

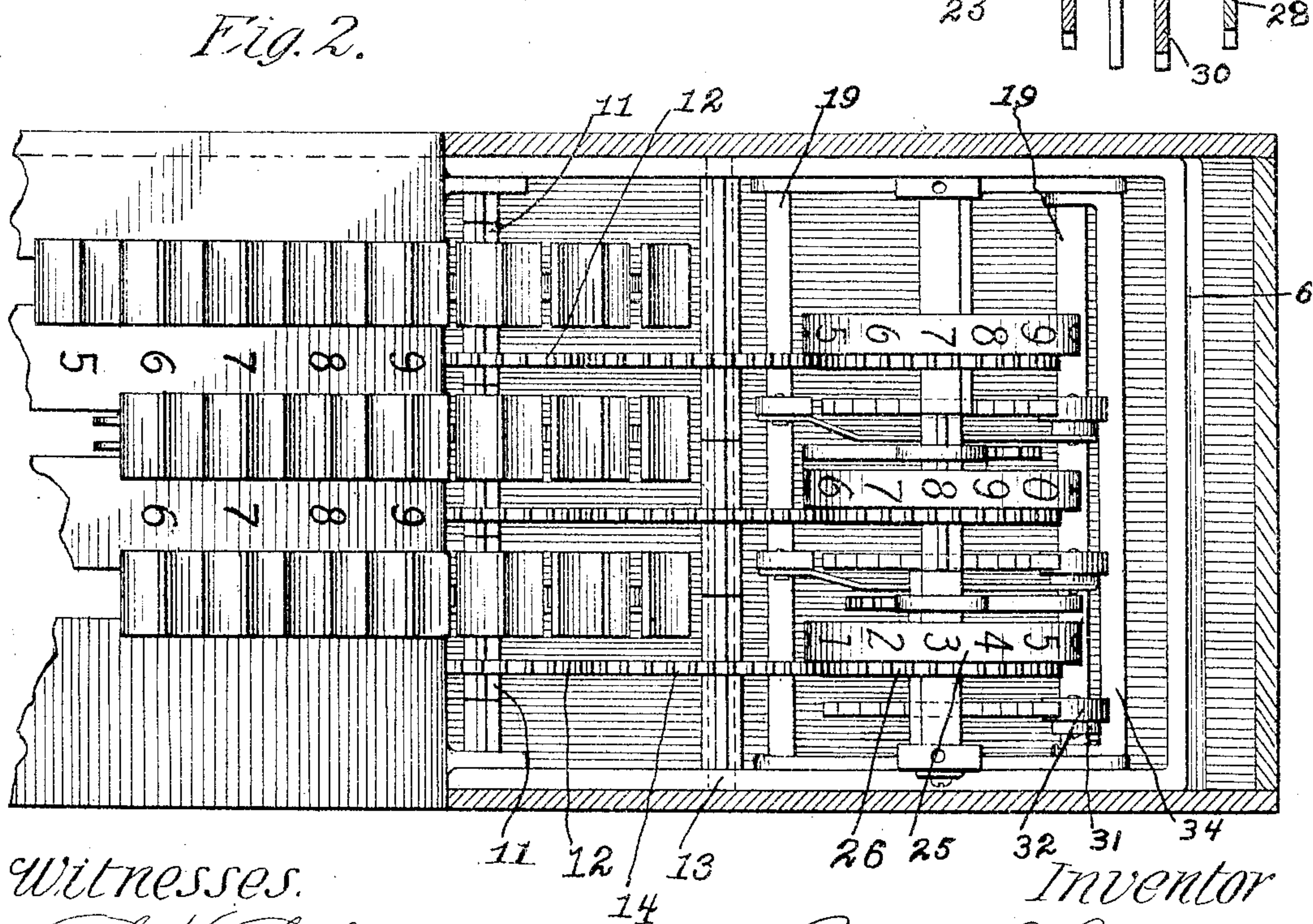
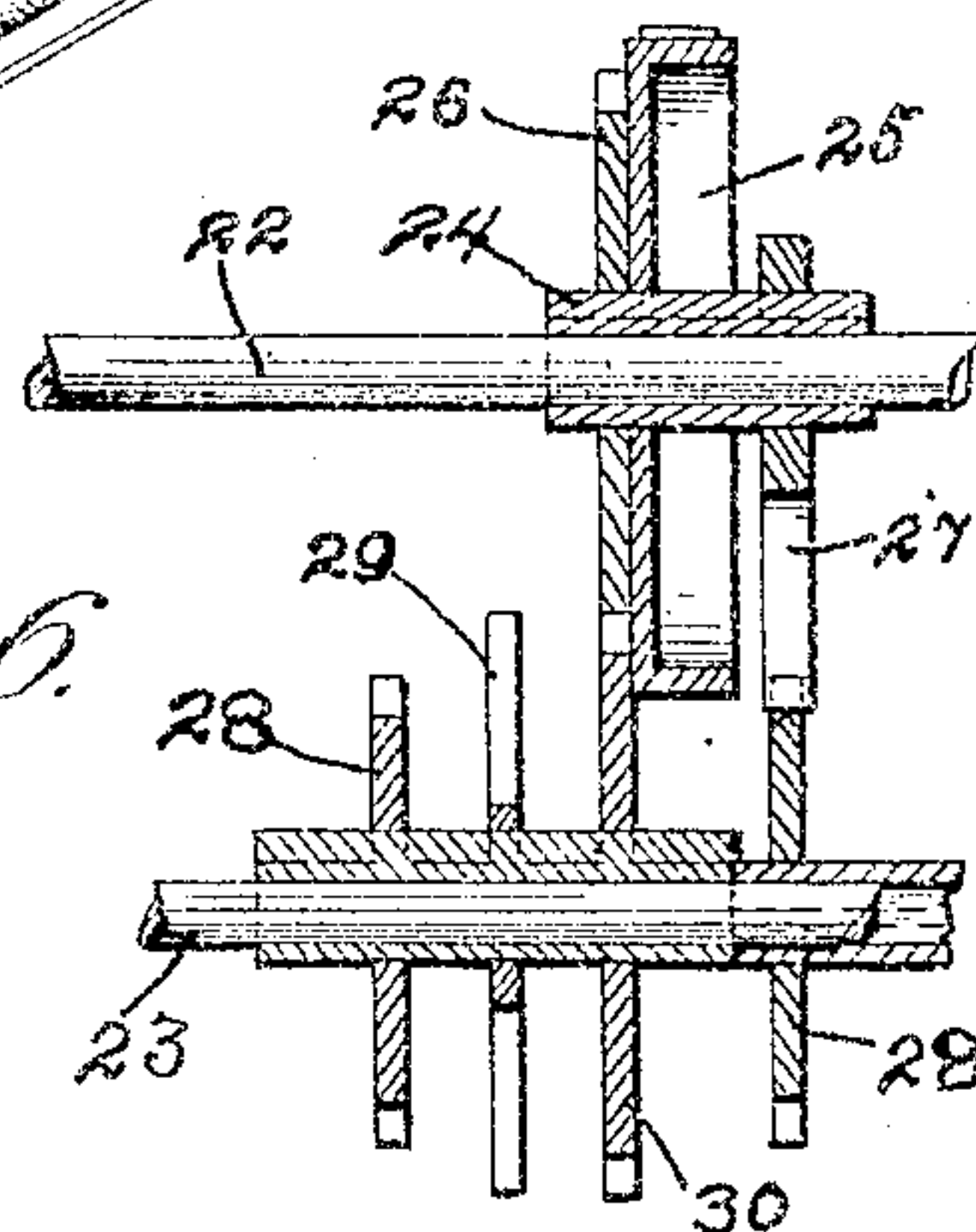
