course in chemistry, drawing, designing, engraving, modelling and painting of vases. The drawing course includes sketching from plants, living and dead animals and the human figure. Some girls are among the pupils. On leaving the school the pupils find employment as designers, engravers and painters on glassware. The instruction is given free and many pupils receive

stipends. The school is provided with three mufflers heated with wood in which the decorated vases are fired. A school furnace was to be added to the outfit for practical work in glass blowing. The Director intends putting up for the purpose a Siemens' regenerative gas furnace with four melting pots of fifty kilos capacity each. All the articles turned out by the masters and students are intended as patterns which can be either bought at cost price, photographed or borrowed and copied by the local manufacturers. The combined ingenuity of the students and masters is thus bent on continually producing new shapes and styles of decoration. There is a similar school at Steinschönau, a small town not many miles distant, in the same district of Bohemia."

7. Information about the bangle factories of Northern India is given in Mr. J. Narayana-murthi's report of which a copy has been already furnished to the members of the Committee. The centre of the industry is Ferozabad, where there are six factories engaged in making glass blocks for bangle making. The actual manufacture is a cottage industry as in Austria, and is carried on in Ferozabad and at Saharanpur. Samples of Ferozabad and Saharanpur bangles are produced, also samples of Ferozabad and German block glass. It will be seen that the Ferozabad glass compares very unfavourably with the German, and though in the present abnormal conditions the factories are doing well, the prospect of their being able to compete with the German glass after the war does not seem very hopeful unless means can be found to improve the quality of the glass.

8. It has been suggested that preliminary enquiries should be made with the object of deciding whether anything can be done to resuscitate the bangle industry. It has been suggested, for instance, that it is worth considering whether a survey of the industry should not be made with the object of collecting evidence on such points as the following:—(1) the exact localities of the old industry and the reasons for such position, usually the presence of certain fusible earths; (2) the local reasons for decay or stagnation of the industry, such as want or cost of fuel, restrictions or imposts on the digging of the earth, foreign imports and so on; (3) the character, composition and treatment of the raw material; (4) the character of the kilns and crucibles; (5) the temperature, fuel and time required; (6) the composition of the glass and its characteristics such as ductility, fusibility, softness, colour and so on; (7) the cost of the glass made; (8) the methods of working it into bangles; (9) the economic condition of the glass workers; and (10) finally whether there is need for financial, expert or other aid.

9. Such a survey could doubtless be carried out. In the gazetteers there already exists some information as to localities, methods of manufacture, colouring agents, causes of decline and so on, and I am now engaged collating and tabulating this information. It is pretty certain however that the result of the enquiry will be to confirm three points which are already fairly well known, viz., that the cause of the stagnation of the bangle industry in the Presidency is mainly due—

- (1) to want of technical skill on the part of the bangle makers,
- (2) to the fact that the alkali earth locally available has never yet given results adequate for the manufacture of high class glass, and
- (3) to the increasing scarcity and dearth of wood fuel.

The only method of dealing with points (1) and (2) would be to open a demonstration and experimental factory at Madras or elsewhere under expert supervision, partly for the purpose of making block glass of good quality for the bangle makers and partly for the purpose of training bangle makers. It is an open question of course whether we could make the glass cheap enough. The third point is more difficult, and it is difficult to see how the fuel difficulty in the districts could be overcome except by planting and maintaining fuel reserves.

Order—No. 635, Home (Education), dated 14th May 1917.

Recorded.

2. The officer in charge of the Department of Industries is requested to convey the thanks of the Government to the members of the Committee for their advice and assistance.

(True Extract)

R. RAMACHANDRA RAO,
Secretary to Government.

To the officer in charge of the Department of Industries.
Editors' Table.

NOTES CONNECTED WITH G.O. No. 635, HOME (EDUCATION),
DATED THE 14TH MAY 1917

[SUBJECT.—Resolutions passed by the Glass Committee.]

From the Officer in charge of the Department of Industries, G. Cur. No. 52,
dated the 9th April 1917.

HOME (EDUCATION) DEPARTMENT.

Mr. Innes submits the recommendations of the Glass Committee appointed in G.O. No. 322, Home (Education), dated the 8th March 1917.

2. *Manufacture of soda water bottles.*—The Committee considers that the experiments in the manufacture of soda water bottles were rightly discontinued and it is not in favour of their being begun again. The grounds of the decision are fully explained in paragraphs 3-11 of Mr. Innes' letter. The Government may accept the Committee's recommendation.

P. R.[AJAGOPALA ACHARIYAR]—3-5-17.

3. *Manufacture of other forms of glassware.*—The Committee is of the opinion that experiments in the manufacture of other forms of glassware should not be undertaken unless, after a careful scrutiny of economic and commercial conditions, the department is satisfied that the experiments are likely to lead to the successful establishment of an industry in the Madras Presidency. The Committee deprecates the inception of experiments except under expert guidance and, in view of the difficulty of obtaining experts at the present time, it is unable to recommend that any experiments should be undertaken at present.

