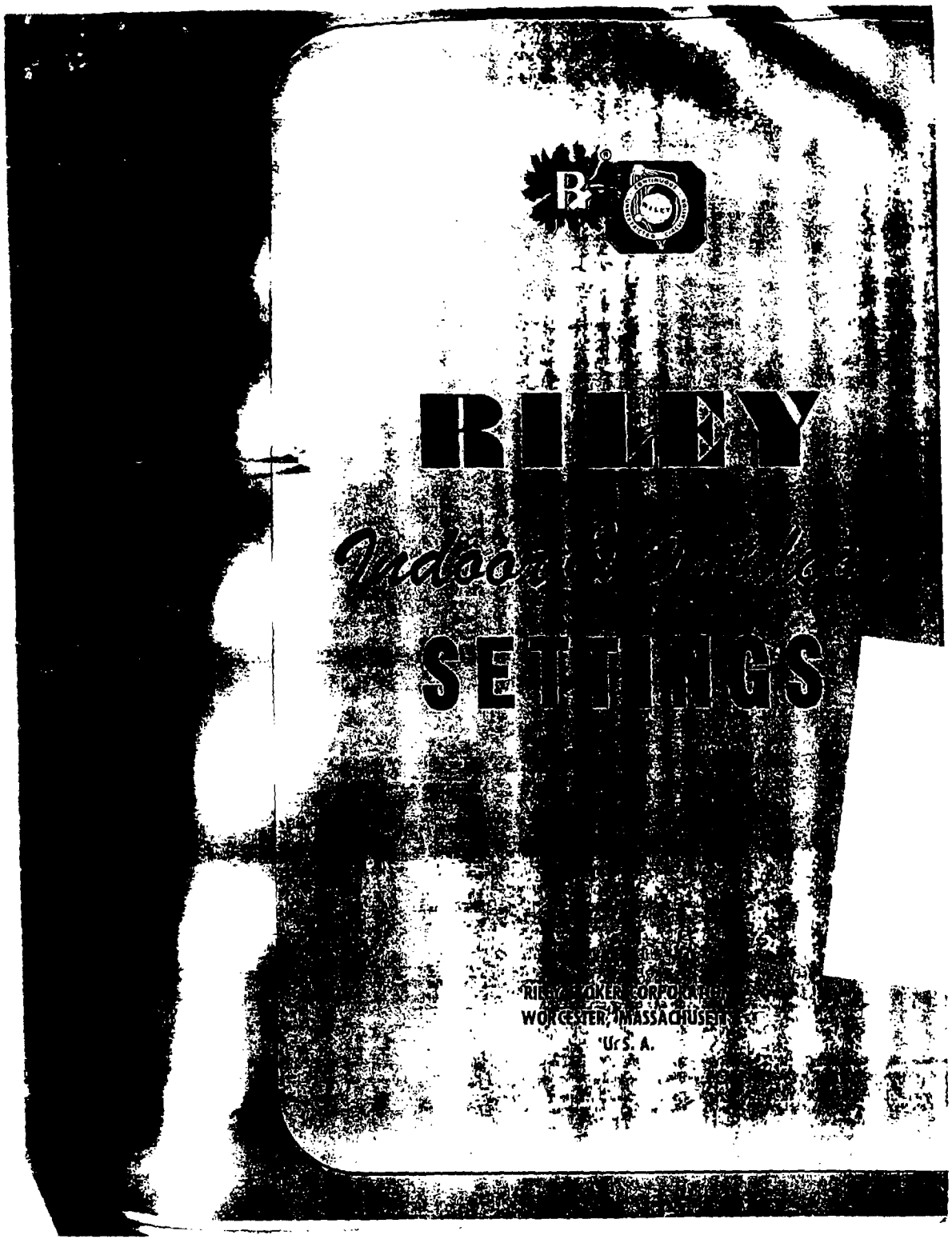
PLAINTIFF'S EXHIBIT

RS-155



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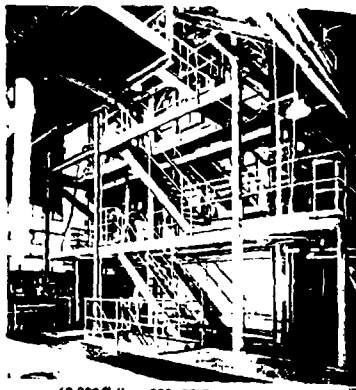
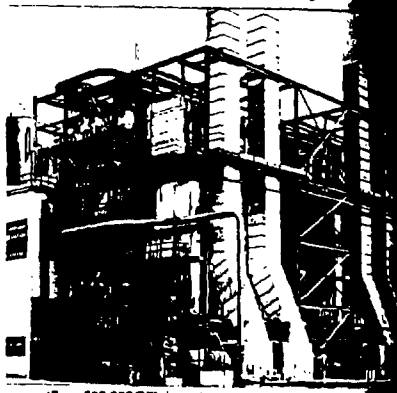
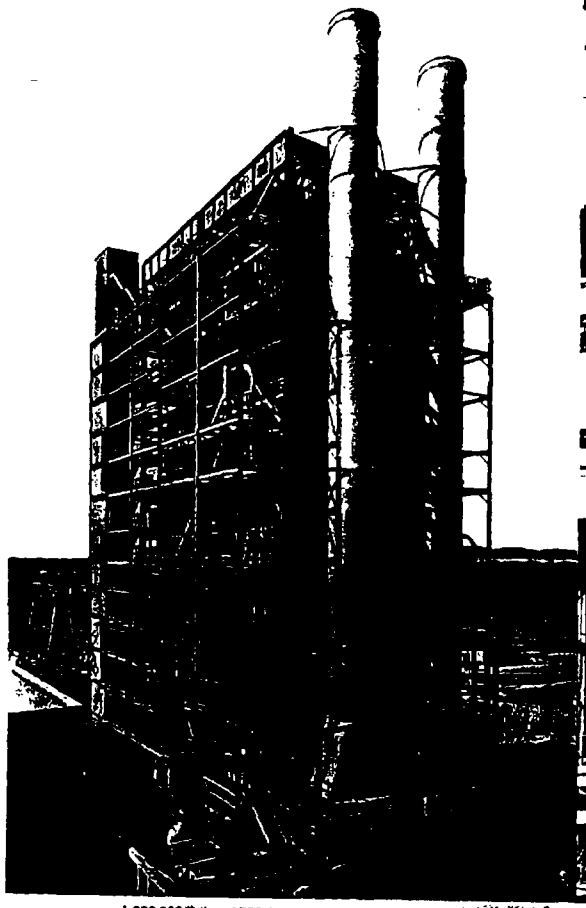


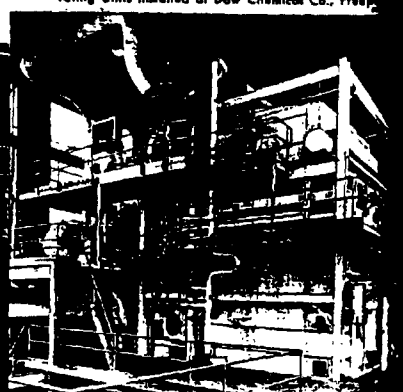
60,000#/hr., 200 PSIG, 477 F Riley Steam
Unit installed at The Flintkote Co., Ridgefield



Two 500,000#/hr., 1450 PSIG, 950 F Riley Ste
rating Units installed at Dow Chemical Co., Free



1,000,000#/hr., 1725 PSIG, 1005/1005 F Riley Reheat Unit
installed at Louisiana Power & Light Co., Westwego, La.



