SPARLING INSTRUMENTS, INC.

INSTRUCTION DATA SHEET

SERIES 100 METERS AND ACCESSORIES

DIRECT DRIVE WATERWORKS INTAKE METERS

10" thru 72"

IDS-171
033720
Supersedes Bulletin 212 of May 1970

GENERAL

The versatility and unique design of Waterworks Intake Meters open new opportunities for greater control and efficiency. They are the most economical and easily installed meters for measuring flows at the discharge end of closed conduit, inverted siphons, or reservoirs. Their low head-loss characteristics make them particularly suited for metering gravity flow systems. Meters may be installed or inspected without interrupting normal service.

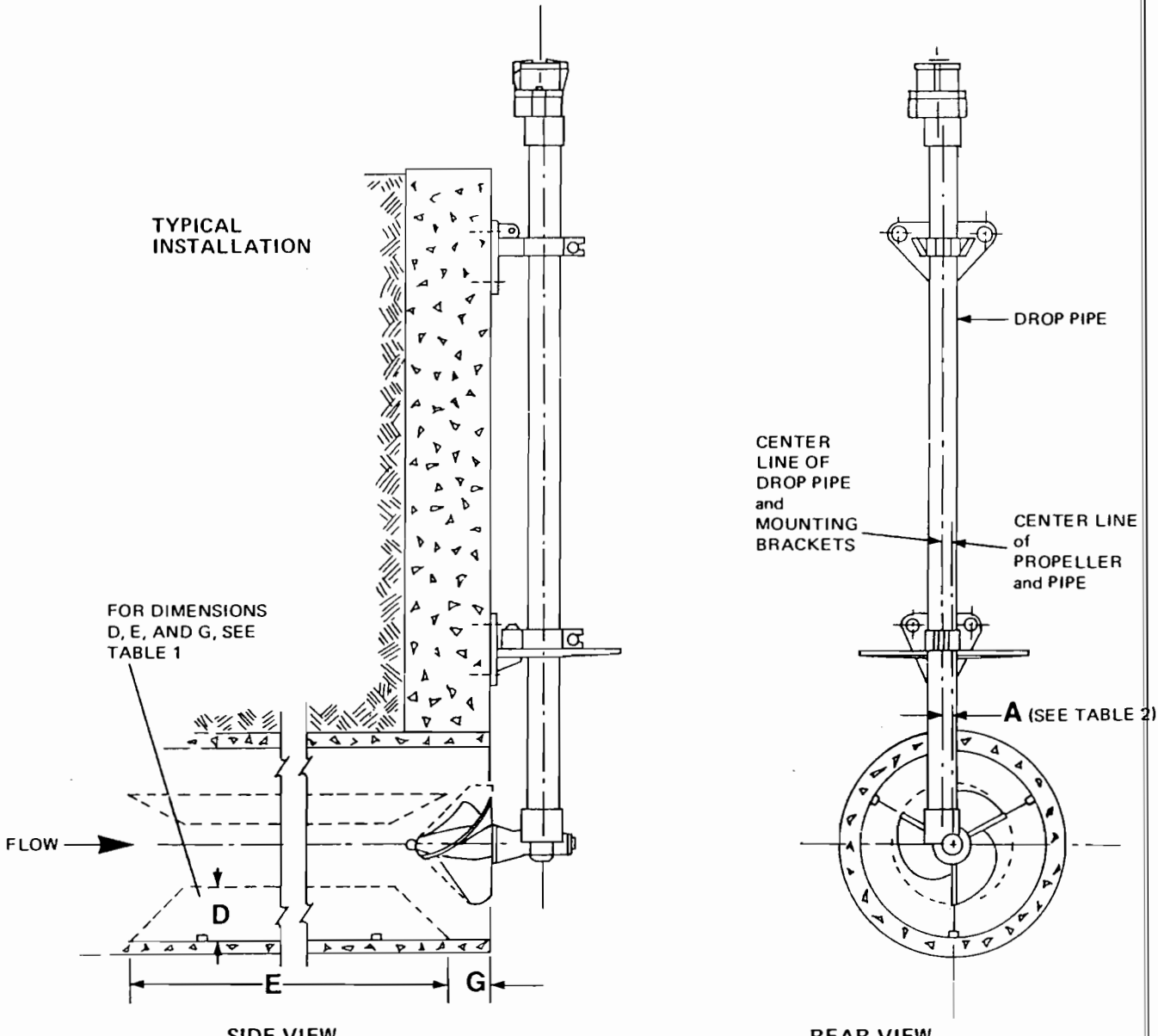

FIGURE 1

Sparling Instruments, Inc.