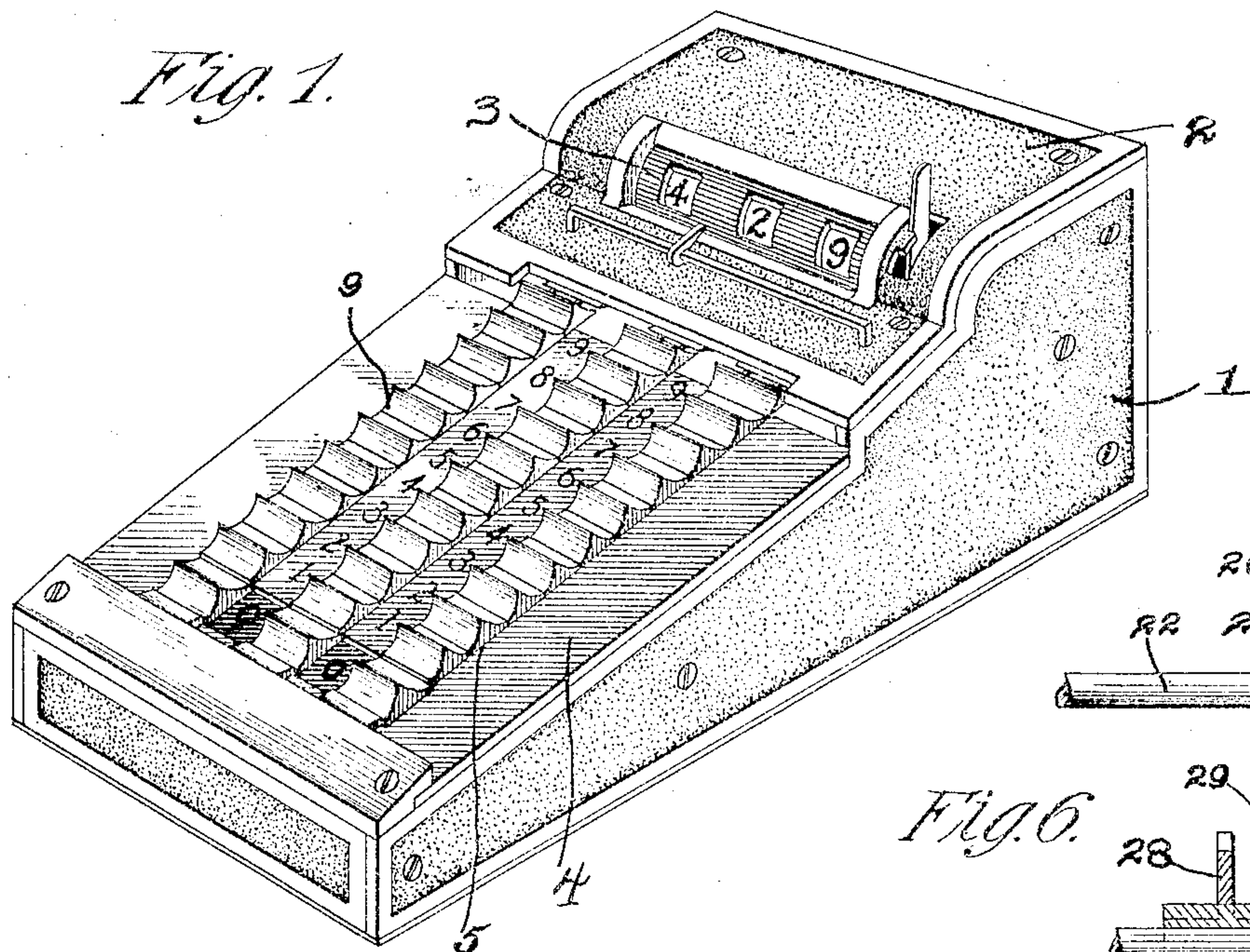
No. 778,447.

