

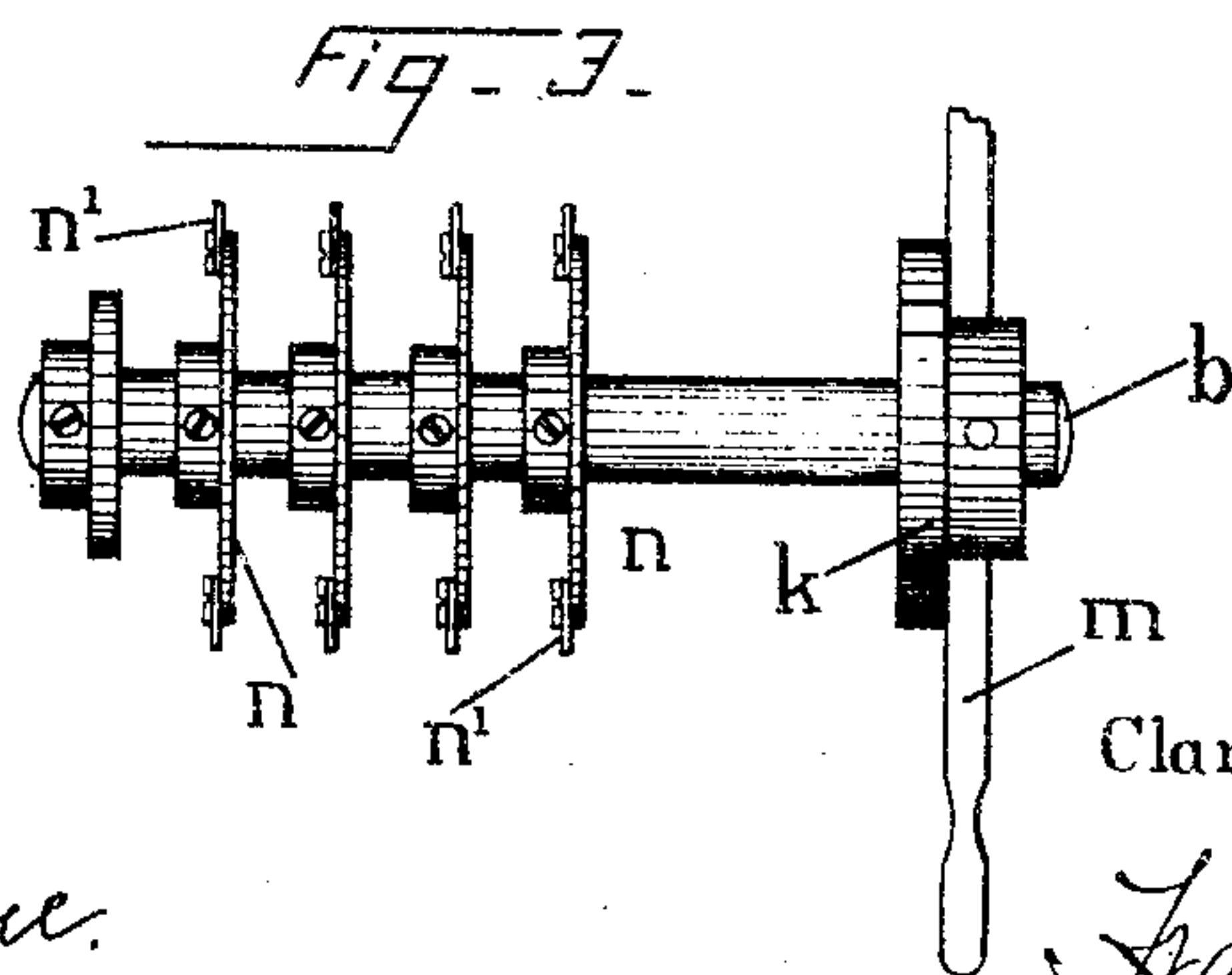
