

### AROMATIC SOLVENT MIXER

In applying aromatic solvent to control submersed water weeds, it is recommended the concentrated solvent be introduced at a drop or structure so that turbulence of the water will effect good mixing. Naturally, ideal conditions for mixing chemical with the water do not exist at every point where introductions are to be made so other means such as compressed air, stirring the water with paddles, and mixing of the chemical in the pumping unit have been investigated. A practical preintroduction technique of assuring dispersal of aromatic solvent has been developed and used by personnel of the Sunnyside Valley Irrigation District, Sunnyside, Washington, and is referred to in that area as the "Sunvalid Solvent System."

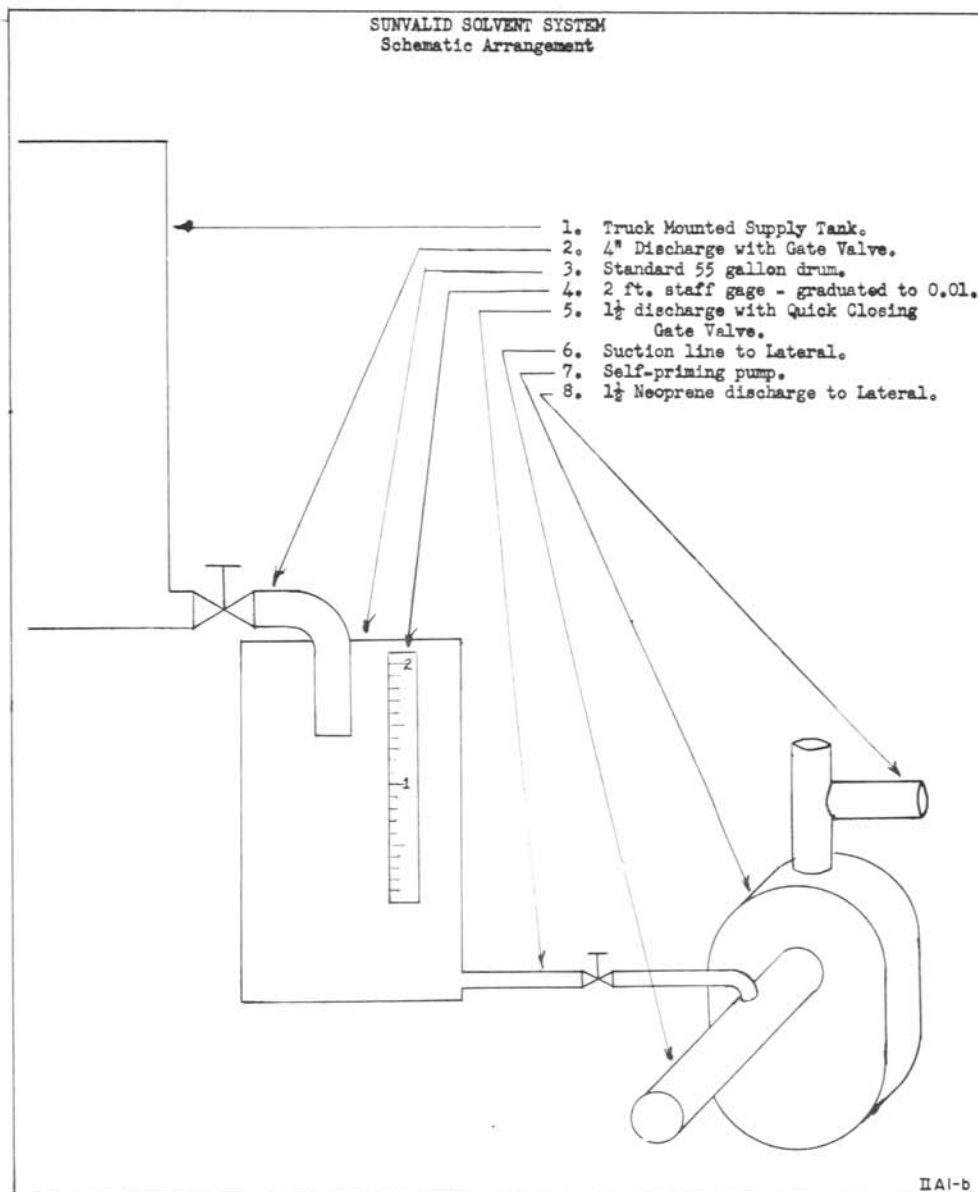
The mixing of solvent with water before it is introduced into the canal eliminates the necessity for nozzles. It also assures thorough dispersion of chemical in the first few hundred feet downstream from the introduction point which so often is difficult to obtain when nozzles are used.

