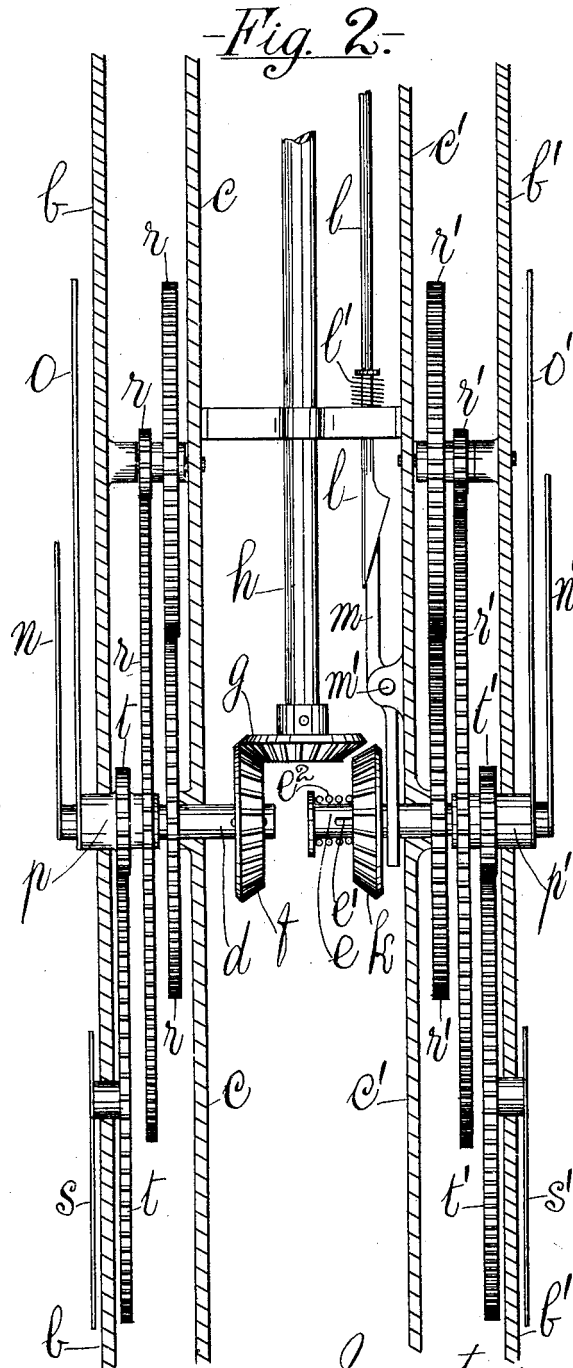
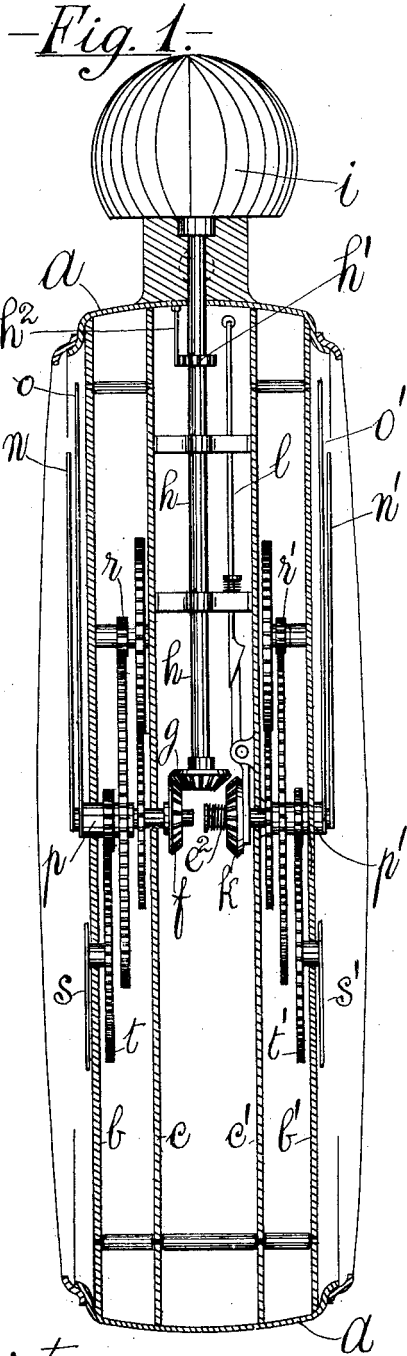


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CALCULATING APPARATUS.

(Application filed Mar. 15, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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No. 661,096.

Patented Nov. 6, 1900.

