EXPERIMENTS ON THE STRENGTH OF CEMENT, CHIEFLY IN REFERENCE TO THE PORTLAND CEMENT USED IN THE SOUTHERN MAIN DRAINAGE WORKS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649579877

Experiments on the Strength of Cement, Chiefly in Reference to the Portland Cement Used in the Southern Main Drainage Works by John Grant

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd. Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

JOHN GRANT

EXPERIMENTS ON THE STRENGTH OF CEMENT, CHIEFLY IN REFERENCE TO THE PORTLAND CEMENT USED IN THE SOUTHERN MAIN DRAINAGE WORKS

Trieste

EXPERIMENTS

ON THE

STRENGTH OF CEMENT,

CHIEFLY IN REFERENCE TO THE POETLAND CEMENT USED IN THE SOUTHERN MAIN DRAINAGE WORKS.

BY

JOHN GRANT, M. INST. C.E.

THESE PAPERS WERE ORIGINALLY PRESENTED TO THE INSTITUTION OF CIVIL ENGINEERS AND READ AT THE MEETINGS OF THE SOCIETY, SESSIONS 1865-6 AND 1870-1, AND ARE NOW REPRINTED BY PERMISSION OF THE COUNCIL,



LONDON: E. & F. N. SPON, 48, CHARING CROSS. NEW YOBK: 446, BROOME STREET. 1875.

186. e. 83.

.

40

98 21

* * *

PREFACE.

THE first of the following Papers on Cement was read before the Institution of Civil Engineers, London, in December, 1865; the second in April, 1871. Both have been out of print for some time, the first for several years; and as frequent inquiries are being made for them, it has been considered advisable to reprint them, the Council of the Institution having very kindly given their permission.

Nothing has occurred since these Papers were read to invalidate the facts or make it necessary to modify the statements made by the Author, who hopes that they may form a safe starting point for anyone who wishes to pursue the subject farther.

1.2.2

-

(v)

INDEX.

CEMENT bricks, 130-137. ABERNETHY, Mr., remarks, 50. Abrasion of Portland cement concrete, -, cost of, 3. 93. 125. Abstracts of tables, 6-16. Adhesion and cohesion, 149, 155. Age, effect of, on cement, 11, 12, 108, 109. Air, concrete kept in, 142, 143. Aird, jun., John, remarks, 68. Albert Embankment concrete, 118. 151. Ashlar, 58. BALLAST in concrete, 17, 138-143, 160-164. Bateman, J. F., remarks, 85. Baynes, Carleton, remarks, 61. Bazalgette, J. W., remarks, 63, 154. Béton, 49, 95-97. Bétons agglomérés, 119. Bevan, Thomas, remarks, 71. Blocks, concrete, 85, 116, 138-143. Blue bricks, strength of, 85, 37. Blue lias lime concrete, 47. Bramley Fall stone, 14, 38, 43. 75. Bramwell, F. J., remarks, 78, 153. Brereton, R. P., remarks, 86. Bricks, cement, crushing strength of, 13, 34, 115, 128, 187. -, strength of, 13, 35-38, 115, 128. Brickwork and cement, strength of, 47, 126, 127. - blocks, quantities of cement for, 39. - for tidal work, 66. Bridge cylinders, concrete in, 68, 69, 86. Briquettes, concrete, 146.

----, effect of age on, 11, 108, 122, 123, -, mode of testing, 2, 110-114. - in aswers, 19-21, 117, 119. Ocments, tensile strains on, 40-45. -, London Main Drainage, 116. Chalk for Portland cement, 4, 72, 81, Chemical tests, 168, 169. Clay for Portland cement, 4, 72, 151. - bricks, strength of, 87. Cohesion and adhesion, 149. Concrete blocks, 87, 88, 95, 188-143. - briquettes, 146. -, cost of, 103. - in bridge cylinders, 68. - for foundations, 86, 87. - for quay walls, 85. - in air and in water, 142, 143. -, Registration form for tests, 113. - sewers, 19-21, 117, 119, 144-148. -, use of, under water, 65, 68. - specification, Suez Canal. . 74. -, strength of, 47, 116. Coode, John, remarks, 87. Cost of cement, 3. - of concrete, 103. - of testing cement, 5. Orossness Works, cement tests, 41, 42. Cartis, Cockburn, remarks, 76. DINES, G., remarks, 69.

Dock wall, concrete for, 162. Druce, E., remarks, 51, 95.

INDEX.

EMBANEMENT, Albert, concrete at, 118. Exbury bricks, strength of, 38. Experiments, mode of conducting, 8, 110-114.

FDRE grinding, importance of, 6. Firebricks, strength of, 35, 37. Filints in concrete, 139-143. Form, tabular, for tests, 111-113. Foundations in water, 86. Fowler, John, remarks, 104. Fox, Sir Charles, remarks, 68. Francis, C. L., remarks, 62. Fresh water, and cement, 13, 27. Further experiments, 107.

GAULT bricks, strength of, 35, 36. Glass in concrete, 139-143. Granite and Portland stone compared, 89. — in concrete, 139-143. —, resistance to compression, 43.

