

PATENTS FOR INVENTIONS.

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ABRIDGMENTS OF SPECIFICATIONS.

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CLASS 64, HEATING,

[*Excepting* FURNACES AND KILNS; STOVES, RANGES,

AND FIREPLACES;

*for which see Abridgment Classes 51, FURNACES &c.; 126, STOVES &c.].*

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PERIOD—A.D. 1855-1866.

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OF THE OF THE STATE  
AND THE STATE  
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PRINTED FOR HIS MAJESTY'S STATIONERY OFFICE  
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## EXPLANATORY NOTE.

The contents of this Abridgment Class may be seen from its Subject-matter Index. For further information as to the classification of the subject-matter of inventions, reference should be made to the *Abridgment-Class and Index Key*, published at the Patent Office, 25, Southampton Buildings, Chancery Lane, W.C., price 1s., postage 6d.

It should be borne in mind that the abridgments are merely intended to serve as guides to the Specifications, which must themselves be consulted for the details of any particular invention. Printed Specifications, price 8d., may be purchased at the Patent Office, or ordered by post, no additional charge being made for postage.

## SUBJECT-MATTER INDEX.

Abridgments are printed in the chronological order of the Specifications to which they refer, and this index quotes only the year and number of each Specification.

Air and gases, Heating. *See* Heating air &c.

**Bed warmers and airers.** '56. 2675. '57. 152. '59. 2196. '63. 1903.

*Excepting* Hot-water bottles and similar heating-apparatus;  
*for which see that heading.*

Boilers. *See* Boiling-pans; Digesters; Egg-boilers, [*Abridgment Class* Cooking &c.]; Heating water &c.

**Boiling-pans.** '55. 737. 1141. 1586. 2016. '56. 422. 1077. 2278. 2619. 2895. '57. 721. 1026. 1573. 1704. 2054. 2241. 2448. 2971. '58. 588. 712. 1079. 1093. 1330. 2332. 2334. 2613. '59. 605. 1778. 2574. 2698. 2725. '60. 86. 1024. 2623. '61. 534. 779. 787. 1150. 1755. '62. 360. 614. 698. 1242. 1371. 2761. 2802. 2956. 3196. 3296. '63. 126. 577. 1657. 1824. '64. 101. 357. 699. 1615. 2834. '65. 1144. 1816. 2471. '66. 1887. 2269. 2671.

**Boiling-pans—cont.**

*Excepting* Digesters; Saucepans and cooking-kettles, [*Abridgment Class* Hollow-ware]; *boiling-pans* for Distilling, concentrating, evaporating, &c., [*Abridgment Class* Distilling &c.]; Paper and paper-making, [*Abridgment Class* Paper &c.]; and *kiers* for Bleaching, [*Abridgment Class* Bleaching &c.]; Dyeing, [*Abridgment Class* Bleaching &c.]; Fabrics, Finishing &c., [*Abridgment Class* Fabrics, Dressing &c.]; Spinning yarns &c., (*including* Preparation and treatment of fibres), [*Abridgment Class* Spinning]; Washing textile substances &c., [*Abridgment Class* Bleaching &c.]; Yarns and threads, Finishing &c., [*Abridgment Class* Spinning];  
*for which see those headings.*

coverings and compositions, non-conductors of heat. *See* Coverings &c., Non-conductors of heat.

furnaces for. *See* *Abridgment Class* Furnaces &c.

27-17-6

**Boiling-pans—cont.**

incrustation and corrosion, preventing and removing. *See Abridgment Class Steam generators.*

making by cutting and working metal. *See Abridgment Class Metals, Cutting &c.*

plastic compositions for. *See Abridgment Class India-rubber &c.*

stoves for. *See Abridgment Class Stoves &c.*  
vapours, consuming. *See Abridgment Class Furnaces &c.*

Brewers' coppers. *See Boiling-pans.*

Buildings and structures, Heating. *See Heating buildings &c.*

Cauldrons. *See Boiling-pans.*

Churches, Heating. *See Heating buildings &c.*

Circulating water and other liquids by heating. *See Heating water &c.*

Coppers or boiling-pans. *See Boiling-pans.*

**Coverings and compositions, Non-conductors of heat.** '55. 2625. '56. 14. 555. 1976. 2115. 2122. '57. 1. '58. 136. 423. 2413. '59. 651. 694. 2546. '60. 233. '62. 92. 1159. 2842. 3271. '63. 1423. 1650. 2846. 3082. 3196. '64. 2748. 3046. '65. 4. 864. 1775. 2480. 2853. '66. 1198. 1327. 1342. 2330. 3026.

**Digesters.** '56. 358. 798. 2619. 2751. '57. 778. 894. '58. 1143. 1283. '59. 589. 2574. '60. 1448. 2623. 3121. '62. 1662. '63. 467. 698. '64. 552. 773. '65. 93. 599. 1168. 1540. '66. 1014.

*Excepting Metals, Extracting &c., (digesters for), [Abridgment Class Metals and alloys]; Paper and paper-making, (boiling-apparatus), [Abridgment Class Paper &c.]; for which see those headings.*  
steam traps. *See Steam traps.*

Drainage traps or steam traps. *See Steam traps.*

Drying by heating. *See Abridgment Class Drying.*

Electric heating-apparatus. *See Heating by electricity.*

**Footwarmers, Carriage and like.** '55. 1118. '56. 1380. 2675. '57. 152. '59. 2196. '61. 38. '62. 393. 3210. 3439. '63. 899. '64. 2353. 2691. 3128. '65. 477. '66. 41.  
fuel for. *See Abridgment Class Fuel, Manufacture of.*  
stoves for heating. *See Abridgment Class Stoves &c.*

Footwarmers, [other than Carriage and like]. *See Bed warmers &c.; Boots &c., Making, [Abridgment Class Boots &c.]; Hot-water bottles &c.*

Geysers for heating water. *See Heating water &c.*

Glass houses, frames, and shelters for plants, Heating. *See Heating buildings &c.*

Halls, Heating. *See Heating buildings &c.*

**Heating air and other gases.** '55. 25. 523. 1004. 1118. 1345. 1489. 1544. 2016. 2154. '56. 110. 212. 943. 952. 1282. 1404. 2132. 2300. 2338. 2522. 2612. 3081. 3092. '57. 604. 666. 740. 1048. 1162. 1347. 1516. 1646. 2622. 3119. '58. 52. 60. 298. 545. 680. 740. 775. 877. 1580. 1763. 2700. 2962. '59. 65. 285. 1474. 1766. 2259. '60. 449. 732. 796. 830. 983. 1340. 1373. 1851. 1899. 3027. '61. 53. 503. 689. 957. 1796. 2084. '62. 263. 552. 1439. 2127. 2656. 2802. 2905. 3254. 3463. '63. 528. 1052. 1539. 1824. 1928. 2266. '64. 904. 1178. 1615. 2666. 2937. '65. 255. 636. 1992. 2255. 2535. 2935. 2996. '66. 545. 606. 1450. 1623. 2376. 2416. 2486. 2744. 3036. 3179.

*Excepting Air and gas engines &c., [Abridgment Class Air and gas engines]; Blast for blast furnaces &c., [Abridgment Class Iron &c.]; Furnaces and kilns, [Abridgment Class Furnaces &c.]; Lamps &c., (heating air in), [Abridgment Class Lamps &c.]; Motor road vehicles, (heating), [Abridgment Class Locomotives &c.]; Railway and tramway vehicles, (heating), [Abridgment Class Railway &c. vehicles]; Road vehicles, (heating), [Abridgment Class Road vehicles]; Stoves &c., [Abridgment Class Stoves &c.]; Superheaters, Steam, [Abridgment Class Steam generators]; for which see those headings.*

lamps and burners for. *See Abridgment Class Stoves &c.*

moulding plastic and powdered substances for. *See Abridgment Class Moulding &c.*

obtaining motive power by. *See Abridgment Class Air and gas engines.*

pipes and tubes. *See Abridgment Class Pipes &c.*

radiators. *See Heating buildings &c.*

thermostats. *See Thermostats &c.*

vapour, [not further specified], superheating. *See Abridgment Class Steam generators.*

**Heating-apparatus and methods of heating,** [not indexed elsewhere]. '55. 2609. '56. 212. '59. 2196. '62. 3439. '63. 181. 1824. 3278. '64. 2811. '65. 2096. '66. 811. 1693.

coverings and compositions, non-conductors of heat. *See Coverings &c., Non-conductors of heat.*

pipes and tubes, cleaning. *See Abridgment Class Pipes &c.*

thermostats. *See Thermostats &c.*

**Heating buildings and structures.** '55.

25. 73. 346. 2757. '56. 536. 1404. 1468. 1686. 1755. 2217. 2300. 2612. '57. 400. 740. 1347. 1994. 2211. 2647. 3119. '58. 52. 60. '59. 65. 277. 1142. 1770. 1970. 2931. 2935. '60. 376. 1340. 1371. 2858. '61. 689. 2045. 2120. 2740. 2796. '62. 1193. 1516. 1853. 1942. 1979. 2127. 2212. 2315. 2644. 2656. 2956. 3254. '63. 273. 718. 1352. 2116. 2266. 2566. 3015. 3094. 3278. '64. 342. 361. 1178. 1424. '65. 636. 989. 2610. '66. 346. 2396. 2734. 2755.

*Excepting heating* Foster-mothers and the like for rearing chickens &c., [Abridgment Class Agricultural appliances, Farmyard &c.]; Railway and tramway vehicles, [Abridgment Class Railway &c. vehicles]; Road vehicles, [Abridgment Class Road vehicles]; Ships, [Abridgment Class Ships &c., Div. I.];  
for which see those headings.

footwarmers. See Footwarmers, Carriage &c. furnaces and furnace fittings. See Abridgment Class Furnaces &c.

heating air or water for. See Heating air &c.; Heating water &c.

injectors and ejectors. See Abridgment Class Injectors &c.

lamps and burners for lighting, adapted also for heating. See Abridgment Class Stoves &c.

moistening heated air for. See Abridgment Class Air and gases, Compressing &c.

pipe connections for. See Abridgment Class Pipes &c.

steam-generating for. See Abridgment Class Steam generators.

steam separators. See Abridgment Class Steam generators.

steam traps. See Steam traps.

stoves and burners for heating. See Abridgment Class Stoves &c.

thermostats. See Thermostats &c.

ventilating by warm air. See Abridgment Class Ventilation.

**Heating by air circulation.** '57. 387. 1516.

'58. 60. 2586. '61. 957. '63. 1376. '66. 811.

*Excepting Heating buildings &c.*; Heating water &c.; Railway and tramway vehicles, (heating), [Abridgment Class Railway &c. vehicles]; Road vehicles, (heating), [Abridgment Class Road vehicles]; Ships, (heating), [Abridgment Class Ships &c., Div. I.]; Ventilation, [Abridgment Class Ventilation];  
for which see those headings.

fans for. See Abridgment Class Air and gases, Compressing &c.

heating air. See Heating air &c.

**Heating by chemical action or molecular combination.** '57. 152. '65. 1833.

'66. 447.

*Excepting Heating water &c.*; for which see that heading.

**Heating by electricity.** '62. 1516.

*Excepting Electric furnaces*, [Abridgment Class Electric lamps &c.]; Heating water and

**Heating by electricity—cont.**

*Excepting—cont.*

other liquids; Metals. Working by electricity, [Abridgment Class Electric lamps &c.];

for which see those headings.

regulating electric currents for. See Abridgment Class Electricity, Regulating &c.

**Heating by steam circulation.** '55. 73.

'56. 191. 212. '57. 387. 422. 507. '58. 508. 2586. '61. 22. '62. 2315. '63. 825. 1376. 1399. 3294. '64. 1178. '66. 811. 3048.

*Excepting Heating air &c.*; Heating buildings and structures; Heating water &c.; Ironing-machines &c., (heating), [Abridgment Class Washing &c.]; Railway and tramway vehicles, (heating), [Abridgment Class Railway &c. vehicles]; Ships, (heating), [Abridgment Class Ships &c., Div. I.];  
for which see those headings.

making apparatus by cutting and working metal. See Abridgment Class Metals, Cutting &c.

pipe joints and couplings. See Abridgment Class Pipes &c.

steam generators. See Abridgment Class Steam generators.

steam superheaters. See Abridgment Class Steam generators.

steam traps. See Steam traps.

thermostats. See Thermostats &c.

**Heating by water or other liquid circulation.** '55. 73. 1141. '57. 2647. '60.

376. '62. 2956. '63. 2575. '64. 1178. '66. 2567

*Excepting Heating air &c.*; Heating buildings and structures; Heating water &c.; Railway and tramway vehicles, (heating), [Abridgment Class Railway &c. vehicles]; Road vehicles, (heating), [Abridgment Class Road vehicles]; Ships, (heating), [Abridgment Class Ships &c., Div. I.]; Steam generators, [Abridgment Class Steam generators];  
for which see those headings.

heating water and other liquids for. See Heating water &c.

pipe joints and couplings. See Abridgment Class Pipes &c.

thermostats. See Thermostats &c.

**Heating, Heat-storing apparatus for.**

'59. 2574.

**Heating water and other liquids:**

*Excepting Boiling-pans*; Brewing, [Abridgment Class Beverages]; Churns, [Abridgment Class Milking &c.]; Cooking and kitchen apparatus &c., [Abridgment Class Cooking &c.]; Digesters; Distilling, concentrating, evaporating, &c., [Abridgment Class Distilling &c.]; Food-warmers, [Abridgment Class Cooking &c.]; Foster-mothers &c., (heaters for), [Abridgment Class Agricultural appliances, Farmyard &c.]; Furnaces &c., [Abridgment Class Furnaces &c.]; Hollow-

**Heating water and other liquids—cont.**

*Excepting—cont.*

ware &c., [Abridgment Class Hollow-ware]; Incubators, (heaters for), [Abridgment Class Agricultural appliances, Farmyard &c.]; Kettles, Tea and like, [Abridgment Class Hollow-ware]; Paper and paper-making, (boiling), [Abridgment Class Paper &c.]; Saucepans &c., [Abridgment Class Hollow-ware]; Spirits, Alcoholic, (mashing-apparatus), [Abridgment Class Beverages]; Steam generators, [Abridgment Class Steam generators]; Stoves &c., (boilers and water-heaters), [Abridgment Class Stoves &c.]; Superheaters, Steam, [Abridgment Class Steam generators]; Tea, coffee, cocoa, and like infusions, Apparatus for making, [Abridgment Class Tea &c.]; Vapour engines, (generators for), [Abridgment Class Steam engines]; Water &c. baths for laboratory use, [Abridgment Class Acids, alkalis, &c.];  
for which see those headings.  
air, heating for. See Heating air &c.  
apparatus combined with—  
baths. '60. 2084. '63. 1545.  
beer and other beverages, raising and drawing off, apparatus for. '64. 1606. 2869.  
chimneys and flues. '55. 346.  
churns. '56. 2363, [Appendix, page 115]. '62. 1768. '64. 2008.  
cooking-apparatus, field, camp, and like. '58. 2338.  
cooling granular, pulverulent, fibrous, and like materials, apparatus for. '66. 2571.  
distilling, concentrating, evaporating, and condensing liquids, apparatus for. '66. 1623.  
drying and airing clothes, apparatus for. '60. 1884.  
drying granular, pulverulent, and pasty materials, apparatus for. '66. 2571.  
fabrics, finishing and dressing, apparatus for. '58. 680.  
mangling and wringing machines. '60. 1884.  
mixing and agitating machines and appliances. '55. 1140. '56. 2363, [Appendix, page 115]. '62. 1768. 3192. '63. 2947. '64. 639. 2008. 2906.  
ovens, baking and cooking. '58. 2338.  
straining liquids, apparatus for. '59. 492.  
washing, domestic, laundry and like, appliances for. '60. 1884.  
yarns, sizing and dressing for weaving, apparatus for. '65. 2883.  
boilers. '55. 1004. 1141. 1586. 1692. 2016. 2850. '56. 111. 193. 466. 834. 880. 955. 1380. 2132. 2157. 2238. 2300. 2720. '57. 108. 437. 508. 721. 1075. 1495. 2229. 2399. 2441. '58. 49. 232. 1093. 1244. 1763. 1967. 2332. 2338. 2390. 2585. 2613. '59. 129. 1642. 1970. 2281. 2340. 2574. '60. 480. 589. 796. 983. 1326. 1340. 1884. 2578. 2813. 2858. '61. 243. 2108. 2796. 2866. '62. 6. 406. 2570. 2802. 2905. 2956. '63. 577. 948. 1019. 1052. 1352. 1824. 2087. 2253. 3055. 3294. '64. 342. 613. 679. 1178. 1400. 1424. 1663. 2000. 2088. 2828. '65. 4. 243. 390. 493. 1510. 1614. 2494. 2574. 2610. 2661. '66. 429. 1134. 1457. 1576. 1623. 1694. 2378. 2560. 2618. 2908. 3179. 3311. 3438. 3448.

**Heating water and other liquids—cont.**  
boilers—cont.

burners for heating. See Abridgment Class Stoves &c.  
cocks. See valves &c. below.  
coverings and compositions, non-conductors of heat. See Coverings &c., Non-conductors of heat.  
furnaces and furnace fittings. See Abridgment Class Furnaces &c.  
geysers. See geysers below.  
incrustation and corrosion, preventing and removing. See Abridgment Class Steam generators.  
making by cutting and working metal. See Abridgment Class Metals, Cutting &c.  
moulding plastic and powdered substances for. See Abridgment Class Moulding &c.  
safety-apparatus, [other than valves]. See safety-apparatus below.  
safety-valves. See valves &c. below.  
tubes, cleaning. See Abridgment Class Pipes &c.  
tubes, securing in tube-plates. See Abridgment Class Pipes &c.  
burners for. See Abridgment Class Stoves &c.  
by—  
air and gases. '55. 346. 2016. '56. 3091. '57. 183. 387. 496. 740. 2289. '58. 680. 1244. 1331. '59. 505. 930. '60. 1024. 2758. 2934. '61. 503. 663. 2084. 2108. 2796. '63. 718. 1019. 1352. 1545. '64. 716. 2545. 2828. 2869. '65. 2292. 2361. '66. 3179. 3448.  
electricity. '62. 1516.  
friction. '64. 2811.  
furnaces and kilns. See Abridgment Class Furnaces &c.  
gases. See air and gases above.  
lamps and burners. See Abridgment Class Stoves &c.  
liquids. '55. 1140. 2016. 2757. '56. 387. 2300. 2363, [Appendix, page 115]. 3091. '57. 183. 2247. '58. 298. '59. 930. 1627. 1766. 2152. 2944. '61. 1858. 2435. '62. 1768. 2434. 3192. '63. 584. '64. 342. 791. 1178. 1606. 2008. 2635. 2869. '65. 2361. '66. 1450. 3179.  
metal and other heaters. '57. 2247.  
molten metal. '61. 1795. '63. 1824.  
steam. '56. 212. 2157. 3091. '57. 183. 387. 437. 496. 2052. 2054. 2289. 2918. '58. 588. 877. 906. 2613. '59. 505. 930. 1627. 2043. 2944. '60. 478. 830. 1024. 1340. 2050. '61. 534. 861. 2435. '62. 1256. '63. 2116. 2947. 3032. 3294. '64. 639. 2213. 2545. 2635. 2869. 2906. '65. 509. 636. 1453. 2361. 2385. 2574. 2883. '66. 218. 1450. 3311.  
stoves. See Abridgment Class Stoves &c.  
trickling over heated surfaces. See surface apparatus below.  
waste gases. See air and gases above.  
water. See liquids above.  
cocks. See valves &c. below.  
coils. See boilers above; surface apparatus below.  
corrosion, preventing. See Abridgment Class Steam generators.

