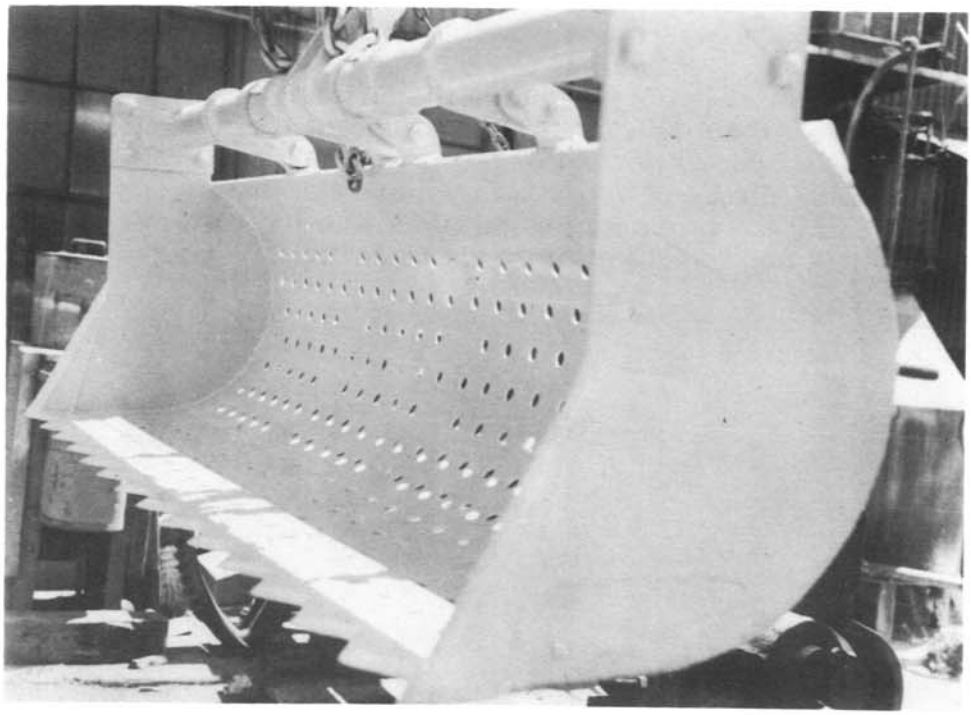
DEMOSSING BUCKET FOR GRADALL EXCAVATOR

A bucket was fabricated in the shops of the Salt River Valley Water Users Association in Phoenix, Arizona, for use with the Association's fleet of Gradall excavators in expediting and facilitating the removal of moss from the canals and laterals of the irrigation system.



Construction details:

The bucket is shaped much like the 60-inch ditch cleaning bucket supplied by the manufacturer. However, the Salt River bucket is 72 inches wide, has a serrated cutting edge, and the bucket plate has been perforated, as it is normally used under water.

The unit is shown in operation in the photograph at left. A large amount of moss and silt can be removed with each pass of the bucket, demossing about one mile of ditch per day.

Cleaning of the canal or lateral while demossing also eliminates an additional pass through the ditch by hand crews at a later date.

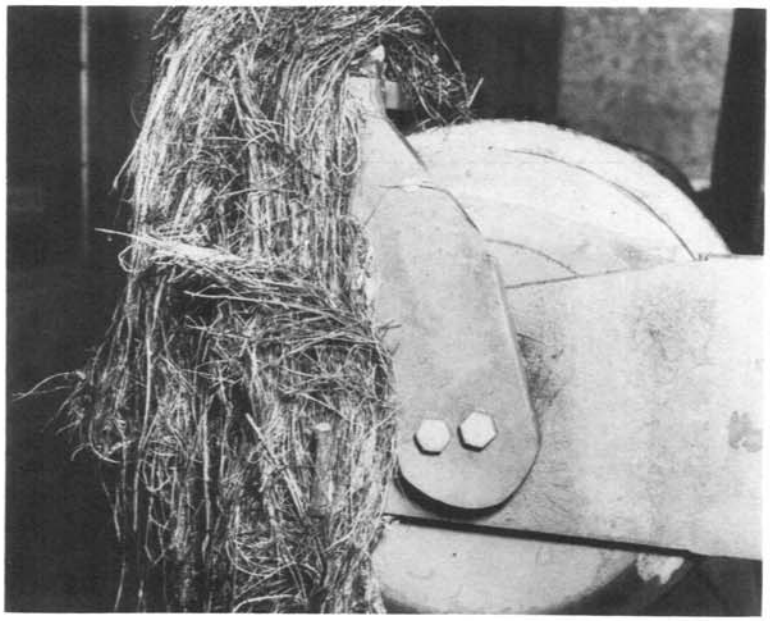
Cost:

On the Salt River Project, maintenance of the canal system is complicated by the proximity of many growing residential areas. Limited right-of-way, the presence of overhead power and telephone lines, and other residential problems made the Gradall ideally suited for the work. Demossing on the project by the use of the bucket is done for approximately $68.00 per mile. This is about one-half the cost of the conventional chaining and discing operation previously used, which involved catching the moss on grates placed in the waterway being cleaned and then hand forking the moss from the grates.

