

A Chronological List of Type-setting Machines and Ancillary Equipment, 1822-1925

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The history of the development (1822-1925) of the mechanical control of printers' type is outlined in this chronological list of type-setting machines. Early emphasis is on the single-type devices which manipulated individual pieces of type; gradually matrix machines were perfected. Also included are machines used to supplement the typesetting process: typecasters, direct printers, transfer or impression devices, and material makers.

The history of mechanical manipulation of printers' types is less than one-third as long as the history of typography itself, but it is every bit as fascinating. Many of the machines are worthy of individual studies, but for the purpose of this chronological list, details and descriptions have been reduced to a minimum.

Over the period of approximately 100 years about 200 machines are known to have been conceived. Many were abandoned at the work bench, as the models failed to fulfill the expectations of enthusiastic inventors; many machines were changed completely and new approaches made. Experimentation went on for years, one of the longest periods being on the Alden Typesetter (#29)—from about 1838 to 1902. To date, the most important work on the subject has been L. A. Legros and J. C. Grant, *Typographical Printing-Surfaces*, published in 1916. The book has some unfortunate gaps and did not cover many of the machines in this chronology. This list has been abstracted from a more comprehensive treatment of the subject in a book now in process, *The Development of Printers' Mechanical Typesetting Methods—1822-1925*.

All through the nineteenth century and well into the twentieth experimenters had been assiduously tackling the problem of setting and/or casting and composing type by mechanical means.

Some of these inventors were printers, but a surprising number of them were not. The 130 individuals included in this list represent fourteen different countries—about two-thirds are Americans, with the British second in number with 17.

The most prolific decade of experimentation was the 1890's. During this period the Linotype and the Monotype were perfected; and, although they work on very different principles, they have replaced and survived all other mechanical typesetters proposed. (The Intertype falls in the Linotype classification; the Ludlow does not control its matrices mechanically.)

Illustrations, of course, are invaluable to such a history, but for this list only a few representative examples can be included. However, illustrations for more than two-thirds of the machines described are in the writer's collection and will be included in the larger work mentioned above.

Ascribing exact invention dates to the machines is extremely difficult. The years given in various research materials may indicate either actual date of invention or of patent. In some cases the year of patent may be ten years later than the year of invention.

The reader should keep in mind a basic distinction between the two main systems for mechanically setting printers' type: (1) single-type machines—to manipulate individual pieces of printers' type by mechanical means, and (2) matrix machines—to manipulate matrices from which type is cast.

In addition to machines used strictly for setting type, four other general categories of machines have been included because of their direct relationship to the typesetting process: (1) typecasters—separate machines to cast individual pieces of type either to supply the single-type machines or as a separate "foundry"; (2) direct printers—connected to typesetting or fixed-type equipment for direct impression of types; (3) transfer or impression devices—indirect use of the type image (for transfer to lithographic stone) or of the type impression in soft material (as a stereotype for casting plates or type); and (4) material makers—mechanical production of slugs, rules, and borders. A few machines which seem to fit none of the established categories are listed as "unclassified."

Every effort has been made to make this list as comprehensive

as it possibly can be. However, new information on these machines—indeed, machines not included here—may be known to readers or will come to light in the future. Readers are encouraged to send corrections to the author, c/o Graphic Crafts, Inc., 1027 Willow Street Pike, Lancaster, Penna. 17602 USA.

The Chronological List

Order of Information. (1) serial number; (2) year; (3) name of machine; (4) name of inventor; (5) country of origin, not necessarily the nationality of inventor; (6) category; (7) power used, where known; (8) function, briefly outlined; (9) commercial use, where known. Most machines had keyboards; those without are noted. After 1900 where the power source is not mentioned, electricity was the driving force. Earlier hot-metal machines used gas to heat the metal. "Computer" and "calculator" refer to mechanical, not latter-day electronic, devices.

1. 1822. CHURCH TYPESETTER. Dr. William Church; English; single-type; powered by clockworks and weights; types fell by gravity into assembler; hand justification; types stored in upright channels; wooden construction; limited use. Church was American settled in Birmingham, England.

2. 1822. CHURCH TYPE CASTER. Dr. William Church; English; type caster, multi-cell; to accompany Church Typesetter (#1); powered by hand wheel and weight; matrix bar, plunger filled all cells at one stroke; mold bar shifted to cut off tangs; type delivered to typesetter or into storage tubes; limited use.

3. 1839. KIEGL COMPOSER. Joseph Peter Kiegl; Hungarian; typesetter, single-type; distributor; no details, looked like pianoforte; no use.

4. 1840. CLAY AND ROSENBERG COMPOSER. John Clay and Frederick Rosenberg; English; single-type; crank or steam power; vertical type channels; types pushed from channels onto traveling chain; hand justification at machine by second operator; some use. Another inventor suggested running by perforated tape.

pushed out by steel plungers; manual justification; distribution by "stick" operating on pistol principle into channels of distributing table (3 devices); 45 years use.

21. 1857. **HOUSTON'S TYPESETTER AND DISTRIBUTOR.** W. H. Houston; American; single-type; steam driven; type pushed into raceway by followers; manual justification; distributor independent but in same machine, automatic; use unknown.

22. 1859. **GILMER TYPESETTING AND DISTRIBUTING DEVICE.** John B. Gilmer; American; single-type; manual; no keyboard; type drawn direct from "case" by special composing stick; manual justification; distribution direct into "case" through bottom of stick; use unknown.

