

SCIENCE:

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

TECHNICAL EDUCATION AT ST. ETIENNE.

FOR the past twenty years the French Government has devoted a great deal of attention to the education of the people. National schools, says the United States consul at St. Etienne, have been opened in almost every village, and the instruction given is of a very useful order. Besides the primary schools, there are superior schools where diplomas for "great merit" may be obtained. These latter, however, are only attained by pupils belonging for the most part to the middle classes, who intend to become teachers or governesses in public or private institutions, or by those who have no other purpose in view than of being considered fairly well educated. As the working classes, on the other hand, cannot afford for their children the expenditure of time and money which a course of these higher schools involves, they are obliged to withdraw them when they have received the certificate of elementary education which is generally given to children between the ages of twelve and thirteen. It is for this poorer class that towns of importance throughout France have established well-equipped schools where various trades are taught gratuitously, both practically and theoretically. St. Etienne being one of these important cities, with 113,000 inhabitants, possesses a model, well organized, and successful technical school.

The technical institution of St. Etienne was built in 1885 at a cost of \$115,000. The school has three hundred students, and the trades taught are weaving, dyeing, sculpture, iron founding, cabinet making, etc. The apprenticeship is four years in duration, and the institution is free. At the end of four years, a certificate of aptitude is given, which enables the pupil to obtain a situation in the line of industrial labor which he had chosen. The work of the school begins each day at seven in the morning, and ends at seven in the evening. The school is composed of two buildings. The first is reserved for general education, and the second contains the different workshops, occupying 1,400 square metres of surface. The fitting up of these workshops is very complete, and comprises vices, lathes, boring, planing, and other machines,

forges, anvils, steam-hammers, carpenters' benches, circular saws, weaving machines of every variety, and all the accessories of the dyeing industry, as well as important collections of chemical and physical apparatus. The whole building is lighted by electricity.

The lectures are of two kinds. The first are common to all students of the same year, and embrace general subjects, while the second are exclusively technical, and are special to each section. In the first year, the students pass through all the workshops to be initiated into the proper handling of the different tools, whether of iron or wood. After this period, the boys are classed according to their tastes, desires, and aptitudes. They work at manual labor three hours daily during the second year, four hours in the third, and five in the fourth and last year for the first six months, and seven hours during the last six months, in order to accustom them to the burden of a day's work. During this period, also, great attention is paid to the teaching of the theory of the different trades, that is to say, the fitters are taught to trace and cut out cog-wheels, and the carpenters to design and execute a certain number of apparatus, such as stairs of different variety, shutters, balconies, etc., on a reduced scale. The weavers, besides being taught thoroughly all the details of the loom and its working, receive special lessons in book-keeping, legislation, commercial geography, and are taught one of the modern languages. Very careful attention is paid to design. The apprentices at all the trades are obliged to follow the instruction given on this subject, which is rightly considered of the greatest importance in the school. Designs of various kinds are executed by the more advanced sections, and every year an exhibition of the work of the boys is held.

Consul Loomis says that the results of this school have been most excellent, and he has been informed that, as a rule, its graduates become self-supporting members of society in a very short time.

THE PRODUCTION OF BUTTER.

BULLETIN No. 17 of the Pennsylvania State College Agricultural Experiment Station, by Professor Thomas F. Hunt, details some carefully conducted experiments with twelve milch cows to determine the value of cotton-seed-meal as compared with bran for the production of butter. The main inquiry was with reference to the relative effect of cotton-seed meal and bran upon the quality of the butter. The quantity of food required to produce a given quantity of butter, the effect of the food upon the health of the animals, and the effect of the food upon the completeness with which the butter fat was recovered from the milk were also subjects of research.

There were three feeding periods of four, four, and two weeks, respectively. The cows were divided into two lots of six cows each, care being taken to have the two lots as nearly comparable as may be.

Beginning with a small quantity of cotton-seed-meal, six cows were fed an increasing quantity of cotton-seed-meal until six pounds were given daily per animal. This heavy feeding of cotton-seed-meal, fed during April and May, did not affect the health of cows averaging 900 pounds each. Calves were fed one pound of cotton seed-meal daily, in skim milk, with apparently disastrous results.

The six check cows were fed bran in place of cotton-seed-meal, while all the other food offered was the same in each lot. The yield of milk was increased about one-fifth when