July 17, 1951 F. A. BABCOCK 2,561,263

PRINTER'S CALCULATOR AND CIRCULAR SLIDE RULE

Filed May 27, 1948 2 Sheets-Sheet 1

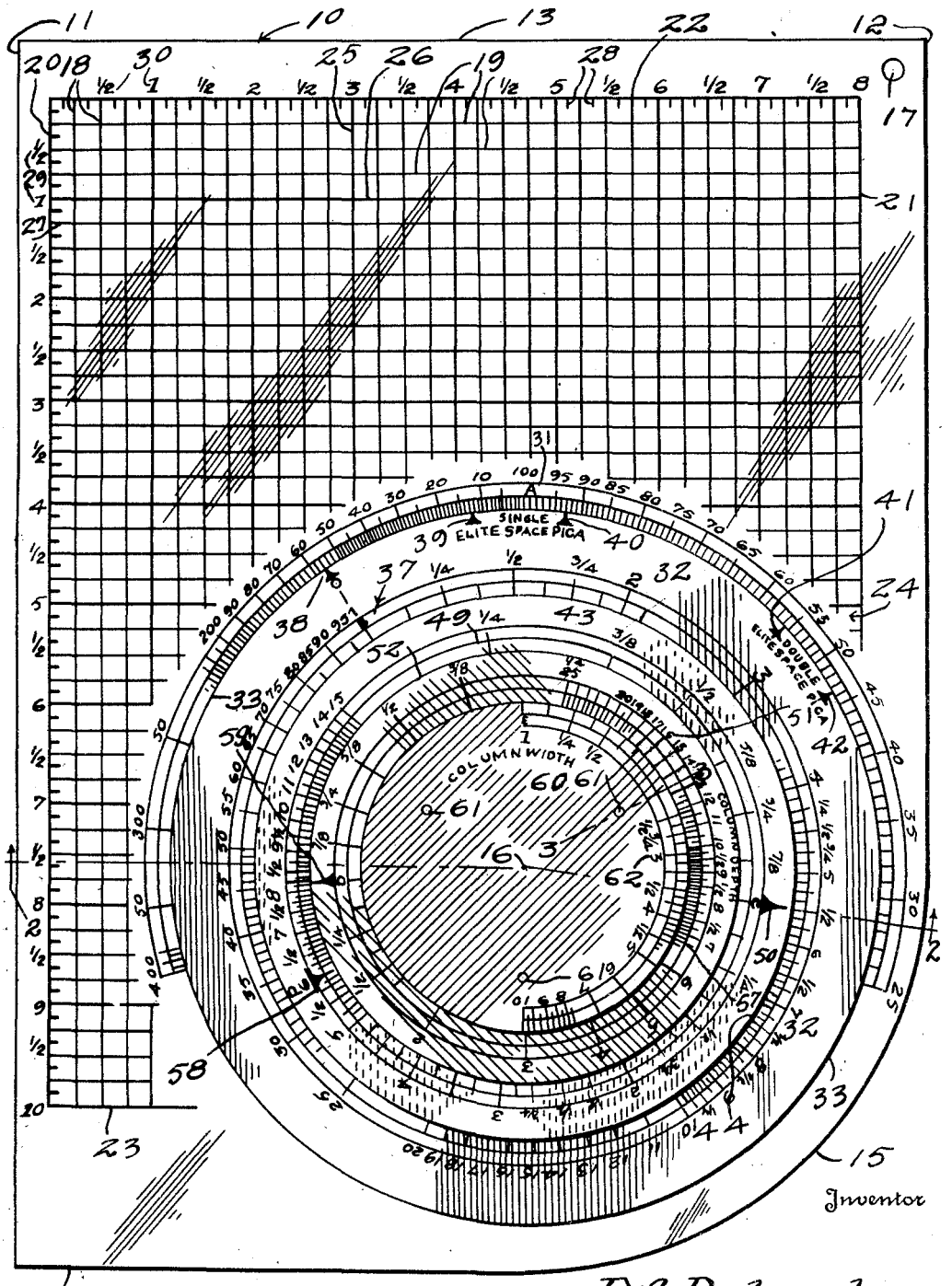

FIG. 1.

