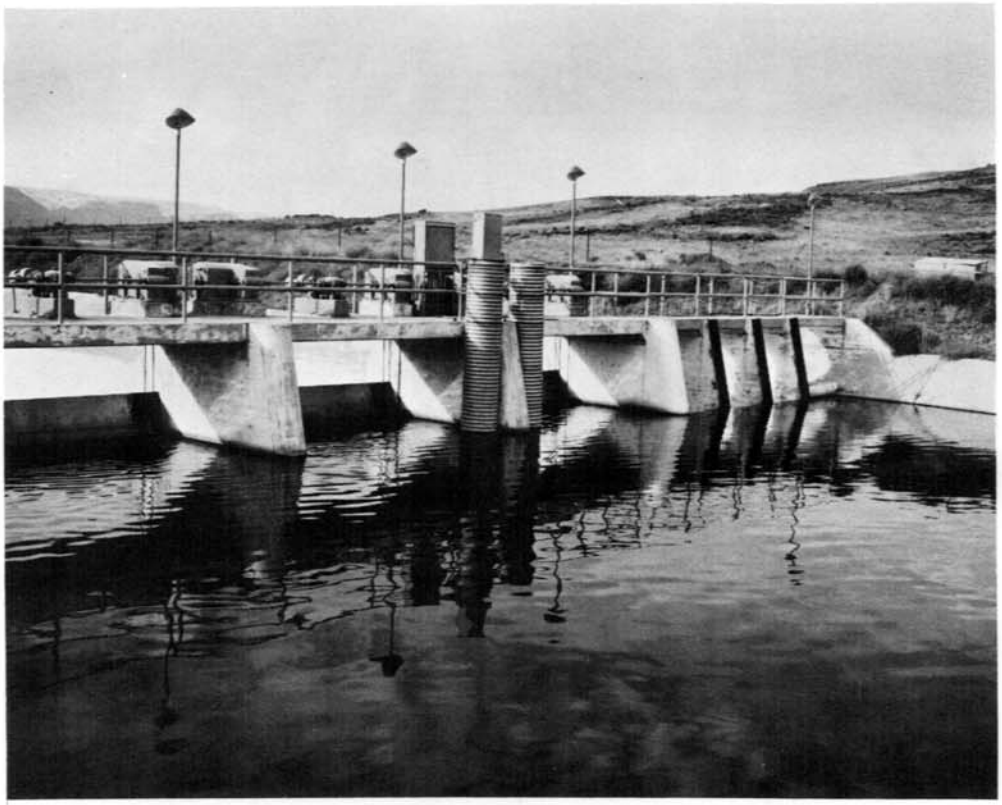
Department of the Interior
Bureau of Reclamation

OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES

RELEASE NO. 20

April, May and June 1957



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OPERATION AND MAINTENANCE

EQUIPMENT AND PROCEDURES

Release No. 20

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INTRODUCTION

This bulletin, published quarterly, is circulated for the benefit of irrigation project operation and maintenance people. Its principal purpose is to serve as a medium of exchanging operation and maintenance information. Reference to a trade name does not constitute the endorsement of a particular product, and omission of any commercially available item does not imply discrimination against any manufacturer. It is hoped that the labor-saving devices or less costly equipment developed by the resourceful water users will be a step toward commercial development of equipment for use on irrigation projects in continued effort to reduce costs and increase operating efficiency.

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Division of Irrigation Operations

Commissioner's Office
Denver, Colorado

AUTOMATIC GATE CONTROL AT CHECKS

Operating people have a serious problem in trying to keep their water deliveries constant, especially since the use of siphon tubes has become very common among modern farmers. It is not unusual for a farmer to use a hundred or more siphon tubes in one setting of his irrigation water with the expectation of having the water run more or less unattended for several hours. However, with a fluctuating water supply, some or all of the siphon tubes may lose their prime and the tubes will then have to be set again. Such a situation is likely to make the farmer quite belligerent toward the man responsible for delivering water to him. It is this fluctuation of delivery that O&M people hope to eliminate by the use of automatic gate controls. It is not their intention that the automatic controls will eliminate the necessity for patrolling the canal.

There are different types of automatic and semi-automatic gate controls available. The January 1953 issue of the Reclamation Era contained an article describing a very successful automatic gate control installed at the White River Check on the Friant-Kern Canal of the Bureau's Central Valley Project in California. Since that time additional installations of similar devices have been made on this and on other Bureau projects. Use of an automatic gate control device on the Columbia Basin Project in Washington is described in an interesting article prepared by the staff of the Columbia Basin Project for this issue of the O&M Bulletin.

"Little Man" of Central Valley Project

A device dubbed the "Little Man" on the Central Valley Project keeps the level of the water in the canal above a check at a constant predetermined elevation. Control of the level of the water above a check by the "Little Man" is accomplished by varying the check gate opening so that the head of water over a turnout gate remains constant. The amount of water delivered through a turnout therefore does not vary.

The "Little Man" was developed by H. E. Van Every, Roy W. Heath, and Glenn C. Beach, Maintenance Division Chief, Electrical Technician, and Electrical Maintenanceman, respectively, of the irrigation operations staff of the Central Valley Project. Mr. Van Every contributed ideas after a search of existing information, Mr. Heath contributed the electrical circuits and Mr. Beach the physical assembly. The efficiency of the "Little Man" in maintaining constant rate of delivery, despite varying flow through the Friant-Kern Canal has led to the use of the device with some modification and improvement at other locations on the Central Valley Project. In attesting to the efficiency of the "Little Man", Manual Aaron, Operation and Maintenance Superintendent of the Delano Section of the Friant-Kern Canal, a principal supply canal of the Central Valley Project, says the "Little Man" is the best hand he has and one that always does as it is told.

Columbia Basin Controls

With modifications suggested by the Central Valley Project and others by their own technicians, the Columbia Basin Project has now installed 20 automatic gate control devices. Because of the many benefits derived from the automatic controls installed to date, the project is considering the conversion of certain hand operated gates to power operations so that it will be possible to install the automatic controls on these.

The Columbia Basin staff emphasize that the automatic gate control was devised as an aid to operating personnel in maintaining canal water levels at nearly constant elevations and to reduce the magnitude of water fluctuations; the primary objective being to obtain a more uniform flow into laterals, and accordingly, more uniform farm deliveries. Actually, the project finds more benefits from the automatic device and summarizes them as:

1. Nearly constant canal water levels are maintained, resulting in much more satisfactory farm deliveries.

2. The time required of operating personnel in adjusting gates is greatly reduced.

3. Planned changes in flow in the canal system are reflected much more rapidly than manual regulation would give.

4. Unintended changes in flow caused by storm runoff or other causes are handled automatically with a minimum of water fluctuations.

5. A reduction in the amount of water spilled at canal and lateral wasteways has resulted in material water and power savings. This has been particularly helpful on certain gravity channels supplying water to relift pumping plants.

6. Greater precision in maintaining specified rates of raising or lowering water levels during periods when filling or emptying canals.

7. It has been possible to operate most of the canal system at a lower level, thereby effecting a reduction in seepage losses from the canals.

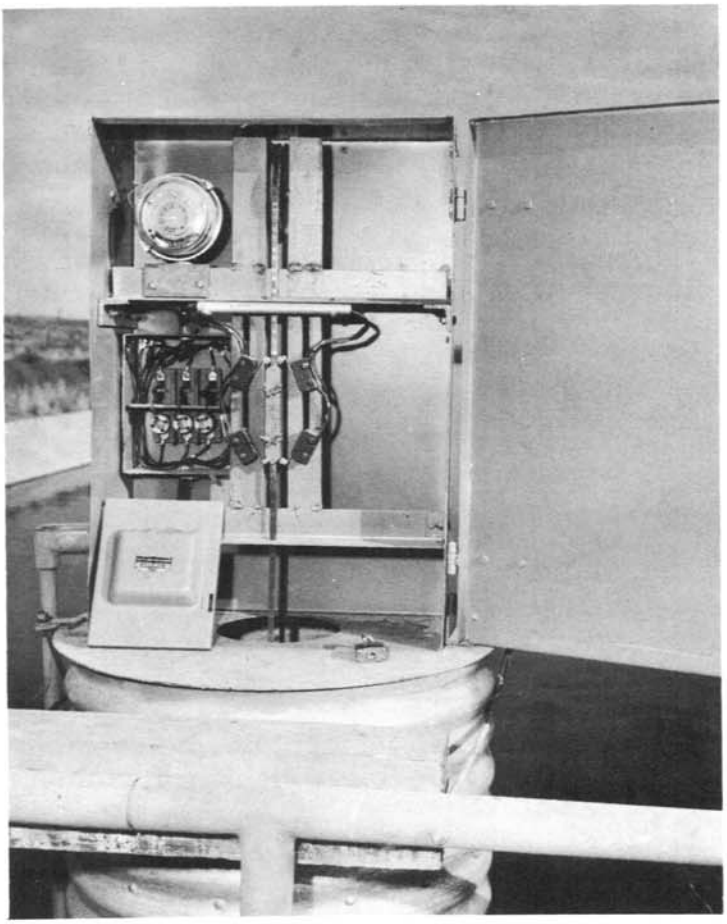
Construction

The photograph on the cover of this issue of the Bulletin shows an installation of the automatic gate control on the High Hill check structure of the West Canal of the Columbia Basin Project. The control is mounted on the left 24-inch diameter corrugated metal pipe well. The right well is a temporary installation on which a water stage recorder was mounted for checking the degree of water level control afforded by the automatic device.