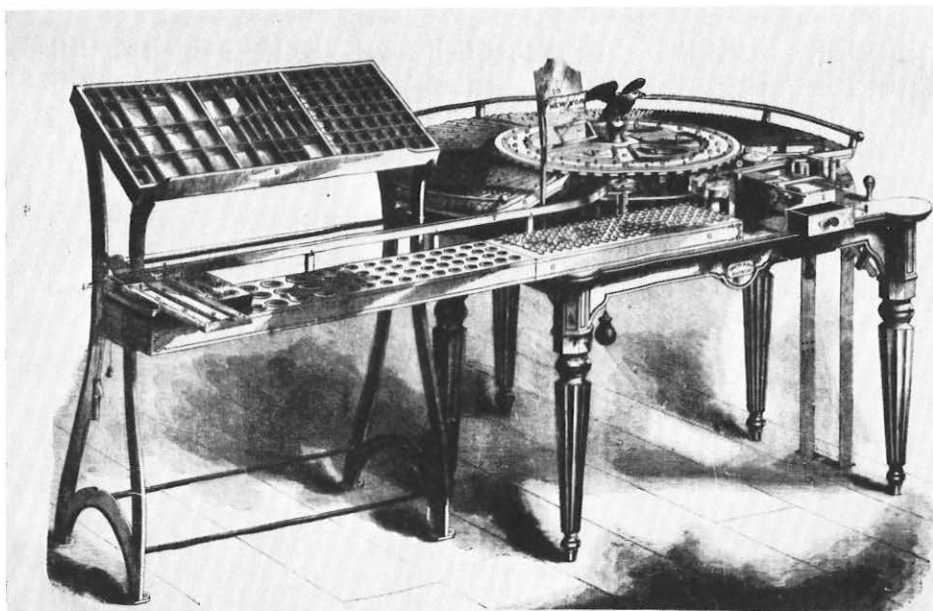
23. 1860. **FELT COMPOSING, JUSTIFYING AND DISTRIBUTING MACHINE.** C. W. Felt; American; single-type; steam; separate keyboard; punched tape controlled machine; type stored in spiral line on drum; justification automatic; distribution automatic, by same tape in reverse (if no corrections had been made in original setup); no use.

24. 1862. **BROWN'S PATENT TYPESETTER.** Orren L. Brown; American; single-type; no keyboard; types released by small lever and tongue at bottom of type channels, dropped into "stick" held in operator's hand; manual justification; separate distributor; distribution by special nicks by rotary motion; limited use.

25. 1862. **FRASER TYPESETTER AND DISTRIBUTOR.** Alexander Fraser; English; single-type; gravity; manual justification; distribution by keyboard in separate machine, reverse of typesetter; 40 years use.

26. 1862. **RAY TYPESETTING SYSTEM.** D. B. Ray; American; single-type; manual, no keyboard; type in tubes arranged in circle; fed into composing stick; details scant.

27. 1864. **DE MEY TYPOGRAPHER.** D. A. De Mey; American; non-classified; impression for electrotyping; foot pedal; indexed wheel controlled type wheel which made impressions in gutta-percha; impression table moved horizontally and laterally; matrix thus composed to be used as mold for electrotypes plates; use unknown.



Alden Typesetter and Distributor, 1866 model (#29).

28. 1864. FLAMM COMPOSERS. Pierre Flamm; American; non-classified; impression for stereotype, and direct printer for lithography; supposed to be first impression machine which made matrices for stereotyping; details scarce.

29. 1866. ALDEN TYPESETTER AND DISTRIBUTOR, #2. Henry W. Alden, W. Mackay; American; single-type; improved after Alden's death; composition same as original (#19); manual justification; distribution mechanical, types returned to storage channels by rotating wheel; 60 years intermittent use.

30. 1866. BAER TYPESETTING MACHINE. Charles Baer; American; single-type; revolving type-receiving channel, radiating type cases; lip at mouth of cases, cams on forked mouth of revolving channel; spring hooks and pushers operated by keys; adjustable galley with sliding-rake; no use.

31. 1867. COREY AND HARPER TYPESETTING MACHINE. A. Corey and J. M. Harper; American; single-type; loose wheel, bearing on types pushed from reservoir; guiding plate to turn type; pushing

bar to adjust row of type in line; type in vertical row, on side, pushed up from below, with block to elevate each type; box with detachable type receiver; spring plate for controlling keys; no use.

32. 1867. KNIAGHININSKI AUTOMATIC COMPOSER. Petr Pavlovich Kniaghininski; Russian; single-type; electro-magnetic coils; tape operated, types picked from inclined grooves, deposited in collector, jaws of composing stick removed type from collector; manual justification; distribution automatic; no use.

33. 1867. MACKIE COMPOSING MACHINE. Alexander Mackie; English; single-type; steam; type picked from small boxes on circular table, controlled by perforated tape; hand justification; no distribution; limited use in Mackie's own newspaper shops. First application of perforated tape on commercial basis.

34. 1868. FOSTER TYPESETTING MACHINE. F. G. Foster; American; single-type; removable vertical plate, with recesses and grooves, covered with glass; type boxes, fingers acting in grooves; spring pressed type forward to guide with curved groove leading to composing stick; setting rule, stick and galley; manual justification; no distribution; no use.

35. 1869. KASTENBEIN COMPOSER AND DISTRIBUTOR. Charles Kastenbein; French; single-type; foot treadle or steam power; gravity, from vertical channels; types pushed into raceway; manual justification; distributor hand-fed, sorted and stacked types in channels; about 30 years use.

36. 1870. KLEES LEAD CASTER. K. M. Klees; American; material maker, strip (?); no details.

37. 1871. HOOKER ELECTRICAL TYPESETTER. John Hooker; English; single-type; no keyboard, but "setting board" arranged like type case; operator touched letter compartments with copper rod, closed electrical contact, which pushed type from sloping troughs; gravity, to long assembly lines; manual justification; distribution in separate machine, no details; about 30 years use.

38. 1871. PLUNKET COMPOSER. T. J. (or G.) Plunket; American; single-type; type channels arranged in circle; magnetic de-

vice rotated, electromagnets picked type from channels, deposited in lines; *iron* types; manual justification; no distribution; no use.

39. 1871. WINDER SYSTEM. R. Winder; English; non-classified; typesetter; manual; no keyboard; type stored in tubes; source material sketchy and conflicting; use unknown.

40. 1872. WESTCOTT DIRECT CASTING MACHINE. Charles Westcott; American; matrix, single-type caster and composer; dies mounted on levers, each stroke of key locked matrix to mold and cast single letter; composition followed casting in machine; no distribution.

41. 1873. FILMER LEAD CASTER. W. Filmer; American; material maker; details lacking, except patent notice.

42. 1873. PAIGE COMPOSITOR. James W. Paige; American; single-type; justifier, distributor; electricity; gravity, delivered perfect composition; justification and distribution automatic, notched type; type stored in upright channels; no use. Only two models built in over 20 years.

43. 1874. GOODALE LEAD CASTER. J. Goodale; American; material maker. Details on early lead casters very scant.

44. 1875. BURR TYPESETTER. S. W. Green and H. A. Burr; American; single-type; steam; gravity; types in vertical channels; manual justification; no distribution; later improved and called Empire (#49).