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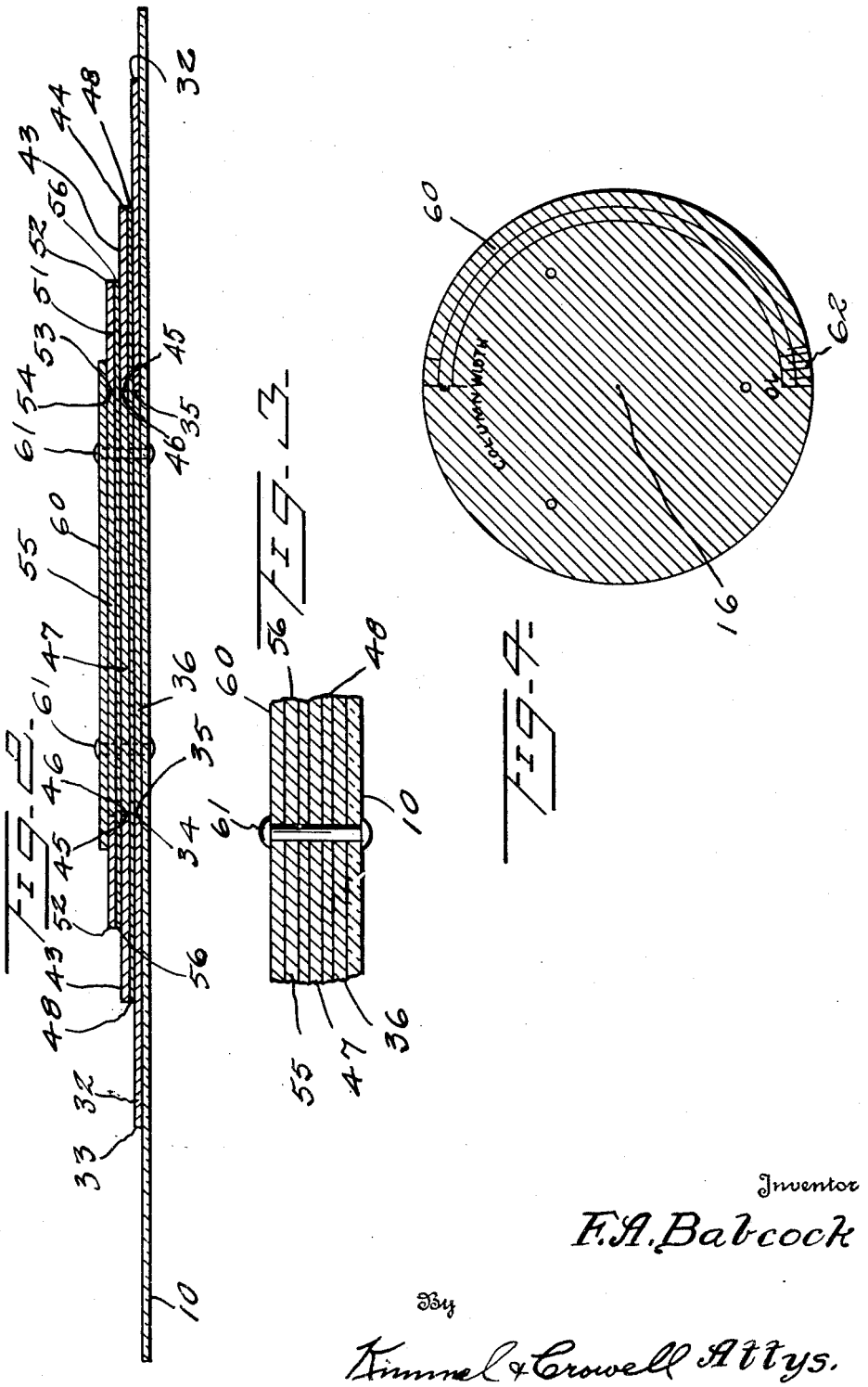

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UNITED STATES PATENT OFFICE

2,561,263

PRINTER'S CALCULATOR AND CIRCULAR SLIDE RULE

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Application May 27, 1948, Serial No. 29,491

3 Claims. (Cl. 235—84)

1

This invention relates to calculators for use by printers, typographers, advertising or copy writers, production workers, editors, lay-out artists and the like.

One of the problems confronted by printers in the lay-out or arrangement of printed matter is to determine the space, both as to column depth and width and its relation to the typewritten text. It is, therefore, an object of this invention to provide a calculating device which will accurately show the space within which a given typed text can be placed using type of a predetermined face and point.