**Heating water and other liquids—cont.**

- cylinders, cisterns, reservoirs, and the like, in. '55. 1140. 2757. '56. 387. 2157. 2300. 2363. [Appendix, page 115]. 3091. '57. 183. 496. '58. 588. 1331. 1718. 2585. '59. 1766. 2044. '61. 534. 663. 964. 1858. 2084. 2391. 2435. '62. 1768. '63. 3032. '64. 716. 2869. 2906. '65. 636. 2361. 2574. 2883. '66. 1603. 2571.
- feedwater for steam generators, heating. See *Abridgment Class Steam generators.*
- for—
- baths. '55. 1004. 2757. '56. 193. 2818. '58. 49. 2585. '59. 505. '60. 2084. 2578. '61. 503. 2084. 2391. '62. 715. '63. 1545. 2253. '64. 613. '65. 2292. '66. 2618. 2908. 3438.
- bleaching. '56. 2157. '57. 2289.
- brewing. '57. 183. '59. 505. 2152. 2944. '61. 1858. 2435. '62. 3192. '63. 3032. '64. 2635.
- churns. '64. 2008.
- cooking. '58. 1093.
- distilling, concentrating, evaporating, and condensing liquids. '59. 505. '65. 243. '66. 1134.
- drying and airing clothes. '64. 613.
- drying animal and vegetable substances. '56. 955.
- drying-apparatus, [not specified]. '58. 680. 2613.
- drying fabrics. '64. 613.
- dyeing. '57. 2289. 2918. '59. 505. '63. 2116. '64. 639.
- fabrics, finishing and dressing. '57. 2289. '64. 639.
- fats and fatty matters, purifying. '65. 1453.
- filtering liquids, apparatus for cleansing. '65. 2385.
- gas, manufacture of. '56. 424. '65. 2184.
- glass houses, frames, or shelters for plants. '55. 2850. '56. 193. '57. 2441. '58. 1244. '61. 663. '62. 6. '64. 2828. '65. 1614. 2184.
- hats and other head coverings, sizing. '57. 2054.
- heating air and other gases. '56. 2132. '60. 1340. '65. 243.
- heating buildings and structures. '55. 1004. 1692. 2757. 2850. '56. 193. 834. 2720. '57. 508. 2229. 2399. 2441. '58. 49. 232. 740. 1244. 2585. 2613. '60. 732. 796. 1326. 1340. 2858. '61. 213. 503. 2391. 2796. '62. 6. 2570. '63. 718. 948. 1352. 3055. '64. 342. 1400. 2000. 2828. '65. 243. 390. 493. 1510. 2184. '66. 429. 1134. 1457. 2560. 3438.
- heating by water or other liquid circulation. '55. 1141. '56. 193. '58. 49.
- hot-water supply. '59. 505. '61. 503. 964. 2084. '64. 613.
- mixing and agitating machines and appliances. '64. 2008.
- oils, purifying. '65. 1453.
- ovens, baking and cooking. '65. 2184.
- paper and paper-making. '65. 2574.
- railway and tramway vehicles, heating. '56. 1380.
- road vehicles, heating. '56. 1380.
- ships. '61. 663. '66. 1134.
- spinning yarns and threads, (coccons, unwinding). '58. 906. '64. 716.

**Heating water and other liquids—cont.**

- for—cont.
- spirits, alcoholic, manufacture of. '61. 1858. 2435.
- sugar, cane and like, manufacture of. '62. 2434. '63. 584. '64. 2906. '65. 2385.
- ventilation. '65. 243.
- vinegar, manufacture of. '56. 3091.
- wash-houses and laundries. '58. 49.
- washing, domestic, laundry, and like appliances for. '58. 1093. 1331. 2585. 2989. '59. 505. '60. 1884. '61. 861.
- washing granular, powdered, and like materials. '66. 2571.
- washing textile substances and the like. '57. 2289. '58. 1331. '65. 2574.
- water, purifying and softening. '59. 505.
- yarns and threads, finishing and dressing. '64. 639.
- yarns and threads, sizing and dressing for weaving. '64. 639. '65. 2883.
- furnaces and furnace fittings. See *Abridgment Class Furnaces &c.*
- gas-heated apparatus immersed in liquid. See *portable apparatus below.*
- gas supply for. '56. 3091. '58. 740. '65. 2184.
- geysers. '58. 740. 1093.
- burners for. See *Abridgment Class Stoves &c.*
- cocks. See *valves &c. below.*
- gas supply. See *gas supply above.*
- water supply. See *water supply below.*
- heating feedwater. See *feedwater, heating above.*
- incrustation and corrosion, preventing and removing. See *Abridgment Class Steam generators.*
- injectors. See *Abridgment Class Injectors &c.*
- liquids, [other than water], heating. '55. 1140. 1978. 2016. '56. 2363. [Appendix, page 115]. 3091. '57. 183. 387. 437. 4967. 40. 2247. 2289. '58. 298. 588. 740. 1331. 1718. 2613. '59. 505. 930. 1627. 2043. 2152. 2944. '60. 480. 589. 1024. 2758. 2813. 2934. '61. 534. 1858. 2435. '62. 1768. 2434. 2905. 3192. '63. 584. 1052. 1824. 2566. 2947. 3294. '64. 639. 791. 1606. 1663. 2008. 2088. 2545. 2635. 2869. 2906. '65. 599. 1453. 2184. 2574. 2883. '66. 1693. 3311.
- pipes and tubes for. See *Abridgment Class Pipes &c.*
- portable apparatus. '55. 1586. 1978. '57. 437. '58. 298. '59. 2574. '60. 2084. '61. 1559. '62. 715. '64. 791. '65. 2361. '66. 3179.
- safety-apparatus, [other than valves]. '56. 1077. '60. 1007. '64. 613.
- special vessels, in, [other than cylinders, cisterns, reservoirs, and the like]. '55. 1141. 1586. 2016. '56. 2157. 2818. '57. 666. '58. 2989. '59. 505. '60. 1024. 2084. '61. 1559. '63. 2947. '64. 791. 2635. '65. 2385.
- stoves for. See *Abridgment Class Stoves &c.*
- surface apparatus. '55. 1004. 1140. 2016. '56. 424. 3091. '57. 183. 387. 496. 666. 2054. '58. 588. 740. 877. 1763. 2613. '59. 492. 505. 930. 1627. 1766. 2043. 2152. '60. 732. 830. 1024. 2050. 2813. '61. 534. 1795. 1858. '62. 263. 1256. 2905. '63. 1019. 1052. 2253. 2566. 2947. '64. 1178. 2008. 2213. 2906. '65. 636. 2292. 2661. '66. 218. 1134. 1450. 2571. 3179.



**Heating water and other liquids—cont.**  
systems of. '56. 2157. 2300. '59. 505. '61. 964. 2796. '62. 2434. '63. 584. 718. 2116. '64. 342. 613. '66. 2560.  
tanks and cisterns, construction of. *See Abridgment Class Hydraulic machinery &c.*  
tanks and cisterns, heating in. *See cylinders &c., in above.*  
thermostats. *See Thermostats &c.*  
vacuum pans. *See Abridgment Class Distilling &c.*  
valves and cocks. '58. 1244. 2585. '60. 480. '61. 534. '63. 1105. '64. 639. '65. 2184.  
water circulation, promoting in vessels other than boilers. '55. 1004. '56. 955. 2300. '57. 496. '65. 2883. '66. 2560.  
water, purifying and softening. '59. 505.  
water supply. '56. 2132. 2157. '57. 387. 437. '58. 2332. 2526. '59. 505. '60. 830. 1884. '63. 2087. '64. 613. 1663. '65. 493. '66. 1457. 1623.  
  
Heat regulators, Automatic. *See Thermostats &c.*  
  
**Heat-retaining chambers and the like.**  
'61. 1692. 3069. '65. 2986. '66. 2722.  
*Excepting Food-warmers, [Abridgment Class Cooking &c.];*  
*for which see that heading.*  
  
**Heat, Utilizing solar and natural.** '56. 1044. '65. 321.  
  
**Hot-water bottles and similar heating-apparatus.** '56. 2675. '63. 1903. '64. 2353.  
  
Insulating or non-heat-conducting coverings and compositions. *See Coverings &c., Non-conductors of heat.*  
  
Kettles or boiling-pans. *See Boiling-pans.*  
  
Kiers. *See Boiling-pans.*  
  
Lagging for steam boilers and the like. *See Coverings &c., Non-conductors of heat.*  
  
Liquids, Heating. *See Heating water &c.*  
  
Non-conducting coverings for heat. *See Coverings &c., Non-conductors of heat.*

Radiators. *See Heating buildings &c.*  
  
Regulators, Heat. *See Thermostats &c.*  
  
Solar heat, Utilizing. *See Heat, Utilizing solar &c.*  
  
Steam chests or digesters. *See Digesters.*  
  
**Steam traps.** '55. 73. 99. 207. 2682. '56. 191. 662. 1252. 1274. '57. 544. 733. 1128. 1355. 1456. 1871. 2268. '58. 1698. 2272. 2488. 2681. '59. 459. 976. 1835. '60. 1726. 2905. '61. 162. 786. 941. 2059. 2108. 2392. 3058. 3235. '62. 734. 833. 1822. 1942. 2162. 2405. 2816. 2890. '63. 645. 1633. 1829. 2383. '65. 2385. '66. 163. 1855. 1909. 3048. 3345.  
separating oil and grease from steam engine exhaust. *See Abridgment Class Steam engines.*  
  
Temperature, Regulating automatically. *See Thermostats &c.*  
  
Thermo-regulators. *See Thermostats &c.*  
  
**Thermostats and other apparatus for automatically regulating temperature.** '55. 86. 2545. 2652. '56. 1606. 1686. 1755. 2132. '57. 1678. 2269. '58. 644. 906. 2364. 2975. '59. 137. 2458. '60. 1338. 1340. 2858. '62. 734. 948. 970. 1268. '63. 2383. 3055. 3096. 3124. '65. 2184. 3268. '66. 76. 1470. 1913. 2068. 2353. 2728. 3351.  
fire and temperature alarms. *See Abridgment Class Fire, Extinction &c. of.*  
pressure-regulating valves *stated* to be applicable but not specially modified for. *See Abridgment Class Valves &c.*  
thermometers and pyrometers. *See Abridgment Class Philosophical instruments.*  
  
Vapour traps. *See Steam traps.*  
  
Warming-pans. *See Bed warmers &c.*  
  
Water, Heating. *See Heating water &c.*



## NAME INDEX.

The names in *italics* are those of persons by whom inventions have been communicated to the applicants for Letters Patent.

- Achard, F. F. A.* ..... '62. 1268  
 Adams, J. .... '62. 3196  
     " W. B. .... '57. 409  
*Alean, E.* ..... '63. 1829  
 Alcan, G. .... '63. 1829  
 Allan, A. .... '58. 2332  
*Andreau, E.* ..... '62. 2890  
 Ange, Marquis d'Auxy, G. C. ....  
     '66. 1693  
*Arbel, H. A. d'* ..... '59. 2574  
 Armstrong, J. .... '58. 2364  
 Ashwell, H. .... '61. 1755  
 Atkinson, M. .... '55. 2154  
 Auxy, G. C. Ange, Marquis d' .....  
     '66. 1693  
 Aydon, E. H. .... '65. 2661
- Bacon, S. T.* ..... '64. 2635  
 Bailey, J. .... '61. 3058. '63. 2383  
     " W. H. .... '61. 3058  
     " ..... '63. 2383  
 Baker, J. .... '66. 3351  
 Bakewell, F. C. .... '55. 1345  
     " T. H. .... '56. 110  
 Barclay, A. .... '55. 2545  
 Barron, W. .... '59. 2281  
 Bartlett, S. J. .... '63. 1105  
 Barton, G. .... '61. 787  
 Bateson, S. S. .... '60. 480  
 Batho, W. F. .... '65. 2494  
 Beauchamps, L. .... '64. 2748  
 Beaumont, J. .... '57. 2918  
 Belleville, J. F. .... '56. 1606  
*Bennett, J. B.* ..... '65. 1540  
 Bennett, R. .... '66. 2330  
 Bentley, T. .... '55. 1978  
 Betts, J. Y. .... '66. 2486  
*Ben, C.* ..... '65. 255  
 Bevan, E. .... '65. 4  
 Bewley, R. .... '60. 449  
*Bibet, J. M.* ..... '62. 3439  
 Blackburn, T. .... '58. 60  
 Blackwell, T. E. .... '56. 387  
     '2217  
 Blake, G. .... '62. 1439. '63. 273
- Blake, G. W. .... '63. 2383  
     " J. .... '63. 1633  
 Bleakley, J. .... '58. 2390  
 Blundell, W. .... '65. 2361  
 Bodmer, L. R. .... '64. 1615  
*Boettcher, L.* ..... '65. 255  
 Boffey, J. .... '65. 2480  
 Bolton, E. .... '62. 698  
     " J. A. .... '61. 689  
 Booth, E. .... '60. 2623  
     " T. .... '66. 2722  
 Botta, F. T. .... '55. 737  
*Boulard, —* ..... '56. 2751  
*Boullenger, J.* ..... '58. 1143  
 Boulton, M. P. W. .... '65. 1992  
*Bourrieff, J. B. M. A.* ..... '66.  
     2755  
 Bousfield, G. T. .... '56. 358  
     '57. 2054. '64. 2635. '66.  
     1913.  
 Bowden, T. .... '57. 733. 1871  
 Brandon, A. .... '55. 1004  
*Brasseur, G.* ..... '62. 2816  
 Bridge, D. C. .... '62. 2570  
 Brinsmead, H. .... '63. 1657  
 Brodie, D. .... '64. 2213  
 Brooman, C. .... '66. 2755  
     " R. .... '56. 662. 2751  
     '58. 2911. '59. 2931. '60.  
     3121. '61. 2392. '62. 1159  
     '63. 1903. '65. 599. 1540  
     2535.  
*Brown, C.* ..... '64. 1615  
 Browning, S. J. .... '62. 3192  
 Brun, P. .... '58. 775  
 Brunton, J. D. .... '66. 545  
 Buchanan, J. .... '57. 1646  
*Bulkley, H.* ..... '65. 2255  
 Büniger, F. L. H. W. .... '62. 2890  
     '66. 163. 1855  
 Burch, J. .... '60. 2623  
 Burgess, W. .... '66. 1887  
 Burnard, G. .... '66. 1198  
*Burton, C.* ..... '56. 1755  
     " T. .... '57. 1128. '64. 639  
 Butterworth, J. H. .... '61. 1795  
     1796
- Cabasson, F. D. P. J. .... '65. 1168  
 Calvert, F. A. .... '63. 1399  
 Cantelo, W. J. .... '56. 955  
 Carr, T. .... '63. 2947  
 Carter, G. .... '60. 86  
 Casartelli, J. L. .... '57. 1456  
 Cass, J. .... '61. 786  
 Chambor, J. A. M. T. .... '56. 952  
*Chameroy, E. A.* ..... '58. 49  
 Chapman, W. .... '56. 536  
*Charles, S.* ..... '58. 2989  
 Cheetham, D. .... '57. 108  
 Clark, D. K. .... '60. 830  
     " W. .... '59. 1474. '61.  
     2084. '62. 3439. '63. 467  
     3015. '65. 1144. 2574. '66.  
     3448.  
     " W. S. .... '56. 2132. 2363,  
     [Appendix, page 115]. 2895  
 Clarke, T. C. .... '62. 6  
 Clifton, R. L. .... '63. 3032  
 Coates, H. .... '57. 2289  
 Cochrane, A. A. L. P. .... '64.  
     2088  
 Coffey, J. A. .... '59. 930  
     '66. 3179  
*Colas, A.* ..... '64. 2691  
     " M. .... '64. 2691  
 Collier, G. .... '62. 1853  
 Conscience, J. F. .... '59. 2340  
*Coombs, H. M.* .... '60. 1884  
 Cossus, A. F. .... '55. 1140  
 Couppier, J. T. .... '58. 508  
 Coutts, J. .... '58. 298  
 Cowper, E. A. .... '63. 1376. 1928  
 Cox, H. .... '62. 1768  
 Coyle, H. .... '65. 2986  
 Craddock, T. .... '57. 1162  
 Craigie, H. .... '56. 834  
 Crane, P. M. .... '60. 233  
 Cranstoun, G. C. T. .... '56. 2157  
 Crawford, M. W. .... '57. 1704  
 Creasy, W. .... '66. 2376  
 Crook, B. E. M. .... '64. 1400  
     " S. T. .... '57. 1075  
     '61. 243  
 Cross, L. .... '59. 2931

Crossley, C. ....'57. 422  
 " J. ....'57. 422  
 " J. W. .... '60. 732  
 '62. 1853  
 Cumming, G. W. ....'66. 429  
 Curley, E. A. ....'65. 2184

*Dalifol, A.* ....'64. 904  
 Damiens, Chevalier de Fenis  
 de Lacombe, F. H. M. C.  
 '62. 2212.

Davies, D. ....'55. 1692  
 " G. ....'59. 492. 2259  
 '62. 1268. '64. 2691  
 Davison, R. ....'59. 2152  
 '60. 478. 3027

Deacon, H. ....'57. 2971  
 Delabarre, C. F. ....'55. 346  
*Delcambre, A.* ....'62. 3210

Dench, E. ....'63. 839  
 Denny, A. ....'58. 252  
 " E. M. ....'64. 361  
 '64. 361

*Desanges, H.* ....'61. 503  
 Direks, H. ....'56. 2619

Dix, A. M. ....'58. 1079  
 Dixon, T. O. ....'62. 1942  
*Duballe, A.* ....'61. 2392

Dufrené, H. A. ....'65. 1816  
 1833

*Duhouset, J. D.* ....'60. 3121  
 Duncan, C. S. ....'63. 1824  
 " J. W. ....'59. 694

Dunn, T. ....'56. 111. '59. 1835  
*Durand, J. J. M.* ....'66. 1470  
 2068

Dyson, J. ....'62. 2570

Eastwood, J. ....'65. 2883  
 '66. 1450

Edgeworth, T. F. ....'60. 983  
 Edmonds, J. K. ....'66. 429

Eley, E. ....'57. 1347  
*Elsworth, O.* ....'66. 2728  
 Elson, S. ....'61. 2108

Epps, A. ....'63. 3124  
 Esquiron, X. T. ....'58. 1283  
*Estourneaux, A.* ....'64. 2748

Faget, J. M. ....'64. 357  
*Fales, L. S.* ....'66. 606

Fanshawe, J. A. ....'60. 2934  
*Paury, A.* ....'62. 3439  
 Fenis de Lacombe, F. H. M. C.  
 Damiens, Chevalier de '62.  
 2212.

Field, E. ....'62. 2956. '65. 2661  
 '66. 811. 1694

Fielding, J. ....'57. 507. 1355  
 Firmin, C. ....'64. 716  
 " G. ....'64. 716

Fleming, A. ....'65. 4  
*Fletcher, A. C.* ....'59. 1474  
 '65. 2996

" C. ....'55. 1345

Fletcher, J. ....'60. 1726  
 '62. 1242. '65. 2385

Fletcher, L. E. ....'60. 1338  
*Fondet, J. B.* ....'62. 3254

Foster, W. ....'55. 523  
 Fouché, L. J. ....'57. 894  
 Fraser, W. J. ....'66. 1576

*Fredet, Neyret, Orioli & ...*'65.  
 1144. 2574

Galloway, G. B. ....'59. 651  
 Gardissal, C. D. ....'56. 2300

Gardner, E. V. ....'56. 212  
 " R. ....'64. 2834

*Gargan & Co.* ....'59. 2259  
 Garnett, J. ....'58. 136  
 " P. ....'58. 136

Garton, C. ....'62. 2434. '63. 584  
 2575

*Ganchez, L.* ....'63. 1829  
 Gedge, J. ....'56. 2122. '57. 2211  
 " W. E. ....'59. 976

" '62. 2816. '64. 904. '65.  
 477.

