Days at work ploughing and scarifying.. 115 days.
Ploughing on hire..... 46 days.

For the crop of 1863—
Land under tillage..... 510 acres.
Days at work ploughing..... 81
" thrashing ..... 21—105 days.

It may be remarked in passing that the whole crop was thrashed by the ploughing engine.

For the crop of 1864—
Land under tillage..... 510 acres.
Days at work ploughing..... 75
" thrashing ..... 26—101 days.

Here again the entire crop was thrashed, and it may be further remarked that for these two last crops the work done in acres amounted to 575 in each year.

For the crop of 1865—
Land under tillage..... 510 acres.
Days at work ploughing..... 54
" thrashing ..... 29— 83 days.

The foregoing statement clearly exhibits that there was a steady yearly increase in the number of thrashing days, with the same power employed each year. This plainly proves that there must have been a larger bulk of grain produced by the land. At the same time, the days occupied in ploughing and scarifying decrease in a similar ratio, thus indicating increased facility in working, less trouble with weeds, and improved fertility. During the whole of this period, we learn, that "the crops were visibly increasing, and at no time did the number of horses exceed nine." The actual accounts of the whole period, including the supply of several improvements made in the apparatus, are given, from which it appears that the average yearly cost was as follows:—

	£	s.	d.
Account.....	60	0	0
One year's coal.....	72	0	0
Oil.....	8	10	0
Depreciation and interest.....	100	0	0
	£240	10	0

The account against the nine horses is as follows:—

	£	s.	d.
Cost for nine horses.....	183	0	9
Hay.....	103	0	0
12 acres of green meat.....	84	0	0
Depreciation and interest on nine horses, valued at £40 each.....	45	0	0
	£420	0	9

Thus we see that the thrashing, cartage and tillage on this farm of 600 acres is done, so far as horse-power and steam are concerned, at an expense of £660.

The report then proceeds:—"Many men may be unprepared for such a case against horses on a light land farm, but such we are assured are the actual figures. It may be objected that no allowance is made for manure in the statement; but let it be remembered that the account, on the other hand, is not charged with the straw, the repair and depreciation of implements, and harness used with the horses. Here, then, without attempting to balance the two cases with exactness, is a power called in to displace and replace thirteen horses.

	£	s.	d.
The annual cost of the power substituted was.....	606	13	4
The annual cost of the substitute is ...	240	10	0
The apparent gain.....	£366	3	4

There are three considerations which go largely to increase the sum which, after the above process of subtraction, is left as gain. Thrashing, when horse-power only was employed, and maintained at a cost of £1,026, was an extra; now that steam has displaced a considerable proportion of the horse-power, and reduced the expenditure of certain specified operations to £660, thrashing is included. The seasonableness and thoroughness of the tillage operations render altogether unnecessary the multiplied acts, which used to characterise every system of good husbandry One deep steam stirring at the right season is made to take the place of several slighter ones. Every year the work becomes easier, more manageable, and the days spent in tillage operations fewer Although no account has been kept upon this farm to measure the exact result of steam as against horse-power in actual bulk of produce—and such an account, for the reason that horse-power and steam are used in conjunction, is impossible—yet the owner of the farm is perfectly satisfied. His stack-yard and his banking balance show a state of improvement that can only be attributed to the employment of steam."

The cut accompanying this article represents Howard's "New Patent Steam Harrow," which has already been described in our pages, (*vide* CANADA FARMER, Vol I., p. 99.)

Familiar Talks on Agricultural Principles.

INTRODUCTORY.

SOME little time ago, one of our correspondents wrote us asking for a simple explanation of certain terms used in agricultural journals and books, such as nitrates, potassa, phosphates, &c., and confessing that to himself and many of his brother farmers, much of their agricultural reading was little better than Greek, from want of acquaintance with the meaning of such words. We might, in reply, have given a glossary of terms used in scientific agriculture, but this course would only have met the case in a very partial manner, for the real difficulty is not so much in ignorance of words as in ignorance of principles.

Generally speaking the farmer is a mere manual labourer. He works according to a few simple traditional rules. Certain modes of culture have been found by experience to bring about certain results. But he cannot explain the why and the wherefore of them. He cannot show why it is and must be as experience has demonstrated. Hence he goes about his work mechanically rather than intelligently, and finds it far more of a task than a pleasure. To know the reasons of things, to be versed in the principles of agriculture, would convert drudgery into an enthusiastic study of nature, and lend a charm to an otherwise tedious avocation, for as the poet Shakespeare observes: "The labour we delight in physics pain."