Grant, John, remarks, 98, 149, 169–172. Gravity, test by, 79.

HALF-BEIGE sewers, 144, 147. Hand-mixed coment, 125. Hartley, Sir Charles, remarks, 95. Hawkahaw, John, remarks, 90. Heavily barnt cement, 56–58, 62. Heavy and light cement, 56–58, 62, 93. Hemans, G. W., remarks, 49. Hydraulic limestone, 54. — lime mortar, 151.

JENNINGS, Joseph, zemarks, 70. Jetties, construction of, 96, Joints for tidal work, 66.

 KEENE'S coment, experiments with, 13, 33, 46.
Kinipple, Mr., remarks, 65. LANE, C. B., remarks, 77. Latham, B., remarks, 188. Lias lime, 92, 151. — lime concrete, 47. — lime and Portland coment compared, 103. Light and heavy cement, 93. Lime concrete, 47, 152. — mortars and brick, 115. Limestone, Halkin Mountain, 54. Liverpool docks, mortar at, 53. Losmy pit sand, experiments with, 8, 9, 24. Longridge, J. A., remarks, 74.

MACHINE bricks, 37. Machine-mixed coment, 125. Manufacture of Portland cement, 4. Marble, strength of, 69. Maudalay, Henry, remarks, 70. Medina and Portland cements mixed, 94. cement, experiments with, 13, 83, 45, 46, 108, 123, 159, 160. Metropolitan sewers, cements for, 1-4. Mill-mixed cements, 125, Mortar, 54, 55, 152, 153, 163-168. - at Liverpool docks, 53. -, quantities used for, 39. Moulds for testing cement, 2, 6, 109, 124, 149, 161.

NEAT coment, strength of, 7, 9, 12, 17, 24, 26, 47, 114, 122, 130-135, 166, 167. ______, strength in water, 17, 18, 25, 26, 40, 42.

PACKING comment, 90, 158, 161. Parian comment, experiments with, 13, 35, 45. Parkes, W., remarks, 155. Piers, use of Portland comment for, 49, 51. —, concrete for, 87, 88, 96. Pit saud, experiments with, 8, 9, 24, 164.

vi

INDEX.

Plaster of Paris in mortar, 152, 153. Portland cement, 1. - and Medina cements mixed, 94. - cement for sea walls and piers, 49. - ---- manufacture, 4. -, neat, strength in water, 40, 42. - -----, resistance to pressure, 43. -, specification for, 2, 162. - stone and granite compared, 89. -----, strength of, 14, 38, 43, 84. Pottery in concrete, 139-143. Pozzolans, 92, 95, 97, 158. Preliminary experiments, 3. Pressed bricks, strength of, 35-37. QUANTITIES of cement, &c., for brickwork, 89. Quay walls, concrete for, 85. RAWLINSON, Bobert, remarks, 52. Redman, J. B., remarks, 84. Reds, bricks, strength of, 35. Register of Portland cement, form of, 48. - of experiments, 110-114. Re-mixing mortar, 149. Ridley, T. D., remarks, 98. Roman cement, 1, 8, 108, 121, 159. -, experiments with, 13, 28-32, 44, 45, 122, 123. Resendale, American, cement, 149, 150. Rubbers, bricks, strength of, 85. SALMON bricks, strength of, 35. Salt water, and coment, 13, 27, 74, 76, 87. Samples, how collected, 2. Sand and Portland cement, 7-9, 18, 26, 122, 130-137. and Roman cement, 29-32. - for coments, 50, 75, 76, 82, 88, 91. -, proportions of, 7-10. Scott Russell, Mr., remarks, 70.

____, Lieut.-Col., remarks, 150-153.

Sea sand in mortar, 164. - walls, concrete or cement for, 49, 87-89, 94, 103. Selenitic mortar, 153. Sowers, concrete, 19-21, 117, 119, 144-148 -, specification, 146-148. Shingle for concrete, 71. Ships, Portland cement for, 70. Sicilian marble, strength of, 69. Slag in concrete, 189-143. Smiths' ashes in mortar, 164. Southern outfall, coment tests, 41, 42. Specification for Portland cement, 48, 147. -, concrete, Snez Canal, 74, 75. -, concrete sewers, 146-148. Specific weight of cement, 55, 56, 79, 80. Stocks, bricks, strength of, 35, 36. Stone, strength of, 13, 14, 38, 48, -, Portland, in concrete, 139-143. Storage of cement, 62. Stucco, Portland cement for, 69. Snoz Canal, concrete specification, 74, 75. Suffolks, bricks, strength of, 35. Summary of results, 14-16. - of tests, 128. Supervision necessary, 5.

TABLES, abstracts of, 6-16. Tabular form for tests, 110-113. Tensile strain, concrete briquettes, 146. , Portland cement, 100-102. 156, 157. -, Portland cement and brick, 115. - strains of cements, 40-45. Test-blocks, size of, 51. Test-moulds, 2, 6, 109. Testing machine, 2. - for small works, 4. Tests, chemical, 169. -, summary of, 126. Thames cand, experiments with, 7.9.

18, 24, 26.

vii