REPORT OF THE DEPARTMENT OF INSUSTRIES, MADRAS 31ST MARCH - 1921

65

REPORT

OF THE

DEPARTMENT OF INDUSTRIES, MADRAS

FOR THE YEAR ENDED 31ST MARCH 1921

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CONTENTS

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From

C. W. E. COTTON, Esq., C.I.E., I.C.S., M.L.C.,
Acting Director of Industries, Madras,

To

THE SECRETARY TO GOVERNMENT,
DEVELOPMENT DEPARTMENT,

Dated Madras, the 29th September 1921.

SIR,

I have the honour to submit the administration report of the Department of Industries for the year ending 31st March 1921. Mr. Green's assistance in its preparation is gratefully acknowledged.

I have the honour to be,

Sir,

Your most obedient servant,

C. W. E. COTTON,
Acting Director of Industries.

REPORT OF THE DEPARTMENT OF INDUSTRIES, MADRAS, FOR THE YEAR ENDED 31ST MARCH 1921.

PERSONNEL.

Director.—Mr. A. Y. G. Campbell, C.I.E., C.B.E., I.C.S., continued to be in charge of the department until the 23rd March 1921, when he handed over charge temporarily to Mr. L. B. Green, M.B.E., and proceeded on combined leave. Mr. L. B. Green was in charge of the department until the end of the year. Mr. A. Y. G. Campbell also held the office of Controller of Munitions until the 23rd March 1921, when on his proceeding on leave, the appointment was abolished. Mr. Green continued as Assistant to the Director and Deputy Controller of Munitions throughout the year. In accordance with G.O. No. 1935, dated 4th November 1920, Mr. Green was, on Mr. Campbell's recommendation, given the designation of Commercial and Industrial Intelligence Officer in his capacity as head of the Intelligence Branch of the department, but having regard to the varied duties which he performs, the title of Deputy Director would be more appropriate. Further information regarding personnel will be found in the appropriate sections of the report.

2. *Director's tours.*—Mr. Campbell was on tour for 130 days exclusive of a stay of 29 days at Kotagiri. He visited Simla in April and Cawnpore in October to attend the conferences of Directors of Industries. In June 1920, he was deputed to Ceylon to investigate the possibility of starting in this Presidency a factory for the manufacture of finished rubber goods. He visited Bangalore on three occasions in order to attend meetings of the Council of the Indian Institute of Science and also Calicut, Tellicherry, Cannanore, Mangalore, Tanur, Madura, Tadpatri, Bellary, Waltair, Ootacamund and Coonoor.

3. *Organization.*—The year was one of experiment in administrative organization. As stated in last year's administration report, proposals had been submitted to Government for the appointment of one Industrial Engineer and of four additional Assistant Directors for employment in the districts to deal with the increasing volume of work. Government sanction to these proposals was received in May, June and July 1920, the appointments being temporary for two years in the first instance. Captain H. W. Watts, who was appointed Industrial Engineer temporarily for a period of two years, joined duty on 2nd May. Mr. P. W. Atherton, who had been appointed as Assistant Director of Industries, Madras Division, on the 3rd of

March resigned his appointment on 3rd May and M.R.Ry. Rao Sahib C. S. Ramachandra Ayyar, Sub-Engineer, acted as Assistant Director as a temporary measure until relieved by Mr. A. E. Jordan on the 4th of October. The following officers joined their appointments on the dates noted against each :—

Name of officer.	Designation.	Date of joining duty.
M.R.Ry. D. Sadasiva Pillai.	Assistant Director of Industries, Madura.	9th July 1920.
Mr. L. S. Pinto ..	Assistant Director of Industries, Coimbatore.	3rd August 1920.
M.R.Ry. T. K. T. Viraraghava Achariyar.	Assistant Director of Industries, Bezwada.	5th August 1920.
M.R.Ry. S. Rajagopalaswami Mudaliyar.	Assistant Director of Industries, Bellary.	9th September 1920.

The Presidency was divided into five divisions with headquarters at Bezwada, Bellary, Coimbatore, Madura and Madras respectively with an Assistant Director in charge of each. The divisions were constituted as follows :—

Name of division.	Revenue districts comprising the division.
1. Bezwada ..	Gānjām, Vizagapatam, Gōdāvari, Kistna and Guntūr.
2. Bellary ..	Bellary, Anantapur, Kurnool and Cuddapah.
3. Coimbatore ..	Coimbatore, the Nilgiris, Anjengo, Malabar, South Kanara and Salem.
4. Madura ..	Madura, Ramnad, Tinnevelly, Trichinopoly and Tanjore.
5. Madras ..	Madras, South Arcot, Chingleput, North Arcot, Nellore and Chittoor.

4. *Duties of Assistant Directors.*—The duties of these Assistant Directors, as laid down by Mr. Campbell, are sufficiently ambitious. They include the collection and dissemination of commercial and industrial intelligence, the supervision of industrial and weaving parties within their jurisdiction, local investigations, and enquiries in connexion with industries of all classes, and the encouragement of persons interested in industries to take advantage of the facilities offered by the department. They are the representatives of the department in the districts to which they are attached, and act as the channel of communication between the people and the department. They receive requisitions for assistance in regard to the establishment of new industries and installations, superintend the work of the supervisors and mechanics engaged in the erection and maintenance of machinery and plant, the carrying out of boring operations and the periodical inspection of industrial and pumping plants for which compounding fees have been paid. They also assist in keeping the department in touch with the industrial resources and

developments in the districts. They exercise administrative control over weaving parties in their divisions, but should consult the weaving expert when any technical problem arises. They may visit Government and aided industrial schools from time to time and report where necessary to the Director of Industries, but should not issue formal orders to the heads of such institutions. The Assistant Directors, on their appointment, were further instructed to give prominent attention to the development of cottage industries and the improvement of the conditions under which they are carried on in respect of the supply of raw materials and markets for the finished products, and to keep in personal touch, as far as possible, with the Collectors and District Officers, Presidents of Local Boards and Chairmen of Municipal Councils and to ascertain their views on subjects of local industrial development.

5. *Work done by Assistant Directors.*—In practice a large portion of the time of Assistant Directors was absorbed in superintending pumping and boring operations and the erection and maintenance of industrial installations and also in exercising general administrative control over the weaving parties. They were also employed in carrying out a census of power plants and in collecting information for use in the compilation of articles on the economic position of the weaving industry and industrial occupations in connexion with the Provincial census. Only two definite industrial inquiries were undertaken. Mr. Pinto, Assistant Director, Coimbatore division, made a survey of the cashew nut industry with particular reference to the extraction of juice from the fruit and its utilization as a source of alcohol, and the same officer also made inquiries (though his report was only received early in the current official year) in regard to the development of the dhupa oil industry in the South Kanara district. His recommendations in those cases are still under consideration.

6. *Further re-organization.*—Although Mr. Campbell's scheme of territorial organization had only been in working order for a few months when the year closed, the impression had already begun to gain ground that the number of divisions created was altogether disproportionate to the volume of work to be done, and the agency employed was unnecessarily expensive, and the present Director was addressing himself to the question of curtailing the number of Assistant Directors' charges, when circumstances arose which enabled him to reduce them from five to three. The question as to the form of territorial organization best suited to the existing industrial needs of the Presidency has since been further examined by him, and his recommendations which were considered at a Departmental Conference presided over by the Hon'ble the Minister for Development on the 15th August were generally concurred in.

It is to be hoped that these proposals which are considerably ess costly than those which they will supersede will prove a more asting solution of this very difficult problem.

7. *Re-organization of the office.*—In consequence of the rapid expansion in the work of the department it was found necessary in May to submit proposals to Government for some increase in establishment. In G.O. No. 1488, Revenue (Special), dated 13th August 1920, Government sanctioned the employment of two additional clerks and one attender for the Intelligence section, one additional clerk for the Textile section and three additional clerks for the General section of the office. Two shorthand allowances of Rs. 10 each were also sanctioned.

With effect from 1st April 1920, the office was divided into the following sections:—

A. Intelligence,
B. Engineering,
C. Industrial Education,
D. Textiles,
E. Staff and Accounts,
F. Statistics,
G. Demonstration Factories and Miscellaneous,

and these arrangements have hitherto worked smoothly and well.

8. *Departmental Conference.*—A conference of the headquarters and district officers of the Department of Industries was held during the month of January 1921 at which a large number of subjects relating to industrial development were discussed. The Conference, which extended over a week, was also attended by the Chief Conservator of Forests, the Registrar of Co-operative Societies, the Director of Agriculture, and Dr. G. J. Fowler of the Indian Institute of Science, Bangalore.

9. *Exhibitions.*—The department participated in three exhibitions during the year at Mangalore and Tellicherry on the West Coast and Nandyal in the Ceded districts. At these exhibitions improved weaving machinery and appliances including handlooms were shown as well as hand and power boring sets and pumping plants. Samples of soaps manufactured at the Kerala Soap Institute, Calicut, and inks and glues manufactured at the Industrial Laboratory, Coonoor, were also exhibited. The Kerala Soap Institute was awarded gold medals for its exhibits of soaps at Tellicherry and Mangalore, whilst the Textile branch of the Department of Industries was awarded a gold medal for the improved appliances exhibited at the Mangalore Exhibition. A great deal of interest was everywhere evinced in the departmental exhibits and it is anticipated that as a result of the exhibitions, the services of the department will become more

frequently resorted to in the districts concerned. Advantage of these exhibitions was taken to give lectures on various industrial subjects of local interest. The Board of Industries have expressed their approval of the policy underlying the participation of the department in such displays.

10. *Board of Industries.*—The Indian Industrial Commission, in their report, recommended the constitution of a Board of Industries to act as an advisory body to Provincial Directors. This recommendation was considered by the Industrial Conference held at the Secretariat, Fort St. George, on the 13th of March 1920, and in pursuance of the views expressed at the Conference the Government in G.O. No. 1954, dated 8th November 1920, sanctioned the appointment of an Advisory Board of Industries for the Madras Presidency consisting of 12 members. The Director of Industries is the Chairman and convenor of the Board and the remaining eleven members are non-officials with Mr. Green as Secretary. Each member of the Board holds his appointment for a period of two years.

11. *Functions of the Board.*—The functions of the Board are advisory, but all matters of general importance affecting industries or industrial education, including the budget, are laid before the Board. The Board have power to co-opt other officials and non-officials for the consideration of particular subjects or classes of subjects, and those co-opted whether officials or non-officials are entitled to vote on resolutions relating to subjects for the discussion of which they were co-opted. The Board may also appoint committees, consisting of its own members or persons co-opted to standing or temporary committees for the consideration of special subjects.

12. *Personnel.*—The following eleven non-official gentlemen were appointed the first members of the Board:—

(1) Sir Bernard Hunter.
(2) Mr. A. P. Symonds.
(3) Mr. A. F. Buchanan.
(4) Col. C. L. Magniac, C.M.G., C.B.E.
(5) Sir Frederick Nicholson, K.C.I.E.
(6) Sir P. Tyagaraya Chettiyar.
(7) Mr. H. M. Ebrahim Sait.
(8) Mr. Jamal Muhammad.
(9) M.R.Ry. V. Tirumalai Pillai.
(10) „ Rao Bahadur T. Ranga Achariyar.
(11) The Bishop of Dornakal.

Mr. N. M. Murray succeeded Sir Bernard Hunter as a member of the Board when the latter proceeded to England on his appointment as a Manager of the London Office of the Imperial Bank of India. Sir Frederick Nicholson resigned his appointment shortly after the close of the year.

13. *Meetings and agenda.*—Meetings of the Board were held in January, February and March. At these meetings 28 questions were included in the agenda and considered by the Board. The following were among the most important questions discussed :—

(1) The acquisition of land in the vicinity of railway stations for industrial development.

(2) The creation of a Provincial Industrial Service.

(3) The provision of facilities for instruction in Mining and Geology, and the question of recruiting a Mining Geologist for the Department of Industries.

(4) The question of the establishment of a Chemical Research Institute for the Madras Presidency.

(5) The improvement of railways in the Madras Presidency from the industrial and trading standpoints.

(6) The desirability of establishing a Commercial and Industrial Museum at Madras.

(7) Financial assistance by Government to organized industries or in the establishment of new industries.

(8) The revision of rules for the levy of fees for work done in connexion with industrial undertakings and pumping installations.

14. *Government assistance to industries.*—Many of the questions which were discussed by the Board are still under correspondence with the Local Government or the Government of India and little advantage would be gained by detailing the present position. It may however be noted with regard to the problem of financial assistance by Government to organized industries, or towards the establishment of new industries, that a partial solution is likely to be found in this Presidency in the adoption, with or without empowering legislation, of the system which has been for some time in force in Mysore with regard to the grant of loans for industrial purposes.

15. *Revision of the fee rules.*—As regards the revision of the rules for the levy of fees for work done in connexion with industrial undertakings and pumping installations the fee charged by the department for the ordering of plant, the preparations of plans and estimates, and the erection of machinery was fixed at 2½ per cent on the capital cost when the price of machinery and plant was about one-third of what it is to-day and the retention of this comparatively

high percentage on the inflated cost of plant apparently contributed to the marked reduction in the volume of erection work undertaken by the Department, it being suggested that parties have been able to arrange for the erection of their plant for a considerably lower figure by private agency. As the bigger engineering works in Madras who act as agents for manufacturers of machinery do not maintain a staff of mechanics for the purpose of erecting machinery sold by them, and the only alternative to departmental supervision is generally the employment of mushroom firms or individuals with insufficient engineering experience, the Board recommended that the rate should be reduced to 1½ per cent and since the close of the year this reduction has been sanctioned by Government.

16. *Work done.*—Though the Board met on three occasions only during the year 1920–21, a very large agenda was dealt with, and some very interesting discussions took place. There is no doubt that the Board has established itself as an advisory body of great value to the department. The members of the Board have been most willing to render assistance to the department not only at formal meetings of the Board but also individually.

Bureau of Industrial and Commercial Information.

17. *Organization and objects.*—The organization and objects of the Bureau of Industrial and Commercial Information, which was under the charge of Mr. Green throughout the year, was described in detail in the last administration report. Evidence of the growing appreciation of the work of the Bureau for which Mr. Green deserves congratulation was reflected in a considerable increase in the number of inquiries received on industrial and commercial questions. The Bureau Superintendent M.R.Ry. S. R. Athmanatha Ayyar has done very good work.

18. A circular descriptive of the work of the Bureau was issued to the leading commercial firms and traders in the Presidency, whose co-operation and assistance was requested so that the information at the disposal of the Bureau should be kept up to date. This circular met with such a gratifying response that the Bureau now possesses up-to-date information as to the activities of all firms of standing, the articles and goods which they export and import, the agencies which they hold and the firms they represent.

