Department of the Interior
Bureau of Reclamation

OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES

RELEASE NO. 38

October, November and December 1961

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Cover Photo.

A subgrade guided slip form purchased for rehabilitation and betterment of the Rio Grande Project facilities in Texas can be used in the lining of canal and lateral sections which vary in depth up to 4 feet 6 inches, provided bottom width remains constant at 3 feet. Photo No. P23-D-31503

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INTRODUCTION

The article "Metal Forms for Rehabilitation Work", beginning on page 1 of this issue of the bulletin, describes work being accomplished on the Rio Grande Project, Texas. The article describing the project activities was prepared for the bulletin by personnel of Project Manager W. F. Resch's staff, El Paso, Texas.

Herbicides, in which the chemical "acrolein" is a major constituent, are being used in the control of aquatic weeds on some projects in the southwest. Region 3 of the Bureau of Reclamation warns that care must be exercised in the use, handling, and storage of the material. An article concerning the use of the herbicide appears on page 19.

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. 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.

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.

* * * * *

Division of Irrigation Operations
Office of Assistant Commissioner and Chief Engineer
Denver, Colorado

METAL FORMS FOR REHABILITATION WORK

Under the Rehabilitation and Betterment Program for the Texas portion of the Rio Grande Project, well over 200 deteriorated lateral check structures are scheduled for replacement or rehabilitation. Some of the other work under this program consists of placing concrete core walls in canal and lateral banks and placing concrete lining in laterals.

A report of the work being performed has been prepared by the Project Manager at El Paso, Texas, and is being presented in this issue of the bulletin, because of its applicability to similar rehabilitation work in other localities. The report follows:

"Under the Rehabilitation and Betterment Program for the Texas portion of the Rio Grande Project, well over 200 deteriorated lateral check structures are scheduled for replacement or rehabilitation. Some of the other work under this program consists of placing concrete core walls in canal and lateral banks and placing concrete lining in laterals. For these types of work, steel forms have either been purchased or fabricated in the project shops.

"Because of differences in capacities and depths of water in the laterals, the size of check structures varies. Most of the structures, however, fall in a certain range of height and width. Therefore, two sets of "knock-down" reusable steel forms were designed and purchased for the construction of these lateral checks. The forms provide for a 4-, 5- or 6-foot bay width and water depths of 3, 4, or 5 feet.

"The forms are used for the concrete overflow side weirs and concrete piers to support a concrete walkway. The pier and weir forms are attached to and suspended from two 6-inch steel channels that are the forms for the walkway. The forms are so designed that 12-inch panels can be added to the height to increase the height of check.

"In using the check forms, the forms are assembled in the yard; the steel is bent, tied and placed in the forms; and the forms with steel in place are hauled as a unit to the jobsite, Figure 1.

"The entire form is suspended across the ditch section by the two 6-inch channels, Figure 2. Concrete for the entire structure, including the cutoffs, lining, piers, weirs and walk, is placed in one pour.

"A completed structure is shown in Figure 3.

"Concrete core walls in the banks of canals and laterals are used to reduce the hazard of ditch breaks, particularly in highly populated areas, and to reduce seepage from the ditches. The trench for the

Fig. 1

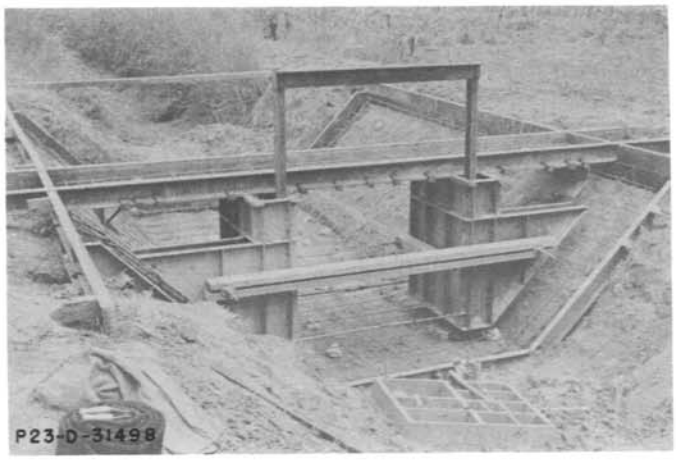


Fig. 2

Fig. 3

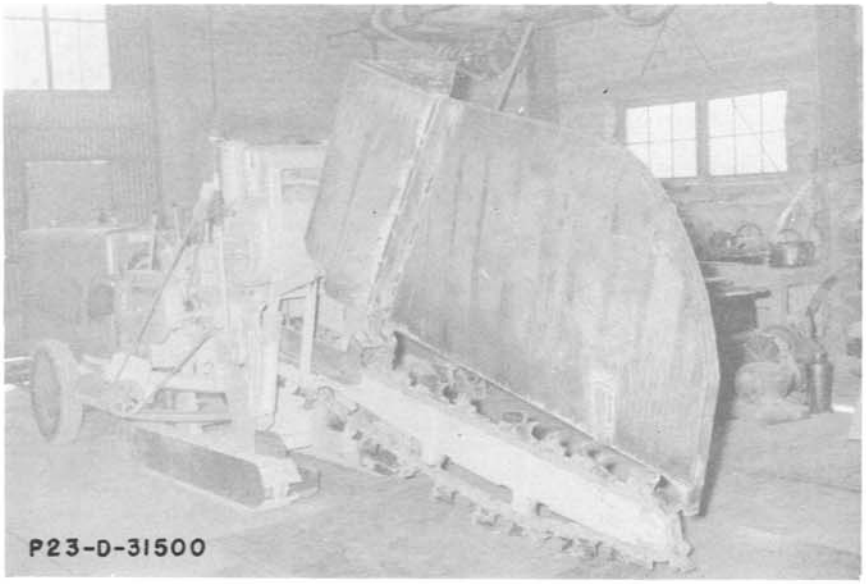


Fig. 4

core wall is excavated with a crawler-mounted, endless-chain type, 25 horsepower trencher, Figure 4, which excavates a trench 3 inches wide and 6 feet deep. This trench is then filled with concrete to a depth of 5 feet. To aid in the placement of the concrete, a special slip form with a hopper was devised. The slip form mounts on the

Fig. 5

Fig. 6

trencher immediately behind the digging chain.

