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EDITORIAL STAFF: H. H. Brown, Editor. L. S. Blodgett, Managing Editor.

Contents

Communications

How Many Square Feet in Any Boiler?

TO THE EDITOR:

In the May issue of BOILERMAKER AND PLATE FABRICATOR, page 138, there is an article by W. F. Schaphorst, entitled, "How Many Square Feet in Any Boiler?" To my view I consider the article useless. He does not say what the distance is between *A* and *C*, shape of the curve, *D*, pitch of spaces to equal height, or pitch of spaces to equal area, etc.

He says: "The dotted line drawn across the chart shows how easily it is done. The line passes through 10, in the curved column *B*, and through the 6, column *C*. The intersection with column *A* shows the area is 350 square feet."

Now instead of its being 350 square feet, it is 345.576 feet, nearly 4½ square feet less, as may be seen by the following calculation:

Circumference of a circle equals the diameter multiplied by Pi (3.1416).

Area of a circle equals the diameter squared and multiplied by 0.7854.

Therefore, $10 \times 10 = 100$

3.1416 Pi	0.7854
10 ft. dia.	100 dia. squared
31.4160	78.5400
6 ft. height	2 ends
188.4960	157.0800

157.0800 = area of 2 flat ends

345.5760 = Total area

Long Beach, Cal. I. J. HADDON.

The Author's Reply to Mr. Haddon

TO THE EDITOR:

Replying to the above by Mr. Haddon, my chart which was reproduced in BOILERMAKER AND PLATE FABRICATOR was plotted according to principles which are explained in detail in the book "The Construction of Alignment Charts" by Prof. George W. Swett of the Massachusetts Institute of Technology, and published by John Wiley & Sons of New York. The distance between columns *A* and *C* and the shape of the curve are of no great importance. Merely draw columns *A* and *C* parallel with each other and then locate a number of points in curve *B*. The location of the points determine the curve, which curve, so far as I know, is not a parabola, hyperbola, cycloid, etc., although it *may* be. The important thing is the development of a chart which is "accurate," that is a point which Mr. Haddon criticizes rather severely.

Most curves of this type are logarithmic, similar in a way to spacings on an ordinary slide-rule. Slide-rules, as Mr. Haddon very likely knows, are not absolutely accurate although they are made with great precision. Slide-rules certainly should be considerably more accurate than a chart published in a magazine from an ordinary engraving. Yet, using 350 square feet as the "answer" in this problem, it will be found to be within 98.74 percent of perfection. In other words, this chart is only 1.26 percent in error, which is perhaps as close as can be expected under the circumstances.

In my article I suggested increasing the length of column *C*, if necessary. In lengthening the column make the spaces exactly the same as in the chart reproduced in BOILER MAKER AND PLATE FABRICATOR. In other words, if the length of the boiler is 20 feet make the length of column *C* twice the length as shown in the May issue.

Newark, N. J. W. F. SCHAPHORST.

Elementary Plate Layout -- Correction

In the first instalment of the article, Elementary Plate Layout, published in the June issue, an error occurs on page 149, third from the last paragraph, fifth line. The sentence "Draw *L-K* through the point *5* parallel to *C-D*," is in error. The letters *C-D* should be changed to *3-5*.

rigid and durable, since the studs reinforce the refractory material and conduct heat from the refractory to the cooling water within the tubes. The floor is water cooled. The cooling tubes are straight and are covered with standard Bailey bare-metal blocks. The tubes of the floor and outer sidewall connect to a common header in such a manner that positive circulation is assured through the floor and the wall. The rear wall, of refractory construction, is protected by a row of bare water-cooled tubes. Protection of the boiler tubes and superheater is obtained by a slag screen, formed by the first two rows of boiler tubes. These tubes are offset or staggered, and are spaced on wider centers than those directly behind them to cool the molten sticky slag, without, however permitting the slag to bridge across the tubes and thereby restrict the flow of gases. The unit is suitable for either wet or dry ash removal. In the boiler shown, arranged for dry ash removal, one ash pit, approximately 2 feet deep, extends across the back of the furnace, in the form of a trough, and provides a receptacle for ashes, which may be easily raked into it from doors at the floor level in the rear wall, or swept to the rear from the front wall by a steam lance. The ash pit is emptied through doors at the rear. Where conditions warrant their use, hopper-bottom and slag-tap types of furnaces provide alternate methods of ash disposal.

