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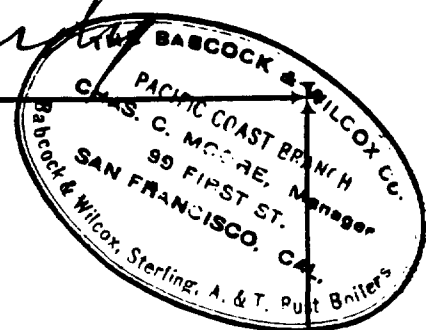
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BY

THE BABCOCK & WILCOX CO.

The Knickerbocker Press, New York

McHardy



STEAM

ITS GENERATION AND USE

WITH CATALOGUE OF THE
MANUFACTURES OF

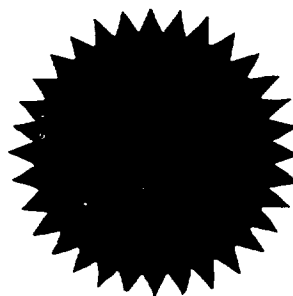
THE BABCOCK & WILCOX CO.

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AND

BABCOCK & WILCOX, LIMITED

ORIEL HOUSE, FARRINGDON ST., LONDON



THIRTY-FOURTH EDITION
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STEAM



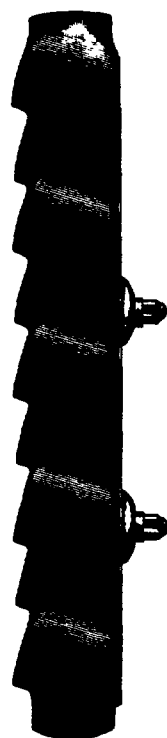
IT IS DURABLE.

The wonderful record of over one hundred thousand horse-power of these boilers in use from two to twenty years, many of them driven day and night, on which the average cost of repairs has not exceeded FIVE CENTS YEARLY PER HORSE-POWER for the boiler proper from all causes, speaks volumes on this point. What does it mean? It means that the wear and tear, including accidents, on the average is about one-half of one per cent. per annum upon the cost (not including furnaces and masonry), while that of a tubular boiler is rarely estimated at less than ten per cent. As to the lifetime of a Babcock & Wilcox boiler,

the end of fifty years, with the occasional replacing of damaged parts, they may not be "as good as new."

For many years we published in this book a list of the users of the Babcock & Wilcox boilers but the list has become so large that we are forced to omit it. To anyone desiring references we shall be glad to furnish as many as desired.

The following summary will give something of an idea of extensive use of Babcock & Wilcox boilers in different industries:—



Side View of Vertical Header.



Front View of Vertical Header.

experience so far fixes no data for a limit. Thirty years' use has developed no single instance of a boiler being worn out in legitimate service, and when worn or damaged small repair has apparently restored them to their pristine youth. We see no reason to suppose that at

	Horse-Power.
Agricultural Machinery,	16,889
Bolts, Nuts and Screws,	8,663
Bricks and Cement,	63,385
Carpets and Oil Cloth,	12,742
Cars, Wagons and Bicycles,	26,068
Chemicals, Glue and Fertilizer,	89,799
Clothing and Furnishing Goods,	9,629
Confectioners,	10,838
Copper, Brass, &c.,	57,900
Cotton and Linen Mills,	199,449
Destructor Works,	24,492
Distillers and Brewers,	60,624
Dye Works and Bleacheries,	29,054
Electrical Engineering and Supplies,	50,179
Electric Lighting,	920,683
Electric Railways,	798,207
Export (not included under any other heading),	156,053
Fire-arms and Ammunition,	11,701
Flour Mills and Bakeries,	47,523
Foundries,	32,203
Gas Works,	76,064
Glass Works,	28,818
Government Works,	66,912
Heating and Power for Buildings,	260,906
Heating (Central Stations),	17,552
Ice-making and Refrigerating,	37,224
Iron and Steel,	466,145
Jewellery,	2,175
Leather Works,	11,066
Locomotives, Boiler Makers and Engines,	43,060
Lumber and Wood Working,	33,788
Machinery, Tools and Hardware,	91,505
Mining,	384,008
Musical Instruments,	1,440
Oils, Paints and Soaps,	62,703
Packers and Cannerys,	40,576
Paper Mills,	79,445
Printers and Printers' Supplies,	15,208
Rope, Hemp, &c.,	6,416
Sewing Machines,	22,407
Silk Mills,	10,373
Steam Roads,	127,468
Sugar Plantations,	134,110
Sugar Refiners,	222,624
Tea, Coffee and Spices,	5,958
Tobacco and Snuff,	6,736
Tube Works,	21,491
Unclassified,	122,269
Water Works,	94,220
Wire Works,	21,226
Woolen Mills,	41,487

