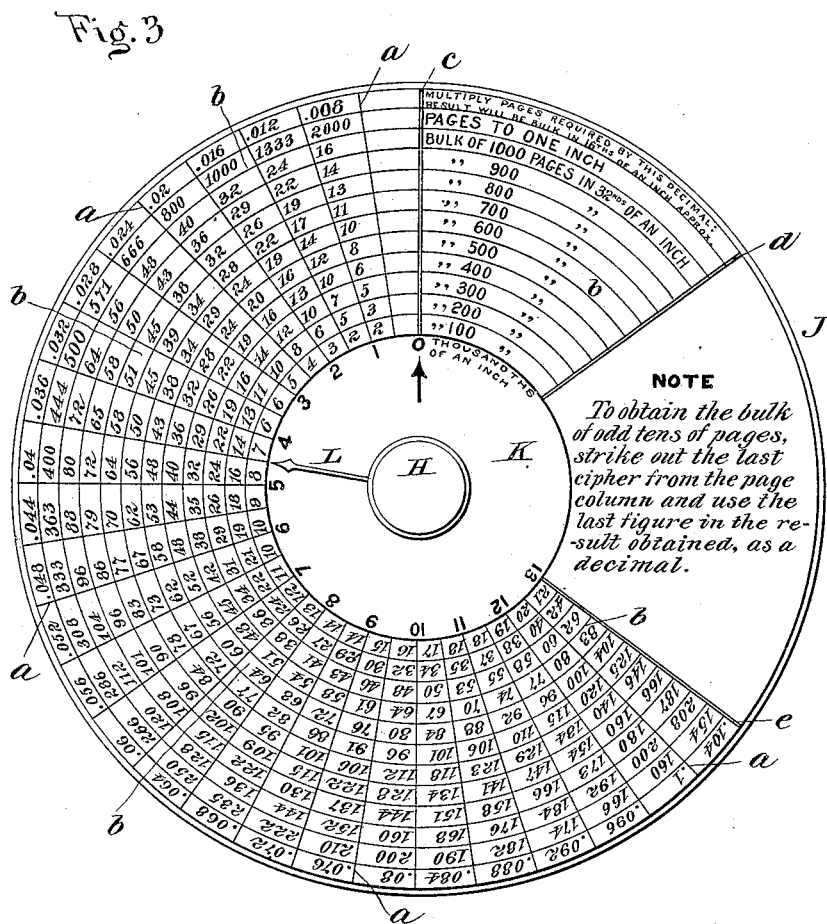


A. M. GRANTHAM.
PAPER COMPUTING INSTRUMENT.

(Application filed Sept. 19, 1899.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:

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Att'ys.

UNITED STATES PATENT OFFICE.

ARTHUR MYLES GRANTHAM, OF NEW YORK, N. Y.

PAPER-COMPUTING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 649,050, dated May 8, 1900.

Application filed September 19, 1899. Serial No. 731,000. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR MYLES GRANTHAM, a subject of the Queen of Great Britain, residing and having my post-office address at No. 66 Fifth avenue, borough of Manhattan, in the city, county, and State of New York, have invented a certain new and useful Paper-Computing Instrument, of which the following is a specification.

- My invention relates to an improved instrument intended for automatically securing computations in reference to sheets of paper, the invention being particularly designed for use by publishers, printers, paper manufacturers, paper agents, and others interested in the use and manufacture of paper, and especially book-paper. At the present time it is the custom in order to obtain the data necessary with which to calculate the weight of paper required for a definite purpose—such, for instance, as in the making of a book of a desired thickness—to first make a dummy volume of the desired number of pages, which may be used as a basis for the computation. The making of dummies is not only expensive, crude, and laborious, but it is often impracticable and in many cases impossible, owing to the lack of sufficient sheets on hand to represent the desired number of pages. The main and essential object of my invention is the production of a simple and compact computing instrument by which the data necessary for securing the weight or thickness or other information connected with sheets of paper may be effected automatically without the necessity of making dummies and with entire expedition.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side view of a convenient embodiment of my invention; Fig. 2, a front view thereof looking in the direction of the arrow *a b*; and Fig. 3, a plan view looking in the direction of the arrow *c d*.

For the purpose of clearness in Fig. 2 I have omitted the scale from the dial.

In all of the above views corresponding parts are represented by the same letters of reference.

A represents a suitable base which carries

two standards B and C, having heads D E, in which are mounted the two screws F and G, said screws being placed in line, as shown. The inner faces of these screws are made perfectly true, so that no errors can occur in the micrometer-gaging of the sheets. The screws F and G are turned by the milled or knurled heads H H. A thumb-screw I is employed to lock the screw F in any desired position of adjustment. Carried upon the standard C in a plane at right angles to the axis of the screws F and G is a dial J, carrying a scale K on its face, said scale being made, preferably, of celluloid or similar material. The screw G is provided with a pointer or index L, which coöperates with the data carried by the scale K. The data may be suitably varied to suit the individual case; but a convenient arrangement thereof is illustrated.

a a a are radial lines which are diametrically disposed upon the scale to form a series of radial columns occupying the major portion of such scale. In the present instance these columns occupy thirteen-twentieths of such surface; but obviously they may be extended or reduced in number.

b b b represent concentric parti-circles which are struck through the radial lines *a*, so as to divide the bulk of the scale into a series of radial and concentric spaces carrying the desired figures to indicate the result of any computation.

c d e are other radial lines which divide the space on the scale not occupied by the figures referred to into two portions, one of which contains references explanatory of the figures referred to and the other of which may, as indicated, contain in concise terms a convenient rule, the purpose of which will be presently explained, for increasing the capacity of the instrument.

