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REPORTS OF INVESTIGATIONS

(U.S. BUREAU OF MINES) - - DEPARTMENT OF THE INTERIOR

BIBLIOGRAPHY OF LITERATURE ON SAMPLING.
(Compiled by W.J. Sharwood and M.W. von Bernewitz)

So far as is known, there is no complete bibliography on sampling, therefore, this one should be of value. In it are nearly eleven hundred references, some dating back 30 years, on sampling at mines, mills, smelters, power plants, pumping stations and refineries. For convenience, there are included a few references to methods for sampling such materials as leather belting in mills, salt impregnated soils, and mine waters. All the important technical journals, including some in foreign countries- and engineering society publications, also mining and metallurgical text-books, have been studied for anything concerning sampling, and while it is not claimed that every important reference has been listed, the bibliography is fairly complete.

The arrangement is alphabetical by authors' names, and the references are numbered serially in the order that they appear in the bibliography. Anonymous references are listed under the name of the journal in which they appear, and are numbered like the references bearing an author's name.

Patents are grouped in their numerical order, without index numbers.

Under the heading, "U.S. Bureau of Mines Publications", are listed all publications of the bureau that deal with sampling. While the serial number is omitted, these same references, of course, have serial numbers where they appear in the list arranged alphabetically by authors.

Acknowledgement is made to Miss Florence Wilkie and to Miss H. Shelby Holbrook, who assisted in revising the manuscript.

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BIBLIOGRAPHY.

1. Abrams, H.T. Core-drills in the petroleum industry. Eng. and Min. Jour., vol. 111, 1921, p. 631. This type of drill gives good cores and reliable samples.
2. Addicks, Lawrence. Chrome plant of the U.S. Metals Refining Co.. Mineral Industry, vol. 15, 1906, p. 302; Eng. and Min. Jour., vol. 83, 1907, pp. 1001 - 1006. Describes sampling of carloads of ore and of pig copper.
3. _____ Copper from secondary material. Chem. and Met. Eng., vol. 22, 1920, p. 119. How to sample junk metals.
4. Akerholm, K.A. Sampling copper ores at Falun. Teknisk tidskrift, vol. 24, p. 10.
5. Alaska Juneau Gold Mining Co. Reports for 1917 to 1920 give number of samples taken, average value, how taken, and comparison with mill returns; 10,400 samples taken in 8 years to end of 1920.
6. Alderson, M.W. Sampling with churn-drill. Min. and Sci. Press, vol. 92, 1906, p. 327. Surface deposit was sampled by drill. Samples were caught in a can set in the water-box. A sample was taken for each foot of possible cre.
7. Allen, A.W. An automatic sampler. Eng. and Min. Jour., vol. 104, 1917, p. 66. Describes pulp sampler.
7. (a) Handbook of ore-dressing. 1st ed. 1920, p. 242. Weights to be taken in sampling ores of various grades, sampling in mills at mines and custom works, coning and quartering, vezin and tailing samplers, drying samples.
7. (b) Recovery of Chilean nitrate. 1st ed. 1921, p. 48. Difficulty in sampling caliche and residue is briefly discussed, but overcome by a new process, pp. VII (preface), 3, 17, 20, 25, 32.
8. _____ The Chuquicamota enterprise. Min. and Sci. Press, vol. 122, 1921, p. 779. Sampling and testing the Chile Copper Co's ore-body. Vol. 123, 1921, p. 117, Sampling residue from the leaching vats.
9. Allen, G.L. Flotation of oxidized ores of lead. Bureau of Mines circular, May, 1916. Abstr. in Chem. and Met. Eng., vol. 20, 1919, p. 172. How sheet shows position of sampler.
10. Allen, I.C. Purchase of fuel-oil for the Government, with directions for sampling oil and natural gas. Bureau of Mines Technical Paper 3, 1911, pp. 13. Methods of sampling wagons, large tanks, drums, and gas wells.
11. Ambler, J. O. Stack losses at the Arizona Copper Co's smelter. Chem. and Met. Eng., vol. 22, 1920, p. 305. Method of sampling flue gases, shown on plan.

12. Ambrose, A.W. Oilfield water problems. Eng. and Min. Jour., vol. 109, 1920, p. 979. Collecting representative samples of water from oil-wells.
13. _____ Petroleum production engineer. Eng. and Min. Jour., vol. 109, 1920, p. 666. Among his daily duties, the engineer should visit drilling wells for collection of samples of formations.
14. _____ Underground conditions in oil fields. Bureau of Mines Bull. 195, Petroleum Technology 62, 1921. Sampling drill-cores, sample containers, examination of samples.
15. American Concrete Institute. Specifications for concrete stone and cement. Proc. vol. XIII, 1917, pp. 465 and 474. How samples should be taken.
16. American Perfumer, vol. 15, 1920, p. 88. Sampling essential oils by brokers in London.
17. American Society for Testing Materials. Tentative method for sampling and analysis of coal. Proc., vol. 14, pt. 1, 1914, pp. 409 - 452. The second part of report by the Committee.
18. _____ Tentative methods of laboratory sampling and analysis of coke. Proc., vol. 16, 1916, part 1, pp. 551 - 555 vol. 17, 1917, part 1, pp. 813 - 825.
19. _____ Tentative methods for laboratory sampling and analysis of coal. Year Book, 1915, pp. 596 - 624. Third Section of report by the Committee.
20. _____ Tentative methods for the sampling and analysis of creosote oil. Proc., vol. 16, 1916, part 1, pp. 564 - 565. Gives Standard for continuous drip samples, gravity samples, and storage tank samples.
20. (a) Anderson, B.G. Mine sampling methods at Tyrone, N. Mex., Eng. and Min. Jour., vol. 112, 1921, p. 531. Specialized routine work on the disseminated copper deposit of the Chino Company, showing many forms used and records kept. Testing keeps close supervision over the grade of ore and on progress of development.
21. Anderson, Glen. Notes on mine sampling. Eng. and Min. Jour., vol. 91, 1911 pp. 466 - 469; comment, p. 1143. Describes methods and tools for underground sampling, also preparation of samples for assay, and guards against salting.
22. Anderson, R.J. and Copps, J.H. Gas atmospheres in aluminum-alloy melting furnaces. Chem. and Met. Eng., vols. 24 and 25, 1921, p. 1020 and 54. Gas samples were taken from furnaces and analyzed.
23. Annual reports of Transvaal Chamber of Mines. Dust sampling department's duties, p. 71 (1916), p. 96 (1917); pp. 44, 73, 103, 214, 219 (1918). As many as 36,000 samples were collected in a year.

24. Argall, Philip. Machine sampling. Eng. and Min. Jour., vol. 86, 1908, p. 291. Discusses intermittent ore streams and essentials of sampling.
25. _____ Mill - tests V. hand-sampling. Min. and Sci. Press, vol. 115, 1917, p. 673. Criticizes article by Morton Webber.
26. _____ Sampling and dry crushing in Colorado. Trans. Inst. M and M, vol. X, 1901, p. 234. A review of methods on Cripple Creek gold-telluride ore, including reducing the lots received for treatment, cutting the sample, sampling rich ore, mixing, and assaying. Discussion by Alfred James and others.
26. (a) _____ Sampling and estimation of ore. Eng. and Min. Jour., vols. 75 and 76, 1903 pp. 260, 889, 116, 729. Discusses ore developed places, for sampling size of samples, checking, re-sampling, pockety deposits, and a description of the Jones sampler.
27. _____ Sampling ore. Min. and Sci. Press, vol. 94, 1907, p. 465. Gives reasons for sampling ore at the mill.
28. Arizona Mining Journal. Assay methods of Copper Queen Branch, Phelps Dodge Corp. - vol. 1V, No: 9, 1921, p. 4. Handling and assaying over 500 samples daily.
29. Asbeck, J. Probenahme bei silberhaltigen Werkblei in Blocken. Chem. Zeit., Jahr. 29, 1905, pp. 78 - 79, pt. 1. Describes sampling of argentiferous-lead bars.
30. Ashcroft, J.W. Sampler used in connection with flotation process at Kyloe, N.S. Wales Trans. Inst. Min. and Met., vol. 22, 1912 - 13, pp. 3 - 25; Mines and Methods, vol. 4, Dec. 1912, p. 91.
31. Atwood, Melville. Simple working test for determining the quantity of gold mechanically combined with auriferous vein-matter. Fifth Annual Report of State Mineralogist of California, 1885, p. 78. Abstract in Min. and Sci. Press, vol. 60, 1890, p. 281. Describes method of sampling auriferous quartz.
32. Aupperle, J.A. Method of sampling and analysis of tin, terne, and lead coated shepts. Proc. American Soc. for Testing Materials. Vol. 14, 1914, pt. 1, pp. 162 - 171.
33. Austin, L.S. Commercial sampling of minerals. Eng. and Min. Jour., vol. 34, 1882, pp. 45, 70, 108-109; 148-149. Describes quartering and split-shovel methods and machinery for crushing.
34. _____ Fire assay of gold, silver, and lead in ores and metallurgical products. 1st ed. 1907, 88 pp. Discusses sampling and preparation of the ore for assay (pp. 12-14).
35. _____ Machine sampling. Eng. and Min. Jour., vol. 86, 1908, p. 238. Discusses article by J.A. Church on ore sampling by machine. Eng. and Min. Jour. vol. 86, 1908, p 113.

5. (a) _____ . Metallurgy of common metals, 3rd ed. 1913. Contains notes on sampling works, and how to sample ores and metals.
6. _____ . Metallurgy of Copper in 1917. Min. Ind. vol. 26, 1917, pp. 179-205. Describes sampling of wet concentrates, pp. 183-184.
7. _____ . Need of uniform methods of sampling Lake Superior iron ore. Trans. Am. Inst. Min. Eng. vol. 50, 1914, pp. 215-230. Discussion of article by A.B. Murray.
8. _____ . Recent smelting practice in Colorado. Mineral Ind. vol. 6, 1897, p. 437. Describes sampling of copper pig at smelters.
9. _____ . Sampling Lake iron ores. Proc. Lake Superior Min. Inst., vol. 13, 1908, pp. 225-230. Discusses principles and methods.
10. _____ . Washoe plant of the Anaconda company, Montana. Trans. Am. Inst. Min. Eng. vol. 37, 1906, pp. 431-485. Sampling mill described with flow-sheet.
11. (a) Austin, W. L. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 45. Discussion of R.A. Parker on mixing samples on canvas.
1. Bailar, J.C. Sampling products of concentrating and sliming tables. West. Chem. and Met., vol. 1, 1905, p. 135; Min. and Sci. Press, vol. 91, 1905, p. 294; Jour. Chem. Met. and Min. Soc. S. Africa, vol. 6, 1905-06, pp. 175. Describes a simple teeter-box sampler and another with a mutilated gear-wheel driving a pinion intermittently; compared hand and automatic sampling.
2. Bailey, E.G. Accuracy in sampling coal. Jour. Ind. and Eng. Chem. vol. 1, 1909, pp. 161-178. Discuss influence of size-weight ratio probability of error in sampling.
3. _____ . Sampling coal and coke. Mines and Minerals, vol. 31, 1910-11, pp. 89-93; 190-192, 209. Shows various patterns for taking samples from cars with shovel. Illustrates a riffle sampler of the Jones type.
4. Bain, H. Foster. Metallurgical problems of the Rand. Min. and Sci. Press vol. 114, 1917, pp. 227-235. Discusses mill sampling.
5. Ball, L.C. Gray's Luck gold mine at one mile, Nanango, Queensland. Queensland Gov't. Min. Jour., vol. 16, 1915, pp. 167-171. Describes sampling method used and gives samples grouped for analysis.
6. Bancroft, G.J. Min. and Sci. Press, vol. 92, 1906, pp. 365. Describes a hand stamp for preparing mine samples.
7. _____ . Notes on mine sampling. Min. and Sci. Press, vol. 78, 1899, p. 636. Gives principles of sampling ore in mines and describes the foot-ounce method of valuation.
8. Bancroft, G.J. Sampling of ore in a mine. Eng. and Min. Jour., vol. 75, 1903, p. 323. Systematic sampling has its limitations; examples given.

49. _____ . Story of the Independence alleged salting case. Min. and Sci. Press, vol. 90-91, 1905, pp. 166-167. Describes method of sampling the mine involved and gives the decision on the case.
50. Barbour, P.E. Douglas Copper Smelter at Fundicion. Mex. Eng. and Min. Journ., vol. 85, 1908, pp. 303-305. Describes a sampler for car-loads of ore mounted on a motor truck.
51. _____ . Goldfield consolidated 600-ton mill. Eng. and Min. Jour., vol. 36, 1908, pp. 467-474. Describes sampling mill.
52. _____ . Home-made automatic sampler. Eng. and Min. Jour., vol. 98, 1914, p. 786. Describes sampler constructed out of material on hand and designed to cut a narrow ore stream from side to side.
53. Bardill, J.O. Bardill sampling machine. Eng. and Min. Jour., vol. 100, 1915, pp. 803-804. Describes machine designed for sampling wet and sticky concentrates.
54. Bassett, R.H. New method of making sieve tests. Iron Trade Rev., vol. 57, 1915, pp. 230, 242b. Describes method of taking scoop samples of stock-piles at Mesabi range.
55. Batekan, G.C. Notes on mine sampling. Proc. Can. Min. Inst., vol. 16, 1913. Abstr. in Eng. and Min. Jour., vol. 95, 1913, pp. 513-516. Discusses difficulties in sampling and gives efficient methods. Paper presented at the Ottawa meeting of Can. Min. Inst.
56. Bauer, O. and Deiss, E. Sampling and chemical analysis of iron and steel. 1915, 373 pp. English translation by Hale and Williams.
57. Bell, J.M. The Waihi gold-field, New Zealand. Trans. Aust. J.M.E., vol. 15 (2), 1911, p. 574. Flow-sheet shows position of sampler in mill.
58. Bender, O. Studium ueber das Probennehmen von Erzen mit Maschinen. Zeit. fur angew. Chemie, vol. 24, 1911, pp. 1164-1166. (Mechanical sampling of ores. Translation, Mines and Minerals, vol. 32, 1911-12, pp. 735-737) Describes various American machines.
59. Bell, Robert N. The I.X.L. Copper prospect. Eng. and Min. Jour., vol. 108, 1919, p. 400. Sampling low-grade chalcopyrite.
60. Bennetts, B.H. Some notes on sampling. Eng. and Min. Jour., vol. 88, 1909, p. 273. Where ore is moved by aerial tram, suggests tripping every 10th car into a special bin.
61. Bentley, Charles. Sampling and analyzing coal. Pahasapa Quarterly, S. Dak. Sch. of Mines, vol. 8, 1919, p. 55. Brief description.
62. Bertrause, L. Analysis of commercial zinc. Am. chem. anal. vol. 23, 1918, pp. 161 and 181; sampling zinc slabs by drilling or sawing.

63. Binns, E.T. Water-cooled sampling tube. Power, vol. 43, 1916, p. 302. Describes tube for high-temperature gases.
64. Blackett, C.E. Metallurgy at Golden Horse-Shoe, Western Australia. Mon. Jour. Chamber of Mines, Dec. 1919. Abstr. in Min. Mag., vol. 22, 1920, p. 312. Sampling gold bars.
65. Blyth, W.B. Preparation of mine samples for assay. Min and Eng. World, vol. 37, 1912, pp. 613-614. Jour. Chamber of Mines of Western Australia, July 31, 1912. Discusses relation of size of ore sampled and amount of sample taken.
66. Boalich, E.S. Marketing the mine prospect. Eng. and Min. Jour., vol. 107, 1919, p. 601. When attempting to sell a prospect, the owner should be able to show an assay map where samples came from.
67. Bock, A. Segregation of metals in alloys and its cause. Chem. Zeit., vol. 29, 1905, pp. 1199-1201; Jour. Soc. Chem. Ind., vol. 24, 1905, pp. 1236-1237. Describes sampling and assaying of silver ingots.
68. Boericke, W.F. Sampling churn-drill holes. Eng. and Min. Jour., vol. 109, 1920, p. 66. When in ore, runs are not over 3 ft. before resuming drilling, the hole should be cleaned out so as not to salt the next run.
69. _____ The Crahall tailing plant. Eng. and Min. Jour., vol. 111, 1921, p. 1065. Sampling 200,000 tons of 1.75% zinc tailing.
70. Boericke, W.F. and Garnett, T.H. Wisconsin zinc district. Bull. 152, Aug. 1919, A. I. M. & M. E. p. 1235. Accurate sampling not practised.
71. Borchardt, W.O. The Borchardt automatic sampler for sand and sline. Eng. and Min. Jour., vol. 91, 1911, pp. 456-457. Describes the apparatus.
72. Bosler, L.C. Automatic sampling of coal. Power, Nov. 3, 1914. Abstr. in Coal age, vol. 8, 1915, p. 423. Many large power plants use grab samples, but the Phila. Rapid Transit Co. uses a machine to sample all coal received.
73. Botsford, R.L. Diamond-drill sampling. Eng. and Min. Jour., vol. 95, 1913, pp. 19-20. Gives sources of error.
74. Bowen, H.P. Handling sludge from diamond-drill holes. Eng. and Min. Jour., vol. 95, 1913, p. 1289. Describes saving sludge for samples by passing the water from the drill-hole through coarse woven jute or sacks held open by a cylinder of coarse copper screen.
75. Boyd, J. Sampling dust in mine air. Report to Transvaal Chamber of Mines. Abstr. in Eng. and Min. Jour., vol. 107, 1919, p. 395. An air suction pump is used, and the quantity of dust is arrived at by passing the air sample through a tube containing sugar, which catches the dust.
76. Brackett, F.W. A pulp-stream sampler. Eng. and Min. Jour., vol. 97, 1914, p. 1017. Describes the Elmore rotating pulp sampler.

77. Bradford, Wagar. Stope-box sampling. Jour. Chem. Met. and Min. Soc. S. Africa, vol. 6, 1905-06, pp. 103-109, 224-225, 339-341. Abstr. Eng. and Min. Jour., vol. 71, 1906, p. 1170. Describes and criticizes stope-box sampling as practised on the Rand.
78. Bradley, W.W. Quicksilver deposits of California. Bull. 78, State Mining Bureau. Describes sampling and testing of cinnabar.
79. Bretherton, S.E. Automatic ore sampler. Min. and Sci. Press, vol. 97, 1903, pp. 321-322. Advocates hand sampling in custom-sampling as more accurate, but suggests a combination hand and machine sampling.
80. _____ . Hints to ore shippers. Proc. Am. Min. Cong., 1910, pp. 265; Min. and Sci. Press, vol. 101, 1910, pp. 530-532. Points out difficulty of taking moisture samples.
81. _____ . Sampling custom ores. Min. and Sci. Press, vol. 87, 1903, pp. 356-357. Illustrates a rotating bucket sampler.
82. Bridgman, H. L. A mixer and divider for ore samples, and small sampling machine. Eng. and Min. Jour., vol. 53, 1892, p. 275. A more accurate, convenient and a faster method than with oil-cloth and spatula.
83. _____ . New system of ore sampling. Trans. Am. Inst. Min. Eng., vol. 52, 1891, p. 701; Iron Age, vol. 50, 1892, p. 770. Discusses sampling by machine, and describes three types of machines and a mixer and divider.
84. Brinsinade, R.B. Mining and smelting near Monterray, Mexico. Min and Sci. Press, vol. 119, 1919, p. 741. Sampling ore before smelting.
85. _____ . Mining and smelting near Matchuala, Mexico. Min. and Sci. Press, vol. 120, 1920, p. 85. Sampling copper-silver ores in the mine and smelter.
86. _____ . Mining near San Luis Potosi, Mexico. Min and Sci. Press. 123, 1921, p. 61. Sampling ore at the Metallurgica Mexicana smelter.
87. Brooks, G.S. and Nitchie, C.C. Gas-producer practice at Western zinc plant. Bull. 153, 1919, p. 2763. A. I. M. & M. E. Sampling gas.
88. Brown, E.F. Distribution of phosphorus and system of sampling at the Pewab mine. Iron Mountain Trans. Lake Superior Min. Inst., vol. 3, 1895, pp. 49-55.
89. Brown, Myles. Mines and Minerals, vol. 26, 1905-06, pp. 163-170. Coal testing, describes methods and apparatus for sampling coal and estimating moisture in it.
90. Brown, R.G. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 190. Calculations - foot-dollars and averaging. Vol. 77, 1904, p. 151. Discussion of Forbes Rickard on samples of group quartering to compare with the foot-dollar average.

90. (a) Some tailing samplers. Min. and Sci. Press, vol. 93, 1906, p. 542. Describes a tailing sampler in which a sampling box is swung through by water power.
91. Brown, W.S. Device for reducing the size of assay samples. Eng. and Min. Jour., vol. 83, 1907, p. 232. Describes a sampling cabinet with riffles designed by H.E.T. Haultain, for mill and mine sampling.
92. Brunton, D.W. Brunton's quartering shovel. Eng. and Min. Jour., vol. 51, 1891, p. 718. Describes and gives views of the shovel for ore containing 25 to 50 per cent of valueless gangue.
93. _____ Interview by T.A. Rickard, Min. and Sci. Press, vol. 122, 1921, p. 753, describes his work in sampling.
94. _____ Modern Practice of ore sampling. Am. Inst. Min. Eng., vol. 40, 1909, pp. 567-596. Discusses development of sampling and describes sampling machines and mills.
95. _____ Modern progress in mining and metallurgy in the Western United States. Am. Inst. Min. Eng., vol. 40, 1909, pp. 543-561. Discusses sampling.
96. _____ New system of ore-sampling. Trans. Am. Inst. Min. Eng., vol. 13, 1885, pp. 639-645. Discusses public sampling and describes several sampling devices.
97. _____ Sampling of ore. Min. and Sci. Press, vol. 97, 1908, pp. 665-666. Defends accuracy of modern methods and discusses errors possible with sampling machines.
98. _____ Theory and practice of ore-sampling. Trans. Am. Inst. Min. Eng., vol. 25, 1896, pp. 826-844. Report of investigation to determine the fineness to which crushing must be carried in sampling gold and silver ores to obtain results within an allowable limit of error.
99. Brunton, E. K. British Columbia Copper Co's smelter, Greenwood, B.C. Trans. Am. Inst. Min. Eng., vol. 52, 1915, pp. 950-964. Describes sampling mill and gives flow-sheet.
100. Bullens, D.K. Assay of arsenic - nickel-cobalt-silver-ore. Eng. and Min. Jour., vol. 90, 1910, p. 809-810. Describes sampling of silver ore at Copper Cliff, Ontario.
101. Bunyan, F.W. Sampling Min. and Sci. Press, vol. 117, 1918, p. 837. Relation between efficient sampling of raw materials and chemical control of their manufacture.
102. Burch, Albert. Sampling large low-grade orebodies. Min. and Sci. Press, vol. 115, 1917, pp. 115-116. Discusses mines that can not be sampled, and accuracy of mill tests for mine samples.

103. Burch, Keyyon. Mine and mill plant of the Inspiration Consolidated Copper Co. Arizona. Bull. Am. Inst. Min. Eng., Sept. 1916, no. 117, pp. 1467-1500. Sampling plant, pp. 1480-1481.
- Bureau of Mines publications on sampling. See U. S. Bureau of Mines in Subject Index at end of this bibliography.
104. Burgess, R.J. Mine sampling and mapping. Eng. and Min. Jour., vol. 101, 1916, pp. 551-552. Discusses advantages of systematic sampling and the keeping of records.
105. Burnham, M.H. Continuous section system of sampling. Trans. Inst. M. and M., vol. X, 1901, p. 204. At one mine on the Rand the reefs were sampled in sections, rather than sampling the mine as a whole. Discussion by E.P. Rathbone, A.C. Hodge, W.H. Trewartha-James, W. McDermott.
106. Burrell, G.A. and Oberfell, G.G. Composition of natural gas used in 25 cities. Bureau of Mines Tech. Paper 109, 1915. Sampling was done by 300 c.c. bottles.
107. _____ and Seibert, F.M. Apparatus for gas-analysis laboratories at coal mines. Bureau of Mines Tech. Paper 14, 1913, pp. 23. Apparatus includes the collection of samples.
108. _____ and Seibert, F.M. Sampling and examination of mine gases and natural gas. Bureau of Mines Bull. 42, 1913, pp. 116. Sample bottles, handpump, fan and evacuated containers.
109. Robertson, I.W., and Oberfell, G.G. Blackdamp in mines. U.S. Bureau Mines, Bull. 105, 1916, 88 pp. Describes the collection of samples of air in mines.
110. Burrows, J.S. Importance of uniform and systematic coal-mine sampling. U.S. Geol. Surv. Bull. 316, 1907, pp. 486-517. Discusses car sampling, mine sampling and sampling for laboratory experiments.
111. _____. Mine sampling and chemical analysis of coals tested at the United States fuel-testing plant, Norfolk, Va. U.S.G.S. Bull. 362, 1908, 4 pp. Gives method of collecting the car load samples, p. 7.
112. _____. The Standardized Sewalls Point Pool coals. Black Diamond, vol. 66, 1921, p. 636. Sampling coal at Sewall's Point, Virginia.
113. Buskett, E.W. Sampling and assaying spelter. Eng. and Min. Jour., vol. 85, 1908, p. 812. Describes hand sampling of spelter.
114. _____. Sampling and buying ore in the Joplin district. Eng. and Min. Jour., vol. 86, 1908, p. 190. Describes sampling of zinc concentrate with a tapering "gun" 4 inches diameter at handle and $1\frac{1}{2}$ inch at point thrust into the ore in bin or car.