45. 1876. STONE LEAD CASTER, AND LEAD SHAVER. H. J. Stone; American; material maker, strip; two machines, one for leads and rules, other for shaving them to uniform size; no other details.

46. 1877. FARNHAM TYPESETTER. J. M. Farnham; American; single-type; gravity; type laid side upon side; no other details; no use.

47. 1878. WICKS ROTARY TYPE CASTER. Fredrick Wicks; English; type caster, multi-cell; electricity; cast types at 60,000 per hour; 100 molds in wheel 20" in diameter; wheel revolved in front of nozzle, cast whole fonts at each revolution; metal temper-

ature 700°; delivered types on rotating chain; two operators required; 25 years use.

48. 1879. WICKS COMPOSER. Frederick Wicks; English; single-type; steam; gravity delivery; two rows of keys, could deliver "chords" or parts of words at same time; types in inclined channels, pushed out by plunger; no springs or cams in machine; delivered into raceway, manual justification; used new types from Wicks Rotary Typecaster (#47); non-distribution; 25 years use.

49. 1880. EMPIRE COMPOSER AND DISTRIBUTOR. Frank McClintock; American; the Burr (#44), greatly improved; single-type; gravity; manual, except for small motor-driven cam which kept a clear space for falling types; three banks of keys, three sections in magazine; automatic justification; distribution in separate machine by special nicks in type; 25 years use.

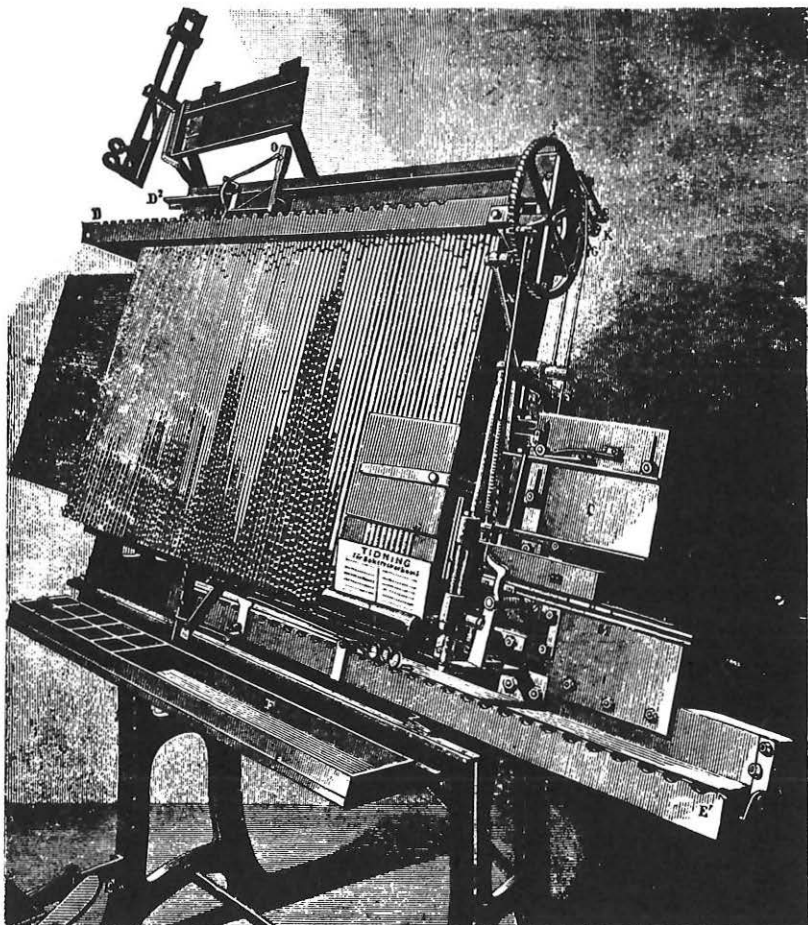
50. 1880. FLEMING LEAD CASTER. J. Fleming; American; material maker; another attempt at machine-cast leads; no details.

51. 1880. THORNE TYPESETTER. Joseph Thorne; American; descendant of Tacheotype (#10); single-type; steam or electricity; gravity; two type cylinders on same axis; top cylinder was distributor, revolved; lower cylinder stationary, stored type; keys released types onto spinning disc at bottom of type cylinder, carried to "type way" and assembler in long lines; manual justification; distribution automatic by special nicks in type; very popular, 30 years use; later improved and known as Simplex One-Man Typesetter (#109) and as Unitype (#113).

52. 1883. McMILLAN TYPESETTER AND DISTRIBUTOR. John L. McMillan; American; single-type; electricity; gravity; type removed by a "grab" which engaged nicks in type; justification automatic; distribution automatic in separate machine; several styles built for different kinds of composition; 20 years use.

53. 1883. ROTARY MATRIX MACHINE. J. O. Clephane; American; impression, stereotype; manual; type wheel, projecting characters; indented papier-mâché, letter by letter; pasted to backing, stereotype plate cast; no use.

54. 1884. MERGENTHALER BAND MACHINE #1. Ottmar Mergenthaler; American; impression, stereotype; vertical patrix bars, each with full alphabet and spaces, side-by-side; dropped to position determined by keyboard; impressed images in papier-mâché strips; strips lined up to form page matrix; stereotype plate cast; no use.
55. 1885. LORENZO DOW COMPOSING MACHINE. Lorenzo Dow; American; single-type; whole mechanism set on small table, cylindrical magazine overhead held types in troughs; types lowered by small boxes traveling on wires, or fell by gravity (?); details unclear; manual justification; no distribution; no use.
56. 1885. LAGERMAN COMPOSER, JUSTIFIER AND DISTRIBUTOR. Alexander Lagerman; Swedish; single-type; no keyboard; set of three-finger rings moved from channel to channel across serrated bar at bottom of magazine, pincers picked type and deposited in traveling "stick"; justification automatic; distribution by second operator at top of magazine, same arrangement as setting apparatus, in reverse; type dropped into long vertical grooves; two-man machine; use unknown.
57. 1885. LYMAN LEAD CASTER. N. R. Lyman; American; material maker; continuous strip.
58. 1885. MERGENTHALER BAND MACHINE #2. Ottmar Mergenthaler; American; matrix, slug caster; steam or electricity; first "Lin-o-type"; construction similar to Band Machine #1 (#54); female (recessed) matrix bars, several characters on each bar, side-by-side, dropped to alignment, same as in #1 machine; hot-metal pot and mold locked against mats, cast slug; no use.
59. 1885. MERGENTHALER FIRST CIRCULATING MATRIX MACHINE. Ottmar Mergenthaler; American; matrix, slug caster; experimental model, transition between #2 Band machine (#58) and "Blower" Linotype (#60); vertical magazine, overhead distributor; wrought-iron frame, U-channel; matrices assembled by keyboard, sent to casting mechanism, returned to magazine via distributor; established principle of Blower.