"By using the form the vertical sides of the trench do not slough off before or during the concrete placement and the slip form being mounted directly behind the digging chain has the added advantage of serving as a 'crumber' bar for the excavation.

"Concrete is supplied from transit-mix trucks that straddle the complete core wall and discharge directly into the hopper of the slip form, Figure 5.

"Vibrators also mounted on the trenching machine vibrate the concrete in the form. Excavation and placement are completed in one operation. About 100 feet of core wall can be placed per hour.

"Although no extensive ditch lining program is being undertaken in this rehabilitation work, some sections of ditch are being lined with concrete in areas of high seepage. On most of the reaches of lining, a 3-foot bottom width ditch can be used by varying the depth of water and slope. For this work the subgraded-guided slip form shown in Figure 6 and on the cover of this issue of the bulletin, was purchased. The depth of section can be adjusted to any dimension up to 4'-6"."

* * * * *

PORTABLE FIELD LIGHT
(Suggestion R7-61-3Gp)

A portable field light, which can be attached to a pickup, was suggested as a means of improving conditions for taking tests on Sherman Dam at night during construction of the dam. The suggestion by Mr. Ralph C. Rima and Mr. Walter A. Crossman, mechanics in the Farwell Project Office, Nebraska, had been most helpful in earthwork control testing. Although designed and used for a specific purpose during construction of Sherman Dam, the field light may be useful

in other areas. The cost of the suggested portable light is $5.50 compared to $20 for a spotlight mounted on the top of a pickup.

By mounting a $1.25 weatherproof receptacle on the pickup box of several vehicles, the same lamp can be used with other vehicles and for other purposes. Thus, it is not necessary to have lamps for each unit as is the case when spotlights are mounted on vehicles and the second vehicle must be available for servicing.

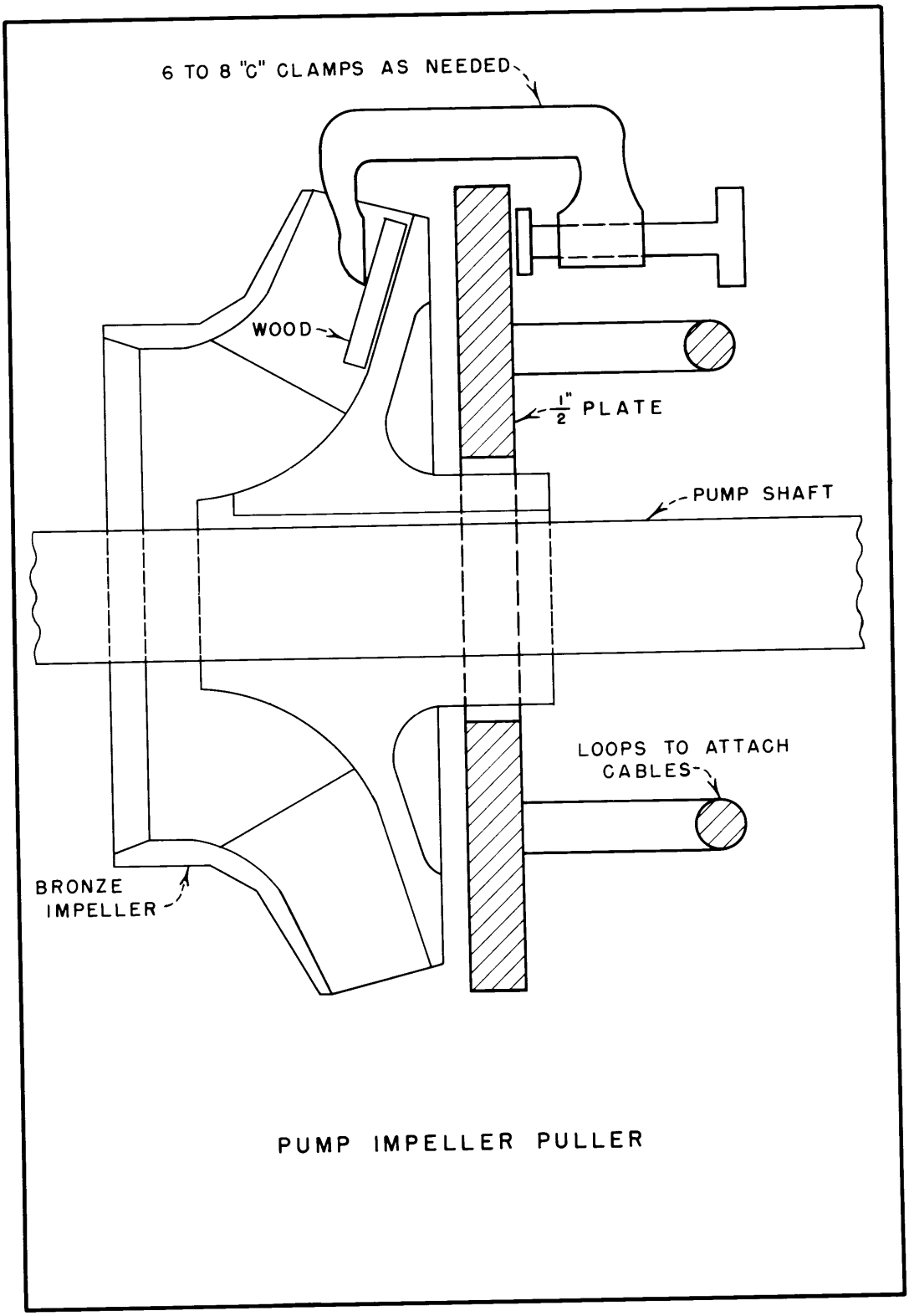
The lamp consists of a 6-inch floodlight (sealed beam) mounted on a 3/4-inch rod, as shown in the photograph above. The rod is 36 inches long and pointed at one end. The device is equipped with 10 feet of extension cord. The cord may be plugged into a two-way, weatherproof socket which is installed on the pickup box. Power is obtained by connecting the socket to the taillight wires.

