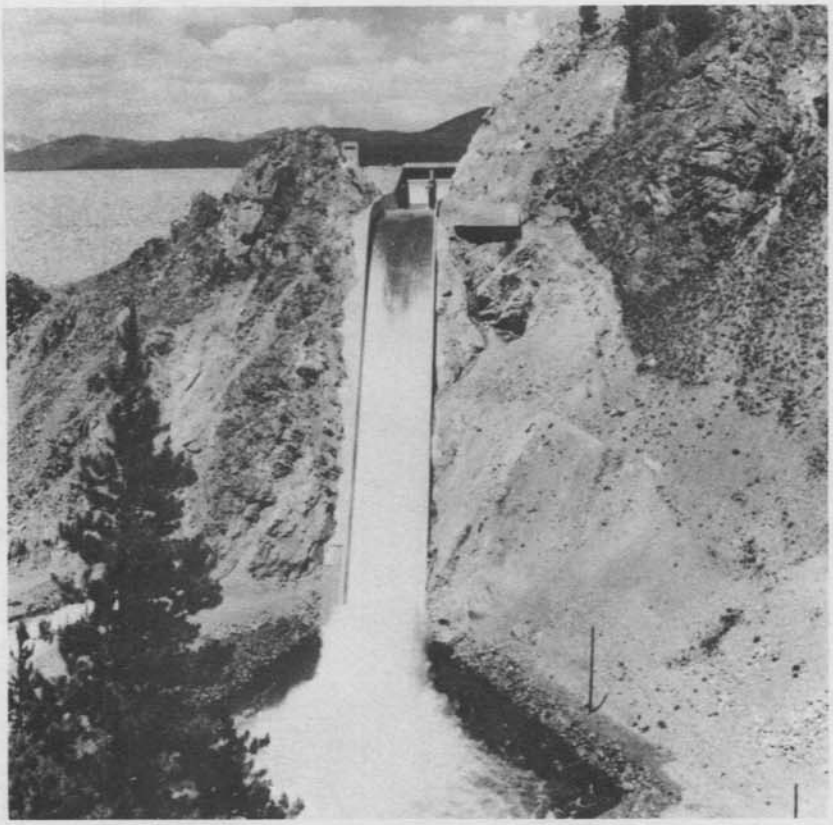
WATER OPERATION AND MAINTENANCE

BULLETIN NO. 83

MARCH 1973



IN THIS ISSUE

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

The Water Operation and Maintenance Bulletin is published quarterly, for the benefit of those operating water-supply systems. Its principal purpose is to serve as a medium of exchanging operation and maintenance information. It is hoped that the reports herein concerning laborsaving devices and less costly equipment and procedures will result in improved efficiency and reduced costs of the systems for those operators adapting these ideas to their needs.

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 Award Committee when a suggestion is adopted.

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Division of Water Operation
and Maintenance
Engineering and Research Center
Denver, Colorado 80225

COVER PHOTOGRAPH:

Granby Dam - Colorado-Big Thompson Project, Colorado. A full view of spillway and stilling basin is shown. It has a flow of 1,059 cubic feet per second as it enters into the Colorado River. Photo P245-D-72985

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION
Rogers C. B. Morton
Secretary

LOCKING DEVICE FOR STEEL GRATING

Gratings at structures in isolated areas on the Yuma Projects, Yuma, Arizona, Lower Colorado Region, were being stolen by vandals. If the grates were not carried away they were thrown into the canals and this situation became very annoying and expensive. Personnel in the Maintenance Branch designed and fabricated a unique locking device that once and for all eliminated the situation. A detailed drawing of the locking device can be found in Figure 1 below.

A full view of this locking device can be found in Figure 2 on the next page. The device as shown was installed at the Parshall Flume structure on the SG-7.7 Lateral, South Gila Valley Unit, Gila Project. Figure 3 also on the next page, shows a closeup view of the device in place and in a locked position.

If further information is desired regarding this locking device, please write to the Project Manager, Yuma Projects Office, 3800 Avenue, 3 E, Yuma, Arizona 85364.