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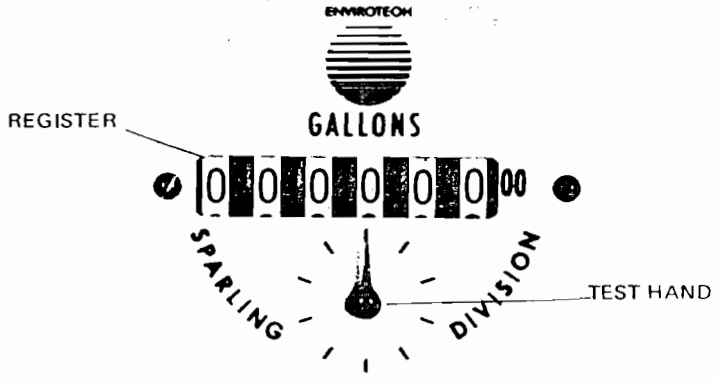
DESCRIPTION

Standard 10" thru 72" size Waterworks Intake Meters feature the same basic design as the Sparling Direct-Drive Tube and Saddle Type Meters. The meters utilize the simple principles of the screw propeller to register flow travel, much as a speedometer registers automobile travel. Gears and a register convert the revolutions of the propeller to cubic feet, gallons or other standard volumetric units. Rotation of the propeller shaft also affords a basis for indicating and recording gallons per minute, or other rates, corresponding to miles per hour on the speedometer.

All materials used in construction are resistant to normal water corrosion. For the 10" thru 30" sizes, the meter drop pipe and gear box are brass. For the larger sizes to 72", the drop pipe is galvanized steel and the gear box is cast iron with a protective coating. All standard propellers are plastic suitable for use in water temperatures up to 100°F. None of the materials used are guaranteed against chemical or electrolytic attack.



TOTALIZER ASSEMBLY

INSTALLATION

Before installation, inspect your meter. Notice the meter has three primary subassemblies:
(1) the lower gear box supporting the propeller and drive mechanism
(2) the drop pipe that raises the register to a convenient height, well above the water level, along with mounting brackets to secure the entire meter and
(3) the six-digit direct-reading register for determination of total flow. A fast moving pointer on the register also serves to determine flow rate.

Now spin the propeller with the fingers. Note how freely it turns and how its rotation advances the figures on the register. Next, hold the propeller with the fingers and rock the propeller from side to side.

KEEP IN MIND THE AMOUNT OF PLAY YOU FIND. This play is correct and will enable you to judge in the future if the bearing under the propeller has become worn and is ready for replacement.

For a general knowledge of the moving parts of the mechanism, turn to page 7. Note how the rotation of the propeller is carried through on shafts and ball bearings. Also note how the shafts are geared to actuate the register on top of the meter.

For proper meter installation, the metered section must run full with the propeller facing the center of flow. Most existing headwalls at the discharge end of closed conduit, inverted siphons, or reservoirs are suitable for attaching the meter mounting brackets. At least five diameters of straight conduit upstream together with straightening vanes are recommended to insure accurate measurement.