PATENTED DEC. 27, 1904.

R. L. CLEVELAND.
ADDING AND SUBTRACTING MACHINE.

APPLICATION FILED OCT. 29, 1902.

2 SHEETS—SHEET 1.



Witnesses.

Wm. H. Schaefer
K. O. Schaff

Inventor

Rienzi L. Cleveland.

By John L. Kindt, Atty.

No. 778,447.

PATENTED DEC. 27, 1904.

R. L. CLEVELAND.
ADDING AND SUBTRACTING MACHINE.

APPLICATION FILED OCT. 29, 1902.

2 SHEETS—SHEET 2.

Fig. 3.

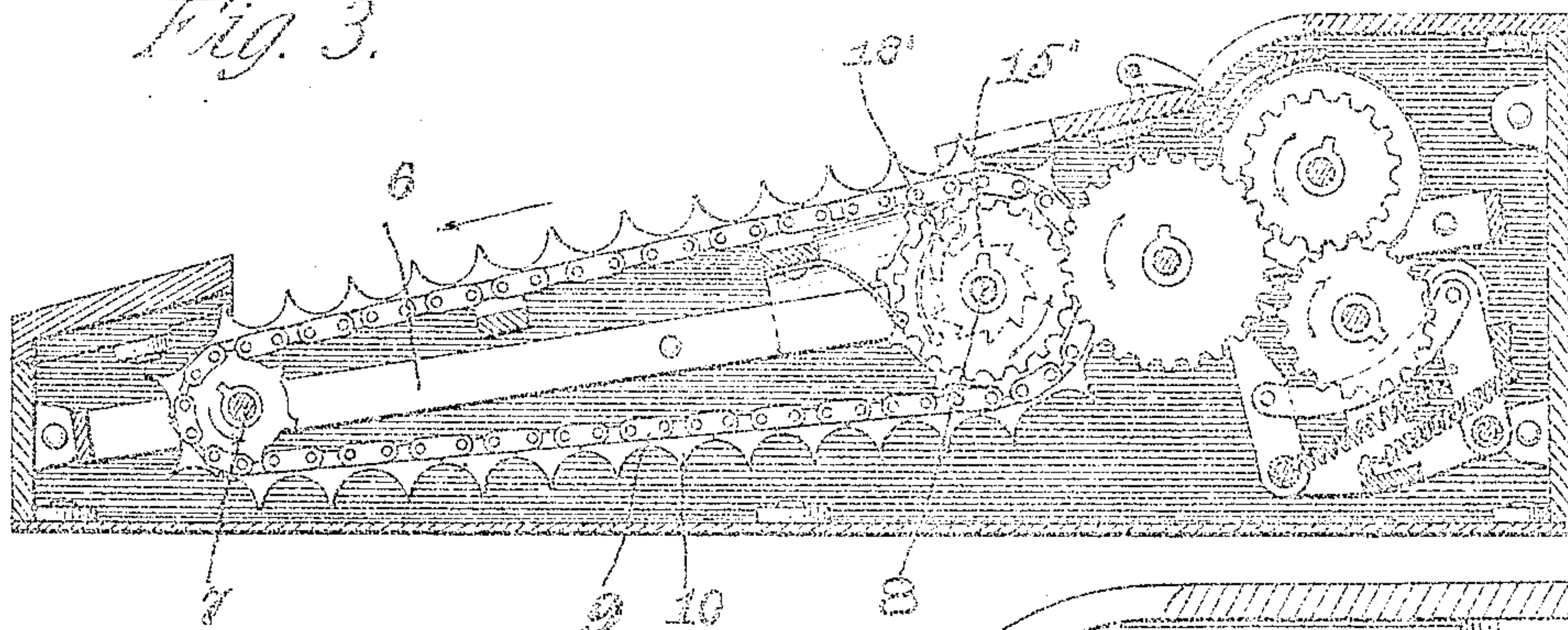


Fig. 4.

