Department of the Interior
Bureau of Reclamation

# OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES

## RELEASE NO. 40

**April, May and June 1962**




CONTENTS

Cover sheet. A grader-mounted sloper is being used by the Lower Tule River Irrigation District in reshaping and weed control on a typical small canal. This is a one man operation, and normally proceeds with the grader traveling about 4 to 5 miles per hour. Photo No. P885-D-33581.

# OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES
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## INTRODUCTION

The Operation and Maintenance Equipment and Procedures 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. It is hoped that the laborsaving 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.

This issue, Release No. 40, includes an article on the advantages of a change in the design of light-duty headgates for irrigation structures, page 1; an article concerning recent field and laboratory studies made of antifouling paint for preventing algae and larvae attachment to irrigation structures, page 3; a report on the use of grader-mounted slopers in the maintenance of canals and laterals on two Bureau projects, including the cost of operating this type of equipment, page 6; and on page 15, the first large-scale use of plastic film as a lining for irrigation system laterals is described.

In addition, there is included in this issue of the bulletin, several suggested laborsaving devices and equipment improvements submitted by employees of the Bureau of Reclamation and others, that might be useful on operating irrigation projects, as well as some tips on safety.

To assure proper recognition of those individuals whose suggestions are published in the bulletins, the suggestion number as well as the person's name is 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
Office of Assistant Commissioner and Chief Engineer
Denver, Colorado

# IMPROVED SLIDE GATE DESIGN

Most light-duty headgates in use on Bureau of Reclamation projects in the Pacific Northwest, and probably elsewhere, according to J. V. Walker of the Bureau's Regional Office in Boise, Idaho, have round, concave gate slides (leaves or disks). There are two objections to the operating characteristics of this type of gate:

1. The orifice opening is crescent shaped with very sharp corners, which can easily catch trash when only partly open and reduce flow to the farm.

2. The space behind the gate slide, caused by its concave shape, allows water to flow through a relatively small opening at the top of the gate seat which also can be very easily choked with trash slowly reducing the flow desired and officially measured to the water user.

One of the older gates of standard design in use on many projects is that shown in Figure 1. The flow of water through the standard design round, concave gate slide and the shape of the orifice and flow behind the slide is apparent. An improved slide can now be obtained. This new slide pattern is constructed of the same gray cast iron material, but has a square bottom and flat back. A front view of this improved slide is shown in Figure 2 and Figure 3 is a view of the back side.

The older standard slide and the improved slide with the square bottom are shown side by side in Figure 4. The new gate slide is interchangeable with the older standard model.

