Department of the Interior
Bureau of Reclamation

# OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES

## RELEASE NO. 27

**January, February and March 1959**



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CONTENTS

# OPERATION AND MAINTENANCE

# EQUIPMENT AND PROCEDURES

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## INTRODUCTION

Good public relations in the community are just as important to any organization as good management, and good operation and maintenance practices. An article of general interest on this subject about Reclamation employees in Region 2 appeared in The Office magazine, December 1958, entitled, "Good Public Relations Bring Good Will to All." Permission to reprint the article, page 5, was secured from the publisher.

This bulletin, published quarterly, is circulated for the benefit of irrigation project operation and maintenance people. Its principal purpose is to serve as a medium of exchanging operation and maintenance information. Reference to a trade name does not constitute the endorsement of a particular product, and omission of any commercially available item does not imply discrimination against any manufacturer. It is hoped that the labor-saving devices 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.

In order to insure proper recognition to those individuals whose suggestions are published in this and subsequent bulletins, the suggestion number as well as the person's name is being given. All Bureau offices are reminded to notify their Suggestions Awards Committee when a suggestion is adopted.

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Division of Irrigation Operations
Commissioner's Office
Denver, Colorado

# MARDEN BRUSH AND WEED CUTTER

Removal of algae and aquatic weeds from canals, laterals and open drains is always an important item in the annual maintenance budget for irrigation projects in southwestern United States. The ideal method of control is by periodic dry-up with a long exposure to bright sunlight. However, in many of the canals it is impossible to curtail the delivery of irrigation water during peak irrigation seasons for a sufficiently long time to kill the algae and weeds. Most of the open drains are not constructed so that they can be dried up. Therefore, other means must be employed.

Control of weeds and brush along a canal or drain bank is another significant item in maintenance costs and in the efficient handling of water. In an effort to reduce costs and more efficiently control the algae and weeds, both in the canals and drains, as well as on the banks and side slopes, heavy-duty weed and brush cutters have been used in recent years. One of these cutters is the Marden Duplex Brush and Weed Cutter shown in use in side-slope cutting, on the cover of this issue of the Bulletin, and in cutting weeds and brush as shown below.


The machine consists principally of large drums equipped with heavy-duty, double-edged reversible blades, with drum and blade assembly carried in a heavy-duty towing frame. The machine is versatile, as shown in the photographs on the following page, and units can be used side by side or in tandem, and can be set with or without angle, depending on the work to be done. The drums can be filled with water if additional weight is desired.

When the cutter is used to remove algae or aquatic weeds, as shown in the top photo of the next page, it is set up tandem and offset so that when pulled forward it has a vigorous action and the cutting edges on the two units overlap each other, cutting the growth into lengths of approximately 12 inches. The vigorous action of the cutting edges in

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P35-303-204-2

the tandem offset style tears the growth loose and in many instances uproots the aquatic weeds. White roots are often seen floating in the lateral after the machine passes. After the growth is torn loose, it can be floated out with the irrigation water.

When the cutter is set up with the drums side by side, the unit can be used with one drum running on top of the bank and the other drum on the slope, either on the inside or the back side of the canal. A drain bank recently cleared of arrow weed and carrizo cane with the cutter is shown in the lower photograph.

The cutter can also be used on a cable behind a tractor to clean along drainage bank slope and when closely hitched to the drawbar of a tractor, the cutter is an excellent piece of equipment to clear wide flood channels of undergrowth. In this manner, the machine can also be used to clear land preparatory to land leveling.

The cutter is being used by the Yuma County Water Users' Association, the Wellton-Mohawk Irrigation and Drainage District, Palo Verde Irrigation District, the Bureau of Reclamation, and others in the vicinity of Yuma, Arizona.

A single D-8 tractor has been used to pull the 7-foot long cutter on much of the work, except where shown in the top photo clearing a lateral

choked with a growth of algae and aquatic weeds. Here the tandem cutter was towed by a Model D-7 and a Model D-8 Caterpillar tractor.

Several of the photographs included in the description of the cutter were supplied by the Yuma Equipment Co., P. O. Box 1630, Yuma, Arizona, from whom additional information concerning the cutter can be obtained. The cutters are obtainable in several lengths and diameters.

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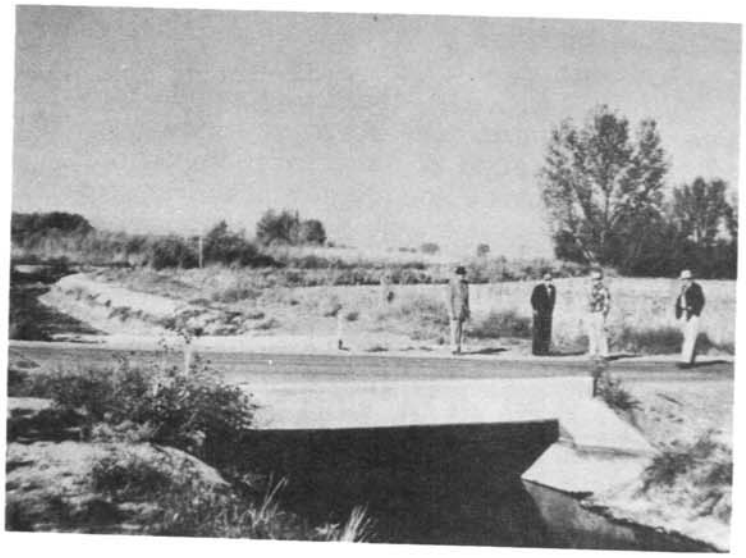
## CROSSING PADS AT HIGHWAY BRIDGES

The management of the South Board of Control, Owyhee Project, Oregon-Idaho, have arranged for the placement of reinforced concrete pads at the highway approaches to bridges over the canals and laterals on the project as shown below. The pads provide a means for the passage of tractors and other operation and maintenance equipment traveling the ditch bank, to cross the asphalt paved highway without damage to the roadway surface.



The pads are 10 feet in width and 6 inches thick. Reinforcement for the pads is furnished by the Board of Control and the State or County highway organizations furnish and place the concrete for the pads.

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## STAINLESS STEEL ROPE

In Release No. 19 of the Operation and Maintenance Equipment and Procedures bulletin we published an article, "Gate Hoist Wire Rope Performance," which reported upon a survey which had been made Bureau-wide to find out how the various types of ropes had been performing. In that report there was mention of only one failure of stainless-steel rope from galling and seizing and this was reported by the W. C. Austin Project, Oklahoma, in Region 5. Since the issuance of that report, we have had some further experience with stainless-steel gate hoist ropes, though under somewhat unusual conditions, which has added to our knowledge of what can be expected and has caused us to place some qualifications on the use of stainless-steel gate hoist ropes.

Our attention was directed to the failure of two stainless-steel gate hoist ropes installed on the radial gate controlling the flow of water into the Big Thompson Siphon on the Charles E. Hansen (Horsetooth) Feeder Canal, Colorado-Big Thompson Project, after only one season's operation. The ropes which failed were 1/2 inch in diameter, 6 x 19 type and the hoist drum was 9 inches in diameter. The gate was on automatic control and hunted over a range of about 2-1/2 inches every 2-1/2 to 3-1/2 minutes. With the changing flow, surging in the siphon was caused which resulted in intermittent vibration of the gate also. It is estimated that the hunting of the controls may have put the hoist through as many as 50,000 cycles in one season. Knowing the susceptibility of stainless steel to work-hardening, it is not surprising that failure resulted.

