

IV 5

4
11

The Engineer.

VOL. LIX.—FROM JANUARY TO JUNE, 1885.



12376a

London:
OFFICE FOR PUBLICATION AND ADVERTISEMENTS, 163, STRAND, W.C.

Wydawnictwo



J. IV. 1 / 1885 / I

~~74 2b.~~
J. IV. 1

Y.
VOL. LIX—FROM JANUARY TO JUNE 1885



Akc. Nr. 1

OFFICE FOR REPLICATION AND ADVERTISING, 107 STRAND, W.C.
London

INDEX.

Illustrations.

LIST OF NAMES.

ABERGAVENNY, Sewerage Works, 102
 Abergavenny Sewerage Works, Abutments of Foot and Main Sewer Bridge over the River Usk, 132, 133
 Abouchoff Steel Works, St. Petersburg, 35-ton Steam Crane, 174
 Alabama, Map Showing Position of the Mineral Districts of, 444
 "America," Twin-screw Tug-boat, Messrs. Cochran and Co., 202, 204
 "America," Twin-screw Engines of the Tug, 204
 American Passenger Locomotive, The Mason Machine Works Company, 28
 American Shaft-sinking Machinery, 114, 115
 Amos and Smith, Messrs., Parker's Patent Digger, Inventions Exhibition, 492, 493
 Anable, Mr., Drain Pipe Posts, 379
 Anchor, Marine Governors, 316
 Anderson, Mr. W., Curves of Powder Gas Pressures, 112
 Anderson and Gallwey, Messrs., Rivetter, Inventions Exhibition, 491
 Appleby Bros., Messrs., Steam Winch, Inventions Exhibition, 425
 Appleby Bros., Messrs., 20-ton Overhead Crane Crab, Inventions Exhibition, 493
 Appleby Bros., Messrs., Whip Crane, Inventions Exhibition, 493
 Archdale and Co., Messrs., Heavy Shaping Machine, 333
 Archer, Mr. T., Epicycloidal Steering Gear, Inventions Exhibition, 493
 Athus District, General Plan of, showing Position of Mines and Works, 240
 Athus Iron and Steel Works, Ore Wagon and Drawhook, 241
 Atwood and Co., Messrs. A., Hoists and Lifts, Inventions Exhibition, 382
 Austrian Patent, Apparatus for Bleaching or Dyeing Yarns and Goods in Vacuo, 181
 Austrian Railway, Diagrams for Estimating the Quantities of Girder Bridges (*Supplement May 22nd, 1885*)
 Aveling and Porter, Messrs., Spring Wheel, Inventions Exhibition, 397
 Aveling and Porter, Messrs., 6-H.P. Traction Engine, Inventions Exhibition, 405
 BARNHART, Mr. H. M., Ballast Unloader, 21
 Barrow Rock Drill Company, The Barrow Machine Rock Drill for Mining, Inventions Exhibition, 457
 Bauer's Link Spanner and Tube Vice, Messrs. James Gibbs and Co., 278
 Belfast Electric Appliance Company, Arc Lamp, Mr. Newton, 72
 Belfast, Electric Lighting in, 72
 Belfast, Messrs. Harland and Wolf's Shipyard, 72
 Bell's Friction Brake for Pulleys, Messrs. W. T. Glover and Co., Inventions Exhibition, 474
 Bell's Low-pressure Filters, Messrs. W. T. Glover and Co., Inventions Exhibition, 474
 Benbow, H.M.S., The Thames Ironworks Company, External View and Deck Plan, 460
 Benbow, H.M.S., Sketch Map Showing Internal Arrangements, 471
 Bernays, Mr., Steam Pumps, Inventions Exhibition, 356
 Berry, Mr. H., Hydraulic Rivetting Plant, 141
 Billing, Mr., Patent Breech-loading Shot Gun, 3
 Bing, Mr. E., Simple Circle Squaring, 434
 Birmingham, Compressed Air Motive Power Supply, 121, 122
 Blaauw Kranz Ravine, Bridge over the, Mr. Max Am Ende, 165
 Blaauw Kranz Bridge, Cape Colony, Messrs. Handyside and Co., 296, 297, 298, 299
 Blaauw Kranz Bridge, Cape Colony, The, Mr. Max Am Ende, 200, 201
 Blackburn Mill on the Roller Mill System, Mr. J. H. Carter, 39, 41
 Bond, Mr. George M., Standards of Length and their Division, 194
 Bond, Mr. George M., Standards of Length as Applied to Gauge Dimensions, 447, 466
 Borland, Mr., Injectors, Inventions Exhibition, 365
 Boston Docks, Hydraulic Coal Hoist, 32
 Boston Docks, Hydraulic Lifting Machinery, Messrs. Abbott and Co., 33, 63, 66
 Botting, Mr. F., Air-tight Covers and Plugs, 497
 Bottomley's Radial Axle Boxes, Inventions Exhibition, Messrs. Sharp, Stewart, and Co., 474
 Bouch, Mr., Long Boiler "Bull" Engine, Stockton and Darlington Railway, 95
 Bouch, Mr., Passenger Engine, Stockton and Darlington Railway, 95
 Brazil, Stern Wheel Steamboat for, Messrs. Forrest and Sen, 366
 Bremner's Valve Gear, Launch Engine with, Messrs. Ross and Duncan, 70
 Brighton Beach Works, 126
 Britannia Company's Treadle Saw, The, 204
 Browett, Lindley and Co., Messrs., Combined Engine and Dynamo, Inventions Exhibition, 397
 Brown, Mr. William, Purifying Feed-water, 163
 Brunton, Mr. J. Forest, Theory of Governors, 1, 2
 Budenburg's High Pressure Gauge, Inventions Exhibition, 353
 Buenos Ayres, Hydraulic Cranes, Port of, Messrs. John Abbott and Co., 103
 Buenos Ayres, Hydraulic Machinery, Messrs. J. Abbott and Co., 184, 185, 188
 Burrell and Sons, Messrs. C., Transporting a Marine Boiler by Road, 279
 Bush Interlocking Rail Bolt, The, 145
 Busch, Mr. Julius, Feed Mechanism for Roller Mills, 8
 Butler, Mr. S., Movable Coal Staiths, Inventions Exhibition, 400
 CARTER, Mr. J. Harrison, Four-roller Break Mill, 40, 42
 Carter, Mr. J. Harrison, Three High Roller Mill, 40
 "Cat" Engine Governor, The, 279
 Chandler, Mr., Engine and Rope-driving Gear, Inventions Exhibition, 397
 Cochran and Co., Messrs., Marine Boilers, Inventions Exhibition, 424
 Conradi, Mr. H., Tram-car Guard, Inventions Exhibition, 485
 Corliss Engine, New Orleans Exhibition, 248
 Coventry Machinery Company, Parallel Grip Vice, 478
 Crompton and Co., Messrs. R. E., 21 Unit Machine, Inventions Exhibition, 504

Crompton 22-Unit Dynamo and Willan's Engine, Inventions Exhibition, 504
 DANISH State Railways, Rails and Fastenings for, 211
 Danube Bridge, Competitive Designs for a, 80
 Davis, Mr., Positive Action Cut-out and Contact Changer, 231
 Deakin and Parker, Messrs., Compound Engine, 261
 Dean Wire Stretcher, The, 219
 Deely and Co., Messrs., Vacuum Sugar Pan, 6
 De Michele, Mr. V., Patent Automatic Cement Testing Machine, 478
 Dick, Kerr and Co., Messrs., Compound Winding Engines, 457
 Dick and Stevenson, Messrs., Steam Hammer, 379
 "Dolphin," U.S. Despatch Boat, 446
 Dowson, Mr. A., Open Grid Groynes, Inventions Exhibition, 426
 Drysdale and Co., Messrs., Hydraulic Pumping Engines, 315
 Durham and Churchill, Messrs., Pistons, 231
 EASTON and Anderson, Messrs., Water-Purifying Apparatus, Inventions Exhibition, 372
 Edison-Hopkinson Dynamo, The, 173
 Edwards, Mr. Easton A., Anemometer, 456
 Elgin, Illinois, Tower System of Electric Lighting, 181
 Ellington, Mr. E. B., Pipe Flange, 233
 FIELDING and Platt, Messrs., High-speed Engine, Inventions Exhibition, 437, 440
 Fletcher and Co., Messrs. Geo., Patent Valve Gear, 305
 Fort de L'Ecluse, Landslip at, 113
 Forth Bridge, Air Lock for Sinking 70ft. Caissons, Messrs. Fowler and Baker, 125
 Forth Bridge, Machinery used in Constructing the, Mr. Andrew S. Biggart, 52, 53
 Forth Bridge, The Main Pier on Inchgarvie, Messrs. Fowler and Baker, 168
 Forth Bridge, View of one of the Great Caissons of the, Plan and Section of ditto, 106, 111
 Fraser, Lieut.-Col. A. T., Stress and Strain Diagrams, 408
 Frisbie and Co., Messrs. D., Friction Clutch, 21
 GARDNER and Woodbridge Screw-cutting Tool, The, 70
 General Engine and Boiler Company, Combined Steam Engine and Air-compressing Machine, Inventions Exhibition, 401
 Glover and Co., Messrs. W. T., Bell's Friction Brake for Pulleys, Inventions Exhibition, 474
 Glover and Co., Messrs. Walter T., Bell's Low-pressure Filters, Inventions Exhibition, 474
 Glover and Co., Messrs. Walter T., Machinery for Cord, Twine, and Rope-making, Inventions Exhibition, 473
 Glover and Co., Messrs. Walter T., Trotter's Wire Gauge, Inventions Exhibition, 473
 Gmelin, Dr. Otto, Cupola, 3
 Goodfellow and Matthews, Messrs., Engines, Inventions Exhibition, 364
 Goodman, Mr. J., Friction of Slide Valves, 186
 Gover, Mr. H. Charles, Railway Carriage Window, 478
 Graham, Mr. Robert Hudson, Radial Valve Gear, 431, and *June 29th, 1883*, pp. 497-499
 Great Eastern Railway Company's Steamboats, Norwich and Ipswich, 71
 Great Eastern Railway Tank Engine for Metropolitan Traffic, Mr. T. W. Worsdell (*Supplement, March 13th*), 204
 Great Southern and Western Railway, Breakdown Plant, Mr. H. A. Ivatt, 268
 Great Southern and Western Railway, Ireland, Four-Coupled Passenger Engine, Mr. J. A. F. Aspinall, 497, 500
 Greenaway and Kitt, Messrs., Four-slide Gas Exhauster and Pump, Inventions Exhibition, 492
 Greenwood and Son, Messrs., Flour Mill, Blackburn, Mr. J. H. Carter, 39, 41
 Grossman Feed-water Regulator, The, 219
 Gruson's Chilled Iron Armour, 373
 HALFORD, Mr. W., Self-fastening Coal Plate, Inventions Exhibition, 453
 Hardie, Mr. T. G., Railway Joint Chairs, 231
 Hastie-Brotherhood Hydraulic Engine, The, The Hydraulic Engineering Company, Inventions Exhibition, 453
 Hathorn, Davey, and Co., Messrs., Domestic Motor, 21
 Hawkesbury Bridge, Borings for the, 155
 Hawthorne and Co., Messrs., Compound Engine, Inventions Exhibition, 433
 Heap, Mr. J., The Gripper Lock Nut, 261
 Heck, Mr. J. H., Stability Balance, 255
 Hedges, Mr., Speed Gauge, 505
 H.M.S. "Active's" Gun, Bursting of, 104
 Hett, Mr., Turbine Governor, 505
 "Hibernia" and "Columbia," Compound Engines of the Tug-boats, De Maatschappij de Maas, Delftshaven, 81, 84
 Holden and Broke, Messrs., Exhaust Steam Injector, 296
 Honigmann Fireless Locomotive Engine, The, 60, 61
 Hooghly, Bridge over the, East Indian Railway, 62
 Hooghly Bridge, Details of Girders, 124, 153, 222
 Hooghly Bridge, The, Mr. W. C. Kernot on the design of, 438
 Hull, Diagram Showing Fluctuations in Demand for Power in, 232
 Hulse and Co., Messrs., Machine Tools, Inventions Exhibition, 369
 Hydraulic Engineering Company, The, Hydraulic Crane, Inventions Exhibition, 452
 INDIAN State Railways, Flexible Buffers and Screw Couplings for Carriages and Wagons, 368
 Indian State Railways, Goods and Ballast Wagons, 366
 Indian State Railways, Well Curbs, 24
 Inventions Exhibition, General Plan of, 329
 Inventions Exhibition, Guns and War Stores, 370, 371, 396, 413
 Inventions Exhibition, Interior of the Electric Light Shed, 340
 Inventions Exhibition, Steam Engines at, 347-350, 352, 353, 358, 364, 397
 Inventions Exhibition, Plan Showing Disposition of Electric Light Systems, 293
 "Isa," Triple-expansion Engine of the, Diagrams taken with a Darke's Indicator during the run, 503

JAMES, Mr., Doubling and Laying Machine, Inventions Exhibition, 473
 Jamieson, Mr., Shaft Coupling, 21
 Janney Railway Coupling, The, Mr. Alfred Davis, Inventions Exhibition, 425
 Johnson, Mr. W., Brick Machinery, Inventions Exhibition, 417
 Joy, Mr. Valve Gear, 117
 KALASHNIKOFF, Mr. V. J., Vertical Boiler, 485
 Kirkaldy, Mr. J., Dirt Arrester, Inventions Exhibition, 432
 Kirkaldy, Mr. J., Feed-water Heaters, Inventions Exhibition, 432
 Kirkaldy, Mr. J., Surface Condensers, Inventions Exhibition, 432
 LA TARDES Viaduct, The, Montlucon and Eygurande Railway, 318, 322, 331, 332
 Leahy, Mr. Henry H., Relieved Slide Valve, 418
 Lean, Mr. Charles, Simple Methods of Calculating Stresses in Girders, 139, 140
 Legg Rotary Power Coal Drill, The, 181
 Linney and Lawson, Messrs., Patent Crank Axle Forging, 231
 Lockwood and Carlisle, Messrs., Piston Rings, 181
 London, Map Showing Hydraulic Power Mains in, 232
 London and North-Western Railway Compound Locomotive, Mr. F. W. Webb, Inventions Exhibition, 349, 352
 MACKINNON Pen, The, 250
 MacLaine Perfect Piston Company, Twin Screws, 315
 Madras Railway, Girders for Beypore and Kallai Bridges, 476
 Malet, Mr., Solid Barbed Wire Fencing, 445
 Malmout Viaduct, Montauban and Cahors Railway, 223
 Manchester, Sheffield and Lincolnshire Railway, Outside Cylinder Express Engine, Mr. Charles Sacré (*Supplement, January 2*), 7
 Mansion House and Bank Subway, Plan, 51
 Marsden, Mr. H. R., Stone Breakers, Inventions Exhibition, 484
 Mather, Mr. G. R., Portable Engine, Inventions Exhibition, 358
 Mather and Platt, Messrs., Electric Light Machinery, 125
 Matthewson's Improved Sand Blast Apparatus, The Tilghman's Patent Sand Blast Company, 466, 467
 Mayhew, Messrs., Boiler Feeders, Inventions Exhibition, 425
 Meatyard, Mr. Edward B., The Equitable Duplex Hammer, 323
 Messenger and Co., Messrs., Full Way Valve, 379
 Mew Island Lighthouse, Belfast Lough, Mr. W. Douglass, 25
 Midland Railway, Express Locomotive, Mr. S. Johnson, 164
 Midland Railway, Four-coupled Express Locomotive, Mr. S. Johnson (*Supplement, February 6, 1885*), 117
 Mogul Engine, American, 300
 Morris, Mr. R., Wagon Coupling, 305
 Morse Cotton Press, The, 304
 Mumford, Mr. A. C., The Desideratum Donkey Pump, 314
 NEILL and Son, Messrs. W., Air Compressing Engines, 145
 New Orleans Exhibition, Section of Music Hall, 248
 Nicholson, Mr., Coupling, 70
 Nicholson, Mr. John, Positions of Coal Bunkers, 255
 Nordenfelt, Messrs., Five-barrelled Volley-firing Machine Gun, Inventions Exhibition, 396
 Nordenfelt Quick-firing Six-pounder Gun, 99
 PARK and Pryce, Messrs., Train Protection Bar, The Railway Signal Company, Inventions Exhibition, 456
 Park Hill Hospital, Liverpool, Mr. Clement Dunscombe, 44, 45
 Parson, Mr., Detachable Boring Tools, 465
 Parson's Patent High-speed Engine, Messrs. Kitson and Co., Inventions Exhibition, 553
 Peam and Co., Messrs. F., Direct-acting Steam Pump, 261
 Peck, Mr. E. C., Friction of Slide Valves, 277
 Peck, Mr. Edw. C., Relieved Slide Valve, 173
 Pickering, Mr., Hoist Gear with Automatic Clutch, 434
 Price's Patent Candle Company, Spiral Candle Making Machine, Inventions Exhibition, 491
 READING, Bridge over the Kennet at, Mr. Ed. Baker, 423
 Remscheid Waterworks, The, Details of Pumping Engines, 288
 Remscheid Waterworks, The Plan and Profile of the Supply Area, 287
 Remscheid Waterworks, The, Pumping Station, Herr L. Disselhoff, 226
 Remscheid Waterworks, Tower and Reservoir, Herr L. Disselhoff, 244
 Rigby, Mr. Wm., Steam Hammer, patented 1854, 418
 Robson, Mr., Gas Hammer, Inventions Exhibition, 424
 "Rocket," Gear of the, as sketched by A. Marson, 180
 Romanes, Mr. C. H., Strains on Circular Lock Gates, 77
 St. HELENS Waterworks, The, Knowsley Pumping Station, Mr. D. M. F. Gaskin, 416, 436
 Schenectady Locomotive Works, Consolidation Goods Engine, 88, 89
 Schmetze's Foundry Sand Mixer, Messrs. T. B. Jordau, Son, and Commans, 181
 Schrabetz, M. Emil, Anti-fluctuator for Gas Engines, 166
 Schuylkill River, Strengthening the Abutments of a Great Bridge across the, 110
 Scott, Mr. H., Flush Tank, 317
 Scott and Son, Messrs. George, Vertical Pump, Inventions Exhibition, 452
 Shanks and Co., Messrs. Alexander, Diagonal Surface Condensing Paddle-wheel Engines, 144
 Shanks and Co., Messrs. Alexander, Boilers for Paddle-wheel Tug-boat, 143
 Shanks and Co., Messrs. Alexander, Tug-boat Paddle-wheels, 146
 Shaw, Mr. Thos., Hydraulic Electric Gun Pressure Gauge, 314
 Sharp, Stewart, and Co., Messrs., Planing Machine, Inventions Exhibition, 473