Another object of this invention is to provide a calculator which will give a direct conversion of typewritten copy area to type area without the necessity of counting either characters or words.

A further object of this invention is to provide a calculator which will indicate accurately different widths and lengths of columns within which a given amount of typewritten matter may be placed.

A further object is to provide a novel, simple and easily operated type calculator, caster or converting device of the above character, which will not only determine what size space a piece of typewritten copy will occupy when set in type of a given face and point size, but will facilitate ascertaining or determining the number of words that will need to be written to fill a given space in type of a given face and size; and figuring what type style and size to use for fitting copy that has already been written into a specified lay-out space or column of a certain length or depth and width, all in a quick and accurate manner far faster than by any other method in common use, thereby providing a calculator which is invaluable to typographers, advertising or copy writers, production workers, editors and lay-out artists for the purpose stated.

A still further object is to provide a calculator having a plurality of relatively movable or rotatable circular or annular dials with scales and other indicia, and markings correlated and cooperative with each other, to quickly determine the facts stated in the foregoing objects.

Another object is to provide means between the inner surfaces of relatively rotatable dials to prevent rotation of any other dial when an adjacent dial is turned to set the same and prevent turning or disturbance of any other dial adjacent thereto or that has been previously set.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the

2

drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a plan view of a type calculator, caster or converting device embodying the invention in the form of a circular slide rule,

Figure 2 is an enlarged sectional view taken on the line 2—2 of Figure 1,

Figure 3 is an enlarged fragmentary section taken on the line 3—3 of Figure 1; and

Figure 4 is a detached plan view of the central stationary circular dial or disc forming a part of the calculator.

Referring to the drawings, my type calculator comprises a flat transparent sheet 10 of cellophane, Celluloid, plastic, glass or other suitable transparent material, preferably of a sufficient thickness or relatively stiff form to maintain its flat condition but still permit some flexing thereof without cracking or injury, becoming limp or disturbing its flat condition or sustaining properties. However, the sheet may if desired, be entirely rigid, and is of generally rectangular shape with its length along its opposite side edges 11 and 12, or from top to bottom, exceeding its transverse dimension or width or along its top and bottom edges 13 and 14. However, one lower corner edge such as the lower right hand corner, may be and preferably is rounded or formed on an arc as at 15 concentric to a center point or axis 16. Also, if desired, one upper corner may have a hole 17 by which the device may be hung from a peg or nail when not in use.

Within the central or inner area, or spaced from the marginal edges of the sheet or plate 10, the later is blocked off, marked or ruled with right angularly intersecting cross lines or markings, preferably opaque, consisting of lengthwise lines 18 and transverse lines 19, including a marginal frame or border having side lines 20 and 21 and top and bottom lines 22 and 23 respectively, somewhat similar to "graph" sheets or mathematical paper. However, the lines may be substituted by markings or by dots at the corners or points of joining or meeting and intersection of the perpendicular lines or markings. Also, the lower corner of the lined area preferably terminates on an arc 24 also concentric to the center 16 and of the same radius as the edge 15.

While the lines or markings are blocked off, divided or spaced in quarter inches, preferably with heavier lines at the margins 21, 22, 23 and 24 and intermediate lines 25 and 26 an inch apart forming inch squares, this is optional. In other words, the squared sheet area may be divided and

calibrated in any desired standard linear scale or measure. The marginal or border lines **20** and **22** are also divided or scaled in inches and fractions thereof, or in ⅛-inches as shown at **27** and **28** and provided with scales **29** and **30**, marked in inches and half inches, or fractions of any other standard linear measure or scale. All of the divisional lines or markings, scales and figures are of course visible through the transparent sheet, and this is true of a piece of typewritten or other copy over which the transparent sheet is placed to determine the size thereof. As shown, the length or depth is 10-inches and the width 8-inches, which is generally sufficient for all practical purposes.