The device, as will be gathered from the previous discussion, is for use on power operated gates only. Those in use through 1956 have been built in project shops. The components are few and inexpensive.

A 24-inch diameter corrugated metal pipe stilling well is attached to the upstream face of the gate structure. Full and partial canal depth wells both are used and both have been very satisfactory. The wells shown in the cover photograph extend only four or five feet below the water surface. Plates cover the bottom of the partial depth wells.

Water is admitted to the well through a small hole to minimize the effect of canal surface fluctuation caused by waves on the water level inside the well. The float in the well is a standard recorder type and preferably should be about 14 inches in diameter. Attached to the float is a standard graduated stainless steel tape; the graduations on the tape aid in making adjustments.



The tape, photograph at left, passes over the pulley mounted in the cabinet installed on top of the well. The other end of the tape carries a counterweight sufficiently heavy to offset the tripper and unbalanced tape, plus enough weight to actuate the micro switches. It has been found that a two to three pound counterweight is sufficient. Clamped to the float side of the tape is the tripper, which actuates the micro switches.

The photograph also shows the arrangement of the electrical equipment. In the center of the cabinet are the micro switches and tripper. Left of center is a three pole safety switch and above this, a time switch.

The micro switches are in pairs, the upper pair control the circuit through the time switch and the gate opening relay circuit; the lower pair control the circuit through the time switch and gate closing relay circuit.

Operation

The time switch controls the period the gate operating circuits are closed, thus giving the water level above the gate time to reflect small gate changes before the gate changes become large and result in excessive "hunting" by the mechanism. On the Columbia Basin Project one minute cycle time switches have been used; that is, the switches make contact once a minute. The "on" time of the switch generally is set at about 2 percent of the cycle; that is, the contacts remain closed for about 2 percent of one minute. It may be necessary to vary this percentage to get optimum results, depending upon gate size and speed as well as head of water on the gate.

The three-pole fused single throw safety switch, mounted inside the cabinet, is used as a means of disconnecting the automatic control and also for protection.

As an added safety precaution, if desired, the existing limit switch installed on the gate hoist may be reset to prevent the check gate from opening beyond any certain point. No change should be made in the lower travel limit switch.

The automatic control device ties into the existing gate installation without alteration of the mechanism or motor control circuits. Manual control takes precedence over the automatic device and the gate may be adjusted at any time by pressing the manual control button, regardless of whether the gate is on "automatic" or not.

To obtain operating information, a water stage recorder was installed temporarily at one automatically controlled gate. The recorder showed the maximum variation either above or below the set water level to be generally in the magnitude of 0.03 foot. If such close control is not required, the pairs of micro switches may be set further apart; generally, this will result in decreased operation of the gate mechanism over a given period as compared to a closer setting.

In cases of multiple gate structures, installation of the automatic control is made on just one gate. The non-automatic gates are adjusted manually from time to time to maintain a fairly well equalized discharge through all gates.

Details of Construction & Operating Instructions

Several drawings of the automatic gate control device used on the Columbia Basin Project will be found on the following pages, including

Gate Control Assembly	Drawing No. 222-116-24809
Installation Detail and List of Parts	Drawing No. 222-116-24810
Wiring Diagram	Drawing No. 222-116-24812
Steel Box for Controls	Drawing No. 222-116-24819
Instruction Chart (to accompany operating instructions). . .	Drawing No. 222-116-24823
Stilling Well Installation.	Drawing No. 222-116-24829

The design of the automatic gate control, on the Columbia Basin Project, was prepared by A. C. Garing and D. H. Gaston. G. R. Burrows assisted with the electrical circuits. All are employees of the project's Irrigation Division.

Prints of the above drawings may be obtained by writing the Project Manager, U. S. Bureau of Reclamation, Ephrata, Washington. The Project Manager also may be contacted for additional copies of the instructions, reproduced below, for operation of the automatic gate control at checks.

OPERATING INSTRUCTIONS FOR AUTOMATIC GATE CONTROL AT CANAL CHECKS

Columbia Basin Project

1. Description and purpose. The gate control was devised to help the O&M personnel keep the water surface in the large canals to a more constant level, thereby causing a more uniform flow into the laterals and farm deliveries. It is operated by a float and counterweight connected with a graduated steel tape over a pulley. A switch trip is mounted on the tape which actuates a set of Micro Switches mounted in a cabinet over a float well (see Drawing No. 222-116-24823). The two upper Micro Switches operate together to open the radial gate and lower the water surface. One of the switches closes the circuit from the power source to the repeating schedule clock or timing device. The other closes the circuit between the clock and the main switch (located in the check control cabinet) that opens the radial gate. The two lower Micro Switches work in the same sequence but close the radial gate when the water surface gets below the desired level. The timing device is set to operate in an "on" and "off" cycle that controls the motor switch. During the "on" time the gate motor is in operation. The "off" part of the cycle is the time between each movement of the gate and gives the water level time to stabilize.

NOTE: Any suggestions for improvement of the device should be reported to the Maintenance Engineering Branch, Irrigation Division.

2. Placing the Automatic Gate Control in Operation

(a) Adjust switch trip on graduated steel tape so that float will be at desired water level.

(b) Micro switches should be between and equidistant from each tape guide, so that the switch trip can rest against the tape guide, either upper or lower, and still keep in contact with the respective set of Micro Switches.

(c) Adjust Micro Switches so that the upper and lower pairs of switches are tripped simultaneously. As a result of experiments

conducted at the W-20 Check, it is recommended the Micro Switches be set for .05 foot variation in the movement of the switch trip from the "off click" of the upper set of switches to the "on click" of the lower set of switches. It is also recommended that the timing device be adjusted to 2% "on" time out of every one minute cycle.

(d) Throw circuit breaker located inside check structure electrical control cabinet, to "on" position and try gate operation with push button control.

NOTE: Push button control has precedence over the automatic control even though the automatic control is in operation.

(e) Throw safety switch, mounted in the Automatic Gate control cabinet, to "on" position.

(f) Raise and lower switch trip to determine that the timing device is working. Allow the clock to run long enough to determine that the gate will open and close. If gate does not raise or lower see if gate is in position of one of the examples given under Paragraph 5.

(g) Do not leave the Automatic Gate control "on" unless you are satisfied it is operating satisfactorily.

3. Closing down operation of Automatic Gate control

(a) Throw the safety switch to "off".

(b) Raise the float out of the water and leave suspended on the switch trip.

(c) Place silica gel in cabinet near Micro Switches and inside clock cases.

4. Procedure for changing water level in the canal. When it is desired to change the water level in the canal, note the tape reading at which the switch trip is in equilibrium between the Micro Switches (read tape at top or bottom of switch trip). Add or subtract desired change to the tape reading and reset switch trip to this new reading. Be sure that the switch trip is in contact with the set of Micro Switches that produce the desired results.

There is an adjustable hook connecting the tape to the float. This should be adjusted so that the counterweight is always above the float. The reason being, that if the counterweight gets down too far it will rest on top of the float, thereby causing an adverse condition. Be sure that the float and counterweight is secured to the tape so that they will not accidentally come off.

5. Possible occurrences. If the repeating schedule clock (timing device) is running and the gate motor does not operate the

Micro Switch between the source of power and the repeating schedule clock is closed but the switch on the opposite side (between the clock and motor) may not be closed. Both Micro Switches should be adjusted to close as near the same time as possible. This will avoid excessive running of the repeating schedule clocks and give better control. The open and close gate motors are equipped with limit switches which govern over the Automatic Gate Control device. If the gate is opened or closed to the limit switch, the clock will be running if the Micro Switches are closed.

Example A. If the radial gate is resting on the bottom of the canal and there is not enough flow to cause the water level to rise, the switch trip will stay down holding the Micro Switches closed. Consequently the repeating schedule clock will be running in an effort to lower the gate further and raise the water level. Under this same example, the gate might be down resting on a piece of driftwood, therefore leaving an opening under the gate. In this case the gate cables will be slack.

Example B. If the gate opens until the motor is cut out by the limit switch, the water surface below the check may be higher than the setting for the desired water level above the check.

