

JULY 1980

CATALOG NO. 2736-B
SUPERSEDES CATALOG NO. 2625A

ERECTING DIRECTIONS

SERIES M450L MILLS WATER-TUBE BOILER

For Automatic Firing with Oil or Gas

STEAM, VAPOR OR WATER HEATING

WITH OR WITHOUT SMITH MANIFOLDS FOR YEAR-ROUND DOMESTIC HOT WATER.
MAXIMUM ALLOWABLE WORKING PRESSURE - STEAM 15 LBS., WATER 40 LBS.
HYDROSTATICALLY TESTED - A.S.M.E. STANDARD

THE SECTIONS IN
THIS BOILER **MUST**
BE ASSEMBLED IN
THE PROPER ORDER.
READ INSTRUCTIONS.

CAUTION

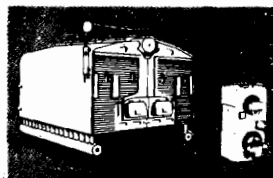
WHEN DOMESTIC HOT WATER MANIFOLDS ARE USED
WITH THIS BOILER BE SURE TO INSTALL JACKET SIDE
PANELS BEFORE ASSEMBLING MANIFOLDS ON THE BOILER.

TO STEAMFITTER

NOTE: READ THESE INSTRUCTIONS CAREFULLY.
THEY WILL SAVE YOU TIME IN ASSEMBLING
BOILER PROPERLY.

IMPORTANT: BE SURE AND SEAL ALL JOINTS
TO PREVENT AIR LEAKAGE INTO COMBUSTION
CHAMBER.

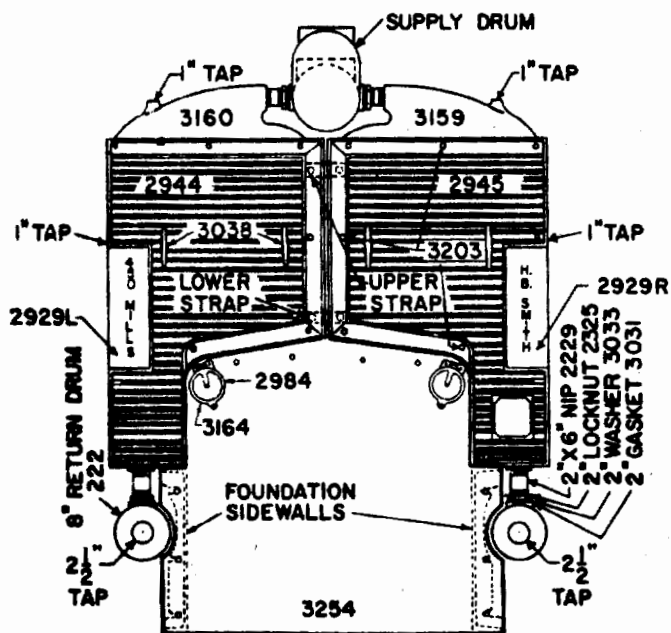
THE **HS**Smith
COMPANY, INC.
WESTFIELD, MASSACHUSETTS, 01086



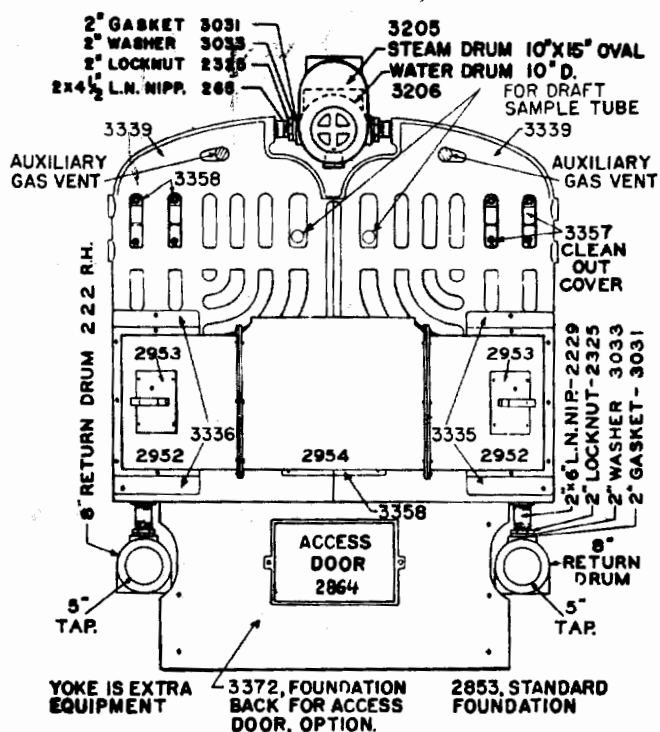
THESE INSTRUCTIONS TO BE LEFT WITH THE BOILER FOR REFERENCE PURPOSES.

SERIES M450L MILLS WATER TUBE BOILER

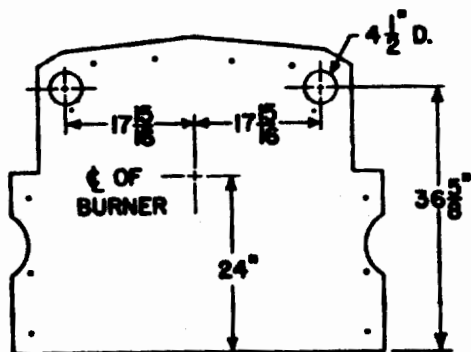
For Automatic Firing with Oil or Gas



FRONT VIEW

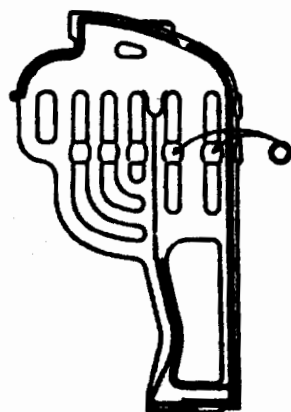


BACK VIEW

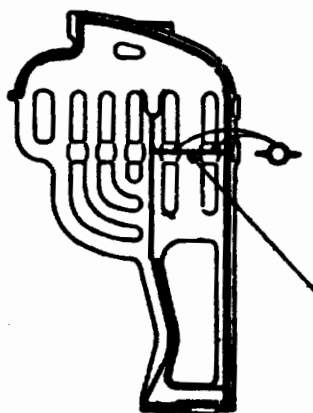


3/8" THICK PLATE, OPENING TO BE CUT IN THE FIELD.

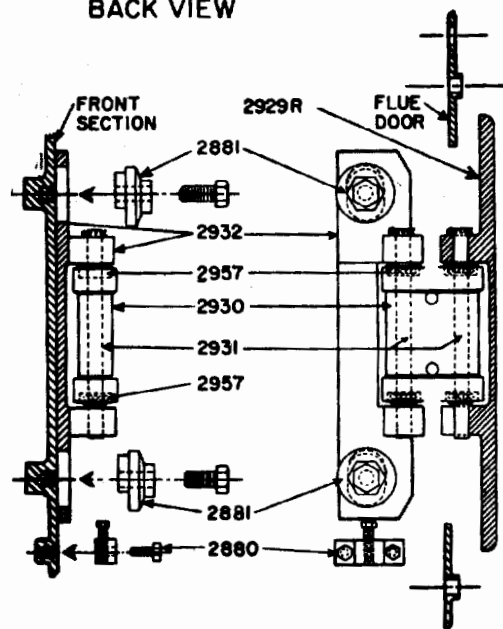
FOUNDATION FRONT PLATE



FORWARD
INTERMEDIATE
SECTION 3337



REAR
INTERMEDIATE
SECTION 3338



FLUE DOOR HINGE INSTALLATION, R.H. SHOWN

**BAFFLE ON REAR
INTERMEDIATE
SECTION ONLY**

SERIES M 450L

List of Parts

PAGE 3

NOTE: R.H. RIGHT HAND OR L.H. LEFT HAND AS SEEN FROM THE FRONT OF BOILER.

CAT. NO.	DESCRIPTION	CAT. NO.	DESCRIPTION
	<u>FOUNDATION</u>		<u>BACK * OLD STYLE PARTS</u>
	ERECTING BARS	* 248	REAR NIPPLE COVER PLATE
2851	C.I. SIDEWALL - 3 SECTION - 18" LONG	* 2947	CLEANOUT COVER
2852	C.I. SIDEWALL - 4 SECTION - 24" LONG	* 2950	R.H. SMOKEHOOD ADAPTER FRAME
2853	FOUNDATION RACK WALL	* 2951	L.H. SMOKEHOOD ADAPTER FRAME
2864	C.I. ACCESS DOOR, BACK WALL	* 3264	R.H. BACK SECTION O.S.
2984	OBSERVATION COVER	* 3265	L.H. BACK SECTION O.S.
3164	OBSERVATION COVER FRAME		<u>SMOKEHOOD</u>
	OBSERVATION COVER INSULATION	2952	SMOKEHOOD ELBOW
3254	STEEL FRONT PLATE LESS BURNER HOLE	2953	SMOKEHOOD CLEANOUT COVERS
	5/16" x 2-1/4" BRASS STUDS	2954	SMOKEHOOD CENTER SECTION
	5/16" STEEL WASHERS	2955	SMOKEHOOD OUTLET ADAPTER 15" x 19"
3372	FOUNDATION BACK FOR ACCESS DOOR		(10 SECTION)
	<u>FRONT</u>	2956	SMOKEHOOD OUTLET ADAPTER 19" x 19"
2880	HINGE SUPPORT		(11-13 SECTIONS)
2881	HINGE ECCENTRIC	3250	SMOKEHOOD OUTLET ADAPTER 19" x 24"
2929R	FLUE DOOR HINGE (H.B. SMITH) R.H.		RECT. TO 24" x 24" 21-22 SECTION
2929L	FLUE DOOR HINGE (450 MILLS) L.H.	3255	L.H. ELBOW WITH DAMPERS, SPINDLES,
2930	HINGE ARM		CRANK ARMS, 9-1/8" & 6-15/16" CONN.
2931	HINGE PIN	3256	R.H. ELBOW WITH DAMPERS, SPINDLES,
2932	BOILER HINGE		CRANK ARMS, 9-1/8" & 6-15/16" CONN.
2944	L.H. FLUE DOOR		AND PIVOT PLATE.
2945	R.H. FLUE DOOR		<u>LOCKNUTS & NIPPLES</u>
2957	BALL BEARING	265	2" x 4-1/2" NIPPLE (SUPPLY)
3038	FLUE DOOR HANDLE	2229	2" x 6" NIPPLES (RETURN)
3102	FLUE DOOR LINING, 2 PC. PER DOOR	2325	2" LOCKNUT
3159	R.H. FRONT SECTION	3031	2" GASKET
3160	L.H. FRONT SECTION	3033	2" STEEL WASHER
3139	FLUE DOOR FASTENING BOLT, 10 PER DOOR		
3240	LOWER STRAP		
3241	UPPER STRAP		
	7/16" x 1" HEX CAP SCREWS FOR STRAPS		
	5/8" x 2-1/4" CAP SCREWS FOR HINGE		
	ECCENTRIC		
	3/8" x 1" JACK SCREW		
	1/2" x 1-1/2" F.H. MACH. SCR. FOR		
	HINGES		
	<u>INTERMEDIATE</u>		
3337	FORWARD INTERMEDIATE SECTION		
3338	REAR INTERMEDIATE SECTION		
	<u>BACK</u>		
3335	R.H. SMOKEHOOD ADAPTER		
3336	L.H. SMOKEHOOD ADAPTER		
3339	BACK SECTION 2 REQUIRED		
3357	CLEANOUT COVER		
3358	BACK STRAP		

* PARTS USED WITH OLD STYLE BACKS.

SEE PAGES 9 & 10 FOR RETURN YOKE PARTS.

DRUMS & CLEANING TOOLS

3205 STEAM SUPPLY DRUM 10" X 15"

3206 WATER SUPPLY DRUM 10" DIA.

Suffix	E	F	G	H	I	J	K	L	M	N	O	P	Q
No. of Sections	10	11	12	13	14	15	16	17	18	19	20	21	22

222 Return Drums — 8"

Suffix	E	F	G	H	I	J	K	L	M	N	O	P	Q
No. of Sections	10	11	12	13	14	15	16	17	18	19	20	21	22

542 Flue Brush Handle

1805

Flue Brush.

Suffix	C		D		E		F		G		H		I	
Length	5 ft.		6 ft.		7 ft.		8 ft.		9 ft.		10 ft.		11 ft.	
No. of Sections	10	11	12	13	14	15	16	17	18	19	20	21	22	

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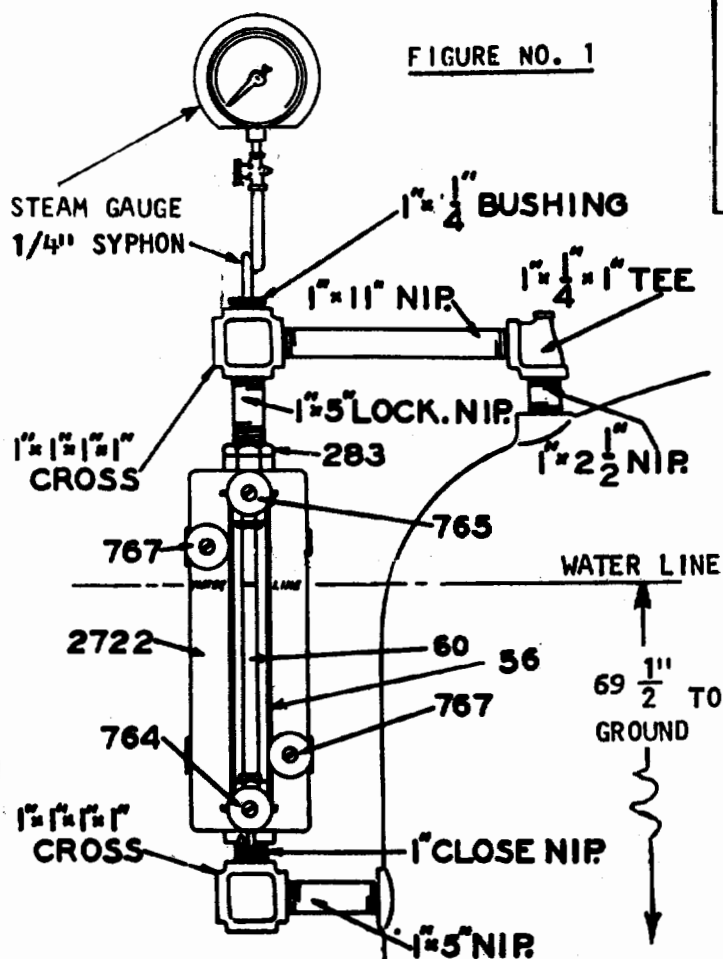
For Automatic Firing with Oil or Gas

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EXTRACT FROM A.S.M.E. BOILER CONSTRUCTION CODE

THE DRAW-OFF COCK SHOULD BE CONNECTED TO THE OPPOSITE SIDE OF THE BOILER FROM THE FEED WATER CONNECTION TO ASSIST IN REMOVING SEDIMENT FROM THE BOILER.

THIS INSTALLATION IS NOT COMPLETE
WITHOUT THE RED INSTRUCTION TAG FOR
PUTTING COLD BOILERS INTO SERVICE
OR FOR CHANGING WATER LEVEL UNDER
STEAM PRESSURE.