* * * * *

PULLING BRONZE PUMP IMPELLERS
(Suggestion R1-60-111)

Pump impellers are usually made of bronze and are machined to a tight fit on the impeller shaft. The impellers are difficult to remove. Since they are bronze, they will not withstand much hammering, and it is difficult to fasten any usual connector, such as a hook, to the impellers. The problem has been largely solved on the Minidoka Project, Idaho, utilizing a suggestion made by John D. Fredrickson.

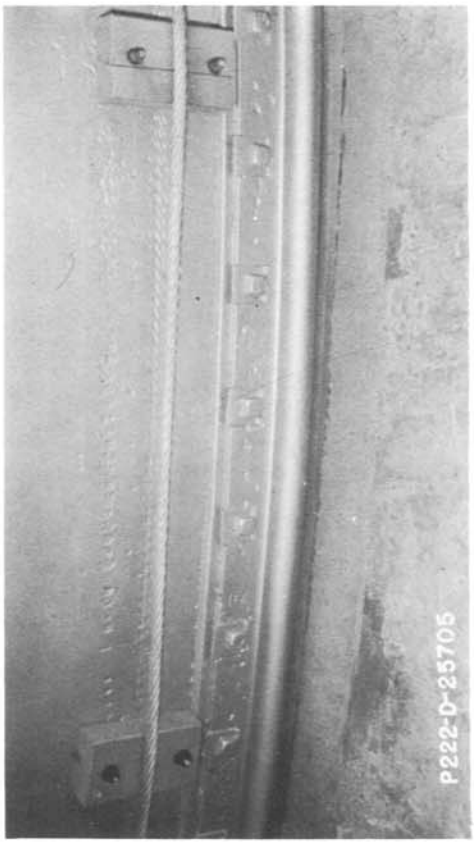
Mr. Fredrickson suggested use of the plate shown on the sketch, page 6. The plate is fastened to the impeller by means of "C" clamps, and by using six or eight of the clamps, the load can be more equally distributed around the circumference of the impeller and not concentrated in one place that could result in serious damage. The plate is fastened to a coffin jack by means of two cables and loops, which are welded to the steelplate. The coffin jack and the opposite end of the pump bowls are fastened to anchors in the shop floor. Pressure is applied with the coffin jack. By using the plate, the impellers can be removed with a minimum of effort and without damage. The device can be used on all impellers which are keyed to the shaft.



Pump Impeller Puller
R1-60-111

HARDWOOD BLOCKS PROTECT PAINT ON RADIAL GATES

Maintenance painting is a problem on all projects, and anything that can be done to protect the painted surfaces is worthwhile. The photograph at left shows one of the Frenchman Canal wasteway radial gates on the Columbia Basin Project which had just been repainted.



Pitting of the base plate, which occurred where the wire rope had rubbed on the face of the gate, shows through the new paint that has been applied. This is a rather common occurrence where the wire ropes are permitted to bear against the gate face. The paint is scarred and accelerated corrosion develops.

Irrigation Manager Joe Kirk of the Columbia Basin Project suggested the idea shown in the photograph. Hardwood blocks are fastened to the face of the gate for the wire rope to bear against, thus preventing damage to the base plate. The amount of work involved in fastening the blocks to the gate is small, and it appears to be an idea worth adoption.

* * * * *

SAFETY MESSAGES
(Suggestion R1-61-29)

Safety on our irrigation projects is being given increased attention by the operators of our irrigation systems. Mr. John Telisak of the North Side Irrigation Field Division, Minidoka Project, Idaho, suggested sending periodic safety messages to water users on monthly water use statements to make the water users and their families aware of hazards present in connection with irrigation structures, channels, and facilities. A sample message suggested by Mr. Telisak is:

> "Swimming in canals and stilling pools is hazardous. Small children, especially, should be made aware of the danger present. Your cooperation in discouraging such practices will be appreciated."

* * * * *

FUEL PUMP SAFETY
(Suggestion R1-CB-60-97)

Mr. Wesley A. Brandon of the Columbia Basin Project Office, Washington, has suggested that all "self-service" gas pumps and other fuel pumps handling explosive or inflammable fuels be equipped with rubber or neoprene spouts on the fuel hoses to eliminate the possibility of sparks. Mr. Brandon also suggested that "No Smoking" signs at the pumps be supplemented with "Stop Your Motor."

* * * * *

WALKPLANK BRACKET FOR WEIR STRUCTURES
(Suggestion R1-61-108)

A number of weir structures on the Minidoka Project, Idaho, were designed without satisfactory means of measuring the discharge from the weirs. It had been common practice by the ditchriders to obtain the measurements by walking on the concrete headwall of the weir--an unsafe and hazardous practice. A suggestion of Robert N. Weibel of the North Side Irrigation Field Division, Minidoka Project, adopted by Region 1, is the walkplank shown in Figure 1.

A bracket (Figure 2) was designed to hang on the concrete headwall. As shown on the sketch (Figure 3), the bracket consisted of 3/8- by 2-inch, flat bars. Welding was used throughout in construction of the bracket. After hooking the brackets over the concrete headwall, 2-inch-thick wooden planking, 12 inches in width, was laid across the brackets, with notches being cut in the planking where it rested on the bracket, to hold the plank in place.

As shown in Figure 1, a 2- by 4-inch stiffener was nailed to the lower side of the walkplank, where the span between brackets is considerable.