6. Technical adjustments to be made only by Pump Maintenance men, or personnel of Maintenance Engineering Branch.

(a) Timing devices:

(1) Make adjustments for percent "on" time and length of cycle.

(2) Check for moisture inside glass. (Determine cause and clean if necessary.)

(3) Be sure that all outside openings are sealed.

(4) Repair or replace defective clocks.

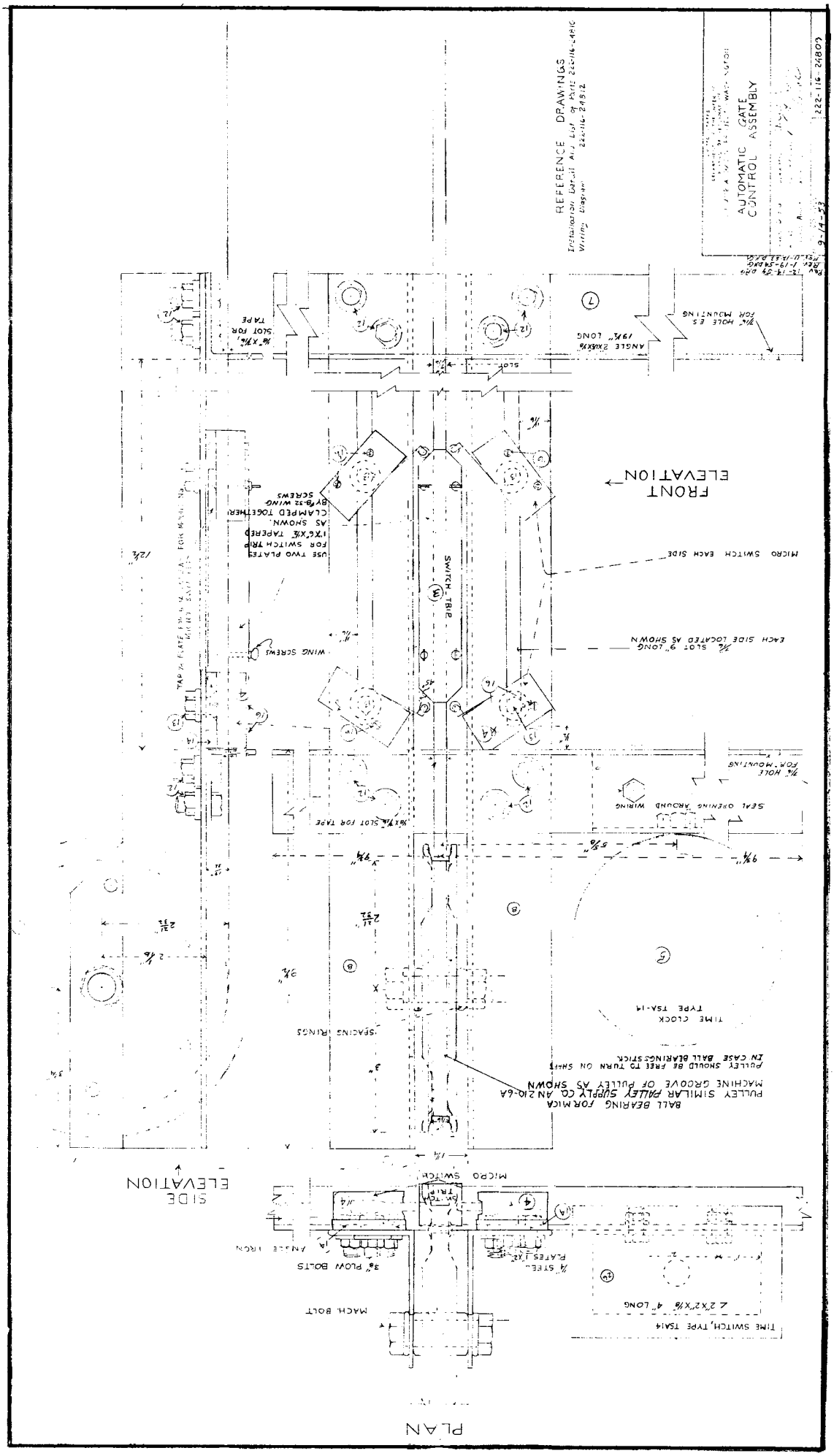
(b) Micro Switches:

(1) Make adjustments (see Paragraph 2(b)).

(2) Replace defective switches.

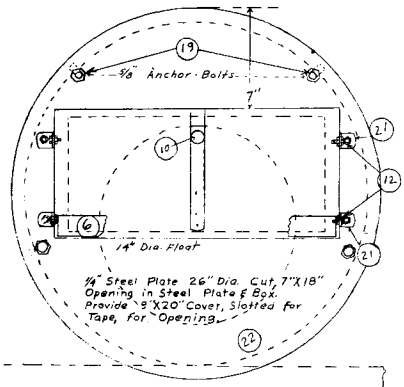
(c) Pulley:

Check ball bearings in pulley and clean if necessary. Do not oil.


AUTOMATIC GATE CONTROL ASSEMBLY
222-116-24809
REFERENCE DRAWINGS
FRONT ELEVATION
SIDE ELEVATION
PLAN
MICRO SWITCH
SWITCH TRIP
TIME CLOCK TYPE TSA-14
TIME SWITCH, TYPE TSA14
MACH. BOLT
3/8" PLOW BOLTS
ANGLE IRON
SEAL OPENING AROUND WIRING
WING SCREWS
MICRO SWITCH EACH SIDE
EACH SIDE LOCATED AS SHOWN
BALL BEARING FORMICA PULLEY SIMILAR PAULEY SUPPLY CO. AN210-6A MACHINE GROOVE OF PULLEY AS SHOWN
PULLEY SHOULD BE FREE TO TURN ON SHAFT IN CASE BALL BEARINGS STICK
SPACING RINGS

PLAN

Shown with top of 16 Gage Steel Box Removed



LIST OF PARTS

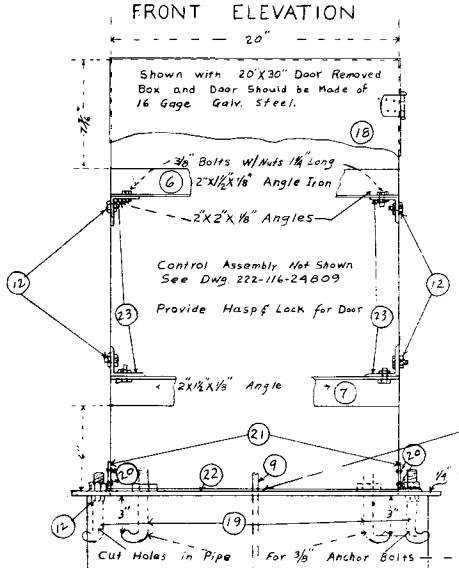
PART NO	DESCRIPTION	MATERIAL	NO REQ'D
1	* Pulley, 6" - Ball Bearing		1
2	Pin for Pulley 3" Long		1
3	(Switch Trip) Plates 1"X 6"X ¼"	Brass	2
4	Micro Switch, Similar to Honeywell BZ-2RW82		4
5	Time Clock Type TSA-14		1
6	Angle Iron 1½"X2"X⅛", 19½" Long		1
7	Angle Iron 1½"X2"X⅛", 13½" Long		1
8	Angle Iron 2"X2"X⅛", 24" Long		2
9	Graduated Stainless Steel Tape ⅜" Wide 21' Long (Feet, Tenths & Hundredths)		1
10	Counter Weight		1
11	Float, 14" Dia.	Copper	1
12	⅜" Mach. Bolts W/nuts & Lock Washers 1¼" Long	Steel	26
13	⅜" Plow Bolts W/nuts & Lock Washers 1¼" Long	Steel	4
14	Plate 1"X2"X¼"	Brass	4
15	Adjustable Clamp & Hook for Stainless Steel Tape	Brass	2
16	#6-32 Screw, ⅞" Long, Round Head	Brass	6
17	#6-32 Screw, ⅞" Long, Flat Head	Brass	4
18	30"X20"X8" Box W/hinges, hasp & Lock	16 ga. Steel	1
19	Hook Bolts ⅜" Dia. 5" Long	Steel	4
20	⅛" Rivets ½" Long	Steel	16
21	Anchor Plates, 90° bend, 1"X⅛", 3¼" Long	Steel	4
22	¼" Plate 26" Dia.	Steel	1
23	Angle Iron 2"X2"X⅛" 4" Long	Steel	4
24	Swivel	Brass	1
25	Safety Switch, 3 Pole, Single Throw 3 blades, 3 Fuses		1
26	Angle Iron 2"X2"X⅛" 4" Long		1