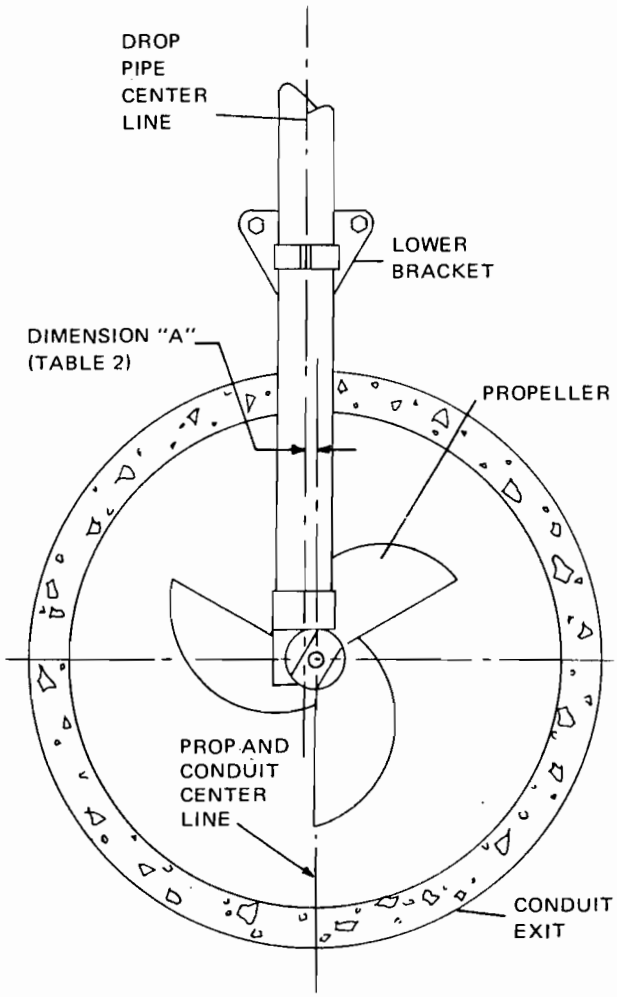
For details on proper mounting of the brackets, refer to Figure 2.

STRAIGHTENING VANES

For circular cross-section conduit three straightening vanes are recommended. The vanes must be equally spaced and parallel with the longitudinal axis of the conduit. The vanes are to be located at no less than the distance indicated in Table 1 for the corresponding size of meter being installed (Ref. Dimension G); the dimension given for G is measured from the end of the conduit to the tip of the straightening vane. All dimension locations are shown in Figure 1, Page 1.

TABLE 1

METER SIZE	10"	12"	14"	16"	18"	20"	24"	30"	36"	42"	48"	54"	60"	66"	72"
DIMENSION D	3 3/16	4	4¾	5½	6	7	8	10	12	14	16	18	20	22	24
DIMENSION E	16½	16½	28	28	30	33	36	45	54	60	72	80	90	96	108
DIMENSION G	4	3	2	4	3	2	1	1	8	6	5	3	1	1	1



UPSTREAM VIEW INTO CONDUIT
FIG. 2

MOUNTING WALL BRACKETS

When installing wall brackets, make sure that the brackets are lined up vertically and are square with the meter drop pipe. Otherwise the meter brackets will jam on installation, making it difficult to remove the meter. It is recommended that the brackets be installed on the meter and the assembly be used for properly locating the holes for the wall brackets.

NOTE: ALLOW FOR THE OFFSET BETWEEN THE DROP PIPE AND THE PROPELLER SHAFT AS SHOWN IN ACCORDANCE WITH DIMENSION "A" AS GIVEN IN TABLE 2 BELOW. THE PROPELLER MUST BE LOCATED IN THE CENTER OF THE CONDUIT FOR ACCURATE MEASUREMENT.

TABLE 2

METER SIZE	DIM. "A"
10" thru 14"	0.628"
16" thru 30"	0.703"
36" thru 72"	1.125"

MOUNTING WALL BRACKETS (con't.)

Using a plumb line mark the beadwall or support structure with a vertical line projected from the center of the conduit opening. Using Dimension "A" from Table 2 for your particular size meter, drop a second plumb line Dimension "A" distance to the left (facing into the conduit)of the first line. This second line is now the centerline of the meter drop pipe and bracket installation. Accordingly, the centerline of the propeller will now be located on the centerline of the conduit.

Installation of Wall Brackets: Proper brackets supplied with your particular size meter are illustrated in Figure 4, Page 6. For instructions given below, reference is made to the 10" - 30" meter size (Figure 3). For the larger sizes the corresponding parts should be obvious and can be installed in a similar fashion.

