New innovations in trash screens increase canal efficiency

by Allan Humpherys
contributing editor

One of the most persistent problems that many irrigators face is that of trash in their irrigation water. This problem is almost universal where water is distributed in open canal and ditch systems. Trash and debris in the water not only obstruct irrigation ditches and structures, but clog sprinkler nozzles, siphon tubes, gated pipe openings, and other discharge outlets and flow measuring devices.

A considerable amount of debris, particularly during high spring flows, originates in the streams from which irrigation water is diverted. Most of the troublesome material, however, is generated within the open irrigation distribution system itself. This includes moss, snails, garbage, windblown debris, vegetative material and soil particles from the irrigation channels and trash contained in irrigation runoff or tailwater which is returned to the canal system.

Thus, trash screens and debris removal equipment are needed at farm turnouts and other locations within the system as well as at stream diversions. On a project basis, it may be more efficient for the canal company, or other organizational entity which operates the distribution system, to install trash removal equipment. The extra cost to deliver clean water may be less than for each irrigator to install his own trash cleaners.

Two general classes or types of self-cleaning trash removal equipment are needed. The first includes that designed for use in canals and laterals at diversion points and at other strategic locations within the distribution system. These are usually relatively large size screens which are power-driven. The other class of screens is smaller and is used at farm turnouts and on individual farms. Various designs and configurations of each class of screen have been, and are being, used with varying degrees of success. There are two recent innovative screen developments that are performing well.

Custom-designed screens

The self-cleaning trash machine is usually custom-designed for a given site and can be made for channels from four feet wide to 15 feet or greater. The screen consists of short sections or segments of double-weave screen made from 6 to 14-gauge galvanized cold-rolled wire.

Each screen segment is independently supported from a heavy cross bar. The screen openings can vary from ¼ inch to 1½ inch, depending upon the size of debris to be removed. The ¼-inch size has a 50% open area. The machine is mounted on a pivot which is supported by a cross beam. The screen can be lifted or tilted out of the water by a winch at its upstream end for repair or inspection.

Ultra-high molecular weight (UHMW) plastic is used for the rails on which the side chains glide, and for the bushings on the roller at the underwater end of the screen. This material is water lubricated and has excellent wear qualities when used under water.

The machine is powered by a 1-hp motor and controlled by a percentage timer in combination with a float which detects differences in water level, so that the running time can be varied from several minutes per hour to continuous, depending upon the amount of debris to be removed. Intermittent running extends the life of the machine.

The machine is specially designed to remove moss. One 15-foot wide unit removed one ton of moss per hour at a site where, previously, several men worked continuously during the irrigation season to clean a fixed grate. Where the volume of trash is large, the machine can be equipped with a side conveyor.

One unit even removed a dead cow from the canal. The machine also is being used with small hydroelectric plants to remove ice blocks and trash that otherwise would damage the plant's turbines. This trash cleaner was developed by R.D. Critser (Critser, Incorporated, Jerome, Idaho).

Variety of screens

A variety of on-farm screens are needed to satisfy the many different field conditions encountered and a number of good self-cleaning screens are commercially available. One such innovative screen recently developed is a water-powered, turbine-driven trash remover that can be used in

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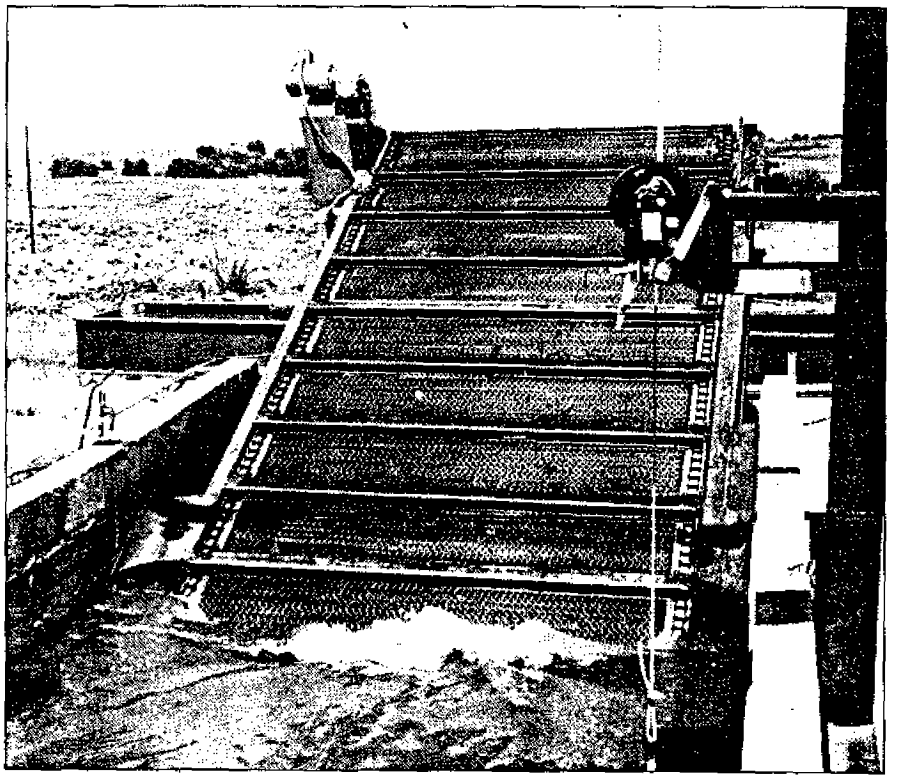
Power-driven trash screen for canals and laterals.