Fig. 1

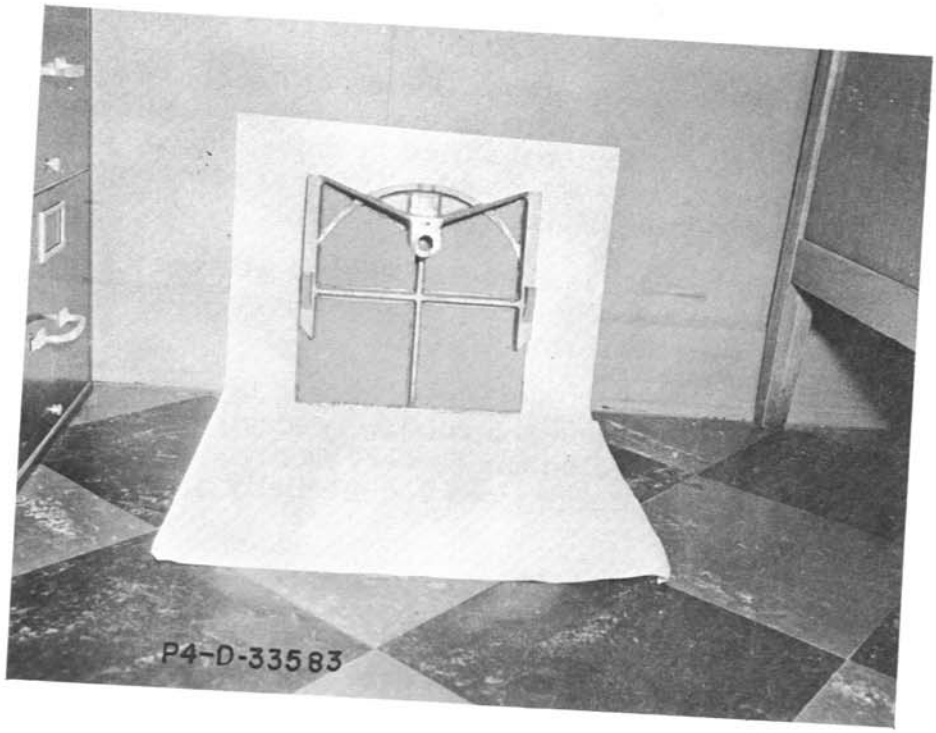


Fig. 2

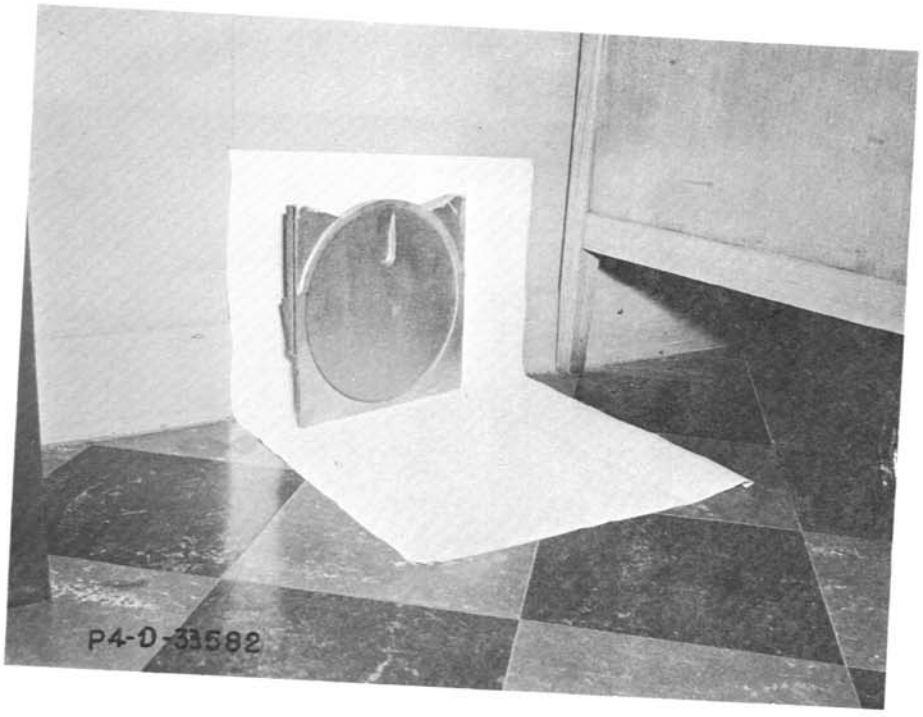


Fig. 3

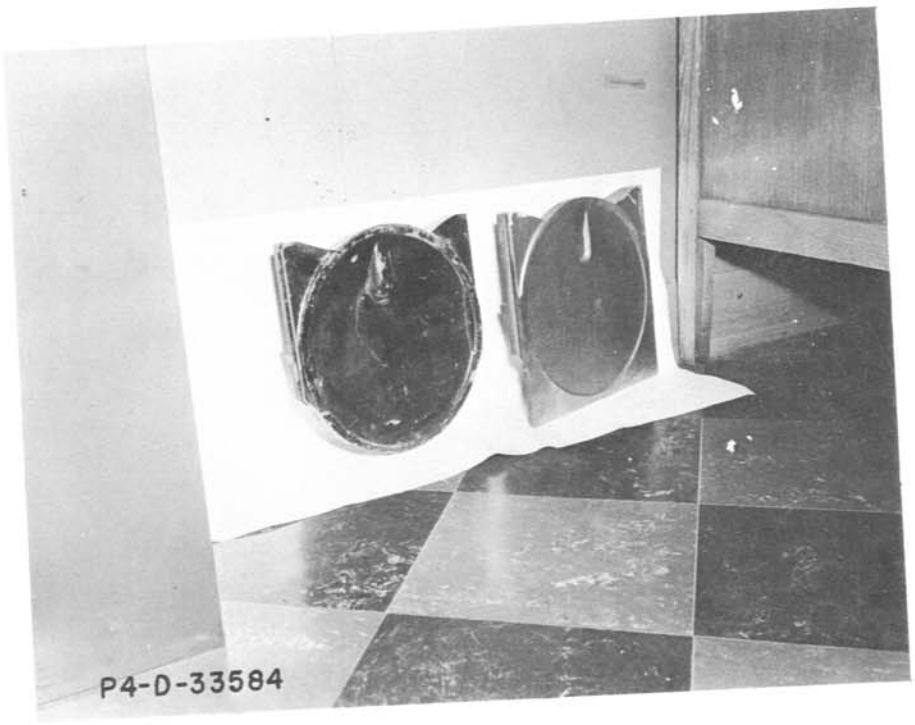


Fig. 4

If additional information for procurement of this improved gate slide is desired, write the Bureau of Reclamation, Mail Code D-410, Building 53, Denver Federal Center, Denver 25, Colorado.

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## ANTIFOULING PAINT FOR PREVENTION OF ALGAE ATTACHMENT TO IRRIGATION STRUCTURES

The attachment of filamentous algae to concrete canal linings and other structures on irrigation systems presents a problem and a nuisance to the irrigation operator. The primary objections of the algal growth are the reduction of channel capacity and interference in making correct water discharge measurements at gaging stations. The algae causing the problems usually are certain species of the greens which attach to structures by means of a hold fast cell. The very small algal filaments or strands, being of various shades of green, have a hair-like appearance in shape and size. The length to which these filaments will grow and remain attached to the concrete flume is illustrated in Figure 1, page 4.

For the past several years, a study has been conducted by the Weed Control Section, Chemical Engineering Branch, Division of Engineering Laboratories, U.S. Bureau of Reclamation, Denver, Colorado, for evaluation of special selected paint materials to determine those

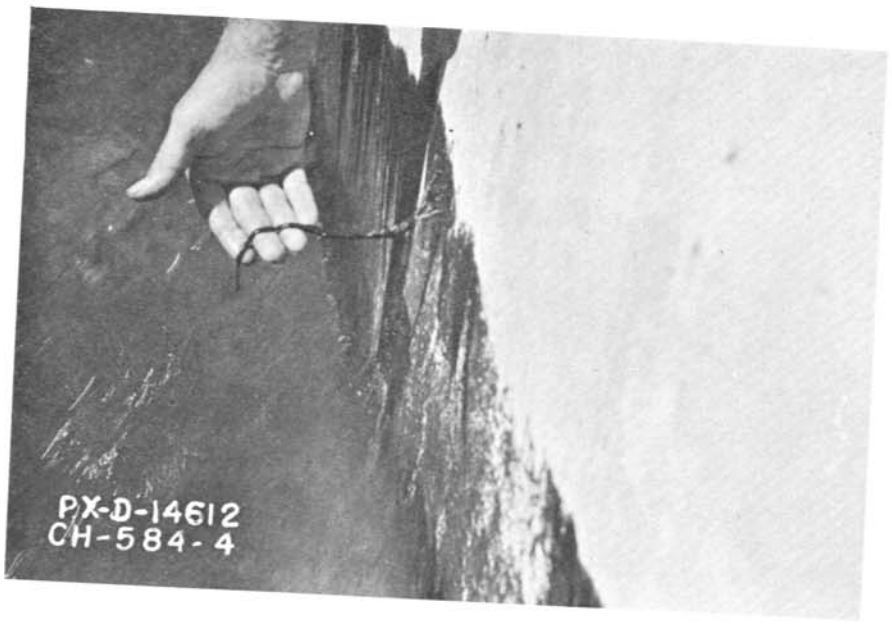


Fig. 1

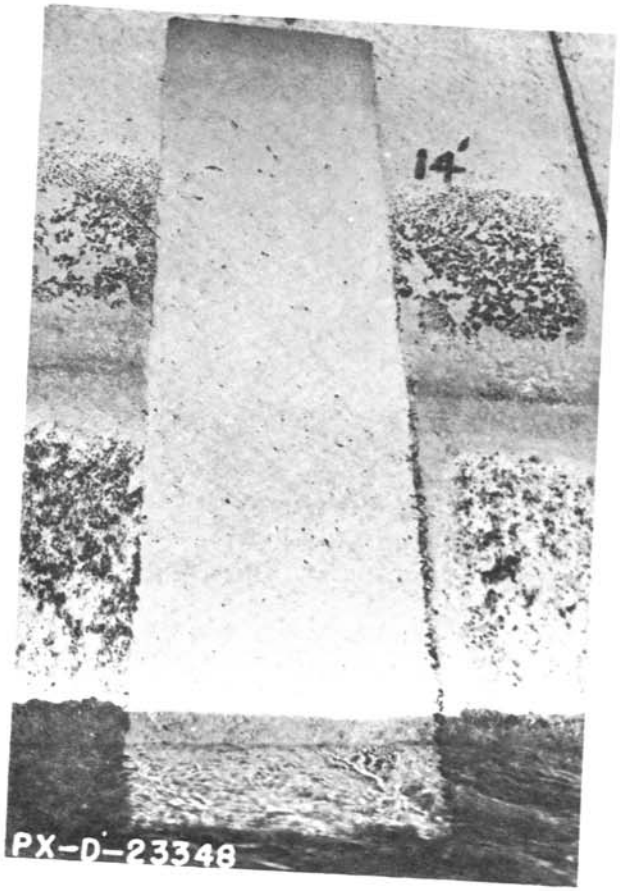


Fig. 2

that may inhibit the attachment of algae. Many of these test paints are commercial marine antifouling formulations furnished by cooperating manufacturers; others have been experimental formulations.

The paint materials are brush applied in 1- and 2-coat applications to relatively small areas on a concrete-lined irrigation canal and are evaluated periodically for effectiveness and durability.