115. Cramp, J.M. The Methods of the U.S. Steel Corporation for the commercial and analysis of pig iron. *Trans. Am. Inst. Min. Eng.*, vol. 44, 1912, pp. 220-249; Eighth Int. Cong. Applied Chem., 1912, sec. 111a;
116. _____. Methods of the U.S. Steel Corporation for the technical sampling and analysis of gases. *Met. and Chem. Eng.*, vol. 9, pp. 302-306; 356-361. Gives U.S. Steel methods of sampling blast furnace, producer, or flue gas, p. 302.
117. _____. Sampling methods. *Min. and Sci. Press*, vol. 99, 1909, pp. 535-536. Discusses cargo sampling.
118. _____. Sampling Methods of U.S. Steel Corporation. *Electrochem and Met. Ind.*, vol. 7, 1909, p. 65. *Min. and Sci. Press*, vol. 99, 1909, p. 535. *Jour. Ind. and Eng. Chem.*, vol. 1, 1909, pp. 107-115. *Iron Trade Rev.*, vol. 44, 1909, pp. 230. Discusses methods of cargo sampling and preparation of samples for analysis adopted.
119. Campbell, C.St.G. Sampling of the Cobalt, Ontario, silver ores. *Trans. Can. Min. Inst.*, vol. 17, 1914, pp. 199; *Abst. in Min. and Eng. World*, vol. 41, 1914, p. 58. Discussion, pp. 237-261.
119. (a) Campbell, H.H. *Manufacture and properties of steel*. 4th ed. 1907, pp. 639. Selection of test pieces, p. 19 and 313.
120. Campbell, J.R. Metallic iron in coke samples. *Colliery Eng.*, vol. 35, 1915, pp. 538-541. Describes preparation of samples for determining the amount of iron taken up from the grinding apparatus.
121. Campbell, M.R. *Coal Fields of the United States*. U.S. Geol. Survey P.P. 100 - A. General introduction, p. 27, explains how coal samples are handled.
122. _____. Commercial value of coal-mine sampling. *Trans. Am. Inst. Min. Eng.*, vol. 36, 1905, pp. 341-353, 834-835. *Abstr. in Can. Min. Jour.*, vol. 28, 1907, p. 113 and in *Eng. and Min. Jour.*, vol. 80, 1905, p. 679. Discusses mine and car sampling at government coal-testing plant, St. Louis, Mo. and suggests method of mine sampling.
123. Campredon, L. *Echantillonage des matieres minerales*. (Sampling minerals). *Compte rend. Soc. ind.* 1906, pp. 294-297. Discusses sampling ore in place, extracted ore and manufactured products such as coke and oil products.
124. *Canadian Mining Journal*. The projected custom sampling-plant. Vol. 30, 1909, pp. 580-584. Describes the plant and gives flow-sheet and plans.
125. Carless, Noel. Cyaniding of gold-silver ores at Waihi Grand Junction Mine, New Zealand. *Trans. Inst. Min. and Met.*, vol. 24, 1914-15, pp. 387-406. Describes methods of sampling and assaying, pp. 401-403.
126. Carter, T.Lane. Mine valuation, *Eng. and Min. Jour.*, vol. 75, 1903, p. 741. Sampling recognized of utmost importance on the Rand. Discrepancies between hand sampling and mill results.

126. (a) _____ . Sampling placer ground. Eng. and Min. Jour., vol. 91, 1911, p. 603. Recommends digging pits to bedrock, drying the panned residue, blowing the block sands and weighing, in preference to using churn drills and sample diggers.
127. Cazin, Franz. A simple sampling device. Eng. and Min. Jour., vol. 89, 1911, p. 358.
128. Chance, H.M. Prospecting for coal. Penn. Geol. Surv., vol. A.C. 1883, pp. 19-54. Describes selecting samples for analysis.
128. (a) Channing, J. Parke. Mine valuation. Eng. and Min. Jour., vol. 76, 1903, p. 383. Calculations based on sampling.
129. Charleton, A.G. Graphic method applied to delineating orebodies with notes on sampling and estimating ore reserves. Trans. Inst. Min. and Met., vol. 9, 1900-01, pp. 203-226; discussion, pp. 226-231. Describes system and gives a list of papers on sampling and estimating reserves.
130. _____ . The industry of mining. Inst. Min. and Met., vol. 1, 1899, p. 184. Gives notes on sampling.
131. Chase, C.A. Liberty Bell mine: solution meter and pulp sampler. Trans. Amer. Inst. Min. Eng., vol. 42, 1911, pp. 694-741; Min. and Sci. Press, vol. 102, 1911, p. 844. Gives drawings of a solution teeter-box meter, with pans in water as dashpots and of a sampler with swinging cutter attached to weighted disc that revolves loosely on a horizontal shaft.
132. _____ . Notes on the Liberty Bell mine. Trans. Am. Inst. Min. Eng., vol. 42, 1911, pp. 734. Describes automatic tailings sampler at the Liberty Bell mill.
133. Chase, Edwin. Sampling large low-grade orebodies. Min. and Sci. Press, vol. 115, 1917, p. 453. Ascribes sampling difficulties to lack of standard assaying methods.
134. Chemical and Metallurgical Engineering. Bureau of Standards, standard samples, vol. 20, 1919, p. 276. Efforts to renew the depleted stock.
135. Chemical Engineering and Mining Review. Commercial sampling and analysis of coal, coke, and by-products. Vol. 10, 1918, pp. 245-246. Recommends use of chrome or manganese steel for crushing coke samples to prevent contamination with iron.
136. Editorials on Badak tin mine, Malaya, vol. XII, 1920, pp. 209 and 391. Criticizes the sampling of 100 acres of tin ground by a dozen holes. Property eventually abandoned.
137. Christian, G.L. Tonopah Extension Assay office. Min. and Met. No. 173, May, 1921, p. 29. Preparation of silver ore samples for assay.

138. Church, J.A. Goldfield Consolidated sampling Mill. Eng. and Min. Jour., vol. 87, 1909, pp. 311-312. Describes method in which the ore is only re-crushed once during sampling owing to ultimate fineness of crushing, and in which a sample is taken from all the ore.
139. _____ . Principles of machine sampling. Eng. and Min. Jour., vol. 86, 1908, pp. 113-115; discussion, pp. 142, 238, 291, 338, 431-433, 531, 776, 917, 951, 1018, 1111; vol. 87, 1909, pp. 269, 420, 516, 862. Discusses conditions necessary for accurate sampling, the disturbing efforts of uncontrolled agitation and the control of feed, describes simplex sampler.
139. (a) Clark, Donald. Australian Mining and Metallurgy. 1st. ed. 1904, pp. 534. Sampling sulpho-telluride ore, lead-silver ore and a copper-gold-silver-lead ore.
140. Clarkson, T. Sampling. Trans. Fed. Inst. Min. Eng., vol. 9, 1894-95, p. 312; discussion, pp. 314-319. Argues for sampling machinery.
141. _____ . Sampling of materials. Trans. Inst. Min. and Met., vol. 2, 1893-94, pp. 229-248; Jour. Soc. Chem. Ind., vol. 13, 1894, p. 214. Discusses principles and methods of sampling and describes seven different mechanical samplers for ores and tailings.
142. Claudet, A.C. Notes on sampling argentiferous and auriferous lead, with diagrams illustrating the unequal distribution of the precious metals. Trans. Inst. Min. and Met., vol. 6, 1897-98, pp. 29-42. Describes sampling by (1) cutting chips out of tops and bottoms of bars, (2) sawing by a circular saw, through the bars, and (3) melting the bars in mass into clean lead and dross.
143. Cleland, E.D. West Australian Mining Practice. 1911, 268 pp. Discusses sampling, pp. 102-103, 197-202.
144. Cleland, W.L. Tin-dressing at Stannary Hills, North Queensland. Trans. Aust. Inst. M. E., vol. Xii, 1907, p. 154. Automatic sampling of mill pulp.
145. Clennell, J.E. The cyanide handbook. 2nd. ed., 1915, p. 600. Covers fully sampling from ore to residue in mills and from cyanide to bullion in treatment plants.
146. Clevenger, G.A. Mill and metallurgical practice of the Nipissing Mining Co., Cobalt, Ontario. Tran. Am. Inst. Min. Eng., vol. 49, 1914, pp. 156-179. Discussion pp. 179-182.
147. Cloud, T.C. Wallaroo smelting works. Eng. and Min. Jour., vol. 83, 1907, pp. 324-330. Describes sampling room and methods at Wallaroo, South Australia.
148. Coal Age. Automatic sampling of coal. Vol. 8, 1915, pp. 423-424. Describes and gives figures showing an automatic sampler.

149. _____ New coal crusher and sampler, vol.4, 1913, p. 608.
An automatic and reliable sampling machine made by the Sturtevant M.
Co. of Boston.
150. Colburn, E.A. Mine and mill equipment at the Ajax mine, Mexico. Mex. Min.
Jour., vol. 16, 1913, p. 231. Describes sampling and crushing methods.
151. Colby, A.L. Sampling pig iron for analysis. Iron Age, vol. 61, June 2,
1898, pp. 13-16. Discusses sampling the drilling of pigs, the drilling
from small test ingots, shotted samples, sampling to determine graphitic
carbon, sampling of cars, and sampling to check chemist's analyses.
152. Colcord, F.F. Eng. and Min. Jour., vol. 82, 1906, pp. 1164. Describes
method used in the Cobalt district for sampling and assaying ore carrying
metallic silver.
153. _____. Sampling and assaying. Min. Ind., vols. 15 (1906), 16 (1907),
17 (1908), 18 (1909); pp. 790, 944, 966, 731, respectively. Reviews arti-
cles on sampling for year.
154. Cole, A.A. Sampling of silver-cobalt ores at Copper Cliff, Ontario. Jour.
Can. Min. Inst., vol. 11, 1908, pp. 287-292; Eng. and Min. Jour., vol. 87,
1909, p. 1283. Describes method involving first cut with Snyder sampler,
finishing on Jones riffles.
155. Colliery Engineer. Analysis of coal, ores, etc.. Vol. 12, 1891-92, p. 211.
Describes canvas and quartering method of preparing samples.
156. Collins, E.J. Knock-down sample catcher. Eng. and Min. Jour., vol. 97,
1914, p. 1289. Describes a canvas catcher for use in cutting samples from
a face.
157. Collins, G.E. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 4.
Discussion of Philip Argall's classification of ore deposits.
157. (a) _____. Searching for ore-shoots in veins. Eng. and Min. Jour., vol.
95, 1913, pp. 941-944. Discusses value of geologic theories and detailed
sampling of indications as guides on exploration. Reprinted in part from
address before the Colorado Scientific Society and published in its Pro-
ceedings, April, 1913.
157. (b) Collam, R.E. Prospecting and testing oil, gas, and water-bearing
strata. Bureau of Mines Bull. 201, 1921. Sampling and identifying drill
cuttings from oil-wells.
157. (c) Courtis, W.M. Sampling Mines. Eng. and Min. Jour., vol. 75, 1903, p.
473. Grab sampling considered of value.
158. Cox, H.A. Gas-sampling pipes. Power, vol. 44, 1916, p. 360. Suggests
method for sampling gas for recorders and Orsata.

159. Crampton, T.H.M. Silverhorn district, Nevada. Min. and Sci. Press, vol. 122, 1921, p. 883. Sampling an outcrop and cost of assaying samples.
160. Crane, E.B. Difficult mine sampling. Min. and Sci. Press, vol. 114, 1917, p. 539. Sampling cinnabar.
161. Crocker, Wm. Prospecting. Min. and Sci. Press, vol. 122, 1921, p. 774. Prospecting and sampling alluvial gold.
162. Crocker, W.J. Average analysis of iron ore; method by units. Min. and Eng. World, vol. 38, 1913, p. 434. Describes method by unit of sampling ore as it comes out of the mine on the way to stockpiles.
163. Crouse, C.S. Oil-shales of Estill County, Ky.. Eng. and Min. Jour., vol. 110, 1920, p. 24. Preparing samples for distillation tests.
164. Crowell, Benedict. Methods of sampling at Lake Superior iron mines. Proc. Lake Superior Min. Inst., vol. 17, 1912, pp. 76-93; Abstr. in Iron Trade Rev., vol. 51, 1912, pp. 1215-1217. Describes and criticizes present methods of sampling ore in place, broken ore and in car load lots, and suggests new methods.
165. Crowell and Murray. Iron ores of Lake Superior. 1st. ed. 1911, pp. 186; 2nd. ed in 1914, pp. 257; 1917, pp. 323; 4th ed. in 1920, pp. 285. Sampling iron ores on pp. 28, 48, 79, and 31, respectively.
166. Crowfoot, Arthur, and Donaldson, K.H. Leaching and concentrating mixed copper ores. Eng. and Min. Jour., vol. 110, 1920, p. 471. Sampling a large dump of slime by digging pits.
167. Crowfoot, Arthur, and Witterran, Ernest. Developing a mill flow-sheet at Morenci, Ariz. Eng. and Min. Jour., vol. 103, 1920, p. 1349. Method of sampling copper tailings.
167. (a) Curle, J.H. Some aspects of mine valuation. Eng. and Min. Jour., vol. 75, 1903, p. 701. Australian engineers did not sample mines properly when examining them. High assays and calculations.
168. Curtis, A.H. Examination and valuation of mines. Trans. New Zealand Inst. Min. Eng., vol. 2.
169. Dahlerus, C.G., Akerblom, K.A., Lundbohm, H. and others. General proftagnig. (Sampling of ores.) Teknisk Tidskrift, vol. 24, 1894, Section kemi och metallurgi, pp. 10-24. abstr. Jour. Iron and Steel Inst., vol. 48, pt. 2, 1895, p. 390. Abstract refers to Dahlerus, Nordstrom, Akerblom, Lundbohm, Dahlstrom, Larson, Landin, etc. Discusses the sampling of ores of iron, zinc, and copper and methods used.
170. Dahlstrom, R. Sampling ores. Teknisk Tidskrift, vol. 24, 1894, p. 20.
171. Daman, A.C. Automatic ore sampler. Eng. and Min. Jour., vol. 103, 1917, p. 188.

172. Daveler, E.V. Milling plant of Alaska Gastineau Mining Co. Min. and Met. No. 157. sec. 11, 1920. Sampling results on 19 mill products.
173. Davenport, L.D. Automatic sand sampler. Eng. and Min. Jour., vol. 96, 1913, p. 69. Describes device for sampling discharge from Dorr classifier.
174. Day, D.E. Oil-shale and the engineer. Eng. and Min. Jour., vol. 110, 1920, p. 1182. Drilling and sampling shale.
175. Dean, E.W. Properties of typical crude oils from Eastern producing fields of United States. Bureau of Mines Serials 2202 and 2235, 1921. Brief mention of method of sampling.
176. Decoto, L.A. Valuation of placer ground. Min. and Sci. Press, vol. 108, 1914, p. 773. Drill-hole samples calculations.
177. Degoutin, N. L'étude pratique des minerais aurifères principalement dans les colonies et pays isolés, (Practical study of gold minerals, chiefly in the colonies and isolated countries.) Bull. de la Soc. de l'industrie minérale sér. 4, te. 5, 1906, p. 1167. Describes crushing, screening of ores, and reducing size of samples.
178. Kalb, Courtenay. Sacramento Hill disseminated copper deposit - I. Min. and Sci. Press, vol. 116, 1918, pp. 349-354. Describes prospect sampling of part of the Copper Queen mine, Arizona, and gives detail of a sample splitter.
179. Delamater, G.R. Standardization in coal washing. Mines and Minerals, vol. 32, 1911-1912, pp. 461-465. Describes experiments to determine how fine a sample must be crushed to give satisfactory results.
180. Del Mar, Algernon. Simple automatic sampling device. Eng. and Min. Jour., vol. 90, 1910, p. 60. Describes a tailing sampler used at the Bunker Hill Mill.
180. (a) . Stamp-milling. 1st. ed., 1912, p. 134. All mill samples should be taken automatically. Two tailing samplers shown.
181. Delprat, G.D. Ore treatment at Broken Hill Proprietary, Australia. Trans. Aust. I. M. E., vol. XII, 1907, p. 4. Scoop samples taken hourly by hand, and found to be reliable.
182. Denmachie, W.J.N. The theory and practice of sampling and calculation of ore reserves. Min. Jour., vol. 101, 1914, pp. 247-249, 291-292. Discusses possible difficulties of samples of a gold vein and gives several methods for keeping records.
183. Dennis, F.J. Examination of dredging properties. AM. Inst. Min. Eng. Bull. 64, 1912, pp. 407-410. Discusses proper method.
184. Denny, G.A. Estimation and valuation of ore reserves. Trans. Mexican Inst. M. and M. No. 2, 1910-1911, p. 11. A treatise on methods of sampling calculations of reserves. Methods applicable in certain cases are often used as though universally suitable whereas errors arise from such procedure.

184. (a) _____ . Mine sampling. Eng. and Min. Jour., vol. 75, 1903, p.960. Sampling and recording at the Meyer and Charlton gold mine, Transvaal. This is carried out in great detail.
184. (b) _____ . Observations on sampling, computation of assay-averages, and relation of assay-value to recovery-value as applied to basket mining in the Transvaal. Trans. Inst. Min. Eng., vol. 19, 1899-1900, pp. 294-316; discussion, pp. 316-320. Gives procedure in sampling.
184. (c) _____ . Some observations bearing on valuation of orebodies. Trans. Mexican Inst. M. & M., No. 1, 1909-1910, p. 147. Importance and difficulty of sampling discussed, and numerous examples of orebodies shown. Discussed in No. 2, 1910-1911, p. 1, by William Crosley.
185. Deutman, E.G. Roasting and magnetic separation of Wisconsin zinc ores. Eng. and Min. Jour., vol. 107, 1919, p. 1107. Concentrates are sampled by glotted pipes, covered with a sheath, which is pulled off when the pipe is in position, allowing the sample to fall into the slots.
186. Dewey, F.P. Assay and valuation of gold bullion. Trans. Am. Inst. Min. Eng., vol. 40, 1909, pp. 780-797; Report of the Director of the Mint, 1909, pp. 27-36.
187. _____ . Direct determination of small amounts of platinum in ore and bullion. Trans. Am. Inst. Min. Eng., vol. 43, 1912, pp. 578-591. Describes method of sampling molten auriferous copper bullion, p. 588.
188. _____ . Sampling of gold bullion. Trans. Am. Inst. Min. Eng., vol. 44, 1912, pp. 853-879; discussion, pp. 879-882.
189. Dickenson, E.H. Grab sampling. Sch. Mines Quart., vol. 35, 1913, pp. 55-56. Discusses errors in grab sampling copper ore.
190. Dickenson, E.H., and Volker, H.J. Samples and their interpretation. Eng. and Min. Jour., vol. 101, 1916, pp. 933-936. Outlines methods of plotting assay maps and showing value of ore, width, and tonnage. Describes keeping of notes.
191. Dickson, H.C. Crucible-assaying of gold-ores. Trans. Inst. Min. Eng., vol. 22, 1901-02, pp. 673-690; discussion, vol. 23, 1901-02, p. 698. Describes taking and preparing vein samples, pp. 674--676.
192. Dixon, J.T. Valuation of placer ground. Min. and Sci. Press, vol. 109; 1914, p. 962. Drill-hole samples calculations.
193. Dodd, W.G. Ore or pulp sampler. U.S. Pat. 693,690. Min. and Sci. Press, vol. 84, 1902, p. 317. Describes an improved automatic tailings sampler.
194. Dods, R. Sampling. Chem. Engineer, Feb. 1910, vol. 11, pp. 58-60. Describes sampling of auriferous and argentiferous lead bullion and automatic samplers.

194. (a) Dolbear, Samuel H., and Burch, Albert, Chromite. Pamphlet published by Min. and Sci. Press in 1917. Complete information of prospecting, sampling, and shipping chrome.
195. Doolittle, C.H. and Jarvis, R.P. Pyritic smelting at Leadville, Trans. Am. Inst. Min. Eng., vol. 41, 1910, pp. 709-722. Describes sampling methods, p. 715.
196. Dougherty, G.T. Bullion sampling and assaying. Eng. and Min. Jour., vol. 41, 1886, p. 4. Describes a puncher for sampling car loads of ore.
196. (a) Dub, G.D., and Moses, F.G. Mining and preparing domestic graphite for crucible use. U.S. Bureau of Mines Bull. 112, 1920, pp. 74. On pages 36-38 is described and illustrated the method of and apparatus for sampling sacked graphite.
197. Dunoulin, W.L. Crushing practice, New Cornelia Copper Co. Bull. 152, Aug. 1919, A. I. M. & M. E. p. 1203. A 1 per cent sample of 5000 tons daily is taken.
198. Duschak, L.H. and Schuelte, C.N. Condensing quicksilver from furnace gases. Technical Paper, 96, U.S. Bureau of Mines, 1919, 29 pp.; Min. and Sci. Press, vol. 117, 1918, pp. 315-323. Describes procedure in sampling and preparation of sample for analysis.
199. Eastaugh, F.A. Effect of different methods of crushing on the ash of coke. Trans. Inst. Min. & Met., vol. 24, 1914-15, pp. 483-488. Describes experiments to show the effect of different methods of preparing samples.
200. Easter, H.F. Lead Smelting at El Paso. Trans. Am. Inst. Min. Eng., vol. 52, 1916, pp. 715-729. Describes sampling base bullion, pp. 717.
201. Edman, J.A. Studies in gold-milling. Discusses relation of size grain to gold content. Min. and Sci. Press, vol. 67, 1893, p. 277.
202. Edmunds, H.R. Assaying at Globe and Phoenix gold mine, Rhodesia. Min. and Sci. Press, vol. 121, 1920, p. 452. Preparation of samples.
203. Edwards, Edward. Tin sluicing in Tasmania. Trans. Aust. I. M. E., vol. 15, 1911, p. 276. Calculating tin deposits by face sampling, tunnels, bores, and shafts.
204. Eggers, J.H. Application of air-drills to mine sampling. Eng. and Min. Jour., vol. 108, 1919, p. 358. A row of shallow holes is drilled and the intervening ribs of ore are cut.
205. Egleston, T. Metallurgy of silver, gold and mercury in the United States. 1887, 2v. Discusses sampling, vol. 1, pp. 66-73; vol. 2, pp. 309-360.
206. Ehrmann, L. Notes on sampling analyzing and treating slime. Proceed. Chem. and Met. Soc. of South Africa, vol. 2, 1897-99, pp. 697-705. Min. and Sci. Press, vol. 79, 1899, p. 256-267. Describes automatic sampler for slimes and gives causes of errors in assays.

207. Elder, R.B. An automatic pulp sampler. Eng. and Min. Jour., vol. 101, 1916, pp. 524-526.
208. Method of obtaining representative coal samples. Vol. 66, 1915, pp. 366-367. Describes briefly revolving drum in side of coal chute to remove sample.
209. Electrical World. Convenient methods and devices for sampling coal. Vol. 68, 1916, p. 426. Describes three automatic samplers.
210. Elliot, R.H. Relative errors in alluvial sampling. Min. and Sci. Press, vol. 111, 1915, p. 465. Criticizes article by C.S. Haley.
211. Emminger, W.G. Sampling in a mill. Min. and Sci. Press, vol. 122, 1921, p. 152. Method of taking pulp samples at Rochester, Nevada.
212. Engineering and Mining Journal (anonymous). Anaconda Copper Mining Co's new reduction works. Vol. 73, 1902, pp. 311-313. Describes sampling department.
213. _____ . Anaconda sample mixer. Vol. 92, 1911, p. 739. Describes mixer for pulp samples.
213. (a) _____ . A promising gold field, and tests by sampling, vol. 76, 1903, p. 89. Experiences in hand sampling and mill tests on a gold-bearing quartzite, Costilla County, Colo.
214. _____ . Arizona Hercules Copper Co's plant. Vol. 107, 1919, p. 1117. Flow-sheet shows position of sampling machines.
215. _____ . A promising gold field and tests by sampling. Vol. 76, 1903, pp. 89-90. Discusses discrepancies in hand and mill sampling.
216. _____ . A question of sampling. Vol. 73, 1902, p. 623. Discusses controversy between mines and smelter as to whether the ore shall be crushed fine for sampling.
217. _____ . Assay of base bullion. Vol. 33, 1882, p. 259, 290, vol. 34, 1882, pp. 6, 133. Discusses proper methods of sampling and assaying bars of lead bullion.
218. _____ . Automatic Mine air sampler. Vol. 91, 1911, p. 847. Describes a device that samples mine air automatically at definite intervals.
219. _____ . Automatic ore-pulp sampler as shown in report by the Cornish (England) Sub-committee on Tin and Tungsten. Vol. 107, 1919, p. 412. This is a slot tippler, recommended after many tests. The number of cuts per hour is twenty.

220. _____ . Automatic ore sampler. Vol. 36, 1906,
p. 181. Description of device used at Beaconsfield, Tasmania.
221. _____ . Automatic sampler. Vol. 33, 1912, p.
112; Min. and Eng. World, vol. 36, 1912, pp. 665-666. Describes an
automatic sampler for tailings.
222. _____ . Bridgeman's assay office sampling
machine. Vol. 61, 1896, p. 543. Describes a small machine for use in
assay offices.
223. _____ . Byrnes' automatic pulp-sampling
machine. Vol. 73, 1902, p. 488. Describes a machine so placed in the
system of launders and pipes that it can take the entire flow from
crushing machinery or tables and give an average and definite sample.
224. _____ . Cole sampler. Vol. 85, 1908, p. 1190.
Describes machine designed to sample ore crushed to 1 or 1½ inch in size.
225. _____ . Clarkson's sampling machine. Vol. 57,
1894, p. 513. Describes machine with a revolving hopper and adjustable
discharge opening.
226. _____ . Collecting mine samples. Vol. 94,
1912, p. 1025. Recommends use of round pliable basket lined with oil-
cloth.
227. _____ . Colliery notes. Vol. 83, 1907, p. 243
Gives method for taking samples of mine air.
228. _____ . Compact sample splitter. Vol. 102,
1916, p. 746. Describes a portable sample splitter.
229. _____ . Co-operative sampling and assaying of
small mines. Vol. 62, 1896, p. 242. Discusses importance of frequent
sampling by a trained man, and suggests a common assay office for a
group of small mines..
229. (a) _____ . Driving lab. crushers. Vol. 112, 1921
p. 177. A convenient drive for laboratory crusher and sample grinder.
230. _____ . Estimates of Mesabi Range orebodies,
Minnesota, vol. 110, 1920, p. 350. Lay-out of drill-holes in sampling
iron ore.
231. _____ . Filter for slime samples. Vol. 92,
1911, p. 931. Describes a three compartment filter.
232. _____ . Flask for moisture samples. Vol. 98,
1914, p. 24.