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Trash cleaner

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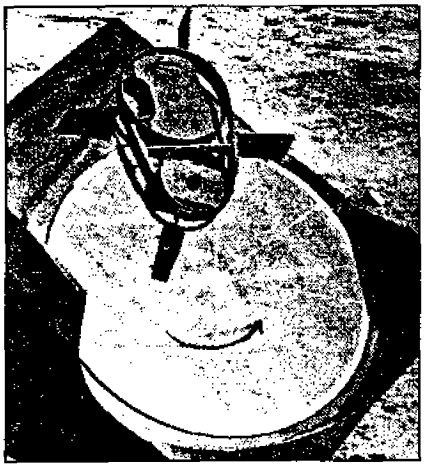
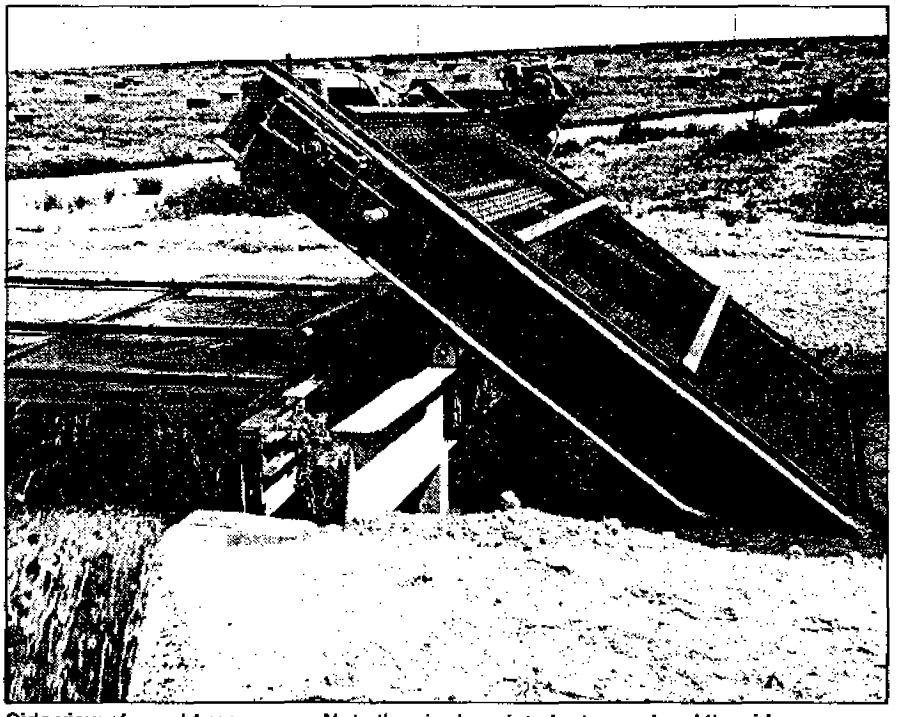
either lined or unlined farm ditches. The rotary screen and screen wipers are driven directly by a drive shaft from a water-powered turbine wheel without using drive belts or pulleys.

A unique feature of this cleaner is the cleaning action of the rubber wiper paddles. The cleaning is done above the water surface where water pressure cannot force loosened trash particles through the screen and back into the water. Each point on the rotating screen is wiped three times as it passes beneath the wiper blades. Trash removed from the screen is collected on a sloping platform and deposited on the side of the ditch where it cannot reenter the water. The machine has been effective in removing moss, grass clippings and other debris.

Turbine water-powered trash remover.





Side view of canal-type screen. Note the single point pivot mount and the side conveyor.

The standard mode is made with 1:1 sides and a 12-inch bottom. With sufficient water velocity, it can operate in three inches of water and can handle flows up to about five cfs. The screen has 3/16-inch diameter x ¼-inch staggered holes in an 18-gauge galvanized perforated metal plate with 50% open area. This trash remover has very low maintenance and was developed by Ed Oest (Irrigation Systems Company, Fruita, Colo.) and Phillip Burnham, a local farmer.

Development continues

Work is continuing on the development of improved self-cleaning weed and trash screens at the USDA-ARS Snake River Conservation Research Center in Kimberly, Idaho. Turbulent fountain screens, horizontal screens with turbulence inducers, and wheel-type screens (Irrigation Age, October 1982) continue to be effective in removing trash from the water.

A submerged screen is now being developed by James Bondurant. This screen is installed in a modified canal turnout which uses a pipe submerged in the canal or lateral for the farm delivery. A section of the submerged pipe wall is removed and covered with a screen to form the intake.

Screens at the Research Center are being developed to remove weed seed as well as trash from the irrigation water. Tests conducted at the research center have shown that a significant portion of the weed population in an irrigated field originates from seeds carried in the irrigation water. Eliminating these seeds could be an economic benefit to the irrigation farmer. ◊