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Department of the Interior

Bureau of Reclamation

OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES

RELEASE NO 12

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INTRODUCTION

This is release No. 12 of the Operation and Maintenance Equipment and Procedures Bulletin. From material supplied by regional, project, and field offices, this issue of the Bulletin has been prepared in the Office of the Assistant Commissioner and Chief Engineer, Denver Federal Center, Denver, Colorado, by the Division of Irrigation Operations. Our thanks to the people who have contributed the very worthwhile information.

In addition to the many suggested items for improvement in equipment or procedures included in this issue, your attention is directed to the article on page 12, the new edition of the Bureau of Reclamation's Concrete Manual. This new edition, the Sixth Edition, is the first published since 1949. Quoting from the new edition:

"Since publication of the fifth edition of the Concrete Manual in 1949, the knowledge of the use and behaviour of concrete has advanced in many important details. The text of the fifth edition has been rewritten or supplemented to reflect the effect of these advancements on the practices of the Bureau of Reclamation."

Release No. 11 of the Operation and Maintenance Equipment and Procedures Bulletin (our last issue), was devoted to the subject, "Good Concrete on Operating Projects." Aimed at our maintenance problems, the release pointed out some of the advancements made in concrete construction in accordance with the Sixth Edition of the Concrete Manual. In fact, the subject matter of our last release was prepared primarily by authors of the new Concrete Manual. Material contained in the Bulletin necessarily was brief. Accordingly, the new edition of the Concrete Manual contains much useful information for construction and maintenance personnel interested in concrete work.

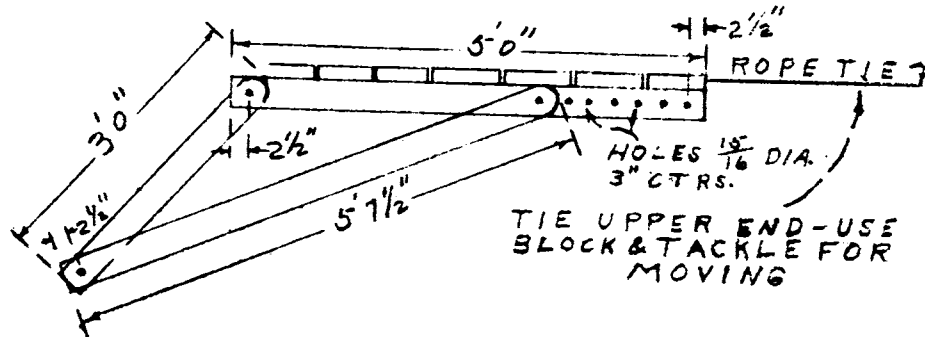
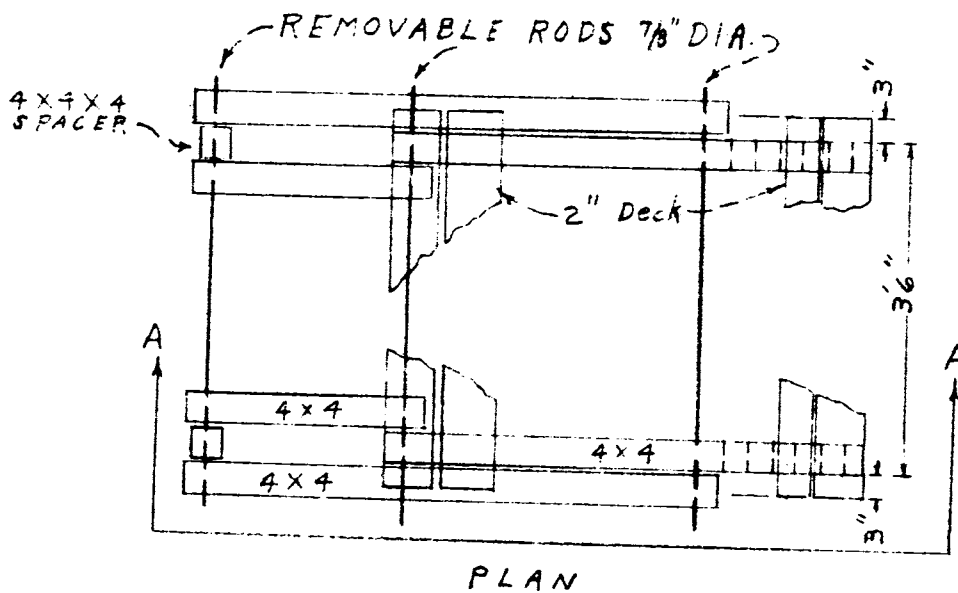
The Operation and Maintenance Equipment and Procedures Bulletin is circulated for the benefit of project operation and maintenance people. Its principal purpose is to provide a medium for exchange of operating and maintenance information. Reference in the Bulletin to a trade name does not constitute an endorsement of a particular product and omission of any commercially available item does not imply discrimination against any manufacturer. It is hoped that labor saving or less costly equipment developed by the resourceful water users will be a step toward commercial development of equipment for use on irrigation projects in a continued effort to reduce costs and increase operating efficiency.