233. _____ . Fracture samples of furnace slag. Vol. 97, 1914, p. 105, 1051. Describes judging efficiency of furnace by examination of fractures of slag.
234. _____ . Flood automatic sampler. Vol. 94, 1912, p. 1217.
235. _____ . Francis automatic pulp sampler. Vol. 102, 1916, p. 427-428. Describes a sampler of the traveling slot type, with a tilting-box motor.
236. _____ . Great Cobar smelting works. Vol. 85, 1908, pp. 950-956. Describes and gives plans of the sampling works.
237. _____ . Grinding samples for assay. Vol. 94, 1912, p. 446, 534, 728. Describes experiments proving that the finer the grinding the lower the metal product.
238. _____ . Hamilton automatic sampler. Vol. 101, 1916, p. 603. Describes a machine that automatically selects 1/96 of the original sample.
239. _____ . Handbook of milling details. 1914, p. 425. "Sampling," pp. 1-30.
240. _____ . Improved teeter-box sampler. Vol. 94, 1912, p. 303. Describes a teeter-box sampler that is regulated by plungers and cylinders and the stream of water that is fed to the teeter-box.
241. _____ . Metallics. Vol. 88, 1909, p. 226. Describes a canvas funnel tied at the bottom for catching mine samples.
242. _____ . Method of sampling, Horn Silver Mine, Utah. Vol. 28, 1879, p. 352. Describes method in which 500 to 600 lbs. of ore was picked loose from every 25 to 50 feet, crushed, thoroughly mixed, and 40 to 50 lbs. taken as a sample.
243. _____ . Method of sampling mine dust. Vol. 111, 1921, p. 508. Dust was caught by J.A. McCrae in a tube containing cane sugar.
244. _____ . Mine sampling. Vol. 75, 1903, pp. 960-962; vol. 76, 1903, p. 4, 45, 80, 116. Brief comments by different mining engineers.
245. _____ . New sampling machines. Vol. 79, 1905, pp. 347. Describes a small roll-jaw crusher for use in laboratories.
246. _____ . New sampling plant at Hamburg, Germany. Vol. 100, 1915, pp. 140-141; comment, p. 319. Describes methods and apparatus for sampling pyrites.

247. _____ . New sampling plant at Tonopah. Vol. 72, 1906, p. 57.
248. _____ . Ore sampling and weighing at the Nipissing mill. Vol. 97, 1914, pp. 1293-1294. Describes methods used.
249. _____ . Overflow indicator for sample bin. Vol. 98, 1914, p. 117.
250. _____ . Rapid sampling filter. vol. 90, 1910, p. 819. Describes a filter of silica sponge.
251. _____ . Regulations for sampling at the Trail Smelter B.C. Vol, 108, 1919, p. 223.
252. _____ . Salting. Vol. 110, 1920, p. 507. Any engineer may have his samples salted.
253. _____ . Salting oil properties. Vol. 95, 1913, pp. 1141-1142.
254. _____ . Sample reducing machine, Vol. 93, 1912, p. 444.
255. _____ . Sampler for cyanide plants. Todd's or Homestake sampler. Vol. 93, 1912, p. 541. Describes and gives detail of sand-sampling device.
256. _____ . Sampling accident at Hoosier Mine, Colorado, due to old bulkheads and insecure ladders. Vol. 103, 1917, p. 642.
256. (a) Sampling and estimation of ore in a mine. Eng. and Min. Jour., vol. 75 1903, p. 513. A mine to be sampled should first be examined generally; trustworthy assistants are essential; pairs of samplers to take alternate samples; mark clearly all places sampled; reduce samples as soon as possible, use a factor of safety in estimates.
257. _____ . Sampling a wet level. Vol. 75, 1903, pp. 436-437. Describes and gives sketch of flume used.
258. _____ . Sampling by borings from rock-drills. Vol. 89, 1910, p. 710. Method of collecting samples at the Mount Morgan Mine, Queensland. Also discusses chip sampling and diamond drill sampling.
259. _____ . Sampling by machine. Vol. 86, 1908, p. 101; vol. 87, 1909, pp. 516-517. Discussion of proper and improper sampling machines.
260. _____ . Sampling copper by granulation. Vol. 90, 1910, p. 1145. Discusses probable source of error introduced by sampling converter charges by a ladle sample granulated into water.
261. _____ . Sampling devices. Vol. 87, 1909, p. 218. A chair for the sampler and a bag for catching samples.

262. _____ . Sampling from lip of a Challenge feeder. Vol. 94, 1912, p. 640. Describes device for taking pulp sample.
263. _____ . Sampling imported ores. Treasury department, Secretary's decisions, March 7, 1893. Vol. 55, 1893, p. 418. Treasury decision on testing carloads of ore.
264. _____ . Sampling in Western Australia. Vol. 36, 1908, p. 340; Jour. Chamber of Mines, W.A., May, 1908, p. ---. Describes methods of sampling of ore in place.
265. _____ . Sampling lead concentrates. Vol. 89, 1910, p. 1216; vol. 90, 1910, p. 253. Describes and gives sketches of device for sampling car load lots of fine lead concentrate.
266. _____ . Sampling ore. Vol. 94, 1912, pp. 159-160, 198, 390. Discusses inaccuracies of handsampling.
267. _____ . Sampling ore. Vol. 14, 1872, p. 9. Discusses advantages of mechanical sampling over hand sampling.
268. _____ . Sampling orebodies. Vol. 68, 1899, p. 672. Discusses various methods.
269. _____ . Sample-quarterming table. Vol. 103, 1917, p. 350. Describes a table and hood for the dustless quarterming of samples.
270. _____ . Sampling practice at Miami Copper mine, Ariz. Vol. 94, 1912, p. 540.
271. _____ . Sampling-screen driven by compressed air. Vol. 90, 1910, p. 638. Description of the device.
272. _____ . Sampling spelter. Vol. 102, 1916, pp. 196, 331, 432. Discusses standards of the American Society for testing materials and the need for contracts between buyer and seller.
273. _____ . Sampling symposium, see 733 a.
274. _____ . Seals for mine samples. Vol. 101, 1916, p. 439. Describes method of sealing bags of samples.
275. _____ . Sheridan Oscillating ore sampler. Vol. 94, 1912, p. 932.
276. _____ . Smelting and ore-sales investigations in Colorado. Vol. 105, 1918, pp. 538-543. Describes mill sampling methods in excerpt from report of O.R. Whitaker to the State Committee.
277. _____ . Solution sampler and weigher. Vol. 94, 1912, pp. 1169-1170. Describes a device for sampling cyanide solutions.

278. _____ . Standard specifications for copper wire bars. Vol. 93, 1912, p. 131. Gives rules for sampling copper wire bars, cables, slabs, billets, ingots and ingot bars, given by American Society for Testing Materials and the International Association for Testing Materials.
279. _____ . Steam-jacketed drying table for tailing samples. Vol. 100, 1915, p. 969.
280. _____ . Taking samples from drill-holes. Vol. 94, 1912, p. 61.
281. _____ . Van Mater sampler. Vol. 83, 1909, pp. 1232-1233. Describes apparatus designed for use in small space.
282. _____ . When sampling fails. Vol. 77, 1904, p. 593. Discusses impracticability of any system for erratic ore bodies or hurried investigations.
283. _____ . Will it come to this. Vol. 107, 1919, p. 795. A satire on any engineers mine report, including 3 stanzas on sampling.
284. Erickson, E.T. Detecting small quantities of petroleum. Eng. and Min. Jour. Vol. 112, 1921, p. 59. Sampling oil-bearing rock for analysis.
285. Eustis, W.E.C. Comparison of various methods of copper analysis. Trans. Am. Inst. Min. Eng., vol. 11, 1883, pp. 120-122. Describes method of preparing the samples of about 1 per cent of total contents.
286. Eye, C.M., and Dodd, M.F. Milling at Benguet Consolidated, Philippines, Min. and Sci. Press, vol. 121, 1920, p. 346. Erratic samples from ore-feeders.
287. Fansett, G.R. Sampling mineralized veins. Arizona State Bur. of Mines, Bull. 66, Ser. 3, 1917, 5pp. Gives directions for sampling and for measuring the width of an orebody.
288. Farish, J.B. Ways that are dark. Min. and Sci. Press, vol. 110, 1915, pp. 576-579. Describes experiences with saltea samples and other frauds.
289. Farrell, J.H. Kansanshi mine and mine sampling. Min. and Sci. Press, vol. 96, 1908, pp. 523-530. Describes valuation of copper ore in place in northwestern Rhodesia.
290. _____ . Mining exploration. Min. and Sci. Press, vol. 120, 1920, p. 269. How sampling is regarded by owners of small mines. Discussion on same by W.C. Frazier, p. 407.
291. Fay, A.H. Geology and Mining of the tin-deposits. Cape Prince of Wales, Alaska. Trans. Am. Inst. Min. Eng., vol. 38, 1907, pp. 664-662. Describes methods of sampling and assaying.
292. _____ . Glossary of mining terms. Bull. 95, p. 539. Definitions of sampling.

292. (a) Fawns, Sydney. Tin deposits of the world, 3rd. ed., 1920. Numerous references to sampling of ores and metallic tin.
293. Feust, Arthur. Practical points on sampling. Min. and Sci. Press, vol. 110, 1915, pp. 368-370. Describes practical methods for taking and cutting down mine samples.
294. Fields, H.B. A launder-sampler. Min. and Sci. Press, vol. 111, 1915, p. 919. Describes device for sampling pulp.
295. Finlay, J.R. Mine valuation. Eng. and Min. Jour., vol. 93, pp. 1238-1239, 1912. Discusses factors bearing on the value of undeveloped mining property.
296. Fieldner, A.C. Accuracy and limitations of coal analysis. Proceed. Coal Min. Inst. Am., 1912, pp. 245-281. Discusses sampling, pp. 270-281.
297. _____. Notes on sampling and analysis of coal. U.S. Bureau of Mines, Tech. Paper 76, 1914, 61pp. Discusses factors affecting accuracy of sampling and analysis and outlines methods used by the Bureau of Mines.
298. _____. Preparation of laboratory samples. Jour. Ind. and Eng. Chem., vol. 5, 1913, pp. 518-521. Discusses size of samples, shipping containers and two methods of sampling according to size of coal.
299. _____, and Katz, S.H. Gases produced from carbon tetrachloride and foamite fire extinguishers in mines. Bureau of Mines Serial 2262; June 1921. Plan shows position of taking gas samples.
300. _____, and Selvig, W.A. Determination of moisture in coke. Tech. Paper 148, 1917. Method of handling samples during tests.
301. _____, Smith, H.I., Fay, A.H., and Sanford, Samuel. Analysis of mine and car samples of coal collected in the fiscal years 1911 to 1913. Bull. 85, U.S. Bureau of Mines, 1914, 444 pp. Describes methods of collecting and analyzing samples of coal.
302. _____, and Smith, H.I., Paul, W.J. and Sanford, Samuel. Analyses of mine and car samples of coal collected in the fiscal years 1913 to 1916. Bull. 123, U.S. Bureau of Mines, 1917, 456 pp. Give analyses and describes samples.
303. Fischer, F. Preparation of ore samples for analysis. Stahl and Eisen, vol. 32, 1912, pp. 1408-1409. Chem. abst., vol. 6, 1912, p. 3246. Points out necessity of fine crushing and recommends at least 8 mesh (493 holes per sq. cm.).
304. Fischer, F.W. Flue-gas collector. Power, vol. 42, 1915, pp. 489-490, 763. Describes an inexpensive and portable sampler for flue gas.
305. Fitch, E.O., Jr. How vanadium affects pig iron; a series of tests on five samples of commercial pig iron containing vanadium. Iron Trade Rev., vol. 55, 1914, pp. 72-74. Describes making of test bars.

306. Fleming, W.R. Determination of oxygen in iron and steel; value of existing methods for determination. Proc. Am. Soc. for Testing Materials, vol. 15, 1913, pp. 476-486; abstr. in Iron Trade Review, vol. 53, 1913, pp. 126-130. Discusses methods of sampling and gives microphotographs of sections of iron ingots.
307. Flint, H.P. Wire sampler for cyanide solution. Eng. and Min. Jour., vol. 95, 1913, p. 707. Describes apparatus.
308. Foote, F.W. Cornwall automatic sampler. Eng. and Min. Jour., vol. 109, 1920, p. 1203. Sampling falling ore that has passed rolls.
309. _____ . Deep-level development at Aspen, Colo. Eng. and Min. Jour., vol. 108, 1919, p. 178. Sampling in Smuggler Leasing mill.
310. _____ . Sample bags and sample filing. Eng. and Min. Jour., vol. 100, 1915, p. 58. Describes canvas bags for carrying samples and rack for the bags.
311. Forbes, C.R. Bibliography of Mining. Min. Ind., vol. 21, 1912. Gives bibliography for 1912 on sampling and valuation, pp. 912-913.
312. Forbes, D.L.H. Treatment of complex silver-ore at the Lucky Tiger mine, El Tigre, Sonora, Mexico. Trans. Am. Inst. Min. Eng., vol. 43, 1912, pp. 471-511. Describes breaker plant and sampling device with figure of latter.
313. _____ . Treatment of gold ore at Dome mine, South Porcupine, Ontario. Can. Min. Jour., vol. 35, 1914, pp. 77-85. Describes methods of sampling and weighing, pp. 83-84.
314. Forster, K. Probenehmen und Erzreservenberuteilung in den Goldfeldern Transvaals. (Sampling and analysis of ore reserves in the gold fields of the Transvaal). Discusses sampling and estimating ore in place in the gold fields of the Transvaal. Metall. & Erz, vol. 11, 1914, pp. 441-449.
315. Foster, C. Le Neve. Treatise on ore and stone mining. 1910, 799 pp. Discusses sampling, pp. 676-680.
316. Foster, T.J. Coal and metal miners' pocketbook. 10th. ed., 1905, 637 pp. Discusses sampling and estimating the amount of mineral available, pp. 251-252. Sampling coal, pp. 173-174.
317. Francis, W.R.S. Francis automatic pulp sampler. Eng. and Min. Jour., vol. 102, 1916, pp. 427-428.
318. Frazer, J.C.W. and Hoffman, E.J. Apparatus and methods for the sampling and analysis of furnace gases. Bull. 12, U.S. Bureau of Mines, 1911, 22 pp. Describes methods of taking "continuous" and "instantaneous" samples and the special apparatus designed for such sampling.
318. (a) Frear, William, and Erb, E.S. Study in soil sampling. Jour. Assoc. Off. Agr. Chem., vol. 4, 1920, p. 98. Influence of method of collecting and sampling soil samples has upon the values obtained in their analysis is shown by results obtained in the analysis of different sets of samples. (Penn. Agr. Expt. Station).

9. French, A.T. Sampling ore. Min. and Sci. Press, vol. 97, 1908, pp. 666-667. Defends coring and quartering against alternate shovel method.
10. Tichere, Leon. Sampling. One of 42 lectures printed on various subjects by different engineers for instruction of employees of Copper Queen Branch, Phelps Dodge Corp., Bisbee, Ariz., 1919.
11. Fuld, H.A. Inaccuracies of churn-drill sampling. Eng. and Min. Jour., vol. 89, 1910, p. 953. Gives experience in prospecting copper deposits.
12. Fulton, Charles H. Buying and selling ores and metallurgical products. U.S. Bureau of Mines Technical Paper 83, 1915. Sampling of ores discussed.
13. _____ . Manual of fire assaying. 2d ed. 1911, 219 pp. Discusses sampling, pp. 36-41.
14. Furman, H. van F. Manual of practical assaying, 1910, 530 pp. "Ore sampling", pp. 6-20, 420-421.
15. Fyfe, Alex. Metallurgical process of the Waihi Grand Junction, New Zealand. Trans. Aust. I. M. E., vol. 16, 1912, p. 64. Sampling of the silver-gold ore before milling; samplers are used.
16. Gahl, Rudolf. History of the flotation process at Inspiration, Arizona. Met. and Chem. Eng., vol. 15, 1916, pp. 393-405. Describes sampling of orebodies to determine if the ore could be treated by flotation.
17. Gale, Hoyt S. Saltpeter in Guatemala. Eng. and Min. Jour., vol. 107, 1919, p. 1025. Sampling with auger.
18. Gardiner, W.H. Gold dredging. Actual recoveries compared with estimates. Eng. and Min. Jour., vol. 110, 1920, p. 515. Sampling gravel by churn-drill, and factors against accuracy.
19. Garlick, E.T.M. Graphic method of computing mine values. Trans. Aust. I. M. E., vol. 15 (1), 1911, p. 91. Cutting samples and computing values.
20. Garthwaite, E.H. Mine Sampling. Eng. and Min. Jour., vol. 79, 1905, p. 430. Describes sample catcher for inaccessible stopes and high drives.
21. _____ . Some sampling results. Trans. Inst. Min. and Met., vol. 16, 1906-07, pp. 171-180; discussion pp. 180-194. Discusses proper distance between mine samples, especially for gold veins.
22. Gas Age. Automatic coal crusher and sampler, vol. 39, 1917, p. 656. Describes and illustrates the machine.
23. (a) Gavin, M.J. Mining oil-shale. Proc. Am. Min. Congress, vol. 24, 1921, p. 497. Difficulty in sampling shale, and core-drilling suggested.
23. (b) _____ . Oil-shale: history and technology. Bureau of Mines Bull. 210, 1921. Sampling and testing of shale discussed, including a hint to take samples from below exposed surfaces.

333. Gavin, M.J., Hill, H.H., and Perdew, W.E. Notes on the oil-shale industry. Bureau of Mines Serial No. 2256, 1921. Considerable care is required in sampling shale deposits.
334. Geismer, H.S. Ramsey mine-run sampler. Coal Age, vol. 11, 1917, p. 606. Device consists of a scoop, 13 ft. long, made from 16 in. wrought pipe. A slot, 3 ft. long, is cut out at the top half at one end, and when pushed by an under stream of coal it will collect a 100-lb. sample.
335. _____ . Sampling placer ground. Eng. and Min. Jour., vol. 91, 1911, p. 845. Criticizes method described by T.L. Carter.
336. Geissler, ---. The Geissler sampling machine. Eng. and Min. Jour., vol. 69, 1900, p. 113; Colliery Guardian, vol. 79, 1900, p. 462; German patents 100, 067, 1898 and 100, 516, 1898. Describes a machine for sampling all kinds of ores as well as coke, phosphate, salt, soda, and cement.
336. (a) Gemmell, R.C. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, pp. 497, 537, 768, 996. Quartering samples underground; sample-bags; sample report book.
337. George, W.H. Moisture in blast-furnace coke. Jour. Soc. Chem. Ind., vol. 38, 1919, p. 394. Describes method and precautions needed in obtaining a representative sample.
338. Glenn, William. Sampling cargoes of ore. Jour. Soc. Chem. Ind., vol. 17, 1893, pp. 123-124. Discusses methods.
339. _____ . Sampling ores without use of machinery. Trans. Am. Inst. Min. Eng., vol. 20, 1892, pp. 155-165; Eng. and Min. Jour., vol. 52, 1891, p. 195. Description and discussion of hand sampling.
340. Goodale, S.L. Argo cyanide mill, Idaho Springs, Colo. Eng. and Min. Jour., vol. 96, 1913, pp. 325-339. Describes sampling plant and methods used, p. 326.
341. _____ . Milling practice at the Camp Bird. Eng. and Min. Jour., vol. 79, 1905, p. 351. Describes automatic sampler used at the mill of the Camp Bird mine, Ouray, Colorado.
342. Gould, H.W. Almaden quicksilver mine in Spain. Min. and Sci. Press, vol. 122, 1921, p. 568. Sampling methods for cinnabar.
342. (a) Gouyard, G.M. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 229. Different assay from samples quartered on canvas.
343. Grabill, C.A. Ore buying in Mexico. Eng. and Min. Jour., vol. 109, 1920, p. 694. On the cover is a map of Mexico showing positions of the principal smelters, at which are sampling plants.
344. _____ . Ore contracts. Eng. and Min. Jour., vol. 108, 1919, p. 806. Discussion of clause regarding sampling.
345. Graham, Thomas. Gaseous mines in Crow's Nest Pass field, B.C. Proc. Mine Inspect. Inst., June, 1916, abstr. in Coal Age, vol. 10, 1916, p. 921. Illustration of vacuum bottles for collecting samples of mine air.

346. Gray, Thomas. Automatic gas-sampling apparatus, with some observations on sampling gas. Jour. Soc. Chem. Ind., vol. 32, 1913, pp. 1092-94; abst. in Gas World, vol. 59, 1913, p. 363; and in Jour. of Gas Lighting, vol. 124, 1913, pp. 949-950. Describes apparatus and method for sampling industrial gases and gives experiments to test the accuracy of the method.
347. Greaves-Walker, A.F. Testing clay properties. Brick and Clay Record, vol. 49, 1916, pp. 1083-1085; vol. 50, 1917, pp. 35-36.
348. Green, R.I. Constant errors in sampling. Min. and Sci. Press, vol. 97, 1908, pp. 524-525. Discusses advantages of grading ore for shipment.
349. Greene, F.T. Mine samples as baggage. Min. and Sci. Press, vol. 114, 1917, p. 722. Cites case of railroad accepting samples as baggage.
350. Gregory, T.W.D. Notes on sampling. Colliery Guard, vol. 109, 1915, pp. 1168-1169. Discusses methods of sampling coal seams, mine air, and water.
351. Griffin, M.L. A mathematical view of sampling with reference to the degree of accuracy attained. Jour. Soc. Chem. Ind., vol. 28, 1909, pp. 192-194. Discusses number of samples necessary to obtain accurate information.
352. _____ . Standard methods of sampling: a review with some suggestions. Jour. Soc. Chem. Ind., vol. 24, pt. 1, 1905, pp. 183-185. Reviews advance of sampling during the previous 25 years.
353. Grcut, F.F., and Soper, E.K. Clays and shales of Minnesota. U.S. Geol. Survey Bull. 678, 1919, p. 45. Sampling clay by cutting groove and by 2-in. auger holes.
354. Grunow, W.R. Churn-drill prospecting at Morenci, Ariz. Eng. and Min. Jour., vol. 101, 1916, pp. 969-974. Describes methods of sampling and illustrates an automatic sample splitter and a stove for drying samples.
355. Guess, G.A. Notes on pyritic smelting. Eng. and Min. Jour., vol. 93, 1912, pp. 113-117. Discusses sampling blast-furnace gases.
356. Gunther, C.G. A device used in sampling untimbered shafts. Eng. and Min. Jour., vol. 82, 1906, p. 247. Describes a sampler's seat in which he can be raised or lowered while working.
357. _____ . Examination of prospects; mining geology. 1912, 222 pp. Discusses sampling, pp. 12-19.
358. Hahn, O.H. Development of silver smelting in Mexico. Trans. Inst. Min. and Met., vol. 8, 1899-1900, pp. 231-299; discussion, pp. 299-303. Describes sampling department at a custom smelter, pp. 241-247.
359. Haldane, J.S. Methods of air analysis. 3rd. ed. 1920, pp. 137. Collection of samples pp. 1-8; keeping samples, p. 75.

360. Haley, C.S. Relative error in alluvial sampling. Min. and Sci. Press, vol. 111, 1915, pp. 79-80. Criticizes methods sampling gold gravel.
361. Haley, D.F. Sampling by machine. Eng. and Min. Jour., vol. 87, 1909, p. 362. Discusses article by J.A. Church, Eng. and Min. Jour., vol. 87, 1908, p. 113.
362. Haley, J.F. Churn-drill prospecting in the Joplin district. Eng. and Min. Jour., vol. 89, 1910, p. 1150-1151. Describes method of drilling and device for sampling cuttings.
363. Hallett, S.I. Automatic sampler at the Smuggler Mills, Aspen, Colorado. Min. and Sci. Press, vol. 83, 1901, p. 55. Describes teeter-box sampler with pneumatic check.
364. _____ . Method of mine sampling. Min. and Sci. Press, vol. 86, 1903, pp. 21-22. Gives advice and suggestions for sampling and valuing ore in mines.
365. Hammond, H.O. Smelter lab. of United Verde Extension. Eng. and Min. Jour., vol. 110, 1920, p. 991. Brief description and plans showing how samples are handled.
366. Hance, J.H. Segregation in gold bullion. Min. and Eng. World, vol. 44, 1916, p. 601; Bull. Am. Inst. Min. Eng., vol. 54, 1916, pp. 506-540. Describes sampling by chipping drilling and dipping, p. 507.
367. Hanchett, F.B. Daily sampling in square-set mining Arizona. Min. and Eng. World, vol. 45, 1916, pp. 949-950. Describes methods.
368. Handy, J.O. Sampling and assaying of silver ores, containing cobalt, nickel and arsenic. Original communications, 8th. Int. Cong. Applied Chem., vol. 3, 1912, pp. 89-95; abstr. in Jour. Soc. Chem. Ind., vol. 31, 1912, p. 890. Discusses moisture sample, sampling low-grade and high-grade ores, and methods of assaying.
369. Handy, R.S. Calculation of recovery in concentration. Eng. Min. Jour., vol. 90, 1910, pp. 301-302. Compares time sampling favorably with Hoover's formula for percentage recovery.
370. _____ . Treatment of tailing and ore in Sweeny mill, Idaho. Min. and Sci. Press, vol. 119, 1919, p. 239. Sampling a dump of 1,200,000 tons of lead-silver tailing.
371. Hanks, Abbot A. Improvements in assaying. Min. and Sci. Press, vol. 102, 1911, pp. 662-664. Describes preparation of ore samples for fire assay.
372. _____ . Sampling and analysis of chromite. Min. and Sci. Press, vol. 117, 1916, p. 654. Preparation of samples for analysis.
373. Harbord, F.W. and Hall, J.W. The metallurgy of steel. 5th. ed. 1916, 2 vols. 522 pp. Describes sampling basic process metal, p. 66; sampling steel for microscopic examination 466-469.