Results from some of the earlier studies are reported in Operation and Maintenance Equipment and Procedures, Releases No. 29 and 37. Antifouling paints used to date for algae prevention are mostly of a soluble matrix type containing copper as the toxicant. This type of antifouling paint is an effective algae inhibitor, but due to its composition, the coating erodes quite rapidly,

hence, there is a need for paint replenishment, following each irrigation season. This is especially true on the invert portion of canals.

More recent test results show that certain insoluble matrix-type antifouling paints are superior to the soluble matrix materials because of their longer effective life. The effectiveness of this type of antifouling paint is shown in Figure 2.

The insoluble matrix paint consists of a vinyl-resin base and a high percentage of cuprous oxide pigment. Those materials that have shown the best performance for both algae prevention and durability conform to Military Specifications MIL-P-15931A, "Paint, Antifouling, Vinyl-Red (Formula No. 121)." Therefore, on the basis of information obtained to date, antifouling paints conforming to these specifications are recommended for use in preventing algal growth on irrigation structures. If the structure is ferrous metal, an anticorrosion vinyl primer should be used in conjunction with the antifouling paint.

The paint material recommended bonds well to clean, dry concrete. Two coats are suggested for best performance. A 2-coat application will give a coverage of about 150 square feet per gallon. Cost of the paint ranges from $7.50 to $8.00 per gallon, depending on the location.

Due to the cost, this method has been limited to small areas such as flumes and weirs, or to flumes where water flows of less than maximum capacity are critical. Algae prevention with antifouling paints has proven to be an effective method and it is becoming quite popular with irrigation operators.

Antifouling paint used for control of algae on flumes of the Black Canyon Irrigation District was also noted to give a reasonable degree of control of black fly larvae. These paint materials may have possibilities for use in inhibiting the attachment of other aquatic organisms such as Bryozoa (pipe moss) and aquatic mosses that are now frequently being recognized on irrigation structures.

Antifouling paints function by preventing the adherence of organisms to the paint itself, but they do not give control beyond the painted areas. The toxicant component of the paint is leached from the paint matrix at an extremely low rate. Consequently, the concentration of toxicant (copper) in the water does not reach a level toxic to the organisms away from the coating. Also, the copper concentration in water would not be considered deleterious to crop plants, injurious to fish, or rise above the limit (3 ppm as copper) established by the U.S. Public Health Service for potable water supplies.

Investigations are continuing on these and other antifouling paint materials for the purpose of obtaining additional information for improvement of this method of algae prevention on irrigation structures. Some of the newer materials contain toxicants other than

cuprous oxide. Test results from these investigations are included in annual laboratory progress reports that are available upon request.

Reports and sources of the antifouling paint recommended may be obtained by writing to the Office of Assistant Commissioner and Chief Engineer, U. S. Bureau of Reclamation, Building 53, Denver Federal Center, Denver 25, Colorado, Attention: D-410.

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## GRADER-MOUNTED SLOPER

A canal bank sloper, designed and engineered primarily for the purpose of maintaining irrigation system canals, laterals and drains, as described in Release No. 10 of the Operation and Maintenance Equipment and Procedures bulletin (1954), was originally mounted on several sizes and makes of tractors. More recently the manufacturer has provided for mounting the sloper on conventional graders, and two projects have reported on the satisfactory operation of the slopers so mounted.

Kittitas Reclamation District--Yakima Project, Washington. --Mr. G. L. Sterling, Secretary-Manager of the Kittitas Reclamation District, Ellensburg, Washington, reports that a motor grader-mounted sloper is an excellent combination of equipment for the removal of berms from canals and laterals and for the disposal of the materials removed. The removed material can be conveniently and easily disposed of by spreading and leveling it alongside the operating road or in a field adjacent to the work.

Some of the advantages in addition to the above include:

(1) Mobility of equipment. --The grader with the sloper blade in place can be moved most any place under its own power.

(2) Weight, weight distribution and leaning wheel. --These features add weight to the sloper in removal of heavy berms and the length of the machine provides for better control over side draft movement.

(3) No changeover of equipment necessary. --Both sloper and grader blades can be carried on the machine at all times.

(4) Cleaning in wet or dry canal. --Cleaning can be accomplished with or without water in a canal or lateral.

(5) Compaction of ditch banks. --An incidental benefit and advantage is that the weight of the machine compacts the ditch banks over which it travels.

The only disadvantages reported in comparing the grader-mounted sloper with one tractor mounted is that good firm footing is required for the grader-mounted sloper--much more so than with a track laying unit. However, but few difficulties have been encountered in this regard and both blades on the motor grader can be used in jacking the machine out of difficulties.

Mr. Sterling reports that it pays to provide for good firm footing for operation of the motor grader because the cleaning operation with this machine is so economical. The Kittitas Reclamation District has spent thousands of dollars in building up ditch banks and roads and in moving fences back from narrow rights-of-way so that the machine can be used. It is planned to have between one-third and one-half of all canals and laterals accessible to this type of cleaning by providing operating roads on both sides of the waterways. The motor with which the grader was equipped has ample power for the work encountered.

Costs have been kept by the district on an actual cost-per-hour basis. They are believed somewhat high because the motor grader was a secondhand piece of equipment and need for repairs developed within a short time after purchase. Actual operation costs, including depreciation, labor, fuel, repairs, etc., over 2,200 hours, averaged $12.11 per hour.

Fresno Field Division--Central Valley Project, California.--Mr. Frank M. Bustamonte of the Fresno Field Division, of the Bureau of Reclamation, Central Valley Project in California, reports that a grader-mounted sloper has proven in most instances to be very satisfactory and economical in the maintenance of small earth canals. The grader sloper may be mounted on a crawler tractor, a motor grader or other equipment of similar or equal size.

The grader sloper is hydraulically operated in all positions. It can be used on any degree of slope, and can be operated in either dry or water-filled canals. It is used for cleaning, reshaping, constructing, and maintaining banks as well as operating roadways, and will fill in washouts and cave-ins. Some irrigation districts have used the grader sloper extensively for weed control and have been very successful in obtaining good results. The photograph shown on page 8, and on the cover of this issue of the bulletin are views of a grader-mounted unit in use on the Lower Tule River Irrigation District reshaping and removing vegetation from a typical small canal, while traveling at a rate of 4 to 5 miles per hour.

As with all types of equipment, the grader sloper has its limitations along with its good points. First, the grader sloper must have a good road or solid bank on which to operate; second, it must be attached to a dependable piece of equipment that will be able to move it economically; and most important of all, it must be operated by a person who knows how to effectively operate the grader sloper as well as the


equipment to which it is attached. If the operator is not completely familiar with both pieces of equipment and their capabilities, the results will be unsatisfactory until he is properly trained.

In California, The Fresno Irrigation District, Lower Tule River Irrigation District, Madera Irrigation District, and Chowchilla Water District, among others, are using the grader sloper for construction and maintenance of their canal systems. Although cost data on this type of work is difficult to obtain, an attempt has been made to provide the information available in this area on the grader sloper. Included in Mr. Bustamonte's report are some cost figures based on several years of actual fieldwork which were compiled by Mr. William Alexander, Engineer-Manager of the Lower Tule River Irrigation District, Post Office Box 511, Woodville Rural Station, Porterville, California. These figures are based on a sloper attached to a motor grader used for reshaping, cleaning, and weed control on canals, traveling about 4 to 5 miles per hour.