19. *New flotations.*—The number of such companies formed during the year rose from 50 to 110 and the capital involved from 119 lakhs to 6½ crores. The greater number of these flotations consisted of banking or loan or trading companies or amalgamations of existing concerns. Messrs. Aspinwall & Co., Limited, Cochin, and Messrs. T. A. Taylor & Co., Madras, were converted into limited companies with authorized capitals of Rs. 40 and 30 lakhs respectively. Eleven

companies were registered under the classification 'Mills and Presses.' The Buckingham and Carnatic Company, Limited, was formed with a capital of 250 lakhs to acquire and amalgamate the five concerns under the management of Messrs. Binny & Co., namely, the Buckingham Mill Company, Limited, the Carnatic Mill Company, Limited, the Tirupur Press Company, Limited, the Jammalamadugu Press Company, Limited, and the Tadpatri Press Company, Limited. The more important of the industrial companies registered during the year were the following :—

Name.	Capital.			Registered office.	Object.
	Authorised.	Subscribed.	Paid up.		
	Rs.	Rs.	Rs.		
Kistna Sugar Works, Limited.	5,00,000	1,16,200	42,245	Masulipatam.	Manufacture of sugar from jaggery.
Tanjore Oil Mills, Limited..	1,50,000	75,725	47,207	Tanjore ..	Extraction of oil.
Carnatic Paper Mill, Limited	10,00,000	2,20,200	87,260	Madras ..	Manufacture of paper.
Bezwada Spinning and Weaving Mill, Limited.	20,00,000	1,60,000	4,000	Bezwada..	Spinning of yarn and weaving of piece-goods.
Shoranur Company, Limited	20,00,000	85,000	12,000	Shoranur.	Manufacture of bricks and tiles.
Star Tile Works, Limited ..	2,00,000	62,275	36,910	Calicut ..	Manufacture of tiles.

The Carnatic Paper Mills, Limited, propose to establish a paper mill on the banks of the river Gōdāvari, and it is understood that the machinery required for the production of 10 tons of paper pulp and 3½ tons of news printing paper per diem has now been ordered and that the necessary steps have been taken to recruit the staff required. The Shoranur company has taken over an old tile-making concern and is enlarging it.

20. A large number of inquiries were received from the public in regard to the sources of supply and markets for various articles and commodities, amongst which may be mentioned, as representing the wide range of the inquiries received, bones, buttons, brushes, belts, cash chests, cement, Cuddapah slabs, chemicals, coir, coir mats, cigar boxes, carpets, diamonds, drugs, decorticators, fibre of various kinds, gloves, grasses, graphite, gas mantles, gunny bags, ink bottles, leather and leather goods, lace, light railway material, mica, manganese, oil-seeds and cake of different kinds, pencils, paints and varnishes, raw materials for paper manufacture, saltpetre, shellac, steel, silk, timber, tanning materials, wick, thread and yarn. Inquiries were received and answered in regard to the price and supply of machinery for the manufacture and refining of sugar, the hulling and polishing of rice, the extraction of oil and the manufacture of aerated waters, buttons, combs, cigarettes, glass containers, locks, paper and card board, soap, and for stone working and polishing.

Estimates of suitable plant were in many cases obtained from manufacturers in England and America and communicated to interested parties.

21. A considerable number of references were received from the Director-General of Commercial Intelligence in regard to overseas trade in general, and with reference to the financial standing and general business reputation of firms in particular. A number of references were also received from Indian firms, merchants and traders requesting to be placed in touch with overseas firms interested in Indian produce and manufactures, but, in the majority of cases, they proved, on inquiry, to be of insufficient financial standing to permit of their being given overseas trade introductions. Apart from the question of financial standing, foreign merchants are reluctant to enter into business transactions with firms in the mufassal unless they have assurances that the latter are conversant with the principles and practice of international trade. Many small firms and traders possess an inadequate appreciation of the advantages conferred by conducting business through an established bank, and it is to be hoped that the greater banking facilities afforded by the passing of the Imperial Bank of India Act will be taken advantage of by such merchants and traders to the benefit not only to themselves but of India's foreign trade also.

22. *Alizarine dyes.*—According to the terms of the peace treaty Germany was required to deliver to the Allies a certain quantity of dye stuffs as part of the indemnity for reparation. Of the German dyes allotted to the British Empire, arrangements were made for the whole of the reparation alizarine dyes, in addition to about 20 per cent of aniline dyes, to be allotted to India. The first consignment of German reparation alizarine dyes arrived in Madras in March 1920 and consignments were received from time to time thereafter. The reparation alizarine dyes were consigned to Messrs. Best & Co., the agents of the British Alizarine Company at Madras, and it was decided that the price at which the indemnity alizarine dyes should be sold at Madras should be the same as that of the ordinary dye supplied by the British Alizarine Company, and that the firm's profit should be limited to 5 per cent plus distribution and handling charges. Messrs. Best & Co. maintained fifteen depots in various parts of the Presidency, through which the distribution was effected among the bona-fide dyers according to the recommendations of a number of local committees. Six consignments, in all aggregating 314,496 lb., were received during the year. The price originally fixed was Rs. 1-3-0 per lb., but owing to the fall in exchange it became necessary to raise this to Rs. 1-9-0 with effect from the 12th December 1920, to Rs. 1-10-0 in February 1921 and before the close of the year to Rs. 1-11-0 per lb.

The removal of the import restrictions in March 1920 resulted in considerable imports of alizarine from America, Germany, Holland and Belgium. Owing to labour difficulties in England the extension of the works of the British Alizarine Company took longer to complete than had originally been anticipated, and it was not until the end of the year that they were able to inform Messrs. Best & Co., that they would thereafter be able to meet Indian requirements in full from their factories. In view of the fact that regular consignments of alizarine dyes were being received from the British Alizarine Company towards the end of the year, and that supplies of this class of dye were becoming plentiful, Government were addressed in regard to the abolition of the system of control under which Messrs. Best & Co. and their agents were restricted to selling the dye to persons included in the list drawn up of bona-fide dyers, but sanction was not accorded until after the close of the year.

23. *Aniline dyes.*—The department was consulted by the Government of India in regard to the selection of the German reparation non-alizarine dyes which should be allotted to India and in regard to the methods of distribution. The Madras firms and dealers interested in this class of dye were addressed in regard to the specific dyes for which a market could be found in this Presidency and a list of such dyes was forwarded to the Government of India. It was eventually decided by the Government of India to appoint Messrs. Killick Nixon & Co., Bombay, to act as sole distributors of aniline dyes throughout India and the firm worked in association with the Director of Industries, Bombay. About 60 tons of aniline dyes were received during the year and lists of dyes available for sale, together with their prices, were furnished to firms and dealers. Owing, however, to the fact that the dyes were not available in smaller quantities than one cask, that samples were not available and that the dyes were sold without guarantee, the demand was disappointing and it is believed that considerable stocks remain unsold at Bombay.

24. *Library.*—The library attached to the central office which contains a number of books on subjects relating to commerce, technology and manufacture, besides a considerable number of monographs, bulletins and miscellaneous scientific and technical publications, was organized in accordance with the Dewey decimal system and card indices are under preparation for books, periodicals and journals, monographs, reports, catalogues and newspaper extracts. About 50 journals and periodicals on scientific, technical and commercial subjects are also received in this department, the most important of which are placed on the table in the library for consultation and reference by the general public. The department

agreed to take over from the Victoria Technical Institute the Dhanakoti Mudaliyar library on the understanding that purchases out of the endowment funds should be restricted to books dealing with architecture and art in relation to industries. The library, although primarily intended as a reference library for the use of departmental officers, was open during office hours to the public and freely resorted to. Proposals have recently been made to keep the library open on Sundays and holidays also.

25. *Adulteration of castor oil.*—It was stated in last year's administration report that, with a view to check the practice of adulterating castor oil before export, Government had approved of a scheme under which facilities were provided for the examination of the oil and the issue of official certificates of purity. The Chemical Examiner tests free of fee such oil as is sent to him by firms and individuals approved by the Director of Industries and grants in each case a certificate showing the standard of purity attained. The facilities provided for the examination of oil were extended during the year to coconut oil also. Only three firms took advantage of the facilities provided by Government for the issue of official certificates showing the standard of purity attained in respect of coconut oil and castor oil during the year. Of the three applications received, two related to coconut and one to castor oil, and in each case an official certificate of purity was furnished. It is probable that the small number of applications received for certificates was due to the heavy reduction in the export of coconut and castor oil during the year and it remains to be seen whether the system will increase in popularity when trade conditions become more normal.

26. *Coal.*—In last year's administration report it was stated that Mr. Walker of the Geological Survey of India had been deputed to examine the Beddadanole coal-field and to indicate suitable sites for boring. On receipt of Mr. Walker's report endeavours were made to interest firms and syndicates in the exploitation and development of the field. These endeavours have so far been successful, that Messrs. Best & Co., acting on behalf of the Hyderabad Deccan Company, have been granted a prospecting licence over 37·96 square miles in the Ellore taluk of the Kistna district, and have applied for concessions over two areas, one in the Yernagudem taluk of the Kistna district, and the other in the Polavaram division of the Gōdāvari district. The firm proposes to start operations immediately the necessary licences are granted.

27. *Cement.*—In last year's administration report it was stated that a note by Mr. Green on the potentialities of a cement industry at Bezwada had been brought to the notice of various financial and industrial syndicates. It is hoped that the endeavours made to

nterest capitalists in the project will, when the financial position is mproved, result in the establishment of this important industry t this centre. The Government have approved of the grant to such syndicate of rights in certain districts for mining and quarrying he limestone and shale required for the manufacture of cement, ubject to the condition *inter alia* that within four years from the rant of the lease an outturn of at least 30,000 tons of cement er annum is attained.

28. *Alkaloids.*—An important development in connexion with hemical industries is the contemplated establishment, at Vizagapatam, by a leading London firm of manufacturing chemists, of a actory for the manufacture of crude alkaloids, principally trychnine, from nux vomica. The firm have already acquired the ecessary land at Vizagapatam and will, it is hoped, proceed with he erection of the factory at an early date.

29. *Phosphatic nodules.*—The subject of the exploitation and levelopment of the deposits of phosphatic nodules in the Trichinopoly district continued to receive attention during the year and experimental work is now being undertaken by departmental agency, including examination of samples of the products found in association with the nodules such as gypsum, white clay and red ochre.

30. *Granite.*—The application of a Madras firm for the lease of certain granite quarries in North Arcot district was strongly supported by the department as the development scheme proposed includes the installation of modern machinery and plant for quarrying. If the cost of production is thereby materially reduced, a greatly increased demand for granite for building purposes in Madras City should certainly result.

31. *Rubber goods.*—The question of the manufacture of finished rubber goods was under consideration during the year, and endeavours were made to interest private capital in the project. Mr. Campbell proceeded to Ceylon to inspect the factory of the Ceylon Rubber Mills Company and to examine the question on the spot. The difficulty is that very large capital would be necessary to ensure success, as the range of articles to be manufactured is very wide, and the competition of imported goods can only be met by large scale production.

32. *Rubber seed.*—The question of the commercial exploitation of rubber seed as a source of oil and feeding cake was considered in consultation with the Secretary of the United Planters' Association of Southern India. The problem of the production of rubber seed oil appeared to resolve itself into the evolution of a decorticating machine which could remove the shell of the seed; for the shell, if mixed

with the cake, renders the latter unfit for cattle food. The installation of decorticators and oil presses on the estate where the seed is collected would appear to be necessary in order to reduce the transport charges, and as a number of rubber estates are still worked without power machinery it would be necessary for these presses to be worked either by mechanical or bullock power. At the United Planters' Association of Southern India annual general meeting in 1920, it was reported that owing to the prevalence of "Phytophthora Meadii," a fungoid disease which attacks the Hevea seed, there was not now available in this Presidency sufficient seed to make the extraction of oil a profitable industry; in fact, it is difficult to obtain even sufficient seed for the planting of extensions. The investigation has not therefore been proceeded with.

33. *Sand for glass.*—The question of the suitability of the sand available in the vicinity of Madras for the manufacture of superior glassware was once more investigated, and the results of a number of analyses carried out on various samples were communicated to the agent of a British firm of manufacturers.

34. *Tile factories.*—The manufacture of roofing tiles of the Mangalore pattern has hitherto been restricted to the West Coast, but there seems no reason why such tiles should not be manufactured elsewhere in the Presidency. Samples of clay were obtained from several places and examined by the Superintendent of Pottery, Sir J. J. School of Arts, Bombay, as a result of which proposals are under consideration by private parties to establish such factories at Bellary, Salem and other places. With a view to determining whether the clay found in the vicinity of Madras was suitable for the manufacture of tiles and also of stoneware pipes, samples of the clay used in the manufacture of stock and face bricks were obtained from the Public Works Department and forwarded to the Sir J. J. School of Arts, Bombay, for analysis and report. The report showed that, although the clay was unsuitable for the manufacture of stoneware pipes, certain of the samples indicated the suitability of the clay found in the vicinity of Madras for the manufacture of face bricks and roofing tiles of the Mangalore pattern.

35. *Kittool fibre.*—The question of arranging for the commercial exploitation of kittool fibre which is obtained from the sago palm was also considered during the year. Although a considerable amount of this fibre is exported from Ceylon, none is exported from Southern India. The inquiries made indicated that the question was rather one of collection and preparation than of finding a market for the product. A firm in Malabar undertook to find a market if the fibre could be collected in quantity and put up in the form of bundles suitable for export. Samples of standard fibre have been obtained from Ceylon and further investigation is proceeding.

36. *Cottage industries.*—The District Assistant Directors, on their appointment, were requested to institute a survey of existing cottage and village industries so as to bring the Department of Industries into closer touch with the Victoria Technical Institute, particularly in regard to the organization and supply of examples of the artistic industries of the Presidency in respect of which the Institute acts as a central sales organization. A list has been drawn up of articles in demand, which includes brassware, lacquer and silverware, coconut, stone and wood carving, embroidery, earthenware, ivory and inlaid work, toys, palampores, carpets and rugs, and the Assistant Directors were requested to undertake regular surveys of the industries connected with these articles, but little progress had been made in this direction when the year ended.

37. *Publications.*—A pamphlet based on information supplied by the Board of Trade in regard to rates of import duty leviable in foreign countries on oil-seeds and allied products was published and circulated to firms interested in the trade. A similar pamphlet in regard to Indian hides, skins and leather goods is under preparation. The preparation of all special reports, such as those for the Monthly Circular of the Imperial Department of Industries and the Quarterly Journal of Indian Industries and Labour, is undertaken in the Bureau.

38. *Miscellaneous.*—A number of samples of minerals were forwarded to the Geological Survey of India for examination and the results thereof communicated to interested parties. In order to ascertain whether lime of high quality suitable for the paper and other industries is available, samples were obtained from various sources and forwarded to the Chemical Examiner for analysis and report.

Statistics.

39. In the report of the Indian Industrial Commission, it was proposed that the work of the Provincial departments of Industries should include the collection and distribution of commercial and industrial intelligence, and in G.O. Mis. No. 676, Revenue (Special) Department, dated the 1st April 1921, the work of collection, compilation and distribution of the statistics relating to Commerce and Industries, including the Review and Returns of the Railborne Trade, was transferred from the Board of Revenue to the Director of Industries with effect from the 1st April 1920. In connexion with this work two new clerical posts were created in the Department of Industries on Rs. 35—2½—50 and Rs. 25—1—35 respectively, and the Director was authorized to employ six temporary clerks on Rs. 20 per mensem for three months every year in order to assist more particularly in the preparation of Railborne Trade statistics.

40. The returns compiled in the Office of the Director of Industries include, besides statistics of Railborne Trade, information regarding minerals, planting products and sundry industries, and a summary on the subject of manufactures is prepared for inclusion in the Administration Report of the Presidency.

41. The delay in the receipt of returns in respect of planting products indicates that considerable difficulties are experienced by Collectors in securing the figures from planters with a reasonable degree of promptitude, and this is further evidenced by the submission of incomplete statistics rendering necessary, in many cases, the preparation of supplementary returns. The matter is engaging the attention of Government.

Mechanical Engineering Branch.