Total Horse-Power, 5,202,000

AVERAGE COST OF REPAIRS OF BABCOCK & WILCOX BOILERS IN THE PAST SEVENTEEN YEARS.

The following facts are gathered from a large number of answers to a circular of inquiry sent to all our older customers. Sufficient replies were received to include over 100,000 horse-power, the repairs to the heating surface of which, due to all causes, have averaged less than 5 cents per horse-power per year, of 300 days at 12 hours per day; boilers which have run night and day being credited with the extra running time. The list would have been more complete, and made a still better showing, but for the fact that a number of our best customers declined to give facts pertaining to their business for publication.

DECASTRO & DONNER SUGAR REFINING CO.
2880 H.P. Average time, 13.6 years, night and day. Total repairs, 6c. yearly per H.P.

SINGER MANUFACTURING CO. (Case Factory),
South Bend, Ind., 900 H.P. Average time, 12½ years. Total repairs, 1½c. yearly per H.P.

"Very bad feed-water... carry heavy fires and force them beyond their rated capacity.... in one instance we had to replace two heads and four tubes that were broken and blistered by a careless fireman heating an empty boiler red hot, and then turning on the feed-water!! Instead of a disastrous explosion that would have followed with other boilers, we lost the above parts and two days' time."

LEIGHTON PINE, Manager.

AMERICAN GLUCOSE CO., Buffalo, N. Y. 3050
H.P. Average time, 9.8 years. Total repairs, 4c. yearly per H.P.

NEW YORK STEAM CO. 13900 H.P. Average time, 3.92 years, night and day. Total repairs, ¼c. yearly per H.P.

ROSAMOND WOOLEN CO., Almonte, Ont. 360
H.P. Average time, 8½ years. Total repairs, 1½c. yearly per H.P.

BOUND BROOK WOOLEN MILLS. 600 H.P.
Average time, 8.1 years. Total repairs, 2c. yearly per H.P.

RARITAN WOOLEN MILLS. 1060 H.P. Average time, 6.7 years. Total repairs, *nothing*.

E. C. KNIGHT & Co., Philadelphia. 2000 H.P.
Average time, 5¼ years. Total repairs, 1c. yearly per H.P.

CONGLOMERATE MINING CO. 1800 H.P. Average time, 3 years. Total repairs, *nothing*.

"The boilers in every way come up to our highest expectations."

HENRY C. DAVIS, Pres't.

BOSTON SUGAR REFINING CO. 1250 H.P.
Average time, 8½ years. Total repairs, 4½c. yearly per H.P.

"Were put in early in 1880; have been in constant use night and day ever since."

C. GILBERT, Des Moines, Iowa. 488 H.P.
Average time, 5 years. Total repairs, 3½c. yearly per H.P.

BROOKLYN SUGAR REFINING CO. 3464 H.P.
Average time, 7½ years, running night and day. Total repairs, 1¼c. yearly per H.P.

JOHN CROSSLEY & SONS, LIMITED, Plantation,
Louisiana. 1260 H.P. Average time, 3½ years. Total repairs, *nothing*.

PORTAGE STRAW BOARD CO., Circleville, O.
1472 H.P. Average time, 3½ years. Total repairs, 3½c. yearly per H.P.

"These boilers have been worked hard a great portion of time and have given good satisfaction."

JNO. L. TAFLIN, Manager.

BAY STATE SUGAR REFINING CO., Boston.
798 H.P. Average time, 7.3 years. Total repairs, 1½c. yearly per H.P.