For mounting the upper and lower brackets for 10" - 30" size meters, proceed as follows:

(1) Locate and secure lower wall bracket (No. 77) with its lower bolt located on the drop pipe centerline and about 4" above the conduit outlet O.D. Secure bracket (No. 77) after using it as a bolt location template and mounting the three bolts in the headwall. (NOTE: No. 82 positioning unit is shipped integrally mounted to No. 77 lower bracket.)

(2) Loosely clamp drop pipe brackets No. 78, No. 79, No. 80 and No. 81 in approximate position on drop pipe such as to locate propeller in center of pipe opening.

(3) Engage brackets No. 79 and No. 77

(4) Slide brackets No. 78 and No. 80 into devetail of bracket No. 76.

(5) Locate upper bracket No. 76 about 6" below register box assembly on headwall using the bracket as a bolt hole template. Locate bolts into headwall. Secure bracket with bolts. Again, the lower bolt of the bracket must be located on the drop pipe centerline.

(6) After securing upper bracket bolt, again engage No. 78 and No. 80 into upper bracket No. 76.

(7) Carefully locate propeller in center of conduit opening with propeller facing upstream.Axis of the propeller should also be parallel with axis of the conduit.

(8) Tighten bolts to permanently secure drop pipe brackets and clamps. Meter is now fully installed.