42. *Pumping and Boring operations.*—The arrangement which placed the Pumping and Boring operations under the control of the Director of Agriculture, and the minor industrial experiments and advisory and inspection work connected with industrial plants, under the control of the Director of Industries, was adversely criticised by the Indian Industrial Commission in paragraph 307 of their Report. The Commission considered that where a well-equipped Industrial Department is in existence, it is a waste of control to have one department installing power plant for agricultural purposes and another for small industries side by side in the same district, that such work is of a totally different character from that which properly belongs to the Agricultural Department, and that valuable adaptations and improvements are not likely to be forthcoming except from a technical department which commands the services of Industrial specialists. The Government in G.O. No. 1402, dated 30th July 1920, accepted the Commission's recommendations and directed that the Pumping and Boring Department with the workshop attached to it should be transferred from the Department of Agriculture to the Department of Industries. This transfer was given effect to on the 9th September 1920 when the entire staff of the Agricultural Engineering section of the Department of Agriculture, with the exception of the Agricultural Engineer and the Engineering Assistant at the Coimbatore College, was transferred to the Department of Industries, but the Director was requested to arrange to depute one Supervisor and two mechanics to assist in the teaching of Engineering at the Agricultural College. M.R.Ry. V. Rangachari, Assistant Agricultural Engineer, became Assistant Industrial Engineer and in addition 13 Supervisors, 24 mechanics, 80 boring maistris, 2 surveyors and 2 tracers with clerical and menial staff came over to the Department of Industries. In consequence of this

transfer, the Supervisors' charges were rearranged as shown in Appendix I.

43. *Staff.*—The mechanical engineering branch continued under the direct charge of Mr. Green until the Industrial Engineer joined duty on the 2nd May 1920, but the general control and direction of the engineering activities of the department in the districts during the year devolved upon the newly appointed Assistant Directors. M.R.Ry. C. Sundararama Ayyar, Supervisor of Industries, Madras subdivision, was appointed as lecturer in Engineering at the Agricultural College, Coimbatore, and Mr. V R. Venkatarama Ayyar, Supervisor of Industries, Trichinopoly subdivision, was transferred to Madras in his stead. M.R.Ry. S. M. Subrahmanya Ayyar was recruited from Public Works Department to fill the vacancy. M.R.Ry. C. S. Ramachandra Ayyar reverted to this branch on the termination of his deputation to the Madras Pencil Factory on the 1st May 1920. From the 4th May 1920 to the 3rd October 1920, he officiated as temporary Assistant Director of Industries, Madras division, and was on privilege leave for the rest of the year.

44. *Information and advice.*—General information and advice on engineering questions is given free of charge if no local inspection is involved. In cases where local inspection is necessary, a fee of Rs. 10 is payable. The number of parties who paid inspection fees for preliminary investigation of their projects under this system during the year under review is 152, of which 106 related to the pumping and boring operations, and the remaining 46 to industrial engineering questions. By the 31st March 1921, 132 of these inquiries had been disposed of.

45. *New erections.*—It was stated in the administration reports of the two preceding years that the continued rise in the price of machinery, and the scarcity and the high cost of liquid fuel had restricted the number of new erections. The conditions prevailing during the period under review did not differ materially from those which obtained in the previous year, as the decrease in the cost of machinery and plant was an insufficient set-off against the progressive fall in exchange. In these circumstances, it is not unsatisfactory that the erection of as many as 38 plants was undertaken during the year, of which 21 were completed before and 17 were in progress on the 31st March 1921. Of the 21 installations completed, 11 were of new and 10 of second-hand plant in new ownership or transferred to more suitable sites by their original owners. The erections include six pumping installations, six rice hullers, two groundnut decorticators and one ginning factory.

46. *Loans sanctioned during the year.*—Twenty-six applications for loans in connexion with the purchase and installation of pumping machinery were received during the year and an aggregate amount of Rs. 12,000 was sanctioned for disbursement to two applicants. A considerable interval generally elapses between the receipt and final disposal of a loan application, since in addition to the scheme having to be investigated from the engineering and agricultural standpoints, the Collector of the district has to be consulted as to the correctness of the statements made in the application form and in regard to the adequacy of the security offered. It is also necessary to ascertain from the Collector and the Executive Engineer, Public Works Department, whether they have any objection to the projected installation. The question whether it is not possible to simplify the procedure governing the grant of these loans is at present engaging attention.

47. *Compounding system.*—For a fixed fee of Rs. 15 per annum the owners of private installations are entitled to have their plants inspected and overhauled three times a year, and also at other times if special requisitions are made. In addition to assisting owners to maintain their plant in good condition—an essential service in a country where there is such a dearth of skilled artizans—this system has the further advantage of enabling the department to suggest improvements and to encourage the industrialist or the ryot to extend and develop his operations. From this point of view it is to be regretted that the number of installations under maintenance decreased during the year under review from 300 to 228. Out of the 228 plants compounded 114 consisted of pumping plants and 114 industrial installations. This decrease may perhaps be attributed to the increasing confidence of owners in their own ability to maintain plants in a satisfactory condition, but is more likely to be due to short-sighted parsimony provoked by hard times which the new territorial staff was not sufficiently well organized to overcome.

48. *Boring.*—At present the department owns five power-drills and 47 hand-drills, but these are insufficient to meet the demands of the public and of other departments and Government have been addressed in regard to the provision of six additional power-drills and 16 hand-drills. If drills could be provided more promptly to deal with applications received for borings, a considerable expansion in the operations of this section should result. Four hundred and ninety-seven boreholes were put down during the year representing a total depth of 16,900 feet or 34 feet per boring. The corresponding figures for 1919–20 were 402 boreholes and 16,587 feet with an average depth of 41 feet. Supply pipes were sunk in the case of 33 boreholes as against 29 in the year 1919–20. Drilling was not unnaturally carried out in most cases in rocky formations and of the 497 borings put down only 240 tapped subartesian water. The

table below indicates the territorial distribution of applications received for boring—

Divisions.	Pending on 1st April 1920.	Received during 1920-21.	Disposed of in 1920-21.	Pending on 31st March 1921.
Bezwada	36	138	121	53
Bellary	....	13	11	2
Coimbatore	24	48	43	29
Madura	39	71	80	30
Madras	17	84	75	26
Total ..	116	354	330	140

49. *Blasting.*—The three torpedoing sets possessed by the department are utilized to blast boreholes in rock in the hope of exposing water sources in the fissures caused by the explosions. On the 1st April 1920, fifteen applications in connexion with torpedoing-operations were in hand and seven were disposed of during the year leaving fifteen in hand on the 31st March 1921. Since the close of the year endeavours have been made to dispose of such applications with a greater degree of expedition.

50. *Pumping sets.*—The department maintains a number of pumping plants, comprising oil-engines and centrifugal pumps which are chiefly utilized in connexion with the sinking and testing of wells but are also used to give one or two waterings in order to save crops from withering. The department owns fourteen pumping sets and a further three sets were under assemblage in the workshops on the 31st March 1921. The number of pumping sets is, however, insufficient to meet demands and proposals involving the provision of twelve additional pumping sets are under the consideration of the Government. On 1st April 1920, nine applications for pumping tests were in hand and 31 were received during the year. Thirty-seven applications were disposed of during the year leaving three in hand on the 31st March 1921.

51. *Mapping of under-ground water-supply.*—Sanction for two surveyors appointed temporarily for the survey of under-ground water-supplies was received; but one of the surveyors resigned on the 28th July 1920 and a successor was not appointed until January while the other was on leave for nearly five months and was subsequently employed on the calculation of levels in connexion with special pumping projects for three months, so that work on the special survey fell yet further into arrears. Only 118 boreholes were connected with mean sea-level out of 1,141 in alluvial tracts that remained to be connected at the commencement of the year.

The improvement of the outturn of work of these surveyors and their concentration on the duty for which they were primarily engaged is receiving the attention of the present Director.

52. *Workshops.*—Supervisor M.R.Ry. A. Somaraju was in charge of the work-shops from the date of the amalgamation with the Pumping and Boring branch. The total number of work orders completed during the year was 215 divided under the following heads:—

1.	Repairs to Testing engines	27
2.	,, Power-drills	10
3.	,, Tractors	6
4.	,, for owners of compounded installations ..	10
5.	,, to boring apparatus	90
6.	Miscellaneous repairs	72
	Total ..	215

53. With the appointment of an Industrial Engineer it was decided that part of the departmental building programme should be carried out under his agency and since the close of the year, a commencement has been made on these lines with the construction of the Industrial Institute, Coonoor. It is hoped that the proposed extensions to the Leather Trades Institute, Madras, and the construction of a new soap factory at Calicut will also be carried out departmentally.

Hides and Skins.

54. *Leather Expert.*—Mr. A. Guthrie, M.B.E., returned from leave on the 16th June 1920, and resumed his duties as Leather Expert and Principal of the Leather Trades Institute. During the period of his leave Mr. Guthrie visited a large number of tanneries and leather machinery manufacturers. He also read a paper on "Indian Tanning Methods" at the United Tanners' Conference in London and delivered a series of three lectures to the students of the Leather Department of Leeds University on "Indian Tanners' Materials and Methods" and "The Difficulties of Tanners in Tropical Countries".

55. *Leather Trades Institute—Staff.*—Mr. P. K. Rajamanikkam Nayudu, who had officiated as Principal during Mr. Guthrie's absence, was appointed permanent Vice-Principal of the Leather Trades Institute with effect from the date of Mr. Guthrie's return.

Mr. K. Seshachalam Nayudu, Chemistry Assistant, was awarded a State Technical Scholarship in Leather Trades Chemistry and resigned his appointment on proceeding to England in July. As it was found that practically the whole time of the Chemistry Assistant was absorbed in teaching and that he had little if any time for research, Mr. M. Subrahmaniam Sastri, B.A., who possessed considerable experience as a teacher, was appointed to the post vacated by Mr. Seshachalam with effect from 18th August 1920.

The appointment of a second assistant to carry out research work is now before Government.

56. The objects of the Leather Trades Institute were detailed in the Administration Report of the preceding year. Owing to the increase of staff it was found practicable to extend the course of lectures and practical work. In consequence of the applications received being in excess of the number that could be accepted, an entrance examination was held upon the results of which 16 students were chosen for admission.

The following table shows the number of students and new admissions from the opening of the Institute:—

	Number of students.	New admissions.
1915	3	3
1916	5	2
1917	11	6
1918	13	6
1919	24	16
1920	34	16

57. *Chemical Research.*—The lack of a suitable chemical laboratory and gas plant again interfered considerably with developments in this section. Sanction for the installation of a gas plant was received from Government, too late for its erection within the year. The general laboratory is too small to accommodate all the students with the result that the third-year students have to work in Mr. Guthrie's laboratory which renders it almost impossible for research work to be undertaken. In spite of these drawbacks, however, a certain amount of research work was carried out. Considerable difficulty has hitherto been experienced by Indian tanners in arranging for the supply and manufacture of a chrome tanning liquor that would give regular and constant results in practice. Mr. Guthrie assisted by some of the senior students worked on the problem of evolving a suitable extract during the year and constructed a plant, which is capable of producing by the direct reduction of bi-chromate with sulphur-di-oxide, a one bath chrome liquor of exceedingly constant quality, at a lower cost than by any of the methods usually employed. Satisfactory as these experiments have been, Mr. Guthrie is endeavouring yet further to perfect the process. A report giving particulars of the experiments and plant, and the results obtained is under preparation.

Owing to the increase in the number of students, the time of the Chemistry Assistant, as has been pointed out already, was almost entirely taken up with teaching, but he carried out a certain amount of analytical work in connexion with the tannery, and also with enquiries received from tanners in various parts of the Presidency.

A commencement was made in investigating the changes that take place in various well waters at different seasons of the year and the effect of these changes on the tanning methods and materials in use in Madras.

58. *Miscellaneous.*—The greater part of the work done in the tannery during the year was in connexion with chrome tannages, but work on certain other classes of tannage was also carried on. Further experimental work in the productien of chamois leather was carried on and leather of good quality was finally produced, but certain difficulties remain to be overcome before the process can be considered a commercial proposition.

Experiments on the tannage of shark skins by a method reported to have been a commercial success in America were made and are being continued, but the local practice of leaving the skin on the flesh, and the high cost of tanning militate against its success.

The curing of *shikar* trophies was discontinued as it was found to interfere with the regular work of the tannery, and to cause friction with customers who send improperly dried skins and then are surprised that the tannery cannot make a better job of them.

59. *Plant.*—No new machines were received during the year but the bark grinding machine that had been lent to the Chrome Leather Company during the war was returned and brought into use. A setting out machine, a new type of fluffing machine and a Symore Jones attachment for the shaving machine have been ordered, but have not yet been received.

A set of small experimental leaches has been built and utilized for the extraction of babool bark.

60. A sum of Rs. 5,989-4-11 was realized by the sale of leather manufactured for instructional purposes and by the execution of private orders. The total expenditure during the year including salaries but exclusive of Europe stores was Rs. 43,652-9-3.

61. In July the Principal and Vice-Principal attended a meeting of the South India Skin and Hide Merchants' Association at which they explained the policy of the Institute, and replied to criticisms regarding its work. The Principal appealed to the members of the Association to evince their interest in the Institute by paying it periodical visits, but only 20 South Indian tanners availed themselves of this invitation during the year, and it is a matter for regret that practically none of the members who criticised the working of the Institute have ever found time to visit it. Among those who honoured the Institute with a visit during the year may be mentioned, His Excellency the Governor of Madras

and the Hon'ble Rai Bahadur K. Venkatareddi Nayudu Garu. Minister for Development, and the latter also presided at the annual prize distribution held on 24th March 1921.

62. Thanks are due to the Chrome Leather Company and Messrs. Wilson & Co. for kindly permitting the students to visit their tanneries and to Messrs. Taylor and Wood of the former Company for judging the essays written by the students on their visit to Chromepet. Also to the Editor of the *Leather World* for the gift of a Chinese hand split buffalo hide.

63. During the vacation, the Vice-Principal visited the chief tanning centres of Southern India and his report indicated that, amongst other things, an examination of the effect of different waters on Avaram tanning was well worth making.

64. The Principal was consulted by several firms and tanneries who propose to start chrome tanneries but none of these schemes have materialized mainly on account of the financial stringency and the particularly acute depression in the hides and leather trade. The water-supply was, however, tested regularly every month in two cases to ascertain whether there was any seasonal variation so that if at some future date either project is proceeded with, the necessary data in this regard will be available for the promoters.

65. The export of hides during the year continued to be on a small scale owing to the inflated stocks of East India tanned kips still held in London and little improvement can be expected until these accumulations have been reduced.

The Textile Industry.

66. *Staff.*—This branch was throughout the year under the direct charge of Mr. Amalsad who got through a great deal of experimental work, particularly with machines of his own designing to improve and cheapen the processes preliminary to weaving. Mr. N. M. Sundara Ayyar secured an appointment as Weaving Superintendent in the Department of Industries, Assam, and his services were transferred to that Province on the 18th of July 1920. M.R.Ry. M. R. Krishna Ayyar, who had obtained experience in the Government Weaving Factories at Bangalore and Salem, was appointed to act for him with effect from the 13th October 1920. M.R.Ry. V. Hanumantha Rao continued as Weaving Assistant and Messrs. K. Swami Pantulu and S. Swaminatha Ayyangar as Weaving Superintendents throughout the year. In accordance with the provisions of G.O. No. 1399, Revenue (Special), dated 30th July 1920 administrative control of the weaving parties was vested in the new Assistant Directors of Industries who were made responsible for seeing that the parties carried out their duties effectively and that

the money collected by them was duly remitted into the treasury, the Assistant Directors themselves maintaining stocks of slays, healds, reeds and other accessories for supply to the weaving parties as required. The Weaving Expert and his special staff continued responsible for the technical guidance of the parties and for the selection of personnel. This arrangement left the Weaving Expert free to conduct further experiments in the evolution of improved appliances including winding, warping and sizing machines of which he took full advantage.