Sharp, Stewart, and Co., Messrs., Portable Boiler Drilling Machine, Inventions Exhibition, 473
 Sheppard and Sons, Messrs., Coal Washing Machinery, Inventions Exhibition, 445
 Siemens and Co., Messrs., Lightning Rod Testing Apparatus, 70
 Sintz Boiler Feeder, The, 141
 Smith, Mr. B. G., Safety Hydraulic Telescopic Hoist, Inventions Exhibition, 452
 Smith, Prof. R. H., Fly-wheel, 19, 20
 Smith and Co., Messrs. Hugh, Fixed Boiler Rivetter, Inventions Exhibition, 426
 Smith and Marshall, Messrs., Patent Gland Packing, 231
 Société Lyonnaise, 50-H.P. Horizontal Engine, 480, 496
 Southern Mahratta Railway, Wheels for, 259
 Spencer and Co., Messrs. James, Hollow Spindle Capstan Lathe, 333
 Spencer, Carter, and Co., Messrs., Portable Winding Machinery, 333
 Spencer and Co., Messrs. J., Portable Slotting and Keyway Cutting Machine, 166
 Spezia, Armour-plates at, 161
 S.S. "Eastwood," Steel Boiler for, Messrs. Earle's Shipbuilding Company, 477
 S.S. "Mona," Compound Engines of the, Messrs. C. Burrell and Sons, 282, 286
 S.S. "Umbria" and "Etruria," Electric Light on Board the, Messrs. J. D. F. Andrews and Co., 278
 Sterne and Co., Messrs. L., Compound Buffer and Draw Spring, 485
 Stiles and Parker Press Company's Presses, The, 145
 Stockport Gas Engines, The, Mr. C. H. Andrews, 192, 193
 Stothert and Co., Messrs. G. K., Horizontal Compound Condensing Engine, 420
 Stratton Separator Company, Separator for Steam Boilers, 505
 Suakim-Berber Railway, High-pressure Pumping Machinery, Messrs. Hayward Tyler and Co., 205
 Suakim-Berber Military Telegraph, 341
 Suakim, Sea-water Distillers, 294
 Summerson, Mr. Thos. R., Water Gauge, 269
 TAFF Vale Railway, Locomotive Breakdown Steam Crane, Messrs. Alex. Chaplin and Co., 48
 Tangey, Messrs., Gas Engine Governor, Inventions Exhibition, 424
 T. C., Friction of Slide Valves, 224
 Terry, Mr. Stephen H., Friction of Slide Valves, 316
 Thomas, Mr. E. C. Greenway, Floating Breakwaters, 187
 Thomson and Browning, Messrs., Metallic Permanent Way, Inventions Exhibition, 464, 465
 Tilbury, New Deep Water Docks at, 260, 408
 Tower Bridge, Mr. Davey Bennett, 334
 Tower Bridge, The, Mr. J. Somestory, 438
 Tower Bridge, Cross Sections of Proposed Low-level, Messrs. Ordish and Matheson, 359, 360
 Tripler, Mr., Spherical Eccentric, 417
 Trossin, Mr. Otto, Superheated Steam Engine, 249
 Trotter's Wire Gauge, Messrs. Walter T. Glover and Co., Inventions Exhibition, 181, 473
 VEASEY and Co., Messrs., Friction of Slide Valves, 212
 Volvox, The Friction of Slide Valves, 163
 W., Drawing of a very Remarkable Boiler Explosion, 83
 Wallasay Ferry-boats, "Snowdrop" and "Crocus," Messrs. Flannery and Fawcus, 337
 Waller and Co., Messrs. G., Phoenix Gas Washer-Scrubber, 378
 Walsh, Mr. J. E., Self-regulating Mill and Purifier Feed, 497
 Waltham Abbey, Electric Safety Lamps, Major Watkin and Col. Brackenbury, Inventions Exhibition, 413
 Weimer, Mr. P. L., Blowing Engines for Charcoal Furnaces, 3
 Welford, Messrs. R. and W., Patent Furnaces, 359
 Wenham, Mr. F. H., Gas Light, 303
 Wheelock Engine, Messrs. D. Adamson and Co., Inventions Exhibition, 348
 Wicksteed, Mr., Testing Machine, Messrs. Joshua Buckton and Co., Inventions Exhibition, 357
 Wiles Spring Hinge, The, 141
 Willan, Mr., Arrangement for Forced Draughts, 256
 Woodhead, Messrs. R., Steam Hammers, 296
 Worsdell, Mr. T. W., Compound Locomotive (*Supplement, May 15*), 377
 Wrightson, Mr. T., Centre Crane for Bessemer Casting Pits, Inventions Exhibition, 433
 SUBJECT MATTER.
 Air Lock for Sinking 70ft. Caissons, Forth Bridge, Messrs. Fowler and Baker, 125
 Anemometer, Mr. Eaton A. Edwards, 456
 Anti-Fluctuator for Gas Engines, M. Emil Schrabetz, 166
 Arc Lamp, Belfast Electric Appliance Company, Mr. Newton, 72
 Armour-plates at Spezia, 161
 BALLAST Unloader, Mr. H. M. Barnhart, 21
 Beach Works, Brighton, 126
 Bleaching or Dyeing Yarns and Goods in Vacuo, Austrian Patent, 181
 Boiler Drilling Machine, Portable, Messrs. Sharp, Stewart, and Co., Inventions Exhibition, 473
 Boiler Explosion, Drawing of a Very Remarkable, 83
 Boiler Feeder, Messrs. Mayhew, Inventions Exhibition, 425
 Boiler Feeder, The Sintz, 141
 Boiler Rivetter, Fixed, Messrs. Hugh Smith and Co., Inventions Exhibition, 426
 Boiler, Steel, for s.s. "Eastwood," Messrs. Earle's Shipbuilding Company, 477
 Boiler, Vertical, Mr. V. J. Kalashnikoff, 485
 Boilers, Marine, Messrs. Cochran and Co., Inventions Exhibition, 424
 Boilers for Paddle-wheel Tug-boat, Messrs. Shanks and Co., 148
 Boring Tools, Detachable, Mr. Parson, 465
 Breakdown Plant for Great Southern and Western Railway, Mr. H. A. Ivatt, 268

- Brick Machinery, Mr. W. Johnson, Inventions Exhibition, 417
- Bridge over the Blaauw Kranz Ravine, 165
- Bridge, The Blaauw Kranz, Cape Colony, Mr. Max Am Ende, 201
- Bridge, Blaauw Kranz, Cape Colony, Messrs. Handyside and Co., 296, 297, 298, 299
- Bridge, Competitive Designs for a Danube, 80
- Bridge, Forth, Machinery used in Constructing, Mr. Andrew S. Biggart, 52, 53
- Bridge, The Forth, Main Pier on Inchgarvie, Messrs. Fowler and Baker, 163
- Bridge, The Hawkesbury, Borings for the, 155
- Bridge, Hooghly, over the East Indian Railway, 62
- Bridge, Hooghly, Details of Girders, 124, 153, 222
- Bridge, The Hooghly, Mr. W. C. Kernot on the Design of, 438
- Bridge over the Kennet at Reading, Mr. Ed. Baker, 423
- Bridge across the Schuykill River, Strengthening the Abutments of a Great, 110
- Bridge, Tower, Mr. Davey Bennett, 334
- Bridge, Cross Sections of Proposed Low-level Tower, 359, 360
- Bridge, The Tower, Mr. J. Somes Story, 438
- Buffer and Draw Spring, Messrs. L. Sterne and Co., 455
- Bursting of H.M.S. "Active's" Gun, 104
- CAISSONS of the Forth Bridge, View of One of the Great, 106
- Caissons of the Forth Bridge, Plan and Section of One of the, 111
- Candle Making Machine, Spiral, Price's Patent Candle Making Company, Inventions Exhibition, 491
- Cement Testing Machine, Automatic, Mr. V. De Michele, 478
- Chilled Iron Armour, Gruson's, 373
- Circle Squaring, Simple, Mr. E. Bing, 434
- Coal Bunkers, Positions of, Mr. John Nicholson, 255
- Coal Drill, The Legg Rotary Power, 181
- Coal Plate, Self-fastening, Mr. W. Halford, Inventions Exhibition, 453
- Coal Staircase, Movable, Mr. S. Butler, Inventions Exhibition, 400
- Coal Washing Machinery, Messrs. Sheppard and Sons, Inventions Exhibition, 445
- Compressed Air Motive-power Supply, Birmingham 121, 122
- Condensers, Surface, Mr. J. Kirkaldy, Inventions Exhibition, 432
- Cotton Press, The Morse, 304
- Coupling, The Janney Railway, Mr. Alfred Davis, Inventions Exhibition, 425
- Coupling, Mr. Nicholson, 70
- Covers and Plugs, Air-tight, Mr. F. Botting, 497
- Crab, 20-Ton Overhead Crane, Messrs. Appleby Bros., Inventions Exhibition, 493
- Crane, Centre, for Bessemer Casting Pits, Inventions Exhibition, 433
- Crane, Hydraulic, The Hydraulic Engineering Company, Inventions Exhibition, 452
- Crane, 35-Ton Steam, Abouchoff Steel Works, St. Petersburg, 174
- Crank Axle Forging, Patent, Messrs. Linney and Lawson, 231
- Cupola, Dr. Otto Gmelin, 3
- Curves of Powder Gas Pressures, Mr. W. Anderson, 112
- Cut-out and Contact Changer, Positive, Mr. Davis, 231
- DESPATCH Boat Dolphin, U.S., 446
- Digger, Parker's Patent, Messrs. Amos and Smith, Inventions Exhibition, 492, 493
- Dirt Arrestor, Mr. J. Kirkaldy, Inventions Exhibition, 432
- Docks, Tilbury Deep Water, 260, 408
- Doubling and Laying Machine, Mr. James, Inventions Exhibition, 473
- Drain Pipe Posts, Mr. Anable, 379
- Dynamo, The Edison-Hopkinson, 173
- Dynamo, Twenty-one Unit, Messrs. R. E. Crompton, Inventions Exhibition, 504
- Dynamo, Twenty-two Unit, and Willan's Engine, Messrs. R. E. Crompton, Inventions Exhibition, 504
- ELECTRIC Light on Board the s.s. "Umbria" and "Etruria," Messrs. J. D. F. Andrews and Co., 278
- Electric Light Shed, Interior of, Inventions Exhibition, 340
- Electric Light Machinery, Messrs. Mather and Platt, 125
- Electric Safety Lamps, Waltham Abbey, Major Watkin and Colonel Brackenbury, Inventions Exhibition, 413
- Electric Lighting Systems, Plan Showing Disposition of, Inventions Exhibition, 293
- Electric Lighting in Belfast, 72
- Electric Lighting, The Tower System of, Elgin, Illinois, 181
- Engine and Air-compressing Machine, Combined, General Engine and Boiler Company, Inventions Exhibition, 401
- Engine, American Mogul, 800
- Engine and Dynamo, Combined, Messrs. Browett, Lindley, and Co., Inventions Exhibition, 397
- Engine, Compound, Messrs. Deakin and Parker, 261
- Engine, Compound, Messrs. Hawthorne and Co., Inventions Exhibition, 433
- Engine, Consolidation Goods, Schenectady Locomotive Works, 88, 89
- Engine, Corliss, New Orleans Exhibition, 248
- Engine, 50-H.P., Horizontal, Society Gonnais, 480, 486
- Engine, Four-coupled Passenger, G. S. and W. Railway, Mr. J. A. F. Aspinall, Ireland, 497, 500
- Engine Governor, The "Cat," 279
- Engine Governor, Gas, Messrs. Tangye, Inventions Exhibition, 424
- Engine, The Hastie-Brotherhood Hydraulic, The Hydraulic Engineering Company, Inventions Exhibition, 453
- Engine, High-speed, Messrs. Fielding and Platt, Inventions Exhibition, 437, 440
- Engine, Honigman Fireless Locomotive, 60, 61
- Engine, Horizontal Compound Condensing, Messrs. G. K. Stothert and Co., 420
- Engine, Inventions, Portable, Mr. G. R. Mather, 358
- Engine, Launch, with Bremner's Valve Gear, Messrs. Ross and Duncan, 70
- Engine, Long Boiler "Bull," Stockton and Darlington Railway, Mr. Bouch, 95
- Engine, Outside Cylinder Express, Manchester, Sheffield, and Lincolnshire Railway, Mr. Charles Sacré (Supplement, January 2), 7
- Engine, Parson's Patent High-speed, Messrs. Kitson and Co., Inventions Exhibition, 353
- Engine, Passenger, Stockton and Darlington Railway, Mr. Bouch, 95
- Engine and Rope Driving Gear, Mr. Chandler, Inventions Exhibition, 397
- Engine, 6-H.P. Traction, Messrs. Aveling and Porter, Inventions Exhibition, 405
- Engine, The Stockport Gas, Mr. C. H. Andrews, 192, 193
- Engine, Superheated Steam, Mr. Otto Trossin, 249
- Engine, Tank, Great Eastern Railway, Mr. T. W. Worsdell (Supplement, March 13), 204
- Engine, Triple Expansion, of the Yacht "Isa," Diagrams taken with a Darke's Indicator, 503
- Engine, Wheelock, Messrs. Adamson and Co., Inventions Exhibition, 348
- Engines, Air Compressing, Messrs. W. Neill and Son, 145
- Engines, Blowing, for Charcoal Furnaces, Mr. P. L. Weimer, 3
- Engines, Compound, of the s.s. "Mona," Messrs. C. Burrell and Sons, 282, 286
- Engines, Compound, of the Tug Boats "Hibernia" and "Columbia," De Maatschappij de Mass, Delfshaven, 81, 84
- Engines, Compound Winding, Messrs. Dick, Kerr, and Co., 457
- Engines, Diagonal Surface Condensing Paddle-wheel, Messrs. Alexander Shanks and Co., 144
- Engines, Messrs. Goodfellow and Matthews, Inventions Exhibition, 364
- Engines, Hydraulic Pumping, Messrs. Drysdale and Co., 315
- Engines at the Inventions Exhibition, 347, 350, 352, 353, 358, 364, 397
- Engines, Pumping, The Remscheid Waterworks, 283
- Engines of the Tug "America," Twin-screw, 204
- Excentric, Spherical, Mr. Tripler, 417
- FEED Mechanism for Roller Mills, Mr. Julius Busch, 3
- Feed-water Heaters, Mr. J. Kirkaldy, Inventions Exhibition, 432
- Feed-water Regulator, The Grossman, 219
- Fencing, Solid Barbed Wire, Mr. Malet, 445
- Ferry Boats, Wallasey, "Snowdrop" and "Crocus," Messrs. Flannery and Fawcus, 337
- Filters, Bell's Low-pressure, Messrs. W. T. Glover and Co., Inventions Exhibition, 474
- Flexible Buffers and Screw Couplings for Carriages and Wagons, Indian State Railways, 368
- Floating Breakwaters, Mr. E. C. Greenway Thomas, 187
- Fluctuations in Demand for Power in Hull, Diagram Showing, 232
- Flush Tank, 295
- Flush Tank, Mr. H. Scott, 317
- Fly-wheels, Professor R. H. Smith, 10, 20
- Forced Draughts, Mr. Willan's Arrangements for, 256
- Foundry Sand Mixer, Schmetze's, Messrs. T. B. Jordan, Son, and Commans, 181
- Friction Brake for Pullers, Bell's, Messrs. W. T. Glover and Co., Inventions Exhibition, 474
- Friction Clutch, Messrs. D. Frisbie and Co., 21
- Friction of Slide Valves, Mr. J. Goodman, 186
- Friction of Slide Valves, Mr. E. C. Peck, 277
- Friction of Slide Valves, T. C., 224
- Friction of Slide Valves, Mr. Stephen H. Terry, 316
- Friction of Slide Valves, Messrs. Veasey and Co., 212
- Friction of Slide Valves, Volvox, 163
- Furnace, Patent, Messrs. R. and W. Welford, 359
- GAB Motion Valve Gear, 96
- Gas Exhauster and Pump, Four Slide, Messrs. Greenaway and Kitt, Inventions Exhibition, 492
- GAUGE, Budenberg's High-pressure, Inventions Exhibition, 353
- Gauge, Hydraulic Electric Gun Pressure, Mr. Thomas Shaw, 314
- Gear of the "Rocket," as sketched by A. Marson, 186
- Girders for Beypore and Kallai Bridges, Madras Railway, 476
- Gland Packing, Messrs. Smith and Marshall, 731
- Governors, Theory of, Mr. J. Forest Brunton, 1, 2
- Grip Vice, Parallel, Coventry Machinists' Company, 478
- Groynes, Open Grid, Mr. A. Dowson, Inventions Exhibition, 426
- Gun, Breech-loading Shot, Mr. Billing, 3
- Gun, Five-Barrelled Volley-firing Machine, Messrs. Nordenfellt, Inventions Exhibition, 396
- Gun, The Nordenfellt Quick-firing Six-pounder, 99
- Guns and War Stores, Inventions Exhibition, 370, 371, 396, 413
- HAMMER, The Equitable Duplex, Mr. Edward B. Mealyard, 323
- Hammer, Gas, Mr. Robson, Inventions Exhibition, 424
- Hammer, Steam, Messrs. Dick and Stevenson, 379
- Hammer, Steam, Mr. William Rigby, Patented, 1854, 418
- Hammer, Steam, Messrs. R. Woodhead, 296
- Hoist Gear with Automatic Clutch, Mr. Pickering, Inventions Exhibition, 434
- Hoists and Lifts, Messrs. A. Atwood and Co., Inventions Exhibition, 382
- Hoist, Safety Hydraulic Telescopic, Mr. B. G. Smith, Inventions Exhibition, 452
- Hospital, Liverpool Park Hill, Mr. Clement Dunscombe, 44, 45
- Hydraulic Coal Hoist, Boston Docks, 32
- Hydraulic Cranes, Port of Buenos Ayres, Messrs. John Abbott and Co., 103
- Hydraulic Lifting Machinery, Boston Docks, Messrs. Abbott and Co., 33, 63, 66
- Hydraulic Machinery, Port of Buenos Ayres, Messrs. Abbott and Co., 184, 185, 188
- Hydraulic Power Mains in London, Map Showing, 232
- INJECTOR, Exhaust Steam, Messrs. Holden and Brooke, 296
- Injectors, Mr. Borland, Inventions Exhibition, 365
- JOURNAL Friction and Train Resistance, Experiments on, 498
- LANDSLIP at Port de l'Ecluse, 113
- Lathe, Hollow Spindle Capstan, Messrs. James Spencer and Co., 333
- Light Gas, Mr. F. H. Wenham, 363
- Lighthouse, Mew Island, Belfast Lough, Mr. W. Douglass, 25
- Lightning Rod Testing Apparatus, Messrs. Siemens and Co., 70
- Link Spanner and Tube Vice, Bauer's, Messrs. James Gibbs and Co., 278
- Lock Nut, The Gripper, Mr. J. Heap, 261
- Locomotive, American Passenger, The Mason Machine Works, 28
- Locomotive Breakdown Steam Crane, Taff Vale Railway, Messrs. Alexander Chaplin and Co., 48
- Locomotive, Compound, Mr. J. W. Worsdell (Supplement, May 15), 377
- Locomotive, Compound, London and North-Western Railway, Mr. F. W. Webb, Inventions Exhibition, 349, 352
- Locomotive Express, Midland Railway, Mr. S. Johnson, 164
- Locomotive, Four-coupled Express, Midland Railway, Mr. S. Johnson (Supplement, February 6), 117
- MACHINE Tools, Messrs. Hulse and Co., Inventions Exhibition, 369
- Map of Mineral Districts of Alabama, 444
- Marine Governors, Anchor, 316
- Mill, Blackburn, on the Roller Mill System, Mr. F. H. Carter, 39, 41
- Mill, Break, Four-Roller, Mr. J. Harrison Carter, 40, 42
- Mill, Flour, Blackburn, Messrs. Greenwood and Son, Mr. J. H. Carter, 39, 41
- Mill and Purifier Feed, Self-regulating, Mr. J. E. Walsh, 497
- Mill, Three High Roller, Mr. J. Harrison Carter, 40
- Mines and Works, Athus District, Showing General Plan, 240
- Motor, Domestic, Messrs. Hathorn, Davey, and Co., 21
- Music Hall, Section of, New Orleans Exhibition, 248
- ORE, Wagon and Draw Hook, Athus Iron and Steel Works, 241
- PADDLE Wheels, Tug Boat, Messrs. Alexander Shanks and Co., 146
- Pen, The Makinnon, 250
- Permanent Way, Metallic, Messrs. Thompson and Browning, Inventions Exhibition, 464, 465
- Pipe Flange, Mr. E. B. Ellington, 233
- Piston Rings, Messrs. Lockwood and Carlisle, 181
- Pistons, Messrs. Durham and Churchill, 231
- Plan of Inventions Exhibition, 329
- Plan and Profile of the Supply Area, The Remscheid Waterworks, 287
- Planing Machine, Messrs. Sharp, Stewart and Co., Inventions Exhibition, 473
- Presses, The Stiles and Parker Press Company's, 145
- Pump, Direct-acting Steam, Messrs. F. Pearn and Co., 261
- Pump, The Desideratum Donkey, Mr. A. C. Mumford, 314
- Pump, Vertical, Messrs. George Scott and Son, Inventions Exhibition, 452
- Pumping Machinery, High-pressure, Suakim-Berber Railway, Messrs. Hayward Tyler and Co., 205
- Pumps, Steam, Mr. Bernays, Inventions Exhibition, 356
- Purifying Feed-water, Mr. Wm. Brown, 163
- RADIAL Axle-boxes, Bottomley's, Inventions Exhibition, Messrs. Sharp, Stewart, and Co., 474
- Radial Valve Gear, Mr. Robert Hudson, 431 (and June 29, 1883, pp. 497-499)
- Rail Bolt, The Bush Interlocking, 145
- Rails and Fastenings for Danish Railways, 211
- Railway Carriage Window, Mr. H. Charles Gover, 478
- Railway Diagrams, Austrian, for Estimating the Quantities of Girder Bridges (Supplement, May 22)
- Railway Joint Chairs, Mr. T. G. Hardie, 231
- Rivetter, Messrs. Anderson and Galloway, Inventions Exhibition, 491
- Rivetting Plant, Hydraulic, Mr. H. Berry, 141
- Rock Drill for Mining, The Barrow Machine, The Barrow Rock Drill Company, Inventions Exhibition, 457
- Rope making Machinery, Messrs. Walter T. Glover and Co., Inventions Exhibition, 473
- SAND Blast Apparatus, Matthewson's Improved, The Tilghman's Patent Sand Blast Company, 466, 467
- Screw-cutting Tool, The Gardner and Woodbridge, 70
- Sea Water Distillers, Suakim, 294
- Separator for Steam Boilers, Stratton Separator Company, 505
- Sewerage Works, Abergavenny, 102
- Sewerage Works, Abergavenny, Abutments of Foot and Main Sewer Bridge over the River Usk, 132, 133
- Shaft Coupling, Mr. Jameson, 21
- Shaft-sinking Machinery, American, 114, 115
- Shaping Machine, Heavy, Messrs. Archdale and Co., 333
- Shipyard, Belfast, Messrs. Harland and Wolf's, 72
- Slide Valve, Relieved, Mr. Henry H. Leahy, 418
- Slide Valve, Relieved, Mr. Edw. C. Peck, 173
- Slotting and Key-way Cutting Machine, Portable, Messrs. J. Spencer and Co., 166
- Speed Gauge, Mr. Hedges, 505
- Spring Hinge, The Wiles, 141
- Spring Wheel, Messrs. Aveling and Porter, Inventions Exhibition, 397
- Stability Balance, Mr. J. H. Heck, 255
- Standards of Length and their Divisions, Mr. George M. Bond, 194
- Standards of Length as Applied to Gauge Dimensions, Mr. George Bond on, 447, 466
- Steamboats, "Norwich" and "Ipswich," The Great Eastern Railway Company's, 71
- Steamship "Benbow," H.M., The Thames Ironworks Company, 460
- Steamship "Benbow," H.M., Sketch Showing Internal Arrangements, 471
- Steering Gear, Epicycloidal, Mr. T. Archer, 493
- Stern-wheel Steamboat for Brazil, Messrs. Forrest and Son, 366
- Stone-breakers, Mr. H. R. Marsden, Inventions Exhibition, 484
- Strains on Circular Lock-gates, Mr. C. H. Romanes, 77
- Stress and Strain Diagrams, Lieut.-Col. A. T. Fraser, 408
- Stresses in Girders, Simple Methods of Calculating, Mr. Chas. Lean, 139, 140
- Subway, Mansion House and Bank, 51
- Sugar-pan, Vacuum, Messrs. Deeley and Co., 6
- TELEGRAPH, Military, Suakim-Berber, 341
- Testing Machine, Mr. Wicksteed, Messrs. Joshua Buckton, Inventions Exhibition, 357
- Train Protection Bar, Messrs. Park and Pryce, The Railway Signal Company, Inventions Exhibition, 456
- Tram-car Guard, Mr. H. Conradi, Inventions Exhibition, 485
- Transporting a Marine Boiler by Road, Messrs. C. Burrell and Sons, 279
- Treadle Saw, The Britannia Company's, 204
- Tug-boat, Twin-screw, "America," 262, 264
- Turbine Governor, Mr. Hatt, 505
- Twin-screws, The MacLaine Perfect Piston Company, 315
- VALVE, Full Way, Messrs. Messenger and Co., 379
- Valve Gear, Messrs. Fletcher and Co., 305
- Viaduct, The La Tardes, Montlucon and Eygurande Railway, 318, 322, 331, 332
- Viaduct, The Malmot, Montauban, and Cahors Railway, 223
- Valve Gear, Mr. Joy, 117
- WAGON Coupling, Mr. R. Morris, 305
- Wagons, Goods and Ballast, Indian State Railways, 306
- Washer-scrubber, Phoenix Gas, Messrs. G. Waller and Co., 378
- Water Gauge, Mr. Thos. R. Summerson, 269
- Water-purifying Apparatus, Messrs. Easton and Anderson, Inventions Exhibition, 372
- Waterworks, The St. Helens, Knowsley Pumping Station, Mr. D. M. F. Gaskin, 416, 436
- Waterworks, The Remscheid, Pumping Station, Herr L. Disselhoff, 226
- Waterworks, The Remscheid, Tower and Reservoir, Herr L. Disselhoff, 244
- Well Curbs, Indian State Railways, 24
- Wheels for South Mahratta Railway, 259
- Whip Crane, Messrs. Appleby Bros., Inventions Exhibition, 493
- Winch, Steam, Messrs. Appleby Bros., Inventions Exhibition, 425
- Winding Machinery, Portable, Messrs. Spencer, Carter, and Co., 383
- Wire Gauge, Trotter's, Messrs. Walter T. Glover and Co., 181, 473
- Wire Stretchers, The Dean, 219