* * * * *

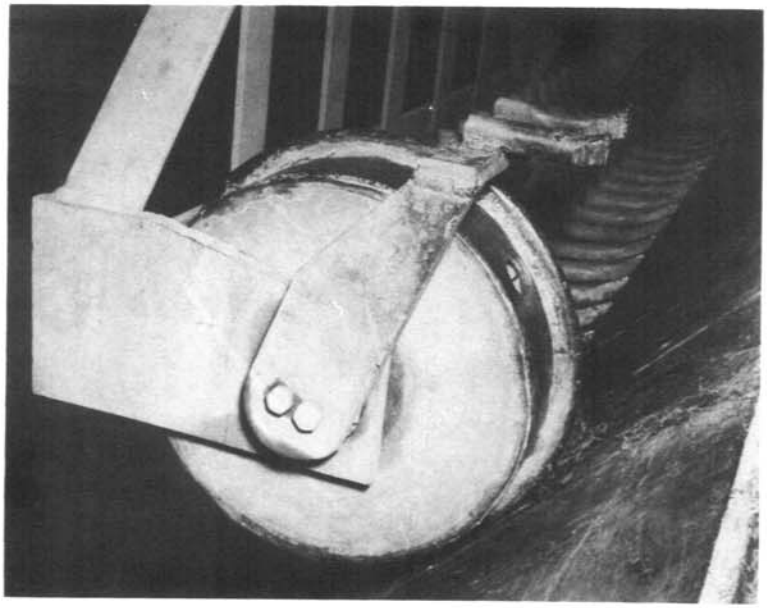
TRASHRACK RAKE

The debris that collects on the trashrack of the Wellton-Mohawk Pumping Plant No. 1 of the Gila Project, Arizona, consists largely of pondweed, as shown in the photograph below. A mechanical rake was provided for clearing the debris from the trashrack; however, in operation, difficulty was encountered in using the rake, due to the type of debris. It collected on the trashrack and interwove into a homogeneous compact mass, forcing the wheels of the rake to ride over it. This in turn lifted the rake away from the trash bars.

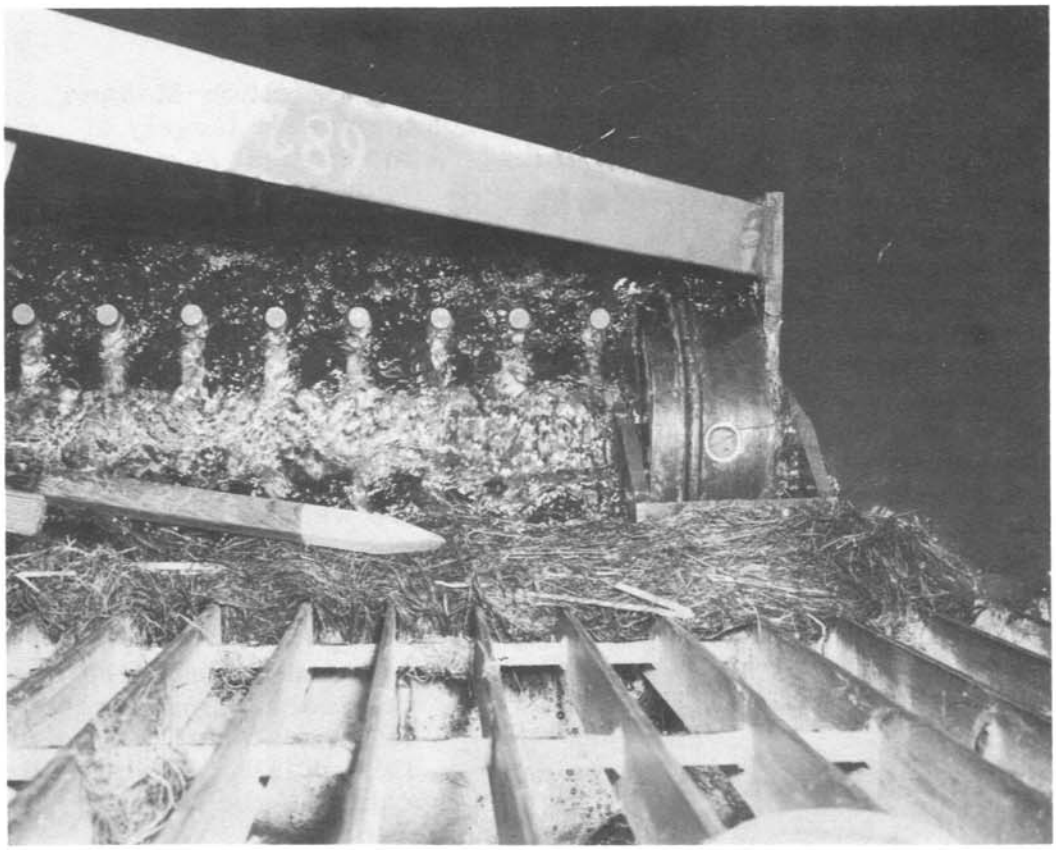


A drawing of the original trashrack rake is presented at the end of this article. The modification of the rake devised by the project forces is shown in the photograph below.

The modification consisted of a set of rake teeth or plows mounted just ahead of the wheels. The teeth clear a path through the debris so that the wheels are permitted to roll on the surface of the rack as designed, successfully removing the entwined mass.



Several rakes of the type installed on the Gila Project have been installed on other Bureau of Reclamation projects. The type of debris appears to have a bearing on the success of the rake in clearing trashracks. As now modified, the Gila Project is well satisfied with the rake in handling the debris, principally pondweed and moss encountered in the canal system. A view of the rake in operation is shown in the photograph at the top of the next page.