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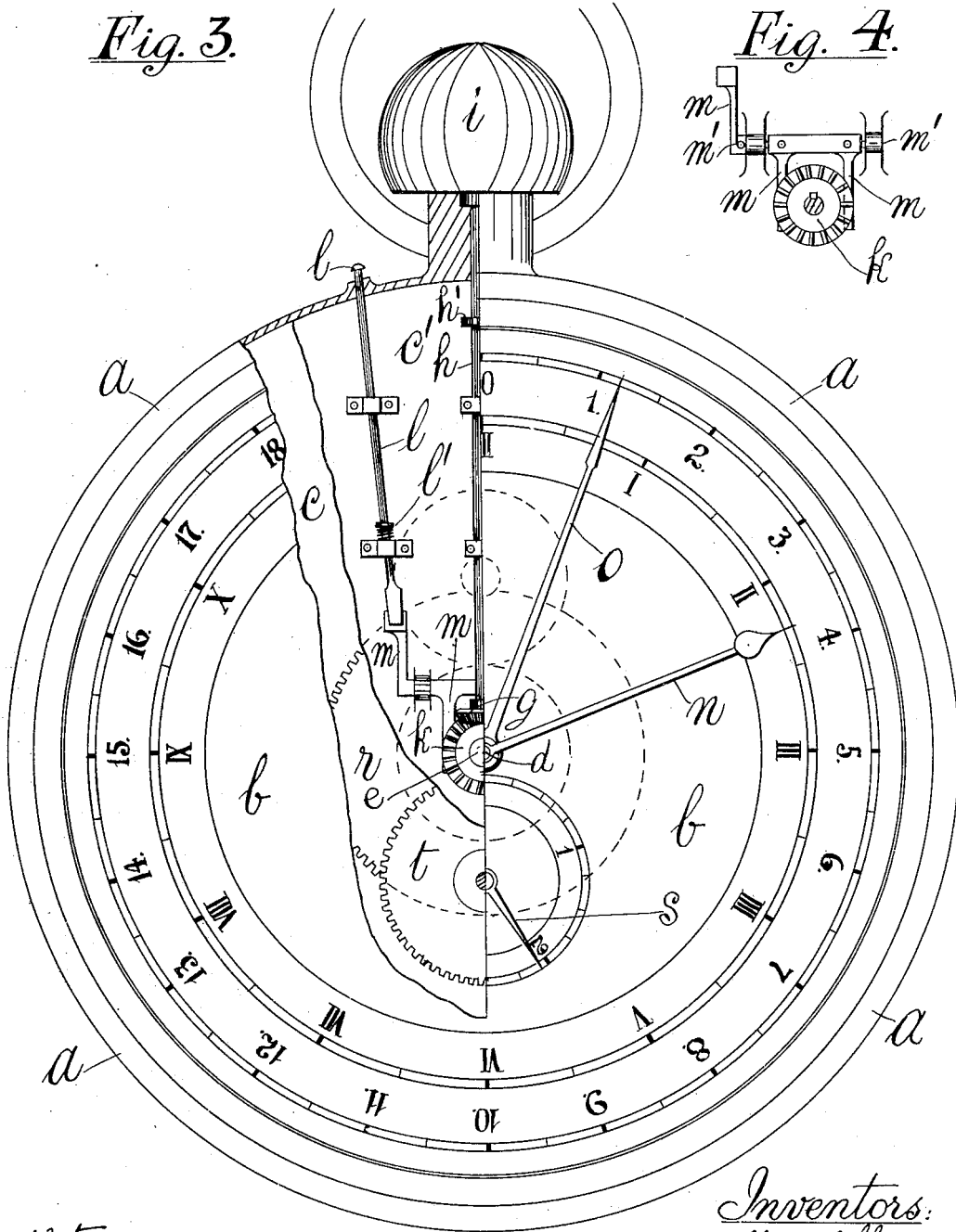
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2 Sheets—Sheet 2.

Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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OF LONDON, ENGLAND.

CALCULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 661,096, dated November 6, 1900.

Application filed March 15, 1900. Serial No. 8,804. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS ALAN WILKINSON, residing at Manchester, in the county of Lancaster, and CLAUD CAREW GIBSON, residing at London, in the county of Middlesex, England, subjects of the Queen of Great Britain, have invented a new and Improved Calculating Apparatus, (for which we have obtained provisional protection in Great Britain, No. 17,306, bearing date August 26, 1899,) of which the following is a specification.

The improvements relate to calculating mechanism, and have for their object to provide apparatus of a simple and convenient character which shall be capable of successively indicating a number of figures at the will of the operator and at the same time of automatically indicating the sum or net total thereof in manner hereinafter to be described. To accomplish this and to carry out our improvements we provide a suitable casing, by preference in the form of a watchcase and of a readily portable character, provided with a simple or item-indicating dial or dials, and with a result-indicating dial or dials, each dial being suitably divided and marked, and also provided with a pointer or pointers. The pointers are mounted in connection with gearing of any desirable character in such manner that on the movement of an actuating device they are simultaneously operated, but means are provided to enable one set of pointers to be moved independently of the other set when required for adjustment purposes.

The accompanying drawings show one form of our invention adapted to the calculation of amounts in British coinage only, although the improvements are equally applicable to different subjects, such as measures of length or the like, whether alone or in addition.

Figure 1 shows a side internal view of apparatus formed in accordance with our improvements and on a larger scale than is intended for convenient use, while Fig. 2 shows a part of the same view on a still larger scale. Fig. 3 shows a front view, partly in elevation and partly internal, of the apparatus, taken at right angles to Fig. 1; and Fig. 4 shows a detailed view of certain parts to be hereinafter described.

