and hoe are the principal instruments, and the soil stirred to great depths.

There are many of these small farms round London, England, where the soil is not of the best, ranging in size from 20 to 150 acres. Some use the plough but say "that one acre cultivated by the spade is more profitable than 5 acres of the plough." The produce from the latter is always inferior and is usually sold to hucksters at a very low price.

What the spade does for the market garden the cultivator can do for the farm, or even ploughs might still be used if fitted with subsoil tynes.

There are some very interesting features in connection with the yields this season. I see that it has been estimated that in Saskatchewan the average wheat yield is but 15 bushels per acre, whilst on the authority of Mr. Saunderson of Indian Head, the yield in that district is averaging 25 bushels—a difference of 10 bushels per acre. Why is this? The land in the Indian Head district has now been under cultivation for many years. whilst in the past two years a very large area of virgin prairie has been broken and upon which 30 bushels might be looked for. Still the general average is but 15. No doubt the exceptional weather has had something to do with results obtained, but why has Indian Head 25 bushels? Is it the quality of the land or better cultivation?

Coming back to mechanical power cultivation and the heavy engines, is it reasonable to suppose that with such machines a better cultivation can be obtained? First the great weight upon the wheels so compresses the land that, when turned up by the plow it is of uneven texture and depth, the resistance to be overcome by the plough is increased and the succeeding operations necessary to form a finely pulverized seed bed are in consequence more numerous and costly.

Assuming, however, that by much disking and harrowing a fine seed bed has been attained, it is simply madness to again compress it previous to sowing the seed. Compression afterwards would be a totally different matter. Generally speaking, in the West the seeding is done when the land contains a considerable amount of moisture and it is doubtful if these large engines could travel. Assuming, however, that they could, what sort of seed bed should we get? A large portion so compressed that the seed when sown would remain on the surface and be wasted. Even after horse drilling a considerable amount of the seed does not germinate owing to the lumpy state of the soil.

Then again, the deeper and finer the seed bed the greater the power necessary to propel the engine itself, meaning increased fuel and water consumption and a higher cost of work done.

The seeding season is a very anxious time for the farmer, more because of the large area he crops. Not only has the seed to be sown, but the moisture must be conserved for its nourishment, whilst protection from blowing must be afforded. In many cases there are therefore three operations involved, drilling, packing and drag harrowing. Between the one and the other the atmosphere is changing rapidly the condition of the soil detrimental to germination of the seed. It would therefore appear that to ensure the fullest protection these three operations should be combined. Machines for this purpose are now in operation in the Argentine and other countries where mechanical traction is in extensive use.

Although large traction engines are made use of in California for harvesting and threshing simultaneously, this is not possible in Western Canada and it would not only be absurd to couple one of these large engines to a few small binders but it would be a great risk to rely on one source of tractive force—a breakdown or stoppage of any kind, would be a very serious matter.

Mechanical traction is however in very extensive use in the old country and elsewhere but instead of heavy traction engines light motors are used, the motive force being either gasoline or steam. The number of binders coupled to these motors varies from one to three, two being found most convenient.

The harvesting completed, we come to a problem the solution of which, provided mechanical power is to be applied throughout, is not easily arrived at.

There are three and possibly four operations that should be proceeding simultaneously, viz.: hauling sheaves, threshing, fall plowing or cultivating, and it may be that the farmer is anxious to ship his grain as soon as threshed.

How would those writers, who predict the doom of the farm horse solve this little problem? Writing in the interest of the manufacturers, they might suggest that a few car loads of motors be shipped to the farmer. No, the horse is not doomed by any means, though his number may be reduced by the adoption of mechanical power. One thing is certain that the separator needs belt power, and unless there is more than one engine or motor on the farm, horses will be required for hauling the sheaves. The plowing or cultivating will have to lie over until the threshing is completed, when the engine could be put to this work, whilst the horses are hauling grain to the elevator. The man who says the farm horse is doomed, knows not the West, he forgets the snow clad prairies over which hundreds of thousands of bushels of grain have to be transported. Can he accomplish this with traction engine motors?

In connection with threshing, the breaking basis has again been detrimental to the farmers' interest. Larger and larger separators have been introduced to utilize the increased power of the engines. Farmers have been relying upon these large outfits to whip off their threshing but have suffered much disappointment and especially so during the present season, due to the wet state of the land and the engines being unable to get around. Any breakdown occurring means throwing idle large gangs of men and teams.

It is doubtful if in the season's run, the smaller outfits will not accomplish as much and possibly more work at less expense.

Contracting and rivalry are doubtless responsible for the abnormal increase in the size of engines, plows and separators. Dick has a better outfit than Bill. Bill goes one better the next season and so on. Where is the finish?

I am convinced that it would have been more in the interests of farmers and manufacturers, had smaller and more generally useful farm machinery been put upon the market. Salesmen would have made easier sales and more of them, notes would not have had to be renewed so often, Bill would have had less sleepless nights and the 'missus' would have had that long promised silk gown.

After due consideration, I am convinced that if mechanical traction is to replace horses to any extent it will be by the adoption of light but powerful motors weighing in the neighborhood of 5 tons. and having a capacity first sufficient to run the separator and second, to enable a reduction in the number of horses equivalent to the tractive force developed.

Though the direct system of cultivation by mechanical power was for many years abandoned in England, after the engines reached a weight of 12 or 14 tons. the perfecting of the light agricultural motor has again revived the system and these little "Samsons" are now to be seen in all parts of Great Britain and the continent of Europe, nor have our friends across the boundary been slow to recognize the qualifications these small machines possess for farm service —why not for our western farms?

For years past, and especially in England and Germany, farmers have contracted for the heavier work upon the farm and in recent years the system has been extended to include almost every operation. The coming of the light agricultural motor has somewhat changed matters and farmers are again commencing to do their own work. Market gardeners are employing motors for the haulage of their produce to market and they are also made use of for road and land rolling.

The contracting system has its advantages and its disadvantages. The farmer has less capital sunk in machinery and more for cattle raising; the contractor who makes it his business, and possesses all kinds of implements, is enabled to meet the various requirements of the farmers; he can maintain his own repair shops, can get better operators, for he keeps them the year round. When not in the field they are assisting in repairs. The trouble is that the farmer cannot always get his work done when it is most needed and there is a danger of scrimping the work. There are quite a number of companies in England Germany and elsewhere owning from one to fifteen complete outfits.

The farm is indeed becoming a veritable workshop equipped with a plant that requires more than a mere superficial knowledge of mechanics. When one sees those train loads of machinery entering the West for distribution, a very important question arises in the mind. Who is going to operate those valuable engines or implements as the case may be? Is the farmer competent? Has he sons and do they possess the qualification? One of the greatest difficulties to be encountered in the introduction of steam cultivating machinery was the lack of competent men. They had to be manufactured and the raw material, most suited was found to exist upon the farm—the farm plowman. Why do farmers continue to pay high prices to operators, when they, or their sons, have now so many opportunities for gaining mechanical knowledge, either by courses at the Agricultural College, by correspondence, or, possibly better still, by entering the workshop where the machines are seen in the various stages of construction, where the proper knowledge of handling tools can be acquired whilst the spare time may be used to look into the theoretical side of the business

It is said that "two heads are better than one." Seeing then that there are many problems requiring solution in connection with farm machinery, why not the farmers put their heads together at the various Institute meetings during the coming winter and thresh out those problems. They discuss stock, grain and politics, why not farm machinery?

A. BURNESS GREIG

Winnipeg, November, 1907.

"MAKING UP."