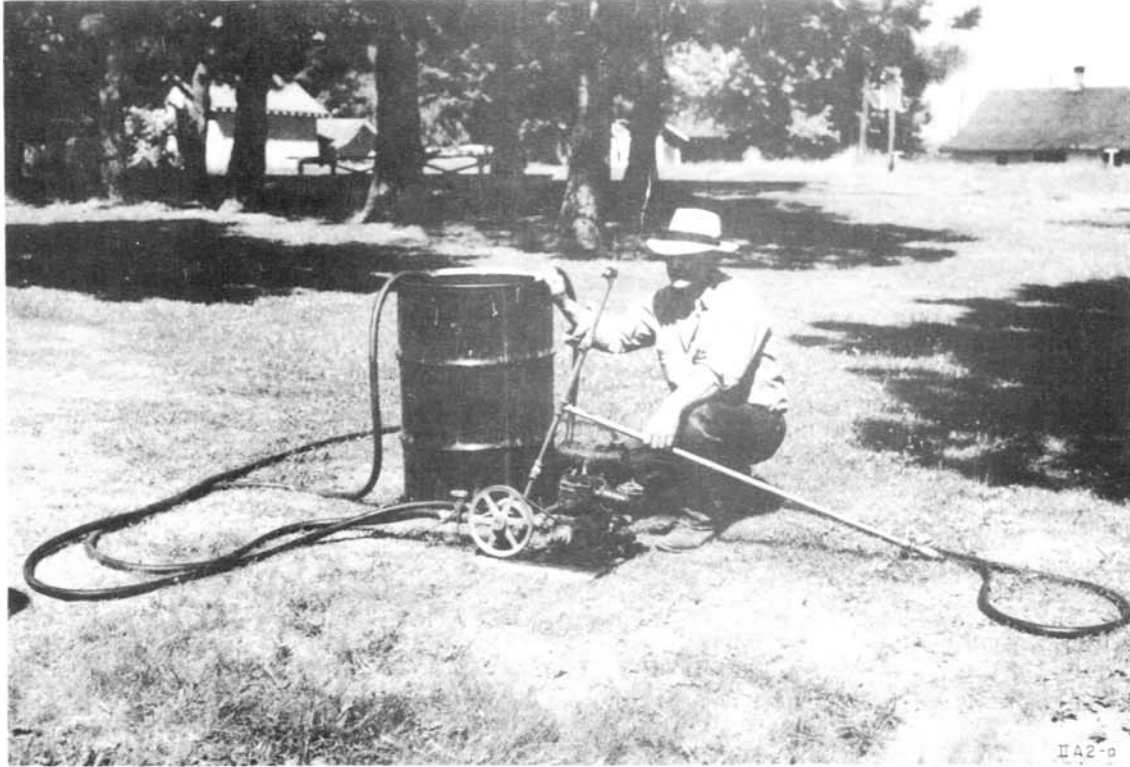
#### Construction Details:

The unit consists of a 4-inch centrifugal pump with intake lines to both the reservoir of chemical and to the lateral. Violent mixing of chemical and water is accomplished in the bell casing of the pump before fluid is discharged back into the lateral.

The intake line to the drum of chemical is fitted with a valve which controls the volume of concentration entering the pump. This particular unit has been used to apply chemical to ditches having a capacity ranging from 3 to 125 cubic feet per second. When Photograph IIA1-a was taken only 1 gallon of chemical was being pumped each minute. The rate of application recommended for controlling submersed aquatic weeds is 6 to 10 gallons of chemical for each cubic foot per second of water over a 30-minute period.

On other projects, mixing units similar to the one described are used which do not draw chemical from a barrel but the pumps are connected directly to a gasoline meter on the reservoir tank. The quantity of aromatic solvent is metered and by checking the volume against time and water flow, the chemical concentration built up in the ditch can be determined.





#### PUMP AND ENGINE FOR INTRODUCING AROMATIC SOLVENT

The equipment necessary to introduce aromatic solvent or Benoclor into small-sized ditches need not be more expensive or elaborate than the pictured unit which was constructed by personnel of the Tieton Division, Yakima Project, Yakima, Washington. A gear or vane pump with capacity of less than 5 gallons per minute when driven by a small air-cooled gasoline engine is satisfactory. Gear pumps without internal return should be equipped with an open by-pass system with the regulatory valve adjustable from 60 to 80 pounds pressure. Pumps with an open by-pass, as shown in the above photograph, must have a return line to the reservoir drum. Oil resistant hose (neoprene or saran) is recommended, and as petroleum oils are soluble in aromatics, the pump should be lubricated with silicone grease.