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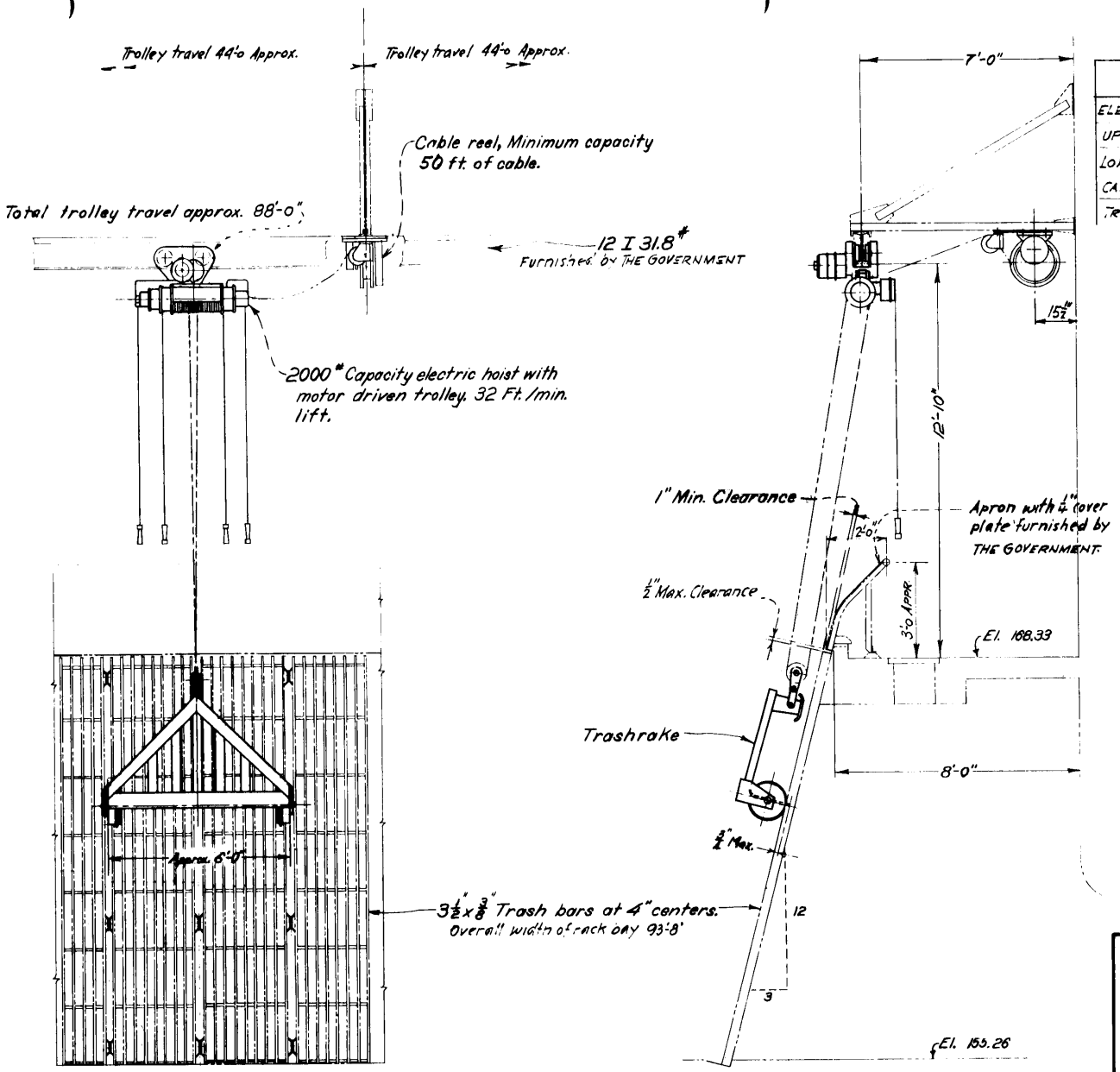


LIST OF EQUIPMENT

DESCRIPTION	NUMBER REQ'D.
ELECTRIC HOIST WITH MOTOR DRIVEN TROLLEY 2000# C.A.P.	1
UPPER LIMIT SWITCH	1
LOWER LIMIT SWITCH	1
CABLE REEL WITH 60'-0 OF CABLE	1
TRASH RAKE APPROX. 6'-0" WIDE.	1

REFERENCE DRAWINGS

GENERAL ARRANGEMENT-BUILDING & EQUIPMENT	50-D-2328
TRASHRACKS	50-D-2344
TRASHRAKE METALWORK	50-D-2345

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GILA PROJECT-ARIZONA
WELLTON-MOHAWK DIVISION

WELLTON MOHAWK PUMPING PLANT NO. 1. TRASHRAKE AND HOIST INSTALLATION

DRAWN C.R.W. SUBMITTED
TRACED RECOMMENDED
CHECKED W.O. APPROVED
CHIEF DESIGNING ENGINEER

REV. 11-15-49 W.O.

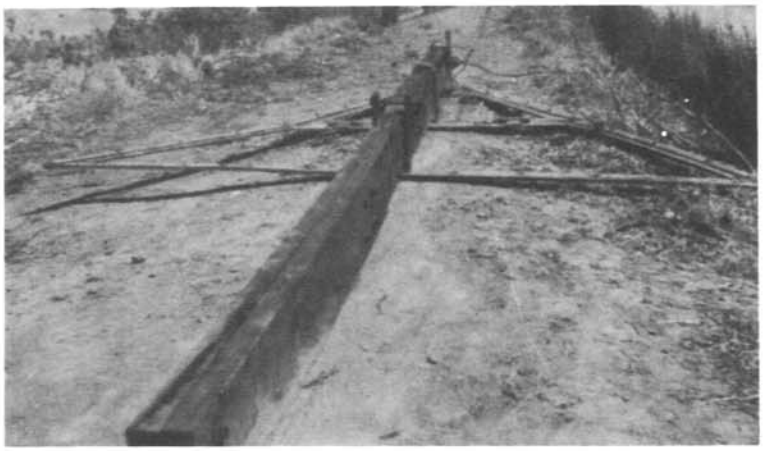
DENVER, COLORADO, AUGUST 24, 1949

50-D-2594

BROAD ARROW WEED CUTTER

Control of aquatic weeds in irrigation and drainage channels is one of the major problems confronting irrigation authorities of the State Rivers and Water Supply Commission, Victoria, Australia. Chemical control and burning with flame throwers have been tried, but removal of weeds by manual labor has been common practice. Dredging with a dragline and bucket has also been used but this procedure alters the characteristics of the channel and leaves a ridge of spoil on the banks for disposal. Other mechanical means have been tried but all tend to alter the shape and depth of channels.