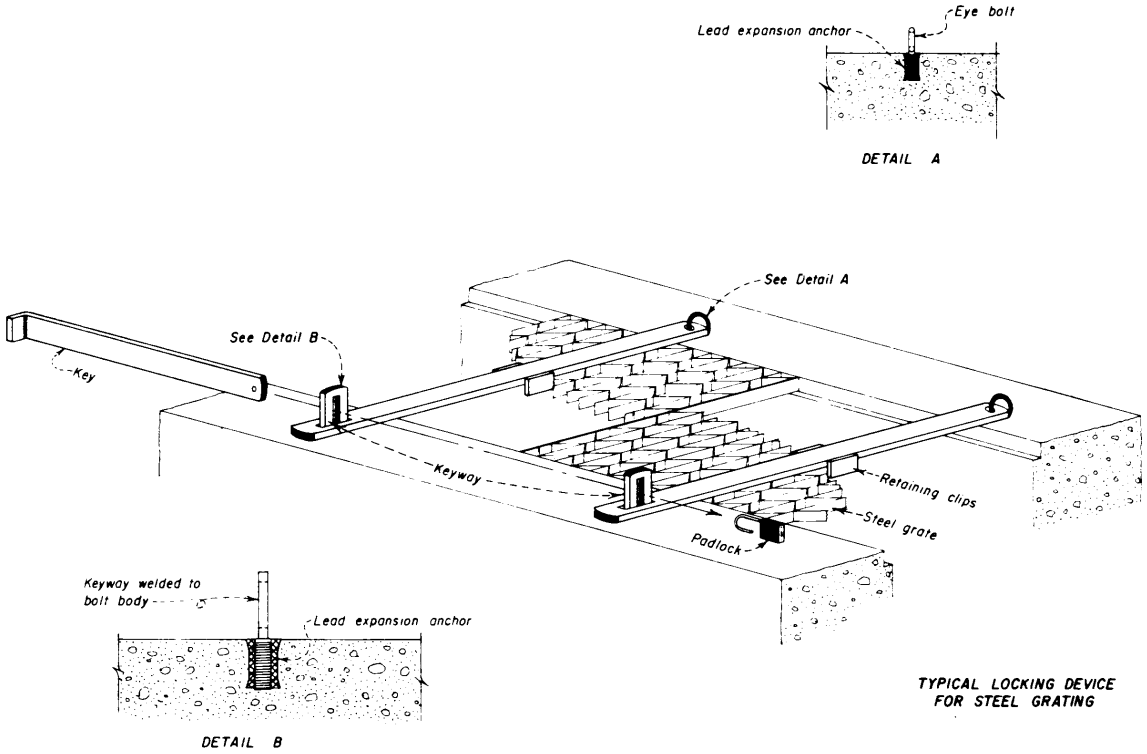

Figure 1

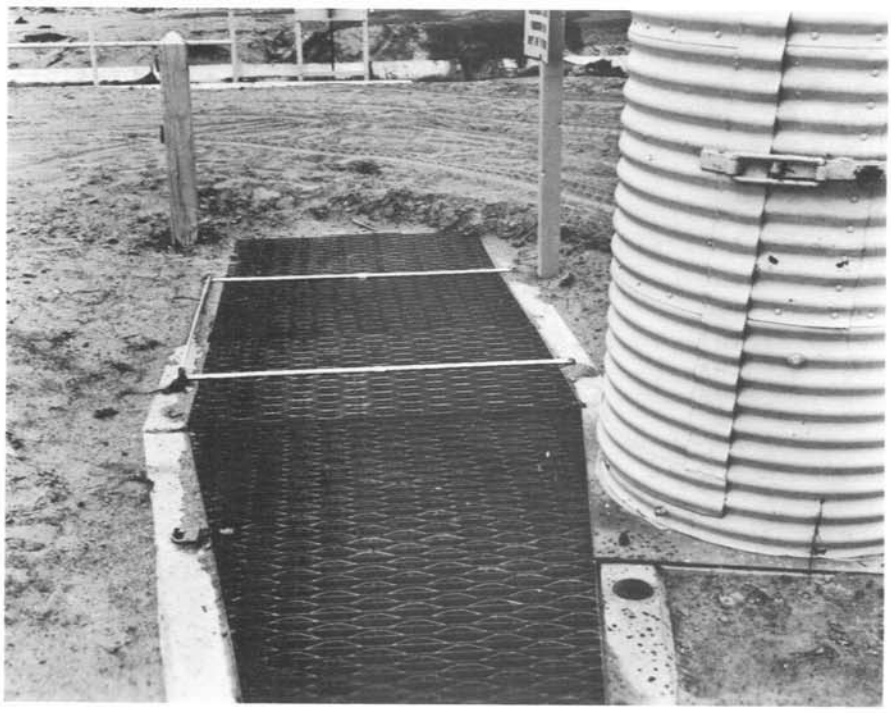

Figure 2 P35-D-72972

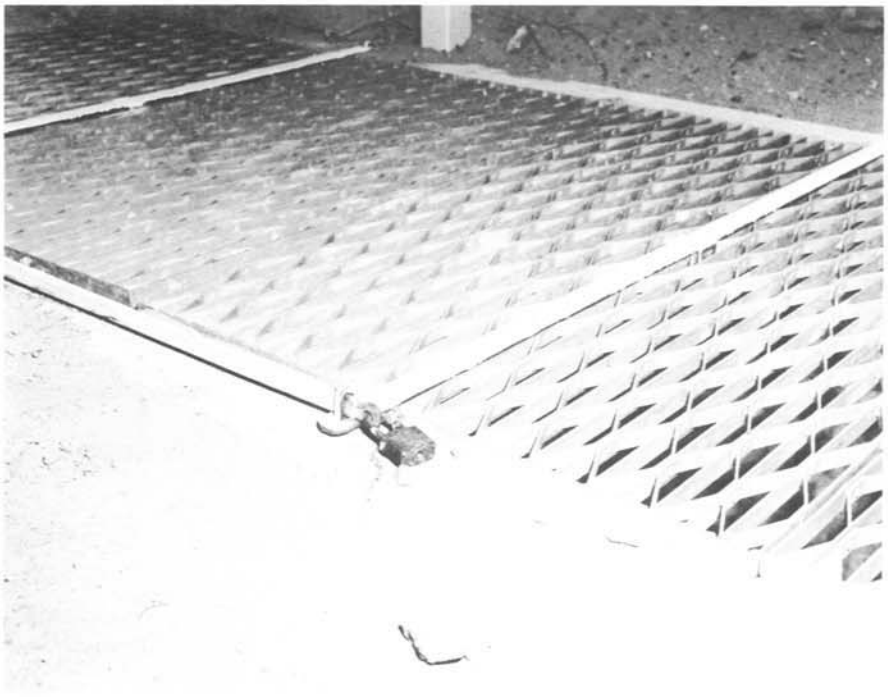

Figure 3 P35-D-72971

A FAST, EASY METHOD OF CLEANING ROADSIDE DRAINAGE DITCHES[1]

Maintenance men in the Oroville Field Division have produced another device to aid them in maintaining drainage ditches along the service roads of the Oroville area. The device is a custom-shaped steel "bucket" which can be attached to the front of a four-wheel drive loader bucket. The idea for the bucket was conceived by Mr. W. B. Hansell, Acting Senior Foreman, and was fabricated by Mr. Vern Dresser (Maintenance Man III) and Leo Lantsberger (Maintenance Man I) at Thermalito Annex Shop, under the supervision of Wayne Hall, Acting Superintendent, Civil Maintenance, Oroville Field Division, Oroville, California.

Description

The bucket was made from 1/4-inch steel plate bent to conform to the shape of the 4000 feet of concrete-lined ditch in the Power Canal area. The dimensions of the bucket are 31-1/4 inches long by 34-inches wide; it is welded out at the end of a 5-foot 5-inch latice-work boom made of 3/8-inch - by 3-inch steel angle. All of this is attached, by bolts, to the left-hand side of a four-wheel drive front loader. Figure 4 below, shows the configuration of the bucket and the boom. It also shows the bucket in a working position in the ditch.

Figure 4 P586-D-72973

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[1] Reprinted by special permission of the Chief, Technical Development Section, Department of Water Resources, State of California, Sacramento, California, from an article appearing in their Technical Bulletin No. 13, dated March 1972.

Figure 5 below, shows position of the attachment to the loader and the position of the bucket when loading into dump truck.

Figure 5 P586-D-72974

Operation

The ditch cleaning bucket was designed to be used by a two-man crew: one man operating the loader and one man driving a dump truck. In the cleaning operation the material only needs to be handled once, since the bucket scoops it out of the ditch and then dumps it into the truck. The cleaning bucket maintains the designed flow line of the existing ditch almost perfectly. The bucket also eliminates the hand cleaning of small trash from the ditch which often was left by other methods. The