Miscellaneous.

- 1885, 9
 A B C Process at Aylesbury, 501
 Abergavenny Sewage Bridge, 163
 Abergavenny and the Sewage Filtration Area, 102
 Abergavenny Sewerage Works, 132, 133, 134
 Accidents in Mines' Commission, 479
 Accidents on Railways to Servants, 155
 Acetate of Soda Heaters, 5
 Aden, Harbour at, 502
 Admiralty and the Navy, The, 227
 Aerial Navigation, 110
 Aerial Navigation, Mr. W. P. Adams on, 195
 African Interior Sea, The, 171
 Alabama, Iron and Coal Districts of, 443, 471
 Amalgamated Society of Engineers, 502
 "America," Steel Twin-screw Tug boat, 262, 204
 American Contracting, An Episode in, 403
 American Engineering Enterprise, 182, 206
 American Mogul Engine, 300, 306
 American Notes, 15, 35, 55, 73, 91, 117, 156, 175, 195, 213, 233, 251, 272, 290, 307, 326, 344, 374, 392, 410, 428, 448, 467, 508
 American Shaft-sinking Machinery, 114, 115
 Amos and Smith, Messrs., Parker's Patent Digging Excavator, 492
 Anable, Mr., Drain Pipe Posts, 379
 Anderson, Mr. R. B., On Water Analysis, 454
 Anderson, Mr. W., on Purification of Water by Iron, 487
 Anderson and Galloway, Messrs., Rivetter, 491
 Anemometer, Mr. Eaton A. Edwards, 456
 Anemometer, Observations on Kite Wire, 479
 Anti-Fluctuator for Gas Engines, 166
 Antwerp International Exhibition, The, 402
 Antwerp Waterworks, 285
 Appleby Bros., Messrs., Steam Winch, 425
 Appleby Bros., Messrs., 20-Ton Overhead Crane Crab, 493
 Appleby Bros., Messrs., Whip Crane, 493
 Aquidaban, The, 91
 Archer, Mr. T., Epicycloidal Steering Gear, 493
 Archibald, Professor E. Douglas, on Biram's Anemometers, 479
 Architectural and Building Trades Exhibition, 191
 Arlberg Tunnel, The, 220
 Armour Plates, Protective Power of, as Proved in Actual Warfare, 387
 Armour Plates at Spezia, 161
 Asbestos, The Admiralty Contract for, 439
 ASSOCIATION, THE BRITISH:
 Account of Preliminary Experiments with Biram's Anemometers attached to Kite Strings or Wires, Prof. E. Douglas, Archibald, 479
 Association of Employers and Foremen, The Manchester, 143
 ASSOCIATION, GLASGOW ENGINEERS', 69
 Cement Testing, Mr. A. Hamilton Brown, 2
 Edinburgh Suburban and South Side Junction Railway, Mr. David Simson, 365
 Engineering Mission to Brazil, Mr. John E. Eaglesham, 187
 Hydraulic Hoists, Mr. A. Wilson, 253
 Rivetting Machines, Mr. Alexander Jack, 69
 Association of Municipal and Sanitary Engineers and Surveyors, 303, 489
 Nottingham, Five Years' Municipal Work at, Mr. A. Brown, 402
 Some of the Advantages and Results of the Supply of Water by Meter, Mr. George Winship, 402
 Visit to Sir John Oldknow's Lacc Factory, 402
 Athus Iron and Steel Works, The, 240, 241
 Atwood and Co., Messrs., Hoists and Lifts, 382
 Australian Shippers' Ring, The, 343
 Austrian Railways, Diagrams for Estimating the Quantities of Girder Bridges (*Supplement, May 22*), 393
 Automatic Boiler Feeding, 83
 Aveling and Porter, Messrs., Spring Wheel, 397
 Aveling and Porter, Messrs., 6-horse Power Traction Engine, 293, 405
 Avesta, in Sweden, The Kleinbessemerei at, 343
 Axle-boxes, Bottomley's Radial, Messrs. Sharp, Stewart, and Co., 473, 474
 Aylesbury, Experiments on Sewage at, 501
- BACKLASH in Gearing, 481
 Ballast Unloader, 21
 Barlow, Mr. Peter William, 422
 Barnaby, Mr., on the Navy, 87
 Barrow Machine Rock Drill for Mining, 457
 Bars, Removal of, from the Entrances to Australian Rivers, 72
 Batteries, Secondary, 27
 Belgian Iron in England, 151
 Belgian Iron Manufacture, 261
 Bell Telephone Patents, The, 122
 Bell Telephone Patents Sustained, The, 26
 Bell's Friction Brake for Pulleys, Messrs. W. T. Glover and Co., 474
 Bell's Low-Pressure Filters, Messrs. W. T. Glover and Co., 474
 "Benbow," H.M.S., 127, 460, 464, 471
 Berthon Boats, 482
 Bessbrook Tramway, Opening of the, 195
 Bessemer, A Sir Henry, for New South Wales, 108
 Bidwell, Mr. Sheldford, on the Action of Light in Diminishing the Resistance of Selenium, 414
 Bidwell, Mr. Sheldford, on Variations caused by Magnetisation in the Length of Iron, Steel, and Nickel Rods, 414
 Bing, Mr. E., Simple Circle Squaring, 434
 Biram's Anemometers attached to Kite Strings or Wires, Experiments with, 479
 Blaauw Krantz Bridge, Cape Colony, 159, 162, 165, 209, 201, 296, 297, 298, 299
 Blackburn Flour Mill, on the Roller Mill System, 39, 41
 Blake's Improved Vertical Boiler, 186
 Blast Furnace Value of Coke, 389
 Bleaching or Dyeing Yarns and Goods in Vacuo, 181
 Blowpipe Flame Furnace, 35, 82
 Board of Trade on Boiler Explosions, 67
 Boiler Drilling, Portable, Messrs. Sharp, Stewart, and Co., 473
 Boiler Efficiency, 34, 228, 277, 283, 351, 362, 409
 Boiler Explosion, Remarkable, 83
 Boiler Explosion at the Mid-Kent Brickworks, Beckenham, 228
 Boiler Feeder, Mayhew's Patent Boiler Feeder Company, 425
 Boiler Furnaces, 213, 225, 243
 Boiler Plates, Experience in the Use of Thick, 271
 Boiler Performance and the Quantity of Steam, 162
 Boiler Setting, Horizontal, 139
 Boiler, Steel, for the s.s. "Eastwood," 477, 479
 Boiler, Vertical, Mr. V. J. Kalashnikoff, 485
 Boilers, Efficiency of Marine, 316
 Boilers, Efficiency of Marine, Mr. J. T. Milton on, 277, 283
 Boilers, Marine, Messrs. Cochrane and Co., 421
 Boilers, Modern Practice in the Construction of, 155
 Boilers, Non-conducting Coatings for, 362
 Boilers for Paddle Wheel Tug Boat, 144, 148
 Boilers, Preventing Incrustation in, 187, 270
 Boilers, Steel, 265
 Bond, Mr. George M., Standards of Length as Applied to Gauge Dimensions, 447, 466
 Books Received, 50, 210, 422
 Boring Tools, Detachable, Mr. Parson, 465
 Boston Dock, Hydraulic Machinery, 32, 33, 63, 66
- Botting, Mr. F., Air-tight Covers and Plugs, 497
 Bottomley's Radial Axle-boxes, Messrs. Sharp, Stewart, and Co., 473, 474
 Bouton, Mr. I. V., on the Construction of Locomotives, 423
 Brake, Automatic, Messrs. Sloan and Hawks, 427
 Brakes, Continuous, 186, 350
 Brazilian Navy, The, 135
 Break-down Tackle for Railway Work, Great Southern and Western Railway, 267, 268
 Breakwaters, Floating, 157, 187, 213, 225
 Brennan Torpedo, The, 422
 Brick Machinery, Mr. W. Johnson, 417
 Bridge betwixt Durham and Sunderland, 464
 Bridge at Chiswick, Proposed, 154
 Bridge, The Forth, 52, 53, 54, 106, 111, 128, 134, 162, 168
 Bridge, Hawkesbury, New South Wales, 155
 Bridge over the Hooghly, East Indian Railway, 62, 70, 438
 Bridge over the Kennet at Reading, 423
 Bridge, Strengthening the Abutments of a Great, 110
 Bridge, The Tower, 439
 Bridges, Girder, Diagrams for Estimating the Quantities of (*Supplement, May 22*), 398
 Brighton Beach Works, 126
 Bristol University College, 339
 British and Foreign Vessels, 338
 British and Metric Measures, A Comparison of, for Engineering Purposes, 90
 Browett, Lindley, and Co., Messrs. Combined Engine and Dynamo, 397
 Brunton, Mr. J. Forest, Theory of Governors, 1
 Brussels Internal Navigation Congress, The, 437
 Budenberg's High-pressure Gauge, 353
 Building Trades Exhibition, 229
 Bursting of H.M.S. "Active's" Gun, 104
 Bush Interlocking Rail Bolt, The, 145
 Butler, Mr. S., Movable Coal Stairs, 400, 402
 Butler Making by Electricity, 108
- CABLE Road on Brooklyn Bridge, Power Needed in Operating the, 459
 Cable Tramways, 391
 Caisson Work in a Canal, 486
 Calculating Machines, 307
 Canal, St. Petersburg and Cronstadt Maritime, 427
 Candle-making Machine, Patent Spiral, 491
 Candle Manufacture, 27
 Cane Lubricators, 85
 Cannon Huntingington Sinkings, 68
 Carnegie, Mr., on Natural Gas Fuel, 395
 Carter, Mr. J. H., Horizontal Four-roller Break Mill, 40, 42
 Catching Dynamitards and Thieves by Steam, 2
 Cement, Testing, Mr. A. Hamilton Brown on, 2
 Cement Testing Machine, Automatic, Mr. V. de Michele, 478
 Chandler, Mr., Engine and Rope Driving Gear, 397
 Chemistry, The New, 19
 Circle Squaring, Simple, 434
 City Lines and Extensions, The, 175
 Clark, Mr. W. J., on Certain Cases of Electrolytic Decomposition, 414
 Cleopatra's Needle, 187
 Climate and its Relation to Health, Dr. Poore on, 91, 135
 Clutch Gravity Friction, 102
 Clyde Navigation, The Improvement of the, 220
 Coal Bunkers of a Steamer, On a Method of Arranging the, so as to Reduce the Ballast to a Minimum, 255
 Coal and Coke Exports, 338
 Coal, Coking, 395
 Coal Discovery, 163
 Coal Drill, Rotary Power, 181
 Coal, The Output of, 209
 Coal Plate, Self-fastening, Mr. Halford, 453
 Coals on Railways, Consumption of, 59
 Coal in South Australia, 309
 Coal Supply, London's, 462
 Coal Trade, Sliding Scales in the, 387
 Coal Washing Machinery, Messrs. Sheppard and Sons, 445
 Cochrane and Co., Messrs., Marine Boilers, 424
 "Cocoa" Gunpowder, 338
 Coke, on the Blast Furnace Value of, Mr. I. L. Bell on, 389
 Coal Production, Restriction in, 442
 Coking Process, The Simon-Carves, 395
 Coking Coal and Recovering Volatile Matters, Note with Reference to the Methods Proposed for, 395
 Colliery Company, A Prudent, 151
 Colombo Breakwater, The, 442
 Colonial Coal Stores, The Position of, 301
 Combustion under Pressure, 421
 Compressed Air Meter, 122
 Commerce, Protection of our, 337
 Commerce and War, 299
 Commercial Electrolysis, 100, 294, 451, 494
 Compressed Air Motive Power Supply at Birmingham, 112, 121
 Concrete Bridge, Erection of, in one Day, 289
 Condensers, Surface, Mr. J. Kirkaldy's, 452
 Condensing Water, Cost of, 461
 Conduct of Experiments, 82, 170
 Conrad, Mr. H., Tram-car Guard and Rail Cleaner, 484, 485
 Continuity in Paper Law, 34, 47
- CONTRACTS OPEN:—
 Borings for the Hawkesbury Bridge, 155
 Flexible Buffers and Screw Couplings for Carriages and Wagons, Indian State Railways, 363, 368
 Goods and Ballast Wagons, Indian State Railways, 306
 Madras Railway, Calcut Extension, Specification for Wrought Iron Girders and Steel Bearings, Bepore and Kallai Bridges, 472, 476
 Rails and Fastenings for Danish State Railways, 210, 211
 Well Curbs, Indian State Railways, 24, 26
 Wheels for South Mahratta Railway, 259
 Cooper's Hill College, 4, 27, 47, 64, 146
 Cord, Twine, and Rope-making Machinery, Messrs. Walter T. Glover and Co., 473
 Corliss Engine at Creusot, Experiments with, a 159, 179, 212, 218, 247, 303
 Cost of Iron Bridges, The, 109
 Cotton Press, The Morse, 304
 Coupling, Mr. Nicholson's, 70
 Coupling, Railway, The Janney, 425
 Coventry Machinist's Company, Parallel Grip Vice, 478
 Coventry Sewage, 205
 Covers and Plugs, Air-Tight, Mr. F. Botting, 497
 Crab, 20-ton Overhead Crane, Messrs. Appleby Bros., 493
 Crane Centre for Bessemer Casting Pits, 433
 Crane, Hydraulic, Hydraulic Engineering Company, 452
 Crane, 20-ton, Worked by Dynamo-Electric Gear, 70
 Crane, 35-ton Steam, Abouchoff Steel Works, St. Petersburg, 174
 Crank Axle Forging, Messrs. Linney and Lawson's, 231
 Crompton 21 Unit Machine, 504
 Crompton 22 Unit Dynamo and Willan's Engine, 504
 Crossheads, Removing, 270
 Crushing Mill, Dead-weight, Messrs. Chas. Sheppard and Sons, 365
 Crushing Mill, Dead-weight, 409
 Cupola, Dr. Otto Gmelin, 3
 Curves of Incandescent Lamps, Characteristic, 271
- Cut-off Valve, Fletcher and Man's, 304, 305
 Cut-out and Contact Changer, Positive Action, 231
 Cutlery Artisans in Canada, 442
- DANUBE Bridge Project, The, R. H. Graham, 77, 80
 Deakin and Parker, Messrs., Compound Engine for Electric Lighting, 261
 Dean Wire Stretcher, The, 219
 De Michele, Mr. V., Automatic Cement Testing Machine, 478
 Dick, Kerr, and Co., Messrs., Compound Winding Engines, 457
 Dick and Stevenson, Messrs., Steam Hammer, 379
 Differential Rates and Costs, 422
 Digger, Messrs. Amos and Smith's, 492, 493
 Directory, City of London, 280
 Dirt Arrester, Mr. J. Kirkaldy, 432
 Distillation of Sea Water, 294
 Disabling General Gordon's Steamers, 229
 Diving Dress, Novel Application of, in a Burning Coal Mine, 101
 Dock for Ceylon, A, 461
 Docks at Antwerp, The New, 402
 "Dolphin," The United States Despatch Boat, 442, 446
 "Domestic Motor," Messrs. Hathorn, Davey, and Co., 21
 Donkey Pump, The Desideratum, 314
 Doubling and Laying Machine, James's, 473
 Dowson, Mr. A., Open Grid Groynes, 426
 Drain Pipe Posts, Mr. Anable, 379
 Driving Belts and Ropes, Mr. J. Tullis on, 507
 Drying by Heated Air, 229
 Dupuy de Lome, M., 109
 Durham and Churchill's Pistons, 231, 243
 Dynamics, The Teaching of, 189, 208
 Dynamite Outrages, Recent, 86
 Dynamo, Crompton 22 Unit, and Willan's Engine, 504
 Dynamo-electric Machine, Testing a, 63
- EDISON-HOPKINSON Dynamo, The, 173
 Edwards, Mr. Eaton A., Anemometer, 456
 Efficiency of Fans, 4, 27, 47, 64
 Electric Arc Lamp, Mr. Newton, 72
 Electric Cables, 4
 Electric Engineering, The School of, 454
 Electric Launch in search of Dynamiters, 143
 Electric Light on Board the S.S. "Umbria" and "Etruria," 278
 Electric Light Cables, 26
 Electric Light Machinery, 125
 Electric Lighting for the Admiralty, 379
 Electric Lighting in Belfast, 72, 127
 Electric Lighting, Cost of, 35
 Electric Lighting at the Crystal Palace, 487
 Electric Lighting, House-to-House, 216
 Electric Lighting, The Power Expended in, 159
 Electric Lighting at the South Kensington, 162
 Electric Lighting, The Tower System of, 181
 Electric Locomotion, 134
 Electric Marine Governors, 265
 Electrical Engineering at the Inventions Exhibition, 293, 338, 340, 354, 405, 504
 Electrical Experiments, New, 417
 Electrical Invention, Facts Not Generally Known Concerning, 22
 Electrical Regulation of the Speed of Steam Engines and other Motors for Driving Dynamos, 312
 "Electrician," The, 78
 Electricity? What is, 5
 Electricity, Professor Tyndall on the Sources of, 22, 89
 Electrolysis, Commercial, 100, 294, 451, 494
 Electrolysis, Commercial, Mr. Paget Higgs on, 451
 Electrolytic Decomposition, Mr. J. W. Clark on Certain Cases of, 414
 Electro-magnetic Wave, On a Model Illustrating the Propagation of the, 391
 Electrometer, Quadrant, Sir W. Thompson's, 271
 Energy, Computation of, Mr. R. H. Thurston on, 506
 Engine and Air Compressing Machine, Combined Steam, 397, 401
 Engine, American Mogul, 300
 Engine, Bouch's Long Boiler, "Bull," 95
 Engine, Bouch's Passenger, 95
 Engine, Compound, Messrs. Hawthorne and Co., 433
 Engine, Consolidation Goods, 88, 89
 Engine and Dynamo, Messrs. Browett, Lindley, and Co., 397
 Engine, Eight Column Double Air Cylinder Blowing, Mr. F. L. Weimer, 3
 Engine, On an Express, 42
 Engine, Express, Manchester, Sheffield, and Lincolnshire Railway, Mr. Charles Sacré, 2, 7, and *Supplement, January 2*, 1885
 Engine, Express, for the Midland Railway, 162, 164
 Engine, The Fielding High-speed, 437, 440
 Engine, Fireless, The Honigmann, 66
 Engine, Four-coupled Bogie, Midland Railway, 116
 Engine Governor, Napier's Patent "Cat," 279
 Engine, The Hastie-Brotherhood Hydraulic, 453
 Engine, Horizontal Compound Condensing, 420, 422
 Engine, 50-H.P. Horizontal Condensing, Société Lyonnaise, 479, 480, 496
 Engine, Parson's Patent High-speed, 353
 Engine, Passenger, Great Southern and Western Railway, Ireland, 497, 500
 Engine, 4-H.P. Portable, Mr. G. R. Mather, 358
 Engine and Rope Driving Gear, Mr. Chandler, 397
 Engine, The Stockport Gas, 192, 193
 Engine, Tank, for Metropolitan Traffic, Great Eastern Railway (*Supplement, March 13*), 204
 Engine, Theoretical Efficiency of the Steam, 409
 Engine, 6-H.P. Traction, Messrs. Aveling and Porter, 293, 405
 Engine, Trial of a Compound, 438
 Engine, Vertical Compound, for Electric Lighting, 261
 Engine, The Wheelock, 348
 Engineering and Architecture, Mr. Goldstraw on the Relation between, 343
 Engineering Mission to Brazil, 187
 Engineering Professorship at University College, Liverpool, 489
 Engineering Trades, The, 5
 Engineers and Contractors, 861
 Engineers in the Navy, 386
 Engines, Air Compressing, 145
 Engines, Compound, of the Tug-boats "Hibernia" and "Columbia," 81, 84
 Engines, Compound, of the s.s. "Mona," 279, 282, 286, 294
 Engines, Compound Winding, Messrs. Dick, Kerr, and Co., 457
 Engines, Diagonal Surface-condensing Paddle-wheel, 144
 Engines, Double Bogie, 47
 Engines, Messrs. Goodfellow and Matthews, 364
 Engines, Hydraulic Pumping, 315
 Engines at the Inventions Exhibition, 347
 Engines at the Inventions Exhibition, Tests of, 422
 Engines, Powerful Mill, Messrs. Goodfellow and Matthews, 448
 Engines, Steam, at the Inventions Exhibition, 396
 Engines, Steam, Regulation of, 30
 Engines, Triple Expansion, 4, 34, 503
 Engines, Twin-screw, of the Tug "America," 204
 England and America, 27
 English and Russian Field Artillery, 283
 Engraving by Electricity, 233
 Ericsson, Captain John, Submarine Gun, 2
 Evaporation and Dissociation, On, 391
- Evolution of Machines, The, 284
 Examination for Local Surveyors and Inspectors of Nuisances, 387
 Excentric, Spherical, Mr. Trippier, 417
 Exhibition, The Antwerp International, 402
 Exhibition, Architectural and Building Trades, 191, 229
 Exhibition, International Inventions, 40, 245, 337
 Automatic Clutch, Mr. Pickering, 434
 Boiler Drilling Machine, Portable, Messrs. Sharp, Stewart, and Co., 473
 Boiler Feeder, Mayhew's, 425
 Brick Machinery, Mr. Johnson, 417
 Candle making Machine, Patent Spiral, Price's Patent Candle Company, 491
 Centre Crane for Bessemer Casting Pits, Mr. T. Wrightson, 432
 Coal Plate, Self-fastening, Mr. W. Halford, 453
 Compound Engine, Messrs. Hawthorne and Co., 432
 Cord, Twine, and Rope-making Machinery, Messrs. Walter T. Glover and Co., 473
 Crab, 20-ton Overhead Crane, Messrs. Appleby Bros., 493
 Digger, Messrs. Amos and Smith, 492, 493
 Dirt Arrester, Mr. J. Kirkaldy, 432
 Doubling and Laying Machine, James's, 473
 Dynamo, 22-Unit, Crompton and Willan's Engine, 504
 Electrical Engineering at, 293, 339, 340, 354, 405, 504
 Ergine and Dynamo, Messrs. Browett, Lindley and Co., 397
 Engine, The Hastie-Brotherhood Hydraulic, 453
 Engine, High-speed, Messrs. Fielding and Platt, 437, 440
 Engine and Rope Driving Gear, Mr. Chandler, 397
 Feed for Roller Mills and Purifiers, Self-regulating, Mr. J. E. Walsh, 497
 Feed-water Heater, Mr. J. Kirkaldy, 432
 Friction Brake for Pulleys, Bell's, 474
 Gas Engine Governor, Messrs. Tangye, 424
 Gas Exhauster, Messrs. Greenaway and Kitt, 492
 Gas Hammer, Mr. Robson, 424
 Guns and War Stores, 370, 371, 396
 Hoist Gear, Mr. Pickering, 434
 Hoist, Patent Safety Hydraulic Telescopic, Mr. B. G. Smith, 452
 Hoists and Lifts, Messrs. A. Atwood and Co., 332
 Horology at, 451
 Hulse and Co., Messrs., Machine Tools, 369
 Hydraulic Crane, The Hydraulic Engineering Company, 452
 Injectors, Borland's, 365
 Low-pressure Filters, Bell's, 474
 Machine Tools, Messrs. Hulse and Co., 369
 Machinery in, 473
 Marine Boilers, Messrs. Cochrane and Co., 424
 Metallic Permanent Way at, 464
 Miscellaneous Exhibits, 424, 432, 452, 491
 Movable Coal Stairs, Mr. S. Butler, 400, 402
 Naval Architecture at, 388
 Open Grid Groynes, Mr. A. Dowson, 426
 Parallel Grip Vice, The Coventry Machinist's Company, 478
 Plan of, 329
 Planing Machine, Messrs. Sharp, Stewart, and Co., 473
 Pump, Messrs. George Scott and Co., 452
 Radial Axle-boxes, Bottomley's, 473, 474
 Railway Carriage Window, Mr. H. C. Gover, 478
 Railway Coupling, Janney's, 425
 Rivetter, Messrs. Anderson and Galloway, 491
 Spring Wheel, Messrs. Aveling and Porter, 397, 398
 Steam Engine and Air Compressing Machine, The General Engine and Boiler Company, 397, 401
 Steam Engines at, 347, 350, 352, 353, 358, 364, 397
 Steam Pumps, Mr. J. Bernays, 356
 Steam Winch, Messrs. Appleby Bros., 425
 Steering Gear, Epicycloidal, Mr. T. Archer, 493
 Stone Breakers, Mr. H. R. Marsden, 484
 Surface Condensers, Mr. J. Kirkaldy, 432
 Testing Machine, Wicksteed's, 357
 Traction Engine, 6-H.P., Messrs. Aveling and Porter, 397, 398, 405
 Tram-car Guard and Rail Cleaner, Mr. H. Conradi, 484, 485
 Waltham Abbey Exhibits, 413
 War Material, 370, 371, 396, 413
 Water Purifying Apparatus, 372
 Whip Crane, Messrs. Appleby Bros., 493
 Wire Gauge, Trotter's, 473
- Exhibition, International, at Königsberg, 63
 Exhibition, The New Orleans, 248, 275, 303, 355
 Exhibition of Sheffield Manufactures, 152
- FACTORY Inspection in Wales, 317
 Fairholme, Capt. C., on German Railway Coupling and Brake Power Regulations, 427
 Fans, Efficiency of, Professor Herschel on, 408
 Feed Mechanism for Roller Mills, Mr. Julius Busch, 3
 Feed-water for Boilers, 224, 243
 Feed-water, Purifying, 163
 Feed-water Regulator, The Grossman, 219
 Field-pieces, Quick-firing, 98
 Fielding and Platt, Messrs., The Fielding High-speed Engine, 437, 440
 Filters, Bell's Low-pressure, Messrs. W. T. Glover and Co., 474
 Fletcher and Man's Cut-off Valve, 304, 305
 Floating Breakwater, 157, 187, 213, 225
 Floods in the Midlands, 144
 Flush Tanks, 296, 317
 Fly-wheels, by Professor Smith, 19
 Forced Combustion at Sea, 47
 Foreign Shipbuilding, 151
 Forgings for Stern Frames, On the Manufacture of Large, 258
 Forth Bridge, The, 52, 53, 54, 106, 111, 128, 134, 162, 168
 Forth Bridge, Air Lock for Sinking 70ft. Caissons, 128, 134
 Forth Bridge, Caissons of the, 106, 111
 Forth Bridge, Machinery Used in Constructing the, 52, 53, 54
 Forth Bridge, Main Pier on Inch Garvie, 162, 168
 Foundry Sand Mixer, Schmetz's, 181
 Free Gift of a Week's Work, 246
 French Public Works, 280
 Friction Brake for Pulleys, Bell's, Messrs. W. T. Glover and Co., 474
 Friction Clutch, Messrs. D. Frisbie and Co., 21
 Friction Experiments, Mr. Towers', 179
 Friction Gear, Raworth's, 419
 Friction of Slide Valves, 107, 146, 163, 180, 212, 234, 243, 277, 316, 351, 418, 439
 Fuel, Mr. Collis on, 271
 "Fundamental" Patent, Another, 494
 Furnace, Messrs. R. and W. Welford, 359
 Furnaces of Small Steam Vessels, Willan's Arrangement for the Application of Forced Draughts to, 256
- GAB Motion, Valve Gear, 96
 Gas Exhauster and Pump, Messrs. Greenaway and Kitt, 492
 Gas Lighting, Curiosities of, 266
 Gas Fuel, Natural, 395
 Gas Furnaces at the Forth Bridge, 67
 Gas Production, Growth in, 209
 Gas Supply, Progress of the, 482