The sheet **10** within the arc **24** is provided with a circular dial or logarithmic scale **31**, marked "A" for convenience of operation, also concentric to the center point or axis **16** and edge **15** and calibrated decimally or in tenths from 25 to 400, divided and marked into units and hundreds, and with spacings progressively and uniformly reduced in lengths of divisional measurements counter-clockwise or from right to left. This scale **31** preferably extends in an arc of substantially 210 degrees and in the form of a dual or double row scale with inner and outer concentric columns as shown, and the indicia or numbers thereon represent the measurements and connotations of type factor figures of the basic type faces used in Linotype, Monotype and foundry types of which there are approximately 250, in all available point sizes up to 18 points and set solid, as well as 1-point, 2-point and 3-point leaded. The factor for any type may be ascertained from available lists or statistics or for any type not given therein, may be readily determined by counting the characters, including spaces between words, in a square inch of the correct size and leading.

On the sheet **10** within the arc **24** and scale **31** concentric thereto, are a plurality of contrasting and progressively smaller circular or annular dials rotatable relative to each other and a central fixed dial, all bearing calibrations or other indicia so correlated as to be relatively turned to quickly indicate the determinations desired as above pointed out, and to provide means between the inner surfaces of relatively movable dials to prevent rotation of any other dial when an adjacent dial is turned to facilitate independent setting thereof and prevent disturbance of any other dial that has been previously set. Said annular dials are mounted in a simple and novel manner to turn in concentric interfitting or overlapping relation upon inner central circular hubs or discs with interposed stationary circular spacers or thin sheets disposed between the intermediate adjacent hubs or discs and the movable dials, and preferably corresponding in size to the dials immediately thereover with the peripheral edge of each spacer being positioned coincident with an adjacent overlying dial, to prevent disturbance of the position of any other dial, especially after being set, upon turning an adjacent dial to any desired or determined position by readily sliding thereon. The arrangement of the dials being positioned over an adjacent separator held stationary adds greatly to the accuracy of my calculator as the extended edge of the fixed separators placed under the edge of each dial prevents undesired deflection of the dial edge which allows for close reading of the adjacent scales.

In the embodiment illustrated, there is provided a rotatable outer annular bottom dial **32** or disc set against or in direct contact with the top surface of transparent sheet **10** with its outer peripheral edge **33** directly within the scale **31** and its inner peripheral edge or circular concentric opening **34** precluded from view, fitting and rotatable in bearing relation around the peripheral edge **35** of a stationary central circular hub or disc **36** suitably fixed or anchored to the sheet **10** to hold the same against turning relative thereto and with the dial **32** rotatable therearound on the smooth top surface of sheet **10**. The dial **32** is provided with a concentric inner annular logarithmic scale **37**, marked "B," also a dual or double row scale, with inner and outer concentric columns divided into fractions of 100 from ⅛ to 100, with spacings also progressively and uniformly reduced in lengths of divisional measurements clockwise or from left to right and calibrated or marked in eighth fractions from 0 (zero) to 10; in units from 10 to 50, and in divisions of five units each from 50 to 100 designated at 1 within the "0" or zero designation and the latter subtended by an arrow **38** pointing outwardly at the edge **33** and cooperating with the calibrations and indicia of the scale **31** on the transparent sheet **10**. Outwardly of the "½" fraction marking on the scale of dial **32**, the latter is marked "Single space" and equidistantly on each side thereof bears connotations "Elite" and "Pica" designating the line spacing and typewriter type size. The "Elite" and "Pica" data are subtended by similar arrows **39** and **40** likewise pointing outwardly at the edge **33** and cooperating with the scale **31**. In addition, dial **32** outwardly of the scale marking "3," is marked "Double space" and equidistantly on each side thereof likewise bears connotations "Elite" and "Pica" also designating line spacing and typewriter type size. The latter "Elite" and "Pica" data are subtended by similar arrows **41** and **42** likewise pointing outwardly at the edge **33** and cooperating with the scale **31**.

A smaller annular dial **43** or disc is disposed above the dial **32** with its outer peripheral edge **44** directly within the scale **37** of dial **32** and its inner peripheral edge or circular concentric opening **45** precluded from view, fitting and rotatable in bearing relation around the peripheral edge **46** of a stationary central circular hub or disc **47** also suitably fixed or anchored to the sheet **10** and disc **36** to hold disc **47** against turning relative thereto and with the dial **43** rotatable around disc **47** at its peripheral edge **46**. A stationary circular spacer, disc or thin sheet **48** of the same diameter as dial **43** is superimposed upon an inner annular portion of dial **32**, covers disc **36** and is fixed or anchored to the sheet **10** and disc **36** so that either dial **32** or **43** may be turned and set to the desired position without turning the outer or adjacent dial or disturbing the setting thereof. Dial **43** is provided with a concentric inner annular scale **49** which also may be a dual or double row scale with inner and outer concentric columns divided into fractions of eighths from ¼ to 15; in units from zero to 15 and calibrated or marked in eighths to 1; in fourths from 1 to 5; in halves to 10 and eighth divisions from 10 to 15, all spacings being progressively and uniformly reduced in widths or lengths of divisional measurements clockwise or from left to right. At the unit "1," scale **49** of dial **43** is marked "C" within an outer arrow **50** pointing outwardly at its peripheral edge and cooperating with scale **37** of outer dial **32** in