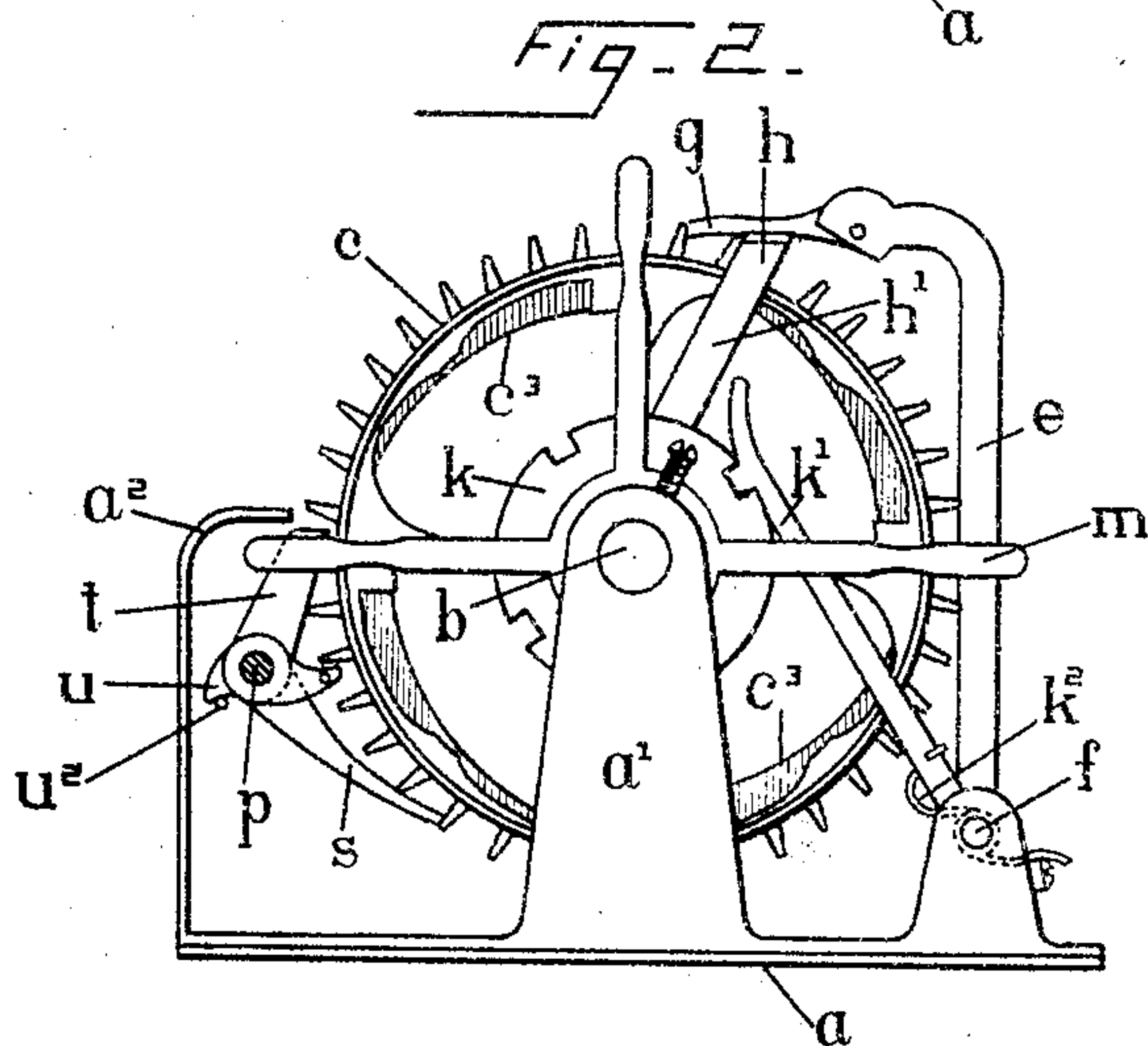