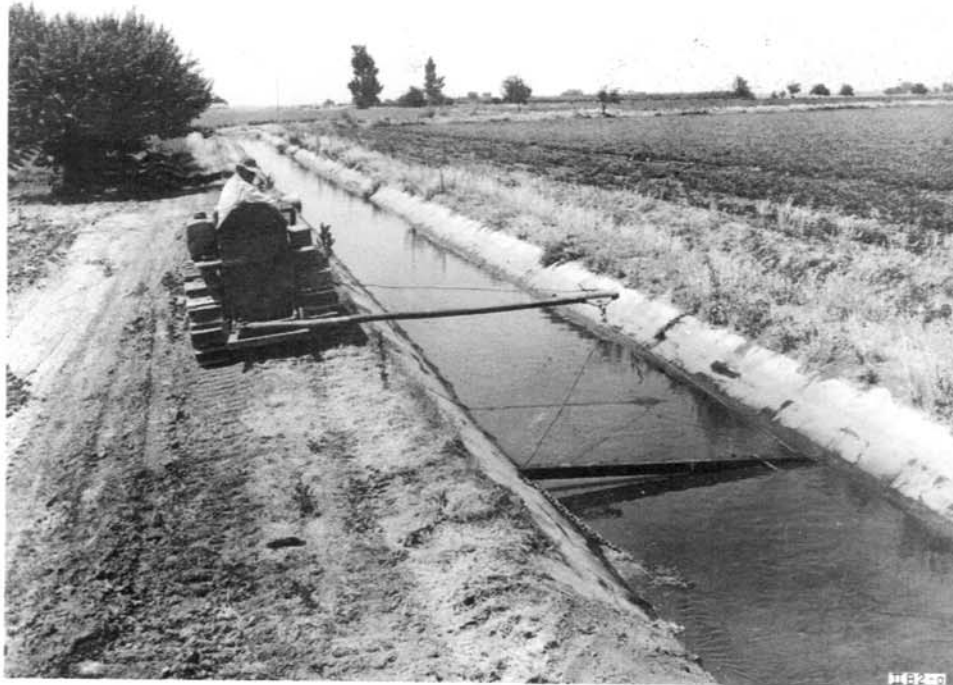
Any nozzle which delivers the required amount of fluid may be used. For small laterals one nozzle may be sufficient, but for larger laterals it will be necessary to assemble a manifold with nozzles 18 to 24 inches apart. By controlling the number of nozzles on the manifold or by changing size of nozzle tips, the necessary quantity of fluid can be introduced over the required contact period.



### CHAINING CART

Designed and constructed by operating personnel of the Payette Division, Boise Project, Notus, Idaho, an iron-wheeled cart to which is attached a series of cross bars, usually railroad rails, connected by chains, serves to break loose aquatic weeds from small laterals. The wheels which roll on a straight axle guide the cross rails down the lateral and even though the angle of pull is not direct the heavy cart will not creep out of the ditch. Four to six cross rails may be used depending upon density of the weed growth. With the flatside of rail forward maximum shearing action is produced on bottom of ditch to cut or pull loose the aquatic vegetation.





### SIDE-ARM BOOM AND DRAG

The side-arm boom has proved satisfactory for towing demossing equipment through irrigation ditches where only one ditchbank operating road has been provided. It also is useful for pulling harrows and other tools on sideslopes or embankments.

This boom was designed by personnel of the Patterson Water Company, Patterson, California.

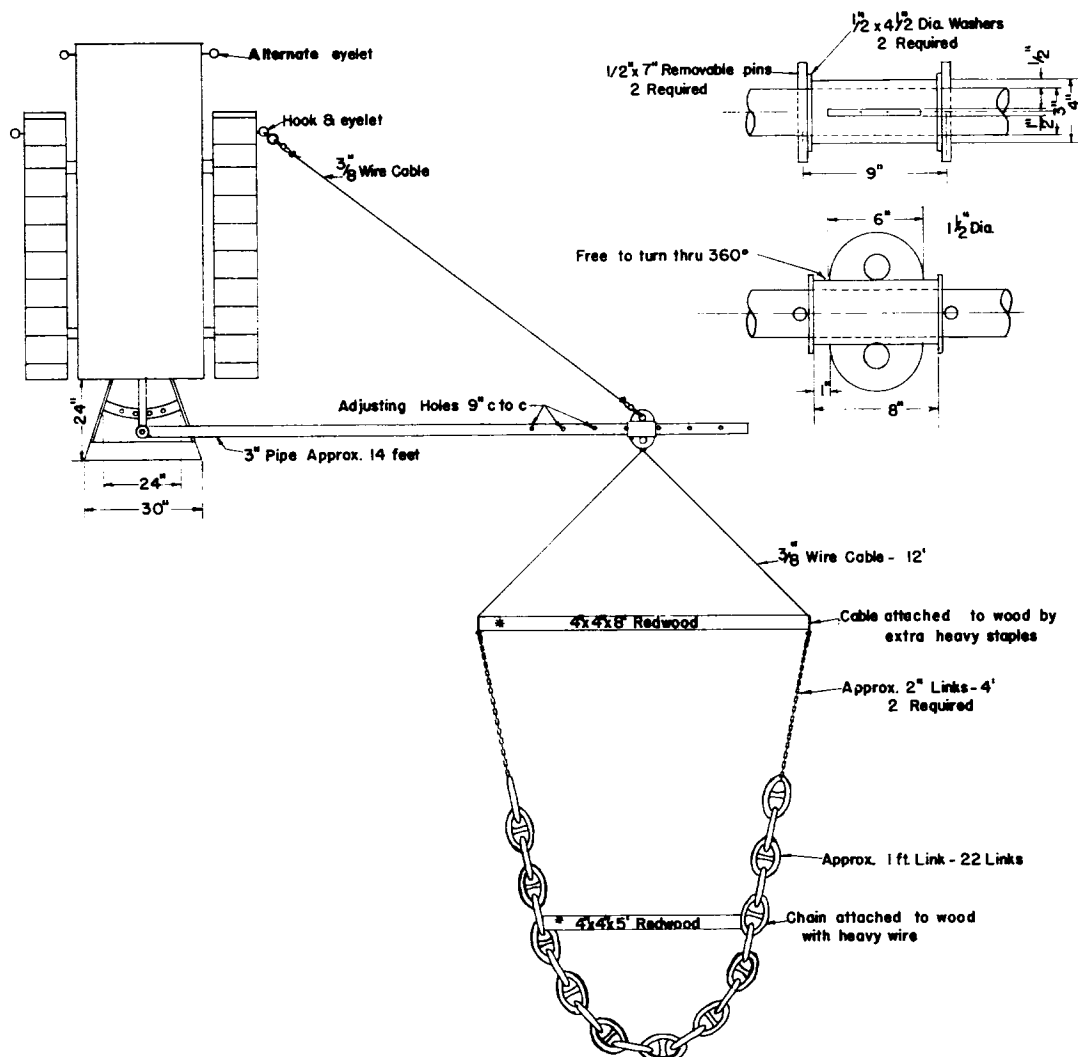
#### Construction Details:

A special platform is constructed on the tractor hitch as a support for the boom. The boom is made from 3-inch pipe to which the free-swinging butterfly is fitted and held in the desired position by two collar clamps. Being able to move the butterfly back and forth on the boom permits the operator to center the drag in ditches of different widths and also allows adjustment for the distance from the ditch where the tractor must operate. When it is desired to make a return trip, the hitch end of the boom is unpinned and refastened to the opposite side of the platform. The butterfly is turned over and the anchor cable is hooked into an eye welded to the track-bar shield on opposite side of the tractor.



The plank spreaders are necessary to keep the heavy chain at proper width to attain full coverage of the ditch. Sufficient length of cable and chain should be used so the entire loop lies flat upon the canal bottom and the pull is as vertical as possible. A drag that is too short results in an upward pull and the chain passes over the weeds without breaking or tearing them loose.





\* NOTE  
Length of spreaders dependant upon canal section

Developed by  
PATTERSON WATER DISTRICT  
Patterson, Calif.

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION	
<b>SIDE ARM BOOM AND DRAG</b>	
DRAWN: M.S.	SUBMITTED: _____
TRACED: _____	RECOMMENDED: _____
CHECKED: _____	APPROVED: _____
STOCKTON, CALIF. 3-6-1982	X-205-198



II83-0

### WATER-PROPELLED SCRAPER

The water-propelled scraper has been devised to cut loose sediment and waterweeds from concrete-lined canals. Pressure of the water against the vertical plank wall, which is cut to fit the shape of the lining, pushes the scraper down the channel. If the water pressure is not sufficient, the scraper is pulled by a truck. Scouring action of the water rushing between the movable scraper blade wings and the lining effectively sluices free much of the debris, that is not loosened by the bulkhead, shaped to fit snugly against the walls. The blade which serves as a runner for the scraper slices through and loosens the sediment on bottom of the canal. Hinged extensions on each side of the scraper bulkhead have been added so that the unit can be used in ditches of different sizes. A wasteway is necessary to remove debris cut-loose from the system.

Scraper was designed for use on the Contra Costa Canal, by personnel of the Delta District, Bureau of Reclamation, Stockton, California.



II83-0

II83-1





### CHANNEL GROOVER

Periodic draining and drying of the channels is the most economical and practical method of controlling submersed waterweeds. Where the method can be used, the sun and wind rapidly dry the exposed weeds and within a few days the tops are dead. Even though water must be carried in the laterals the year round, the Imperial Irrigation District operation and maintenance forces practice drying entire lateral systems for 3 days every 3 weeks, effectively reducing the weed problem. Periodically, it is necessary to groove or channel the bottom of the ditches to connect the low areas and permit rapid and complete draining so all weeds will dry quickly.

The unit shown in operation above and in detail on the following page, was designed and constructed by personnel of the Imperial Irrigation District, Imperial, California. Several sizes of the channel groover, sometimes referred to as the "moss plow" have been constructed but each is designed to slice a groove about 12 inches wide and 8 inches deep.

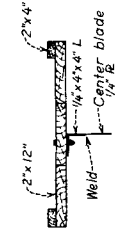
#### Construction Details:

The groover is constructed of heavy metal and planking. The plowshares are discarded grader blades or steel plates with lugs welded on one side for bolting into the platform. This unit weighs about 400 pounds.

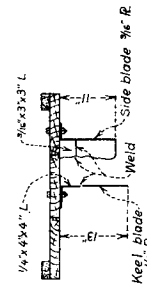


The forward lever is attached to a rolling couler which the operator manipulates to keep the sled near the center of the ditch. A movable arm on the hitch can be pinned in several positions to produce a more direct pull. The vertical staff at rear of the platform serves only as a handhold for the second rider who adds weight and also helps balance the sled.

