areas and farming districts. The Bureau of Biological Survey is aiding in the organization of such control units in all the Western

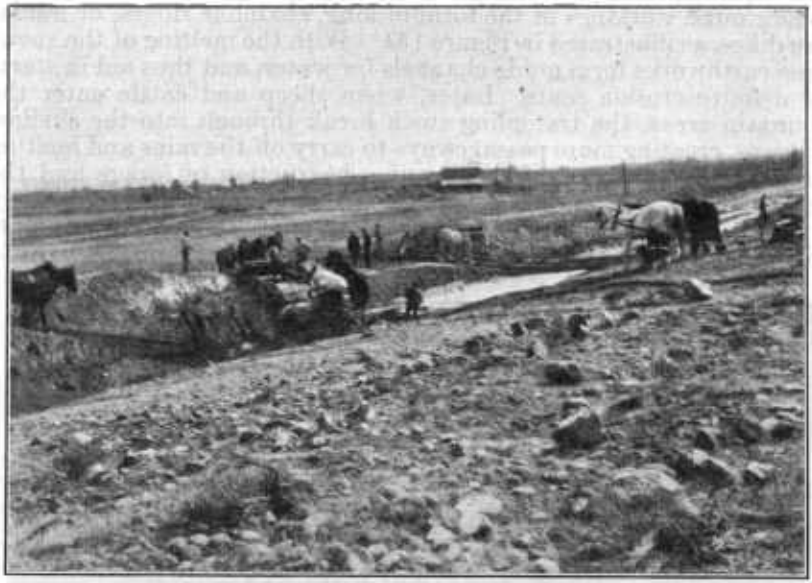

FIGURE 156.—Expensive break in irrigation ditch near Kennewick, Wash., caused by water finding its way through burrows made by pocket gophers

States, which will, in time, assist greatly in preventing further loss of soil through erosion caused by rodents.

ALBERT M. DAY,
Biologist, Bureau of Biological Survey.

SPRAY Residue Removal by Latest Methods Is an Economic Benefit

The removal of arsenical spray residue from apples and pears is an almost universal practice in the Pacific Northwest. With more stringent regulatory measures being enforced, spray-residue removal has become necessary and is being adopted more and more in other sections of the country. Prolonged dry weather such as prevailed during 1930 over large areas of the Eastern States made it necessary for many growers to face this problem for the first time in areas where it had not been anticipated that the difficulty would be encountered.

Combination of lead arsenate with oil sprays generally makes fruit cleaning more difficult than when lead arsenate is applied alone. However, when these combination sprays are prepared with oils of a viscosity of 75 Saybolt or less, with relatively high volatility, and when properly applied, difficulty of cleaning is not materially increased.

Such combination sprays should be used immediately after mixing, in order to avoid separation and resulting heavy oil-covered blotches of residue on the fruit. Late applications of combined lead-arsenate oil sprays should be avoided.

The sooner fruit is cleaned after harvest the more easily the cleaning can be accomplished and with less risk of damage. If cleaning and

packing are unavoidably delayed the fruit should be held in the coolest storage available.

Dry cleaning is not generally satisfactory for removing excessive arsenical spray residue. Moreover, when the elements of cost, relative efficiency, safe handling of fruit, and capacity are considered, washing methods are invariably more economical and satisfactory.

To be commercially practicable, washing equipment should clean fruit satisfactorily without the necessity for frequent repairs and adjustment, and with a minimum of rough handling and mechanical or chemical damage to the fruit. Several types and sizes of satisfactory washing equipment are on the market, and it is also possible to construct satisfactory homemade devices. (Fig. 157.)

Washing methods employing hydrochloric acid are by far the most frequently used, although alkaline materials may also be employed. The latter are gelnerally efficient, but because of the solvent effect of alkalies upon the waxy coating of the fruit their use must be supervised rather closely, particularly the rinsing phase. Washing methods that require submersing the fruit more than a few inches below the surface of the liquid should be avoided, especially if the varieties to be washed have open calyx tubes, in order to avoid possible penetration of the washing solution into the core region with consequent injury and possible decay.

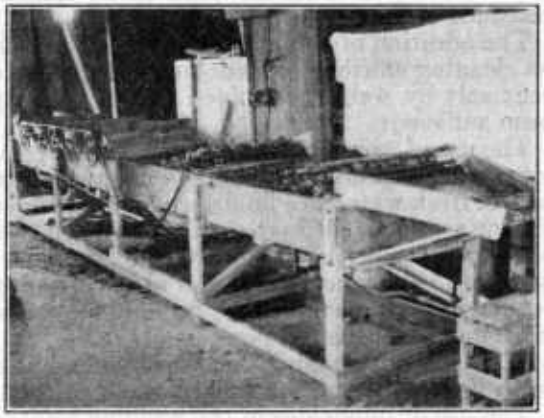

FIGURE 157.—Homemade washer of paddle type for removal of spray residue from apples and pears

Simple Dipping Relatively Inefficient

One of the primary requisites of any washer is that it shall move as large a quantity of fresh solvent over the fruit per unit of time as is mechanically economical. Simple dipping methods are therefore at a disadvantage in fruit cleaning unless the washing solution is agitated.

The satisfactory washing of apples and pears generally requires an acid concentration of at least 1 gallon to 100 gallons of water. The commercial grade of hydrochloric or muriatic acid is used.

Increasing the acid concentration to 4 gallons to 100 gallons of water gives significant increase in cleaning efficiency, but beyond this does not generally justify the added cost, and the higher concentrations put a greater burden on the rinsing section, as well as increase the danger of injury to the fruit from acid burning and from soluble arsenic, which may result on poorly rinsed fruit.