<u>CATALOG NUMBER</u>	<u>NAME OF PART</u>
56	GAUGE GLASS RODS
60	GAUGE GLASS (5/8" x 12")
283	LOCKNUT (1")
764	GAUGE COCK (LOWER)
765	GAUGE COCK (UPPER)
767	TRY COCKS
	4-1/2 STEAM GAUGE
2722	WATER COLUMN

1. #10-344, 3/8" DIA. ROPE WICKING, 15'-4" BETWEEN EACH PAIR OF SECTIONS.
2. #10-668, 1/2" DIA. BRAIDED ROPE 126" CEMENTED TO EACH FLUE DOOR BY H.B. SMITH CO.
3. #10-659, 3/8" DIA. BRAIDED ROPE, 64" CEMENTED TO EACH SMOKEHOOD ADAPTOR BY H.B. SMITH CO.
4. INSULATING CEMENT QUANTITY REQUIRED:

10-11 SECTIONS, 200 LBS.	19 & 20 SECTIONS, 350 LBS.
12, 13 & 14 SECTIONS, 250 LBS.	21 & 22 SECTIONS, 400 LBS.
15, 16, 17 & 18 SECTIONS, 300 LBS.	
5. FURNACE CEMENT.

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PAGE 5

GENERAL

PREPARE A SMOOTH LEVEL FLOOR AREA OR SETTING TO RECEIVE THE BOILER FOUNDATION. ALLOW SUFFICIENT TIME FOR CEMENT IN FLOOR OR SETTING TO CURE BEFORE COMMENCING TO ERECT THE BOILER.

NOTES

IF THE SUPPLY AND RETURN DRUMS AND THE BOILER SECTIONS HAVE BEEN STORED ON THE JOB SO AS TO HAVE BEEN SUBJECTED TO WEATHER EXPOSURE, CARE SHOULD BE EXERCISED TO REMOVE ANY DIRT, MUD, SAND OR OTHER FOREIGN MATERIALS FROM THE INTERIOR OF THE CASTINGS AND TO THOROUGHLY CLEAN THE THREADS OF ALL TAPPINGS.

SUPPLY DRUMS

1. THE 2" x 4-1/2" TOP DRUM NIPPLES (265) ARE SHIPPED WITH EXCLUSIVE HY-TEMP HYDRONIC GASKET (3031) AND WASHER (3033) ASSEMBLED AT THE FACTORY. TAPERED THREADS ARE PROTECTED BY A PLASTIC CAP WHICH MUST BE REMOVED BEFORE INSTALLING NIPPLES.
2. CLEAN THE THREADS OF EACH TAPPING AND INSTALL THE NIPPLES IN THE DRUM SO THAT THE ENDS OF THE NIPPLES MEASURE 3 INCHES OUT FROM THE BOSS ON THE DRUM. USE WOOD GAGE FOR MEASURING.

BOILER FOUNDATION

1. BOLT THE FOUNDATION SIDEWALL SECTIONS (2851 AND 2852) TOGETHER IN THE CORRECT COMBINATION OF 18" AND 24" LENGTHS REQUIRED FOR THE BOILER (18" LENGTH IS FOR 3 SECTIONS AND 24" LENGTH IS FOR 4 SECTIONS.) USE A 7/16" x 2" BOLT WITH TWO WASHERS AND A NUT AT EACH BOLT SLOT IN THE SIDEWALL SECTIONS. USE SHIMS BETWEEN THE SIDEWALL SECTIONS WHERE NECESSARY TO INSURE A STRAIGHT ASSEMBLED WALL AND BE SURE THAT THE "TOP" MARKING UP AND THE FLAT SIDE ON THE INSIDE OF THE FOUNDATION.
2. BOLT THE FOUNDATION BACK END (3308) AND THE ERECTING BARS TO THE SIDEWALLS USING A 7/16" x 1-3/4" BOLT, TWO WASHERS AND A NUT AT EACH BOLT HOLE. CHECK TO BE SURE THAT THE SIDEWALLS ARE PARALLEL AND AT RIGHT ANGLES TO THE BACK AND ERECTING BARS BY ADJUSTING TO MAKE THE DIAGONAL MEASUREMENTS OF THE FOUNDATION EXACTLY EQUAL USING A RIGID STICK OR BOARD AS A GAUGE. SEE FIG. NO. 3.
3. POSITION THE ASSEMBLED FOUNDATION IN ITS PROPER RELATION TO THE SUPPLY HEADER SUSPENDED OVERHEAD. CHECK TO BE SURE IT IS LEVEL.

STANDARD FOUNDATION

24" HIGH.

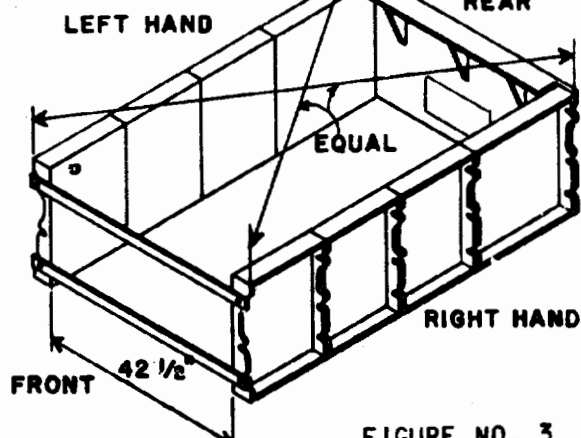


FIGURE NO. 3

3. WHEN THE SUPPLY DRUM AND NIPPLES ARE PREPARED, PLACE IT IN POSITION AND SUPPORT IT AT ITS PROPER HEIGHT WITH A CHAIN HOIST FROM A PIPE FRAME, THE BUILDING CONSTRUCTION OR BY OTHER SUITABLE MEANS.

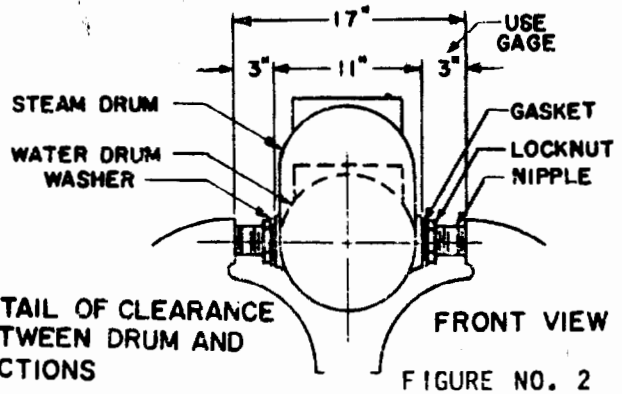
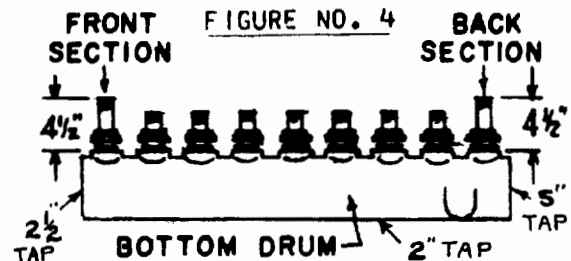


FIGURE NO. 2

RETURN DRUMS

1. THE 2" x 6" BOTTOM DRUM NIPPLES (266) ARE ALSO SHIPPED WITH THE HY-TEMP HYDRONIC GASKET (3031) AND WASHER (3033) ASSEMBLED AT THE FACTORY. TAPERED THREADS ARE PROTECTED BY PLASTIC CAPS, WHICH MUST BE REMOVED BEFORE INSTALLING NIPPLES.
2. CLEAN THE THREADS OF EACH NIPPLE TAPPING AND INSTALL NIPPLES IN THE DRUMS SO THAT THE DISTANCE FROM THE BOSS ON THE DRUM TO THE END OF THE NIPPLE IS 4-1/2" FOR THE FRONT AND REAR SECTIONS. OTHER NIPPLES SHOULD BE SCREWED INTO THE DRUMS AS FAR AS POSSIBLE. SEE FIG. NO. 4.
3. RETURN DRUMS MAY BE USED ON EITHER THE RIGHT OR LEFT HAND SIDE OF THE BOILER. A 2" TAPPING IN THE BOTTOM OF THE DRUM IS PROVIDED FOR THE DRAIN VALVE. THE DRUM MUST BE INSTALLED WITH THE 2-1/2" TAPPING AT THE FRONT OF THE BOILER. SEE ILLUSTRATION



NOTE

RUNNING THREAD OF NIPPLE IS FOR ENGAGEMENT INTO DRUM.
TAPERED THREAD OF NIPPLE IS FOR ENGAGEMENT INTO SECTION.

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SECTIONS

(THE ASSEMBLY OF FRONT AND BACK SECTIONS CAN BE PERFORMED IN REVERSE ORDER IF DESIRED).

NOTE: USE PIPE JOINT COMPOUND ON TAPERED THREADS. DO NOT USE COMPOUND ON RUNNING THREADS.

1. CLEAN THE THREADS OF DRUM TAPPINGS ON BOTH HALVES OF THE FRONT SECTION. THEN, ONE AT A TIME, PLACE EACH HALF SECTION IN PLACE AT FRONT OF BOILER FOUNDATION AND MAKE EACH SUPPLY DRUM NIPPLE INTO THE SECTION, USING THE WOOD SPACING GAUGE TO MAINTAIN THE EXACT 3" DISTANCE FROM THE BOSS ON THE DRUM TO THE FACE OF THE SECTION AT THE PARTING LINE WHEN THE SECTION IS PLUMB AND THE SUPPLY DRUM LEVEL. WHEN THE TWO HALF SECTIONS ARE IN POSITION CENTERED ON THE FOUNDATION WITH THE CENTER LINE OF EACH HALF SECTION 2-3/4" FROM THE FRONT END OF THE FOUNDATION SIDEWALLS AND PLUMB, INSTALL THE TOP AND BOTTOM FRONT STRAPS USING THE 7/16" x 1" HEX. HEAD CAP SCREWS FURNISHED.

2. VERIFY THE POSITION AND ARRANGEMENT OF THE SECTIONS AND BRACE THE SECTION IN POSITION IN A SUBSTANTIAL MANNER. SEE FIGURE NO. 7.

NOTE: DO NOT TIGHTEN LOCKNUTS AT THIS TIME. WHEN ALL NIPPLES HAVE BEEN MADE UP TIGHTLY INTO THE SECTIONS, FIRST READ THE INSTRUCTIONS FOR SEALING GAS-KETS AND TIGHTENING LOCKNUTS ON PAGES 8 AND PAGE 9 AND FOLLOW INSTRUCTIONS EXACTLY.

3. WHEN THE POSITION AND ARRANGEMENT OF THE SECTIONS AND THE FOUNDATION HAVE BEEN CHECKED AND PROVED, BRACE THE SECTIONS IN PLACE IN A SUBSTANTIAL MANNER. FASTEN FRONT STRAPS IN PLACE WITH 7/16" x 1" HEXAGONAL HEAD CAP SCREWS.

BACK SECTIONS

4. CLEAN THREADS OF TAPPINGS ON BOTH HALVES OF BACK SECTION, THEN PLACE ON THE FOUNDATION AND SCREW THE SUPPLY DRUM NIPPLES TIGHT INTO SECTIONS USING PIPE JOINT COMPOUND ON THE THREAD AND EMPLOYING THE WOOD SPACING GAUGE TO MAINTAIN THE EXACT DISTANCE FROM THE BOSS ON THE DRUM TO THE FACE OF THE SECTION AT THE PARTING LINE WHEN THE SECTION IS PLUMB AND THE SUPPLY DRUM IS LEVEL. SEE FIGURE NO. 2 DIMENSION OF 3 INCHES FOR BOTH STEAM AND WATER DRUMS. CHECK TO SEE THAT SECTIONS ARE CENTERED ON FOUNDATION. INSTALL BACK CONNECTING STRAP (3358) IN THE POSITION SHOWN IN FIG. NO. 5.

5. WHEN THE POSITION AND ARRANGEMENT OF THE SECTIONS AND THE FOUNDATION HAVE BEEN CHECKED AND PROVED, BRACE THE SECTIONS IN PLACE IN A SUBSTANTIAL MANNER. USE WEDGE BETWEEN REAR SECTIONS AND TOP OF FOUNDATION BACK END AT THE CENTER OF THE BOILER TO MAKE SECTIONS PLUMB.

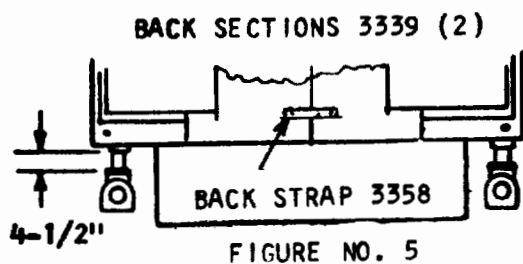


FIGURE NO. 5

6. PLACE RETURN DRUMS IN POSITION ON RIGHT HAND OR LEFT HAND SIDE OF BOILER AS MARKED. MAKE NIPPLES TIGHT INTO SECTIONS USING PIPE JOINT COMPOUND ON THE THREADS. MAINTAIN THE 4-1/2" SPACING FROM THE BOSS ON THE DRUM TO THE FACE OF THE SECTION. CHECK TO BE SURE FRONT AND REAR SECTIONS REMAIN PLUMB AND CENTERED ON THE FOUNDATION. DO NOT TIGHTEN LOCKNUTS.

7. WHEN FRONT AND REAR SECTIONS ARE CONNECTED INTO BOTH SUPPLY AND RETURN DRUMS, REMOVE THE TEMPORARY BRACING. COMPLETE THE TRIMMING OF THE BACK SECTION BEFORE INSTALLING INTERMEDIATE SECTIONS.

CLEANOUT COVER INSTALLATION:

THE FOUR CLEANOUT COVERS AND INSULATION WITH HARDWARE FURNISHED MUST BE INSTALLED WHILE THE INSIDE OF THE BACK SECTION IS ACCESSIBLE. SEE REAR VIEW OF BACK SECTION ON PAGE 2 AND STUDY FIG. NO. 6 OF THE CLEANOUT COVER INSTALLATION.

1. ASSEMBLE 5/16" x 1-1/2" SCREW AND NUT ASSEMBLY ONLY AND TIGHTEN SECURELY.

2. PLACE THE INSULATION AND CLEANOUT COVER AGAINST THE BACK SECTION AND ASSEMBLE WASHERS AND WING NUTS.

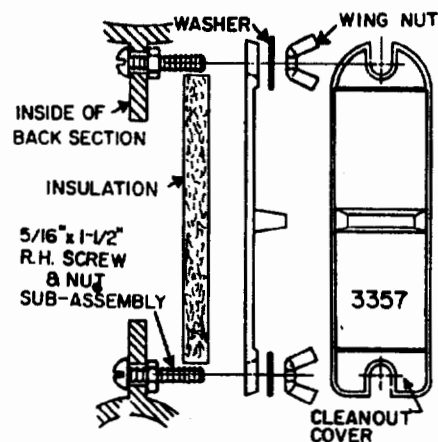


FIGURE NO. 6

DRAFT SAMPLE TUBE (WHEN REQUIRED)

THE DRAFT SAMPLE TUBE MUST BE INSTALLED BEFORE THE INTERMEDIATE SECTIONS ARE PLACED IN POSITION. SEE FIG. NO. 7. A KNOCK-OUT OR STEEL PLUG IS PROVIDED IN THE WEB OF THE BACK SECTION SO THAT THE DRAFT SAMPLE TUBE MAY BE INSTALLED IN EITHER THE RIGHT OR LEFT HAND BACK SECTION, DEPENDING UPON CONTROL PANEL LOCATION. PUNCH OUT THE KNOCK-OUT WITH A BALL PEEN HAMMER OR REMOVE STEEL PLUG AS NECESSARY. THEN INSTALL PARTS AS SHOWN IN FIG. NO. 7.A.

INSULATING CEMENT

1. INSULATING CEMENT IS TO BE USED TO FILL THE POCKETS OF SECTIONS AND SPACES BETWEEN ADJACENT SECTIONS AND BETWEEN SECTIONS AND THE FOUNDATIONS. SEE FIG. 9 FOR LOCATION OF SPACES TO BE FILLED.