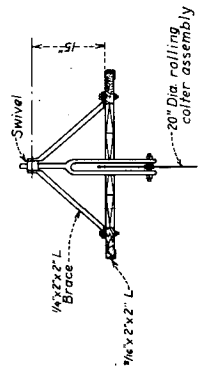




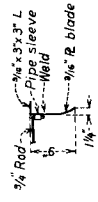
SECTION A-A



SECTION B-B



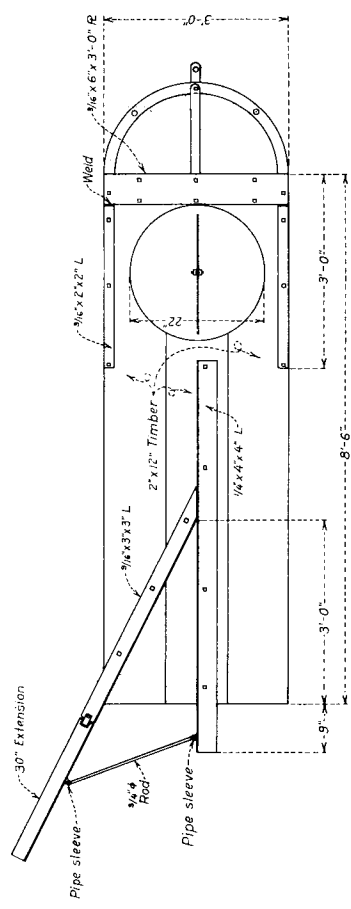
SECTION C-C



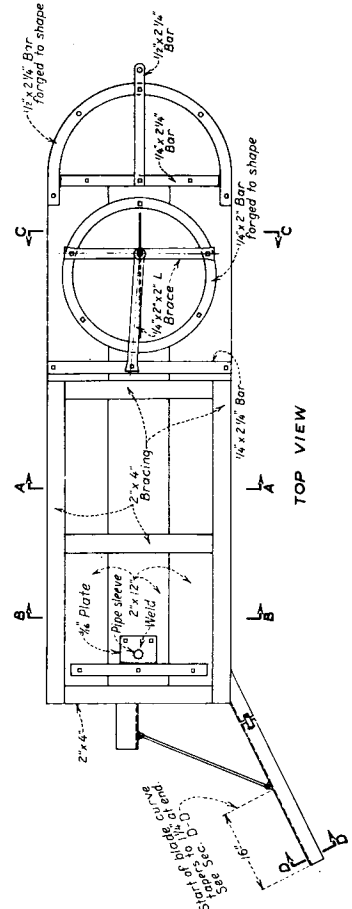
SECTION D-D

See top view for extent of blade curve section

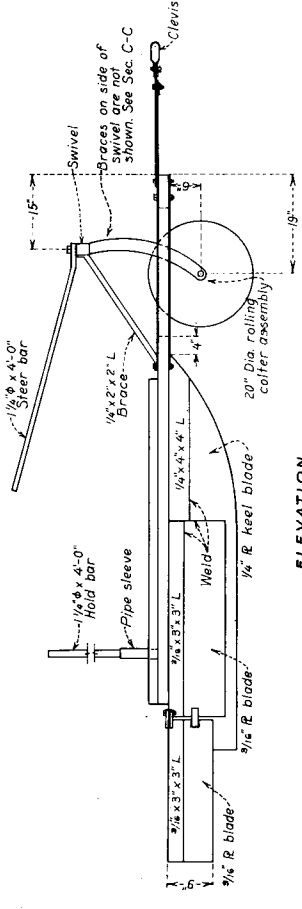
Traced from Imperial Irrigation District Drawing, No. 20-P-0342.



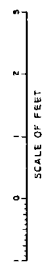
BOTTOM VIEW



TOP VIEW



ELEVATION



DRAWN BY: \_\_\_\_\_  
 TRACED BY: M.H.E.  
 CHECKED BY: \_\_\_\_\_  
 APPROVED BY: \_\_\_\_\_  
 DIVISION OF RECLAMATION  
 REGION 3  
 ARTS, CALIF., NEV., NEW MEX., UTAH  
**MOSS FLOW**  
 BODUCAR CITY, NEV. 10-17-1951 X-300-355

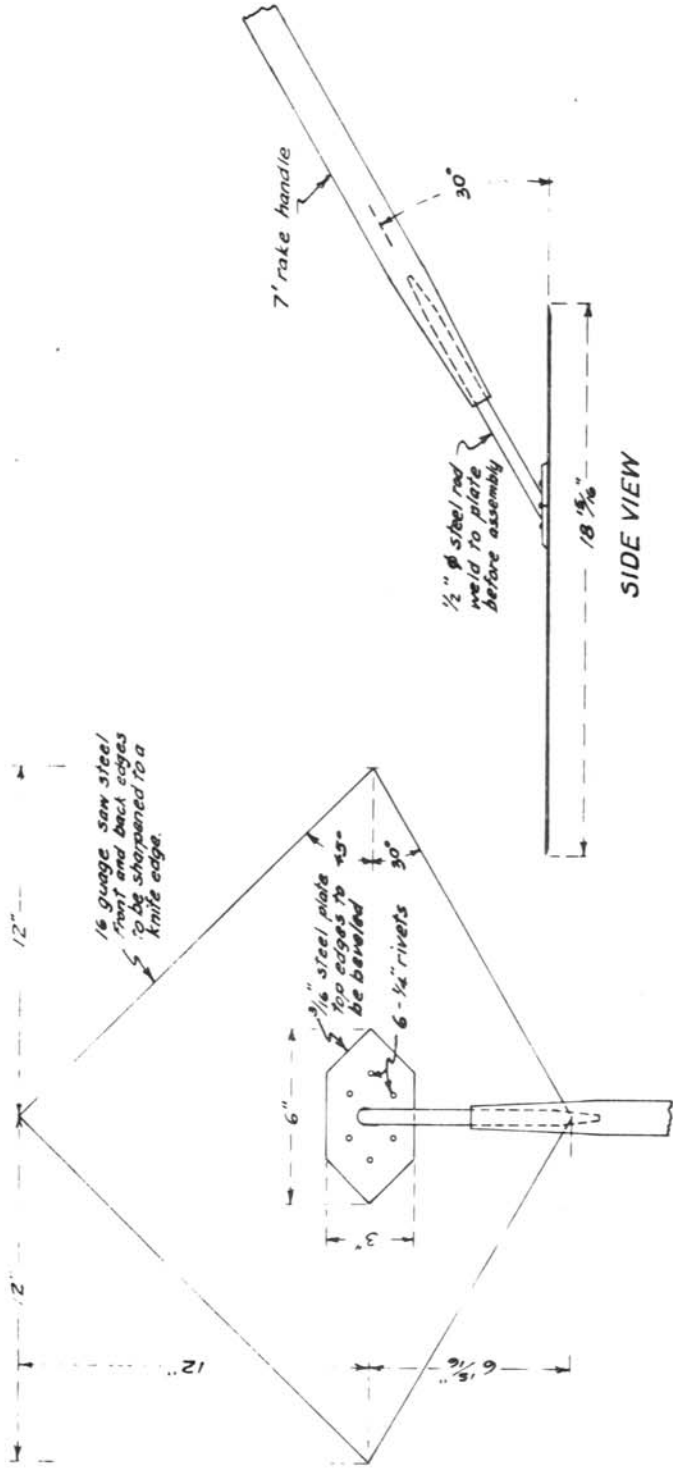
## HAND WATERWEED CUTTER FOR SMALL LATERALS

