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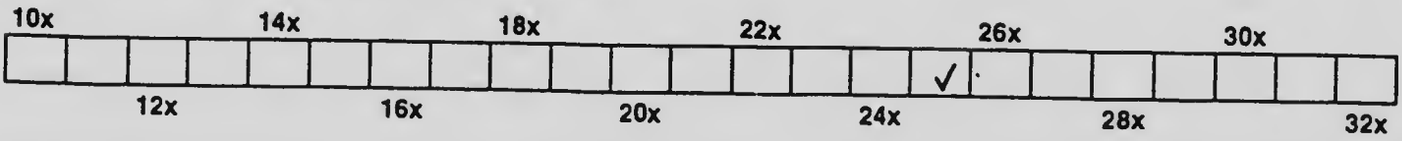

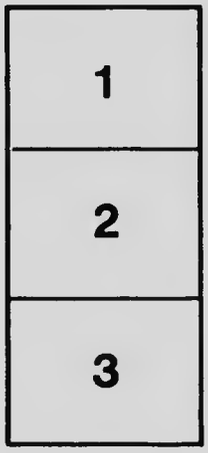

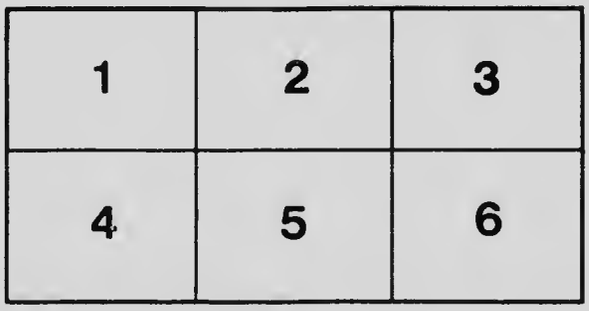

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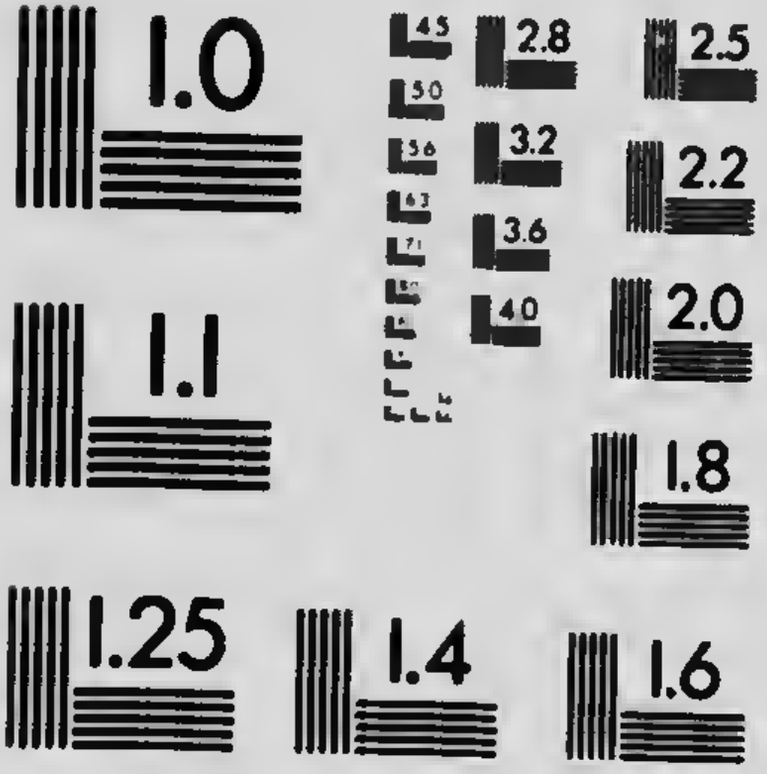

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DOMINION DEPARTMENT OF AGRICULTURE.

SEED BRANCH.

PAMPHLET No. 1.

January, 1918.

CLEANING SEED.

In cleaning seed the aim should be to produce a sample containing only the larger and plumper kernels of the kind of crop desired. To produce a sample of this kind it is necessary to remove impurities such as straws, chaff, dirt and other inert matter, weed seeds, seeds of crops other than the kind desired, and any small, shrunken, immature and otherwise inferior kernels of the kind being cleaned.

Improper cleaning of seed is in most cases due to lack of the necessary riddles and screens, or to the mill not being properly regulated. Any good fanning mill in which thorough control over the air blast is obtained, and in which a series of four or more riddles and screens* may be adjusted at will, may be fitted and operated to do fairly good work.

GENERAL PRINCIPLES.

Impossible to give Definite Directions.

It is impossible to give instruction for fitting and operating a mill which will apply in all cases, as different samples of the same kind of seed may require different treatment, even in the same mill. On the other hand, the same sample of seed would require different combinations of sieves in different mills, depending on the length and slope of the sieves, the direction and violence of the shake, the strength of the air blast and the way in which it strikes the seed, and the rate at which the grain is passed over the sieves. The operator will have to depend on his own judgment and ingenuity in fitting a mill for doing the best work on any particular lot of seed. Even the directions furnished by the manufacturers of the mill should not be followed blindly. These directions are for cleaning the average lot and cannot be correct for every lot of grain of the same kind. Only general principles can be laid down for the guidance of fanning mill operators.