Two 50,000#/hr., 450 PSIG, 556 F Riley Steam
rating Units Installed at Ware Industries, Ware,

Steam Generating Units

Boiler Settings for Riley Steam Generating Units are designed, engineered and fabricated to assure permanent air and gas tightness at all ratings and pressures. Materials used and methods of fabrication employed are selected to meet the maximum in operating requirements and to keep maintenance costs at a minimum.

Expansion Provisions

Each Riley Setting is designed and constructed to allow for unrestricted expansion of pressure parts. All welded joints insure gas, dust and air tightness.

Construction Sturdy

Riley Settings are ruggedly reinforced and covered to prevent setting vibration and pulsation and to guard against damage from furnace puffs.

Low Radiation Loss

Adequate thickness of top quality insulating materials used in Riley Settings insure against radiation loss and provide cool external surfaces.

Modern in Appearance

Riley is a leader in establishing trends in functional setting design. The appealing, trim appearance of Riley Settings inspires good housekeeping and maintenance practices among operating personnel.



900,000#/hr., 1500 PSIG, 950 F Riley Steam Generating Unit installed at Columbus & Southern Ohio Electric Co., Columbus, Ohio

Steam Generating Unit installed at Carbide & Carbon Chemicals Co., South Charleston, W. Va.

Construction of Ri
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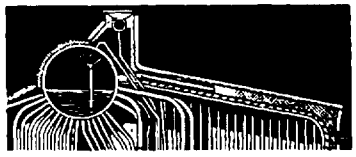
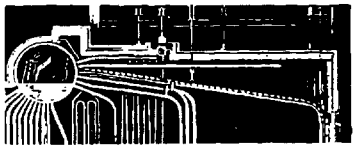


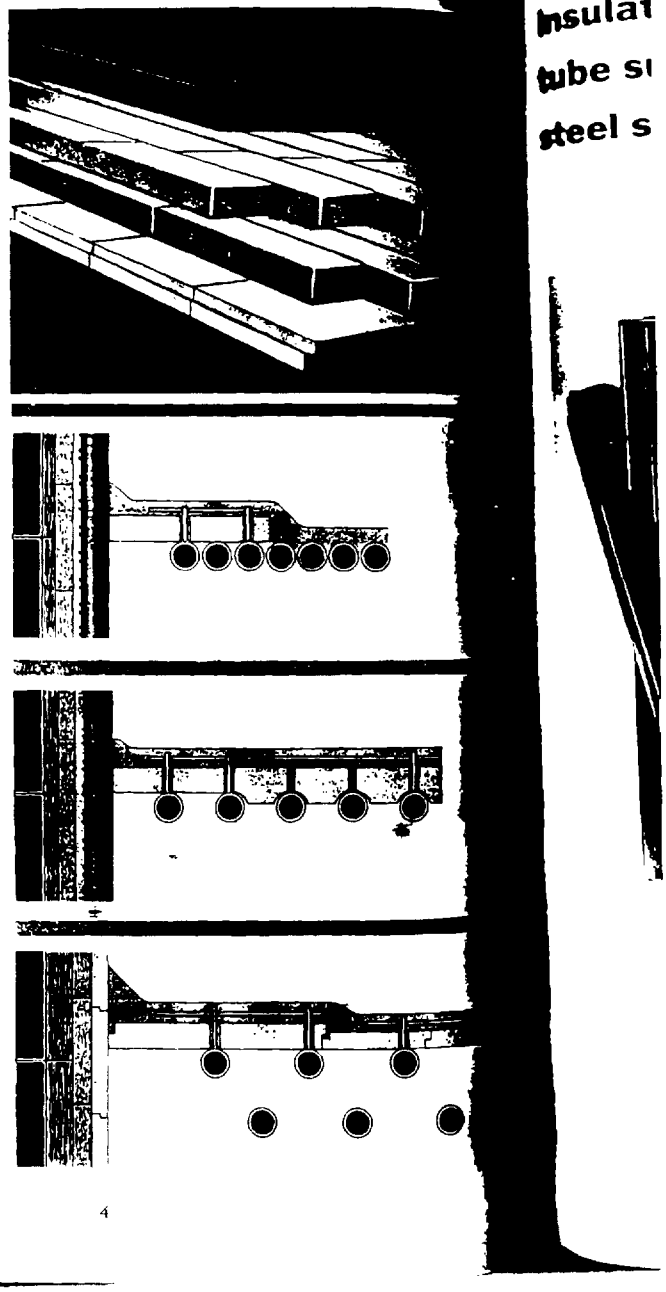
Standard Roof Design

Roof sections of Riley Steel Clad Insulated Settings rest directly upon the roof tubes of the boilers. The standard roof section utilizes a layer of heavy interlocking or "T" tile, covered with a layer of high temperature block insulation, and a layer of mineral wool felt compressed by the steel roof casing.



Penthouse Roof Design

With some boiler designs, a portion or all of the boiler roof tubes are enclosed within a penthouse enclosure of double panel insulated construction. When roof tubes are of tangent spacing, expanded metal is tack welded to tubing to secure an adequate thickness of plastic refractory. Roof at side wall junctions is sealed as shown at right with refractory tile secured to roof tubes by studs and anchor rods. When roof tubes are on wide spacing, interlocking or "T" tile are used. The tile are held in position by expanded metal which, in turn, is secured by anchor rod assemblies welded to studs attached to roof tubes on approximately 18" centers. An adequate thickness of plastic refractory is applied over the tile, anchor rods and expanded metal to assure permanent gas tightness.



RILEY steel clad insulated settings for tube supported and steel supported units







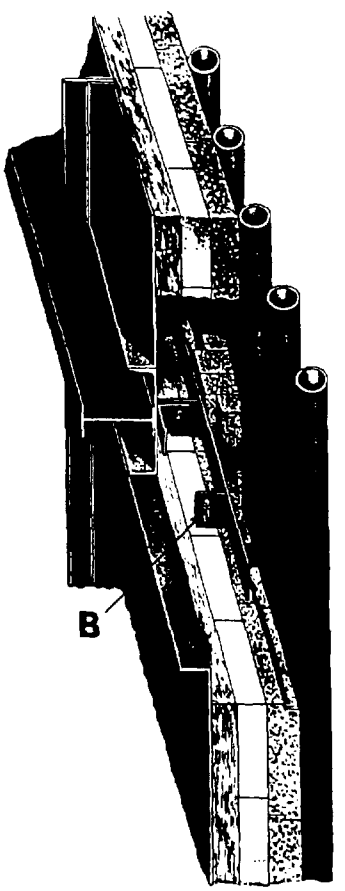
... for Tangent ... bes

With tube supported units, when 3¼" O.D. tubes are tangent spaced on 3 5/16" centers, expanded metal is tack welded to the outside of the waterwall tubes to secure the high temperature plastic refractory; high temperature block insulation is then applied followed by mineral wool felt which is compressed between the block insulation and steel casing. Sturdy tube anchor assemblies maintain permanent tube alignment and spacing. With structural steel supported units, connecting plates (A) are slotted to allow for expansion of setting walls.