Failure of individual wires occurred at the point where the rope flexed on and off the drum, but the major breaks were about 6 inches above the gate connections where there was no bending. It is believed the failures in the straight ropes were due to torsion as the load on the ropes varied.

The most desirable first step in remedying this situation would be to eliminate the hunting of the gate by proper adjustment of the control, or, if necessary, by their modification. This, however, is not always easy to do, so we must recognize that hoist ropes may operate under these conditions at times and take steps accordingly. If stainless-steel ropes are indicated, because of corrosion conditions, at a gate that might be expected to be moved frequently; a softer type of rope such as a 6 x 37 type will likely give much better service than a stiffer type. The more flexible stainless-steel ropes are not so susceptible to work-hardening. The importance of proper lubrication of stainless-steel ropes is emphasized, so that the individual wires may move upon one another without galling as they conform to the applied loads. Annual inspection of gates and hoists is also important, and this should include a careful scrutiny of individual wires of the hoisting ropes, particularly in case of stainless-steel ropes where work-hardening failures are a possibility. Individual broken wires scattered through a rope are difficult to detect.

* * * * *

# GOOD PUBLIC RELATIONS BRING GOOD WILL TO ALL

(An article written by William G. Waggoner, Employee Relations Officer, Region 2, U. S. Bureau of Reclamation, Sacramento, California, is reprinted from the December 1958 issue of The Office. Copyright 1958, by Office Publications, Inc., 232 Madison Avenue, New York 16, N. Y.; further reproduction is prohibited.)

Public Relations is the reaction of the public to the activities and objectives of a company's effort. Every employee is a public relations messenger for his employer. He cannot avoid it. He is either a good one or a bad one. Say, for instance, an employee helps his next-door neighbor fix his lawn mower. What happens? In the neighbor's mind your employee is a good neighbor, a "right guy" to have around. By association, your company becomes a good outfit and their local project a worth-while one. Chain reaction from an accumulative neighborliness rolls the rocks out of your road. This is the down-to-earth objective of a public relations program.

The average employee is not consciously doing a public relations job for his employer. He is only being a normal, well adjusted member of a community. Basically, good public relations originate in high employee morale which, in turn, generates from individual employee satisfaction with the objectives of his organization and the part he plays.

The California organization of the U. S. Bureau of Reclamation has neither a public relations officer nor a formal program. Yet the employees, by their activities, have won recognition and acceptance as citizens and members of the community which could well be the envy of a public relations staff with a full-fledged program.

Officially, there is little latitude for our Government agency to participate in community efforts. The money appropriated by Congress is firmly labeled for the building of dams, powerhouse and irrigation systems, and their operation. Funds cannot be donated to local projects, nor equipment or materials for a civic enterprise, so, that leaves it up to the individual employees and their employee associations to step into the gap.

Good public relations can be fun. When the citizens of Weaverville, Calif., headquarters of a Reclamation project, decided the town needed a face-lift, our employees promptly volunteered a Saturday-Sunday team of painters and did a bang-up job. How could the townspeople ever think of the Reclamation project boss as a bureaucrat when they had seen him with paint in his hair and eyebrows, doing as good a job and having as much fun at it as the local citizens working beside him! This story of community spirit was spread by newspapers, radio and television.

Near Tracy, Calif., there are huge Reclamation pumping plants operated by electrical energy generated several hundred miles up-stream at Shasta Dam. Here the Sacramento River lifts itself by its own bootstraps and runs along the side of a mountain range, back down into a valley to irrigate thousands of acres on its way to the Pacific Ocean. When the town of Tracy decided to put on a festival, our employees were in there pitching. They sponsored an entry for the queen contest and wound up with an employee winner leading a parade astride an elephant. She received congratulations from California's Gov. Knight, plus a free trip to Mexico City. All this was headline news with pictures in local newspapers. Community activity, good fun, and the Bureau of Reclamation became a local citizen.

The townspeople of Winters, Calif., Reclamation headquarters for the Solano project, showed an interest in the large number of foreign visitors to the damsite. Reclamation employees responded to this interest. They constructed a large and attractive display board with colored ribbons leading from all over the world to Winters. This was a matter of great civic pride and the display was featured in one of the store windows--with an appropriate by-line to our bureau.

Reclamation employees are more than fair-weather friends. During the serious floods of 1955-56, individually and collectively, officially and unofficially, they won the respect of their fellow citizens when the chips were down. They manned danger points at threatened breaks. They donated their time and talents to alleviate the common danger. One employee at the huge Shasta Dam, on his own, compiled addresses and telephone numbers of people whose homes were immediately threatened and kept them hourly informed of changes in flood conditions. Another, a "ham" radio operator, spent four days practically without sleep to render the same service.

Last year an Army plane night-crashed on a mountain near Klamath Falls, Ore. An alert employee witnessed the crash and took off in his jeep up the opposite side of the mountain from which organized search parties were operating. His coolness, judgment and knowledge of terrain were credited by the Army with the saving of the lives of the survivors.

An incident indicative of unusual civic slant of California Reclamation employees occurred recently. When one of their officials retired, he did not receive a watch, golf clubs, luggage or other ordinary remembrance. The employees established an engineering scholarship in his honor at a local college.

Ordinary activities include managing and coaching a half-dozen Little League baseball teams, winning national awards in different personal activities, authoring articles in magazines of national circulation, serving as officials in a variety of local, professional and civic organizations; or, you may find a full page spread in the Sunday supplement--a "how he did it" write-up of some Reclamation employee's problems in building his own home in the community. It is a foregone conclusion

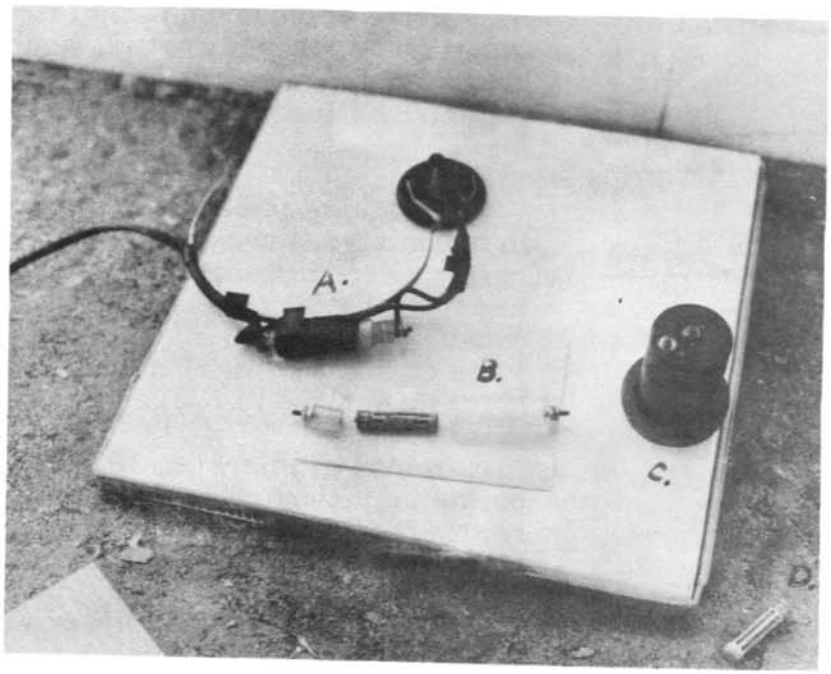
that quotas for the United Crusade and other worth-while fund raising campaigns will be oversubscribed by the employees of this agency.