374. Harding, J.E. Calculation tonnage and grade from drill-hole samples. Min. and Met. No. 168, Dec. 1920, p. 39. Method of estimation.
375. Harp, C.C. Sampling coal deliveries. National Eng., vol. 20, 1916, pp. 421-423. Discusses factors in determining value of coal, importance of representative samples, collecting and preparing samples and handling of final samples.
376. Harrington, Daniel. Dust control and ventilation in metal mines. Eng. and Min. Jour., vol. 111, 1921, p. 738. How air samples are obtained.
377. . Ventilation in metal mines; a preliminary report. Bureau of Mines Tech. Paper 251, 1921. How samples of mine air are taken.
378. Harris, C.M. Prospecting in Western Australia. Bull. Inst. Min. and Met. Abstr. in Min. Mag., vol. 21, 1919, p. 304. Discusses sampling methods for placer ores.
379. Harris, F.S. How lines should be examined. Eng. and Min. Jour., vol. 70, 1900, p. 603. Comments on article by O.H. Packer.
380. Hartley, Carney. Churn-drill sampling. Min. and Sci. Press, vol. 98, 1909, p. 549. Comments on article by W.E. Thorne.
381. Harvey, Alfred. Automatic ore sampling. Min. and Sci. Press, vol. 88, 1904, pp. 70-79. Describes and gives plans of an automatic ore sampling plant.
382. . Automatic ore sampling. Min. and Sci. Press, vol. 86, 1903, pp. 367-369. Describes the Vegin and the New Brunton sampling machines.
383. Hastings, J.H. Sampling and analyzing zinc ores and products. Eng. and Min. Journal, vol. 104, 1917, pp. 163-165. Gives suggestions for sampling ore in place, old dumps, mill and smelter feed, concentrates and spelter. Gives methods in vogue.
384. Hastings, J.B. Sampling of large low-grade ore-bodies. Min. and Sci. Press, vol. 114, 1917, pp. 379-380. Suggests methods for mine sampling and mill tests on mine samples.
385. Haultain, H.E.T. Notes on sampling. Can. Min. Jour., vol. 31, 1910, pp. 356-360. Discusses quartering down, sampling porcupine ore bodies, and principles of sampling.
386. Hazard, F.H. Device for splitting pulp samples. Eng. and Min. Jour., vol. 93, 1912, pp. 109-110. Describes troughs for splitting net samples.
387. Heath, G.L. The analysis of copper and its ores and alloys. 1916, 292 pp. Discusses sampling and crushing, pp. 14-36.
388. Heathcote, C.S. Automatic ore sampler. Jour. Chamber of Mines, Western Australia, Mar. 31, 1908; abstr. Eng. and Min. Jour., vol. 86, 1908, p. 151. Describes a sampler with a revolving arm carrying a tripping bucket. Resembles Bretherton's patent.

389. Heideberg, F.M. A portable water sampler. Eng. and Min. Jour., vol. 103, 1916, pp. 343-344. Describes portable mine-ditch sampler.
390. Heller, A.H. Flotation at the Afterthought mine, Calif. Min. and Sci. Press, vol. 119, 1919, p. 151. Flow-sheet shows position of automatic sampler.
391. Herdy, J.A. Sampling ore in tunnels. Eng. and Min. Jour., vol. 91, 1911, p. 796.
392. Heriot, E.M. Ore dressing at Clausthal, Germany. Eng. and Min. Jour., vol. 100, 1915, pp. 425-429. Gives sketch of sampling plant.
393. Herman, H. Intensive boring on the Wonthaggi coal field, Victoria. Proc. Aust. I. M. E., No. 32, 1918, p. 145. Over 300,000 ft. of boreholes were put down to test the coal in 11 years.
394. Heron, C.M. Mine sampling at El Tigre; Mexico. Eng. and Min. Jour., vol. 98, 1914, pp. 155-158. Describes development and stope sampling and the keeping of records.
395. Herr, Irving. Sampling placer-gravel deposits. Eng. and Min. Jour., vol. 102, 1916, pp. 261-262. Describes a method and gives sketch of gravel field and drilling plans.
396. _____. Some observations on sampling. Eng. and Min. Jour., vol. 102, 1916, pp. 1015-1017. Discusses errors in sampling.
397. Herrick, H.N. Valuation of dredging ground. Min. and Sci. Press, vol. 109, 1914, p. 652. Drill-hole samples calculations.
398. Hersam, E.A. Principles in the practice of sampling. Min. and Eng. World, vol. 35, 1911, pp. 1054-1055. Discusses principles of sampling especially the element of chance.
399. Herzig, C.S. Mine sampling. Eng. and Min. Jour., vol. 72, 1904, p. 361, vol. 73, 1905, p. 93. Describes the use of a canvas bucket in place of a sampling box.
400. _____. Mine sampling and valuing. A discussion of the methods used in sampling and valuing ore deposits, with especial reference to the work of valuation by the independent engineer. Ed. of 1914, 163 pp.
401. _____. Ore in sight. Min. and Sci. Press, vol. 102, 1911, pp. 266-267. Discusses mine valuation and the part played in it by the human factor.
402. _____. Results from sampling. Min. Mag., vol. 3, 1913, pp. 364-365. Discusses errors made by four engineers in valuing the same mine.
403. _____. Valuation of dredging ground. Min. and Sci. Press, vol. 109, 1914, p. 563. Placing drill-holes and calculating results of sampling.

404. Hess, F.L. Tungsten minerals and deposits. Bull. 552, U.S. Geol. Survey, 1917. Sampling and testing of tungsten.
405. Higgins, Edwin. How shall we get mining efficiency? Eng. and Min. Jour., vol. 109, 1920, p. 139c. Query 13c asks, "Are sampling and assaying properly correlated, so that results are obtained with a minimum of delay?"
406. Higham, James. An automatic pulp sampler. Proc. Chem. and Met. Soc. of S. Africa, vol. 4, 1903-04, pp. 232-235; Min. and Sci. Press, vol. 57, 1903, p. 222. Describes a machine for sampling mill pulp and tailings.
407. Hill, H.H. and Dean, E.W. Quality of gasoline marketed in the United States. Bureau of Mines Bull. 191, 1920. Method of collecting samples.
408. Hillebrand, W.F. Standard methods of sampling and analysis and standard samples. Jour. Ind. and Eng. Chem., vol. 8, 1916, pp. 466-469. Gives principles and criteria for sampling. Gives bibliography of methods for sampling a variety of articles approved by the U.S. Government and scientific and technical organizations.
409. Hills, V.G. Mine sampling. Trans. Can. Min. Inst., vol. 17, 1914, pp. 262-274. Discusses size and reduction of samples, keeping of notes and records, inch measurements, bunched samples, and selective sampling.
410. _____ . Tailing samples. Eng. and Min. Jour., vol. 58, 1914, p. 31c. Discusses advantages of the water-box sampler. Comments on article by L.U.N. Judell.
411. Hintz, E. Bericht der Unterkommission fur die Bearbeitung der Eisenerzanalyse. Zeit. fur Angew. Chemie, Jahr. 27, 1, 1914, pp. 9-11; Iron ores: Report of the Committee on methods of analysis, Verein Deutscher Chemiker. Abstr., Jour. Soc. Chem. Ind., vol. 33, 1914, p. 13c. Discusses preparation of samples and gives directions for sampling.
412. Hodge, W.R. Test-pit for dump sampling. Eng. and Min. Jour., vol. 52, 1911, p. 1028. Describes method of driving pit into large dumps.
413. Houghes, A.D., jr. Sampling and its importance; also on sampling placer mines. Eng. and Min. Jour., vol. 52, 1911, p. 264. Discusses principles and sampling from wet batteries and describes placer sampling.
414. Hofman, H.O. Improvements in sampling and assaying. Min. Ind., vol. 14, 1905, pp. 646-648. Reviews progress in sampling and assaying for 1905 and references to periodicals.
415. Hofmann, Ottokar. Treatment at the Auburn mill, Nev. Min. and Sci. Press, vol. 22, 1871, p. 24c. Sampling methods are covered.
416. Hohl, L.J. Valuation of dredging ground. Min. and Sci. Press, vol. 109, 1914, p. 493. Placing of drill-holes and calculations.
417. Holloway, G.T. Min. Jour., vol. 79, pp. 44-45. Gives tables for converting percentages into curces, or pennyweights, or grains per ton of 2240 lb. and also per ton of 2000 lb.

418. Holmes, J. A. Sampling of coal in a mine. Technical paper 1, U. S. Bureau of Mines, 1911, 18 pp. Describes the sampling methods and sampling outfit devised by the U. S. Geological Survey and the Bureau of Mines.
419. Holmes, J. A., Franklin, E. C., and Gould, R. A. Report of Selby Smelter Commission, Bureau of Mines Bull. 98, 1915, pp. 528. Numerous references to sampling the atmosphere in the smelter zone.
420. Holt, Theo. P. Plant of the Tintic Milling Co., Utah. Min. and Sci. Press, vol. 120, 1920, p. 603. Sampling silver-lead ore.
421. Hood, K. K. Curves for ore-valuation. Min. and Sci. Press, vol. 121, 1920, p. 270. Graphs plotted from drill samples and assay multiplied by certain factors.
422. Hooper, H. E. Mine sampling devices. Trans. Inst. Min. & Met., vol. 18, 1908-09, pp. 66-67; Min. & Sci. Press, vol. 97, 1908, p. 704. Describes a sampling chair and a catching bag.
423. _____ Test-pit sampling of placers. Eng. and Min. Jour., vol. 102, 1916, p. 222. Describes sampling alluvium worked for wolfram.
424. Hoover, Herbert C. Principles of Mining, 1st. ed. 1909, pp. 199. Sampling includes ore in a mine and mill products. Chapter 1, on mine valuation, discusses all phases of sampling, and calculations arising therefrom. Precautions against natural salting and intentional salting are given.
425. Hopkins, G. V. Buying and sampling ores and working mines on the tribute system in Chili. Trans. Inst. Min. and Met. vol. 6, 1897-98, pp. 108-112. Describes mechanical sampling as found in Chile.
426. Horner, R. R. Black sand deposits of Southern Oregon and Northern California. Technical Paper 196 U. S. Bureau of Mines, 1918. Methods of sampling beach sands containing platinum.
427. Horwood, C. B., and Park, Mungo. Development-sampling and ore-valuation of gold mines. Trans. Am. Inst. Min. Eng., vol. 39, 1908, pp. 685-694. Discusses principles and methods.
428. Hotchkiss, W. O. Exploration methods on Goebic range. Min. and Met. No. 163, 1920, p. 29. Difficulty in sampling iron ores.
428. (a) Howe, A. S. Mine sampling. Eng. and Min. Jour., vol. 75, 1903, p. 588. Grab sampling; rich streaks; and use of slide-rule.
429. Hughes, F. C. Sampling of ores and bullion, especially silver bullion for Mint purposes. Trans. Min. and Geol. Inst. of India, vol. 2, part 1, 1907, pp. 57-70. Discusses methods and devices.
430. Hulst, G. P. International Lead refining plant. Trans. Am. Inst. Min. Eng., vol. 49, 1914, pp. 532-538; discussion 538. Describes sampling kettles and method of sampling.

41. Hunt, R.W. Manufacture of steel rails. Bull. 153, Sept. 1919, of A. I. M. & M. E., p. 2336. Sampling ingots by drilling.
42. Huntoon, L.D. Accuracy of mechanical and riffle ore samplers. Eng. and Min. Jour., vol. 90, 1910, pp. 62-65. Discusses requirements for mechanical ore samplers and the cause of inaccurate results with riffles. Compares wet and dry screen tests.
43. _____ Faulty sampling devices. Eng. and Min. Jour., vol. 91, 1911, p. 159. Warns against simple looking device that fails to take a fair sample of lumps.
44. _____ Preparation of assay samples. Eng. and Min. Jour., vol. 91, 1911, p. 1249. Gives methods of reducing large mechanical samples and assay pulps so as to avoid inaccuracies.
45. _____ Preparing and recording samplers for use in technical assay laboratories. Trans., Am. Inst. Min. Eng., vol. 40, 1909, pp. 747-754. Discusses Dewey decimal system of records and the use of index and assay cards.
46. _____ Stamp-mills, in 1910. Eng. and Min. Jour., vol. 91, 1911, p. 46. Cost of sampling was 1/4 cent per ton when treating 3000 tons daily. Charge for custom sampling was 20 to 22 cents per 100 tons of ore.
47. Hutchins, J.P. and Stines, M.C. Sampling placer ground. Min. and Sci. Press, vol. 102, 1911, pp. 292-294. Describes handling of sample after it is pumped up.
47. (a) Hutton, G.H. Placer prospecting practice. Min. and Met., No. 176, 1921, p. 15. Sampling methods of today are little changed from 10 years ago; sampling and actual recoveries often vary widely; suggestions made for different method of calculation of estimates.
47. (b) _____ Valuation of placer deposits. Min. and Sci. Press, vol. 123, 1921, p. 365. Methods of sampling, calculations and discrepancies between sampling and actual recoveries.
48. Ingalls, W.R. Methods of mine examination. Eng. and Min. Jour., vol. 70, 1900, pp. 753-754. Comments on article by O.H. Packer.
49. Ionides, S.A. Continuous sulphuric acid sampler. Chem. and Met. Eng., vol. 20, 1919, p. 38.
40. Iron and Coal Trade Review. Standardization of coal sampling. Vol. 36, 1913, pp. 574-575. Discusses colliery, cargo, bunker, truck, and bag sampling, also laboratory treatment of sample.
41. Irvin, D.F. Adequate sampling in modern mill practice. Min. and Sci. Press, vol. 106, 1913, pp. 514. Discusses the sampling of sand, of cullion and of tailings with diagram.
42. _____ Cyanide plant accounting. Eng. and Min. Jour., vol. 97, 1914, pp. 897-899. Describes sampling methods used at a cyanide plant.

443. Jackling, L. The Republic sampling and reduction works. Min. and Sci. Press, vol. 31, 1900, p. 372. Describes plant at Republic, Washington.
444. James, G.A. Contamination of laboratory samples by iron derived from crushing machinery. Chem. Engineer, vol. 14, 1911, pp. 380-381.
445. _____. Moisture as a source of error in assay reports. Eng. and Min. Jour., vol. 90, 1910, pp. 1047. Discusses importance of keeping samples dry.
446. _____. Salting of samples and means of detection. Min. and Eng. World, vol. 36, 1912, pp. 1099-1100. Gives causes of innocent salting.
447. Janda, F. Die Erzprobenahme und die Zürrichtung des Durchschnittsmusters für die chemische Analyse. (Sampling and the preparation of samples for chemical analysis). Oesterreichische Zeit. für Berg-und Huttenwesen, Jahr. 52, 1904, pp. 547-549, 561-564, 577-580.
448. Janin, Charles. Gold dredging in the United States. U.S. Bureau of Mines Bull. 129, 1913, p. 180 to 192. Sampling and calculating value of placer ground; theoretical value and actual yields.
448. (a) _____. Mining Engineers' Examination and Report Book. 1st. ed. 1913. Instructions for sampling fully covered.
449. _____. Sampling placer ground. Eng. and Min. Jour., vol. 91, 1911, p. 754. Criticizes method described by T.L. Carter.
450. Janin, Charles, and Winston, W.B. Gold dredging in California. State Mining Bureau Bull. 57, 1910, pp. 312. Sampling placer ground by drilling discussed on 17 pages.
451. Jarman, Arthur. Mining and treatment at the Talisman mine, New Zealand. Trans. Aust. I. M.E., vol. 16, 1912, p. 359. Sampling in the mine.
452. Jene, H.L. Mortar for laboratory crushing. Eng. and Min. Jour., vol. 87, 1910, pp. 788. Describes device for coarse ore especially ore which is inclined to fly during crushing.
453. Jennings, R.C. Valuing placer ground. Min. and Sci. Press, vol. 109, 1914, p. 527. Drill-hole sample calculations.
454. Jennings, S.J. Large-scale sampling. Eng. and Min. Jour., vol. 90, 1914, p. 1138. Describes the taking of 30-ton samples at Juneau, Alaska.
455. _____. Sampling of low-grade ore deposits. Min. and Eng. World, vol. 41, 1914, p. 1086. Describes a method of sampling gold ore in Alaska.
455. (a) Jenson, J.B. Petro-shales of the Western Slope. Proc. Am. Min. Congress, vol. 24, 1921, p. 532. Prospecting and sampling should be done by diamond-drills and tunnels.

456. Johnson, Paul. An automatic system of sampling. Eng. and Min. Jour., vol. 73, 1902, pp. 514-516; Abst. Jour. Soc. Chem. Ind., vol. 21, 1902, p. 784; Min. Ind. Vol. 11, 1902, pp. 426-430. Describes a sampling mill and apparatus at Greenwood, British Columbia.
457. _____ . Ore sampling at El Paso, Texas. Eng. and Min. Jour., vol. 53, 1892, pp. 111, 132. Discusses methods of sampling in United States and in Europe.
458. Journal of Canadian Mining Institute. Recent developments at the Granby smelter. Vol. 13, 1916, p. 273-287. Describes sampling methods at the works in British Columbia.
459. Journal of Industrial and Engineering Chemistry. Tentative methods for sampling and analyzing coal. Vol. 5, 1913, pp. 517-528. First report of the committee of the American Society for Testing Materials.
460. _____ . Preparation of laboratory samples; committee report. Vol. 9, 1917, pp. 100-101. From report of the Joint Committee on coal analysis of the American Society for testing materials.
461. Judell, L.U.W. Simple sampling device. Eng. and Min. Jour., vol. 90, 1910, p. 1146. Describes a simple device for sampling jig-tailings. p.1052
462. _____ . Simple sampling device. Eng. and Min. Jour., vol. 97, 1914, / comment, vol. 98, 1914, p. 29. Describes an automatic pulp sampler.
462. (a) Julian, H.F. and Smart, Edgar. Cyaniding gold and silver ores, 1st. ed. 1904, pp. 405. Where samples may be taken, sampling dumps, and lab. methods, pp. 9-17.
463. Juen, E. Probenehmen in metallurgischen Betrieben. (Sampling in metallurgical works). Zeit. angew. Chemie, Jahr. 17, 1904, p. 1544. Discusses principles and methods.
464. Kahan, R.R. Sampling bullion. Jour. Chem. Met. and Min. Soc. S. Africa. Abstr. in Min. and Sci. Press, vol. 123, 1921, p. 30, Discusses dip samples, and drilling of gold bullion.
465. Keene, J.P. Churn-drill gravel-sampling. Min. and Sci. Press, vol. 99, 1909, pp. 288-289. Describes method of sinking the pipe to the bed rock with little or no driving.
466. Keety, T.F. Errors in mine sampling. Eng. and Min. Jour., vol. 91, 1911, p. 799. Describes errors liable in sampling erratic gold veins.
467. Keighley, F.C. Selection of coke samples for analysis. Proceed. Coal Min. Inst. Am. 1913, pp. 167-172. Suggests methods for sampling coke for determining the phosphorous present.
468. Keller, Edward. Distribution of the precious metals and impurities in copper and suggestions for a rational mode of sampling. Trans. Am. Inst. Min. Eng., vol. 27, 1898, pp. 106-123.

469. _____ . Mathematics of copper sampling. Eng. and Min. Jour., vol. 93, 1912, pp. 703-705, discussion, pp. 729, 1213. Discusses interior structure of copper bars and demonstrates how each separate hole can be made to represent the average of the bar in which it is placed.
470. _____ . Mobility of gold in solid state. Eng. and Min. Jour., vol. 107, 1919, p. 35a. Sampling copper plates containing gold.
471. _____ . Principles and practice of sampling metallurgical materials with special reference to the sampling of copper bullion. U.S. Bureau Mines Bull. 122, 1916, 102 pp. Discusses theory of sampling and its application; describes procedure and equipment in detail.
472. _____ . Sampling anode copper with special reference to mineral content. Bull. AM. Inst. Min. Eng., vol. 42, 1911, pp. 905-908; Min. Ind., vol. 19, 1910, p. 797. Discusses William Wraith's paper.
473. _____ . Sampling metallic metallurgical materials (copper). U. S. Bureau of Mines Bull. 122, 1916.
474. Kerns, R.W. International smelter at Miami, Ariz. Eng. and Min. Jour., vol. 101, 1916, pp. 420-424. Describes sampler copper concentrates.
475. Kershaw, J.B.C. Fuel economy in the boiler-house. Chem. and Met. Eng., vol. 20, 1919, p. 294. Sampling flue gases.
476. _____ . Sampling v. correct analytical results. Met. and Chem. Eng., vol. 17, 1917, p. 108. Gives principles of sampling.
477. _____ . Scientific methods of coal buying. Coal Age, vol. 11, 1917, p. 337. An intelligent and reliable sampler is necessary, and with two or three helpers can sample 1000 tons daily. Face and cargo sampling discussed.
478. Kiddie, Thomas. Causes of variations in ore sampling. Jour. Can. Min. Inst., vol. 13, 1910, pp. 556-560; discussion, pp. 560-578; Eng. and Min. Jour., vol. 80, 1909, pp. 825-826. Discusses effect of size of ore on results of sampling and analysis.
479. _____ . Screen analysis in sampling. Eng. and Min. Jour., vol. 80, 1909, pp. 825-826. Discusses tests of sampling machines and gives results with Jones sampler and with riffle and with cone sampling.
480. Kimball, J.P. Differential sampling of bituminous coal-seams. Trans. AM. Inst. Min. Eng., vol. 12, 1904, pp. 317-349. Discusses structure of coal seams and methods of sampling of different state surveys. Gives plan for differential sampling.
481. King, J.T. A laboratory sampler. Can. Min. Jour., vol. 36, 1915, pp. 109-112. Describes a rapid, accurate and efficient device for sampling finely ground ore.

182. King, L.M. Sampling and assaying a car of bonanza ore. Min. and Sci. Press, vol. 94, 1907, pp. 241-242. Describes the sampling and assaying of 50 tons of ore from Goldfield, Nev., yielding 606 oz. gold and 74 oz. silver per ton, equal to about \$600,000.
183. Kirby, E.B. Sampling and measurement of orebodies in mine examination. Min. and Sci. Press, vol. 71, 1895, pp. 268, 284, 300, 320. Eng. and Min. Jour., vol. 59, 1895, pp. 196-197, 221-222, 247-248; abstr. Mines and Minerals, vol. 20, 1899-1900, pp. 132-133. Discusses methods of sampling and valuing ore in place.
184. _____ . Testing and sampling placer deposits. Proc. Colorado Sci. Soc., vol. 6, 1898, pp. 186-198; abstr. in Eng. and Min. Jour., vol. 68, 1899, pp. 130-131; Min. and Sci. Press, vol. 78, 1899, pp. 637, 666.
185. Kithil, K.L. and Davis, J.A. Mining and concentration of carnotite ores. Bureau of Mines Bull. 103, 1917. Full details of sampling methods with illustrations.
186. Kitson, A.E. Bauxite in West Africa. Report of Geol. Survey of Gold Coast for 1919. Sampling bauxite.
187. Kneff, C.W. A sampling cone. Jour. Ind. and Eng. Chem., vol. 4, 1912, pp. 682-683. Describes a hopper through which the ore is run to prepare a cone for quartering. The lumps and fines are well mixed.
188. Knox, N.B. and Haley, C.S. Mining of alluvial deposits, II. Min. Mag., vol. 12, 1915, pp. 153-153. Discusses sampling by channeling and by bulk.
189. Kreisinger, H. and Cvitz, F.K. Sampling and analyzing flue gases. U.S. Bur. Mines Bull. 97, 1916, 70 pp. Describes simple apparatus intended for use of men in charge of boiler plants.
190. Labarthe, Jules. Bunker Hill smelter. Min. and Sci. Press, vol. 114, 1917, pp. 155-156. Describes sampling mill for gold, silver, and lead ore.
191. Lachmund, Oscar. Best methods of sampling and marketing ores. Min. World, vol. 34, 1911, pp. 402. Gives suggestions to ore snippers.
192. Lafferty, R.F. Sampling dredging grounds. Eng. and Min. Jour., vol. 92, 1911, pp. 1023-1024. Discusses placer ground sampling and drills.
193. Laist, Frederick, and others. Electro-lytic zinc plant of the Anaconda Company. Paper of A. I. M. and M. E., abstr. in Min. and Met., No. 168, Dec. 1920, p. 36. Abstr. in Min. Jour. London, vol. 132, 1921, p. 207. Sampling molten spelter from ladles.
194. Lamble, B.C. sampling and assaying molybdenum ores. Can. Min. Jour., vol. 37, 1916, p. 185. Describes coning and quartering system in the mill at Orillia, Canada.
195. Landis, E.K. Sampling iron-ore. Trans. Am. Inst. Min. Eng., vol. 20, 1891, pp. 611-613. Describes sampling car load lots by hand.