Geyelin, C. K. ....'59. 2935  
*Gibbs, J. S.* ....'65. 1540

Gibbs, W. A. ....'66. 3036  
 Gilbee, W. A. ....'56. 3001

Gill, S. L. ....'66. 2935  
 Gimson, G. ....'56. 191  
 " J. ....'56. 191

*GINESTON, J.* ....'63. 1903  
 Golding, G. G. ....'55. 2850

Gordon, A. ....'56. 1044  
 " G. ....'66. 2571  
 Gossage, W. ....'61. 2059

" '62. 1371  
 Gothard, J. ....'57. 2918

Graham, D. A. ....'66. 3345  
 Grainville, J. L. C. le F. de.  
 '56. 3092

*Grandjean, P.* ....'64. 2691  
 Grant, J. ....'58. 2338

Graveley, W. H. ....'58. 423  
 Gray, C. E. ....'62. 1662  
 " R. ....'58. 2832

Green, E. ....'58. 877  
 " T. ....'66. 1457

Greenwood, J. ....'58. 1763  
 Griffiths, J. ....'64. 679

Grimes, R. G. ....'64. 2869  
 Grimshaw, W. D. ....'58. 2975

Grist, J. ....'57. 496  
*Guillon, A.* ....'65. 599

Gurney, G. ....'56. 1468  
 Gwynne, G. ....'56. 798  
 " J. E. A. ....'59. 694

Haeck, F. ....'59. 1766  
*Haeck, F.* ....'64. 791

Haigh, T. ....'61. 534  
 Haines, F. ....'56. 14  
 Hall, E. ....'55. 73  
 " H. ....'66. 3311  
 " T. ....'58. 2488

Hamer, J. ....'59. 2546

Hargraves, E. ....'63. 2846  
 Harris, T. ....'57. 183

*Harrison, E.* ....'55. 1544  
 Harrison, J. ....'55. 86  
*Harrison, J.* ....'59. 1970. '64.  
 1424. '65. 2610

Harvey, J. ....'60. 1007  
 " N. ....'56. 2238

Haseltine, G. ....'62. 2656  
 '64. 2008

Hattersley, R. ....'64. 2353  
 Hawksley, G. ....'57. 666

Hayden, D. W. ....'58. 1093  
 2585

Hazard, R. ....'56. 943. 2338  
 '57. 1048

Healy, W. ....'56. 2720  
 Hedley, O. D. ....'60. 1851

Hemming, G. P. ....'65. 2986  
*Henon, L.* ....'64. 2691

Henry, M. ....'63. 3096  
*Heustebise, A. P. V.* ....'66.  
 3448

Heywood, C. ....'64. 690  
 " E. ....'56. 880

Hill, H. C. ....'61. 2045  
 " T. ....'63. 2575

Hindley, E. S. ....'62. 1979  
 Hine, T. C. ....'58. 545

Hodge, P. R. ....'59. 2458  
 Hodgson, H. ....'60. 233

Hollingdrake, R. ....'66. 2734  
 Holt, C. H. ....'55. 2682  
 '56. 1274

Horstmann, F. G. A. ....'66.  
 2353

Howe, G. ....'58. 2613  
 Howell, J. B. ....'56. 2298

Hughes, E. T. ....'58. 1143  
 '65. 255

Hulley, J. ....'65. 493  
 Humphreys, J. D. ....'62. 970

Hunter, C. ....'56. 2612  
 Hutchinsohn, J. ....'55. 207

Hutton, A. ....'56. 2675

Jackson, S. ....'63. 1019  
 Jaffrey, J. ....'64. 679

James, H. B. ....'63. 3082  
 Jaques, G. ....'60. 2934  
 " J. A. ....'60. 2934

*Jebb, T. A.* ....'64. 2008  
 Jeffreys, J. ....'62. 2905  
 '63. 1052

Johnson, J. H. ....'58. 49. '59.  
 1970. 2725. '64. 1424. '65.  
 2610. '66. 1014. 2728.

" W. ....'63. 126  
 Johnston, W. ....'58. 2272

Jolley, R. ....'61. 1692. 3069  
 Jones, E. F. ....'57. 694  
 " J. A. ....'66. 1327  
 " R. W. ....'61. 2120  
 " T. ....'59. 1142  
 '64. 2828

Jong, S. de. ....'56. 1404

Jordan, C. .... '61. 957  
 Jouan, A. .... '59. 492  
 Joule, J. P. .... '59. 2043  
 Juquin, A. .... '65. 1816

Kay, R. D. .... '56. 555  
 Kennedy, R. .... '58. 2364  
 Kirk, J. M. .... '63. 181  
 Kirrage, W. .... '58. 2413  
 Kraggs, W. .... '66. 1623  
 Knight, F. .... '65. 1510  
 Knowles, J. .... '63. 1019  
 Kopisch, C. G. .... '57. 2622  
 Koppel, L. .... '66. 1198  
 Kyle, D. D. .... '63. 1545

Lacombe, F. H. M. C. Damiens,  
 Chevalier de Fenis de  
 '62. 2212

Ladd, W. F. .... '63. 467  
 Laidlaw, D. .... '64. 2666  
 Laming, R. .... '56. 424  
 Law, G. H. .... '62. 406  
 Lee, T. V. .... '63. 528  
 Leeds, L. W. .... '56. 2132  
 Leeming, D. .... '57. 422  
 Leger, E. .... '62. 3439  
 Leiss, F. .... '56. 1077  
 Lemière, L. F. .... '58. 1331  
 Le Mire de Normandy, A. R.  
 '56. 1252. '59. 459

Lepard, S. .... '61. 2796  
 Leroy, C. .... '66. 2068  
 Le Roy, F. .... '65. 864  
 Leval, G. .... '62. 3254  
 '63. 2296

Lindemann, G. .... '62. 360  
 Lipman, A. .... '65. 2535  
 Lipsett, A. O. .... '61. 2866  
 Lloyd, F. .... '66. 811  
 Lock, A. G. .... '65. 93  
 Locke, E. .... '58. 2526  
 Lombard, J. B. A. .... '58. 1283  
 Longbottom, A. .... '65. 1775  
 " J. .... '55. 1141. '65.  
 1775. '66. 1450

Longmaid, W. .... '55. 1141  
 Lord, S. .... '57. 1128  
 Lorentz, X. .... '57. 2211  
 Lovell, G. .... '56. 2157  
 Lovrein, C. H. .... '66. 606  
 Luders, T. .... '65. 2610  
 Luis, J. .... '58. 906. 1718  
 Lush, J. .... '61. 2435

Macaulay, T. .... '57. 2241  
 McCallan, G. .... '57. 544  
 McConnell, J. E. .... '62. 393  
 McCormick, J. .... '59. 2725  
 McCrindell, J. H. .... '56. 1282  
 Macfarlane, T. .... '63. 126  
 McClvor, W. G. .... '65. 321  
 McKenzie, J. F. .... '66. 1913  
 McKnight, W. H. E. .... '59. 129  
 McLaren, A. .... '65. 390

Maepherston, A. .... '56. 2122  
 Maire, J. F. .... '57. 778  
 Maling, E. A. .... '61. 2740  
 Manbré, A. .... '64. 552  
 Maniguet, F. .... '58. 775  
 Mann, A. .... '62. 948  
 Marcesheau, A. J. B. L. de.  
 '55. 2625

Markham, C. R. .... '65. 321  
 Marland, S. .... '66. 447  
 Marriott, A. .... '63. 948  
 Martin, J. .... '55. 2652  
 " L. E. C. .... '63. 2087

Martin, L. J. .... '58. 1143  
 Massot, P. .... '65. 1816  
 Mather, C. .... '58. 2681  
 Mathews, D. .... '59. 1627  
 Matley, M. .... '58. 2488

Maumené, J. F. .... '64. 904  
 Meiklejohn, J. .... '58. 1244  
 Mennons, M. A. F. .... '56. 1976  
 '59. 2574

Merrell, E. .... '59. 1778  
 Merryweather, M. .... '62. 2956  
 " R. M. .... '62.  
 2956

Messenger, T. G. .... '56. 466  
 Meynard, C. J. L. .... '63. 3096  
 Milbank, J. .... '64. 2000  
 Miller, H. .... '58. 2488  
 " T. N. .... '63. 718  
 " W. .... '57. 1573

Miriland, V. .... '62. 3296  
 Moes, J. .... '57. 740  
 Monkton, E. H. C. .... '62. 1516  
 Montgomery, J. .... '59. 137  
 Moore, J. .... '62. 2127

Morel, A. .... '59. 976  
 Moreland, R. .... '63. 698  
 Morfit, C. .... '58. 588  
 Mornay, H. de. .... '60. 1899  
 Morris, T. .... '62. 1516  
 Morrison, D. .... '58. 712

Morton, E. J. .... '66. 3026  
 Morton, E. W. .... '66. 3026  
 Moule, H. .... '62. 2644  
 Muir, G. W. .... '55. 25. '58. 52

Murphy, W. J. .... '64. 101  
 Murrell, O. .... '63. 577  
 Musgrave, J. .... '58. 680  
 '60. 2905

Needham, R. .... '61. 3235  
 Nelson, E. .... '62. 2802  
 '66. 2269

Nelson, L. W. .... '60. 1884  
 Newall, J. .... '60. 2050  
 Newcoune, H. J. .... '59. 277  
 1770. '66. 2396

Newsham, H. .... '56. 2895  
 Newton, A. V. .... '56. 1686. '57.  
 2269. '60. 1340. '64. 1178  
 2906. '65. 2255. 2996.  
 " W. E. .... '56. 2522  
 '57. 1994. '58. 2334. '60.  
 1884. '61. 1150. '66. 606.

Neyret, Orioli, & Fredet. .... '65.  
 1144. 2574

Nicholls, W. .... '57. 2247  
 Noble, O. .... '66. 606  
 Normandy, A. R. Le Mire de.  
 '56. 1252. '59. 459.

Norton, J. .... '58. 2613  
 " J. L. .... '66. 163  
 1855

Oakley, J. T. .... '62. 2315  
 Oddie, J. .... '55. 86

Orioli, & Fredet, Neyret. .... '65.  
 1144. 2574

Ormsom, H. .... '57. 2441  
 '65. 1614

Palmer, G. H. .... '64. 1663  
 Parker, A. W. .... '65. 2292  
 " J. .... '62. 92. 552. 833

Parkinson, T. .... '64. 639  
 Partz, A. F. W. .... '57. 387  
 Patrick, H. W. .... '59. 589  
 Pattinson, H. L. .... '58. 2706

Pearce, J. C. .... '55. 99  
 Pensom, R. K. .... '62. 3210  
 '63. 899

Perkins, A. M. .... '55. 2757  
 '64. 342  
 " L. .... '65. 636

Perks, W. .... '64. 1606  
 Pettit, G. B. .... '56. 193  
 '62. 715

Phillips, G. A. .... '56. 2278

Pichoin, C. .... '66. 1470. 2068

Pierckstone, W. .... '61. 162  
 Pickers, G. H. .... '63. 1352

Pimont, P. .... '61. 22  
 Pincus, E. .... '59. 2725  
 Pincus, H. .... '65. 2006

Pitman, J. T. .... '57. 1  
 '58. 588

Planck, H. .... '65. 3268  
 Plimsoll, S. .... '59. 285  
 Pontifex, C. .... '62. 263  
 " E. A. .... '62. 2405

Pougalt, A. .... '58. 1698  
 Pragst, F. .... '63. 2116  
 Pratt, H. .... '55. 1544  
 Preux, A. E. .... '56. 1380  
 Priedaux, T. .... '66. 218

Prindle, D. .... '61. 1150  
 Prost, J. M. .... '57. 1678  
 Purnell, B. .... '60. 376  
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Rae, J. .... '55. 1118  
 Ramsbottom, J. .... '66. 1909  
 Ramsden, W. G. .... '60. 589  
 Ransome, F. .... '63. 1650  
 Rawle, H. .... '66. 606

Redman, G. A. .... '59. 1474  
 Rennard, G. .... '65. 2535  
 Renner, H. E. .... '66. 1014

Reynell, H. ....'63. 1423  
 Richards, J. S. ....'66. 606  
 Richardson, R. ....'64. 3046  
 Riddell, J. H. ....'62. 3463  
 Ridge, B. ....'55. 2154  
 Riley, L. ....'61. 964  
 Riviere, H. ....'63. 2253  
 Robbins, E. Y. ....'62. 2656  
 Robbins, J. ....'64. 773  
 Roberts, J. ....'61. 38  
 Robertson, J. ....'64. 2666. '66.  
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 Robinson, E. ....'64. 2545  
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 Rolland, E. ....'58. 644  
 Ross, W. ....'58. 2272  
 Rostand, C. ....'64. 2906  
 Rul, L. J. G. ....'59. 2944  
 Ruquois, C. L. ....'62. 1159  
 Ryder, J. N. ....'59. 605  
  
 Sadleir, T. ....'55. 1586  
 Salmon, P. ....'64. 3128  
 Sanges, L. de. ....'61. 2084  
 Saunders, J. M. ....'56. 2818  
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 Schiffer, B. A. ....'62. 833  
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 Schneider, C. ....'56. 1077  
 Schröder, F. H. ....'66. 2567  
 Schwartz, T. ....'55. 2016. 2609  
 Senior, C. ....'60. 1373  
 Sequelin, S. ....'65. 1453  
 Seward, A. ....'57. 2399  
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 Shanks, A. ....'61. 861  
 Shaw, R. ....'66. 76  
 Shrewsbury, G. ....'66. 3438  
 Sibille, E. P. ....'58. 740  
 Smalley, J. ....'58. 60  
 Smethurst, J. ....'63. 825  
 Smith, C. W. ....'65. 2480  
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 Smith, S. ....'62. 2761  
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 Snell, W. ....'63. 2566  
 Soar, T. ....'61. 787  
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 Stafford, B. ....'60. 1024  
     " J. ....'60. 1024  
 Stanford, J. F. ....'59. 2196

Steel, G. ....'57. 2229  
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 Stevens, C. ....'61. 503  
 Stoker, P. ....'65. 477  
 Stratford, W. ....'61. 779  
 Subra, B. ....'63. 3015  
 Swain, W. ....'56. 3081  
 Swan, A. ....'66. 2671  
 Sykes, B. C. ....'60. 732  
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 Taylor, F. ....'64. 639  
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     " W. ....'58. 2975. '60.  
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 Teager, J. H. ....'56. 536  
 Tellier, C. ....'65. 1833  
 Thom, D. ....'56. 2278  
 Thomas, P. E. ....'60. 3121  
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 Thomson, J. ....'66. 2908  
 Thorp, R. ....'62. 3271  
 Thurgar, W. C. ....'64. 2811  
 Thys, J. ....'65. 2853  
 Tizard, W. L. ....'62. 1256  
 Tourné, J. E. ....'61. 1795. 1796  
 Travis, E. ....'57. 1456  
 Traves, J. ....'60. 1326  
 Turner, F. W. ....'58. 2962  
 Twibill, J. ....'65. 243  
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 Tylor, W. H. ....'60. 2578  
  
 Underwood, G. ....'66. 2560  
  
 Vanderburgh, G. E. ....'60. 1448  
 Vanderfeesten, J. M. ....'63.  
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 Vannoy, H. ....'57. 152  
 Varley, C. F. ....'60. 2858  
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 Vaux, C. ....'60. 1340  
 Vickerman, J. ....'61. 941  
 Vincent, J. P. ....'66. 606  
  
 Wagner, J. H. G. D. ....'59. 505  
 Walker, A. B. ....'57. 437  
     " H. ....'66. 2416  
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Walker, L. ....'60. 1340  
 Walker, W. ....'57. 3119  
 Walsh, S. A. ....'63. 467  
 Walton, J. ....'62. 2127  
 Wanklyn, W. ....'62. 2162  
 Ward, R. A. ....'64. 2811  
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 Watson, P. R. ....'63. 3094  
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 Weare, R. ....'62. 1516  
 Weatherdon, B. F. ....'66. 1470  
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 Weems, J. ....'55. 1489. '56. 1282  
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 Wheatley, H. ....'62. 1193  
 Wheeler, J. F. ....'66. 41  
 Whimster, T. ....'58. 2332  
 White, J. ....'64. 2937  
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 Whittles, H. ....'63. 645  
 Wiert, L. ....'58. 1967  
 Wiert, L. ....'64. 1178  
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 Wiles, W. G. ....'57. 1026  
 Williams, C. W. ....'60. 2813  
     " T. ....'62. 1768  
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 Willington, T. A. G. ....'66. 346  
 Wilson, D. ....'63. 1376  
     " J. ....'60. 2084  
     " J. H. ....'66. 1434  
     " L. ....'66. 2618  
     " W. ....'63. 3278  
     " W. ....'64. 613  
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     " W. ....'66. 1694  
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 Wood, A. ....'61. 1858  
 Woodcock, W. ....'58. 60. 1580  
 Wright, R. ....'57. 2647  
     " R. A. ....'62. 614  
     " R. A. ....'57. 894  
  
 Yapp, G. W. ....'63. 2566  
 Young, G. ....'56. 2157

## HEATING.

Excepting FURNACES AND KILNS; and STOVES, RANGES, AND FIREPLACES;

for which see Abridgment Classes FURNACES &c.; STOVES &c.

Patents have been granted in all cases, unless otherwise stated. Drawings accompany the Specification where the abridgment is illustrated and also where the words *Drawings to Specification* follow the date.

A.D. 1855.

**25. Muir, G. W.** Jan. 3. *Drawings to Specification.*

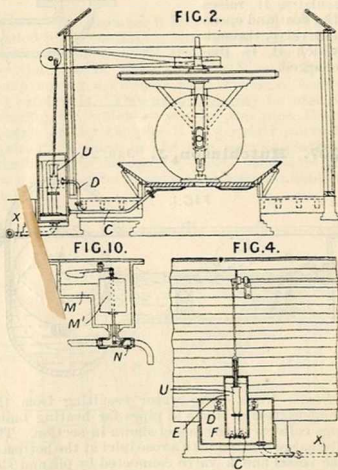
*Heating buildings; heating air.*—Apartments are warmed by air which is heated in passing through hollow jambs and cheeks of the fireplace and delivered through a hollow, perforated mantel-piece. Metal pipes employed for conducting flame from a furnace for heating air, have short lengths of "clay" pipe attached to them at the furnace end.

**73. Hall, E.** Jan. 11.

*Heating buildings &c.; heating by steam and water circulation.*—Relates to means for heating gunpowder mills. The pans of edge-runner mills are made hollow and steam or hot water is circulated through them. In one arrangement, shown in Figs. 2 and 4, water heated by steam from a pipe X is maintained by the pump U at a high-level in the tank E, and flows by the pipe C to the chamber under the mill-pan, returning by the pipe D to the low-level tank F. For steam circulation, the pans are similarly arranged and the necessary circulating-pipes are fitted. The mill generally, or parts in proximity to the edge-runners, may be heated by steam circulating-pipes.

*Steam traps.*—The waste pipe of the steam circulating-system described above may be fitted

880—750—204. Wt. 22104 L. & M.



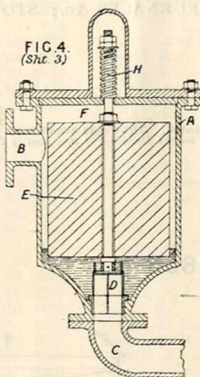
with a steam trap of the form shown in Fig. 10, in which an escape valve N is controlled by a counter-weighted float M<sup>1</sup> in the chamber M.

- 86. Harrison, J., and Oddie, J.** Jan. 12.  
[Provisional protection only.]

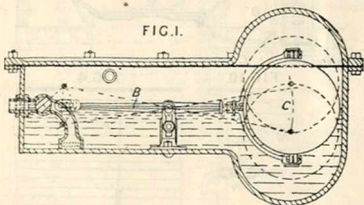
**Thermostats.**—In drying-apparatus, or sizing or dressing machines for yarns in which air heated by gas jets is used, the temperature is automatically regulated by means of thermometers having pistons connected to the valves for supplying gas or hot and cold air.

- 99. Pearce, J. C.** Jan. 13.

**Steam traps.**—A trap, specially suitable for automatically discharging the water of condensation from the pipes of steam hammers, consists of a casing A provided with an inlet B and outlet C, and with a double-beat valve D on the spindle of which is a large float E, balanced to any desired extent by a spring H resting on a cross-bar F. As the water accumulates, it raises the float and opens the valve, through which it is discharged.



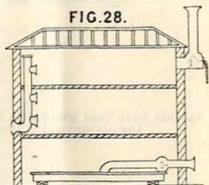
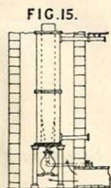
- 207. Hutchinson, J.** Jan. 27.



**Steam traps.**—The water resulting from the condensation of steam in pipes for heating buildings collects in the vessel shown in section. The discharge is fitted with a rose inlet at the bottom of the vessel and a valve connected by pin and slot with the lever B to which is fitted the ball-float C of glass &c. When sufficient water has collected the float rises, opens the valve, and thus allows the steam to force out the water.

- 346. Delabarre, C. F.** Feb. 15.

**Heating water; heating buildings.**—Relates to induction apparatus for propelling air and gases and forcing liquids by the action of a jet or jets of steam, compressed air, water or other gas or liquid, and comprises means in combination with such apparatus for heating water and heating buildings by waste furnace gases &c. For producing draught in furnaces in general, an apparatus such as shown in Fig. 15 may be inserted in the chimney. This apparatus may be jacketed, as shown, or the chimney itself may be jacketed in the case of a locomotive, to serve for heating water, or drying or superheating steam. Such a chimney may also deliver the furnace gases to pass through tubular heating-apparatus. Chimneys and flues with such draught-inducing apparatus may be arranged horizontally and serve for heating and drying purposes, among which heating buildings and heating water are mentioned. Fig. 28 shows such an arrangement.



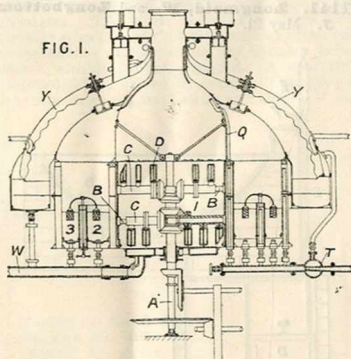
- 523. Foster, W.** March 8. [Provisional protection only.]

**Heating air.**—Air for use in drying wool and the like is heated by passing it through a number of vertical tubes in a chest filled with steam. The cold air enters a chamber at the bottom of the steam chest and circulates through the tubes to another chamber at the top. In another arrangement, the tubes are horizontal, with the air on the outside and the steam inside.