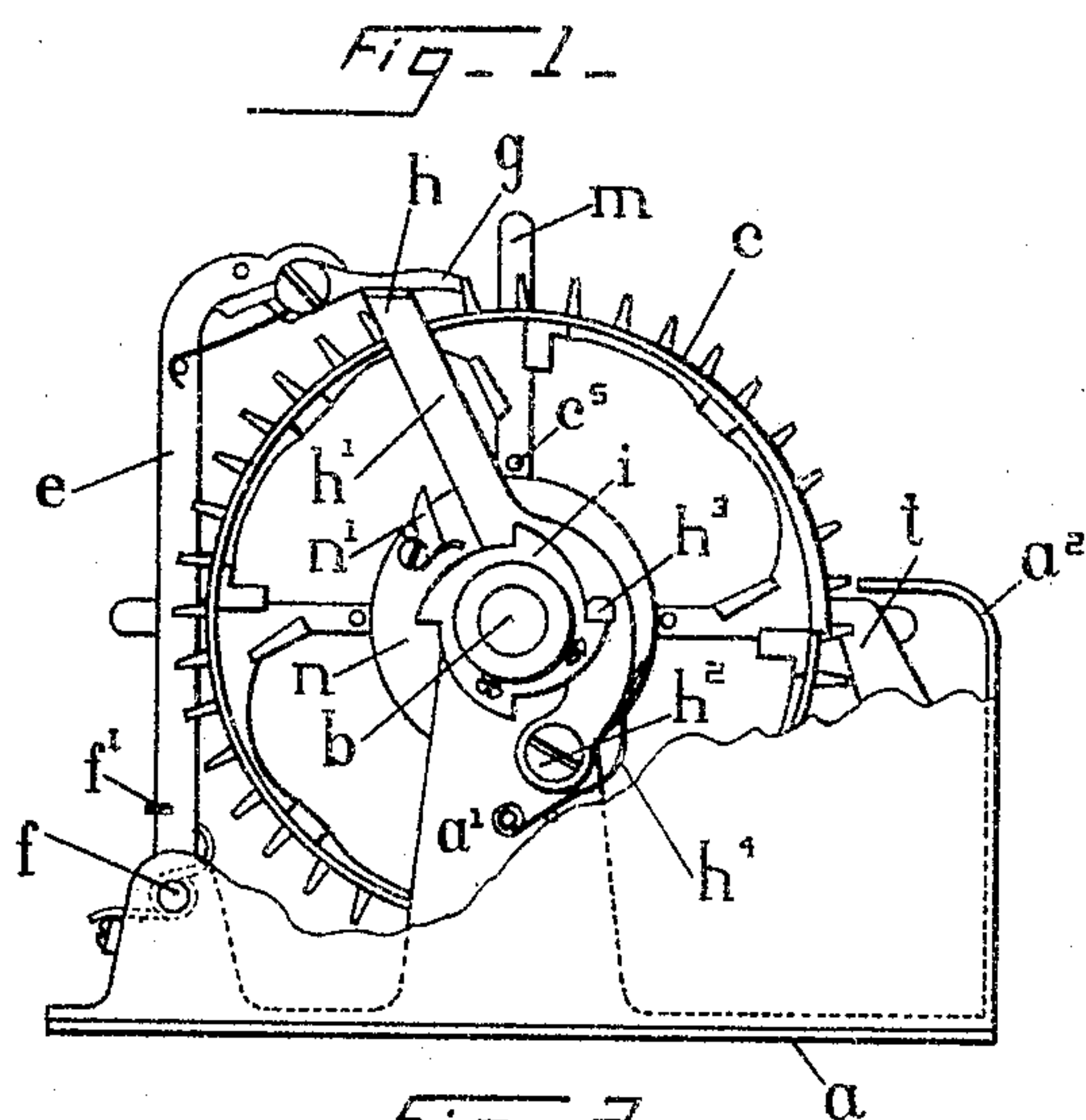
No. 781,257.

