

large numbers of their engines, and they are also exported to the continent, but they are perfectly useless here. As road steamers, our bridges will not bear their weight with safety, and we have often seen the engine stuck in the mud, and when ascending hills their construction tells terribly against their utility. On loose macadamized roads, they have often been obliged to wait until the pressure of steam reached seventy pounds per inch before they could surmount obstructions, and that with out any load attached, except their own unwieldy weight. For farm work, the want of power and the destructive weight rendered them absolutely useless. These two steam carriages not being of any use, locomotives are now condemned as useless for any such work, and are used for ordinary stationary power. The next "locomotive for common roads," that made its appearance in Canada was imported by a gentleman of the city of Toronto. It was called the "Thompson road steam-r." The one had its wheels cased with large bands of India rubber, protected by iron bands, and attached to the wheels by chains at the sides. These bands were used to cause the wheels to assume a flattened figure on that portion which touched the earth. This was done to increase its tractive power, and prevent the wheels slipping round. It is to contend with this difficulty, that Mr. Parvin has invented his ingenious feet. The enormous masses of rubber were several inches in thickness, and about fifteen inches in width, and whilst they afforded a certain tractive force by the great weight flattening the lower portion of the rubber, the engine had also to contend with the impelliment so formed, placed directly before the wheels, and of course it was constantly climbing a hill.

The engines that propelled this carriage were far too small, and proved defective in their construction. We have often seen the steam gauge showing 119 to 160 lbs. to the inch. Subsequently, however, this was somewhat amended. When placed in a wet soft spot, it could hardly extricate itself without any load, unless the steam was enormously high, but on a smooth level road, or when surmounting a low hill, it was capable of drawing six loaded waggons, each containing a two horse load, but usually four such waggons were quite enough for it to haul; and it was stated as a fact, that teams, hired at three dollars a day were cheaper, more efficient and more reliable, all things considered, than this engine for road work. Consequently this engine must also be included amongst the failures, although it certainly was the best, and did the most work in comparison with the others.

With all these failures before us, it may well be asked, how can we hope to succeed in this direction? and where can our farmers obtain such an engine as they all feel the want of, that can be cheaply purchased, easily managed, entirely efficient when at work, and capable of drawing three to six ploughs across our Canadian fields, thrashing the grain, sawing the wood, hauling lumber or goods on the roads; doing as a day's work in the field, from five to ten acres a day of deeply and well ploughed land; or hauling at one load three to six tons of merchandise or freight (twenty miles and return) on ordinary macadamized roads? And last, but not least, an engine that can be furnished at a reasonable price, and made in Canada? There need be no hesitation in stating, that all this can be done if only well directed mechanical genius be applied to the task.

We will, however, enumerate some of the most necessary qualities which such an engine should possess.

1st. The whole locomotive should not exceed in weight two and a half to three tons.

2d. The wheels should be provided with such appliances as will render slipping round impossible, and at the same be so constructed that they will not clog in ordinary soil.

3d. The steering apparatus should enable the engine to turn in its own length, dragging after it its load of ploughs, in at one end of the furrow and out at the other, like an ordinary team.

4th. The control of the power should be such that an engine of ten-horse power can instantly be converted, by gearing and increased speed, into one of fifty-horse, whilst at the same time the load will move in the same proportion slower.

5th. It should be capable of going almost anywhere that an ox team can go with a waggon, and as ordinarily used about a farm, through gates and gaps, and in fact be completely under control.

6th. The cylinder should be oscillating, of ten inches diameter, with a two inch stroke, and there should be two of them with cranks set at right angles, so arranged that one or both cylinders can be used at a time.

7th. The "cut off" to the steam should be so regulated that when doing light work a mere "cloud" of steam is used, although when first let on to the engine, it must have a pressure of fifty lbs. per square inch, and be instantly cut on and used expansively; on this point mainly depends the economy in steam when light work is being done, and by altering the segment on the eccentric wheel that regulates the cut off, the full power of the engine can instantly and for one moment be obtained, to be again reduced to a minimum when the "stopping point" is passed.

To plough from eight to ten acres between sunrise and sun-set would only require five teams, probably four could do it, if they could stand the long hours. But an engine never tires, feed it with fuel and water, and you may work it each day twenty-four hours as well as twelve. It wants no dinner, and it never complains of the torrid heat of summer; it never wants exorbitant wages in busy times, and consequently it is of all other sources of labor and power the best adapted for Canada, where fire-wood is cheap, and water generally plentiful, and where labor is extravagantly high and scarce.