Note: Repeating Schedule Clock Should be for 115 Volt Circuit with a Total Cycle of one Minute Similar to General Electric Type TSA-14.
Paint All Non-Bearing Surfaces With a Rust Preventive.
* Pulley Should be light Weight, Similar to Pulley Supply Co. AN 210-6A

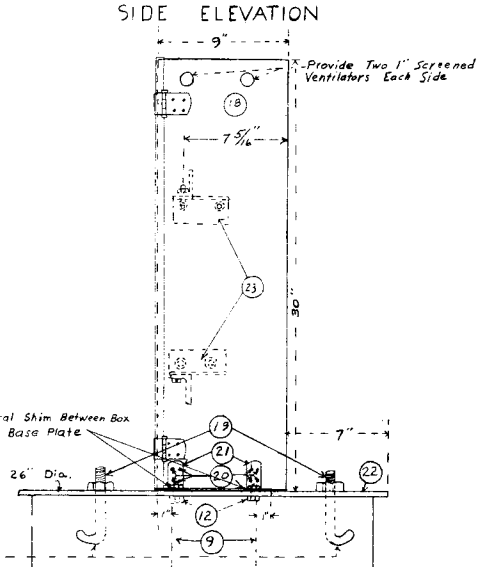
REFERENCE DRAWINGS

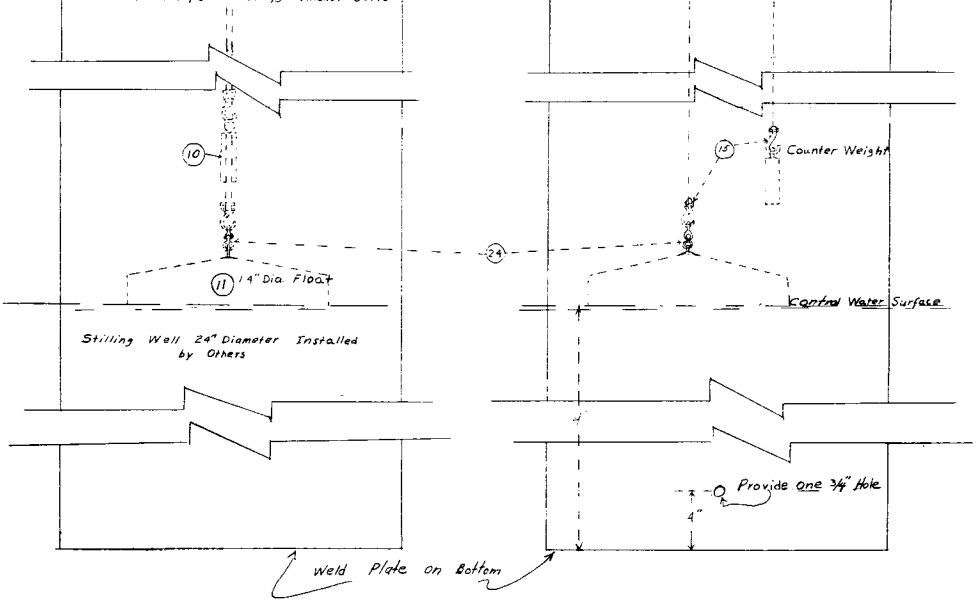
AUTOMATIC GATE CONTROL ASSEMBLY 222-116-24809
WIRING DIAGRAM 222-116-24812

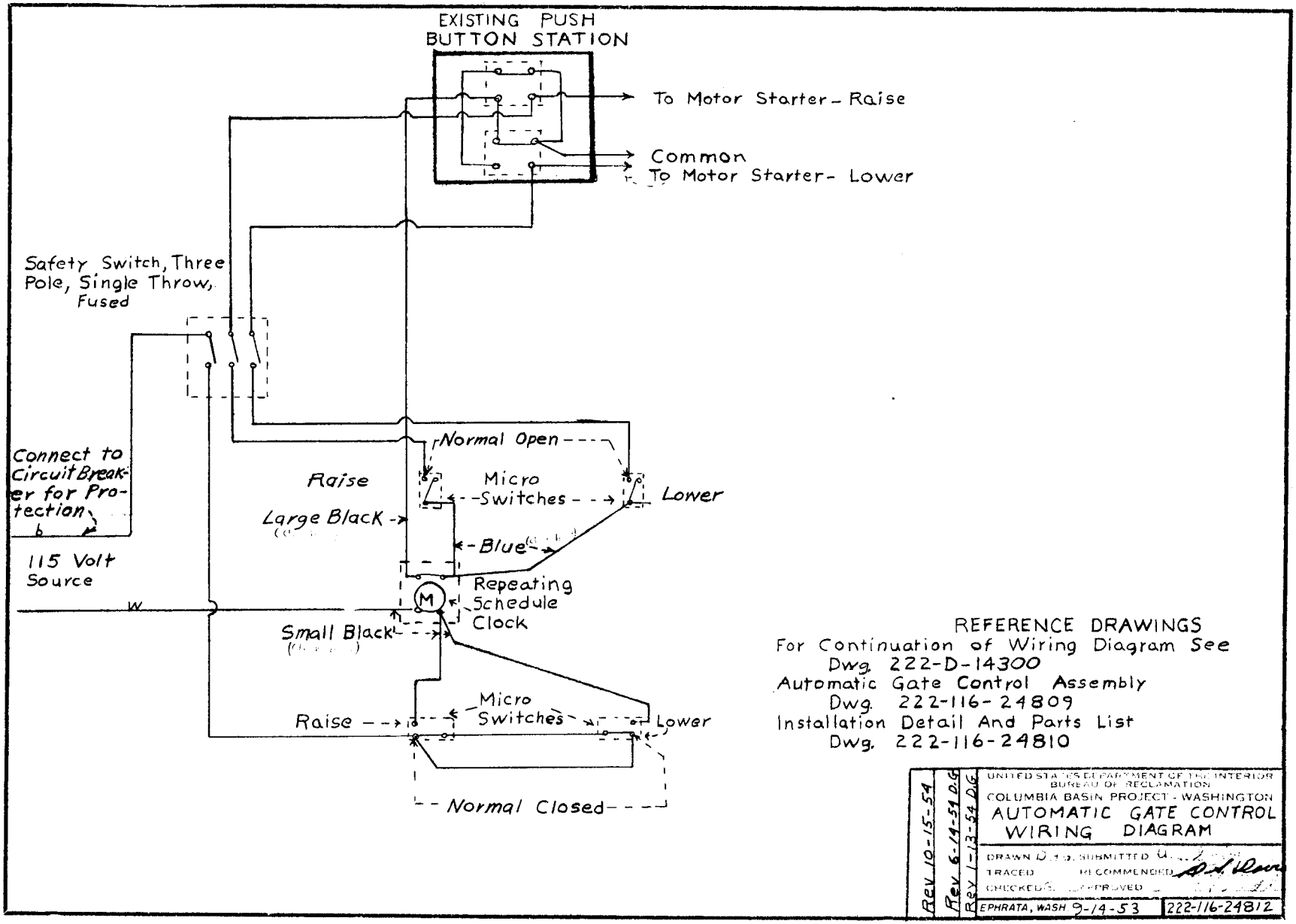
FRONT ELEVATION



SIDE ELEVATION







REFERENCE DRAWINGS

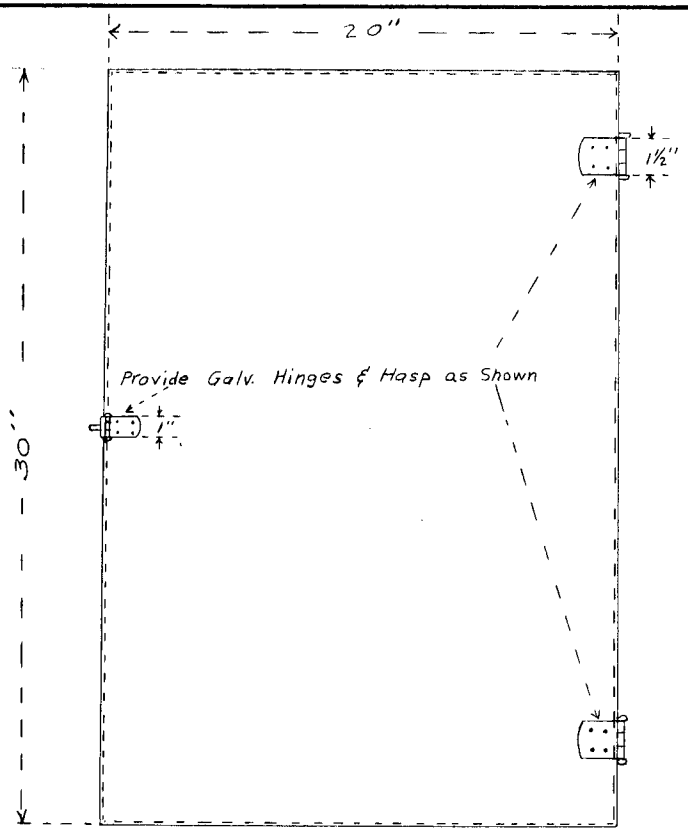
For Continuation of Wiring Diagram See
Dwg. 222-D-14300
Automatic Gate Control Assembly
Dwg. 222-116-24809
Installation Detail And Parts List
Dwg. 222-116-24810

Rev. 10-15-54 D.G.
Rev. 6-14-54 D.G.
Rev. 1-13-54 D.G.