"These boilers have been constantly driven at their highest capacity ever since their installation, until the present winter, and the cost of repairs to heating surfaces in that time has been \$82.53."

J. F. STILLMAN, Supt.

WHEELER, MADDEN & CLEMSEN M'FG CO.,
Middletown, N. Y. 244 H.P. Average time, 5 years. Total repairs, *nothing*.

"We think this a very good record, and are very much pleased with the boilers."

JOEL H. GATES, Burlington, Vt. 244 H.P.
Average time, 5 years. Total repairs, *nothing*.

RUMFORD CHEMICAL WORKS. 279 H.P. Average time, 5 years. Total repairs, *nothing*.

"No expense on account of repairs to heating surfaces for either of them, since they were put in."

N. D. ARNOLD, Treas.

TYTUS PAPER CO., Middletown, O. 650 H.P.
Average time, 6 years, night and day. Total repairs, 6½c. yearly per H.P.

SOLVAY PROCESS CO., Syracuse, N. Y. 3456
H.P., from 6 to 1½ years. Average time, 2.6 years, night and day. Total repairs, 1¼c. yearly per H.P.

"The only repairs we have had to make are for new tubes when they have been burnt out. As you are well aware the water which we use at Syracuse is very hard upon boiler tubes, and we suppose we have burnt out more on this account than if the water had been good."

F. R. HAZARD, Treas.

"I believe our repairs would have been greater had we used the tubular type of ordinary design."

W. B. COGSWELL, Manager.

THE WARDLOW THOMAS PAPER CO., Middletown, O. 600 H.P. Average time, 6 years. Total repairs, *nothing*.

"Easily managed, economical in coal, attendance, and repairs; and the element of safety under our hard firing is a source of much satisfaction to us."

O. H. WARDLOW, Pres't.

W. A. WOOD, M. & R. M. CO. 360 H.P.
Average time, 4½ years. Total repairs, 1½c. yearly per H.P.

"We consider them as good as new to-day, and can recommend them as economical both in repairs and fuel."

J. M. ROSBAROOKS, Sup't.

MARCUS MOXHAM & Co., Swansea, Wales.
104 H.P. Average time, $3\frac{3}{4}$ years.

"It has not cost us a penny for repairs."

LAING, WHARTON & DOWN, *Electricians*,
London. 85 H.P. Average time, 2.3 years.

"As regards repairs they have got to come, as they have not yet cost anything."

CARNEGIE BROTHERS & Co., Pittsburgh, 900
H.P. Average time, 5 years. Total repairs,
 $1\frac{1}{2}$ c. yearly per H.P.

"The total repairs to heating surfaces in that time have been \$50."
CARNEGIE BROS. & Co.

RANSOMES, SIMS & JEFFERIES, L'd, Ipswich,
England. 35 H.P. Average time, $4\frac{1}{2}$ years.
Total repairs, *nothing*.

"The repairs appear to have been about £7 for brick-work."
RANSOMES, SIMS & JEFFERIES, L'd.

CROCKER CHAIR Co., Sheboygan, Wis. 225
H.P. Average time, 7 years. Total repairs,
1c. yearly per H.P.

"The total cost of repairs to heating surfaces in that time has been not to exceed \$15. We do not hesitate to say that it is the best boiler we have ever used."

EAGLE PAPER Co., Franklin, O. 250 H.P.
Average time, $4\frac{1}{4}$ years. Total repairs, 22c.
yearly per H.P.

"We are well pleased with them."
D. B. ANDERSON, Manager.

FIELDHOUSE & DUTCHER MANUFACTURING Co.,
Chicago. 75 H.P. Average time, 6 years.
Total repairs, $11\frac{1}{2}$ c. yearly per H.P.

"Consider your boiler to be the most economical and best made."

LOUISIANA SUGAR REFINING Co. 960 H.P.
Average time, $5\frac{1}{2}$ years.

"The cost of repairs is very moderate."
JOHN S. WALLIS, Pres't.

NORTH BEND PLANTATION, Louisiana. 400
H.P. Average time, 10 years. Total repairs,
 $11\frac{1}{2}$ c. yearly per H.P.