Importance of the Air Blast.

The air blast in a fanning mill is intended to remove as much as possible of the lighter material without unnecessary waste of plump seed; it is not strong enough unless a few good seeds are being blown out with the chaff. This is the only way of taking out some impurities which, on account of their size, cannot be separated by sieves. The work of the air blast is of double importance on account of the fact that the removal of the light material assists the sieves by (1) removing part of the grain

* As used in this article the word *riddle* refers to the upper sieve and *screen* to the lower sieve. The word sieve is applied indiscriminately to either or both.

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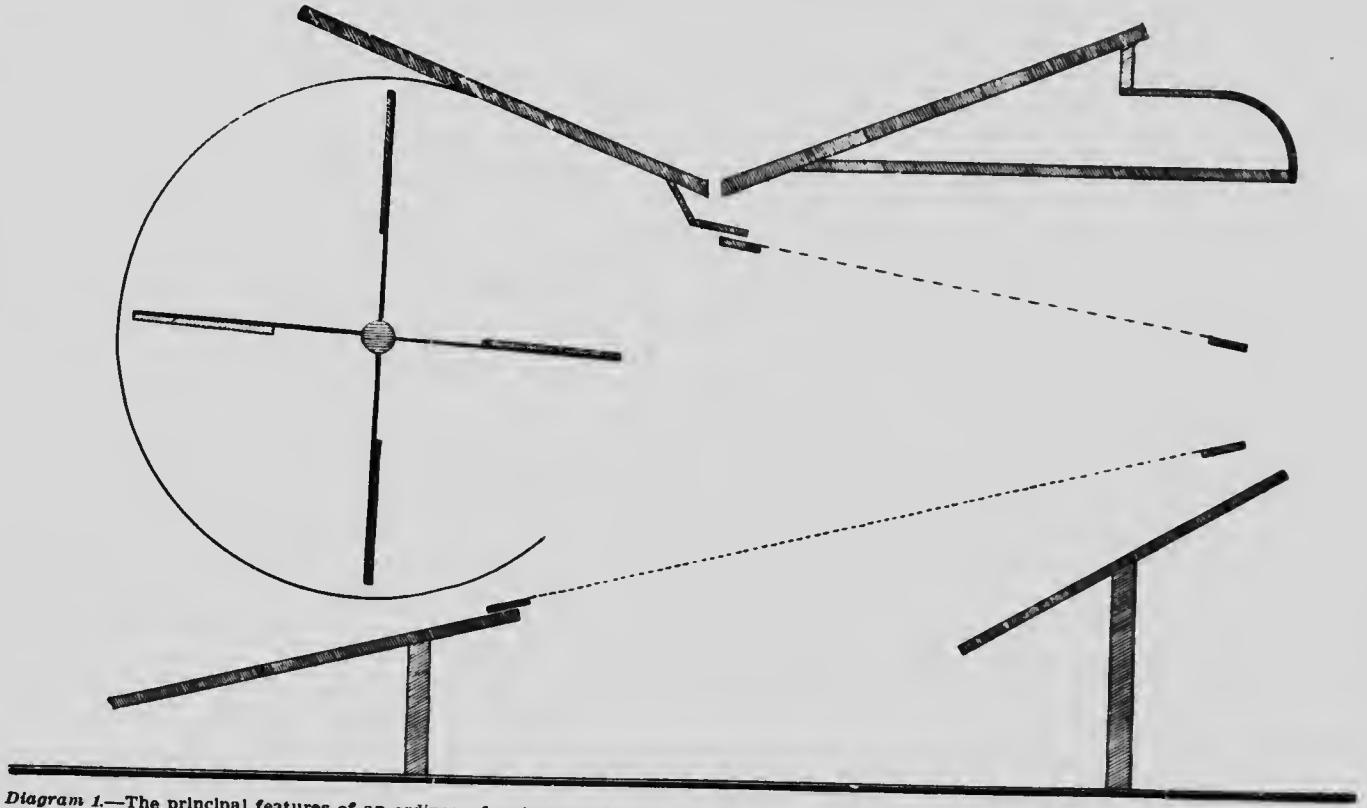

Diagram 1.—The principal features of an ordinary fanning mill are a hopper to contain the seed to be cleaned, an upper sieve or riddle, lower sieve or screen, and a fan to produc[e] ast. An adjustable opening in the hopper controls the rate at which seed is permitted to reach the riddle. In different mills t[he] directed so as to strike the seed in several ways: (1) as it falls from the board under the hopper to the riddle, (2) upwards th[rough] lifting straws and chaff off the sieve and floating the lighter seeds over the end, (3) as the seed falls from the upper to th[e] In another type of mill the air blast is directed upwards through the falling stream of grain as it comes off the screen.

that would otherwise have to go through them; (2) preventing them from becoming clogged by this light material. In some mills this fact is taken into account when the air blast is increased, by automatically decreasing the shake of the sieves.

The air blast is a very important feature of a fanning mill, and it will pay to take pains to experiment to find out just what can be done with it. It is often advisable to run seed through the mill rapidly at first to take out dirt and chaff by means of the air blast, and then to clean it more slowly once or twice, using both sieves and air blast.