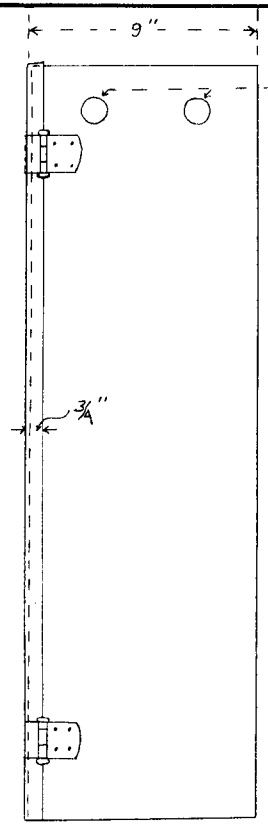
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA BASIN PROJECT - WASHINGTON
AUTOMATIC GATE CONTROL WIRING DIAGRAM

DRAWN D.J.G. SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED

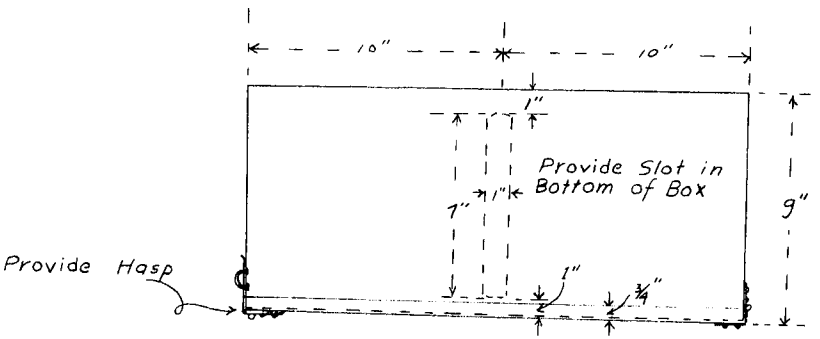
EPHRATA, WASH 9-14-53 | 222-116-24812



FRONT ELEVATION



SIDE ELEVATION



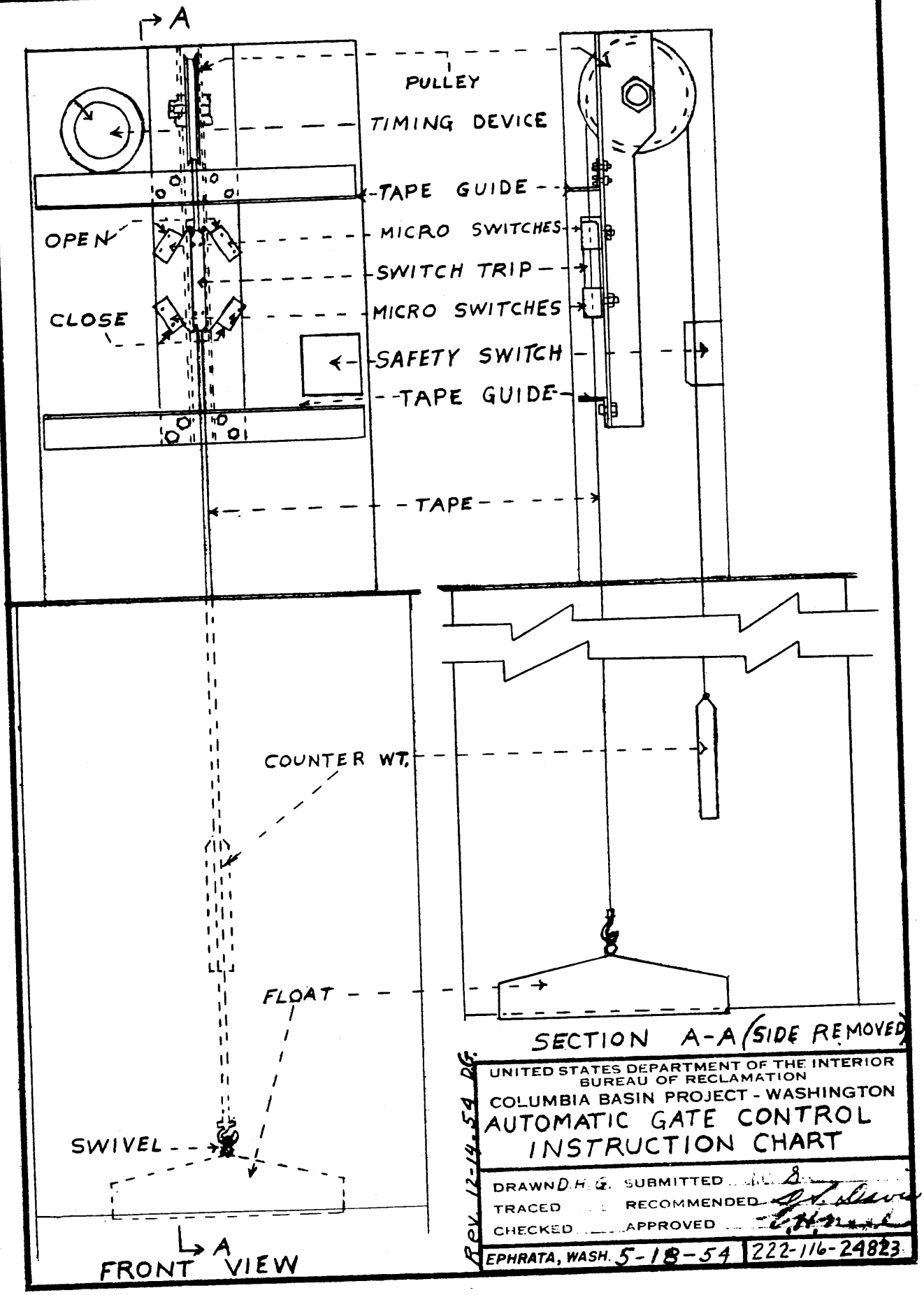
PLAN

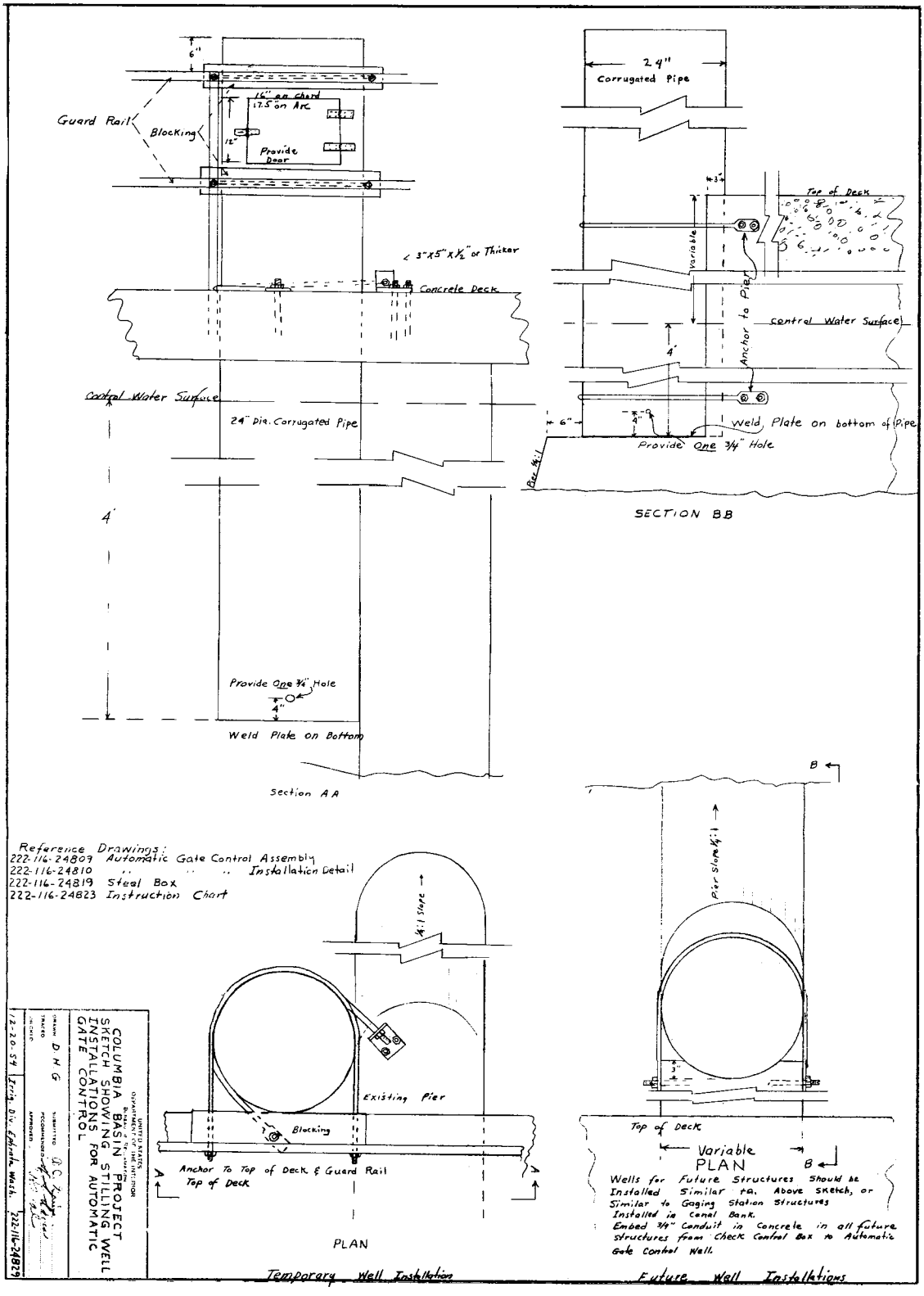
Note: Use 16 ga Galvanized Steel for Box. Construction Equal to an Outdoor Switch Cabinet. Use Riveted Seams.