The broad arrow weed cutter, shown below, was developed by Mr. R. I. Walsh, A.M.I.E.Aust. Information extracted from the official supplement to the Commission's staff magazine "Spillway", was published in "The Commonwealth Engineer", June 1948. The weed cutter was considered a considerable improvement over the then existing methods used in removing weeds and appeared the only implement that did not damage or alter the shape of the channel in operation.



Cutting can be carried out on either up or down stream runs. The blades have a slicing action as they move forward and will cut any weed. The cutter sinks just slightly below the bed of the channel and the cut is generally just under the surface of the silt through the root system of the weeds. The result of cutting the weeds so low is that many of them will not grow again.

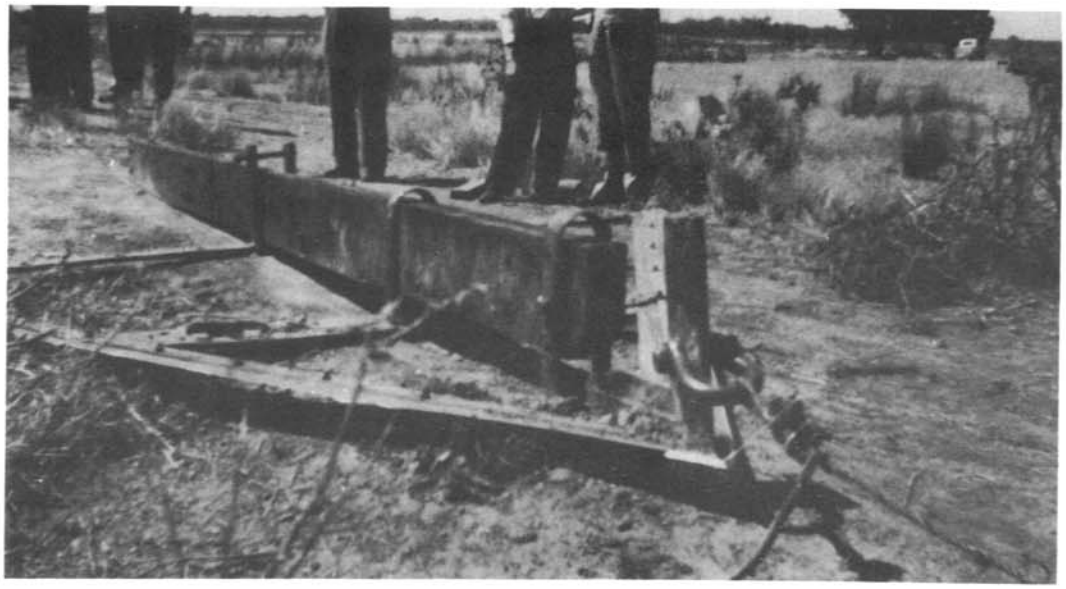
Using the 10-foot cutter shown above, one trip up and one down is required to clear a 16-foot channel. Removing the cut weeds from the canal by hand labor requires about 12 men. It is estimated that about 4 to 5 miles of channel per day can be cleaned. In the photograph at left, a portion of the weeds cut during a 20-minute run are

being forked from the channel where they have collected against a bridge. In channels from which the weeds have been cut with the broad-arrow cutter, it has been necessary to recut the weeds only once every six weeks as compared with once every two weeks when cut by hand methods.

In the photograph at left, a four horse team, two on either bank, is pulling the 10-foot weed cutter along a channel. Note the turbulence on the left bank following in the wake of the cutter working on that side.

Construction Details:

The implement as the name implies is shaped like an arrow and is constructed in three parts:- the arrow-head or 5-foot cutter, the training or 10-foot cutter and the rudder. A pulling attachment is fixed to the arrow-head for hitching the tow rope.



Flush welded construction is adopted for the arrow-head or 5-foot cutter, 4- by 1/2-inch flat mild steel being used. This forms a 5-foot equilateral triangle, with 4-inch bearing surface on the three sides. A triangular hardened-steel nose piece is welded to the apex and is bevelled 1 inch to a knife edge. Also, flush welded to the main frame is a 4- by 1/2-inch cross member to take the rudder bracket and pulling attachment.

In the center of the base a rudder guide is welded. This is

the center guide for the 10-foot cutter and rear guide for the 5-foot cutter. In addition, on this member are welded the female components of the butt hinges for attaching the trailing cutter.

Cutting blades 5 feet in length and manufactured from 5-1/4- by 1/16-inch saw steel are bevelled to a knife edge and sharpened. The blades are attached to the frame by a cover piece of 3- by 1/4-inch mild steel bolted through with 3/8-inch counter-sunk bolts, spaced at 16-inch centers. The cutting edge of the blades protrudes 1-1/2 inches over the base.

Formed on a base of 4- by 3/4-inch mild steel, the trailing or 10-foot cutter has its four members flush welded at the corners. The front member carries the male components of the butt hinges and the rear member of the rear rudder guide for the 10-foot cut. Blades similar to those on the arrow-head are attached in the same manner.

A pulling attachment, profiled from 1/2-inch mild steel plate, is welded to the main frame and cross member of the arrow-head. This is "L" shaped, the vertical leg having three 1-inch holes for the adjustment of the shackle to allow for the varying angle of pull. To this shackle is attached a single wire rope, 4 feet 6 inches long with a ring on the outer end for connecting the towing ropes.

Design of the rudder follows modern timber practice. The material used in Australia was laminated hardwood, heavy red gum being used for the pilot model. Two lengths of rudder are required:- 12 feet for the 5-foot cut and 16 feet for the 10-foot cut; therefore, the laminations are of varying lengths. On one side there is a 12-foot length and a 4-foot length and on the other side a 9-foot 6-inch and a 6-foot 6-inch length. When the 12-foot rudder is required the 9-foot 6-inch and the 4-foot laminations are removed and a 5-foot 6-inch filling piece is fitted. Each lamination is 2 inches in thickness and 9 inches in width, making the full section 9 inches by 4 inches. However, the front end is reduced to 6 inches back to the center guide and cut away to 7 inches at the rear guide to allow for a slight vertical movement so as not to disturb the horizontal alignment of the cutter, the front end being pivoted. The laminations are bolted together with 1-inch bolts; bolt heads and nuts are recessed making the rudder sides flush so that there is nothing to catch in the weeds to cause undue drag.