496. Lane, T.C. Mine salting. Mex. Min. Jour., vol. 12-13, 1911, pp. 38-39. Describes frauds.
497. Lang, Herbert. Management of a country smelter. Min. and Sci. Press, vol. 109, 1914, pp. 440-442. Discusses sampling and buying ores.
497. (a) Langtry, W.D. Methods of coal sampling. Coal Industry, vol. 4, 1921 p. 556. Brief discussion on importance of sampling coal as an aid to selling, with photographs of taking samples at the face and at a tippie, and 32 views of quartering a sample.
498. Laschinger, E.J. New apparatus for sampling air for dust. Jour. Chem. Met. and Min. Soc. S. Africa, vol. 12, 1912, pp. 443-446. Describes device for sampling mine air.
499. Lathe, F.E. Recent developments at the Granby smelter. Jour. Can. Min. Inst., vol. 13, 1910, pp. 273-287. Describes methods of sampling car loads of copper-gold-silver ore, and gives diagrams.
499. (a) Lawrence, B.B. Ore in sight. Eng. and Min. Jour., vol. 75, 1903, p. 323. Use of the terms positive, probable, and possible ore.
500. Lawrie, Thomas. Sampling ore received at the Sulphide Corporation's works Australia. Proc. Aust. I. M. E., No. 31, 1918, p. 4. Sampling concentrates with scoops and ore by taking so many shovelfuls.
501. Ledoux, A.R. American methods of sampling ore and assaying copper. Min. Ind., vol. 1, 1892, p. 143.
502. _____. Assays of copper and copper matte. Trans. Am. Inst. Min. Eng., vol. 25, 1896, pp. 250-292; discussion, pp. 1000-1010. Describes taking samples from a car load of matte - samples of borings from anodes for series of assay tests, p. 250.
503. _____. Sampling argentiferous and auriferous copper. Jour. Can. Min. Inst., vol. 2, 1899, pp. 108-118; Discusses methods.
504. _____. Sampling ores of Cobalt, Ontario. Can. Min. Jour., vol. 30, 1907, pp. 388-389. Describes sampling methods for ore containing silver in nuggets and small particles.
505. _____. Stories from a laboratory. Eng. and Min. Jour., vol. 109, 1920, p. 1390. Some interesting history concerning British and American sampling of copper.
505. (a) Lee, C.E. Sampling ore in a mine. Eng. and Min. Jour., vol. 75, 1903, p. 401. Sampling accessories - gads, moils, and tags.
506. Lee, C.W. Data of two experiments showing liquation in cyanide gold bars. Proc. Chem. Met. and Min. Soc. S. Africa, vol. 2, 1898, p. 801-803; Jour., vol. 1, 1898, p. 116.

507. Leggett, T.H. Sampling large low-grade orebodies. Min. and Sci. Press, vol. 115, 1917, p. 51. Compares mill tests vs. moil-sampling and concludes in favor of the latter.
508. Lejeune, A.S. Mine sampling and ore valuation with special reference to the Witwatersrand area. S. African Min. Jour., vol. 22, pt. 2, 1913, pp. 146, 179, 263, 292, 318, 344, 380, 439. Discusses apparatus, methods, assay plans, calculation of ore reserves, sampling dumps, faulting of ore veins.
509. Lenher, Victor. Contamination of laboratory samples by iron. Jour. Ind. and Eng. Chem., vol. 4, 1912, p. 471. Describes experiments that showed samples to be contaminated.
510. LeRoy, E. A water-actuated sampler. Min. and Sci. Press, vol. 106, 1914, p. 378. Describes sampler of tilting box type.
511. Leslie, E.H. Milling operations at the Commonwealth property, Arizona. Min. and Sci. Press, vol. 108, 1914, pp. 722-730. Describes sampling plant.
512. Leupold, H. Improved sand and slime samples. Proc. Chem. Met. and Min. Soc. S. Africa, vol. 5, 1904-05, pp. 122-123. Describes methods of sampling to determine weight of slimes or sand in a large tank.
513. Levy, Ernest. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 458. In examining a partly-caved mine, don't depend upon outside information.
513. (a) _____. Sampling floor of a wet level. Trans. Inst. Min. and Met., vol. 13, 1903-04, pp. 145-148; discussion, pp. 148-150. Describes difficulties and method devised to overcome them.
514. Lewis, R.S. Milling calculations. Chem. and Met. Eng., vol. 20, 1919, p. 229. Sampling pulp for specific gravity.
515. Liddell, D.M. Influence of number of templet holes in sampling copper. Eng. and Min. Jour., vol. 90, 1910, p. 953. Discusses effect of number of templet drilled holes on the silver assay of copper pig.
516. _____. Magnetic particles in copper bullion sampling. Eng. and Min. Jour., vol. 90, 1910, pp. 752-753. Discusses method of dealing with magnetic particles in sampling copper bullion.
517. _____. Metallurgist and chemists' handbook. 1916, 603 pp. Discusses coal sampling, pp. 316-317, and weights to be taken in sampling ore, pp. 314-315.
518. _____. Moisture in copper bullion. Eng. and Min. Jour., vol. 90, 1910, pp. 1095-1096. Describes tests to determine amount of moisture present.
519. _____. Salting assays by salted cupels. Eng. and Min. Jour., vol. 95, 1913, p. 835. Describes experiments to test the possibility of salting with cupels.

520. _____ . Sampling and assaying in 1910 and 1911. Min. Ind., vols. 19 and 20, 1910 and 1911, pp. 732-806 and 385-399. Reviews articles on sampling for the two years and gives short bibliography.
521. _____ . Sampling coke. Coal Age, vol. 3, 1915, p. 1-1. Importance of proper sampling.
522. _____ . Sampling errors due to copper bar shapes. Eng. and Min. Jour., vol. 92, 1911, p. 1173. Recommends a thin bar with a small bevel.
523. _____ . Short formula for samples containing metallics. Eng. and Min. Jour., vol. 90, 1910. Gives formula for determining total per cent of metallics thrown out at successive crushings.
524. _____ . Top and bottom drilling in pig copper. Eng. and Min. Jour., vol. 90, 1910, pp. 397-398. Discusses differences in samples taken from top and from bottom of the bar.
525. Lieban, G.O.A. Apparatus for taking core samples of slime deposits, etc. gesundh. Ing. vol. 43, 1920, p. 163. An iron trough, 25 to 33 inches long with a cover is used. When forced down into thick slime, wedge end down, by means of an attachment the other end is covered, and the sample from the particular point is brought to surface.
526. Lincoln, F.C. State Ore Sampler of Nevada, announces charges at the Hazen sampler, and compares them with other works. Eng. and Min. Jour., vol. 108, 1919, p. 746.
527. Lindgren, J.M. Sampling and analysis of Illinois coals. Trans. Am. Inst. Min. Eng., vol. 40, 1909, pp. 17-24. Discusses methods of sampling stock piles, face sampling and keeping samples.
528. Locke, C.E. School laboratory work. Sampling of an ore containing coarse gold. Trans. Am. Inst. Min. Eng., vol. 45, 1913, pp. 251-255.
528. (a) Longridge, C.C. Gold and tin dredging. 3rd. ed., 1914. Prospecting and valuing placers, p. 25.
529. Lord, N.W. United States fuel-testing plant at St. Louis, Mo. Bureau of Mines Bull. 28, 1911. Accuracy of car samples, and moisture loss in samples.
530. Lord, N.W., Holmes, J.A., Stanton, F.M., and Sanford, Samuel. Analysis of coals in the United States, with descriptions of mine and field samples, collected between July 1, 1904, and June 30, 1910. Bull. 22, U.S. Bureau of Mines, 1912, 1129 pp. Describes methods of collecting and analyzing samples of coal.
531. Lorenz, F.H. Salting of mines. Min. and Sci. Press, vol. 121, 1920, p. 546. Putting gold into dynamite, or drilling minute holes in the face and salting them.

532. Loring, W.J. Sampling large low-grade orebodies. Min. Sci. Press, vol. 114, pp. 791-792. Discusses factor of number of samples taken.
533. Louis, H. An ore-sampling device. Eng. and Min. Jour., vol. 80, 1908, p. 61. Describes a machine with 3 V-troughs, practical in the field or laboratory.
533. (a) Louis, Henry. "Handbook of Gold Milling", 2nd. ed. 1899, pp. 591. Importance of sampling, and lab. methods, p. 509. Also, "The Dressing of Minerals", 1st. ed., 1909, pp. 544. Where samplers might be placed.
534. Luetcher, G.L. Sampling of materials used and produced in the manufacture of iron and steel. American Manufacturer, vol. 45, no. 9, p. 3. Abstr. Jour. Iron and Steel Inst., No. 2, 1899, pp. 472-475. Describes methods for sampling ore in mines and in cars or piles, for reducing samples, for sampling coal, coke, limestone, pig iron, steel and wrought iron, and furnace producer and chimney gases.
534. (a) Ludlum, A.C. Placer prospecting practice. Min. and Met., No. 179, Nov. 1921, pp. 27-28. The president of a dredge constructing company discusses G.H. Hutton's previous paper, and gives comparisons of sinking pits and drilling holes with actual gold recovery by dredge near Leadville.
535. Lunge, G. Sampling and analyzing ores and chemical products. Eng. and Min. Jour., vol. 35, 1883, p. 286. Suggest international agreement on methods.
536. _____ . Technical methods of chemical analysis. 1908-14, 3 vol. Sampling, vol. 1, pp. 7-17.
537. MacDonald, D.F. and Enzian, Charles. Prospecting and mining copper ores at Santa Rita, N. Mex. U.S. Bureau of Mines Bull. 107, 1916, pp. 122. Describes churn-drilling, sampling, and estimation of disseminated copper ore.
538. MacDonald, H.J.C. Standard mine cost statement. Eng. and Min. Jour., vol. 112, 1921, p. 127. Head under which sampling comes.
539. MacDougall, C.W. Quincy mine assay office. Eng. and Min. Jour., vol. 81, 1906, pp. 654, 708, 806. Describes methods of determining percentage of copper in waste sands, in minerals from classifiers and tables, and in waste slag.
540. MacFarren, H.W. A sampler. Min. and Sci. Press, vol. 95, 1907, p. 677. Describes a sampler for wet sand.
541. _____ . A sand-tank sampler. Min. and Sci. Press, vol. 97, 1908, p. 636. Describes and gives diagram of device.
542. _____ . Practical stamp-milling and amalgamation, 3rd. ed., 1914. Automatic samplers are considered best, p. 169. In Part 4, by C.T. Hutchinson, pertinent remarks are given on sampling.

543. Mandy, J.T. Contribution to the philosophy of shipment sampling. Can. Min. Jour., vol. 31, 1910, pp. 718-722. Discusses principles of sampling and compares mechanical sampling and hand sampling, favoring the former.
544. Marriage, E.C.D. Experiences of a custom assayer. Eng. and Min. Jour., vol. 110, 1920, p. 906. Always examine the original sample submitted for assay.
545. Marsh, Robert. Sampling and assaying copper ores of the Ely District. Colo. Sch. Mines Quart., vol. 30, 1908-09, pp. 51-57. Describes methods both during prospecting and actual mining.
546. Mathewson, E.P. Ore sampling by machine. Eng. and Min. Jour., vol. 66, 1908, pp. 338, 631, 776. Compares accuracy in modern works of machine sampling with the best assaying.
546. (a) Mathez, Auguste. Mine Sampling. Eng. and Min. Jour., vol. 76, 1903, p. 304. Sampling irregular orebodies, and a lead seal for sample bags.
547. Mathiez, F.F. Sampling diamond deposits. Min. and Sci. Press, vol. 116, 1918, p. 324. Presents problems of sampling diamond deposits.
548. Maxwell, J.W. Mill check on mine sampling. Eng. and Min. Jour., vol. 104, 1917, p. 384. Describes methods of taking samples that checked closely with mill test.
549. McAllister, J.E. Greenwood copper smelting works. Eng. and Min. Jour., vol. 91, 1911, pp. 1011-1015. Describes sampling arrangements.
549. (a) McCann, Ferdinand. Cyanide practice in Mexico. 1st. ed. 1912, p. 194. In describing a number of mills, sampling is covered.
550. McDermott, Walter. Mining reports and mine salting. Trans. Inst. Min. and Met., vol. 3, 1894-95, pp. 108-130. Describes experiences with frauds in valuing ore in place, pp. 119-130. Discussion, pp. 135-137, 140, 145-146, 148-149.
551. McGillivray, J.D. Comstock ore sampling. Min. and Sci. Press, vol. 72, 1896, p. 164. Evidence on ore sampling given in the Hale and Norcross case. Discusses sampling methods in general and those used on the Comstock in particular.
552. McGregor, A.G. Features of the new copper smelting plants in Arizona. Trans. Am. Inst. Min. Eng., vol. 55, 1916, pp. 781-803. Describes concentrate sampler, pp. 783-784.
553. McMillen, D.A. An auto-hydraulic sampling device used in Globe district, Arizona. Eng. and Min. Jour., vol. 30, 1910, p. 999. Describes a machine in which a teeter-box throws a valve and admits steam, or compressed air to move sampler.
554. _____. Sampling low-grade and irregular orebodies. Eng. and Min. Jour., vol. 90, 1910, pp. 750-751. Discusses errors in the usual methods and describes the spiral method.

555. McNeill, W.K. Notes on Cobalt silver ores. Can. Min. Jour., vol. 29, Jan. 1, 1908. Gives suggestions for sampling silver ores from Cobalt, Ont.
556. Megraw, H.A. Cyanidation at the Liberty Bell mill. Eng. and Min. Jour., vol. 95, 1913, pp. 9-13. Brief description and view of automatic tailing sampler.
557. _____. Calculation of extraction in cyanidation. Eng. and Min. Jour., vol. 96, 1913, pp. 441-444, discussion, p. 1230. Discusses value of correct sampling.
558. _____. Cyaniding troubles and remedies, II. Eng. and Min. Jour., vol. 94, 1912, pp. 360-364. Discusses inadequate sampling methods.
559. Mehring, C.A. Treatment of boiler feed water. Chem. and Met. Eng., vol. 21, 1919, p. 630. Method of collecting drip samples.
560. Meiklejohn, C.A. Determination of available CaO in lime. Eng. and Min. Jour., vol. 107, 1919, p. 739. Air must be kept from the sample being tested.
561. Mein, W.W. Sampling low-grade ore deposits. Min. and Eng. World, vol. 42, 1915, p. 374. Methods at the Dome Mine, Ontario.
562. Meriwether, H.M. How mines should be examined. Eng. and Min. Jour., vol. 70, 1900, p. 514. Comment on article by O.H. Packer.
563. Merrill, C.W. The alleged shortage in cyanide bullion. Trans. Inst. Min. and Met., vol. 7, 1898-99, pp. 223-226; discussion, pp. 226-228. Describes a straight slotted scoop sampler for cyanide residue of wet sand.
564. Merton, A.M. Specifications and tests for zinc dust. Min. and Eng. World, vol. 38, 1913, pp. 1227-1228. Gives method for sampling kegs of the dust.
565. Middleton, W.B. Prospecting tin land in Malaya. Min. Jour., vol. 108, 1915, pp. 149-151; Trans. Inst. Min. and Met., vol. 24, 1914-15, pp. 300-323. Discusses sampling, pp. 304-305, and describes sampling the boreholes, pp. 314-317, 324-326.
566. Miller, G.W. Mine sampling. Ores and Metals, vol. 13, Sept. 1, 1904, no. 17, p. 22-23; no. 18, pp. 23-25; no. 19, p. 22. Discusses principles and methods for sampling ore in place and making maps of mines and gives table for estimating gross value of ore.
567. Millers, E.W. Sample reducing machine. Eng. and Min. Jour., vol. 93, 1912, p. 444. Describes a machine especially designed for mixing and reducing coal samples, but also practical for other minerals.
567. (a) Minard, F.H. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 421. Sampling is a difficult job; no college graduate should be in charge of such work. Quartering, numbering, and calculating.
568. Mines and Methods. Sampling "joker" at Daly-West and Daly-Judge. Vol. 1, 1909, p. 156. Describes a crude and inaccurate sampler at the Daly-West mill.

569. _____ . Ohio copper mill, Utah. Vol. 1, 1909, p. 164. Description of tester-box sampler.
570. Mines and Minerals. Automatic coal sampler. Vol. 31, 1910-11, p. 85.
571. _____ . Mechanical laboratory sampler. Vol. 35, 1911, p. 1023. Describes a machine having a series of hoppers.
572. _____ . Scientific study of copper deposits. Vol. 31, 1911, pp. 654-656. Describes graphic method for deducing whether work in progress is a true drift or is crosscutting the vein.
573. Mining and Engineering World. An Oregon sample grinder. Vol. 38, 1913, p. 21. Description and drawing of a simple ore grinding device used in Oregon.
574. _____ . Clift's automatic ore sampler. Vol. 42, 1915 p. 93. Description and view of machine for crushing and sampling ore.
575. Mining and Scientific Press, (anonymous). Apparatus for sampling ores. Vol. 31, 1875, p. 129.
576. _____ . Automatic ore sampling. Vol. 75, 1897, p. 521. The Bridgman machine.
577. _____ . Colorado Pitchblende Co. Vol. 118, 1919, p. 412. Selection or accurate sampling?
578. _____ . Dodge sampling machine. Vol. 62, 1891, p. 193. Illustrated description.
579. _____ . Flow-sheet of Independence mill, Cripple Creek, Colo. showing sampling plant. Vol. 118, 1919, p. 374.
580. _____ . Foster-Coolidge automatic sampling machine. Vol. 84, 1902, p. 337. Apparatus described compared with hand sampling.
581. _____ . Good form of sampling pick. Vol. 92, 1906, p. 21. Brief description and drawings.
582. _____ . Hints to speculators and mine investors, vol. 123, 1921, p. 127. Hint 14, as given in a Cornish publication of 1857, warns people that samples submitted may not be from the mine under discussion.
583. _____ . Idlewild sampler. Vol. 74, 1897, p. 432. Gives brief description and drawings of a tailings sampler used at Idlewild or Taylor mine, Cal.
584. _____ . Improved automatic tailing sampler. Vol. 84, 1902, p. 317. Description of device for cutting out samples of tailings that are sluiced from the mill.

585. _____ . Inaccuracies in mill sampling. Vol. 91, 1905, p. 20. Discussion of causes of errors.
586. _____ . Lead smelting. Vol. 52, 1886, p. 7. Discusses sampling and buying of ore.
587. _____ . Method of arranging mine samples. Vol. 79, 1899, p. 4. Criticizes Bancroft's "foot-ounce" method of valuation.
588. _____ . Methods at a Colorado sampler. Vol. 76, 1898, p. 564.
589. _____ . Mill samples. Vol. 40, 1884, p. 352. Discusses methods of sampling silver ore.
590. _____ . Mine owners' sampling. Vol. 73, 1896, p. 234. Condemns inaccurate sampling by mine-owners.
591. _____ . Mine sampling. Vol. 37, 1903, p. 78; vol. 92, 1906, p. 102. Discusses methods of sampling.
592. _____ . Mine sampling again. Vol. 118, 1919, p. 448. General discussion of subject, and conclusion that mining is selective, but sampling is non-selective.
593. _____ . Notes on mine sampling. Vol. 89, 1904, p. 55. Gives advice and suggestions on mine sampling.
594. _____ . Permissible explosives. Vol. 122, 1921, p. 96. Samples submitted to Bureau of Mines for test must be representative.
595. _____ . Prospecting. Vol. 123, 1921, p. 82. Editor's note in discussion suggests that a 'sample' be taken, not a 'specimen'.
596. _____ . Salting of mines. Vol. 121, 1920, p. 183. How an entire mining town aided in salting an engineer's samples.
597. _____ . Sampling a drill-hole by dynamiting. Vol. 111, 1915, p. 975. Brief description.
598. _____ . Sampling and assaying. Vol. 94, 1907, pp. 336, 461, 462. Letters discussing errors in mine valuation.
599. _____ . Sampling and averaging ores. Vol. 87, 1903, p. 414. Advises daily sampling in working a mine and the keeping of sample records.
600. _____ . Sampling large low-grade orebodies. Vol. 114, 1917, pp. 293, 469, 719, 791, 792, 906; vol. 115, 1917, pp. 5, 113, 115, 301, 379, 451, 453. Editorials and discussions of methods of mine sampling and of mines that cannot be sampled.

601. _____ . Sampling auriferous quartz. Vol. 60, 1890, pp. 281, 287. Describes methods of sampling and testing gold quartz.
602. _____ . Sampling auriferous concentrates. Vol. 63, 1891, p. 234.
603. _____ . Sampling gold quartz. Vol. 71, 1895, p. 117. Describes test for determining quantity of gold mechanically combined with auriferous vein matter.
604. _____ . Testing ores. Vol. 72, 1896, p. 145. Describes crushing and quartering method at mines.
605. _____ . Two styles of tailing samplers. Vol. 86, 1909, p. 379. Describes briefly two automatic samplers.
606. _____ . A neat device for sampling screenings. Vol. 103, 1911, p. 595. Below a screen is a slotted one-inch pipe which catches some material passing thru the screen.
607. _____ . Valuation of mines; editorials, vol. 122, 1921, pp. 379 and 486. Sampling 7 old Comstock mines and proposed operations; and difference between sampling and mining.
608. Mining Journal. Robeson's continuous automatic sampler for stamp batteries. Vol. 76, 1904, p. 475. Description of sampler.
609. Mining Magazine. Sampling and estimating Messina copper ore reserves. Vol. 13, 1915, pp. 320-321. Describes face sampling and car sampling in the Transvaal.
610. _____ . Selling tin concentrate. Vol. 6, 1912, pp. 25-26. Mentions some peculiarities of the Cornish system of sampling tin ores.
611. Mining Reporter. Notes on sampling. Vol. 44, 1901, pp. 315, 423, 447, 465, 488, 513; vol. 45, 1902, pp. 99, 117, 156, 206, 249, 372, 314, 337, 362, 408. Discusses methods of sampling and describes in detail several sampling machines.
612. _____ . Procedure to be used in sampling and settling ores shipped to the U.S.R. Co. Vol. 53, May, 31, 1906, p. 533. Gives copy of sampling regulations issued by the company.
613. Mining Science. Fairchild tailings sampler. Vol. 64, 1911, pp. 279-280. Describes a sampler with vertical axis rotated by pump.
614. Mixer, C.T. Methods of sampling iron ore. Proceed. Lake Superior Min. Inst., vol. 4, 1896, pp. 27-33. Describes methods of sampling used by four companies.
614. (a) Moline, A.H.P. Calculating percentage of recovery in concentration. Min. and Sci. Press, vol. 117, 1918, p. 152. Accuracy of calculations depends upon reliable sampling of feed and tailing.

5. Monahan, F.W. Device for sampling zinc-box solutions. Eng. and Min. Jour., vol. 89, 1910, p. 551. Describes siphoning a sample of cyanide solution with a bottle and a cotton wick.
6. Montanistischen vereinirn Erzgebirge Geitschrift. Musterentnahme von Erzen. (Taking samples of ores) Dec. 1, 1912, p. 461.
7. Moore, M.S. Report on the Blue Tier tin-field, Tasmania. Suppl. No. 1, Proc. Australia Inst. Min. Eng., Dec. 30, 1912.
8. Morgan, J.C. and Barrett, E.P. A chemical laboratory. Min. and Sci. Press, vol. 120, 1920, p. 300. Plan of Bureau of Mines laboratory at Salt Lake City, showing place for samples.
9. Morgan, P.G. Difficulties and errors in sampling ores of gold and other metals. New Zealand Mines Record, vol. 6, Oct. 16, 1902. Gives directions for sampling.
20. Moses, F.G. Sampling of churn-drill prospect holes. Eng. and Min. Jour., vol. 100, 1915, pp. 301-304. Discusses difficulties with dart-valve boilers, through foreign rock getting into sludge, and precautions to be observed in drying samples. Describes splitter for reducing samples automatically.
21. Moss, H.W. Sampling and weighing lead ores. ^{Aust.} Trans. Inst., vol. 8, 1901, p. 92. Describes methods in use at Broken Hill, Australia.
23. Muir, D.D. Sampling low-grade ore on a large scale. Min. and Sci. Press, vol. 111, 1915, pp. 737-741, comment p. 730. Describes and compares automatic sampling and the concentrate method used on gold ore in Alaska.
24. Munroe, H.S. Losses in copper dressing in Lake Superior district. Trans. Amer. Inst. Min. Eng., vol. 8, 1879, pp. 409-451. "Sampling of sands, assays, etc", pp. 420.
25. _____ . Mine sampling and valuation. Min. and Met. Soc. Am., Bull. 44-45, 1912, pp. 116-122; Min. and Sci. Press, vol. 105, 1912, pp. 18-Eng. and Min. Jour., vol. 93, 1912, pp. 1276-1277. Discusses methods and problems.
26. _____ . Sampling mine dumps. School of Mines (Columbia) Quarterly, vol. XXIX, April, 1908, p. 233. The natural sizing of ore on dumps, and sinking sampling shafts lined with corrugated iron.
27. Murray, C.B. Need of uniform methods of sampling Lake Superior iron ore. Trans. Am. Inst. Min. Eng., vol. 50, 1914, pp. 204-210, discussion 210-230. Describes various methods and suggests a method for sampling cars.
28. Myers, Wilber. Grading iron ores. Eng. and Min. Jour., vol. 97, 1914, pp. 1203-1205. Describes daily sampling of ore at the mine.
29. Naething, F.S. Diamond drilling at the Miami mine, Arizona. Eng. and Min. Jour., vol. 97, 1914, pp. 1039-1041. Describes sampling and recording methods.

630. Nagel, O. Layout, design, and construction of chemical and metallurgical plants. 1911, 206 pp. Describes sampling mill, pp. 63-64, and discusses layout, design and construction of sampling plants, pp. 62-63.
631. Nason, A.A. Sampling ores from Cobalt mines. Eng. and Min. Jour., vol. 92, 1911, p. 1144; vol. 92, 1911, p. 51. Criticizes article by F.W. Pugsley.
632. Newberry, A.W. Drill-hole samples in raising. Eng. and Min. Jour., vol. 97, 1914, p. 709. Describes methods in sampling a mine by drilling into a raise.
633. Newhouse, E.L. Ore sampling and buying in Mexico. Eng. and Min. Jour., vol. 49, 1890, p. 535. Describes method of sampling at mines.
634. Nichols, H.G. A pulp-stream sampler. Eng. and Min. Jour., vol. 97, 1914, p. 19.
635. _____. Treatment of tin ores in Cornwall. Trans. Inst. Min. and Met., vol. 23, 1913-14, pp. 85-100. Describes an improvement on the Elmore sampler, p. 95-96.
636. Nicholls, H.E. A method of testing alluvial deposits. Trans. Inst. Min. and Met., vol. 14, 1905-06, pp. 195. Describes method of testing large alluvial flats for gold.
637. Nissenson, - Bleierzbemusterung. (Sampling lead ore) Chemiker-Ztg., Jahr. 37, 1913, p. 1136. Describes methods of reducing size of samples for different kinds of ore.
638. North, W.O. Milling at United Eastern, Arizona. Bull. 152, Aug. 1919, A. I. M. & M. E., p. 1189. Sampling methods from feed to residue. Cost is 4/10 of 1 cent per ton.
639. Oates, J.H. Battery feed sampler. Eng. and Min. Jour., vol. 89, 1910, p. 1005. Describes a machine with a sheet-iron box on a swinging arm, and hinged bottom opened by tripper at receiver.
640. O'Brien, T.F. The Koering process. Min. and Sci. Press, vol. 122, 1921, p. 523. Samples of gold ore said not to yield gold by assays.
641. Oke, A.L. A crude but efficient sampler, Eng. and Min. Jour., vol. 37, 1909, p. 290. Describes and gives views of machine.
642. _____. Cutting floor samples. Eng. and Min. Jour., vol. 97, 1914, pp. 950-951. Describes and gives figures showing device to catch flying pieces.
643. _____. Keeping records of mine sampling. Mex. Min. Jour., vol. 19, 1911, pp. 213-215. Describes methods adapted to sampling vein formations.
644. _____. New sampling device. Eng. and Min. Jour., vol. 86, 1908, p. 122. Describes a device with a set of sloping riffles, like Haultain's.