The same letters indicate corresponding parts wherever they occur.

a is the outer casing of the apparatus.
 $b b'$ are outer plates, and $c c'$ are inner plates, serving to support various parts of the construction, $b b'$ being also employed as dial-plates. Two shafts $d e$ are mounted to turn in the plates aforesaid, d carrying an attached bevel-wheel f , gearing permanently into a second bevel-wheel g upon the spindle h , connected to the cap i , which cap is capable of being turned by hand. Upon the shaft e a third bevel-wheel k is mounted, so as to be capable of sliding upon a key e' in order to be brought into gear with the bevel-wheel g . The necessary actuation to effect this clutch movement is accomplished in the example shown by means of a spindle l , projecting through to the exterior of the apparatus, the lower extremity of which spindle l is provided with an incline, so that when the said spindle is depressed by the operator the upper arm of the lever m , fulcrumed at m' , is moved toward the plate c' , the lower arms of such lever being consequently forced in the contrary direction, thereby pushing bevel-wheel k into gear, as already referred to. A front view of the lever m and wheel k is shown in Fig. 4.

Springs are shown at e^3 and l' to effect the return of parts $k m l$ on release. A star-wheel h' upon the spindle h , controlled by a spring-pawl h^2 , mounted on the casing, prevents the spindle h being accidentally turned from any ordinary cause, but the power of the said spring-pawl h^2 may be overcome by the operator on turning the cap i . The pointers $n n'$ are connected to their respective shafts $d e$, but the pointers $o o'$ are respectively mounted upon sleeves $p p'$, riding loosely upon the said shafts $d e$, which sleeves receive a reduced rate of motion from such shafts by means of ordinary gearing $r r'$, respectively, and impart a further reduced rate of motion to the pointers $s s'$ through the gearing $t t'$.

The operation is as follows: Supposing the calculation to commence at zero, the spindle l is depressed to place wheel k into gear with wheel g . The cap i is then turned and the whole gearing is set in motion, all the point-

ers being moved until the desired figures forming the first item are indicated equally upon both sets of dials. The spindle *l* is then released, whereby shaft *e*, together with its train, is disconnected. The spindle *h* is then turned, so as to bring back to zero all the item-indicators *n o s*, the pointers *n' o' s'* remaining stationary. On the succeeding operation, which is an exact repetition of the foregoing, while the second item is simply indicated, as before, by the pointers *n o s*, the indicators *n' o' s'* will show a result equivalent to the sum of the two items, having traveled over the combined distances of the two forward movements without having been set back. In like manner further additions may be effected, and it will be readily understood that by actuating the mechanism in a contrary direction items may be subtracted when desired. In this latter case it may be preferable to mark the item-indicating dial with double sets of figures progressing in contrary directions, so that minus and plus indications may be obtained with equal readiness.

It will be obvious that by multiplying the mechanism described a greater number of indicating-dials than are shown may in like manner be applied to one apparatus.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a portable calculating apparatus, item and result indicating mechanisms in two detached portions, capable of effecting addition or subtraction at the will of the operator, and capable of being coupled together in operation, or of being disconnected to permit of the item portion being set back to zero: the said item portion comprising pointers, gearing operating same, and a hand actuating spindle or stem permanently in connection with such gearing, and capable of operating the same in either direction: the said result-indicating

mechanism comprising pointers, gearing operating same, a movable clutch-wheel in connection with such gearing, a coupling-spindle operated from the exterior of the apparatus by hand, and connections actuated by such spindle, whereby said clutch may be forced into or out of communication with the actuating-stem aforesaid, such stem being thereby capable of simultaneously operating both sets of pointers in either direction, or of actuating the item-pointers alone, substantially as herein set forth.

2. In a portable calculating apparatus, item-indicating pointers *n, o, s*, gear-wheels *r, t*, and shaft *d*, operating same, bevel-wheel *f* actuating said shaft, bevel-wheel *g*, gearing with wheel *f*, and hand-spindle *h*, operating wheel *g*; in combination with result-indicating pointers *n', o', s'*, gear-wheels *r', t'*, and shaft *e*, operating same, movable clutch-wheel *k*, actuating said shaft *e*, the movable clutch-wheel being capable of operation through bevel-wheel *g*, and spindle *h*, or of disconnection therefrom, lever *m* acting on said clutch-wheel, and spindle *l*, operating said lever, for the purpose and in manner substantially as herein set forth.

3. In a portable calculating apparatus, pointers *n, n'*, on shafts *d, e*, pointers *o, o'*, on sleeves *p, p'*; riding upon such shafts, and pointers *s, s'*; said shafts *d, e*, and sleeves *p, p'*; gearing *f, g, k, r, r'*, and *t, t'*, operating said pointers; spindle *h*, rotated by hand, and actuating said gearing; in combination with spring *e²*, and lever *m*, acting on clutch-wheel *k*, and spindle *l*, depressed by hand to connect wheels *k*, and *g*, for the purpose and in manner substantially as herein set forth.

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