Full Equipment of Sieves Necessary.

It is most important to have a full equipment of both wire and perforated zinc riddles and screens of all sizes made for small seeds. The want of any of these may entail a waste of good seed or other loss many times greater than the total cost of the full equipment of sieves.

Before fitting the mill for cleaning, trials by hand should be made with the sieves arranged in series one over the other. It must be remembered, however, that the results in the mill will not necessarily correspond to the work done by the same sieve used in the hand. It is only by actual trial in the mill that one can decide finally what sieve is best for the sample in question.

What the Top Sieve Accomplishes.

The *riddle* or top sieve should be just large enough to let the seed through and hold back the larger impurities. When weed seeds similar in size to the seeds in which they occur are very prevalent, their separation cannot be satisfactorily accomplished. In cleaning such seed regulate the slant of the riddle, amount of shake and size of the opening in the hopper so that the sample will travel slowly and as much as possible of the seed will find its way through the riddle. Impurities larger than plump seed will travel the length of the sieve and fall behind. Do not give the riddle so much shake or have it at such a pitch that much of the seed runs off with the weed seeds. Sometimes it is necessary to put small blocks of wood under the back of the mill to reduce the slant of the riddle.

The Work of the Lower Sieve.

The *screen* or lower sieve should be just large enough not to let the good seed through. It is not large enough unless small kernels of the kind of seed being cleaned are taken out along with the weed seeds. Lower sieves are usually made of woven wire.

Seed should Travel Slowly over Sieves.

Usually when grain contains a large number of impurities the longer it takes to travel over the lower screen the more impurities are removed. Weed seeds much smaller than the grain in which they occur are often not removed when the operator is attempting to clean too fast and has too much seed on the lower sieve, or has given it too much slant.

Delivering Grain Behind Mill sometimes Advisable.

More satisfactory work can sometimes be accomplished in cleaning a lot of seed by arranging the sieves so that the good grain is delivered at the back of the mill or in some place where impurities are usually delivered.

SIEVES—DESCRIPTION AND NUMBERS.

Fanning mill sieves are of two general types, those made of perforated zinc and those made of woven wire. Perforated zinc sieving has either round (figs. II, III and V), oblong (fig. VIII), or triangular (fig. IX) perforations. There are square (figs. IV and VI) and long-mesh (figs. I and VII) woven wire sieves.

The diameter of the perforations in zinc sieves is usually given in sixty-fourths of an inch. For example, an "8" sieve usually means one with perforations $\frac{8}{64}$ of an inch in diameter. The next smaller and larger sizes are $\frac{7}{64}$ and $\frac{9}{64}$, respectively, although half sizes sometimes occur. A similar system is used for the triangular and oblong perforations.

The mesh of woven wire is usually expressed by giving the number of wires to the inch each way; thus an 8 by 8 woven wire is one made of eight wires to the inch each way; a 2 by 10 contains two wires to the inch one way and ten the other. The size of the opening will vary with the diameter of the wire used.

The numbers which manufacturers put on the various sieves supplied with their mills often have no reference to the size of the perforation or mesh of the woven wire of which the sieve is made. For example, a sieve which a manufacturer designates as No. 12 may not be a $\frac{12}{64}$ perforated zinc or a 12 by 12 woven wire. It is not a difficult matter, however, to determine the size of the perforations or mesh of the woven wire cloth by means of a proper rule.

CLEANING GRASS AND CLOVER SEEDS.

It must be remembered that the sieves mentioned below are not recommended as the best or the only sieves for cleaning the various seeds in question. They are mentioned as examples of the type of sieve most useful for the various purposes. The specific sieve required for cleaning any particular lot of seed depends on a variety of circumstances as explained above.

The seeds of many of the weeds that grow in red and alsike clover and timothy and ripen at the same time are of such size that they are difficult or impossible to remove by sieves in an ordinary fanning mill. Few fanning mills are fully equipped with sieves for cleaning small seeds; indeed, most of them are not designed for this work. However, seed that contains a very large number of such weed seeds or that contains only a few more weed seeds than are permitted in seed that may be legally sold under the Seed Control Act may often be cleaned to grade without heavy dockage, provided the proper sieve is available.

If there is a properly equipped and operated power cleaner within a reasonable distance it will usually pay to have seed cleaned by it.

For cleaning small quantities, hand sieves may be found to be most satisfactory and economical.

Red Clover.

A sample usually contains few weed seeds larger than the clover seed. Ragweed, if none of the outer hulls has been removed in threshing, should be separated from the clover by a 12-inch perforated zinc riddle (fig. II). Sticks, pieces of straw and anything larger than the clover run over this sieve.