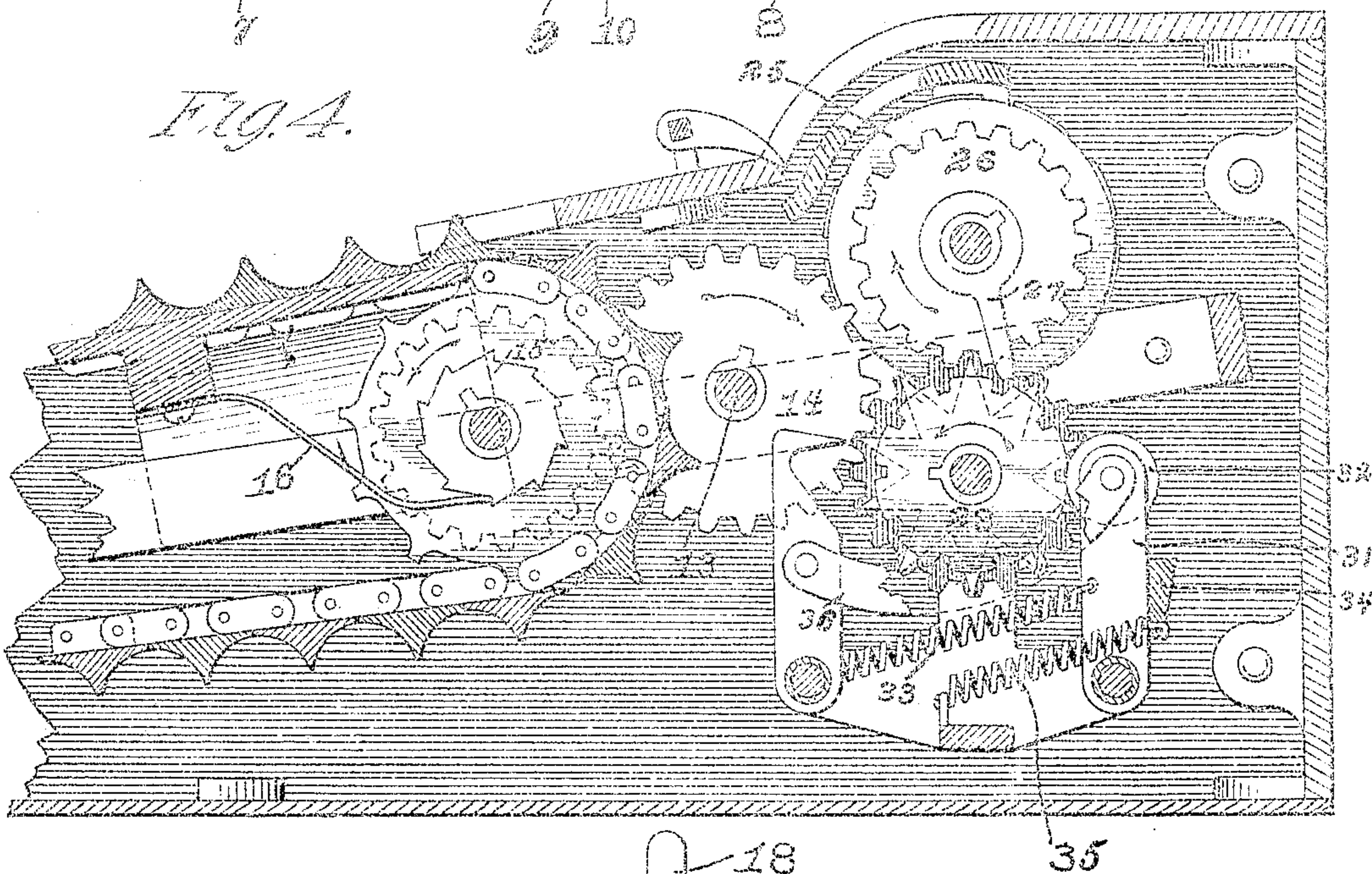