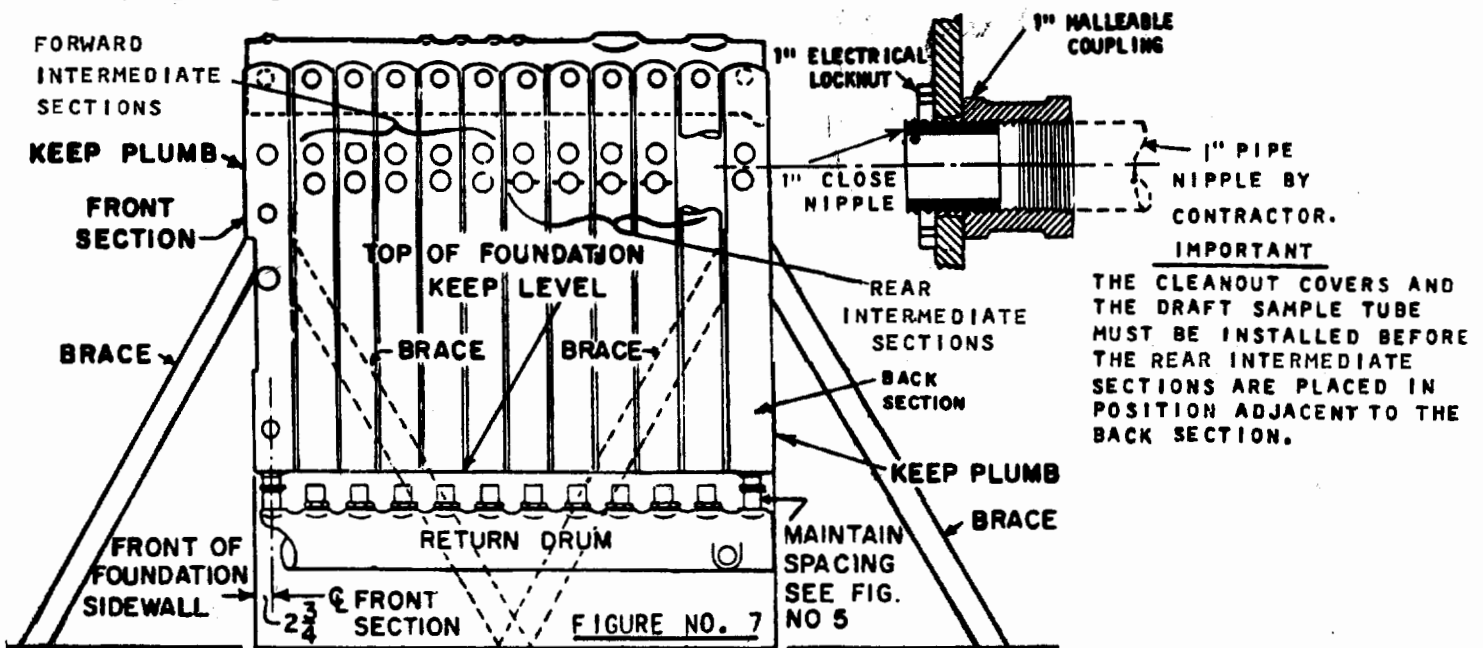
2. FOLLOW THE MANUFACTURERS INSTRUCTIONS FOR THE PREPARATION AND USE OF THE INSULATING CEMENT.

3. DO NOT PREPARE MORE INSULATING CEMENT THAN REQUIRED FOR IMMEDIATE USE IN SEALING BOILER.

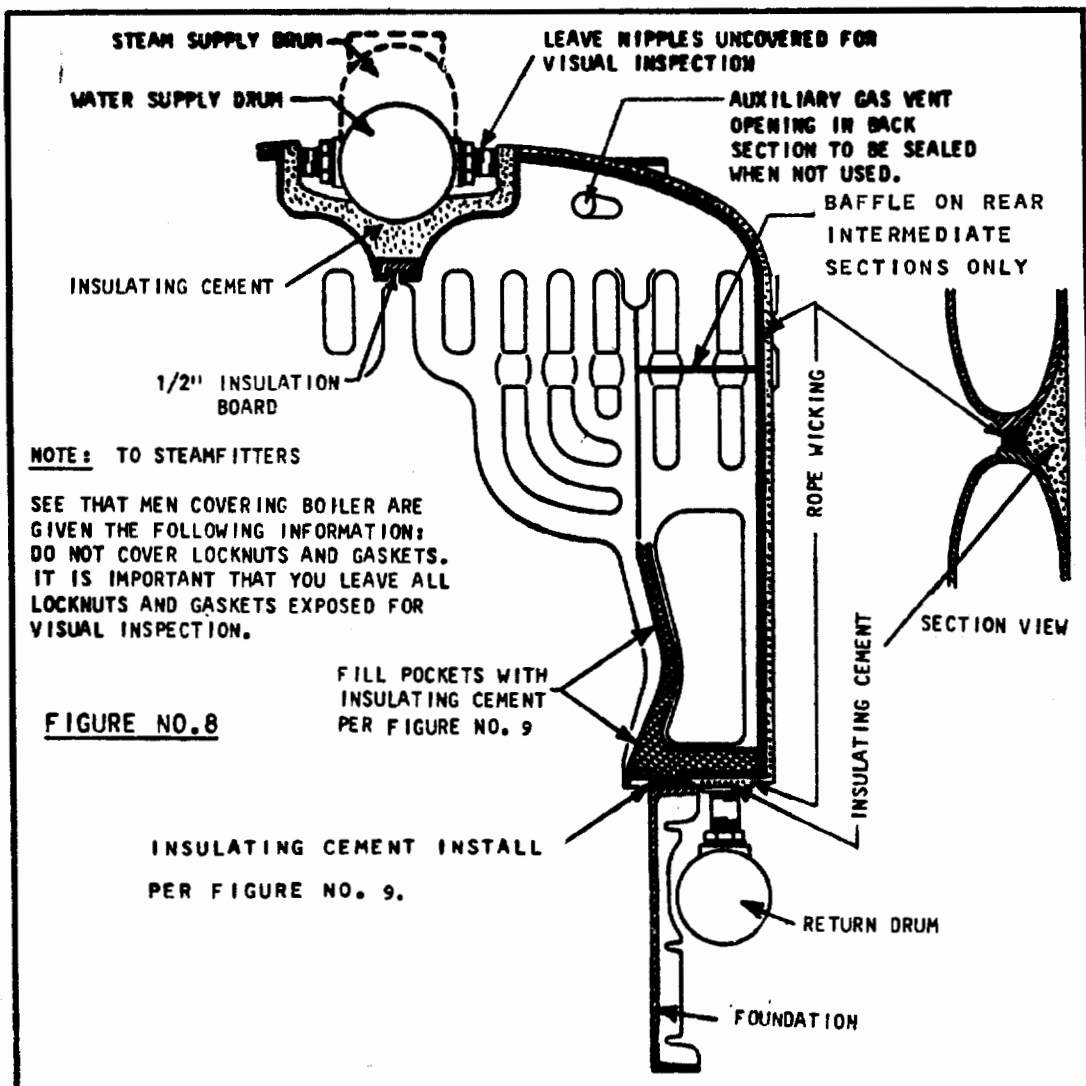
EXAMPLE:
12 SECTION BOILER

SUPPLY DRUM
KEEP LEVEL

FIGURE NO. 7A



THE CLEANOUT COVERS AND THE DRAFT SAMPLE TUBE MUST BE INSTALLED BEFORE THE REAR INTERMEDIATE SECTIONS ARE PLACED IN POSITION ADJACENT TO THE BACK SECTION.



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INTERMEDIATE SECTIONS

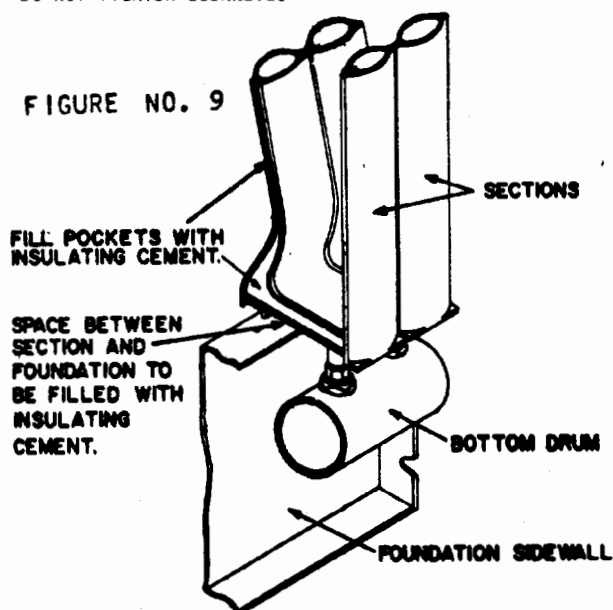
1. TWO TYPES OF INTERMEDIATE SECTIONS ARE FURNISHED. SEE PARTS LISTS AND DRAWINGS FOR NUMBERS AND IDENTIFYING FEATURES AND REFER TO THE TABLE SHOWING THE NUMBER AND LOCATION OF THE VARIOUS TYPES OF SECTIONS. BE SURE TO INSTALL EACH TYPE OF SECTION IN ITS PROPER LOCATION.

REAR INTERMEDIATE SECTIONS ARE PLAINLY MARKED FOR POSITIVE IDENTIFICATION WITH A LARGE CAST-ON NAMEPLATE READING "REAR INTERMEDIATE SECTION." THESE SECTIONS HAVE A CAST-ON BAFFLE ON THE CROSS TUBE AND ARE SPOTTED WITH ORANGE PAINT ON THE OUTSIDE OF THE SECTION NEAR SUPPLY BOSS. REAR INTERMEDIATE SECTIONS MAY ALSO BE IDENTIFIED BY A ROUND RAISED SPOT ON EACH SIDE OF BOTH SUPPLY AND RETURN BOSSES AS WELL AS A SHORT HORIZONTAL RIB ON EACH SIDE OF THE BOSS ON THE SIDE OF SECTION.

2. FILL THE POCKETS AND THE SPACES BETWEEN THE SECTION AND THE FOUNDATION OF THE BACK SECTION WITH INSULATING CEMENT. SEE FIGURE NO. 8.

3. TAKE A REAR INTERMEDIATE SECTION 3338. CLEAN THE THREADS OF TAPPINGS, FILL POCKETS WITH INSULATING CEMENT. PLACE A QUANTITY OF INSULATING CEMENT ON THE TOP OF THE FOUNDATION SIDEWALL ADJACENT TO THE REAR SECTION SUFFICIENT TO FILL THE SPACE UNDER THE SECTION. PLACE THE SECTION ON THE FOUNDATION AND SLIDE INTO POSITION NEXT TO THE BACK SECTION. APPLY PIPE JOINT COMPOUND TO THE NIPPLE THREADS AND ENGAGE THE SUPPLY DRUM NIPPLES INTO THE SECTION. MAINTAIN THE EXACT 3" DISTANCE FROM THE BOSS ON THE DRUM TO THE FACE OF THE SECTION AT THE PARTING LINE USING THE WOOD SPACING GAGE. MAKE NIPPLE UP INTO SECTION TWO OR THREE TURNS. A SMALL PINCH BAR IS A CONVENIENT TOOL FOR POSITIONING THE SECTIONS TO LINE UP SUPPLY DRUM NIPPLE WITH THE TAPPING. DO NOT TIGHTEN LOCKNUTS.

4. APPLY PIPE JOINT COMPOUND TO THREADS OF RETURN NIPPLE, THEN ENGAGE NIPPLE IN SECTION AND MAKE UP TWO OR THREE TURNS TO HOLD SECTION IN POSITION. DO NOT TIGHTEN LOCKNUTS.



5. INSTALL AND CONNECT THE OPPOSITE HAND INTERMEDIATE SECTION IN THE SAME MANNER TAKING CARE TO FILL THE POCKETS AND SEAL THE SPACES WITH INSULATING CEMENT.

6. AS EACH FULL SECTION IS ERECTED, IT IS RECOMMENDED THAT THE JOINTS BETWEEN SECTIONS IN THE AREA UNDER THE SUPPLY DRUM BE SEALED WHILE ACCESSIBLE FROM THE INSIDE UNDER THE DRUM. THE ACCESS TO THIS AREA IS SOMEWHAT RESTRICTED WHEN ALL SECTIONS ARE IN PLACE.

7. THE JOINT BETWEEN SECTIONS UNDER THE SUPPLY DRUM SHOULD BE SEALED USING THE ROPE WICKING FURNISHED WITH THE BOILER. LAY THE ROPE OVER THE JOINT AND THEN PACK GENTLY INTO THE SPACE BETWEEN BEADS OF THE SECTIONS TAKING CARE NOT TO FORCE THE ROPE PAST THE BEADS. APPLY INSULATING CEMENT OVER THE ROPE SO AS TO FILL THE SPACE UP TO FINISH FLUSH WITH THE OUTSIDE LINE OF THE SECTIONS. SEE FIGURE NO. 8. THE EXTERIOR JOINT BETWEEN SECTIONS CAN THEN BE SEALED AFTER ALL SECTIONS ARE CONNECTED IN PLACE.

8. AS THE SECTIONS ARE ERECTED, THE LONGITUDINAL JOINT DIRECTLY UNDER THE TOP HEADER SHOULD BE SEALED BY PLACING THE NARROW INSULATING STRIPS OVER THE JOINT THEN COVER WITH A LAYER OF INSULATING CEMENT EXTENDING THE FULL WIDTH OF THE MILLBOARD AND JOINING WITH INSULATING CEMENT BETWEEN SECTIONS. SEE FIGURE NO. 8.

9. REFER TO THE TABLE SHOWING THE LOCATION AND NUMBER OF SECTIONS ON PAGE 4 AND TAKE CARE TO INSTALL REAR INTERMEDIATE SECTIONS AND FORWARD INTERMEDIATE SECTIONS IN THEIR PROPER ORDER. CONTINUE TO INSTALL INTERMEDIATE SECTIONS IN THE SAME MANNER DESCRIBED ABOVE EXCEPT FOR THE LAST THREE SECTIONS ON EACH SIDE.

THESE SECTIONS MUST BE PLACED IN POSITION WITH THE BEAD PROPERLY SPACED BEFORE THE NIPPLES ARE ENGAGED INTO SECTIONS.

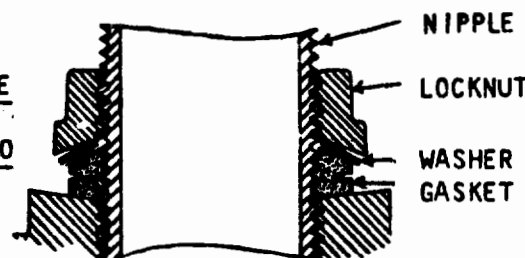
NOTE

BEFORE COMMENCING TO SEAL GASKETS AND TIGHTEN LOCKNUTS READ THE ENTIRE ARTICLE ON THIS SUBJECT AND FOLLOW THE INSTRUCTIONS IN EVERY DETAIL

SEALING GASKETS AND TIGHTENING LOCKNUTS

1. WHEN ALL SECTIONS ARE IN PLACE, GO OVER THE ENTIRE BOILER AND MAKE NIPPLES TIGHT INTO THE SECTIONS.
2. TIGHTENING LOCKNUTS -- WHEN ALL SECTIONS ARE IN PLACE WITH NIPPLES MADE UP TIGHT INTO SECTIONS, SCREW EACH LOCKNUT DOWN HAND TIGHT SO THAT THE GASKET IS TIGHT TO BOSS OF DRUM (SEE FIGURE NO. 11).