work operation can proceed down the ditch in one direction and there is no need to come back over the area worked. The operation consists of driving the front-end loader and truck out to the beginning of the job, positioning the loader so that the bucket extends into the ditch, and then driving slowly along until the bucket cleans up the loose earth and other trash out of the existing ditch.

Figure 6 on the next page shows the cleaning activity in progress, and Figure 7, shows the opposite view of the same operation. The photographs clearly show how clean the ditch is after just one pass with the bucket.

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INTRODUCTION

A most unique device for preventing vandalism to the gratings at structures in isolated areas is described in the first article starting on page 1.

Roadside drainage ditches at best are not easy to clean. The Oroville Field Division in Oroville, California, has solved the problem very satisfactorily with a custom-shaped steel bucket, as described on page 3.

Why burning is not a cure-all for a weed control problem is explained on page 9.

The damage to a pickup truck from a tire blowout is shown on page 10. Safety belts prevented serious consequences in this roll-over-type accident.

Seat belts are also the topic of another article on page 11, which emphasizes that arguments for not wearing seat belts are unrealistic.

"Buried Pipe Stops Agonizing Water Losses," is the title of the three-page article starting on page 12. This is a very successful program to replace open canals with underground pipe, which is expanding as fast as funds and time will allow.

The article starting on page 15 describes in detail a novel idea for a diversion dam boat boom that was developed and built for Palo Verde Diversion Dam by District personnel.

* * * * *

Figure 6 P586-D-72975

Figure 7 P586-D-72976

Figure 8 P586-D-72978

Figure 9 P586-D-72977

When the bucket is full (or when the available trash and gravel have been picked up) the loader operator drives to the rear of the dump truck and empties his bucket as shown in Figure 8 at left. This is repeated right on down the ditch line.

The bucket is not meant to be used as a ditcher, it simply cleans the existing facility so that drainage can continue unimpeded. A sort of before-and-after view of this is shown in Figure 9 at lower left.

