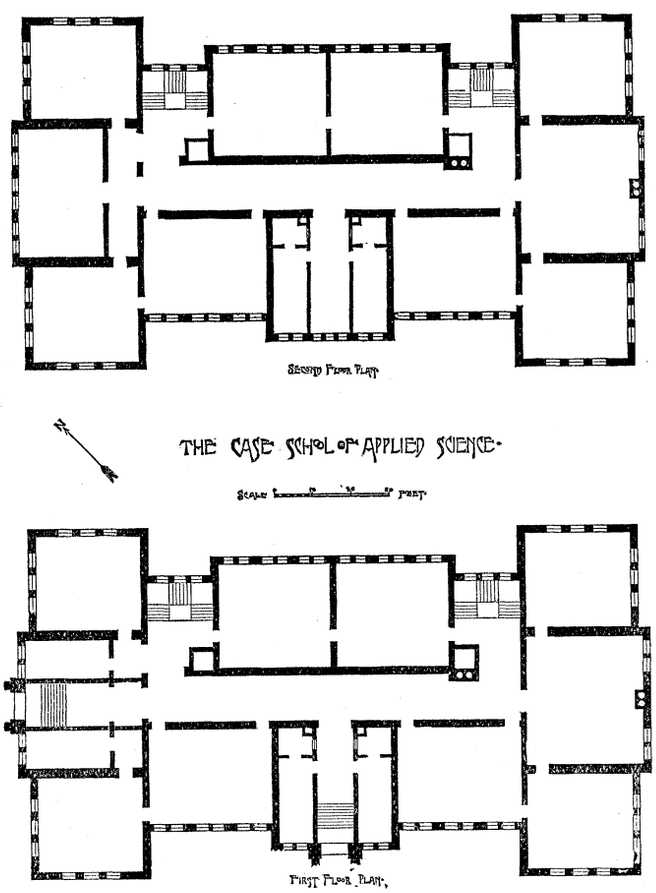
broken, with some of the dormers and gables still standing in a damaged condition. Upon inspection it was found necessary to take down all above the main cornice, and about half of the walls. The material of the walls below the cornice was found to be in such good condition that all of this work was replaced according to the original design, except the tower. The entrance to the tower, not being badly damaged, was taken down, and replaced with only a slight alteration in the roof. The tower and every thing above the plancier of the main cornice are of different design from the corresponding parts of the original building. Before any new work proceeded, the board of trustees, in connection with their architect, Clarence O. Arey, discussed each point, so as to obviate as far as possible the defects that had been found in the former building.

The outside walls of the building are a combination of rock-faced ashlar and brick backing, except in the dormers, which are of solid stone. The stone used is Amherst, O., sandstone. All of the partition walls are of brick. The floors were formerly of wood, but are now to be thoroughly fire-proof, — of iron girders and tile arches. The roof was formerly of light timbers close together. Now it is built of heavy timber, according to the 'slow-burning' method of construction, and is slated with Maine slate. The flashings and gutters are all of copper. The ridge-rolls, and front and under faces of the upper mouldings of the cornice, are of galvanized iron. This is used only where it is easily replaced or very little exposed. The tower is now temporarily roofed with a flat, pitched roof at the top of the stone-work, and only part of the carving shown in the drawing is completed.

A general view of the reconstructed building is shown in the accompanying illustration. It has a ground plan 161 by 92 feet, and



consists of three stories besides the basement and attic. The basement is arranged for heavy machinery, laboratories, and workshops. The remainder of the building is designed for class-rooms, drawing-rooms, and cabinets for collections, etc. The boiler-room is outside of the walls of the building, to avoid danger from fire or explosion. The chemical laboratory, which also contains the furnaces for assaying, is in a separate building. Every precaution has been taken not only to render the building fire-proof, but to keep fire entirely out of it.

The educational interests of the school have been carefully attended to. The school is well organized, and is supplied with a strong corps of professors.

The preparation required for admission is such as is given by the best high schools and academies. The studies pursued in the school consist principally of modern languages, mathematics, natural history, natural science, and engineering. The school provides courses leading to the degree of bachelor of science (B.S.) in civil engineering, mechanical engineering, mining engineering, electrical engineering, physics, and chemistry. While advanced theory occupies an important place in all of the courses, the methods of instruction incline decidedly towards the practical. Laboratory, shop, and field work are prominent features of the various courses.

Original investigations both by professors and students are constantly in progress in the various departments, and some of the published results are valuable contributions to the advancement of science. Just at the present time scientific men are deeply interested in some investigations now in progress in the school, preliminary statements in regard to which have already been published.