645. _____ . Office records of mine sampling. Mex. Min. Jour., vol. 12-13, 1911, pp. 30-31. Describes forms and methods used with native assistants on silver and gold-silver veins in Argentina.
646. _____ . Riffle for reducing samples. Eng. and Min. Jour., vol. 97, 1914, p. 620. Describes a portable sampling riffle.
647. _____ . Sample catcher for backs. Eng. and Min. Jour., vol. 98, 1914, pp. 1096-1097. Describes canvas bag used when sampling the back of a working, in order to prevent loss of any material broken.
648. _____ . A sample crusher. Eng. and Min. Jour., vol. 91, 1911, p. 558. Describes and illustrates home-made crusher for mine samples.
649. _____ . Aids to the Engineer. Min. Mag., vol. 10, 1914, p. 370. Discusses sampling stopes in South America.
650. Oldfield, F.W. A sampler. Min. and Sci. Press, vol. 95, 1907, p. 807. Describes a sampler for wet sand.
651. Olver, J.S. Rand sampling practice. Abstr. Min. and Sci. Press, vol. 97, 1908, pp. 674-675. Describes various methods.
651. (a) Odernheimer, E. Sampling calcium carbide. Chemiker Zeitung, vol. 26, 1902, p. 703. The composition is variable, due to unconverted lime and coke. A drum should be emptied on a metal plate, and after the dust is distributed evenly, take two 1-lb samples. Lots of 100 drums may be sampled by drawing from each tenth drum. A respirator should be worn during this work.
652. Orthey, Max. Probenahme and Analyse der Proben auf Eisenhüttenwerken. (Sampling and analysis of iron samples in blast-furnaces) Metallurgie, vol. 4, 1907, pp. 286-277.
653. Pacific Coast Miner. An automatic sand sampler. Vol. 15, 1909, p. 96.
653. (a) Packard, G.A. Sampling and estimation of ore, vol. 76, 1903, p. 116. Effect of high and barren assays upon averages.
654. Packer, O.H. How mines should be examined. Eng. and Min. Jour., Vol. 70, 1900, pp. 457-458. Discusses sampling methods and gives instructions for examining and sampling a mine.
655. Palmer, C.S. An experience in sampling. Mining Reporter, vol. 50, July 28, 1904, p. 85. Discusses effect of fineness of sample.
656. _____ . Notes on sampling. Eng. and Min. Jour., vol. 80, 1905, p. 405. Presents difficulties of sampling.
657. Park, James. Mine-sampling and ore-valuation. New Zealand Mines Record, vol. 8, Mar. 16, 1905, p. 328. Discusses equipment, record of samples, sampling ore, assaying, sampling dumps and tailings, and salting of mines.

658. Parker, E.W., Holmes, J.A., and Campbell, M.P. Report on operations of the government coal-testing plant at the Louisiana Purchase Exposition, St. Louis, Mo. 1904. U.S. Geol. Surv. Prof. Paper 48, 1906, 3 vols. Discusses commercial value of coal-mine sampling, pp. 142-155.
659. Parker, R.A. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 4. Danger in mixing damp samples on canvas; a specific instance of wide difference in assays. Discussion of W.L. Austin on same point, p. 116.
660. _____. Sampling large low-grade orebodies. Min. and Sci. Press, vol. 114, 1917, p. 903. Gives suggestions for sampling gold deposits.
661. Parmelee, H.C. Cyanidation of low-grade sulphide ores in Colorado. Met. and Chem. Eng., vol. 13, 1915, pp. 421-425. Describes sampling plant.
662. _____. Some assay results from re-sampled ores. Western Chem. and Met., vol. 1, 1905, pp. 152. Ascribes the lowering of value in re-sampling to loss of dust carrying high metal content.
663. Parr, S.W. Chemical study of Illinois coals. Ill. Geol. Surv., Bull. 3, 1916, 86 pp. Gives methods of field sampling, pp. 11-26.
664. _____. Principles of coal sampling. Sci. Am. Suppl., vol. 50, 1915, pp. 15-16.
665. Parsons, A.B. Nevada Consolidated Copper Co.. Min. and Sci. Press, vol. 122, 1921, p. 525. Sampling and estimating the deposit from churn-drilling.
666. _____. Operations of the Engels Copper Mining Co., Calif. Min. and Sci. Press, vol. 123, 1921, pp. 189 and 193. Flow-sheet of mill shows position of three samplers, which are described as being automatic of the swinging type. They take samples of feed, concentrate, and tailing and are very reliable.
667. _____. Sampling at Garfield smelter. Min. and Sci. Press, vol. 122, 1921, p. 17. Description of how concentrate is sampled.
667. (a) Parsons, L.A. Mill-tests v. hand-sampling. Min. and Sci. Press, vol. 115, 1917, pp. 781-782. Discusses advisability of using Webber's plan for checking hand sampling by mill-test.
667. (b) _____. Sampling an erratic orebody. Min. Mag., vol. 13, 1915, pp. 151-154; Min. and Sci. Press, vol. 114, 1917, pp. 724-726, 908-910. Describes methods and discusses principles.
668. Paterson, G.S. Prospecting for alluvial tin in Nigeria. Min. Mag., vol. 12, 1915, pp. 33-41. Discusses pit and drill sampling and gives figures showing sampling method and apparatus.
669. Patterson, B.G. and Thomas, G.A. Mount Morgan (Queensland) practise of estimating ore reserves. Trans. Aust. I. M. E., vol. 15 (1), 1911, p. 301. Sampling of certain blocks of ground done at night, and assayed next day, thus keeping a close check on milling.

670. Pead, C.H. An automatic sampler for tailing, sand, and slime. Proc. Chem. Met. and Min. Soc. S. Africa, vol. 3, 1902-03, pp. 360-361; Min. and Sci. Press, vol. 86, 1903, pp. 410-411; Min. Jour., vol. 73, 1903, p. 266. Describes a sampler run by water.
671. Pearce, J.A. Ore sampling at a custom mill. Eng. and Min. Jour., vol. 104, 1917, p. 66. Describes methods at the Argo mill.
672. Pearce, S.H. Some notes on mine surface sampling. Min. and Sci. Press, vol. 79, 1899, pp. 516, 549; Mines and Minerals, vol. 20, 1900, pp. 391-394. Discusses methods.
672. (a) Peele, Robert. Mining Engineers' Handbook, 1st. ed. 1918, pp. 2375. In 7 sections, by 7 engineers, are notes on sampling orebodies and mill products.
673. Pelton, E.F. A system of mine sampling. Eng. and Min. Jour., vol. 94, 1912, pp. 403-404. Describes method of close sampling in use at Morenci, Ariz.
673. (a) Percy, John. Metallurgy - silver and gold, part I, 1880, pp. 698. Sampling of silver ores described, p. 241.
674. Perret, L.A. Russian placer mining. Min. and Sci. Press, vol. 122, 1921, p. 457. Pit and drill sampling.
675. Peters, E.D. Modern copper smelting. 1895, 642 pp. Discusses sampling, pp. 30-41.
676. _____. The practice of copper smelting. 1911, 693 pp. Discusses sampling of copper ores, pp. 8-20.
677. Pierce, A.R. Sampling large low-grade orebodies. Min. and Sci. Press, vol. 119, 1919, p. 396 and 558. Discussion of mill tests and hand sampling.
678. Pope, G.S. Directions for sampling coal for shipment or delivery. Tech. Paper 133, U.S. Bureau of Mines, 1917, 15 pp. Summarizes U.S. Bureau of Mines Bull. 116.
679. _____. Methods of sampling delivered coal and specifications for the purchase of coal for the Government. U.S. Bureau Mines Bull. 116, 1916, 64, pp. Describes more fully the methods given in U.S. Bureau of Mines Bull. 63.
680. _____. Sampling coal deliveries, and types of government specifications for the purchase of coal. U.S. Bureau Mines Bull. 63, 1913, 68 pp. Describes in detail the methods of sampling and the reasons therefor; gives new specifications for the purchase of coal by the Government.
681. Poston, R.H. Carrier for mill sample pans. Eng. and Min. Jour., vol. 108, 1917, p. 402. A wooden cabinet 24 in. high with 9 shelves is used.

682. Power, F. Danvers. Sampling ores on the west coast of Tasmania. Trans. Australian Inst. Min. Eng., vol. 3, 1895, p. 237. Describes business methods.
683. Power. Collecting and preparing samples of coal deliveries. Vol. 43, 1916, p. 864. Discusses and illustrates quartering.
684. Power and the Engineer. Sampling and analysis of coal. Gives methods of sampling and testing used by the technologic branch of the U.S. Geol. Survey. Vol. 31, 1909, pp. 477-480.
695. Price, G.W. The Cananea ore-bedding system. Min. and Sci. Press, vol. 119, 1919, p. 669. Sampling mixed copper ores, and the cost.
686. Prutzman, P.W. Petroleum in Southern California. State Mining Bureau Bull. 63, 1913. Selection and analyses of samples.
687. Pugsley, F.W. Sampling ores from Cobalt mines. Eng. and Min. Jour., vol. 91, 1911, p. 776; vol. 92, 1911, p. 5. Discussion, vol. 91, 1911, p. 1144; vol. 92, 1911, pp. 5, 51.
688. Pulsifer, H.B. Ore-sampling in Montana. Min. and Sci. Press, vol. 121, 1920, pp. 866. A study of custom ore-sampling plants in Montana, fully illustrated. Editorial comment on p. 860.
688. (a) Purington, C.W. Estimates of ore in a mine. Eng and Min. Jour., vol. 75, 1903, p. 552. Discussion of G.E. Collin's note. Consideration of the system of ore-shoots in a mine, as opened, of importance.
688. (b) _____ . Gravel and placer mining in Alaska. U.S. Geol. Survey Bull. 263, 1905, p. 273. Necessity for sampling discussed pp. 42 and 83.
689. Pye, A.M. Methods of sampling. Australian Min. Standard, vol. 39, 1906, p. 249. Describes rather crude methods used in Australia.
690. Radford, W.J. Methods of testing placer gravels. Min. and Sci. Press, vol. 109, 1914, pp. 5 and 221. Sampling by panning, shafts, and drills.
691. Raht, A. Distribution of silver in lead bullion and the different methods of sampling. Min. Ind., vol. 3, 1894, pp. 414-418. Describes methods in the United States and advocates dip-samples.
692. Ransome, F.L. Copper deposits of Ray and Miami, Arizona. U.S. Geological Survey P.P. 115, 1919, pp. 192. Importance of correct sampling of disseminated copper ores (p.92.)
693. Rattle, W.J. and Son. Cargo sampling of iron ores received at Lower Lake ports - including the methods used in the analysis of the same. Lake Superior Min. Inst. vol. 11, 1905, pp.173-180; Eng. and Min. Jour., vol. 80, 1905, pp. 824-825; Mines and Minerals, vol. 26, 1906, pp. 318-319; Iron age, vol. 76, 1905, p. 1162; Iron Trade Rev., vol. 38, no. 42, Oct. 19, 1905, pp. 28-29.

694. Rawlins, S.L. Sampling mine dumps. Min. and Sci. Press, vol. 97, 1906, p. 120. Describes methods used on old Spanish dumps.
695. Raymond, R.E. Sampling large low-grade orebodies. Min. and Sci. Press, vol. 115, 1917, p. 301. Describes mines in Missouri that can not be sampled.
695. (a) Read, T.T. The Mason Valley Copper Smelter, Nevada. Min. and Sci. Press, vol. 105, 1912, p. 267. Describes sampling of ore.
696. Reed, S.A. More remarks on ore sampling. Sch. Mines Quart., vol. 3, 1882, p. 253; vol. 6, 1884-85, pp. 351-358; Min. and Sci. Press, vol. 45, 1882, p. 9. Illustrates split-shovel and riffle-shovel sampler with fixed scoop and some types with moving scoops.
697. Reinecke, L. and Clark, K.A. Sampling deposits of stone and gravel in the field. Proc. Am. Soc. Testing Materials, vol. 18, part 2, 1918, p. 393. Methods for sampling and testing rock for concrete.
698. Reyburn, S.W. and Zimmerman, S.H. Diamonds in Arkansas. Eng. and Min. Jour., vol. 109, 1920, p. 983. In sampling Arkansas Diamond Corp. property in Pike County, 120,000 tons of rock and clay is to be milled and washed.
699. Reynolds, O.J. Sampling a difficult ore. Cal. Jour. of Technology, vol. 5, no. 1, 1905, p. 39. Describes car load sampling of ore carrying gold, silver, lead, and zinc.
700. Rice, C.T. Grab sampling in stopes. Eng. and Min. Jour., vol. 92, 1911, p. 741. Describes accurate methods of taking grab samples.
701. _____ . Sampling practice at Independence mill. Eng. and Min. Jour., vol. 107, 1919, p. 641. Describes appliances used.
702. Rice, E.R. Churn-drilling of disseminated copper. Eng. and Min. Jour., vol. 111, 1921, p. 1058; and vol. 112, 1921, p. 11. Sampling and assaying the sludge.
702. (a) Rice, G.S. and others. First series of coal-dust explosion tests in the Experimental Mine. U.S. Bureau of Mines Bull. 56, 1913, p. 113. Method of sampling afterdamp and other gases, pp. 38, 54, 107.
703. Rice, J.H. Methods of sampling ore in place. Min. and Sci. Press, vol. 97, 1908, p. 382. Criticizes inadequate methods and advises the sampling of each streak.
704. Richards, R.H. Ore dressing. 1st. ed. 1909, 4 vols., 2052 pp. "Samplers", vol. 2, pp. 845-852; vol. 3, pp. 1570-1578.
705. _____ . Text book of ore dressing. 1st. ed. 1909, 702 pp. Discusses difficulties of sampling, compares hand and machine sampling, discusses taking moisture samples, size of samples, limits to machine sampling; describes and compares the Vezin, the Snyder and the Brunton samplers, pp. 430-435.

705. (a) Rickard, Forbes. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 921. Sampling of a sampling, or checking the average of a number of samples by sampling the quarterings.
706. Rickard, T.A. Bunker Hill enterprise, Idaho. Min. and Sci. Press, vol. 120, 1920, pp. 489 and 527. Flow-sheets showing position of samplers at the lead mill.
707. _____. Bunker Hill smelter, Min. and Sci. Press, vol. 122, 1921, p. 47. Sampling mill at lead smelter.
708. _____. Old Mexican workings and some remarks on sampling. Min. and Sci. Press, vol. 94, 1907, pp. 433-435. Describes methods of sampling, buying, and selling among the Mexicans.
709. _____. Re-opening old mines on the Mother Lode, Calif. Min. and Sci. Press, 113, 1916, pp. 238 and 240. Flow-sheet shows position of sampler in mill; and notes on sampling practise.
710. _____, and Others, under own names. Sampling and Estimation of Ore in a Mine. 5th impression, 1907, p. 222. A symposium on mine sampling by 27 engineers. Reprint from Eng. and Min. Jour., vols. 75, 1903; 76, 1903; 77, 1904.
710. (a) _____. Sampling and estimation of ore in a mine. Eng. and Min. Jour., vol. 75, 1903, pp. 213, 254, 290, 362, 438, 515, 555, 590, 626, 662; vol. 76, 1903, pp. 305, 345, 498. The whole subject lucidly discussed. Following these were the views of 26 engineers, which were reprinted in Sampling and Estimation of Ore in a Mine, 1904. A review of the symposium by T.A. Rickard in vol. 76, 1903, pp. 305, 345, 498, 730, and also re-printed.
710. (b) _____. Stamp-milling of gold ores. 2nd. ed., 1898, p. 260. Automatic sampler described on p. 50, and the lack of regular sampling discussed on 94 and 241.
711. _____. Utah Copper enterprise. Min. and Sci. Press; vol. 117, 1918, p. 477, sample plan of ore deposit; p. 716, automatic sampler in the mill; p. 853, sampling flotation concentrates.
712. _____. Valuation of mines. Min. and Sci. Press, vol. 106, 1913, pp. 766-771. Gives advice to the young mining engineer.
713. Ricketts, L.D. Constant errors in sampling and assaying. Min. Mag., vol. 4, 1911, p. 127. Eng. and Min. Jour., vol. 90, 1910, p. 316. Discusses errors not dependent on the doctrine of chance, in sampling porphyry copper deposits, for instance.
714. Reifsnyder, S.K. Some experiments on sampling quartation. Jour. Am. Chem. Soc., vol. 15, 1893, pp. 260-265. Describes mixing shot, ore (magnetite) and glass and dividing after mixing by inquantation to determine the error with both dry and wet material.

715. Riley, L.F. New simple device for sampling. Jour. Soc. Chem. Ind., vol. 38, 1919. A tapered tube is used for catching dust.
716. Robbins, H.R. Chart for tonnage-sampling and dilution-control. Min. and Sci. Press, vol. 116, 1918, p. 584. Gives chart for determining dry-tonnage per 24 hours, percentage of solid in wet pulp and specific gravity of dry ore in wet pulp.
717. Roberts, G.M. Experiments in sampling silver-lead bullion. Trans. Am. Inst. Min. Eng., vol. 28, 1899, pp. 413-427. Discusses sampling bars from the liquation furnace and bars from the lead kettles, gouge and chip-sampling, distribution of silver in the bar, and loss of lead by volatilization.
718. Roberts, H.M. Progress in methods of exploration. Min. and Sci. Press, vol. 119, 1919, p. 55. A good diamond-drill sample is superior to any other ore sample.
719. Robey, Lloyd. Methods of taking mill-head samples. Min. and Sci. Press, vol. 109, 1914, pp. 183-184. Discusses difficulties.
720. Rogers, A.H. and Van Wagenen, H.R. Chilean nitrate industry. Trans. Am. Inst. Min. Eng., vol. 59, 1917. Discusses prospecting and sampling, p. 11-12.
721. Rogers, A.P. Dredging and the sampling of placer ground. Eng. and Min. Jour., vol. 89, 1910, pp. 561-562. gives details of sampling gold ore.
722. Rogers, G.S. Helium-Bearing Natural Gas. U.S. Geol. Survey, P.P. 121, p. 113, 1919. sampling and tests of gas for helium.
723. _____ . Sunset-Midway Oilfield, California. U.S. Geol. Survey, P.P. 117, p. 103, 1919. Sampling oil and water, pp. 15 and 52.
724. Roller, A.H. and Curran, H.T. Cyaniding sulphide ores at the Argo Mill, Idaho Springs, Colo. Mex. Min. Jour., vol. 18, 1914, pp. 204-208. Describes mill and sampling methods.
725. Rollin, G.S. Improved sludge box for diamond drilling. Eng. and Min. Jour., vol. 97, 1914, p. 660. Describes and gives sketch of box for catching samples.
726. Root, J.W. Sampling base bullion. Western Chem. and Met., vol. 1, 1905, p. 221; Mining Reporter, vol. 53, 1906, p. 129. Discusses sampling base bullion by punching, sawing, dipping from the kettle, and casting from the molding siphon. The rate at which different sections of the bars cooled, showed distribution of silver.
727. Roper, L.S. Valuing partly exhausted mines. Min. and Sci. Press, vol. 122, 1921, p. 667. How sampling sometimes does not indicate value of a mine.
728. Rose, Hugh. Santa Gertrudis mill, Pachuca, Mexico. Bull. Am. Inst. Min. Eng. 1916; abstr. Eng. and Min. Jour., vol. 102, 1916, pp. 247-253. Describes sampling of ore, p. 247, and gives plan of breaking and sampling plant.

728. (a) Rose, T.K. Metallurgy of gold, 6th. ed., 1915, p. 601. Numerous references to sampling.
729. Ruhl, Otto. Rock-dust sampler. Eng. and Min. Jour., vol. 99, 1915, p. 238. Describes apparatus used by the Bureau of Mines.
730. Rzehulka, A. Sampling and valuation of ores. Min. Jour., vol. 97, 1912, p. 668; abstr. from Montanistische Rundschau, April 16, 1912. Describes methods of sampling ore in mines and in carloads.
731. Saint-Smith, E.C. Big Wonder syndicate's auriferous lodes. Queensland Gov. Min. Jour., vol. 16, 1915, pp. 211-215. Report of examination of mine. Describes the sampling of ore in place.
732. . Mount Mascotte gold mine, Australia. Queensland Gov. Min. Jour., vol. 16, 1915, pp. 320-322. Report of examination of mine.
733. Sale, A.J. Drilling and analysis of copper ores. Eng. and Min. Jour., vol. 102, 1916, pp. 87-90; criticism, p. 231. Discusses errors that may occur from the usual methods of figuring averages from churn-drill hole samples and the application of the law of compensating errors. Comments on assaying of churn-drill samples.
733. (a) Sampling and Estimation of Ore in a Mine, by T.A. Rickard and 26 other. 1st. ed., 1904, p. 222. 5th impression, 1907. Reprint of articles in Eng. and Min. Jour., vols. 75, 1903; 76, 1903; 77, 1904. Reference numbers to contributors are 26 a; 40 a; 48; 90; 126; 128 a; 157; 167 a; 167 b; 184; 336 a; 342 a; 428 a; 499 a; 505 a; 513; 546 a; 567 a; 653 a; 658; 688 a; 705 a; 710 a; 773 a; 794 a; 822 a; 862 a.
734. Sampling, definitions of A.H. Fay, Bull. 95, U.S. Bureau of Mines, 1920, p. 589.
735. Schuette, C.N. Sampling and estimation of quicksilver ore. Min. and Sci. Press, vol. 122, 1921, p. 293. Ordinary groove samples unsuitable for cinnabar, but pan samples are reliable.
736. Scientific American. When coal is not coal until it is analyzed. Vol. 116 1917, p. 555. Describes and gives view of a machine for pulverizing coal and taking a sample.
737. Scobey, Jesse. La Luz and Los Angeles mine, Nicaragua. Eng. and Min. Jour. vol. 110, 1920, p. 6. Sampling a peculiar gold ore deposit.
738. . Ore sampling without machinery. Met. and Chem. Eng., vol. 11, 1913, pp. 83-86. Explains and illustrates hand sampling.
739. . Sampling mill work. Min. and Sci. Press, vol. 83, 1901, p. 119. Discusses methods for determining the per cent of extraction in which samplers are used.
740. Scott, C.E. Commercial sampling of coal. Mines and Minerals, vol. 33, 1912-13, pp. 199-201. Discusses precautions necessary to secure an accurate sample.

41. _____ . Mechanical coal sampler. Mines and Minerals, vol. 31, 1910-11, p. 169-170. Describes and gives plan of sampler.
42. Semple, C.C. A Steam Sample drier. Eng. and Min. Jour., vol. 91, 1911, p. 799. Describes a steam-jacket sample drier.
43. _____ . Dewatering slime samples. Eng. and Min. Jour., vol. 91, 1911, p. 407. Describes a small wooden filter for dewatering slime samples.
44. _____ . Sampling ores containing metallics. Eng. and Min. Jour., vol. 82, 1906, p. 362. Discusses method.
45. Sen, Janshi. Valuing placer ground. Min. and Sci. Press, vol. 122, 1921, p. 704. Discusses placing of drill-holes and calculating results.
46. Separk, E.A. Some aspects of the analyzing and grading of iron ores of the Gogebic Range. Trans. Lake Superior Min. Inst., vol. 10, 1904, pp. 103-117; discussion, pp. 117-126. Describes methods of sampling used.
47. Seyler, C.A. Composition and analysis of coal. Practical Coal Mining. 1908, vol. 1, pp. 72-73. Discusses sampling coal at a mine or in trucks for analysis.
48. Sewell, F.W. Mining and metallurgy of copper, silver, lead, and zinc. Trans. Aust. Inst. M. E., vol. XII, 1907, p. 108. Flow-sheet of Wallaroo and Moonta mill shows position of sampler.
49. Sharpless, F.F. Mill-tests v. hand-sampling. Min. and Sci. Press, vol. 115, 1917, p. 638. Discusses methods.
50. Sharwood, W.J. A note on sampling. Jour. Ind. and Eng. Chem., vol. 4, 1912, pp. 227-229. Discusses possible errors in sampling.
51. _____ . Measurement of pulp and tailing. Min. Mag., vol. 1, 1909, pp. 226, 297; vol. 2, 1910, pp. 45-53. Discusses measurement of sand in vats, capacity of filter-presses. Measurement of tonnage crushed in mills and flow measurements.
52. Shaw, A.M. A tailing sampling device. Eng. and Min. Jour., vol. 101, 1916, p. 223. Describes and illustrates an augur for sampling dry tailings.
53. Shaw, E.N. Discrepancies in cyanidation. Min. and Sci. Press, vol. 113, 1916, pp. 92-94. Discusses errors in sampling and in assaying.
54. Shaw, S.F. Combination method of mine sampling. Min. and Sci. Press, vol. 120, 1920, p. 629. Eight specific comparisons of mill tests with hand samples.
55. _____ . Mine sampling. Min. Mag., vol. 5, 1911, pp. 457-460. Describes method used in Costa Rica and gives stope assay-map of gold vein.