* * * * *

ADJUSTABLE SCAFFOLD FOR PARABOLIC CURVES

An adjustable scaffold, drawing of which is shown below, was constructed and successfully used in repairing the parabolically curved spillway at Caballo Dam, Rio Grande Project, New Mexico-Texas. Designed by Jesse H. Jackson, Maintenance Superintendent, Elephant Butte, New Mexico, the scaffold provides a level working platform, that is easily adjustable to a change in curvature of the surface.

The platform eliminates working while suspended from a rope and safety-belt and increases the workman's efficiency. In addition to reducing the hazards of such working conditions, the platform provides ample space for spare tools.



SECTION A-A

Construction:

The scaffold consists of a wooden platform and adjustable legs, connected by removable 7/8-inch diameter steel rods. Held in position by rope or a cable attached to a block and tackle, the platform can be raised or lowered into the working position with a minimum of effort and lost time.

The project advises that the scaffold can be constructed for about \$20.00 and is durable and sufficiently light in weight to be easily moved from place to place.

* * * * *

PORTABLE ELECTRIC DRILL RAISES AND LOWERS GATES

Where electric power is available, the time consuming and laborious task of raising and lowering gates by hand can be eliminated. The device shown below and constructed by A. J. Phipps, Central Valley Project, California, accomplishes just this, and is adaptable to other hand-operated gates and hoists.



An electric drill furnishes the motive power and an old Chevrolet steering gear assembly with a gear reduction ratio of 7:1, transmits the power to the original gate-raising mechanism. Direction of the gate travel can be reversed by attaching the driving mechanism to the opposite side of the original hand-cranking gear.

* * * * *

COLUMBIA BASIN TRASHRACK

The trashrack shown in the photograph below is of the type presently being installed on laterals in the West Canal area of the Columbia Basin Project, Washington. The flat slope of the rack aids in the removal of weeds and the landing mat deck provides good footing. The trashrack shown was installed in a lateral having a capacity of 400 cfs.



Construction:

Surplus rails are used for the supporting cross members and pipe for the rack varies from $3/4$ - to $1-1/4$ -inch heavy duty, depending on the length of span. The rack shown was constructed of $1-1/4$ -inch pipe with the longest pipe length being about 20 feet.

The pipe is spaced 8-inch center to center and placed on a slope no steeper than 4:1. Upper ends of the pipes are loosely attached to the rail by large spikes which pass through holes in the ends of the pipes and through the web of the rail. The foundation for the rail cross member can be of concrete or serviceable timber. The

platform required in large laterals, as shown in the photograph, has a deck constructed from surplus landing mat supported by a pipe framework.

In many cases the complete unit is fabricated in the project shop and is rigidly constructed, using pipe or heavy strap around the outside perimeter of the rack. A fence enclosure is constructed adjacent to large installations for deposit and burning of weeds collected.