- 737. Botta, F. T.** April 3.

**Boiling-pans.**—Fig. 1 shows a vertical section of apparatus for brewing and for cooling &c. beer, under reduced pressure, produced by the condensation of steam. Steam blown through the pipe Q is condensed by the water-cooled shield Y producing a partial vacuum which is maintained by means of the jet T. Water, let in through the pipe W, is mixed with the malt, and afterwards the mass is boiled at from 50° to 70° C., under the diminished pressure, by heating with steam. When saccharification is complete, the liquid is

FIG. 1.

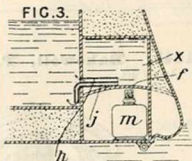


forced, by steam pressure, through the false bottom of cylinder 1 into cylinder 2, where it is boiled at from 60° to 75° C., and is then forced into cylinders 3, where it is again boiled.

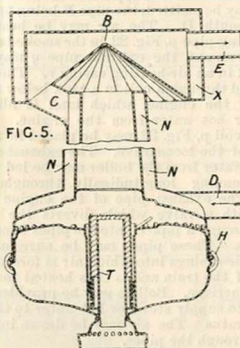
1004. **Brandon, A.** May 5.

*Heating water; heating air.*—Relates to apparatus for heating baths, warming apartments, &c. Fig. 3 shows the application of the invention to a bath. The wall of the bath is double, and at one part of the interspace is a chamber X which communicates with the bath by pipes h, j. The water in the

FIG. 3.

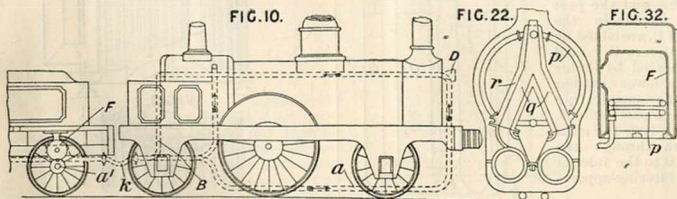


chamber X is heated by a lamp *m* placed beneath the diaphragm *f*. The heated water rises into the bath by the pipe *h*, and fresh cold water takes its place through the pipe *j*. In a modification, the bath is fitted with a lining, a space being left between the lining and the bath. This space communicates with the chamber X and is filled with liquid which, as it becomes heated, imparts heat to the water in the bath. Fig. 5 shows a heater separate from the vessel which contains the water to be heated. It consists of an annular chamber N which opens into a chamber B by the



pipe C. The chamber B is covered in by a double-walled top X containing non-conducting material, and communicates with the bath or other vessel by the pipe E. The chamber N rests upon a lamp having a circular wick T and is secured by catches H. This apparatus may be used for heating air, which enters by the pipe D and passes off by the pipe E, to be used where required. A worm or the like may be placed in the heater to increase its effect. The sides may be made of glass to render the lamp available for lighting.

1118. **Rae, J.** May 17.



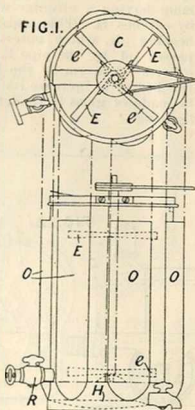
*Heating air; heating water; footwarmers.*—Air is heated by passing through tubes in the boiler, smoke-box, or furnace of the locomotive, or through

casings round the blast pipe in the smoke-box, and is conveyed through pipes to boxes with perforated covers in the floors of the compartments

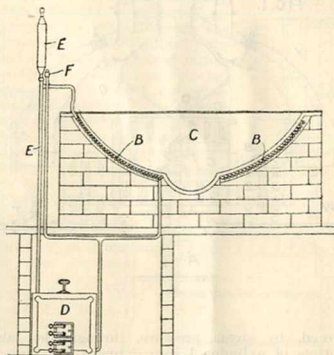
of the carriages. Steam and hot water may be similarly conveyed into closed boxes in the floors of the compartments. The boxes are of such a width that the passengers may place their feet on them, and the open boxes are adapted to serve as ventilators in hot weather. Similar means may be adopted for warming cabins &c. on ships. The fan F, Fig. 10, on the tender is rotated by the axle  $a'$ , and drives air through the pipes  $a$  as shown by arrows. The pipe  $a$  leads into a pipe B passing horizontally through the steam space of the boiler, and the air passes thence through the pipe  $k$  to the heating-apparatus in the train. The fan F may be omitted, the pipe B being fitted with a bell-mouth D. The air may be heated in a circulating-pipe  $p$ , Fig. 22, in the smoke-box of the locomotive, and the exhaust pipe  $q$  may also be enclosed in an air-heating casing  $r$ . The air may be passed through a coil in a tank below the foot-plate of the engine, which tank is filled with steam or hot water from the engine. An air-heating coil  $p$ , Fig. 32, may be placed in the fire-box F of the locomotive. The exhaust steam or the hot water from the boiler may be led through pipes running longitudinally throughout the train. The exhaust pipe of the engine may be fitted with a valve which diverts the exhaust steam through a pipe G into the pipes beneath the carriages. These pipes may be surrounded by concentric casings into which air is forced by the motion of the train and is thus heated for warming the carriage. Boilers may be provided at the stations to supply steam or hot water to the heating-apparatus. The air may be drawn instead of forced through the pipes.

1140. **Cossus, A. F.** May 21.

*Heating liquids.*—Fluid fatty matters or oils are mixed with carbonized peat and "schists", then filtered through fabrics of increasing degrees of fineness and finally through unsized paper. Fig. 1 shows, in plan and elevation, the mixing and heating apparatus. The oils &c. and the peat &c. placed in the vessel C, are mixed by the stirrers E,  $e$ , and are heated by water in the lower chamber H and communicating side compartments O. After a time the mass is run through the cock R to the inlet of the filtering-apparatus.

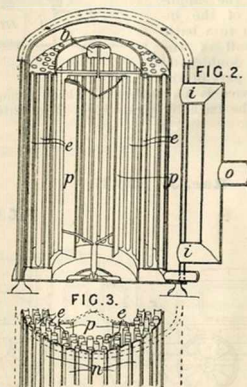


1141. **Longmaid, W., and Longbottom, J.** May 21.



*Boiling-pans; heating water &c.*—Coppers &c. are heated by hot water circulated through a close coil B in proximity to, and approaching the shape of, the copper C to be heated. A portion of the piping passes through the firebox D. An expansion tube E closed at the top is also provided, the other end of the tube being shown at F.

1345. **Bakewell, F. C.,** [Fletcher, O.] June 13.



*Heating air.*—Exhaust steam is employed for heating the air supply to a furnace in a tubular condenser with which a fan is combined. Fig. 2

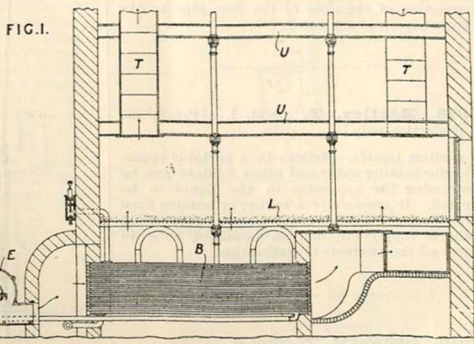


shows a perspective view, in section. of the apparatus. The steam passes through several circular rows of tubes *e*, which connect upper and lower annular chambers, the top chamber being shown with its cover removed. A centrally-mounted fan *p*, driven by means of the pulley *b*, draws in air at top and bottom and throws it out

among the tubes. The air is collected by pipes *i*, *i*, *o* and conducted to the furnace. Baffles *u*, Fig. 3, referred to in the Specification as "angular strips," are placed over the spaces between the tubes of the outer row. Water of condensation, with any uncondensed steam, is withdrawn by a pipe at the bottom.

1489. **Weems, J.** June 29.

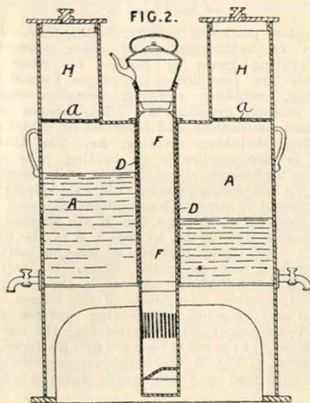
*Heating air for drying grain, malt, &c.* The air is forced by a fan *E* through a number of tubes *B* contained in an iron cylinder *A* filled with steam. This steam, which may be the exhaust from the fan engine, enters the cylinder at the discharge end of the air tubes.



1544. **Pratt, H.**, [Harrison, E., partly]. July 11. Drawings to Specification.

*Heating air for warming or ventilating a flour mill of special design.* Air is admitted to the mill near the ground, and is passed through tubes in a tubular condenser employed for condensing the steam from an engine. The heated air is either passed through the mill to warm it, or into a ventilating shaft to cause an upward current of air.

1586.



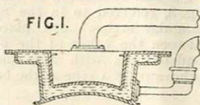
1586. **Sadleir, T.** July 14.

*Boiling-pans; heating water.*—A hollow vertical chamber *F*, *F*, open at the top and bottom, is formed in or about the middle of any portable vessel *A*, suitable for heating liquids, and contains charcoal or other smokeless heating-medium. Two steamers *H*, placed on the boiler, communicate with it by perforations *a*. A kettle *D*.

(For Figure see next column.)

1692. **Davies, D.** July 26.

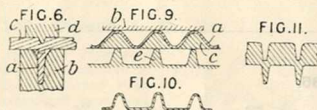
*Heating water for heating buildings.* Fig. 1 shows a cross-section of the boiler and pipes connected therewith. The boiler is constructed of an inner and an outer pan or shell, rectangular in plan, or of a single-cored casting of the form shown. By means of the concave bottom, greater strength and heating-surface is obtained. The sides of the outer pan and the hollow set-off or flange form the return flue. The proportion of the area of the flow pipe to the return pipe is about 4 to 1.



1978. **Bentley, T.** Sept. 1. [Provisional protection only.]

*Heating liquids.*—Relates to a portable apparatus for heating water and other fluids by gas, by immersing the apparatus in the liquid to be heated. It consists of a burner or burners fixed in a conical closed vessel, having a descending tube to supply air, and an ascending tube to carry off the products of combustion.

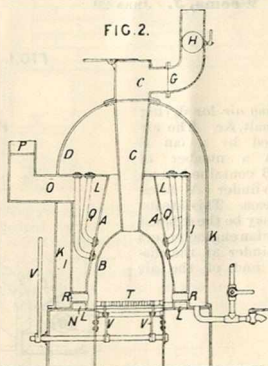
2016. **Schwartz, T.** Sept. 6.



*Heating gases and liquids; boiling-pans.*—The parts of heating-pans and other apparatus for heating gases or liquids by gases or liquids are provided with ridges formed by casting, moulding, drawing, pressing, stamping, raising, grooving, &c. The ridges may be made separately and attached by soldering, welding, shrinking, riveting, &c. The invention is also applicable to heating pans and boilers for brewers, dyers, hatters, and domestic cooking and baking vessels. External spiral ribs or external or internal longitudinal ribs may be provided. Wire ridges *a*, Fig. 6, are secured to ready-made vessels &c. by dies *b*, *d* of the form shown which force part of the wrought metal *c* into locking recesses in the ridges. In another method, the dies form recesses in the wrought metal into which the heads of the ridges are forced and clinched. Projecting surfaces are raised on wrought metal by stretching the metal. Projections of the usual form are first produced in the metal *a*, Fig. 9, the hollows on one side are filled with lead or other ductile material *c*, and

the whole is pressed between dies *b*, *e* so as to produce corrugations of the form shown in Fig. 10. Plates and tubing of heavy metal may be ridged, as shown in Fig. 11, and the hollowed surface may be rendered smooth by soldering, welding, enamelling, or other binding, by coating, or by filling the cavities.

2154. **Atkinson, M., and Ridge, B.** Sept. 27.



*Heating air.*—Air for ventilating and also for drying and warming buildings is heated in the space *L* which is formed in the interior of the steam boiler shown and is traversed by water tubes *Q*. The cold air enters this space from the hollow bed-plate *N* and escapes in a heated state through a conduit *O* controlled by a damper *P*. Steam jets are employed for exhausting the air from the space *L*.

2545. **Barclay, A.** Nov. 12. [Provisional protection only.]

*Thermostats &c.*—An elastic caoutchouc tube is filled with liquid subject to the pressure of the steam in a boiler. Lateral dilatation of the tube being prevented by a spiral spring surrounding it, its longitudinal motion is caused to operate a furnace damper.

2609. **Schwartz, T.** Nov. 20. [Provisional protection only.]

*Heating-apparatus.*—Corrugations, grooves, ridges, ribs, &c. are formed on vessels or receptacles used for heating. Solid or plastic bodies may be similarly corrugated &c.

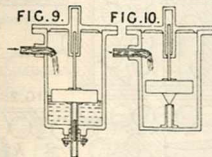
2625. **Marcesheau, A. J. B. L. de.** Nov. 21. Drawings to Specification. [Provisional protection only.]

*Non-conducting coverings.*—In an engine with reciprocating cylinders and fixed pistons, charcoal is used to prevent condensation.

2652. **Martin, J.** Nov. 24.

*Thermostats for incubators.* In an incubator in which the egg-trays rest upon hollow shelves which communicate with vessels of hot water at each side, the heat is regulated by a thermostat in one of the vessels. It consists of a wide glass tube containing mercury and fitted within a tin guard to which is affixed a divided gauge. In the open end of the U-tube is a float in connection with a lever which operates a valve opening communication with a vessel of cold water above. A mark on the float enables the temperature to be read off. When the water gets too hot, the air in the air chamber expands and moves the mercury, float, and valve, and thus allows cold water to flow in.

2682. **Holt, C. H.** Nov. 28. [Provisional protection only.]



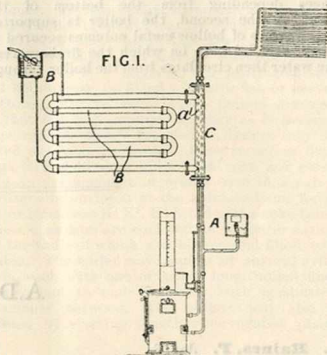
*Steam traps.*—Figs. 9 and 10 show two forms of steam trap, of which no description is given.

2757. **Perkins, A. M.** Dec. 6.

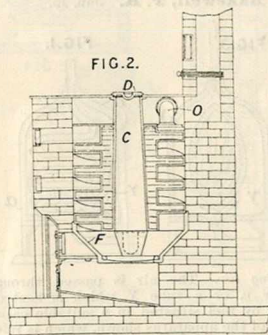
*Heating buildings &c.; heating water.*—The water of an ordinary low-pressure hot-water apparatus B, for warming buildings and apartments, is heated in a pipe C through which pass the small pipes  $a^1$  of a high-pressure apparatus A. When it is simply desired to keep down the temperature of the high-pressure apparatus, the flow and return pipes may be passed through a cistern containing water for a bath or other domestic purpose.

(For Figure see next column.)

- 2757.



2850. **Golding, G. G.** Dec. 17.



*Heating water.*—The shell of a boiler for heating water for warming conservatories, hot-houses, and other buildings, is made in the form of a screw so as to obtain a large heating-surface, the spiral channel between the convolutions of the thread forming a flue for the passage of the flame &c. The boiler is set in brickwork above the furnace F, and is fired through a central vertical flue C, closed at the top by a cover D, and made sufficiently large to contain a full supply for several hours. The heated water escapes from the upper part of the boiler through a pipe O, and, after circulating through the building, enters it again through another pipe behind the hopper C. Three modifications are described. In the first,

the sides of the furnace are formed by water spaces depending from the bottom of the boiler. In the second, the boiler is supported upon a series of hollow metal columns secured to a hollow metal base on which the firebars rest. The water then circulates from the boiler through

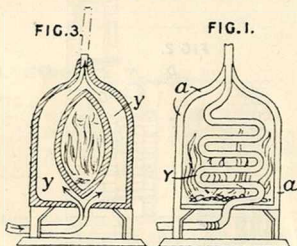
the metal columns and hollow base. If preferred, firebrick columns may be used. In the third modification, the boiler shell is made similar to a double-threaded or right and left handed screw, so that the combustion products pass off in opposite directions.

A.D. 1856.

14. Haines, F. Jan. 3.

*Non-conducting coverings.*—Cork is used for lagging steam engines, boilers, pipes, &c.

110. Bakewell, T. H. Jan. 15.

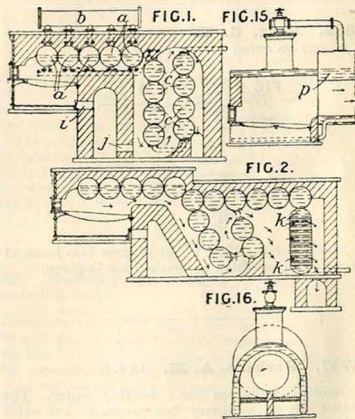


Heating air.—The air is passed through a chamber *y*, or a tube *Y*, which is heated externally by fuel situated in a suitable casing *a*. Instead of the apparatus shown, which is referred to as a "calorian," the cold air may be passed over, or under, any solid body that is heated, or through an iron tube fixed in, or near, the grate of a kitchen fire. The heating-medium in the "calorian" may be fire, gas, steam, hot water, or other agency.

111. Dunn, T. Jan. 16.

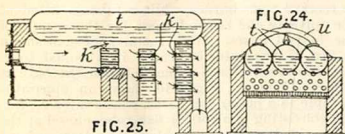
*Heating water.*—Relates *inter alia* to boilers for heating water and generating steam of the kind described in Specification No. 959, A.D. 1853. Fig. 1 shows a boiler consisting of a number of retort-shaped elements *a*, each in communication with the steam receiver *b*. The feed-

water is passed through a number of vessels *c* arranged transversely in the flues. Air for secondary combustion is supplied through openings *i, j*. In addition to the heaters *c*, the water may also be passed through a water-heater *k*, Fig. 2, in which opposite sides are connected by tubes through which the smoke and furnace gases pass, or similar flat water chambers, without tubes, may replace some of the cylindrical elements. The



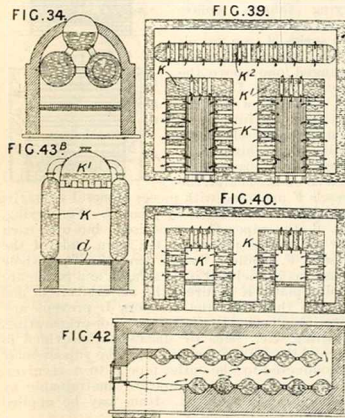
furnace, boiler elements and water-heaters may be practically enclosed in a water-jacketed chamber the sides of which form headers for the boilers. The cylindrical elements may also be built into the arch of the furnace and flues, and connected together at the sides by flat vertical chambers. The bridge of the furnace may be formed by one or more cylindrical water chambers. Various ways of disposing the steam and water chambers

and heaters are shown in the Specification. Some of the cylindrical chambers may be traversed by longitudinal flues. The second part of the invention relates to the application of auxiliary fireboxes or boilers to ordinary internally-flued boilers, for the purpose of increasing their steam-generating capacity. Figs. 15 and 16 show a longitudinal and a transverse section, respectively. The firebox added to the boiler  $p$  is made saddle-shaped as shown, and

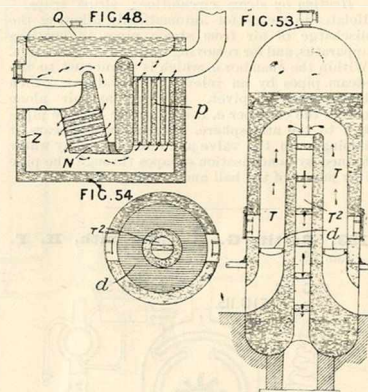


water-jacketed. This firebox may be built up in different ways. In one modification, it consists of concentric cylinders with the grate in the inner one; in another, the casing consists of concentric elliptical walls connected by a hollow transverse web, so as to provide two fireboxes for a two-flued boiler. A pair of Cornish boilers with the flues placed eccentrically may be similarly fitted. The casing of the firebox may also be formed by a number of cylindrical water chambers similar to those shown in Fig. 1, arranged transversely or

in the furnace flues transversely to the main cylinder. In one modification, one large retort-shaped boiler is set at an angle and is surrounded by a spiral flue. In another case, a number of boilers are suspended side by side from transverse beams. To increase the heating-surface, old boilers may be fitted with new flat or curved bottoms. Fig. 34 shows three boilers arranged so that one may replace another as it becomes impaired by fire. Internal cylinders may be fitted as shown in broken lines to act as flues. Figs. 39 and 40 show in sectional plan and elevation an arrangement in which each of a pair of furnaces is enclosed at the sides, end and top by water chambers  $K, K^1, K^2$  fitted with smoke-tubes. These chambers are enclosed in an outer casing, all the walls of which are hollow and filled with water. The boiler may consist of several cylinders, each with one or more longitudinal flues, placed end to end in series with combustion chambers between. The boilers may also be formed by riveting together corrugated plates,



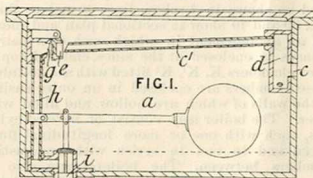
longitudinally side by side, and connected together so as to cover or enclose the fire. Figs. 24 and 25 show in cross and longitudinal section respectively one of many arrangements shown for facilitating the transport and repair of steam generators as well as for the purpose of increasing the heating-surface. The middle cylinder  $t$  is supported by a bridle  $u$  from the two outer ones. All may be partly supported by the water-heater  $k$ . A number of water cylinders may be arranged



as shown in Fig. 42, washers being inserted to form spaces to allow of circulation. Fig. 43<sup>B</sup> shows one of several modifications of vertical boilers described. The cylinders  $K$ , arranged in a circular row around the grate  $d$ , communicate with a steam receiver  $K^1$ . The vessels  $K$  may be fitted with smoke-tubes and enclosed in a hollow-walled cylindrical casing. The elements  $K$  may be club-shaped and arranged around the grate on the surface of an imaginary cone. This allows of the elements being nested for transport. Fig. 48 shows a section of a marine boiler. A flat water and steam chamber  $Q$  is fitted within a hollow-walled casing  $Z$ . The products of combustion, after passing over a bridge formed by the chamber  $N$ , pass in succession, as shown, through smoke-tubes in the water chambers  $N$  and  $p$  respectively. In a modification fitted with three furnaces, the circulating water chambers are fitted below the steam and water chamber  $Q$  with the smoke-tube horizontal. Figs. 53 and 54 show, in

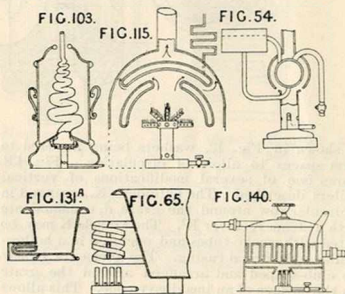
vertical and horizontal section respectively, a vertical boiler, inside which an annular furnace grate *d* is fixed. The annular flue *T* leads into a central one *T'* with hollow walls forming part of the boiler. The flue however may be  $\cap$ -shaped.

