

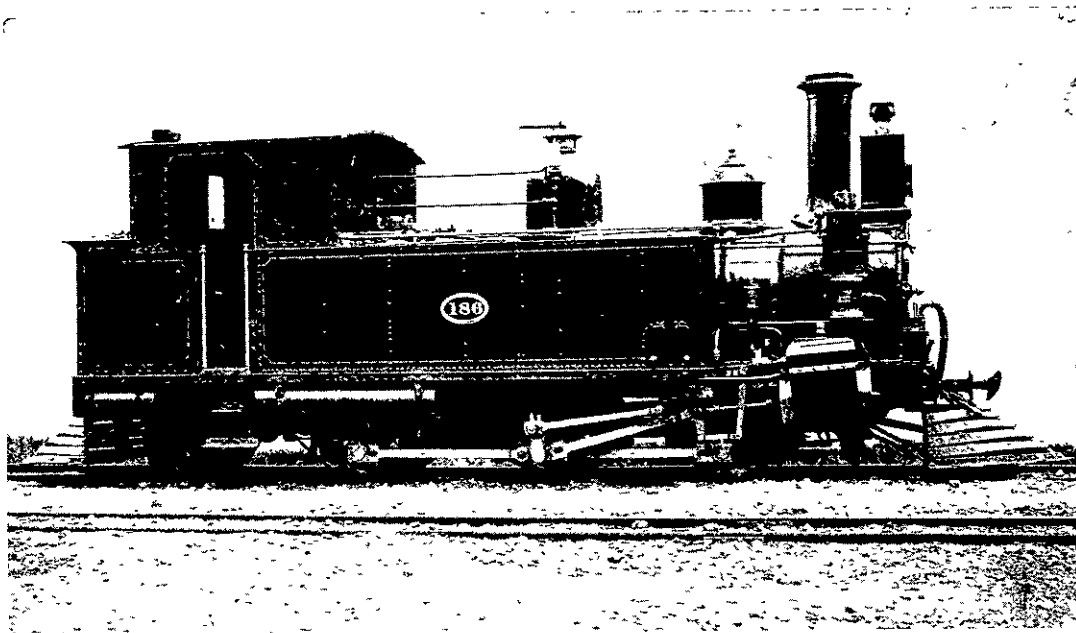
FELL ENGINE CLASS "H" FOR THE RIMUTAKA INCLINE. BUILT BY MESSRS NEILSON & CO., GLASGOW. GRADE, 1 IN 15, CURVES, 5 CHAINS RADIUS CYLINDERS (OUTSIDE), 14" DIAMETER X 16" STROKE, CYLINDERS (INSIDE), 12" DIAMETER X 14" STROKE, DIAMETER OF COUPLED WHEELS, 2' 8"; DIAMETER OF TRAILING WHEELS (RADIAL), 2' 6", TRACTIVE POWER, 19 250 LBS, TOTAL WEIGHT IN WORKING ORDER, 39 TONS

## THE BUSINESS MAN AS VIEWED BY AN ENGINEER.

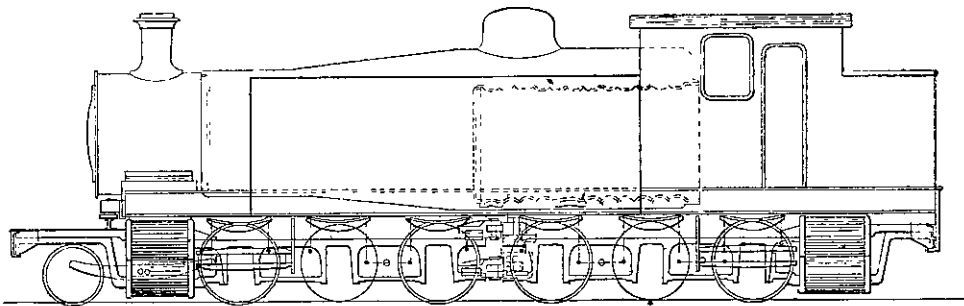
THE following, which is extracted from an address delivered to the students of the Institution of Electrical Engineers, entitled "Some Difficulties in Getting On," contains a few points worth noting by beginners in almost any calling, and shows that, in the lecturer's opinion, the business man has greater earning power than either the scientific or professional man.

The first difficulty is to know what equipment is necessary, and how to get it—that is to say, to know what ought to have been learnt, and how to make up any deficiencies. At once each of us is confronted with the question, "What is going to be my work?" I say "us," because the difficulty in many cases is permanent, one never knows what he will be called upon to tackle in the future. The difficulty is much greater, however, in the case of a young man, because he has probably the vaguest idea of what his life's work will be, and that idea time will show to be quite wrong. Ladies have at different times told me that So-and-so, the new Archbishop of Canterbury, said, as a boy, he intended to be an archbishop, and this shows wonderful strength of character, and all that sort of thing. But probably every curate intended to be an archbishop, as there is only one career open, and one top. If you glance round at the work of some of our big men, you will be surprised to see how many have made their reputation by doing one small thing, but doing it well. If a man gets to the front in one narrow subject, the world credits him with knowledge of all the rest. It is, however, even easier to acquire a large general knowledge than an advanced special knowledge of one narrow subject. The speciality must not be too narrow either. I remember a Scotchman applying for an opening. He had no knowledge of electrical work, but thought it was easy to become an electrician. I suggested he had better stick to his own line, in which he admitted he was really at the top of the tree. He said, unfortunately, eminent as he was in it, there was just then no opening. His speciality was "Turnip analysis." He could analyse a turnip better than anyone else in the country, but no one wanted any turnips analysed.