FIGURE
NO. 10



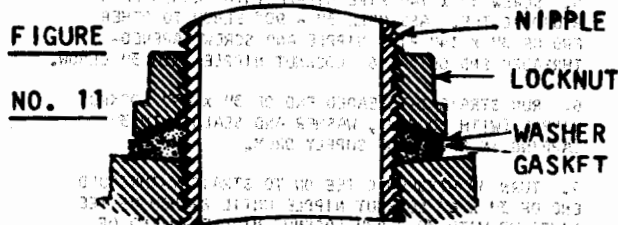
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SEALING JOINTS BETWEEN SECTIONS

3. THEN, USING A LOCKNUT WRENCH, TIGHTEN EACH LOCKNUT APPROXIMATELY 1-3/4 TURNS. WHEN THE DISTANCE FROM THE BOSS TO THE WASHER IS APPROXIMATELY 3/32" AND THE OUTSIDE DIAMETER OF THE GASKET IS ROUGHLY EVEN WITH THE OUTSIDE EDGE OF THE WASHER, THE SEALING HAS BEEN MADE (SEE FIGURE NO. 11)



1. AFTER ALL SECTIONS ARE IN PLACE AND CONNECTED TO SUPPLY AND RETURN DRUMS, GO OVER THE ENTIRE BOILER AND COMPLETE THE SEALING OF JOINTS USING ROPE WICKING AND INSULATING CEMENT ALL AS SHOWN IN FIGURE NO. 8.

2. TAKE PARTICULAR CARE TO SEAL THE JOINTS BETWEEN THE BOTTOMS OF THE SECTIONS AND THE TOP OF THE FOUNDATION ON THE REAR AS WELL AS ON THE SIDES.

3. THE VERTICAL JOINT BETWEEN THE TWO HALVES OF THE REAR SECTIONS SHOULD BE CAREFULLY FILLED WITH INSULATING MATERIALS. ROPE AND INSULATING CEMENT SHOULD BE APPLIED FROM THE INSIDE OF BOILER. THE OUTSIDE SEAM SHOULD BE FILLED WITH INSULATING CEMENT.

4. FINAL INSPECTION - AFTER THE BOILER HAS BEEN FILLED WITH WATER AND FIRED UP, INSPECT ALL NIPPLES FOR LEAKS. LEAKS CAN BE STOPPED AT ANY TIME BY SLIGHTLY TIGHTENING THE LOCKNUT APPROX. 1/8 TURN UNTIL THE CONDITION SHOWN IN FIGURE NO. 11 IS OBTAINED.

THE VERTICAL JOINT BETWEEN THE TWO HALVES OF THE FRONT SECTION SHOULD BE CAREFULLY SEALED WITH ROPE WICKING LAID IN THE OPENING AND COVERED WITH INSULATING CEMENT.

INSTRUCTIONS FOR INSTALLATION OF WATER RETURN YOKE

1. A GOOD GRADE OF PIPE COMPOUND SHOULD BE APPLIED TO ALL TAPERED PIPE THREADS. DO NOT USE COMPOUND OR SEALERS OF ANY KIND ON THE STRAIGHT THREADS OR ON THE GASKETS. FOLLOW INSTRUCTIONS FOR SEALING GASKETS AND TIGHTENING LOCKNUTS AS DETAILED ON PAGE 8 AND 9.

2. ASSEMBLE AND TIGHTEN THE 5" x 4" HEX. BUSHING, 4" x 3" PIPE NIPPLE, AND 4" x 4" STANDARD TEE INTO THE 5" REAR END TAPPING OF BOTH R.H. AND L.H. RETURN DRUMS. BRANCH OF 4" x 4" STANDARD TEE MUST FACE DOWNWARD IN BOTH CASES.

3. SCREW THE 4" x 3" PIPE NIPPLE AND 4" STANDARD TEE INTO BRANCH OF 4" TEE ON L.H. RETURN DRUM.

4. SCREW THE 4" x 3" PIPE NIPPLE AND 4" LOCKNUT TEE INTO BRANCH OF 4" TEE ON R.H. RETURN DRUM.

5. RUN 4" x 3/8" LOCKNUT NIPPLE INTO 4" LOCKNUT TEE ABOUT AS FAR AS IT WILL GO.

6. SET DISTANCE FROM END OF 4" x 7" LOCKNUT NIPPLE TO FACE OF 4" x 3/8" LOCKNUT TEE TO MEASURE 5". THEN LINE THIS UP WITH 4" STANDARD TEE ON L.H. RETURN DRUM. BACK NIPPLE DOWN TO 4" x 3/8" LOCKNUT TEE AND MAKE UP TAPERED JOINT. BACK 4" x 3/8" LOCKNUT NIPPLE OUT OF 4" LOCKNUT TEE AT R.H. RETURN DRUM AND MAKE UP TAPERED JOINT INTO 4" x 4" x 6" LOCKNUT TEE. IT MAY BE NECESSARY TO SLIGHTLY TURN THE 4" LOCKNUT TEE AT R.H. RETURN DRUM OR THE 4" STANDARD TEE AT THE L.H. RETURN DRUM TO MAKE A PERFECT ALIGNMENT POSSIBLE.

7. SCREW THE 6" x 5" PIPE NIPPLE AND 6" x 6" 45° ELBOW INTO THE BRANCH OF THE 4" x 4" x 6" LOCKNUT TEE. MAKE SURE TIGHT. HAVE OUTLET OF 6" x 45° ELBOW FACING AWAY FROM THE BOILER. THE ASSEMBLED 4" x 4" x 6" LOCKNUT TEE, 6" NIPPLE, AND 6" x 45° ELBOW IS FREE TO ROTATE UNTIL THE LOCKNUTS ON THE 4" x 7" AND 4" x 3/8" LOCKNUT NIPPLES ARE TIGHTENED. THIS MAKES PRECISE ADJUSTMENT OF THE TEE AND 45° ELBOW POSSIBLE. TURN THE 4" x 4" x 6" LOCKNUT TEE UNTIL THE FACE OF THE 6" x 45° ELBOW IS PLUMB, THEN TIGHTEN LOCKNUTS.

8. INSTALL 4" x 2" HEX. BUSHINGS AND 2" BRASS CLEAN-OUT PLUGS WHERE INDICATED.

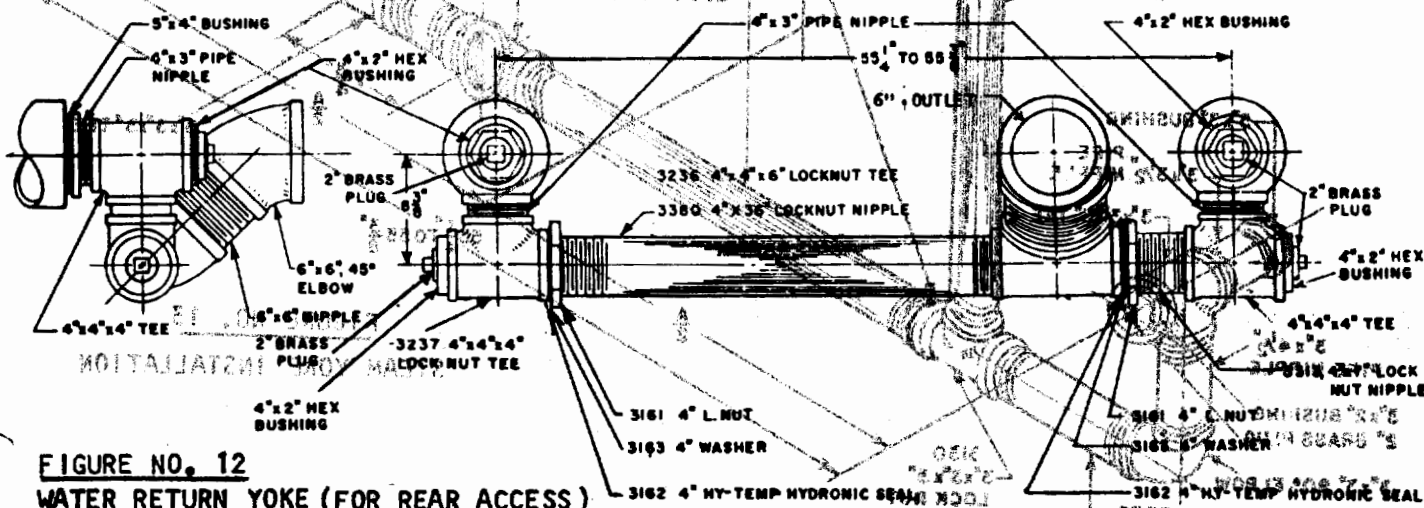


FIGURE NO. 12
WATER RETURN YOKE (FOR REAR ACCESS)

SEE PAGE 18, FIGURE NO. 31 FOR WATER RETURN YOKE (NO REAR ACCESS)

SERIES M450L MILLS WATER TUBE BOILER

INSTRUCTIONS FOR INSTALLATION OF STEAM YOKE

1. ASSEMBLE 5 x 3 HEX. BUSHING, 3 x 3-1/2 PIPE NIPPLE AND 3 x 3 x 3 STD. TEE INTO 5" REAR END TAPPINGS OF BOTH R.H. AND L.H. RETURN DRUMS. BRANCH OF 3 x 3 x 3 STD. TEE MUST FACE DOWNWARD IN BOTH CASES

2. TAPERED THREADS SHOULD HAVE PIPE JOINT COMPOUND APPLIED BEFORE BEING MADE UP. DO NOT USE COMPOUND ON STRAIGHT THREADS.

3. SCREW 3 x 4-1/2 PIPE NIPPLE AND 3" 90° ELBOW INTO BRANCH OF 3" TEE ON R.H. RETURN DRUM. MAKE UP 3 x 12-1/2 PIPE NIPPLE INTO 90° ELBOW AND INTO TAPERED THREAD END OF SPEC. HYDRONIC TEE. HAVE BRANCH OF 3" HYDRONIC TEE FACING UPWARD. RUN STRAIGHT-THREADED END OF 3" x 26-1/2" LOCKNUT NIPPLE INTO STRAIGHT THREADS.

4. SCREW 3 x 4-1/2 PIPE NIPPLE AND 3" STD. TEE INTO BRANCH OF 3" TEE ON L.H. RETURN DRUM. MAKE UP 3 x 2-3/4" PIPE NIPPLE INTO 3" STD. TEE AND INTO 3" TAPPING OF 3 x 3 x 4 TEE. (HAVE 4" TAPPING FACING AWAY FROM THE BOILER.) THEN BACK LOCKNUT NIPPLE 3 x 26-12" OUT OF 3" HYDRONIC TEE AND ENGAGE TAPERED END INTO 3 x 3 x 4 TEE AND MAKE UP TIGHT.

5. SCREW 3" x 14" PIPE NIPPLE INTO BRANCH OF 3" HYDRONIC TEE. ASSEMBLE 3" - 90° ELBOW TO OTHER END OF 3" x 14" PIPE NIPPLE AND SCREW TAPERED-THREADED END OF 3 x 6 LOCKNUT NIPPLE INTO 3" ELBOW.

6. RUN STRAIGHT-THREADED END OF 3" x 47" LOCKNUT NIPPLE (WITH LOCKNUT, WASHER AND SEAL) INTO 3" TAPPING IN BOTTOM OF SUPPLY DRUM.

7. TURN 3" HYDRONIC TEE ON TO STRAIGHT-THREADED END OF 3" x 6" LOCKNUT NIPPLE UNTIL BRANCH OF TEE LINES UP WITH 3" x 47" LOCKNUT NIPPLE IN END OF SUPPLY DRUM. (IT MAY BE NECESSARY TO MOVE 3" x 14" PIPE NIPPLE AND ELBOW ASSEMBLY AWAY FROM OR NEARED BACK SECTION IN ORDER TO MAKE TEE AND LOCKNUT NIPPLE LINE UP.) ONCE LINED UP, BRING LOCKNUT NIPPLE OUT OF THE DRUM AND MAKE TAPERED-THREADED END TIGHT INTO TEE.

8. MAKE UP ALL LOCKNUT JOINTS FOLLOWING INSTRUCTIONS GIVEN FOR SEALING GASKETS AND TIGHTENING LOCKNUTS.

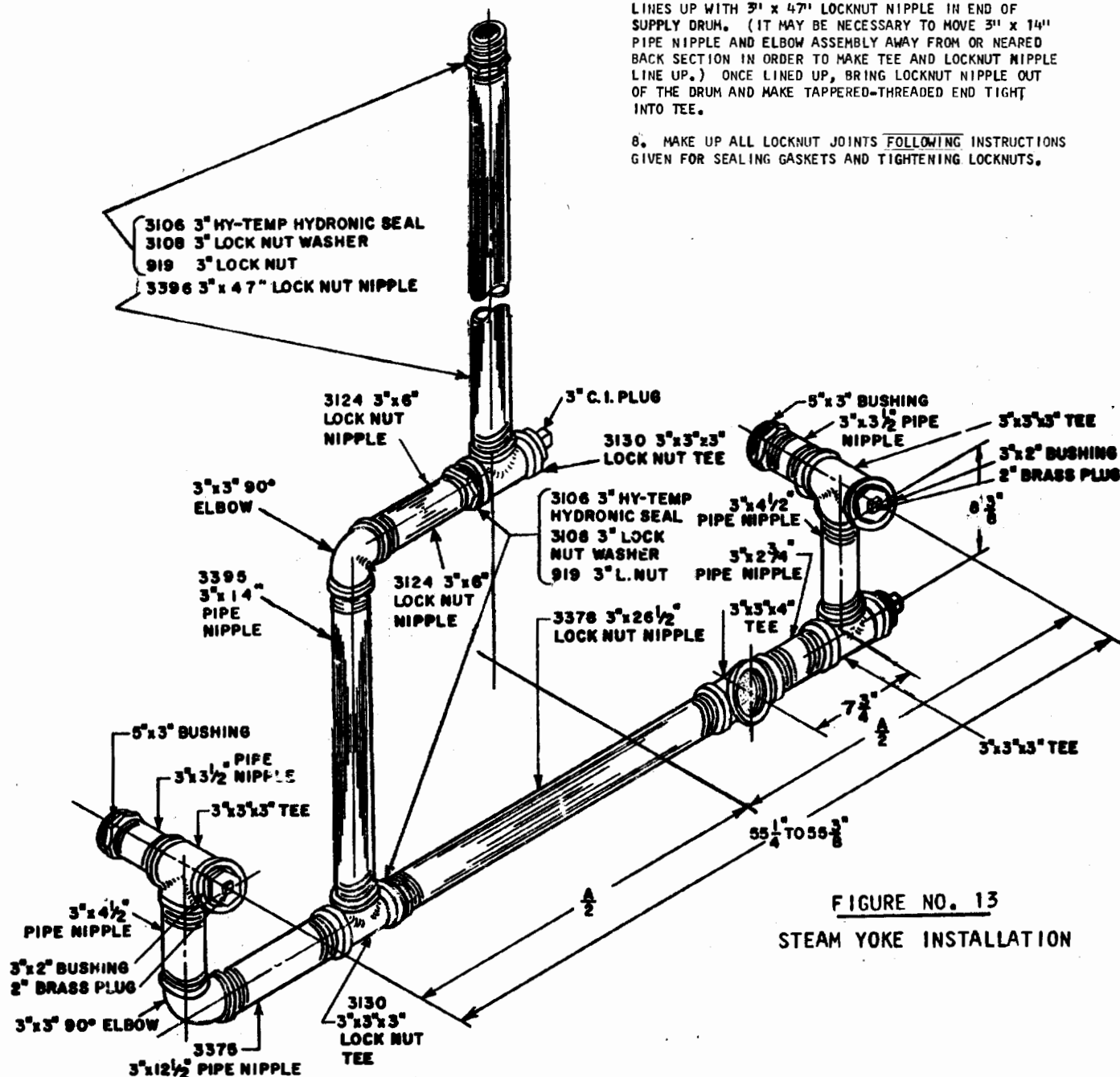


FIGURE NO. 13

STEAM YOKE INSTALLATION

SMOKEHOOD FOR NATURAL DRAFT

1. INSTALL THE SMOKEHOOD ADAPTER FRAMES (3335 & 3336) ON THE BACK SECTION USING $7/16"$ x $2-1/2"$ MACHINE BOLTS WITH ONE WASHER EACH. THE ROPE SEAL IS APPLIED TO THE FRAMES AT THE FACTORY, BUT CARE MUST BE TAKEN TO MAKE SURE THAT THE ROPE HAS NOT TWISTED OR KINKED DURING SHIPMENT. LINE THE FRAMES UP WITH THE OPENINGS IN THE BACK SECTIONS AND TIGHTEN ALL FASTENING BOLTS.