**191. Gimson, J., and Gimson, G.**  
Jan. 24.



*Heating by steam circulation; steam traps.*—Relates to means for automatically allowing the discharge of air from steam pipes in heating-apparatus, and for removing water of condensation. Within the chamber *a*, which is connected to the steam pipes by an inlet *c*, is a valve *e*, which hangs from a pivot. So long as air alone enters the chamber *a*, it can escape by the pipes *h*, *i* to the atmosphere. When steam appears, it impinges on the valve and closes it. Any water formed by condensation escapes through the pipe *i* by means of the ball and lever valve shown.

**193. Pettit, G. B., and Smith, H. F.**  
Jan. 24.

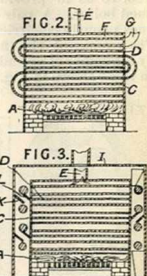


*Heating water.*—Relates to apparatus for heating water for circulation in apartments, conservatories, hot-houses, &c., and also to baths with heating-appliances. Fig. 103 shows one form of apparatus suitable for heating water for warming apartments, &c. The water to be heated circulates either on the inside or the outside of a spiral heated from below by a gas burner. With the arrangement shown in Fig. 115, flat tubes convey-

ing water are fixed as a boiler so that the flame from a gas burner can play on them; or the flat tubes may be utilized as flues with the water on the outside. Another form of apparatus is shown in Fig. 54. Fig. 131<sup>a</sup> shows an arrangement for heating the water in a bath. The lower part of the bath is formed with a lateral extension, containing a flat tube or flue having a gas burner at one end. If desired, the flue may pass all round the bottom of the bath. In this case, one end of the flue is extended beyond the end of the bath to receive a gas burner, while a tube is fitted at the opposite end to the burner for the escape of the heated gases. With the arrangement shown in Fig. 65, the water is heated in a coiled tube, the ends of which are connected with the bath at different levels. Fig. 140 shows an apparatus suitable as a boiler for baths, conservatories, &c., and consisting of a coil of flat tube, closed at the upper side, so as to form, when placed on a level surface, a spiral flue, which is heated by a gas burner; the water circulates in the internal spaces.

**212. Gardner, E. V.** Jan. 26.

*Heating by steam circulation; heating air; heating liquids.*—Relates to apparatus for heating and drying air, baking, evaporating, distilling, drying fabrics, coffee, sugar, &c. In a chamber *C*, a series of iron vessels *F*, open at each side, are arranged one above the other. Plates *D* direct the products of combustion from the furnace *A*, around the vessels *F*, and finally to a chimney *A*. When the apparatus is used as an air-heater, the

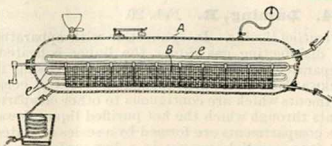


vessels *F* are filled with pieces of metal or drying material and connected by pipes *G*. For drying, Fig. 3, the pipes *G* are not used; but over each pair of rollers placed at the open ends of the vessels *F*, endless bands travel. The whole apparatus is enclosed in a casing *I*, and inside are sloping plates *K* to direct the materials from one band to the next, and scrapers *L* prevent any material adhering to the bands. For evaporating, distilling, &c., pans or dishes are provided in place of the rollers and bands. The vapours may be conducted by the outlet pipe *E* to a receiver. Where a constant temperature unattainable by furnace heat is required, steam may be applied instead of the furnace *A*.

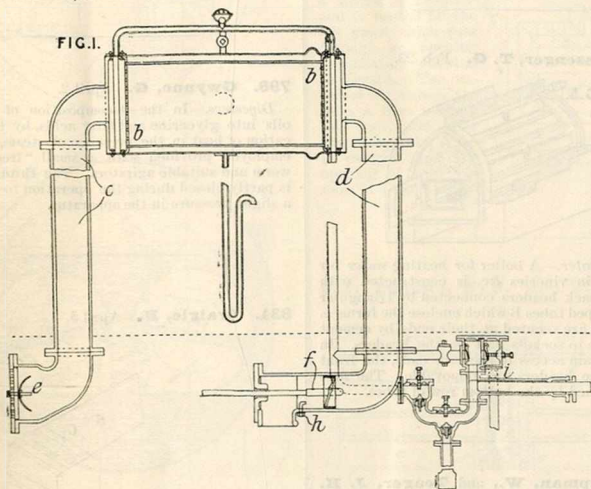
**358. Bousfield, G. T.,** [a communication].  
Feb. 12.

*Digesters.*—Fatty bodies are decomposed into glycerine and fatty acids by heating with water at a temperature below 350° F., and soaps are produced by using solutions of alkalis or of alkaline

carbonates. The boiler A is heated by a closed steam coil *e*, and is provided with a swinging copper agitator B, of which the blades are made of gauze. If desired, high-pressure steam is introduced through a perforated pipe to heat and agitate the mixture. When carbonates are employed, the carbon dioxide evolved passes through a safety-valve at the top of a dome or cylinder. A rotating fan is employed to break up the foam and prevent its escape through the valve.



387. Blackwell, T. E. Feb. 14.



*Heating liquids.*—Consists in giving a siphonic arrangement to the tubes or spaces within which the circulating water flows, so that the water may rise above and descend to its natural level in passing through the compartment in which the liquid is to be heated. The ascending pipe *c* leading to the heating-cylinder *b* is fitted with a

flexible valve *e*, while the descending pipe *d*, forming the longer leg of the siphon, may be provided with a pump *f*. The valve *e* and pump *f* are placed as far as possible below the surface of the circulating water in the reservoir. A small pump *i* is provided to fill the apparatus, or to exhaust the air or vapour from the cylinder *b*.

422. Waygood, R. Feb. 19. [*Provisional protection only.*]

*Boiling-pans.*—Relates to an arrangement of various appliances for laundry use. It consists of a table fitted with rollers and serving both as a mangle and as an ironing board. Underneath the table is fitted a semicircular metal

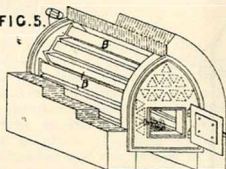
vessel or boiler, in which is suspended an oscillating wooden grating serving as a dasher. A flue is placed under this vessel, and at one side of it a small stove which heats water in the washing and boiling vessel, the irons for ironing, and a drying-chamber. The stove may be separated from the rest of the apparatus and used for ordinary purposes.

**424. Laming, R.** Feb. 20.

*Heating liquids.*—In connection with apparatus for disinfecting gas liquor, the liquor is heated, preparatory to its being distilled, by passing it backwards and forwards through a series of compartments which are contiguous to other compartments through which the hot purified liquor flows. The compartments are formed by a series of plates slid into parallel grooves in a box preferably of wood, suitable stop strips being driven down between the plates to form the ends of the compartments. The plates are perforated near the ends to form the necessary communicating channels.

**466. Messenger, T. G.** Feb. 23.

FIG. 5.



*Heating water.*—A boiler for heating water for circulation in vinerics &c. is constructed with front and back headers connected by triangular or other shaped tubes B which enclose the furnace. These tubes are secured at their ends by cement or otherwise to sockets cast on the headers. In order to obtain access to the tube ends, the front plates of the headers are removable. The fire-grate is formed by the bottom row of tubes.

**536. Chapman, W., and Teager, J. H.**  
March 1. [Provisional protection only.]

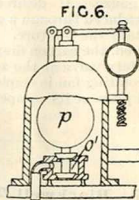
*Heating buildings &c.*—Steam from a steam-cooking-apparatus passes into an exit pipe or passage, which is connected with a steam closet, or with a series of pipes enclosed in a closet made of metal or other material, and, after heating the closet or pipes, is conveyed to a chimney.

**555. Kay, R. D.** March 5.

*Non-conducting coverings.*—A cotton or cotton-and-wool felt is attached to one or both sides of a woven fabric by means of a solution of caoutchouc or other cement, thus forming a fabric suitable for use in making "cylinder lappings" &c.

**662. Brooman, R. A.,** [a communication].  
March 19.

FIG. 6.

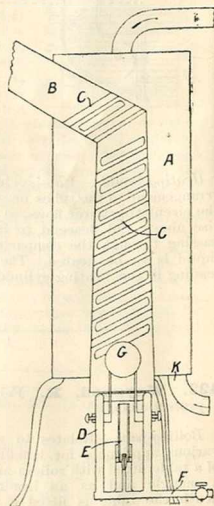


*Steam traps.*—A float p is raised by the accumulated condensed steam and lifts the discharge valve o'.

**798. Gwynne, G.** April 2.

*Digesters.*—In the decomposition of fats and oils into glycerine and fatty acids, by the application of heat in the presence of steam, a still is employed provided with a small "free steam" worm and suitable agitators. The throttle valve is partly closed during the operation to preserve a slight pressure in the apparatus.

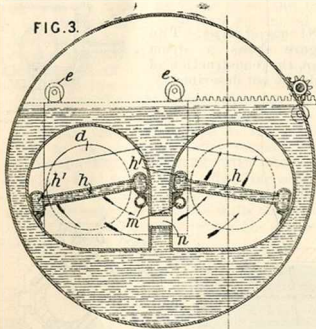
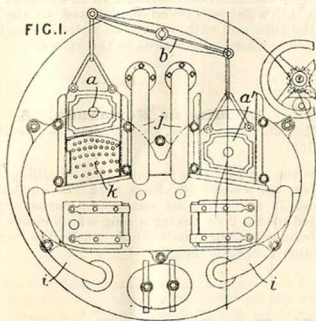
**834. Craigie, H.** April 5.



*Heating water for heating buildings.* One or more water containing cylinders are traversed by flues B, which are crossed by water tubes C. Gas burners are arranged beneath the tubes.



880. Heywood, E. April 14.



*Heating water &c.*—Figs. 1 and 3 show, respectively, a front elevation and a vertical section of a two-flued boiler in which the smoke and gases from a freshly-charged furnace pass by short tubes *n* to the adjacent furnace before proceeding to the flues. Water is circulated through the fire-bars *h*, which, by lateral chambers *h'*, and trunks *i, j*, communicate with the water in the boiler. The firebars are secured to the side chambers *h'* by screwing them into position, the screwed ends of the bars being alternately placed. Though described as applied to steam boilers, the invention is stated to be applicable to boilers for heating water and other liquids.

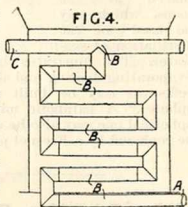
943. Hazard, R. April 19. [Provisional protection only.]

*Heating air.*—Air is heated for drying, warming buildings, and other heating purposes, in a brick

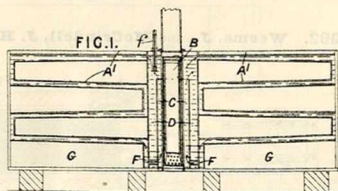
chamber through which the smoke and heated gases from boilers, stoves, or furnaces, are conveyed by pipes. These pipes are secured at the ends to socketed iron plates, having doors to facilitate cleaning of and the removal of soot from the pipes.

952. Chambor, J. A. M. T. April 21.

*Heating air.* A wormed pipe *B* is placed at the back of a domestic fireplace and is heated by the hot gases which pass through an opening immediately behind the grate. The external air enters the tube *A* from beneath the floor, and after traversing the tube *B*, escapes from the opening *C* into the room in a warm condition.



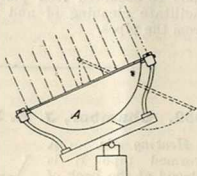
955. Cantelo, W. J. April 22.



*Heating water for drying-apparatus.*—Fruits and other vegetable matters are desiccated on a series of metal double partitions or shelves *A'* forming hot-water plates or hearths slightly sloping to increase the circulation of water in them. *B* is a stove or "furnace" burning charcoal or other fuel for heating the water in the cistern or water-jacket *C*. The water rises and circulates through the shelves *A'* and may be drawn off by a cock at *F*. A pump barrel may be placed in the surrounding cistern *D* and so arranged that at every stroke of the piston the water will be raised above the ordinary level, and by flowing onwards will maintain the requisite circulation. A thermometer may be fitted at *f*. Reserve hot chambers may be placed at *G*. When vegetable matters are spread on the top surfaces of the shelves *A'*, they receive heat from the surface on which they rest, and by radiation from the surface above them, and thus lose their moisture and contract, harden, dry, and retain much of their colour.

1044. **Gordon, A.** May 2.

*Solar heat, utilizing.*—A concave mirror *A* is mounted on an equatorial axis and driven by clock-work to follow the sun. Solar heat is thus concentrated on a still &c. placed at the focus, which may be used for the distillation of sea-water. The apparatus is also applicable for evaporating, boiling and steam-generating. The reflectors may be built up from segments of spheres. A parabolic mirror combined with a spherical one may also be used. The mirror may be replaced by a Fresnel polyzonal lens.



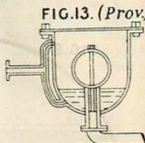
oil &c. The ebullition of the liquid causes it to pass up the tube, and through an opening at the top, into a flat or curved plate, fixed to the top of the tube and with or without little channels in its edge, whence it returns to the vessel.

1252. **Le Mire de Normandy, A. B.** May 26. *Disclaimer. Drawings to Specification.*

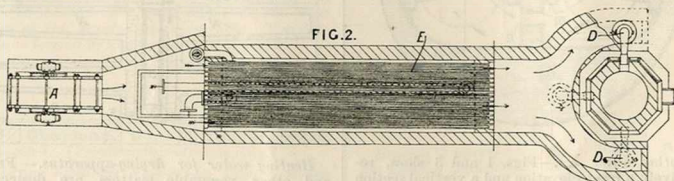
*Steam traps.*—In apparatus for distilling sea-water, the escape of steam with the condensed water is prevented by means of a chamber provided with a float having a plug which closes the vulcanized-rubber exit tube until the water attains a certain height.

1274. **Holt, C. H.** May 28.

*Steam traps.*—The Figure shows a steam trap, the construction of which is not described.

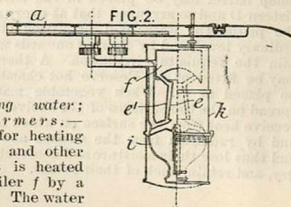
1077. **Schneider, C., and Leiss, F.** May 8. [*Provisional protection only.*]

*Heating liquids; boiling-pans.*—In order to prevent the boiling-over of oil, pitch, tar, varnish, or any liquid, a conical tube having its lower end cut away so as to form two or more projections, is stood in the vessel containing the

1282. **Weems, J., and McCrindell, J. H.** May 30.

*Heating air by steam for use in the manufacture or further treatment of iron and other metals.* As applied to a cupola, air is driven by a fan through pipes *E* in a cylindrical vessel, to which

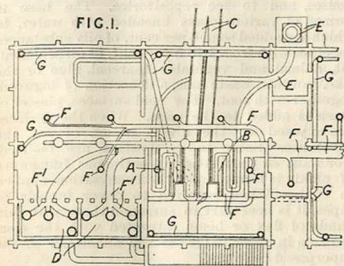
exhaust or other steam is admitted. The air may be sent through steam-jacketed pipes, which are externally heated by furnace gases.

1380. **Preux, A. E.** June 10.

*Heating water; footwarmers.*—Water for heating railway and other vehicles is heated in a boiler *f* by a lamp *i*. The water

enters at the bottom of a jacket *e* surrounding the flue *e* of the lamp, and leaves by a pipe connected to the boiler *f*. The burner is provided with passages to permit both an interior and an exterior supply of air. The lamp may have a cap capable of sliding in the flue *e* to regulate the heat. The heater is enclosed in a casing *k* placed outside the vehicle. The vehicle is heated by the water circulated in a metal case *a* placed in the interior of the vehicle or recessed into and made flush with the floor, for use as a footwarmer. The case is stayed internally to bear the weight of passengers. A boiler may be placed at each end of the case *a*.

1404. Jong, S. de. June 13.



*Heating buildings; heating air.*—Relates to the ventilation of buildings with warm air by means of furnaces A, B and flues F of porous bricks or earthenware. Fig. 1 shows in plan the application of the invention to laundries. Fresh air is supplied to the flues F by pipes C on the north side of the building, and is conducted by diminishing mains and surface pipes F' to apertures or ventilators in the floor. Vitiated air is drawn off through passages in the ceiling leading to the furnace chimney or shaft E. When the furnace fire is lighted and warm air is first admitted into the building, cold air is drawn out of the rooms through passages G in the floors leading to the ashpit of the furnace. The passages and flues are fitted with valves for regulating the flow of air. The furnaces are preferably in a cellar lined with white glazed tiles or cement to reflect heat. The walls and vaulted ceiling of the cellar are hollow, and the spaces are filled in with turf ashes.

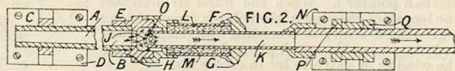
1463. Gurney, G. June 23. *Disclaimer.*

*Heating buildings &c.*—Air is heated and moistened by a radiator composed of a metal

1686. Newton, A. V., [a communication]. July 17.

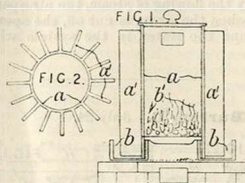
*Heating buildings &c.; thermostats.*

—The expansion and contraction under varying temperature of a pipe supplying steam, hot air, or hot water for heating purposes is utilized to control the supply. A similar arrangement may also control an air-inlet valve in steam-heating systems to allow the water to flow out when the apparatus is cold, and thus prevent freezing &c. The supply pipe A, B, about 20 ft. in length, is fixed at the end A by the bracket D. At the end B a valve-box E, F, G, H is fixed with a stuffing-box L, M, into which the closed end of the exit steam pipe J, K is fitted, one point being held in a fixed position by the



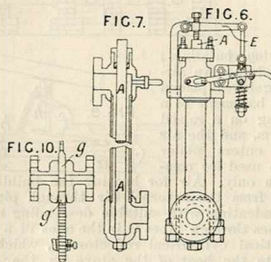
wall bracket N. The position of the exit steam pipe with regard to the pipe A, B is regulated by the screw P, Q, which alters the position of the bracket N on the exit pipe. At the end J of the pipe J, K are a number of apertures through which the steam passes. When the steam heats the pipe A, B, this lengthens and the opening O, J becomes small and the circulation is diminished. For controlling the inlet of air, such a regulating-

vessel a with a number of radial plates a' dipping into a water container b and heated by a fire b',



gas, hot water, or steam. When using a fire, a movable cover and an ashpit doorway are provided.