756. Shelton, G. L. Saited mines. Eng. and Min. Jour., vol. 96, 1913, pp. 111-114. Describes some unusual methods.
757. Shellshear, W. Flotation of gold-copper ore at Mt. Morgan, Queensland. Proc. Aust. I. M. E., No. 22, 1918, p. 58. Sampling 14 sections of products from a Wilfley table.
758. Shepard, F. E. Progress in mill design. Eng. and Min. Jour., vol. 93, 1912, pp. 543-547. Discusses automatic sampling.
759. Shimer, P. W. Device for sampling iron and other metals. Trans. Am. Inst. Min. Eng., vol. 30, 1901, pp. 321-323. Describes and gives figures showing device for taking samples from a pile of pig-iron.
760. Shimmin, J. T. Re-modeled Arizona Hercules concentrator. Eng. and Min. Jour., vol. 109, 1920, p. 1116. Flow-sheet shows position of 3 samplers which have 3 minutes between cuts.
761. Shiras, Tom. Bauxite mining in Arkansas. Eng. and Min. Jour., vol. 107, 1919, p. 1074. All orebodies are sampled as soon as found.
762. Simmons, Jesse. Trojan milling practice, South Dakota. Min. and Sci. Press, vol. 111, 1915, pp. 707-710. Describes method in automatic sampling and causes of error.
763. Simons, E. H. The accuracy of commercial samples and assays. Calif. Jour. of Tech., vol. 2, Nov. 1903, pp. 8-14; abstr. in Min. and Sci. Press, vol. 88, 1904, pp. 9 and 27. Discusses accuracy attainable in everyday sampling.
764. Simpson, G. Calculation of extraction in cyanidation. Eng. and Min. Jour. vol. 96, 1913, p. 1230. Discusses accuracy of motor-discharge sample and crushing in cyanide solution.
765. Simpson, Duncan. Sand sampling in cyanide works. Trans. Inst. Min. and Met., vol. 16, 1906-07, pp. 30-39; discussion, pp. 38-41. Describes and discusses eight methods used at the New Goch Gold Mine.
766. Sleeman, H. R. Mill tests v. hand sampling. Min. and Sci. Press, vol. 11, 1919, p. 415. Discussion of Morton Webber's paper in same Journal in 1918. Also vol. 119, 1919, p. 143 and p. 701, bulk v. hand samples; and in vol. 115, 1917, p. 563.
767. _____ . Sampling of mines. Min. and Sci. Press, vol. 121, 1920, p. 405. Sampling errors.
768. Small, F. H. Sampling and preparation of leather for analysts; Am. Leather Chem. Assoc. Chem. and Met. Eng., vol. 24, 1921, p. 1095. Methods described are applicable for sampling leather belting deliveries at mines or metallurgical plants.
768. (a) Smart, R. C. Coal-dust sampling and methods adopted in practice. South Wales (England) Inst. of Eng. March 1921, abstr. in Iron and Coal Trades Review, vol. 102, 1921, p. 753. Discussion of sampling coal dust in mines, with sketches. A vacuum cleaner is used in some cases to clear out crevices.

59. Smith, C.A. South-western Portland cement works; Eng. and Min. Jour., vol. 96, 1913, pp. 719-723. Describes hourly sampling of all the limestone crushed.
70. Smith, C.E. Some sources of error in the iodometric determination of copper. Met. and Chem. Eng., vol. 14, 1916, pp. 379-380. Discusses methods to obtain accurate samples.
71. Smith, E.A. Note on the sampling of gold alloys. Chemical News, vol. 93, 1906, pp. 225-226. Discusses scraping and cutting samples of gold alloys used by jewelers and goldsmiths.
72. _____ . Sampling and assaying the precious metals; in ores, bullion, and products. Discusses sampling of gold-silver alloys. 1913, 460 pp.
773. Smith, E.A. Coppelen. Sampling and testing the Chuquicamata orebody. Eng. and Min. Jour., vol. 97, 1914, pp. 1015-1016. Describes testing of drill-hole samples and selection of large samples for leaching tests.
773. (a) Smith, E.C. Mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 614. Claimed that hand sampling does not serve for mines, but taking out wheelbarrow loads and mill-tests will. Assaying is discredited.
774. Smith, F.D. Sampling ores for assay. Min. and Sci. Press, vol. 76, 1898, p. 492. Discusses inaccuracies of hand sampling.
775. Smith, H.D. Sampling low-grade orebodies. Min. and Sci. Press, vol. 114, 1917, p. 293. Discusses practicability of running mill tests on large bodies of low-grade gold ore.
776. Smith, M.B. Sampling coal deliveries. Elect. Ry. Jour., vol. 42, 1913, pp. 1242-1243. Compares five methods of R.O.M. sampling.
777. Smith, W.A.G. Sampling at Great Coban, Australia. Proc. Aust. Inst. M. E., No. 36, 1919; p. 75; abstr. in Min. Mag., vol. 23, 1920, p. 48. Twelve men, in six sets of two each, used a 7-lb. hammer and chisel-pointed steel to sample the copper ore. Two pounds per foot was taken. The paper covers sampling in all classes of workings, reduction of samples, recording, and plans.
778. Smoot, A.M. Mathematics of copper sampling. Eng. and Min. Jour., vol. 93, 1912, p. 1213. Comments on article by Edward Keller.
779. _____ . Sampling silver ore. Trans. Can. Min. Inst., vol. 17, 1914, pp. 239-250. Describes methods of sampling and assaying crude silver ore at Cobalt, Ontario.
780. Snelling, W.O. and Storm, C.G. Analysis of black powder and dynamite. Bull. 51, Bureau of Mines, 1913. How to sample sticks of dynamite and grains of powder, pp. 12 and 68.
781. Bohnlein, M.G.F. American tin-slag analysis. Eng. and Min. Jour., vol. 107, 1919, p. 576. Steps in assaying a sample of slag.

782. Somerhair, E.E. Moisture in coke. Mines and Minerals, vol. 28, 1907-08, pp. 430-431. Discusses importance of proper care of samples for analysis.
783. Sorley, D. Notes on sampling. Jour. Soc. Chem. Ind., vol. 13, 1894, pp. 975-976; Glasgow City Analysts' Soc. 1893-94, no. 4. Gives directions for sampling iron ore, pyrite residues, basic slag, pig iron, wood pulp, and sulphate of ammonia and of potash.
784. Spaulding, E.P. Mill-tests v. Hand-sampling. Min. and Sci. Press; vol. 1, 1917, pp. 301-302. Comment on article by Albert Burch.
785. Speak, S.J. Lead-zinc deposits at Broken Hill, northern Rhodesia. Min. Mag., vol. 21, 1919, p. 203. Sampling peculiar deposits by diamond-drill.
785. (a) Sperry, E.A. Investigation of Feather River Black sands, California. Min. and Sci. Press, vol. 105, 1912, p. 624. Sand bars or beaches were sampled by shoveling or pumping, and samples assayed in the field.
786. Stadeler, A. Sampling of ores and coal. Stahl and Eisen, vol. 38, 1918, pp. 25 and 51. Methods used in Sweden and United States.
787. Staley, H.F. and Beecher, M.F. Practical handling of Iowa clays with application of ceramic principles. Iowa State College, Bull. 43, Oct. 10, 1914, 48 pp. Describes proper way to sample prospects, pp. 6-7, 10.
787. (a) Stander, H.J. Mill and smelter methods of sampling. Arizona State Bureau of Mines, Bull. 26, 1915-16, p. 12. Advice to producers who ship ore to custom plants, and brief notes on hand and mechanical sampling methods.
788. Stanton, Horace. Mine samples as baggage. Min. and Sci. Press, vol. 114, 1917, p. 433. Argues that railroads should check mine samples as personal baggage.
789. Stead, J.E. Gas-testing and sampling apparatus. Jour. Soc. Chem. Ind., vol. 8, 1889, pp. 176-178. Describes method and apparatus for testing gas from fires for which coal or coke is the fuel.
790. _____. New form of gas sampler. Iron and Steel Journal, no. 1, 1884, pp. 187-189. Describes device for sampling blast furnace gases.
791. Steel, Donald. Valuing placer ground. Min. and Sci. Press, vol. 109, 1914, p. 845. Drill-hole sample calculations.
792. Steele, J.H. A model tramway and sampler. Eng. and Min. Jour., vol. 72, 1901, pp. 596-597. Describes mill and methods of sampling lead-silver ore at Park City, Utah.
793. Steinem, C. A solution meter. Eng. and Min. Jour., vol. 92, 1911, p. 675. Describes a meter to measure solutions and also in some case tailings and concentrates.

794. Sterner-Rainer, Roland. Mercury production at Almaden, Spain. Osterreich. Zeit. fur Bergund Hutten, vol. 62, 1914, p. 529. Abstr. in Chem. and Met. Eng., vol. 20, 1919, p. 32. Sampling cinnabar.
794. (a) Stevens, Blamey. Method of least squares as applied to mine sampling. Eng. and Min. Jour., vol. 76, 1903, p. 266. Calculations of ore reserves based on sampling.
795. Stewart, J.B. Presenting assay results by graphic method. Min. and Sci. Press, vol. 104, 1912, pp. 654-657. Gives practical advice on the form of reports of mine valuation.
796. Sticht, Robert C. Mining and smelting at Mount Lyell, Tasmania. Min. Ind., vol. 26, 1907, pp. 385-442. Describes sampling works and methods, p. 428.
797. Stockhausen, F. Liqutation in cyanide bars. Proc. Chem. Met. and Min. Soc. of S. Africa, vol. 2, 1897, pp. 46-50, discussion pp. 50-52. Compares dip, drilling and cutting samples and advocates dip.
797. (a) Storm, C.G. Analysis of permissible explosives. U.S. Bureau of Mines Bull. 96, 1916. On p. 12 is described the method of sampling dynamite cartridges.
798. Storms, W.H. Difficult mine sampling. Min. and Sci. Press, vol. 114, 1917, p. 361. In sampling soft and hard ore the former may salt the latter.
799. _____ . Errors in mine sampling. Min. and Sci. Press, vol. 103, 1911, p. 112. Comments on article by Morton Webber.
800. Stowell, E.G. and Coghill, W.H. Flotation of low-grade quick-silver ore. Min. and Sci. Press, vol. 120, 1920, p. 117. Preparing samples of cinnabar for assay.
801. Strauss, L.W. Chilean nitrate industry. Min. and Sci. Press, vol. 108, 1914, pp. 972 and 1014. Sampling caliche deposits and finished product.
802. Stromeyer, C.E. Coal sampling. Coll. guard., vol. 102, 1911, pp. 1125-1126. Discusses relation of size of sample to limit of error.
803. Stuckenberg, W.D. Triplicate sampling of coal. Power, vol. 44, 1916, pp. 612-614. Discusses accuracy of triplicate sampler and gives proper methods of filling cans for sampling.
804. Swain, P.W. Commercial sampling and analysis of producer gas. Trans. Am. Soc. Mech. Eng., vol. 38, 1916, pp. 961-977. Describes methods and apparatus, pp. 963-968.
805. Swart, W.G. Marking samples. Eng. and Min. Jour., vol. 79, 1905, p. 814. Suggests cutting sample number on small pieces of wood and enclosing with the sample.
805. (a) Taggart, A.F. Boring. Section 9 of Peele's Mining Engineers' Handbook, 1918, pp. 307-376. Details of all kinds of drilling and getting samples.

806. Taylor, J.H. Mechanical ore sampler. Eng. and Min. Jour., vol. 100, 1915, p. 229. Describes a device for daily sampling of small amounts of ore.
807. Taylor, L.H., jr. Salted drill samples of Ellipic Mine. Eng. and Min. Jour., vol. 96, 1913, pp. 269-270. Describes tests to discover salting.
808. Taylor, W.W. Sampling certain ores. Eng. and Min. Jour., vol. 63, 1897, p. 160. Describes method used in sampling jigged iron ore.
809. Text-book of Rand Metallurgical Practice. 1912, 2 vols. Treatises by various mining authorities; discusses "Sampling, grading and assays", vol. 1, pp. 79-81. "Sampling," vol. 1, pp. 168-170, 291-292, 334.
810. Textor, Oscar. Standard methods of sampling cargoes of iron ore. Proc. Lake Superior Min. Inst., vol. 13, 1908, pp. 231-233. Describes methods.
811. The Times, London, Engineering Supplement. Fuel sampling. Jan. 26, 1917.
812. Thomas, A.C. Ore sampling. Trans. Aust. Inst. Min. Eng., vol. 10, 1902, p. 276; Australian Min. Standard, vol. 30, 1904, p. 256. Discusses principles and suitable tools.
812. (a) Thomas, Kirby. Test drilling on the Mesabi iron range. Eng. and Min. Jour., vol. 75, 1903, p. 896. Diamond-drilling, sampling the sludge, placing holes.
813. Thompson, H. Notes on reduction of gold ores. Min. and Sci. Press, vol. 25, 1872, p. 274. Discusses sampling from stamps and dumps.
814. Thompson, R.W. Notes on sampling as practiced on the Rand. Can. Min. Jour. vol. 32, 1911, pp. 307-308. Describes methods of sampling gold ore.
815. Thomson, F.A. Metallics in sampling work. West. Chem. and Met., vol. 3, 1907, pp. 16-19. Abstr. in Eng. and Min. Jour., vol. 83, 1907, p. 845; and Jour. Chem. Met. and Min. Sec. S. Africa, vol. 7, 1906-07, p. 420. Shows difficulties of sampling ore containing metallics.
816. Thomson, H.N. and Sicka, L.T. Tococe plant of International Smelting and Refining Co. Trans. Am. Inst. Min. Eng., vol. 46, 1913, pp. 940-955; abstr. in Min. and Eng. World, vol. 39, 1913, pp. 291-293. Describes sampling mill, p. 941.
817. Thorne, W.E. Churn-drill sampling. Min. and Sci. Press, vol. 98, 1909, pp. 358-359; comment, p. 549. Discusses precautions to prevent errors in the samples; drill samples are unreliable for indicating gold, and should be checked by shafts.
818. Thornhill, E.B. Value of dredging ground. Min. and Sci. Press, vol. 109, 1914, p. 105. Placing of drill-holes for sampling, and calculations.
819. Thornton, Edward. Sampling low-grade orebodies. Min. and Sci. Press, vol. 114, 1917, pp. 469-470. Describes sampling with a stoper-drill.

20. Thurmond, F. LeRoi. The Swansea mill, Arizona. Min. and Sci. Press, vol. 120, 1920, p. 606. Sampling copper tailings.
21. Tracy, L.D. Mine-water neutralization plant at Calumet mine, Pa. Min. and Met., No. 161, 1920, p. 29. samples of water come from boreholes.
22. Trager, E.A. Laboratory method for examination of well cuttings. Econ. Geol., vol. XV, No. 2, 1920, p. 170. Sampling drill cuttings from oil-wells.
22. (a) Treadwell, J.C. Ore developed. Eng. and Min. Jour., vol. 75, 1903, p. 660. Rich pockets in ore-shoots sometimes not revealed by sampling.
23. Trewartha-James, V.H. Taylor's pulp sampler. Trans. Inst. Min. and Met., vol. 25, 1915-16, pp. 185-189; discussion, pp. 189-225. Describes sampler used in East Pool Tin Mines in Cornwall.
24. Truscott, S.J. The Witwatersrand gold fields. 1902, 517 pp. Sampling and ore valuation, Chapter XIV, pp. 304-334. Stope plans, Chap. XV, p. 364.
25. Tupper, C.A. Copper production of Great Cobar, Ltd. Min. and Eng. World, vol. 40, 1912, pp. 363-366. Describes methods of sampling copper ore by machine.
26. Turnbull, Thomas. Notes on sampling for gold. Trans. Aust. Inst. Min. Eng., vol. 3, 1895, pp. 71-74. Discusses sampling alluvial gold and quartz ore and the merits of dish tests.
27. Tweedy, R.F. Sampling large low-grade orebodies. Eng. and Min. Jour., vol. 104, 1917, p. 522. Discuss possibility of too low a valuation of ore in a mine.
28. Tyrrell, F.G. Sampling small lots. Min. and Sci. Press, vol. 114, 1917, p. 261. Defends honesty of smelter sampling.
29. Tyssowski, John. The new International Smeltery at Tocoale, Utah. Eng. and Min. Jour., vol. 89, 1910, pp. 865-867. Describes sample mill of the Brunton type.
30. Vail, R.H. New smelting works of Arizona Copper Co. -I. Eng. and Min. Jour., vol. 97, 1914, pp. 1279-1283. Describes sampling mills.
31. _____ . The El Paso smelting works. Eng. and Min. Jour., vol. 98, 1914, pp. 465-68. Describes sampling mills, pp. 466-467.
32. Van Zwaluwenberg, A. Principles of ore sampling. Mines and Methods, vol. 1, 1909, pp. 69-71. Discusses theory and machinery.
33. _____ . Sampling by machine. Eng. and Min. Jour., vol. 87, 1909, p. 420. Discusses article by J.A. Church, vol. 86, 1908, p. 113.
34. Verschoyle, W.D. An emergency sampler. Eng. and Min. Jour., vol. 80, 1905, pp. 485-486. Describes a cheap and accurate device for small samples, easily constructed and resembling the Jones sampler.

835. Vogelstein, Ludwig. Sampling of spelter. Eng. and Min. Jour., vol. 102, 1916, p. 432. Pleads for binding regulations governing sampling and testing, comments on editorial on the subject, p. 108.
835. (a) von Bernewitz, M.W. Customs treatment at Kalgoorlie, Western Australia. Min. and Eng. Review, vol. VI, 1912, p. 229. Sampling oxide and sulphotelluride ores.
836. _____ . Filter-pressing. Trans. Aust. I. M. E., vol. 15 (1), 1911, p. 153. Sampling ore residue in filter-frames.
836. (a) _____ . Metallurgy of California Mother Lode. Min. and Sci. Press, vol. 108, 1914, p. 65. Sampling tailing at South Eureka mill
836. (b) _____ . Present metallurgical practice at Kalgoorlie Western Australia. Min. and Eng. Review, vol. V, 1911, pp. 13-19. How 12 different plants sample 140,000 tons of ore and residue monthly.
837. von Bernewitz, M.W. and Osborn, H.S. Prospectors Field-Book and Guide. 9th edition, 1920. Theory and practice of sampling discussed.
838. Wagner, W.H. Mine sampling. Min. and Sci. Press, vol. 120, 1920, p. 451. Practice at North Butte mine, Montana. Editorial comment on p. 439.
839. Wallace, D. Tricks in ore buying. Eng. and Min. Jour., vol. 82, 1906, p. 1079 and 1128. Describes frauds chiefly in Mexico.
840. Walton, W.L. Calculation of recovery in concentration. Eng. and Min. Jour. vol. 90, 1910, p. 541. Criticises methods proposed by T.J. Hoover and R.S. Handy.
841. Ward, W.F. Preliminary sampling of placer ground. Eng. and Min. Jour., vol. 95, 1913, pp. 702-704. Describes drilling outfit and its use.
842. Warwick, A.W. Hand sampling in small mills. West Chem. and Met., vol. 1, 1905, p. 138; Min. and Sci. Press, vol. 91, 1905, pp. 274-275. Argues for accuracy in sampling and describes methods of hand sampling.
843. _____ . Notes on sampling. 1903, 41 pp.
844. _____ . Ore in sight. Mining Reporter. Vol. 46, 1902, pp. 416, 438, 460, 507; vol. 47, 1903, pp. 28, 54. Discusses principles and method of valuing ore in place.
845. _____ . Sampling of mine and mill dumps. Mining Reporter, vol. 47, June 11, 1903, p. 540. Discusses difficulties in sampling.
846. _____ . Sampling mill dumps or tailings ponds. Mining Reporter, vol. 50, July 21, 1904, p. 59. Describes the sampling of a mill dump.
847. Waterhouse, L.V. Flotation at Mt. Lyell, Tasmania. Proc. Aust. I. M. E., No. 38, 1920, p. 117. Abstr. Min. and Sci. Press, 123, 1921, p. 87. Sampling copper ore and concentrates, and drawings of apparatus.

48. _____ . Flotation practice at Mt. Lyell, Tasmania. Min. and Sci. Press, vol. 123, 1921, p. 87. Sampling coarse ore, concentrate, tailing and pulp in the copper mill.
49. Watson, E.C. Prospecting. Min. and Sci. Press, vol. 122, 1921, p. 742. Sampling surface dirt and costeans for gold.
50. Watt, A.P. Concentration Practice in Southeast Missouri. Trans. Am. Inst. Min. Eng., vol. 57, 1917, pp. 322-411. Criticizes sampling methods at mills, p. 400.
51. Watts, A.S. Fieldspars of New England and North Appalachian states. U.S. Bur. Mines, Bull. 92, 1916, 181 pp. Gives results of examination of deposits and tests of samples.
52. Watts, W.L. Examination of prospects and mines. Min. and Oil Bull., vol. 1-2, Feb. 1916, p. 56. Discusses duties of examining engineer, principles of sampling, and methods of estimating values.
52. (a) Weatherbee, D'Arcy. Dredging for gold in California. 1st. ed., 1907, p. 217. Appendix of 30 pages consists of contributions by J.H. Curle, T.A. Rickard, G.L. Holmes, and C.W. Purington. Prospecting, drilling and sampling are fully covered.
53. Webber, Morton. Combination method of mine sampling. Min. and Sci. Press, vol. 120, 1920, p. 303. Mill tests as a check on moil sampling. Editorial comment in same issue, p. 203.
54. _____ . Detection of salting. Min. and Sci. Press, vol. 119, 1919, p. 673. How salting may be done, and how to circumvent it.
55. _____ . Latent errors in mine sampling. Min. Mag., vol. 12, 1915, pp. 99-101. Discusses causes and means of avoiding errors.
56. _____ . Mill-tests v. hand-sampling. Min. and Sci. Press, vol. 115, 1917, pp. 125-129. Describes three methods used in sampling three different kinds of mines.
57. _____ . Mill tests v. hand sampling. Min. and Sci. Press, vol. 118, 1919, p. 417. Discussion of H.R. Sleeman in same issue.
58. _____ . Sampling an erratic ore body. Min. and Sci. Press, vol. 114, 1917, pp. 792-793. Criticizes article by L.A. Parsons.
59. _____ . Sampling of mines. Min. and Sci. Press, vol. 113, 1916, p. 846. Describes method in which mixing is timed so as to mix each sample thoroughly.
60. _____ . Systematizing large mine examinations. Min. and Sci. Press, vol. 121, 1920, p. 233. First study the mine, then whitewash the places to be sampled by the sampling crew. Checking assayers by false numbers on similar samples. Editorial comment on p. 225.

872. Wiley, W.B. Sampling and preparation of raw material for analysis at South Works, Illinois Steel Co. Jour. Ind. & E.Chem., vol. 3, 1911, pp. 103-108. Describes methods and gives plans of sampling house.
873. Williams, Albert, jr. Metal mining. Coll. Eng. and Met. Miner, vol. 15, 1894, pp. 1-3. Describes methods of obtaining and preparing ore samples.
874. _____ Popular fallacies regarding previous-metal ore deposits. 1884, pp. 257-271; 4th annual report of the U.S. Geol. Surv., 1884, pp. 253-271. Gives advice for mine sampling.
875. _____ Public sampling works. Eng. Mag., vol. 3, 1892, pp. 34-43. Gives procedure of sampling in public works.
876. Williams, D.J. Sampling the Main Reef series. Proc. Chem. and Met. Soc. S. Africa, vol. 3, 1902-03, pp. 160-171; Min. and Sci. Press, vol. 86, 1903, pp. 165-166; discussion 171-177. Discusses problems of underground engineering and gives sectional drawing of reefs.
877. Williams, L.B. Importance of efficient mine sampling. Monthly Jour. Cham. of Mines, W. Australia, vol. ---, Nov. 30, 1914, p. 304.
878. Willien, L.J. Coal gas candlepower. Am. Gas Light Jour., vol. 102, 1915, pp. 219-220, discussion, p. 317. Describes methods of sampling gas in order to test it for candle power.
879. Willis, Charles F. Selling a prospect. Ariz. Min. Jour., vol. 4, Aug. 1920, p. 23. Importance of correct sampling of prospects.
880. Wilson, J.B. Mount Morean, Australia, mine records and assay plans. Eng. and Min. Jour., vol. 89, 1910, p. 710. Describes methods used.
880. (a) Winchell, N.H. and H.V. Iron ores of Minnesota. Geol. and Nat. History Survey of Mines, Bull. 6, 1891, p. 429. Sampling of the ores pp. 186-188.
881. Wise, O.B. Duty and sampling of lead ores. Mining, vol. 1, 1896, pp. 298-301; abstr. in Min. and Sci. Press, vol. 73, 1896, p. 132. Comments on act of Congress on the sampling of lead-silver ore from Canada.
881. (a) Woakes, E.R. Highland ore dressing mill, B.C. Eng. and Min. Jour., vol. 74, 1902, p. 852. Lead-silver ore and tailing is sampled every 15 minutes.
882. Wolcott, C.E. Sampling ore in the Cripple Creek District. Mining Reporter, vol. 50, Sept. 8, 1904, pp. 241-244. Gives methods of sampling with diagrams of schemes for several companies.
883. Wolf, A.G. Flow-sheet conventions. Eng. and Min. Jour., vol. 109, 1920, p. 380. Symbol for sample-cutter in flow-sheets.
884. _____ Sampling mine floors. Eng. and Min. Jour., vol. 104, 1917, pp. 1111-1112. Discusses difficulties and water control in floor sampling.