No farmer should be content to toil, like a mole, in the dark. He should aspire to understand his business; to be familiar not only with its practical operations, but with the theories and facts on which they proceed. There is nothing abstruse, or difficult of comprehension about the principles of agriculture. Nor are they mere guesses and conjectures, but the results of patient inquiry, careful observation, and persevering research. They are thoroughly proved and established facts.

It is not, perhaps, to be wondered at that so few farmers are versed in the science of their business, when it is remembered that it is only very lately that agriculture could claim to have been reduced to a system and based on a theory Little more than half a century has passed away since Sir Humphrey Davy applied chemistry to agriculture, explained the organization of plants, the nature of soils, and the influence of light, heat, electricity, moisture and the atmospheric gases upon vegetable formations. Previous to his day, the most absurd ideas were maintained, such as that all vegetable products were capable of being generated from water; that the soil contained all the nourishment of plants, and that by finely dividing it, any number of crops might be raised from the same land; and the like. The discoveries of Sir Humphrey Davy have been greatly improved upon since 1840 by Liebig, Johnson, Lawes, Morton, M. Ville, and others, until at the present time agriculture takes rank among the fixed or exact sciences.

There are aged patriarchs of the farm now living who have witnessed the birth of Agricultural Chemistry, and can tell of a time when not only its laws, but its very name were unknown. But though of comparatively recent origin, scientific agriculture has made remarkable progress, and it must not be forgotten that many much newer discoveries have come to be perfectly familiar to every one. The past half century has been fruitful of discovery and improvement in every department of human activity, and it behoves the farmer to see to it that he is not in the rear of his age.

One great obstacle in the way of securing attention to principles, is the prejudice which exists against "book-farming." Many good farmers entertain this prejudice, and though it is ill founded and unfortunate, there is after all some excuse for it. Mere theory never made a farmer yet. The practical part of the business cannot be got from books, but must be learnt on the farm itself. There have been those who have supposed themselves thorough qualified farmers merely because they have become posted in the science as taught in books, but their efforts to reduce theory to practice have proved mortifying and mirth-provoking failures. When wise and experienced men have met with such cases, they have unthinkingly said, "Ah, this comes of book-farming!" In some instances too, practical men have been misled by theorists. What applies to a particular soil or climate has been made a rule for every soil and situation. Facts and experiments have been made public without the conditions of success being carefully laid down. A slavish imitation of processes described in a loose, general way, has often led to waste of time and money, and thus scientific farming has come into disrepute.

The relation between the theory and practice of Farming is aptly illustrated by Prof. Dawson, in chapter ii. of his admirable work, "First Lessons in Scientific Agriculture,"—a volume that deserves to be more widely known, and from which we expect to derive many suggestions in the series of articles we are now commencing. "A practical seaman," says Prof. D., "must be able to perform all the active duties required of him in the ship—to steer, to go aloft, to reef sails; and, a mere landsman may be quite helpless in these matters, however much he may know as to the theory of navigation. But the ship may be well manned with able-bodied and skilful seamen, and may yet lie helpless in mid-ocean, if there is no one on board capable of working out its reckoning and determining its course; and a landsman, a boy, or a woman, may be able to do this by means of the learning taught in the schools, though quite unable to perform any of the duties of the practical seaman. The ship is equally helpless without practical skill and without science. Both must be present. It is just so with farming; the farmer must know the practical operations of his art—how to plough, to harrow, to sow, to reap; But he may know and industriously practice all these, and yet be running his farm to ruin, as surely as the seaman would his ship, if he knew not his course and distance. Here science comes to the aid of the farmer. It teaches him the nature and composition of his soil, the materials of which he exhausts it in cropping, the various requirements of different cultivated plants, the nature and uses of manures, the causes of sterility and impoverishment, and the cheapest and best modes for remedying the one and avoiding the other; and the materials necessary to renovate lands that have been already exhausted."

It will be our object in these "FAMILIAR TALKS" to reflect some of the light which science has shed on the farmers' pathway of toil, and to draw attention to the laws by which an all-wise Providence directs the wondrous course of Nature. We shall affect no originality, but avail ourselves freely of all the helps within reach, by means of which our object can be promoted in the most effective, simple, and interesting manner. We shall hope to engage as listeners to these "talks," not only those of our readers who are actually engaged in farming, but all who take an interest in the forms of life and beauty with which the Creator has filled the earth. The principles of agriculture form an important and deeply interesting branch of natural science, well worthy the attention of every thoughtful mind.