Lagerman Composer, Justifier and Distributor, 1885 (#56).

60. 1885. MERGENTHALER "BLOWER" LINOTYPE. Ottmar Mergenthaler; American; matrix, slug caster; steam or electricity; circulating matrices, stored in upright sheet metal tubes; keys released mats into delivery channel, blast of air forced mats to assembler; justification by double wedges (space bands), line clamped in casting head, locked against mold in rotating disc; distribution via chain atop magazine, combination shoulders on mats and lips in distribution channel; wide usage, about five years; replaced by Square Base Linotype (#67).

61. 1886. LAGERMAN TYPOTHETER. Alexander Lagerman; Swedish; single-type; small electric motor; types dropped by hand into hopper, sorted and stacked, delivered as unjustified lines; manual justification; no distributor; type taken from ordinary type case; some use.

62. 1886. WENTSCHER CASTING AND TYPESETTING MACHINE. Ernst Wentscher; German; matrix, caster-composer; similar to Johnson Type Caster and Johnson Composer (#105-106); types cast, and inserted in composer, which had keyboard, gravity feed; temporary spaces; justification by replacement of temporaries; no use; patents bought by Johnson.

63. 1887. LANSTON MONOTYPE (Impression). Tolbert Lanston; American; matrix, impression; keyboard punched paper ribbon, justification established at keyboard; two tapes punched, one for movement of metal blanks in composer, cutting blanks to size; second tape controlled matrix die-case; die-case shifted each letter over metal blank and *embossed* letter, delivered letter-by-letter to galley, lines automatically justified; no distribution; no use.

64. 1887. UNIVERSAL TYPESETTER. Alexander Lagerman; English; single-type; same as Typotheter (#61), with improvements.

65. 1888. LAGERMAN JUSTIFIER. Alexander Lagerman; Swedish; single-type; justifier; hand crank; removed temporary spaces and inserted proper spaces or combinations for exact justification; lines moved up from unjustified bank to justified bank; took over from Typotheter (#61).

66. 1888. RISLEY AND LAKE COMPOSER. Isaac Risley, V. F. Lake; American; transfer, lithography; steam; printed on roll of paper by action of "type sleeve" as types were inked by small rollers, special paper for transfer to stone; letter-spacing proportional and justification automatic; type sleeve rotated and moved up and down; no use.

67. 1889. SQUARE BASE LINOTYPE. Ottmar Mergenthaler; American; matrix, slug caster; electricity; new style matrix carried in inclined magazine, released by verge escapement; 90 keys, 90 magazine channels; justification by sliding wedges (space bands); cast-

ing in revolving mold disc; mats carried to magazine by second elevator; distributed by screws and combination teeth in mats; slugs delivered into stacker; wide use.

68. 1890. CHADWICK TYPESETTER. J. W. Chadwick; English; single-type; last improvement on Lagerman Typotheter (#61); installed on board in type stand; manual; had warning bell, and dial indicating number of spaces to be thrown into hopper; manual justification; no distribution; limited use.

69. 1890. KLETZKER'S IMPRESSION MACHINE. A. J. Kletzker and J. G. Goesel; American; impression, stereotype; small electric motor; letter punches in oscillating head, driven into flong for making stereotype matrices; impression table shifted two directions; no use.

70. 1890. LANSTON MONOTYPE (Hot Metal). Tolbert Lanston; American; matrix, single-type caster, composer; principle of punched tape and unit setting established in first impression machine for all Monotypes; this model *cast* types as dictated by key-boarded tape; die-case about four-inches square, held 225 matrices; compressed air moved die-case to position matrices over mold; type cast and delivered to galley letter-by-letter; justification automatic; no distribution; not final design.

71. 1890. ROGERS TYPOGRAPH. John R. Rogers; American; matrix, slug caster; electricity; matrices were long brass rods, strung on wires in elliptical frame; upon release by keyboard, matrices slid down wires to assembly and casting position; after cast operator tipped frame back, mats slid back to home position; justification by revolving wedges; wide commercial use, popular in Canada and Europe, especially Germany until WW II; revived in Germany about 1964, with improvements.

72. 1890. ST. JOHN TYPOBAR. R. H. St. John; American; impression, type-bar; electricity; circulating hardened-steel matrices; keyboard released mats from magazine to assembler, soft cold-metal blanks mounted on steel bases presented to line of mats; justification by wedges; mats *embossed* line on blanks, then line passed through trimming knives; mats returned to magazine au-

tomatically; metal blanks stored in composer; after use, type-bars were run through another machine which stripped type metal from bases; bases were re-used; no cams; run by rotary devices; no use.

73. 1890. **SIMPLEX LINOTYPE**. Ottmar Mergenthaler; American; matrix, line-slug caster; third stage of Linotype development, first true production model; electricity; inclined magazine, circulating matrices; released by verge escapement; gravity to assembler; rotating mold disc, casting and trimming devices; justification by double wedge (space band); distribution by combination teeth in matrices and grooved distributor bar; elevated to top of magazine; basis for all subsequent models; universal use.

74. 1891. **MATRIX MAKING MACHINE**. H. Lee and E. LeBrun; American; impression, slug caster; electricity; two banks of keys; types made impressions in metal blanks, slugs cast from this matrix, delivered to galley and matrix discarded; types restored to magazine; no use.

75. 1891. **McGRATH TYPE-COMPOSER**. P. H. McGrath; American; single-type; no details on composer, but special computing and casting device made wedge spaces; justification by advancing wedges from thin to thick and cutting off excess.

76. 1892. **MATRIX TYPOGRAPH**. T. T. Heath; American; impression, stereotype; pretyped copy on unit system, justified at keyboard; operator of impression machine followed this copy; 140 male punches in die-case, impressed letters in soft matrix material page by page; die-cases interchangeable, different faces or sizes of type; stereotype plates cast from matrix; no use.