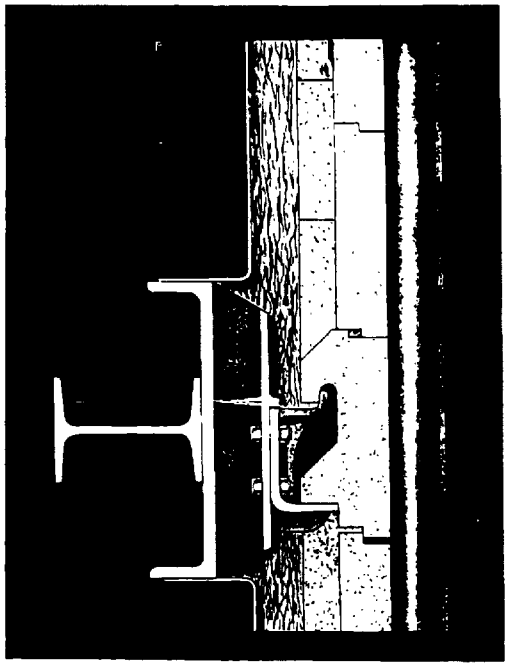
... Walls for Wide Spaced Tubes

When tubes are spaced on other than tangent spacing, the 3¼" O.D. tubes are backed with heavy interlocking tile. High temperature block insulation is then applied and mineral wool felt is compressed between block insulation and steel casing. Tube anchor assemblies bolted to buckstay members keep tubes aligned, and provide support for refractory.

With structural steel supported units connecting plates or angle brackets "B" are slotted for expansion.

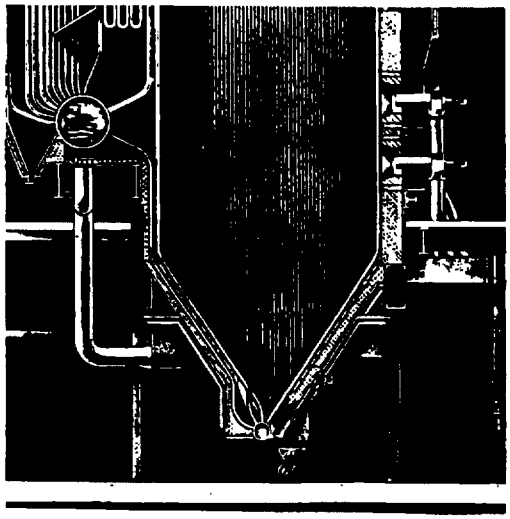


construction (continued)



Refractory Supports

Refractory and insulation used in Ril
Settings are sectionally supported a
secured to prevent shifting or settling
voids and hot spots are thus eliminate
Heat-resisting tile support brackets,
shown, are bolted to reinforced buckstay



Single Header Hopper Bottom Units

The front and rear slopes of the hopper
Single Header Hopper Bottom Units are
tinuation of the front and rear furnace wall
are covered with the same materials as t
walls; plastic refractory or interlocking
backed by a layer of block insulation with
wool felt compressed between the block
tion and steel casing. Steel lugs or bol
heads welded to tubes secure buckstays and

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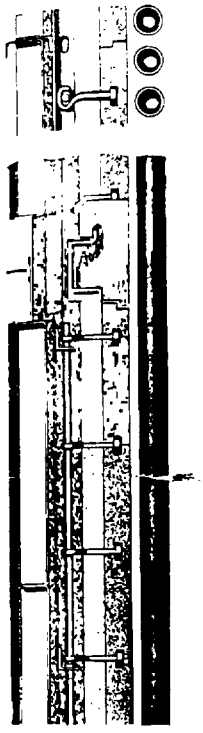
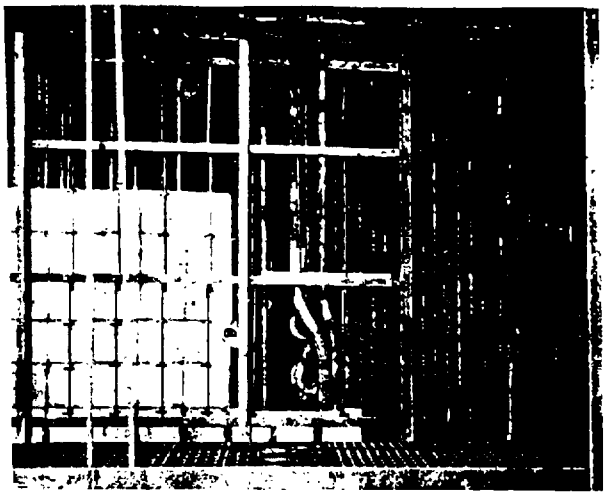


