No. 814,593. PATENTED MAR. 6, 1906.

H. C. DUNGAN.

TRANSFER AND INDICATING MECHANISM FOR CALCULATING MACHINES.

APPLICATION FILED DEC. 19, 1904.

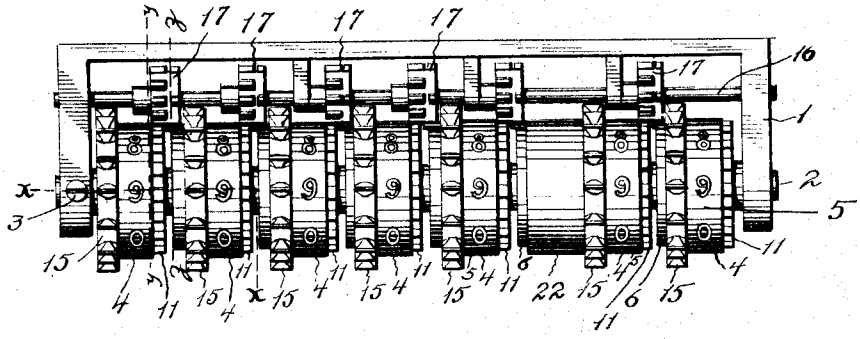

Fig. 1.

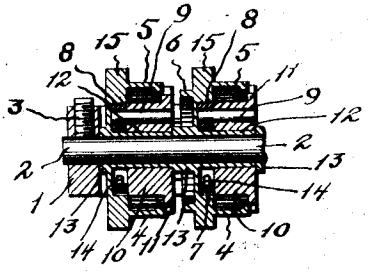

Fig. 2.

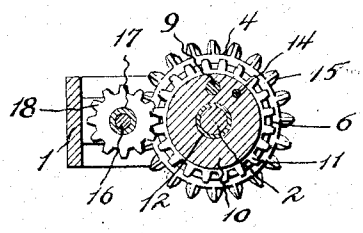

Fig. 3.

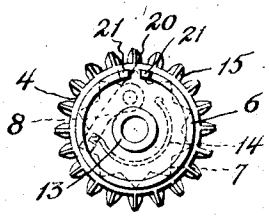

Fig. 4.

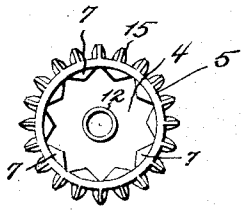

Fig. 5.

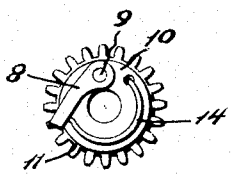

Fig. 6.

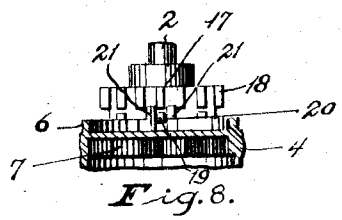

Fig. 8.

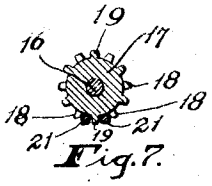

Fig. 7.

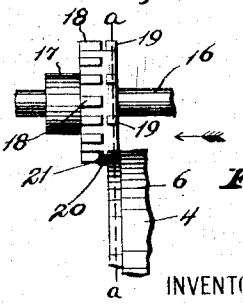

Fig. 9.

WITNESSES:

Carl Stoughton

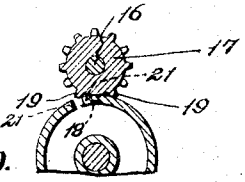

Fig. 10.

INVENTOR

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BY

Shepherd & Barr

ATTORNEYS

UNITED STATES PATENT OFFICE.

HARRY C. DUNGAN, OF JACKSON, OHIO, ASSIGNOR OF ONE-HALF TO EDWIN JONES, OF JACKSON, OHIO.

TRANSFER AND INDICATING MECHANISM FOR CALCULATING-MACHINES.

No. 814,593. Specification of Letters Patent. Patented March 6, 1906.

Application filed December 19, 1904. Serial No. 237,459.

To all whom it may concern:

Be it known that I, HARRY C. DUNGAN, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Ohio, have invented certain new and useful Improvements in Transfer and Indicating Mechanism for Calculating-Machines, of which the following is a specification.

My invention relates to a new and useful improvement in transfer and indicating mechanism for calculating-machines.

The object of the invention is to provide simple means of superior construction for transferring the addition or calculation from one indicator-wheel to another; and it is especially an object of my invention to simplify the mechanism by reducing the number of parts and by so arranging the said parts as to produce a compact structure.

Furthermore, it is the object of my invention to produce a device of the character described that will be strong, durable, efficient, and simple and comparatively inexpensive to produce and one in which the several parts will not be liable to get out of working order.