PATENTED JAN. 31, 1905.

C. H. WILLIAMS.
ADDING MACHINE.

APPLICATION FILED JAN. 15, 1904.

2 SHEETS—SHEET 1.



Witnesses

Witnesses
Frank S. Selwire.
May F. Ritchie.

Clarence H. Williams,
Inventor

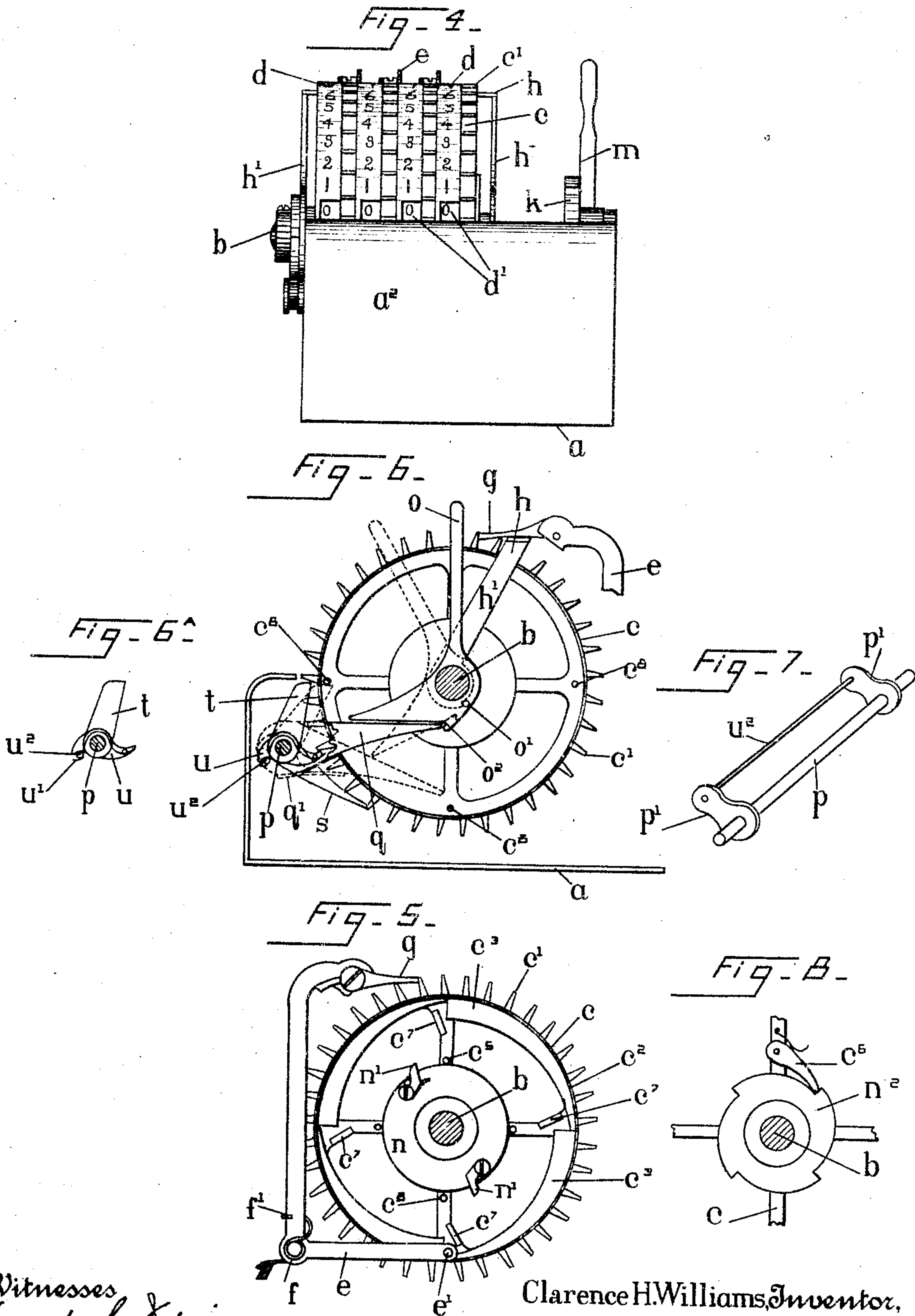
Frank H. Allen

Attorney

C. H. WILLIAMS.
ADDING MACHINE.

APPLICATION FILED JAN. 15, 1904.

2 SHEETS—SHEET 2.



Witnesses
Frank S. Selwice
May L. Ritchie.

Clarence H. Williams, Inventor,

by Frank H. Allen
Attorney

UNITED STATES PATENT OFFICE.

CLARENCE H. WILLIAMS, OF NEW YORK, N. Y.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 781,257, dated January 31, 1905.

Application filed January 15, 1904. Serial No. 189,117.

To all whom it may concern:

Be it known that I, CLARENCE H. WILLIAMS, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Adding-Machines, which improvements are fully set forth and described in the following specification, reference being had to the accompanying sheets of drawings.

The chief aim of this invention is to provide simple and reasonably-cheap mechanism for computing arithmetical problems, and particularly for adding together any desired number of figures. Incidentally I have improved the mechanical details of such adders, as I shall explain fully hereinafter.