- Gauge, Budenberg's High Pressure, 353
 Gauge, Hydraulic and Electric Gun Pressure, Mr. Thos. Shaw, 314
 General Engine and Boiler Co., Combined Steam Engine and Air Compressing Machine, 397, 401
 German Colonial Fleet, The, 107
 German Navy, Addition to the, 54
 German Railway Coupling and Brake Power Regulations, 427
 Girder Bridges, Diagrams for Estimating the Quantities of (*Supplement, May 22*), 398
 Girders for Baymore and Kallai Bridges, Madras Railway, 472, 476
 Girvan Waterworks, The, 152
 Gland Packing, Messrs. Smith and Marshall, 231, 243
 Glover and Co., Messrs. Walter T., Machinery for Cord, &c., Making, and New Standard Wire Gauge, 473
 Gmelin, Dr. Otto, Cupola, 3
 Goodfellow and Matthews, Messrs., Powerful Mill Engines, 448
 Goods and Ballast Wagons, Indian States Railways, 306
 Gover, Mr. H. C., Railway Carriage Window, 478
 Government and the Pump Makers, 212
 Governor, Gas Engine, Messrs. Tangye, 424
 Governors, Gas Engine, 439
 Governors, Marine, 316
 Governors, The Theory of, 1
 Great Eastern Railway Express Trains, Comparative Dimensions of, 59
 Great Eastern Railway Co.'s Harwich Fleet, 61, 71
 Greenaway and Kitt, Messrs., Four Side Gas Exhauster and Pump, 492
 Greenwood, Messrs., Flour Mill, Blackburn, 39, 41
 Gripper Lock Nut, The, 261
 Grossman Feed-water Regulator, The, 219
 Groynes, Open Grid, Mr. A. Dowson, 426
 Gruson's Cast Iron Turbine, 373
 Gun, Breech-loading Shot, Mr. Billing, 3
 Gun Committee Enquiry, The "Active," 87
 Gun Forgings, A New Departure in, 171
 Gun, Nordenfolt's Five-barrelled Volley-firing Machine, 396
 Gun, Submarine, Captain John Ericsson, 2
 Guns as Heat Engines, 112
 Guns, Pressures on, 127
 Guns at the Inventions Exhibition, 370, 371, 396
 Guns, Strength of, 129
 Guns and War Stores, Inventions Exhibition, 370, 371, 396
- HALFORD, Mr., Self-fastening Coal-plate, 453
 Hammer, The Equitable Duplex, 323
 Hammer, Gas, Mr. Robson's, 424
 Hammer, Steam, Messrs. Dick and Stevenson, 379
 Hammers, Steam, 296, 379, 418, 499
 Hammersmith Bridge, 463
 Hansberry, Mr. T. K., Patent for Drawing Water from a Well, 426
 Hardened Glass, 202
 Harland and Wolff, Messrs., Shipbuilding and Engineering Works, Belfast, 72, 334
 Hartley, Sir C. A., on Inland Navigations in Europe, 427
 Hastie-Brotherhood Hydraulic Engine, The 453
 Haulage by Fireless Locomotives, Cost of, 171
 Hawkesbury Bridge, New South Wales, Borings for the, 155
 Hawthorne and Co., Messrs., Compound Engine, 433
 Health Exhibition Publications, 163
 Heat Capacity of a Thermometer, 391
 Heat of Fusion, Latent, and Specific Heat, 459
 Heat in its Relation to Combustion, 341
 Heating Feed-water, 150
 Heating Surface, Influence of Position on the Value of, 199
 Heberlein Automatic Brake, The, 408, 419, 439
 Hedger, Mr. Killingworth, on Overhead π Underground Wires in the U.S., 426
 Hedges, Mr. K., Speed Gauge, 503
 H.M.S. "Benbow," 127, 466, 464, 471
 H.M.S. "Benbow," Visit of H.R.H. Prince George of Wales to, 127
 H.M.S. "Stagnation" Admiralty Duet, 225
 Hett, Mr., Turbine Governor, 503
 Higgs, Mr. Paget, on Commercial Electrolysis, 451, 494
 Highgate Archway, 130
 High-speed Steamships, 319
 Hoist Gear with Automatic Clutch, Mr. Pickering, 434
 Hoists and Lifts, Messrs. A. Atwood and Co., 382
 Hong Kong, The Defences of, 151
 Honigmann Fireless Locomotive Engine, The, 60, 162
 Hooghly Bridge, The, 124, 134, 153, 154, 221, 231, 438
 Hooghly Bridge, Details of Girders and Expansion Sling, 124, 134, 153, 154
 Horology at the Inventions Exhibition, 451
 Horse Guards' Parade, Drainage of, 592
 Horse-power, Cost of, Hudson, Prof. W. H., on the Third Law of Motion, 29, 119
 Hulse and Co., Messrs., Machine Tools, 369
 Hydraulic Engineering Company, Hydraulic Crane and Hydraulic Engine, 452, 453
 Hydraulic Hoists, 258
 Hydraulic Lifts, 317, 343, 351, 384, 408
 Hydraulic Lifts, Cost of Working, 343, 384
 Hydraulic Machinery, Port of Buenos Ayres, 96, 103, 184, 185
 Hydraulic Power Mafns in London, 232
 Hydraulic Power, Recent Progress in the Public Supply of, 116, 232, 288
 Hydraulic Rams, The Force of, 143
 Hydraulic Rivetting Plant, 141
 Hydro-mechanics—Physiography, On the Theory and Practice of, 90
 Hydro-mechanics, Sir Edw. Reed on the Theory and Practice of, 454
- ILLUMINATION in a Fog, On the Theory of, 391
 Incandescent Lamps, Mr. W. P. Adams on, 444
 Indian Public Works Department, 419
 Indian State Railways, Flexible Buffers and Screw Couplings for Carriages and Wagons, 363, 368
 Indian State Railways, Goods and Ballast Wagons, 306
 Indian Railway Network, Mr. Haughton on, 146
 Indicator and Indicator Diagrams, Prof. O. Reynolds on the Theory of the, and the Errors in, 454
 Industrial Exhibition at Sheffield, 171
 Inflexible Explosion, The, 502
 Injector, The Improved Exhaust Steam, 296
 Injectors, Mr. Borland's, 365
 Injectors, Madan's, 409
 Inland Navigations in Europe, Sir C. A. Hartley on, 427
- INSTITUTE, THE FRANKLIN:
 Standards of Length and their Subdivision, Mr. George M. Bond, 142
 Standards of Length as Applied to Gauge Dimensions, 447, 466
- INSTITUTE OF GREAT BRITAIN, THE SANITARY, 454
 Autumn Congress, 469
 Examination of Local Surveyors and Inspectors of Nuisances, 454
- INSTITUTE, THE IRON AND STEEL, 351
 Dr. Percy's Presidential Address, 351, 389
 Blast Furnace Value of Coke from which the Products of Distillation from the Coal Used in Manufacture have been Collected, Mr. I. L. Bell, 389
 Natural Gas Fuel and its Application to Manufacturing Purposes, Mr. Carnegie, 295
 Note with Reference to the Methods Proposed for Coking Coal and Recovering Volatile Matters, Prof. Armstrong, 395
 Properties of Malleable Iron Deduced from its Microscopic Structures, Dr. Wedding, 395
 Recent Results and Further Development of the Simon-Carves Coking Process, Mr. Henry Simon, 395
- INSTITUTE OF MINING ENGINEERS, THE AMERICAN:
 New Methods of Shaft-sinking through Loose Water-bearing Materials, Jas. E. Mills, 114
 Institute, Polytechnic, 152
- INSTITUTION OF CIVIL ENGINEERS, 15, 267, 340 413
 Comparison of British and Metric Measures for Engineering Purposes, Mr. A. Hamilton-Smythe, 90
 Construction of Locomotive Engines and some Results of their Working on the London, Brighton, and South Coast Railway, Wm. Stroudley, 225
 Electrical Regulation of the Speed of Steam Engines and other Motors for Driving Dynamos, Sir Fred. J. Bramwell, 312
 First Annual General Meeting under the Revised Bye-laws, 474
 Forms of Ships, The, Sir Edw. Reed, 454
 Inland Navigation in Europe, Sir Charles A. Hartley, 427
 Metropolitan and Metropolitan District Railways, Mr. Benjamin Baker, 175
 Modern Practice in the Construction of Steam Boilers, Mr. David Salmond Smart, 155
 President's Inaugural Address, Sir Fred. J. Bramwell, 46
 Purification of Water by Iron on a Large Scale, Mr. W. Ander-on, 487
 Signalling of the London and North-Western Railway, Mr. Arthur Moore Thompson, 439
 Theory of the Indicator and the Errors in Indicator Diagrams, Prof. O. Reynolds, 454
 Theory and Practice of Hydro-Mechanics, Physiography, Mr. John Evans, 90
 Water Motors, Professor W. Cawthorne Unwin, 280
- INSTITUTION OF CIVIL ENGINEERS FOR IRELAND:
 Breakdown Tackle for Railway Work, Mr. H. A. Ivatt, 267
- INSTITUTION OF MECHANICAL ENGINEERS, 64, 101
 Abstract of Results of Experiments on Rivetted Joints with their Application to Practical Work, Professor A. W. B. Kennedy, 390
 Carbon in Steel, Sir Frederick Abel, 101
 Recent Improvements in Wood-Cutting Machinery, Mr. George Richards, 101
 Second Report of the Research Committee on Friction, 101
 Institution, The National Smoke Abatement, 113
- INSTITUTION OF NAVAL ARCHITECTS, THE, 237
 Application of Moderate Forced Draught to the Furnaces of Small Steam Vessels upon Willan's System, 256
 Efficiency of Marine Boilers, Mr. J. T. Milton, 277
 Experience in the Use of Thick Steel Boiler Plates, Mr. W. Parker, 271
 Manufacture of Large Forgings for Stern Frames, Mr. D. Purves, 258
 Mechanical Method of Measuring a Vessel's Stability, Mr. J. H. Heck, 255
 Method of Arranging the Coal Bunkers of a Steamer so as to Reduce the Ballast to a Minimum, Mr. John Nicholson, 255
 Most Suitable Propeller for Shallow Draught, Mr. J. I. Thorneycroft, 256
 Notes on the Strength of Rivetted Joints, Mr. J. Milton, 257
 Practical Measurement of the Comparative Fighting Efficiency of Ships of War, Captain G. H. Noel, 238
 Some Further Experience with Triple Compound Engines, Mr. A. E. Seaton, 256
 Stowage of Steamships, Mr. F. P. Purvis, 255
 Strength of Mild Steel Plates and Rivets of Various kinds used in Shipbuilding, Mr. Wildish, 257
 Theoretical Duty of Heat in the Steam Engine, Mr. J. McFarlane Grey, 256
- Institution of Permanent Way Inspectors, 154, 206
 Inventions Exhibition, see Exhibition
 Iron and Coal Districts of Alabama, 443, 471
 Iron, Malleable, Dr. Wedding on the Properties of, 395
 Iron, Removing Red Shortness from, 78
 Iron and Steel Armour-Plates, Compound, 186
 Iron and Steel, Proof Tests of, 320, 343
 Iron Trade, 86
 Iron, Water Purification on a Large Scale by, 487
 Iron, Coal, and General Trades of Birmingham, Wolverhampton, and other Districts, 16, 25, 55, 74, 91, 117, 135, 156, 175, 195, 213, 233, 251, 272, 290, 308, 326, 344, 374, 392, 410, 428, 448, 468, 488, 508
- Irrigation in its Latest Aspects, 170
- JACKSON, Mr. Thomas, 50
 James's Doubling and Laying Machine, 473
 Janney Railway Coupling, The, 425
 Jenkin, Professor H. C. Fleeming, 483
 Jigger Hoist, Plan of, 184
 Johnson, Mr. W., Brick Machinery, 417
 Journal Friction and Train Resistance, Experiments on, 498
- KALASHNIKOFF, Mr. V. I., Vertical Boiler, 485
 Kenilworth Waterworks, Opening of the, 26
 Kennet, Bridge Over the, at Reading, 423
 Kirkaldy, Mr. J., Surface Condensers and Feed Water Heaters, 432
 Kleinbessemmer at Avesta in Sweden, 343
 Kriebel Steam Engine, The, 275
 Krupp Works at Essen, The, 90
- LANDSLIP and its Cause, A Remarkable, 113
 La Tarbes Viaduct, Montlucon and Eygurande Railway, 318, 322, 331, 332
 Lathe, Hollow Spindle Capstan, 333
 Latimer Bridge Safety Guards, 213
 Launch, Astoria, 193
 Launch of the "Benbow," 471
 Launch Engine with Bremser's Valve Gear, 70
 Launches and Trial Trips, 280, 325, 339, 351, 391, 409, 447, 466, 487, 507
 Law of Motion, Third, Professor W. H. Hudson on, 199
 Laws of Motion, 237, 269, 350, 384, 407, 408, 418, 419, 438, 458, 459, 486, 499
 Laws of Motion, Newton's, 129, 163, 187, 213, 217, 224, 242, 311, 342, 380
 Lead in Steam Engines, 421
- LEADERS:—
 1885, 9
 A B C Process at Aylesbury, The, 501
 Active Gun Committee Enquiry, The, 87
 Admiralty and the Navy, The, 227
 African Interior Sea, The, 171
 Amalgamated Society of Engineers, The, 302, 502
 Antwerp Waterworks, 285
 Architectural and Building Trades Exhibition, 191
 Aylesbury, The A B C Process at, 501
 Backlash in Gearing, 481
 Basic Steel, 31
 Belgian Iron in England, 151
 Board of Trade on Boiler Explosions, 67
 Boiler Efficiency, 228
 Brennan Torpedo, The, 422
 British and Foreign Vessels, 338
 Broken Screw Shafts, 190
 Building Trades Exhibition, The, 229
 Cannon Huntingington Sinkings, 68
 Coal and Coke Exports, 338
 "Cocoa" Gunpowder, 338
 Colombo Breakwater, The, 442
 Combustion under Pressure, 421
 Conduct of Experiments, The, 170
 Conduct of Mechanical Experiments, 30
 Cost of Condensing Water, 461
 Cost of Haulage by Fireless Locomotives, 171
 Creeping of Rails, The, 85
 Crisis in the Yorkshire Coal Trade, 229
 Curiosities of Gas-lighting, 266
 Cutlery Artisans in Canada, 442
 Defences of Hong Kong, 151
 Differential Rates and Cost, 422
 Disabling Gen. Gordon's Steamers, 229
 Dock for Ceylon, 461
 Dr. Percy's Address, 385
 Drainage of the Horse Guards' Parade, 502
 Drying by Heated Air, 229
- LEADERS (continued):—
 Dynamite Outrages, Recent, 86
 Electric Marine Governors, 265