So the story goes, year in and year out. A story of public relations that any company or organization can match. The files of the Bureau of Reclamation in California carry an ever-increasing record of appreciation for their employees as good citizens. When complimented on his public relations program, Regional Director Bellport of the Reclamation Agency commented: "I do not care so much for the word 'program.' It sounds like a conscious effort. Actually, anything we may have accomplished is the result of the spontaneous, good citizenship of public spirited employees."

* * * * *

## LESS CUMBERSOME CURRENT METER MEASUREMENTS
(Suggestion R2-59-139)

An idea that has been duplicated by the Geological Survey and the Pacific Gas and Electric Company employees who have seen it in use, is a plastic holder for a penlight battery used with current meters in making water measurements. A photograph of the device and its arrangement is shown in the photograph below.




With reference to the photograph at left, "A" shows the holder attached to a head set used with the current meter; "B" shows the holder and battery ready for assembly; "C" for comparative purposes, shows the size of the battery originally used in the current meter measurements; and "D" is the small penlight battery used in the less cumbersome equipment.

The arrangement, in addition to eliminating the more cumbersome and heavier battery, also eliminates about 8 feet of wire by taping the smaller battery and holder to the head set. The suggestion of the device and its arrangement was made by Arthur E. Salmon of the Fresno Operations Branch, Central Valley Project, California.

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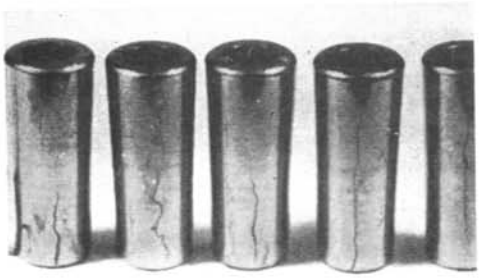
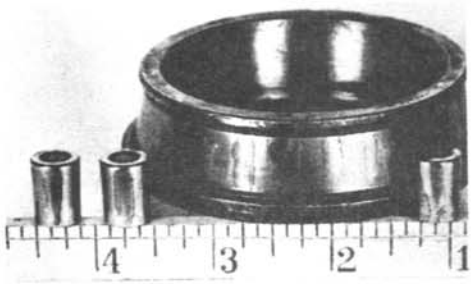
# CUT WHEEL BEARING DAMAGE



Mechanics who adjust wheel bearings by relying on their sense of "feel", or who depend on visual inspections to spot water-contaminated grease, can cut spindle and wheel bearing wear by developing better adjustment and relubrication procedures.



**DANGER SIGNAL**—First signs of wear are hairline marks on rollers and race that have been exposed to contaminated grease.




**BADLY ETCHED**—Rollers and race suffering from advanced stages of water etch are now susceptible to flaking and pitting.

That's been the experience of engineers of the Timken-Detroit Axle Division of Rockwell Spring and Axle Co. They point out that like all highly finished carburized steel products, wheel bearings are extremely susceptible to attack by water. And because of the job wheel bearings perform it is virtually impossible to keep water from them for long.

Water enters a wheel bearing cavity in one of two ways: It gets past ineffective seals when a rig is working in rain or over wet ground, and it builds up from the condensation of vapor resulting from repeated breathing.

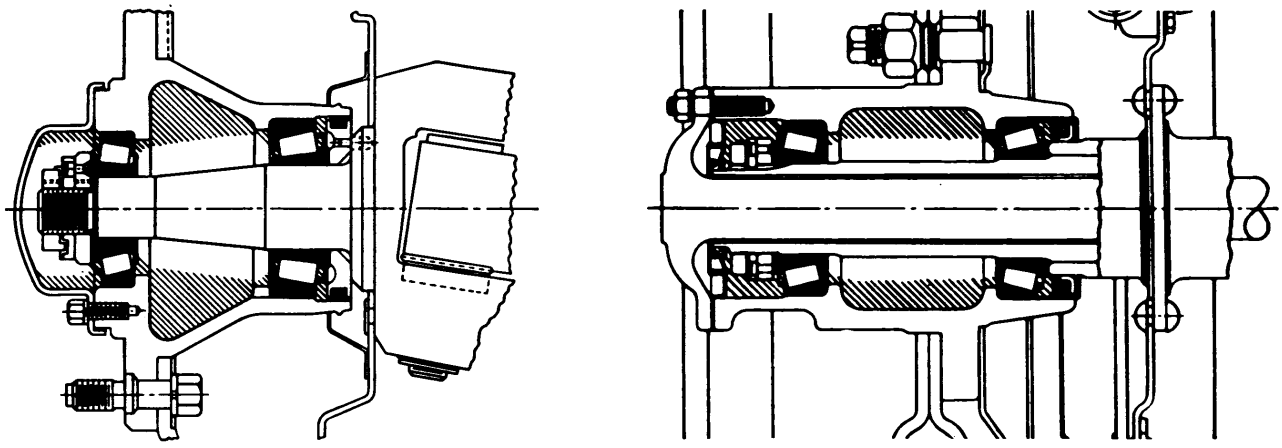
Breathing is caused by changes in barometric pressure or temperature resulting from weather variations. Changes that cause condensation also occur every time a machine is put to work or shut down. For this reason, it is impossible to prevent breathing.

In many instances, breathing builds up enough water to damage bearings without producing noticeable changes in the bearing lubricant. Long before contamination shows up to the naked eye, bearing damage can occur in the form of hairline marks on rollers and races. When this happens, the next step is pitting and flaking that ruins bearings.

Good steels are made up of millions of tiny particles closely bonded together. The gray or black stains called water etch that appear first on deteriorating bearings occur when water literally removes the adhesive holding these particles together. When this happens, liberated particles accelerate wear on all bearing parts. This wear becomes fatal when freed particles work between rollers and mating parts.

In no time, the rolling action of the bearing is retarded and this increases the creeping action of the loosely fitted inner race. When creeping becomes substantial, it causes wear on spindles and journals.

Water-contaminated grease must be removed completely from wheel bearing cavities before it begins this chain of damage. The best way to remove old grease is with kerosene or diesel fuel solvents and a stiff brush. Gasoline and heated solvents are not recommended by Timken-Detroit, and steam cleaning particularly should be avoided.



To repack bearings, force new grease into all cavities between rollers and roller cages. Make sure that cavities and the hub cap also are packed with grease. The lubricant should be on a level with the smallest diameter of the bearing cups or outer races.