Fig. 1

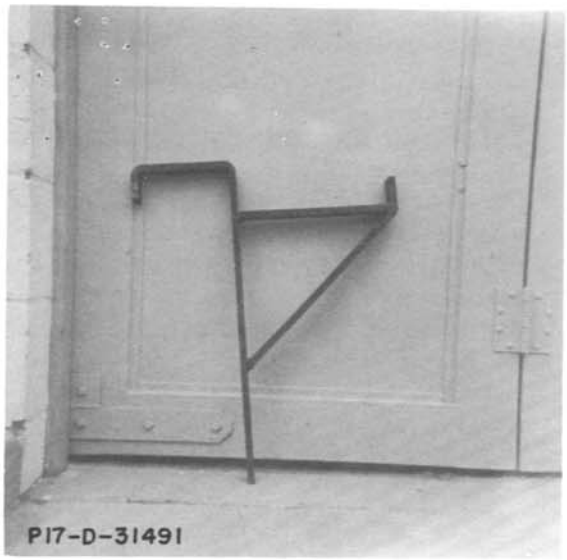


Fig. 2

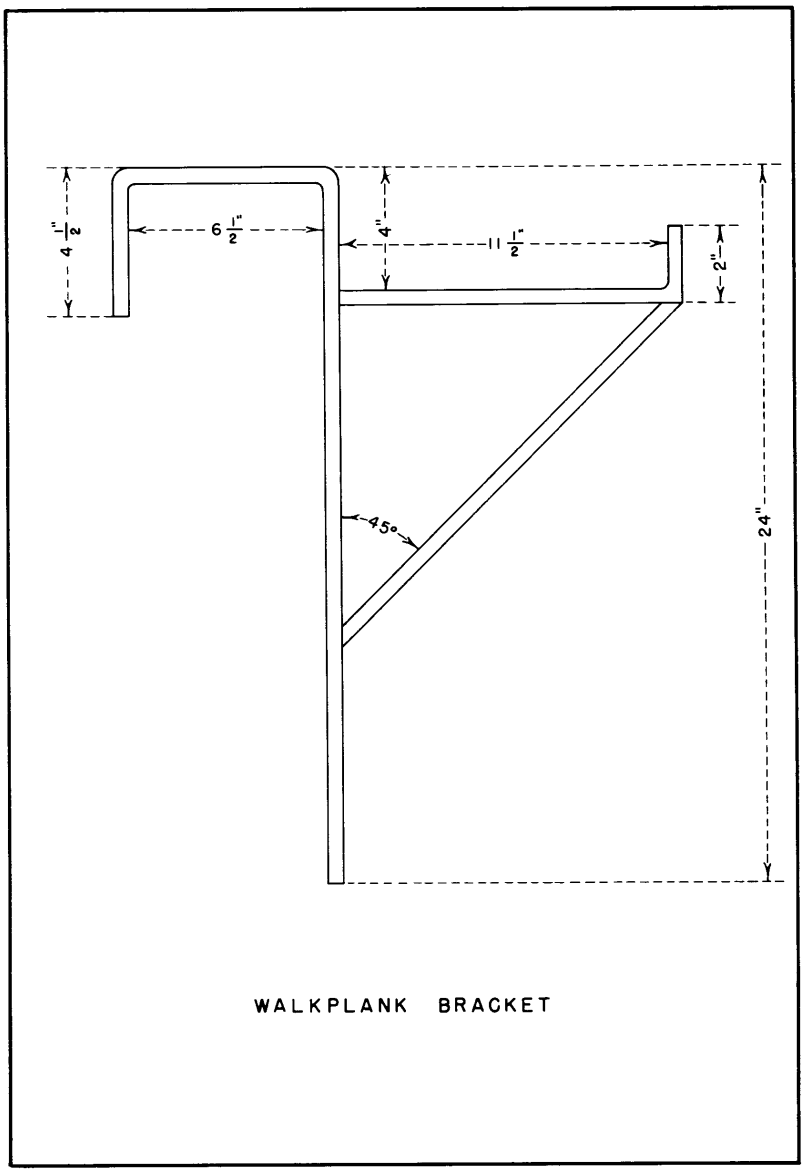


Fig. 3

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LOOKING AT THE NEXT ACCIDENT VICTIM
(Suggestion R7-61-39)

Two of the problems in safety education are (1) the need for the constant stressing of accident prevention and (2) the natural tendency for people to become immune to repeated safety warnings, thinking that accidents always happen to someone else. The solution to these problems is to have something that people see often and at a time when they think of themselves in the light of accident prevention.

A mirror is seen by everyone several times a day, with only themselves in mind, and Mr. William C. Klostermeyer of the Grand Island Development Office, Grand Island, Nebraska, suggests that use be made of the mirror for its effectiveness. He suggests that a decal, or a gummed sticker, be placed on the mirror, stressing that the owner of the image in the mirror might be the next accident victim.