 Engineers and Contractors, 361
 Engineers in the Navy, 386
 English and Russian Field Artillery, 283
 Episode in American Contracting, An, 403
 Evolution of Machines, 284
 Exhibition of Sheffield Manufactures, 152, 171
 Extraordinary Verdict, An, 228
 Failure of the Shipping Bounty Scheme, 171
 Foreign Shipbuilding, 151
 Free Gift of a Week's Work, A, 246
 Friction of Slide Valves, 107
 Gas Supply, Progress of the, 482
 German Colonial Fleet, The, 107
 Growth in Gas Production, 209
 Hammersmith Bridge, 463
 Harbour at Aden, The, 502
 Heating Feed-water, 150
 High-speed Steamships, 319
 Highgate Archway, 130
 House-to-house Electric Lighting, 246
 Increase in Merchant Shipping, 482
 Inflexible Explosion, The, 502
 Institution of Civil Engineers, 463
 Inventions Exhibition, The, 245, 337
 Iron and Steel Rails, 50
 Iron Trades, 86
 Irrigation in its Latest Aspect, 170
 Lead in Steam Engines, 421
 Liabilities for Street-making, 151
 Labelling a Colliery Company, 108
 Lighthouse Illumination, 284
 Locomotive Engine Boilers, 169
 London's Coal Supply, 462
 London Fires, 85
 London Main Drainage, 149
 London Sewage Inquiry, The, 403
 Madras and Colombo Harbours, 227
 Making Butter by Electricity, 108
 Manchester Ship Canal, The, 442
 Marine Boilers, 283
 Meteorological Progress, 246
 Mileage of Screw Shafts, The, 362
 Miners' Strike, The, 320
 Mines' Drainage in South Staffordshire, 68
 Navy and the Admiralty, The, 319
 Needed Improvement, A, 284
 New Departure in Gun Forgings, 171
 New Sliding Scale in Iron Mining, 320
 New Street and Model Dwellings, 284
 Newton's Third Law, 129
 Non-conducting Coating for Boilers, 362
 North British Borneo, 209
 North British Railway, The, 284
 Official Examination of Patents, 245
 Official Project for a Water Supply to London, 29
 Our Friend the Foreigner and His Wares, 209
 Our New Ships, 301
 Output of Coal, The, 209
 Pall Mall Pavement, The, 209
 Patent-office Delays, 501
 Paving of the New London Street, 482
 Penistone Railway Accident, The, 190
 Position of Colonial Coal Stores, The, 301
 Practical Steam Engine Economy, 462
 Private Wagon Risks, 482
 Proof Tests of Iron and Steel, 320
 Protection of our Commerce, The, 337
 Prudent Colliery Company, A, 151
 Putney and Hammersmith Bridges, 108
 Rail Export, Our, 171
 Railway Accident in Russia, 502
 Railway Preferences, 502
 Railway Rates, 67, 151
 Railway Rates and Charges, 191, 462
 Railway Rates and Foreign Competition, 502
 Railway and Sea-borne Coal, 209
 Rating of Coal Colonies, 50
 Rating of Machinery, The, 502
 Regulation of Steam Engines, 30
 Restriction in Coke Production, 442
 Richmond Water Supply, 482
 School of Forestry, Proposed, 481
 Sheffield Steel and the Gun Factories, 31
 Sheffield Steel for Heavy Ordnance, 228
 Shipping Freights, 206
 Shoeburyness, Fatal Accident at, 191
 Shoeburyness, The Shell Explosion at, 207
 Sir Henry Bessemer, A., for New South Wales, 108
 Sliding Scales in the Coal Trade, 387
 Sliding Scales in Iron Mining, 246
 Soudan Railway, The, 130, 149, 171
 South Yorkshire Coalowners and the Railway Companies, 266
 Standards of Light, 302
 Steamship Insurance, 108
 Steamship Trade, The, 68
 Steamships and Crews, 87
 Steamships and War Risks in Mutual Offices, 363
 Steel Boilers, 265
 Steel and Iron Shipbuilding, 404
 Steel Ships, 303
 Steel Tin Plates, 152
 Strand to Oxford-street, From the, 191
 Street Maintenance and Subways, 189
 Strength of Guns, The, 129
 Strike in Coal Trade, The, 284
 Strike of Colliery Lads, A, 228
 Strike in Yorkshire, Recent Great, and its Effects on the Trade, 462
 Suakim-Berber Railway, The, 207, 284
 Substitutes for Hard Wood, 246
 Teaching of Dynamics, The, 189, 208
 Telegraphy in Time of War, 441
 Tests of Engines at the Inventions Exhibition, 422
 Torquay Waterworks, 338
 Tower Bridge, The, 361
 Trade, Our Falling, 130
 Traders and the Railway Bills, 130
 "Traveller's Rest," The, 228
 Trial of a Moncrieff Hydro-pneumatic Carriage at Shoeburyness, 284
 Unconsidered Aspect of Modern Strikes, An, 441
 United States Despatch Boat, "Dolphin," The, 442
 United States Cruisers, 422
 Value of Vessels, 50
 Virtue of Weight, 49
 Volunteer Torpedo Corps, 404
 Wages of British Workmen, 130
 Water Supply in Lancashire, 130
 Water Supply of London, 49
 Water Supply in the Soudan, 191
 Wear Coal Shipments, The, 229
 Westinghouse Brake, The, 130
 Work of the Metropolitan Board, The, 337
 Working Hours and Trade Depression, 169
 Yorkshire Coal Industry, The, 190
 Yorkshire Coal Trade, The, 209
 Yorkshire Miners and Labour Representation, 31
- Lectures to Artisans, Free, 50
 Legg Rotary Power Coal Drill, The, 181
 Length of Iron, Steel, and Nickel Rods, Variations caused by Magnetisation, 414
- LETTERS TO THE EDITOR:—
 Abergavenny Sewage Bridge, Contractors, 163
 Acid Proof Cement? Cement, 301
 Altesnek Dynamometer? S. H., 107
 American Railway Couplers, Alfred Davis, 227
 Asbestos Machinery? H. D., 421
 Augmented Railway Rates, Fredk. T. Haggard, 27
 Australian Shipper's Ring, The, Smith, Morrison and Co., 343
 Automatic Boiler Feeding, Automatic, 83
 Automatic Feed of Rock Borers, George Low, 487, 501
 Balanced Slide Valves, Janus, 343
 Blake's Improved Vertical Boiler, James Blake, 186
 Blake System? The, A. B. R., 431
 Blow-pipe Flame Furnace, A. C. Engert, 82
 Blow-pipe Flame Furnace, W. Schonheyder, 35
 Boiler Efficiency, Richard H. Buel, 34
 Boiler Efficiency, Thos. Raybould, 409
 Boiler Efficiency, Wm. Robertson, 351
- LETTERS TO THE EDITOR (continued):—
 Boiler Explosion, Remarkable, Richd. Hartland, 83
 Boiler Furnaces, S. Boswell, 243
 Boiler Furnaces, Hawksley, Wild, and Co., 225
 Boiler Performance and the Quality of Steam, Geo. H. Babcock, 162
 Boiler Steel, B. Dean, 277
 Boiler Steel, Thos. Turner, 276
 Brakes, Continuous, John Noble, 186
 Brakes, Continuous, Clement E. Stretton, 186
 Brochure on Gas Engines, H. H. Thwatte, 337
 Caisson Work in a Canal, C. J. Reynolds, 486
 Candle Manufacture, Leopold Field, 27
 Cane Lubricators, T. and W. Summers, 85
 Cane-splitting Machine? S., 441
 Cloth Hearthrugs? W., 461
 Combined Boring and Shaping Machines? E. K., 29
 Compound Iron and Steel Armour-plates and Steel Armour-plates, Sam. R. Smyth, 187
 Compressed Paper? M., 189
 Conduct of Experiments, John Pinchbeck, 82
 Construction of Specifications, The, Wm. Spence, 127
 Continuity in Patent Law, Wm. Spence, 34, 47
 Continuity in Patent Law, Patentee, 47
 Continuity in Patent Law, Wm. Spence, 162
 Continuous Brakes, Clement E. Stretton, 350
 Cooper's Hill College, Cooper's Hill, 27, 76 to 79
 Cooper's Hill College, H. S. Hele Shaw, 4, 64
 Cooper's Hill College, Impartial, 47
 Cooper's Hill College, J. I. de Jongh, 146
 Cost of Electric Lighting, Flannery and Bagallay, 35
 Cost of Horse-Power, H. H., 29
 Cost of Working Hydraulic Lifts, E. H. Ellington, 342, 384
 Cracking of Steel Plates, W., 83
 Crayon Pencil and Plate Polishing Powder Makers? C. D. G., 441
 Dead-weight Crushing Mill, The, Chas. E. Hall, 409
 Deep Water Docks at Tilbury, Forth, 384
 Deep Water Docks, Tilbury, H. K., 439
 Deep Water Docks at Tilbury, W. X. Y., 351
 Double Bogie Engines, F. C. Christy, 47
 Duration of U.S. Patents for Inventions previously Patented Elsewhere, Howson and Sons, 276
 Efficiency of Fans, Robert H. Smith, 27
 Efficiency of Fans, W. C. Unwin, 4, 47
 Efficiency of Marine Boilers, Economist, 317
 Efficiency of Marine Boilers, L. Hopcraft, 317
 Efficiency of Marine Boilers, James Howden, 316
 Efficiency of Marine Boilers, One Interested, 316
 Efficiency of Marine Boilers, Jno. Kirkaldy, 316
 Electric Cables, J. G. Lorrain, 4
 Electric Light Cables, James Johnstone, 26
 Electric Lighting in Belfast, George Annesley Grindle, 127
 Electric Lighting at the Crystal Palace, Electric Light, 487
 Electricity? What is, James Johnstone, 5
 Enclosing Telephones? R. T. C., 107
 England and America, Wm. Tighe Hamilton, 27
 Engraving Brass? J. P. M., 149
 Eyelets? G. E. C., 67
 Factory Inspection in Wales, R. J., 317
 False Water Gauge, R. Snowden, 34
 Feed-water for Boilers, A. B., 243
 Feed-water for Boilers, Steam User, 224
 Feed-cutting? H. D. D. B., 107
 Floating Breakwaters, Lewis W. Leeds, 212
 Floating Breakwaters, E. C. Greenway Thomas, 187, 225
 Flush Tanks, Francis Botting, 319
 Flush Tanks, H. Scott, 317
 Forced Combustion at Sea, James Howden, 47
 Ford, Stathan, and Co., Messrs. Timmins and Pirrie, 441
 Friction of Slide Valves, T. C., 224
 Friction of Slide Valves, E. D., 243
 Friction of Slide Valves, J. Goodman, 186
 Friction of Slide Valves, The, Henry R. Leahy, 418
 Friction of Slide Valves, Ex-Locomotive, 186
 Friction of Slide Valves, Marine Engineer, 212
 Friction of Slide Valves, Marine Engineer, 439
 Friction of Slide Valves, Edw. C. Peck, 212, 224, 277, 351
 Friction of Slide Valves, H. Perrott, 163
 Friction of Slide Valves, Radius, 163
 Friction of Slide Valves, S. W., 186
 Friction of Slide Valves, Stephen H. Terry, 316
 Friction of Slide Valves, Thos. Veasey and Co., 212
 Friction of Slide Valves, Viator, 163
 Friction of Slide Valves, Vinox, 163, 186
 Friction of Slide Valves, The, W. Carlisle Wallace, 146
 Gas Engine Governors, Crossley Bros., 439
 Gas Engines? G. O., 319
 Gas Furnaces at the Forth Bridge, Tancred, Arrol, and Co., 67
 Government and the Pump-makers, Jas. S. Dewar, 212
 Government and the Pump-makers, An English Pump, 212
 Gutta-percha, A. B. C., 245
 Hart Metal? Lubricant, 385
 Heating Power of Electrical Currents? Caloric, 207
 Heberlein Automatic Brake, The, Chas. Fairholme, 408, 439
 Heberlein Brake, The, Clement E. Stretton, 419
 Honigmann Fireless Locomotive Engine, The, E., 162
 Hooghly Bridge, The, W. C. Kernot, 438
 Hydraulic Lifts, American Elevator Company, 408, 317, 351
 Improvement of the Mersey, Edw. Foulger, 163
 Indian Public Works Department, Unity, 419
 Latimer Bridge Safety Guards, Assoc. M.I.C.E., 213
 Laws of Motion, The, H. A., 270
 Laws of Motion, The, W. A. S. Benson, 419, 499
 Laws of Motion, S. Eddington, 384
 Laws of Motion, A. Girton Girl, 350, 407, 438, 486
 Laws of Motion, A. S. Herschel, 458
 Laws of Motion, Oliver J. Lodge, 407, 418, 459, 499
 Laws of Motion, W. H. Longmore, 407
 Laws of Motion, The, E. Lousley, 418
 Laws of Motion, Wm. Muir, 458
 Laws of Motion, R. D. Napier, 350
 Laws of Motion, An Old Student, 350, 408
 Laws of Motion, Jas. G. Schultz, 270
 Laws of Motion, The, Robt. H. Smith, 269, 407
 Laws of Motion, The, R. Snowden, 270
 Laws of Motion, C. E. Stromeyer, 384
 Laws of Motion, The, Φ , II., 269, 407, 418, 438, 459, 486, 499
 Laws of Motion, The, Thos. Veasey and Co., 270
 Links in the History of the Locomotive, Graduate, 163
 Lloyd's Patent Welding Process? J. B. G., 49
 Locomotive Engines in Portugal, Miguel Carlos Correia Paes, 47
 Machinery for Making Five-Gallon "Drums"? J. R. B., 501
 Madan's Injectors, Chas. S. Madan, 409
 Manchester Ship Canal Bill and Tidal Scour, Joseph Boulton, 276
 Marine Governors, Anchor, 316
 Miller's Coupled Buffers, Assoc. M.I.C.E., 213
 Milroy's Excavator? G. L. C., 385
 Miss Templeton, Henry C. Waters, 343
 Navy, The, Thos. Symonds, 82
 New Electrical Experiments, James Johnstone, 417
 Newton's Laws of Motion, S. Eddy, 242
 Newton's Laws of Motion, J., 242
 Newton's Laws of Motion, P. T. M., 242
 Newton's Laws of Motion, Oliver J. Lodge, 242
 Newton's Laws of Motion, W. H. Longmore, 242, 342
 Newton's Laws of Motion, E. Lousley, 342
 Newton's Laws of Motion, Wm. Muir, 213, 224, 242
 Newton's Laws of Motion, Robt. D. Napier, 342
 Newton's Laws of Motion, An Old Student, 242
 Newton's Laws of Motion, Φ , II., 312, 384
 Newton's Third Law, Ed. Gobert, 224
 Newton's Third Law, Wm. H. H. Hudson, 224
 Newton's Third Law, Wm. Muir, 163
 Newton's Third Law, An Old Student, 224
 Newton's Third Law, Wm. Lewis Pratt, 187