such relative position for averaging the horizontal character or word count.

A still smaller annular dial 51 or disc is disposed above the dial 43 with its outer peripheral edge 52 directly within the scale 49 of dial 43 and its inner peripheral edge or circular concentric edge at opening 53 precluded from view, fitting and rotatable in bearing relation around the peripheral edge 54 of a stationary central circular hub or disc 55 also suitably fixed or anchored to the sheet 10, discs 36 and 37 and stationary circular spacer disc or thin sheet 48 to hold disc 55 against turning relative thereto and with the dial 51 rotatable around disc 55 at its peripheral edge 54. A stationary circular spacer disc or thin sheet 56 of the same diameter as the dial 51 is superimposed upon an inner annular portion of dial 43, covers disc 47 and is fixed or anchored to sheet 10, discs 36, 37 and 47, spacer disc 48 and disc 55, so that either dial 43 or 51 may be turned and set to the desired position without turning the other or adjacent dial or disturbing the setting thereof.

Dial 51 is provided with a circular or concentric inner annular scale 57 which may also be a dual or double row scale with the inner and outer columns divided into and calibrated in fractions of inches or other standard linear scale, in eights from 0 to 25 reading counter-clockwise with all spacings progressively and uniformly reduced in width in such direction or from left to right. At the unit "6," scale 49 of dial 43 is marked with an inner arrow 58 pointing inwardly at the outer peripheral edge of dial 51 and cooperating with the scale 57 of dial 51. Outwardly of the unit "6" and arrow 58, dial 43 is marked "P." At the unit "1" of scale 57 of dial 51, the latter is marked "D" and with an outer arrow 59 pointing outwardly at its peripheral edge and cooperating with the scale 49 of dial 43. Also, dial 51 is marked "Column depth."

An inner central smaller stationary circular dial or disc 60 is provided at the center of the dial 51 over the disc 55 to preclude the latter from view and dial 60 at its annular peripheral edge portion overlaps or extends over the inner annular edge portion of the annular dial 51. Headed pins or rivets 61, shown as three in number, extend through dial 60 and parts 10, 36, 48, 47, 56 and 55 to anchor them to sheet 10 and hold them stationary. Dial 60 is provided with a semicircular scale 62 divided and calibrated in eights reading in a clockwise direction from 1 to 10 with all divisions progressively and uniformly reduced in width in such direction. The divisions of scales 57 and 62 only are not limited to inches, but may be any unit to produce answers to problems in picas points etc., as desired. Scale 62 is marked "E" at the unit "1" and inwardly thereof or at any other suitable place, is marked "Column width" as shown. In order to carry out the contrasting scheme of the various dials, they may be differently marked or colored, and for this purpose, dial 32 may be red, dial 43 purple, dial 51 green and dial 60 brown, as shown, or such dials in the order named may be yellow, green, red or brown and white, respectively.

In the operation of the calculator to find what size space a typewritten or other copy will occupy when set in type of a given face and size, the following steps are taken.

First, determine whether the copy is typed in pica typewriter type (10 characters to the lineal inch) or in elite typewriter type (12 characters to the lineal inch) and whether it is typed single or double space. Next, select the type face and size in which the typewritten copy is to be set. Having a list of type factors, the factor and number for the particular type face and size selected is found. By way of example, assuming that our typewritten copy is typed in pica type, single spaced, and we want to have it set in 10-point Garamond bold type, 2-point leaded (10 on 12), from the type factor list it is determined that this particular type has a factor of 93 or in other words, contains an average of 93 characters to the square inch. Therefore, set the arrow 40 on the dial 32 designated as "Pica-single space" directly opposite the factor number 93 on scale 31 of the transparent sheet 10. To measure the typewritten copy with the transparent sheet 10, the latter is placed directly over the copy so that the top horizontal line 22 extends directly across the top line of the typing and the left hand vertical line 20 extends down the left hand edge of the typewritten copy. Two readings are needed, one to give us a factor for the average width of the typewritten lines, and the other to determine a factor for the depth or length of the typewritten copy. These figures as indicated on the transparent sheet will then be transferred to the respective dials.