Every year small, sluggish sublaterals become infested with aquatic growths. The weed growths together with the silt deposits which accumulate among them rapidly increase the elevation of the water surface to a point where corrective action is required. Often the weeds in small ditches are removed by rakes or by dragging chains behind teams of horses or small tractors. However, hand-operated devices are useful in very small laterals where the infestation is not heavy or is in isolated patches.

This hand-operated "moss cleaner" was developed by personnel of the Tieton Division, Yakima Project, Yakima, Washington, to cut the aquatic plants on the bottom of the ditch. The implement is pushed by the operator wading up the ditch. Cut weeds float downstream to be removed with a weed hook at a screen or a structure.

### Construction Details:

The implement is a diamond-shaped blade of saw steel which is attached to a fork handle. Both edges of the blade are kept very sharp so the weeds are cut rather than being pulled. The hard-wood handle is fastened to the blade at an angle of 30 degrees. The details of the cutter are shown on the drawing on the next page.



UNITED STATES  
 DEPARTMENT OF THE INTERIOR  
 BUREAU OF RECLAMATION  
 YAKIMA PROJECT - TIETON DIVISION - WASH

**MOSS CLEANER**

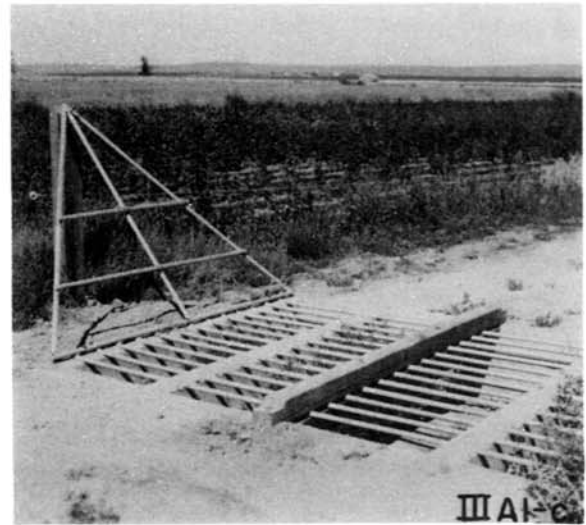
DRAWN P.L.H. SUBMITTED  
 TRACED P.L.H. RECOMMENDED  
 CHECKED ..... APPROVED .....

YTP 4002 YAKIMA, WN. FEB 17, 1945 1069



### CATTLE GUARDS

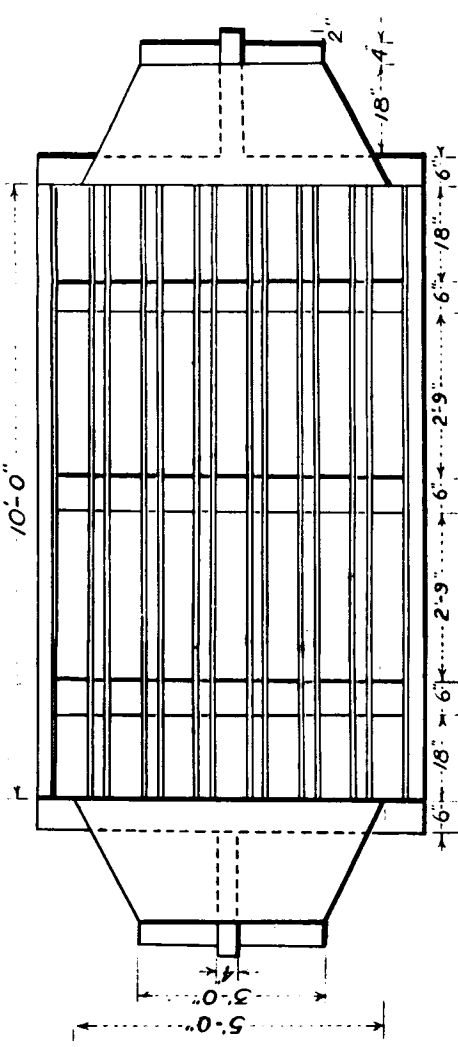
Pasturing of ditchbanks is an accepted and practical method of controlling weeds and utilizing forage along irrigation ditchbanks and on adjacent rights-of-way. However, proper control of the livestock requires fencing, and unless cattle guards are installed the ditchriders are confronted with the delaying chore of opening and closing gates. Several photographs and designs of different cattle guards which have been used on irrigation projects throughout the West are illustrated and design drawings are included.