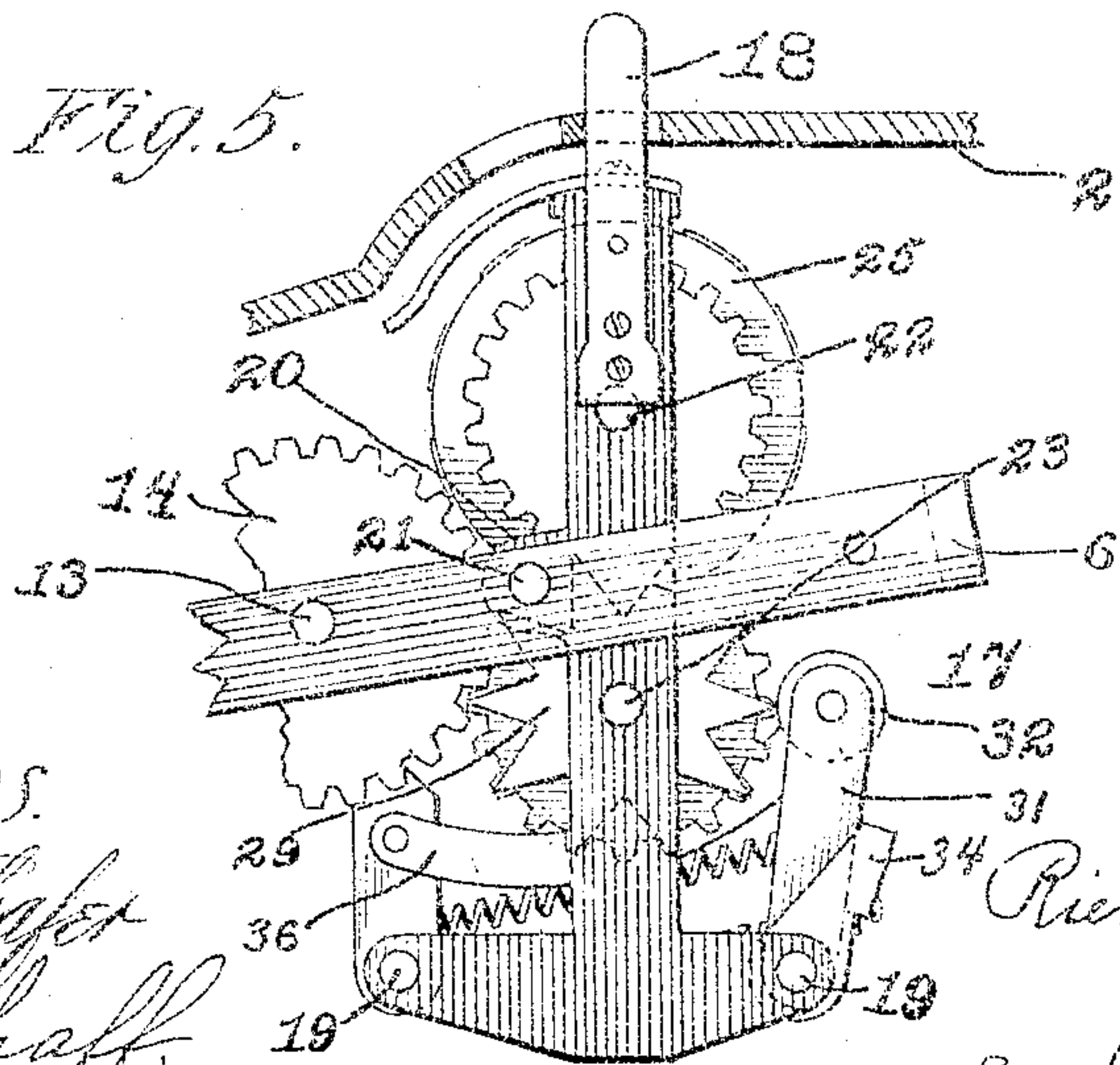