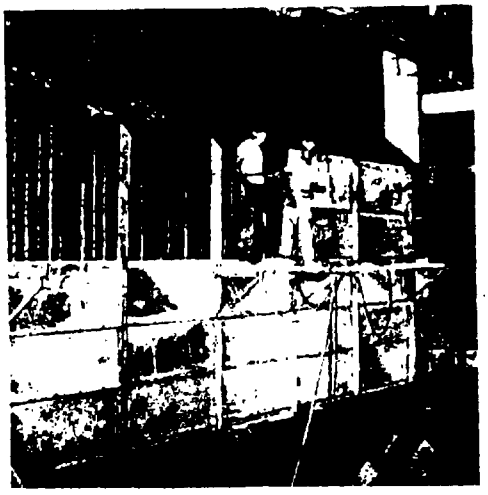


Supported Side Walls

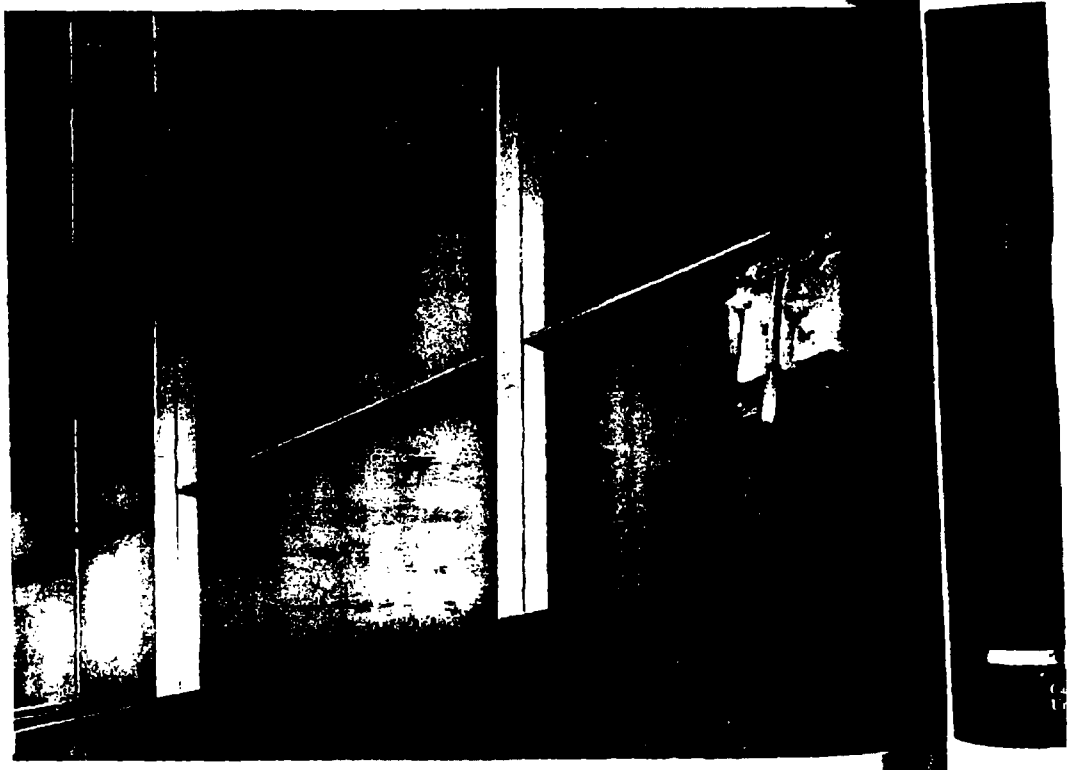
The side walls of extra wide steam generators are structural steel supported and spaced away from tubes to allow clearance between the side walls and boiler or waterwall tubes for longitudinal expansion of drums and headers. Tile support brackets and anchors are bolted to reinforced buckstays and structural uprights. The complete assembly is imbedded in insulation and covered by steel panels.

The lower side walls of the hopper bottom are covered with cored interlocking tile with retainer bolts and support angles holding those portions of the side wall not secured by side waterwall tubes. Block insulation is installed back of tile and is secured by the mineral wool felt compressed by the steel casing.





Casing panels are of heavy No. 10 gauge plate and are fabricated with flanges on all sides. Continuous pressure tight welding panel flanges and joints throughout the e setting assures permanent air and gas tight Panel assemblies are fastened and positioned clamps prior to welding. Sturdy flats lo between the horizontal buckstays reinforc vertical panel joints. Careful shop fabric makes installation quick, easy and accurate

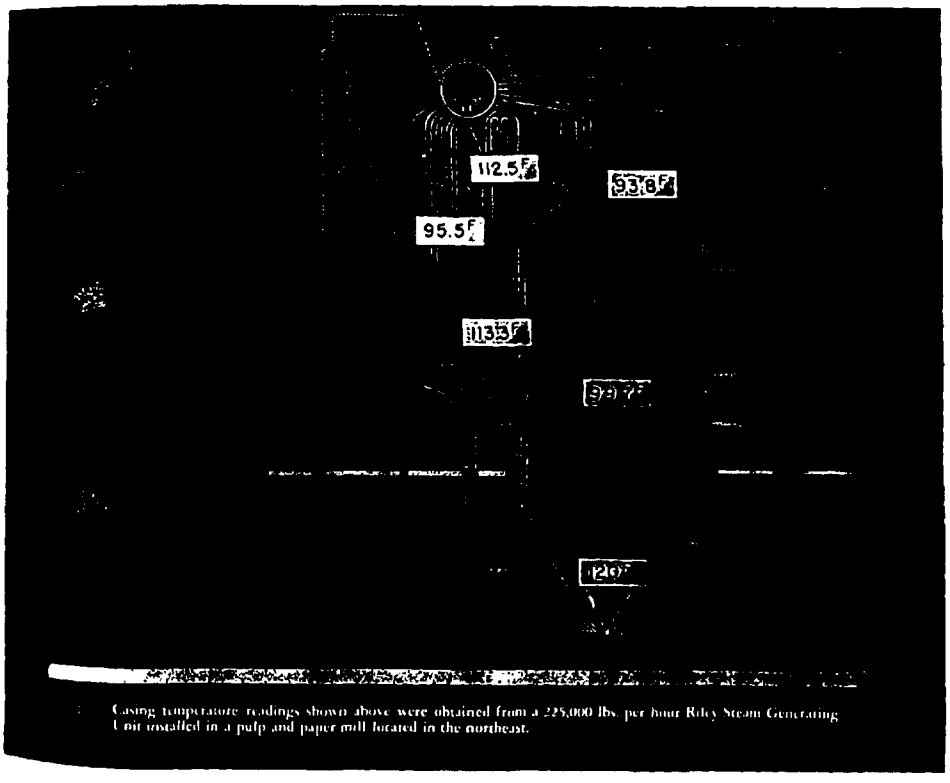


As can be seen by these tabulations Riley settings are adequately insulated against radiation heat loss throughout the setting, unit [illegible] sustained and comfortable outside casing temperatures are assured. Tight [illegible] joints prevent air infiltration and escape of combustion gas and dust.

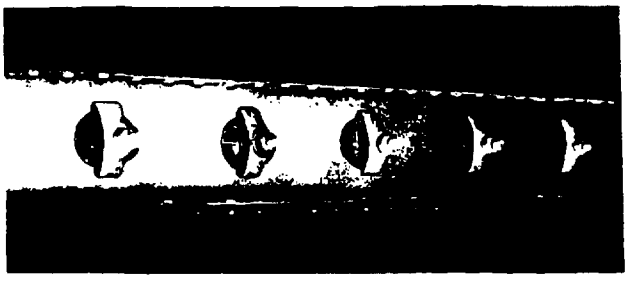
FURNACE SIDE WALL	A TUBE SPACING 3⅜" to 4⅝"	B TUBE SPACING 4½" to 6½"
Outside Casing Temp.	105 F	110 F
Heat Loss BTU/Sq.Ft./Hr.	104.2	122

FURNACE SIDE WALL	C Tubes Spaced on 6" Centers			D Tubes Spaced on 8½" Centers		
Fire Face Temperature	1600 F	2000 F	2200 F	1600 F	2000 F	2200 F
Outside Casing Temperature	103 F	109 F	111 F	104 F	110 F	112 F

Figures are based on 70 F room temperature and 10 MPH air current.



Casing temperature readings shown above were obtained from a 225,000 lbs. per hour Riley Steam Generating Unit installed in a pulp and paper mill located in the northeast.