Correct advice.

P. R.[AJAGOPALA ACHARIYAR]—3-5-17.

Mr. Innes states that the general sense of the Committee was that owing to the absence of cheap fuel Madras could not be considered a suitable centre for glass-making industry. Also the only expert now available is an Indian who claims to have studied in Japan the art of making Japanese silky bangles and Mr. Innes merely states that it is probable that he has sufficient knowledge of the process of glass-making to enable him to advise as regards the manufacture of such elementary forms of glassware as bottles for ink and gum and small containers for fish paste.

It is recognized that glass is mainly a fuel industry and fuel in Madras is dear. It is therefore for consideration whether Mr. Innes should be asked to conduct a preliminary enquiry into the commercial prospects of the manufacture of cheap glassware, e.g., window glass, sheet glass, lampware, etc. If the results of the enquiry are encouraging, the question of engaging the services of the Indian expert may subsequently be considered.

Hardly necessary.

P. R.[AJAGOPALA ACHARIYAR]—3-5-17.

4. *Encouragement of the indigenous bangle industry.*—The Committee suggests that a preliminary survey should be made of the indigenous bangle industry in the Madras Presidency and that, in the light of the information obtained by this survey, it should be considered whether the department could do anything to assist the industry either

by supplying the bangle-makers with block glass or by giving them technical instruction in bangle-making. At the same time the Committee recognizes that it is

I agree.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

contained in paragraphs 8 and 9 of his note appended to his letter. Two of the important causes that have led to the decline of the bangle industry are the importation of an article of much higher quality from Austria and the increasing difficulty of obtaining cheap fuel. Mr. Innes considers that the preliminary survey suggested by the Committee can be carried out by the department but, for the reasons given in paragraph 9 of his note, he doubts whether the enquiry will elicit fresh facts or lead to useful results in the way of resuscitating the industry. Apparently the experiments, if instituted, will have

I would leave it to him.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

5. *Analysis of alkaline earths available in the Presidency for the manufacture of commercial alkali.*—The Committee recommends that a survey should be made by the Department of Industries of the alkaline earths in the Presidency and that samples of these earths should be analysed with the object of determining whether commercial alkali can be obtained from them. Mr. Innes states that Dr. Simonsen has kindly consented to make the analyses and that he himself would ascertain the localities of the earths and obtain samples for analysis. He however states that much work has probably been done on these earths already by the Agricultural Chemist and that it will be necessary first to ascertain what information is already on

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

E.A.H.—29-4-17.

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The first three resolutions of the Committee may be accepted. The proposed enquiry with alkaline earth is likely to

Quite so.

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2. I doubt the wisdom of Government seeking to resuscitate the bangle industry; the industry seems to be dead or moribund; the demand is considerable, but the competition is also very keen; and without a heavy protective tariff any attempt to rehabilitate the Indian bangle workers seems doomed to failure. Further, bangles are a mere luxury; they are not a commodity which can either be considered necessary or conducive to the good of the consuming public; nor do they work in with, or stimulate other industries. From the strictly economic point of view bangle-production and consumption is waste; surely there must be other industries more deserving of State support than this, and more likely, when established, to benefit both the working class and the public alike. I venture to deprecate the institution of the proposed survey and to submit that it need in no case be undertaken without a strong support forthcoming from Indians themselves.

I would leave this question of survey to Mr. Innes himself.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

E. A. HARVEY—29-4-17.

Honourable Member for perusal in advance and favour of return.

R. RAMACHANDRA RAO—2-5-17.

The Committee appointed by the Government in their order, dated the 8th March 1917, to examine the position of the glass industry has been most helpful and I would act on the conclusions arrived at by the Committee, which are explained at length in the interesting report furnished by Mr. Innes. I do not think that any detailed orders are necessary either on the resolutions of the Committee or on Mr. Innes' report. The experimental glass factory for making soda water bottles has already been closed down, and in view of the facts elicited we shall not revive that experiment. As for other forms of the glass industry, we are not likely to embark on any of them except after very careful enquiry and under expert advice. I am very doubtful about our being able to do anything for reviving the industry in glass bangles. On the whole it seems to me that it would suffice to issue a Government Order reading and recording the correspondence and asking Mr. Innes to convey the thanks of the Government to the Members of the Committee. It is necessary that the order should be placed on the editors' table so that the public may be in possession of correct information on the subject. The draft order may embody G.O. No. 322, dated the 8th March 1917, without its annexures, and the whole of the current file.

2. Please circulate.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

H. F. W. G[ILLMAN]—7-5-17.

A. G. C[ARDEW]—7-5-17.

P[ENTLAND]—8-5-17.

A draft order is submitted for approval.

S.K.—9-5-17.

N.K.—12-5-17.

