

(2) Misplaced switches, broken rails, or any breaks in the continuity of the track cause the display of a stop indication at the signal governing entrance to the block, and thus greatly reduces the liability of derailments.

(3) The signals increase the traffic capacity of the line, as one train can follow another as soon as the first train passes the first signal in advance, which is accomplished in considerably less time than the prescribed time interval of the telegraph block.

(4) The signals afford maximum protection at meeting and passing points, serving as a check on dispatchers' orders, also as a reminder to trainmen at scheduled meeting and passing points.

(5) The signals more than double the safety factor in connection with flagging, as an approaching train would, in most cases, meet a caution or stop indication before the flagman could go out far enough to insure adequate protection.

GERMAN "IRIDIUM" STEEL.

The gradual development of the cutting power of Mushet's pioneer type of steel proceeded by cumulative improvements from 1880 to 1912; it was influenced in 1900 by the discovery in what is now the University of Sheffield of the influence on steel of relatively small quantities of the somewhat rare element vanadium, an influence which, unlike that of tungsten, extended also to structural steels. In connection with the latter it was found that the vital factor of structural steel, known as the elastic limit, could be almost doubled without an undue sacrifice of toughness and ductility. By reducing the carbon in the original Mushet steel from 1.8 to 0.7 per cent., much increasing the tungsten and chromium, largely reducing the manganese, and adding 1 per cent. vanadium, the thermal stability of the cutting hardness was easily doubled, rising from 300° C. to well over 600° C. In fact, such steel can be run for several minutes cutting cleanly at a red heat. The net result of the researches in British cutting-steels which were made between 1740 and 1912 has been in certain cases an improvement in cutting-power of about 900 per cent. As an example of German jealousy of British supremacy in the science of manufacturing high-speed tool steel, the following is interesting: A German firm not long ago added to the composition of standard Sheffield steel the element cobalt, and under the authority of a certificate from Charlottenburg claimed that the new German steel was twelve times as powerful as the best British product. This obviously absurd statement was challenged by both British and German steel-makers, and researches in Sheffield University have since shown that the claim is without foundation in fact, because upon the cutting power of the best type of high-speed steel the element cobalt has no influence whatever. It is interesting to know that this German steel was largely advertised as "iridium" steel, possibly because in its composition iridium was conspicuous by its absence.

Canada's total production of marketable coal for the year 1914 comprising sales and shipments, colliery consumption and coal used in making coke or otherwise used by colliery operators, was 13,594,984 short tons, valued at \$33,433,108, as against 15,012,178 tons, valued at \$37,334,940 in 1913, showing a decrease of 1,417,194 tons or 9.4 per cent. in quantity and of \$3,901,832 or 10.4 per cent. in total value.

ESSENTIALS OF AN ENGINEERING OFFICE ORGANIZATION.

By Wilfred G. Astle.

Records kept in a haphazard way, or not kept at all, don't mean "less office expense"; they mean chances missed, business lost, efforts wasted. . . . In the game of modern business, as in the game of baseball, it is the man who keeps score on results who follows most closely the progress and the profits of his work.

ANY organization—whether it be an engineering, a factory or a political organization—is composed of three elements, which are men, equipment, and a field of operation or what might be called, for lack of a better term, space. In a large corporation, these elements are highly developed. The workers number in the thousands, and the factory or plant has the most advanced kind of machinery and the field of operation or the space (of the internal organization) has been carefully analyzed, selected and arranged.

In an office organization will be found these same three elements, consisting of the workers, equipment, such as appliances, desks, cabinets, etc., and the office space. The first step in building up an efficient office organization is to combine in proportions that are right, such of these elements as have been carefully selected and perfected for the particular work to be done.

In its usual sense the office is the part of a business establishment in which the administrative and clerical work is performed. Generally speaking, a business is divided into four basic departments—the production, the sales, the financial, and the accounting departments. The production department supplies the article to be sold, the sales department is concerned in selling it, the financial department collects and disburses the money involved in the conduct of the entire business and the accounting department records all the transactions, summarizes the facts and presents the results in statements and reports for use in further operations. From a management point of view, then, the office may be defined as that part of a business organization which performs the purely clerical work necessary in the conduct of the whole business. The head of any one of these divisions has, theoretically, no right to supervise the work of any of the others, and as Mr. J. William Schulze, expert on office organization and management, illustrates this by comparing these four basic divisions to the four wheels of a wagon. The left fore-wheel does not control the hind-wheel, but each has its own work to do. If the left fore-wheel should cave in, it might still be possible to move the wagon by dragging it along on the remaining hub, but the resulting progress would be a slow, wearying process which could not be continued indefinitely. The office is the fifth wheel, it being a necessary part of the running gear, without which, it would be impossible to steer.

In other words, the factory manager, the sales manager, the treasurer and the controller should have nothing to do, theoretically, with office details. That is a function almost as far removed from their real duties as those of the color sergeant are removed from the duties of the army general. They should call upon the office for the work they want done—not upon individual clerks in that office. The office manager or chief clerk or whatever may be the title of the person in charge of the office,