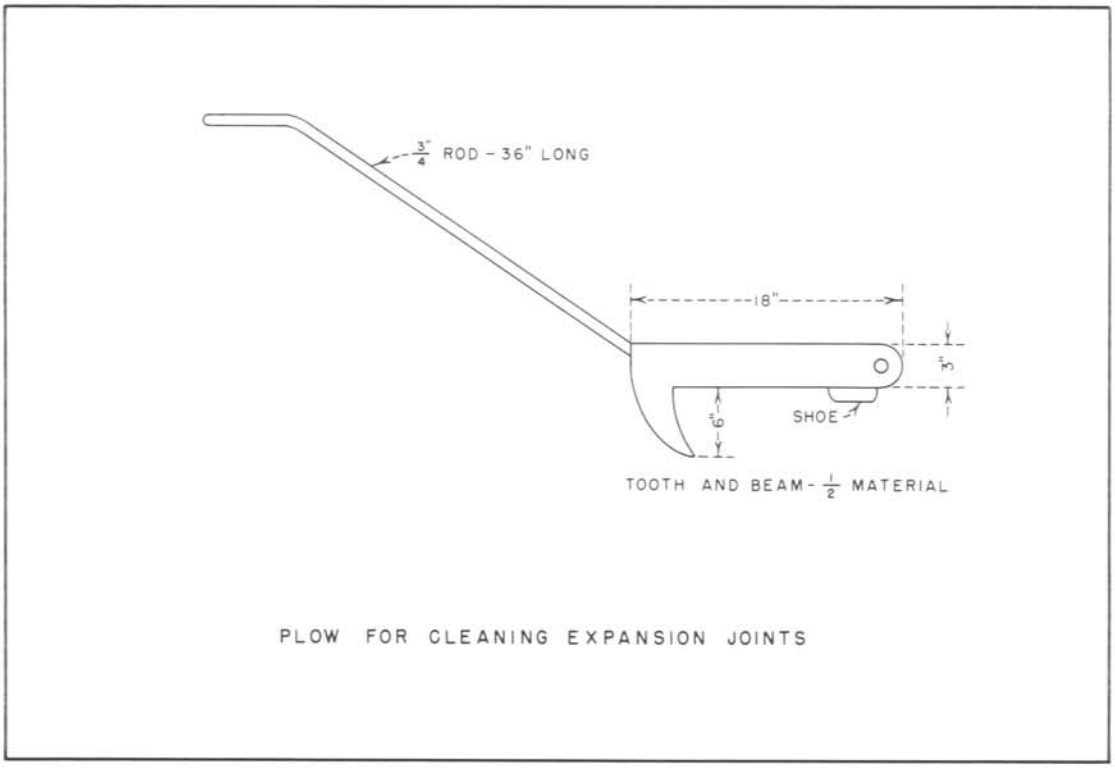
A suggested decal that has been adopted in the Grand Island Development Office and in its field stations, with the concurrence of the local safety committee, is shown in the illustration below. The decal has been attached to mirrors located above wash basins in all rest rooms.

* * * * *

PLOW FACILITATES ROOF REPAIR
(Suggestion R1-61-55)

When repairing the machine shop roof slab at the Hungry Horse Powerplant, it was first necessary to remove the old filler from the joint which was 400 feet long, about 4-1/2 inches deep, and varying in width from 1/2 to 1-1/8 inches. Since one side of this joint was a vertical wall, it was difficult to remove the filler with ordinary hand tools. Mr. Ray D. Ellman and Wilber C. Schaeffer of the O&M Division suggested building the "plow" shown in the sketch, page 11. This plow, pulled by means of an air-powered winch, as shown in Figures 2 and 3, pages 11 and 12, removed the joint filler quickly and easily.

The operation required two men, one operating the winch and the other guiding the "plow". Actually, because of the varying joint width, three separate plows were used, having widths of 1/2 inch, 3/4 inch, and 1 inch. The suggestion saved a great deal of time and manpower in removing the old filler from the joint on this job, and it can also be used on other similar future jobs here and on other projects.



PLOW FOR CLEANING EXPANSION JOINTS

Fig. 1

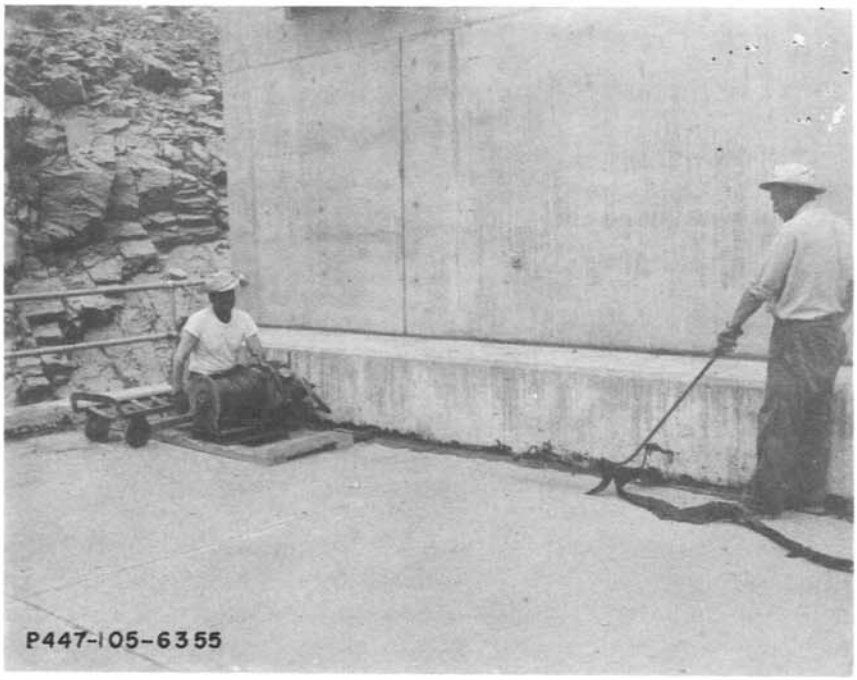


Fig. 2

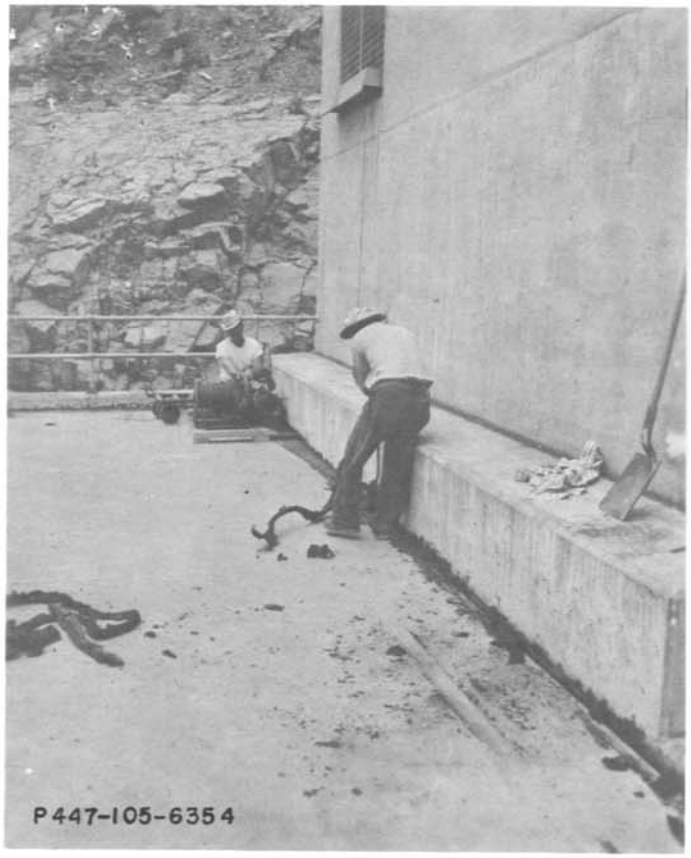


Fig. 3

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OIL FILTER AND FAN BELT REPLACEMENTS
(Suggestion R4-2C-61-12)