* * * * *

DESCHUTES WEIR POOL WEED SPRAYER

Use of the "Deschutes Weir Pool Weed Sprayer", planned and constructed by Mr. Huron D. Wise, heavy duty mechanic, Deschutes Project, Oregon, and used on the project, results in considerable savings in time, more weir pools and isolated areas being sprayed, and the spraying operation being much better than that usually performed with less efficient 3-gallon back-pack-type sprayers. The new device delivers the spray material from the spray wand held in the operator's hand in response to his pressing a button on the handle of the wand. The device is shown in the photograph below.

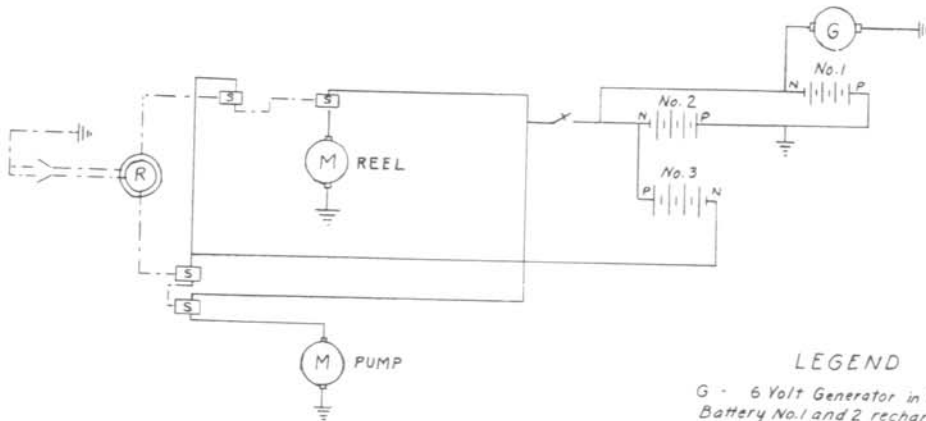


Construction:

The unique feature of this unit is the elimination of a gas engine for power. The pump and reel are both operated by two 6-volt starter motors with remote controls on the boom handle which gives

the operator finger tip control when spraying 100 to 200 feet from the machine.

The unit is built on a metal base which can be placed in any one-half-ton pickup with room to spare. It has a tank capacity of 50 gallons. A diagram of the complete unit is shown on the following page and a wiring diagram and details of the hollow bronze shaft are given below.