E. A. HARVEY—12-5-17.

[G.O. No. 635, Home (Education), dated the 14th May 1917.]

Receiving letter from the officer in charge of the Dept^l
of Ind. Affairs forwarding a copy of the recommendation
of the committee appointed to advise regarding the

READ AGAIN G.O. No. 322 ^{Am (K)} dated 11.8. 3. 1917. (Order with
out answer
to be printed
in full)

READ ALSO:-
C. D. 17822A From the *Officer in charge* No. *52* dated *the 9.4.1917*
of the Dept^l of Industries

” ” ” ” ” ” ” ” 191

" " " " 191

ORDER.

PS

No. 635, dated 14.5.1917

Records.

2. The officers in charge of the Department, of Indochina is requested to convey the thanks of the Govt to the members of the committee ^{for their} ~~appointment~~ ^{assistance} ~~to~~ ^{and} ~~advise~~ ⁱⁿ ~~regarding~~ ^{the} ~~the~~ ^{expenses} ~~permanently~~.

8K
25.17.

12/10/20

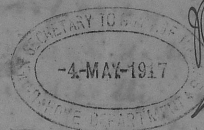
~~Elch~~
12.5.17

The officers in charge
of the Dept. of Indistrie.

E. T.

correct information on the subject. The draft order may embody G.O. No.322, dated the 8th March 1917, without its annexures, and the whole of the current file.

2. Please circulate.

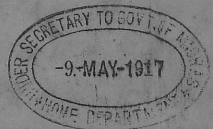
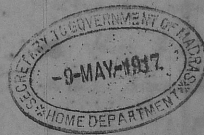


H M₂
H M₁
HE

7.5.17.

7.5.17

8.5.17.



A draft order is submitted for approval.

8X
9/5/17
Print up. Is Dr. Sumner's name spelled correctly in G.O. 322. I who found mistakes in the note - who corrected the proof? Probably Mr. Sumner had letter for the proofs of the present G.O. as there are a number of misprints & technical

Box 48
Enc 4.5.17
Recd 9.5.17

Arms.

12.5.17

The Gp. has been printed & a proof copy is placed below. In Gp. No. 322, dated the 8th March 1917, the spelling of Dr. Simonson's name as given in the Limes' letter of the 2nd March last was adopted. In the quarterly civil list ~~the name~~ was spelt differently in different places. It has now been ascertained that the correct spelling is 'Simonson' & this has been adopted in the present Gp. The spelling & the ~~several~~ mistakes noticed by the U.S. in the notes to Gp. No. 322 dated the 8th March 1917, will ~~be~~ be corrected in the copies here & in Madras.

A draft do. to the Limes forwarding the proof of the present Gp. is submitted for approval.

8K
29.5.17.

3/17/17

1.6.17

* It is regretted that these mistakes were not corrected in the proof.

NOTES CONNECTED WITH G.O. No. 635, HOME (EDUCATION),
DATED THE 14th MAY 1917

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not in favour of their being begun again. The grounds of the decision are fully

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

explained in paragraphs 3-11 of Mr.
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P. R[AJAGOPALA ACHARIYAR]—3-5-17.

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may subsequently be considered.

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I agree.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

in paragraphs 8 and 9 of his note on pages 40 and 50 of current list. Two of the important causes that have led to the decline of the bangle industry are the importation of an article of much higher quality from Austria and the increasing difficulty of obtaining cheap fuel. Mr. Innes considers that the preliminary survey suggested by the Committee can be carried out by the department but, for the reasons given in paragraph 9 of his note, he doubts whether the enquiry will elicit fresh facts or lead to useful results in the way of resuscitating the industry. Apparently the experiments, if instituted, will have to be carried on under the supervision of

doubtful whether indigenous bangles will be able to survive the competition of Austria unless protected by heavy import duties. Mr. Innes' views are contained

I would leave it to him.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

experts. It is for consideration whether Mr. Innes should be asked to institute an enquiry on the lines suggested in paragraph 8 of his note and report the result to Government.

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P. R[AJAGOPALA ACHARIYAR]—3-5-17.

record. No orders are necessary on this point.

E.A.H.—29-4-17.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

6. The thanks of Government may perhaps be conveyed to the members of the Committee for their help and advice.

N.S.—25-4-17.

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Quite so.

P. R[AJAGOPALA ACHARIYAR]—3-5-17.

number of industries. It may be left to Mr. Innes to take what action is necessary in consultation with the Agricultural department.

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Appended to his letter

K/

14

3 -

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question
survey

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P. R[AJAGOPALA ACHARIYAR]-3-5-17.

H. F. W. G[ILLMAN]-7-5-17.

A. G. C[ARDEW]-7-5-17.

P[ENTLAND]-8-5-17.

A draft order is submitted for approval.

S.K.-9-5-17.

N.S.-12-5-17.

E.A.H.-12-5-17.

[G.O. No. 635, Home (Education), dated the 14th May 1917.]

K/

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