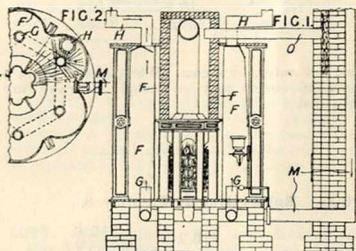
1606. Belleville, J. F. July 8.



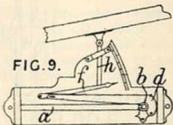
*Thermostats.*—The temperature of the steam coming from a boiler is regulated by admitting a jet of cold water to the steam pipe through a spring-controlled valve g, Fig. 10, which is opened automatically by the expansion of a rod or tube A, Figs. 6 and 7, operating through a lever E.

tube and valve-box opening into the air may be interposed in the course of the piping at the highest point of the building. When the pipe is heated by the flowing of steam, the air aperture is closed; when the steam is cut off, the aperture is opened and the water in the system will then flow off.

1755. **Burton, C.** July 24.



*Heating buildings; thermostats.*—An air-heating stove is placed in the basement of a building on a raised platform, and the air which enters under this is used for combustion only. Air for heating the building is drawn from the external air through pipes M communicating with suitable descending shafts, and rises through pipes G in the axes of a series of vertical cylindrical reflectors F, which concentrate the heat of the stove on the rising currents of air. The descending shafts are fitted with wind-directed hoods and archimedean screw propellers. The heated air is drawn off by pipes H to the rooms above, when it may be diffused by suitable apparatus or admitted by openings in the skirting. The pipes H, M may be opened to any extent at will. Air heated in a chamber surrounding the flue passes by a pipe O into the hollow walls of the house, which it helps to dry. A thermostat for rooms, cucumber frames, &c. in which the air is warmer than outside is shown in FIG. 9. A leaden pipe *a* is fitted with a wheel *b* at one end, bearing on a pivoted arm *d*, which moves a pointer *f*. When the warm air increases the length of the pipe *a*, the pointer *f* moves along a graduated scale, so recording the temperature, and also moves the arm *h* pivoted to it, so opening the window or valve to let in cooler air.



1976. **Mennons, M. A. F.**, [a communication]. Aug. 25.

*Non-conducting coverings and compositions for application to walls, partitions and other parts*

of buildings, to furnaces, steam boilers, cylinders, or similar apparatus, to funnels or pipes, to hot-houses, and to ice repositories. The base is formed of various clays kneaded with water, to which are added some 6 per cent. of oily substances together with from 1 to 5 per cent. of oil sediment, fat, animal and vegetable charcoal, glue or the like, sawdust, waste hair, a decoction of logwood, together with soot. For cold surfaces, plaster of Paris is added to the mass. When the surfaces are exposed to the direct action of fire, the substances liable to combustion are omitted. For walls or partitions, a continuous framework of plants is formed and the composition applied in coats. When required to cover funnels or pipes, it is necessary to surround them with thin bands of flax or hemp saturated with the composition in order to ensure the adherence of the superposed coatings.

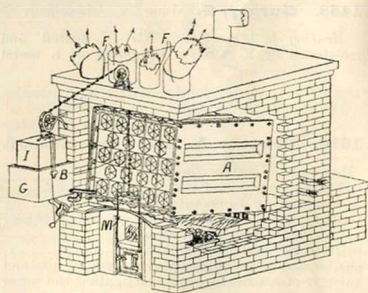
2115. **White, S.** Sept. 10. *Drawings to Specification.*

*Non-conducting coverings.*—In apparatus for distilling oil, the stills are provided with circular heads charged with sand or other non-conductor of heat.

2122. **Gedge, J.**, [Macpherson, A.]. Sept. 11.

*Non-conducting compositions.*—A varnish, paint or colouring-matter for coating metals, &c., and so offering resistance to rays of heat is obtained by melting together "Jews' pitch" and "Bayonne essence."

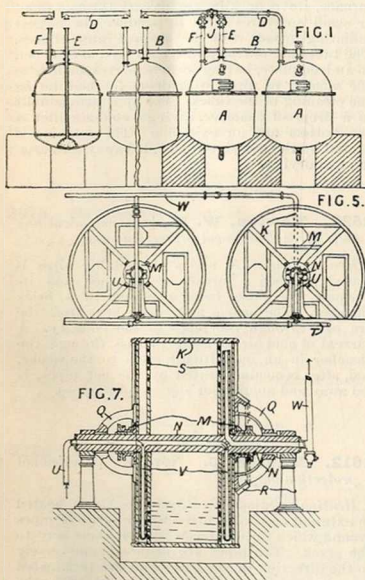
2132. **Clark, W. S.**, [Leeds, L. W.]. Sept. 12.



*Heating air; heating water; thermostats.*—Air is heated by passing it through hexagonal pipes B which pass through a water cistern A. The water is heated by a furnace, and the heated water transmits heat to the air passing through

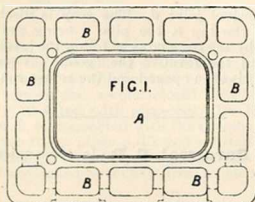
the pipes B. Cold air enters the back end of the pipes, and passes out at the front, away to the pipes F. The bottom of the cistern A is corrugated to expose large heating surface to the fire. The pipes B contain radial ribs. To regulate the temperature of the water, a float I in a cistern G, communicating with the main cistern A, operates a damper M by means of a chain. As soon as the water boils, the pressure of steam forces it back into the cistern G, thus raising the float and operating the damper M, which checks the draft and allows it to pass direct to the chimney. The float I also operates to regulate the supply of water.

**2157. Cranstoun, G. C. T., Young, G., and Lovell, G.** Sept. 15.



from the pipe B, and any kier may be cut out by operating the valves J. The steam from the end kier is passed through a coil of pipes arranged in a tank containing the water supply for the kiers. Figs. 5 and 7 show the application of the invention to a series of dash-wheels K, which are shown arranged end to end. Each dash-wheel is mounted by means of stuffing-boxes M, Fig. 7, upon a fixed hollow axle N, provided with perforated tubes V connected by a pipe U to the steam pipe T and depending into the liquid in the dash-wheel, which is provided with perforated partitions S between which the material treated is contained. The waste steam escapes to a pipe W, connected by pipes to the ingress pipes U of the other dash-wheels. The dash-wheels are rotated by suitable gearing R, and are supported on the axles N by brackets Q. They may be arranged side by side.

**2217. Blackwell, T. E.** Sept. 20.



*Heating buildings.*—Hollow fireclay blocks have a large central hole A and a number of separate or connected holes B. The large holes A are joined to form fire flues, and some of the blocks may have skew holes for altering the directions of the flues; the holes B form channels through which air, heated by the fire flues, rises and escapes through holes in the sides of the blocks.

**2238. Howell, J. B., and Harvey, N.** Sept. 24. [Provisional protection only.]

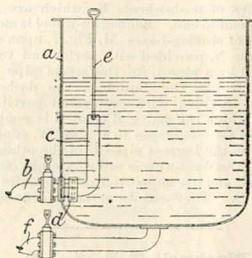
*Heating liquids.*—Boilers are made with plates of cast steel, which are riveted together with steel rivets. Angle or T steel is used for supporting and stiffening the shell of the plates.

**2278. Thom, D., and Phillips, G. A.** Sept. 29.

*Boiling-pans.*—In the stage of soap manufacture known as soap cleansing, the soap is run out of the boiling-pan, without admixture of "goods" or sediment by means of a special arrangement of taps. The boiling-pan may have the interior surface of the bottom convex; the "goods" or sediment is run off by a tap in the convex bottom until the soap reaches the level of a tap, situated in the side just above the convex bottom; the

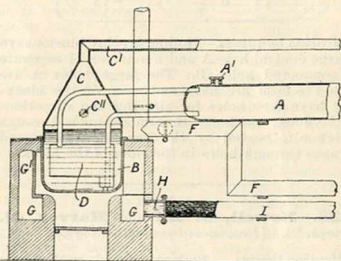
*Heating liquids.*—Relates to the application of steam for producing a boiling action in covered kiers for bleaching and other processes for fabrics &c. In Fig. 1, a series of kiers A are each connected by valved pipes to a steam pipe B, and are connected to a pipe D fitted with valves J by ingress pipes E opening below perforated false bottoms in the kiers, and egress pipes F opening at the tops of the kiers. In operation, steam is passed from the pipe B into the first kier; when the liquid in this boils, the steam evolved is conducted by the pipe D into the next kier, and so on. Fresh steam may be passed into any kier

lower soap is then closed, the upper tap opened, and the tap run off. In another form of apparatus, the boiling-pan *a* is fitted with an outlet tap *b* for pure soap, the tap being connected to the pipe *c*



by the swivel joint *d*. The soap is discharged through the tap *b*, the pipe *c* being gradually lowered by the rod *e*, so as to follow the level of the soap until the level of the "goods" is reached. The tap *f* is then opened and the refuse run out.

**2300. Gardissal, C. D.**, [a communication].  
Oct. 1.



*Heating buildings &c.; heating water; heating air.*—Relates to apparatus for heating greenhouses and for other heating purposes, in which hot water, steam, furnace gases and hot air are employed, all being produced or heated by one stove or furnace. A boiler *B* contains a metal vessel whose ends are joined to two pipes entering respectively at the top and bottom of a vessel *A* containing water and having openings *A*<sup>1</sup> at the top; these openings may at will be closed. The boiler is fitted with a conical cover *C* frictionally held in place and fitted with a steam-pipe *C*<sup>1</sup> leading into the space to be heated. A cock *C*<sup>11</sup> closing an opening in the cone is opened when steam is being freely evolved, with the object of drawing air into the cone and through the pipe *C*<sup>1</sup>. The flue *F* is only used when the fire is fully on and it passes through the greenhouse or other

space to be heated. The furnace is surrounded by a chamber *G* having a mouth *G*<sup>1</sup> for admitting air which is heated, and passes out through a pipe *H* into a pipe *I* made of wire gauze which is placed in the space to be heated. When the end of this pipe is closed, heated air escapes through the gauze. When the end is opened, air is sucked in at the sides, heated, and delivered in a single hot stream at the end. According to the Provisional Specification, a worm replaces the vessel *D*, and the smoke flue may pass through the air-heating chamber *G*.

**2338. Hazard, R.** Oct. 7. [Provisional protection only.]

*Heating air.*—Smoke and heated gases from a furnace, stove, or kiln, are passed through pipes or small apertures so as to produce the largest radiating-surface with the smallest internal area. The tubes are of iron and are secured at each end to an iron plate, having sockets, corresponding to the number of pipes, with doors for facilitating the cleaning of the tubes. The apparatus is built in a fireproof chamber having a cold-air inlet at the bottom and an exit flue. The cold air is heated by the hot pipes, and is led away for warming and drying.

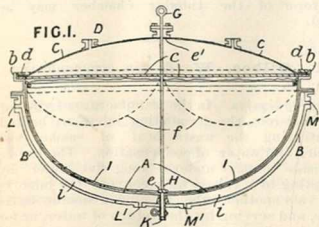
**2522. Newton, W. E.**, [a communication].  
Oct. 27. [Provisional protection only.]

*Heating air.*—A series of metallic pipes is placed between a furnace or fireplace and its chimney, the pipes being enclosed in a brick chamber. The smoke and waste heat from the fire pass through the pipes to the chimney. A current of cold air is made to pass through the chamber in an opposite direction to the smoke, and, after becoming heated by the hot pipes, is led away and applied for any useful purpose.

**2612. Hunter, C.** Nov. 6. [Provisional protection only.]

*Heating buildings; heating air.*—Air is heated in external apparatus fitted with a series of pipes around which furnace gases pass on their way to the stack. The pipes are disposed transversely to the direction of the gases and are terminated by a chamber which communicates with the atmosphere. At the other end, a discharging chamber communicates with a perforated duct which is placed inside and near the ceiling of the apartment to be heated. On the opposite side of the apartment, and on a level with the floor, a similar duct is situated which provides for the discharge of the air. The ends of the duct communicate with vertical pipes which open to the atmosphere at a considerable elevation. The ducts may be of metal, lined or enamelled if desired, or of fireclay, or other material. A fan may be employed for forcing cold air into the heater.

2619. Dircks, H. Nov. 7.

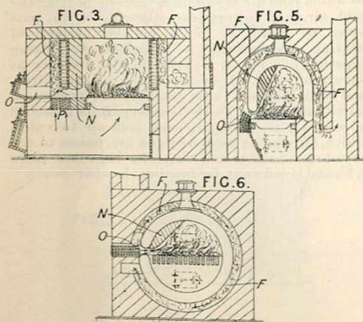


*Boiling-pans; digesters.*—In brewing, the saccharifying-pan A is fitted with a heating-jacket B, and a cover C is clamped on by a metal ring d, a packing-ring c making a steam-tight joint. A metal rod G, H is connected at e with the bottom of a strainer I. This rod, when raised until the part H is at e, will raise the strainer to f. L, L<sup>1</sup> and M, M<sup>1</sup> are inlets and outlets for hot water or steam to the spaces i. Concentrated worts are obtained by blowing in steam at the opening D, after saccharification has occurred, and running off the wort at the tap K.

2675. Hutton, A. Nov. 13.

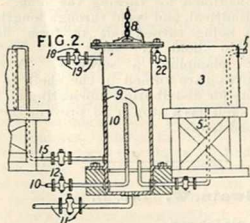
*Footwarmers for carriages, for domestic purposes, for invalids, and for use in places of worship &c.* Instead of using a metal vessel sunk into the floor of the carriage, the hot water, sand &c. is charged into a vessel of vulcanized rubber, water-proof cloth, &c. adapted to sustain a temperature of 212° F. and a pressure of about 15 lbs. per square inch. This vessel is provided with a valve and with a casing of cloth, or partly of cloth and partly of wood or metal; it may be moved about as desired and serves as a footstool.

2720. Healy, W. Nov. 18.



*Heating water.*—Vertical and horizontal boilers B for heating water for heating public buildings, churches, conservatories, factories, &c. are made to enclose the fire and are surrounded by the flues F.

2751. Brooman, R. A., [Boulard, —.] Nov. 20.

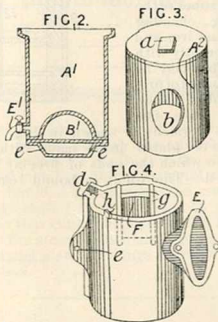


*Digesters.*—Fig. 2 shows steam chambers 3, 9 for dissolving and boiling soluble glass in water. Steam is admitted to the first chamber 3 by a pipe 1, and to the second closed chamber 9 by pipes 10, 19 fitted with stop-cocks 12, 18. The chamber 9 is connected with the chamber 3, and a receiver 16, by pipes 5, 15, and is fitted with a gauge cock 22, waste pipe 11, and a detachable cover 8 suspended by a chain from a crane.

2818. Saunders, J. M. Nov. 28. Drawings to Specification.

*Heating water.*—Water for baths and other purposes is heated in water spaces forming the back, or front, plates (or both) of a cooking-range.

2895. Clark, W. S., [Newsham, H.]. Dec. 6.

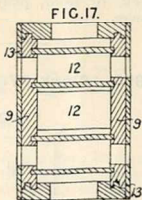
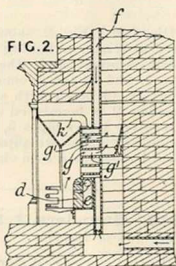




**Boiling-pans.**—Boiling-pans for agricultural and other purposes are made long and with a longitudinally arched bottom B' attached to and forming the top of a furnace. The bottom may be corrugated. The boiling-pan is fitted with a cock E', the plug of which is shown on an enlarged scale in Fig. 3 and the shell in Fig. 4. The plug has a hole b, corresponding with an opening E in the shell, and is provided with a square projection a for turning the plug. The shell is cylindrical, and is cut through lengthwise, the edges being turned out to form flanges d made to hold a sheet of "elastic gum" by clamping a screw c. A recess F and grooves g are formed in the shell to hold cotton waste for distributing lubricating oil; the top of the shell has a stop h to prevent the plug being turned too far.

**3081. Swain, W.** Dec. 27.

**Heating air for ventilation and warming.** Fig. 2 shows in vertical section the arrangement as applied to a domestic fireplace. At the back of the fireplace is placed the chamber g to which the external air is led by a pipe below the grate. The air circulates about the tubes g' which pass through the chamber g and become heated. Thence it is carried by the pipe k to the desired portion of the room to be warmed. A tubular chamber, as described, may be separately constructed for application to an ordinary grate. The tubes of the air-heating chamber may be of cast iron and coated externally with enamel. They may be also constructed of fire-clay instead of metal, in which case the chamber is formed as shown in Fig. 17. The inner faces of plates 9 are made with circular grooves into which the ends of fireclay tubes 12 are inserted. The whole is bound together by

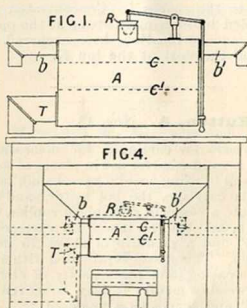


iron plates 13, clamped or otherwise secured. The form of the tubular chamber may be varied.

**3091. Gilbee, W. A.,** [a communication]. Dec. 30.

**Heating liquids.**—In the manufacture of vinegar from beet-root, the fermenting juices are heated by utilizing the waste heat of smoke, lost vapours, and water of condensation. The smoke "is made to pass under a long flat boiler, by "adapting to a tube which conveys the juice to "the vats another tube, forming a double envelope, and serving for the return of water, or for "bringing back to the boilers the condensed "vapours; or by the combination of the three "means, by the employment of the smoke, the "lost vapours, and the water of condensation."

**3092. Grainville, J. L. C. le F. de.** Dec. 30.



**Heating air.**—Relates to an apparatus which is applied to an ordinary fireplace for utilizing the waste heat by allowing it to pass over a chamber to which cold air is supplied, thereby heating the said air, and afterwards allowing it to pass away by means of pipes for the purpose of heating apartments. A chamber A, shown separately in Fig. 1, is fitted in the fireplace as shown in Fig. 4. It is preferably of sheet iron, and is divided into three parts by two perforated partitions C, C'. To the bottom part is attached an elbow pipe T for allowing cold air to enter, which, after being heated by the fire, passes to the top of the chamber and leaves by the elbow pipes b, b', and is led away for heating the apartments.



A.D. 1857.

1. **Pitman, J. T.**, [a communication].  
 Jan. 1. *Drawings to Specification.*

*Non-conducting coverings.*—A covering for boilers consists of a layer of cotton batt enclosed between sheets of paper or fabric, the layers being gummed together.

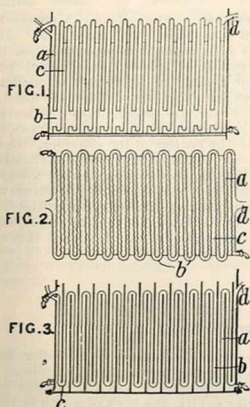
108. **Cheetham, D.** Jan. 13. [*Provisional protection only.*]

*Heating water.*—The level of the water in boilers is indicated by a float, attached to a rod which passes up into a glass tube placed on the outside of the boiler.

152. **Vannoy, H.** Jan. 19. [*Provisional protection only.*]

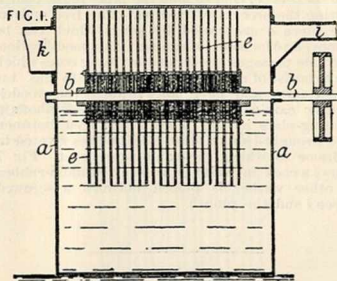
*Heating by chemical action; foot-warmers; bed-warmers.*—The heat evolved by moistening quick-lime is used for heating foot-stoves or foot-warmers, chafing or warming pans, and chafing-dishes, also for heating beds, or drying bed sheets, blankets, or wearing-apparel, or for other purposes. The quick-lime is placed in a metal vessel to which water is fed from a second vessel through a tube having a stop-cock.

183. **Harris, T.** Jan. 21.



*Heating liquids.*—Relates to apparatus for heating wort or beer by hot water, steam, or hot air. A cistern having division plates, so as to establish two distinct ascending and descending passages through the cistern, is employed, and the wort or beer circulates in one direction and the hot water steam or hot air in the opposite direction and produces a heating effect. A section of the cistern with the passages *a* united by boxes *b* through which the hot water, steam, or air circulates, is shown in Fig. 1. The wort or beer enters at *d* and circulates up and down the spaces *c*. The vessels are preferably made of tinned copper and the partitions are sometimes made corrugated as shown in Fig. 2, which is a plan of the apparatus shown in Fig. 1. To prevent the water forming in its passage a natural current, without acting efficiently, the boxes *b* are placed alternately at top and bottom. The apparatus is provided with a cover, if necessary. A modification is shown in Fig. 3, in which the plates *c* are attached to a movable bottom, and the plates *d*, *d* slide into grooves in the sides of the tank.