A long mesh woven wire screen is better than one made of square mesh wire cloth for cleaning red clover seed. The 4 by 24 (fig. I) is often employed for this purpose, but the exact mesh required will depend on the size of the clover seed and the kind of impurities to be removed. A long mesh sieve will hold all the good clover, allowing the smaller impurities to pass through. This sieve, assisted by the air blast, should take out practically all of the pale plantain, much of the mayweed and lamb's quarters, and many of the ribgrass as well as shrunken clover seeds. Besides the 4 by 24 sieve,

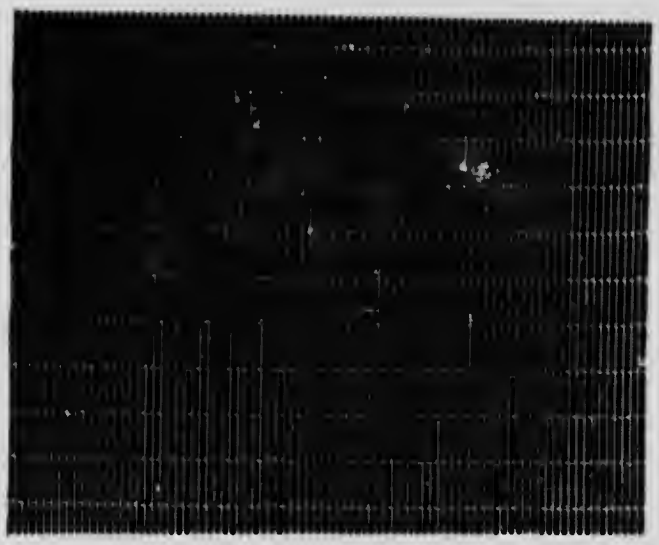

Fig. I.—Four by twenty-four woven wire sieve, contains four wires to the inch one way and twenty-four the other, the type of screen used in cleaning red clover seed. Shrunken clover seeds, ribgrass, and the smaller weed seeds pass through the oblong openings while the plump seed remains above.

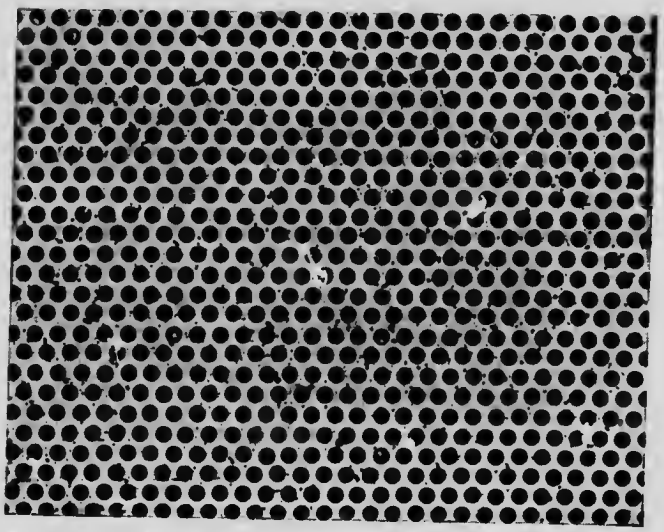

Fig. II.—One-fifteenth-inch perforated zinc sieve—perforations 1/15-inch in diameter, used as a riddle or upper sieve for cleaning red clover.

the 4 by 25, 4 by 26, 4 by 28, 6 by 24, 6 by 28, etc., are also recommended as lower sieves for cleaning red clover, their efficiency depending upon the size of the seeds composing the sample.

The 22 by 22 woven wire screen is very useful in the lower shoe for taking out sheep sorrel and seeds only slightly smaller than the clover. In some cases the 20 by 20 or 18 by 18 may be required, but this will allow considerable of the smaller clover to pass through.

Hulled ragweed, docks, catchfly, foxtail and black medick are very near the size of clover and are impossible to remove by means of an ordinary fanning mill. Fields must be cleaned of these weeds before clover seed can be grown with profit.

Alfalfa requires similar sieves to those recommended for red clover.

Alsike.

A zinc riddle with perforations ⅛ inch in diameter is about right to remove weed seeds and other impurities larger than alsike, including Canada thistle and docks. This sieve is used above, the larger impurities being held and run off at the end while the alsike passes through. With this sieve the air blast should be correctly controlled in order to insure a good separation.

The 21 by 24 woven wire sieve (contains 21 wires to the inch each way) used in the lower shoe, is one of the most useful sieves for cleaning alsike. It will improve the general quality of the sample by removing the small and immature alsike along with the smaller weed seeds—chickweed, worm-seed mustard, plantain, shepherd's purse, and seeds similar in size. These small materials pass through the 24 by 24 sieve while the plump alsike is held back.

Timothy.

Weed seeds and other material larger than timothy are removed by a sieve which with the aid of the air blast will hold back the impurities and run them over the end of the sieve while the timothy passes through. A zinc sieve with perforations 1/22 inch in diameter (fig. 111), if used with only a slight slope and given a short quick shake, will accomplish this. This sieve should be used above and should take out docks, Canada thistle, chicory, and impurities of similar size. If the riddle is used with much slope and given a wide violent shake much of the timothy will run over with the impurities. By exercising a little ingenuity the 1/22-inch perforated zinc sieve may be used to advantage in most mills. The 22 by 22 woven wire sieve is sometimes used as a riddle in cleaning timothy seed.

For removing sheep sorrel, ribgrass, black medick, catchfly, wild mustard and other impurities only slightly larger than timothy, a hand sieve made of 1/25-inch perforated zinc is recommended when not too large a quantity is to be cleaned.