One of the great difficulties is to keep knowledge in a polished state ready for immediate use. In practice, it may have to lie idle for long periods, and then be wanted very much on short notice. The fact is overlooked by people who suffer from the modern craze for writing about technical education. For instance, we are told that all engineers ought to have the calculus at their finger-ends, and so on, but it is forgotten that, though an engineer ought to be well up in mathematics, he only makes a calculation requiring higher mathematics once in several years, perhaps, and it is impossible for him to keep his mathematics in working order down to minute details. All he can do is to keep general principles in his mind. Probably, the only thing to do is to treat knowledge as a huge district into which one's life is long enough to make some very little roads. From each main road there are branch roads, and from each branch road little paths, and so on, to an infinite extent. Many places can be reached by several paths. Each road or path gets obliterated by weeds if it is not constantly trodden. Life is too short to make many roads or paths and very much too short to keep many of them in order by constant use. The best thing, then, is to keep one or two main roads clear, and remember where the branch roads and paths are, and go over them again when needed. To go back to plain speaking,



BRANCH-LINE TRAIN SERVICE CLASS "Fa" BUILT IN NEW ZEALAND RAILWAY WORKSHOPS. DIAMETER OF CYLINDERS 12" STROKE 18", DIAMETER OF DRIVING WHEELS 3' 0", DIAMETER OF BOGIE WHEELS 2' 0"; STEAM PRESSURE 160 LBS. PER SQUARE INCH, TRACTIVE POWER 8,520 LBS; WEIGHT IN WORKING ORDER 28½ TONS.



THE NEW COMPOUND LOCOMOTIVE, CLASS "E," BUILT IN THE NEW ZEALAND RAILWAY WORKSHOPS. LOW-PRESSURE CYLINDERS, 16" X 18", HIGH-PRESSURE CYLINDERS, 9½" X 18"; DIAMETER OF DRIVING WHEELS, 36½", TRACTIVE POWER, 29,000 LBS, TOTAL WEIGHT IN WORKING ORDER, 65 TONS.

the great thing is to master a certain number of broad fundamental principles which give a starting-point for refreshing old knowledge or acquiring new.

It is often said that the pursuit of knowledge has a nobility of its own. But what knowledge? You may find out what all the numerals in Bradshaw add up to, or who was Napoleon's great-aunt; or what Mary Shelly ate, or who really wrote the tune of "God save the King," or the Letters of Junius, or who really started the kinetic theory of gases. In each case you gain knowledge. But you will say, "What is the use of such knowledge?" Your question at once commands the answer, "No knowledge is worth obtaining for its own or any other sake unless it is, or will probably be, useful to man."

A man's value to the world at large may generally be roughly estimated by the income he earns. Where position is earned at the same time, the money income is, in proportion, less for a given usefulness; but, taking such disturbing elements into account, the rule is broadly true. The business man comes out far above the engineer. He employs the engineer, the scientific man is his servant.

If you examine the large industries, you will, as I say, find the commercial, or business man, with little or no technical knowledge, at the top of the tree. If you confine your attention to engineers, you will find the engineers who make the biggest incomes and occupy the most important and responsible positions are those who have most business or practical knowledge. Our leading consulting engineers do not spend a large portion of their lives plotting curves, counting electrons, or even making anything more than arithmetical calculations. They spend their time dealing with large questions on purely commercial lines; and, as a rule, the bigger the engineer the more he knows about practice and business and the less he knows about text-book science. I do not for a moment mean to say that text-book science is not of priceless value, of course, it is; and the more scientific knowledge you or I, or, still more, the leading engineers, have, the better, but most of us suffer from too little common sense in proportion to our scientific knowledge.

The engineers occupying smaller positions, assuming the same age in both cases, are not necessarily deficient in technical knowledge, but they are generally wanting in business attainment, and less able to take responsible positions. It is often said that to be a good master you must have been a good servant, but a good servant does not necessarily make a good master; generally the

reverse. There is a wide distinction between the man who can earn a few hundreds a year and the man who earns as many thousands. It is a very curious thing that there is hardly anything between. One type of man will earn his few hundreds a year all his life, remaining permanently an assistant, or he will undertake responsible work and get into fair figures. The engineer who is worth £750 a year seems hardly to exist, except for a short time on his way from one class to another. This is what is meant by the saying, "that there is plenty of room at the top of the ladder." It is not that the men who remain as assistants permanently are ignorant of science; quite the reverse. The business man can rent a profound mathematician for a few pounds a week, if he wants him; but he probably does not. The real point is that the assistant is wanting in business knowledge or in push. If he is wanting in ambition, or lazy, nothing I can say is to the point; but he may be suffering from a false notion of the relative values of raw science, technology, and business knowledge."

## The Motor Car and Agriculture.

The application of the motor to farming could not have been long delayed. To Mr. Dan Albone, of Biggleswade, Bedfordshire, is the credit, so far as England is concerned, of stepping into the breach, and bringing the farmer and the motor-maker into mutually beneficial acquaintance.

Mr. Albone calls his invention the "Ivel Agricultural Motor," and it is a provisionally protected patent. Among its many claims to praise is the fact that it can be adapted to use either in the field or in the barn. In the field, it can be attached for traction purposes to the plough, to the mower reaper, binder, and other field machines; in the barn, the petrol motor, for the time stationary, can be used for cutting chaff, pulping roots, grinding corn, and a variety of other useful purposes. More than this, the "Ivel" can be used as a road traction engine, for the carriage of produce to market. Mr. Albone himself uses his "Ivel" motor for a similar purpose. Finding, in common with most country automobilists, a difficulty in obtaining petroleum, owing to the regulations of the railway companies, he has been sending his agricultural motor, towing a couple of vans, to London to fetch spirit. Biggleswade, by the way, is forty-five miles from London, and the travelling advertisement has been a capital one for the inventor.—*Magazine of Commerce.*