2. SEAL ALL OPENINGS BETWEEN THE REAR SECTION AND THE FLANGE OF THE ADAPTER FRAMES WITH BLACK FURNACE CEMENT.

3. ASSEMBLE THE $5/16"$ x $1"$ SQUARE HEAD MACHINE BOLTS AND SQUARE NUTS WITH ONE WASHER EACH LOOSELY ON THE INSIDE FLANGES OF THE SMOKEHOOD ELBOWS ON THE ENDS WHICH WILL BE SECURED TO THE ADAPTER FRAMES.

4. TAKE UP THE SMOKEHOOD CENTER SECTION (2954) AND PLACE IT IN POSITION BETWEEN THE ELBOWS WITH THE OUTLET EITHER LOOKING UP OR TO THE REAR AS REQUIRED. INSTALL THE $1/4"$ x $3/4"$ BOLTS, WASHERS AND NUTS, FOR FASTENING THE CENTER SECTION TO THE ELBOWS. LINE UP THE INTERIOR SURFACES OF THE CENTER SECTION AND THE ELBOWS AND TIGHTEN THE NUTS SO AS TO DRAW THE ELBOW FLANGES TIGHT TO THE CENTER SECTION FLANGES ALL AROUND.

5. ALIGN THE ELBOW OPENINGS WITH THE ADAPTER FRAME OPENINGS AND TIGHTEN NUTS SO AS TO DRAW THE FLANGES OF THE ELBOWS TIGHT TO THE ADAPTER FRAME.

6. SEAL ANY OPENINGS BETWEEN FLANGES WITH BLACK FURNACE CEMENT.

7. INSTALL SMOKEHOOD REDUCER, IF REQUIRED, OVER THE OUTLET OF THE CENTER SECTION. DRILL $9/32"$ DIAMETER HOLES IN THE CENTER SECTION TO MATCH THE HOLES IN THE REDUCER. ASSEMBLE $1/4"$ BOLTS THROUGH HOLES.

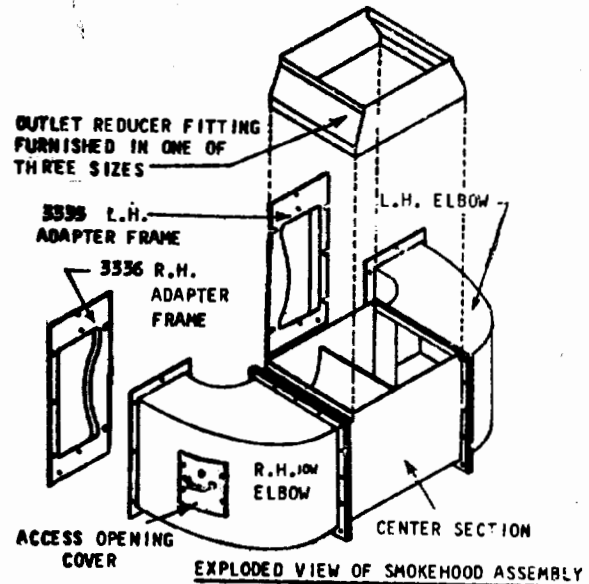
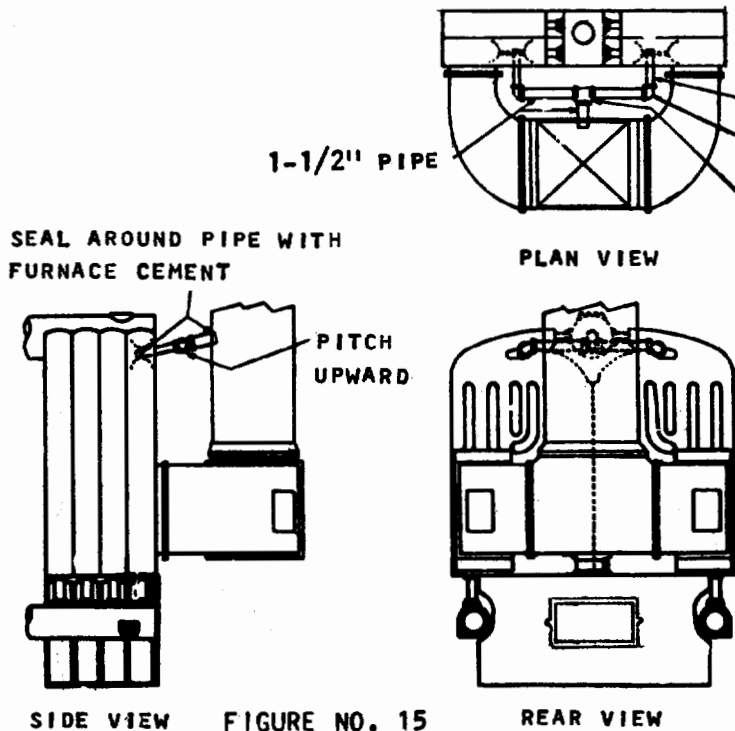
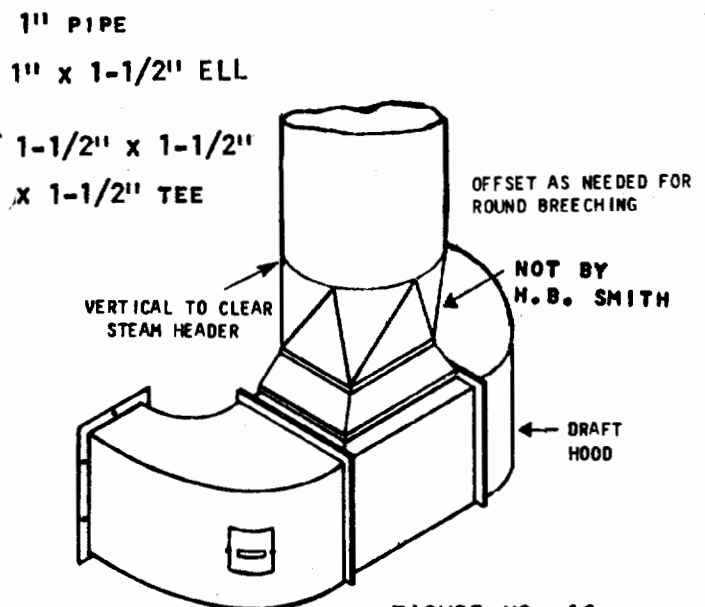


FIG. NO. 14



AUXILIARY FLUE GAS VENT
FOR GAS FIRED BOILERS



DISCHARGE CONNECTION FOR STEAM BOILER

(NATURAL DRAFT)

NOTE: VERTICAL RECTANGULAR UPTAKE FULL SIZE OF DRAFT HOOD OUTLET WILL CLEAR THE STEAM HEADER.

SERIES M450L MILLS WATER TUBE BOILER

FOR NATURAL DRAFT

FLUE DOORS AND HINGES

1. SEAL ANY OPENING BETWEEN FLANGES WITH BLACK LEAD. BOLT HINGE SUPPORTS (282) IN PLACE FOR FORWARD SECTION.

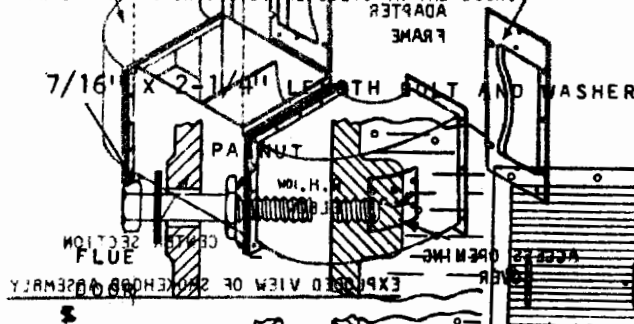
2. INSTALL SHOCK REDUCER. IF REQUIRED, IT SHOULD BE PLACED OVER THE COMPLETE HINGE ASSEMBLY WITH THE HINGE PLATE. THE COMPLETE HINGE ASSEMBLY SHOULD BE PLACED ON THE OUTSIDE OF THE BOILER. THE HINGE PLATE SHOULD BE PLACED ON THE INSIDE OF THE BOILER. THE HINGE WITH THE SHOCK REDUCER SHOULD BE PLACED ON THE LEFT HAND DOOR AND THE HINGE WITH THE SHOCK REDUCER ON THE RIGHT HAND DOOR.

3. THE BOILER HINGES SHOULD BE PLUMB WITH THE OUTSIDE EDGES APPROXIMATELY PARALLEL TO THE OUTSIDE EDGES OF THE SECTIONS.

4. SWING THE HINGE ASSEMBLY TO THE OPEN POSITION.

5. BEFORE PLACING FLUE DOORS ON THE BOILER, ASSEMBLE THE 7/16" x 2-1/4" SPECIAL BOLT AND NUT AS SHOWN IN FIG. 17.

6. PLACE THE FLUE DOORS ON THE BOILER AND HOLD AGAINST THE FRONT SECTION AND HOLD LOOSELY IN PLACE WITH 2 OR 3 SPECIAL BOLTS IN THE DOOR.



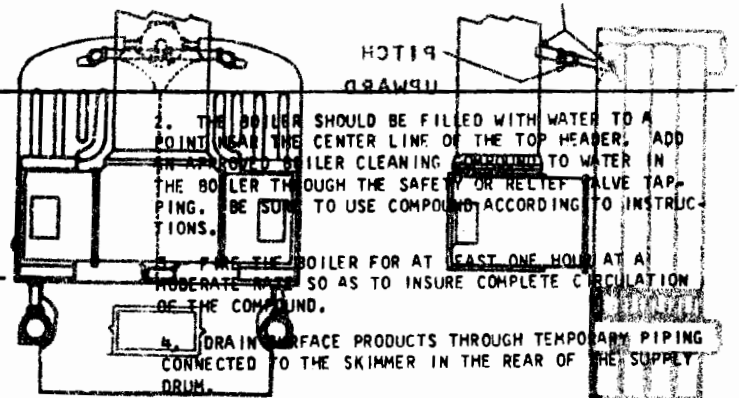
IF ANY BOLT BOTTLES IN DOOR, REMOVE BOLT AND A WASHER. FLUE DOOR BOLT ASSEMBLY DETAIL. FIGURE NO. 17.

7. INSTALL THE SMOKEHOOD ADAPTER FRAME (282) IN POSITION ON TOP OF FLUE DOOR. SHOCK REDUCER HINGE PLATE SHOULD BE PLACED ON THE OUTSIDE OF THE BOILER. EACH THROUGH THE DOOR OUTER BOLT HOLES OPEN DOORS HAND TIGHTEN WITH TWO FLATHEAD SCREWS BOLT THROUGH EACH BOLT HOLE AND FLUE DOOR. HINGE IN POSITION.

8. ADJUST THE FLUE DOORS SO THAT, WHEN CLOSED, THE GASKETS ON THE DOORS SHOULD SEAT SQUARELY ON THE COMPRESSION BEADS ON THE FRONT SECTION. HORIZONTAL ADJUSTMENT IS ACCOMPLISHED BY LOOSENING THE 5/8" INCH CAP SCREW SLIGHTLY AND TURNING THE ECCENTRICS. VERTICAL ADJUSTMENT IS ACCOMPLISHED BY MEANS OF THE JACK SCREW IN THE BOILER HINGE SUPPORT. THE FLUE DOORS SHOULD BE FASTENED IN THE CLOSED POSITION. MAKE UP THE SMOKEHOOD CENTER SECTION (282) WITH THE FLUE DOORS IN POSITION BETWEEN THE ELBOWS. IT SHOULD BE PLACED IN POSITION LOOKING UP OR TO THE REAR AS REQUIRED. THE 1/4" x 3/4" BOLTS, WASHERS AND NUTS, FOR FASTENING THE CENTER SECTION TO THE ELBOWS, LINE UP THE INTER SURFACES OF THE CENTER SECTION AND THE ELBOWS AND TIGHTEN THE NUTS SO AS TO DRAW THE ELBOWS TIGHT TO THE CENTER SECTION FLANGES ALL AROUND.

9. SEAL THE ELBOW OPENINGS WITH THE ADAPTER FRAME. TIGHTEN AND TIGHTEN NUTS SO AS TO DRAW THE ELBOWS TIGHT TO THE ADAPTER FRAME.

PLAN VIEW
SEAL AROUND PIPE WITH FURNACE CEMENT



2. THE BOILER SHOULD BE FILLED WITH WATER TO A POINT NEAR THE CENTER LINE OF THE TOP HEADER. ADD IN APPROVED BOILER CLEANING COMPOUND TO WATER IN THE BOILER THROUGH THE SAFETY OR RELIEF VALVE TAPPING. BE SURE TO USE COMPOUND ACCORDING TO INSTRUCTIONS.

3. FIRE THE BOILER FOR AT LEAST ONE HOUR AT A MODERATE RATE SO AS TO INSURE COMPLETE CIRCULATION OF THE COMPOUND.

4. DRAIN SURFACE PRODUCTS THROUGH TEMPORARY PIPING CONNECTED TO THE SKIMMER IN THE REAR OF THE SUPPLY DRUM.

5. WHEN COOL, OPEN THE BOTTOM DRAIN VALVES AND DRAIN BOILER COMPLETELY. INTRODUCTION OF THE BOILER INTERIOR WITH CLEAN WATER INTRODUCED BY A HOSE INTO THE TOP HEADER. WHEN THE FLUSHING IS COMPLETE, CLOSE THE DRAIN VALVES AND FILL THE BOILER WITH CLEAN WATER.

6. COMPLETE THE INSTALLATION OF PERMANENT PIPING CONNECTIONS, CONTROLS, SAFETY OR RELIEF VALVES AND ANY OTHER COMPONENTS.

7. CHECK CAREFULLY FOR AIR LEAKS IN THE SEALING OF THE BOILER AND REPAIR WHEN NECESSARY.

FIRING AND CLEANING

NOTE: THE FUEL BURNING EQUIPMENT SHOULD BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

1. THE FUEL BURNING EQUIPMENT SHOULD BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

SMOKEHOOD FOR WING I.D. FAN

1. INSTALL THE SMOKEHOOD ADAPTER FRAMES (3335 & 3336) ON THE BACK SECTION USING 7/16" x 2-1/2" MACHINE BOLTS WITH ONE WASHER EACH. THE ROPE SEAL IS APPLIED TO THE FRAMES AT THE FACTORY, BUT CARE MUST BE TAKEN TO MAKE SURE THAT THE ROPE HAS NOT TWISTED OR KINKED DURING SHIPMENT. LINE THE FRAMES UP WITH THE OPENINGS IN THE BACK SECTIONS AND TIGHTEN ALL FASTENING BOLTS.

2. SEAL ALL OPENINGS BETWEEN THE REAR SECTION AND THE FLANGE OF THE ADAPTER FRAMES WITH BLACK FURNACE CEMENT.

3. ASSEMBLE THE 5/16" x 1" SQUARE HEAD MACHINE BOLTS AND SQUARE NUTS WITH ONE WASHER EACH LOOSELY ON THE INSIDE FLANGES OF THE SMOKEHOOD ELBOWS ON THE ENDS WHICH WILL BE SECURED TO THE ADAPTER FRAMES. ONE AT A TIME, INSTALL THE ELBOWS BY CATCHING THE INSIDE BOLTS IN THE SLOTS OF THE ADAPTER FRAMES AND THEN INSTALLING THE REMAINING 5/16" x 1" SQUARE HEAD MACHINE BOLTS AND SQUARE NUTS WITH ONE WASHER EACH. THE BOLTS FOR THE TOP AND BOTTOM HOLES SHOULD BE INSERTED WORKING THROUGH THE SMOKEHOOD ELBOW. DO NOT TIGHTEN THE NUTS, BUT ALLOW THE ELBOWS TO REST LOOSELY IN POSITION.