Motor Grader

| | | |
|---|---|---|
| Initial Cost | | $27,754.48 |
| 6 years depreciation at 16-2/3% per year depreciation based on 12,000 hrs life | = | $ 2.313/hr |
| Operating Costs | | |
| Diesel Fuel, 3 gals/hr at $0.093/gal | = | $ 0.279/hr |

Operating Costs--Continued

| | | |
|---|---|---|
| Gasoline for starting | = | $ 0.030/hr |
| Lubrication Oil and Filter | = | $ 0.088/hr |
| Grease 0.60 lbs/hr at $0.18/lb | = | $ 0.108/hr |

Repairs

| | | |
|---|---|---|
| $2,520.99 based on 21 months period | = | $120.05/month |
| 3,050 hours of operation in 21 months | = | $ 0.826/hr |
| Interest, Taxes, and Insurance | = | $ 0.833/hr |
| Total Cost of Operating Motor Grader | = | $ 4.477/hr |

Sloping Blade Attachment

| | | |
|---|---|---|
| Depreciation based on 12,000 hrs life | = | $ 0.413/hr |
| Interest, Taxes, and Insurance | = | $ 0.149/hr |
| Repairs $270.12 based on 18 months period | = | $ 15.01/month |
| Repairs after 2,287.5 hours of operation in 18 months | = | $ 0.118/hr |
| Total Cost of Operating Blade | = | $ 0.680/hr |

| | | |
|---|---|---|
| Total Cost of Operation Grader and blade per hour | = | $ 5.157 |
| Cost per mile Grader and blade, based on an average speed of 4-1/2 mph | = | $ 1.15 |

If additional information is desired, write Mr. G. L. Sterling, Manager, Kittitas Reclamation District, 4th Avenue and Water Streets, Ellensburg, Washington; Regional Director, U.S. Bureau of Reclamation, Post Office Box 2511, Sacramento, California, or Assistant Commissioner and Chief Engineer, U.S. Bureau of Reclamation, Denver Federal Center, Building 53, Denver 25, Colorado, Attention: Code D-410.

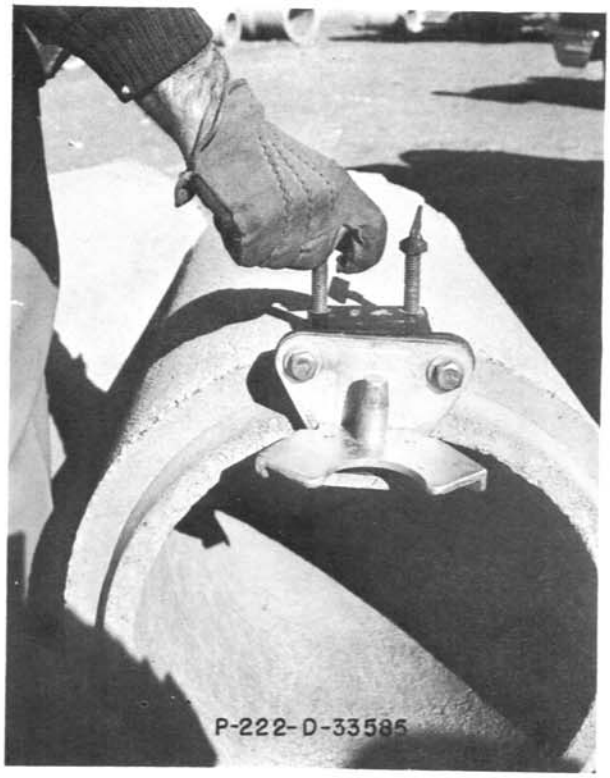



Fig. 1

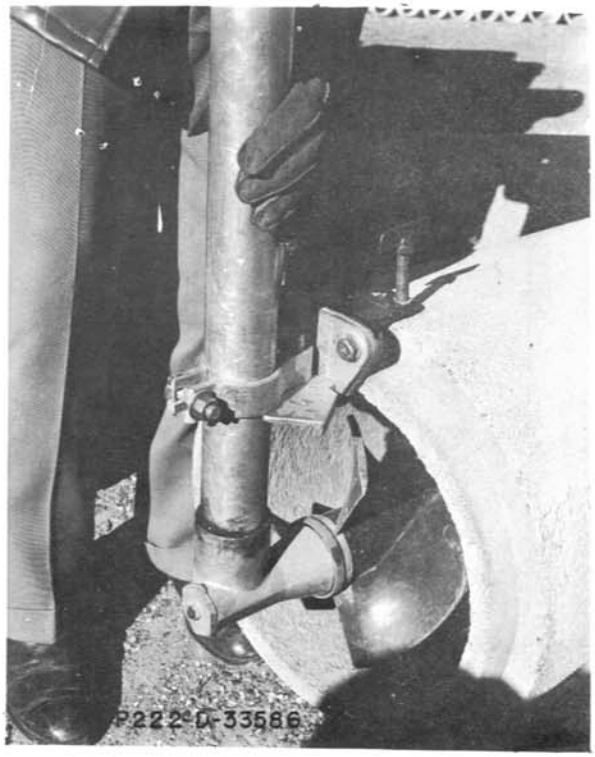



Fig. 2

## FLOWMETER CLAMP
(Suggestion R1CB-62-16)

An improved clamp that can be readily attached to concrete pipe to hold a flowmeter while measuring the flow of water from a canal turnout has been developed by Marvin C. Sektnan of the East Low Field Branch, Irrigation Division, Columbia Basin Project, Washington. The first clamp constructed and shown in Figures 1 and 2 below, was made from spare parts and materials available on the project. It made attachment of the flowmeter to the pipe much simpler and less time consuming than previous methods used and the idea has been adopted for use on projects in the Pacific Northwest.

The clamp shown in detail in Figure 3 embodies some improvements over that shown in Figure 1, and can be made in any machine shop at a nominal cost. It can be attached to the pipe by tightening the two set screws. With wings on the set screws, no wrench is needed to tighten the clamp sufficiently to hold the meter firmly in position. The meter can than be slipped onto the clamp as shown in Figure 2.

It is difficult to place a monetary value of the clamp, but ditchriders report the device is a time saver and a convenience, especially should it be necessary to make several water measurements at the same place at frequent intervals. The clamp can be