387. **Partz, A. F. W.** Feb. 10.

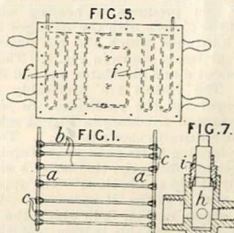


*Heating liquids.*—A current of heated air or steam is passed through the chamber *a*, which contains a series of discs *e*, made of wirework, perforated metal, or fibrous material and dipping into the liquid. These discs are mounted on a revolving shaft *b* or are caused to reciprocate. Each disc thus continually presents a fresh film of liquid to the steam or hot air. Instead of discs, screw-formed plates or wings of perforated metal may be used.

409. Adams, W. B. Feb. 12. [Provisional protection only.]

*Heating buildings.*—Double or cellular floors and roofs are constructed of sheets of slate, metal, stone or artificial material secured at the angles by stud plates, and hot air may be circulated through the spaces.

422. Crossley, C., Leeming, D., and Crossley, J. Feb. 13.



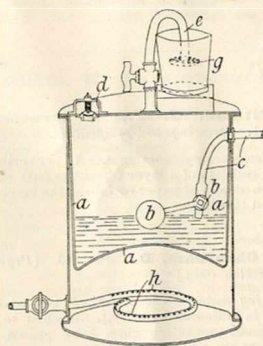
*Heating by steam circulation.*—Relates to steam-heated plates for use in heating-apparatus, and a tap for use therewith. Fig. 1 shows a series of pipes *a, b* which are held together by wooden plugs while the sockets *c* are cast about the joints. The metal of the plates is then cast about the pipes, the sockets serving to hold the pipes in the centre during the process of casting. The free ends of the pipes *a* are closed by plugs which can be removed to facilitate cleaning. In a modification, the side passages are formed by using cores which may consist of metal bars covered with gas tar and emery, and have holes to admit the wooden plugs *c* carried by the pipes *b*. Fig. 5 shows a heating-plate having pipes *f* arranged between two wrought-iron or other metal plates riveted to a frame to which the handles are cast. Fig. 7 shows a cock in which a vulcanized india-rubber or other washer is placed between a screwed piece *i* and the plug *h*.

437. Walker, A. B. Feb. 14.

*Heating liquids.*—An apparatus for heating "wine, beer, spirits, and water and other "beverages" by steam, consists of a boiler *a*, in which the tap of the feedwater-supply pipe *c* is actuated by a float *b*, and a steam supply pipe *e*, fitted with a rose *g*, dipping into the liquid to be heated. A circle of gas jets *h* or other means for heating the boiler may be employed. A safety-valve *d* is also fitted in the boiler top. The apparatus may be of large or small dimensions.

(For Figure see next column.)

- 437.



496. Grist, J. Feb. 20. [Provisional protection only.]

*Heating liquids.*—In apparatus for heating brewers' mash and other liquids, the liquid is heated and caused to circulate by means of a number of branch pipes provided with stop-cocks, opening near the top and near the bottom of the liquid, and passing through a heating-cylinder which is supplied with steam or hot air.

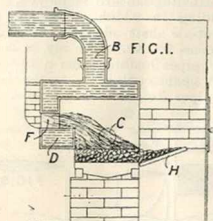
507. Fielding, J. Feb. 21. [Provisional protection only.]

*Heating by steam circulation.*—A steam chamber, employed in conjunction with the pipes or cylinders of a steam heating-apparatus, is fitted with steam-inlet pipes, and outlet pipes or valves for steam, air, and water of condensation. The steam inlet and outlet pipes, unclosed by any valve or cover, are placed above the level of the water of condensation, which is withdrawn through a valve in the bottom of the chamber. In the top cover of the chamber, and above the water level, are an air-escape valve and a steam safety-valve. As the chamber becomes filled with steam and air, the steam, passing through the outlet pipes, is returned to the boiler, or may be employed again for heating, while the air is forced through the air-escape valve.

508. Whitehead, J. Feb. 21.

*Heating water.*—Relates to a boiler for supplying hot water for heating buildings. The boiler is saddle-shaped, and the furnace is below the interior cavity, the back of which is partially closed to effect a check on the draught. A hollow

chamber D connects the side water spaces, and also forms a fire bridge. A pipe B allows for the escape of the hot water, which returns through a

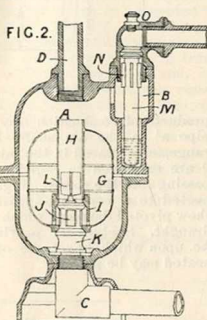


branch at C. The waste products of combustion escape through a contracted opening F to the flue.

**544. McCallan, G.** Feb. 24.

*Steam traps.*—

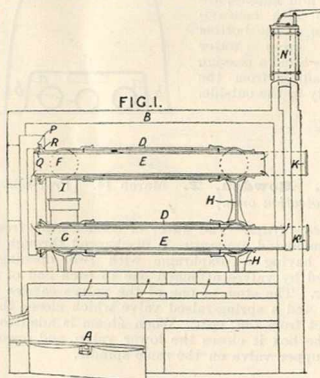
Air and water are discharged from a steam pipe or cylinder, as they accumulate, through a pipe D, leading to a receiver A, made in two parts. The water of condensation escapes through apertures J in a pipe K leading to a discharge pipe C screwed to or integral with the bottom half of the receiver A. The discharge of the water is controlled by a double-seated valve I carried by a tube H secured centrally in a float G, or a ball float may be used without the tube H. The pipe K carries a triangular feather or guide L, and the float has drainage apertures at the bottom. The air escapes through a chamber B screwed to or integral with the upper half of the receiver A and containing a valve having a tubular stem M guided by feathers N and dipping into mercury, so that when steam enters this chamber the air in the stem expands and closes the valve. Fresh mercury is introduced through an opening closed by a screw O.



**604. Jones, E. F.** March 2.

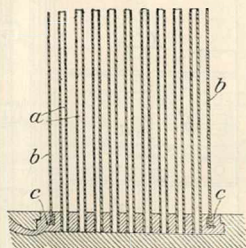
*Heating air.*—Two or more tiers of concentric pipes D, E are mounted on brackets H in a chamber B over the grate A. The products of com-

bustion enter the chamber through the perforated arch of the furnace, circulate outside the pipes D, and then pass through the inner pipes E to the flue N, as shown by arrows. The air to be heated is passed through the annular spaces between the inner and outer pipes, these spaces being connected together by horizontal and



vertical pipes G, F, I, and with the inlet and outlet pipes K, K'. An expansion-joint between the inner and outer pipes is made by bolting to their flanges Q, R a flexible metallic ring P having a raised lip on its inner edge to bear on the flange Q.

**666. Hawksley, G.** March 7.

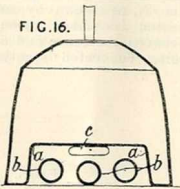


*Heating gases and liquids.*—An apparatus for heating air, steam, and other fluids consists of a number of wrought-iron tubes a and a casing b with flanges c, the whole being held together by cast-iron ends. The ends of the tubes a are closed with loam, and arranged in the mould as shown during the process of casting.



721. Taylor, S. L., and Rolfe, T. E. March 13.

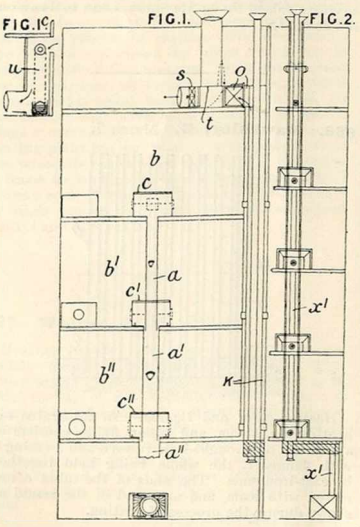
*Heating liquids; boiling pans.*—Small boilers, such as coppers and kettles, are made with concavities *a* at the bottom with cross water tubes *b* and a passage *c* leading from the cavity to the outside.



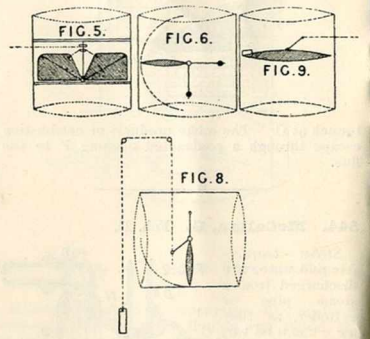
733. Bowden, T. March 14. [Provisional protection only.]

*Steam traps.*—The water of condensation from steam-heated apparatus is discharged through a box having a diaphragm with two openings closed by valves attached one to each end of a lever. The stem of one of the valves carries a float and a spring-raised valve which closes the outlet from the box. When steam is admitted to the upper valve on the same spindle.

740. Moes, J. March 16.

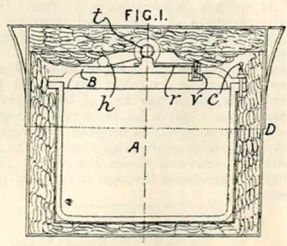


*Heating buildings; heating air; heating liquids.*—To ventilate and heat houses, and other buildings, an inlet pipe, and an outlet pipe fitted with an exhausting-fan are employed. Fig. 1 shows a building in which successive portions *a*<sup>1</sup> &c. of a hot-air shaft admit air through boxes *c*<sup>1</sup> &c. to rooms *b*<sup>1</sup> &c. The air is heated by passing over pipes leading from a furnace to a chimney. A pan containing water is placed among the pipes to moisten the air. Or, the



products of combustion may pass up through a pipe *x*<sup>1</sup> in the air shaft, Fig. 2. Various arrangements placed in the inlet shafts Figs. 5, 6, 8, 9 are employed to register the amount of air passing into the rooms. Fig. 5 shows a fan connected to a counting-apparatus. Figs. 6, 8, 9 show pivoted dampers which are inclined by the draught. Shelves are provided in the boxes *c*<sup>1</sup> &c. upon which beverages or other liquids to be heated may be placed.

778. Maire, J. F. March 20.



*Digesters.*—Food is first partly cooked in a digester *A* over a fire, and the vessel is then placed in a box *D* lined with a bad-conductor of heat, and the food allowed to finish cooking by the heat it contains. The lid of the vessel is

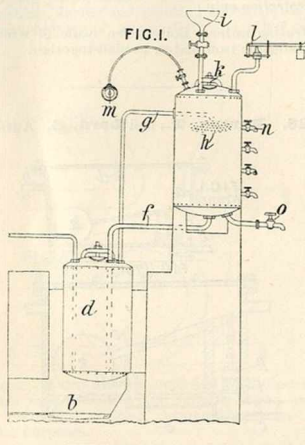
secured by means of three keys *c*, each of which has a small bitt at its lower end; the bitt passes through a groove in the hole in the flanges, and the key is afterwards turned partly round so as to bring the bitt clear of the groove. A valve *v* in the lid is kept down by a spring *r*, which is pressed by a screwed button *t*, through which a ring *h* for raising the lid is inserted. When the vessel *A* is made of clay &c., its lid is secured by a rope which is passed over the top of it and through lugs on the side of the vessel, an india-rubber or felt ring being inserted between the flanges of the vessel and its lid to form a steamtight joint.

**894. Wright, R. A., and Fouché, L. J.**  
April 1.

*Digesters.*—Relates to apparatus for decomposing fatty and other substances by treating with superheated steam and hot water. The substance to be treated, together with water, is introduced by a funnel *i* or manhole *k* into a cylindrical vessel *h*, the bottom of which is connected by a pipe *f* to the bottom of a boiler *d* heated by a furnace *b*. Superheated steam and water pass from the boiler *d* to the vessel *h* by a pipe *g* terminating in a rose inside the vessel *h*, and, after passing through the substances in the vessel *h* returns to the boiler *d* by the pipe *f*. The vessel *h* is fitted with a safety-valve *l*, pressure gauge *m*, and test cocks *n*, and is emptied by means of a cock *o*. Or the boiler may be heated by a steam jacket, or by a steam coil. In a modification, the tubes connecting the upper parts of the two vessels terminate in perforated tubes instead of a rose.

(For Figure see next column.)

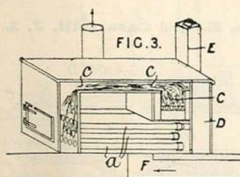
894.



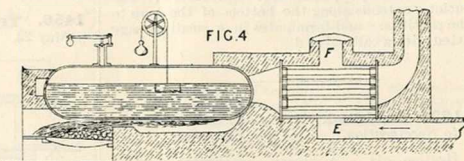
**1026. Wiles, W. G.** April 11. [Provisional protection only.]

*Boiling-pans.*—In apparatus for treating hops, the "batch" is heated by horizontal steam pipes placed near the bottom of the vessel and below a perforated false bottom from which a perforated pipe rises. When the liquid boils, it passes up the pipe and falls through the perforations on to the hops.

**1048. Hazard, R.** April 14.



*Heating air.*—The waste gases of stoves and furnaces are utilized by passing them through a number of iron or other tubes traversing a chamber through which air is passed. Fig. 3 shows the tubes arranged horizontally below the fireplace *C* of a hot-plate for cooking. The hot gases from the flue *c* underneath the plate pass through the tubes *a* to a chamber *D* connected with the chimney *E*, while cold air enters

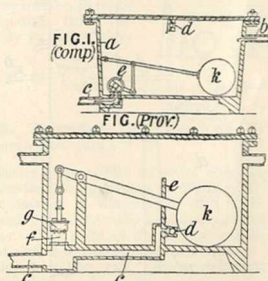


around the tubes from the outside through a flue *F* and finally escapes through another flue at the side. The tube ends enter sockets in cast-iron tube plates, and the joints are made tight with iron cement. A pan, containing water, is placed in the hot-air chamber for moistening the air. Fig. 4 shows the tubes arranged in the flues at the back of a steam boiler.

**1075. Crook, S. T.** April 16. [*Provisional protection only.*]

*Heating water.*—Boilers are made of wrought or malleable iron plates, welded together.

**1128. Burton, T., and Lord, S.** April 22.



*Steam traps.*—Relates to a steam trap for use on steam chests and pipes, drying-cylinders, printing-machines, drying-stoves, tape legs or dressing-frames, finishing-machines &c. It consists of a closed chamber *a*, Fig. 1, having an inlet *b* from the pipe or vessel to be drained and an outlet *c* controlled by a rotary valve *e*, which is operated by a float *k*. The valve *e* is made hollow from end to end and has a port formed at one side. As the water accumulates in the trap, the float *k* rises and opens the valve *e*, thereby allowing the water to be discharged. A ball valve *d* for the escape of air is fitted to the top of the trap. According to the Provisional Specification, the discharge valve consists of a sleeve *g*, Fig. (Prov.), working over ports in a short cylinder *f* closed at the top. The float *k* works in a separate compartment formed by a partition or midfeather *e*. The outlet *c* extends along the bottom of the trap to the partition *e* and terminates in a small passage fitted with a ball valve *d*.

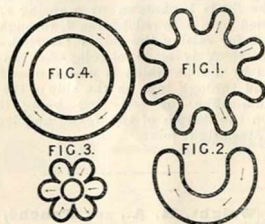
**1162. Craddock, T.** April 24. *Drawings to Specification.*

*Heating air.*—A steam superheater may be employed for this purpose. It comprises a surface apparatus composed of a number of copper tubes, through which the air to be heated is passed, and which is surrounded by steam.

**1347. Eley, E.** May 13.

*Heating buildings &c.; heating air.*—Pipes for use in heating conservatories, churches and other

buildings are formed of fluted or other ornamental form, Fig. 1, to increase the heating-surface. Fig. 2 shows a pipe with a gutter to contain water which is evaporated to moisten the air in a green-

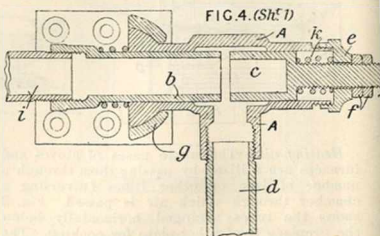


house. Figs. 3 and 4 show forms of pipes with inner spaces, in which currents of air may be heated, and outer spaces for conveying hot water or steam.

**1355. Fielding, J.** May 13. [*Provisional protection only.*]

*Steam traps.*—Relates to modifications in the trap described in Specification No. 507, A.D. 1857, whereby the water can be discharged however great the pressure of steam may be. According to the present invention, the separate valves for the escape of air and the discharge of water are dispensed with, and in lieu of them a combined air and water valve is used. This valve is fitted at the bottom of the trap and consists of a rotary or oscillating barrel or disc, operated by a float and formed with separate ways for the water and air. The air way is controlled by a lift valve, placed immediately above the barrel or disc and closed by a float as the water accumulates in the trap or by a pressure of steam.

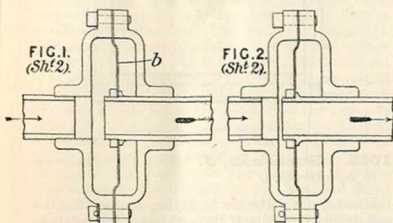
**1456. Travis, E., and Casartelli, J. L.** May 23.



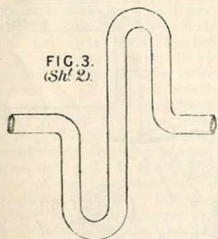
*Steam traps.*—A sliding tube, which when filled with steam bears against an adjustable valve or piston so as to be closed, contracts when the

steam therein condenses, thereby causing the end to recede from the valve and allowing the water to escape. A box A, Fig. 4 (Sheet 1), of brass or other anti-corrosive material, is fitted with a sliding tube *b*, which is connected to a steam apparatus, an adjustable piston *c*, and an outlet pipe *d*. When the air has been expelled and steam appears at the outlet *d*, the piston *c* is adjusted to close the tube *b*. As the tube *b* cools and contracts, air, water and steam again escape. The tube *b* is connected to a pipe *i*, which may have a "compensating" arrangement, such as a

for drying yarns, fabrics or fibrous materials, or in finishing, drying and printing the same, and in the manufacture of paper, felt, and other sub-



bend, coil, disc, or similar device, Figs. 1 to 5 (Sheet 2), to act when the pressure of the steam exceeds the point at which the apparatus was adjusted. Figs. 1 and 2 (Sheet 2) show a plain or curved disc compensation device, in which an elastic disc *b* is held between flanges which are attached to the expanding pipe *c* and to the pipe *d*, which is connected to the sliding tube. A swivel joint *g* may be employed to enable the apparatus to accommodate itself to any movement of the pipe *i*. A spring *k* may also be employed to compensate for any additional ex-



pansion after the piston has been adjusted. The apparatus may be used for right hand or left hand by transposing the tube *b* and piston *c*. The trap is applicable to all steam or vapour conduit pipes and vessels, and to receivers in which steam or vapour is condensed and removed. It may also be applied where steam is employed for mechanical power, heating, drying, evaporating, condensing, boiling, digesting, warming, heating private or public buildings, churches, mills, or warehouses, and for ventilating mines. It is also applicable to cylinders and vessels used

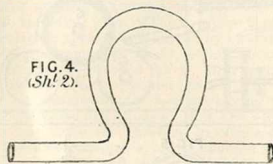


FIG. 4.  
(Sheet 2).

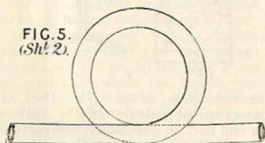
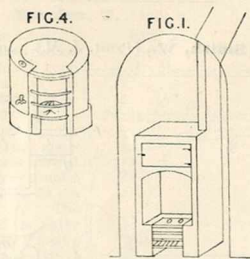


FIG. 5.  
(Sheet 2).

stances. It may also be employed with pipes and vessels used in boiling and refining sugar, brewing, distilling, cooking, evaporating pans and similar purposes.

1495. Welch, E. May 27.



*Heating water.*—The outer casing of a cylindrical or square firebox, Fig. 4, forms a boiler. In the stove shown in Fig. 1, the boiler is formed against the cheeks of a stove.