Lines of typewritten copy are, of course, uneven as to length. This, however, is a variable that in type casting can be largely overcome by care at this stage of the calculation. Looking at the right hand margins of the copy through the transparent sheet, the average width of the various typewritten lines are found. A little practice will enable one to determine this average quickly and without the slightest necessity for counting the characters in the long or short lines. In this case let us assume that the average line width falls at the vertical division line indicated at 5½. This, then, is the column or copy width factor. This number is then found on the red scale 32 and the purple scale 43 is then turned until the arrow 50, indicated at "C," points directly at such number or marking on the scale 32.

It will be obvious that the lower divisions of scale 37 will be used in working calculations based only on separately typed sheets, namely, the indicia below 8. However, for the purpose of uniformity, scale 37 has been carried from zero to 100 similar to the other scales of the present calculator and provides means for calculating material that can be accumulatively assembled to give a total amount of copy in a given job lot, in which case the higher divisions extending from eight to as high as 100 can be advantageously used.

The next step is to find the number of the horizontal division line on the transparent sheet below the last line of the typewritten copy. This is the factor that indicates the length or depth of the copy and for purposes of our example we will assume it to be 8¼. Whether the copy is double or single spaced makes no difference in determining this depth factor as that was taken care of when we set the factor "Single space-pica" arrow 40 on the red scale 32 at the type factor number of 93 on the scale "A" on the transparent sheet. Next, 8¼ is then found on the purple scale 43 and the green scale 51 is turned and set with the arrow 59 at "D" at this point on the purple scale.

The answers to the problem may then be read on the green scale 51, namely, column depth or length, and on the brown scale 60, namely, column width. Any depth dimension is chosen on

the green scale 51, and the dimension directly opposite on the brown scale 60 will be the column width when the copy is set in 10-point Garamond bold, 2-point leaded. This procedure may be reversed by choosing a desired column width on the brown scale 60 and then referring to the green scale 51 to read the depth of the column of type when set to this width.

In this example, a 6-inch column depth would require a 4⅞-inch column width. A 12-inch column depth would require a 2 7/16-inch column width to accommodate the copy, or you can choose any other depth or width dimension within the range of the scales and learn the corresponding dimension from the opposite scale, giving the preferred column width and column depth to accommodate the typed or other copy in question.

To assure clarity, I have gone into considerable detail in the foregoing instructions. Actually, however, the entire problem simmers down to these five simple steps;

(1) From the list of type factors, find the type factor for the particular size and style of type it is desired to use.

(2) Determine whether the copy is typed in pica or elite, single or double spaced. Set the corresponding arrow-pointer on the red dial 32 directly opposite the type factor number on the scale "A" on the transparent sheet.

(3) Place the transparent sheet over the typed copy sheet and determine the vertical line on the ruled transparent sheet that approximately bisects the uneven right hand margins of the copy at the point indicating the average width of the typewritten lines. Align the arrow 50 or "C" on the purple scale 43 with this width factor figure on the red scale 32.

(4) Find the number of the horizontal line on the transparent sheet that appears directly below the last line of typewritten copy, i. e., the copy depth or length factor number and then set the arrow 59 or "D" at this number on the purple scale 43 by turning green dial or scale 51.

(5) Now read your answers on the scale 57 of dial 51 (Column depth) and the scale 62 of dial 60 (Column width) respectively.

In order to determine the number of words needed to fill a given space when set in type of a specific size or for word count calculations, the two arrow-pointers not used in the foregoing example, namely, the arrow 38 or "0" on dial 32, and the arrow 58 at unit "6" on the dial 43 and pointing inwardly, are used. The latter falls at "6" on the scale 49, this being the number of characters in the average word.

