

is far better. (Fig. 16.) So also is the special ditching plough manufactured by one of our Ontario firms. (Fig. 17.)

In hard ground the home-made drainage plough is very difficult to control when the ditch becomes deep—sometimes it goes too deep, at other times, because of its lightness, it skims along the surface, doing no good. The subsoil plough, too, has these defects, and besides it is not strong enough in very heavy soil. I have seen a subsoil plough twisted so out of shape as to be useless for any purpose, and that simply because of the stiffness of the soil and uncontrollability of the plough. The pick plough and the ditching plough have none of these defects—they are heavy and therefore strong enough for all purposes, ride steadily at a uniform depth and are easily held. Because of their weight they are somewhat cumbersome in turning at the end, but they perform their work so effectively that this slight drawback may be overlooked. The pick plough is not made primarily for drainage work, but for tearing up pavement, old roads, etc., hence the handles, as in an ordinary plough, are too low and too wide. But they can be raised and narrowed as described above—which was actually done on some of them which I have seen used for drainage purposes.

Actual test has shown that the "pick plough" reduces the cost of digging by 42 per cent. compared with pick and shovel. The "ditching plough" probably does about the same. It is found that they can be used to depths of four feet or over, and some who have followed this method claim that even if the ground can be spaded it is cheaper to use the plough and shovel method.

#### GRADING THE DITCH.

Having dug the ditch within a few inches of its final depth, the next operation is to remove the remaining earth, leaving the ditch bottom with an even fall throughout. The accompanying drawing (Fig. 18) will aid in understanding the method to be described:

Two cross-heads are set up 100 feet apart, one at stake 0 and the other at stake 100, as shown in Fig. 18. Both are put 6 feet 6 inches above the ditch bottom, the one at stake 100 thus being higher than that at stake 0 by the amount of fall in 100 feet, *e.g.*, if the fall is 14 inches in 100 feet, then cross-head 100 is set just 14 inches higher than cross-head 0. The stakes must be stout and driven firm in the ground. A light cord—binder twine does very well—is then stretched *tight* and tied over the cross-pieces, so that the sag is negligible. Since one end is 14 inches higher than the other, this cord has the same fall as the ditch bottom is to have, and hence if the latter is made parallel to the cord it will have the required fall. It is necessary to provide a light testing or "travelling" stick 6 feet 6 inches long, since the cord is that height above the ditch bottom. With a narrow shovel the earth is gradually removed until the stick standing on the ditch bottom just passes under the line, as shown in the drawing. When such is the case the ditch is deep