Reference Drawing:
Automatic Gate Control
Installation Detail 222-116-24810

COLUMBIA BASIN PROJECT, WASHINGTON
16 GAGE GALVANIZED STEEL
BOX 30"X 20"X 9"

Mar. 17, 1959 | 222-116-24819


A
PULLEY
TIMING DEVICE
TAPE GUIDE
OPEN
MICRO SWITCHES
SWITCH TRIP
CLOSE
MICRO SWITCHES
SAFETY SWITCH
TAPE GUIDE
TAPE
COUNTER WT.
FLOAT
SWIVEL
A
FRONT VIEW
SECTION A-A (SIDE REMOVED)
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA BASIN PROJECT - WASHINGTON
AUTOMATIC GATE CONTROL
INSTRUCTION CHART
DRAWN D.H.G. SUBMITTED
TRACED RECOMMENDED
CHECKED APPROVED
EPHRATA, WASH. 5-18-54
222-116-24823
Rev. 12-14-54 DG.


6"
16" on Chord
17.5 on Arc
Guard Rail
Blocking
12"
Provide Door
∠ 3"X3"X½" or Thicker
Concrete Deck
Control Water Surface
24" Dia. Corrugated Pipe
4'
Provide One ¾" Hole
4"
Weld Plate on Bottom
Section A A
24" Corrugated Pipe
3"
Top of Deck
Variable
Anchor to Pier
Control Water Surface
4'
6"
2"
Weld Plate on bottom of Pipe
Provide One ¾" Hole
SECTION BB
Reference Drawings:
222-116-24809 Automatic Gate Control Assembly
222-116-24810 " " " Installation Detail
222-116-24819 Steel Box
222-116-24823 Instruction Chart
½:1 Slope
Existing Pier
Blocking
Anchor To Top of Deck & Guard Rail
Top of Deck
A
A
PLAN
Temporary Well Installation
B
Pier Slope ½:1
3"
Top of Deck
Variable
PLAN
B
Wells for Future Structures Should be Installed Similar to, Above Sketch, or Similar to Gaging Station Structures Installed in Canal Bank.
Embed ¾" Conduit in Concrete in all future structures from Check Control Box to Automatic Gate Control Well.
Future Well Installations
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA BASIN PROJECT
SKETCH SHOWING STILLING WELL INSTALLATIONS FOR AUTOMATIC GATE CONTROL
DRAWN D H G
TRACED
CHECKED
SUBMITTED
RECOMMENDED
APPROVED
12-20-54 Irrig. Div. Ephrata, Wash.
222-116-24829

CLEANING LATERALS AND SMALL CANALS

Rehabilitation of the Middle Rio Grande Project in New Mexico is currently under way and one contractor, the Richey Construction Company has devised the machine below to clean the laterals and small canals.

A "V" plow, moldboards and wing blades are mounted on an HD-5 crawler tractor and propelled by the additional power of a D-8 and an HD-15 tractor operating from the canal banks. A view of the machine from the front end of the HD-5 tractor is shown in the photograph at left.

The machine has been used to clean 11 miles of waterways in rehabilitation of one unit of the project. Machines of similar design can be purchased commercially, but the one built by the Richey Construction Company was produced with a minimum of shop and field work. The basic idea of the "V" plow with moldboards 4-1/2 feet high mounted on a small tractor with a wing blade on either side, is to

force material up the side slopes of the canal. The wing blades are about 8 feet long and 3-1/2 feet wide. The hydraulic system of the HD-5 tractor is used to control the "V" plow and wing blades.

The machine was designed for a canal with a bottom width of 6 feet and side slopes of 1-1/2:1. Existing canal sections up to 6 feet were cleaned. No difficulty was encountered in moving the cleaned material up the side slopes if the quantity was not too great. The tremendous amount of material being moved by the ditcher is shown in the photograph at left.

The contractor had completed fabrication of the machine before delivering it to the job site, but after initial trials, had to make several modifications to the original design. The principal change involved the side blades which were originally in a fixed position. It was discovered that it would be necessary to change the angle on these blades to permit greater flexibility in operation. They were modified to permit hydraulic control of both slope and angle. All modifications were performed with field equipment. The major changes were accomplished with a portable welder.

In actual operation, the waterway is first cleared and the old spoil banks are leveled, as shown in the photograph on the following page. Structures to be removed are taken out to leave the waterway as clear as possible. The small tractor upon which the machine is mounted travels on the bottom of the newly formed section. It provides very little motive power for cleaning operations, but does supply control to the plow and wings by virtue of its weight and use of the hydraulic system. The contractor used two large crawler tractors and a bridle towing arrangement for tractive power. One tractor operated on each spoil bank of the waterway. The tractors used were one Allis-Chalmers HD-15 and one Caterpillar D-8. These tractors had dozers mounted and were able to flatten spoil banks to provide their own roadway for operation.

Under ideal conditions the rate of progress in cleaning the laterals was about 1-1/2 miles per hour, and the quantity of material moved was about four to five hundred cubic yards. Progress is interrupted frequently by structures encountered. Turnouts or headwalls in the canal bank can be

by-passed by using the hydraulic lift, but when bridges or control structures are encountered, the tractor on which the cleaning machine is mounted must leave the waterway on approaching the structure and enter it again on the far side. A large mound of material is left in the bottom of the waterway at each structure. This has to be removed later. The contractor accomplishes this with a small mobile excavator. In extremely heavy cuts sufficient material cannot be moved at one pass to complete the design section. A second cut has to be made by lifting the plow and blades, backing up and making a second pass. The maximum effective depth of cut has been between 1/2 and 1 foot. A second pass is usually required if a greater cut is encountered.

The principal advantages of this cleaning machine are rapid progress, an accurately shaped final section, and excellent grade control. The main disadvantages are the plugs left in the waterway where it was necessary to by-pass structures, and the wide access road required on either spoil bank for the large towing tractors.

Mounting the plow on a small crawler tractor makes a very effective unit for rehabilitation work. Numerous structures have to be by-passed, and the crawler facilitates entering and leaving the waterway.

By comparing the photograph at the top of this page with the one of the first page of this article, a fair idea of the effect of one pass may be gained as these photographs show typical before and after sections.

* * * * *

FLATHEAD WING DITCHER

Harold H. Johnson, of the Bureau of Indian Affairs, also submitted a description, photographs and a drawing of a small ditcher that was constructed in the project shops of the Flathead Irrigation Project. The device described and shown on the following pages was constructed at a cost of about $800. Mr. Johnson states that it is about as good a ditcher as he has seen for the construction and cleaning of laterals considering the money spent.

The wing was constructed to fit on the "C" frame of a bulldozer and accordingly can be raised and lowered as desired with the hydralic controls of the tractor. The angle the wing makes with the tractor can be changed with a telescopic adjustment.

The drawing on the following page shows the essential parts of the wing, mounting, and the telescopic adjustment for changing the angle of the wing. The blade and extension arm will fit all tractors. However the bracket which connects the "C" frame to the wing must be modified to fit the particular frame used. Method of assembly on the frame of a Caterpillar D-4 tractor and Allis-Chalmers HD-5 with Garwood frame are indicated on the drawing.