The dials are then set as follows:

The setting of scale 57 of dial 51 is made by choosing the figure denoting the depth or length in inches of the lay-out copy space to be filled. This figure is set opposite the figure on the scale 62 of dial 60 that indicates the lay-out copy area width. The scale 49 of dial 43 is then set by adjusting the arrow "P" or 58 on the dial 43 opposite the arrow "D" or 59 on the dial 51. The scale 37 of dial 32 is then set by referring to the type factor list and selecting the type factor for the particular type face, size and leading to be used on the particular job. The arrow "0" at 38 on the dial 32 is then set at this type figure on the scale "A" indicated at 31 on the transparent sheet 10.

By this means the answer is indicated by the arrow "C" at 50 on the scale 49 of dial 43 which then points directly to the answer on the scale 37 of dial 32. The answers will appear on scale 37 of dial 32 as fractions of 100. To left of "1," answers are read direct. To right they are converted from fractions. For example: "¾" for instance, indicates that 75 words will be needed to fill the space; "1¼" indicates 125 words; "2" indicates 200 words; "2½" indicates 250 words; "3½" indicates 350 words and so on.

In actual example, we will assume the user wants to find how many words should be used or written to fill a lay-out space 3-inches wide by 5-inches deep when set in 10-point Cheltenham bold type 1-point leaded, and this is accomplished as follows:

(1) Set 5 which is the depth of the lay-out area on the scale 57 of green dial 51 opposite 3, the width, on the dial 60.

(2) Set the arrow 58 marked "P" of scale 49 on the purple dial 43 opposite the arrow 59 marked "D" of scale 57 on the green dial 51.

(3) The type factor table tells us that the factor number for 10-point Cheltenham bold type 1-point leaded is 90. Thus, arrow 38 marked "0" on the red dial 32 is set to point to the figure 90 on the scale 31 marked "A" on the transparent sheet 10.

(4) The arrow 50 marked "C" of scale 49 on the purple dial 43 now points to 2¼ on scale 37 of the red dial 32, meaning that 225 words will be required to fill the space.

The calculator constituting the type caster or converter constituting the present invention is based on the principle of the count of type characters per square inch but it is understood that any other suitable lineal measurement or scale may be employed. This character, hereinafter known as "type factor" forms the basis of the calculation and will be found on the scale printed on the transparent sheet at 31. From these factors, working inward, the set of the various dials directly converts any typewritten sheet of copy with no intermediate steps, from either pica or elite, single or double space, into the area into which the specified type will fit. This scale will also reverse the procedure and determine the size type or the type factor of any page of typewritten or copy matter and area into which it is to be set. This converter will also calculate the number of words to be written and fitted into a predetermined area in a predetermined type factor. By placing the transparent scaled sheet over the copy it automatically measures or indicates the size of the typewritten page or sheet. The numbers across the top and down the left hand side of the transparent sheet are transferred to the red and purple dials 32 and 43 respectively for conversion and the contrasting colors of the various dials will permit convenient and immediate identification of the various dials in setting the same for the various determinations such as set in the examples. Thus, the calculator or converter gives a direct reading in inches or may be designed to give a direct reading in any other unit of measurement desired, such as picas, points, etc., by two sets of dials or otherwise without intermediate calculation between the various steps and requires no figuring whatsoever in order to calculate and directly convert the sheet of typewritten copy to an area of desired column width and depth in inches and setting of the dials gives the correct area to accommodate the type face chosen.

The scales 31, 37, 49, 57 and 62 of the calculator of this invention are normal logarithmic scales

commonly used in slide rule operation with modifications as follows:

Each scale is based on a circular scale running from 1 to 100 around the scale. Scale **31** is marked out on the transparent sheet in an arc corresponding to the radius of dial **32** and runs counter-clockwise utilizing only a portion on either side of 1 running to the left up to 400 and to the right to 25. The divisions on this scale are basically 10ths, and the figures instead of starting at 1, start at 100 and proceed to 200, 300, etc. If this scale were completed, the extreme right hand number would be 2500 instead of 25; however, instead of using the right hand section of this scale as a continuation of the figures, it has been changed to indicate fractions of 100. Scale **37** marked "B" for convenience of operation is extended clockwise running from 1 to 100, and is divided into basic units of 8ths. Scale **49** of dial **43** marked "C" is an exact duplicate of scale **37** except that to the left of 1 fractional divisions of 1 have been indicated down to 4ths thus permitting calculations below the basic division of 1 inch. Scale **57** of dial **51** marked "D" is again the same as scales **49** and **37** except that it runs counter-clockwise. Scale **62** of the fixed dial **60** marked "E" is again an exact duplicate of scale **37** except that it is shorter in linear distance covered. Because of its limitations as to size and the desirability of simplifying the appearance of the calculator the last named scale, namely **62**, has been carried to 10 only.