The boiler tubes are arranged in three passes, and are so spaced as to secure maximum heat transfer consistent with a draft loss that is sufficiently low to permit operation with natural draft up to fairly high ratings. The exceptionally high efficiency claimed for this boiler is also due, in part, to the cross-flow of gases over the tubes in all passes and to the fact that practically all the draft resistance is effective in promoting heat transfer, because of the scrubbing action of the gases on the tubes. The tubes in the first pass are 3¼ inches in diameter, and the diameter of those in the succeeding passes is 2 inches. Thus, those tubes subjected to the most severe conditions, and in which scale is most liable to accumulate, are of large size and easy to clean. For the less severe conditions in the later passes, which are less liable to collect hard scale, the use of smaller tubes is feasible and results in a considerable increase in the efficiency of the unit. The tubes are on alternate wide and narrow centers to facilitate their renewal. All tubes can be cleaned with standard turbines, and the outside of the tubes can be cleared of all ash deposits with a minimum number of soot blowers.

The drums are of fusion-welded or, if desired, riveted construction. The lower drum rests upon cast-iron saddles, which, in turn are supported by footings. It is anchored by the saddle near one end, but is free to move to the other end. The upper drum is supported by beams carried on corner columns and, in the larger sizes, by auxiliary guides and supports secured to the buckstays and rear corner angles. It is equipped with the necessary steam-and-water separator to assure the delivery of dry steam. Steam enters the dry pan at the front of the boiler where the water is comparatively quiet, passes over the length of the dry pan, and is taken away from the rear of the drum to the superheater.

Fuels, such as pulverized coal, oil, or gas can be fired singly or in any combination, and conversion from one or any combination of these fuels to another can be accomplished without any changes to either the boiler or the furnace.

Several of these units have been in very successful operation for a number of months. The design has definitely passed the experimental stage and the unit can be considered proved and dependable for the service for which it is designed.

Trade Publications

GENUINE WROUGHT IRON PLATE.—A bulletin which outlines the development, qualities and wide application of genuine wrought iron plates as produced with modern facilities has just been issued by the A. M. Byers Company, Pittsburgh, Pa. Genuine wrought iron possesses two features of interest to every engineer—an exceptional resistance to most types of corrosion and the ability to resist fracture from fatigue caused by vibration. Both these qualities are the result of combining a metallic iron of high purity with non-rusting slag. In order to indicate some of the services for which genuine wrought iron plates and sheets are being used, the bulletin has been profusely illustrated with examples of installations where its qualities have been of particular value and have resulted in increased life of such installations.

TESTING WELDERS.—This recent publication by the Linde Air Products Company, New York, outlines simple tests for measuring the ability of welders, which is the first of the six essential steps in every procedure control for oxy-acetylene welding. It is pointed out that welding technique differs somewhat with the materials to be welded and with the type of joint used, so that it cannot be assumed that a man who can weld excellent joints in aircraft tubing can also do as well in 20-inch steel pipe. Separate sections of the book discuss in detail the fracture test, the bend test, the tensile test, and the observation test. To round out the booklet, a summary of existing and pending qualification tests for welding steel plate and pipe are given. This includes: the A.S.M.E. Unfired Pressure Vessel Code for both Class 2 and Class 3 welded constructions, the A.S.A. Pressure Piping Code (unofficial) and the specifications and standards covering welding of steel and wrought iron pipe of the Heating and Piping Contractors National Association.

DUST COLLECTORS.—Pangborn Corporation of Hagerstown, Md., has just issued a new bulletin on the Type "CH" all-metal cloth screen, dust collector. This is one of the most complete catalogues published to describe and illustrate the many exclusive and new features not previously available in this class of equipment. Many large photographs, charts and drawings clearly illustrate the 14 outstanding points of superiority claimed for this new collector.

PORTABLE COMPRESSORS.—A novel bulletin, describing the advantages of two-stage air-cooled portable compressors has been issued by The Ingersoll-Rand Company, New York. This compressor is built in 5 sizes ranging from 75 to 370 cubic feet per minute piston displacement. It is supplied in a variety of mountings from a steel wheel mounting with a towing speed of 10 miles per hour to the two-wheel trailer mounting which can be towed by a truck at 35 miles per hour. Both oil engine and gasoline engine-driven units are shown in the bulletin which gives details as to the amounts of fuel savings that can be expected compared with the operation of single-stage water-cooled compressors.

WHITE PAINT.—The New Jersey Zinc Company, New York, has issued a booklet containing the latest information on the heat reflection and heat radiation qualities of various colored paints. Applications of this paint to various heat and light reflection problems are described and illustrated.

between plates. Observe appearance of weld metal, penetration into corners.

In some cases it is possible to tilt work so molten metal pool is horizontal, with increased speed.

A tilt of 5 degrees will be satisfactory.

Work of the A. S. M. E. Boiler Code Committee

The Boiler Code Committee meets monthly for the purpose of considering communications relative to the Boiler Code. Any one desiring information as to the application of the Code is requested to communicate with the Secretary of the Committee, 29 West 39th St., New York, N. Y.

The procedure of the Committee in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of The American Society of Mechanical Engineers for approval, after which it is issued to the inquirer and published.