67. *Peripatetic weaving parties.*—At the commencement of the year there were two peripatetic weaving parties in existence, and sanction was received during the year to the employment of ten additional parties to demonstrate to weavers the advantages of improved methods and appliances; but only five of these were organized during the year. Each party consists of one head maistri, one assistant maistri and three expert weavers. The maistris are not only acquainted with improved methods of weaving, but also with warp preparations of all kinds and sizing and joinery; for example, they have to alter hand-shuttle looms to take the fly-shuttle slay. The head maistri possesses the same qualifications as the maistri, but in a superior degree, and is in charge of the party and responsible for the recovery and remittance to the Assistant Directors of the money derived from the sale to weavers of slays, healds and other accessories. The principal duties of the weaving parties may be defined as follows:—

(1) to persuade the local weaver to adopt the fly-shuttle slay when it is practicable to do so and to carry out the necessary alterations in the country loom to enable this to be done; and to adopt flanged beams on their pit looms where longsized warps can be wound;

(2) to cheapen the cost of warp preparation by the use of hand-driven mill warping machines, sizing machines and dressing machines;

(3) to train weavers who only weave plain cloth, to produce towels, bed sheets, twill cloths and fancy designs by the use of extra treadles or draw boy harness;

(4) to educate weavers to weave finer cloths and cloths of better quality in the manufacture of which power-driven looms cannot compete with hand-looms.

Considerable difficulty is experienced in recruiting suitable persons as maistris and weavers. Although a number of persons undergo training in mission schools and thus acquire an elementary knowledge of weaving, few possess the ability to explain the advantages of improved appliances to the village weavers and overcome

their reluctance to the adoption of new methods. Only with great difficulty the full complement of head maistris, assistant maistris and expert weavers were secured for the five new parties formed and they did not start work until the last quarter of the year under review.

The question of the manufacture of improved appliances locally received constant attention. It is the policy of the department not to sell appliances below the price at which they can be produced in order to encourage their manufacture by private enterprise. The labour of weaving depends to a great extent upon the suitability of the slay for the class of work for which it is used and the Weaving Superintendents have attempted to train the village carpenters in the construction of these appliances in the hope that they would assist in extending their use when the party is moved to another village, but experience has shown that as soon as a party is withdrawn, the local prices are advanced and extended use of the improved appliances thereby retarded. Also the sowcars often view the work of the parties and any departure from the existing order of things, with great suspicion and show considerable ingenuity in discovering objections to the adoption of the fly-shuttle. Many instances have been brought to notice where they have pitched their rates so much lower for goods manufactured on the fly-shuttle slay that the weaver has been compelled to revert to the hand-shuttle in order to maintain his earnings.

68. *Party No. I.*—This party continued to work in the Ganjām district throughout the year with Berhampur as headquarters, and was under the supervision of M.R.Ry. S. Swaminatha Ayyangar. The party visited 58 villages during the year under report, of which 29 villages were visited for the first time. In many of these villages the fly-shuttle slay was practically unknown prior to the advent of the party. The procedure adopted by a party is to arrange for a demonstration of fly shuttle weaving in a central place in a village, or on the loom of one of the most influential weavers. When the advantages of the fly-shuttle slay have been sufficiently manifested and a number of them have been introduced, the party moves on to another village but a maistri remains behind for some time to watch the looms at work and to instruct the weavers in the manipulation of the improved appliances. This No. I Party introduced during the year 220 fly-shuttle slays, 8 dobbies, and other accessories of a total value of Rs. 1,481.

If the work of the parties is to have a lasting effect, it is necessary that they should revisit the scene of their former activities from time to time with a view to ascertain whether the improved appliances introduced have been retained or discarded. Nine villages where pioneer work had been done in the previous year were

revisited in 1920–21. The demonstration of the warping and twisting machine and other appliances was continued during the year at the headquarters of the party. The silk weavers who could not afford to purchase twisting machines brought their own yarns and had them twisted on the department's twisting machine. The work of the municipal weaving school at Berhampur was also frequently visited and advice given. The Superintendent of the party also visited the jails at Berhampur and Vizagapatam. In the latter jail fly-shuttles are now being manufactured for the use of the party. The Superintendent also visited the school at Parlakimedi and the power-loom factory at Palacole and remedied certain minor defects found in the working of the factories which tended to lower the quality and quantity of the fabrics produced. It seems doubtful whether there is much scope in the Ganjām district for the introduction of dobbies for fancy weaving as such work is not carried out in the district. Nor does there seem to be a great future for the warping mill as the weavers are not capable of sizing long warps.

69. *Party No. II.*—This new party was organized by M.R.Ry. S. Swaminatha Ayyangar and commenced operations at Vizianagram in October 1920. It visited five weaving centres, viz., Vizianagram, Nellimarla, Rajam, Boddam and Kancharam and introduced 36 shuttle slays and 37 shuttles valued at Rs. 227. A demonstration of the improved warping mill and fly shuttle slays with weavers' beams was given at Vizianagram and Rajam and aroused considerable interest.

70. *Party No. III.*—This party was organized by M.R.Ry. V. Hanumantha Rao, Weaving Assistant, during the year and commenced work at Adoni in the Bellary district on the 15th December 1920. After a preliminary investigation of the chief weaving centres in the Adoni division, a demonstration of improved weaving appliances and accessories was given at Yemmiganuru and Kosigi. The party introduced 41 shuttles and 2,050 pirns in seven villages. The assistance rendered by the Chairman of the Municipal Council, Adoni, in securing for the party a suitable building in the town for demonstration purposes is gratefully acknowledged.

71. *Party No. IV.*—This party was also organized during the year by Mr. V. Hanumantha Rao and commenced work at Pullampet in the Cuddapah district on the 1st December 1920. After completing the usual preliminary survey of the most important weaving centres, the party commenced operations in January at Pullampet and Madhavaram. The party visited five villages altogether in the last three months of the year under review and introduced *inter alia* 10 slays, six shuttles, six dobbies and 225 pirns. The work of this party

was considerably interfered with by an outbreak of cholera in epidemic form at Pullampet. The party received considerable assistance there from M.R.Ry. Nookala Venkatasubbayya Garu, a leading member of the weaving community.

72. *Party No. V.*— Party No. II, which had been working in the Anantapur district since 1919–20, continued to work in the same area throughout the year under review, first as Party No. II until the end of October 1920, and subsequently as Party No. V. It visited 66 villages of which 36 villages were visited for the first time and the remainder re-visited on request. The party introduced a large number of improved appliances and accessories, including 430 slays, 601 shuttles, 22,054 pirns, 80 dobbies, 64 English healds, 4,910 wire healds, two pit looms, one frame loom and two sash looms. The party participated in the Industrial Exhibition which was held at Nandyal in January 1921.

73. *Parties Nos. VI and VII.*—M.R.Ry. K. Swamy Pantulu, who was in charge of Party No. II, which was working in the Anantapur district, was withdrawn from that party in October 1920 in order to organise Parties Nos. VI and VII to operate in the Chittoor and North Arcot districts. Party No. VI commenced work in the Chittoor district on the 1st of November 1920 and operated in two areas at Pedda Tippasamudram and Vayalpad from which centres they visited 33 villages in the vicinity and introduced 39 fly shuttle slays, 64 Madras roller shuttles, 12 Madras plain shuttles, two dobbies and 2,275 pirns of a total value of Rs. 458. The party took advantage of the weekly shandies at Vayalpad and Chintaparti to which places weavers come from long distances to give demonstrations of improved appliances and accessories. Party No. VII, which consisted of one weaver maistri only, commenced work in the North Arcot district on the 12th November 1920. It visited four villages and introduced 18 slays, 41 Madras roller shuttles, 1,475 pirns and two dobbies.

The Weaving Superintendent maintained close touch with the local Assistant Registrar of Co-operative Societies with the result that two weavers' societies were started, one at Greamspet and the other at Vadiayangadu. The former society was started on the 2nd March 1921 with 37 members and a paid-up capital of Rs. 830, the value of each share being Rs. 25. The latter, which was started on the 17th February 1921, has 17 members on its rolls and a paid-up share capital of Rs. 350, the value of each share being Rs. 25. The societies are arranging for the co-operative purchase of yarns for their members.

74. *Madura Institute weaving section.*—In G.O. No. 308, Development, dated 22nd February 1921, Government approved the proposal of the Director to utilize the weaving section of the Madura Industrial Institute for the following purposes:—

(1) For training head maistris and maistris of peripatetic weaving parties;

(2) for training teachers in weaving employed in schools;

(3) as a central distributing agency of slays and other improved apparatus connected with the hand-loom industry;

(4) as a central distributing factory for the supply of looms and special warp and weft preparation machinery;

(5) for the preparation of warps for sale to weavers; and

(6) as a permanent museum of all types of hand-woven fabrics, improved looms and accessories.

One of the Weaving Assistants, Mr. M. R. Krishna Ayyar, was engaged in supervising the manufacture of improved weaving appliances and accessories at the Institute and also in the training of the head maistris, maistris and weavers required for the additional weaving parties in the manipulation of the improved appliances and processes of hand-loom weaving.

Mr. Amalsad's proposals to establish a Textile Institute at Madras were still under consideration at the close of the year.

75. *Improvements in weaving machinery.*—The Weaving Expert devoted considerable attention during the year to devising improvements in weaving machinery and appliances and to organizing and placing on a satisfactory basis the departmental manufacture of such appliances. A number of working drawings were made and the manufacture of model looms and improved appliances, including winding, warping and sizing machines required for the several peripatetic weaving parties, was undertaken at the Madura Industrial Institute.

Twelve pit looms were constructed to weave coarse and fine cotton cloths, figure-bordered sarees, Madras handkerchiefs, lungis, solid bordered sarees, shawls, etc. Two special looms for weaving coir brush mats and matting were made, as well as two looms for weaving *kora* grass mats and six frame looms for weaving Turkish and honeycomb towels, damask goods and jacquard weaving.

The first set of improved appliances attracted much attention and several orders for various types of machinery were received from the public, but as the requirements of the weaving parties could not be fully met, the execution of these had unfortunately to be deferred.

76. *Weaving Schools.*—Instruction in hand-loom weaving is given in many industrial schools in this Presidency, but it is conducted on primitive lines, and the question of winding and warping does not receive much attention while sizing, which is of the first importance,

is entirely neglected. To overcome the difficulty experienced by many school authorities in arranging for their yarn to be sized, a simple type of hand-sizing machine was devised. The machine has been installed at the Wesleyan Mission Industrial school, Karur, and the results obtained from it will be watched with considerable interest.

77. *Text-books.*—The absence of suitable text-books on weaving subjects has been felt, and, in order to supply this deficiency, the Weaving Expert proposes to prepare a series of pamphlets dealing with warp and weft preparation, hand-loom weaving in cotton and silk, design and cloth structures and textile quantities and calculations which, it is hoped, will be published during the ensuing year. The Publicity Bureau have undertaken to translate the pamphlets into Tamil and Telugu and to bear the cost of their publication.

78. *Exhibitions.*—A set of improved weaving machines and appliances were exhibited at the Industrial Exhibition held at Mangalore from the 27th to 30th December 1920 and demonstrations were given of the machinery in operation. The weaving branch was awarded a gold medal for the improved appliances exhibited at the Mangalore Exhibition. The weaving branch also participated in an Industrial Exhibition at Nandyal in January 1921 and most of the appliances exhibited were subsequently purchased by the Nandyal Municipality.

79. *Kiers.*—For the small hand-loom weaving-factories on the West Coast which no peripatetic party has yet visited a simple and cheap type of boiling kier for dyeing yarns which circulates the liquor efficiently and gives a good result in practice was designed and constructed to replace the crude brass vessel in general use. Automatic denting hooks which completely remove all visual labour when drawing the warp threads through the reed were introduced for the first time at Cannanore and elsewhere.

80. *Hosiery.*—The possibility of introducing hosiery as a home industry was also considered and two knitting machines were purchased by the department on which trials and experiments are proceeding while at the same time men and women operatives are being trained. A number of inquiries were received from persons desirous of starting power driven banian knitting factories. Plans and estimates were prepared for plants of various capacity but owing to the keen Japanese competition it is doubtful whether a factory could be successfully run on commercial lines, unless a spinning and bleaching mill is attached to it. Owing to the high cost of machinery prevailing during the year these projects have not advanced.

81. *Lungis and Madras handkerchiefs.*—These were hitherto manufactured on single box slays and the time lost to the weaver by reason of his having to change the shuttles frequently to replace one by another with a different coloured weft was considerable. Mr. Amalsad has designed an appliance to overcome this difficulty and multiple box slays have been constructed and introduced which have given good results in practice.

A beaming machine has also been evolved whereby any desired scheme of coloured yarns can be arranged to give an equal distribution of tension for each thread, and the opening of the yarns from the ball form into a sheet form and the winding of them upon a weaver's beam, is facilitated. This machine which is simple in construction and has given excellent results in practice dispenses with the services of four operatives.

82. *Ellore carpet industry.*—The pile carpet industry at Ellore and Masulipatam and the *cumbly* industry have suffered greatly in recent years owing to the difficulty experienced in securing supplies of soft and even yarns.

Plans and estimates for the establishment of a woollen spinning mill were prepared during the year but although endeavours were made to interest capitalists in the project, the financial outlook prevented any development in this direction.

83. *Spinning mill at Coimbatore Jail.*—At the request of the Inspector-General of Prisons, the Weaving Expert prepared plans and estimates for a spinning mill with 3,600 spindles which may be increased to 15,000 if and when occasion arises.

Chemical Industries.

84. Dr. Marsden returned from leave early in April but as no suitable laboratory was available in which he could work at Madras arrangements were made for him to work at the Indian Institute of Science at Bangalore. In G.O. Mis. No. 2194, dated 14th December 1920, Government approved the proposal of the Director to change Dr. Marsden's designation to that of Industrial Chemist.

Mr. K. C. Srinivasa Ayyangar, Assistant Chemist, having been appointed as a probationer in the general list of the Indian Audit Department, was relieved of his duties in this department on the 24th March 1921.

85. *Dyes.*—As stated in the Intelligence section of this report the difficulties experienced during the previous year in securing adequate supplies of alizarine dye, continued almost throughout the year. It was only in March 1921 that the British Alizarine Company were able to advise that they would henceforth be able to supply India's requirements in full while supplies also began to

arrive from America and Germany and the shortage from which the market has suffered from so long may now be considered definitely at an end. Some time must necessarily elapse, however, before trade conditions become absolutely normal again.

Manufacturers in Europe and America are devoting increasing attention to the Indian market, which as is well known was before the war mainly supplied from Germany. The conservative Indian dyer is inclined to prefer the specific brands to which he was accustomed before the war and alternative makes are, and will for some time continue to be, received with a certain amount of suspicion. For this very reason the demand for German Reparation aniline dyes allotted to India was inconsiderable owing to the large variety of dyes received many of which were unknown to Indian dyers and therefore not readily absorbed.

The utilization of indigenous dyes does not appear to have increased appreciably as the result of the shortage of foreign dyes and the demand is still chiefly for suitable synthetics. A complaint having been received from silk dyers that they could not obtain sufficiently fast dyes for their purpose, sample dyeings with available indigenous colours were prepared and submitted to them. Dyeings with lac dye, on cotton mordanted with alum and tin, were submitted to an inquirer interested in the product.