LETTERS TO THE EDITOR (*continued*).—
 Obstructing the Midland Railway, Subscriber, 270
 Packing Groceries? Enquirer, 207
 Panama Canal, The, John I. de Jongh, 34
 Paper Rollers? T. W. S., 29
 Pattern Plates? Engineer, 337
 Peat Moss Litter Machinery? R. M., 227
 Polishing Pebbles? D., 481
 Pressures on Guns, J. W., 127
 Preventing Incrustation in Boilers, Thos. Veasey and Co., 187
 Preventing Shortness of Water in Steam Generators, B. H. Thwaite, 127
 Prof. Hannay's Electrographs? W. N. J., 403
 Prof. A. Herschel on the Efficiency of Fans, A. T. Fraser, 408
 Proof Tests, Geo. P. Culverwell, 276
 Proof Tests of Iron and Steel, Geo. F. Culverwell, 343
 Proposed Widening of Old Broad-street, W. C. Unwin, 458
 Pumping Machinery, Frank Pearn and Co., 29
 Purifying Feed-water, Wm. Brown, 163
 Rail Joints, F. G. Field, 225
 Railway Passenger Traffic, Clement E. Stretton, 47
 Railway Signalling, Goods Driver, 225
 Railway Signalling, S. A. Croft, 213
 Railway Signals, S. A. Croft, 243
 Railway Signals, Express Driver, 187
 Railway Rates, Fredk. T. Haggard, 83
 Railways for India, Kerr, Stuart, and Co., 270
 Raising Sunken Ships, H. T. M., 224
 Ratchet Brace? The Enquirer, 189
 Ratio of Contraction of Area to Elongation in Tested Bars, C. E. Stromeier, 439
 Ratio of Contraction of Area to Elongation in Tested Bars, W. C. Unwin, 419, 439
 Ratio of Contraction of Area to Extension, C. E. Stromeier, 487
 Raworth's Friction Gear, Browett, Lindley, and Co., 419, 441
 Removing Crossheads, An Old Subscriber, 270
 Rocket, The, Comet, 64
 Rocket, The, W. Jeffery, 47
 Rocket, The, J. Jenkins, 64
 Rocket, The, Alfred Marson, 186
 Rocket, The, Old Swannington Driver, 127
 Rocket, The, Thos. West Smith, 146
 Rocket, The, Robt. Stannard, 28, 47
 Screw Mixture? Vulcan, 207
 Secondary Batteries, Bernard Drake, 27
 Shipping Coal at Bristol, Fair Play, 127
 Shelling Maize? C. E. W., 29
 Shoeburyness Explosion, Thos. Knox Fortescue, 224
 Small Dynamo-electric Machines? J. S., 29
 Smith's and Marshall's Gland Packing, Marshall and Thunder, 243
 Soudan Railway, A., H. G. Kunhardt, 146
 Special Plant for Wagon Builders, Craven Bros., 35
 Steam Hammers, Glen and Ross, 418, 499
 Steam Hammers, Graham Stevenson, 438
 Steel Guns, Sir Joseph Whitworth and Co., 5
 Steel Plates for Bridge and Boiler Construction, Thos. Turner, 82
 Steel Ropes, N. Butchart, 67
 Strain Diagrams, R. H. G., 419, 499
 Street Maintenance and Subways, J. Gurdon L. Stephenson, 212
 Strength of Springs? Spirifer, 85
 Stress and Strain Diagrams, W. C. Unwin, 403
 Stresses on Roofs, Foreman Carpenter, 409
 Suction Taking-off Apparatus, T. R. J., 441
 Tan-burning Boilers? J. G. N., 301
 Tanks for Suakim, John Bellamy, 243
 Tanks for Suakim, Fraser and Fraser, 277
 Theoretical Efficiency of the Steam Engine, Robt. Gill, 409
 Tidal Action, T. B. Lightfoot, 64
 Tilbury Deep-water Dock, Thames, 408
 Tilbury Deep-water Dock, Z., 317
 Tin Boxes? A. W., 421
 Tin-foil Machines? E. Z. H., 129
 Tower Bridge, W. Davey Bennett, 384
 Tower Bridge, The, R. Laybourne, 459
 Tower Bridge, The, J. Somes Story, 439, 486
 Town Heating by Steam, H. Gray, 162
 Trade Profits? X. Y., 385
 Transmission of Power, Chaff-cutter, 227
 Trevithick Memorial, Hyde Clarke, 499
 Trevithick Memorial, The, John Davis, 487
 Trevithick Monument and No Monument, A. Hyde Clarke, 458
 Trial of a Compound Engine, R. Tinkler, 438
 Trial of a Corliss Engine at Creusot, W. S., 212
 Tricycle Making Machinery, Tricycle, 245
 Triple Expansion Engines, W. S., 4
 Triple Expansion Engines, Robt. Wyllie, 34
 Vacuum Brakes—Jerks in Trains, Clement E. Stretton, 438
 Ventilating Railway Carriages? Whirlwind, 301
 Victoria Electric Lighting Installation, P. Walter D'Alton, 5
 Water Gauges, Thos. R. Summerson, 269
 Water Supply for the Suakim-Berber Route, An English Engineer, 186
 Water Supply for the Suakim-Berber Route, S. Owens and Co., 186
 Wilson's Patent Piston Rings? P. I., 67
 Wind Pressures on Roofs, Dorabju B. Rabadina, 83
 Wind Pressures on Roofs, R. H. Graham, 126
 Local Surveyors and Inspectors of Nuisances, Examination for, 887
 Loch Katrine and the Glasgow Water Supply, 152
 Lockwood and Carlisle's Piston Rings, 181
 Locomotive, American Passenger, The Mason Machine Works Co., 28
 Locomotive Breakdown Steam Crane, Taff Vale Railway, 42, 48
 Locomotive Compound, London and North-Western Railway, 349, 352
 Locomotive Compound, with Patent Starting Gear, Great Eastern Railway, Mr. T. W. Worsdell, 377, and Supplement, May 15
 Locomotive Engine Boilers, 169
 Locomotive Engines, Construction of, and some Results of their Working on the London, Brighton, and South Coast Railway, 225
 Locomotive Engines in Portugal, 47
 Locomotive Engines for the Suakim-Berber Railway, 215
 Locomotive, Express, Midland Railway, 851, and Supplement, May 8
 Locomotive, Four-coupled Express, Midland Railway, Supplement, February 6
 Locomotive, Links in the History of, 95
 Locomotives, Mr. J. V. Bouton on the Construction of, 423
 Locomotives, Compound, Mr. T. Worsdell, 377
 Lodge, Professor Oliver, 405
 London's Coal Supply, 462
 London Main Drainage, 149
 London, Tilbury, and Southend Railway Bill, The, 306
 London Sewage Enquiry, 403
 Lost Energy, 311, 341
 Lower Thames Valley Main Sewerage Bill, 463
 LEGAL INTELLIGENCE:
 Wasteneys Smith's Patent "Stockless" Anchor, 143
 Liabilities for Street Making, 151
 Libelling a Colliery Company, 108
 Light, Action of, in Diminishing the Resistance of, 414
 Light, Wave Theory of, 405
 Lighthouse Experiments, South Foreland, 815
 Lighthouse Construction, Mr. C. H. Wordingham on, 454
 Lighthouse Illuminants, 225
 Lighthouse Illumination, 284
 Lighthouse, New Island, Belfast Lough, 25
 Lightning Rod Testing Apparatus, Messrs. Siemens and Co., 70
 Liquid Films—A Soap Bubble, 323
 Link Spanner and Tube Vice, Bauer's, 278
 Links in the History of the Locomotive, 163
 Lippett, Mr. A., Articles Made of Slag, Exhibited by at the Antwerp Exhibition, 402