Each make, type, year, and model of vehicle, carries different oil filter elements and fan belt sizes. Mr. Koerner Rombauer of the Glen Canyon Unit, Colorado River Storage Project, felt there was a need for some means of quickly determining which filter elements and fan belts were required during replacement. He suggested that the serial number and make, printed on the element containers as received, be secured to the underside of the engine hood. By so doing, it was quickly possible to obtain the proper filter element or fan belt needed from warehouse stock.

It was originally suggested that the identifying information be taped to the hood. However, as a modification, a plastic holder was used by Mr. Rombauer to prevent the information from being destroyed by water, oil, and heat.

* * * * *

POLYETHYLENE ROPE USED ON LIFE PRESERVERS
(Suggestion R3-BC-61-28)

A suggestion adopted on the Boulder Canyon Project in Nevada and Arizona is that of Mr. Bruce A. Smith concerning the rope of the life preservers. Mr. Smith suggested that the existing ropes be replaced with nylon skiing rope, because it was stronger and would not be so subject to deterioration by rotting as are the ropes now used. Mr. Smith believed that the suggestion would be a saving to the Government, since the ropes would not have to be replaced so often.

In adopting Mr. Smith's suggestion, however, it was decided that polyethylene rope might be superior to the nylon rope, because the polyethylene material will float indefinitely and, unlike nylon rope, will not lose its strength when wet.

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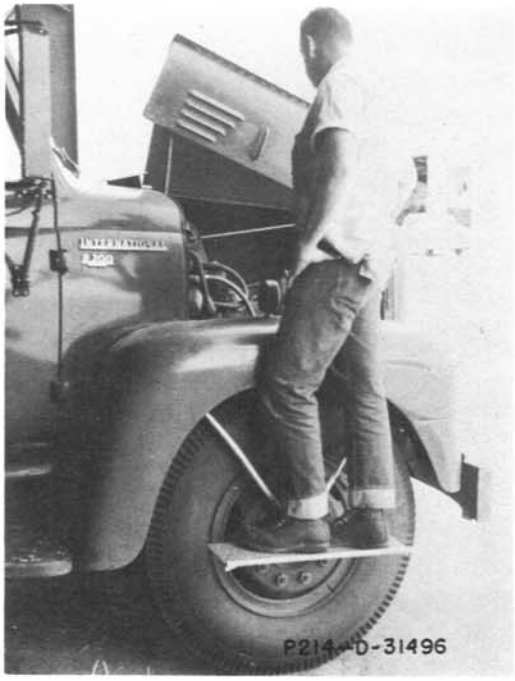
PORTABLE PLATFORM FOR MOTOR VEHICLE REPAIR
(Suggestion 60-161-R2)



Mr. Oscar A. Schwarz of the Fresno Operations Field Branch, Central Valley Project, California, observed the need for a step to allow easy and safe access to truck motors. To meet this need, he fabricated a 12- by 24-inch step to hang over the top of truck tires. The step, as shown in the photograph at left, is constructed of steel floor plate material, and the hangers are of 1/4-inch-diameter pipe.

The portable platform permits easy access to truck motors in particular, and prevents possible straining or slipping from standing on tiptoes on smooth or oily floors.

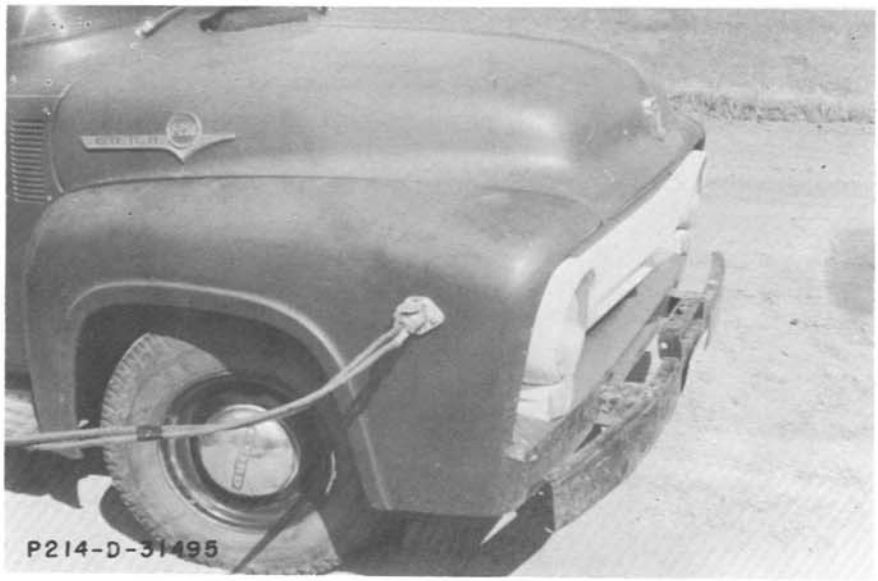
* * * * *

A CONVENIENT SOURCE OF ELECTRIC POWER
(Suggestion R2-61-49)

The pony motor used for starting the main diesel engine of a crane had been started by manual cranking in a small cramped spot. This condition created two hazards: (1) the possibility of broken bones when the engine kicks, and (2) the possibility of the operator being trapped in an inescapable spot if the motor should backfire during cranking and ignite the fuel. An electric starter seemed the only answer, but the cost of installing and maintaining a battery and generating system seemed excessive, especially on a rig left alone on the canal during nonoperating days when the battery could be stolen.