The authorities of the Coimbatore Jail were desirous of starting khaki dyeing to meet the requirements of certain Government departments for khaki cloth, but were advised that the jail could not be expected to produce cloth of the required market standard of fastness and finish.

A number of comparative trials were made during the year, and advice given in regard to the suitability of dye-stuffs for specific purposes; assistance was also rendered in an interesting investigation carried out in the Indian Institute of Science, Bangalore, upon the conditions prevailing in the indigenous indigo dye-vat. Doctor Marsden was consulted with regard to the effluent from a dye factory; samples of the effluent were tested, the treatment for purification prescribed, and plans for the necessary installation prepared.

86. *Miscellaneous inquiries.*—The Salt and Abkāri Department have been manufacturing table salt on an experimental scale for the last few years, and it was suggested that the manufacture of this product from sea salt would be a suitable investigation for this department to undertake. While the matter was under consideration, it was brought to notice that a company had been formed in Madras to take over and develop a factory which had already been established and the proposal was not therefore proceeded with.

The suitability of Madras as a centre for the manufacture of certain necessary chemicals was also considered in connexion with an inquiry into the question of the utilization of the saline soils of the Presidency. The investigation that was carried out indicated that as a source of carbonate of soda, these saline soils are of no value as raw material, as they did not appear to contain more than one per cent of alkali. The prospect of the development of a heavy chemical industry in Madras is remote owing to the absence of many of the essential raw materials and the high cost of fuel.

The fish guano industry on the West Coast is handicapped by the difficulty experienced in drying the product during certain seasons of the year. A simple form of drying arrangement was suggested for trial to the Fisheries department.

In view of the difficulties caused by extended growth of prickly-pear in certain districts and the expenditure required to keep the growth under control, an investigation was commenced with the object of determining whether any means could be devised for the utilization of the plant or for diminishing the cost of its eradication. The fibre content is small and unsuitable for paper and the carbohydrate content and its nature does not afford much prospect of its use as a source of alcohol.

87. *Power alcohol.*—The Industrial Chemist was engaged during the latter part of the year in carrying out inquiries in connexion with the production of power alcohol. As a preliminary to the consideration of the question, the Indian Trade Commissioner was requested to place the department *an courant* with the course of investigations in England, and to indicate the directions in which Doctor Marsden could be of assistance. Mr. Chadwick replied to the effect that Sir Frederick Nathan, the Power Alcohol Investigation Officer, desired to know on what part of the problem the department proposed to work, and was informed that the department would be prepared to assist in carrying out researches for the Fuel Research Board in the following directions:—

(*a*) compilation of information regarding the products available;

(*b*) specific experiments with reference to tropical products available in this Presidency;

(*c*) experiments under tropical conditions regarding the use of mixtures or denaturants;

(*d*) by acting as official intermediary between the Power Alcohol Committee and the Department of Bio-Chemistry at the Indian Institute of Science, Bangalore, in connexion with the investigation of alcohol production by direct fermentation of cellulose,

These investigations are proceeding, and inquiries have been instituted with a view to decide in what directions the power alcohol resources of the Presidency could be utilized. Vegetable products containing starch or sugar are suitable raw materials but in India, as in other countries, they are food products and as such have a value which precludes their economic use for the manufacture of alcohol. Information in regard to the quantities of alcohol available from Mohwa flower and other products is being collected, but it is not anticipated that the supplies of such materials will be sufficient to provide for the needs of a large industry. In America and elsewhere experiments are proceeding upon the manufacture of spirit from wood and other waste materials and in such directions would appear to lie the solution of this vital problem.

It has been considered that the forests of the Madras Presidency have great potentialities as regards the supply of raw materials for the wood pulp and paper industries, and the Industrial Chemist has prepared a bulletin on the subject of 'Paper and Pulp Production in the Madras Presidency' which outlines the principles of manufacture and summarizes the information available in regard to the available local supplies of raw materials. This report will shortly be published as a Bulletin of Indian Industries and Labour.

88. *Glue.*—As a result of experiments in the manufacture of glue which were undertaken by this department, arrangements were made for the transfer of a small experimental factory in Washermanpet to Messrs. Beardsell & Co. with a view to manufacture on a commercial scale. The terms of this arrangement were still under discussion at the close of the year. A tannin extract plant at the Research Factory at Maihar was purchased from the Government of India, and installed in the factory while the balance of the plant required to enable manufacture to be commenced was mainly constructed in the Public Works Workshops. Mr. Chinnaswami Ayyangar who held a scholarship granted by the Madras Government for the study of Applied Chemistry at the Indian Institute of Science was appointed Superintendent of the factory by Messrs. Beardsell & Co.

Mr. K. C. Srinivasa Ayyangar continued his research work on glue and gelatine in the laboratories of the Presidency College, the King Institute, Guindy, and the Indian Institute of Science, Bangalore. The result of his further investigations were published in a paper which has been printed in the Journal of the Indian Institute of Science and awarded the Sir William Wedderburn Research Prize of the University of Madras He also delivered a series of public lectures on Madras Chemical Industries under the auspices of the Publicity Bureau and attended the Indian Science Congress

at Calcutta where he read a paper embodying the results of his researches during the year on glue and gelatine.

Kerala Soap Institute.

89. The Kerala Soap Institute at Calicut (formerly known as the Government Soap Works) was in charge of Mr. A. K. Menon, Soap Expert and Oil Chemist, throughout the year. The year opened with a stock of 120 tons of soap; 225 tons of all classes of soap were manufactured during the year, and 234 tons valued atRs. 1,77,180 were sold as compared with 386 tons in 1919–20, leaving a balance of about 110 tons in stock on the 31st March 1921. The demand for soap was not maintained at the level of the previous year and there was a corresponding reduction in outturn. The falling off in the demand is attributable to the increase in the price of soaps consequent on the rise in the price of raw materials and to the competition of foreign soaps which were imported and stocked, when the rate of exchange ruled in favour of importers. The competition of cheap and spurious imitations of soaps produced in the factory also began to be felt for the first time. About 6 tons of milled toilet soap were sold as against 11½ tons in the previous year and 6 tons and 6 cwts. in the year 1918–19.

There was a good demand for insecticidal soaps made from fish oil, for use by planters and horticulturists. The Government Entomologist, Coimbatore, distributed considerable quantities of these soaps among mango-growers to combat the mango hopper pest. Information was circulated regarding the uses of these soaps and their prices through the medium of the Publicity Bureau. The demand for textile soaps from the cotton mills showed a reduction.

The system of selling the products of the factory through the agency of three travellers with headquarters at Calicut, Madras and Masulipatam respectively was continued during the year. The West Coast traveller was successful in introducing a considerable volume of business during the year in spite of the unfavourable conditions of the market; the volume of orders obtained by the Madras traveller was not so satisfactory, while the amount of business introduced by the traveller for the Telugu districts was very disappointing.

90. *Profit and Loss.*—A gross profit of Rs. 47,405-1-9 was made during the year but the working expenses including depreciation amounted to Rs. 49,891–2–0 leaving a balance of Rs. 2,486–0–3, net loss on actual working. To this amount must be added a sum of Rs. 7,523 for overhead charges and other expenses not actually incurred thus making the total debit Rs. 10,009–0–3. The correctness of the valuation of materials as on the 31st March 1921 has been questioned by the auditors, and the debit therefore is likely to be increased, when stocks have been written down to the values.

obtaining at the close of the year. The establishment charges exceeded those of the previous year by Rs. 4,904 and rents and taxes by Rs. 1,614 while other charges remained more or less stationary although the sales represented only 60 per cent of those of the previous year. In addition to the reasons given in paragraph 89 supra the two causes which, according to the Superintendent chiefly contributed to the disappearance of the profits, were (1) the inadequate provision for advertisement the provision for which was reduced from Rs. 4,000 to Rs. 1,000 and (2) the policy of the late Director which favoured greater attention to instruction than to the expansion of the commercial side of the factory.

It is doubtful whether the latter of these appreciably affected the volume of sales, with the factory in its present site and its very limited accommodation for students. On the question of policy my view is that unless the Institute is run on commercial lines and pays its way, the public will not take up the manufacture of pure soap as a money making proposition and until they do so it is premature to provide teaching facility to students at Calicut, for they will find no employment when they are trained. So far, nearly all our imitators have not scrupled to produce adulterated soaps, which gives them a temporary success as of course they can undersell pure soaps, but the day of reckoning, though delayed, is inevitable. The accounts of the year 1920–21 were audited by Messrs. Fraser & Ross, who expressed general satisfaction at the way in which the books were maintained. The Institute incurred two bad debts during the year consequent on the failure of two Madras firms, one of which had transacted business with the Institute for several years.

91. *Instruction.*—It was not possible in the year under review to extend the instructional side of the factory, or to make any appreciable progress in the training of soap managers, foremen, and chemists owing to the lack of accommodation, equipment and staff. Applications for admission to the factory for training were received in large numbers from persons in all parts of India, Burma and Ceylon interested in soap manufacture, but the great majority of these had to be refused owing to the lack of facilities for training. Estimates and plans for the new factory at Calicut are, however, in an advanced stage of preparation and when the new buildings are completed, it will be possible to take up in earnest the training of men in soap manufacture, provided that they satisfy the Superintendent that they have the means to start factories of their own, or have found capitalists to back their experiments.

92. *Small factories.*—A large number of small factories have come into existence on the West Coast and elsewhere during the last few years, but the products of these factories are generally inferior, and, in many cases, positively injurious. The Superintendent was

requested to inspect as many of these mushroom concerns as possible and to assist the owners with advice and suggestions, making analyses of the soaps they turned out and pointing out how mistakes in the processes could be rectified. The Superintendent was unable to find time to make regular inspections, but some improvement has already been noted as a result of occasional visits by himself and his assistants. It is unfortunate that the petty manufacturers of genuine soaps experience considerable difficulty in disposing of their products in competition with grossly adulterated soaps. It seems as if, in certain quarters, it is a case of cheap soap or none.

93. *Staff.*—The number of orders registered in the office of the Institute amounted to 2,280, and the number of invoices and letters despatched, to 2,058 and 11,631 respectively.

An appointment of head clerk was sanctioned during the year, and Mr. A. P. Karunakaran, the book-keeper and head accountant, was appointed to the post, the ledger clerk K. Narayana Menon being promoted to book-keeper in his stead.

There were no changes in the superior staff. Mr. P. Kanna Kurup continued his studies at the Indian Institute of Science. Four Madras Government scholars who are undergoing a course of Oil Technology at Bangalore were admitted for a short course of training during their vacation, and the practical experience which they gained in the manufacture of soap should prove of value.

The factory staff was reduced by 20 owing to the general trade depression, and the consequent falling off in the demand for soaps and reduction of output.

94. *Laboratory.*—The work of the laboratory increased considerably during the year. A large number of samples of oils, soaps and candles being sent for analysis and advice. The Sericultural Expert sent some silkworm chrysalides for the ascertainment of their oil content which proved disappointingly small. Further tests will be made when better samples are obtained. Advice was given to several enquirers in regard to improving their methods of manufacturing soap and candles.

95. *Exhibitions.*—The products of the Institute were exhibited at two exhibitions during the year, one at Mangalore and the other at Tellicherry, where they attracted much attention. The Institute was awarded gold medals for their exhibits of soap at both places. A representative range of soaps manufactured at the Institute was shown at the Mahamakham festival at Kumbakōnam and this exhibit resulted in the sale of considerable quantities of soap.

96. *Extensions of plant.*—The glycerine recovery plant which was ordered from England over four years ago arrived during the year, but owing to the lack of accommodation it cannot be erected

and utilized pending the construction of new factory. The position in respect of the causticising plant received from the Public Works Department Workshops is similar, as this plant cannot be erected until the new factory has been completed. Large stocks of soda ash which have accumulated will be converted into caustic soda when the causticising plant is installed in the new factory. The installation of the glycerine plant will add considerably to the profit of the factory as the failure to recover this valuable by-product is not only wasteful, but involves a considerable financial loss.

97. *Miscellaneous.*—Mr. A. K. Menon spent 54 days on tour. He attended the Conference of Officers of the Department of Industries at Madras in January and delivered a lecture on Soap manufacture at the Anderson Hall. He also wrote the draft of an article on the "Cold process of Soap manufacture" which is now in the press.

GOVERNMENT INDUSTRIAL INSTITUTE, COONOOR.

98. *Staff.*—The object of starting this Institute is to create an organized fruit-preserving industry on the Nilgiris, and at the same time to encourage an extension of existing fruit culture. The preliminary experiments, to which reference was made in last year's administration report, were carried on in Sir Frederick Nicholson's residence, and the plant was domestic in character. The Lady Manager, Miss Channing Pearce, proceeded to England in May 1920 on deputation to extend her knowledge of the subject, to study the latest methods and processes of manufacture and to arrange for the purchase and shipment of the necessary plant required for manufacture on a commercial scale. She is due to return in the middle of September after a visit to the fruit-crystallizing factories on the Riviera. The land for the proposed factory was selected and acquired at Coonoor, and the construction of the Institute building has, since the close of the year, been commenced under the supervision of the Industrial Engineer. It is hoped that the factory will be completed and the plant installed early next year when manufacture on a commercial scale will begin. Sir Frederick Nicholson proceeded to England in September 1920 and returned in March 1921. During his stay at home Sir Frederick inspected a number of fruit-preserving factories and the works of several machinery manufacturers, and arranged, in consultation with Miss Channing Pearce, for the supply of the requisite plant for fruit-preserving.

99. *Experiments.*—The chemist in charge of the Industrial Laboratory conducted a number of useful experiments with pectiniferous materials for the production of jelly which it is anticipated will prove useful, when the manufacture of preserves is undertaken at the Institute. Sir Frederick Nicholson also directed his efforts to propaganda with a view to the development of fruit culture on the

Nilgiris, as a regular supply of good fruit within a reasonable radius is essential to the success of the factory. Various land-owners have declared their readiness to raise quick-growing fruit-crops, as well as orchard trees. The Agricultural Department has greatly enlarged the nucleus orchard in Sim's Park reserve and is, it is understood, contemplating further developments. It will be necessary, however, to take further steps in regard to the organization of fruit supplies.

100. The gross expenditure on the Industrial Institute, exclusive of the cost of Miss Channing Pearce's deputation, during the year amounted to Rs. 414–13–3; the receipts were Rs. 484–3–3.

INDUSTRIAL LABORATORY, COONOOR.

101. The opening of this laboratory is due to the untiring zeal of Sir Frederick Nicholson, the subjects proposed for investigation in the first instance being inks, adhesives and vinegar. Mr. Pinto, Assistant Director, Coimbatore division, was in charge of the laboratory during Sir Frederick's absence in Europe and an improved furnace for boiling inks and a vinegar plant were erected under his supervision. M.R.Ry. S. Venkatarama Ayyar continued as Chemistry Assistant throughout the year. The laboratory remained in the unsuitable and very confined quarters of a house rented for the purpose.