1516. Wilber, W. May 29.

*Heating by air circulation; heating air.*—Relates to means for heating-apparatus for hulling and extracting oil from seeds. A three-branch jacketed chamber R, Fig. 10, is fitted with stuffing-boxes over the ends of the oil-pressing rollers, G, G<sup>1</sup>, G<sup>2</sup>, Fig. 3, cold air being drawn through the jacket by a fan J and supplied to chambers *u*,

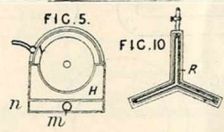
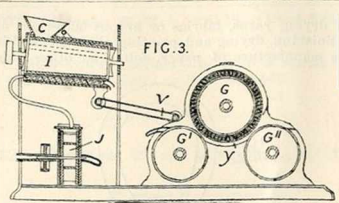
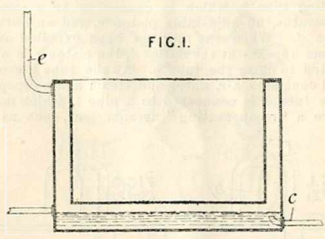


Fig. 5, heated by a steam coil. Part of the hot air passes to the exterior of the rollers and the mill I, and part to the inner compartment of the chamber R to supply the rollers, thence returning to the jacket.

**1573. Miller, W.** June 4.

*Boiling-pans* for use in the manufacture of sugar are heated by steam jackets in which the temperature is not allowed to exceed 212° F. To

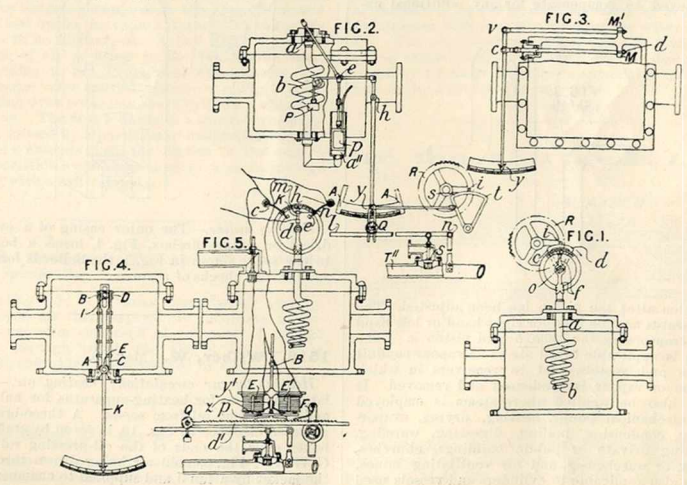
attain this end, the jacket has a free outlet *e*, and the live steam is led into water retained in the bottom of the pan by suitably elevating the water-waste pipe *e*.



**1646. Buchanan, J.** June 12. *Drawings to Specification.*

*Heating air.*—The air in drying-rooms is heated and dried by passing it through metal and earthenware pipes arranged in the flue of a furnace and leading to an air duct. The metal pipes are protected from the direct action of the furnace by a perforated fireclay arch, and the earthenware ones serve to absorb moisture from the heated air.

**1678. Smith, W.,** [*Prost, J. M.*]. June 16.





**Thermostats.**—Relates to thermostatic feed-regulating devices for steam generators composed of a series of tubes, through which water passes and is converted into superheated steam. The supply of feedwater is regulated in accordance with the temperature of the steam. The feed-pump is made to supply more water than can be vaporized under ordinary conditions, and the surplus is returned to the cistern. Fig. 1 shows one form of regulator, in which a tube *a, b*, containing a liquid or a gas and enclosed in a steam chest, has its lower end sealed, and its upper end communicating with a pressure gauge *f*. The gauge dial is graduated by comparing it with a standard thermometer. The pointer of the gauge may operate a feed regulator as described below in connection with Fig. 2. A peg *i* on the wheel *R* of an alarm apparatus is held by a segment *c, d* fixed to the shaft *o*. When the temperature exceeds or falls below certain limits, the peg *i* is released, allowing the alarm apparatus to act. In another form of this apparatus, the gauge may be in direct communication with the steam chamber. Fig. 2 shows an apparatus in which a tube *a, b*, sealed and fixed at the top, and filled with mercury, communicates with a vertical cylinder *a<sup>1</sup>*, which encloses a piston *p*. By means of rods, the expansion and contraction of the mercury actuates a pointer *y*, pivoted at *h*, and moving over a graduated scale. The pointer is connected to a segment *s, t*, against which bears a peg *i* on the wheel *R* of an alarm apparatus, as in the apparatus shown in Fig. 1. For regulating the supply of feedwater, a carriage *Q*, travelling on a lever *l, n*, which bears upon an overflow valve *S* in the feed pipe *T<sup>1</sup>*, is moved by the pointer *y* so as to control the escape of the feedwater. The piston *p* may be made hollow as shown and filled with a liquid under pressure, so as to prevent the mercury escaping. A weight *P*, attached by a cord to the joint *e*, compels the piston to follow the mercury on its contraction. Fig. 3 shows a thermometer in which the relative expansion of two metal rods attached to fixed flanges *M<sup>1</sup>, M* outside and inside the steam chest, is magnified, and the temperature indicated on a graduated scale by a pointer *y* attached to the ends of the two rods. An alarm apparatus similar to that shown in Fig. 2, or the feed-regulating arrangement consisting of the carriage *Q* and lever *l, n* mentioned above, may be attached to the pointer shown in Fig. 3. In the apparatus shown in Fig. 3, the rod *d, c*, in contact with the steam, passes through a stuffing-box; but where the rods and steam chest are of the same metal the rod *d, c* is fixed to the outside of the chest. The rod *v* is then surrounded by water to keep its temperature constant. Fig. 4 shows an apparatus in which the unequal expansion of two parallel blades *A, B, C, D*, which are of different materials, but approximately, of the same length, moves a pointer *K*. The blades which are connected by cross-pieces are fixed at the ends *A* and *C* and carry a peg *l* which passes through a slot in the lever which operates the pointer. The pointer may be attached, as in the arrangement shown in Fig. 2, to an alarm clock and also to a feed regulator. The above-mentioned thermometers may be used to control electrical alarms and regulating-apparatus. Fig. 5 shows the apparatus described in connection with Fig. 1 adapted for

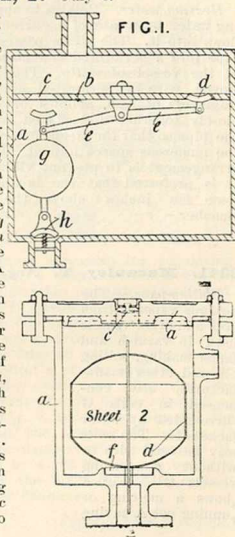
this purpose. The end of the pointer *K* is insulated and fitted with two silver pieces *m, n*, which may bear against springs *c, d* and *e, h*. These springs are connected through a bell or bells to one pole of a battery, and the pointer *K* is connected to the other pole. The carriage *Q* of the feed-regulating apparatus is moved by an arrangement of electromagnets *E, E<sup>1</sup>*, which actuate a double armature pivoted at *B*, and having a pawl *p* which moves toothed racks *d<sup>1</sup>*. Two racks *d<sup>1</sup>* are employed, the second having teeth cut in the reverse direction, so that the electromagnets may move the carriage in either direction. The electromagnets are connected to the springs *c, d* and *e, h*, and to the battery by a wire *s, t*. A spring having a rounded catch presses the racks against a roller support and prevents them from moving backwards. A liquid thermometer, having one wire connected to the battery placed in the liquid, and a second wire so arranged that when the liquid rises it completes the circuit, may be employed. A pipe *A*, fitted with a safety-valve, connects the steam chest with the condenser.

**1704. Sykes, E., and Crawford, M. W.**  
 June 18. [Provisional protection only.]

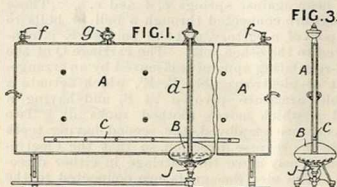
**Boiling-pans.**—A pipe is passed through the bottom of a boiling-pan for soap, tallow, bones &c., to lead the offensive fumes to the ashpit beneath, from which they pass through the fire and flues.

**1871. Bowden, T.** July 6.

**Steam traps.**—A steam trap of the float type consists of a chamber *a*, Fig. 1, divided by a partition *b*, in which two apertures are closed by valves *c* and *d* attached to a lever *e*. The stem of the valve *c* carries a float *g* and a valve *h* which closes the water outlet. A spring holds the valve *h* open until the air has escaped. Another form of the same type consists of a chamber *a*, Fig. 2, in which a float *d* forms the water discharge valve. This valve has for its seat an india-rubber ring *f*. A valve *c* allows the air to escape.



1994. **Newton, W. E.**, [a communication].  
July 18.



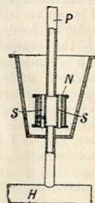
*Heating buildings.*—A radiator A composed of two metal plates, arranged parallel to each other, is combined with a steam generator B, preferably of the shape of an oblate spheroid, and preferably heated by a gas burner J. The ends of the plates are bent towards each other, and soldered to form a closed vessel, having valves *f* for the escape of air and, if necessary, a safety-valve *g*. A baffle *c* is placed just above the boiler, which is fed by a tube *d*. The tube *d* passes through the radiator, and is provided with slots below the normal water level. The whole apparatus is mounted upon castors and fitted with handles.

2052. **Smith, O. H.** July 28.

*Heating water.*—Relates to apparatus for heating water by means of a current of steam which flows into it. The steam passes by means of a pipe into a perforated box placed at the bottom of the vessel of water. The box is made of woven wire or perforated wood, and contains fragments of iron, pebbles or the like packed closely together and placed round the exit of the pipe so that the steam forces its way through the numerous spaces formed. The object of this arrangement is to prevent vibration and noise. It is preferred that the box should be placed some few inches above the bottom of the chamber.

2054. **Bousfield, G. T.**, [a communication].  
July 28.

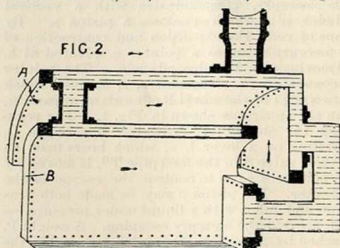
*Heating liquids; boiling-pans.*—Relates to the heating of hatters' kettles for sizing hat bodies. Steam passes down the pipe P from the boiler and enters the drum N, which contains the tubes S, through which the liquid in the kettle circulates. The condensed water passes down into the drain pipe H, and is returned to the boiler.



2211. **Gedge, J.** [Lorentz, X.]. Aug. 20.  
[Provisional protection only.]

*Heating buildings.*—Houses and other buildings are built with one central chimney or shaft, into which flues from all the fireplaces lead.

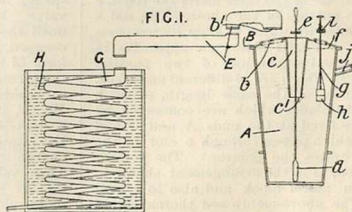
2229. **Steell, G., and Steell, W.** Aug. 22.



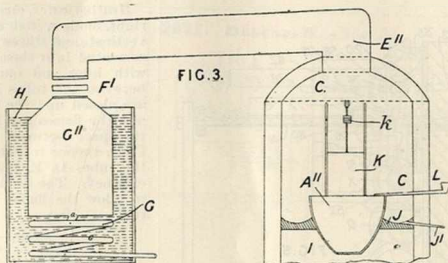
*Heating water.*—Water for heating churches, horticultural buildings, mansions, and theatres, is heated in a boiler having two arched water chambers A, B, connected together at both ends by flanged pipes of the form shown. The inlet and outlet pipes are connected to the bottom of the inner chamber and the top of the outer chamber. There may be three water chambers and the boiler may be round or square.

2241. **Macauley, T.** Aug. 25.

*Boiling-pans.*—The noxious vapours from pots and other vessels used in varnish and japan making, boiling oil, and other manufactures, are condensed in coils G surrounded by water jackets H. The coils may be used with or without condensing vessels G<sup>1</sup>. Fig. 1 shows a melting or running pot A having



a cover B with a ground socket or ring b to receive a corresponding ring or plug b' on metal tubes E similarly connected together and to the condenser. The lid carries a funnel c, c' through which works a spatula d carrying a sliding plug e to close the aperture c'. The hole in the plug is bevelled on both sides to permit free working of the spatula. An aperture f is provided to admit a gauge rod g carrying a cup h and a plug i. The pouring nozzle j is arranged as shown. In the case of a boiling-pot, a larger connecting-pipe is used in conjunction with the removable lid, having a plug-closed aperture, draining-channels being provided in the lid and connecting-pipe. Fig. 3

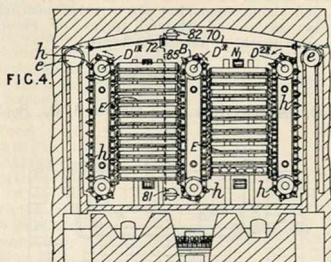


shows a fixed pot A'' enclosed in a brick chamber C, and a small telescopic section F' arranged between the connecting-tube E'' and the condenser. The brick floor I has channels J and a drain J'. The charging is effected at L. A sliding metal door K with a counterweight k is provided to permit working near the pot.

2247. **Nicholls, W.** Aug. 25. [Provisional protection only.]

*Heating milk.*—A vessel containing hot water is placed in the milk vessel. "Heaters," i.e., pieces of hot metal, are placed in the water to keep up its temperature.

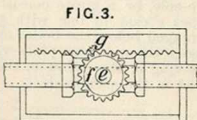
2269. **Newton, A. V.,** [a communication]. Aug. 27.



*Thermostats.*—In an apparatus for regulating the heat of a baker's oven, an arched rod 70, Fig. 4, expands and arches upwards when heated, and lifts a lever 72 pivoted at 73, Fig. 5, so that the stud 74 depresses a counterweighted lever 77 pivoted on a horizontal rod 74, and the arms 79 allow the arms 80 to fall. The damper then closes the outlet e of the furnace. If the temperature of the oven rises after the flues are closed, a current of cold air is admitted at the opening 81, Fig. 4, and passes through the oven and away at the opening 82 leading to the chimney. The dampers at the openings 81, 82 are connected by a rod 85, and are operated simultaneously by the lever 78, Fig. 5, after it has closed the flue dampers.

2268. **Thompson, C., and Thompson, J.** Aug. 27.

*Steam traps.*—Water, air, and other fluids are discharged from drying cylinders, steam chests, printing-machines, drying-stoves, tape legs or dressing-frames, finishing-machines, and steam pipes for mills, print works, dye works, bleaching works, or other similar purposes, through an automatically-operated valve on a spindle e. As the steam pipe expands and contracts, due to its varying temperature, a toothed wheel f, on the valve spindle, is operated by a fixed rack g which may be secured to the floor, ceiling, or other horizontal bearing. Instead of a plug cock, a sliding or mushroom valve, operated by a lever or inclined plane, may be used; or the valve may consist of two eccentric cylinders with apertures at right-angles to their axis.



(For Fig. 5 see next page.)

2269.

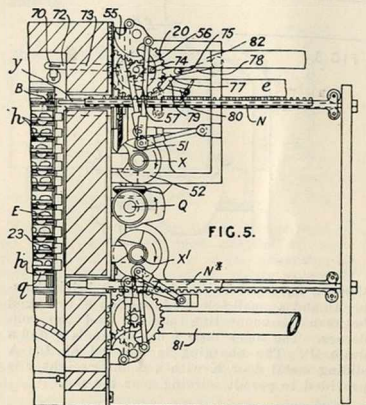


FIG. 5.

2289. Coates, H. Sept. 1. [Provisional protection only.]

Heating liquids.—In apparatus for heating liquids used in bleaching, dyeing, soaping, clearing, and sizing, steam, hot air, or other heating-agents are passed through pipes or chests immersed in the liquid to be heated.

2399. Seward, A., and Seward, C. Sept. 16.

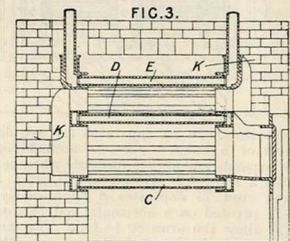


FIG. 3.

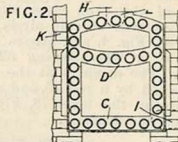


FIG. 2.

Heating water, circulating-boilers for. Two upright, hollow, flat castings are joined by two vertical and three horizontal rows of tubes cemented into them. The castings are provided with inlet and outlet pipes H, I. The spaces between the tubes in the upper and middle sets are closed up; the fuel rests on the lower tubes, and the flames and hot gases pass to the back of the space between the lower and middle tubes C, D, thence to the front of the space between the tubes D, E, and above the tubes E to the chimney. The brickwork K is slightly recessed to allow the flames to circulate round the side tubes.

2441. Ormson, H. Sept. 19. Disclaimer.

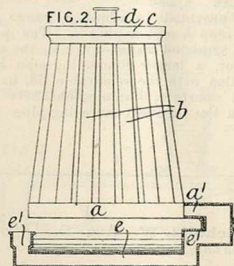


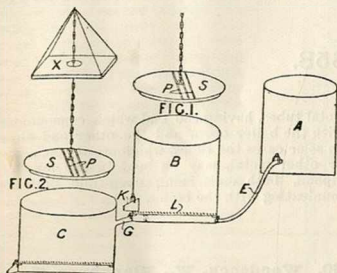
FIG. 2.

Heating water.—In order that no joints may be exposed to the fire in a tubular boiler for heating water for heating horticultural and other buildings, the lower ring a and part of the upper ring c of the boiler are cast in one with the pipes b. Pipe-sockets d are in one, with a casting which completes the upper ring, and in which are formed holes for the introduction of fuel and the escape of smoke. Some of the pipes b may be shorter than the others, the ring a being bulged upwards at one place so as to leave a fire-hole, or a grate consisting of a number of pipes e cast in one with the ends e' may be arranged below the boiler as shown. The water passes through the pipes c, the connection a', the ring a, the tubes b, the ring c, and pipes fixed in the sockets d.

2448. West, E. B., [a communication]. Sept. 21.

Boiling-pans for use in brewing. The pans communicate with each other and with a boiler, and a floating cover is employed to prevent evaporation. The boiling-pan B communicates with the boiler A through the pipe E, which is provided with stop-cocks, and with the boiling-pan C through the pipe G. The pans have discharge pipes K fitted with stop-cocks, and strainers L supported on ledges and each comprising two perforated

plates with a layer of fabric between them. The floating covers S are suspended by chains;



they may be of hollow metal, and are formed so as to float with their extended top edges several inches above the liquid.

**2622. Kopsich, C. G.** Oct. 14. [*Provisional protection only.*]

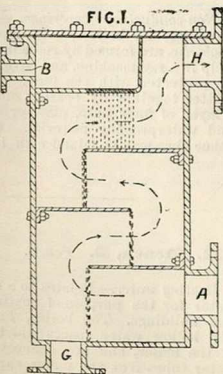
Heating air for ships' jet propellers. A blowing machine drives cold air through the grates of boilers for heating to 1000° or more.

**2647. Wright, R.** Oct. 15. [*Letters Patent void for want of Final Specification.*]

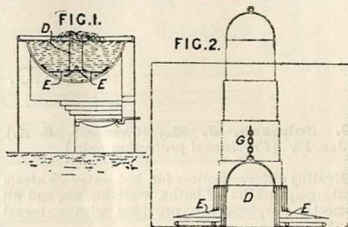
Heating by liquid circulation; heating buildings. —Oil or fatty matter is employed as the circulating liquid, and is heated by passing through the hollow walls and cross-tubes of a furnace. A screw may be used to facilitate the circulation. The pipes may be fitted with a safety-valve. The oil may be heated by passing the tubes through the fire.

**2918. Walker, H., Beaumont, J., and Gothard, J.** Nov. 20.

Heating water. —Exhaust steam is used to heat water for dyeing and other purposes in a small auxiliary condenser. On its way to the main condenser, the steam enters at A, coming in contact with the water which falls on to plates arranged in a zig-zag fashion. The hot water passes away at G.



**2971. Deacon, H.** Nov. 30.



Boiling-pans. —In boiling caustic-soda liquors or soap, or treating the caustic-soda liquors with sodium nitrate or other oxidizing-agent, a tube is placed in the liquid up which the boiling liquid flows, in order to prevent boiling over or effervescing at the sides. As shown in a caustic-soda pot, Fig. 1, a "geyser" tube D is supported by or fixed to a plate E placed on the bottom, or, in the case of a pan heated by steam pipes, over the pipes. The tube may be made telescopic, and adapted to be drawn out by a chain G, as shown in a soap copper, Fig. 2. Several of these tubes may be arranged in one pan. The length of the tube may also be varied by providing it with a flange upon which movable rings may be placed.

**3119. Walker, W.** Dec. 19.

Heating air.

—Relates to a kiln or oven for supplying heated air to buildings. An oven and furnace a are enclosed by brickwork, as shown in Figs. 1 and 2. At the top part of the oven are placed tubes b, through which pure air passes, and, after becoming heated, is led away for heating buildings. When pure air is not required for heating purposes, the dampers d are closed and the fire-door opened so as to admit the hot air from the furnace a to the flues, and thence to the buildings to be heated.

