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Harry Designs a Tractor

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HARRY was quite a mechanic, and had always spent his spare time making things in the workshop he had built next to the barn. He had designed and built many labor-saving devices that enabled his father to operate his 150-acre farm with less trouble and labor than ever before and his father caught the "Make-the-machinery-do-it" spirit, and was always improving his equipment. Naturally the tractor problem came up and many trips were made to various farmers to inspect different makes and types. All kinds of opinions and advice was given by different tractor operators, which, instead of solving the problem, only made it more complicated because each operator had different ideas and suggestions to make.

Harry and his father talked over the tractor situation many times during the evening discussions, but could come to no decision—some tractors had certain advantages that were lacking in others, but then they themselves were lacking in improvements that the other tractors possessed. Some had a fine engine but would not burn kerosene satisfactorily. Some that burnt kerosene would not make a close turn or the driver was too far from the plow. Others that had these things were not geared high enough for hauling loads to the depot. Thus they argued pro and con and could not decide upon a tractor satisfactory to both.

One day Harry said he had been thinking the whole proposition over and had decided that the only way to get a tractor suitable to their needs was to actually build it and he would start on the design that very evening. His father was a little doubtful about such a large undertaking, but finally was persuaded that it would

only cost a little more to build one and then they would have the "ready-to-order" kind beat half a dozen different ways because it would be just what they wanted.

Three months slipped along before Harry had his plans perfect, and he now felt that he had a tractor designed that, when built, was going to be 'way ahead of anything on the market. Harry wanted to start building one at once, to test it out, and if it proved satisfactory he then was anxious to start manufacturing the tractor in quantities, because he said there was a big demand for a good tractor and surely one designed and built by a farmer should be better adapted for the farmers' needs than one designed by some city fellow. His father was more cautious, however, and said that before they ordered the patterns made and machine work started it would be better to let an expert give his opinion on the design; it would not cost much and might save a lot. This seemed to be a good idea, and Harry readily agreed, although he was of opinion that he had thoroughly covered every detail and he could not imagine where any improvement was possible.

A few days later Harry and his father went to a well known tractor expert in the city and asked him to look over the plans and give his opinion on the new type tractor. The expert first asked if they were going to make more than one, and Harry explained that if it proved satisfactory he was going to build them in quantities.

After the expert had looked



over the details for a short time he said: "Well, this is a fairly good tractor and has many novelties about it, but there ought to be many changes and re-design before you start to build even the first one. Look here, for instance, when your tractor is plowing you intend to have the right wheel in the furrow, don't you?"

"Yes, that's the idea, and you will notice I have designed an automatic steering arrangement so it will follow the furrows," said Harry.

"That's all very well, but you have not spaced your wheels right; notice when the wheel is in the furrow and the plow following, that the line of draft comes just so many inches from the furrow and to have the tractor work well it is necessary that the line of draft practically coincides with the line of pull of the tractor, if they do not there is a twist thrown on the tractor, and while it will run under these conditions, still it is not so satisfactory and in soft slippery ground, may prevent it from working at all. You will have to move that wheel in six inches to bring things right."

"I never thought of that, and it is plain enough now since you have called my attention to it," replied Harry.

"Here is another thing. If you draw a line from about where the driver's eye will be down to the front wheel where it is in the furrow, you will notice that it cuts through the cooling hopper and that means that the driver cannot see the wheel in the furrow and so will not be able to steer good. You must either move your engine over or else change the design of that hopper, or you could possibly put the seat about a foot or sixteen inches higher. It would certainly never do to make it as you have designed it."

"That's another one on me, all right," laughed Harry.

"I see you have adopted hopper cooling instead of a radiator; well that cheapens manufacturing some, but upon what data have you designed that hopper?"

"Oh! I didn't see anything at all fine about a hopper, so long as it holds water and covers the cylinder well, what more can it do?"

"Oh, it can do a lot," replied the expert. "That hopper of yours in the first place is much too small; I don't believe you could plow more than half an hour between fillings. You know a tractor is working under practically full load every minute it is plowing, and it will evaporate a large quan-