77. 1892. **MONOLINE**. Wilbur Scudder; American; matrix, slug caster; electricity; matrix bars in small magazine, advanced to assembler and cast slug, moved back into magazine; justification by wedge spacer; 15 years use. Not made or sold in U.S.A. because of infringements of certain Mergenthaler patents.

78. 1892. **SEARS TYPO-MATRIX**. Charles Sears; American; impression, slug caster; keyboard, separate caster; punches driven into

wooden elements, which were run through caster, made "Lin-o-type" slugs; justification by differential feed on keyboard; no use.

79. 1892. TACHYTYPE. Frank A. Johnson; American; non-classified; inventor experimented with three principles: Monotype, Linotype, and impression (stereotype); 16 different patent listings, but no specific details, except on impression method: keyboard punched tape, caster impressed letters in soft-metal matrix, cast slug lines; no use.

80. 1892. TRIANGLE MONOTYPE. Tolbert Lanston; American; matrix, caster and setter; electricity; same tape principle, unit system as cold-metal machine (#63); type cast as die-case moved to and fro over mold; two tapes used to operate machine; no use.

81. 1893. CALENDOLI COMPOSER. V. Calendoli; French; single-type, type-bar; electromagnets; keyboard of 575 keys; types short, with deep keyhole slot in bottom, slid down inclined conduits to assembler; moved onto type metal bars, no justification; no distribution, type-bars melted down after use; types stored in upright channels; three machines in system: type caster, base caster, composer; limited use.

82. 1893. DOW COMPOSING MACHINE. Alexander Dow; American; single-type; typesetter and justifier; electricity; automatically composed and justified; separate distribution by combination nicks; set eight different sizes of type by changing sizes in upright channels; used types from Wicks Rotary Type Caster (#47); about 10 years use.

83. 1893. GOODSON GRAPHOTYPE. George A. Goodson; American; matrix, single-type caster and setter (Monotype principle); keyboard perforated ribbon, which controlled caster; die-plate moved to and fro over mold; justification automatic; cast hollow type, melted down after use; about 15 years use.

84. 1893. HILL'S DEVICE. A. A. Hill; American; single-type; manual; strapped to compositor's waist; type dropped into it by both hands; manual justification; no use.

85. 1893. KEMP'S TYPE-BAR MACHINE. William Kemp, Jr.; American; single-type, type-bar; caster and setter; short types cast

in wheel with tenon, assembled on bars; details scant; use unknown.

86. 1894. CONVERSE TYPESETTER #1. Frank B. Converse; American; single-type; setter and justifier; electricity; gravity; 92 channels in four groups, upright magazine at right angle to keyboard; justification, temporary steel wedges determined proper spaces which were replaced by metal spaces; no distribution; no use.

87. 1894. COX TYPE AND LOGOTYPE MACHINE. Paul F. Cox; American; single-type, logotype; electricity; types, logotypes in two magazines at right angles, released onto traveling belts at right angles; assembled at common point; manual justification; no use.

88. 1894. COX COMPOSER, SPACE DISCARDER, DISTRIBUTOR. Paul F. Cox; American; single-type; electricity; three machines: composer—type pushed from magazine onto traveling belt, soft-metal piece cut from reel, crimped and inserted as space; justification by compression; space discarder—sorted types and spaces, threw out spaces, stacked type; distributor—similar to Thorne (#51), type put in top of cylinder which revolved, sorted types by nicks and distributed into radiating channels; channels with type put into composer; limited use.

89. 1894. FOWLER TYPE CASTER AND SETTER. Joseph C. Fowler; American; matrix, single-type caster-composer; cast at each stroke of key, stored type in magazine; composition from magazine; justification by compressible spaces; use unknown.

90. 1895. ANGLE-END MONOTYPE. Tolbert Lanston; American; matrix, caster-composer; electricity; perforated tape and casting principles same as earlier Monotypes; galley and delivery mechanism on angle at end of machine; one tape used; no use.

91. 1895. COMPOSITE TYPE BAR. Lucien A. Brott; American; matrix, type-bar; caster and composer; electricity; composite mold, all letters cast at each stroke of plunger, deposited in magazine; composition usual manner, types $\frac{3}{4}$ " high; justification automatic; line moved to secondary casting unit and welded to solid base; limited use.

92. 1895. FOWLER IMPRESSION COMPOSER. Joseph C. Fowler; American; impression, slug caster; electricity; steel patrices (dies) impressed lines in lead blanks to make matrices, slugs cast; compressible steel spaces; no use.
93. 1895. PULSOMETER. S. H. and P. E. Hodgkin; English; single-type; electricity; 116 horizontal channels in tiers; type pushed forward, gravity drop to assembler; manual justification; distribution by keyboard in separate machine, selection by set-width of types passing through bridges; limited use.
94. 1896. BERRI TYPECASTER. William Berri; American; matrix, single-type caster and composer; details scarce; lines of matrices assembled with mold dividers between each matrix, forming plurality of mold cells; line cast as single types; justification by wedge; no use.
95. 1897. BERRI CASTING JUSTIFIER. William Berri; American; single-type; justifier; electricity; machine separate from Type-caster (#94); measured unjustified line of type, calculated width of spaces, set mold and cast all spaces at same time, stored them in receptacle; type lines passed beneath this magazine, spaces inserted step-by-step, temporary spaces removed; no use.
96. 1896. BURG COMPOSER. Hubert Burg; German; single-type; types gathered in channel, pushed to assembler; justification automatic; distributor handled several sizes; details scant.
97. 1896. DES JARDINS JUSTIFIER. B. M. Des Jardins; American; single-type; brass temporary spaces, computer calculated and inserted justifying spaces; designed for Thorne Typesetter (#51); use unknown.
98. 1896. THE STENOTYPE. The Stenotype Company; English; direct printer (?); typesetter, set line, made impression, distributed; no connection with American Stenotype of 1911; details scant.
99. 1897. BELLOWES ELECTRIC COMPOSITOR. Benjamin F. Bellows; American; matrix, slug caster; electricity, electro-magnetic; assembled brass matrices, cast solid slugs; 128 keys; gravity; temporary hollow spacers, replaced by solid brass justifying spaces; mats

circulated, distributed by combination holes in mats; two machine models, could cast 5- to 36-point sizes; no use.