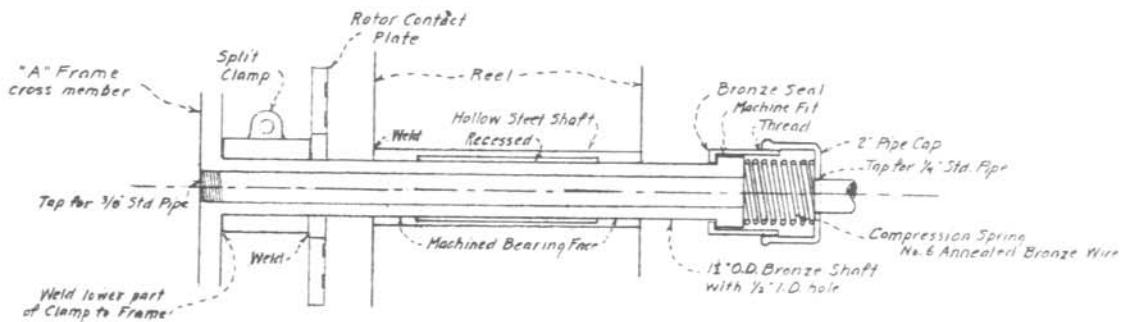


WIRING DIAGRAM

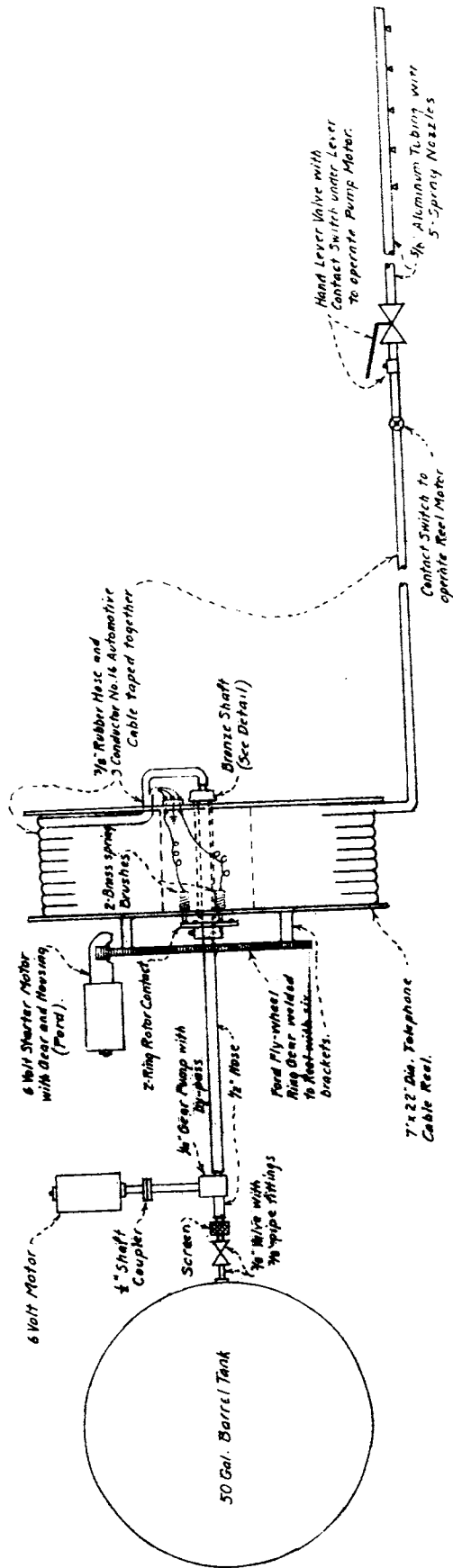
NOTE: For 150 Ft. Hose - 12 volts are required to operate solenoid switches (Batteries No. 2 and 3.)
For 75 Ft. or less - 6 volts is sufficient to operate solenoid switches and Battery No. 3 could be omitted.

LEGEND

- G - 6 Volt Generator in Truck
- Battery No. 1 and 2 recharged by Truck Generator.
- Battery No. 3 recharged in Shop
- M - 6 Volt Automobile Starting Motors (Ford)
- S - 6 Volt Automobile Solenoid Switch (Ford)
- R - Rotor Contact (2-Rings) for Transmission through reel and spray control.
- 300 Amp. Battery Conductor Cable.
- - - No. 16 Automotive Conductor