FRANCIS AXE Co. 136 H.P. Average time,
 $5\frac{1}{2}$ years. Total repairs, *nothing*.

WELHAM ESTATE, Louisiana. 240 H.P. Average
time, 2 years. Total repairs, *nothing*.

"I have used the boiler with perfect satisfaction."
WM. E. BRICKELL, Agent.

JOSEPH SCHOFIELD & Co., Littleboro, Man-
chester. 156 H.P. Average time, $2\frac{3}{4}$ years.
Total repairs, $1\frac{1}{2}$ c. yearly per H.P.

SETH THOMAS CLOCK Co. 125 H.P. Average
time, 7 years. Total repairs, *nothing*.

"The only cost has been the amount spent on account of burning up of fire-box furnace brick."

WALLACE & SONS. 400 H.P. Average time,
7 years. Total repairs, $\frac{1}{2}$ c. yearly per H.P.

"They are apparently in perfect condition now."

FOSS & BARNETT. 125 H.P. Average time,
7 years. Total repairs, *nothing*.

"Have not cost one dollar for repairs—simply new grate bars. Think they are good economical boilers."

CORTLAND WAGON Co. 82 H.P. Average
time, 6 years. Total repairs, *nothing*.

"No outlay for repairs. We consider this remarkable because we have forced the boiler from the beginning."

EAGLE SQUARE MANUFACTURING Co., South
Shaftsbury, Vt. 200 H.P. Average time,
 $5\frac{1}{2}$ years. Total repairs, *nothing*.

"Have purchased a few fire brick to go between tubes. We have found no other repairs necessary."
F. L. MATTISON, Treas.

PAINE LUMBER Co., Oshkosh, Wis. 416 H.P.
Average time, 4 years. Total repairs, *nothing*.

"Have been using the ordinary boilers with both large and small tubes for thirty years past, and regard your boilers as more economical."
PAINE LUMBER Co.—A. B. IDESON.

P. P. MAST & Co., Springfield, O. 85 H.P.
Average time, $8\frac{1}{2}$ years, night and day.
Total repairs, $3\frac{1}{2}$ c. yearly per H.P.

"We regard it as the best boiler ever used by our Company, and think it has no equal in the market. After all this hard usage, equal to 14 years, we find it still in good condition."
P. P. MAST & Co.

EDISON ELECTRIC ILLUMINATING Co. of Piqua,
O. 100 H.P. Average time, $5\frac{1}{2}$ years.
Total repairs, $4\frac{1}{2}$ c. yearly per H.P.

HALLET & DAVIS Co., Boston. 104 H.P.
Average time, 6 years. Total repairs, 5c.
yearly per H.P.

"Our repairs to boiler have been for new nipples in mud-drum in Aug., 1887, which is certainly a very creditable showing."
HALLET & DAVIS Co.

H. D. SMITH & Co., Plantsville, Conn. 75 H.P.
Average time, 8 years. Total repairs,
nothing.

"We know of no other boiler that would do the work that this is doing."
H. D. SMITH & Co.

F. A. POTH BREWING Co., Philadelphia. 400
H.P. Average time, 4 years. Total repairs,
 $1\frac{1}{2}$ c. yearly per H.P.

J. L. CLARK, Oshkosh, Wis. 107 H.P. Average
time, $6\frac{1}{2}$ years. Total repairs, $\frac{1}{2}$ c. yearly
per H.P.

"Develop at least one-third more work than rated. We cannot speak too highly of your boilers. They are simply perfect."
J. L. CLARK.

SOCIETÀ GENERALE ITALIANA DI ELETTRICITÀ,
SISTEMA EDISON, Milan, Italy. 1476 H.P.
Average time, $3\frac{1}{2}$ years.

"The repairs have consisted in the changing of 4 tubes and about 220 rivets (not counting the last accident due to carelessness of the firemen)."
L'Amministratore Delegato—J. COLUMBA.

UNION IRON WORKS, Johnstone, Scotland.
104 H.P. Average time, 5 years. Total re-
pairs, 3c. yearly per H.P.