Proper wheel bearing adjustment also has a great effect on the life of bearings. Most mechanics agree that the ideal bearing adjustment would be one that imposed no pre-load on the bearings, and at the same time does away with all end-play. But both human and mechanical factors make it impossible to achieve this adjustment with regularity.

Timken-Detroit finds that a small amount of end-play is preferable to a slight amount of preload. Bearings with end-play of from .001- to .010-inch will have a longer life expectancy than bearings with a slight preload.

Timken-Detroit's adjustment recommendations, which do not depend on a mechanic's sense of "feel", follow:

1. Assemble bearings and hub on the axle sleeve or steering knuckle spindle and install the thrust washer if one is required.

2. Screw the wheel bearing adjustment nut against the bearing or thrust washer as the wheel revolves.

3. Tighten the adjusting nut to 50-lb. ft. torque while the wheel rotates. Rotate the wheel in both directions to position bearings.

4. Back off the adjusting nut. For axles that have only a single nut, back off the nut one-sixth to one-fourth turn and lock it in place. For axles with double nut and lock construction, back off adjusting nuts one-fourth to one-third turn.

5. Assemble the nut lock washer and tighten the jam nut. For assemblies with a bending-type lockwasher between the adjusting nut and jam nut, torque limits are 100- to 150-lb. ft. for nuts larger than 2-5/8-inch. For assemblies with a doweled adjusting nut and pierced wheel bearing nut lock, torque limits are 200- to 300-lb. ft. for 1-1/8- to 2-5/8-inch nuts; and 250- to 400-lb. ft. for nuts larger than 2-5/8-inch.

6. Cotter pin the nut or bend the wheel bearing nut lock washer over adjusting and jam nuts.

* * * * *

## NO GASOLINE, PLEASE!

Reports frequently state that white gasoline has been used in cleaning the surfaces of metal, wire rope, mechanical parts, etc. Gasoline is highly inflammable, as all of us know, and should never be used for this purpose. It is even more hazardous, of course, when used indoors.

Many solvents on the market will do the job as well as white gasoline, if not better. The solvents are much safer to use.

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## FORK ATTACHMENT FOR GRADALL

A fork-type attachment used on a truck-mounted Gradall to facilitate the removal of floating moss or other debris that accumulates in a canal or drain has been developed by the Yuma County Water Users' Association, which operates and maintains a portion of the Yuma Project, Arizona. Photographs of the Gradall and attachment are shown below.

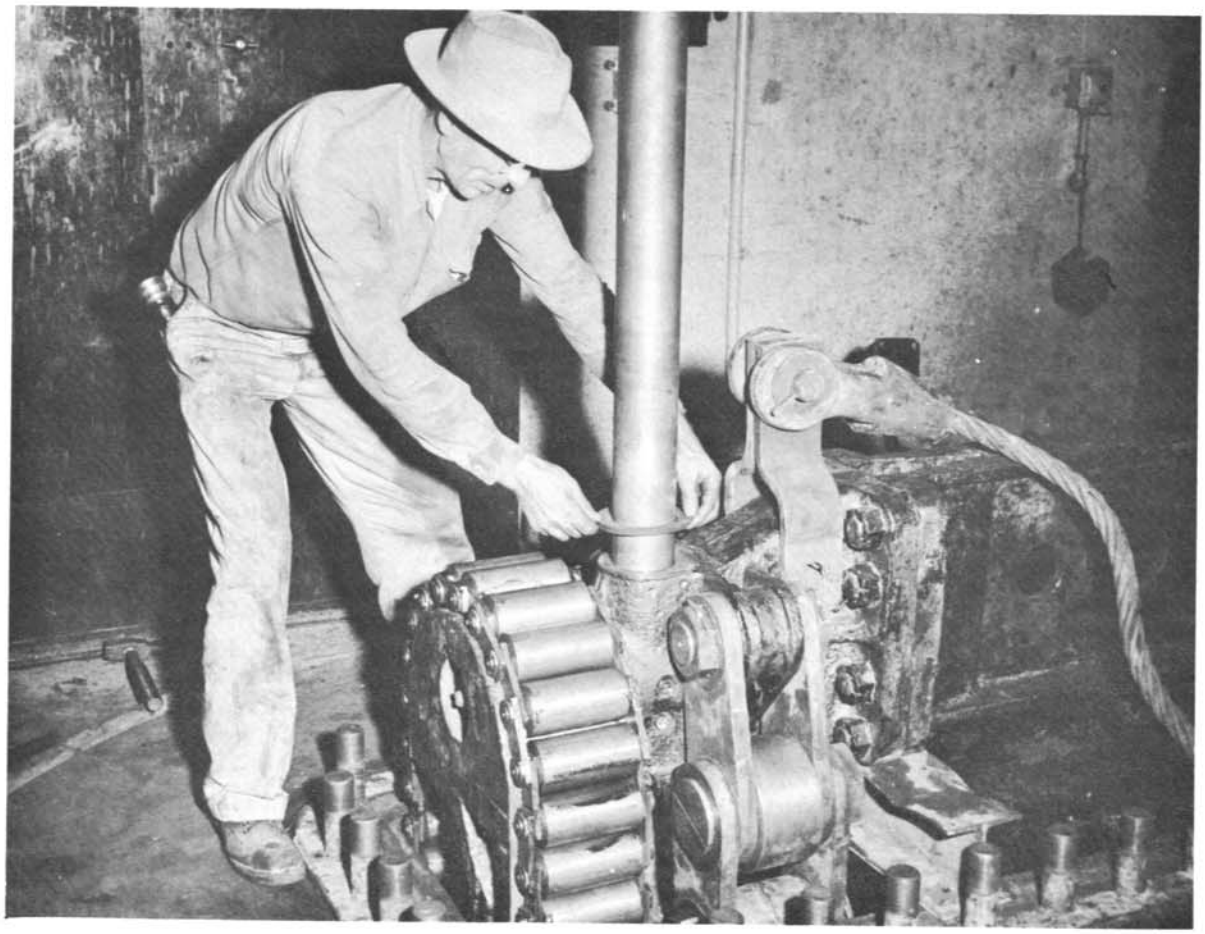

The Gradall and attachment has been used particularly in connection with a brush cutter (similar to the Marden described in a previous article). Material that is cut on the bank slopes often falls into the canals or the drains and the algae or aquatic weeds that are cut loose also float with the irrigation or drainage water. When this dislodged debris amounts to so much that it cannot be floated through the turnouts with the irrigation water, it is necessary to remove the material from the canal. The Gradall with the fork-type attachment has proved to be a very efficient unit for the work.