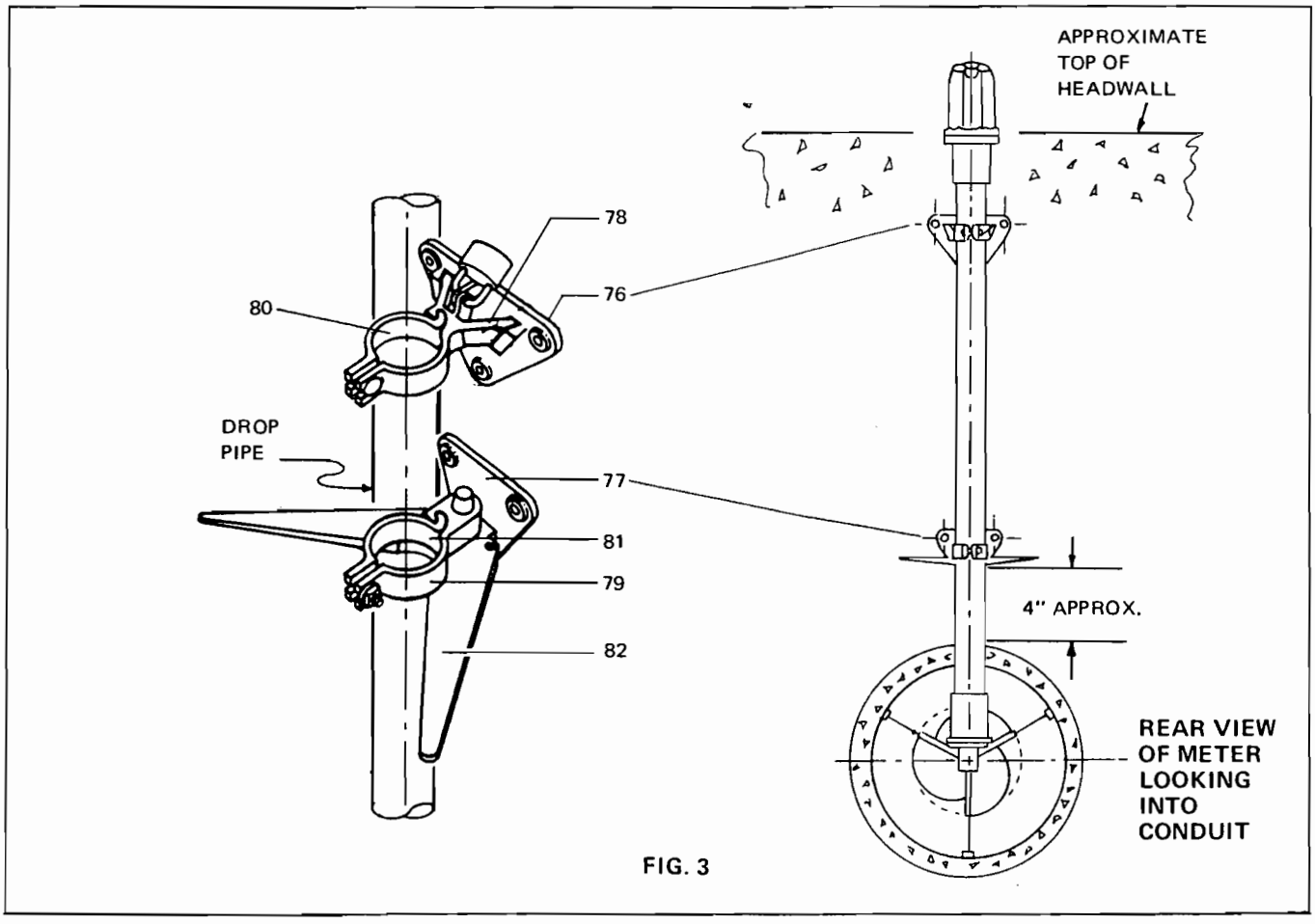


FIG. 3

PERIODIC INSPECTION

INSPECTION SCHEDULE

The meter should be removed from service only if any malfunction is evident. Removal would also permit inspection of the mechanism, the propeller and straightening vanes.

INSPECTION NOTES

WITHDRAWING METER ASSEMBLY

Remove padlock or pin from upper support bracket. Hold meter firmly. Lift up about two inches, allow lower end to go downstream sufficiently to clear propeller and lift out. Care should be taken that the propeller is not damaged in removing the meter.

Spin the propeller with the fingers to make sure there are no binds affecting totalization. Note advance of totalizer figure as propeller rotates.

Rock the propeller on the supports with the fingers. The radial play should be approximately 1/16" maximum over all.

See that propeller blades are smooth, clean and undamaged. Examine the metering chamber and straightening vanes for foreign matter that may have accumulated, and remove such foreign matter.

REPLACEMENTS

If your meter does not pass these tests, it should be taken apart, cleaned and necessary replacement of parts should be made. (See page 7)

The front bearing (42) is the key to the life of the meter. If it is kept in proper condition, the other parts last almost indefinitely. If the "play" on the front bearing becomes excessive, there may be unnecessary wear on the worm (47) and other working parts.

Keep spare bearings available.

CORRECTIVE MAINTENANCE

If the meter did not pass the tests outlined above, proceed with disassembly as follows:

FOR 10" -30" METERS

(1) Loosen screws and remove register box and clock.

(2) Loosen set screw on drive gear (28) on vertical shaft (41), and remove gear.

(3) Hold propeller firmly and take off propeller nut (39) and washer (39B). Pull propeller off of shaft, tapping the opposite end of the shaft, if necessary, to loosen the propeller's hold.

(4) Lift out the Woodruff key (45C).

(5) Remove vertical shaft plug (56) and pull out the vertical shaft with gear.

(6) Remove propeller shaft plug (46) and take out the propeller shaft (40), tapping the propeller end of the shaft, if necessary, to break the fit.

(7) Remove front bearing (42) by pressing it out from rear of gear box if it does not pull out readily.

(8) Pull or tap out the vertical shaft bearing (44).

FOR 36" -72" METERS

(1) Remove gear box assembly (30) from drop pipe by removing bolts from lower drop pipe flange.

(2) Proceed with steps 3 and 4 above for 10"–30" meters.

(3) Remove vertical shaft plug (56) and pull out the lower vertical shaft and gear assembly (41B).

(4) Proceed with steps 6 thru 8 above for 10"–30" meters.

(5) If it is desired to also inspect the upper vertical shaft bearing (44B), disassemble upper drop pipe flange and remove upper vertical shaft (41G).

(6) Remove upper vertical shaft bearing (44B).

CLEANING PARTS

Thoroughly clean all parts, EXCEPT PROPELLER, with solvent. Wipe clean and examine for wear. Clean the propeller so that the blades offer a smooth surface to the flow. If blades are broken or damaged, replace with a new propeller.

REPLACEMENT OF PARTS

Examine the worm (47) for wear, as well as the bearings. See that the vertical shaft (41) has not been bent (check both upper and lower shafts (41G and 41D) on meters 36" -72") and that no parts show wear. Replacement, if necessary, should be made while the meter is disassembled, and proper new parts will add years of life to the meter.