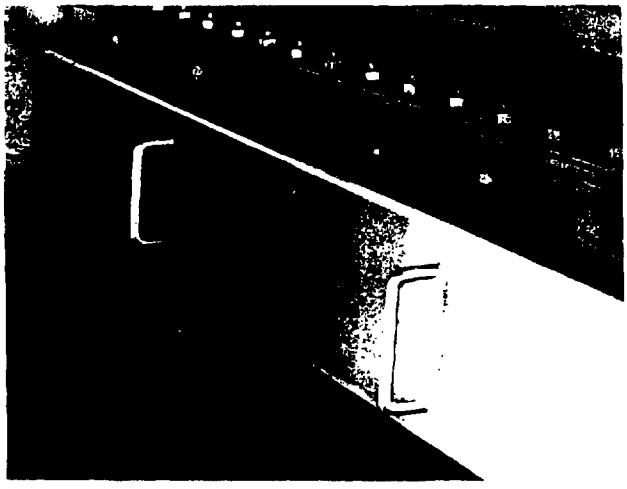


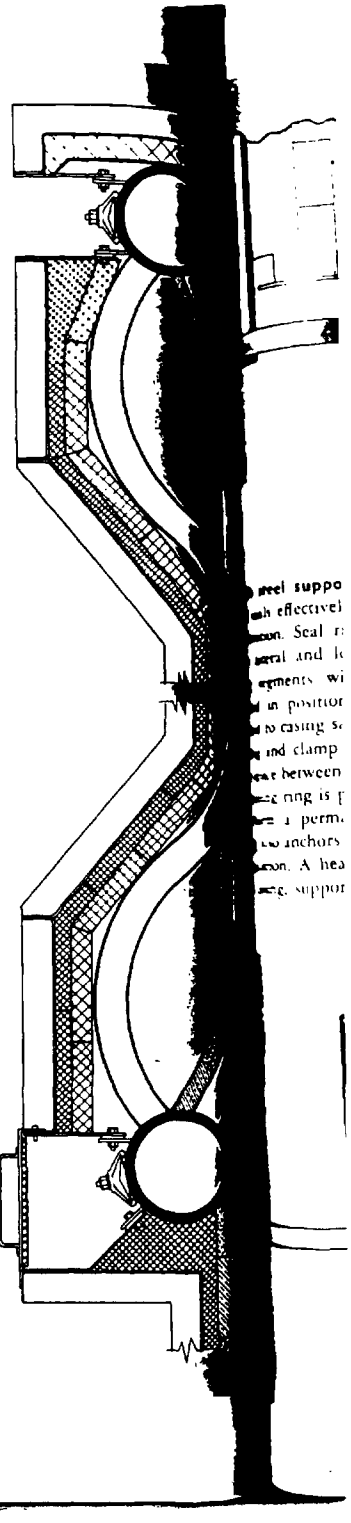
Wherever insulated casing joins headers in Riley tube supported and steel supported units, special metal to metal seals are employed to prevent leakage of gas and air.

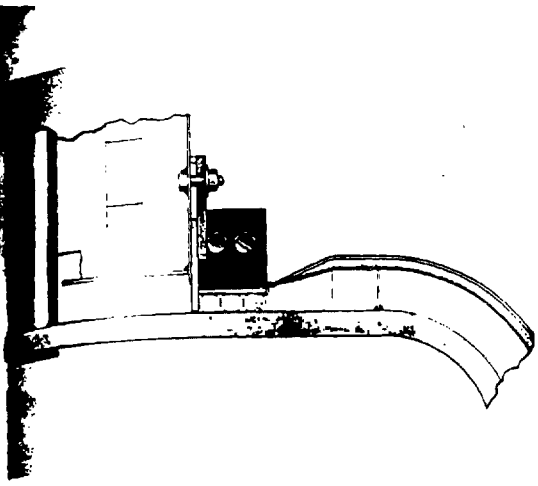
Header flats are welded to waterwall headers prior to stress relieving. Sealing plates have slotted holes positioned 90° to the slotted holes in the header flats to permit free expansion movement. An asbestos gasket is used between seal plate and header flat to complete the gas and air tight connection. No stresses are imposed on casing or setting materials by expansion of pressure parts.

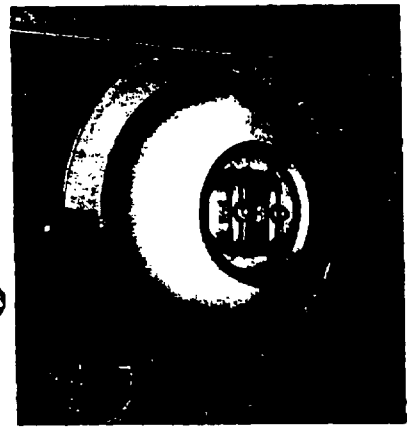
Such header seals are not required with units for pressurized furnace operation. Equal expansion of the casing and pressure parts at equal temperature eliminates the use of header seals. Panel flanges are attached directly to header flats by continuous seal welding.

When specified, removable insulated cover plates are provided for headers. The cover plates, in easy to handle sizes, are insulated with asbestos millboard attached on inside of cover. Anchor pins are used to secure the cover plates in position.