There are about 10 miles of road-ways and ditches along the Power Canal and Tail Channel in the Oroville area. The roads have oiled gravel surfaces and are 12 to 14 feet wide. Using the loader bucket, the two-man crew cleaned three miles of roadway ditch, a total of 35 yards of material in one eight-hour working day; that was for a total of 16 man hours. This was taken as about an average days work, and the time required to clean all of the ditches could be pretty closely estimated. By comparison, if this roadway ditch had been cleaned by hand (based on experience) it would have taken two men a total of 144 hours to clean the three miles with a correspondingly larger amount of time needed to do the ditches on all of the roads. If a backhoe and truck had been used to clean the same three miles of ditch there would have been considerable scarring of the pavement from the stiff legs of the backhoe; also, the truck would have to back in each time to be loaded. Estimated total time: three men for five days, or a total of 120 man-hours.

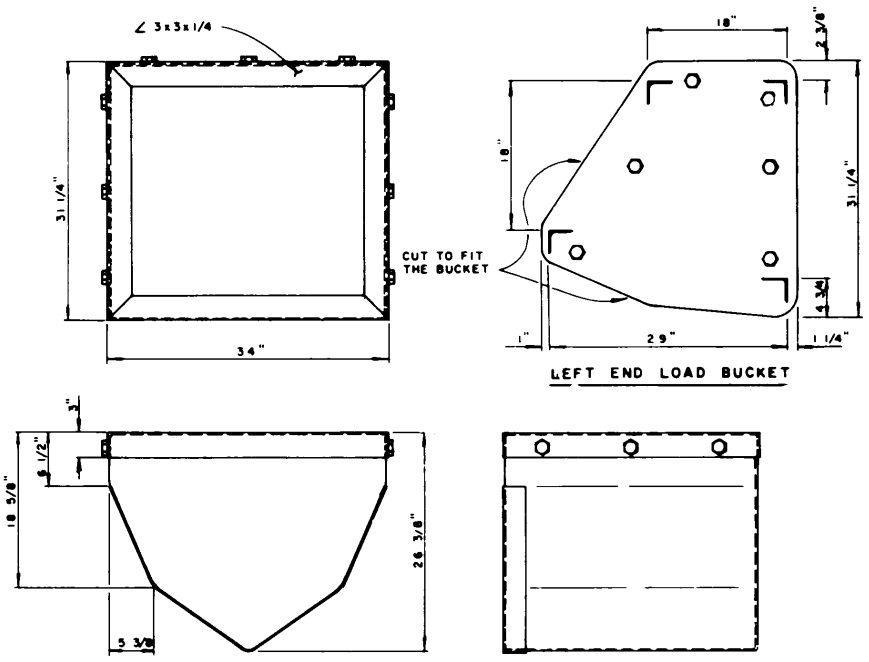

Figure 10

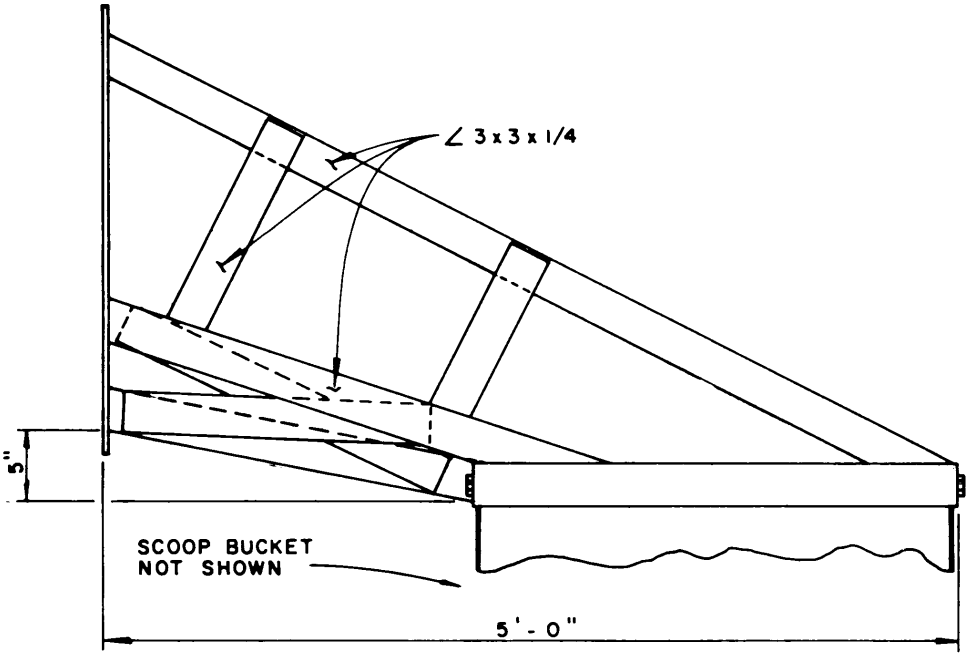

Figure 11

The roads are too narrow to use a front-end loader to clean the ditches. But where the front loader is used on wider roadways there is destruction of the road surface because of so much turning, and there is always a considerable amount of hand cleanup work required. This method also takes much time. The fastest method of these alternative ways might have been to use a power grader to windrow the loose material out of the ditch and then the front-end loader to pick up and dump. Here again, there would have been double handling of the material, some hand cleanup, and road surface damage. The new bucket is by far the best answer to date.