In the annexed drawings, Figure 1 is an end elevation of an adding-machine embodying my improvements, the case being partly broken away to expose the interior parts; and Fig. 2 is a similar view of the opposite end of said machine. Fig. 3 is a detached view of the main shaft of said machine and of the several elements fixedly mounted on said shaft. Fig. 4 is a front elevation of my said machine. Fig. 5 is a detached view of one of the numeral-wheels and coöperating parts. In Fig. 6 I have illustrated a modification of the resetting mechanism; and in Fig. 6^a I have shown detached the dog *t*, pawl *u*, and the shaft *p*, on which said dog and pawl are mounted. Fig. 7 is a perspective view of rock-shaft *p* and a wire frame carried by said shaft. In Fig. 8 I have shown a modified form of ratchet-and-pawl mechanism for connecting the successive numeral-wheels of the train.

Referring to the drawings, the letter *a* indicates a base-plate having at each end an upright *a'*, whose upper end portions are bored to provide bearings in which a shaft *b* is revolvably mounted. Loosely mounted on said shaft are wheels or disks *c*, formed, as here shown, with forty radial projections *c'* of such size and at such distance apart that a finger-tip may be readily entered in the spaces between said projections in order that the wheels *c* may be rotated or partially rotated on the axial shaft *b*. Fixedly located between the several disks *c* are strips *d*, that are secured

to the front plate *a''* of the machine. Said strips *d* are curved to conform to the circumferences of disks *c*, and each of the said disks is formed with a circumferential flange *c''*, that lies immediately under the next adjoining strip *d*, and thus provides a partial support that prevents the collapsing or bending of the said strip. These strips *d* embrace at least one-fourth of the circumference of the disks, and each strip is provided with numerals "1" to "9," that are spaced to register with the spaces between the projections *c'*. The lower end of each strip *d* is cut away, as at *d'*, to expose the numeral on the coinciding wheel *c*.

The front plate *a''* of the machine extends upward to a point substantially level with the axial center of shaft *b*, and the result of any and all sums computed by the machine is read along the upper line of the said front plate through the spaces *d'*. The circumferential flange *c''* of each wheel *c* is provided with four sets of figures from "1" to "0," that are likewise spaced to register with the spaces between the projections *c'*, said figures being hidden from view by the strips *d*, excepting as they (the figures) appear in the said result. When it is desired to operate the machine to perform a sum in addition, a finger-tip is inserted in the space opposite the desired figure that appears on the fixed strip *d* and the wheel is drawn forward and downward until the operator's finger engages the upper edge of the front plate *a''*. This movement exposes to view the numeral on the said wheel corresponding to the numeral on strip *d*, opposite which the finger-tip was inserted.

As here shown the machine is provided with four numbered wheels *c*, the units-wheel being at the right hand, the "tens-wheel" next, the "hundreds-wheel" next, and so on, and it should be understood that any desired number of such wheels may be provided, according to the desired capacity of the machine. In order to carry forward the tens, hundreds, &c., from wheel to wheel, I have provided novel devices which I will proceed to describe.

Each wheel *c* (except the last of the train) is formed with four cams *c''*, that engage successively a stud *e'*, that extends laterally from

the end of a right-angle lever e , that is fulcrumed on a rod f at the lower rear portion of the machine. (See Figs. 1, 2, and 5.) The upper ends of levers e are held normally forward by means of suitable springs, here shown as wire springs f' , that are coiled around the rod f . The cams c^3 terminate abruptly, so that when the lever-stud e' reaches the highest point of the cam the stud drops off suddenly. The other end of each lever e extends upward and has pivoted thereto a spring-actuated pawl or dog g , whose free end projects forward over wheel c and is adapted to engage one of the radial projections c' , and thus push the wheel forward one number whenever the described cams c^3 rock the lever e , and it will now be understood that whenever one of the wheels c —for example, the tens-wheel—is drawn forward sufficiently to move the cipher past the point of view above the front plate a^2 the lever e and its dog g will be actuated by cam c^3 to carry the “ten” forward to the next wheel of the train. Located immediately under the dogs g is a bar h , that is supported by arms h' at each end of the machine, the said arms being pivoted to the stands a' at h^2 . One of said arms, h' , has a lateral extension or stud h^3 , that is engaged by a ratchet-disk i , secured upon the end of the shaft b , in such manner that when said shaft is rotated the ratchet-disk i forces the stud h^3 forward, and thus moves the arms h' and the connected bar h correspondingly forward, under the free ends of the several dogs, and thus holds the said dogs out of engagement with the projections c' during the operation of returning the wheels c to their initial positions after a computation has been made and the result has been read. The arms h' are held normally rearward by means of a suitable spring h^4 .

