NOTES ON ENGINEERING.

'CHILLED' CAST IRON FORTS.

DOCUMENTS laid before the Board of Fortification and Ordnance of the United States Army, recently, contain some interesting information regarding the applicability of one of those materials which this country has always produced in highest perfection, in the construction of coast-defences. This country, alone, employs chilled cast iron to the exclusion, practically, of all other materials in car-wheel construction and certain brands of domestic irons possess a very extraordinary combination of strength, toughness, and capacity for taking on, by 'chilling,' a hardness exceeding that of tool-steel. Our ordnance cast irons, in earlier days, were of rare quality and our irons and steels generally are unexcelled.

For some years past, the Grusonwerk of Magdeburg-Buckau has been employing chilled cast iron in the construction of shields and turrets in the coast-defence systems of European countries, practically after the plan of the American inventor, Timby, of a half-century ago and of his licensee, John Ericsson, who used the device on the 'monitors.' The 'Endicott Board,' represented by Captain Bixby, U. S. A., investigated this matter, in 1865, with the result that the system was recommended and the erection of 22 such turrets was advised for defense of our principal harbors.

It was found that some forty turrets had been built for European governments and that probably many others, the location of which had been carefully concealed, were in existence. In the famous trial at Spezzia, an Italian turret was attacked by the shot of an Armstrong 100-ton, 16.93-inch, gun at 150 yards, the projectile weighing one ton, and withstood three such shots, each impact measuring 47,566 foot-tons. They have since been erected and accepted by a number of the European governments for defence of particularly important points. Germany has ten or a dozen.

In this country, notwithstanding our special advantage in quality of iron suited to this purpose, the general indifference of Congress and the people respecting coast-defence up to the outbreak of our recent war prevented any action being taken toward introduction of this later Timby turret, the Gruson chilled iron construction. In 1898, however, in the midst of the excitement and anxiety awakened by the rumors of a possible descent of the enemy upon our coasts, Mr. P. H. Griffin, of Buffalo, a well-known and expert manufacturer of chilled iron wheels, and other constructions, privately negotiated with the Krupps, who had by this time assumed control of the Gruson invention, and secured the right to build in this country and was given possession of the various special secret and expert methods which had made the Grusonwerk successful. A company was formed in the United States, and it is, as we are informed, now established in new works at Chester, Pennsylvania. This remarkable and important manufacture is thus finally brought into a country in which it is known that the finest material in the world is available for its purposes. *

The satisfactory chilling of cast iron to a depth of a fraction of an inch and on the surfaces of small masses, like car-wheels, has not been always found an easy matter; the production of the chill required for ordnance purposes on the surfaces of masses weighing from four to six millions of pounds involves, undoubtedly, some peculiar and difficult manipulations. Should it prove as successful, however, as with our car-wheels, another important addition will be made to the list of benefits conferred, by the metallurgical chemist and the foundryman together, upon our industrial system. This constitutes one of the most remarkable scientific achievements of the time.

THE 'AIR-SPLITTING TRAIN.'

THE daily press of recent dates has been supplied from Baltimore with interesting and impressive accounts of the repetition of the Bessemer experiment with what is now denominated the 'air-splitting train,' a train which is given, as far as practicable, the form of a cigar in its outer shape and which thus evades to some extent the head-resistance of the air and the friction of irregular surfaces on the side of the train and at its junctions between adjacent cars.

*See paper by Mr. T. Guilford Smith, 'Gruson Rotating Turret.' *Trans. Am. Inst. Min. Eng.*, Feb. 1900.

This plan was adopted by Sir Henry Bessemer, a half century ago, and with, as he thought, excellent results; but no one knows precisely to what extent the reduction of resistance occurs. The Bessemer train seems to have been a more perfect illustration of the principle of construction proposed than is the modern example.

A speed of 78 miles an hour is reported from Baltimore; but this is, of course, little to the purpose. The same weight of train could probably have been forced up to the same speed by a plucky engineer if constructed in the usual way. In fact, speeds of equal and greater magnitude are, and have for years been, made on the East and West Coast Railways of Great Britain and the record is held in our own country at above 100 miles an hour with the common form of train. What is wanted is an accurate comparison, by experts, of resistances at equal speeds of the ordinary train and of the same size and weight of train encased with the cigar-shaped shell devised by Bessemer. Obviously, the more perfectly the cylindrical spindle is approached in the exterior conformation of the train, the less will be the air-resistance. This, at high speeds now coming to be not unusual, will no doubt prove of real value if the improvement of Bessemer can be effected without too much loss of comfort, convenience and safety. Bessemer fitted his engine with a conoidal 'bow,' as the seaman would call it, and also coned the rear of the train, as well as providing against breaks between adjacent cars. The train was fairly cylindrical. He ran it at enormous speeds, for the time, until it was finally 'ditched.'

R. H. Thurston.

CURRENT NOTES ON PHYSIOGRAPHY.

TOPOGRAPHIC TERMS.

H. M. Wilson, of the U. S. Geological Survey, has compiled a very useful 'Dictionary of Topographic Forms' (*Bull. Amer. Geogr. Soc.*, xxxii, 1900, 32–41), containing definitions of some 260 words, and 'intended to include all those terms employed popularly or technically in the United States to designate the component parts of the surface of the earth.' Besides a majority of English words, there are many taken from Spanish and French, and a few from other languages, making an interesting and characteristic polyglot vocabulary that has naturally grown up in different parts of the country. The definitions are terse and appropriate in nearly all cases. Escarpment is very properly limited to 'an extended line of cliffs or bluffs,' instead of being allowed to include the body of an unsymmetrical ridge, as is the practice of some English writers. Interfluve is of relatively new coinage, equivalent to doab of northern India, meaning 'the upland separating two streams having approximately parallel course.' The printer seems to have suppressed a few words, such as 'the low alluvial land about,' at the beginning of the definition of delta which reads 'the mouth of a river which is divided down stream into several distributaries.' Bottom, as well as bottom land, should be defined according to its use in the Southern States, as a narrow flood plain. Cascade is not 'a short, rocky declivity in a stream bed,' but the dashing water on such a declivity. Upland might advisedly be used for surfaces intermediate in altitude between lowland and highland, instead of serving as a synonym for highland. Landslide deserves definition in the active sense of a sliding mass, as well as in the passive sense of a mass that has slid. Several words have a more general use than is indicated; for example, dome and meadow are well known in the east as well as in the west. Malpais is perhaps by accident referred to French instead of to Spanish origin.

It is to be hoped that geographers in different parts of the country may contribute supplements to this fundamental list, and that it may be republished in more extended form in a year or two. Adjectives and perhaps verbs also might then be added to the nouns that now appear alone. The following terms are offered for consideration, some being taken from Whitney's 'Names and Places' (1888):—Slough, towhead, ford, reach (used in Wilson's definitions, but not defined), meander, bend (perhaps kink also, from Alaska), narrows, shut-in (Mo.), dismal (N. C.), barrens (Tenn.), glen (N. Y.), intervale (N. H.), falls (in the Maryland sense of a cascading stream), river (in the Florida sense of a