A simple dockage-tester

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A SIMPLE DOCKAGE-TESTER

By G. L. SUTTON

In Part 3 of my article "The Basic Principles of Wheat Marketing"*, I gave a brief description of an Australian-made instrument for rapidly ascertaining the percentage of "dockage" or unmillable material contained in a sample of commercial wheat. I feel that this dockage-tester is so simple in operation and so convenient to use that it warrants a more detailed description.

The instrument is simple in design and is suitable for use at the silo, bulk bin, flourmill or warehouse. The percentage of unmillable material in a sample of commercial grain may, by the use of this dockage-tester, be quickly ascertained even by operators not familiar with the use of a laboratory balance and unaccustomed to calculating percentages.

By using a large token weight representing 500 grammes with smaller tokens representing 5, 10, 15 and 20 grammes and numbered respectively 1, 2, 3 and 4, the dockage-tester becomes practically self-calculating.

THE METAL TRAY

This is the main feature of the instrument and full details are given to facilitate manufacture by a metal-worker. The tray consists of four sides and a central partition or support, all constructed from 14-gauge sheet iron. The floor of the tray is a grid constructed of $\frac{1}{8}$ in. round steel rods with spaces between them forming a screen through which unmillable material such as weed seeds, cracked grain, sand, etc., can fall while the millable grain remains above the grid.

The inside measurements of the metal tray are as follows:—Width, 8 $\frac{934}{1,000}$ in.; length (front to rear), 8$\frac{3}{4}$ in.; vertical overall depth, 2$\frac{1}{4}$ in.

The front and rear ends are 1$\frac{3}{8}$ in. deep by 8 $\frac{934}{1,000}$ in. long and their top edges are level with the sides of the tray. The sides are the full 2$\frac{1}{2}$ in. deep and 10$\frac{3}{8}$ in. long with $\frac{3}{4}$ in. turned at right angles at each end and welded to the front and rear portions.

The central support is a strip of 14-gauge sheet iron 8 $\frac{934}{1,000}$ in. long and 1$\frac{1}{4}$ in. deep. It is welded in position centrally as shown at A in the plan (Fig. 1) with its lower edge level with the lower edges of the sides.

The Grid Screen.

The grid screen consists of 27 steel rods which are of $\frac{1}{4}$ in. diameter and 8$\frac{2}{3}$ in. in length. The holes through which the rods fit are drilled in the ends and the central support at 328$\frac{1}{1,000}$ in. (centres) apart with the first and last holes 203$\frac{1,000}{1,000}$ in. (centres) from their respective sides.

The line of the centres is 1$\frac{3}{8}$ in. from the top of the front and rear ends of the tray and $\frac{1}{4}$ in. from the upper edge of the central support partition.

The rods are 78$\frac{1,000}{1,000}$ in. (2 millimetres) apart and thus the spaces between them correspond with the spaces in the winnowing screens used by flourmillers to separate the millable wheat from the associated unmillable material.

The extra depth of the side pieces permits them to be slotted as shown in the

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Fig. 1.—Plan and elevation of the metal grid tray.
side elevation (Fig. 1). Each side carries two slots which are \( \frac{3}{8} \) in. wide and \( 3\frac{3}{4} \) in. long with a \( \frac{1}{4} \) in. division between them.

Two round steel rods \( 9\frac{1}{4} \) in. long and \( 7/16 \) in. diameter pass through the slots from side to side so that they are below, and at right angles to the grid screen rods. Each of these transverse rods serves as an axle or spindle upon which 28 iron washers (corresponding with the spaces between the grid screen) are loosely mounted. These washers are \( 1\frac{1}{2} \) in. in diameter with \( \frac{1}{8} \) in. holes and they are made from 16-gauge metal. With the spindles in position below the grid, the upper edges of the washers project slightly through the spaces between the grid rods.

The spindles are shouldered at each end to \( \frac{3}{8} \) in., and on the shoulder is rivetted a fixed disc of \( 1\frac{1}{2} \) in. diameter and \( 3/16 \) in. thickness. These discs fit into recesses on the inside of the wooden box which encloses the tray, and rest on the hardwood runners on which the tray slides to and fro when actuated by the handle.

The handle is \( \frac{3}{8} \) in. diameter brass rod, shouldered to \( \frac{1}{4} \) in. at one end and threaded to bolt to the front of the tray which is drilled to receive it.

THE WOODEN BOX

The box which serves as a container for the tray is made from softwood dressed to \( \frac{1}{4} \) in. thickness. The inside measurements of the box are:—Length (front and rear), \( 12\frac{3}{4} \) in.; width, \( 9\frac{3}{8} \) in.; depth, \( 4 \) in.

Two hardwood runners made from timber \( \frac{3}{4} \) in. wide and \( \frac{3}{4} \) in. thick are screwed and glued inside the box and the tray rests on these with its upper edges just below the upper edges of the box. The recesses for the discs on the end of the washer spindles are made by gluing and screwing three pieces of plywood to each side of the box above the hardwood runners. Pieces of \( 3/16 \) in. plywood \( 3\frac{1}{4} \) in. wide are used. The centre pieces are \( 3\frac{1}{4} \) in. long and the end pieces \( 3\frac{1}{2} \) in. long.

Below the runner is a shallow drawer to receive the dockage or unmillable material which falls through the spaces in the grid. At the top of the box above the drawer handle a small groove is cut in the front end of the box to allow the tray handle to protrude.

METHOD OF OPERATING

To operate the dockage-tester, the tray is placed in position in the box and a quantity of commercial wheat (previously...
Fig. 3.—Plan and side elevation of wooden box.

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weighed with a token weight representing 500 grammes) is tipped into the tray.

The box is closed and the handle of the tray is pulled out to its full length and pushed back as far as possible. This operation is repeated a standard number of times (say 25 times with each sample).

The movements of the handle cause the grid-bottomed tray to slide backward and forward, but the spindles carrying the washers remain stationary, being held by the recesses. The washers thus help to keep the spaces between the grid bars clear.

Weed seeds, sand, cracked or shrivelled grain, small pieces of straw and any substances that pass through the spaces in the grid, fall into the drawer.

Clean plump grain and any material too large to pass through the grid will remain above the bars in the tray. Any large pieces of straw, backbone, etc., too large to pass through the grid may be picked out by hand without difficulty and added to the material in the drawer.

This unmillable material is then removed from the drawer and weighed on a balance using token weights representing 5, 10, 15 and 20 grammes and numbered respectively 1, 2, 3 and 4.

The total of the numbers on the tokens used to balance the dockage will give the percentage of unmillable material of the sample. For example, if the material requires the tokens numbered 2 and 3 to balance it, the percentage of dockage in the sample will be 5%. Similarly, if numbers 1 and 2 tokens were used, the percentage would be 3%.

Instead of scales, a chondrometer could be used in the following manner. Sufficient grain is placed in the bucket to balance with the indicator at the 50 lb. mark on the bar. After being treated in the dockage tester the unmillable material is placed in the empty bucket and the balancing counter-poise added. Every ½ lb. registered on the bar then represents 1% of unmillable material in the sample.

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