Formed from 4- by 1/2-inch mild steel, the front bracket and the center guide are of "U" shape, with the rear guide in two "L" shaped parts, a bolt being fitted across the top to allow for withdrawing the rudder for transportation.

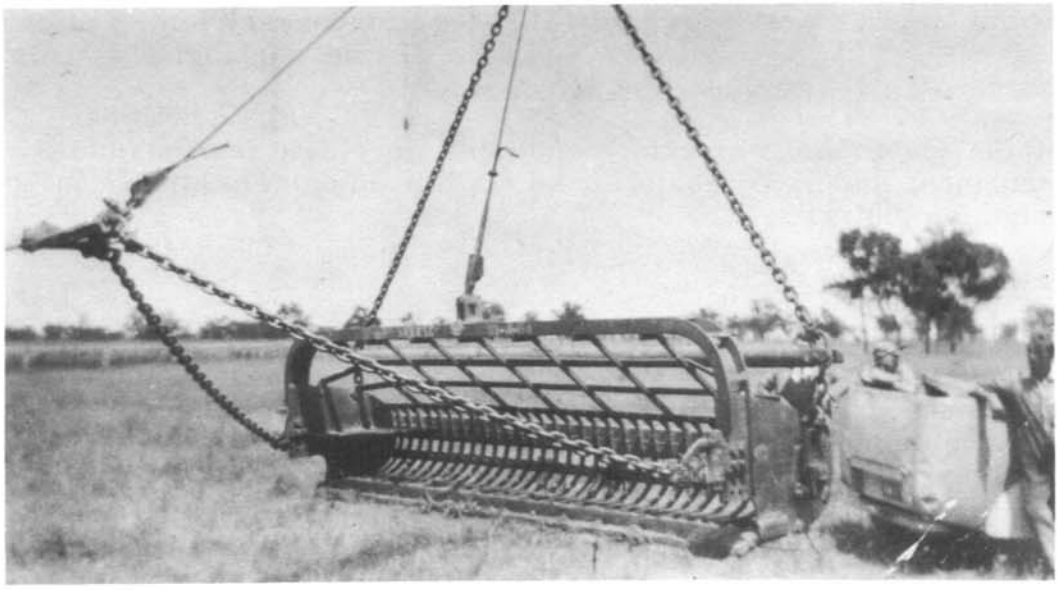
The implement can be broken down into sections light enough for two men to handle and can be easily transported. The longest length is the 12-foot section of the rudder and the greatest width, the arrow-head cutter, approximately 5 feet.

* * * * *

NEW ZEALAND WEED BUCKET

One of the major problems in the irrigation districts of Victoria, Australia, is the maintenance of the drainage channel systems. The persistent growth of weeds seriously affects the capacity and efficiency of the drains, and previously, although a great many control methods have been tried, a reasonably satisfactory means of dealing with the problem had not been obtained.

The Hon. H. E. Bolte, M.L.A., who was then Minister of Water Supply in Victoria, was in New Zealand during the early part of 1950. He was very much impressed with the performance of the implement shown below, used on weed control work by the North Canterbury Catchment Board. As a result of the Minister's inspection, the Commission immediately placed an order for two of the implements, which are popularly referred to as "New Zealand Weed Buckets".



The weed buckets purchased, one 8 feet in width and the other 10 feet in width, were evolved by Mr. W. H. Harris, then Chief Engineer of the Catchment Board, and manufactured under patent by Messrs. Sinclair, Melbourne & Co., Lyttleton, New Zealand. They were tested under the most severe conditions.

Although the 10-foot bucket has been successfully tested, the 8-foot bucket was considered the best suited to the needs. The 8-foot bucket, attached to a 3/8-cubic yard dragline, was engaged in cleaning a drain which had a bed width of up to 10 feet and from 3 to 4 feet in depth.

The weeds dealt with can be classified into three groups in order of infestation, viz., Pondweed and Ribbonweed; medium to light Cumbungi with Pondweed; and heavy Cumbungi. Depending on the type of weed infestation, the lengths of channel which may be cleaned daily are

in the order of 1,800, 1,300, and 800 feet respectively, or approximately 7, 5, and 3 times the lengths normally cleaned at the same daily cost by the excavator using a standard bucket.

The weed bucket, shown in use in the photograph at left, has an advantage over the standard bucket also in that it removes, roots and all, without enlarging or upsetting the designed bed width of the drain. As with the standard bucket, however, a certain amount of water is necessary for its effective working.

Others who have inspected the bucket under working conditions were also impressed by its performance, and have requisitioned similar equipment for use in other irrigation districts.

Construction Details:

Manufactured under patent, the 8-foot bucket is 18 inches high and 21 inches deep. Its weight is approximately 1,060 pounds and is used successfully on a 3/8-cubic yard dragline. The bucket consists of a cutting blade on the base, with reversible edges, one edge being straight and the other curved from the base to the top and is latticed to enable silt and water to drop through.

The 10-foot bucket, which is the one shown in the photographs, is similar in design, but is 30 inches high and 2 feet deep. It weighs 1,740 pounds and is too heavy for use on a 3/8-cubic yard dragline, but is very suitable for a 1/2-cubic yard machine. The 10-foot bucket, as shown in the above photograph, was used for cleaning approximately 1,300 feet of cattail infested drainage channel in a day, with the bucket attached to a 1/2-cubic yard dragline.