A detailed sketch of both the bucket and the boom can be found in Figure 10 and 11 on the preceding page. Prior to utilizing this design, it would be appreciated if proper clearance is obtained through--Mr. William B. Hansell, Senior Foreman, State of California, Department of Water Resources, Division of Operations and Maintenance, Clen Drive, Box 939, Oroville, California.

The bucket might be adapted to other uses, if required. Variations could be worked into the bucket and arm configuration. The shape of the bucket might be hydraulically adjustable; hydraulic rams might be used to vary distance and elevation. A small shoe could be placed on the outside of the bucket as a cutting edge, and there are many other possibilities.

* * * * *

In 1934, the American chemist, Harold Urey, showed that "H_2O" is not the whole chemical story of water. He proved the existence of heavy hydrogen (deuterium) and heavy water (D_2O). Then came the discovery of heavier hydrogen (tritium) and still heavier water (T_2O). Theoretically, therefore, in combination with 3 isotopes of hydrogen, 18 subspecies of H_2O are possible.

In 1808, John Dalton, an English chemist, published an atomic theory including the law of constant proportion among the elements in a given compound. That is, contrary to traditional belief, water has the same proportions of hydrogen and oxygen whether it falls from the sky, flows in the Rhine or is frozen in the heart of Antarctica.

BURNING NO CURE-ALL FOR WEED CONTROL[1]

Mature weeds are sometimes burned in the hope that the fire will destroy the weed seeds. The intensity of the heat determines the number of weed seeds that will be killed, and the amount of debris and litter to be burned determines the intensity of the heat produced by the fire.

Experimental work conducted in Colorado showed little, weed control on burned fields. However, work on Russian knapweed indicated 85 percent germination before burning but none afterwards. Germination of field bindweed (creeping jenny) seed was 36 percent before and only seven percent after burning. Other research revealed that seeds of many common weeds are killed when exposed for 15 minutes to temperatures between 175 and 212 degrees.

In Nebraska, burning stubble has not been an effective means of controlling wild oats. If a heavy stubble and straw cover exist and the burning is slow, such as would occur in a windrow, exposure to the heat may help break dormancy of newly shattered wild oat seed. However, burning as a rule is not a good agronomic practice and does not give acceptable wild oat control.

The effects of burning on weeds are sometimes strikingly shown after a prairie or forest fire. Weeds missing from the area for years may suddenly appear after a fire and become dominant plants.

It was explained by Dr. Laren Robison, extension weed specialist at the University of Nebraska, that exposure to moderate heat may break seed dormancy. And following a fire, weed seed germination may be enhanced.

* * * * *

Climatic conditions identical in all essential aspects with those that prevail now were established at least 5000 years ago, and perhaps 8000 years ago. The Near East and Middle East already were arid to semi-arid, and it was there that the early civilizations arose. This was no mere coincidence. The need for extensive irrigation required community effort for water diversion, maintenance of works and allocation of water, and these could be achieved only through effective social and political organizations.

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[1] Reprinted by special permission of the Editor, from an article that appeared in the February/March 1972 issue of Irrigation Age.

SEAT BELTS PREVENTED SERIOUS INJURIES[1]

Figure 12 PX-D-72396

Figure 13 PX-D-72397

The two photographs at left, Figure 12 and Figure 13, show a Power O&M International 1-ton pickup damaged in a rollover-type accident. Vehicle was traveling on an asphalt 2-lane U.S. Highway pulling a hotline tool trailer at 50 mph when the right rear tire blew out. The pickup swerved to the right immediately after the blowout and then to the left where it rolled completely over in the left borrow ditch, stopping on the wheels. The trailer rolled one and a half times stopping on its top, and it was still secured to the pickup with the safety chains but unhooked at the hitch.

The vehicle driver and another passenger received bruises on their heads and bodies. However, the seat belts which they were wearing prevented serious injuries. It is very fortunate that there was no approaching traffic at the time. The tire blowout occurred due to the wheel rim splitting. It was determined that the vehicle was considerably overloaded, and this probably caused the rim to split. All vehicles should be weighed to determine that the gross vehicle weight is not being exceeded.

* * * * *

[1] By Clare A. Erickson, Project Safety Officer, Missouri-Souris Projects Office, Bismarck, North Dakota and reprinted here by special permission, from the Reclamation Safety News, Third Quarter 1972.

STUDIES SHOW ARGUMENTS FOR NOT WEARING SEAT BELTS UNREALISTIC[1]

The reasons cited by motorists for not wearing safety belts are many, but all ignore the facts. Some motorists assert that they fear being "trapped" inside the car, rather than being, as they say, "thrown clear" in a crash. Their reasoning is false. Latest seat belt studies show that you are 30 times as likely to be killed if you are thrown out of a car than if you remain inside.