Below are given records of the interpretations of this Committee in Cases Nos. 758, 772 and 773 as formulated at the meeting of April 27, 1934. They have been approved by the Council. In accordance with established practice, names of inquirers have been omitted.

CASE NO. 758.—(Annulled)

CASE NO. 772.—(*Special Rule*)

Inquiry: Is it permissible under the requirements of the Code, to construct heaters, evaporators, and heat exchangers for power-plant service with seamless drawn Admiralty metal tubes which comply with A.S.T.M. Specifications B 44-24 for Seamless Admiralty Condenser Tubes and Ferrule Stock to form the heat-transfer surface?

Reply: Although the Code contains no direct reference to, or specifications for, Admiralty metal tubing, it is the opinion of the Committee that tubes complying with A.S.T.M. Specifications B 44-33 may be used with safe results in unfired pressure vessels at temperatures not in excess of 406 F. When vessels are so constructed, it is the opinion of the Committee that the official Code symbol stamp for the particular type of vessel may be applied.

CASE NO. 773.—(*Interpretation of Pars. H-64 and H-117*)

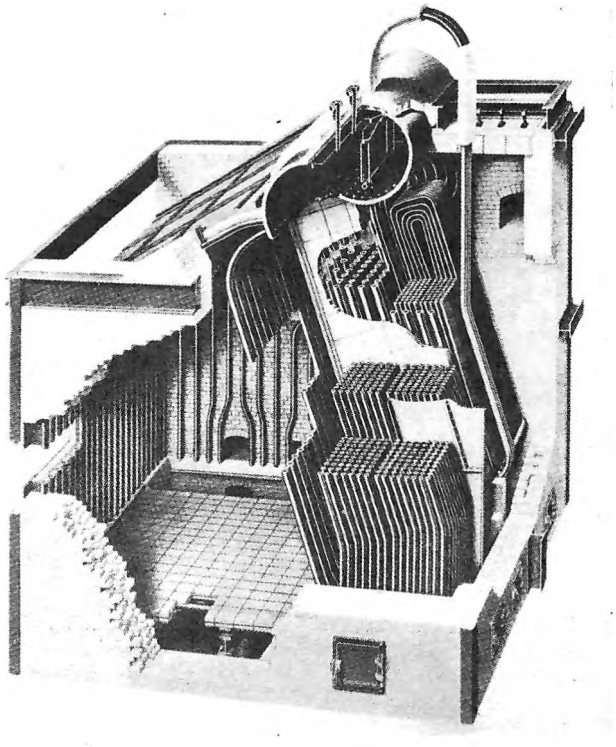
Inquiry: Will it be permissible to attach to a low-pressure steam-heating boiler a low-water fuel cut-off and/or water feeder which embodies a float and float bowl and is so constructed as to permit the flow of steam or water therethrough?

Reply: A low-water fuel cut-off and/or water feeder cannot be attached to a low-pressure steam-heating boiler unless it is so constructed that the water inlet valve cannot feed the water into the boiler through the float chamber and that the device is sufficiently isolated or insulated from the heat to insure a temperature at which scale will not be deposited therein.

Integral-Furnace Boiler

The Babcock & Wilcox Company, New York, announces a new boiler, designed to provide a completely co-ordinated unit comprising a two-drum boiler, a water-cooled furnace, burners for liquid, gaseous, or pulverized solid fuels, and, when needed, a superheater, economizer, and an air heater. This unit is particularly applicable in industrial plants where operation at high nominal ratings with high final steam temperatures, and where high efficiency is desired. The arrangement of the boiler proper, with inclined tubes entering an upper and a lower drum, and with the furnace paralleling the drums and separated from the rows of tubes by a furnace wall, instead of the conventional arrangement of boiler set over furnace, makes its installation advantageous where headroom is limited. The large furnace volume required for pulverized-coal firing of other types of boilers of the same capacities as the integral-furnace boiler, but with refractory-lined furnaces, has penalized this method of firing more than it has any other in first cost, operation, and maintenance. This new unit removes this handicap, since water-cooled furnace walls can be applied to this boiler at a fraction of the cost for applying this construction to conventional boilers of the same capacities.

The furnace is water-cooled to assure low maintenance costs and minimum outage for repairs and replacements. All the advantages of water-cooling are secured by an arrangement so simple that its cost is kept within the limits prescribed by the service for which the boiler is installed. This feature is shown by the arrangement of the cooling-water tubes, the simplicity of the supporting structure, the use of but two headers, and the necessity for but one small section of steel casing. The two side walls are of Bailey stud-tube construction employing tubes, suitably spaced, with the spaces between the tubes filled with plastic refractory material secured in place by studs welded to the tubes. Thus the wall is inherently



New integral furnace boiler unit