* * * * *

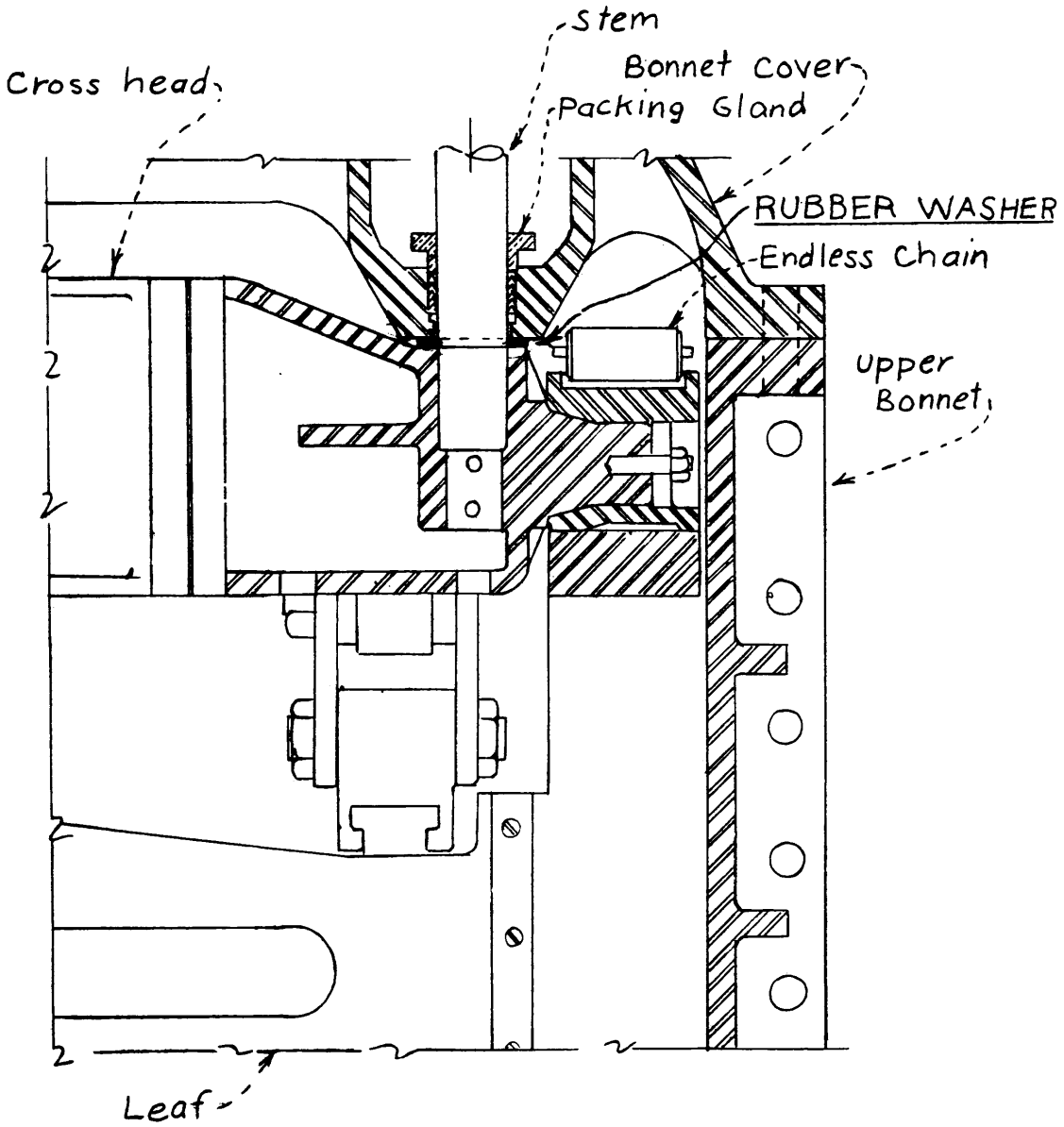
## WASHER SIMPLIFIES REPACKING OF GATE STEMS
(Suggestion R3-56-12)

Improved operation, improved gate design, and the elimination of unsightly conditions have resulted from the installation of a very simple rubber washer around the smooth section of the paradox gate stems on gates at Hoover Dam, Boulder Canyon Project, Arizona-Nevada. The suggestion was the joint effort of Neil H. Holmes, Joseph L. Kine, Houston I. Wheeler, William D. McCollough, John D. Gieck, and Andres J. Alldridge, all of the Maintenance Division, Hoover Dam, with headquarters at Boulder City, Nevada.

Installation of the rubber washer is shown in the photograph below and its location with reference to other gate parts is shown in the drawing on the following page.



The rubber washers were inserted around the smooth section of the 4-inch diameter gate stems on the 24 paradox emergency gates. The washers are located between the top of the crosshead trunnion and the bottom of the bonnet cover hoist case. With the paradox gate full open, and overtravelling approximately 1/8 inch, the washers under compression




will squeeze to exclude high-pressure water from bearing upon the 1-inch packing cavity of the gate stem in the cover case. The sealing action of the rubber washer, so located, makes it possible to add one ring of packing, as necessary, or remove and replace old packing against a full penstock pressure; a vexing problem that has been a matter of discussion for years.

Repacking of the gate stems without taking the penstock out of service has eliminated the necessity for removing four, or five, generator

units from operation in order that the stems can be repacked or performing the work on costly overtime, the only time the units can be spared from power system operation; has eliminated the time consuming operation of station-service valves, to empty and refill the 30-foot penstock; has saved water for power generation, which formerly was wasted in emptying the penstocks; has eliminated the frequency of inspection of, and adjustment to, faulty and leaking gate stem packing and fabrication of dams, water collecting and water disposal systems in the valve house and tunnel plugs to control leakage through worn packing; has reduced damage to paint and metal parts caused by immersion in water for long periods of time; and has given guaranteed insurance against packing "blow out" and unscheduled shut down.

The Bureau does not have many gates of the type discussed, but the idea suggested by the Hoover Dam maintenance personnel can be used to save time and costs which can be enormous under some conditions of installation, such as those at a powerplant. The idea can well be adapted to other gates in use at present and planned for future installation that have similar packing arrangements. The washer will be used on a 48-inch ring-follower gate now under design in the Commissioner's Office, Denver.

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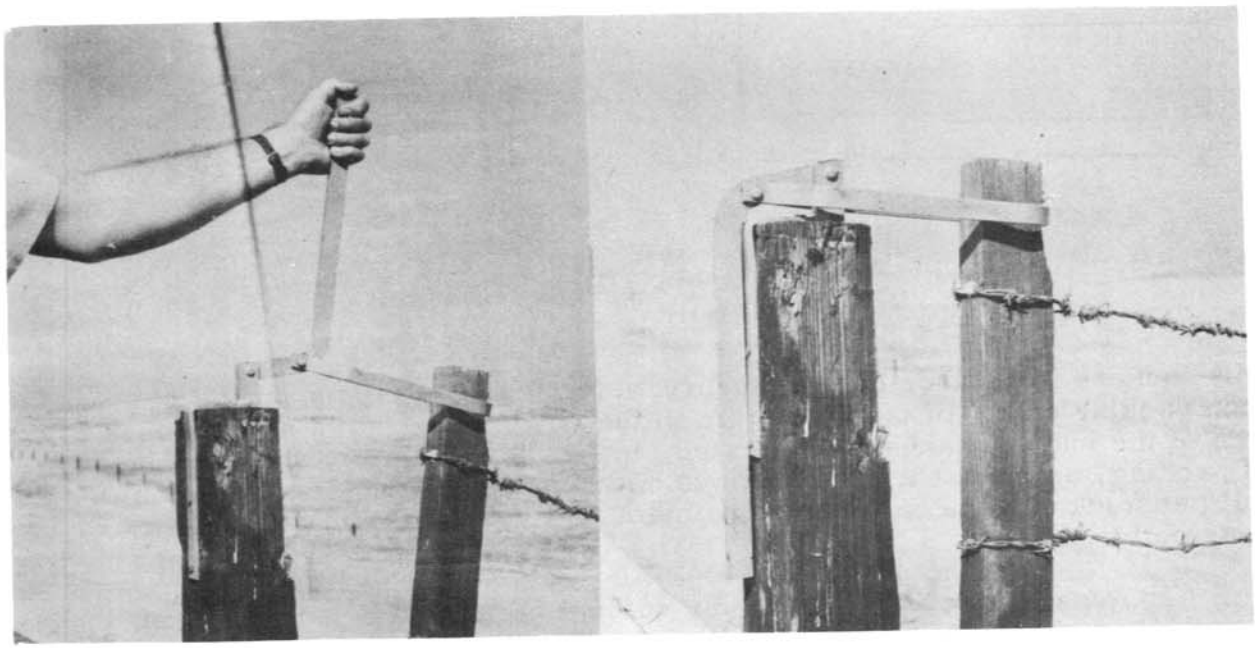
## QUICK-CLOSING GATE FASTENERS
(Suggestion R2-59-81)