LITERATURE:
 Alkali Makers' Pocket Book, George Lunge and Hurter Ferdinand, 50
 Almanack für die K. K. Kriegs Marine, 1885, 87
 Assay and Analyses of Iron and Steel, Thos. Bayley, 69
 Descriptive Mineralogy, by Hilary Bauermann, 321
 Electrolysis: Practical Information on Nickeling, Coppering, Gilding, Silvering, the Refining of Metals, and the Treatment of Minerals by Means of Electricity, by Hippolyte Fontaine, 191
 Fourth Annual Report of the State Mineralogist of California, by Henry G. Hanks, 285
 Future Naval Battles, and How to Fight Them, Admiral Sir George Elliott, 463
 The Gas Manager's Hand Book, Thos. Newbigging, 285
 Geology of Weymouth, Portland, and the Coast of Dorsetshire, from Swanage to Bridport-on-the-Sea, with Natural History and Archaeological Notes, Robert Damon, 68
 Graphische Behandlung der Mechanischen Wärme Theorie, Gustav Herman, 464
 Lehrbuch der Telephonie u. Mikrophonie, C. Grawinkel, 31
 Modern Shipbuilding and the Men Engaged in it, by David Pollock, 363
 Our Gold Supply, by Thos. Cornish, 303
 Practical Treatise on the Manufacture of Bricks, Tiles, Terra Cotta, &c., C. T. Davis, 87
 Practice of Ore Dressing in Europe, by Wheaton B. Kunhardt, 69
 Principles of Ventilating and Heating, and their Practical Application, J. S. Billings, 229
 Recommendations of United States Gun Foundry Board on Proposed Addition to the Establishments of the Gun Factories in the United States, 172
 Report on the Manufacture of Coke, J. D. Weeks, 247
 Stability of Ships, Sir E. J. Reed, 130
 Technological Dictionary of the Physical, Mechanical, and Chemical Sciences, F. J. Vershoyer, 422
 Technologisches Wörterbuch in Englischer u. Deutscher Sprache, von Otto Brandes, 422
 The Works Manager's Handbook of Modern Rules, Tables, and Data for Civil and Mechanical Engineers, Millwrights, Boiler Makers, &c., W. S. Hutton, 443
 Theory of Deflections and of Latitudes and Departures, J. W. Smith, 87
 Treatise on Valve Gears, by Dr. Gustave Zeuner, Translated from the German, 200
 Liverpool and Manchester Railway, Cost of Locomotive Power for Six Months, 97
 MACHINE TOOLS, Messrs. Hulse and Co., 369
 Mackinnon Pen, The, 250
 Madagascar, 17
 Madras and Colombo Harbours, 227
 Madras Railway, Calcutt Extension, 472
 Madras Railway, Girders for Beypore and Kallai Bridges, 472, 476
 Magnesia Mine, A Great, 220
 Magnetisation, Variations caused by, in the Length of Iron, Steel, and Nickel Rods, 414
 Malet, Mr., Solid Barbed Wire Fencing, 445
 Malleable Iron, On the Properties of, Deduced from its Microscopic Structures, 395
 Malmindot Viaduct, Montauban and Cahors Railway, 223, 231
 Manchester, Sheffield, and Lincolnshire Railway, Express Engine (Supplement, January 2, 1885), 2, 7
 Manchester Ship Canal, The, 442
 Manchester and Thirlmere, 37
 Manchester Ship Canal Bill and Tidal Scour, 276
 Mansion House and Bank Subway, 51
 Marine Boiler by Road, Transporting, 279, 282
 Marine Boilers, Efficiency of, 277, 279, 283
 Marsden, Mr. H. R., Stone Breakers, 484
 "Mason" Passenger Locomotive, 26, 28
 Massey, Mr. W. H., 180
 "Materials of Engineering," from the "Indicator," 225
 Matthew's Sand Blast Apparatus and Process, 466
 Mayhew's Patent Boiler Feeder Co., Boiler Feeder, 425
 Measuring a Vessel's Stability, On a Mechanical Method of, 255
 Mechanical Experiments, Conduct of, 30
 Merchant Shipping, Increase in, 482
 Mersey, Improvement of the, 163
 Messenger and Co., Messrs., Full-way Valve, 379
 Metallic Permanent Way, Inventions Exhibition, 464
 Meteorological Progress, 246
 Metropolitan Board, The Work of the, 386
 Metropolitan and Metropolitan District Railway, The, 175
 Mew Island Lighthouse, Belfast Lough, 25
 Michell, Mr. W. M., 238
 Midland Railway, Obstructing the, 270
 Mileage of Screw Shafts, 362
 Mill, Break-Roller, Mr. J. Harrison Carter, 40
 Mill Engines, Powerful, Messrs. Goodfellow and Matthews, 448
 Mill and Purifier Feed, Self-Regulating, Mr. J. E. Walsh, 497
 Mill, Three-High Roller, Mr. J. H. Carter, 40
 Miller's Ribbon Wire, 280
 Miller's Coupled Buffers, 213
 Mineral Wealth of Annam and Tonquin, French Commission to Inquire into, 18
 Miners' Safety Lamps, 51
 Miners' Strike, The, 320
 Mines, Drainage in South Staffordshire, 68
 Miscellaneous, S. 23, 43, 65, 79, 105, 123, 147, 167, 183, 203, 239, 263, 281, 295, 313, 335, 367, 381, 399, 415, 435, 455, 475, 495
 Miscellaneous Exhibits at the Inventions Exhibition, 424, 432, 452, 491
 Mogul Engine, American, 300, 306
 Moncrieff Hydro-Pneumatic Carriage, Trial of, at Shoeburyness, 284
 Monochromatic Telescope, On, a 391
 Morse Cotton Press, The, 304
 NAPIER, Mr. Robert D., 387
 Natural Gas Fuel and its Application to Manufacturing Purposes, 395
 Naval Architecture at the Inventions Exhibition, 388
 Naval Engineer Appointments, 37, 47, 64, 109, 122, 143, 197, 206, 220, 243, 280, 295, 322, 341, 351, 382, 419, 452, 487, 494
 Navy, The, 82, 180
 Navy and the Admiralty, The, 319
 Needed Improvement, A, 284
 New River Bridge betwixt Durham and Sunderland, 464
 New South Wales, Increase in the Population of, 429
 Newton's Law of Motion, 129, 163, 187, 213, 217, 224, 242, 311, 342, 380
 Newton's Third Law, 129, 163, 187, 213, 224
 New Streets and Model Dwellings, 284
 New York State Survey, The, 143
 New York Water Supply, 187
 Nicol's Prism, On the Use of, 195
 Nile Expedition, The, 96
 Nordenfolt, Quick-Firing Six-pounder Gun, The, 99
 North British Borneo, 209
 North British Railway, The, 284
 North of England, 16, 36, 56, 75, 92, 118, 136, 157, 176, 196, 215, 234, 252, 273, 291, 308, 326, 344, 374, 393, 411, 428, 449, 468, 488, 509
 "Norwich" and "Ipswich," Great Eastern Railway Co.'s Steamboats, 71
 Notes from Lancashire, 16, 36, 56, 74, 92, 117, 136, 156, 176, 196, 214, 234, 252, 272, 290, 308, 326, 344, 374, 392, 410, 428, 448, 468, 488, 508
 Notes and Memoranda, S. 23, 43, 65, 79, 105, 123, 147, 167, 183, 203, 221, 239, 263, 281, 295, 313, 335, 367, 381, 399, 415, 435, 455, 475, 495
 Notes from Scotland, 17, 37, 57, 75, 93, 118, 137, 157, 177, 197, 215, 235, 252, 273, 291, 309, 327, 345, 374, 393, 411, 429, 449, 469, 488, 509
 Notices to Correspondents, 9, 29, 49, 67, 85, 107, 129, 149, 169, 189, 207, 227, 245, 265, 283, 301, 319, 337, 361, 385, 403, 421, 441, 461, 481, 501

Nottingham, Mr. A. Brown on Five Years' Municipal Work at, 402
 OBITUARY:
 Barlow, Mr. Peter Wm., 422
 Dupuy De Lome, M., 109
 Jackson, Mr. Thomas, 50
 Jenkin, Prof. Henry Charles Fleeming, 483
 Michell, Mr. W. M., 238
 Napier, Mr. Robt. D., 387
 Samuda, Mr. J. D'Aguiar, 338
 Thomas, Mr. Sidney Gilchrist, 181
 Westinghouse, Mr. Geo., 104
 Ocean Dock Scheme, The, 83
 Oil, Gritty, 452
 Old Broad-street, Proposed Widening of, 458
 Ore Wagon and Draw Hook, Athus, 241
 Ornamentation of Works in Iron, Appropriate, 69
 Our Friend the Foreigner and his Wares, 209
 Oxygen, Cheap, 83
 PADDLE Steamers for the Nile, 350
 Paint Mills, 271
 Palestine, Enterprise in, 166
 Pall Mall Pavement, The, 209
 Panama Canal, The, 34
 Park Hill Hospital, Liverpool, 44, 45
 Park and Pryce, Messrs., Train Protection Bar, 456
 Parson, Mr., Detachable Boring Tools, 465
 Parson's Patent High-speed Engine, 353
 Patent, Another "Fundamental," 494
 Patent Law, Continuity in, 162
 Patent-office Delays, 501
 Patent-office Joke, A, 426
 Patents, Official Examination of, 245
 Paving of the New London Street, 482
 Peck's Relieved Slide Valve, 173
 Percy, Dr., Presidential Address, 385, 389
 Permanent Way, Metallic, Inventions Exhibition, 464
 Pen, The Mackinnon, 250
 Penistone Railway Accident, The, 190
 Petroleum as a Fuel, Use of, 351
 Phosphates, Separation of, from Slag after the Thomas-Gilchrist Process, 90
 Photographing to Scale, 351
 Pickering, Mr., Hoist Gear with Automatic Clutch, 434
 Pier at St. Anne's-on-the-Sea, The New, 503
 Pipe Flange, 233
 Piston Rings, Lockwood and Carlisle's, 181
 Pistons, Messrs. Durham and Churchill, 231, 243
 Planing Machine, Messrs. Sharp, Stewart, and Co., 473
 Pictograph, Mr. C. H. Hinton on the, 91
 Polarising Prisms, Some New Forms of, 195
 Polychromatic Printing, 33
 Poore, Dr., on Climate and its Relation to Health, 91, 135
 Port Pirie, Deepening, 91
 PORTFOLIO OF WORKING DRAWINGS:—
 Four Wheels Coupled Passenger Engine, Midland Railway (Supplement, May 8)
 Power for Wood-working Tools, 414
 Presses, The Stiles and Parker Press Company's, 145
 Preventing Shortness of Water in Steam Generators, 127
 Price's Patent Spiral Candle-making Machine, 491
 Printing Establishments in New South Wales, 17
 Private Bill Legislation, 172, 180, 230, 251, 266, 324, 398, 478
 Private Bills in Parliament, 180
 Private Bills, Progress of, 109
 Private Legislation, Prospective, 69
 Private Way Risks, 482
 Proof Tests, 276
 Propeller for Shallow Draught, The Most Suitable, 256
 Public Health, 145, 445
 Pulley, A Large, 42
 Pump, Vertical, Messrs. George Scott and Son, 452
 Pump, Steam, Mr. Joseph Bernays, 356
 Pumping Engines for the Hydraulic Machinery, Port of Buenos Ayres, 185, 188
 Pumping Machinery, 29
 Pumping Machinery, Direct-acting, 204, 205
 Putney and Hammersmith Bridges, The, 108
 RADIAL Valve Gears, Robert Hudson Graham on, 431, and June 29th, 1883, pp. 497-9
 Radiation, Recent Researches on, 271
 Rail Exports, Our, 171
 Rail Joints, 224
 Railway Accident, 152
 Railway Accidents, 135
 Railway Accident in Russia, 502
 Railway Bills, The, 202
 Railway Carriage Window, Mr. H. C. Gover, 478
 Railway Coupling and Brake Power Regulations, Germany, 427
 Railway, The Edinburgh Suburban and South Side Junction, 365
 Railway Extension, 206
 Railway Fatalities, Nine Months', 166
 Railway Joint Chairs, Mr. T. G. Hardie, 231
 Railway Matters, S. 23, 43, 65, 79, 105, 123, 147, 167, 183, 203, 221, 239, 263, 281, 295, 313, 335, 367, 381, 399, 415, 435, 455, 475, 495
 Railway, The Metropolitan, 350
 Railway Passenger Traffic, 47
 Railway Preferences, 502
 Railway Rates, 27, 67, 83, 151, 191, 462, 502
 Railway Rates, Augmented, 27
 Railway Rates and Charges, 191, 462
 Railway Rates and Foreign Competitions, 502
 Railway and Sea-borne Coal, 209
 Railway Signals, 187, 213, 225, 243
 Railways for India, 270
 Railways of the World, 116
 Rails, Creeping of, 85
 Rails and Fastenings for Danish State Railways, 210, 211
 Raising Sunken Ships, 224
 Rating of Coal Colonies, 50
 Rating of Machinery, 55, 502
 Ratio of Contraction of Area to Extension, 458, 487
 Ratio of Contraction of Area to Elongation in Tested Bars, 439
 Reed, Sir Edw., on Hydro-mechanics, 454
 Renscheid Waterworks, The, 219, 226, 235, 244, 287, 288
 Renscheid Waterworks, Details of Pumping Engines, 288
 Renscheid Waterworks, Plan and Profile of Supply Area, 287, 288
 Resistance to Rolling, Prof. R. H. Smith on, 413
 Reynolds, Prof. O., on the Theory of the Indicator and Errors in Indicator Diagrams, 454
 Rice Mills for the East, 135
 Richmond Water Supply, The, 482
 River Pollution, Professor Robinson on, 195
 Rivers Running into Tideless Seas, 366
 Rivetted Joists, Experiments on, 390
 Rivetter, Messrs. Anderson and Galloway, 491
 Rivetting Machines, 69
 Robson, Mr., Gas Hammer, 424
 Rock-borers, Automatic Feed of, 487
 Rock Drill for Mining, The Barrow Machine, 457
 Rocket, The, 26, 47, 64, 127, 146, 186
 Rolling, Professor R. H. Smith on Resistance to, 413
 ROYAL INSTITUTION, 37, 270
 Liquid Films, a Soap Bubble, Prof. A. W. Rücker, 323
 Sources of Electricity, Prof. Tyndall, 22, 89
 Sunlight and the Earth's Atmosphere, Prof. S. P. Langley, 323
 ROYAL METEOROLOGICAL SOCIETY:
 Exhibition of Sunshine Recorders, 102
 Royal Scottish Corporation, Wm. Templeton, 321
 St. Helen's Waterworks, Knowsley Pumping Station, 416, 419, 436
 St. Petersburg and Cronstadt Maritime Canal, 427