102. *Inks.*—The further investigation of high grade inks, such as those commonly known as 'blue-black writing fluids' was proceeded with. A number of experiments were made, and certain formulæ having given promising results, a commencement was made with the manufacture of ink on a commercial scale. Sir Frederick Nicholson has been successful in producing inks, which, he claims, after laboratory tests, practical, microscopic and chemical, to be equal in quality to the standard imported inks. Considerable difficulty was at one time experienced in obtaining supplies of blues of a satisfactory quality but abundant supplies are now coming forward. The question of containers is proving a more persistent difficulty, as it seems doubtful whether bottles of the requisite appearance and shape, and of uniform size, quality and capacity can be obtained in India. A quantity of stoneware jars, sufficient for present requirements, was obtained from Messrs. Parry & Co. Quotations are being invited from English manufacturers for glass bottles, and at the same time experiments are under contemplation with a view to developing the local manufacture of stoneware and earthenware jars suitable for inks, vinegar, jams and spices. A considerable proportion of the cost, and much of the difficulty of ink manufacture, lies in the proper maturation of the ink. Ordinarily high class writing fluids require several months to prepare

and mature during which period important chemical changes and sedimentation take place; and this again involves the provision of storage facilities on a considerable scale and elaborate plant and in consequence the locking up of capital. The experiments that have been made up to the present indicate a successful abbreviation of this period without any reduction in quality.

Second-class inks can be manufactured comparatively cheaply, but the difficulty of containers is greater than in the case of high class inks, since the value of the ink is disproportionate to that of the containers. In a tropical climate it is necessary that even second-class inks should have the characteristic of fluidity and experiments at the laboratory to this end have been very successful.

103. *Adhesives.*—This investigation has been hampered by the want of suitable raw material. Casein cannot be obtained in Coonoor nearly so cheaply as in Bombay where experiments in the manufacture of adhesives from this material have been very successful. In the absence of accommodation and apparatus, the preparation of dextrin has not been attempted, while the preparation of sealing waxes has been deferred for the present owing to the prohibitive price and inferior quality of the lac available.

104. *Vinegar.*—The plant for the manufacture of vinegar was set up and a few gallons of good vinegar were made during the absence in England of the Honorary Superintendent, but whether from undue heating or other cause, the whole of the bacteria in the generator suddenly died and the experiment was discontinued pending Sir Frederick Nicholson's return. It is very difficult to control the experiments in vinegar manufacture in the godown available and improved accommodation is needed. Three new small generators of laboratory size have, however, been set up and experiments are proceeding.

105. For the purposes of the Fruit Preserving Factory several of the available sources of pectin were examined practically and with a considerable degree of success. Pectin can be most economically made from such citrous fruits as are either non-edible or are not ordinarily eaten. The Director of Agriculture has kindly undertaken to make special inquiries in the Nilgiris and Shevaroys as to any such possible sources of pectin, the quantity available, and the price at which it could be obtained. The Director of Agriculture is also collecting information in regard to supplies of edible citrous fruits such as oranges and lemons.

106. The gross expenditure on the Industrial Laboratory during the year amounted to Rs. 9,324-5-0, and the receipts were nil, but a stock of 1,400 gallons of ink was in hand at the end of the year and arrangements will shortly be made to place this stock, and that which has accumulated since the close of the year, on the market.

PALLAPALAIYAM SUGARCANE CRUSHING FACTORY.

107. In accordance with G.O. Mis. No. 1926, Revenue (Special), dated 3rd November 1920, the conduct of the experiments at the sugarcane crushing factory at Pallapalaiyam were transferred from the control of the Director of Agriculture to that of the Director of Industries.

The crushing station was first started by Mr. (now Sir) Alfred Chatterton in 1912 and the objects of its establishment were as follows:—

(*a*) to evolve a suitable design of furnace capable of boiling the cane juice into jaggery with megass as fuel, thus rendering any additional or other fuel unnecessary;

(*b*) to demonstrate to agriculturists the increased percentage of extraction of juice from sugarcane which results from the use of power-driven mills in the place of bullock driven iron mills;

(*c*) to determine the smallest economical size of power plant by which jaggery can be manufactured at a rate lower than that produced by bullock-driven mills and country furnaces.

108. In 1914, after a number of experiments, an improved furnace was produced in which megass and trash could be used without additional wood or other fuel and various further improvements have been carried out from time to time. As a result of experience gained during the year under review, and with a view to improve still further the existing furnace, arrangements are being made for air gratings to be fitted sloping away from the chimney and for the insertion of partitions to retain the hot gases in the furnace for a longer period so as to ensure their imparting an increased percentage of heat to the upper pans. It is hoped that this will result in a further considerable saving in the consumption of megass and trash.

109. The factory commenced work for the 1920–21 season on the 21st August 1920 and continued in operation until the 10th December 1920, i.e., for 92 full working days or 905 hours. Altogether 638 tons of cane were crushed from which about 500 tons of juice were obtained, and 103½ tons of finished jaggery produced. The accounts show that the receipts amounted to Rs. 2,717-2-4 and the expenditure to Rs 4,553-15-9 leaving a debit balance of Rs. 1,836-13-5 on the seasons working.

110. The ryots have been charged a uniform rate of Rs. 3 per pothi of 260 lb. for manufacturing jaggery during the last three years, in spite of the fact that the price of jaggery has risen from Rs. 16 to Rs. 25 per pothi in 1918–19 to from Rs. 50 to Rs. 65 per

pothi in 1920-21. The ryots agree that the departmental rate of Rs. 3 per pothi is lower than their own and also admit that the quality of the jaggery made is superior to that produced in the country mill. The rate for the current campaign has been enhanced to Rs. 3-8-0 per pothi.

111. It cannot be claimed that up to the present the experiment has been a success. Indeed in most seasons the factory appears to have worked at an actual loss. The inability to show a profit is only partly attributable to the fact that the rate charged to the ryots for manufacturing jaggery was too low. In most years operations were started too late in the season and no megass was stored at the end of the previous year for use at the commencement of the following season. The lack of success is chiefly due however, to the disappointing percentage yield of extraction obtained. The results obtained up to the present from the three-roller mill installed in the factory show little improvement on that obtained from the ordinary iron bullock-driven mill. Proposals have therefore been submitted to Government for the installation of a five-roller mill to improve the percentage of extraction. It is anticipated that the five-roller mill should give an extraction of about 75 per cent as compared with 66 per cent with the existing mill.

Industrial Education.

112. *Staff.*—Mr. W. Fyfe continued as Inspector of Industrial Schools throughout the year and did most valuable work. He spent 87 days on tour and in addition to inspecting the Aided Industrial Schools, the Madura Industrial Institute and the Madras Trades School, visited during the course of his tours several of the principal jails and Criminal Settlements.

113. *State Technical Scholarships.*—At the instance of the Finance Committee of 1919, the Government requested the Director of Industries to report, in consultation with the State Scholarship Selection Board, whether it was necessary to institute scholarships from Provincial funds for study abroad on conditions similar to those hitherto awarded by the Government of India. The Board of Selection considered this desirable and the Government accepted their recommendation and sanctioned the institution of four additional scholarships of the value of £250 payable from Provincial funds. Under this scheme the number of scholarships held at any one time is limited to four, and they are filled up as vacancies occur. In addition to the Government of India State Technical Scholarship already held by a Madras student, the Government of Madras awarded three scholarships from Provincial funds during the year for study abroad. The three selected candidates sailed for England during the year.

Considerable difficulty is now being experienced in securing for the State technical scholars adequate facilities for practical training in factories abroad. A good illustration of these difficulties is afforded by the case of Mr. P. Kanna Kurup to whom a scholarship was awarded for the study of hydrogenation of oils. Mr. Kurup had already received a sound theoretical training at the Indian Institute of Seience, Bangalore, and what he required was practical training in works under commercial conditions. It has been found that facilities for practical training in the manufacture of oils and fats are extremely difficult to obtain, and although further inquiries into the possibility of securing for Mr. Kurup admission into suitable works are proceeding, it is doubtful whether he will be able to obtain the requisite practical training in Europe or America. Pending the result of these inquiries, his scholarship has been held in abeyance. It has also been found extremely difficult to secure Indian students admission into tanneries and leather works abroad for practical training. Endeavours are, however, being made through the good offices of the High Commissioner to secure greater facilities for the training of Government technical scholars in factories in the United Kingdom than are at present obtainable.

Mr. K. Seshachala Nayudu, to whom a Government of India State Technical Scholarship for the study of the chemistry of leather had been awarded during the previous year, left for England in July 1920.

Of the four Government of India State Technical Scholarships allotted to this Presidency, one fell vacant during the year, and was awarded to Mr. G. Sundram Ayyar for the study of hydro-electric engineering. He left Bombay for England in May 1921.

114. *Indian Institute of Science Scholarships.*—The eight scholarships granted in the previous year for the study of applied chemistry at the Indian Institute of Science, Bangalore, were increased in value from Rs. 50 to Rs. 60 per mensem and four additional scholarships were awarded. The object of the institution of these scholarships is the provision of adequate facilities for the technical training of well-educated young men of the Presidency for employment in chemical industries. Two of the scholars relinquished their scholarships during the year, one to take up an appointment in the Glue Factory at Madras conducted by Messrs. Beardsell and Company and the other to conduct research work on behalf of a Calcutta firm. In view of a probably large demand for industrial chemists, this system of awarding scholarships has, since the close of the year, been placed on a permanent basis and the number has been increased to 18.

115. *Victoria Jubilee Technical Institute Scholarships.*—Three scholarships of the value of Rs. 30 per mensem tenable in the

Victoria Jubilee Technical Institute, Bombay, were awarded during the year, one for the study of Sanitary Engineering and Plumbing, one for the study of Technical and Applied Chemistry and the third for the study of Textile Manufacture. These scholarships have never been popular, and in no year, since the scheme was inaugurated have all the scholarships been taken up. In the previous year two of the three scholarships awarded were relinquished at the last moment, while during the year under review the three selected candidates gave up their scholarships before commencing the course. There is little doubt that the real cause of their unpopularity is the inadequate value of the scholarships and unless they are enhanced to correspond more closely to the cost of living in Bombay the difficulty of finding students to take them up is likely to persist.

116. *Industrial School Scholarships.*—In previous years it has been the practice to award about 200 scholarships annually to pupils in Aided Industrial Schools. These scholarships varied in value from Rs. 1-8-0 to Rs. 9 per mensem and were awarded for one year only on the basis of the then existing Government Technical Examinations. The Government Technical Examinations in wood-working and metal-working have, however, been recently discontinued and the examinations in the other subjects, in which instruction is imparted in assisted schools, do not constitute an ideal basis on which to award scholarships. Accordingly during the year under review, the system governing the award of scholarships in Industrial Schools was reviewed and revised. The new system provides for the award of 60 scholarships per annum, tenable for any pre-arranged period up to five years, and increasing in value from Rs. 1-8-0 to Rs. 7-8-0 per mensem. The scholarships are moreover tenable not only in aided industrial schools but also in mills and workshops where arrangements can be made for the provision of classes during working hours in subjects likely to improve the value of the apprentices as workmen and operatives. The scholarship is further augmented by a bonus of the value of two months' average scholarship for each year of apprenticeship for such scholarship-holders as satisfactorily complete the period of apprenticeship or training previously arranged. It is hoped by means of these scholarships and bonuses to assist employers, who are prepared to experiment with classes in working hours for the benefit of their employees, to retain the apprentices and young learners in their works for a sufficiently long period to complete their training, and as a result to check the present wastage caused by the migration of adolescent labour from one factory to another in search of a small enhancement in wages to the detriment of their training and inconvenience of their employers.

117. *Madras Trades School.*—The Government Trades School, Madras, which was started in 1916 as an experimental school o

afternoon classes for apprentices engaged in the engineering and plumbing trades in Madras, more than maintained its early promise during the year under review. It has now 250 students on the rolls and provides instruction in mechanical engineering, electric wiring, plumbing, minor sanitary science, practical mathematics, machine drawing (a three years' course for English-speaking students, and a two years' elementary course for vernacular metal-workers), building drawing for brick-layers and plumbers, wood-work drawing for wood-workers.

The development of the School has been restricted owing to the fact that it has been conducted in a rented building, the accommodation of which is quite inadequate. A fully equipped workshop and a small demonstration foundry are urgently required and until the construction of the new buildings is complete, little further progress can be expected. A site has, however, now been secured for the erection of permanent buildings, and plans and estimates have, since the close of the year, been submitted to Government for sanction. The cost of the new buildings is estimated at Rs. 2,80,000 and the provision of the electrical installation will involve a further expenditure of Rs. 28,000. The incomplete equipment of the School, which was a subject of adverse criticism by some of the examiners, was augmented during the year by purchases from the United Kingdom of working sectional models of various types of engines, full size sectional models of machine parts, extra plumbing tools, and electrical and mechanical apparatus for demonstration purposes. The various courses of study have also been revised and the subjects are now grouped into courses. Ordinarily an apprentice is required to take a complete course extending over the full period of his apprenticeship, which in most workshops in Madras is now fixed at five years.

Mr. H. M. Winckler was Superintendent of the School until the 1st August 1920, when consequent upon his appointment as Superintendent of Chengalvaraya Naicker's Technical Institute, Madras, he resigned and was succeeded by Mr. N. M. Adyanthaya. Mr. V. Jagannadha Ayyangar continued as assistant lecturer throughout the year. Two additional temporary lecturers were appointed during the year.

118. *Perambur Branch Trades School.*—The branch of the Trades School, which was established last year in connexion with the Perambur Railway Workshops of the Madras and Southern Mahratta Railway, also developed satisfactorily. Two separate courses are now conducted to suit the varying educational attainments of the apprentices employed in the works. One course has been arranged for boys with a good general education, of which there are a fair number, and the other for apprentices whose lack of knowledge of

mathematics would prevent them from deriving any benefit from the higher course. About 100 apprentices employed in the works receive four hours' training per week during working hours in machine drawing and mechanics, but if extra accommodation could be provided, it would be possible to deal with a much larger number of apprentices. The classes conducted at Perambur furnish an interesting instance of the value of co-operation between the Department of Industries and a large works organization. The Railway authorities provide the building and equipment and arrange to send their apprentices, while the Madras Trades School furnishes the trained staff required for tuition and supervision, the Railway bearing the cost of such tuition, and the cost of supervision being borne by the Trades School. The officers of the Perambur Works have evinced considerable interest in the school and are always willing to co-operate in any way with officers of the department to improve the school. The success so far achieved at Perambur is largely due to the enthusiasm of Mr. Jagannadha Ayyangar, the Senior Lecturer, who, in addition to his work in the class room, spends a considerable portion of his leisure, in arranging sports and games for the students with the idea of fostering that spirit of *esprit de corps* which is unfortunately lacking in most groups of apprentices in this country.

119. *Madura Industrial Institute.*—Mr. H. E. R. Dunhill continued as Superintendent throughout the year. Mr. V. Rama Rao was appointed as Assistant Superintendent with effect from 19th November 1920. In G.O. No. 1390, Revenue (Special), dated 29th July 1920, Government sanctioned a revised scheme for the reorganization of the Institute which involved the provision of a five years' apprenticeship in wood-working and metal working and short courses in oil-engine and motor-car driving and mechanism.

The organization of the new classes has been seriously handicapped by the non-completion of the new buildings by the Public Works Department. A commencement has, however, been made and when the hostel and warden's quarters are handed over, it will be possible to proceed with the training of an increased number of apprentices. Considerable additions have been made to the staff during the year. Difficulty has been experienced in regard to the supply of good drinking water, as the municipal water mains do not extend to the Institute and drinking water has to the carried to the Institute for the use of the apprentices and staff. Water is obtainable from wells on the site good enough for washing and industrial purposes, but it cannot be regarded as fit for drinking. The question of extending the municipal main to the Institute is under correspondence with the local authorities and it is to be hoped that it will be possible to arrive at a satisfactory arrangement.

