

digging into the ground, scatter the seed broadcast over it. In the regular broadcast seeders, the tubes are dispensed with altogether, the seed falling from the box, and spring cultivator teeth are attached which throw the covering over it. The feed-wheel which carries the seed from the box to the tubes consists of a solid cut-away cylinder of about three inches in length, Fig. 1, Plate 1. This is turned by a gearing driven by the road wheels, so when the machine is at rest, the feed is closed; it is also closed when the hoes or shoes are lifted from the ground, or there is a motion of backing the machine. On the rear of the seed box there is an indicator showing how much seed of different kinds should be sown to the acre—grain seed being given in pecks and grass seed in pounds, Fig. 2. By moving the pointer on this indicator to the figure showing the quantity it is desired to sow to the acre, the feed-wheel is shifted, enlarging or diminishing the size of the opening in the measuring channel to allow just the amount desired to pass through. Besides this there is a dial which registers the number of acres sown. The hoes are held in position by springs which allow them to pass over obstructions freely, and quickly return to their working positions. They are locked securely to the frame by clamps, without the use of bolts or pins, so that they may be easily removed and replaced by cultivator teeth. The depth at which they deposit the seed and the angle at which they cut the ground is regulated in some by spring pressure, in others by a mechanism similar to the reversing link of a locomotive; and they may be lifted out of the ground either all together by a lever, or independently by chains. Another lever is provided for shifting the hoes to a double-line, or zigzag position, to permit clods to pass between when working on rough lumpy ground that has not been sufficiently broken up by the harrow.

Cultivators.—The third process of agriculture—the care of the growing crop—is an important one, but the implements used for it are of the simplest variety. The ground must be kept clear of weeds and thistles, and it must be loosened up, especially while the crops are young, after it has become caked either by rain or by sun. For these purposes a variety of implements is used, such as horse-

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