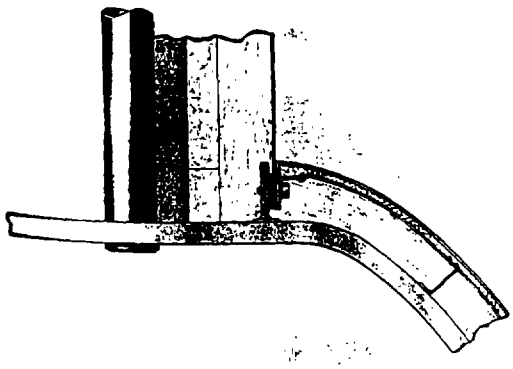




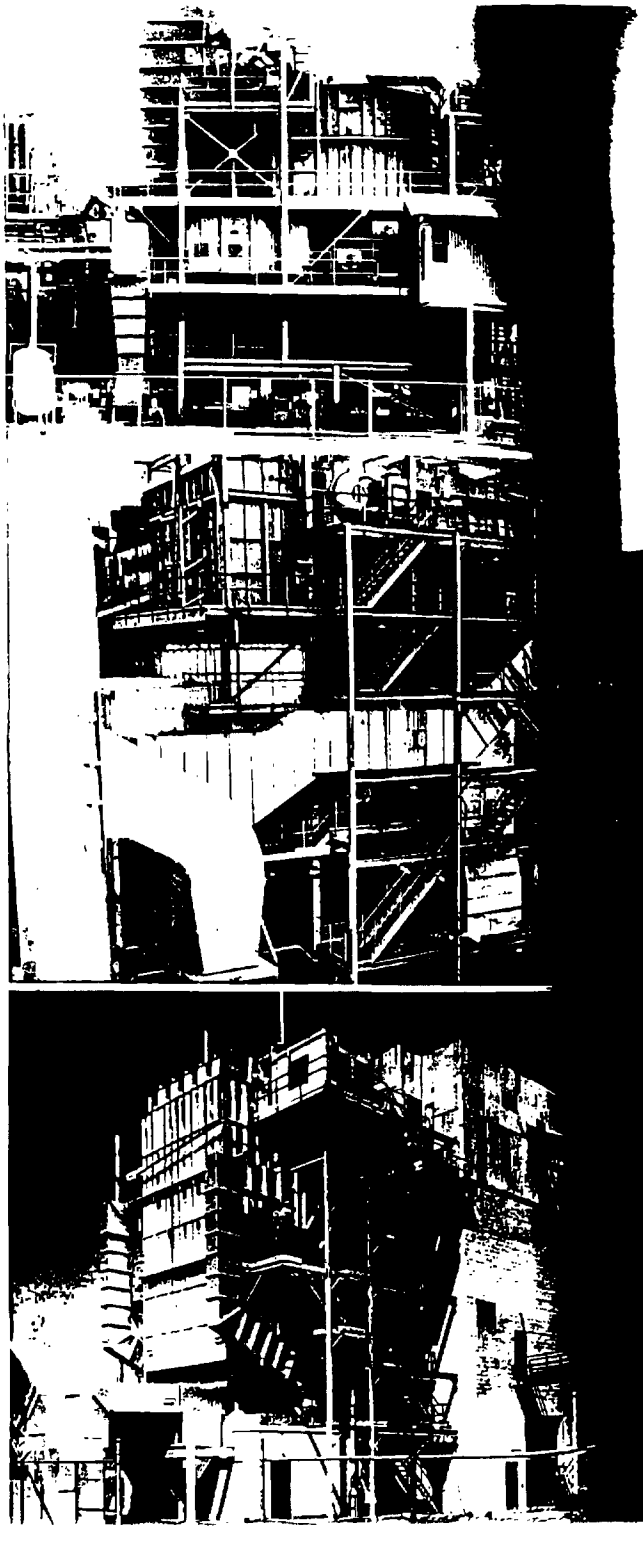
Drum End Seals

Steel supported Riley units (above), drum end seals effectively seal against gas leakage and air infiltration. Seal rings and clamps are designed for free lateral and longitudinal drum movement. Seal ring segments with insulated retaining rings are bolted in position at drum ends. Clamp segments bolted to casing sandwich the seal ring between steel casing and clamp segments. As shown in illustration the space between outside of the drum and insulation retaining ring is packed with strands of asbestos rope to form a permanent seal. The insulation retainer ring also anchors lacing wire used to secure the drum insulation. A heavy clearance ring, welded to inside casing, supports setting insulation and refractory.

With tube supported Riley units (below), a circular band is attached at drum ends by continuous welding prior to final stress relieving of drum. The band provides a base for field welding the seal ring segments. As shown in illustration (below), an asbestos gasket is used between the seal ring and steel casing. Closely spaced tap bolts secure insulation retaining clips, steel casing and gasket to the seal ring. Since expansion of pressure parts and setting with Riley tube supported units is equalized, a permanent seal at drum ends is maintained.







This is one of two 165,000#/hr. 975 Psig, 975 F Riley Steam Generating Units installed for Hawaiian Commercial and Sugar Co., Maui, T. H. A third Riley Unit will have a capacity of 200,000-pounds per hour.

Here is a 250,000#/hr. 1000 Psig, 830 F Riley Steam Generating Unit installed for Gaylord Container Corp., Bogalusa, Louisiana. Three other Riley Units are in operation at this plant.

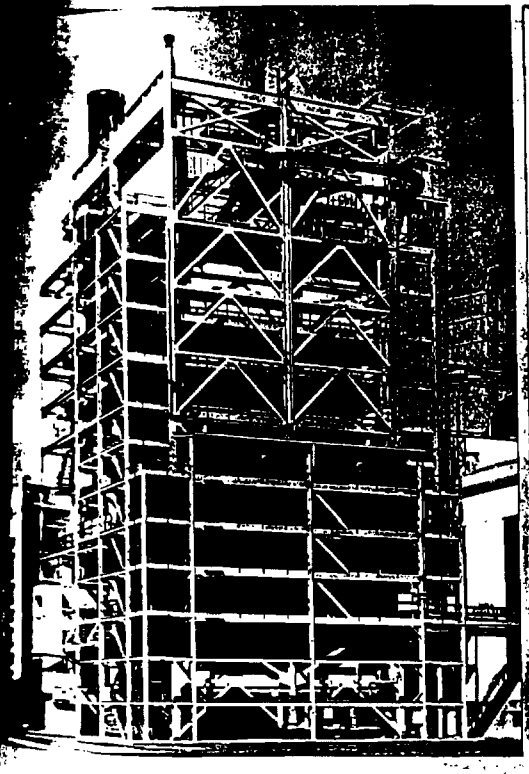
View of a 125,000-#/hr. 725 Psig, 830 F Riley Steam Generating Unit installed for Superior Water, Light and Power Co., Superior, Wisconsin.

RILEY *All Weather* Outdoor Settings

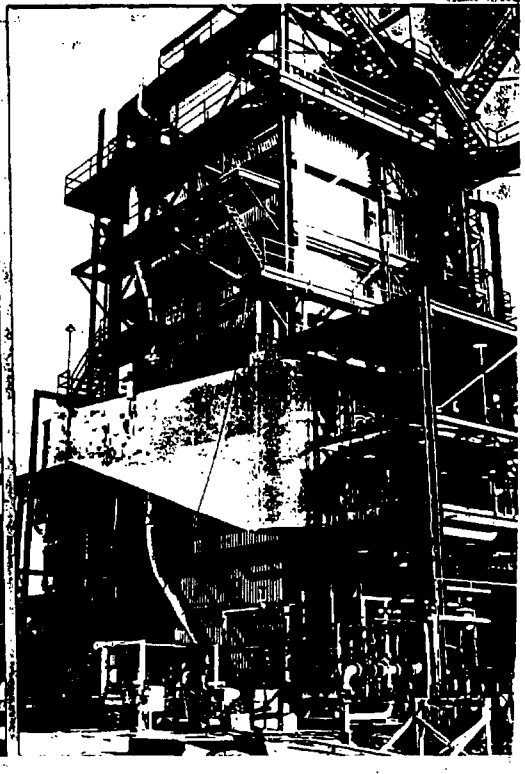
Many Riley outdoor type steam generating units are in successful operation in various climates throughout the world. They include all capacities and methods of firing. Advanced operating and maintenance procedures together with adequate protection of auxiliaries assure efficient performance and smooth functioning of the entire plant. The design and construction of Riley indoor settings are suitable for outdoor installations with but small additional cost to provide for drainage and disposal of rain water.

When necessary, because of plant location, an enclosure is installed over the firing aisle to protect operating personnel. Building costs are reduced to a minimum or eliminated entirely.

One of two 1,250,000 #/hr. 2125 Psig, 1005/1005 F Riley Reheat Steam Generating Units installed for Houston Lighting and Power Co., Houston, Texas. Nine other Riley Units are in operation for Houston Lighting & Power Co.



Here is a 425,000 #/hr. 1375 Psig, 960 F Riley Steam Generating Unit installed for Southern Nevada Power Co., Las Vegas, Nevada.



Settings for Pressurized Furnaces

Riley Settings constructed for pressurized furnace operation are equipped with strong horizontal structural steel bands encircling the vertical walls. They are designed to withstand maximum possible internal pressures without deflection. Structural channels welded to furnace wall tubes provide supports for pressure skin casing panels. Filler rods are used to insure good contact between tubes and casing supporting channels.