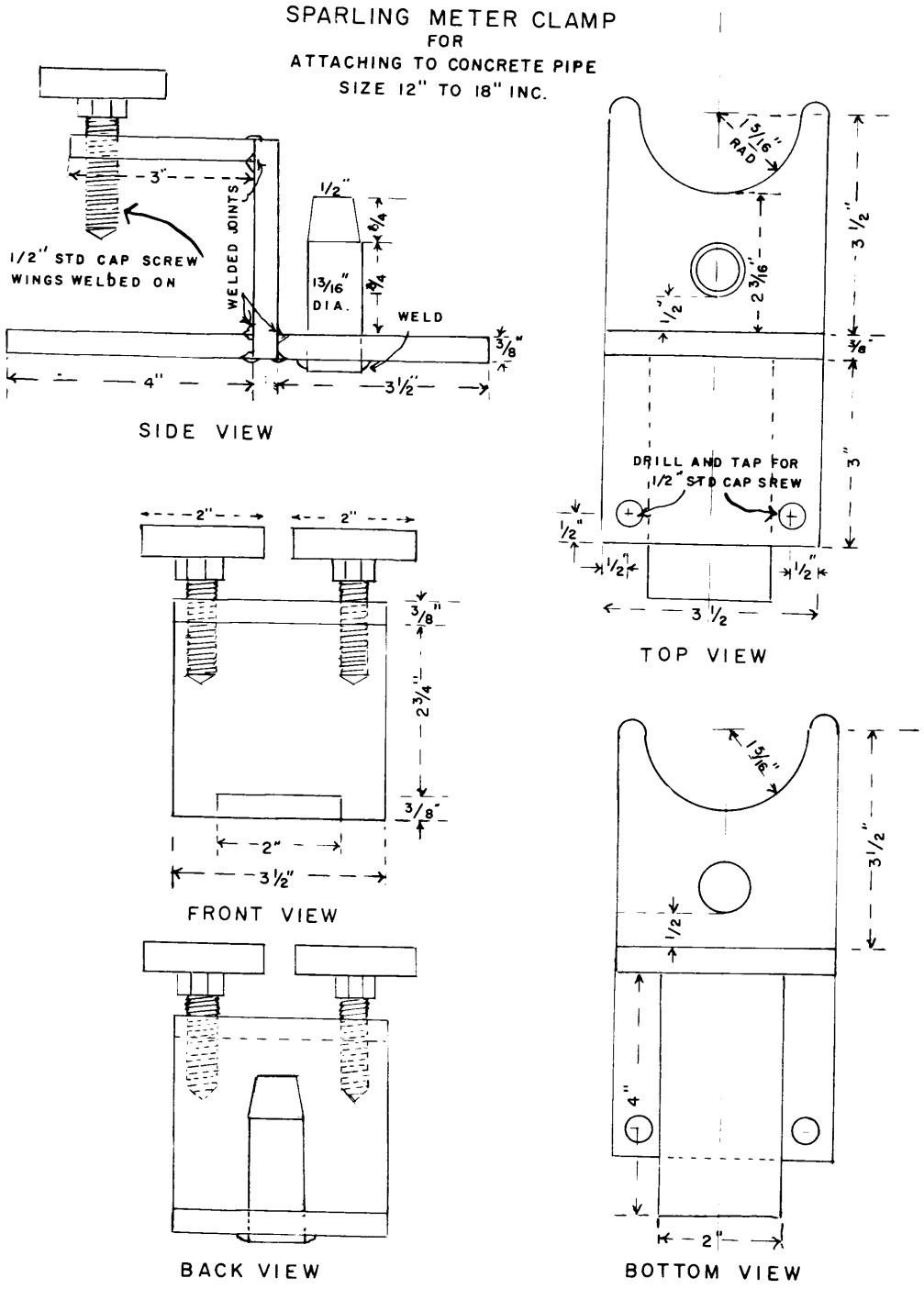



Fig. 3

left in place and the meter quickly slipped on and off of the clamp. Since the meter can be more easily attached in the proper position, it also is believed that more accurate water measurement is possible.

* * * * *

## STINGING INSECTS CAUSE TROUBLE

(Reprinted from the Niobrara-Lower Platte Projects Safety Bulletin)

Although rare, some people are extremely sensitive to bee and wasp stings. Surprisingly, bees cause more deaths than snakes.

Although honeybees, bumblebees, hornets and wasps have been around for millions of years, we must be realistic and take into consideration that dangers do exist when employees are exposed to these active little "stingers."

The majority of us can suffer stings by bees or wasps with no ill effects. The usual reaction to such a sting is local pain followed by swelling and itching. These symptoms subside after several hours to 2 or 3 days. Treatment for the normal person and his insect sting consists of keeping him calm and applying ice immediately to the affected area. Application of ice will help to retard swelling and relieve pain. Calamine lotion may be used to relieve itching. As the poison of insects is compounded chiefly of an acid, the local application of an alkali should be employed. Prompt and liberal application of Spirits of Ammonia will neutralize the acid and provide relief within 20 minutes to 1 hour. If swelling continues, put on a second application. A paste made of baking soda also affords great relief.

In general, prevention is not easy to accomplish because normally none of the insect repellents are effective against the wasp, hornet, and yellow jacket, although they are very effective against mosquitoes and other biting pests. People who are constantly exposed to wasps are strongly advised to wear a helmet or hat with a net over their face and neck, a heavy long-sleeve cotton shirt, and gloves.

Newspapers and medical journals of the last few years have reported extreme cases where tragedy has taken place with unbelievable swiftness. For instance, in Texas, a man clipping his hedge was attacked by yellow jackets and stung on the neck and forehead. Five minutes later, he was dead. How can an insect weighing less than 1/100 of an ounce kill a husky human being in minutes? The answer lies in our body's allergic reaction to certain foreign materials. Pint sized though the yellow jacket is, compared to other wasps and bumblebees, it has a venom capable of producing a violent reaction. Victims, however, are usually forewarned of their allergy by severe reactions to several stings preceding the fatal one. A person who experiences extreme headache, nausea or dizziness after a bee sting, should see his doctor immediately. The doctor can counteract the poison and give the patient immunization shots or an emergency treatment kit. Should you be stung by a bee or wasp, it is important that you seek medical attention if symptoms warrant.

* * * * *

## SAFETY TREADS FOR EQUIPMENT

(Reprinted from Plowback by permission of the National Conference on State Parks, Washington D. C.)

Supervisory Park Ranger, H. Wayne Norton, of Great Sand Dunes National Monument, Colorado received an award for his suggestion on safe footing.

Vehicles such as pickups and dump trucks which men must mount and alight from often present safety hazards under wet, muddy, and icy conditions. Wayne suggests the use of "Safety Tread, " on running boards, bumpers, and other areas where a man may step. The photographs show the material applied in two ways, patches and strips. The material is self-adhesive and will stick firmly to any clean dry surface.