Woven wire screens are recommended for the separation of weed seeds smaller than timothy; they should hold the timothy while the weed seeds pass through. They are used below and are not assisted by the air blast.

It is difficult to give explicit directions as to the proper mesh of woven wire to be used in this work. A square mesh containing 28 or 30 wires to the inch each way is often used. See fig. —. For plump seed the 28 by 28 is preferable; the 30 by 30 is used for smaller seed. If the screen is long and if the timothy contains only very small weed seeds such as cinquefoil and northern gentian, a 32 by 32 will give good results, especially where the timothy itself is quite small. Instead of these mesh sieves the following long mesh are sometimes used: 6 by 30, 6 by 34, 6 by 38, 8 by 38, or 8 by 40. One of these woven wire sieves for removing small weed seeds is indispensable for cleaning timothy.

Weed seeds almost the same size as timothy and therefore difficult of separation are small-seeded false flax, ox-eye daisy, ribgrass, golden dock, stitchwort, mayweed, catchfly, black medick, sheep sorrel, blue-eyed grass, lamb's quarters, and wallflower.

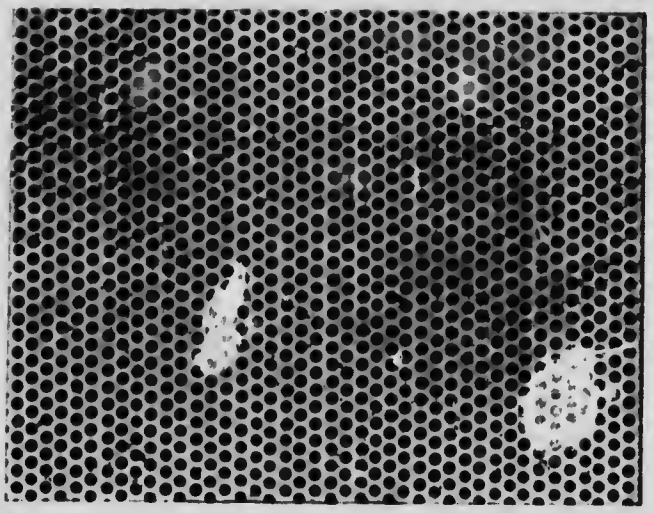

Fig. III.—One-twenty-second-inch perforated zinc sieve—perforations 1/22-inch in diameter. When used as riddle with a short quick shake timothy passes through, leaving Canada thistle, chicory and seeds similar in size above to be run off the end. Success in making separations with any sieve depends on giving it the proper slope and movement. Since this is one of the finest riddles used in general cleaning, it is the most difficult to operate effectively.

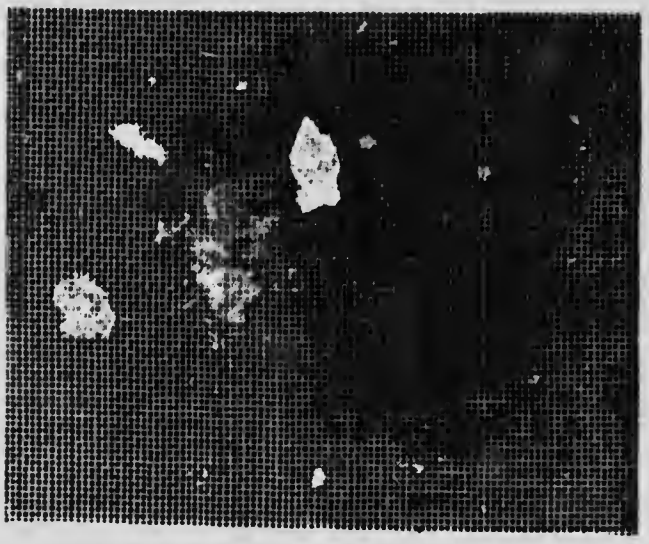

Fig. IV.—Twenty-eight by twenty-eight woven wire sieve—made of twenty-eight wires to the inch each way, a useful screen for removing small weed seeds such as chickweed, cinquefoil, plantain, shepherd's purse and worm-seed mustard from timothy. When the timothy is sma'l a finer screen such as the 30 by 30 should be used. Sometimes screens made of long mesh wire cloth similar to that shown in fig. I, only finer, are used for timothy seed. The 6 by 30, 6 by 36, 8 by 38, and 8 by 40 are used, but the last two or three are too fine for satisfactory work.

CLEANING CEREAL GRAINS AND FLAX.

In cleaning cereal grains for seed it is often advisable to remove from one-third to one-half of the total bulk. When grain is thus thoroughly cleaned, most of the weed seeds will be removed with the screenings. Some of the weed seeds are difficult to separate, but most of them can be removed by a good fanning mill if the proper sieves are at hand and sufficient time and pains are taken to determine the best combination of size and slope of sieves, shake, air blast, and rate at which the grain is passed over the sieves.