P. & P. CAMPBELL, Perth, Scotland. 146 H.P.
Average time, 2 years.

"The boilers have cost nothing for repairs themselves, but the doors and furnace have cost about £4 10s. per annum."
P. & P. CAMPBELL.

CHENEY BROS., So. Manchester, Conn. 350 H.P. Average time, 7 years.

"Running steadily for seven years, and during that time they have not cost us anything for repairs to the heating surfaces."

CHENEY BROS.

TOLEDO & OHIO CENTRAL R. R. 120 H.P. Average time, $7\frac{3}{4}$ years. Total repairs, $12\frac{1}{8}$ c. yearly per H.P.

"The boilers have given entire satisfaction in every respect."

J. B. MORGAN, Master Mechanic.

McAVOY BREWING CO., Chicago. 832 H.P. Average time, 6 years. Total repairs, 10c. yearly per H.P.

"Our experience with them has been to our entire satisfaction."

Geo. DICKINSON, Sec'y.

(NOTE.—One-half of total expense was due to broken headers caused by low water, because of water combination becoming shut off.)

CORNWALL BROS., Louisville, Ky. 227 H.P. Average time, $8\frac{1}{4}$ years. Repairs, *nothing*.

MAGINNIS COTTON MILL, New Orleans. 624 H.P. Average time, 6 years. Total repairs, $1\frac{1}{8}$ c. yearly per H.P.

PIONEER MILLS. 150 H.P. Average time, $9\frac{1}{2}$ years. Total repairs, "slight."

"Cost of repairs comparatively nothing. No leaking of flues or boiler at any time."

J. A. M. JOHNSTON, Agent.

LAWRENCE ROPE WORKS, Brooklyn. 250 H.P. Average time, 7 years. Total repairs, 4c. yearly per H.P.

JAMES MARTIN & Co., Philadelphia. 208 H.P. Average time, $7\frac{1}{8}$ years. Total repairs, 16c. yearly per H.P.

"There has been but little cost for repairs to them, those we have made being for a few new tubes that became clogged or coated with scale on account of the *very* hard (well) water we are using. We cannot speak too highly of them."

JAS. MARTIN & Co.

FAIRMOUNT WORSTED MILLS, Philadelphia. 400 H.P. Average time, 7.5 years. Total repairs, $6\frac{1}{8}$ c. yearly per H.P.

WM. WHITAKER & SONS, Philadelphia. 480 H.P. Average time, 7 years. Total repairs, *nothing*.

VANDERBILT UNIVERSITY, Nashville, Tenn. 200 H.P. Average time, 6 years. Total repairs, 4c. yearly per H.P.

"Cost of repairs to heating surface on all the above during that time has been \$48.25. The boilers during that time have given entire satisfaction."

OLIN H. LANDRETH, Dean of Engineering Dept.

ARLINGTON MILLS MANUFACTURING CO. 500 H.P. Average time, 8 years. Total repairs, *nothing*.

SOMERSET MANUFACTURING CO., Raritan, N. J. 720 H.P. Average time, 7.5 years. Total repairs, *nothing*.

NEW YORK & BROOKLYN BRIDGE. 600 H.P. Average, $2\frac{1}{2}$ years. Total repairs, *nothing*.

"The boilers have done excellent service and have given entire satisfaction."

C. C. MARTIN, Ch. Eng. & Supt.

CHURCH & Co., Brooklyn, E.D. 584 H.P. Average time, 4.2 years. Repairs, *nothing*.

ECONOMIST PLOW CO., South Bend, Ind. 150 H.P. Average time, 5 years. Total repairs, *nothing*.

"We believe it to be the most durable boiler made."

LEIGHTON PINE, Pres't.

UNION METALLIC CARTRIDGE CO., Bridgeport, Conn. 276 H.P. Average time, $4\frac{1}{3}$ years. Total repairs, *nothing*.

"The cost of repairs to heating surfaces of said boilers in that time has been nothing. We carry from 75 to 80 lbs. all the time."

A. C. HOBBS, Supt.

WARDER, BUSHNELL & GLESSNER CO. 650 H.P. Average time, $3\frac{1}{4}$ years. Total repairs, $4\frac{1}{8}$ c. yearly per H.P.