120. *Aided Industrial Schools.*—The number of industrial schools assisted by Government during the year was 37. The subjects taught in the boys' schools included carpentry, cabinet-making, fitting, turning, moulding, blacksmithy, weaving, oil-engine and motor-car driving, and in girls' schools, mat and basket making, weaving, lace-work, embroidery and needle-work.

The number of pupils under training in these schools was 1,696. The Government grant-in-aid during the year amounted to Rs. 77,404-9-9. The schools were systematically inspected during the year and the progress of previous years has been generally maintained. The more important schools are separately noticed below.

121. *The Anjuman Industrial School.*—This school was almost entirely reorganized under a new Superintendent last year and is now in a distinctly more satisfactory state than it has been for some time past. In view of the fact that few of the boys complete the full course, endeavours are now being made to provide them with as complete a general education as possible and to give them a grounding of manual training likely to stand them in good stead in whatever trade they may take up in after-life.

122. *Chengalvaraya Naicker's Technical Institute.*—This school also shows signs of considerable improvement, the general slackness which pervaded the Institute during the regime of the former Superintendent having been to a great extent remedied, but the school had got into a very unsatisfactory condition and it will probably take the new Superintendent another year at least of hard work to bring the Institute into good working order. The want of a young and energetic Assistant Superintendent is the chief need at present. It is gratifying to note that the managing committee are supporting the new Superintendent with funds and assistance in other directions. Credit is due to Mr. Winckler for introducing the new broom without provoking friction with the old staff. The present Committee are alive to their responsibilities with regard to the Institute and the Superintendent's proposals for its further improvement and development will, I am confident, receive their sympathetic consideration up to the limit of the funds available.

123. *St. Joseph's Industrial School, Tindivanam.*—This school continues to do good work, particularly in providing competent teachers of cabinet-making and drawing for employment in other recognized industrial schools. The training section attached to the school is being extended by the construction of a new building which will provide increased facilities for the training of teachers.

124. *American Arcot Mission Industrial School, Katpadi.*—This school, which had showed little progress during the two preceding years, has been considerably improved during the year under review.

Mr. Rottschaefer, the Superintendent, returned from leave in America, and brought with him a quantity of new apparatus. When the new buildings at present in course of construction are completed, the school will be entitled to rank as one of the best in the Presidency. Mr. Rottschaefer specialises in the production of high grade furniture in preference to goods of bazaar standard, and recently supplied a considerable quantity of furniture for one of the principal social clubs in Madras, the appearance and finish of which will compare favourably with the products of the best European workshops.

125. *Wesleyan Mission School, Karur.*—This school has also progressed during the year. The Superintendent, Mr. Arnett, is a well trained practical man who possesses ideas, but is handicapped by an inadequate budget. If Mr. Arnett could command more money, a good deal could be accomplished and, now that exchange is more favourable to remittance from the United Kingdom, it is hoped that the mission may be able to place more funds at the Superintendent's disposal.

126. *Orr's Works School.*—With the assistance of Government, Messrs. P. Orr & Sons, Scientific Instrument Makers, established last year a works school to improve the education of the young boys employed by them. The practical classes are taught by the European Works Manager and the literary classes by a trained Indian teacher. The Government have supported the experiment to the extent of half the cost, and the development of the school, which has proceeded very satisfactorily, has been carefully watched by the Department. Such apprenticeships in commerical workshops supplemented by class instruction should serve to turn out a number of artisans of a good type, so urgently needed all over the Presidency, and the establishment of this school has, as was only to be expected, attracted a good deal of attention from other employers. I hope in the next administration report to be able to report that other works in Madras have followed the lead of Messrs. Orr and arranged to establish schools on very similar lines for the benefit of the young artisans whom they employ.

127. *Alvartirunagiri Industrial School.*—This school is on a modest scale, but its establishment and recognition by Government mark a distinct stage in the progress of industrial education. Hitherto, the schools assisted by the Department have been almost entirely composed of charitable or proselytising organizations maintained by missionary societies or charitable trusts, but this experiment represents an attempt made by a few public-spirited Indian gentlemen of the locality to establish, with subscribed funds, an institute for the improvement of the weaving industry. The authorities have been successful in attracting a class of youth not generally provided for by existing institutions, and it is to be hoped

that their enterprise and enthusiasm will bear good fruit and encourage others similarly situated to follow their laudable example.

School of Arts.

128. *Transfer to Department of Industries.*—In accordance with G.O. No. 1078, Home (Education), dated 17th September 1920, the School of Arts was transferred from the control of the Director of Public Instruction to that of the Director of Industries with effect from the 1st October 1920 and simultaneously proposals for reorganization of the School were called for by Government in deference perhaps to a considerable volume of newspaper criticism directed against the school and the conduct of the painting class in particular. Mr. Hadaway endeavoured but without success to get the authors of these criticisms when they disclosed their identity to come round to the school, as internal evidence suggested that a good deal of the criticism was based upon second-hand and inaccurate information. It would be a great misfortune if such indications of dissatisfaction directed chiefly towards a single section of the school were allowed to obscure the substantial service which Mr. Hadaway has been rendering to the industrial arts of this Presidency since 1907. The painting class cannot, it is certain, be converted into a miniature South Kensington except at a considerable increase in expenditure. The school further provides instruction in designing, jewellery, silver and metal working, furniture-making, wood-carving, modelling, engraving and lacquer work.

129. *Personnel.*—Mr. W. S. Hadaway, the Superintendent, returned from leave on the 1st of May and relieved Mr. M. Velayuda Asari, the Assistant Superintendent, who had acted during his absence. During his leave, Mr. Hadaway availed himself of an opportunity to examine and study old European methods of lacquer work as applied to furniture. These processes have been applied in the school during the year with excellent results and the Malabar process of lacquering, which was found to be unsuitable for ordinary furniture, has now been practically superseded.

M.R.Ry. M. Velayuda Asari, the Assistant Superintendent, proceeded on leave with effect from the 19th July 1920 and M.R.Ry. N. Balakrishna Mudaliyar was appointed to act as Assistant Superintendent in his stead from that date.

130. The number of pupils on the rolls on the 31st March 1921 was 241 of whom 24 were females. The average attendance during the year was 145 and the average number on the rolls 219. In the previous year the total number of pupils and the average attendance were 222 and 154 respectively, while therefore the

school increased slightly in numbers, the average attendance declined by 6 per cent during the year under review. Endeavours are now being made to increase the average attendance which, it is hoped, will show an improvement next year.

131. The following table shows the distribution of the students according to the different departments in which they are working and the class from which they come:—

Departments	Officials.	Inferior servants.	Traders.	Land-holders.	Artisans.	Coolies.	Mendicants.	Others.	Total.
Wood work	4	..	10	3	35	1	..	..	53
Carpet weaving	..	..	..	..	1	1	..	..	2
Metal work	2	..	..	1	8	1	..	..	12
Jewellery	1	2	2	..	11	..	..	..	16
Modelling	1	..	..	..	1	..	..	..	2
Engraving	6	3	11	7	47	..	..	..	74
Lacquer work	2	3	5	5	21	..	..	..	36
Special Painting	5	..	2	..	15	..	..	..	22
Total ..	21	8	30	16	139	3	..	..	217

Though the percentage of pupils drawn from the artisan class dropped slightly from 65·5 to 64 per cent it is satisfactory to note that the artisan community send their boys to the School of Arts for training in such numbers, as they acquire a wider outlook, especially in the evolution of patterns and designs, than would be possible if they worked solely among their own people. So long as the caste system prevails, it is desirable that Asaris and Kammalas should acquire a knowledge of methods, patterns and designs which should tend to improve and develop the arts they have inherited.

132. The number of scholarships held by students of the school are at present as follows.—

Government of Madras	80
Government of Hyderabad	1
Government of Mysore	4
Victoria Technical Institute	4

The value of the scholarships ranges from Re. 1 to Rs. 5 each, but these amounts under present conditions appear to be inadequate, and proposals are under consideration to enhance considerably the value of the stipends in order that they may attract and retain a better class of students.

133. The results of the Government Technical examinations were satisfactory and showed a further improvement on those of last year as is indicated by the following table:—

Year.	Number appeared.	Number passed.	Percentage of passes.
1918–19 ...	228	160	70
1919–20 ...	168	134	80
1920–21 ...	176	149	85

134. Mr. Hadaway visited the British Industries Fair at the Crystal Palace in February and March 1920 and afterwards participated in a small conference held in the London Office of the Indian Trade Commissioner at which Mr. Chadwick, Major Longden and Mr. Heard of the Lucknow School of Arts and Crafts were also present.

135. A number of carpets of good quality were manufactured during the year and a considerable amount of carved and other furniture was made.

In the modelling department, some large flower pots and a fountain for Government House, Ootacamund, were completed.

136. In December and January Mr. Hadaway proceeded on tour to visit the Art schools at Bombay, Lucknow and Lahore, and an interesting report on the work they are doing has since been received from him. Lucknow and Lahore are like Madras chiefly Crafts schools, while the tendency at Bombay, as the present Principal like his predecessor is an artist of distinction, has been to develop the Painting class at the expense of other sections.

137. The accounts of the school were audited by the Accountant-General. The total expenditure on the school during the year was Rs. 75,114–4–11, the receipts were Rs. 2,360–2–3. The net cost was therefore Rs. 72,754–2–8.

Munitions.

138. Mr. A. Y. G. Campbell, C.I.E., I.C.S., was Controller of Munitions until the 23rd March 1921, when he proceeded on leave and the appointment was abolished. Mr. L. B. Green continued as Deputy Controller of Munitions throughout the year and still continues to serve in that capacity under the Chief Controller of Surplus Stores.

139. At the commencement of the year there were two separate offices of the Board of Industries and Munitions in existence at Madras, namely the office of the Controller of Munitions and that of the Deputy Controller of Munitions Manufacture. These two offices were amalgamated with effect from the 1st May 1920 and placed under the charge of Mr. Green.

140. Fifty indents were received during the year for the supply of stores from surplus depot stocks, and the balance of the stores was disposed of by auction. On the 31st March 1920 there were 30 orders outstanding in the Munitions Manufacture branch and four new orders were received during the year. All these orders were completed by September 1920. Five consignments of fish oil were despatched to various destinations and the balance stock of oil and containers was disposed of locally. The stocks of tanstuffs were also disposed of, and the surplus stock of gunpowder despatched to Lahore.

Messrs. Chettle, Holt & Co. completed their contract for 1,200 tents in June when the surplus stocks of tent materials, left over, were disposed of by auction.

141. The work of winding up the commitments of the Indian Munitions Board at Madras proved to be one of considerable magnitude, as in addition to closing down outstanding contracts and liquidating the commitments of the Board with firms and contractors, arrangements had to be made for the disposal of the balance of surplus stores. It had to be ascertained whether all stores supplied free to manufacturing firms had been fully utilized in the manufacture of finished stores accepted, and in the case of firms with considerable stocks of stores and components on hand at the termination of their contracts to relieve them as far as possible of these.

142. The volume of correspondence in regard to the disposal of surplus stores and the adjustment of accounts, not only of the offices of the Controller of Munitions and the Deputy Controller of Munitions Manufacture but also in respect of the operations of the Controller of Tanning Stuffs and Deputy Controller of Hides, the latter offices of which had been closed down during the previous year, continued to be heavy. Several claims were received from contractors in respect of tan-stuffs and gunnies alleged to have been supplied and these necessitated careful inquiries. In order to carry out the requisite adjustment of transactions, the Controller of War Accounts required countersigned invoices from consignees in India and overseas, and considerable difficulty was experienced in obtaining the return of outstanding invoices duly countersigned from overseas indentors. The number of outstanding invoices was, however, reduced to inconsiderable proportions by the end of the year.

Finance.

143. The receipts and expenditure of the department are exhibited in Appendix II. The total expenditure on the department was Rs. 8,69,190–14–8, the total receipts were Rs. 2,57,635–4–1. The net cost was therefore Rs. 6,11,555–10–7. The increase in expenditure is mainly due to the transfer to this department during the year of the pumping and boring operations and the School of Arts, and to the increase in the district staff. The expenditure, receipts and net cost of the department during the three preceding years were as follows :—

Year.	Expenditure.	Receipts.	Net cost.
	Rs.	Rs.	Rs
1917–18	2,79,741	84,809	1,94,932
1918–19	3,40,937	1,45,988	1,94,949
1919–20	6,30,285	3,31,114	2,99,171

APPENDIX I.

Jurisdiction of the Supervisors of Industries.

Names of subdivisions.	Head-quarters of supervisors.	Jurisdiction.	Date of formation.	Remarks.
1. Bezwada subdivision.	Bezwada ..	Godâvari, Kistna and Guntûr districts.	10th September 1920.	Bezwada division.
2. Waltair subdivision.	Waltair ..	Ganjam and Vizagapatam districts.	Do.	
3. Bellary subdivision.	Bellary ..	Bellary and Anantapur districts.	Do.	Bellary division.
4. Cuddapah subdivision.	Cuddapah ..	Cuddapah and Kurnool districts.	Do.	
5. Calicut subdivision.	Calicut ..	Malabar and South Kanara districts.	Do.	Coimbatore division.
6. Coimbatore subdivision.	Coimbatore.	The Nilgiris, Coimbatore and Salem districts.	Do.	
7. Trichinopoly subdivision.	Trichinopoly.	Trichinopoly and Madura districts.	Do.	Madura division.
8. Tinnevelly subdivision.	Tinnevelly .	Ramnad and Tinnevelly districts.	Do.	
9. Tanjore subdivision.	Tanjore ..	Tanjore district	Do.	
10. Madras subdivision.	Madras .	Madras and Nellore districts.	Do.	Madras division.
11. Vellore subdivision.	Vellore ..	North Arcot and Chittoor districts.	Do.	
12. Chingleput subdivision.	Chingleput..	South Arcot and Chingleput districts.	Do.	

APPENDIX II.

Statement of receipts and charges of the Department of Industries for the year 1920–21 (March final).

Receipts.	Amount.	Charges.	Amount.
	Rs. A. P.		Rs. A. P.
1. Weaving Branch ..	5,610 3 8	1. Director of Industries including District Industrial Staff.	3,02,874 10 5
2. Industrial schools including Madras Trades school, Leather Trade Institute and Madura Industrial institute.	12,110 1 6	2. Madura Industrial Institute including Weaving and Dyeing branches.	1,29,842 13 8
3. Other receipts including District Industrial Staff.	32,915 13 11	3. Madras Technical Institute (Madras Trades School and Leather Trades Institute).	87,984 2 4
4. Kerala Soap Institute..	2,04,526 11 0	4. Kerala Soap Institute ..	1,82,959 15 11
5. School of Arts	2,472 6 0	5. School of Arts	32,641 11 5
		6. Grants-in-aid to Industrial schools.	77,504 9 9
Total receipts ..	2,57,635 4 1	7. Scholarships	21,525 3 7
Net cost of the department.	6,11,555 10 7	8. Miscellaneous experiments.	33,357 11 7
Grand Total ..	8,69,190 14 8	Total charges ..	8,69,190 14 8
		Grand Total ..	8,69,190 14 8

II

Official Memorandum No. 2362-II/21-1, Development, dated 11th November 1921.

The Accountant-General is requested to expedite his remarks on the Administration Report of the Department of Industries for the year 1920–21, copy of which has been sent to him by the Director.

J. M. TURING,
Secretary to Government.

To the Accountant-General.

