

properties. This problem, then, will, as soon as possible, be taken in hand.

Another important task is the testing of steam gauges, indicator springs and the like; for this purpose a mercury pressure gauge will be provided in the physics building to measure pressures up to twenty atmospheres—the height of the building will not allow more to be measured directly—together with an arrangement for multiplying in a known ratio the pressure measured directly.

Again, gauges of all kinds used in engineering practice will be tested, including the standard screws which the Small Screw Committee of the British Association hope to issue. Another problem which calls for early attention is that of wind pressure on surfaces.

is becoming more important each day. In the Optical Department photographic lenses are now tested by eye observations only. It is proposed to establish a photographic test, and to include microscope and other lenses.

It will be seen thus that there is a full programme of work before the staff of the laboratory; the Committee are anxious to keep in the closest touch with trade and industry, and the Director will welcome any suggestions to secure this end. The laboratory has been established to deal with physical problems bearing on manufacture and commerce; it can hope to succeed only through the cordial co-operation of the men who know what those problems are, and who can indicate the lines along which the necessary investigations should proceed; with their assistance it may soon do a national work.

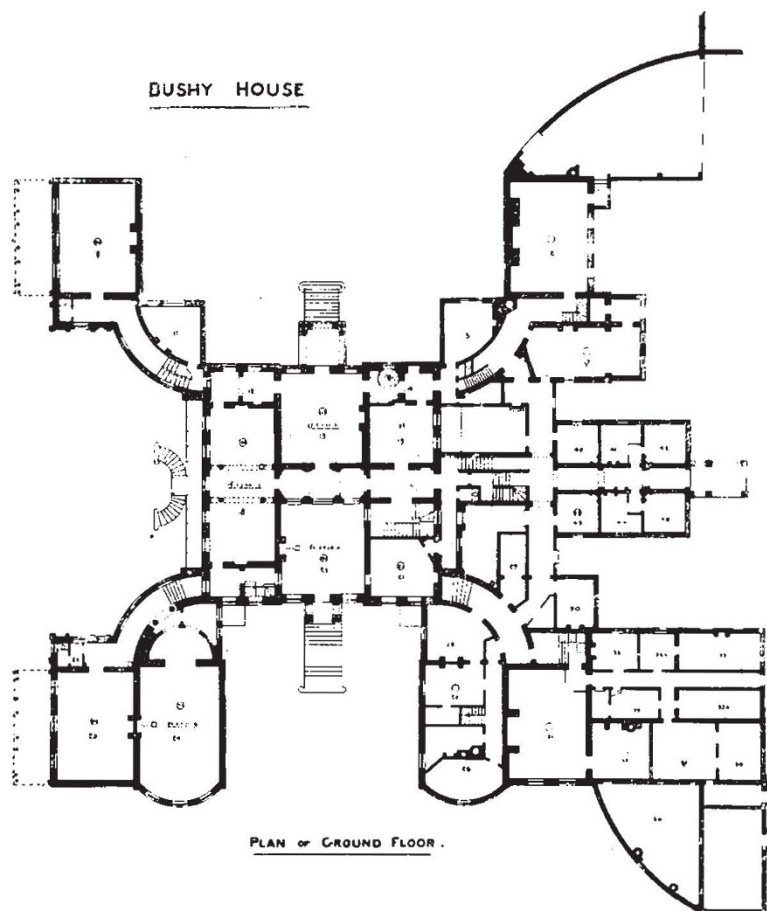


FIG. 2.

In electricity there is ample scope for work. The magnetic testing of iron for commercial use will be undertaken at once, and there are many forms of apparatus which do not come under the direct cognisance of the Board of Trade Electrical Department for which it is desirable to have some recognised test—*e.g.* condensers, special forms of cells, resistance boxes as distinct from standard coils and the like. A valuable list of measurements, by which the work of the Board of Trade Laboratory would be supplemented and assisted, has been submitted to the committee by Mr. Trotter.