In cleaning cereals, especially wheat, attention should be given to the removal of the smut. Unbroken smut balls are impervious to the solutions used to destroy smut spores on the surface of the kernels. Unless all smut balls are removed from a lot of wheat, the grain is liable to be reinfected, thus rendering the labour of treating it of no avail, by the breaking of a few of these smut balls. One smut ball contains millions of spores, enough to infect quite a large quantity of grain. Bulletin No. 73 on "Smut Diseases of Cultivated Plants" says:—

> "The fanning mill will remove smut balls very completely from the wheat, and owing to the danger pointed out, any wheat containing smut balls should be sent to the mill before treating—if none is available at the farm. Should, however, any smut balls appear on the surface of the solution when grain is being treated, it is necessary to remove them quickly. The smut balls are much lighter than the grain, and will rise to the surface when the latter is vigorously and repeatedly stirred. We have found, however, that the time of treatment given to wheat or other grain is far too short to permit the removal of all smut balls rising to the surface. Even when prepared and working quickly, we have not succeeded in scooping off all smut balls that came to the top during treatment, under 10-15 minutes. This long exposure of grain will seriously affect the germination."

Various patent devices for making difficult separations, such as wheat from oats, wild oats from barley or wheat, vetch from rye, etc., are on the market, but these cannot be described here; neither can we go into the various combinations and gangs of sieves recommended by different firms for certain classes of work.

In cleaning cereals a large mesh woven wire sieve is usually employed as a topmost sieve to take out straws and the larger impurities which otherwise would clog the riddle and interfere with the separation it is intended to make.

Wheat.

A zinc sieve with perforations about 12, 13 or 14 sixty-fourths of an inch in diameter is generally used as a riddle. Such impurities as oats will often slide the length of such a sieve and fall off behind, while wheat tips on end and falls through the perforations. A number of these riddles with the same or approximately the same perforation is often arranged one above another. By this means an oat or a wild oat falling through a perforation is started sliding again on the sieve below, and is ultimately run off behind.

Several types and sizes of sieves are used in the lower shoe for cleaning wheat. The 5/64 or 6/64 perforated zinc, 7 by 7, 8 by 8, and 9 by 9 square mesh woven wire, and the 2 by 9, 2 by 10, and 2 by 11 long mesh woven wire are all in use. In deciding which sieve to use, the kind of wheat, nature of impurities, and object of the cleaning —whether for seed or market—must be considered. The buckwheat screen (fig. IX) is sometimes used for the separation of wild buckwheat from wheat.

Barley.

The cleaning of barley requires similar although not identical sieves to those used for wheat.

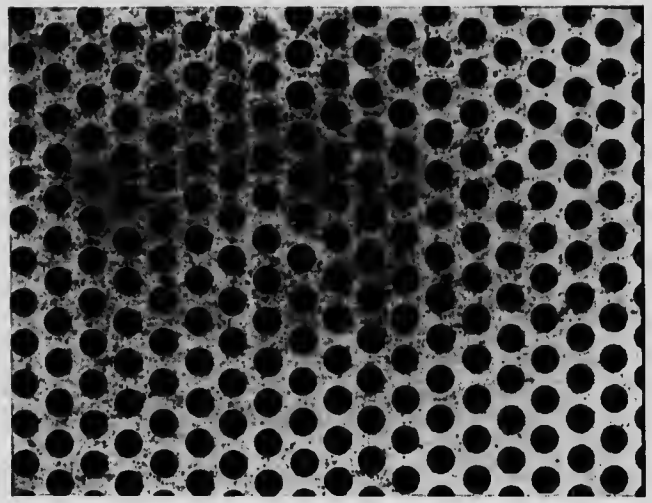

Fig. V.—Sieving sometimes used as a screen for wheat, perforations $^{8}/_{64}$-inch in diameter. This sieve will hold the plump wheat and permit small weed seeds and shrunken wheat to pass through. A sieve of this kind with larger perforations, about $^{13}/_{64}$ (approximately $\frac{1}{5}$) inch in diameter, should be used as a riddle or upper sieve for wheat. Oats and other impurities larger than wheat should slide the length of such a sieve and fall off behind while the wheat kernels tip on end and fall through.

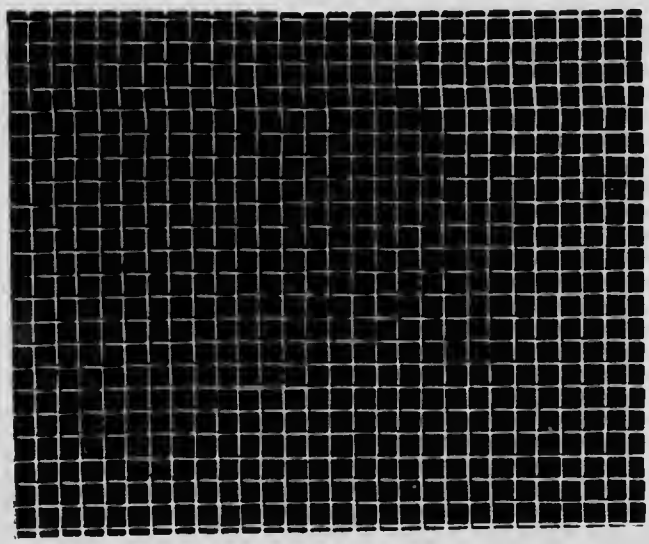

Fig. VI.—The 8 by 8 square mesh sieve. Woven wire sieves are generally used as screens in cleaning grain. Two other square mesh screens, the 7 by 7 and 9 by 9, are also used, depending on the size of the grain and nature of impurities. In preparing grain for seed use a coarser screen than when cleaning for market.