"The boilers are giving us the best satisfaction."

CHAS. A. BAUER, Gen'l Manager.

CHICAGO CITY RAILWAY CO. 1000 H.P. Average time, 7 years, night and day. Total repairs, $4\frac{1}{8}$ c. yearly per H.P.

"The boilers have worked well and proved very satisfactory."

C. B. HOLMES, Supt.

SHEBOYGAN MANUFACTURING CO. 333 H.P. Average time, 8 years. Total repairs, 4c. yearly per H.P.

"We have found them economical, easily kept in running order, and in all ways entirely satisfactory, and should we need additional power would use no other boilers."

G. L. HOLMES, Pres't and Gen'l Manager.

JACKSON & SHARP CO., Wilmington, Del. 467 H.P. Average time, $5\frac{1}{8}$ years. Total repairs, $1\frac{1}{8}$ c. yearly per H.P.

"Have cost *nothing* for repairs to heating surfaces, except through the carelessness of our fireman, who, soon after starting the first boilers, allowed the water to get too low and burst three or four headers, but doing no other damage. We consider them safe and economical steam generators."

THE JACKSON & SHARP CO., by Chas. S. Robb.

SOUTH BEND TOY MANUFACTURING CO. 61 H.P. Average time, 4 years. Total repairs, $2\frac{1}{8}$ c. yearly per H.P.

"We consider these boilers the safest and most economical in the market."

F. H. BADET, Sec. & Treas.

COLUMBUS BUGGY CO., Columbus, O. 800 H.P. Average time, 7 years. Total repairs, $1\frac{1}{8}$ c. yearly per H.P.

"We consider them the best boiler in the market and we are now evaporating 9 lbs. of water to one pound of poor slack coal."

FRED. WEADON, Supt.

EDISON ELECTRIC ILLUMINATING CO. OF N. Y. 900 H.P. Average time, 7 years. Total repairs, *nothing*.

"They give plenty of dry steam and have been absolutely tight at all times. The boilers have shown unusual ability to carry a constant pressure under the extreme and sudden fluctuations, which are unavoidable in an electric light station."

C. E. CHINNOCK, V. Pres.

KENNESAW MILLS CO., Marietta, Ga. 200 H.P. Average time, 7 years. Total repairs, $2\frac{1}{8}$ c. yearly per H.P.

"You will see that the repairs on our boilers have not cost very much for the last 7 years."

J. R. BUCHANAN.

E. GREENFIELD'S SON & Co., Brooklyn. 160 H.P. Average time, 4 years.

"They show no signs of wear, therefore probably will not need repairing for some time to come. We consider them the best boilers we have ever used."

BLACK & GERMER, Erie, Pa. 92 H.P. Average time, 4 years. Total repairs, *nothing*.

"Is easily cared for and economical in the consumption of fuel."

PLANTERS SUGAR REFINING Co., New Orleans. 292 H.P. Average time, 6 years. Total repairs, *nothing*.

"The only expense attached to them has been new grate bars and fire brick work." JOHN BARKLEY, Pres't.

S. S. HEPPWORTH, Yonkers, N. Y. 104 H.P. Average time, 4½ years.

"During all this time it gave no trouble whatever, and did not cost one penny for repairs."

WILSON & MCCALLAY TOBACCO Co. 300 H.P. Average time, 5 years. Total repairs, 4½c. yearly per H.P.

JOHN COLLINS, Denny, North Britain. 425 H.P. Average time, 3½ years.

"The repairs to heating surfaces have been slight, and caused by an unfortunate admission of grease to feed water in the case of my 140 H.P. boiler. With this exception, which of course arose from no fault of yours, the boilers have done good and heavy work and given me satisfaction." JOHN COLLINS.

SINGER MANUFACTURING Co., Kilbowie, Scotland. 2106 H.P. Average time, 4½ years. Total repairs, ¼c. yearly per H.P.

"We have much pleasure in sending you particulars of boilers as requested. . . . Total repairs, £3. 19. 3, which we consider highly satisfactory."