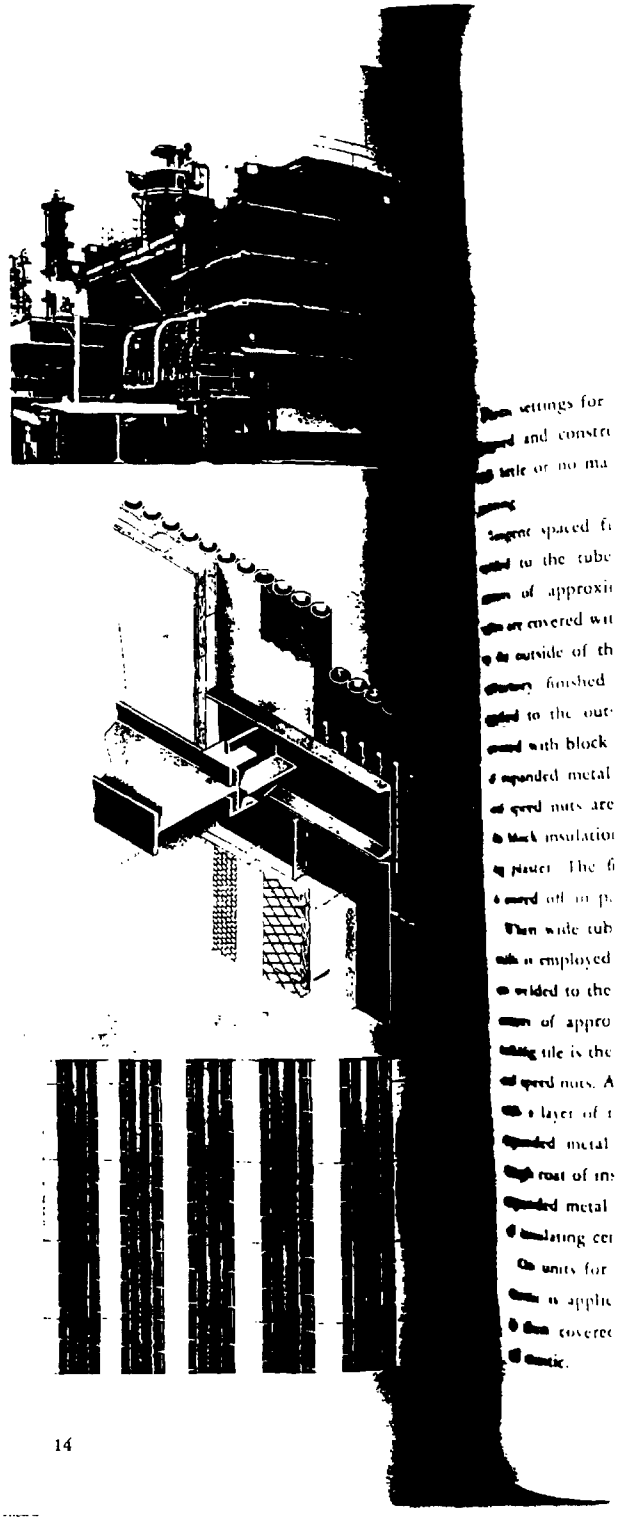
The furnace wall tubes are externally covered by heavy gauge expanded metal, tack welded to tubes, supporting a special high heat conducting refractory to fill all voids between tubes and pressure skin casing and to insure intimate contact and equal heating of casing. The casing panels of No. 10 gauge steel are welded along their flanges to each other and to the supporting channels. Note: *Pressure skin casing is not welded or otherwise attached directly to tubes.*

Following completion, to check for complete tightness of pressure skin casing and welding of casing joints, the entire setting is subjected to a pneumatic pressure test equal to maximum fan pressure. The external insulation consisting of two layers of block, metal reinforced plaster and weather protecting coating or lagging is then applied.

Where setting wall tubes are of wider than tangent spacing they are finned and backed by special shapes of refractory tile between tubes and skin casing.

In sections of Riley units where tubes are wide spaced, finned tubes are used to secure and retain setting tile. Casing and insulation material used for this area are the same as used with furnace walls.

When so specified, metal lagging is applied to the setting for outdoor installations. If metal lagging is used, the coats of insulating cement and emulsion are omitted.