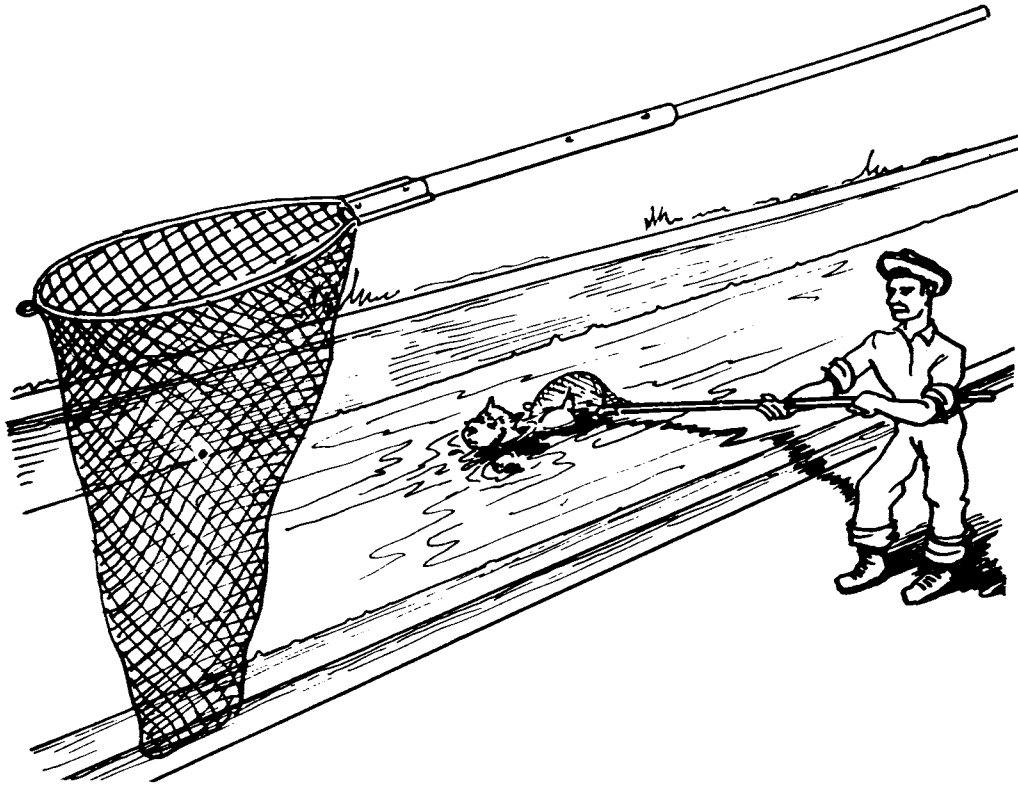


HOLLOW BRONZE SHAFT DETAIL



WEIR POOL WEED SPRAYER

DIPNET REMOVES SMALL ANIMALS FROM CANALS



Removing dogs and small animals both dead and alive from concrete lined canals is a common chore on the Central Valley Project in California. It can be a dangerous chore. Recently a ditchrider was bitten seriously about the face by a dog he had rescued and the bites made hospitalization, including rabies treatment, necessary. The ditchrider lost 14 days working time.

Gordon Johnson of the project came up with the idea of a dipnet. As shown above, the dipnet is similar to the type used by commercial fishermen, with a long telescoping handle carried as standard equipment by ditchriders in their vehicles. For further detail write the Regional Director, U. S. Bureau of Reclamation, Sacramento, California.

* * * * *

LOW-BOY MOUNTED EQUIPMENT SPEEDS GROUTING

The photograph on the cover of this issue of the Bulletin and those on the following pages illustrate the method being used to back-fill grout under concrete linings on the Columbia Basin Project. Mounting the several pieces of equipment on the low-boy trailer facilitates its movement from place to place as a compact unit.

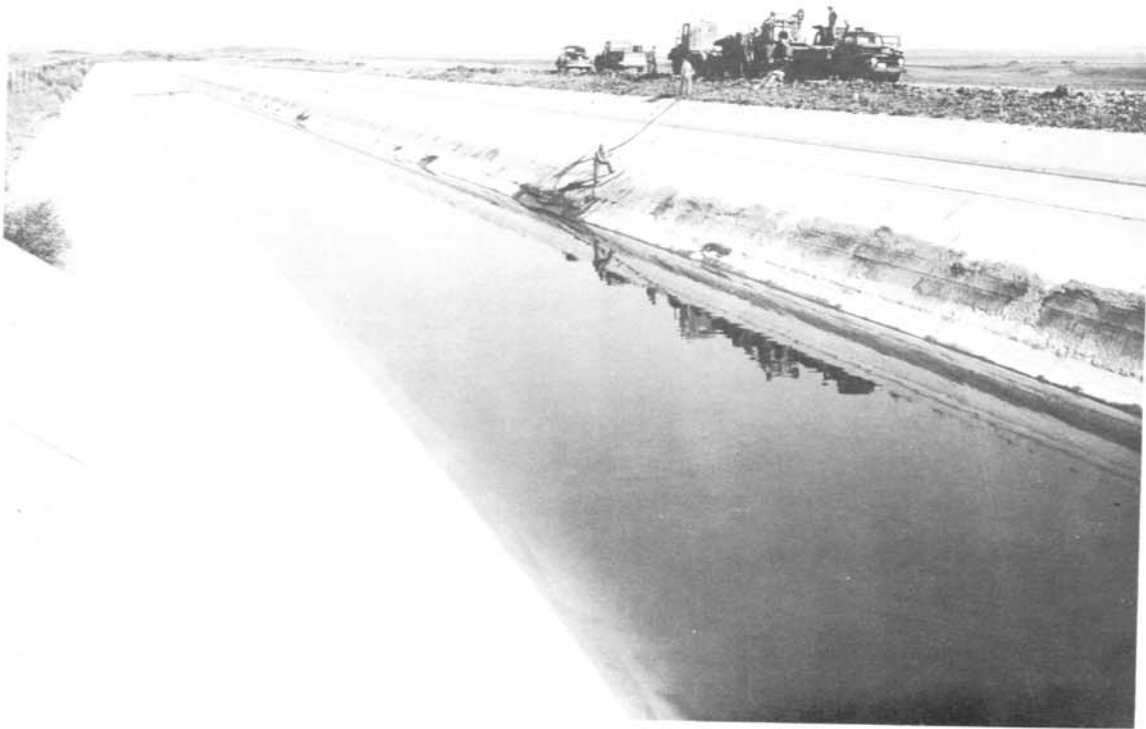
In the photograph below, an air compressor, concrete mixer, and agitator, together with the water and cement, are conveniently available to the work.