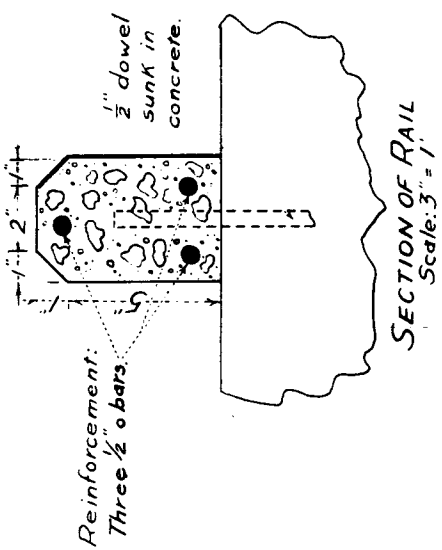
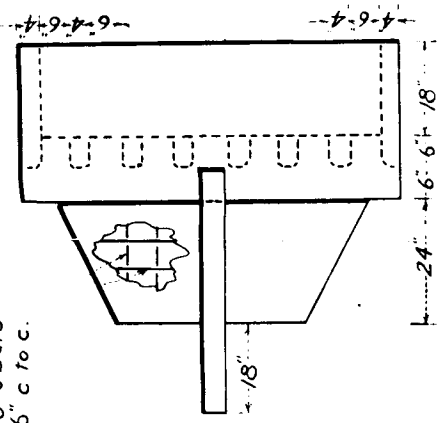


3/8" o bars  
6" c to c.

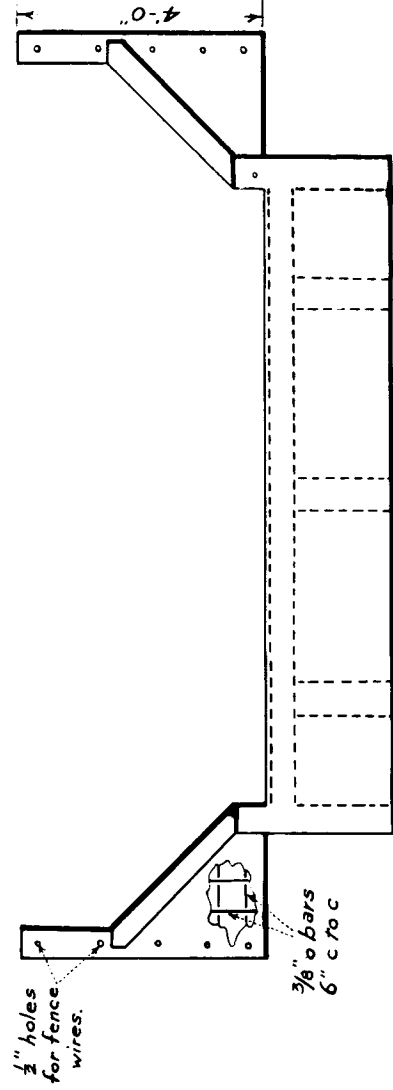


PLAN  
Scale: 1" = 2'

END ELEVATION  
Scale: 1" = 2'

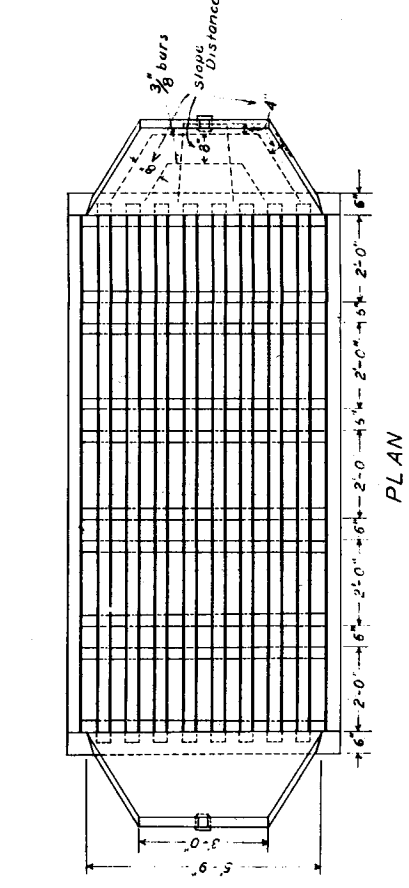
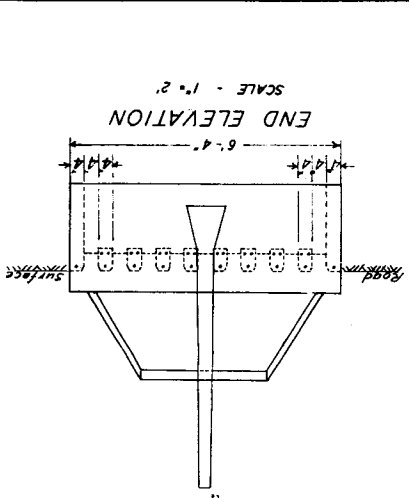