100. 1897. **BOTZ MACHINES**. Charles J. Botz; American; scant details, except working principles; non-classified; several machines: type-bar, impression machine, keyboardless setter.

101. 1897. **BOWRON JUSTIFIER**. C. W. Bowron; American; single-type; justification by false hollow spaces, replaced by proper spaces; controlled by steel balls which fell when space key was struck; no use.

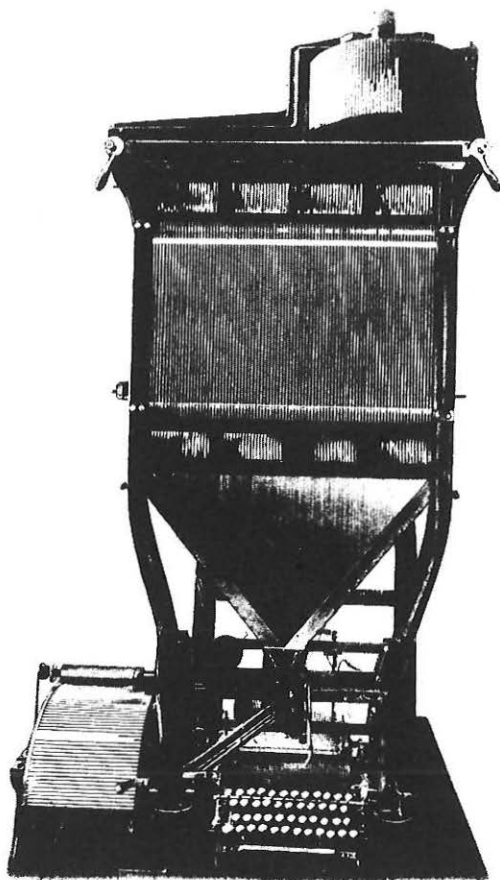
102. 1897. **ELECTROTYPGRAPH**. C. Méray-Horváth, C. Rozár; Hungarian; matrix, single-type caster and composer; electricity; separate keyboard for punched tape; tape controlled caster, justified lines delivered; die-case, each matrix having three faces; distribution by remelting; Teletypograph (#103) part of this system; perforated tapes relayed by telegraph to distant shop or city.

103. 1897. **TELETYPOGRAPH**. C. Méray-Horváth, C. Rozár; Hungarian; non-classified; part of Electrotypograph system (#102); telegraphic system of perforating tapes, relaying copy or messages to distant keyboard-perforator; similar to modern Teletypesetter (TTS); tapes re-punched and ran through caster; scant details; limited use.

104. 1897. **FOUR TOWER MONOTYPE**. Tolbert Lanston; American; matrix, single-type caster, composer; electricity; principles same as other Lanston machines, except machine was much longer, had four paper tape towers, cast four different jobs, or four setups of same matter; no use.

105. 1897. **JOHNSON TYPE CASTER**. Frank A. Johnson; American; type caster, multi-cell; single-type caster, but cast full alphabet in rotation each revolution of machine; types stored in tubes, ready for Composing Machine (#106); limited use.

106. 1897. **JOHNSON COMPOSING MACHINE**. Frank A. Johnson; American; single-type; electricity; gravity; temporary spaces, replaced by proper spaces cut from metal strips and inserted; type supplied by separate caster (#105); limited use.



Stringertype, 1913 model (#121).

spacer; types delivered in composed lines, as in Monotype; mats raised to top of magazine and distributed, as Linotype; 36 years use.

122. 1900. WEBSTER LEAD CASTER. C. C. Webster; American; material maker, strip; cast in continuous strip; could cut to short lengths; no subsequent shaving; compressed air (tank with hand pump) aided casting; use unknown.

123. 1901. AUTOMATIC TYPE MACHINE. F. H. Brown, J. E. Hanrahan, G. A. Boyden; American; also called Compositype;

type caster, single-type; cast one kind at time; own matrices, or electrotyped matrices from founder's types; orifice of mold same for all sizes, 6- to 36-point, a serious drawback; limited use.

124. 1901. BROWN BAR-O-TYPE. Herbert Brown; American; matrix, slug caster; bar form of matrix, 10 characters per bar, suspended by hooks, upright magazine; keys released, aligned matrix bars, space tubes inserted between words, line measured, spaces calculated, solid brass spaces delivered through tubes, tubes withdrawn; mats raised to magazine by hooks; distribution by combination nicks; two machines built, no use.

125. 1901. DUPLITYPE. W. H. B. Miller; American; type caster, single-type; foundry type impressed into blotting paper produced matrix; matrix fastened in bottom of box-mold, metal poured in; all manual labor.

126. 1901. LINOTYPE JUNIOR. P. T. Dodge; American; matrix, slug caster; matrices were long flat brass rods, one letter to each, with hook at top; keyboard released mats, slid down wires to assembly and casting mechanism, then returned to home on wires; derived from Rogers Typograph (#71); about 5 years use.

127. 1901. LOGOTYPE CASTING AND COMPOSING MACHINE. Ottmar Mergenthaler, Emil Lawrenz; American; matrix, logotype caster; circulating matrices; keyboard of 42 keys released mats into assembler, with temporary "separator"; last word had "correcting" space; justification by wedge in casting mechanism; one word and space, or part of long word advanced to mold at a time, mold adjusted itself and cast logotype, delivered lines of logotypes; mats sorted into eight groups, distributed into eight magazine segments; no use.

128. 1901. POLYTYPE. Fritz P. Lucke; German; matrix, slug caster; curved matrix with several characters on outer edge, inner edge had teeth for control in machine and distribution; wedge spacers; composed matrices delivered to supporting cylinder; two molds in large wheel; after cast, distribution by grooved roller; no use.

129. 1901. STORM ELECTRIC LINOTYPE. Alfred W. Storm; American; matrix, slug caster; matrices on ends of "spider" arms, like

wheel spokes, electrical contacts moved mats to casting position; metal pot and mold at top of machine; nozzle engaged line of mats, cast slug; gas heated; self-contained water cooling system; no use.

130. 1901. VAN HOYWEGHEN COMPOSER. Henri Celeste Van Hoyweghen; Belgian; non-classified; no mechanical description, called composing machine to eliminate all assembling and stone work, spacing, distribution; to permit change of characters, compose ovals, obliques, vignettes, frames, borders; use unknown.