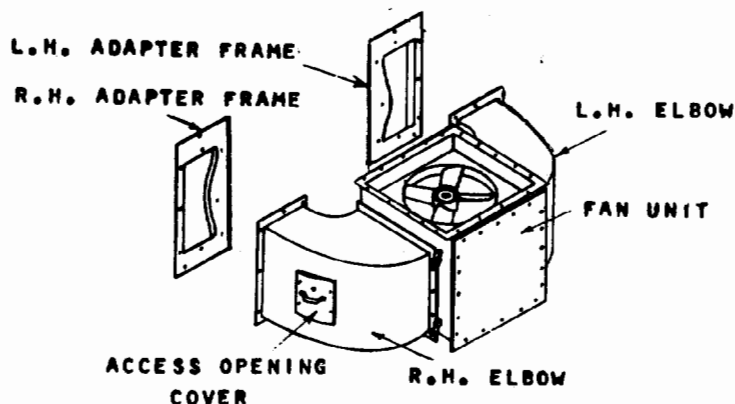
4. UNPACK THE INDUCED DRAFT FAN AND ASSEMBLE THE SIDE PANELS AS REQUIRED.

NOTE: TWO MEN CAN INSTALL THE INDUCED DRAFT FAN. ONE MAN SHOULD WORK IN THE SPACE BETWEEN THE FAN AND THE REAR SECTION, THE OTHER ON THE OUTSIDE. THE POSITIONING OF THE FAN IS EASILY DONE USING BLOCKING OF THE PROPER HEIGHT UNDER THE FAN MOTOR BRACKET FOR SUPPORT.

5. TAKE UP THE INDUCED DRAFT FAN, PLACE IT IN POSITION BETWEEN THE SMOKEHOOD ELBOWS, LINE UP THE FLANGES AND INSTALL THE 1/4" x 3/4" SQUARE HEAD MACHINE BOLTS AND SQUARE NUTS WITH ONE WASHER EACH. TAKE CARE TO LINE UP THE INSIDE OPENING OF THE SMOKEHOOD ELBOWS WITH THE INLET OPENINGS OF THE FAN.

6. THE DAMPER OPERATOR MOTOR BRACKET AND MAIN DAMPER SPINDLE SUPPORT BEARINGS SHOULD BE PLACED IN POSITION. (SEE FIGURES NO. 20 AND 22. STUDY PAR. NO. 9.

7. TIGHTEN NUTS ON FAN FLANGES AND SEAL ANY OPENINGS BETWEEN FLANGES WITH BLACK FURNACE CEMENT.



EXPLODED VIEW OF SMOKEHOOD ASSEMBLY
FOR WING FAN
SHUTTER DAMPER REQ'D. (NOT SHOWN)

FIGURE NO. 18

8. WHEN THE INDUCED DRAFT FAN AND THE SMOKEHOOD ELBOWS ARE COMPLETELY ASSEMBLED AND TIGHT, LEVEL UP THE ASSEMBLY AND CENTER THE CONNECTIONS TO THE ADAPTER FRAMES AND TIGHTEN NUTS TO FASTEN THE SMOKEHOOD ELBOWS TIGHT TO THE ADAPTER FRAMES. SEAL OPENINGS BETWEEN FLANGES AND ADAPTER FRAMES WITH BLACK FURNACE CEMENT.

9. AFTER THE INDUCED DRAFT FAN AND SMOKEHOOD ELBOWS ARE INSTALLED, POSITION THE DAMPER SPINDLE SUPPORT BEARINGS, INSERT THE DAMPER SPINDLE WITH END HAVING "FLAT" ON L.H. SIDE, THEN TIGHTEN THE NUTS TO HOLD THE BRACKETS. (SEE FIGURE NO. 20). SEE THAT MAIN DAMPER SPINDLE TURNS FREELY.

10. SLIP THE OPERATING ARM ON THE RIGHT HAND END OF MAIN DAMPER SPINDLE AND THE QUADRANT ON THE LEFT HAND END OF MAIN DAMPER SPINDLE. PLACE THE DAMPERS IN THE L.H. ELBOW IN THE CLOSED POSITION, THEN TIGHTEN QUADRANT SET SCREW ON THE FLAT OF MAIN DAMPER SPINDLE. NEXT PLACE BOTH DAMPERS IN THE CLOSED POSITION AND FASTEN CRANK ARM TO R.H. END OF MAIN DAMPER SPINDLE BY TIGHTENING LOCKING NUT. CHECK THE OPERATION THROUGH THE FULL TRAVEL. IF THE DAMPERS AND LINKAGE DO NOT MOVE FREELY, CHECK THE ENTIRE ASSEMBLY FOR RESTRICTION. THE ALIGNMENT OF THE LINKAGE IS THE MOST LIKELY SOURCE OF EXCESSIVE FRICTION. ADJUST ALIGNMENTS UNTIL FREE OPERATION IS OBTAINED.

11. AFTER ASSEMBLY OF THE ACTUATOR TO THE BRACKET, CONNECT THE DRIVE LINKAGE BETWEEN THE DAMPER MOTOR AND THE PIVOT PLATE, AS ILLUSTRATED WITH THE DAMPER BLADES IN THE CLOSED POSITION. IT MAY BE NECESSARY TO POWER THE CONTROL AND RE-POSITION THE BRACKET ON THE DAMPER MOTOR SPINDLE TO MATCH FIGURE NO. 22.

12. OPEN CLEANOUT COVERS ON SMOKEHOOD ELBOWS TO CHECK DAMPER POSITIONS. RIGHT AND LEFT HAND MUST BE THE SAME.

DRAFT CONTROL DAMPER (WING)

1. THE BAROMETRIC TYPE DRAFT CONTROL DAMPER OR THE MOTOR OPERATED BYPASS TYPE DAMPER BOTH ARE TO BE INSTALLED ON THE REAR SIDE OF THE INDUCED DRAFT FAN ASSEMBLY USING BOLTS, NUTS AND WASHERS AS REQUIRED.

2. WHEN USING THE BAROMETRIC TYPE DAMPER, THE COUNTERWEIGHTS WILL BE ADJUSTED TO OBTAIN THE OVER-FIRE DRAFT REQUIRED BY THE BURNER INSTALLER.

3. WHEN USING THE MOTOR OPERATED BYPASS TYPE DAMPER, THE MOTOR OPERATOR IS NOT FURNISHED BY THE H.B. SMITH CO. THE DAMPER MOTOR BRACKET AND LINKAGE SHOULD BE LEFT READY FOR THE USE OF THE BURNER INSTALLER WHO WILL SET, CONNECT AND ADJUST THE DAMPER OPERATING EQUIPMENT.

4. WHEN USING THE MOTOR OPERATED SHUTTER DAMPER, THE SMOKEHOOD ELBOWS ARE SHIPPED WITH THE DAMPERS AND LINKAGE INSTALLED.

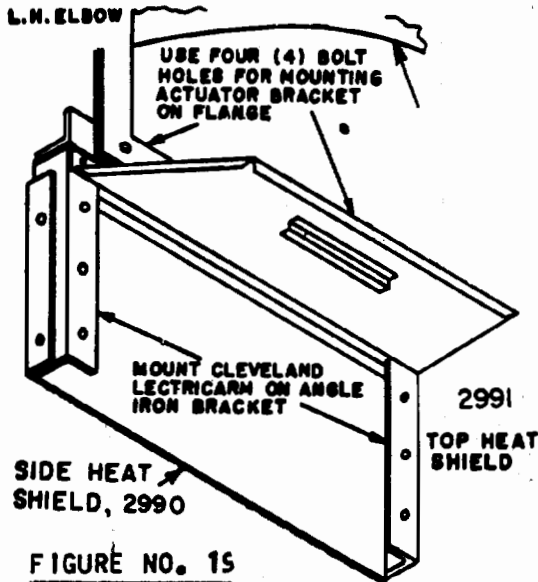
5. AFTER THE INDUCED DRAFT FAN AND SMOKEHOOD ELBOWS ARE INSTALLED, POSITION THE DAMPER SPINDLE SUPPORT BEARINGS, INSERT THE DAMPER SPINDLE AND TIGHTEN THE NUTS TO HOLD THE BRACKETS IN POSITION. (SEE FIG. 20 & 22).

6. INSTALL THE OPERATING ARM ON THE RIGHT HAND END OF THE SHAFT AND THE QUADRANT ON THE LEFT HAND END OF THE SHAFT. CONNECT THE DAMPER LINKAGE TO THE CONNECTING SHAFT ARMS. PLACE BOTH DAMPERS IN BOTH ELBOWS IN THE CLOSED POSITION AND SET BOTH THE OPERATING ARM AND THE QUADRANT ON THE SHAFT BY TIGHTENING THE LOCKNUT NUT AND SET SCREW. CHECK THE OPERATION THROUGHOUT THE FULL TRAVEL. IF THE DAMPERS AND LINKAGE DO NOT MOVE FREELY, CHECK THE ENTIRE ASSEMBLY FOR RESTRICTION. THE ALIGNMENT OF LINKAGE IS THE MOST LIKELY SOURCE OF EXCESSIVE FRICTION. ADJUST ALIGNMENTS UNTIL FREE OPERATION IS OBTAINED.

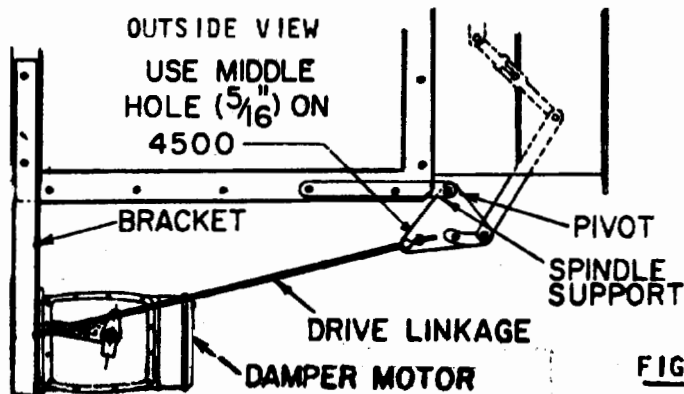
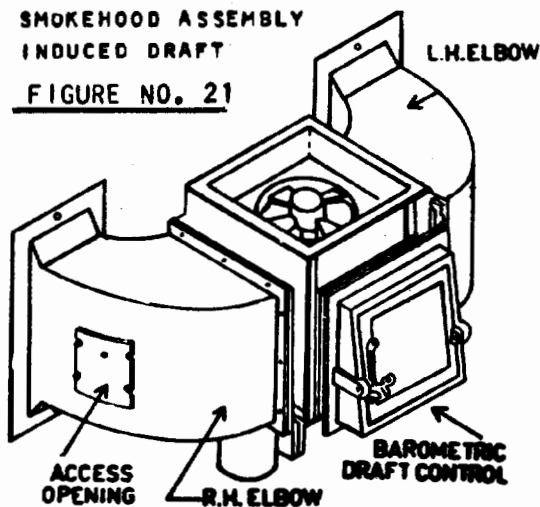
DRAFT CONTROL DAMPER MOTOR MOUNTING

1. THE MOTOR OPERATOR IS NOT FURNISHED BY THE H.B. SMITH CO. THE DAMPER MOTOR BRACKET AND LINKAGE SHOULD BE LEFT READY FOR THE USE OF THE BURNER INSTALLER WHO WILL SET, CONNECT AND ADJUST THE DAMPER OPERATING EQUIPMENT.

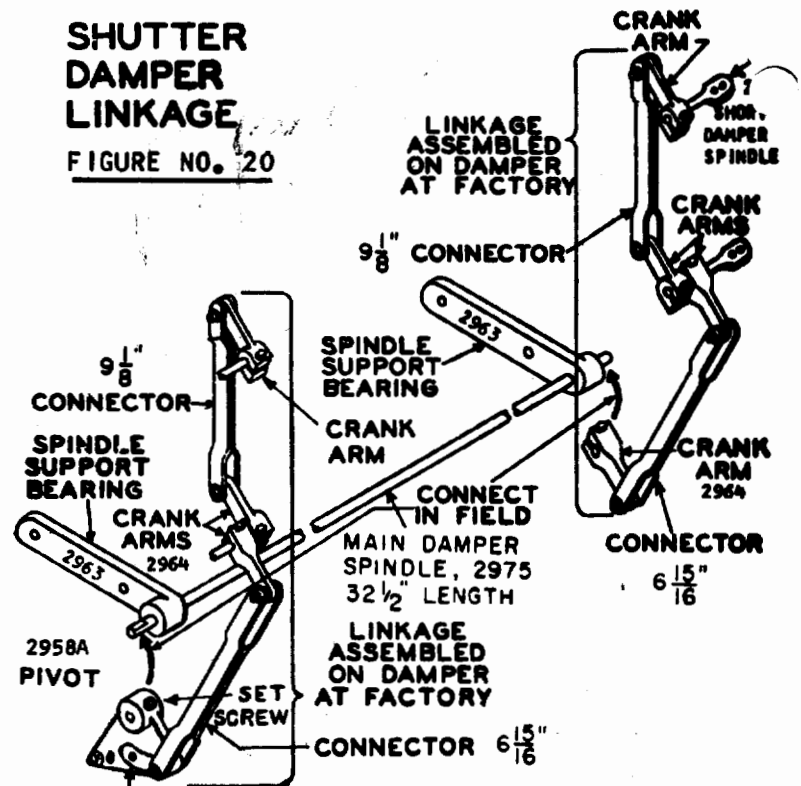
2. FIG. NO. 19 ILLUSTRATES THE ANGLE IRON MOUNTING BRACKET WITH THE TOP AND SIDE HEAT SHIELDS IN POSITION.



**SMOKEHOOD ASSEMBLY
INDUCED DRAFT
FIGURE NO. 21**



**SHUTTER
DAMPER
LINKAGE
FIGURE NO. 20**



USE THIS HOLE FOR 4500 ACTUATOR DRIVE ARM

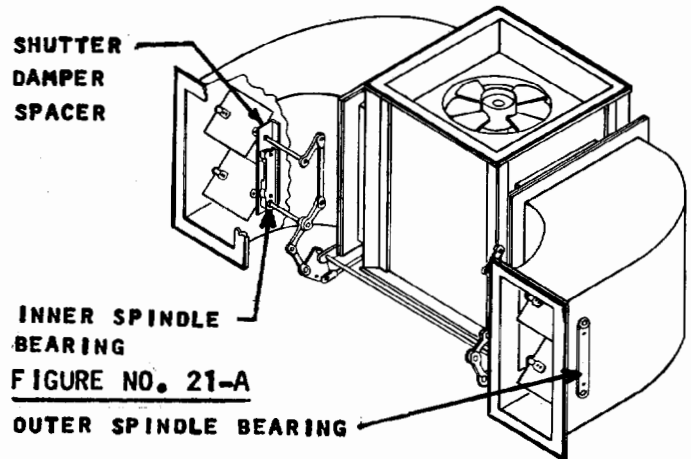


FIGURE NO. 21-A

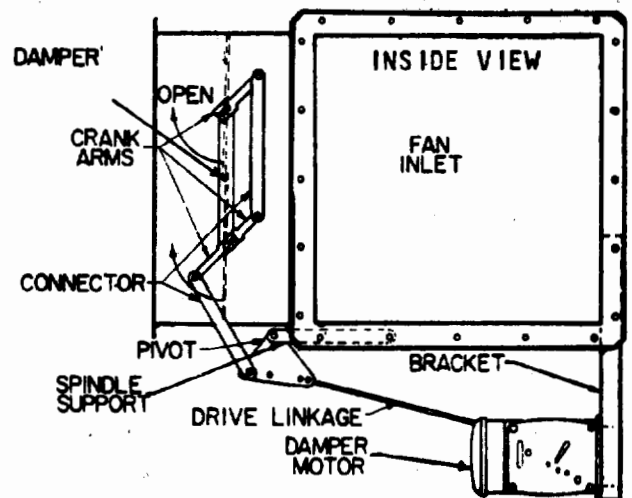


FIGURE NO. 22

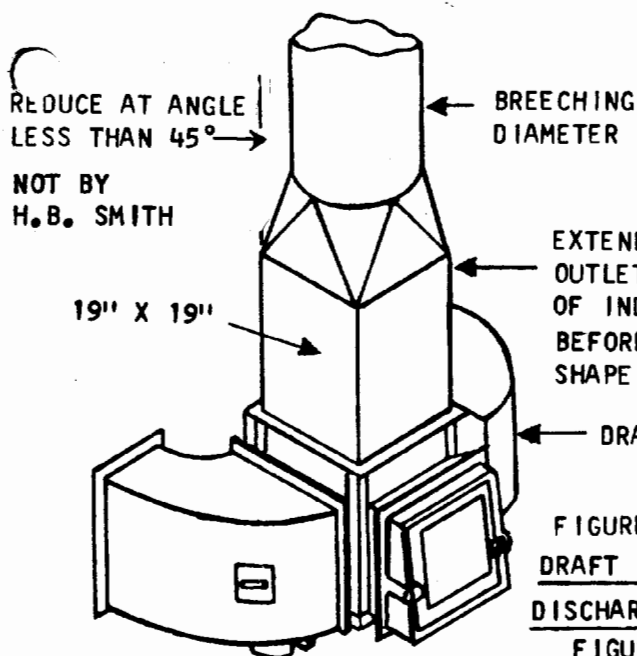
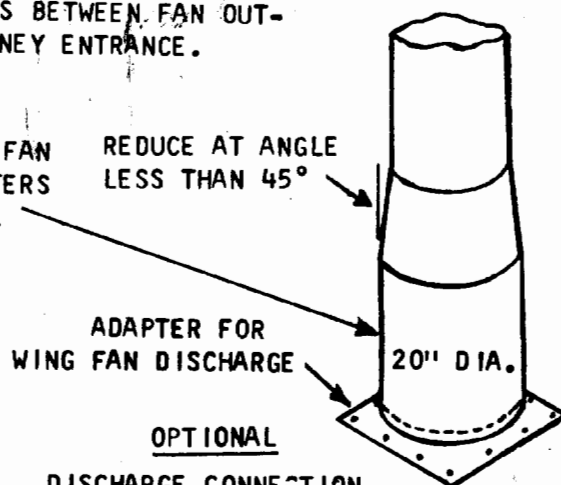