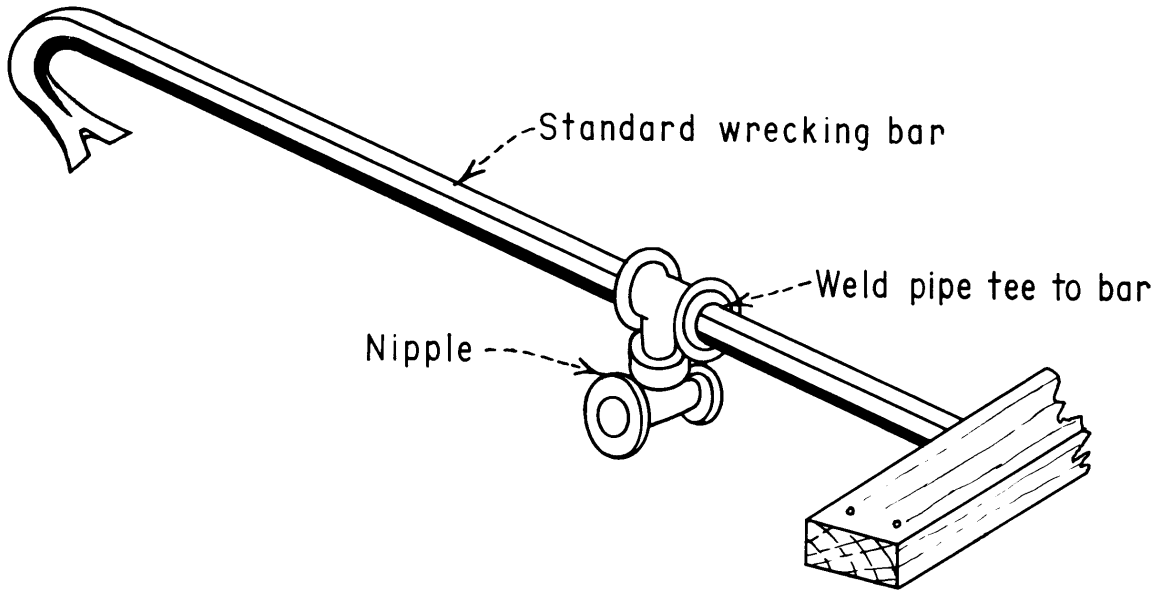
* * * * *

## IMPROVED WRECKING BARS

(Reprinted from Grist by permission of the National Conference on State Parks, Washington, D. C.)

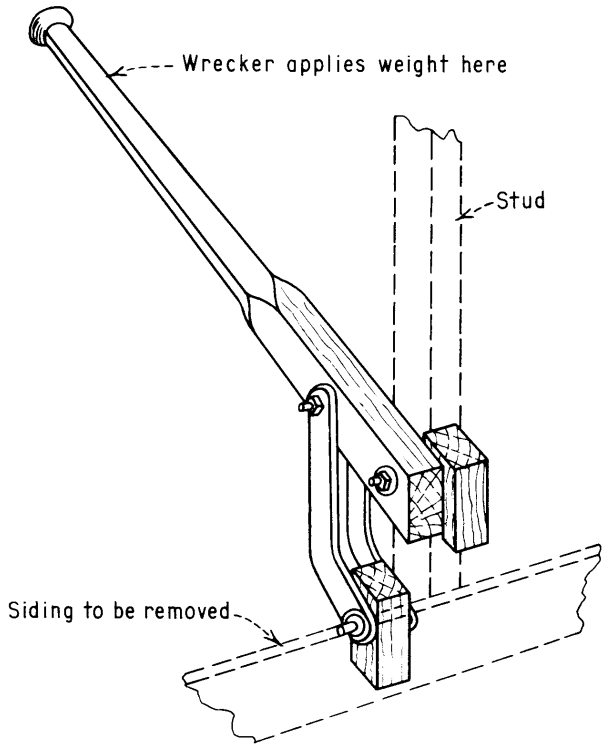
Somebody out at Straits State Park in Michigan must have had a sore back from wrecking a building and decided to do something about future jobs of that kind.

As the sketches show, two improvements have been worked out to step up the leverage without pushing harder on the wrecking bars.




The first improvement is the simplest, being the use of two pipe tees and a nipple to make a fulcrum for a standard wrecking bar. The fulcrum can be taped in place with friction tape, or welded.

The second idea is a little harder to work out, but will pay big dividends in tearing down walls, especially in pushing off wood siding with minimum damage.




As the sketch shows, the tool looks a little like a cant hook, with a wood block in place of the usual hook.

Where a cant hook has a pointed working end to the handle, the special wrecking bar has a wood block bolted in place at one side to fit the outer surface of the stud and provide leverage.

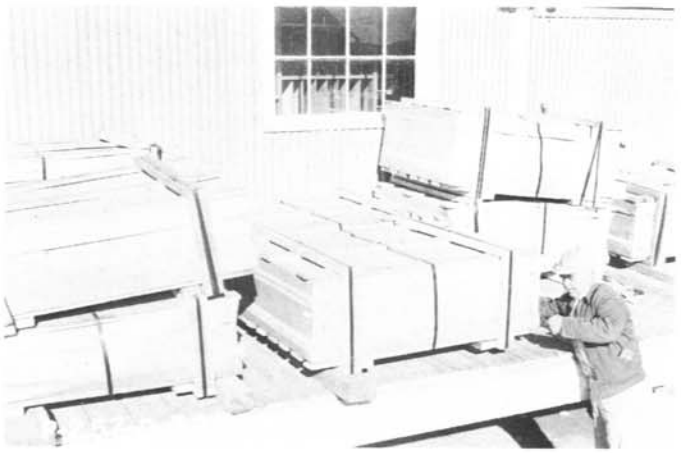
* * * * *

# INSTALLATION OF BURIED PLASTIC MEMBRANE CANAL LINING TUCUMCARI PROJECT, NEW MEXICO

The first large-scale installation of plastic canal lining on a Bureau project was made this spring on the Tucumcari Project, New Mexico, by the Arch Hurley Conservancy District, which is responsible for the operation and maintenance of project irrigation facilities. Assistance was provided by representatives from the Bureau's Regional and Denver Offices. The work involved requires placement of 32,282 square yards of lining in 6,558 linear feet of the McCaskey Lateral and 1,700 linear feet of the Savage Lateral. The lining is being used to control seepage in areas that have generally become too wet for agriculture.

The plastic selected for the lining work was 10-mil-thick, black polyvinyl chloride film, fabricated in widths up to 36 feet and lengths up to 647 feet from plastic material having widths of 54 inches. The seams were bonded by use of liquid cement. The various lengths and widths of plastic lining required for the McCaskey Lateral are shown in the figure on page 17. Three sheets, 29 feet wide by 500 feet long, and one sheet 29 feet wide by 258 feet long, were furnished for the Savage Lateral.

The plastic lining was packaged by accordion folding the material into cardboard boxes 40 inches wide by 56 inches long, and from 18 to 30 inches high, depending on the length and width of the sheet. In all, 17 boxes of plastic lining, weighing a total of 20,000 pounds, were received on the project. For shipment, the cardboard boxes were supported by a wooden frame fastened with several steel bands. The plastic lining arrived in good condition. Photograph 1 shows the packaged plastic lining as received on the project. The 32,282 square yards of lining were furnished to the jobsite at a cost of $15,323, or $0.47 per square yard.



Photograph 1

## Preparation of Lateral Subgrade

Only the McCaskey Lateral was prepared for plastic lining this spring. It is planned that the plastic lining will be installed on the Savage Lateral in the Fall of 1962 after the irrigation season has been completed.

The subgrade of the McCaskey Lateral was

Photograph 2

Photograph 3

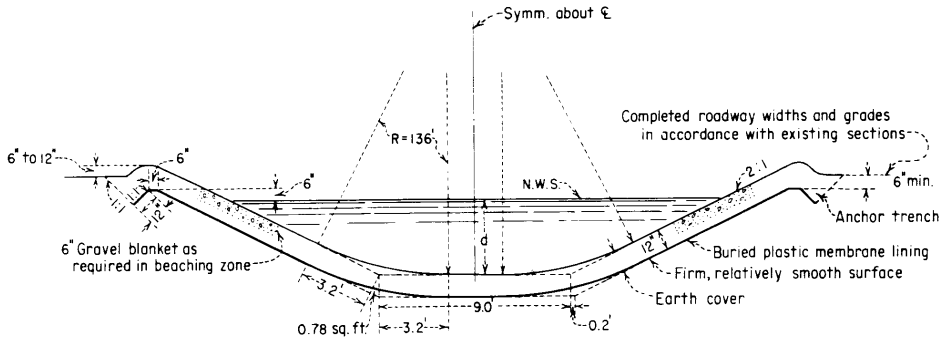
Photograph 4

prepared by first over-excavating approximately 1 foot and shaping the bottom and slopes with dragline equipment. The bottom and slopes were then smoothed by dragging a heavy steel-link chain up and down the lateral. Large clods were worked to the bottom where they were dissolved and leveled by running irrigation water into the bottom of the lateral. The canal subgrade was finished to a bottom width of 8 feet with 2:1 side slopes. Trenches 1 foot deep were made in each berm for anchoring the plastic lining along the top of the side slopes.