131. 1902. CASTOTYPE. JOSEPH C. Fowler, Sr. and Jr.; American; matrix, single-type caster and composer; bar-type matrices, various letters of same width on same bars; matrix lowered, registered with its mold, single type cast, assembled; lines over-set, soft metal quads between words; lines compressed to measure, sent through trimming knives to remove protrusions from spaces; distribution by remelting; limited use.

132. 1902. CONVERSE'S NEW TYPESETTER. Frank B. Converse; American; single-type; similar to No. 1 (#86) with improvements and changes; gravity; 90 keys, types fell into assembling "stick"; when filled, replaced by another stick; composition continuous; justification automatic; two vertical magazines, one roman, one italic; could handle seven different type bodies; use unknown.

133. 1902. DYOTYPE. J. Pinel; French; matrix, single-type caster and setter; separate keyboard punched paper tape; tape controlled caster; matrices in wheel, six rows to wheel, two wheels to machine = 576 characters; wheels rotated and moved in direction of axis, contacted mold, cast type; selecting needles pushed through holes in tape; justification automatic, effected at keyboard; distribution by remelting; limited use.

134. 1902. PLANOGRAPH. Charles T. Moore; American; transfer, lithographic; perforated tape fed through printer which printed on chemicalized paper, justification by computation as for Monotype; transfer to metal plate or stone for printing; use unknown.

135. 1902. SEARS DIRECT PRINTER. Charles Sears; American; non-classified; composition for relief plate; differential keyboard, typed on chemically prepared paper; transfer to metal plate; plate etched to *raise* characters (relief) for printing direct; use unknown.

136. 1903. DOUGALL LINOTYPE. J. R. Dougall; Canadian; matrix, slug caster; simplified form of Linotype; circulating matrices; casting mechanism, crucible, mold arm (not disc), knife block, cams turned at right angle to front (keyboard); assembled lines of mats turned 90° for casting, turned back for usual distribution; one magazine; also known as Style-B Linotype; limited use.

137. 1903. LITHOTYPE. W. S. Timmis; American; transfer, lithographic; keyboard punched paper tape, electromagnets in keyboard; tape passed through printer, "type sleeve" rotated and moved axially, hammer struck transfer paper to type sleeve; finished matter run through transfer press onto metal plate; limited use.

138. 1904. BROOKS CASTING AND SETTING MACHINE. B. A. Brooks; American; matrix, single-type caster and setter; matrix and mold for each letter; new letter cast and deposited in channel as each was removed in composition; justification by computation, spaces cast and inserted in line; use unknown.

139. 1904. DOW TYPE SELECTOR. Alexander Dow; American; non-classified; mechanized type case; types stored in large sloping case with channels, nicks all one way, face outward; types ejected onto shelves at two levels, replaced as each letter was picked off; identifying strip for each shelf, showing characters immediately above; use unknown.

140. 1905. PEARSON COMPOSING MACHINE. John R. and Gustave R. Pearson; American; matrix, single-type caster and composer; one-operation machine; single-type cast at each stroke of key; six rectangular matrix bars, characters on each surface, rotatable; each to its own mold; justification by computation, spaces cast and sent to galley with types, inserted by hand; limited use.

141. 1905. ROTOTYPE COMPOSER. Franz Schimmel; German; matrix, slug caster; polyhedral matrices, circulating, having 10 faces, assembled by keyboard of 100 keys; lines sent via carrier in rotating wheel to casting segment; compressible spacers; mats distributed after cast; second and third lines composed while first in process; slug delivered to front; limited use.

142. 1906. BAKER TYPESETTER AND DISTRIBUTOR. A. G. Baker; American; single-type; manual throughout; 90 keys; 90 type channels in upright magazine; gravity; type pushed out by plunger, fell into assembler, hand justification; distribution automatic at top of machine; operated in conjunction with keyboard; distributor moved to and fro, selection of wards returned type to channels; any style or size of type; use unknown.

143. 1906. LUDLOW TYPOGRAPH (Matrix Bar). Washington I. Ludlow; American; sliding matrix-bar; slug caster; flat table-top, series of tapered matrix bars 24" long, thin end to thick end; bars slid either direction to align letters to form words; metal pot and mold under table, moved to position to cast slug, receded; slug delivered at front of machine; cast 8-, 10-, 12-point sizes; no use.

144. 1906. UNIVERSAL TYPE CASTER. Philip Nuernberger, George Rettig; American; typecaster, single-type; cast types for machine or case; 6- to 36-point, different mold for each size; recessed break at foot of type, tang broken off in recess, no further dressing necessary; also known as Nuernberger-Rettig Type Caster; about 10 years use.

145. 1907. GOODSON GRAPHOTYPE, ONE-MAN MACHINE. W. Nicholas and W. Ackermann; American; matrix, single-type caster and composer; remodeled Graphotype (#83); perforated tape eliminated, keyboard built-in; mechanical controllers adjusted for spaces automatically, which were cast with types for automatic justification; die-plate shifted to and fro by electro-magnetic elements; lines delivered complete to galley. Machine adaptable to casting type sorts to 36-point; limited use.

146. 1907. HANIGAN TYPE BAR. A. W. Hanigan; American; single-type (type-bar); system in Monotype classification; type

cast full height, with dove-tail recess in body; justification by wedges, no spaces cast; curved type-metal segment wedged into recess, flattened against body forming a type bar; use unknown.

147. 1907. KLETZKER & GOESEL TYPE-BAR MACHINE. A. J. Kletzker, J. G. Goesel; American; impression, cold embossing; type-bar; few details available; matrices assembled and embossed characters in relief on edge of type-metal blanks, forming a slug; no use.

148. 1907. STRINGER LINE JUSTIFYING MACHINE. H. J. S. Gilbert-Stringer; English; single-type; justification by milling; for Wicks Composer (#160) or others; two kinds of em quads (one high, one low) played into lines at composer; line overset; computer set wedges for proper spaces; small jaws pulled high quads from line, passed them over fast milling cutter, returned to line of type, delivered to galley; use unknown.

149. 1908. BHISOTYPE. S. A. Bhisey; English; type caster, multi-cell; full alphabet cast at each stroke of plunger; type delivered on chains direct to composer, or stored in channels; one caster capable of supplying eight typesetters for day; several models for different type sizes; about 15 years use.