Having thus described in general terms the mechanism for adding and carrying forward the “tens,” &c., I will proceed to describe the devices by means of which the mechanism may be quickly set back to its initial position. This is accomplished through the partial rotation of shaft b . Secured to one end of said shaft is a notched disk k and a cooperating detent k' , that is held in yielding engagement with the said disk by a spring k^2 , as is best seen in Fig. 2 of the drawings. A hand-wheel or, preferably, lever-arms m , as here shown, provides a convenient means for partially rotating the shaft b . Secured to the said shaft are disks n , (one for each numeral-wheel c), which disks carry one or more spring-actuated pawls n' , that are adapted to engage pins c^5 in the wheels c whenever the shaft b is rotated. After a computation has been made one of the lever-arms m is grasped and drawn forward to partially rotate the shaft b and the attached disks n , thus causing the pawls n' to pick up the numeral-wheels and move them

forward until the detent k' drops into the next notch in the disk k , when “0” will appear on all of the numeral-wheels at the point of view above the front plate.

In Fig. 8 of the drawings I have shown a variation of my invention whereby a pawl c^6 is hung on each numeral-wheel and coacts with ratchet-disks n^2 , that are substituted for the described disks n . This reversal of the cooperating parts does not affect the resulting operation of the machine, but provides a somewhat stronger and more durable construction.

By reference to Fig. 5 of the drawings it will be seen that stop-lugs c^7 are cast upon the numeral-wheels opposite the delivery end of each cam c^3 . When the machine is operated at high speed, the studs e' on levers e are engaged and abutted by the said lugs c^7 just as the studs e' are about to drop off the highest part of said cam, and the numeral-wheel is thus checked and prevented from being carried too far by momentum and the operated wheel is prevented from passing zero without moving the next wheel one point.

In Figs. 2 and 6 of the drawings I have illustrated means for preventing overrotation of the disks c when they are being reset to zero. In the said Fig. 6 a lever-arm o is substituted for the wheel m , and the arms h' and the connected bar h are operated by means of a stud o' in arm o , that engages one of the arms h' whenever the lever-arm o is drawn forward. Located at the front of the machine is a rock-shaft p , on which is secured a lever q , whose free end extends rearward under the said lever-arm o and lies normally in a notch o^2 in said lever-arm, as is best seen in Fig. 6. Loosely mounted on shaft p are spring-actuated detents s , (one for each numeral-disk c), that lie in the notches between the projections c' , and thus prevent backward rotation of the said disks. Secured to the shaft p are dogs t , that lie between the projections c' and are adapted to be rocked forward into the circular path traversed by certain studs c^8 , projecting from the sides of wheels c . Loosely mounted on shaft p are pawls u , that are held frictionally against displacement on said shaft by springs u' . The heel of each pawl u rests on a wire u^2 , that extends from side to side of the machine and is supported at its ends by arms p' , secured to the shaft p in such manner that the shaft p , arms p' , and wire u^2 rock together as a single structure. The toe of each pawl u engages the projections c' of the adjacent wheel c , and when said wheel is partially rotated in the operation of computing a sum the pawl u acts as a spring-actuated drag or “click” to prevent the overrotation of said wheel.

When the hand-lever o is rocked toward the front of the machine, the free end of lever q is depressed and the shaft p is rocked in its bearings. This moves the free ends of dogs

t forward into the path of studs c^s , and just as the ciphers on said numeral-wheels are brought to the point of view at the front of the machine the said studs c^s abut the dogs u and the wheels are positively stopped. When the hand-lever o is returned to its initial position, the lever q is forced upward by a spring q' . The shaft p is thereby rocked back to its normal position, the dogs t are moved out of engagement with the studs c^s , and the dogs u are moved into engagement with the numeral-wheels.

My described machine is simple in construction, absolutely correct in its computations, and may be constructed at a much less cost than some of the machines now in common use.