NOVA SCOTIA SUGAR REFINERY, Halifax, N. S. 800 H.P. Average time, 7¾ years, night and day. 600 H.P. since 1880; 200 in 1885. Total repairs, 1½c. yearly per H.P.

"We have pleasure in saying we consider them first-class boilers in every respect." J. A. TURNBULL, Man.

KENNEDY'S PATENT WATER METER Co. L'D., Kilmarnock, Scotland. 51 H.P. Average time, 6 years. Total repairs, *nothing*.

"Repairs confined to re-expanding one tube. The cost was trifling." THOS. KENNEDY.

BENT COLLIERY Co. L'D. Bothwell, Scotland. 480 H.P. Average time, 4½ years.

"The cost of repairs during that time has been trifling. I think two short tubes were renewed. The boilers have been constantly at work." JAS. S. DIXON.

CORPORATION OF ABERDEEN GAS WORKS, Scotland. 93 H.P. Average time, 3 years, night and day. Total repairs, *nothing*.

"The boiler continues to give great satisfaction." ALEX. SMITH.

THE SQUARE WORKS, Ramsbottom, England. 136 H.P. Average time, 4 years, night and day. Total repairs, 9½c. yearly per H.P.

"Since Feb. 5th, 1884, night and day work, 16/6 except the breakdown through being short of water, which cost £31. 17. 4 to repair." HERBURN & Co.

WHITMORE & SONS, Edenbridge, Kent, England. 100 H.P. Average time, 3 years.

"Have not spent one penny on the boiler"

MILLER & Co., Foundry, Edinburgh, Scotland. 240 H.P. Average time, 3 years. Total repairs, *nothing*.

"Only expense has been some repairs to the brickwork in connection with the stoker." MILLER & Co.

CARTHNESS STEAM SAW MILL, Wick, Glasgow. 146 H.P. Average time, 2½ years. Total repairs, *nothing*.

"We are well pleased with your boilers, and can with confidence recommend them to any firm wishing to economize their working expenses." ALEX. McEWEN.

GEORGIE MILLS, Edinburgh, Scotland. 146 H.P. Average time, 3½ years, night and day. Total repairs, *nothing*.

"Neither boiler has required any repairs to heating surfaces." J. & G. Cox.

J. & T. BOYD, Iron Works, Glasgow. 208 H.P. Average time, 2½ years.

"One of these has worked nearly 5 years and the other about half that time without any repairs whatever."

DUBOIS & CHARVET-COLOMBIER, Armentières, France. 476 H.P. Average time, 3 years.

"These boilers have worked to our entire satisfaction since 3d November, 1885, without as yet any repairs whatever."

ARROL BROTHERS, Bridge Builders, Glasgow. 146 H.P. Average time, 5½ years.

"Cost of repairs to heating surface is as yet nothing. It gives us pleasure to hand you this information, which is entirely at your own disposal." ARROL BROS.

JAMES EADIE & SONS, Tube Works, Glasgow. 64 H.P. Average time, 5 years.

"Repairs to heating surfaces, none."

HUGHES & SON. Meole Brace, Shrewsbury, England. 61 H.P. Average time, 4 years.

"Has up to now cost us nothing whatever for repairs. We can only repeat that we are very much pleased in every respect with your boiler."

WESTINGHOUSE AIR BRAKE Co., Pittsburgh. 92 H.P. Average time, 4½ years. Total repairs, 4c. yearly per H.P.

"The repairs have been merely nominal, being confined to the re-expanding of a few tubes and the replacing of two or three hand hole covers, at a total cost probably not exceeding \$15. The boiler has given entire satisfaction." H. H. WESTINGHOUSE, General Manager.

CARTHAGE WATER WORKS. 122 H.P. Average time, 6½ years. Total repairs, *nothing*.

"They are practically as good as when we put them in; there is not a blister or scale on the tubes. The fire has not been out since we first started up in January, 1882." C. S. BARTLETT, Manager.

J. PONGS, JR., Newerk, Germany. 120 H.P. Average time, 3 years.

"Has been running 3 years without needing any repairs up to this time." J. PONGS, JR.

CARRON Co., Carron, Stirlingshire, N.B. 416 H.P. Average time, 4 years. Total repairs, *nothing*.