The 4-1/2-inch thick unreinforced concrete linings placed in the West and East Low Canals have developed cracks in the side slopes in certain areas. The trouble is occurring where the lining was placed over fractured and jointed rock or permeable gravel in cut sections. The distress is characterized by a settlement and cracking of the lining, which upon removal discloses voids as much as 2 feet in depth, normal to the canal slope, beneath the lining. The voids are apparently caused by the seepage of water through joints in the lining, causing settlement of the backfill material, or carrying the silt backfill material into voids in the underlying rock or gravel subgrade.

Repairs for the lining, where the slabs of concrete are still intact, are accomplished by drilling 2-1/2- to 3-inch holes through the lining in cracked and "hollow sounding" areas, and filling the voids with a lean cement-sand grout. The grout consists of 1 part cement to 3 parts of sand, using about 8 gallons of water per sack of cement and Durite, a

grouting agent. This is mixed in a standard concrete mixer and dumped into a hopper from which the grout flows by gravity through a flexible hose to the holes drilled through the lining. No attempt is made to raise settled slabs into place, but if they are too badly cracked and have settled an excessive amount, the slabs are removed backfilled with soil and replaced. The photograph below is a general view of the operation on the West Canal.



The project advises that in addition to the equipment now mounted on the low-boy a water supply tank will be added to the equipment in the future. For further details of the equipment and its use write the Project Manager, U.S. Bureau of Reclamation, Ephrata, Washington, or the Regional Director, U.S. Bureau of Reclamation, Boise Idaho.

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NEW EDITION OF BUREAU'S CONCRETE MANUAL

A new edition of the Bureau of Reclamation's Concrete Manual, the sixth edition, has just been received from the Government Printing Office. This new edition is available upon request and without cost to Bureau personnel. To others, it can be made available at a cost of \$2.50. The Manual can be obtained from the Superintendent of Documents, U.S.

Government Printing Office, Washington 25, D. C., or the Bureau of Reclamation, Denver Federal Center, Denver, Colorado, Attention: 841. (Postage is not required in Canada, Central and South America, Cuba, Dominican Republic, Haiti, Mexico, Newfoundland, Spain and the United States and its territories and possessions.)

The new edition of the Concrete Manual will be of interest to all engaged in project operation and maintenance. Like previous editions, a full chapter has been devoted to the repair and maintenance of concrete, and concrete structures. Some of the items covered in the new edition of the Manual are: methods of repair; preparation of concrete for repair; use of dry-pack mortar; procedure for the replacement of formed and unformed concrete; procedure for mortar replacements; repairs under seepage conditions; curing of repairs; and treatment for protection of concrete against weathering.