Oats.

In cleaning oats the most important sieve is the lower one. The size of the opening, its slope and shake should be such as to get everything smaller than the plump oats to pass through. A useful sieve for this purpose is one made of zinc with oblong perforations (see fig. VIII). The size of the slits to be used will vary with the kind of oats. A variety with a large kernel will of course require a wider slit than one with slim kernels. The $\frac{5}{64}$ by $\frac{1}{2}$ may be taken as a standard. For very plump oats the $\frac{1}{12}$ by $\frac{1}{2}$ is about right.

Long mesh woven wire screens (fig. VII) are commonly used instead of the perforated zinc. Square mesh sieves are used also.

Flax.

Flax requires on top a woven wire sieve such as the 3 by 16, 4 by 16 or 4 by 14, or a $\frac{1}{8}$ by $\frac{1}{4}$ perforated zinc riddle, and a $\frac{1}{12}$-inch perforated zinc screen below.

TO GET PROPER SIEVES FOR CLEANING SEED.

Every farmer who has a fanning mill that will not clean his seed with the sieves supplied should send a sample of the seed to the manufacturer, asking him to send a sieve to do the work. No mill is equipped with sieves for every kind of cleaning; they are fitted for cleaning the *average* lot of seed. The farmer who is willing to pay for a sieve to clean *his* seed should be supplied with the sieve he needs.

It is to the interest of the manufacturer to have his mill do satisfactory work, and nearly all of them are ready to supply additional sieves for special work. If you cannot get what you require from the manufacturer, communicate with the Seed Branch, Department of Agriculture, Ottawa, and we may be able to help you.

NEW SIEVES FOR OLD MILLS.

In most districts in the older settled parts of Canada there are a great many fanning mills that were bought fifteen or twenty years ago. Many of these are still in good repair, but most of the sieves that originally came with them are lost or worn out. Of the firms who built these mills many are out of business; others are now building a mill of an altogether new model, and have not on hand a supply of frames to fit the old ones. Farmers who wish to order sieves for such a mill may use the following list as a guide in deciding what sieves to order. The list includes the sieves which will be found to be of most general use for the various purposes indicated, but before deciding finally what sieve to buy for cleaning a specific kind of seed, read what is said about cleaning that seed above.

The seed laboratories at Ottawa and Calgary are prepared to examine samples at any time with a view to advising what sieves to use and where they may be obtained. For such examination samples of from eight to twelve ounces should be submitted. The sender should also state the kind of mill he has.

Red clover.—Riddle, $\frac{1}{15}$-inch perforated zinc. *Screen*, 4 by 24 woven wire for plump seed and for removing ribgrass; 4 by 26 or 2 by 28 for small seed; 20 by 20 for removing sheep sorrel.

Alsike.—Riddle, $\frac{1}{18}$-inch perforated zinc. *Screen*, 24 by 24 woven wire.

Timothy.—Riddle, $\frac{1}{20}$-inch perforated zinc or 22 by 22 woven wire; $\frac{1}{22}$-inch if upper shoe of mill can be given a short quick shake; 28 by 28 below for plump seed or for removing worm-seed mustard; 30 by 30 for smaller seed.

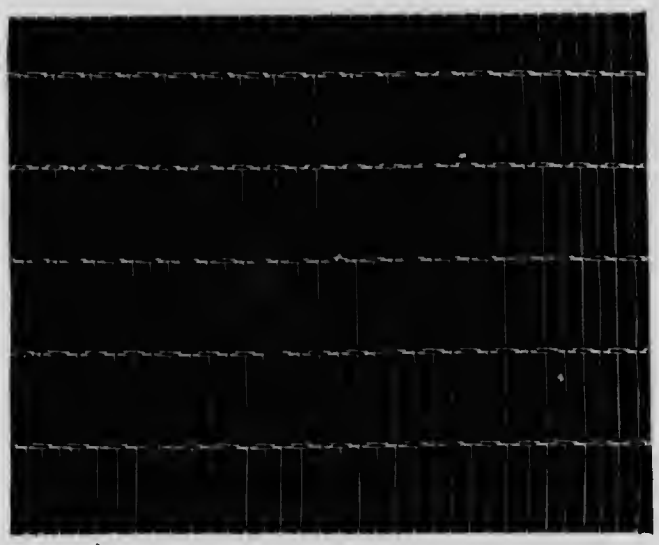

Fig. VII.—Two by ten woven sieving is commonly used in making screens for cleaning grain. The long mesh sieving is preferred to the square mesh when the grain to be cleaned contains impurities which are long and narrow, e.g. chess in wheat. The square mesh is better for vetch and mustard. This type of screen is often used for oats.