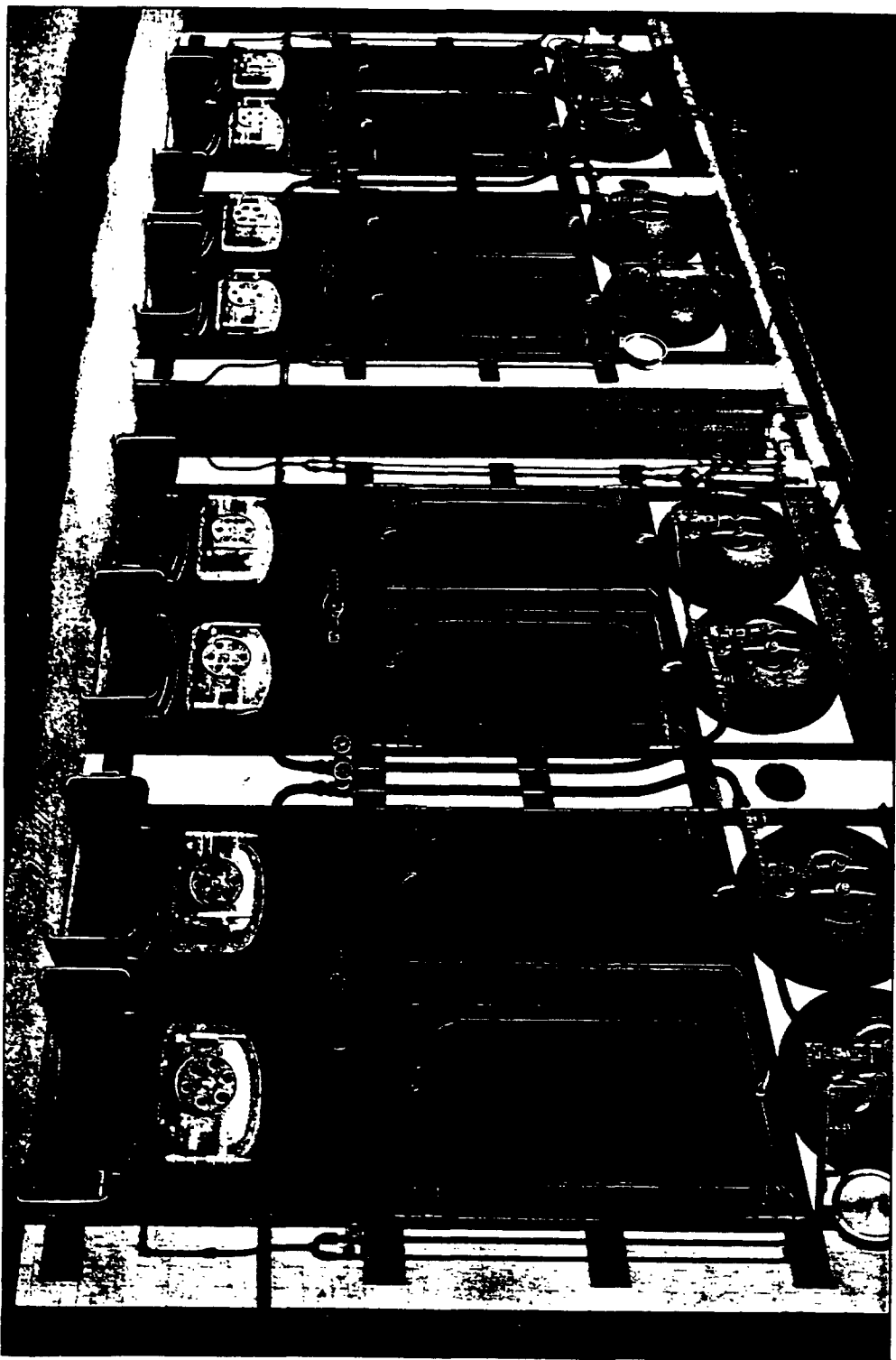
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Baldwin Locomotive Works, Philadelphia, Pa. 5864 H.P. Babcock & Wilcox Boilers.