Samuda, Mr., 338
 Sand Blast Apparatus and Process, Matthewson's, 466
 Saw, The Britannia Company's Treadle, 204
 Saw, New Foot Power, 204
 Schnetze's Foundry Sand Mixer, 181
 Schrabetz's Anti-fluctuator for Gas Engines, 166
 School of Forestry, Proposed, 481
 Science and Art in Connection with Buildings, Mr. W. Goldstraw on, 402
 Scientific Mistake, A, 383
 Scott and Son, Messrs. George, Vertical Pump, 452
 Screw-cutting Tool, The Gardner and Woodbridge, 190
 Screw Shafts, Broken, 190
 Seddon, Lieut.-Col. H. C., Appointment to Portsmouth, 278
 Selected American Patents, 18, 38, 58, 76, 94, 120, 138, 158, 178, 198, 216, 236, 254, 274, 292, 310, 328, 346, 376, 394, 412, 430, 450, 470, 490, 509
 Selenium, Mr. Shelford Bidwell on the Action of Light in Diminishing the Resistance of, 414
 Separator for Steam Boilers, 503
 "Servia" in a Gale, The, 229
 Sewage at Aylesbury, Experiments on, 501
 Sewage Question, The, 154
 Sewer, Bursting of a, 459
 Sewerage Works, Abergavenny, 102
 Shaft Coupling, Mr. Jamieson, 21
 Shaft-sinking Machinery, American, 114, 145
 Shaping Machine, Heavy, 333, 334, 351
 Sharp, Stewart, and Co., Messrs., Bottomley's Radial Axle-boxes, 473, 474
 Sharp, Stewart, and Co., Messrs., Planing Machine, 473
 Sharp, Stewart, and Co., Messrs., Portable Boiler Drilling, 473
 Sheffield Correspondent on Steel Tubes for Ordnance, Our, 154
 Sheffield District, 16, 36, 56, 74, 92, 118, 136, 157, 176, 196, 214, 234, 252, 272, 291, 308, 326, 344, 374, 392, 410, 428, 448, 468, 488, 508
 Sheffield Steel and the Gun Factories, 31
 Sheffield Steel for Heavy Ordnance, 228
 Sheppard and Sons, Messrs., Coal-washing Machinery, 445
 Shipping Bounty Scheme, Failure of the, 171
 Shipping Coal at Bristol, 127
 Shipping Freights, 266
 Ship Canal, Proposed New, 91
 Ship Railway for Canada, A, 137
 Ships, The Forms of, Sir Edw. Reed on, 454
 Ships, Our New, 301
 Ships, Steel, 303
 Ships of War, Practical Measurement of the Comparative Fighting Efficiency of, 938
 Slag, Articles made of, exhibited by Mr. A. Lippett, at the Antwerp Exhibition, 402
 Sleeping Cars, The First, 6
 Slide Valves, Balanced, 343
 Slide Valves, Friction of—see Friction of
 Slide Valve, Relieved, 173
 Sliding Scale in Iron Mining, The New, 320
 Sliding Scales in Iron Mining, 246
 Sliding Scales in the Coal Trade, 387
 Sloan and Hawks, Messrs., Automatic Brake, 427
 Slotting and Keyway Cutting Machine, Portable, 166
 Smoke-Fog, a Five Ton, 382
 Shoeburyness Explosion, The, 224
 Shoeburyness, Fatal Accident at, 191
 Shoeburyness, The Shell Explosion at, 207
 Side Armour v. Horizontal Armour, 122
 Siemens Bros. and Co., Messrs., Raworth's Friction Driving Gear, 397, 441
 Signalling of the London and North-Western Railway, 439
 Silk Cannon, 127
 Simon-Carves Coking Process, Recent Results and Further Development of the, 395
 Sintz Boiler Feeder, The, 141
 Sir Henry Bessemer for New South Wales, A, 108
 Soc. Lyonnaise à Paris, 50-horse Power Horizontal Engine, 479, 480
 SOCIETY OF ARTS, 25, 109
 Climate in its Relation to Health, Dr. Poore, 91, 135
 Medals Awarded by, 467
 Prizes for Essays on "London Reconstruction," and "Housing of the London Poor," 463
 Results of the Examinations, 434
 Society, Bath and West of England, 5, 57
 Society of Civil Engineers, The American, 447
 SOCIETY, CIVIL AND MECHANICAL ENGINEERS', 391
 Appropriate Ornamentation of Works in Iron, Mr. G. Richards Julian, 69
 Indian Railway Network, 1884, Mr. Houghton, 146
 Steel Guns, Lieut. Charles Berthon, 220
 Visit to the Works of the new Hammersmith and Putney Bridges, 414
 SOCIETY OF ENGINEERS:
 American Engineering Enterprise, Mr. Arthur Rigg, 182, 206
 Cable Tramways, W. Newby Colam, 391
 Society of Engineers, The Amalgamated, 302, 324
 SOCIETY, KING'S COLLEGE ENGINEERING:
 Aerial Navigation, Mr. P. W. Adams, 195
 Construction of Locomotives, Mr. V. I. Bouton, 423
 Fuel, Mr. Collis, 271
 Heat in its Relation to Combustion, Mr. R. B. Anderson, 341
 Incandescent Lamps, Mr. W. P. Adams, 464
 Lighthouse Construction, Mr. C. H. Wordingham, 454
 Lighthouse Illuminants, Mr. C. H. Wordingham, 225
 Petroleum as a Fuel, Use of, Mr. Smith, 351
 Recent Marine Engineering, Mr. Duncan, 195
 Steel, Mr. C. W. Atkinson, 135
 SOCIETY, THE LIVERPOOL ARCHITECTURAL:
 Science and Art in Connection with Buildings, Mr. W. Goldstraw, 402
 SOCIETY, THE LIVERPOOL ENGINEERING:
 Recent Progress in the Public Supply of Hydraulic Power, Mr. E. B. Ellington, 116, 232
 Relation between Engineering and Architecture, Mr. Goldstraw, 343
 Science and Art in Connection with Buildings, Mr. W. Goldstraw, 402
 SOCIETY, MANCHESTER GEOLOGICAL:
 Automatic Safety Lamp, Mr. J. S. Burrows, 51
 SOCIETY OF MECHANICAL ENGINEERS, THE AMERICAN:
 Computation of Energy, Mr. Robert H. Thurston, 506
 SOCIETY, THE METEOROLOGICAL:
 The Equivalent of Beaufort's Scale in Absolute Velocity of Wind, Dr. W. Koppen, 426
 Note on a Peculiar Form of Auroral Cloud seen in Northamptonshire, Rev. Jas. Davis, 426
 The Temperature Zones of the Earth Considered in Relation to the Duration of the Hot, Temperate, and Cold Period, and to the Effect of Temperature on the Organic World, Dr. W. Koppen, 426
 Velocities of Winds, their Measurement, Lieut.-Col. H. S. Knight, 426
 SOCIETY, THE PHYSICAL, 156
 Calculating Machines, Mr. Joseph Edmondson, 307
 Characteristic Curves of Incandescent Lamps, Prof. J. A. Fleming, 271
 Comparison between the Mercury Standards of Resistance Issued by M. Mascart with those of the British Association, Mr. E. T. Glazebrook, 494
 Determination of the Heat Capacity of a Thermometer, On the, Mr. J. W. Clarke, 391
 Error Involved in Prof. Quinke's Method of Calculating Surface Tensions from the Dimensions of Flat Drops and Bubbles, Mr. A. M. Worthington, 494
 Evaporation and Dissociation, On, Prof. W. Ramsay and Dr. S. Young, 391
 Experiments showing the Variations caused by Magnetisation in the Length of Iron, Steel, and Nickel Rods, Mr. Shelford Bidwell, 414
 Further Experiments in Spectrum Analysis, Mr. C. Cleminshaw, 271
 Lecture Experiments on Spectrum Analysis, Mr. C. Cleminshaw, 91

- SOCIETY, THE PHYSICAL (*continued*).—
 Manner in which Light Affects the Resistance of Selenium and Sulphur Cells, Mr. Shelford Bidwell, 494
 Model Illustrating the Propagation of the Electro-Magnetic Wave, Dr. S. P. Thompson on a, 391
 Monochromatic Telescope, On a, Lord Rayleigh, 391
 Note on the Action of Light in Diminishing the Resistance of Selenium, Mr. S. Bidwell, 414
 Note on the So-called Silent Discharge of Ozone Generators, Mr. W. A. Snenstone, 391
 On Certain Cases of Electrolytic Decomposition, Mr. J. W. Clark, 414
 On the Spectral Image Produced by a Slowly Rotating Vacuum Tube, Mr. Shelford Bidwell, 414
 On the Use of Nic I's Prism, Mr. I. C. McConnel, 195
 Polograph, The, Mr. C. H. Hinton 91
 Recent Researches on Radiation, Capt. Abney, 271
 Self-recording Stress and Strain Indicator, Prof. H. S. H. Shaw on a, 391
 Sir W. Thomson's Quadrant Electrometer, Dr. John Hopkinson, 271
 Some New Forms of Polarising Prisms, Mr. H. G. Madan, 195
 Structure of Mechanical Models Illustrating some Properties in the Ether, Prof. G. F. Fitzgerald, 307
 Theory of Illumination in a Fog, on the, Lord Rayleigh, 391
 Winding of Voltmeters, on the, Professors W. E. Ayrton and John Perry, 494
 Society, The Royal Agricultural, 356
 Soudan, Drinking Water for the, 172, 250
 Soudan Expedition, 220
 Soudan Railway, A, 130, 146, 149, 171
 Southampton Waterworks 141
 Society, Steam Engine Makers', 134
 South Kensington Museum, 46, 93, 120, 178, 205, 254, 310, 359, 409, 453, 505
 South Yorkshire Coalowners and the Railway Companies, 266
 Specific Heat and Latent Heat of Fusion, 459
 Specifications, Construction of, 127
 Spectrum Analysis, Lecture Experiments on, 91, 271
 Speed Gauge, Mr. K. Hedges, 503
 Spezia Plate Trials, Conclusion of the, 161
 Spring Compound Buffer and Draw, Messrs. L. Sterne and Co., 485
 Spring Wheel, Messrs. Aveling and Porter, 397
 Stability Balance, Heck's, 255
 Stagnation, H.M.S., 225
 Staiths, Movable Coal, Mr. S. Butler, 400, 402
 Standards of Length as Applied to Gauge Dimensions, Mr. George M. Bond, 447, 466
 Standards of Length and their Subdivision, 142, 143, 194
 Standards of Light, 302
 Stanford's London Improvements Map, 134
 Steam Boilers as Magazines of Explosive Energy, Mr. R. H. Thurston on, 506
 Steam Engine Economy, Practical, 462
 Steam Hammers, 438, 499
 Steam, How to Measure its Efficiency, 98
 Steam Pump, Direct-acting, 261
 Steamers on the Nile, 243
 S.S. St. André, Trial Trip of, 166
 Steamships, Economical, 21
 S.S. "Eastwood," Steel Boiler for, 477, 479
 Steamship Insurance, 108
 Steamship Trade, The, 68
 Steamship Trade in 1884, 21
 Steamships and Crews, 87
 Steamships and War Risks in Mutual Offices, 363
 Steam Tramway, Economical, 46
 Steam Tramways in London, 312
 Steam Trawling in Brazil, 243
 Steel, Mr. C. W. Atkinson on, 135
 Steel, Basic, 31
 Steel Boilers, 265
 Steel Guns, 5
 Steel Guns, Lieut. Chas. Berthon on, 220
 Steel and Iron Shipbuilding, 404
 Steel Plates for Bridge and Boiler Construction, 82
 Steel Plates, Cracking of, 83
 Steel Rails for the United States, 120
 Steel Ropes, 67
 Steel Tin Plates, 152
 Steel Tubes for Ordnance, our Sheffield Correspondent on—see *Sheffield Correspondent*
 Steering Gear, Epicycloidal, Mr. T. Archer, 493
 Stern Wheel Steamboat for Brazil, 306
 Sterne and Co., Messrs. L., Compound Buffer and Draw Spring, 485
 Stiles and Parker Press Company's Presses, The, 145
 Stockport Gas Engine, The, 192, 193
 Stone Breakers, Mr. H. R. Marsden, 484
 Storm Signal Service in Canada, 46
 Stothert and Co., Messrs. G. K., Horizontal Compound Condensing Engine, 420, 422
 Stowage of Steamships, On the, 255
 Strain Diagrams, 40-, 419, 499
 Strains on Circular Lock Gates, C. H. Romanes, 77
 Strand to Oxford-street, From the, 191
 Stratton Separator Company, The, 503
 Street Lighting in the City, 305
 Street Maintenance and Subways, 189, 212
 Street-Watering and Scavenging, 378
 Street's Indian and Colonial Mercantile Directory, 184-5, 206
 Strength of Mild Steel Plates and Rivets of Various Kinds used in Shipbuilding, 257
 Strength of Riveted Joints, Notes on the, 257
 Stress and Strain Diagrams, 408, 418
 Stress and Strain Indicator, On a Self-Recording, 391
 Stresses in Girders, Simple Method of Calculating, 139, 140
 Stresses on Roofs, 409
 Strike in the Coal Trade, The, 284
 Strike of Colliery Lads, A, 238
 Strike, The Miners', 320
 Strike on the Wear, 332
 Strike in Yorkshire, Effects on the Trade of the Recent, 462
 Strikes, An Unconsidered Aspect of Modern, 441
 Structure of Mechanical Models Illustrating some Properties in the Ether, 307
 Substitutes for Hard Wood, 246
 Suakim-Berber Military Telegraph, 341
 Suakim-Berber Line, The, 284
 Suakim-Berber Railway, The, 207
 Suakim and Berber Railway, Epitaph to the Memory of, 466
 Suakim and Berber Water-pipe, 206
 Sugar Pan, a Great Vacuum, 6
 Sugar Production, 503
 Sunlight and the Earth's Atmosphere, Professor Langley on, 323
 SUPPLEMENTS:
 Austrian Railway Diagrams for Estimating the Quantities of Girder Bridges, *May 22, and p. 398*
 Compound Locomotive with Patent Starting Gear, Great Eastern Railway, Mr. T. W. Worsdell, *May 15*
 Four-Coupled Express Locomotive, Midland Railway, Mr. Samuel Johnson, *February 6th, 1885*
 Surface Tensions, Mr. Worthington on Professor Quinke's Method of Calculating, 494
 TANGYE, Messrs., Gas Engine Governor, 424
 Tank Locomotive for Metropolitan Traffic, Great Eastern Railway, (*Supplement, March 13, p. 204*)
 Tanks for Suakim, 243, 277
 Tarakeswar Railway, The, 37
 Telegraphy in Time of War, 441
 Telephone and Telegraph Wires, 258, 265, 321, 343, 387
 Telephone and Telegraph Wire Question, The, 258, 265, 321, 343
 Templeton, Miss, 321, 343
 TENDERS
 Bray, Co. Wicklow, for Extension of Concrete, Mr. P. F. Comber, 195
 Darlaston Sewerage Works, Mr. E. Pritchard, 135
 Engine, Pumps and Tanks for West Ham Union, 507
 TENDERS (*continued*).—
 Farnham Main Sewerage, Mr. James Lemon, 135, 238
 Finchley Main Drainage, Mr. George W. Brumell, 210
 Gasworks for the Schools and Workhouse of Mitcham, 487
 Leicester, Borough Lunatic Asylum, Boiler for, Mr. J. Gordon, 312
 Leicester Sewage Works, Boiler, 7ft. 30in. long, Mr. J. Gordon, 312
 Luton Sewage Extension, 218
 Nar, Wrought Iron Highway Bridge Over the, Mr. E. G. Mawbey, 154
 North Bridge and Woodgate Improvements, 339
 Nottingham Corporation, New Cattle Market, 439
 Penrhynendraeth Main Sewerage, Mr. Thomas Roberts, 398
 Wednesbury Sewerage Works, E. Pritchard, 339
 Wellington Waterworks, Mr. E. Pritchard, 135, 218
 Tested Bars, Ratio of Contraction of Area to Elongation in, 419
 Testing Machine, Mr. Wicksteed, 357
 Theoretical Duty of Heat in the Steam Engine, On the, 256
 Thermometer, On the Heat Capacity of a, 391
 Thermometers, The Astronomer Royal on, 456
 Third Law of Motion, Professor W. H. H. Hudson on the, 199
 Thomas, Mr. Sidney Gilchrist, 131
 Thurston, Mr. R. H., on Steam Boilers as Magazines of Explosive Energy, 506
 Tidal Action, 64
 Tibury, New Deep Water Docks at, 260, 262, 317, 351, 355, 408, 439, 479
 Timber, The Preservation of, 503
 Tin Can's Mission, The, 398
 Tin Trade, 143
 Tipton Gasworks, The, 87
 Torpedo Corps, Volunteer, 404
 Torpedo Vessels, Foreign, 100
 Torquay Waterworks, 338
 Toulet, M., Captive Balloon Exhibited at Antwerp, 402
 Tower Bridge, The, 133, 359, 360, 361, 384, 439, 486
 Tower Bridge Scheme, The, 133
 Tower System of Electric Lighting, The, 181
 Towers, Mr., his Friction Experiments, 179
 Town Heating by Steam, 162
 Trade, Our Falling, 130
 Traders and the Railway Bills, 130
 "Traveller's Rest," The, 228
 Train Protection Bar, Messrs. Park and Pryce, 456
 Tram-car Guard and Rail Cleaner, Mr. H. Conradi, 484, 455
 Trevithick Memorial, 417, 434, 487, 499
 Trevithick Monument and No Monument, A, 458
 Tripler, Mr., Spherical Eccentric, 417
 Triple Compound Engine, Some Further Experience with, 256
 Trossin's Superheated Steam Engine, 249, 250
 Trotter's Wire Gauge, Messrs. Walter T. Glover and Co., 181, 473
 Tug Boat Paddle Wheels, 144, 146
 Tug Boat, Messrs. A. Shanks and Co., 144, 146, 148
 Tullis, Mr. J., on Driving Belts and Ropes, 507
 Turbine Governor, Mr. Hebt's, 503
 Twin Screws, MacLaine's, 315
 UNITED STATES CRUISERS, 422
 U.S. Despatch Boat "Dolphin," The, 442, 446
 United States Patents for Inventions Previously Patented Elsewhere, Duration of, 276
 University College, Bristol, Engineering Department, 280
 VACUUM, Apparatus for the Production of a, 332
 Vacuum Brakes, Jerks in Trains, 438
 Value of Vessels, 50
 Valve, Full-way, Messrs. Messenger and Co., 379
 Vice, Parallel Grip, Coventry Machinists' Co., 478
 Victoria Electric Lighting Installation, 5
 Vienna Storm, The, 466
 VISITS IN THE PROVINCES:—
 Messrs. Greenwood's Mill, Blackburn, 39, 41
 Voltmeters, Professor Ayrton and John Perry, on the Winding of, 494
 WAGES of British Workmen, 130
 Wagon Builders, Special Plant for, 35
 Wagon Coupling, Mr. R. Morris, 365
 Wales and Adjoining Counties, 17, 37, 57, 75, 93, 119, 137, 157, 177, 197, 215, 235, 253, 273, 291, 309, 327, 345, 375, 393, 411, 429, 449, 469, 489, 509
 Wallasey Ferry Boats, "Snowdrop" and "Crocus," 336, 340
 Walsh, Mr. J. E., Self-regulating Mill and Purifier Feed, 497
 War and Commerce, 299
 War Material at the Inventions Exhibition, 396, 413
 War Vessels, Old, 356
 Washer-scrubber, Phoenix Gas, Messrs. G. Waller and Co., 378
 Water Analysis, Mr. R. B. Anderson on, 454
 Water Gauge, False, 34
 Water Gauges, 269
 Water Motors, 280
 Water Purification by Iron on a Large Scale, 487
 Water Purifying Apparatus, Messrs. Easton and Anderson, 372
 Water Supply in Lancashire, 130
 Water Supply of London, 49
 Water Supply to London, Official Project for, 29
 Water Supply by Meter, Advantages and Results of, 402
 Water Supply in the Soudan, 191
 Water Supply for the Suakim-Berber Route, 186
 Wave Theory of Light, The, Prof. Oliver Lodge on, 40
 Wear Coal Shipments, The, 229
 Weather Signals in the United States, 5
 Wedding, Dr., on the Properties of Malleable Iron, 3
 Weight, Virtue of, 49
 Weimer, Mr. P. L. Eight Column Double-air Cylinder Blowing Engine, 3
 Well Curb, Indian State Railways, 24
 Wenham Light, The, 363
 Westgarth, Mr. W., Society of Arts Prize Essays, 463
 Westinghouse, Brake, The, 130
 Westinghouse, Sen., Mr. George, 104
 Wheel Tooth Cleaning Machine, 314
 Wheels for South Mahratta Railway, 258
 Wheels for a Steam Roller, 87
 Whip Crane, Messrs. Appleby Bros., 493
 Whitworth Scholarships, 51
 Wire's Spring Hinge, 141
 Wilkesbarre, U.S.A., Wire Rope Manufactured at, 345
 Willan's, Mr. P. W., Arrangement for Forced Draughts, 256
 Winch, Steam, Messrs. Appleby Bros., 425
 Winchester, Cost of Sewage Pumping, 210
 Wind Pressure on Roofs, 83, 126
 Winding Machinery, Portable, 383
 Wire Fencing, Solid Barbed, Mr. Malet, 445
 Wire Gauge, Trotter's, 181, 473
 Wire Stretcher, The Dean, 219
 Wires Overhead v. Underground, Mr. Killingworth Hedges on, 426
 Wood-Cutting Machinery, Improvements in, 101
 Wood with Iron, Effect of Encasing, 494
 Wood-Working Tools, Power for, 414
 Woodhead's Steam Hammer, 296
 Wordingham, Mr. C. H., on Lighthouse Construction, 454
 Working Hours and Trade Depression, 169
 Wrightson, Mr. T., Centre Crane for Bessemer Casting Pits, 433
 YORKSHIRE Coal Trade, Crisis in the, 229
 Yorkshire Coal Industry, The, 190, 209
 Yorkshire Miners and Labour Representation, 31



