are harvested for seed early in their life. Thus though the header harvester has almost entirely replaced the threshing mill, the effect has been offset by the change in seed production methods. Consequently seed-cleaning plants still have a similar task to perform, the removal of weed seeds, other crop seeds, broken seeds, pieces of straw, and other rubbish from the field-dressed seed.

Separation Principles and Devices

In the separation of weed, grass, and clover seeds, dirt, chaff, straw, and other foreign matter, including broken seed, principles are used according to the impurities in the line. The varying characteristics of the seeds and foreign matter have been made use of in devising the methods for eliminating them. These main characteristics are size, shape, and specific gravity.

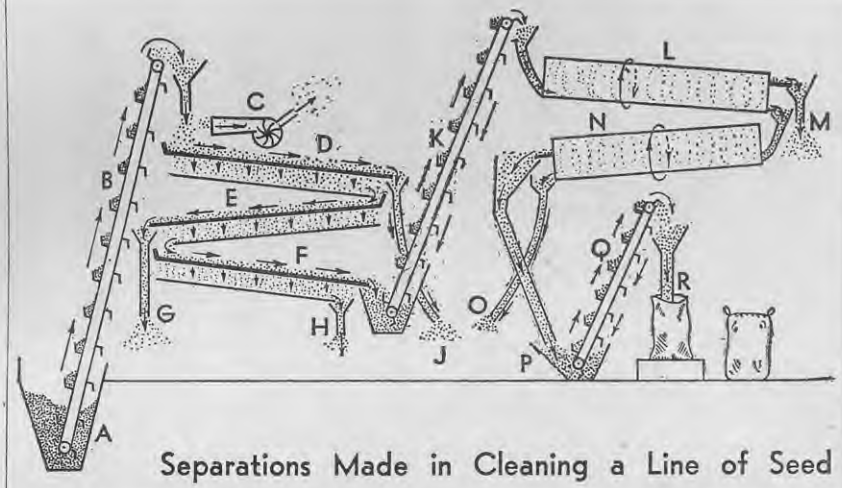
The most generally useful device in seed-cleaning machinery is the riddle, which depends upon size and shape differences for its usefulness. The perforations in a series of riddles reveal a great variety of shapes and sizes suitable for separating many kinds of impurities. The main riddle types include round and oblong holes punched into sheet zinc, and wire mesh giving square and various oblong openings. Opening sizes range from the equivalent of the smallest seeds harvested to the largest, the range used in any particular plant depending on the types of seeds handled. Three prime motions used in the operation of riddles are to and fro, up and down, and crosswise. A combination of to and fro and crosswise will give a rotary motion. Again the riddles may be run on eccentrics on a steel spindle, thus combining to and fro and up and down to give the seed a jumping motion. In the seed trade such a machine is known as a "jump machine". In addition to the type of motion of riddles, they may also be run at different speeds and pitches.

Another device making use of size and shape is the cellular cylinder. This, too, may be obtained with a large variety of shapes, sizes, and angles of indentations or cells in the inner surface of the cylinder. Cellular cylinders are fitted at an angle to the horizontal. As the cylinder slowly rotates material is picked up in the cells, leaving behind in the bottom of the cylinder anything too large to fit into the cells. As the material is lifted upward by the cylinder that of greatest length falls out first and returns to the bottom. Shorter material is lifted higher and when it does fall it is caught in a suspended trough running the length of the cylinder. The position of this trough or tray can be adjusted to make a separation at an earlier or a later stage in the cycle of the cylinder. The material remaining in the bottom of the cylinder works along and is caught at the lower end, while that gathered in the tray is taken away separately. Thus a cylinder will make separations with great accuracy in material of the same shape in cross-section but varying in length. Such a separation would be an impossibility over riddles.

In using air currents in a dressing plant advantage is taken of variations in specific gravity, by which chaff, straw, and empty glumes may be separated from sound seed, and lighter seeds such as grasses may be separated from denser seeds such as clovers. The current of air formerly obtained by blast is now more usually developed by suction. The strength of the current can be adjusted according to the line of seed being cleaned.

A modern machine-dressing plant consists of a number of different types of machines, linked up as required into one plant, so that any line of seed may be fed into the hopper and go automatically through as many processes as are necessary for thorough cleaning. Sometimes lines will have to go through the same process twice.

The separations made in a line of Italian ryegrass are shown in the illustrations on page 14.



Separations Made in Cleaning a Line of Seed

The number of separations made in cleaning a line of seed will depend both on the kind of seed and its condition before machine dressing begins. The accompanying flow diagram, though not that of any particular machine nor giving the order in which the component parts may be used or the numbers of the parts, illustrates a link-up of elevators, blast, riddles, and cylinders, which are essential in most cleaning operations. The following is a description of the labelled parts:—

A—Hopper for field-dressed seed, usually built with the top just above floor level and large enough to hold several sacks of seed.

B—Elevator to lift field-dressed seed to machine.

C—Air suction to remove light chaffy material.

D—Top or scalping riddle; the largest impurities in the line are retained on this riddle, the balance passing through it.

E—Second riddle, with similar function to the top riddle, but separating impurities more nearly the size of the seed being cleaned. This riddle may be employed to remove the largest seed or to carry over the main run of seed and allow only the smallest seed to pass through with small impurities.

F—Third riddle; the seed being cleaned, together with impurities of similar size, pass over this riddle, smaller impurities passing through it.

G, H, and J—Spouts at which the separations made by riddles E, F, and D are collected.

K—Second elevator, lifting riddled seed to cylinders.

L—First cylinder, which separates material of shorter length than the seed being cleaned, lifting it into the cylinder tray.

M—Discharge point for material separated in first cylinder.

N—Second cylinder, which separates material of greater length than the seed being cleaned. The dressed seed is lifted into the cylinder tray while the separated material passes along the bottom of the cylinder.

O—Discharge point for material separated in second cylinder.

P—Hopper into which machine-dressed seed is delivered.

Q—Elevator lifting machine-dressed seed to bagger.

R—Bagger for machine-dressed seed.

Photographs on opposite page by Green and Hahn Photography Ltd.