FIGURE NO.
DRAFT INDUCER
DISCHARGE CONNECTION
FIGURE NO. 23

NOTE: USE NO MORE THAN 2 LONG
RADIUS ELBOWS BETWEEN FAN OUT-
LET AND CHIMNEY ENTRANCE.



OPTIONAL
DISCHARGE CONNECTION
NOT BY H.B. SMITH

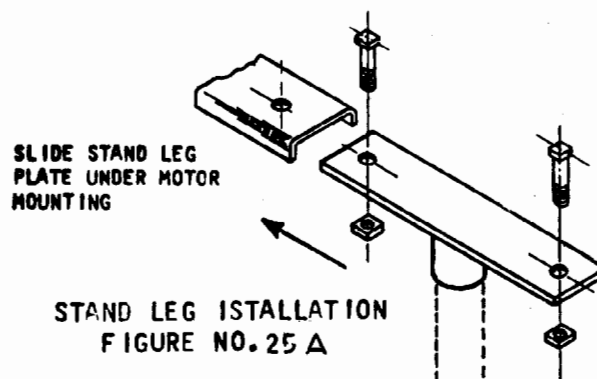
FIGURE NO. 24

WHITTY FAN INSTALLATION

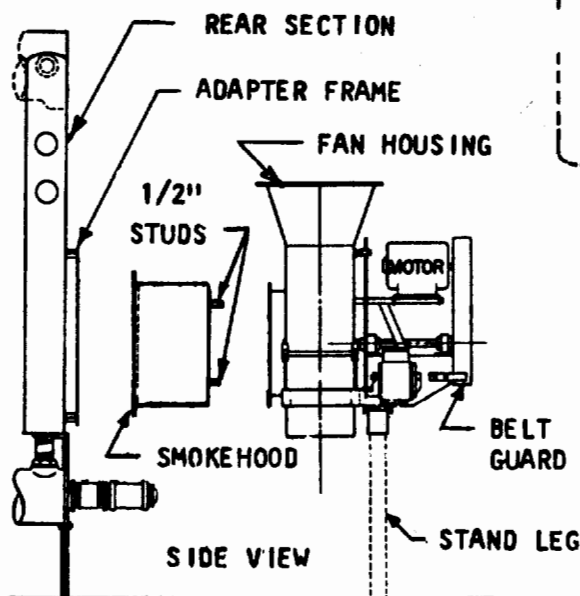
1. INSTALL THE SMOKEHOOD ADAPTER FRAMES (3335 & 3336) ON THE BACK SECTIONS USING 7/16" x 2-1/2" MACHINE BOLTS WITH ONE WASHER. THE ROPE SEAL IS APPLIED TO THE FRAMES AT THE FACTORY, BUT CARE MUST BE TAKEN TO MAKE SURE THAT THE ROPE HAS NOT TWISTED DURING SHIPMENT. LINE UP REAR SECTION AND TIGHTEN ALL THE FASTENING BOLTS. SEE FIGURE NO. 25.
2. SEAL ALL OPENINGS BETWEEN THE REAR SECTION AND THE FLANGE OF THE ADAPTER FRAMES WITH BLACK FURNACE CEMENT.
3. REMOVE CLEANOUT COVERS FROM SMOKEHOOD. ASSEMBLE THE 5/16" SQUARE HEAD MACHINE BOLTS AND SQUARE NUTS WITH ONE WASHER EACH LOOSELY ON THE FLANGES OF THE SMOKEHOOD ELBOWS. SEE FIGURE NOS. 25 & 26 ON PAGES NO. 15, AND 16. PLACE SMOKEHOOD UP AGAINST ADAPTER FRAMES AND ENGAGE BOLTS WITH SLOTS IN THE FRAMES. ASSEMBLE THE BOLTS TO THE TOP AND BOTTOM OF THE SMOKEHOOD THROUGH THE CLEANOUT COVER OPENING, ADDING THE NUTS AND WASHERS ON THE OUTSIDE OF THE FLANGE. ASSEMBLE AND TIGHTEN THE REMAINING BOLTS, NUTS, AND WASHERS ON THE INSIDE FLANGES. REPLACE CLEANOUT COVERS.

4. SUPPORT THE FAN HOUSING AND MOTOR UNIT IN POSITION AGAINST THE SMOKEHOOD MATCHING THE HOLES IN THE THIMBLE WITH THE 1/2" STUDS. ASSEMBLE THE 1/2" HEX NUTS AND TIGHTEN.

5. PREPARE THE 2" PIPE STAND LEG (NOT FURNISHED) AND ASSEMBLE TO THE COUPLING PRIOR TO SLIDING THE PLATE UNDER THE MOTOR BASE SUPPORTS. SEE PAGE 15, FIGURE NO. 25A. SLIDE STAND LEG PLATE IN POSITION, ASSEMBLE BOLTS AND NUTS, THEN TIGHTEN. ADJUST PIPE TO SUPPORT WEIGHT OF UNIT.



STAND LEG INSTALLATION
FIGURE NO. 25A



WHITTY INDUCED DRAFT FAN
FIGURE NO. 25

SERIES M450L MILLS WATER TUBE BOILER

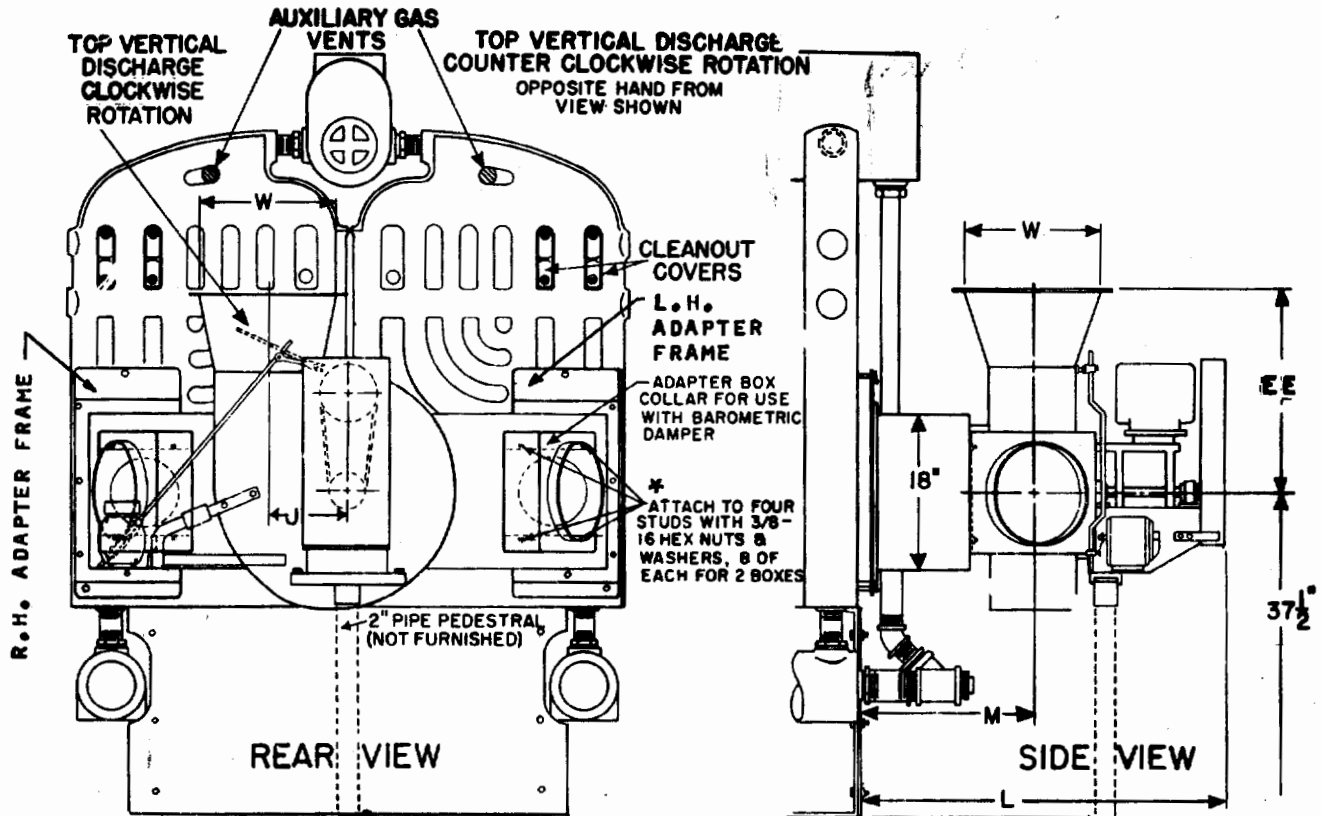


FIGURE NO. 26 WHITTY FAN INSTALLATION SHOWING OPTIONAL ADAPTER BOX AND BAROMETRIC COLLAR TO FACE AWAY FROM FAN.
 *NOT USED WITH MOTOR DRIVEN DISCHARGE DAMPER

M450L WHITTY FAN DIMENSIONS							
BOILER SIZES	J	L	M	S	T	W	EE
M450L-S/W 10 THRU 16	11-1/4	42-1/4	20	23	7	16	21
M450L-S/W 17 THRU 22	13-1/4	46	21	27	8-1/2	18	25

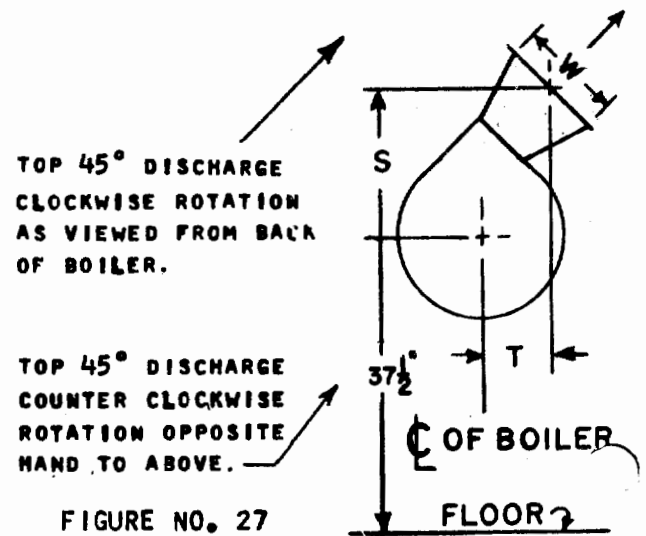
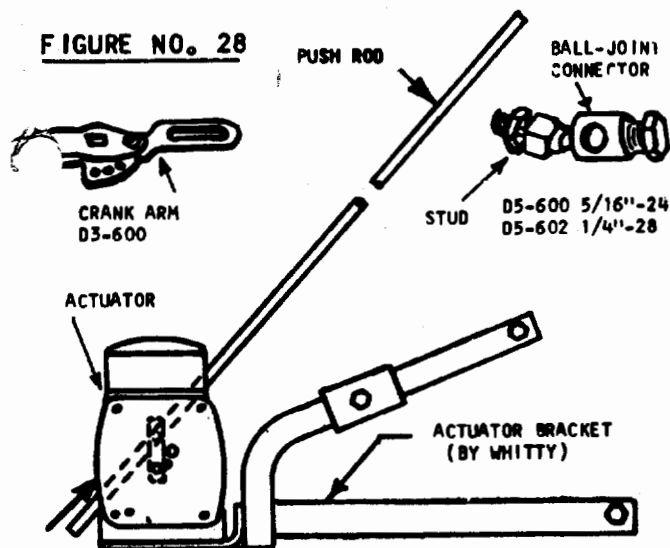


FIGURE NO. 27

ACTUATOR INSTALLATION

1. PLACE THE ACTUATOR IN POSITION ON THE MOUNTING ANGLE BRACKET WITH THE RED POSITION INDICATOR AWAY FROM THE BOILER. USE $1/4"$ X $5/8"$ SQUARE HEAD BOLTS (3). SEE FIGURE NO. 29.
2. SEE PREFERRED INSTRUMENTS BULLETIN SD1 DM-1 DATED 11/65 FOR ADJUSTMENT AND MAINTENANCE OF MOTOR ACTUATORS. PAGE 4, PARAGRAPH "DAMPER LINKAGE" COVERS DETAIL OF LINKAGE ASSEMBLY.
3. SEE FIGURE NO. 29 FOR LINKAGE POSITION ON STANDARD VERTICAL DISCHARGE FAN INSTALLATIONS. (OPTIONAL DISCHARGE POSITION REQUIRES DIFFERENT CRANK ARM AND LINKAGE POSITIONS).
4. ASSEMBLE D5-600 $5/16"$ -18 THREAD BALL JOINT CONNECTOR STUD TO THE D3-600 CRANK ARM.
5. ASSEMBLE D5-602 $1/4"$ -28 THREAD BALL JOINT CONNECTOR STUD TO THE DAMPER CRANK OF THE DAMPER CRANK SHAFT. ADJUST CRANK ARM TO POSITION SHOWN IN FIGURE NO. 29.
6. CONNECT PUSH ROD BETWEEN ACTUATOR CRANK ARM AND DAMPER CRANK ARM. TIGHTEN SET SCREWS TO LOCK PUSH ROD IN POSITION AS ILLUSTRATED. CHECK TO BE SURE ALL THREADED PARTS ARE DRAWN UP TIGHT.