A quick-closing gate fastener, shown in the photograph below, was suggested by Forrest L. Willson, Fresno Operations Branch, Central Valley Project, California. The fastener is being used with wire gates on the Madera and Friant sections of the Friant-Kern Canal. The device improves the looks of the gates, keeps the wire taut, and makes opening and closing of the gates much simpler.



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## SAF-T-BOOM ELECTRICAL SHIELD

Demonstrated at the National Safety Congress in Chicago, Illinois, last November, is a shield or rack installed along a boom of a crane or dragline to protect the operators and ground personnel in the area from shock should the boom accidentally come in contact with high tension power lines. A photograph of the shield installed on a mobile crane is shown below.

The shield of tubular framework is supported at four points by 15-kv insulators and is so constructed that it will support a load at any point in excess of the safe working loads for the supporting insulators. The shields are built to fit individual booms so that a minimum clearance of 10 inches is maintained between the framework of the boom and the framework of the shield. After fabrication the shield is coated with a three-coat application of Steelcote Epo-Lux, an Epoxy and Versamid resin product, in excess of 15 mils in thickness. Although the shield does not depend upon the coating applied for any of its dielectric properties, the Steelcote Manufacturing Company claims from data supplied them that a dielectric strength exceeding 2,000 volts per mil can be obtained from carefully coating the metal parts.


SAF-T-BOOM Demonstration at the National Safety Congress in Chicago, Illinois - November 19 through 21, 1958, as viewed by many of the 16,000 persons attending.

There is possibility, of course, that the vertical load line could contact an overhead power line below the end of the protective framework and care must still be exercised by an operator of a machine equipped with the device; however, contacting a power line is less likely and the shield could prove useful in providing boom protection under power lines with voltages up to 30,000.

Further information on the shield can be obtained from the manufacturer, Saf-T-Boom Corporation, 1613 Main St., Little Rock, Arkansas. Brochures published by the manufacturer list the shields for a 20-ton crane or larger as $625 and for cranes under 20 tons as $575, fob Little Rock.

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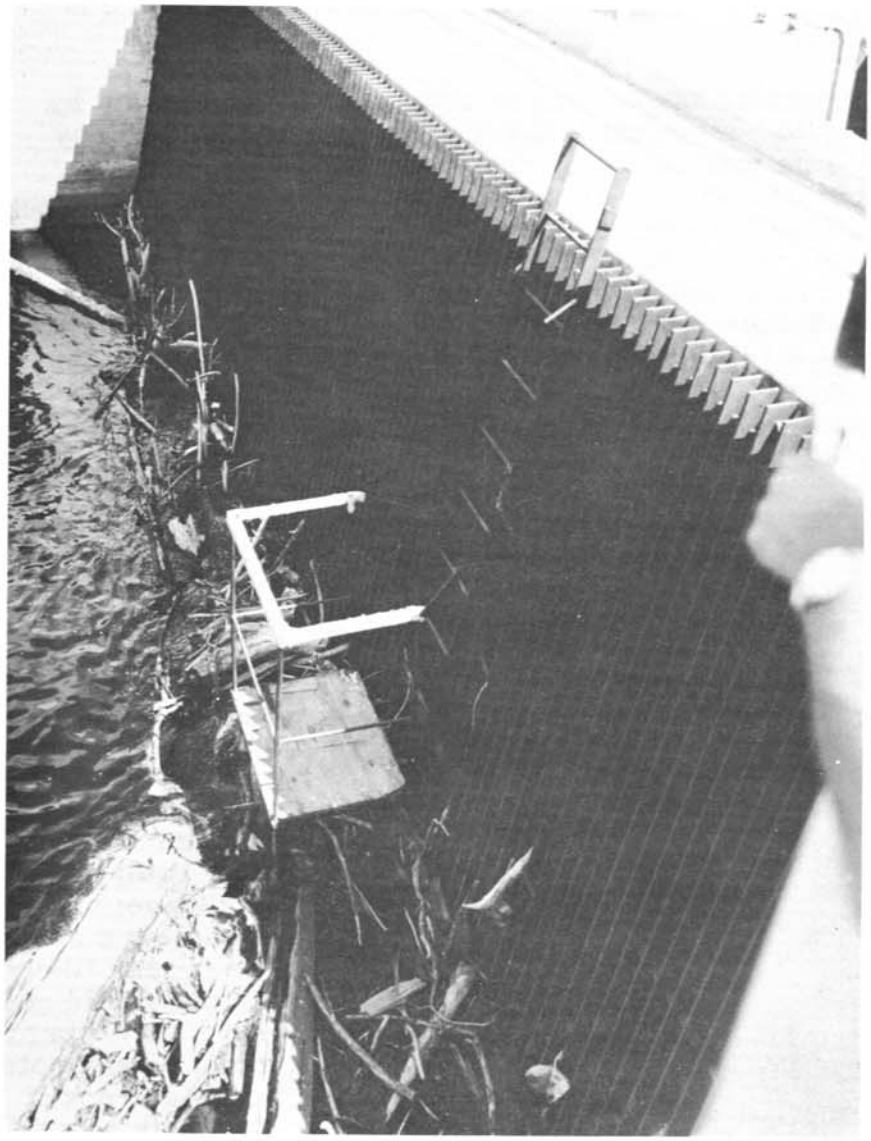
## TRASHRACK WORKING PLATFORM

Removal of trash and debris from a trashrack is an ardous task at best and it can be a dangerous one at times. Mechanical devices for handling the trash are available, but they are costly and often the structure being protected is far removed from a source of power. Accordingly, much of the work must be accomplished by hand using hooks, rakes, and special tools developed frequently by the man who has to use them.



Even with the proper tools, it is sometimes difficult to get into a position whereby the debris, such as that lodged against the trashrack in the photograph at left, can be safely handled. Leaning over the deck at the top of the trashrack and attempting to remove the trash with long-handled tools would be dangerous and cumbersome. Some special means was needed and the Provo River Water Users' Association devised the movable working platform shown in the photograph and in more detail in the drawing on the facing page.