885. Wood, G.W. The Rochester mill. Nevada, Min. and Sci. Press, vol. 111, 1915, pp. 317-320. Describes taking of samples of silver ore.
886. Wood, H.E. Separating metallics from Pacific Coast sands. Eng. and Min. Jour., vol. 109, 1920, p. 398. In sampling several million tons of beach sands; 14 ft. holes were drilled, and 200 samples, each 200 lbs. were taken.
887. Wood, H.R. Notes on sampling. Colo. Sch. Mines Quart., vol. 13, 1891-92, pp. 364-368; Eng. and Min. Jour., vol. 54, 1892, p. 156; Jour. Soc. Chem. Ind., vol. 12, 1893, p. 547. Discusses briefly vein and mine sampling, dump sampling and slag sampling.
888. Wood, J.E. A method of collecting gold from pannings. Trans. Inst. Min. and Met., vol. 20, Oct., 1910-11, p. 44. Describes wrapping samples of gold in lead foil for convenience and protection.
889. Woodbridge, D.E. La Cananea mining camp. Eng. and Min. Jour., vol. 82, 1906, pp. 623-62. Discusses method of sampling ore with an automatic sampler of the revolving barrel type.
890. _____ . Mesabi iron ore range. Eng. and Min. Jour., vol. 79, 1905, pp. 466-469. Describes methods of sampling ore in place.
891. Woodbridge, T.R. Ore sampling conditions in the West. U.S. Bur. Mines Tech. Paper 86, 1916, 96 pp. Discusses conditions affecting ore sampling and the methods used.
891. (a) _____ . Ore sampling. Section 29, of Peele's Mining Engineers' Handbook, 1918. Notes on mill and lab. samplers, with flow-sheets and costs.
892. _____ . Sampling by machine. Eng. and Min. Jour., vol. 86, 1908, p. 917; vol. 87, 1909, pp. 269-272. Discussion of article by J.A. Church. Vol. 86, 1908, p. 113.
893. Woodman, J.E. Coal sampling. Can. Min. Jour., vol. 28, 1907, p. 112. Discusses principles.
894. Worcester, S.A. Colburn-Ajax mill, Victor, Colorado. Eng. and Min. Jour., vol. 93, 1912, p. 753. Describes sampling methods.
894. (a) Wraight, E.A. British-America Nickel Corporation. Min. Jour., vol. 134, 1921, p. 526. Nickel ore at the main shaft is sampled by a traveling car which takes a sample from the ends of 7 sorting belts.
895. Wraith, William. Sampling anode-copper with special reference to silver-content. Trans. Am. Inst. Min. Eng., vol. 41, 1910, pp. 318-323; discussion, vol. 42, 1911, pp. 905-908. Give smelter, refinery, and ladle-shot methods of sampling and comments on them.

896. Wright, C.A. Mining and milling lead-zinc ores in the Missouri-Kansas-Oklahoma district. Bureau of Mines Bull. 154, 1918. Importance of sampling emphasized, p. 123.
897. _____ . Mining and milling lead-zinc ores in Wisconsin. Bureau of Mines Tech. Paper 95, 1915. Methods of prospecting and sampling are given.
898. Wright, L.T. Element of chance in sampling of ores. Min. Mag., vol. 3, 1910, pp. 33-358. Discusses application of mathematics to determine errors of chance in sampling, especially Vezein's principles of safe weights.
899. Wright, S.B. Smelting and refining of Cobalt silver ore. Eng. and Min. Jour., vol. 107, 1919, p. 263. The silver - cobalt - arsenic - nickel ores and concentrates are first crushed to 20 mesh, and cut by Snyder machines.
900. Wybergh, Wilfred. Estimating and sampling ore reserves as practiced on the Witwatersrad. Trans. Inst. Min. and Met., vol. 4, 1896-97, pp. 261-274. Gives details and data on sampling both undeveloped mines and ore already blocked out.
901. Yancey, H.F. and Fraser, Thomas. Sulphur in coal beds. Bull. Uni. of Illinois, 221. Abstr. in Jour. Ind. and Eng. Chem., vol. 13, 1921, p. 35. Sampling coal seams
902. Young, G.J. Control of ore-dressing operations. Eng. and Min. Jour., vol. 107, 1919, p. 907. systematic sampling at each stage is highly important.
903. _____ . Elements of mining. 1916, 628 pp. Discusses mine sampling, pp. 584-600.
904. _____ . Snyder ore sampler. Eng. and Min. Jour., vol. 70, 1900, p. 549.
905. _____ . Selection of a method for ore treatment. Met. and Chem. Eng., vol. 15, 116, pp. 297-299. Gives principles of sampling.
906. Young, L.E. Bibliography of mining. Min. Ind., vol. 20, 1911, Gives bibliography for 1911 on sampling and valuation, pp. 775-776.

PATENTS.

- Allen, Charles. Automatic ore and pulp sampler. U.S. patent 754,912, March 15, 1904. A spout oscillates through the ore stream collecting a sample.
- Andrus, G.S. Sampling apparatus. U.S. patent 280,994, July 10, 1883.
- Backus, G.S. Sampler. U.S. patent 1,238,058. August 21, 1917. Cuts out $\frac{1}{4}$ of the material by the cone and chute method. For pulverized ores.
- Badger, H.S. Combines measuring and sampling machine. U.S. patent 725,915, April 21, 1903. A spout, that is attached to a measuring device that tilts mechanically from one side to the other alternately dumping its contents from either end, passes through the ore stream falling into the device and samples it at each movement.
- Bardill, J.O. Automatic sampling machine. U.S. patent 1,063,494, June 3, 1913. A circulating sweep-arm with a sample box attached passes through the stream of falling ore at regulated intervals and catches a sample.
- Beeken, L.L. Coal sampling machine. U.S. patent 1,186,646, June 13, 1916. Automatically samples a large body of coal and reduces the samples.
- Behr, H.C. and Schmidt, C.F.E.O. Apparatus for sub-dividing stream of pulp and other liquids. U.S. patent 1,020,251, March 12, 1912. Apparatus includes a swinging spout that moves in a circle and passes periodically through a falling stream of liquid cutting out a sample each revolution.
- Boener, E.G. Device for sampling, mixing and blending granular substances. U.S. patent 1,160,036, November 9, 1915. The material falls over a cone into ducts and intervening spaces. The material led off by the ducts and that falling between them is led off in both cases by two different spouts, dividing both of the previous divisions.
- Bradford, Allen. Automatic sampling apparatus. U.S. patent 384,420, June 12, 1888. A vibrating sampling-cup passes through launder containing pulp or tailings and cut out sample.
- Bretherton, S.E. Ore sampler. U.S. patent 704,853, July 15, 1902. For coarse ore. Buckets suspended on a rotating arm pass through the stream, catch samples and on passing beyond the stream are tripped and their contents dumped into a sample box.
- Bridgman, H.L. Ore sampler. U.S. patent 433,714, August 5, 1890. The mass of ore is automatically split in passing through chutes rotated by hand.
- _____. Sampling machine. U.S. patent 457,145, August 4, 1891. A large mass of ore is passed through chutes with spiral blades, $\frac{1}{8}$ being taken out in each chute and passed on to the next, until the sample is reduced to two samples each $\frac{1}{128}$ th of the mass.
- Brunton, D.W. Device for sampling. U.S. patent 454,120, June 16, 1891. A riffle shovel divided in three parts, the outer two without backs, so that when the shovelful of ore is tilted backwards one-third the contents remains in the shovel and the other two-thirds fall out.

- runton, D.W. Ore sampling machine. U.S. patent 304,259, August 16, 1884.
The stream is cut by a vibrating spout attached to a bar on a rotating wheel.
- _____ Ore sampling machine. U.S. patent 553,508, January 23, 1896.
A spout swings across the ore stream and deflects samples.
- uskett, E.W. Multiple riffle sample. U.S. patent 841,928, January 22, 1907.
The sample is cut out and reduced by passage of the ore through three sets of riffles in an inclined shaft.
- yrnes, O. Sampling machine. U.S. patent 608,834, August 9, 1899. The pulp is dropped over a rotating wheel with spiral ribs. One rib with a projecting spout on the end carries off a sample and drops it into a receiving spout that leads to the exterior of the machine.
- alkins, A.C. Apparatus for separating material. U.S. patent 850,293, April 16, 1907. The material passes through lateral openings of regulated size in the side of the hopper into rotating buckets. One half the material passes on and the other half is retained in the buckets, one eighth of the material in each bucket.
- _____ Attachment for ore sampling machine. U.S. patent 683,844, October 1, 1901. Device to control agitation of hopper independently or rotation of the sampling buckets.
- _____ Ore sampling machine. U.S. patent 682,528, September 10, 1901.
Mechanically quarters pulverized ore by hand power.
- Clarkson, Thomas. Sampler for grain, minerals, etc. U.S. patent 518,915, April 24, 1894. One-tenth of the mass is obtained as a sample by passing through an annular rotating hopper with chutes.
- Clift, A.S. Plant or apparatus for sampling ore. U.S. patent 1,062,636, May 27, 1913. A series of grinding and deflecting devices for automatically sampling ore.
- Cheesman, D.J., Moore, J.A. and Snyder, C.A. Ore sampler. U.S. patent 621,771, March 21, 1899. The stream is mechanically mixed by rotation and a rotating bucket cuts the stream taking two samples.
- Cogswell, S.E. Automatic sampler. U.S. patent 1,241,196, September 25, 1917. A series of empty tubes pass under a hole in the bottom of an inclined shaft down which ore is falling. As the tube directly under the hole becomes filled, its weight causes it to pass on admitting the next tube beneath the hole. Designed for crushed or granulated material.
- Colby, F.J. Sampler. U.S. patent 1,133,933, March 30, 1915. A series of riffles through which the mass of ore falls, part being deflected in each set and sent on to the next set for further reducing.
- Collum, J. Machine for sampling ores and other metals. U.S. patent 146,167, January 6, 1874.

- Condé, J.C. Liquid sampling device. U.S. patent 569,783, October 20, 1896.
- Constant, C.L. Ore sampler. U.S. patent 888,471, May 26, 1908. The ore falls vertically over a drum rotating horizontally. A sample falls into the drum through two openings in its sides and passes out through opening at the ends of the drum.
- Damm, J.M. Ore mixer and sampler. U.S. patent 655,478, August 7, 1900. Ore is rotated in the hopper and falls into spouts, one of which leads to the sample box.
- Dodd, W.G. Ore or pulp sampler. U.S. patent 693,690, February 18, 1902. A rocking trough cuts through a falling ore stream and samples it at each movement. The samples flow out through a pipe and are outside the launder.
- Dodds, R.D. Sample-taking device. U.S. patent 1,235,883, August 7, 1917. Obtain sample of formations through which the drill bit passes. Designed particularly for drilling oil wells.
- Drawe, J.J. Oil and liquid sampler. U.S. patent 892,944, July 7, 1918.
- Dyer, G.S. Liquid sampler. U.S. patent 732,059, June 30, 1903.
- Eyre, T.E. Ore sampling machine. U.S. patent 299,920, June 3, 1884. A grooved, conical divider in the hopper cuts out a sample which is removed by a cylinder with a screw thread and vertical shaft, journaled to rotate within the hopper.
- Fairchild, O.H. Ore sampler. U.S. patent 1,001,129, August 22, 1911. Takes a sample transversely across a sliding stream of ore, splits it in two parts, and distributes the reserve sample into two or more compartments.
- Fanderz, H.D. Ore-sampling machine. U.S. patent 649,288, May 8, 1900. Divides 25 to 100-ton lots and takes a small sample by mechanically splitting the ore stream.
- Fenstermaker, Abraham. Sample-taking machine. U.S. patent 887,615, May 12, 1903. A turn-table with sample box comes under a deflecting spout at given intervals. The spout deflects sample from the ore stream and automatically releases it as the box passes under. Designed for granular or pulverized material.
- Flood, J.N. Automatic electric sampler. U.S. patent 1,010,032, November 28, 1911. A moving deflector, actuated by electricity automatically takes a cross section of the entire stream of pulverized ore at given intervals.
- Foster, C.R. and Coolidge, Winthrop. Ore sampler. U.S. patent 694,734, March 4, 1902. Wet or dry ore is divided by gravity in passing through a hopper containing dividers.
- Geissler, Carl. Automatic sampler for grain, etc. U.S. patent 632,713, September 12, 1899. A series of rotating drums cuts out part of a falling stream of granular material.

Hullberg, A.G. Ore sampler. U.S. patent 782,235, February 14, 1905. According to adjustment of part the cutter takes from 5 to 50% of the whole stream of ore.

Haggstrom, C.J. Liquid sampler. U.S. patent 1,296,794, March 11, 1919.

Hallett, S.I. Ore sampler. U.S. patent 566,169, August 18, 1896. Automatically divides the mass into four, retaining one quarter as sample, which is put through the machine again until the sample is the desired quantity.

Hamilton, Robert. Automatic sampling device. U.S. patent 1,151,682, August 31, 1915. A series of buckets are arranged on concentric wheels rotating vertically. As the grain passes over the wheels the first set of buckets catches samples, a part of which falls into the second set and a part of that sample falling into the third set until $1/96$ th of the original sample is obtained. For granular material.

Haultain, H.E.T. Sampling apparatus. U.S. patent 680,526, August 13, 1901. Sets of troughs inclined and spaced to catch part of a falling mass. Each set reduces the size of the sample.

Hawley, R.C. Ore sampling device. U.S. patent 463,509, November 17, 1891. Hoppers arranged one above the other and containing oscillating dividing wings that halve the entering material.

Ore sampling device. U.S. patent 475,557, May 24, 1892. The stream is divided in half in the first hopper and each half passes through a series of hoppers containing oscillating wings where they are reduced, resulting in two identical samples.

Hopper, G.L. Ore sampler. U.S. patent 523,664, July 31, 1894. A swinging spout passes through the stream of liquid, catches a sample and discharges it to one side of the launder.

Hogdson, F.S. Automatic sampling mechanism. U.S. patent 1,024,134, April 23, 1912. A pocket to be attached to a scoop that automatically takes a sample of each scoopful of ore.

Hones, L.E. Sampler operating device. U.S. patent 1,079,010, November 18, 1913. An electrically actuated cutter takes samples at intervals of a stream of fluid or powdered ore.

Hones, William. Sampling apparatus. U.S. patent 359,158, March 8, 1887. A stream of ore passing down an inclined chute passes over riffles, the retained ore passes on and over a second set of riffles and so on until less than $1/256$ of the original mass is obtained.

Hawton, C.L. Tailing sampler. U.S. patent 1,188,794, January 27, 1916. Samples are lifted from the stream by a fluid-pressure jet passing back and forth across the main launder.

McCone, A.J. Ore sampling apparatus. U.S. patent 949,234, February 13, 1910. The ore falls on a traveling carrier on which are a series of pans spaced so that the intervals are in any desired proportion to the pans. The ore falling through the spaces is the sample.

- McDermott, Walter. Ore sampling machine. U.S. patent 354,203, December 14, 1888. Designed to be attached to a crushing mill. A spout projects into the stream of dry or wet ore and deflects a sample into a pail.
- McGregor, A.G. Sampling apparatus. U.S. patent 1,155,670, October 5, 1915. A carrier on chains passes through a falling stream at regular intervals, catches a sample, and automatically dumps it into a sample pile.
- Moore, C.C., jr. Sampling machine. U.S. patent 573,610, December 22, 1896. The ore falls through a series of conical hoppers containing deflectors. The first hopper deflects $\frac{1}{4}$ the mass, which passes to the second hopper where $\frac{1}{4}$ of the sample is deflected, & through as many hoppers as is desired.
- Morehouse, W.L. Ore feeder and sampler. U.S. patent 1,079,184, November 13, 1913. A tube revolving within the hopper mixes the ore with an external screw, takes samples through openings in its sides, and passes them to its ends by means of an internal screw where they are discharged.
- Nagel, Carl. Weighing or measuring apparatus. U.S. patent 1,092,741. April 7, 1914. Includes a device to take samples of liquids from weighing or measuring apparatus opened by valves.
- Newhouse, R.C. Sampling device. U.S. patent 1,170,842, February 8, 1916. Part of the material passing through a screw conveyor is automatically released as sample.
- Overstrom, G.A. Sampler. U.S. patent 674,095, May 14, 1901. The entire stream is mechanically deflected at regular periods.
- Palmer, C.E. Apparatus for sampling ores. U.S. patent 398,275, February 19, 1899. The ore falls over a conical surface and one-third is caught in a pocket as a sample.
- Petersen, George. Apparatus for taking samples from grain and the like. U.S. patent 1,063,725, June 3, 1913. Cuts many small samples from either an uninterrupted or an intermittent stream of pulverized ore.
- Pott, F.B. Ore sampler. U.S. patent 1,215,988, February 13, 1917. A rotating drum containing buckets that open into the base of a cone, catches samples, and discharges them through the cone.
- Potter, G.D. Automatic ore sampler. U.S. patent 679,574. July 30, 1901. Periodically cuts part of the mass.
- _____. Ore sampling machinery. U.S. patent 523,731, July 31, 1894. Designed to sample 5 car-load lots at a time. The weight of the sample is proportional to the weight of the car-load, about 50 lbs. Each car is sampled separately.
- Raht, W.L. Ore sampling machine. U.S. patent 751,340, February 2, 1904. Ore passes down chute screw conveyor, and over a rotating drum that catches samples through openings in its sides.

- Ramsay, Erskine. U.S. patent 1,249,491, December 11, 1917. A sample pocket timed to move transversely across chute and cut a stream of falling ore. Designed chiefly for coal. A screen below the pocket dump divides the slate, slack, and lumps.
- Rorrison, William. Liquid sampler. U.S. patent 166,717, January 4, 1916.
- Rosberg, F.W. Pulp and ore sampler. U.S. patent 580,803, April 3, 1897. A cup cuts the stream mechanically at regular intervals.
- Scobey, Jesse. Ore sampler. U.S. patent 684,314, October 8, 1901. Periodically diverts a part of the stream into a trough. Designed for tailings but also can be used for ore.
- Sheridan, L.M. Ore-sampling device. U.S. patent 1,031,385, July 2, 1912. Cutter intermittently deflects part of the stream.
- Snyder, F.T. Sampler. U.S. patent 773,819, November 1, 1904. Gravity conveyors from which samples are deflected.
- Stephens, Will and Munger, J.P. Automatic tailing sampler. U.S. patent 665,620, January 8, 1901. Journaled drum dips sample from the current.
- Stratton, J.H. Sampling mill. U.S. patent 599,649, February 22, 1898. A concentric series of wheels carrying buckets spaced equidistantly. The top of the buckets is proportioned to the intervening spaces as the amount of the sample is to the mass.
- Tagliabue, G. Liquid sampling device. U.S. patent 540,121, May 28, 1895.
- Topham, T.A. Ore sampler. U.S. patent 563,101, June 30, 1896. A rotating wheel with a chute cuts a sample from stream of ore. The number of samples taken is regulated by the speed of the wheel.
- Truesdell, A.E. Recording sampler. U.S. patent 1,228,078, May 29, 1917. Pockets rotating on wheels catch samples from the ore stream. The pockets are timed to cut the stream in, say half hour intervals, and are labelled with their scheduled time.
- Urquhart, C.H. Ore sampler. U.S. patent 1,008,638, February 24, 1914. Periodically diverts the entire stream; operates by gravity.
- Van Mater, J.A. Ore sampling apparatus. U.S. patent 946,744, January 18, 1910. Sampling buckets pass automatically on chains through the stream of falling ore.
- Wallace, J.M. Toller for grain or ore. U.S. patent 240,344, April 19, 1891. Sampling spouts around the periphery of a conical, rotating hopper carry off samples.
- Ware, W.B. Sampling machine. U.S. patent 1,274,962, August 6, 1918. A snug fitting wheel rotates against an exposure of the ore stream and carries off a sample in an open pocket. For powdered or granular material.

Wendell, C.A. Automatic sampling device. U.S. patent 1,223,544, April 24, 1917
Selects samples automatically from a stream of ore and reduces them in
geometrical progression.

Weymouth, T.R. Thief for testing oils. U.S. patent 844,433, February 19, 1907.

Williams, C.J. Apparatus for sampling streams of wet ore and the like. U.S.
patent 1,235,090, July 31, 1917. A scoop is mechanically tipped at regular
intervals to deflect the stream at a fall in a stepped launder.

U. S. Bureau of Mines Publications Containing Notes On Sampling:

In the preceding text, these same references are listed alphabetically by author's names, but are grouped here for convenient reference.

Bulletin 12, 1913. Apparatus and methods for sampling and analysis of furnace gases, by J.C.W. Frazer and E.J. Hoffman.

Bulletin 22, 1913. Analysis of coals in the United States, with descriptions of mine and field samples collected between 1904 and 1910, by N.W. Lord and others.

Bulletin 28, 1911. United States fuel-testing plant at St. Louis, Mo., 1905 to 1906, by N. W. Lord.

Bulletin 42, 1913. Sampling and examination of mine gases and natural gas, by A. Burrell and F. M. Seibert.

Bulletin 51, 1913. Analysis of black powder and dynamite, by W. O. Snelling and G. Storm.

Bulletin 56, 1913. First series of coal-dust explosion tests in the Experimental Mine, by G. S. Rice and others. Methods of sampling after-damp and other gases, pp. 8, 54, 107.

Bulletin 63, 1913. Sampling coal deliveries, and types of government specifications for purchase of coal, by G. S. Pope.

Bulletins 85 and 123 (1914 and 1917) Analysis of mine and car samples of coal collected in 1911-13 and 1913-16, by A. C. Fieldner and others. Methods of collecting and analyzing samples.

Bulletin 92, 1916. Feldspars of New England and North Appalachian States by A. Watts. Testing of samples described.

Bulletin 96, 1916. Analysis of permissible explosives, by C. G. Storm. Method of sampling dynamite is described.

Bulletin 97, 1915. Sampling and analyzing flue gases, by Henry Kreisinger and K. Ovitz.

Bulletin 98, 1915. Report of the Selby Smelter Commission, by J. A. Holmes, C. C. Franklin, and R. A. Gould. Sampling the atmosphere near the smelter.

Bulletin 103, 1917. Mining and concentration of carnotite ores, by K. C. Kithil and J. A. Davis. Descriptions and illustrations of samplers.

Bulletin 112, 1920. Mining and preparing domestic graphite for crucible use, by H. D. Dub and F. G. Moses. On pages 36-38 is described and illustrated the method and apparatus used in sampling sacked graphite.

Bulletin 116, 1918. Methods of sampling delivered coal, by G. S. Pope.

Bulletin 122, 1916. Principles and practice of sampling metallurgical materials with special reference to sampling copper bullion, by Edward Keller.

Bulletin 127, 1918. Gold dredging in the United States, by Charles Janin. Sampling and calculating placer ground.

Bulletin 154, 1918. Mining and milling lead-zinc ore in the Missouri-Kansas-Oklahoma district, by C. A. Wright. Importance of sampling emphasized.

Bulletin 191, 1920. Quality of gasoline marketed in the United States, by H.H. Hill and E.W. Dean. Methods of collecting samples.

Bulletin 195, 1921. Underground conditions in oil fields, by A.W. Ambrose. Sampling drill-cores, sample containers, examination of samples.

Bulletin 201, 1921. Prospecting and testing oil, gas, and water-bearing strata. By R.E. Collom. Sampling and identifying drill cuttings from oil-wells.

Bulletin 210, 1921. Oil-shale: history and technology. By M.J. Gavin. Sampling and testing shale discussed, including a hint to take samples from below exposed surfaces.

Technical Paper 1, 1911. Sampling of coal in a mine, by J.A. Holmes.

Technical Paper 3, 1911. Purchase of fuel-oil for the Government, with directions for sampling oil and natural gas, by J.C. Allen.

Technical Paper 14, 1913. Apparatus for gas-analysis laboratories at coal mines, by G.A. Burrell and F.M. Seibert. Apparatus for collecting samples is included.

Technical Paper 76, 1914. Notes on sampling and analysis of coal, by A.C. Fieldner. Discusses factors affecting accuracy of sampling, and methods used by the Bureau of Mines.

Technical Paper 83, 1915. Buying and selling ores and metallurgical products by C.H. Fulton. Brief discussion of sampling methods.

Technical Paper 95, 1915. Mining and milling lead-zinc ores in Wisconsin, by C.A. Wright. Prospecting by drilling discussed.

Technical Paper 109, 1915. Composition of natural gas used in 25 cities, by G.A. Burrell and G.G. Oberfell. Samples were collected in 300 cc. bottles.

Technical Paper 133, 1919. Directions for sampling coal for shipment or delivery, by G.S. Pope. The complete operation of sampling is graphically set forth in a series of 34 sketches.

Technical Paper 148, 1917. Determination of moisture in coke, by A.C. Fieldner and W.A. Selvig. Method of handling samples during tests.

Technical Paper 186, 1918. Methods for routine work in the explosives physical lab. of Bureau of Mines, Pittsburgh, Pa., by S.P. Howell and J.E. Tiffany. Regulations regarding submitting samples of explosives.

Technical Paper 261, 1921. Ventilation in metal mines; a preliminary report, by Daniel Harrington. How samples of mine air are taken.

Serial 2120, April, 1920. Oil thieves, by A.R. Elliott. Description of instruments used in sampling oil in tanks or reservoirs. A piece of pipe or bottle is lowered to the desired depth, and a sample taken; or a set of $\frac{1}{4}$ to 1 inch valves are fitted at certain intervals on the outside of a tank, allowing samples to be drawn off.

Serials No. 2202 and 2236, 1921. Properties of typical crude oils from eastern producing fields of the United States, by E.W. Dean. Brief mention of method of sampling.

Serial 2256, 1921. Notes on the oil-shale industry, by M.J. Gavin, H.H. Hill, and W.E. Perdew. Considerable care is needed in sampling shale deposits.

Serial No. 2262, June 1921. Gases produced by carbon tetrachloride and foamite fire extinguishers in mines, by A.C. Fieldner and S.H. Katz. Plan of mine shows positions for taking gas samples.

Sampling report. F. Form 6 - 138. A blank for report on a coal seam and samples taken therefrom. One page.

Sampling report. Form - - -. A blank for report on shale deposits. One page.

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