The city of Cleveland affords unusual advantages for a scientific school. It is an important railroad centre and lake port, and offers excellent opportunities for studying the various engineering problems connected with transportation. It is the centre of extensive mining and manufacturing interests. It has chemical works, steel-works, rolling-mills, furnaces, forges, machine-shops, and manufactories of electric machines and appliances, and of various other sorts. These, in many cases, are the most extensive of their kind in this country, and their variety is noteworthy. Almost all varieties of engineering structures and of manufacturing processes can be seen in the city, and are available for examination and study by the students. These advantages, and their influence in insuring the prosperity and usefulness of the school, were fully appreciated by Mr. Case, and had no slight weight in influencing him to found the school.

ETHNOLOGY.

Prehistoric Researches in South-eastern Spain.

TWO Belgian engineers, Messrs. Siret, are about to publish the important results of their extensive archæological researches in Spain, which extend over the coast from Carthagena to Almeria. The oldest remains belong to the neolithic period. There is not a trace of metal to be found in these ancient habitations. The implements consist of polished axes, perforated shells, pottery, grinding-stones, chipped flints, and primitive walls of stone. In another class of sites which belong to a more recent period, remains of copper and a few bronze implements were found. The inhabitants lived in stone houses, the stones being cemented by earth. Flint implements, particularly arrow-heads and knives, ornamented pots, bone points, and numerous copper celts, were found in the houses. Cremation was practised to a considerable extent by the people of that period. Copper ores and scoriæ proved that they practised the art of smelting.

In a later period fortified villages, with walls made of stone and mud, were built on the tops of the hills. In the space surrounded by the walls, the ruins of burnt houses, implements, remains of grain which was kept in clay pots, cloth made of broom, and hand-mills, were found. Flint was used only for making saws. The dead were buried in natural caves, or in stone boxes under the houses or near them.

At the end of the copper period the inhabitants still lived on the tops of steep hills, in fortresses. The implements consisted of the same material, but, besides, moulds for casting copper, ivory, gold, and silver were found. Over twelve hundred graves belonging to this period were opened. All of them were situated in the houses, and consisted either of small chambers of stone, of stone boxes, or of huge clay pots with rounded bottom and wide mouth. The largest of these are over three feet long and two feet wide. The skeletons are doubled up, hands and knees being pressed against the chin. Sometimes husband and wife are found in the same urn. The study of this vast amount of material will be highly interesting.

Virchow points out that part of this ancient culture is probably due to Phœnician influence (*Zeitschr. für Ethnologie*, 1887, No. v.).

PREHISTORIC SKATING. — As is well known, the art of skating is a prehistoric one. In many parts of Europe bones of domesticated animals have been found which had been used as skates or as runners of small sledges. It is of considerable interest to learn that similar implements are found still in use in several parts of northern Germany. In the *Journal of the Berlin Ethnological Society*, sledges are described which consist of a board resting on the bones of a horse. But, besides this, skates are used the runners of which consist of the lower jaw of cattle, the curvature of the lower side serving admirably the object of the skate.

BOOK-REVIEWS.

The Early History of the English Woolen Industry. By W. J. ASHLEY, M.A. Baltimore, American Economic Association.

"I CANNOT but be sensible," says the author, "of the honor which the American Economic Association has done me by permitting me to join in their work." The members of the association might say in reply, that they are sensible of the honor which Mr. Ashley has done them in consenting to take part in their work. The co-operation of English and American students in economics is most encouraging; at least, we on this side of the water appreciate very highly such papers as the one which forms the subject of this notice, or as lately appeared in the *Quarterly Journal of Economics* from the pen of Professor Foxwell of Cambridge.

There are two points of interest in the preface to this monograph. In the first place, Mr. Ashley explains, very properly we think, the revival of economic studies in the United States. This country, he says, "exhibits the forces of competition and capital working on a larger scale than elsewhere, and in a freer field, uncrossed by any of the influences of decaying feudalism." England is no longer "the classic land of capitalistic production," as Karl Marx once called her: that honor now belongs to the United States. It is, then, chiefly because economic questions have lately come to be of such importance, that Americans are studying them with earnestness; and it is because the field offered for their solution is comparatively free that European peoples regard that study with peculiar interest. But, in the second place, our author cautions American students against being too greatly influenced by the teachings of German universities. "No observer of German thought," he says, "can fail to see, that, though most vigorous within its range, its range is exceedingly narrow. German writers seldom realize the atmosphere of individual initiative in which English and American thought moves." And he adds, "American teachers will be compelled, by the traditions of their country, the needs of their pupils, and the criticisms of their opponents, to give due weight to the forces of competition and to the arguments of more recent English economists." This view is certainly correct. There is a radical difference between the German and the American. Whether we consider political or industrial affairs, the closer we observe, the more strongly do differences impress themselves upon our minds. German thought does not fit American affairs. The only lesson of abiding importance brought from the universities on the continent pertains to methods of investigation.