Fear of submersion in a body of water in an accident car also is cited by some as reason for not wearing safety belts. Studies have shown that submersion of the vehicle in an accident occurs in only 0.3 percent of all injury-producing accidents, an event of exceptionally low risk, which is comparable to the similar low risk of fire in serious accidents.

Studies conducted in the United States to date on the effectiveness of the combined lap-shoulder belts in accidents have been limited by the relatively small numbers of such restraint systems in use in crashes. Estimates of the use of lap-shoulder belts among those who have them available range from 2.5 percent to 5 percent. However, such data as are available indicate that this restraint system is extremely effective in reducing or eliminating injuries in severe crashes.

DID YOU KNOW

Carrying loose flashbulbs in your pocket can result in a painful burn. The friction of one bulb rubbing on another can set a bulb off, and when one flashbulb goes off, the heat it generates is likely to set the remaining bulbs off. The National Safety Council recommends that flashbulbs be kept in their wrappers prior to use. Avoid carrying loose bulbs in your pockets - they are a potential hazard.

A person should not wear sunglasses indoors under artificial light as this practice weakens the eyes' acceptance of all light.

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[1] Reprinted from the Reclamation Safety News - Third Quarter 1972.

BURIED PIPE STOPS AGONIZING WATER LOSSES[1]

Since the Cedar Bluff Irrigation District in Ellis County, Kansas, began operations six years ago, farmers in the district have agonized over costly water losses from seepage in their open canals. This water loss exceeded 25 percent in many of the district's sandy areas.

Now their common agonizing has turned into community action in a program of installing underground pipe to replace the open canals.

An Extension irrigation specialist, Mr. Russell Herpich, at Kansas State University, who gives professional assistance to the district, reports that pipe has already been installed in many problem areas in the district and that the installation is continuing as rapidly as funds and time allow. Figure 14 below, shows a typical underground pipe installation being installed to conserve water in the Cedar Bluff Irrigation District.

Figure 14 P372-D-72979

[1] Reprinted by special permission of the Editor, from an article in the July, 1972, issue of IRRIGATION AGE.

The first pipe installation was made in 1969. One-half mile of 15-inch PVC pipe and 900 feet of 10-inch pipe were installed as a replacement for an open lateral canal. The line cost the district $5,000.

During the summer prior to the pipe installation, there was 252.4 acre-feet of water diverted into the open canal. Only 161.6 acre-feet reached its final cropland destination. More than 80 acre-feet was lost from seepage and evaporation. At a cost of $5.00 per acre-foot, the annual water loss alone from that one open canal was running slightly more than $400.

Since the pipeline was installed, all water diverted down the lateral reaches its cropland destination. Water losses from seepage and evaporation are zero. Mr. Herpich points out that "the $400 yearly water savings will pay for the complete pipe installation in 12-1/2 years." Eroded and silted open irrigation canals shown below in Figure 15, are costly and unsightly. Underground pipe installations will eliminate such trouble spots.

Figure 15 P372-D-72980

Robert Schamel, district superintendent, adds that there are many other costs associated with open canals that are eliminated with pipe installation.

"We have 18 miles of main canal and 24 miles of lateral canals in our district." Mr. Schamel notes, "and our records show it costs us $125 per mile per year in weed control alone (materials and labor). Other maintenance costs such as canal cleaning make the bill even higher."

Since the success of the pilot project, the district and its farmers are cooperating in further pipe installations. The district and the waterusers are equally splitting the cost of the new pipe work. Special problem areas such as sandy spots, steep inclines where erosion is rapid and places where silt interferes with gated pipe operation are getting first attention.

In one location where 27 acre-feet of water is being lost for every 177 diverted from the main canal, a $435 underground pipe project will pay for itself in two years in savings from water loss, weed control and canal cleaning.

Mr. Herpich cites the Cedar Bluff pipe installation as a fine example of a self-help effort that benefits the agriculturally-oriented economy around Hays, Kansas, as well as the district and its irrigators.

"Any investment that conserves our precious Kansas water, reduces maintenance and labor costs, reduces soil erosion, irrigates more land with the same amount of water, helps prevent the spread of weed seeds in open canals and pays for itself in just a few years is certainly a wise one," Herpich stresses--"The more underground pipe installed at Cedar Bluff, the better off the community will be."

* * * * *

A small sealed vial in Paris, France, contains 45 grams of water that was synthesized in 1775 by burning a gas that later received the name of hydrogen. Today any schoolboy can do the same thing, but 200 years ago chemistry still had made no clean break with alchemy. The true structure and composition of chemical substances were unknown. Even water, the most palpable of substances, was a chemical mystery.

Characteristic of the Government executive is the instinctive acceptance of responsibility - responsibility not only toward his department and agency but also toward the community, the nation, and even the world.

DIVERSION DAM BOAT BOOM

The following article was recently submitted by our Lower Colorado Regional Office, Boulder City, Nevada, and was written especially for this publication by Mr. G. M. Davidson, of the Palo Verde irrigation District, Blythe, California. The boat boom described here is a unique operation and was fabricated and installed entirely by District personnel. It was installed above the Palo Verde Diversion Dam, on the Colorado River.