With the specific data described employed on the scale K the assumption is that the pitch of the screw G is .020 of an inch, so that in turning the head H to advance the pointer L from "0" to "13" the screw G would have retreated from the screw F to a distance of .013 of an inch, this being the maximum thickness of any paper with which I am familiar that is now on the market.

The explanatory matter contained by the scale between the radial lines *c* and *d* may be

of any suitable character, a convenient arrangement being shown. In the outermost circle between the edge of the dial and the outer circle *b* are the words "Multiply pages required by this decimal. Result will be bulk in sixteenth of an inch approx." In the next space below are the words "Pages to one inch." In the third space are the words "Bulk of 1000 pages in thirty-seconds of an inch;" next "900 pages," "800 pages," "700 pages," and so on. If now it is assumed that data concerning the thickness or weight of a sheet of paper are desired, the sheet will be placed between the faces of the screws *F* and *G* and the head *H* of the screw *G* turned until the sheet is held between the screws. The pointer *L* will therefore indicate on the scale the thickness of the sheet in thousandths of an inch. Assuming, as indicated, that this thickness is .0045, then it will be seen that if the book which is to be printed is to have one thousand pages its bulk or thickness in sixteenths of an inch will be one thousand multiplied by .036, equals thirty-six sixteenths, equals 2.25 inches approximately, or, instead, the figures indicated will show that a book of one inch in thickness made of the paper under comparison would be one of four hundred and forty-four pages, or, on the other hand, if it is known that the book to be made is to have, say, five hundred pages the figure in the corresponding circle will show that such a book will have a thickness of thirty-six thirty-seconds of an inch.

The rule referred to by which the capacity of the instrument will be increased is stated in terms to be: "To obtain the bulk of odd tens of pages, strike out the last cipher from the page-column and use the last figure in the result obtained as a decimal." However this rule may be expressed, its substance may be thus explained: Suppose it is desired to know the thickness of a book of six hundred and forty pages to be made of paper the thickness of which has been shown by the pointer *L* to be .0045. The six hundred pages will obviously have a thickness of $43/32$ of an inch, while the forty pages will obviously have a thickness of $2.9/32$ of an inch, making $45.9/32$ of an inch for the complete book. In this way it is possible from a single sheet of paper to determine automatically and very quickly the number of pages which will be required to occupy a certain bulk—the amount of bulk which will be required to be occupied in a given number of pages in decimals or in an odd number of pages by the use of the decimal multipliers contained in the extreme outer circle.

The purpose of the screw *F* is to secure adjustment of the apparatus to compensate for changes of temperature, wear, &c. This adjustment is effected, obviously, by moving the head *H* of the screw *G* until the pointer *L* is coincident with the "0" and by then turning the screw *F* until its inner face engages the cor-

responding face of the screw *G*, after which the thumb-screw *I* is engaged with the screw *F* to lock it against accidental movement.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. As a new article of manufacture, the combination with a micrometer and an indicating device the position of which is dependent upon the distance separating the micrometer-faces, of a scale with which said indicating device coöperates, said scale being supplied with figures representing the pages in a given thickness which will be occupied by sheets subjected to the action of the micrometer, and also with figures representing the thicknesses which will be occupied by such sheets in various amounts, substantially as set forth.

2. As a new article of manufacture, the combination with a micrometer and an indicating device the position of which is dependent upon the distance separating the micrometer-faces, of a scale with which said indicating device coöperates, said scale being supplied with figures representing the pages in a given thickness which will be occupied by sheets subjected to the action of the micrometer, and also with figures representing the thicknesses which will be occupied by such sheets in various amounts, and with figures representing the multipliers by which the thickness of odd numbers of sheets can be obtained from a comparison with a single sheet subjected to the action of the micrometer, substantially as set forth.

3. As a new article of manufacture, the combination of a micrometer-screw, a pointer carried thereby, and a scale with which said pointer coöperates, said scale being supplied with figures representing the pages in a given thickness which will be occupied by sheets subjected to the action of the micrometer, and also with figures representing the thicknesses which will be occupied by such sheets in various amounts, substantially as set forth.

4. As a new article of manufacture, the combination of a micrometer-screw, a pointer carried thereby, and a scale with which said pointer coöperates, said scale being supplied with figures representing the pages in a given thickness which will be occupied by sheets subjected to the action of the micrometer, and also with figures representing the thicknesses which will be occupied by such sheets in various amounts, and with figures representing the multipliers by which the thickness of odd numbers of sheets can be obtained from a comparison with a single sheet subjected to the action of the micrometer, substantially as set forth.

This specification signed and witnessed this 14th day of September, 1899.

ARTHUR MYLES GRANTHAM.

Witnesses:

JNO. R. TAYLOR,

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