In the field of repair and replacement, the sixth edition of the Concrete Manual states:

"New information is presented in this edition on factors influencing strength of concrete. . . . Precautions are given for the use of calcium chloride where sulfate attack is expected because test results have shown that this admixture may impair the resistance of concrete to this attack.

". . . . More detail is included on the repair of cracks in siphons and on the repair of concrete pipe. In many instances better photographs and drawings have been used."

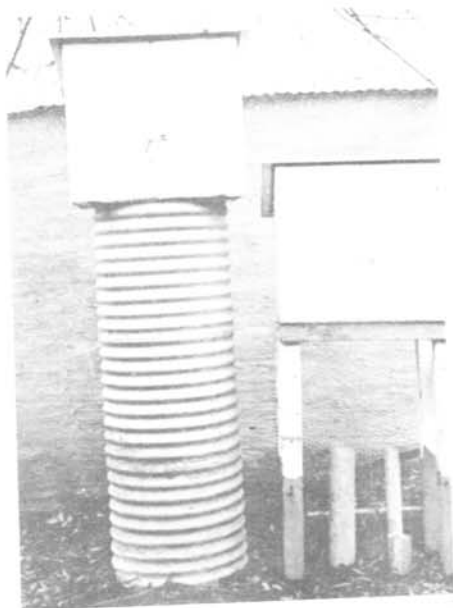
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CORRUGATED METAL CULVERT WATER LEVEL RECORDER STAND

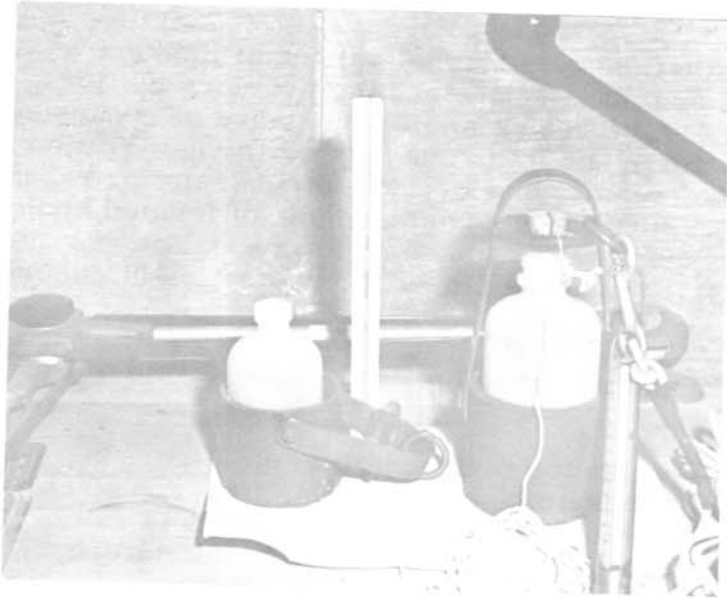
The suggested use of corrugated metal culvert pipe for water level recorder stands by Arthur R. Nelson, Project Development Division, Bureau of Reclamation, Sacramento, California, has eliminated expensive fabrication, transportation and installation of the older type of recorder stands on California Projects.

The suggested stand gives complete instrument protection from animals as well as protection from human tampering. Further information can be obtained by writing the Regional Director, Bureau of Reclamation, Sacramento, California.