150. 1908. THOMPSON TYPE CASTER. John S. Thompson; American; typecaster, single-type; cast all "sorts" needed in composing room, or new fonts, 12- to 48-point; used own matrices, or with adapter in mold, cast from other line casting matrices; universal usage.

151. 1909. GRANTYPE. J. C. Grant; English; matrix, single-type caster and composer; basic Linotype construction, but assembling and casting mechanisms adapted to single types; matrices circulated; lines turned at 90° for casting and returned for distribution; matrices acted as part of mold, lines cast with open spaces between letters to form "comb" with solid base or tang; tang broken off, line closed up and delivered; limited use.

152. 1909. GRANT-LEGROS-MAW LINE JUSTIFIER. J. C. Grant, L. A. Legros, T. F. Maw; English; single-type; mechanically similar to Stringer Line Justifier (#148); lines over-set, justifying spaces

computed; special long quads set into line, extending below foot of type, pulled from line, passed over fast milling cutter, bottom extension cut off, returned to line, delivered to galley; to be connected to any typesetting machine; use unknown.

153. 1909. **HOOFNAGLE JUSTIFIER**. W. T. Hoofnagle; American; single-type; few details; from composer type received in word-holders, justifying spaces are cast and inserted between words; no use.

154. 1909. **LUDLOW TYPOGRAPH**. William A. Reade; American; hand-set matrices, slug caster; outgrowth of Ludlow Typograph (#143); brass matrices, any desired size, or mixture, hand set in steel "stick" from case; slug cast in machine, mats immediately hand distributed; slug (over 12-point) had overhang, built up with leads; universal use.

155. 1909. **ROTOTYPE**. Franz Schimmel; German; matrix, single-type caster and setter; derived from Rototype Composer (#141); 123 keys; matrices decagonal, 12 to a roller, moved rotationally and axially; one letter cast each stroke of key; slow; mold opened and ejected type, no mechanical justification, but cast spaces provided; distribution by remelting; no use but still available in 1924 (!).

156. 1909. **UNTYPE-BAR MACHINE**. Rolls P. Link; English; matrix, type-bars; types cast as short heads; assembler sprung channel open in base, inserted type and released lips of base which gripped type heads; distribution by stripping heads from bases; use unknown.

157. 1910. **PANTOTYPE**. René Dacheux; Belgian; single-type; one-man machine; set, justified, distributed; few details; compressible spaces from soft-metal tubing; distribution by nicked type; use unknown.

158. 1910. **RAPID TYPE CASTER**. L. A. Legros and J. C. Grant; English; type caster, single-type; for case or composer; mold similar to Monotype; cast one letter at a time, 10,000 per hour; water-cooled mold, hot nozzle kept in contact, nozzle heated by circulating molten metal; limited use.

159. 1910. VICTORLINE. German Linotype Co.; German; matrix, line slug caster; similar to Linotype (#73); 103 keys, mats circulated; magazine change by swinging and tilting; water-cooled mold disc; details scant; limited use.
160. 1910. WICKS COMPOSER AND JUSTIFIER. Frederick Wicks; English; single-type; same basic construction as 1879 machine (#48); improvements; Stringer Line Justifying Machine (#148) added; limited use.
161. 1911. AMALGATYPE. E. B. Barber; American; matrix, type-bar; details scant; machine cast single types with expanding spacers; secondary casting welded types into solid line; weight 550 pounds; distribution by remelting; no use.
162. 1911. HUMMEL COMPOSER. J. J. Hummel; American; single-type; details scant; plurality of type fonts, series of magazines; no use.
163. 1912. LESKOW COMPOSER. E. Leskow; English; single-type; type in stationary radial channels; composing channel rotated; details scant; use unknown.
164. 1912. LINOGRAPH. Hans Petersen; American; matrix, line slug caster; circulating matrices; Linotype principle, many refinements, simplifications; vertical magazines, one elevator, short matrix travel, low-quad slugs; 1921 model three magazines, 1923 model twelve magazines; less than five feet high; widespread use until 1944.
165. 1912. ROWOTYPE. Ogden Rowotype Company; American; matrix, line slug caster; typewriter keyboard, could be removed and used as office typewriter; matrices on long arms, concentric rows at top of machine; fell by gravity to assembling and casting point; slug cast in vertical position; electrical escapements; justification by pairs of wedges; no use.
166. 1912. THOMPSON TYPESETTER AND JUSTIFIER. John S. Thompson; American; single-type; details scant; used temporary spacers and cast proper spaces, inserted between words; no use.

167. 1913. **INTERTYPE**. International Typesetting Machine Company (later Intertype Company); American; matrix, line slug caster; Linotype principles; circulating matrices, 90-keys; refinements and simplifications from Linotype; quick magazine changes; machine adaptable to alterations to change model; universal use.
168. 1916. **HANSEN FACSIMILE TYPESETTER**. H. P. Hansen; American; single-type; typesetter for duplicating purposes; small electric motor; gravity; types moved directly into type drum; printing performed; type drum inserted in automatic distributor at top of machine; special type with grooves; limited use.
169. 1916. **ORIENTYPE**. S. Sheba; Hawaiian; single-type; Chinese language; resembled small Brooklyn Bridge; gravity; sliding seat for operator; types in brass tubes with combination notches, released by springs, traveled on belt to assembler; types classified into 100 units; use unknown.
170. 1917. **ELROD LEAD CASTER**. Benjamin S. Elrod; American; material maker, strip; crucible, continuous-flow mold; frictional puller draws material from mold in continuous strip; cuts to lengths to 25 inches; 1- to 36-point leads, slugs, rules; universal use.
171. 1922. **ROBERTSON PHOTO-COMPOSING MACHINE**. John Robertson; English; non-classified; basic Linotype principle; circulating photo-mats; camera, film-controlling device replaced casting mechanism; matrices reflective, larger than standard sizes; too early for times; no use.
172. 1923. **MONOTYPE MATERIAL MAKER**. Lester Walden, M. C. Indahl; American; material maker, strip; crucible, metal injected into mold by force-pump, pushed out by steel blade; interchangeable molds; strips any length, stacked on table; casts 2- to 36-point material, rules and borders; universal use.
173. 1925. **MONOTYPE GIANT CASTER**. M. C. Indahl; American; type caster, single-type; uses own matrices; casts up to 72-point types, and strip furniture to 72-point; castings on larger sizes hollow or recessed; universal use.