* * * * *

KERR GRASS DRILL

The Kerr Grass Drill shown below is used in the Bureau of Reclamation's Region 5, New Mexico and Texas, for seeding grasses along canals and on reservoir areas. The photograph is a general view of the drill in operation seeding grasses on the McMillan Reservoir area, on the Carlsbad Project in New Mexico.

Construction Details:

This particular drill has separate seed containers for each drill furrow, which is of advantage when using the seeder on a steep slope. Also separate containers are provided on the seeder for the large, fluffy seed (Western wheat grass, grama, etc.) and the small hard seed (Bermuda, Love grass, etc.). Regulators are installed on the seven discs to regulate depth of seeding, and a conventional car transmission is incorporated into the construction of the drill to facilitate changing seeding rates.

The drill shown was purchased from the Kerr Manufacturing Co., Geary, Oklahoma, for approximately $650. For further information write the manufacturer or the Regional Director, U. S. Bureau of Reclamation, Amarillo, Texas.

* * * * *

"SEED EASY" BROADCAST SEEDER

The "Seed Easy" broadcast seeder shown below and manufactured by Garber Power Seeders, Inc., St. Paris, Ohio, has been a big help in the spoil bank seeding program along canals on the Bureau of Reclamation's Central Valley Project. Use of the seeder has resulted in completing the job faster and at less cost. Compared with previous seeding methods and costs, there was a saving of $600 to $800 in the broadcasting of 50,000 pounds of seed.

The seeder performs very efficiently and with the exception of seeding by helicopter, it is the fastest method used on the project for seeding large spoil banks and ditch-bank areas. The seeder has been borrowed on several occasions by other public agencies who also have found it to be fast and efficient.

First used on the Delta-Mendota Canal, a similar seeder was purchased later for use on the Friant-Kern Canal also a part of the Central Valley Project. For seeding slopes the seeder is used on the left side of the pick-up truck as shown. For seeding larger areas, the seeder is mounted over the tail gate. It is mounted on a platform designed to fit in the bed of a pick-up truck, so that the broadcaster hangs over the side or end of the truck bed. The operator on the pickup controls the speed of the seeder engine so that the seed is broadcast 10 to 50 feet onto the spoil banks. On level ground the truck travels 8 to 10 miles per hour.

The photograph above and on the following pages does not show

the attachment for handling small seeds, but such an attachment is furnished with the seeder. By using the grass seeding attachment, both large and small seeds or two different kinds of seeds can be planted at the same time without mixing prior to seeding.

The seeder has a built-in metering device so that the adjusted density of the broadcast seed is uniform, whether the fans are throwing seed 10 feet or 40 feet.

Construction Details:

The seeder used on the canal banks of the Central Valley Project was the Garber "Seed Easy", Model GM. A platform, large enough to fill the entire pickup truck bed, was secured to the bed. The platform should be sufficiently high to permit the seeder to rest on the platform and on the side or tail gate of the truck bed. The seeder was attached to the platform by two bolts on the back side and two clamps, which are furnished with the machine.

Some modifications were made to the seeder on the project, which improved its operation and the results obtained. These modifications were:

(a) The addition of a hand throttle to control the speed of the fans, rather than use of the engine governor for this purpose.

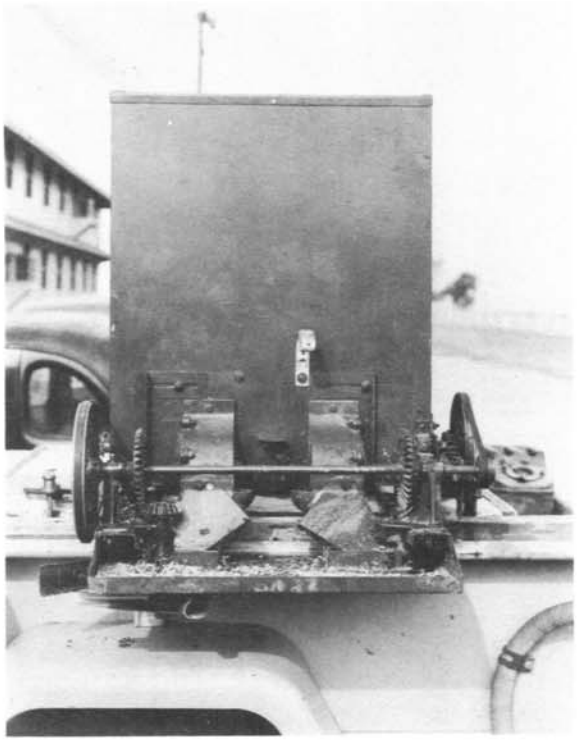
(b) The seed reflector behind one fan was extended approximately 8 inches to the outside so that all the seed cleared the truck bed.

(c) Bushings were placed behind the gears operating the fans so that the gears had a closer fit and ran smoother at high speeds.

(d) The engine pulley was replaced with a smaller one. A 1-1/2-inch pulley was found best.

It was discovered that by closing one aperture and disconnecting the broadcaster from the same side, the opposite broadcaster

would then throw sufficient seed a greater distance (when needed) than when both broadcasters were operating. One fan was sufficient to distribute seed with the seeder mounted on the side of the truck; however, for larger areas with the seeder mounted on the tail gate the two fans were used. The second fan can be removed by loosening one set screw from the gear on the fan shaft, shown in the photograph at left.



Except for the above and keeping the gears well coated with a heavy gear grease to reduce wear, the project forces found no need to improve upon the seeder as furnished.

The seeder cost approximately $150, complete with engine and grass-seeding attachment. The one first used on the Central Valley Project was purchased from the H. C. Shaw Company, Stockton, California. Further information regarding the seeder, its present cost and its operation may be obtained from the manufacturer, dealers, or the Bureau of Reclamation. To contact the latter, write Regional Director, U. S. Bureau of Reclamation, Sacramento, California, Attention: Code 2-440.