Fig. 5.



Witnesses.

Wm. H. Schaffer
R. Schaff.

INVENTOR

Riengo L. Cleveland.

By John R. Kindt, Att'y.

UNITED STATES PATENT OFFICE.

RIENZI L. CLEVELAND, OF DEVILS LAKE, NORTH DAKOTA.

ADDING AND SUBTRACTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 778,447, dated December 27, 1904.

Application filed October 29, 1902. Serial No. 129,218.

To all whom it may concern:

Be it known that I, RIENZI L. CLEVELAND, a citizen of the United States, residing at Devils Lake, in the county of Ramsey and State of North Dakota, have invented certain new and useful Improvements in Adding and Subtracting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention is an improvement on my former patent, No. 638,097, the same relating to calculating-machines and being designed to facilitate the operations of addition and subtraction.

The primary object of my improvement is to provide means whereby the mechanism can be reversed without danger of the counting-wheels being moved during such operation.

A further object of the invention is to simplify and improve the construction of machines heretofore employed, and, further, to produce a machine which is perfectly reliable in operation.

Briefly described, the invention comprises a suitable frame having journaled in its opposite ends a pair of shafts over which a series of parallel endless chains pass, said chains being adapted to be moved by the operator. Pivotaly mounted on the inner end of the said frame is a reversing-frame, having journaled therein the counting and gear wheels, which are operated by the movement of the said endless chains through the medium of intermediate gear-wheels.

As heretofore stated, the primary object of this invention is to provide means whereby the mechanism can be readily reversed, and I have found that by mounting the reversing-frame on the inner end of the endless-belt frame I can readily swing the respective gear-wheels of the reversing mechanism into mesh with the other mechanism of the machine without causing any accidental movement of the counting-wheels. The detailed description of this construction will be carefully explained in the following description.

Further objects and advantages of the invention will be hereinafter referred to.

In the accompanying drawings, Figure 1 is a view in perspective of a calculating-machine constructed in accordance with the present invention. Fig. 2 is an enlarged plan view of one end of the casing with the top removed, showing the mechanism for operating the registering-wheels. Fig. 3 is a vertical longitudinal section through the machine, taken about in line with one of the endless chains. Fig. 4 is an enlarged vertical longitudinal section through one end of the machine. Fig. 5 is a detail view, in side elevation, of the reversing mechanism; and Fig. 6 is a view in elevation of a portion of the registering-wheel shaft, reversing-wheel shaft, and their coöperating gears, the same being shown in section.

Similar numerals of reference designate corresponding parts throughout the several views of the drawings.