It was found that the "C" frames as furnished with the dozers may not be sufficiently sturdy to handle the wing. Accordingly, the frame is cut open at the top and a 5/8-inch thick fish plate is welded to the rectangular gussets between on 8-inch centers.

Mr. Johnson states that the efficiency of the ditcher in cutting and cleaning small laterals is excellent, but is reduced when used in larger laterals. If you have any questions, it is suggested you contact the Flathead Irrigation Project, St. Ignatius, Montana or Mr. Harold H. Johnson, Area Office, Bureau of Indian Affairs, United States Department of Interior, 804 North 29th St., Billings, Montana.

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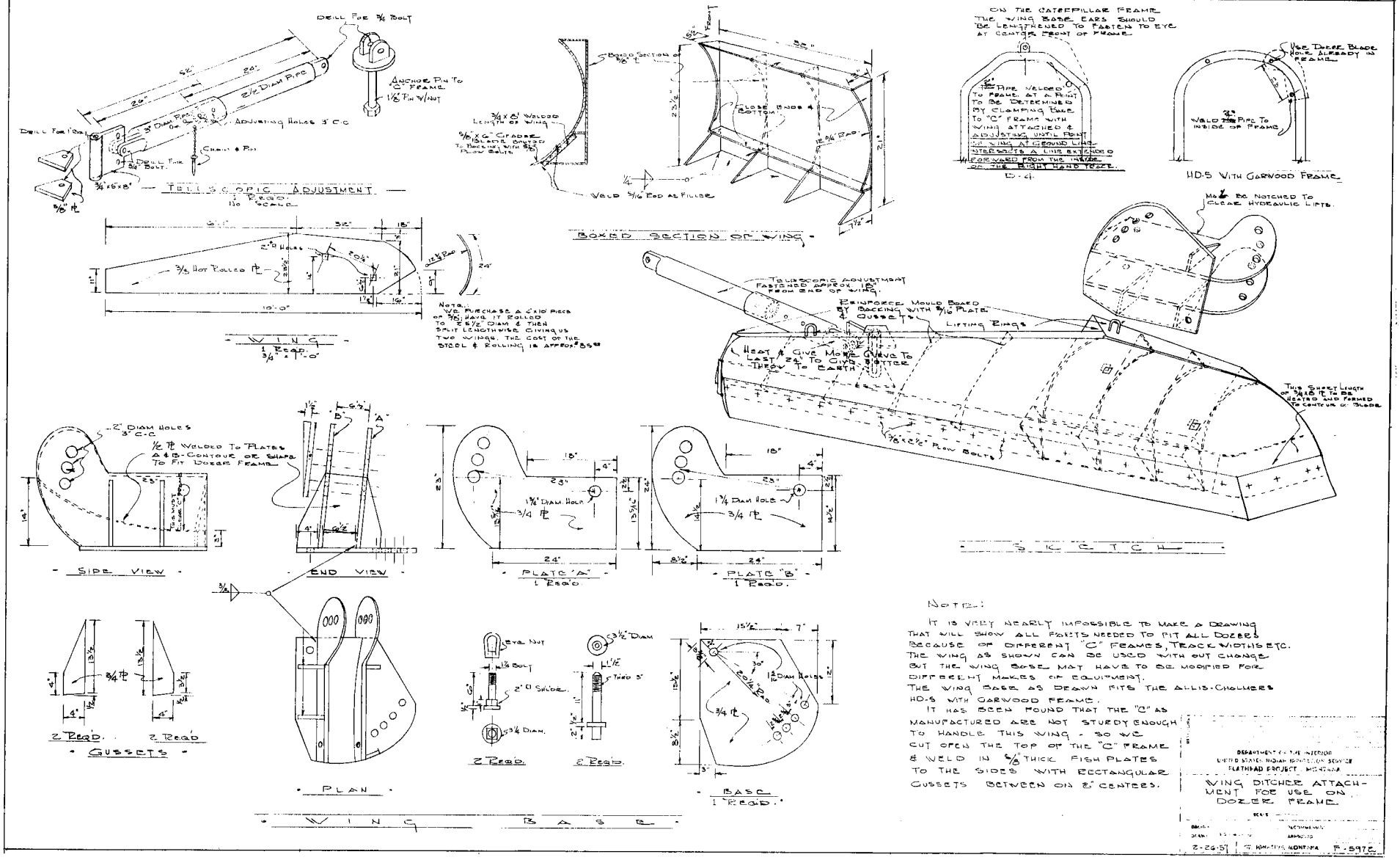

TELESCOPIC ADJUSTMENT
1 Reqd.
1½ Scale
BOXED SECTION OF WING
WING
1 Reqd.
3/8" x 1'-0"
Note.
We Purchase a 6"x10" Piece of 3/8" Have it Rolled to 8½ Diam & then Split Lengthwise Giving us Two Wings. The Cost of the Steel & Rolling is Approx $55.00
ON THE CATERPILLAR FRAME THE WING BASE EARS SHOULD BE LENGTHENED TO FASTEN TO EYE AT CENTER FRONT OF FRAME
D-4.
HD-5 With Garwood Frame
Must Be Notched To Clear Hydraulic Lifts.
To Telescopic Adjustment Fastened Approx 18" From End of Wing.
Reinforce Mould Board By Bracing With 3/16 Plate & Gusset
Lifting Rings
Heat & Give More Curve To Last 24" To Give Better Throw To Earth
3/4"x2½" Flow Bolts
This Sheet Length of 34½" To Be Heated and Formed To Contour of Blade
SKETCH
SIDE VIEW
END VIEW
PLATE 'A'
1 Reqd.
PLATE 'B'
1 Reqd.
GUSSETS
2 Reqd.
2 Reqd.
PLAN
2 Reqd.
2 Reqd.
BASE
1 Reqd.
WING BASE
NOTE:
IT IS VERY NEARLY IMPOSSIBLE TO MAKE A DRAWING THAT WILL SHOW ALL POINTS NEEDED TO FIT ALL DOZERS BECAUSE OF DIFFERENT "C" FRAMES, TRACK WIDTHS ETC. THE WING AS SHOWN CAN BE USED WITH OUT CHANGE BUT THE WING BASE MAY HAVE TO BE MODIFIED FOR DIFFERENT MAKES OF EQUIPMENT.
THE WING BASE AS DRAWN FITS THE ALLIS-CHALMERS HD-5 WITH GARWOOD FRAME.
IT HAS BEEN FOUND THAT THE "C" AS MANUFACTURED ARE NOT STURDY ENOUGH TO HANDLE THIS WING - SO WE CUT OPEN THE TOP OF THE "C" FRAME & WELD IN ⅝" THICK FISH PLATES TO THE SIDES WITH RECTANGULAR GUSSETS BETWEEN ON 8" CENTERS.
DEPARTMENT OF THE INTERIOR
UNITED STATES INDIAN IRRIGATION SERVICE
FLATHEAD PROJECT, MONTANA
WING DITCHER ATTACHMENT FOR USE ON DOZER FRAME
2-26-57
DRAWING NO. P-597E

WEED CONTROL WITH SOIL STERILANT

In an annual report of the Regional Weed Control Program for 1956, the Irrigation Division of Region 7, Bureau of Reclamation, points to the success achieved in using soil sterilant to control weeds in laterals on the Bostwick Division of the Missouri River Basin Project.

The two photographs at left are of adjacent laterals. The upper photograph shows a section of a lateral not treated with the soil sterilant, while the lower photograph shows the condition of the adjacent lateral on June 14, 1956, that had been treated with soil sterilant during the period April 30 to May 15.

About 30 miles of laterals were treated with Televar W soil sterilant this past year. An area about eight feet wide in the wetted perimeter of laterals was treated with the sterilant. It was mixed in a suspension with water and applied at the rate of 12 pounds per acre with a specially designed hand boom. The boom was operated by a man walking in the bottom of the lateral. The chemical was applied, as stated previously, between April 30 and May 15, after all dry weeds had been burned out of the laterals and they had been cleaned with a ditcher, where necessary.

Excellent results were obtained. No broadleaf weeds or weedy grasses were observed before July 15. After July 15, a few weedy grasses were observed, however, they were sparse and obtained only limited growth

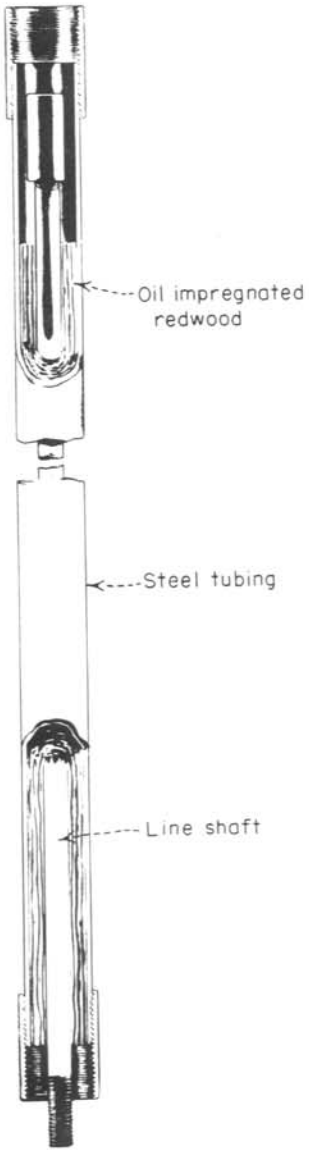
which caused no operation difficulties.