Optical and thermometric testing is now carried out to a large extent at Kew Observatory, but both these branches of the work can be extended; the question of the measurement of very high and of very low temperatures

surely they should have taken warning, and endeavoured to improve their product and to manufacture it more cheaply.

Mr. Harington says that after the "bolt from the blue" in 1897 the price of indigo steadily fell until 1899, when, owing to the bad season, one of the finest crops ever seen in Behar was ruined and the price rose nearly 25 per cent. This naturally gave the producers of artificial indigo their chance, and they were able to offer their product at prices slightly lower than those ruling for the natural article. According to Mr. Harington, when synthetic indigo was first placed on the market the average cost of manufacturing Behar indigo was 170 rupees per maund, but that now, owing to more careful working and by sowing only on good lands, it

THE PRESENT CONDITION OF THE INDIGO INDUSTRY.

FOR some time past letters on the subject of artificial *versus* natural indigo have been appearing in the *Times*. One by L. J. Harington, which appeared at the end of last month, is of considerable interest, since he writes as a planter of nineteen years' experience. He considers that the days of natural indigo are not numbered, and that the Government of India are not likely to take the advice of Dr. Brunck (*NATURE*, p. 111) and endeavour to grow food stuffs in place of cultivating indigo. He further remarks that "there is so little to choose between artificial and natural indigo that the whole thing is a matter of price, and the victory must go to the one who can afford to sell cheapest." He then goes on to say: "Indigo had always paid, at times well, at other times fairly so, and planters were content to grow and manufacture indigo exactly as their predecessors had done. Then in 1897 the Badische discovery came like a bolt from the blue." This is a rather remarkable admission. Here were men manufacturing indigo, and they had evidently not taken the trouble to ascertain what was being done in the scientific world and by other manufacturers. Were they not aware that so far back as 1880 indigo had been synthetically prepared, and that numerous patents had been taken out? Certainly the processes had not been commercially successful; but

can be produced for 100 rupees, and he hopes that by engaging, not one chemist, but a dozen, the "cost of making indigo will soon be reduced to a level at which it will be quite impossible for synthetic to compete." Mr. Harington says, however, that the Behar planters cannot afford to spend more on experiments than they are now doing, and he appeals to the Indian Government to give a grant of at least 5000*l.* for five years. It is certainly refreshing when an indigo planter calls, not for one experienced chemist, but for a dozen. It is, unfortunately, more usual for manufacturers to sneer at chemists, saying that they only waste material in experimenting. Do they imagine that experiments which are carried out by chemists on the Continent and in America, and which enable these countries to undersell us, cost nothing?

If our manufacturers employed capable chemists and gave them a free hand, instead of employing what one may perhaps be allowed to term *glorified bottle washers*, there is very little doubt but that they would find experimenting does pay.

If it is true that, owing to bad seasons in India, the indigo producers cannot afford to pay for expert advice, then, owing to the enormous interests which are involved and the danger of delay, surely the Indian Government will not refuse its aid. It must, however, be remembered that Government cannot aid every industry.

It has already been stated in a previous article that Sir William Hudson had applied to the Indian Government for a loan to help the indigo planters to reintroduce the cultivation of the sugar-cane, as an auxiliary to the production of the dye-stuff. The Government of India thereupon appointed Mr. O'Connor, head of the Statistical Department, to report on the proposed scheme of rotating sugar with indigo crops.

Before 1840 sugar was cultivated and manufactured in Behar, but the methods employed were of the crudest, and transport was bad and expensive, therefore the production of sugar gradually died out, and many of the sugar planters turned to the manufacture of indigo. Since 1840 railways and good roads have been introduced. By careful selection and cultivation a better quality of cane-seed is now obtainable. Further, improved modern machinery and methods enable the sugar grower to obtain a much enhanced yield of a good class of sugar. The committee appointed to inquire into the possibility of the cultivation of sugar by indigo planters have nearly finished their work, and it is understood they are of the opinion that the cultivation should yield a handsome return to the planters in Behar, "if its cultivation, manufacture and distribution are conducted on business principles." I might also add on scientific principles, and let them employ chemists who are able to do more than simply determine the strength of the sugar by means of a saccharometer. It is to be hoped that the indigo planters, if the cultivation of sugar is introduced, will not again settle down into lethargic coma with the idea that all is now well. They may be absolutely certain that any advantage which they obtain will only add to the energy with which the German men of science will attack the problem.