REASSEMBLING THE METER

FOR 10"–30" METERS

To reassemble the 10"–30" size meter, coat all shafts, gears and bearings with a small amount of Lubriplate No. 105 grease. Then proceed as follows:

(1) Insert the vertical shaft bearing (44) through opening and press firmly into the shoulder.
(2) Replace propeller shaft assembly (40), pressing the rear bearing (43) up to the shoulder in the gear box.
(3) Replace the front bearing (42) by sliding onto the propeller shaft and into front of gear box.
(4) Replace propeller shaft plug (46); screw in propeller shaft thrust screw (46A) until it comes in contact with end of propeller shaft, back off thrust screw ¼ turn and tighten propeller shaft plug lock nut (46B). Make sure there is a slight clearance between the thrust screw and the end of the propeller shaft.
(5) Replace vertical shaft and gear assembly (41). Be sure the worm (47) and gear mesh smoothly and that the propeller shaft turns freely with the fingers.
(6) Replace vertical shaft plug (56) following the same instructions as given in step 4 above for the propeller shaft plug.
(7) Replace Woodruff key (45C).
(8) Replace the propeller, washer (39B) and tighten the nut (39). Spin the propeller to check for free rotation. If propeller does not turn freely, tap side of gear box to eliminate binding.
(9) Replace drive gear (28) on vertical shaft (41) and register box and clock in accordance with instructions shown below – "TO REINSTALL REGISTER."

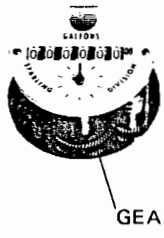
FOR 36"–72" METERS

To reassemble the 36" -72" size meter, coat all shafts, gears and bearings with a small amount of Lubriplate No. 105 grease. Then proceed as follows:

(1) If upper drop pipe flange had been disassembled, replace upper vertical shaft bearing (44B).
(2) Replace upper vertical shaft (41G) by sliding down through bearing (44B) and secure with retaining ring.
(3) Reassemble upper drop pipe flange assembly.
(4) Reassemble lower drop pipe flange assembly to gear box (30).
(5) Proceed with steps 1 through 8 above for 10" -30" meters.
(6) Repack meter with grease (Lubriplate No. 105), using forcefeed gun to fill the gear box through the grease fitting (54). Use enough grease to reach all moving parts, but not enough to cause a drag. Spin the propeller occasionally while greasing to insure that no drag develops.
(7) Meter is now ready to be re-installed.

TO REINSTALL REGISTER

(1) Place Drive Gear (28) on the vertical shaft (41) and tighten set-screw on flat face of shaft so that top face of gear is 1/16" below level of register base recess.
(2) Press Drive Gear (29) as far as it will go on spindle of the register clock. Tighten set-screw over flat face of spindle. Be sure clock turns freely.
(3) Fit bottom of clock in recess of register base so that gears (28) and (29) are approximately in the position shown at right.
(4) Turn clock so that the gears mesh snugly, as at A, then back off just a trifle, as at B.
(5) Check this slight play by jiggling gear C in the register, to make sure that the gears are in mesh but do not bind.
(6) Replace register cover over the clock and secure with screws. Be sure the bottom of the clock has not slipped out of the recess in register base.



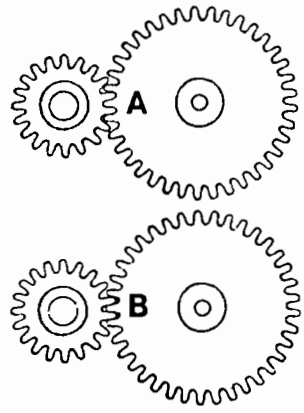
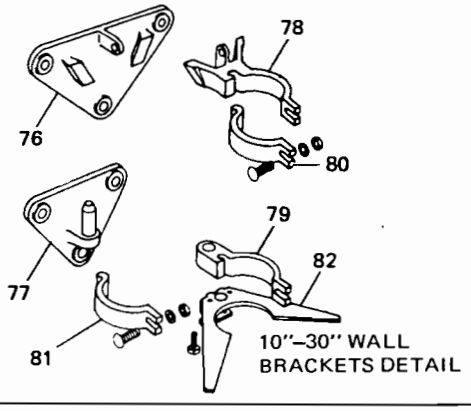
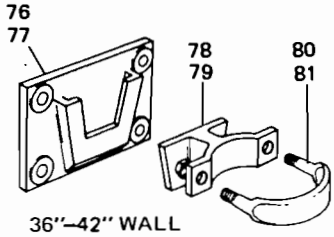