The acid concentration should be determined frequently. Simple and inexpensive apparatus is available for this purpose. Notes should be kept of the acid strength and temperature, of the chemical analyses made on the fruit, and of any other significant information, for reference in future operations.

The time required to remove spray residue depends upon a number of factors, such as the variety and maturity of the fruit, the amount of residue present, the strength and temperature of the acid solution, and the method of application. Generally, with flotation washers, an exposure of the fruit to the cleaning solution for 3 to 5 minutes is sufficient. When a dipping method is used, in which there is not much agitation of the solvent, an exposure of 5 minutes is generally required. Where the solution is pumped or thrown over the fruit an exposure of from 2 to 4 minutes is usually sufficient. With commercial washing machines 20 to 40 seconds generally suffice.

By raising the temperature of the cleaning solution to 80° F. and preferably to 95° or 100°, increased efficiency may be obtained. Warming the acid generally can be done best by some form of low-pressure steam coils placed in the tank or by heating directly in corrosion-resistant coils.

The addition of common salt to the acid solution will often enhance its cleaning efficiency, particularly if the solvent is warmed. One per cent salt by weight dissolved in the washing solution has generally been sufficient.

The use of 2 or 3 gallons of fresh water per bushel of fruit is desirable for rinsing. Recirculation of a portion of the rinse water and the addition of fresh water as a final spray or flood over the fruit as it leaves the rinsing section is also satisfactory. When there is a great shortage, all of the water may be circulated and 2 pounds of lime to 100 gallons of water added to neutralize the acid carried over on the fruit and to render insoluble the arsenic remaining. In such cases, however, the rinse must be renewed periodically.

The acid solution and rinse tanks should be emptied and flushed with fresh water after about 1,000 bushels of fruit have been cleaned.

The use of fungicides in the washing solution or rinse water has not given any practical benefit in reducing the danger of decay in the fruit. This danger is not great, however, if the washing is done with proper equipment and under reasonably sanitary conditions.

Injury From Faulty Washing

Faulty washing practices sometimes cause certain types of injury: (1) Arsenical injury, which occurs as depressed dark brown or black spots, sometimes extending into the flesh and usually found in the calyx end of the fruit; (2) hydrochloric acid injury, which is light brown or tan in color and may occur on any portion of the fruit; (3) chemical injury at the core, due to penetration of cleaning solution through open calyx tubes; and (4) mechanical injury due to defects in the equipment and rough handling. The remedies for these troubles have already been suggested in this discussion.

Reasonable drying of the fruit facilitates packing, but when it is well rinsed no storage troubles have resulted from the packing of wet fruit. Drying by air blasts, which sweep the water off the fruit, or by different types of cloth-drying apparatus are more satisfactory than by brush driers. The cloths on the rollers of wiping equipment, designed primarily for dry cleaning, will also serve the purpose, but must be frequently renewed if they are to function satisfactorily.

Commercial experience with properly washed fruit indicates that it keeps as well as unwashed fruit, that better grading and sorting result, that the final appearance of the fruit is much more attractive, and that

it commands a higher price. Fruit cleaning, therefore, is a distinct benefit, particularly in sections where considerable spraying with arsenicals is necessary.

H. C. DIEHL,
Physiologist, Bureau of Plant Industry.

STANDARD Specifications for Household Buying Are Being Developed

At the present time many farm products are graded for sale according to standards set up by the Bureau of Agricultural Economics. Manufacturers have for a long time been writing accurate descriptions for the raw materials and partly finished goods they buy. The Bureau of Standards of the Department of Commerce has worked with industrial and commercial agencies in setting up specifications that have limited the production of various articles to a given number of sizes and thereby cut down manufacturing costs. The Federal and State Governments have worked out specifications for purchases for various Government institutions. The housewife is beginning to ask why she can not buy in accordance with specifications that are guaranteed by the manufacturers.

The Bureau of Home Economics and the American Home Economics Association received so many requests for information on the subject of standard specifications for household goods that they cooperated during the past year in the compilation and publication of the booklet called "Household Purchasing: Suggestions for Club Programs." This booklet outlines the material available for club programs on difficulties the consumer meets in the present market, food standards and grades, food containers, weights and measures, quality standards and grades for foods, buying textiles and clothing, household equipment, and what the Government can do to help the consumer. The programs are now in use by a number of extension clubs.

In this attempt to bring together information as to the standard specifications which are now in definite, usable form for the housewife, several points came to light.

Some of the grades used in sorting agricultural products for the market can profitably be used by the housewife in her purchasing, provided definite information is furnished her as to what these grades mean. In some cities beef officially stamped with the official grade name can be bought in the retail shops. In some parts of the country poultry, eggs, and butter are now being sold to consumers labeled according to the Government grades. Large numbers of turkeys have been graded for the consumer, each bird being labeled with its Government grade mark. The standards for canned foods developed in the Bureau of Agricultural Economics under the warehouse act have been used in certain States as a basis for selling canned goods.

Definitions Under Food and Drugs Act

Under the food and drugs act, definitions and standards for a large number of food products have been promulgated by the department. These are designed (1) to fix the identity of the articles, and (2) to insure that they be of sound and merchantable quality. The specifications are of such a nature that any departure of an article above the maximum or below the minimum limits prescribed is evidence that the article is either impure or abnormal. Recently the food and drugs act has been amended to authorize the Secretary of Agriculture to promul-