The platform hangs on the cross bars of the trashrack and the weight of the ladder, platform and hand railing around the platform is not so great but what one man can move it from one position to another on the trashrack.

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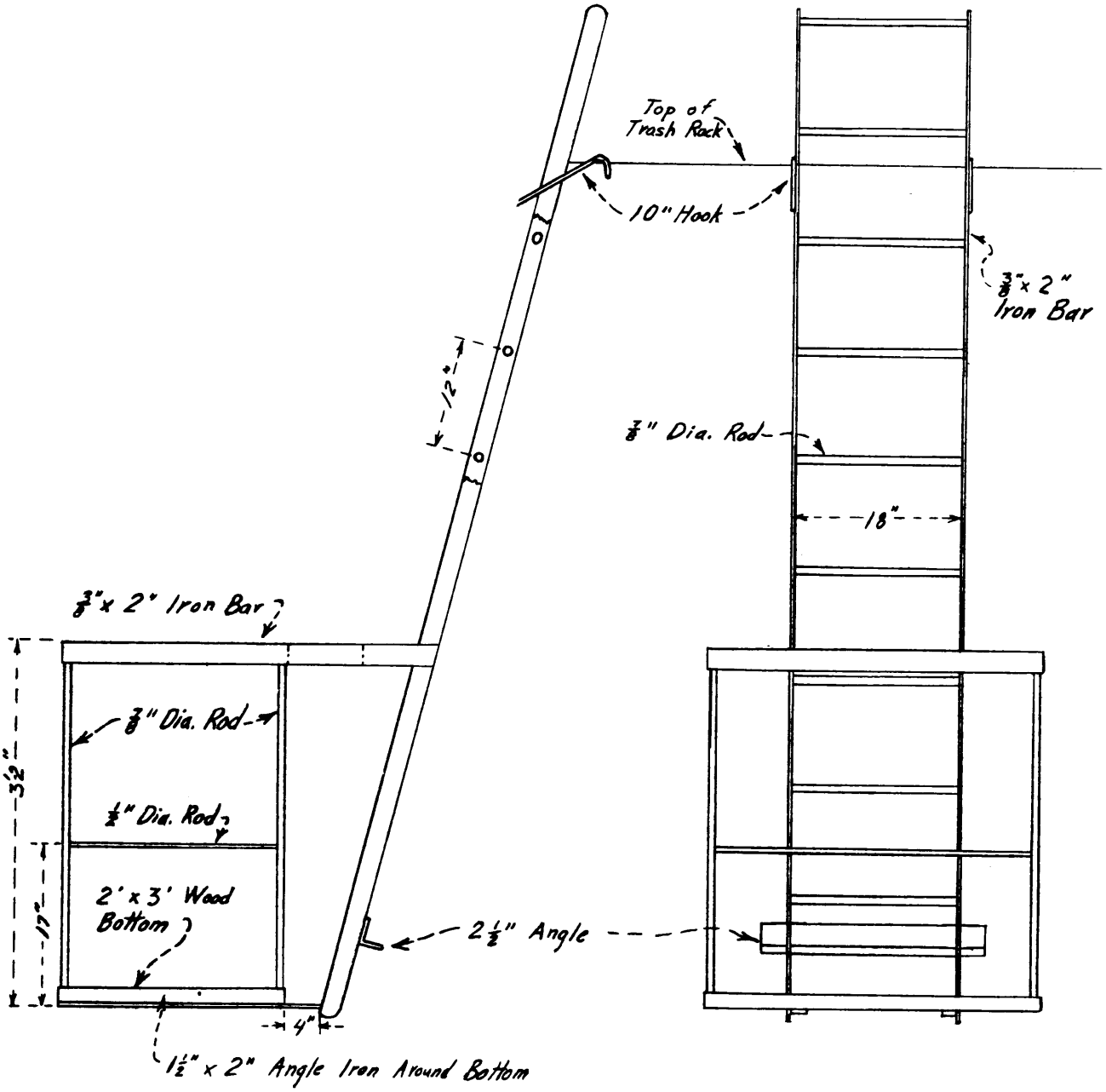



MURDOCK DIVERSION DAM
TRASH RACK LADDER

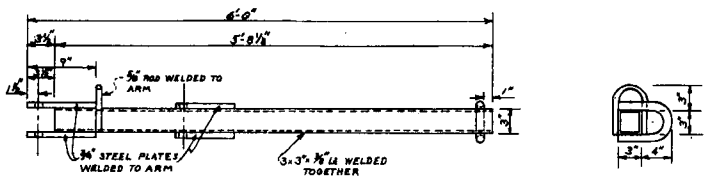
## POLE TWISTING DEVICE
(Suggestion R7-57-6)

Full treated fir poles of a 69-kv transmission line in Colorado, after standing a year or more, took a bad twist which resulted in the crossarms being out of line with the pole butts and thereby leaving the conductor sagging unevenly. Uneven conductor sag results in uneven oscillation of adjacent conductors under adverse weather and wind conditions. This allows the phases to become close enough to each other that short circuits occur so something has to be done.

Several attempts to straighten the structures had not been satisfactory, so the "tool" shown below was constructed and is being used by maintenance crews. The "tool" shown in more detail in other photographs and a drawing on the following pages has given very satisfactory results.

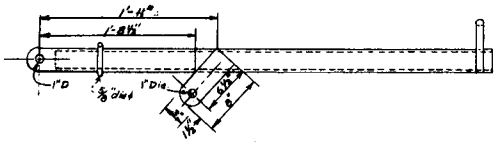

The clock-wise twist of the 70-foot long poles in the photograph at the top of page 20 is representative of the misalinement. As one end of the crossarms is thrust forward, the other end is thrust backward. The effect is that the conductor sag is thrown out of balance with the forward span being pulled tighter and the back span loosened. Poles are pulled away from the vertical position and the hardware of the crossarms is twisted and weakened.

It has been found that merely straightening or plumbing the structure does not place the crossarms where they should be. It is necessary to return the tops of the poles to their original position. In some instances the pole had to be turned 60 degrees to bring the gain at the pole top back to a position perpendicular to the power lines.