With the above and other objects in view the invention consists of the novel details of construction and operation, a preferable embodiment of which is described in the specification and illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view of my improved mechanism. Fig. 2 is a partial longitudinal sectional view taken on the line *x x* of Fig. 1. Fig. 3 is a transverse vertical sectional view taken on the line *y y* of Fig. 1. Fig. 4 is an end elevation of one of the indicator-wheels, showing its pawl-and-ratchet mechanism in dotted lines. Fig. 5 is an end elevation of the opposite side of the indicator-wheel with the actuating-gear and pawl removed. Fig. 6 is an elevation of one of the actuating-gears removed from the indicator-wheel, showing the pawl extended. Fig. 7 is a transverse vertical sectional view taken on the line *z z* of Fig. 1. Fig. 8 is a detail plan view of one of the transfer-wheels, showing in connection therewith a cross-section of a portion of one of the numeral-wheels. Fig. 9 is an elevation of one of the transfer-wheels and a portion of one of the numeral-wheels, and Fig. 10 is a transverse vertical sectional view taken on the line *a a* of Fig. 9 and looking in the direction of the arrow.

In the drawings the numeral 1 designates a U-shaped frame which supports between its extended portions a longitudinal shaft 2, held in fixed relation to the frame by a set-screw 3, bound upon one end of the said shaft. It is to be understood, however, that the shaft 2 may be supported in any suitable manner and that the frame 1 may have any suitable shape and is supported in operative relation to any suitable form of operating means. Arranged on the shaft 2 and loosely mounted are a plurality of indicator or numeral wheels 4 cut away on each side to form laterally-extending ring-like portions 5 and 6, except the last wheel to the left, which is constructed without the ring-like portion 6. The symbols or numerals are preferably arranged upon the outer surface of the ring-like portions 5 in any suitable manner. Each wheel 4 is formed with an interior star-wheel 7, adapted to be engaged by a pawl 8, mounted upon a pin 9, projecting from and carried by an integral collar 10 of a gear 11, which collar portion projects within the ring portion 5 of the numeral-wheel 4. Each numeral-wheel 4 is formed with a sleeve 12, which supports it about the shaft 2, and upon this sleeve is loosely mounted the gear 11. The gear-wheel is so constructed that the inner sides of its teeth bear against the outer edge of the ring-like portion 5, and each of the sleeves 12 of the numeral-wheel are enlarged at one end, as shown at 13 in Fig. 2, which enlarged portion bears against the next adjacent gear-wheel 11, thus holding it within the ring-like portion 5 when the parts are assembled on the shaft 2. The pawl 8 is held in contact with the teeth of the star-wheel 7 by a curved spring 14, having one end pivoted in the collar portion 12 and its free end in engagement with the pawl 8. It is obvious that by such an arrangement the numeral-wheels may move independently of each other or that by imparting motion to one the other may be moved therewith.

Each numeral-wheel 4 is provided with a ring of gear-teeth 15, which are adapted to be connected to any suitable form of operating mechanism, such as is shown in the application of myself and James M. Huckins, filed July 8, 1905, and bearing Serial No. 268,875. The gear-teeth 15, as illustrated in the drawings, have a peculiar shape, being beveled on the sides as well as their tops. Such a con-

struction enables the gear-teeth to be more readily meshed with the common operating means. It is to be understood, however, that the gear-teeth 15 may have any suitable shape; but as there are ten numerals or digits on each indicator-wheel it is necessary that the ring 15 must contain ten teeth or a multiple of ten, and likewise each gear 11 must contain ten teeth or a multiple of ten, the number of teeth in the ring 15 and upon the gear 11 being the same.

For the purpose of transferring additions from one numeral-wheel to the other I arrange upon the frame 1 a counter-shaft 16, upon which are loosely mounted a plurality of transfer-wheels 17. The transfer-wheels are each formed with two rings or sets of gear-teeth 18 and 19, respectively, there being preferably twice as many teeth in the ring 18 as there are in the ring 19, thus causing one of the teeth 19 to lie in line with every other tooth of the ring 18, as clearly set forth in Fig. 6. The transfer-wheels 17 are disposed so that the ring of teeth 18 mesh with the teeth of the gear-wheel 11 and that portion of the peripheries of the transfer-wheels lying between the teeth 19 will normally contact with the outer periphery of the ring-like portions 6 of the next adjacent numeral-wheel, as clearly set forth in the drawings. It is obvious, owing to the distance between each of the teeth 19, that when a portion of the periphery of the numeral-wheel 17 lies in contact with the ring-like portion 6 a tooth 19 will stand on each side of the point of contact, and thus lock the transfer-wheel against rotation. It is also obvious that the transfer-wheels form the only means of transferring motion from one numeral-wheel to the other.