Pontoons for the boom were made of 12-gauge, 28 inch diameter steel pipe with 3/16-inch steel plate welded over the ends and 2 x 3 x 1/4-inch angle iron was used for the cable supports. Figure 16 below shows a full view of one of the pontoons with the cable attachment clearly visible.

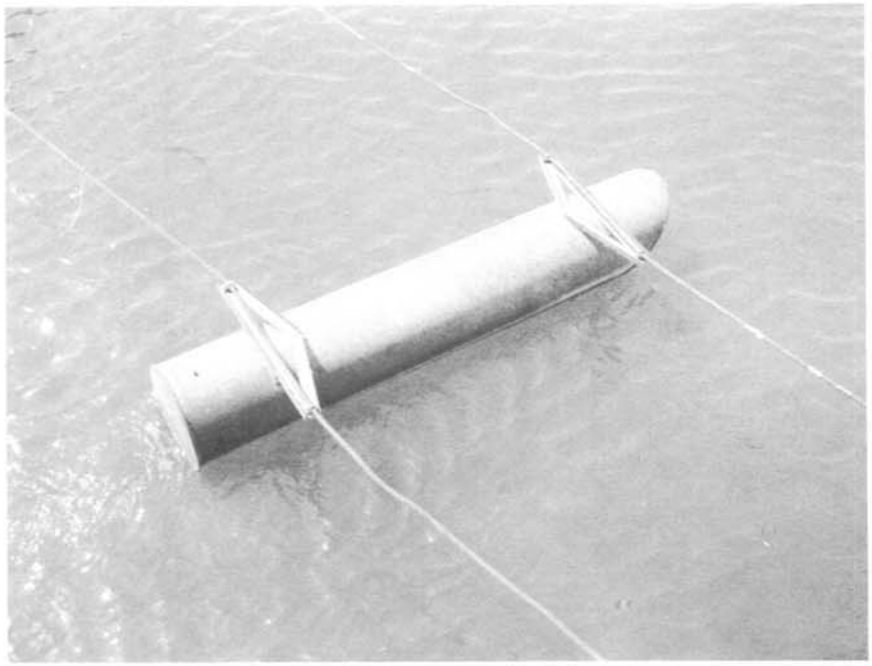


Figure 16 P385-D-72981

The entire surface of the pontoons are painted with an antioxidine paint and to keep them in good condition they are painted every two years.

Pontoons are spaced approximately 20 feet apart, supporting two 1 and 1/4-inch cables, as shown in Figure 17 on the next page. Cable clearance over the water is approximately 18 inches, and each cable is fastened to each pontoon in two places with cable clamps extending

through the cable support angles. Figure 18 below shows the booms east shore anchor on the Arizona side, and Figure 19 on page 18, shows the west shore anchor on the California side.