Turning now to the monograph itself, we find it to be an eminently satisfactory sketch of the history of the English woollen industry from earliest times to the period of the great inventions. The peculiar interest in such a sketch lies in the fact that the history of the woollen industry fairly represents the development of all industries. Whether we consider the relation of artisans to early local government, or the internal organization of trades, or the social and political influence of changed methods of doing work, we find a true picture in the history of the woollen industry. The author divides his sketch into four parts. He first treats of the establishment of the guild system; second, of the education of the English workman by the importation of foreign skilled workers; third, of the rise of the merchant class; and, fourth, of the growth of the domestic system. For us in this country the part which treats of the separation of the merchant class from the main body of workers is perhaps the most instruetive. Americans pride themselves on being cosmopolitan, and it is true that their love of travel makes them familiar with the existing habits and customs of many peoples; but when it comes to history, their minds are essentially provincial. They are prone to regard the nineteenth century, out of which their minds have never travelled, as the natural and therefore the permanent order of society. Their conservatism is, on this account, unreasonably strong. It would be a good thing if every business-man could be brought to see that there once existed a successful industrial society, in which a separate class of traders was not known. They then might regard with less suspicion certain tendencies in modern times looking towards further industrial changes.

But professed students of history, as well as business-men, will find in this monograph much instruction. It is a common error to say that machinery and steam-power are responsible for the creation of a clearly defined laboring-class. Mr. Ashley shows that such an assumption is not correct. His sketch closes with the establishment of the 'domestic system' of industry, but the liberties and rights then exercised were very nearly the same as those which laborers now enjoy. It needed only the great inventions to fully establish the 'factory system' as we now know it, and to bring about the era of great industries. Failure to recognize that the social position of the workman was quite the same before and after 1760 is responsible for many misinterpretations of industrial history.

In closing we can only say that American students are always grateful for reliable information on English industrial history. They feel that the society with which they deal is as much the result of English life during the middle ages as is English society itself. But this they cannot study at first-hand, because of paucity of material, and on that account they read with eagerness all that English scholars may write upon the subject. Mr. Ashley, then, has the thanks of American students for his excellent monograph on the English woollen industry. H. C. ADAMS.

A Plea for the Training of the Hand. By D. C. GILMAN, LL.D.

Manual Training and the Public School. By H. H. BELFIELD, Ph.D. New York, Industrial Education Association. 8°.

Primary Methods. By W. N. HAILMANN, A.M. New York, Barnes. 12°.

Industrial Instruction. By ROBERT SEIDEL. Tr. by Margaret K. Smith. Boston, Heath. 12°.

The Manual-Training School. By C. M. WOODWARD, Ph.D. Boston, Heath. 8°.

EACH one of these books bears evidence in its own way to the educational *Zeitgeist*. Each one, had it appeared ten years ago, would have appealed to perhaps a few score readers: it is safe to say that at this time they will be read by thousands. Educational thought and educational practice are in motion. In all parts of the country and in all grades of schools the signs of progress are seen and its effects are felt. The dominant trait of this progress is a demand for reality in education, for practicality in the widest and best sense of the word. Teach the child to know not merely words, but things, objects; teach him not merely to know, but to use and apply what he knows. Teach him literature, teach him arithmetic, teach him geography, and so on, but also teach him something about the busy, active life of which he is so soon to form a part. Teach him not only to perceive and to remember, but to compare, to judge, to execute, to manage. This, if its opponents did but know it, is the philosophy of manual training; and because this philosophy is so certain and so sound, the manual-training movement is carrying every thing before it. The best educational thought of the country is enlisted in its service; and its advocates are making rapid and successful progress, while its handful of vociferous opponents are asserting that it is useless, crude, and destructive of the school. The success of manual training, and the thought and inquiry it has aroused, call for a literature. All of the books whose titles are given above are in answer to this call.

The first is a handsomely printed pamphlet, the first of a permanent series of educational monographs to be issued under the editorship of the president of the Industrial Education Association of