* * * * *

WEED SPRAY HOSE

A spray hose that is oil resistant and that has proved to be very successful for use on spray equipment, is the B. F. Goodrich "Weed Spray" hose. Designed for conducting weed-killing solutions such as DDT, 2-4D, etc., and for low pressure insecticidal and fungicidal spraying of shrubs, bushes, trees, etc., for the control of pests and disease, the hose has given good service.

The hose is supplied in 500-foot reels or in specified lengths. It is of braided construction with high tensile strength rayon cord. It can be supplied in internal diameters of 3/8- and 1/2-inch, which will have external diameters of 11/16- and 27/32-inch, respectively. Maximum working pressure is given as 200 pounds, with the weight per foot of the 3/8-inch ID hose being 0.158 and that of the 1/2-inch 0.237.

The hose has a semi-glossy, black, smooth rubber cover.

B.F.Goodrich Spray Hose

Tubes will not flake or clog spray guns

Paint spray hose

Recommended uses: For conducting paints, lacquers, varnishes, varnish thinners, synthetic enamels, oils, gasoline, kerosene and fuel oil.

Cover: Semi-glossy, black, smooth, oil-proof rubber. Resists solvents, sun-checking.

Reinforcement: Braided construction. High tensile strength rayon cord.

Tube: Light gray — will not flake or clog gun. New improved; resists discoloration from paint, solvent, gasoline and oil.

Length: Supplied in 500 ft reels or specified lengths.

Couplings: Barbed inserts or special reattachable fittings, as specified by customer.

Paint spray hose specifications

Size (ID)	Braid	OD	Wt lb per ft	Max work pressure lbs
1/4"	1	1/2"	.10	150
1/4"	2	5/8"	.17	225
5/16"	1	21/32"	.14	150
5/16"	1	11/16"	.18	150
3/8"	2	11/16"	.16	200
1/2"	2	7/8"	.24	150

Replaces Catalog Section 4470 Issued 10-1-52

Weed spray hose

Recommended uses: Ideal for weed killing solutions of all types, and low pressure insecticidal and fungicidal spraying of shrubs, bushes, trees, etc.

Cover: Semi-glossy, black, smooth rubber. Resists oil, abrasion, sun-checking and aging.

Reinforcement: Braided construction. High tensile strength rayon cord.

Tube: Will not flake or clog nozzle. Resists solvents, oils and aromatic carrier used in common weed-killing solutions. Oil-resistant.

Length: Supplied in 500 ft reels or specified lengths.

Couplings: As specified by customer.

Weed spray hose specifications

Size (ID)	Braid	OD	Wt lb per ft	Max work pressure lbs
3/8"	1	11/16"	.158	200
1/2"	1	27/32"	.237	200