III

Letter from the Accountant-General, Madras, to the Secretary to Government, Development Department, dated the 18th November 1921, No. Trichy. P.A. 4-21881.

With reference to your Memorandum No. 2362-II/21-1, dated 11th November 1921, in connexion with the Administration report for the year 1920–21, submitted to Government by the Director of Industries under his No. 828-E/21, dated the 31st October 1921, I have the honour to state that the figures given in Appendix II of the report have been duly verified and found correct.

IV

Endorsement of the Accountant-General, No. Trichy. P.A. 4-22454, dated 24th November 1921.

* Letter No. 828 E/21, dated the 14th November 1921, with its enclosure.

* Forwarded in continuation of this office letter No. Trichy. P.A. 4-21881, dated the 18th/19th November 1921.

Order—No. 2355, Development, dated 21st December 1921.

Recorded.

2. It is clear from the report that the various activities of the Industries Department are now grouping themselves under the following heads :—

(1) General assistance to trade and industry, including collection of statistics and of industrial and commercial information, and the supply of information to the public as regards the sources of supply of and markets for various articles of commerce.

(2) Experiments and enquiries having for their ultimate object the starting either by private owners or by the Government of new industries or of new branches of or improved processes in existing industries.

(3) Management of manufacturing institutions owned by Government which have passed beyond the early experimental stage.

(4) Assistance to scattered industries not conducted in factories, of which the weaving industry is at present the most conspicuous example.

(5) Similar assistance intended principally for the benefit of agriculturists.

(6) Industrial education in all its branches, including education in arts and crafts and the grant of scholarships.

The Government consider that the activities of the department will be more readily understood by the public if they are classified under some such heads as the above, and are at present inclined to the view that the best method of classification is that which follows the object aimed at rather than the agency employed. Doubtless no classification is possible in which the various heads do not to some extent overlap. For example the activities of the engineering section which are undertaken chiefly for the benefit of agriculturists are hardly separable from those connected with small industrial undertakings, and the Leather Institute which is primarily educational also conducts a certain amount of research. Again when an experiment passes from the experimental to what is usually described as "semi-large scale," this does not mean that experiments

are not still going on. The Director will be requested to consider whether for the purpose of future reports he will adopt the above classification or can suggest one better suited to the circumstances of the department.

3. The Government consider it desirable to emphasize at the outset of this review that the duties of the department do embrace all these activities and are not confined by any means to those defined under heads (2) and (3) above. These heads are those which arouse most public interest. It would, in fact, appear from the criticisms which reach Government that a large section of the public believes that the department exists solely for the purpose of developing new Government-managed industries designed to yield an immediate profit. It is hoped of course that the development of such industries, either in the hands of Government or private persons, will be one of the results of the department's work, but it is necessarily now the least developed and is likely to be of slow growth. The organization of a new branch of industry, unless there is to be great risk of failure and loss, is usually the outcome of patient investigation and experiment often covering several years. At the present stage of the department's growth it is not reasonable to expect that any large number of investigations will pass from the experimental to the producing stage. In the meantime, the other activities of the department more particularly those on the educational side are of course a preparation for the stage when more production is undertaken and more skilled assistance will be required.

4. *General departmental organization.*—The year, as observed by the Director, was one of experiment in administrative organization. Mr. Campbell's scheme under which the Presidency was divided into five territorial charges each under an Assistant Director has proved unnecessarily expensive for the work now expected of these officers. The number of Assistant Directors has therefore since the close of the year been reduced to three, and the question as to what final shape the departmental organization should take is now under the consideration of Government.

5. Several questions of interest were discussed by the Board of Industries this year and their advice has been of value to the Government and the Director.

6. In paragraphs 17—21 the Director describes the work of the Bureau of Industrial and Commercial Information. That the assistance rendered is appreciated by the public is clear from the enormous variety of enquiries received and answered.

In paragraph 19 the Director briefly discusses the new company flotations which were more than twice as numerous as those of the

previous year, while the new capital authorized for issue was nearly six times as great. The figures are derived from statement No. II of the report on the working of the Indian Companies Act published in G.O. No. 648, Law (General), dated 22nd June 1921. These flotations indicate an expansion of trading activities, but they do not appear to indicate any great expansion in indigenous industrial enterprise. As remarked by the Director, a great number of these flotations consisted of banking or loan or trading companies or amalgamations of existing concerns. A close scrutiny of the statement above referred to also indicates that, after excluding the capital put up by a few large existing firms, and after excluding also banking and insurance, printing and publishing and purely trading concerns only a small residue remains which can be identified as new industrial enterprise. It is also observed that the paid-up capital in these last cases is often only a fraction of the capital authorized. This last feature may perhaps disappear in the succeeding year's report.

7. In paragraphs 26, 27 and 30 the Director alludes to a few instances in which private industry has been directly benefited by the help or advice of the department. Messrs. Best & Co., at the suggestion of the late Director, undertook to prospect for coal during the year over an area in Ellore taluk and after the close of the year over two more areas—one in Yernagudem taluk, Kistna district, and the other in Polavaram division, Gōdāvari district. Near Beddadonal in the last-mentioned area Mr. Walker of the Geological Survey of India has already indicated suitable sites for experimental borings for coal. The Government now await with interest the results of Messrs. Best & Co.'s operations, which will be of great importance to the industrial development of the Presidency, should a seam of workable coal be struck.

On the recommendation of the Board of Revenue and the Director of Industries the Government sanctioned during the year Mr. A. Ghose's application for the grant of rights for mining and quarrying lime-stone and shale required for cement manufacture in Dhone and Nandyal taluks of the Kurnool district and also his proposal to transfer the concession to a Bombay Syndicate.

On the recommendation of the Director, the Government recently sanctioned Messrs. Lakshmi Ratan's application for a lease for quarrying granite with the help of modern machinery and plant.

In paragraph 28 of his report the Director alludes to an important departure in the manufacture of alkaloids, principally strychnine, at Vizagapatam by a leading firm of manufacturing chemists. It is understood that the advice of the department was taken by this firm before embarking on this venture.

It is observed from paragraph 25 of the report that only three firms took advantage of the facilities provided by Government for the issue of official certificates of purity in respect of coconut-oil and castor-oil. The Government hope that in future more exporters will appreciate the advantages of the system.

The report makes no reference to the Paper Factory which the Government understand is being established at Rajahmundry. The Director is requested to report the progress, if any, made by the concern.

8. In paragraphs 84 to 88 the Director discusses the activities of the department under experimental inquiries. In the absence of a suitable laboratory in which he could work at Madras, Dr. Marsden was allowed to work in the Indian Institute of Science, Bangalore. He was engaged mainly on inquiries connected with the production of power alcohol. A number of comparative trials were made and advice given in regard to the suitability of dye-stuffs for specific purposes and in regard to the purification of effluents from dye factories. Investigations were also made into the carbonate contents of saline soils of the Presidency and possible ways of utilizing prickly-pear.

The Director has recently recommended the erection in connexion with the Leather Trades Institute of a small chemical laboratory where the officers of the department can conduct chemical experiments on a small scale. The matter is under consideration.

Attention has been devoted during the year to the question of how best the available deposits of phosphatic nodules near Trichinopoly can be made available to the ryots for use as manure at a price within their means. The Director is now conducting experiments at Madras on the cost of crushing these nodules.

The ink manufactured by Sir F. Nicholson at the Industrial Institute, Coonoor, has, on test in the Secretariat offices, been found to be very satisfactory. Further tests are being made by the Superintendent of Stationery. The results of Sir F. Nicholson's work on these inks appear likely to prove most satisfactory, and it is hoped that the stage of commercial production is now close at hand.

Enquiry is also proceeding under Sir F. Nicholson's direction on the subject of adhesives, pectin and vinegar.

In paragraphs 31–35 the Director alludes to various other inquiries regarding the manufacture of rubber goods, the use of rubber-seed, sand for glass, tile factories and Kittool fibre of which the two last may apparently result in further developments.

9. *Management of institutions owned by Government.*—The Kerala Soap Institute had an unsatisfactory year resulting in a net loss as reported of Rs. 2,486–0–3. If overhead charges are added to this, the loss amounts to Rs. 10,009, a figure which, it is understood, is likely to be further increased when the stocks have been written down to the values obtaining at the close of the year. The reason for the reduced outturn and loss have been explained by the Director and the Government agree that run on a larger scale the factory is much more likely to show a profit. The Government have recently dealt with the subject for this factory in some detail in G.O. No. 1931, dated 14th October 1921, which contains the decision regarding the lines of its future management.

(ii) *Glue Factory.*—This may be said to have passed during this year beyond the stage of experiment and reached the stage of commercial production on a small scale. The experiment was undertaken at the request of Government in the year 1920 by Messrs. Beardsell & Co., to whom the Government are indebted for their assistance in the matter. After the close of the year Messrs. Beardsell & Co. unfortunately found themselves compelled to relinquish the further conduct of these experiments and after a considerable quantity of glue of good quality had been produced. The Government have recently taken over the factory and decided to conduct manufacture themselves.

(iii) *Buildings for the Jam Factory at Coonoor* were not begun during the year under report but are now in a fairly advanced condition.

10. *Assistance to scattered non-factory industries.*—The only industry which is at present receiving organised assistance is that of the handloom weavers. The policy of the department is to demonstrate the utility of certain improved appliances, detailed by the Director in paragraphs 67–73 of which the best known is the fly-shuttle, and this is done by means of travelling parties who visit the principal weaving centres. Ten such parties were sanctioned during the year under review in addition to the existing two; but the Director could organise only five new parties owing to the difficulty experienced in securing suitable men for employment as maistris and weavers. In February 1921 the Government sanctioned the Director's proposal to utilise the weaving block of the Madura Industrial Institute for holding training classes for such men, and the Government hope that a sufficient number will soon become available. The number of parties sanctioned has since the close of the year been increased to 18. But the question of the number of parties really required in order to visit the weaving centres of the Presidency with sufficient frequency is still open to some doubt. The Government have already called upon the Director to submit

a report on this point. The work of this section of the department is described by the Director in very great detail in paragraphs 66–83 of the report. The Director has also advised the installation of a warp-making machinery in Madras with the object of supplying weavers with machine-made warps. The details of the scheme are still under discussion.

It is hoped that it may be possible to organise similar assistance in the case of the dyeing industry. In paragraph 85 of his report the Director alludes to various experiments conducted during the year on the subject of dyes.

Cottage industries.—In paragraph 36 of the report the Director describes the action already taken. No definite lines of work have yet been decided.

11. *Assistance intended principally for the benefit of agriculturists.*—This constitutes the principal work done by the Pumping and Boring branch of the department which is organized under the engineering section. This work which was previously done by the Agricultural Department was transferred to the Industries Department in the course of the year under report. The object of the department is to secure that wells for agricultural purposes are not dug at haphazard by ryots without borings being taken and underground water definitely located. The services of the department are placed at the disposal of the ryots at a moderate fee, which, however only represents a small part of the cost of these operations. Where the conditions are suitable for the installation of a small pumping plant this is also erected at the ryot's cost by the officers of the department. The Director has since the close of the year submitted proposals for purchasing additional drills and pumping sets costing over two lakhs. These proposals are under consideration and Government hope to be able to place the requisite funds at the disposal of the Director during the year 1922–23. It is also hoped ultimately that maps of underground water levels may be evolved from those borings. In addition to the above duties the engineering section of the department erects or advises on the erection of small industrial plant. At present a large majority of these are small rice and ginning mills and other small plants intended for preparing agricultural products for the market and these may be termed half industrial and half agricultural. Only a moderate number—38 such plants—were erected during the year. As remarked by the Director the work was much hampered by the exorbitant cost of machinery, and these results are therefore fairly satisfactory. It may be hoped that with the fall in the price of iron and steel products the work done under this head will largely increase in the near future. The Government agree with the Director's remarks in paragraph 46 regarding the desirability of simplifying procedure and minimising

the delay in granting loans. The Government share the regret of the Director that a fall in the number of installations overhauled by the department was due to the fee charged. The charge is so extremely moderate that it is unlikely to be the cause of this decrease.

The Pallapalaiyam Sugarcane Crushing factory referred to in paragraphs 107 to 110 is also in charge of the engineering section of the department. The Government agree that the experiment cannot claim to have been a success, but they have decided that before abandoning it altogether the effect of installing a five-roller mill should be watched, and have accordingly sanctioned the Director's proposal to purchase one such mill.

12. *Educational.*—During the year under review the Government sanctioned the institution of four State Technical scholarships tenable abroad payable from Provincial funds in addition to the four State Technical scholarships allotted to the Madras Presidency and paid for by the Government of India out of their funds. The Government of India have since the close of the year issued instructions provincialising these latter four scholarships also with the result that at present there are eight Provincial State Technical scholarships tenable abroad. The Government understand that owing to the lack of funds the Director was not able to bring the number of Madras scholars at Bangalore to the sanctioned number of 18 and hope that he will find it possible to do so at least in the year 1922–23. The Director has reported that the unpopularity of scholarships tenable at the Victoria Jubilee Technical Institute, Bombay, is due to smallness of their value. The question of enhancing their amount is under the consideration of Government.

The Madras Leather Trades Institute continued to do good work. The need for sixty students was recognised in G.O. No. 1898, dated 14th October 1919. Plans and estimates for its extension are now under consideration and Government hope that it will not be long before the extension is complete. The connexion of this extension with the chemical work of the department has been alluded to above in paragraph 7. The Madras Trades School and its branch at Perambur continued to do good work. The mechanical engineering section of the Madura Industrial Institute was reorganised during the year. It is now conducted simply as a commercial engineering and cabinet-making workshop with the training of a large number of apprentices as one of its main functions. The Institute provides apprenticeship in wood-working and metal-working and short courses in oil engine and motor-car driving and mechanism. The Government are particularly glad to note that the Orrs School is progressing satisfactorily and share the Director's hope that other works will also follow the lead of Messrs. Orr and arrange to establish schools on similar lines for the benefit of young artisans whom they employ.

They have indeed recently received a proposal from the Director to assist a school proposed to be started by Messrs. Addison & Co. for giving special training in printing and allied trades at the Addison Press. The proposal is under consideration.

The Government also note with satisfaction that the other aided schools continued to maintain the progress of the previous year.

There has been a considerable volume of criticism in the press about the conduct and working of the School of Arts during the year and the Government have since the close of the year appointed a strong committee under the presidentship of the Hon'ble Mr. Justice Oldfield to go into the question of the working of the school and indicate in detail the lines on which its work should be reorganised.

13. *Agricultural Statistics.*—Paragraph 41 refers to the delay in the receipt of returns in respect of statistics of planting products. At present the United Planters Association, South India, representing the majority of planters in South India takes the trouble of collecting these figures from its constituents, but the fact that the rendering of them is not compulsory under law has been found to be a great obstacle in the way of obtaining full and accurate figures. The United Planters Association, South India, has made strong representations urging the necessity for legislation in the matter and the question is being examined.

14. *Financial assistance to industries.*—In paragraph 14 of the report, the Director refers to the problem of rendering financial assistance by Government to private industries or towards the establishment of new industries. The initial difficulty lies in the fact that at present there is no law under which such loans can be issued. The question of taking these powers by legislation is now under the consideration of Government.

15. The department continued to be efficiently administered during the year.

(By order of the Government, Ministry of Development)

H. G. STOKES,
Acting Secretary to Government.

To the Director of Industries.
,, the Public Department.
,, Sir F. Nicholson, K.C.I.E.
,, the Government of India, Department of Industries (with C.L.).
,, the Publicity Officer.
Editor, Tamil.