The calculating-machine contemplated in this invention comprises a suitable casing 1, in which the operative parts of the machine are mounted. This casing has a suitable cover 2, provided with sight-openings 3, preferably covered with glass and through which the figures on the registering-wheels may be read. The front portion of the top of the machine is covered by a face-plate having a plurality of longitudinal slots or ways 5, along which the movable finger-pieces hereinafter described travel. Between the longitudinal ways 5 the plate 4 has represented thereon numerals ranging from "0" to "9," inclusive, the "0" being nearest the operator. Within the casing I provide a longitudinal frame 6, which is suitably secured to the casing at a point intermediate the top and bottom and extending approximately the entire length thereof. At the forward end of the frame 6 is journaled an auxiliary shaft 7, and at a point adjacent the rear end of the said frame is journaled the main sprocket-wheel shaft 8. Upon these shafts are loosely mounted sprocket-wheels, around which the chains 9 pass. Each chain is provided with a series of finger-pieces 10, which are provided with depending shanks, said shanks forming links of the chain, as will be apparent by reference to Fig. 3 of the drawings. The sprocket-wheels 8 of the main shaft are loosely mounted thereon and carry spring-pressed pawls 16',

which engage ratchet-wheels 15', rigidly secured upon sleeves 11, the sleeves of the several sprocket-wheels being journaled upon the said main shaft and arranged side by side.

5 Fixed upon these sleeves at points adjacent the respective ratchet-wheels are gear-wheels 12, the function of which will be hereinafter explained.

13 designates a shaft arranged in the rear 10 of and lying parallel to the said main shaft and upon which are loosely mounted a series of gear-wheels 14, which gear-wheels at all times mesh with the gear-wheels 12 of the sleeves 11, heretofore referred to.

15 In view of the foregoing it will be apparent that as the endless chains are moved along their course by the operator movement will be transmitted, through the respective gear-wheels 12, to the gear-wheels 14, and in order 20 to prevent any rearward movement thereof I mount upon the sleeves of the respective sprocket-wheels of the main shaft ratchet-wheels 15, which are constantly engaged by the spring-pawls 16, secured at their one ends 25 to the lower side of the face-plate 4 of the casing.

At a point in the rear of the shaft 13 I pivotally mount between the sides of the frame 6 a vertically-disposed reversing-frame 17, 30 which is fulcrumed at a point approximately central of its height and being adapted to be operated or swung by means of the operating bar or handle 18, the upper end of which projects through opening formed in the cover 35 of the casing 1. This reversing-frame comprises approximately inverted-T-shaped side bars and the transversely-arranged bars 19, said bars being secured to the lower ends of the side bars of the frame. The side bars are 40 provided at a point intermediate their lengths with outwardly-projecting ears 20, which ears are formed with lugs 21, adapted to be received in openings in the sides of the frame 6, whereby the said reversing-frame is pivotally 45 mounted within the frame 6 at a point adjacent to the gear-wheels 14. The function of this construction and arrangement will be set forth in the following.

22 and 23 represent the registering-wheel 50 shaft and the reversing-wheel shaft, respectively, which shafts are journaled in the side bars of the reversing-frame at points above and below the fulcrum-point thereof. Mounted upon the registering-wheel shaft is a series of sleeves 24, each of which has fixed 55 thereon a registering-wheel 25, gear-wheel 26, and the elongated arm 27, the free end of which is provided with a single tooth. These sleeves 24 are arranged side by side upon 60 said shaft 22, and the registering-wheels thereof represent the units, tens, and hundreds columns, respectively. The shaft 23 is also provided with a series of sleeves similar in construction to the sleeves 24 of the shaft 22, 65 which sleeves are each provided with a count-

ing-wheel 28, star-wheel 29, and gear-wheel 30. The gear-wheels 26 and 30 are adapted to be alternately swung into mesh with the respective gear-wheels 14, loosely mounted on the intermediate transversely-arranged shaft 70 13, whereby the reversing operation is accomplished.

In order to prevent any movement of the registering or counting wheels during the reversing operation, I provide a suitable clutch 75 mechanism whereby this danger is entirely obviated. Loosely mounted on one of the transverse bars 19 of the reversing-frame is a series of upwardly-extending arms 31, each of which has journaled in its upper end a 80 roller 32, the said rollers being adapted to frictionally engage and enter between the teeth of the respective star-wheels 29. The arms 31 are normally held under tension, so that their respective rollers will constantly en- 85 gage the said star-wheels, by means of springs 33, which springs have their one end secured to the opposite transverse bar of the reversing-frame and their other ends secured to the respective arms in any desired manner. In 90 order to assist the springs 33 in the performance of their function, I provide an auxiliary means, the same comprising a transversely-arranged bar 34, which normally engages the rear edges of the arms 31 and being normally 95 drawn forward by means of springs 35.