In order to transfer the addition from one numeral-wheel to the other, I provide upon each of the ring-like portions 6 a bifurcated lug 20, adapted to receive one of the teeth 19, and whose furcations 21 extend a sufficient distance beyond the tooth 19 to straddle and engage one of the teeth 18, it being understood that the teeth 18 have a greater length than the teeth of the gear-wheel 11, thus allowing the furcations 21 to engage the said teeth 18. The ratio between the numeral-wheels being one to ten, it is apparent that starting at the right each complete revolution of one of the numeral-wheels must move the next succeeding numeral-wheel one-tenth of a revolution. Thus when ten units have been added on the first numeral-wheel the next numeral-wheel is moved one-tenth of a revolution, thus indicating the amount of the addition. During the revolution of the numeral-wheel the transfer-wheel 17 is locked against rotation, as previously described, and shown in Fig 10, and the teeth 19 standing on each side of the center of the ring 6 and one of the elongated teeth 18 standing exactly in line with the center of the ring. As the numeral-wheel is moved around and the bifurcated lug 20 approaches the point of contact, or which, in fact, is the transfer-point, being the end of a complete revolution, the foremost furcation 21 contacts with the tooth 18 previously described and moves the transfer-wheel so as to throw the next following tooth 19 into the bifurcated lug 20. The continued moving of the numeral-wheel completes the movement of the transfer-wheel, the following furcation bearing against the tooth 19 until the latter is carried to the position shown in Fig. 7, at which point the bifurcated lug rides away from the tooth and the parts are in position to start another transfer. As before set forth, the numeral-wheels each being provided with twenty teeth and the gear-wheels 11 each being provided with twenty teeth it is obvious that when motion is transmitted to the transfer wheel or wheels the gear-wheel is moved the distance of two teeth, which is one-tenth of its entire revolution.

It is to be noted that owing to the star-wheel and pawl construction each numeral-wheel 4 may be moved independent of the adjacent transfer-wheels and the numeral-wheels to the right and left until it has completed one revolution, when its bifurcated lug 20 will mesh with the transfer-wheel and operate the same as described to transfer the addition or revolution to the next succeeding numeral-wheel.

The operation may be briefly stated as follows: The suitable operating mechanism with which the teeth 15 may be connected being operated to effect the addition, one or more of the numeral-wheels 4 are rotated, according to the value of the addition sought to be made. As motion is imparted to the numeral-wheels they are moved step by step until they have completed a full revolution, when the bifurcated lugs 20 will contact with the transfer-wheels and carry the addition from one wheel to the next succeeding wheel, thus setting up the addition.

I wish it to be understood that although I preferably have designed my invention to be used in connection with a type-writer or other manifolding-machine I may apply the same to any form of machine or meter wherein its use would be both advantageous and efficacious and that various changes and alterations may be made without departing from the spirit of my invention.

In Fig. 1 of the drawings I have shown the second numeral-wheel 4 to the right provided with a collar portion 22 between the ring-like portion 6 and the ring of gear-teeth 15. Such a construction produces a considerable space between the ring-like portions 5 of the second and third numeral-wheels from the right. Thus when the addition is set up the last two digits or numerals in line to the right are sep-

arated from the other numerals appearing on the left-hand side of the space, the space serving as a decimal-point to indicate dollars and cents. It is obvious that by such an arrangement the result of repeated additions may be readily read, and it is also apparent that the collar 22 may be omitted and the numeral-wheels constructed one like the other, except the last wheel to the left, which, as has been hereinbefore stated, is formed without the ring-like portion 6.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination a plurality of numeral-wheels, gear-wheels one arranged at each side of each numeral-wheel and connected thereto so as to allow any of the numeral-wheels to move independently of the other numeral-wheels of a higher or lower denomination, each gear-wheel adapted to move independently of the other gear-wheels and also adapted to impart motion to the numeral-wheels, and a transfer mechanism in engagement with the teeth of the gear-wheels adapted to transfer motion from each numeral-wheel to the gear-wheel of the next adjacent numeral-wheel of a higher order.

2. In an adding device the combination with a recessed numeral-wheel provided upon its outer periphery with a ring of fixed teeth free from engagement with other parts of the device, of a gear-wheel having connection with the recessed portion of the numeral-wheel so as to impart motion thereto or to allow the numeral-wheel to move independently thereof, and a transfer device engaging the teeth of the gear-wheel.

3. An adding device comprising a recessed numeral-wheel formed with an internal ratchet, a gear-wheel having a portion projecting into the numeral-wheel, and a spring-pressed pawl carried upon the said projecting portion of the gear-wheel and engaging with the internal ratchet.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY C. DUNGAN.

Witnesses:
A. L. PHELPS,
M. B. SCHLEY.