Figure 17 P385-D-72982

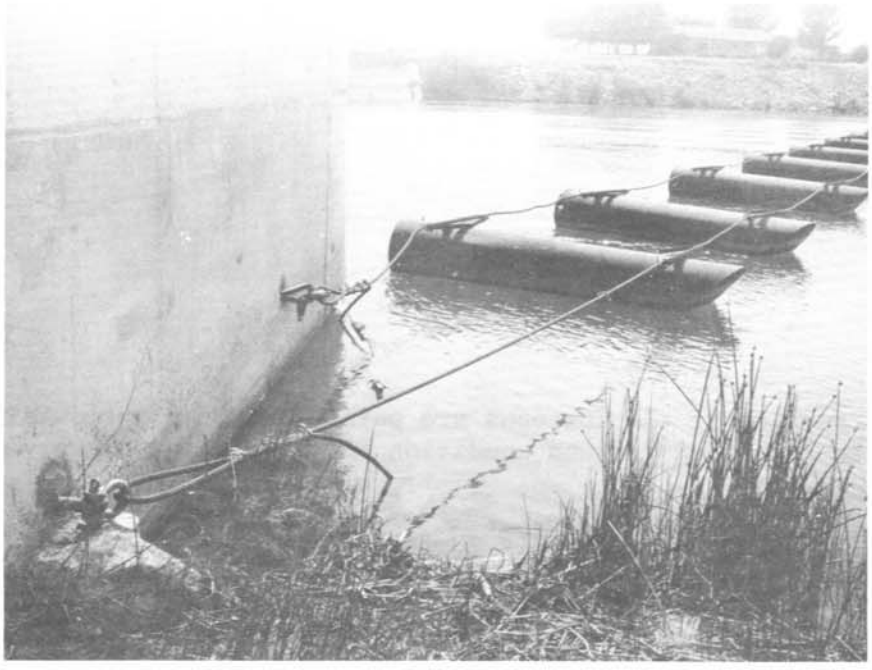
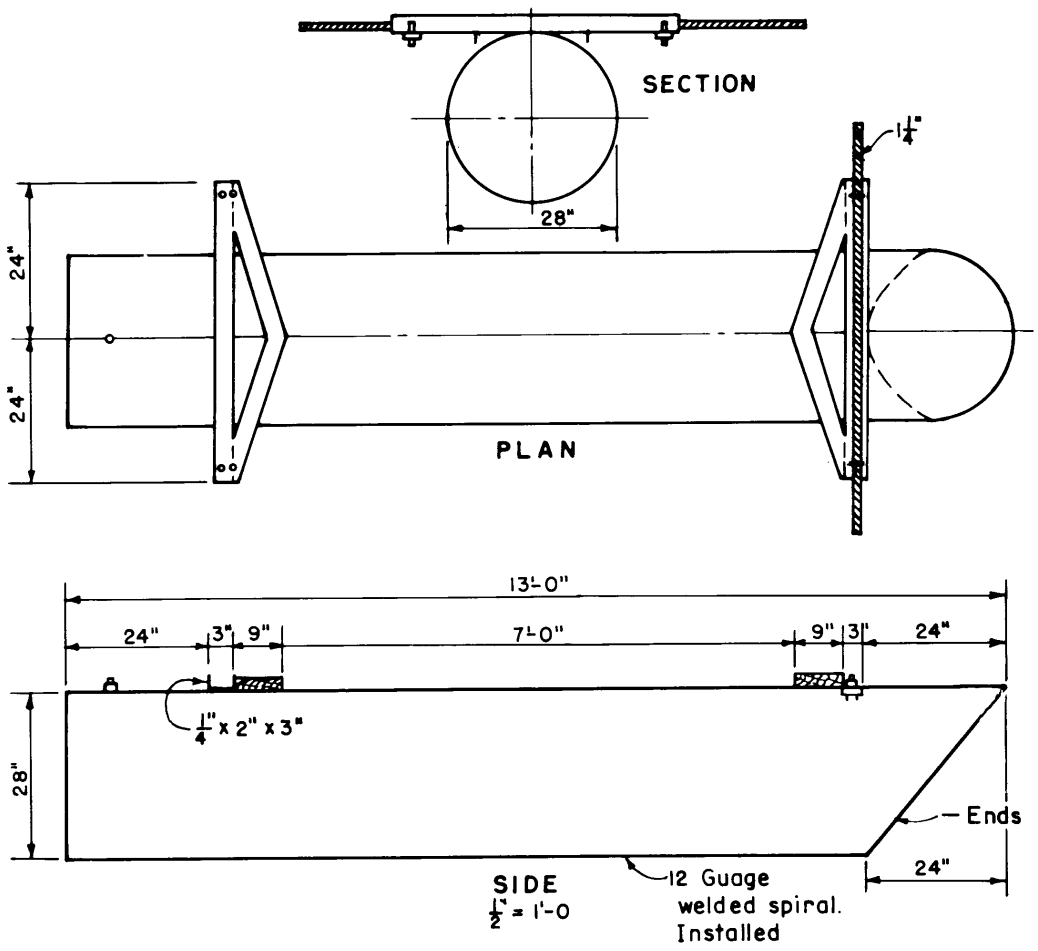
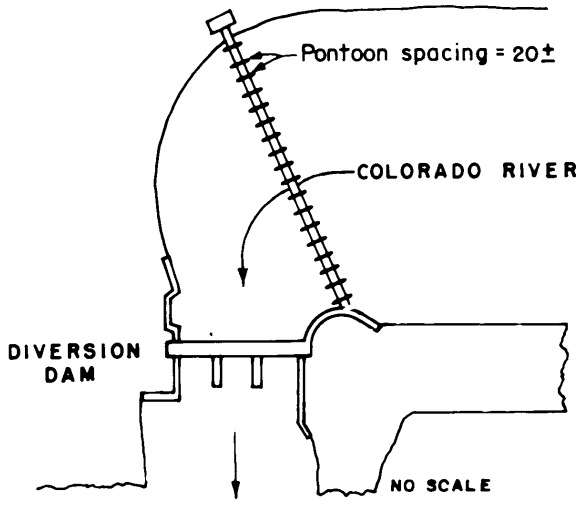


Figure 18 P385-D-72983





SKETCH

PALO VERDE DIVERSION DAM

DETAILS

Cable Safety Line and
Steel Pontoons

PALO VERDE IRRIGATION DISTRICT
Blythe, California

Figure 19 P385-D-72984

The boom as described here was installed in 1967 to replace one with 18-inch diameter pontoons that tended to catch a lot of floating debris and on occasions the old boom would roll over, twisting the cables.

This new boom installation has been very successful since installation. On several occasions the cables have proven to be low enough to catch boaters and swimmers, thus preventing them from being carried downstream over the dam.

A complete sketch of the boat boom described in this article can be found on the preceding page.

If additional information is desired regarding the boat boom installed above Palo Verde Diversion Dam, please write to the Regional Director, Lower Colorado Region, P. O. Box 427, Boulder City, Nevada 89005.

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GPO 846-461