An engine and boiler, well cared for, will last a man's life time. We are now working an engine purchased upwards of thirty-three years since. It has not cost an average of five dollars a year for repairs, and is now equal to new. But this extreme endurance is altogether due to its having always been carefully watched and attended to. No minor points have been neglected. This freedom from accident is due to constant surveillance, and not to any mechanical skill of the persons in charge. They have always been sober laboring men.

Let us not, therefore, be afraid of steam. There is absolutely less danger than with horses, if proper care and intelligence are used. Let us apply to the proper quarter and obtain a government grant of \$2000.00 to be given as a bonus to any one who will construct a farm locomotive embracing the foregoing requisites, and mechanical skill will not be long in solving the problem of steam ploughing, and producing an engine that will be of invaluable service both on the farm and on the road.

What Constitutes an Agricultural Education?

The altered state of Agriculture now as compared with what it was even at the commencement of the present century, has, as we pointed out in our last issue, rendered a special education imperatively necessary to enable the farmer to pursue his business profitably and intelligently. This is a matter upon which all thoughtful men who have devoted attention to the subject are agreed, but upon the question of what constitutes that education, there has been and indeed still is much diversity of opinion.

Educational matters have ever proved prone of dispute; but the necessity of bringing into the same sphere of action—of blending together and harmonizing the work and the ideas of scientific

men on the one hand, and practical men on the other, has rendered agricultural education unusually so.

As a branch of education it owes its origin to the application of scientific principles to the cultivation of the soil, and the subject of dispute is based mainly upon the question of introducing or excluding the study of these principles in the education of the farmer.

The scientific men argue that a school or college course for this purpose should be confined to strictly scientific studies, and practical acquaintance with the details of farm management obtained either before or after such a course.

The purely practical educationists insist that there is no necessity for making the farmer acquainted with the principles that underlie the work of the farm, and that his education should merely consist of a training in the various operations and general management of a farm, worked upon scientific principles.

Experience has proved that both these theories of what should constitute an agricultural education, are erroneous, and institutions conducted according to either have not only failed to accomplish the object for which they were intended, but have largely contributed to bring the object aimed at into disrepute.

If in accordance with the former theory, we take a boy from a common school, and for two, three, or four years in succession confine his attention to scientific studies, it cannot be denied that his mind is likely to receive a bent towards scientific investigation, or other strictly mental occupation, rather than to the application of these principles in the work of the farm. In short he is more disposed to preach than to practise, —he seeks to live by his head and not by his hands, and shrinks from what he now erroneously regards as the drudgery of farm life.

Hence young men, educated under such a system, too frequently fail to return to the farm. The farming has been educated out of them,—they seek for a town rather than a country life, because they believe they will find there occupation and associations more in harmony with their previous career. Even if from necessity they return to the farm, they do so at a great disadvantage. The application of scientific principles to the work of the farm, involves the introduction of new and improved practice and appliances of which they are necessarily ignorant, while a thorough knowledge of them is indispensable to success, and any system of agricultural education not providing instruction and requiring practice in these matters, must be incomplete, if not injurious.

Such are the arguments usually brought forward by the strictly practical educationists in opposition to what may be called the theoretical system, and while there is much good sound sense in their reasoning they themselves err as far in the opposite direction. Their system ineffectually would reduce the farmer to a mere machine for carrying blindly into operation the teaching of the scientists. We can have no sympathy with such a system as this. It is the exploded doctrine of a by-gone age, and were it not that even at the present day it has some advocates, it would be unworthy of notice. Those who support such a plan of education seem to forget that this is, happily, an intellectual age; that men's minds are now stimulated by a good common school education, their reasoning faculties are aroused, and they will no longer voluntarily devote themselves to an occupation that does not afford ample employment for these faculties. They seek food for thought, and if their education is not such as to enable them to derive this intellectual enjoyment from the work of the farm, they seek it elsewhere.

By such an illiberal system, the all-important art of husbandry would be delegated to the hands of the intellectual drones of society, and the better minds amongst us betake themselves to other pursuits, and thus, for lack of a judicious education, leave behind them a calling than which there is none more con-