The logarithmic arrangement of the scales of the present device being proportional to the values of their functions provide for solution of layout problems wherein:

a—is the number of characters in the average length line of typewritten copy, which represents the column width.

b—is the number of lines of typewritten copy and is known as the column depth.

c—is the number of characters in an inch of type face chosen.

d—is the number of lines in an inch depth of the type face chosen.

e—is the quotient of *ab* divided by *cd*.

y—is the width of type column required.

x—is the type column depth required.

ab—is determined by laying the transparent sheet **10** over the typewritten copy to be printed and reading *a* as the average lengths of the typewritten lines and *b* as the number of horizontal lines in the copy.

cd—is determined by the number of type characters in one linear inch of the type chosen and the number of lines of type to be placed in each vertical inch of column depth, to be filled.

Example.—A type face having 18.5 characters to the inch and 6 lines deep would contain 111.0 characters. This is conventionally recognized as the type factor.

e—is the number of square inches of space required for *ab* and is the

$$\text{Quotient}=\frac{ab}{cd}=e$$

y—is the width of the type area to which the copy is to be set in type *cd*, and is a known factor determined by layout requirements.

x—is the depth required for the type set in width *y*, and is the unknown factor to be solved by the calculator, thusly,

$$\frac{ab}{cd}=e,\ \frac{e}{y}=x$$

In developing the scales **31**, **37**, **49**, **57** and **62** I first measure the peripheral distance of each circle required to provide a calculator of the desired size and then transfer each measurement to a straight line. Each distance is then divided into equal parts of 1000 or more depending on the length of scale to be developed. Reference is then made to five place logarithmic tables for each number from 2–10 with their corresponding values which I then plot on the corresponding scale as points of division. Corresponding numbers with their increments are plotted opposite each of the points of a corresponding number. The completed scales are then transferred to each respective dial. An example of what is required is as follows:

In developing scale **37** which is divided into 10ths I find point 2 by using log .30103. This point is placed at an even division as point 2 and log .4771 falls at point 3. The same procedure is followed for scales **37**, **49**, **57** and **62** except that these scales are divided into 8ths and therefore the log of .125, .250, .375, and .400 are used.

I do not mean to confine myself to the exact details of construction herein disclosed but claim all variations falling within the purview of the appended claims.

What I claim is:

1. A type calculator of the kind described comprising a transparent scaled sheet, a circular logarithm scale on said sheet having numerical indicia indicative of the number of type characters per unit area, a disc rotatable in said scale having indices for cooperation with said first scale for determining proportional members of type characters in proportional areas, an inner logarithm scale on said disc having indicia indicative of the average length of type in a given area, a second rotatable disc concentric to said first disc and having a logarithm scale for cooperation with said second logarithm scale, a third concentric disc rotatable on said sheet having a logarithm scale having indicia indicative of the space required for said type and cooperating with said latter logarithm scale, and a fourth disc fixed on said sheet having a logarithm scale cooperating with said last mentioned logarithm scale, for calculating the number of selected type characters for a selected area proportioned to the number of type characters in a given area.

2. In a calculator as defined in claim 1, of a separating member placed adjacent a rotatable disc formed with an outer edge, said member being fixed against rotation and having a peripheral edge approximately coincident with the outer edge of said rotatable disc.

3. A calculating device comprising a transparent base member formed with a semi-circular logarithmic scale having numerical indicia marked thereon indicative of the number of type characters for the unit area, a plurality of superimposed circular discs rotatably carried by said base, said circular discs having outer edges formed with log scales disposed from said scale of the base member for cooperation with said semi-circular scale for determining proportional numbers of type characters in proportional areas, a spacer disc positioned under each of said rotatable discs and fixed to the base against rotation relative thereto, each of said spacers being formed with an outer edge substantially coincidental with the outer edge of an adjacent disc forming a support and bearing means coextensive

of a said adjacent disc for independent supported rotation of said rotatable discs relative to each other and said spacers.

FOSTER A. BABCOCK.

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