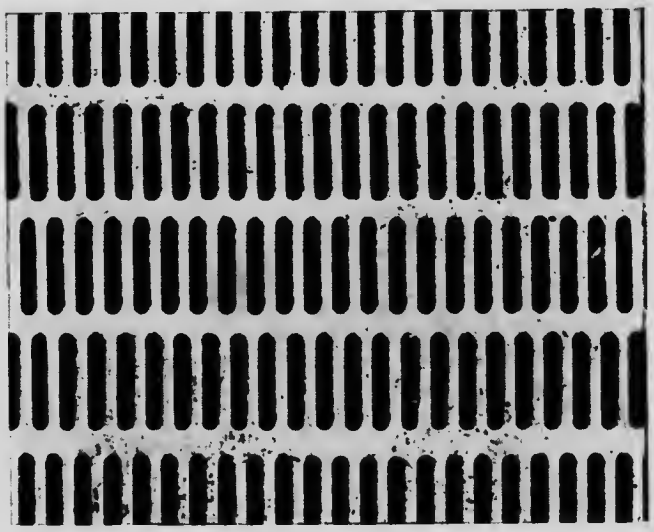

Fig. VIII.—A type of perforated zinc screen sometimes used for separating the "thin" kernels of oats from the plump ones. The exact size required depends on the variety of oats grown and will vary somewhat with the season. A screen with perforations ¾ inch long and 5/64 inch wide may be taken as a standard.

Wheat.—Riddle, 13/64-inch perforated zinc. *Screen,* 2 by 10 woven wire for chess; 7 by 7 for wild vetch or wild buckwheat, or buckwheat sieve (fig. IX) for wild buckwheat.

Barley.—Riddle, 18/64-inch perforated zinc. *Screen,* same as for wheat.

Oats.—Screen, 2 by 10 woven wire, or 5/64 by ½ (fig. VIII) perforated zinc.

Flax.—Riddle, 3 by 16 woven wire. *Screen,* 1/12-inch perforated zinc.

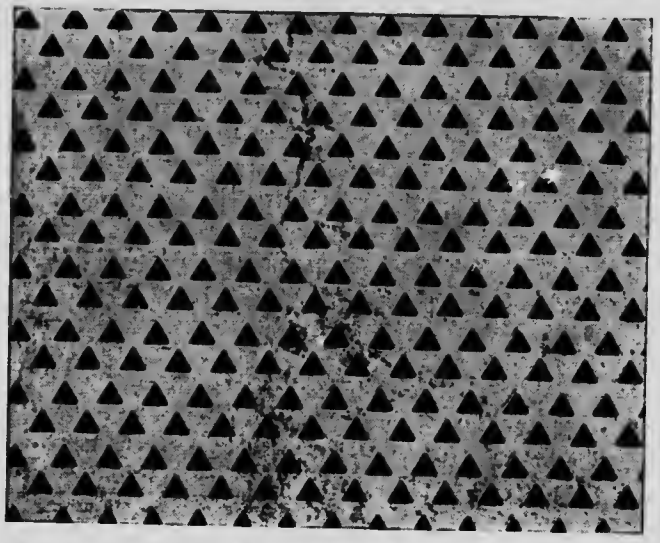

Fig. IX.—The buckwheat screen is made specially for the separation of wild buckwheat from grain. It should be used with the point of the aperture towards the upper end of the screen. If a screen of this type is given a short, quick shake from side to side many wild buckwheat seeds will fall through the triangular perforations. Screens of this kind are usually made of zinc containing perforations 5/64 inch to the side, but larger perforations would probably be preferable for many samples on account of the larger size of the wild buckwheat seeds.

CARE OF MILL.

A fanning mill, and especially the sieves, should not be stored where moisture will collect on them. Many granaries are damp and sieves stored in them soon rust out. A good plan is to have a box in which the sieves can be put when not in use. If fitted side by side in such a case sieves can be easily got at without handling over the whole collection. Numbers plainly marked on the upper or outer edge of the frame make it easy to find any sieve required. It pays to take care of machines and other equipment of the farm, and the fanning mill and its appliances are no exception to the rule.

HINTS FOR THOSE INTENDING TO BUY A MILL.

Choose the mill that will produce the best grade of seed.

See that the mill is well made but do not over-estimate the value of its lasting qualities: a mill that will clean and grade well will pay for itself in a season or two.

The capacity of a mill in bushels per hour should not receive too much consideration. It takes only a few hours, even with the slowest mill, to clean all the seed used on the average farm for the season. Don't sacrifice quality of work for speed. Neither should the power required to run the mill be given too much consideration. Other things being equal, though, the easiest running mill should be chosen.

See that the sieves are well made and fit snugly into the mill so that there is no place into which weed seeds or grain may lodge.

The mill should be easy to clean out when changing from one kind of grain to another.

The ease and rapidity with which the amount of grain leaving the hopper can be controlled is an important matter. It should be possible to shut off or regulate the flow of grain to the sieves with one hand while turning with the other. If one must stop turning the mill in order to close the hopper, the sieves become flooded and poor work results. It is an advantage for the person turning the mill to be able to see the work the sieves are doing.

Preference should be given to the mill with the simplest and best arrangement for bagging.

It is a great advantage to deal with a firm who will guarantee to see that the mill is fitted with the proper sieves to handle the grain for which it is required. When you buy a mill give the firm to understand you will send them samples of your seed and you will expect them to send the best sieves for cleaning it. If manufacturers would do this, only a few standard sieves need be supplied with each mill. A large collection of sieves supplied with the mill is not an advantage unless they are specially adapted for the work to be done.