SECTION OF RAIL  
Scale: 3" = 1'

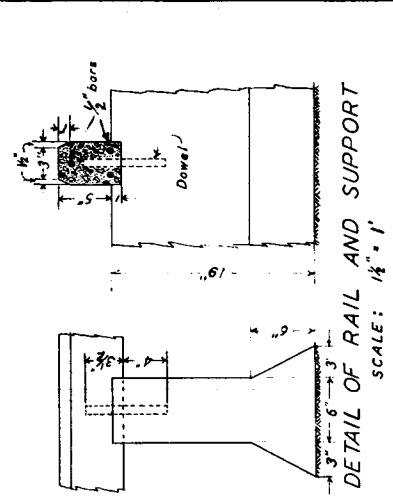


SIDE ELEVATION  
Scale: 1" = 2'

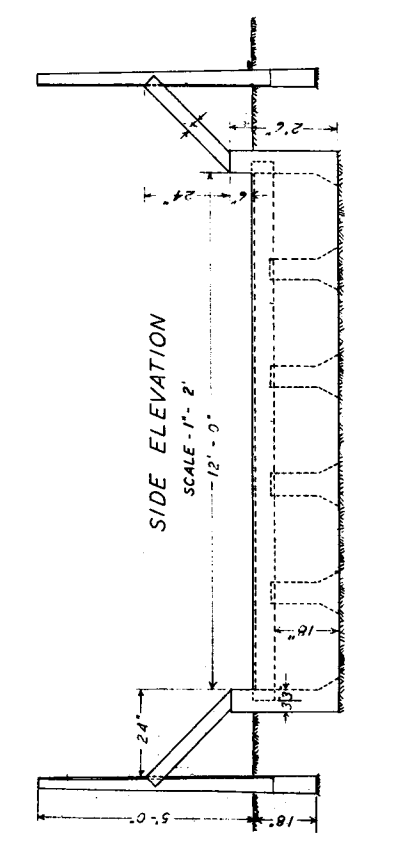
DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION ORLAND PROJECT - CALIF.	
<b>CATTLE GUARD</b>	
DRAWN: L.P.A.	SUBMITTED:
TRACED: J.L.	RECOMMENDED:
CHECKED:	APPROVED:
DR. 16	ORLAND, CALIF. 5/17/40 E 425



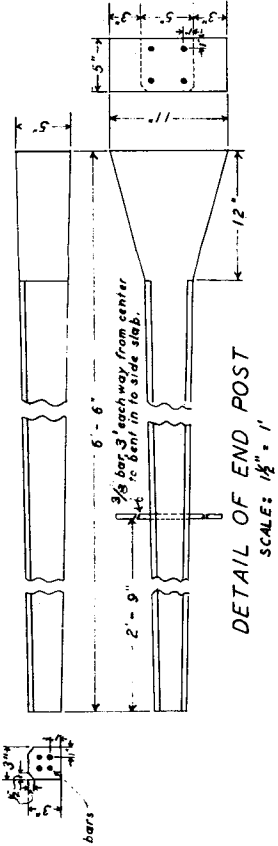
PLAN  
SCALE - 1" = 2'



DETAIL OF RAIL AND SUPPORT  
SCALE: 1/2" = 1'



SIDE ELEVATION  
SCALE - 1" = 2'



DETAIL OF END POST  
SCALE: 1/2" = 1'

Concrete required = 77.9 cu. ft. = 2.9 cu. yds.  
Steel Required: 12.2# = 342" = 228#  
Total Steel = 90" = 264#

Department of the Interior  
Bureau of Reclamation  
NEWLANDS PROJECT - NEV.  
CONCRETE CATTLE  
GUARD  
Drawn by: [Name]  
Checked: [Name]  
Submitted: [Date]  
Approved: [Signature]  
Fallon, Nevada 4-18-40

## SEED SCARIFIER

To assure even germination of hard-coated seeds for ditchbank and other planting, it may be necessary to treat the seeds in some manner which will facilitate the entrance of moisture and stimulate germination. This may be accomplished by soaking the seeds in water, treating them with dilute concentration of acid, or by mechanically scratching the seed coat. A simple, inexpensive, mechanical scarifier or scratcher may be constructed by following the accompanying design drawing.

This scarifier was constructed on the Pathfinder Irrigation District, North Platte Project, Mitchell, Nebraska.

### Construction Details:

**Emery Cloth:** Suggest using 2-1/2-grade 30E Silicon carbide paper on Number 80-grit emery cloth. Fasten paper in place with casein glue

**Wire Screen:** 20 mesh