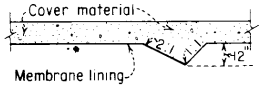
Construction details are shown in the drawing in the upper portion of the figure on page 17, and Photographs 2, 3, 4, and 5 are views of the lateral taken at various times during the preparation and lining operation.

Photograph 2 is a typical view of the McCaskey Lateral prior to preparation for the placement of the vinyl plastic lining.

Photographs 3, 4, and 5 are views of the lateral after preparation of the subgrade for placement of the plastic film. Shown is the general smoothness of the subgrade and the anchor trenches at the berms.

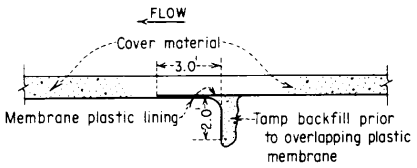



**TRANSVERSE SECTION OF WATERWAY**




**LONGITUDINAL SECTION**

METHOD OF ENDING PLASTIC MEMBRANE




**LONGITUDINAL SECTION**

MEMBRANE RELIEF LAP FOR UPLIFT TO BE PROVIDED WHERE UPLIFT SEEPAGE IS EXPECTED; AND AT SPLICES SPACED AT 500' MAX. SPACING

**VINYL PLASTIC SHEETS INSTALLED**

| NO. SHEETS | WIDTH | LENGTH | SQUARE YARDS |
|---|---|---|---|
| 1 | 33'-0" | 500' | 1833 |
| 1 | 33'-0" | 340' | 1247 |
| 1 | 34'-0" | 500' | 1889 |
| 1 | 34'-0" | 550' | 2078 |
| 3 | 34'-10" | 500' | 5806 |
| 1 | 34'-10" | 181' | 701 |
| 1 | 36'-0" | 647' | 2580 |
| 4 | 36-0" | 500' | 8000 |
| 1 | 36'-6" | 619' | 2476 |

TOTAL SQUARE YARDS = 26618

TUCUMCARI PROJECT - NEW MEXICO

**McCASKEY LATERAL**

**PLASTIC LINING CONSTRUCTION DETAILS**

## Installation of the Plastic Lining

Installation of the lining was begun at the downstream end of the lateral. Working upstream, Photograph 6, the lining was installed by unfolding the plastic film from the box while the box, on a truck, was moved along the lateral operating road. The plastic was pulled into position and anchored in the berm trenches, Photographs 7 and 8, by use of patrol graders operating on each side of the lateral. The first sheet of plastic lining installed was 36 feet wide by 647 feet long. This 2, 580 square yards of lining was installed in 2 hours' time.

Where concrete structures were encountered in the lateral, a trench approximately 12 inches deep was excavated along the sides of the structure walls. The surface of the concrete was then cleaned and an asphaltic mastic similar to roof flashing material was applied to the cleaned area. The plastic film was cut and carefully pressed to the asphalt coating to provide a watertight seal. A typical installation is shown in Photograph 9.

Photograph 5

At the end of the installation of each sheet of plastic, the upstream end of the sheet was folded back approximately 3 feet and a 2-foot-deep transverse cutoff trench was dug by hand across the lateral as shown in the longitudinal sections of the drawing, page 17. The sheet was then unfolded and tucked into the cutoff trench, Photograph 10, and the trench carefully backfilled. The next sheet of vinyl was placed in the invert, allowing a 3-foot overlap.

Photograph 6

Placement of the plastic lining was accomplished rapidly without difficulty other than that resulting

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

Photograph 12

from placement during gusty winds. After the first day, high winds were encountered which required employing special techniques to prevent the wind from blowing the plastic lining from the lateral. By using the following techniques, it was possible to install the plastic during relatively high winds.

1. The lining was placed as nearly as possible, moving in the direction of the wind.

2. Sufficient laborers were used to keep the plastic in a tight fold, as it was removed from the container, until unfolding it over the lateral subgrade.

3. As the plastic was placed on the subgrade, it was immediately weighted down with temporary weights.

4. Some cover material was then immediately bladed, with patrol graders, from the berm onto the placed lining.

The project forces found that old discarded tires, Photograph 11, could be conveniently used as temporary weights for holding the plastic lining down until a small quantity of cover material could be placed.

The completed installation at the upstream end is shown in Photograph 12.

The cover operations were begun immediately after placing the lining. The cover consists of 1 foot of earth material, and in the beaching zones on the slopes, 6 inches of earth cover with a 6-inch gravel blanket has been placed to control erosion in these areas. Good organization and workmanship in placing the vinyl plastic lining were evident and without the wind, which hampered the work at times, it was estimated that during an 8-hour day, 3,000 linear feet (10,000 square yards) of plastic lining could have been placed.

* * * * *

## GASOLINE

(Reprinted from Niobrara-Lower Platte Projects Safety Bulletin)

Improper use and handling of gasoline is causing serious injuries every day in this country. Developing safe practices for handling and use of gasoline cannot be overemphasized.

Remember, it's the gasoline vapors that burn, not the gasoline, and the higher the temperature the more rapid the rate of evaporation. Gasoline will evaporate in temperatures as low as 45° below zero. Another thing to remember, is that gasoline vapors are heavier than air and unless there is some circulation these vapors will flow along the lowest point.

The following safety rules are a must in handling and using gasoline:

There must be no smoking, open lights, or flames where gasoline is handled or used.

Never use gasoline for any cleaning purpose. This rule applies, not only to your hands and clothing, but to equipment and parts. Use either fuel oil, which is generally available, or some other relatively safe solvent.

Before you fuel equipment, be sure the engine is stopped.

Use only approved safety cans to carry gasoline.

When you're pouring gasoline, keep the hose nozzle or can spout in contact with the rim of the tank opening.

Avoid spillage or overflow. If you should spill more than a few drops, flush it with water.

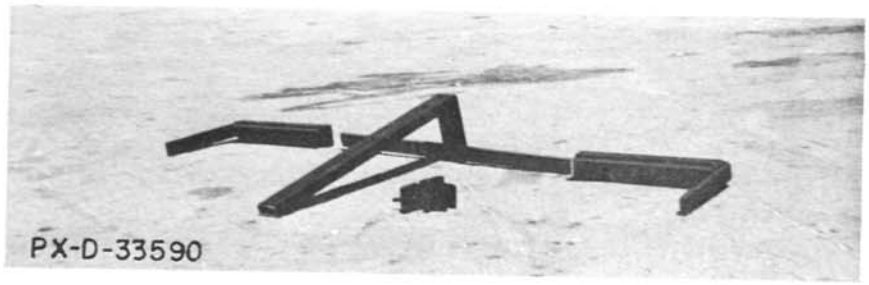
In order to keep from being a victim of a gasoline fire, it is important that we practice these few safety rules.