FIGURE NO. 28

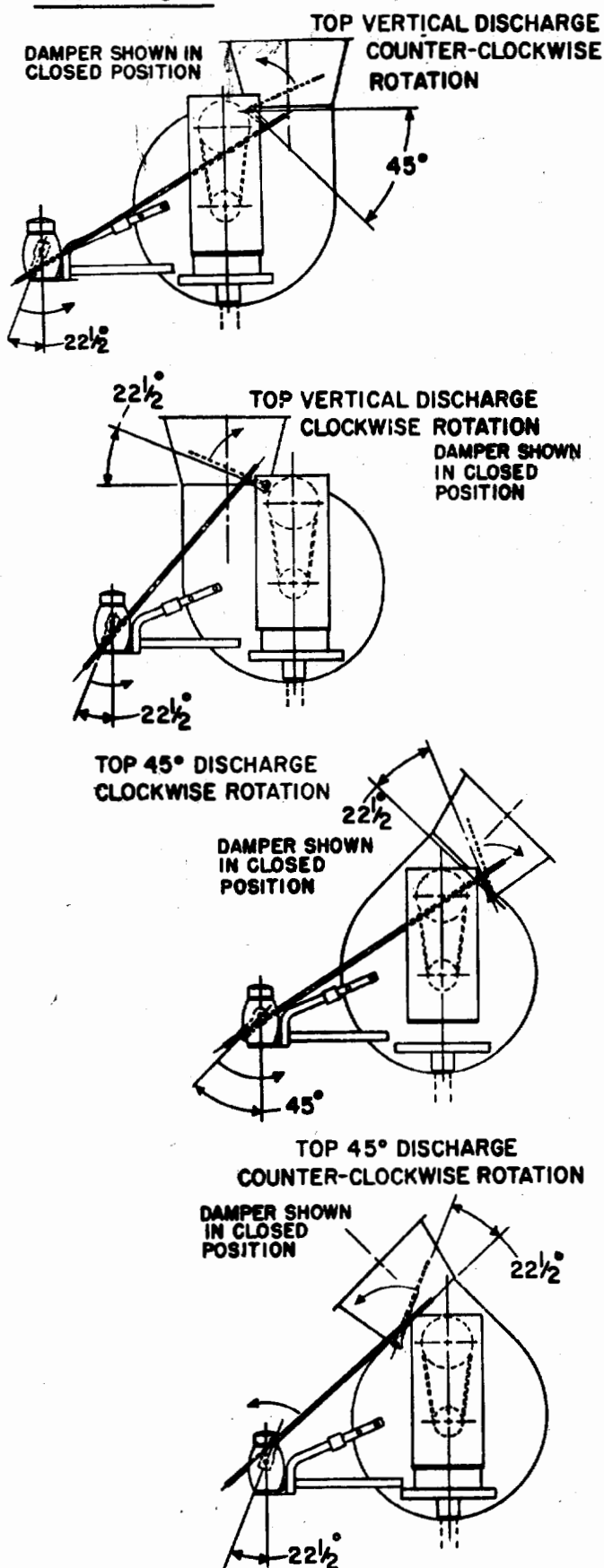


INDUCED DRAFT FAN DISCHARGE DAMPER ACTUATOR PARTS

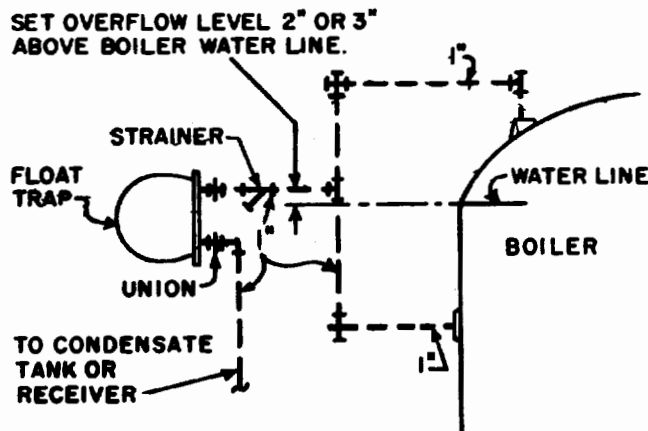
CAT. NO.	DESCRIPTION
ACTUATOR PARTS	
DM-1 3276	P.I. MOTOR ACTUATOR 24 V. DAMPER CRANK FOR WHITTY FAN DAMPER ASSEMBLY.
D3-600	CRANK ARM FOR MOTOR ACTUATOR, ADJ. RADIUS OF FROM $1-13/16"$ TO $2-7/8"$.
D5-600	$5/16"$ -24 DIA. STUD-USE WITH D3-600 CRANK ARM.
D5-602	$1/4"$ -28 DIA. STUD-USE WITH D3-601 CRANK ARM.
D5-100	PUSH ROD, $5/16"$ DIA. X 48" LONG PLATED STEEL SHAFT.

WHITTY INDUCED DRAFT FAN ACTUATOR INSTALLATION AS VIEWED FROM BACK OF BOILER

FIGURE NO. 29



SERIES M 450L MILLS WATER TUBE BOILER



SUGGESTED PIPING FOR OVERFLOW TRAP TO PREVENT FLOODING OF IDLE BOILERS IN MULTIPLE BOILER INSTALLATIONS WITH INDIVIDUAL WATER LEVEL CONTROL AND NO EQUALIZING CONNECTIONS.

FIGURE NO. 30

RETURN YOKE (WATER)

1. INSTALL 5" x 4" BUSHING AND 4" x 7" LOCKNUT NIPPLE USING PIPE WRENCH ON NIPPLE TO TIGHTEN BUSHING AT THE SAME TIME.
2. ADJUST THE 4" x 4" x 4" SPECIAL LOCKNUT TEES ON THE RUNNING THREAD SO THAT THE FACE OF EACH TEE MEASURES 6" FROM THE END OF THE RETURN DRUM. BOTH TEES SHOULD MEASURE AN EQUAL DISTANCE FROM THE DRUMS.
3. THREAD THE 4" x 15" LOCKNUT NIPPLE INTO THE 4" x 4" x 6" SPECIAL LOCKNUT TEE FACTORY ASSEMBLY PORTION OF YOKE.
4. INSTALL THE CROSS PIPE ASSEMBLY, 4" x 27" PIPE NIPPLE, INTO THE R.H. 4" x 4" x 4" TEE AND MAKE IT TIGHT. BE SURE 6" OPENING IN 4" x 4" x 6" TEE IS IN PROPER POSITION FOR RETURN PIPING. BACK THE 4" x 15" LOCKNUT NIPPLE OUT OF THE 4" x 4" x 6" TEE AND CHECK ALIGNMENT WITH L.H. 4" x 4" x 6" TEE. ADJUST TEE IN OR OUT ON 4" x 7" LOCKNUT NIPPLE UNTIL ALIGNMENT IS CORRECT AND THEN MAKE UP TIGHT.

PUTTING COLD BOILER INTO SERVICE OR CHANGING WATER LEVEL UNDER STEAM PRESSURE

THE FOLLOWING PROCEDURE WILL PREVENT "STEAM HAMMER" CAUSED BY THE INTRODUCTION OF SYSTEM STEAM INTO THE PIPING AND STEAM SPACE OF A COLD BOILER:

1. CLOSE VALVES ON SUPPLY, RETURN AND EQUALIZING PIPING SO AS TO ISOLATE THE COLD BOILER FROM THE SYSTEM.
2. IF WATER LEVEL ADJUSTMENT IS NECESSARY, ADD OR DRAW OFF WATER TO DESIRED LEVEL.
3. START THE BURNER AND ALLOW STEAM PRESSURE TO BUILD UP TO EQUAL SYSTEM PRESSURE.
4. OPEN RETURN VALVE TO ALLOW FEED WATER TO ENTER THE BOILER. THEN OPEN THE SUPPLY VALVE SLOWLY UNTIL BOILER PRESSURE AND SYSTEM PRESSURE ARE EQUAL AND THE VALVE FULLY OPEN. THEN OPEN EQUALIZING VALVE, IF ONE HAS BEEN SUPPLIED.
5. THE BOILER IS NOW "ON LINE" AND SHOULD BE ALLOWED TO OPERATE ON AUTOMATIC CONTROL.

5. TIGHTEN LOCKNUTS IN THE MANNER DESCRIBED FOR DRUM CONNECTIONS.

NOTE: USE PIPE JOINT COMPOUND ON TAPERED THREAD JOINTS TO BE MADE UP IN THE FIELD. DO NOT USE COMPOUND ON RUNNING THREADS.

FIGURE NO. 13

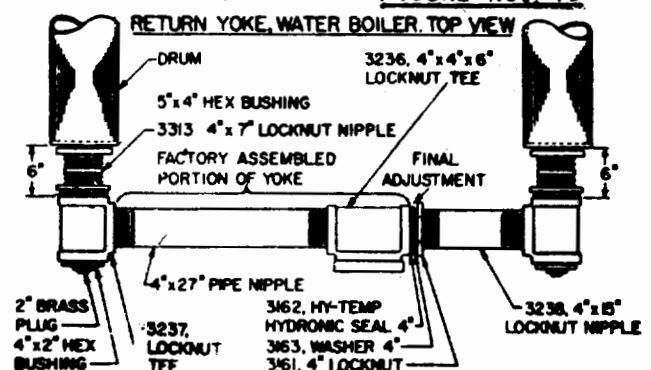


FIGURE NO. 31 WATER RETURN YOKE (NO REAR ACCESS)

NOTE: JACKET ASSEMBLY INSTRUCTIONS ARE PUBLISHED IN SEPARATE CATALOG.

NOTE: COMBUSTION CHAMBER ASSEMBLY INSTRUCTIONS ARE PUBLISHED IN SEPARATE CATALOG

SERIES M450L MILLS WATER TUBE BOILER

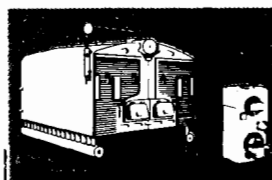
PAGE

AGE 20

SERIES M450L MILLS WATER TUBE BOILER

THE **HBSmith**
COMPANY, INC.

WESTFIELD, MASSACHUSETTS, 01086



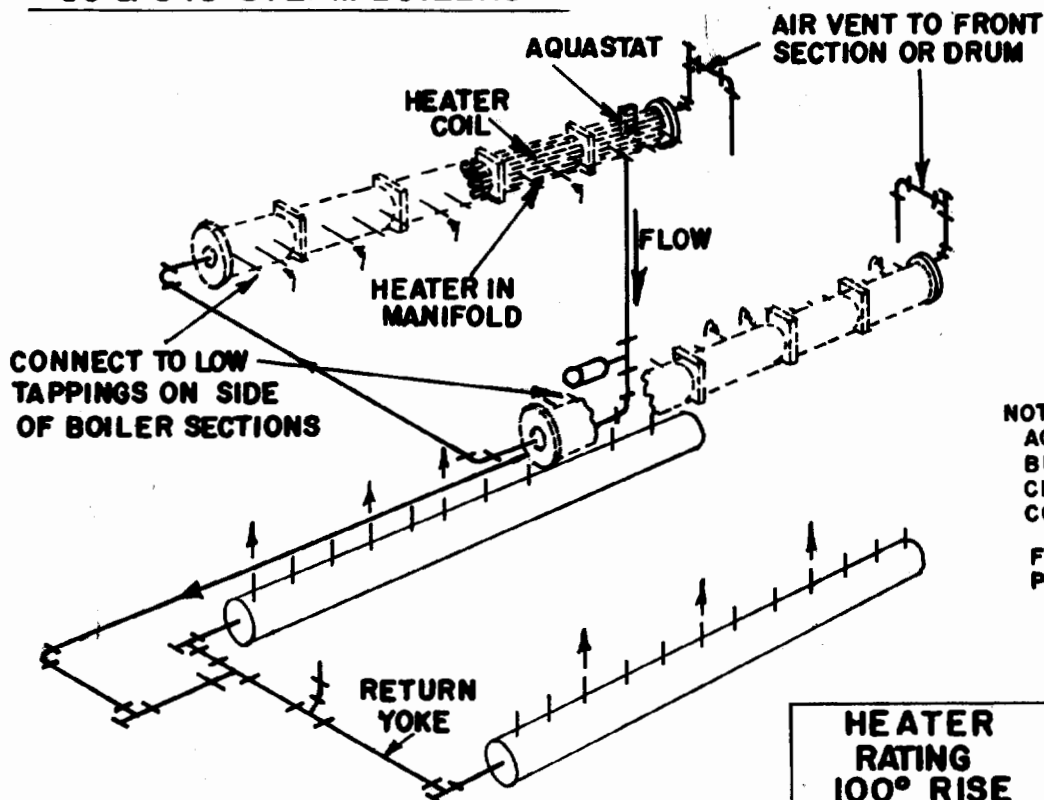
H. B. SMITH CO., INC.,

WESTFIELD
MASS.

DWG. **B-2106**

ITEM	DESCRIPTION	PATT. NO.	CAT. NO.	MAT'L.
	RECOMMENDED TANKLESS HEATER			

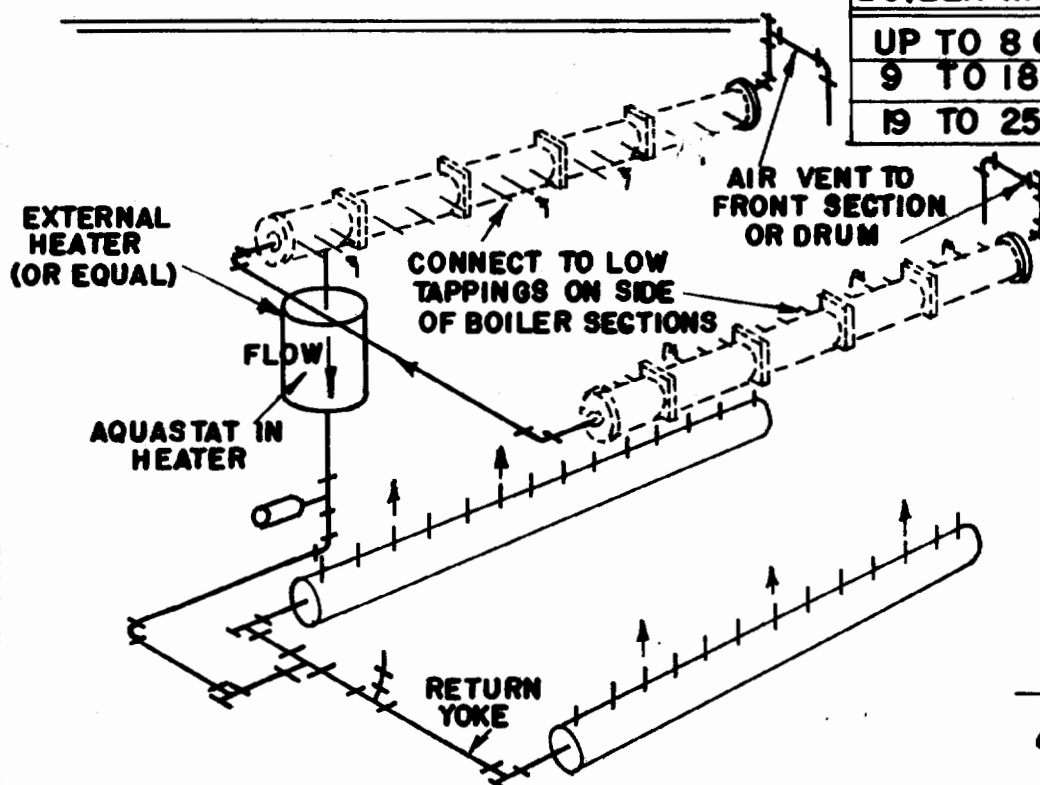
ARRANGEMENTS FOR- 450, 4500, 60 & 640 STEAM BOILERS



NOTE:
AQUASTAT TO CONTROL
BURNER OPERATION,
CIRCULATOR TO RUN
CONTINUOUSLY

FIELD PIPING EQUAL TO
PUMP SIZES

HEATER RATING 100° RISE BOILER WATER AT 200°	PUMP SIZE
UP TO 8 GPM	1-1/2
9 TO 18 GPM	2
19 TO 25 GPM	2-1/2



NOTE:
FOR 350 &
3500 SEE DR. NO. B-2101
FOR GREATER
CAPACITY SEE DR. NO.
B-2107

SCALE

DR. BY *R.P.K.*

APPR. BY *LAE*

DATE *11-28-66*