At the suggestion of heavy-duty mechanic Gordon Q. Sewall of the Fresno Operations Field Branch, Central Valley Project, California, an electric starter was installed and equipped with a convenient electric socket. A similar socket was installed on the front fender of the operator's pickup truck, as shown in the photograph below. A heavy-duty electric cable, extending from the pickup to the electric starter, supplied the necessary current and has simplified the starting of the crane motor.

Another feature that will be added, when materials are received, will be an adapter from the regular cable plug to alligator clips so that the cable can be used to start any rig which has a low battery. This would include tractors, trucks, sprayers, etc., which are away from the project headquaters.



AUGER GUIDE AND SAFETY LOCK
(Suggestion R4-WB-59-4)

A mobile auger drill was used in the exploration of the borrow area for Willard Dam on the Weber Basin Project in Utah. Standard equipment on the truck-mounted rig included an auger guide. Difficulty was encountered in keeping the guide in place, and if it was not kept in place, the auger drifted out of alinement. Much time was consumed in securing the guide when this occurred.

In addition, the standard guide furnished had no device for locking the auger in place while removing it from the drilled hole. This necessitated the use of a heavy awkward plate which was placed on the ground and interlocked with the auger after it was raised to keep it from falling down the drilled hole. Interlocking of this heavy plate with the auger was difficult and created a safety hazard if the operator accidentally rotated the auger while the plate was engaged.

Mr. J. W. Farrel, Construction Inspector of the Ogden Area Field Branch of the Weber Basin Project, suggested some improvements and was instrumental in construction of a new guide and safety lock that resulted in considerable saving of man-hours of work; the elimination of hazards which increased safety; and greater ease of operation. This was accomplished by the single piece of equipment shown on the drawing on page 16.

The auger guide and safety lock devised by Mr. Farrel remains securely locked at all times, thus assuring good alinement of the auger. The handles are extended against the frame of the truck, freeing the auger for rotary movement, while the 7-1/2-inch-diameter cylinder acts as a guide for the bit and auger. Dogs on the handles can quickly be swung into place to hold the auger when it is in a raised position and keep it from falling down the drilled hole. Two braces, with bolts extended, are used for mounting the device on the framework of the truck. The small U-shape clamp holds the handles in place, locking the bit and auger in an elevated position when necessary.

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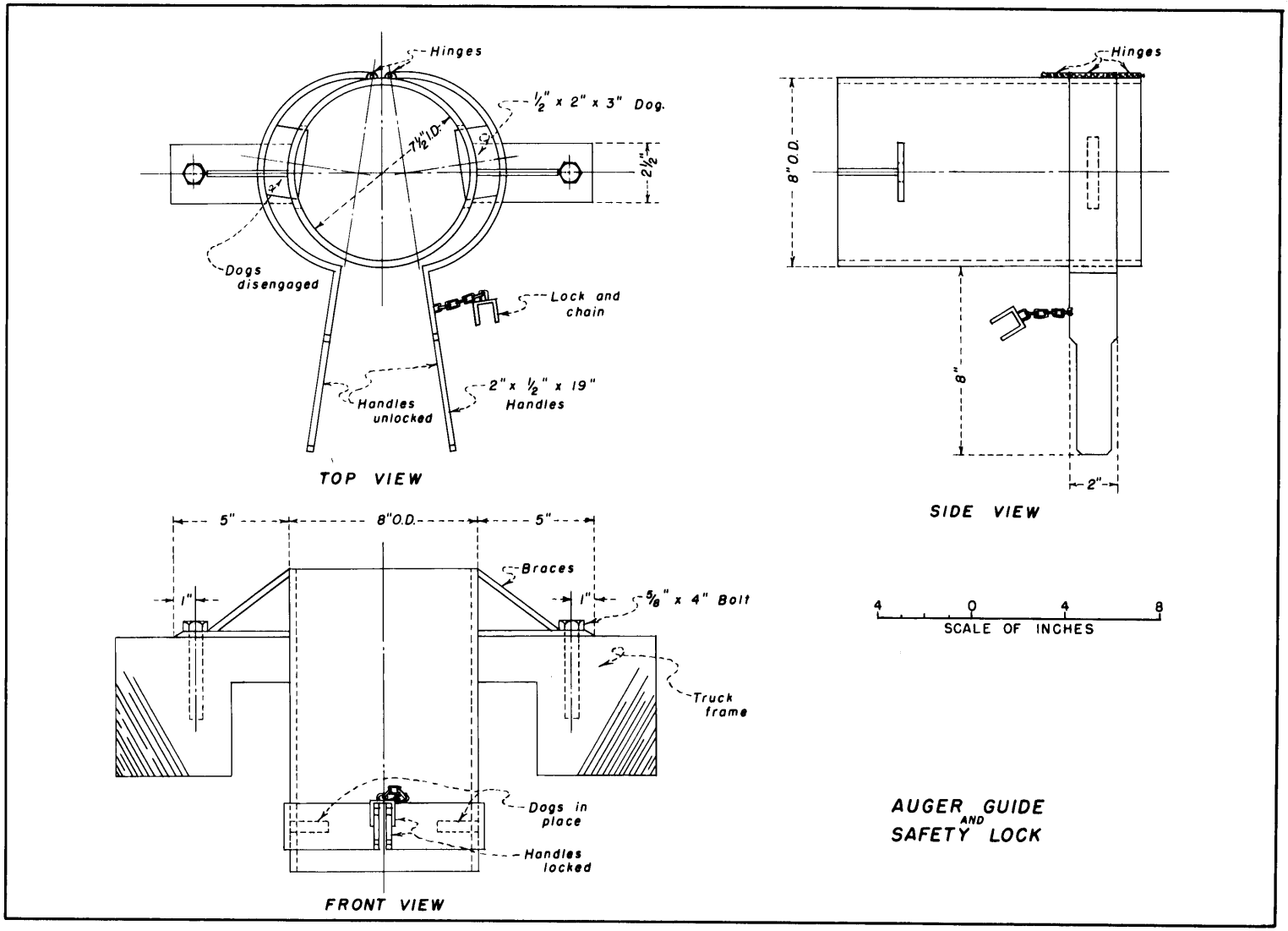

Auger Guide and Safety Lock

CLEANING CONCRETE-LINED CANALS
(Suggestion R2-61-81)

When removing silt from the canal prism of a concrete-lined canal, it is wet and often submerged in water, making it sloppy and difficult to pick up. Layers of silt are usually comparatively thin, and the use of an ordinary dragline bucket for this operation is impractical, due to the design and weight. A light-weight bucket, with wide opening, is advantageous.