* * * * *

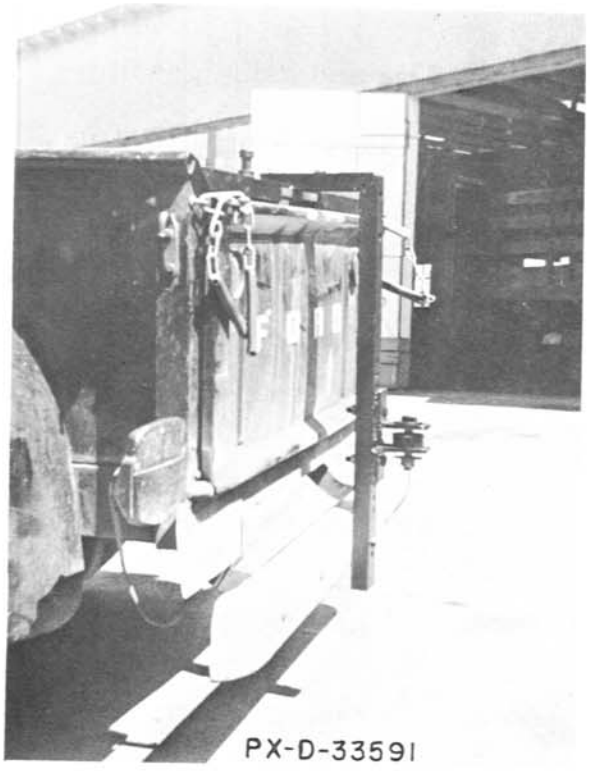
## BETTER TRAILER HITCH

(Reprinted from the Plowback by permission of the National Conference on State Parks.)

An improved portable trailer hitch devised by Harold E. Scott, Operator General at Sequoia and Kings Canyon National Parks not only won one award but when he modified the idea later, won a second.

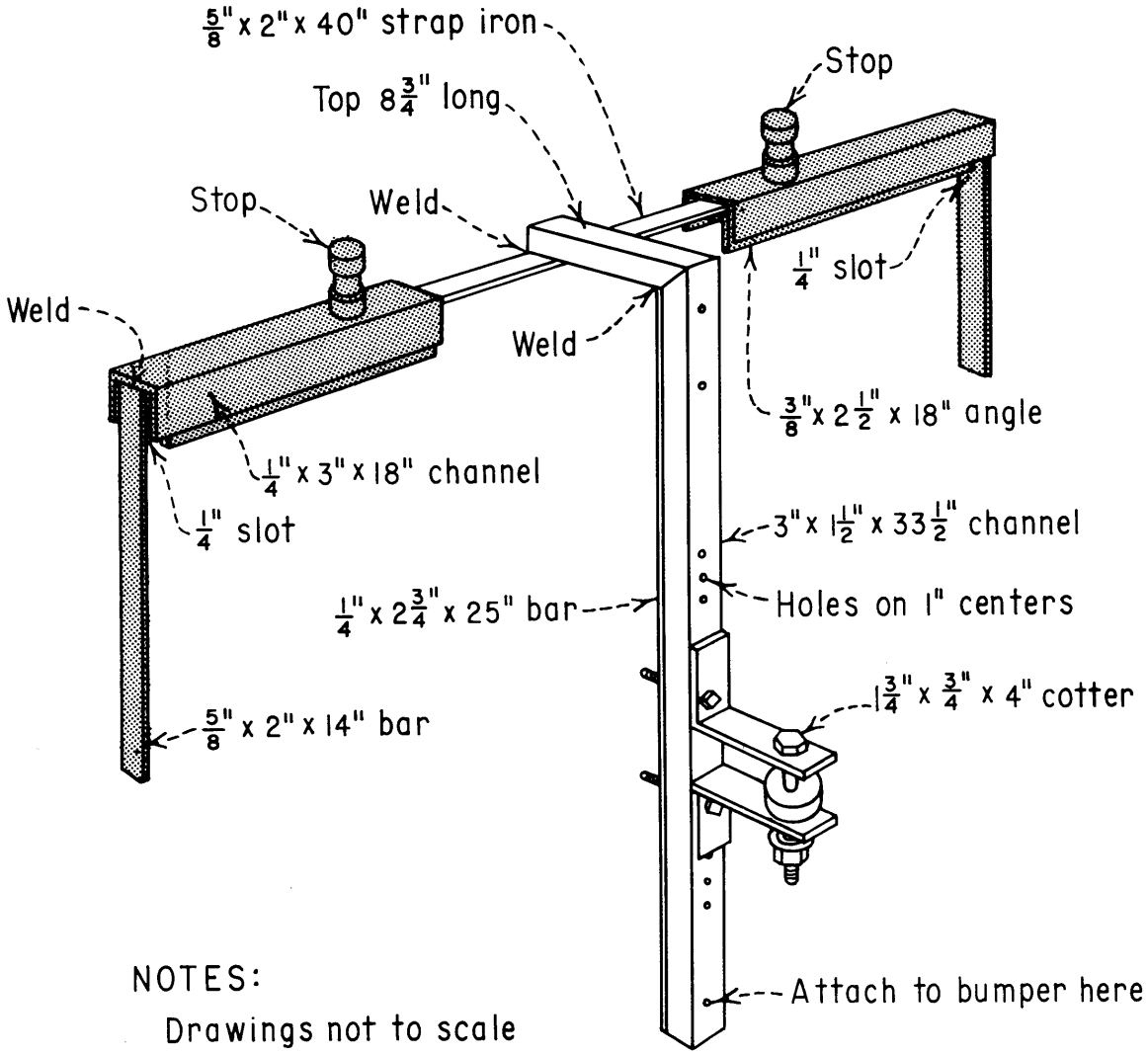



Harold's trailer hitch as now devised permits horizontal expansion of the T-bar to fit pickup beds varying from approximately 38 to 65 inches, while the tongue of the T-bar permits vertical adjustment for about 7 inches.




The hitch has been used successfully in pulling small hot pots, rotary pull brooms, welders, etc.

As the photographs and sketch on the following page show, the basic unit is T-shaped, made from channel, strap and angle iron, including the hitch bracket welded to the bottom of the tongue. Two separable sliding outer members ride on the sides of the T to allow adjustments to fit various truck bed widths. Legs on these sliding members fit into truck stake holes.


5/8" x 2" x 40" strap iron
Top 8 3/4" long
Stop
Stop
Weld
Weld
Weld
1/4" slot
3/8" x 2 1/2" x 18" angle
1/4" x 3" x 18" channel
1/4" slot
3" x 1 1/2" x 33 1/2" channel
1/4" x 2 3/4" x 25" bar
Holes on 1" centers
1 3/4" x 3/4" x 4" cotter
5/8" x 2" x 14" bar
Attach to bumper here
NOTES:
Drawings not to scale
Adjustable housings

* * * * *

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