* * * * *



SIMPLER WATER SAMPLER



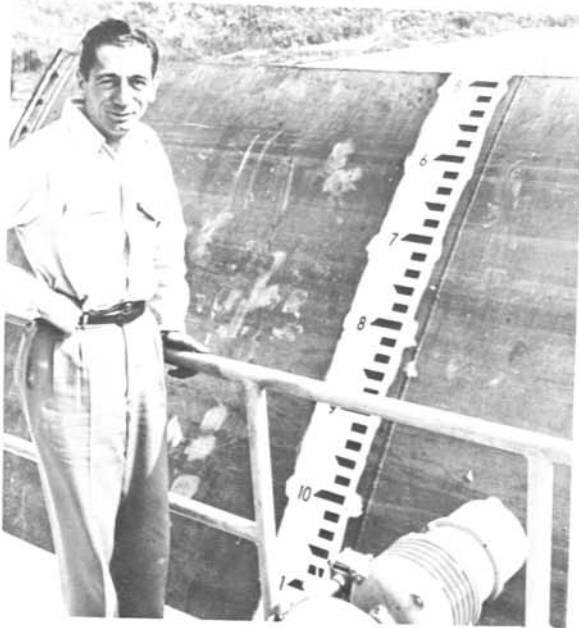
Noticing the mess of weights and tangled cords the hydrologists were contending with each time a water sample below the surface of a stream was taken, James C. Bair, located at Los Banos on the Central Valley Project, California, rigged up the harness shown in the photograph at left.

The harness neatly solved the problem and materially simplifies the operation. Further information concerning the sampler can be obtained by writing the Tracy Operations Field Branch,

U.S. Bureau of Reclamation, Tracy, California, or the Regional Director, U.S. Bureau of Reclamation, Sacramento, California.

* * * * *

ENAMELED GAUGE MARKERS



Another suggestion from the Tracy Operations Field Division, Central Valley Project, California, is the porcelain enameled metal gauge marker for radial gates shown in the photograph at left.

Mr. F. S. Icardi made the suggestion and his idea was immediately adopted. The installation shown is on a radial gate on the Delta-Mendota Canal and provides for a saving in annual painting costs. It should have merit in similar installations on other projects.

If further information is desired, contact offices given in the article above.

* * * * *

SHOVEL ATTACHMENT SAVES TIME AND EFFORT

On the Deschutes Project in Oregon, constructed by the Bureau of Reclamation and now operated by the North Unit Irrigation District, a Model U-9, Quickway Shovel is used most of the time as a dragline. The equipment as designed requires the operator to use three levers in excavation work; one to swing the machine, one to drag the bucket, and one to hoist the bucket. A skilled operator will drag and hoist the bucket and swing the machine all at the same time, requiring operation of the three levers against pressure with two hands. To do this means that the operator has to let go of the swing lever with his left hand to operate one of the bucket levers or use his right forearm to operate two bucket levers. Such an operation results in delayed motion or, where the latter type of operation is used, in extreme fatigue and a temporary paralysis of the forearm at the end of an eight-hour shift.

An attachment designed and constructed by Mr. Huron Wise in the Project's, Madras shop, provides for easier operation and increases the output of the machine. Use of the device, by actual count and measurement, permits handling $1/3$ more material in a day.

The Attachment

As constructed in the factory, the drag and hoist levers of the Model U9, Quickway Shovel are connected directly to hydraulic cylinders, which in turn are connected with hydraulic lines to the main winch. They are live levers. That is, they cannot be set in position. The operator must pull these levers and hold them against hydraulic pressure in order to operate the particular mechanism.

The attachment shown on the following page permits the operator to pull either one or both of the bucket levers against pressure in the hydraulic cylinder and lock them into position until released. The device consists of an arrangement of adjustable links connecting the levers to the hydraulic cylinders. Locking is accomplished without the use of "dogs" or ratchets, by adjusting the vertical linkage so that the center pin of the horizontal links is slightly below the axis of the horizontal linkage.

The device can be constructed in any reasonably well equipped shop. The installation made on the Deschutes Project has been in operation for some time without further adjustment. It has proven to be very satisfactory.

If further details are desired, write the Manager, North Unit Irrigation District, Madras, Oregon, or the Regional Director, Bureau of Reclamation, Boise, Idaho.

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ATTACHMENT FOR OPERATING
 CONTROLS OF HYDRAULIC
 SHOVEL - MODEL - US
 DIVISION OF RECLAMATION
 BUREAU OF RECLAMATION
 DESCHUTES PROJECT - MADRAS, OREGON
 11.8.2.1945
 Design - H.D. Ware
 Drawn - BAB