The Region feels confident that the sterilization of the wetted perimeter of laterals has cut down operation costs, reduced the amount of water lost by transpiration and reduced silt deposits in the bottom of laterals. Heavy silt deposits in untreated laterals greatly reduced their capacity.

* * * * *

SPECIAL DRIVE SHAFT SUPPORT FOR DEEP WELL PUMPS

The Salt River Valley Water User's Association at Phoenix, Arizona, have under test a different type of deep well pump drive shaft support than that ordinarily used. From early results reported, this support may offer a good solution to the problem of maintaining drive shafts in wells that are so badly out of line that the conventional spider and bearing arrangement does not give satisfactory service.



The support being tested by the Salt River Project consists of a thick cylinder of oil impregnated redwood, drilled to fit the diameter of the drive shaft and encased in a steel tube, see the illustration at the left. The shaft is supported full length between the pump bowls and discharge head by the redwood tubeline. The manufacturer claims the tubeline will dampen vibration, reduce shaft wear, reduce mechanical power losses, and extend the life of the pump.

The Salt River Project made one tubeline installation in the summer of 1955 in their well at 7E 14 5/8 N which had the pump set at a depth of 290 feet where the alinement of the well was off the vertical about 50 inches. In the spring of 1956, another installation was made at 30E 3S, where the pump was set at a depth of 240 feet and the misalinement at that point was about 20 inches.

For additional information on the performance of these installations, write Mr. H. Shipley, Chief Engineer, Salt River Valley Water User's Assn., Phoenix, Arizona.

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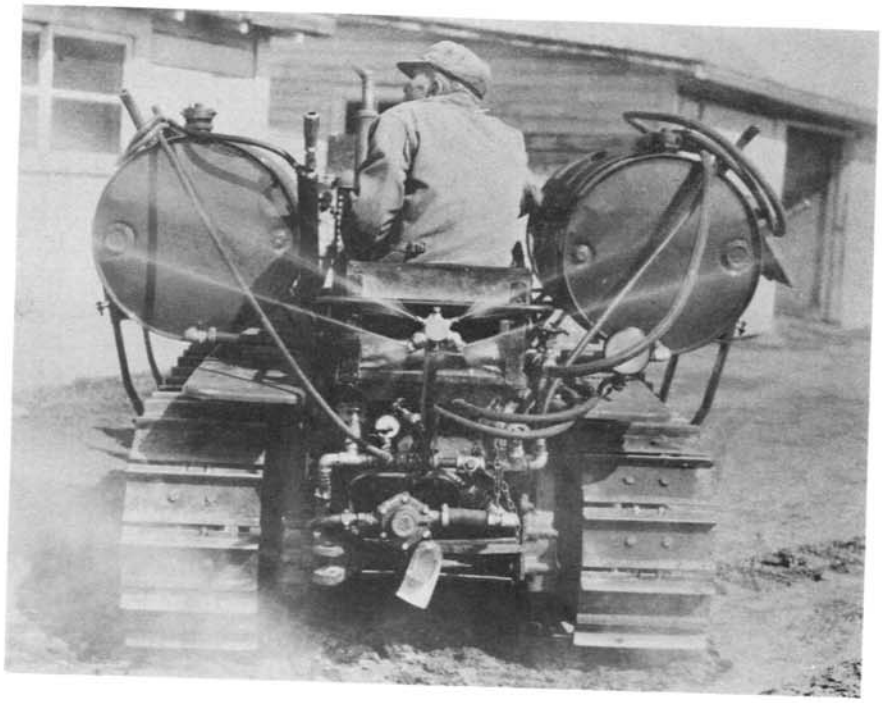
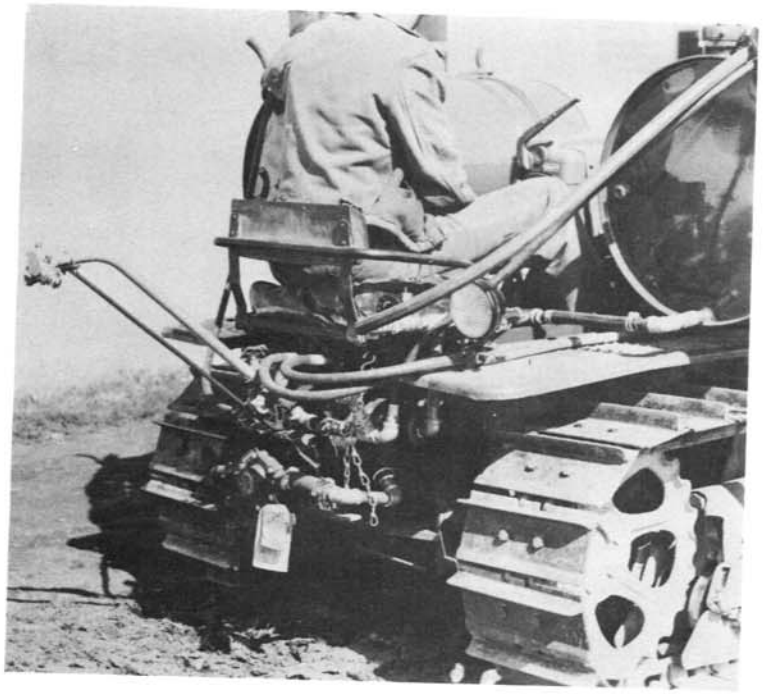
TRACTOR MOUNTED SPRAY UNIT

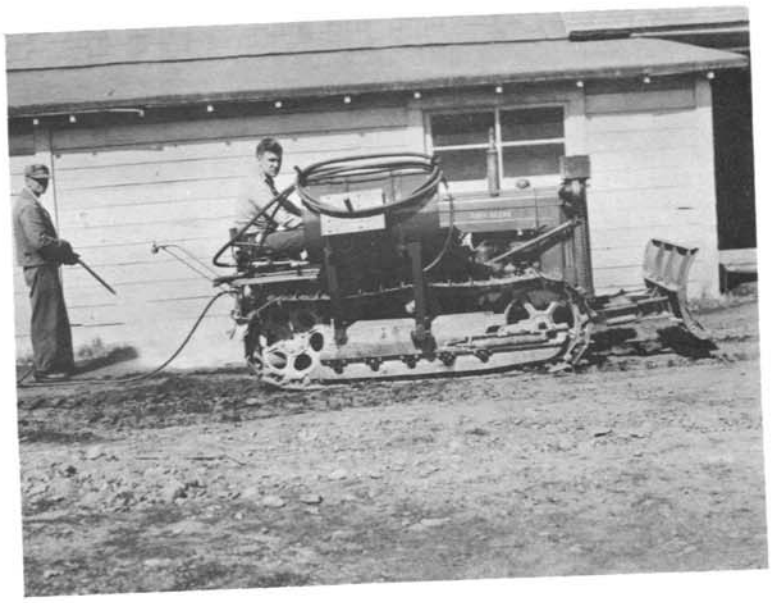
The tractor mounted spray unit shown in the photographs below and on the following page, like the Wing Ditcher in a previous article, also was constructed in the shops of the Flathead Irrigation Project, St. Ignatius, Montana.





This compact unit mounted on the small crawler tractor makes it possible to gain access to areas where a truck could not travel. More detail of the spray unit and manner in which it is mounted can be seen in the photograph at left.

The spray pump kit was purchased and the hook-up modified with material on hand to fit the requirements of the installation on the tractor. The two 55-gallon



drums mounted over the tractor treads provide an ample supply of spraying material without having to stop too frequently for refilling.

The unit can be used for the broadjet spraying of a canal or lateral, a borrow area or other similar area, as shown in the photograph at the top of the preceeding page, or it can be used in hand spraying, as shown in the photograph at left. One-man operation of the tractor and conveniently located controls of the spraying equipment simplifies the operation and reduces operational expense.

For more detail on the unit or the specific type of spraying equipment used, contact the Flathead Irrigation Project, Irrigation Service, Bureau of Indian Affairs, St.Ignatius, Montana, or Mr. Harold H. Johnson, Area Office, Bureau of Indian Affairs, 804 North 29th Street, Billings, Montana.

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