Plastic Settings

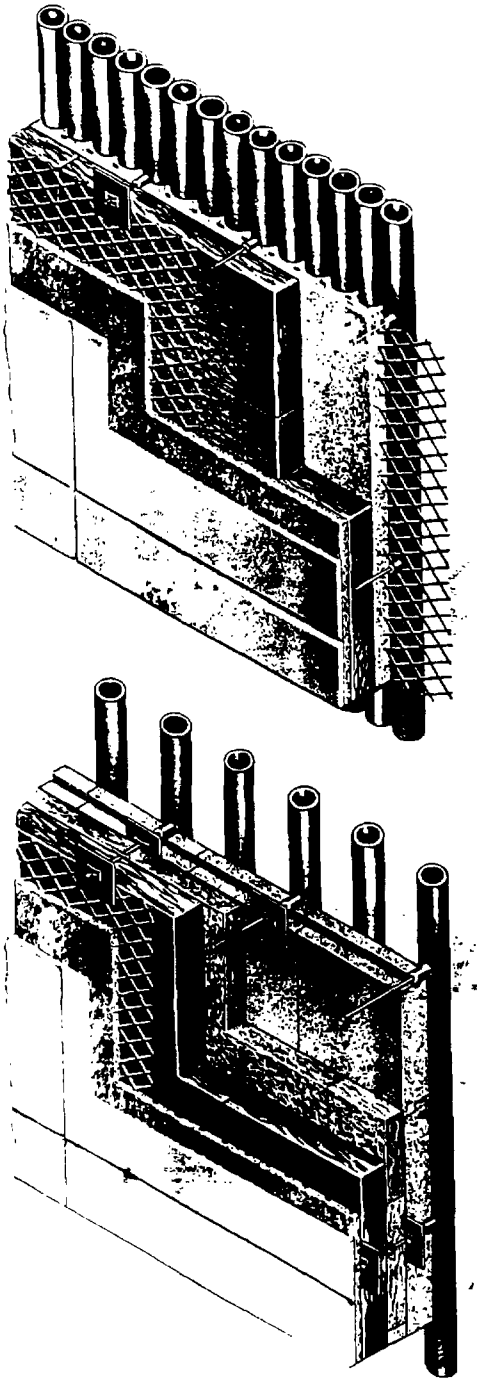
For Indoor and Outdoor Units

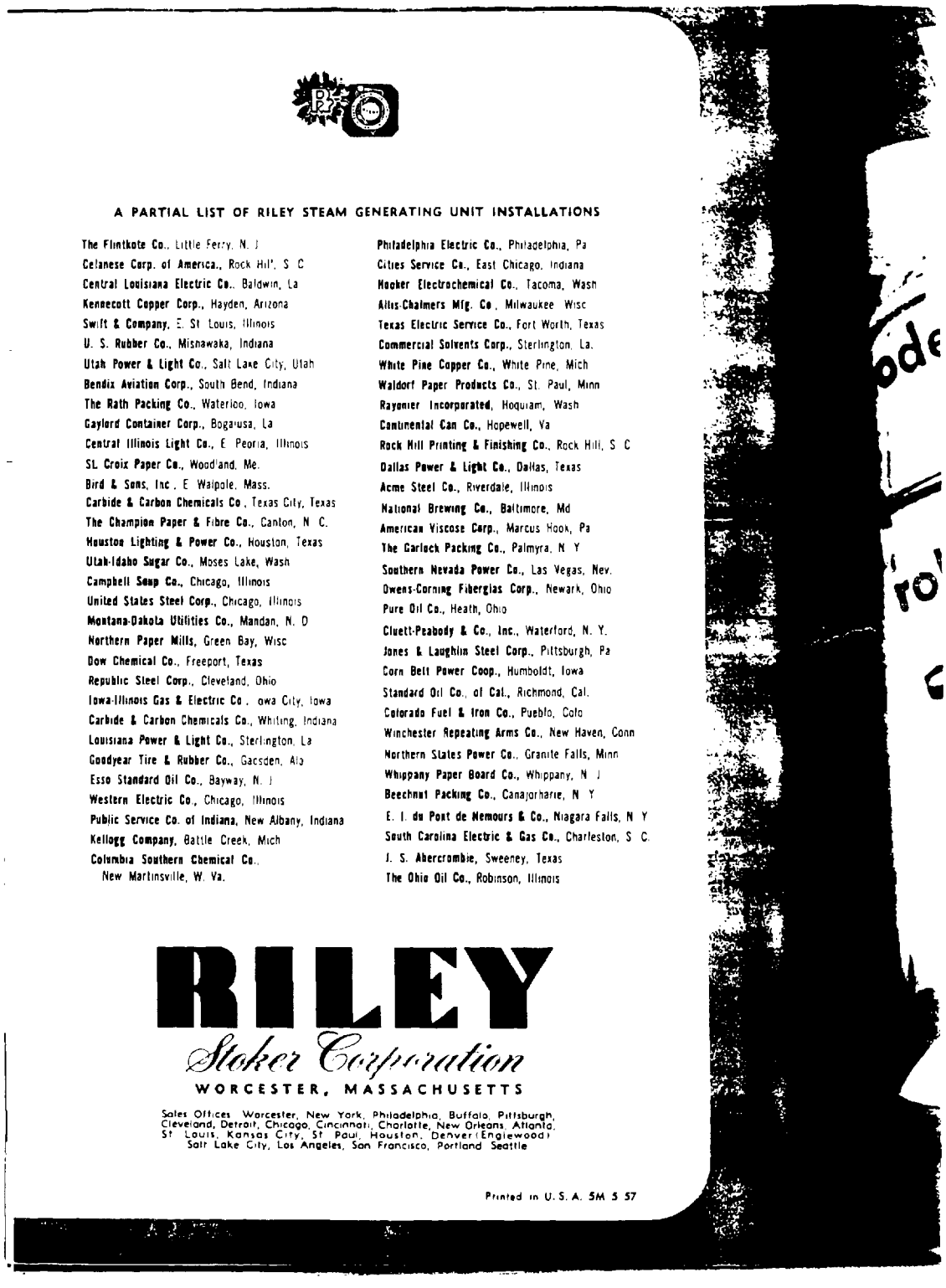
Plastic settings for indoor or outdoor service are designed and constructed for heavy duty service with little or no maintenance other than periodic patching.

Tangent spaced furnace waterwalls have studs welded to the tubes on horizontal and vertical centers of approximately eighteen inches. The tubes are covered with expanded metal tack welded to the outside of the tubes. Light weight castable refractory finished to a smooth flat surface is applied to the outside face of the tubes and is covered with block insulation; then, another sheet of expanded metal is applied. Large size washers and speed nuts are used with the studs to secure the block insulation which is covered with insulating plaster. The finish coat of insulating plaster is scored off in panels to complete the setting.

When wide tube spacing of boiler and furnace walls is employed with this type of setting, studs are welded to the tubes on horizontal and vertical centers of approximately eighteen inches. Interlocking tile is then secured with large size washers and speed nuts. A layer of block insulation covered with a layer of mineral wool felt is secured with expanded metal by washers and speed nuts. A rough coat of insulation plaster is applied over the expanded metal and is covered with a finish coat of insulating cement scored off in panels.

On units for out-of-door service a tack coat of plastic is applied over the insulating plaster; this is then covered with glassfab and a finish coat of mastic.





A PARTIAL LIST OF RILEY STEAM GENERATING UNIT INSTALLATIONS

The Flintkote Co., Little Ferry, N. J
Celanese Corp. of America., Rock Hill, S C
Central Louisiana Electric Co., Baldwin, La
Kennecott Copper Corp., Hayden, Arizona
Swift & Company, E. St Louis, Illinois
U. S. Rubber Co., Misnawaka, Indiana
Utah Power & Light Co., Salt Lake City, Utah
Bendix Aviation Corp., South Bend, Indiana
The Rath Packing Co., Waterloo, Iowa
Gaylord Container Corp., Bogalusa, La
Central Illinois Light Co., E Peoria, Illinois
St. Croix Paper Co., Woodland, Me.
Bird & Sons, Inc., E Walpole, Mass.
Carbide & Carbon Chemicals Co., Texas City, Texas
The Champion Paper & Fibre Co., Canton, N C.
Houston Lighting & Power Co., Houston, Texas
Utah-Idaho Sugar Co., Moses Lake, Wash
Campbell Soup Co., Chicago, Illinois
United States Steel Corp., Chicago, Illinois
Montana-Dakota Utilities Co., Mandan, N. D
Northern Paper Mills, Green Bay, Wisc
Dow Chemical Co., Freeport, Texas
Republic Steel Corp., Cleveland, Ohio
Iowa-Illinois Gas & Electric Co., owa City, Iowa
Carbide & Carbon Chemicals Co., Whiting, Indiana
Louisiana Power & Light Co., Sterlington, La
Goodyear Tire & Rubber Co., Gadsden, Ala
Esso Standard Oil Co., Bayway, N. J
Western Electric Co., Chicago, Illinois
Public Service Co. of Indiana, New Albany, Indiana
Kellogg Company, Battle Creek, Mich
Columbia Southern Chemical Co., New Martinsville, W. Va.
Philadelphia Electric Co., Philadelphia, Pa
Cities Service Co., East Chicago, Indiana
Hooker Electrochemical Co., Tacoma, Wash
Allis-Chalmers Mfg. Co., Milwaukee Wisc
Texas Electric Service Co., Fort Worth, Texas
Commercial Solvents Corp., Sterlington, La.
White Pine Copper Co., White Pine, Mich
Waldorf Paper Products Co., St. Paul, Minn
Rayonier Incorporated, Hoquiam, Wash
Continental Can Co., Hopewell, Va
Rock Hill Printing & Finishing Co., Rock Hill, S C
Dallas Power & Light Co., Dallas, Texas
Acme Steel Co., Riverdale, Illinois
National Brewing Co., Baltimore, Md
American Viscose Corp., Marcus Hook, Pa
The Garlock Packing Co., Palmyra, N Y
Southern Nevada Power Co., Las Vegas, Nev.
Owens-Corning Fiberglas Corp., Newark, Ohio
Pure Oil Co., Heath, Ohio
Cluett-Peabody & Co., Inc., Waterford, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh, Pa
Corn Belt Power Coop., Humboldt, Iowa
Standard Oil Co., of Cal., Richmond, Cal.
Colorado Fuel & Iron Co., Pueblo, Colo
Winchester Repeating Arms Co., New Haven, Conn
Northern States Power Co., Granite Falls, Minn
Whippany Paper Board Co., Whippany, N J
Beechnut Packing Co., Canajoharie, N Y
E. I. du Pont de Nemours & Co., Niagara Falls, N Y
South Carolina Electric & Gas Co., Charleston, S C
J. S. Abercrombie, Sweeney, Texas
The Ohio Oil Co., Robinson, Illinois

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