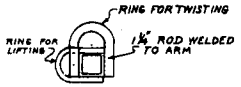


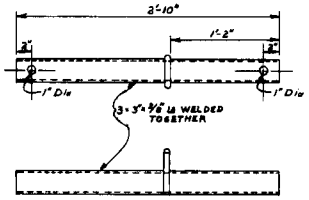




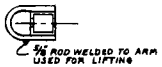



ARM "A"




ARM "B"



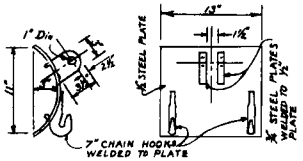
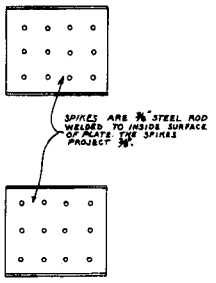




PLATE "A"



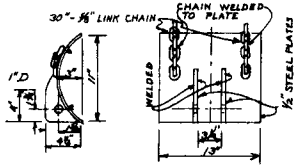
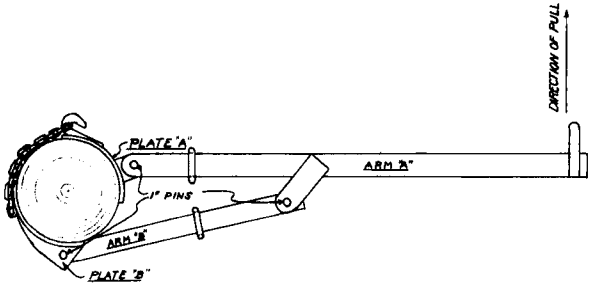
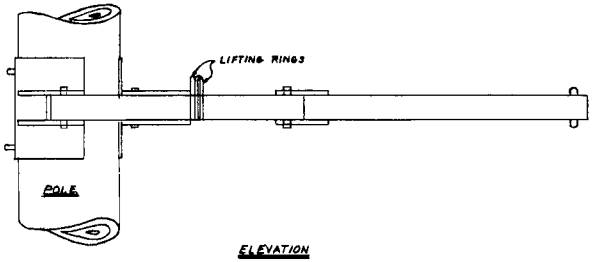




PLATE "B"




PLAN




ELEVATION

SUGGESTION NUMBER R7-57-6

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

# DEVICE FOR TURNING POLES IN GROUND

SCALE 1½"=1'

| | |
|---|---|
| DRAWN LPD | SUBMITTED A.W. Kelly |
| TRACED LPD | RECOMMENDED |
| CHECKED R.S. | APPROVED |
| LOVELAND-COLO. NOV. 12-1958 | 245-A13-380 |




The power lines involved must be kept energized for customer service at all times. This makes it necessary to straighten the poles with the line energized.

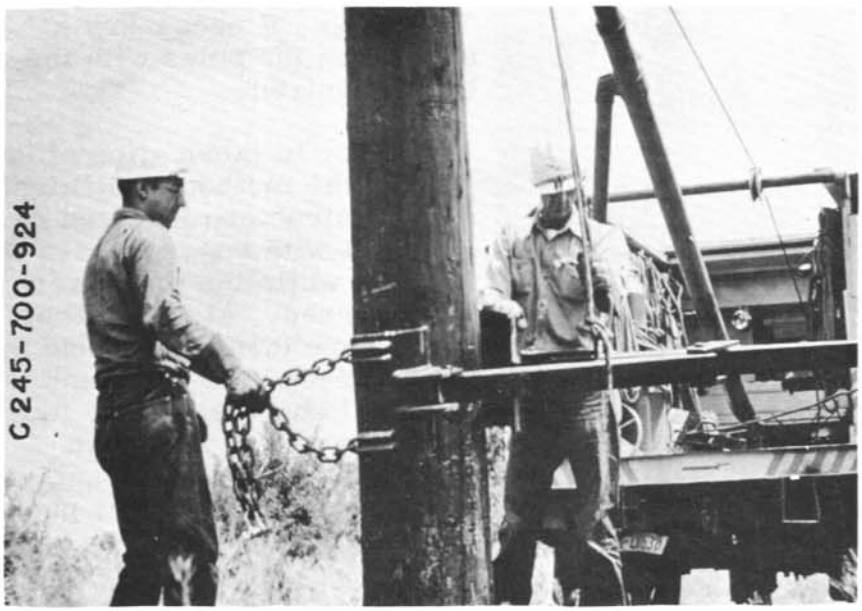
Prior to fabrication of the "tool," the method of straightening a structure involved first guying it with ropes to keep it in place while the poles were being turned. At least three holes were then dug around the base of each pole with hand augers and shovels. After loosening the earth, men then turned the pole with a cant hook and muscle power, photograph at left.

Care had to be taken to avoid excessive damage to the pole from the use of the auger, shovels, and cant hook. Breaking into the treated pole butt could mean early replacement because of decay. Finally, the backfill had to be replaced around the pole. This was done with air tampers.

The operation was accomplished much more simply, a lot more quickly, and with much less physical effort by use of the constructed device, photograph at left. Actually, the poles could be turned with the device in 15 minutes. About 2 hours were required to perform the task by hand methods. Hole digging equipment is not required when the twisting device is used and the use of air tamping equipment is considerably reduced.

The devised tool consists of two 1/2-inch, curved steel plates; two arms fabricated

from angle iron; lifting and pulling rings, see drawing on a preceding page. A winch line attached to the end of the lever tightens the clamp and turns the pole. Pointed pieces of 3/8-inch steel rod, 1/2 inch long, are welded on the inside of the plates to insure initial holding of the plates to the pole until the tool is under strain. Pressure applied to the plates by the chain and levers is so great that no slipping can occur to damage the pole.




The suggested tool was the idea of four power line maintenance men: William L. Larsen, V. D. Oldson, H. J. Dayhoff, and A. J. Melick. Mr. Larsen worked out the design details of the device which has been used to straighten and aline 408 H-frame structures on one power line, more than 200 on another, and 75 on a third; not counting the poles straightened in 3-pole and switch structures. The pole structures on other lines will be realined in the future. The problem of a satisfactory method for straightening transmission line structures when twisted has been pondered by the Transmission Lines and Substations Branch of the Region 7 Power Division for several years. The devised "tool" is the solution.

* * * * *

## "HOT" AND "COLD" SPARK PLUGS



Still confused about "hot" and "cold" spark plugs? Champion says too many truck owners, even mechanics, think a "hot" plug is one that gives a hotter spark. It just isn't so! And the mix-up can cause trouble. A plug with too hot a heat range, can cause detonation or even pre-ignition. This can mean serious engine damage.

On the other hand, too cold a plug causes premature fouling and usually results in power loss. Heat range actually refers to the ability of a spark plug to conduct heat away from its firing tip. The heat must travel up the center electrode and out through the insulator to the shell, and from

there through the plug seat to the cylinder head. The big difference between the hot and cold plug is distance through which the heat travels to be dissipated. The further it goes, the hotter the plug. Most "hot" plugs therefore are a little longer than the "cold" plugs.

Use the plugs this way. If you do high speed, over the road driving where your combustion chamber temperature stays high, use the short, "cold" plug. If you do stop-and-go city driving, short haul dumping, or other driving where there is a tendency for plug fouling, use the hotter design, tall plug. Then the heat stays in the plug longer, and burns off the carbon deposits before they can foul the electrode. Hope that clears up the hot and cold plug problem.

* * * * *

## REDUCING DAMAGE TO SURBURBAN TAIL PIPES
(Suggestion R2-58-170)

The Trinity River Division, Central Valley Project, Lewiston, California, reports that in the past it has been necessary to change tail pipes on suburban-type vehicles no less than twice a year, not including the number of times it is necessary to repair damaged tail pipes, caused by a driver either backing into or driving over something that would hit the pipe.

In an area where the terrain is very rough, tail pipes are easily damaged and Alden H. Sepulveda suggested that a hole be drilled in the bumper, bringing the tail pipe out through the hole, as shown in the photograph above. It is reported that one vehicle on which this was done a year ago for experimental purposes has not needed tail pipe repairs or replacement and plans are being made to make similar replacement on other vehicles of this type.

* * * * *



GPO 859752