Printed in U.S.A. 7-54

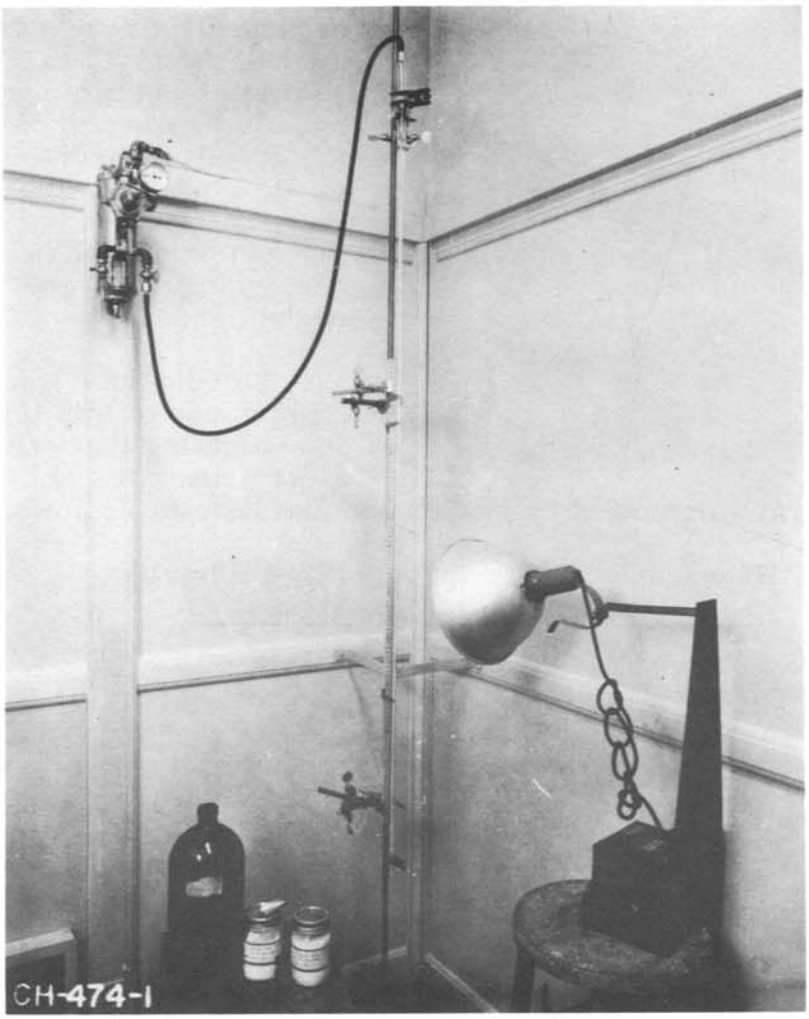
Paint — air — oil hose

Weed spray hose

NEW METHOD FOR ANALYZING HYDROCARBON TYPE AQUATIC WEED KILLERS

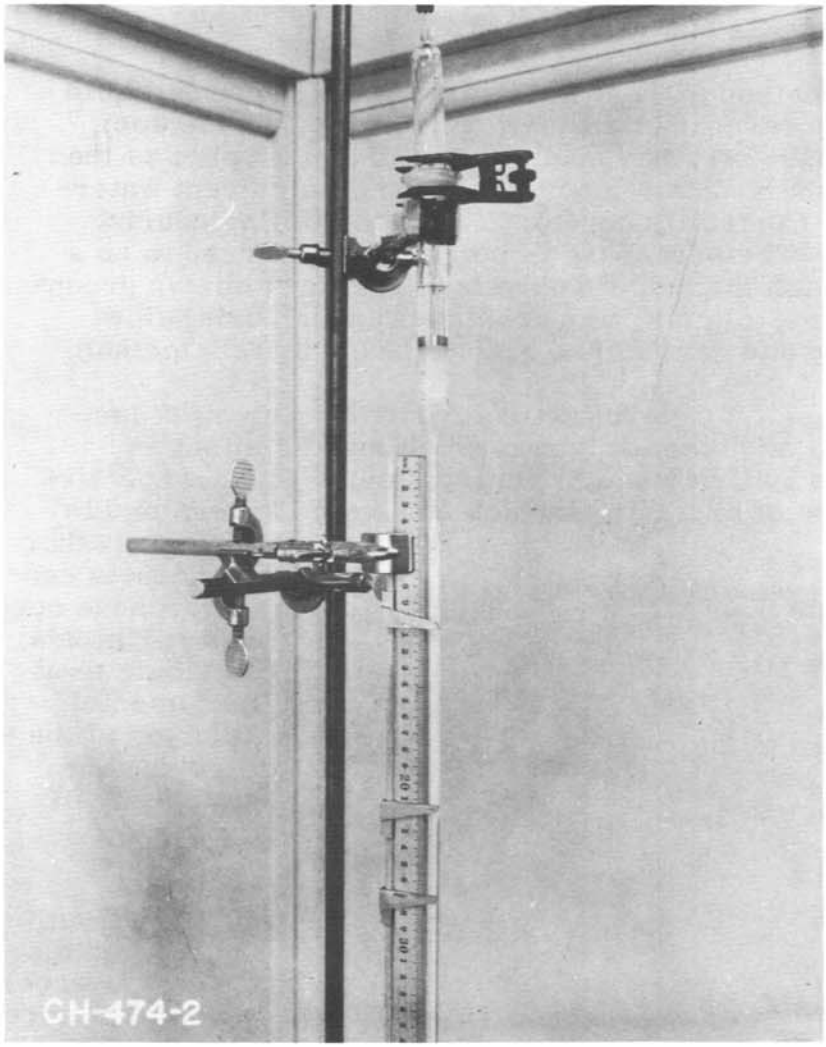
The "Tentative Method of Test for Hydrocarbon Types in liquid Petroleum Products (Fluorescent Indicator Adsorption (FIA) Method)," ASTM Designation: D 1319-54T, has been evaluated and adopted as the method for determining the aromatic content of aromatic solvent water-weed killers in the Weed Control Laboratory, Division of Engineering Laboratories in Denver. The procedure is sometimes referred to as a chromatographic adsorption method of analysis. The three major groups of hydrocarbons (saturates, olefins, and aromatics) which boil below 600° F. can be separated and determined quantitatively by this method.

The method is used to determine the aromatic content of samples of waterweed killers and other solvents which may be effective herbicides. The results will be used in preparation of revised specifications covering purchase of aromatic solvent waterweed killers and in determining whether offered products conform to purchase specifications. The data will contribute to a more fundamental understanding of the factors governing the phytotoxicity of hydrocarbons.



Test Procedure

A small portion (3/4 ml) of the sample to be analyzed is introduced into a reservoir on top of a column of packed adsorbent (silica gel). After the sample is added to the adsorbent, an appropriate desorbing liquid (isopropyl alcohol) is added to the reservoir. Under slight air pressure the desorbing liquid forces the hydrocarbon portion down the column slowly, during which passage the hydrocarbon portion is fractionated and separated into contiguous zones according to the



adsorbability of the components. The lowest zone contains the saturates, the middle zone the olefins, and the top zone the aromatic hydrocarbons. After the top zone has progressed far enough into the analyzer section, the boundary of each zone, which has a distinct color under ultraviolet light caused by the fluorescent indicator dyes added to the sample, is marked. The length of each zone is measured and used to calculate the percentage by volume of each of the groups of hydrocarbons present; the length of each zone is proportional to the percentage of the hydrocarbon groups.

To illustrate the importance of this test in evaluating the herbicidal properties of solvents, results on several samples of hydrocarbons are listed as follows:

Sample No.	Hydrocarbon types (percent by volume) Saturates	Olefins	Aromatics
1	99.7	0.3	0.0
2	86.3	13.7	0.0
3	93.4	0.0	6.6
4	0.0	99.3	0.7
5	4.8	17.1	78.1
6	6.4	8.7	84.9
7	0.0	4.3	95.7
8	0.3	0.7	99.0

Sample Nos. 1, 2, and 3, which contain a high percent of saturates, are found to be ineffective for aquatic weed control. This type of

hydrocarbon is represented by such materials as ordinary gasoline, kerosene, and other straight-chain and branched-chain saturated hydrocarbons.

Sample No. 4 is a branched-chain unsaturated hydrocarbon (olefin). This compound caused some injury to aquatic weeds but not enough to be considered an effective waterweed killer.

Sample Nos. 5, 6, 7, and 8, which contain a high percentage of aromatics, are the most effective for controlling aquatic weeds. Sample No. 6 is more effective than No. 5 at least in part because of the higher aromatic content of No. 6. Sample Nos. 7 and 8 are more effective than Sample Nos. 5 and 6 and are among the best of the aromatic hydrocarbon solvents for control of submersed aquatic weeds. Sample No. 8 is a pure grade of xylene and Sample No. 7, based on its distillation range, probably contains a high percent of xylene.

The above results demonstrate the importance of knowing the percentage of the different types of hydrocarbons represented in an aquatic weed killer. The percent of aromatics, along with the distillation range, is a very useful factor in determining those solvents that are likely to be effective waterweed killers.

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GPO 840391