F. MOLLWO PERKIN.

THE ROYAL INDIAN ENGINEERING COLLEGE.

ALL the members of the teaching staff at Coopers Hill must be gratified at the expression of public opinion in support of the cause of the seven gentlemen who have received notice of dismissal. Since our remarks upon the matter were written last week, leaders and letters have appeared in the *Times*, *Daily News* and other newspapers, expressing astonishment at the condition of things which permits distinguished men of

science to be treated with indignity, and demanding that an inquiry shall be made not only into the present case of injustice, but also into the whole system which renders it possible for scientific service to be belittled by the action of an official unable to appreciate its value.

Testimonies to the importance and efficiency of the work done by the scientific staff at Coopers Hill have been given by men whose opinions carry weight with the public as well as in the world of science. As mentioned last week, Lord Kelvin has directed attention to the valuable work done at the College, and has given his great influence to the cause of the teaching staff. Prof. J. A. Ewing, F.R.S., professor of mechanism and applied mechanics in the University of Cambridge, has since come forward to add his testimony to that of Lord Kelvin and others. The following words of Prof. Ewing's are of particular value in enabling people to appreciate the gravity of the case.

"To suggest that the dismissal of men like Prof. McLeod and Prof. Hearson can make for efficiency is preposterous. I know nothing of the finances or of the administration of Coopers Hill, but I do know something of its teachers and of their teaching. I have examined Prof. Hearson's students at Coopers Hill, and have had the advantage of co-operating with him as examiner in the Mechanical Sciences Tripos at Cambridge. The pages of the Royal Society's *Philosophical Transactions* bear witness to his originality as a contributor to engineering science. Those who know, as I do, what fulness of knowledge and what infinite patience he brings to bear upon his teaching are not surprised that he teaches with success. One feels that to praise him is an impertinence, but when he and his colleagues are treated in this incredible fashion those who know their merits should speak out."

So far as personal qualifications are concerned, therefore, the dismissed members of the staff are perfectly competent to perform their duties; and the results obtained prove that the teaching has been done in a most efficient manner. But a much larger question is at issue. A writer, who signs himself "J. P.," in the *Times* substantiates this remark with a statement of personal experience.

"For upwards of a quarter of a century," he says, "Coopers Hill has supplied the Indian Public Works Department, and for more than half that time the Indian Forest Department, with a body of recruits whose efficiency has been the admiration of all those whose position and experience render them competent to judge the question, men with whom I for one (and I am sure that I express the opinion of all the older members of the Public Works Department) feel it an honour to be associated."

If it were worth while, evidence to this effect could be considerably multiplied, but no useful purpose would be served by doing so. Every one who has followed the expressions in the public Press since the letter from Colonel Ottley was published, is convinced of the abilities of the gentlemen who have been dismissed, and the efficiency of the College.

This efficiency has been attained in spite of circumstances tending to discourage the teaching staff. It is nothing short of a scandal that capable men like those giving instruction at Coopers Hill should be controlled as if they were orderly-room clerks or petty assistants in a private school, with a Mr. Squeers as their over-lord. The only reasonable way to carry on the work of an institution for higher education is to let the teaching staff be largely responsible for the arrangement of courses of studies as well as for the actual instruction, but this does not appear to be the method followed at Coopers Hill; for the present deplorable state of affairs could not have arisen if the views of the staff as to the reorganisation of studies had been obtained. "J. P." expresses this view in the following extract from his letter:—

"One of the reasons why it has been so successful is that former presidents have looked upon the college not as a field for the display of their own vanity, or for trying experiments