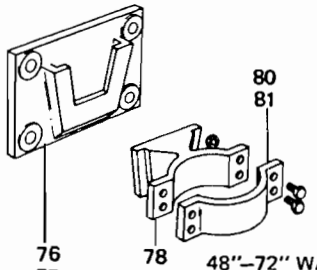
FIG. 4



10"–30" WALL BRACKETS DETAIL



36"–42" WALL BRACKETS DETAIL



48"–72" WALL BRACKETS DETAIL

PARTS LIST

ITEM	DESCRIPTION
22	Register Clock & Dial Assembly (specify reg.)
22A	Register Clock Dial (specify reg.)
22C	Register Clock & Dial Assembly 10:1 (specify reg.)
23	Register Box & Cover Assembly
24	Register Box Screw
25	Register Box Glass
28	Drive Change Gear 5 thru 16 tooth (specify # teeth)
28A	Drive Change Gear 17 thru 45 tooth (specify # teeth)
29	Clock Change Gear (specify # teeth)
30	Gear Box
38	Propeller, Plastic
39	Propeller Shaft Nut
39B	Propeller Shaft Washer
40	Propeller Shaft Assembly Complete–single row
40A	Propeller Shaft Assembly Complete–double row
41	Vertical Shaft & Gear Assembly (for 10 ft. drop pipe)
41A	Vertical Shaft Assembly, less gear (for 10 ft. drop pipe)
41B	Lower Vertical Shaft & Gear Assembly, less bearing
41C	Vertical Shaft Gear
41D	Lower Vertical Shaft Assembly, less gear & bearing
41E	Vertical Shaft Lock Nut
41G	Upper Vertical Shaft (for 5 ft. drop pipe section)
42	Front Ball Bearing–single row
42A	Front Ball Bearing–double row
42B	Front Rubber Bearing
42C	Front Bearing Sleeve (for use with 42B)
43	Rear Ball Bearing
44	Vertical Shaft Ball Bearing
44A	Vertical Shaft Ball Bearing, lower plug
44B	Vertical Shaft Ball Bearing, upper plug
45	Propeller Shaft
45A	Bearing Retainer Ring
45B	Bearing Retainer Ring
45C	Propeller Shaft Key
46	Propeller Shaft Plug Assembly
46A	Propeller Shaft Plug Thrust Screw
46B	Propeller Shaft Plug Lock Nut
47	Worm
50	Packing Nut
50A	Packing Follower (2 required)
50B	Packing Gland Body
54	Grease Fitting
56	Vertical Shaft Plug Assembly
56A	Vertical Shaft Plug Thrust Screw
56B	Vertical Shaft Plug Lock Nut
57	Propeller Shaft Thrust Nut
57A	Rear Bearing Lock Nut
58	Drop Pipe
76	Wall Bracket, upper
77	Wall Bracket, lower
78	Bracket Arm, upper
79	Bracket Arm, lower
80	Bracket Clamp, upper
81	Bracket Clamp, lower
82	Lower Positioning Bracket Assembly

SEE FIG.4, PAGE 6.

