deepest. In peat and muck soils the land is likely to settle after it is drained. For this reason, to preserve their alignment the tile should be put down in the clay or they will have to be relaid after a few years.

In the East, for general farming purposes, the laterals are placed from 32 to 70 feet apart. In draining orchards a lateral is often laid between each two rows of trees, regardless of the distance apart. In the Middle West, on the higher lands and closer soils, 8 rods apart, or 132 feet, has proved satisfactory. In order to get on the land quickly after a rain, some farmers prefer the laterals 95 feet apart, although there is no increase in yields from this practice. On the level lands with porous subsoils, 10 to 12 rods is the usual distance between laterals. Tile laid deep and 20 rods apart have given good drainage in some instances.

At Marion, S. C., laterals 100 feet apart on sandy-loam soil with clay subsoil, the tile being laid 3½ feet deep, have proved amply effective.

In all sections, for trucking, the laterals should be put closer than for general farming, usually not more than 40 or 50 feet apart. A safe guide in locating laterals is to place them so close together that there will be no perceptible difference in the growth of crops between them.

PREPARING TO LAY THE TILE.

GETTING THE NECESSARY FALL.

In all cases the greatest fall possible should be obtained. The more fall a tile has the faster the water will run through it. If the fall is less than 2 inches to 100 feet careful leveling must be done. Large tile are frequently laid with a fall of 1 inch to 100 feet. Where there is sufficient fall above to force the water through, tile have been laid on the level for a short distance, in order to keep the depth. This, however, is rarely a good thing to do. In sandy land, tile should have at least 3 inches to 100 feet, so that any sand that enters may be washed out. For tile 4 inches and larger a fall of 3 inches to 100 feet is considered good on any ordinary soil.

If the land is level, the drain must be started deep at the outlet in order to get the fall. Thus, if there is no fall in the surface for 1,000 feet, 2 inches to 100 feet can be obtained by starting the drain 5 feet deep at the outlet and running out to 3 feet 4 inches at the source.

Where the outlet is not low enough there are several methods by which the proper fall for tile can be secured. All of these methods are dependent on pumping. One plan is to run the drain into a well and then pump the water to a higher level, from which it is carried to the outlet. During heavy rains the mouth of a tile drain may be submerged and rendered useless until the water goes down.

Where this condition is likely to prevail for several days, or long enough to injure the system or the crops, a silt basin with two compartments has proved successful. A trap between these compartments is closed in times of high water and the water pumped from the first into the second. As this gives the water a good head, it is forced out. When the water goes down, the trap is opened and the pumping ceases.

DRAINAGE TOOLS.

The special tools most commonly used in digging a ditch and laying tile are tile spades, a shovel, a drain scoop, and a tile hook (fig. 6). The tile spades are of two kinds, solid and open. They are from 16 to 22 inches long, the 18 and 20 inch sizes being most used. The spade for digging the top of the ditch is usually 5½ inches wide at the top and 6 inches at the bottom. The solid bottom spade is 5½ inches wide at the top and 4½ inches at the bottom. The open spades are used in digging mucky or sticky soils. The shovel used is an ordinary earth shovel. The drain scoop is made in various sizes to suit the size of the tile. These are not over 8 inches, however, but can be used for larger tile if necessary. All these tools except the tile hook can be bought on the open market; if not from a local dealer, certainly from a wholesale hardware company. The hook can be made by any good blacksmith by taking the handle of an old rake, hoe, or fork and fastening a hook in the end. This hook is made from a ½-inch rod, and is 9 to 10 inches long.

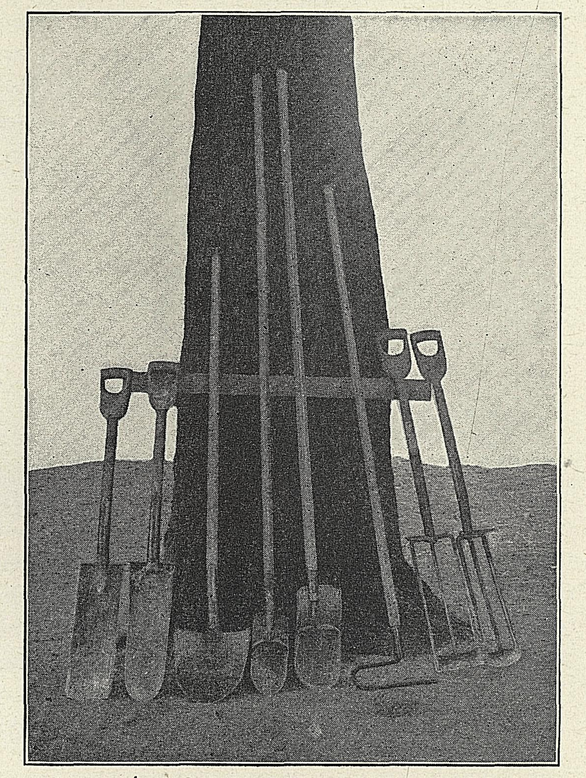

FIG. 6.—Drainage tools. Description (from left to right): Solid top spade, solid bottom spade, dirt shovel, 4-inch drain cleaner, 5-inch drain cleaner, tile hook, open top spade, and open bottom spade.

Several machines are made for digging the ditches for tile drains. The best known of these is the trenching machine. This has proved