Having thus described my invention, I claim—

1. In combination, a multiple of relatively revoluble numbered wheels having peripheral projections, means for returning the same to the zero-place, and means for stopping said wheels at said place comprising pins movable therewith, a rock-shaft connected with said return means and having dogs to engage said pins, and spring-actuated detents loosely carried by said shaft and arranged to engage said projections.

2. In combination, a multiple of revolubly-mounted numbered wheels formed with radial circumferential projections, pins c^s projecting from the sides of said wheels, a lever fulcrumed on the axial support of said numbered wheels, a shaft p , an arm q secured to said shaft and adapted to coact with the said lever, spring-actuated detents s loosely mounted on said shaft, and dogs t secured to said shaft and adapted to be rocked into the circular path traversed by the said pins c^s .

3. In combination, a multiple of revolubly-mounted numbered wheels formed with radial circumferential projections, a rock-shaft p parallel with the axial support of said wheels, a wire u^2 mounted to rock with shaft p as set forth, pawls u loosely mounted on said shaft and adapted to engage the said radial projections, to prevent overrotation of the numbered wheels, spring-actuated detents for preventing backward rotation of said wheels, and means for simultaneously revolving the numbered wheels and for rocking the shaft.

4. In combination, a multiple of revolubly-mounted numbered wheels formed with radial, circumferential, projections, cams and stops carried by said wheels as set forth, suitably-fulcrumed levers having at one end studs adapted to engage said cams and stops, spring-actuated pawls hinged to the other ends of said levers and adapted to coact with the said radial projections, and a guard h adapted to hold the said pawls out of operative engagement with the said projections.

5. An adding-machine comprising a plurality of separately-revoluble number-wheels

having circumferential projections, means for communicating motion from one wheel to another at predetermined places in the travel of said one wheel, comprising a pawl adapted to coact with said projections, and means for returning the wheels to the zero-place comprising an operating device, a ratchet-disk, and a pivoted arm which engages said pawl and lifts the same out of engagement with said projections and is provided with a stud which is engaged by said ratchet-disk and operated thereby to turn said arm pivotally.

6. An adding-machine comprising a plurality of separately-revoluble number-wheels having radial projections, means connecting each wheel with the one at one side of it at predetermined places in the revolution thereof, comprising cams on said wheels, and a suitable fulcrumed lever having at one end a stud to engage the cam on its wheel and at its other end a spring-pawl to engage said projections of the next wheel, and means for returning the several wheels to the zero-place comprising an operating device, a ratchet-disk, a pivotally-mounted bar which is arranged under the several pawls and is adapted when turned to lift the same out of engagement with said projections, and a stud having connection with said bar and engaged with said ratchet-disk and operated thereby to turn said bar pivotally.

7. An adding-machine comprising a plurality of separately-revoluble number-wheels having radial projections, means connecting each wheel with the one at one side of it at predetermined places in the revolution thereof, comprising pawls to engage said projections, and means for returning the several wheels to the zero-place comprising a shaft, means for turning said shaft, disks provided with means for connecting them with the respective wheels, whereby movement of one is communicated to the other, detaining means for stopping the movements of said wheels at the zero-place, a pivotally-mounted bar which is arranged under the several pawls and is adapted when turned to lift the same out of engagement with said projections, and means for turning said bar pivotally.

8. An adding-machine comprising a plurality of separately-revoluble number-wheels having radial projections, means connecting each wheel with the one at one side of it, comprising pawls to engage said projections, pivotally-mounted means carrying said pawls, and means for turning said pivotally-mounted means when a wheel has moved a predetermined distance, and means for returning the several wheels to the zero-place comprising a shaft having means adapted to turn the same, disks provided with means for connecting them with the respective number-wheels whereby movement of one is communicated to the other, detaining means for stopping

the movements of the wheels at the zero-place,
a ratchet-disk, a pivotally-mounted bar which
is arranged under the several pawls and is
adapted when turned to lift the same out of
5 engagement with said projections, and a stud
having connection with said bar and engaged
with said ratchet-disk and operated thereby
to turn said bar pivotally.

In testimony whereof I have signed my name
to this specification in the presence of two sub- 10
scribing witnesses.

CLARENCE H. WILLIAMS.

Witnesses:

HOWARD W. LEE,
ALFRED G. FREEMAN.