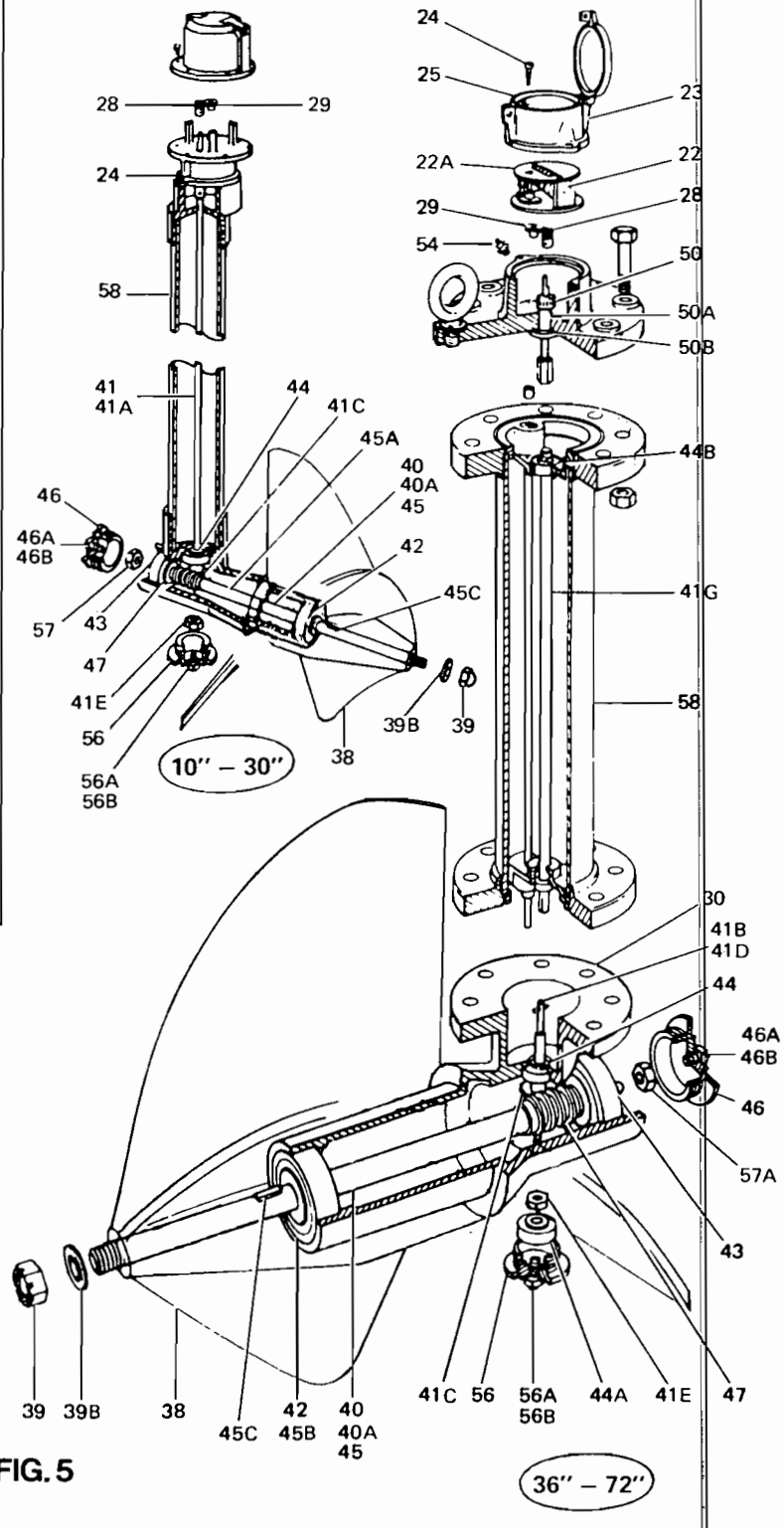


FIG. 5

SPARLING SERVICES

1. FACTORY SERVICES

Complete Factory Meter Service, Overhaul and Performance Test is available. Contact your Sparling Representative for service rates.

2. PACKAGING FOR SHIPPING

When returning Intake Meter to factory, bolt unit complete into wooden box securely. If meter is permitted to move in box freely, damage might occur and as a result, repair costs will be higher.

DO NOT SHIP VIA PARCEL POST
Methods such as air express, Motor Freight,etc., have proven good. Mark "Fragile Instrument."

3. ORDERING PARTS

WHEN ORDERING PARTS, PLEASE INCLUDE THE FOLLOWING INFORMATION:

(1) Meter Serial No.
(2) Meter Size
(3) Correct Item No.
(4) Part Description
(5) Mention IDS-171