From the foregoing it will be obvious that as the star-wheels are rotated the teeth thereof will force outwardly the arms 31 by engaging the rollers 32 thereof, and in order to prevent 100 the said star-wheels from rotating too great a distance while the respective rollers 32 are out of engagement therewith I loosely mount on the opposite transverse bar of the reversing-frame a series of pawls or lock-arms, the 105 same being arranged adjacent the sides of the star-wheels opposite to the rollers and being connected to the arms 31 by means of the curved links 36. These pawls or lock-arms are normally out of engagement with the re- 110 spective star-wheels; but as the star-wheels move the rollers 32 outwardly an inward movement is imparted to the respective pawls through the medium of the links 36, thereby 115 throwing their free ends between the succeeding teeth of the star-wheels and preventing the same from moving more than one tooth at a time.

The operation is as follows: If, for instance, it is desired to add up the debit side of the 120 ledger and to find out the difference between the debits and credits, the registering-wheels are set at "0" and the handle of the reversing-frame pulled forward, so as to throw the registering-wheel shaft into gear with the 125 gear-wheels 14 of the intermediate shaft 13. The various amounts are now added by moving the endless chains through medium of the finger-pieces 10. Thus, for instance, if a number of units or pennies were to be added the 130

endless chain arranged on the right hand of Fig. 1 would be operated, the amount thereof being gaged by the numerals arranged on the face-plate 4. The movement thus impart-
 5 ed to this chain will be communicated to the gears 12, 14, and 26, respectively, to the digit counting registering wheel, and the amount debited or added will appear in the side opening 3 of the top of the casing. When the
 10 complete revolution is given to the digit-registering wheel, the toothed arm 27 thereof will engage the counting-wheel 28 of the tens-column registering-wheel and move the same the space of one tooth, thereby registering
 15 on the registering-roller thereof that ten cents has been debited. The succeeding registering-wheels are operated in a similar manner, and it will be understood that, although in the present drawings I have shown
 20 but three endless chains of finger-pieces, the same and the corresponding operative parts of the machine may be increased according to the desire of the manufacturer or the need of the user. After the debit side of
 25 the ledger has been added the handle of the reversing-frame is moved rearward, which throws the reversing-wheel shaft into gear with the intermediate shaft 13. The machine is then operated in a manner similar to the
 30 manner described for adding the several amounts debited until all the credits have been dealt with, whereupon by glancing at the observation-openings the difference between the debits and credits may be readily ob-
 35 served.

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

1. In combination with the adding and sub-
 40 tracting mechanism, a reversing-frame comprising side and end bars, a pair of shafts in the said side bars, registering-wheels mounted on the upper of said shafts, reversing gear-wheels mounted on both of said shafts, said
 45 reversing-wheels being in constant mesh with one another, counting-wheels mounted on the lower of said shafts, upwardly-extending spring-actuated arms loosely mounted on one

of the end bars of the said reversing-frame, rollers journaled in the upper end of the said 50 arms, pawls loosely mounted on the other end bar, links connecting the said arms and pawls whereby the said rollers and pawls will alternately engage the said counting-wheels, and means for throwing the said reversing gear- 55 wheels into and out of gear with the adding and subtracting mechanism.

2. In combination with the adding and subtracting mechanism, a reversing-frame, registering-wheels, reversing gear-wheels, and 60 counting-wheels journaled in the said reversing-frame, rollers arranged on one side of the said counting-wheels, pawls arranged on the opposite side of said wheels, means for alternately throwing the said rollers and pawls 65 into engagement with the counting-wheels, and means for throwing the said reversing gear-wheels into and out of gear with the adding and subtracting mechanism.

3. The combination with the adding and sub- 70 tracting mechanism, and the reversing-frame, of wheels mounted in the reversing-frame, arms pivoted in the said frame, rollers journaled in the upper ends of the said arms and normally engaging said wheels, pawls pivoted 75 on the opposite side of the said wheels, and links connecting the said arms and pawls, substantially as and for the purpose specified.

4. The combination with the operating means, of a series of gear-wheels actuated 80 thereby, a reversing-frame, shafts journaled in the reversing-frame, gear-wheels mounted on said shafts and meshing with one another, counting-wheels mounted on one of said shafts, means for alternately moving the last-named 85 gear-wheels into mesh with the former, and pawls pivoted in the reversing-frame, and means for operating said pawls for preventing accidental movement of the counting-wheels, said means comprising links pivoted to the 90 said pawls, and automatically-operated means connected to the said links.

RIENZI L. CLEVELAND.

Witnesses:

C. S. HAMILTON,
 GEO. MENDER.