Fig. 1

Fig. 2

Such a bucket was suggested by Henry R. Read, equipment operator, Fresno Operations Field Branch, Central Valley Project, California, and is shown in Figures 1, 2, and 3.

The bucket, being wide with flat bottom and cutter bar,

Fig. 3

slips under the material without disturbing the silt and water, assuring a cleaner, greater volume with each pass. The bucket is cast to the bottom of the canal, pulled across and up the side to the pickup point. As the bucket is pulled up the canal slope, it is designed for the liquid or semiliquid material to level with the top rim (Figure 1). This is also true upon lifting the bucket. The angle remains the same, retaining a full bucket with a minimum amount of spill, Figure 2.

Figure 3 shows the bucket in the dumped position.

The bucket uses the trip sheave, clevice and socket from the regular dragline bucket. A schematic design of this bucket is available in the Delano Unit Office, if one should be required, and can be obtained by writing the Regional Director, Bureau of Reclamation, Post Office Box 2511, Sacramento 11, California.

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HANDLE ACROLEIN TYPE HERBICIDES CAREFULLY

A proprietary herbicide using the chemical "acrolein" is being used to kill aquatic weeds in some irrigation canals in the southwest. The ingredients of the herbicide, as listed on the containers, are: 85 percent Acrolein and 15 percent inert ingredients. In referring to "Dangerous Properties of Industrial Materials," by N. Irving Sax, we find that the material possesses properties which should be given special attention in handling, storing, transporting, and during application. The properties of the herbicide are listed below and are being called to your attention, as it is felt special handling procedures of the material should be available to those who might use it.

ACROLEIN (Acrylaldehyde)

Synonyms: Propenal; acrylic aldehyde; allyl aldehyde; acraldehyde.

Description: Colorless or yellowish liquid; disagreeable choking odor.

Formula: CH_2CHCHO

Constants:

Mol. Wt. 56.06
M. P. -87.7°C
B. P. 52.5°C
Flash P. < 0°F
Density 0.841 at 20°/4°C
Autoign. Temp. Unstable (532°F)
Vap. D. 1.94

Toxic Hazard Rating:

Acute Local: Irritant 3; Allergen 1; Ingestion 3; Inhalation 3
Acute Systemic: U
Chronic Local: Allergen 1
Chronic Systemic: 0

MAC: (ACGIH accepted); 0.5 parts per million in air; 11 milligrams per cubic meter of air.

Toxicology: Due to its extreme lachrymatory effect it serves as its own warning agent. Industry records one fatality ascribed to exposure to it formed by the heat of welding in an enclosed space. It affects particularly the membranes of the eyes and respiratory tract. It is a weak sensitizer; inhalation may cause asthmatic reaction (Section 9).*

Fire Hazard: Dangerous, when exposed to heat or flame.

Spontaneous Heating: No

To Fight Fire: Carbon dioxide or dry chemical (Section 6).*

Explosion Hazard: Unknown

Disaster Control: Dangerous, when heated to decomposition, emits highly toxic fumes; can react vigorously with oxidizing materials.

Ventilation Control: Use moderate rate
Personnel Protection: Section 3*
Personal Hygiene: Section 3*
Storage and Handling: Section 7*
Shipping Regulations: Section 11*
I.C.C. Classification: Flammable liquid; red label
Coast Guard Classification: Inflammable liquid, red label.

*NOTE: References are to the article "Dangerous Properties of Industrial Materials," by N. Irving Sax, referred to in the first paragraph. If additional information is requested concerning the use and handling of the material contact the Regional Director, Bureau of Reclamation, Post Office Box 427, Boulder City, Nevada.

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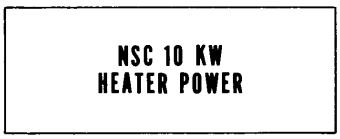
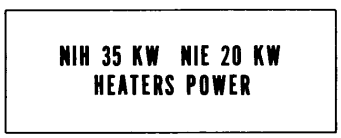
PLASTIC NAMEPLATES ATTACHED BY PRESSURE-SENSITIVE TAPE
(Suggestion R7-61-25)

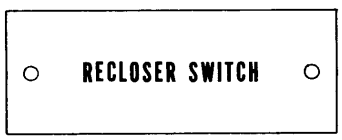
The use of double-faced, pressure-sensitive tape for adhering plastic nameplates to the face of switchboard panels was a suggestion of Mr. Roland R. Thessen of the South Platte River Projects Office, Loveland, Colorado. The tape is used instead of the present method of drilling the nameplates and the switchboard panels and using sheet metal or machine screws to hold the plates in place. The photographs below illustrate the use of the tape in securing the nameplates to a steel panel.

Use of the tape will save a good deal of time, since it is not necessary to drill each nameplate and the panel when installing new tags or changing old ones. Defacement of the panelboard is eliminated, and more information can be contained on the tag when there are no screwheads protruding on the face of the tag. The nameplates can also be cleaned more easily. The suggestion has been adopted by the South Platte River Projects office where it is being used on numerous switchboard panels.





The above nameplates are secured to panel with the pressure-sensitive double-faced tape.



The above nameplates are now secured with tape but were originally held by screws.

GPO 853181