J. A. TURCK.

CALCULATING MACHINE.

APPLICATION FILED OCT. 9, 1911.

1,154,897.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

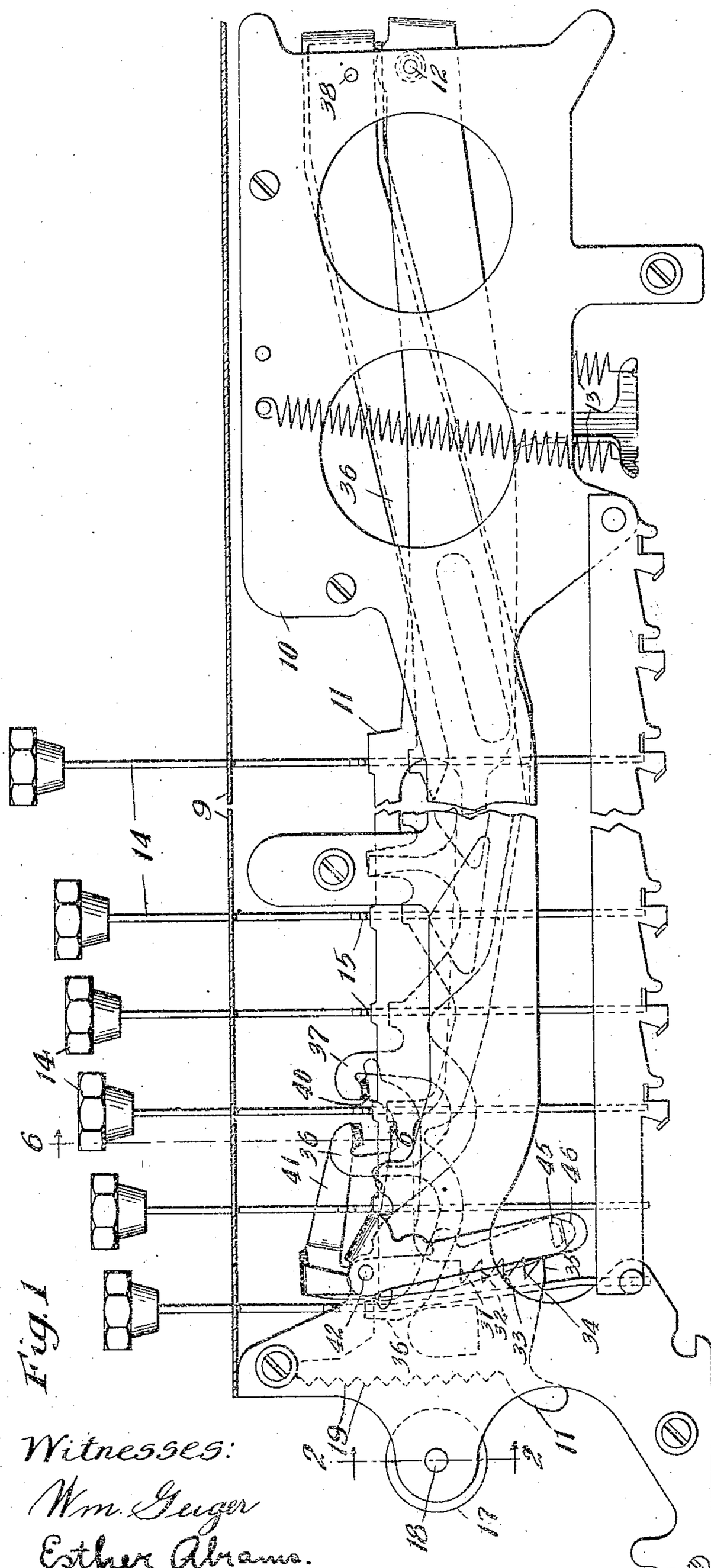

Fig. 1

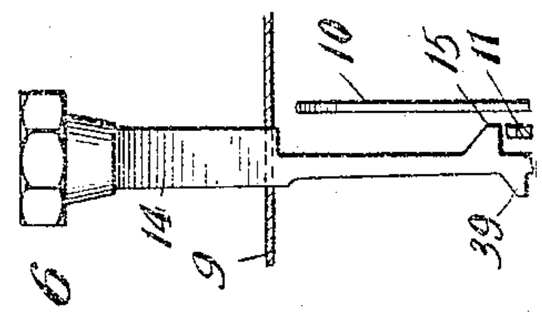

Fig. 6

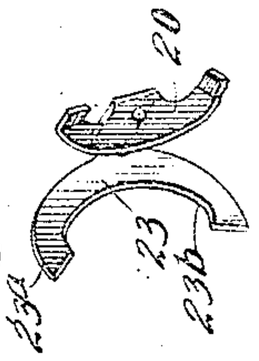

Fig. 5

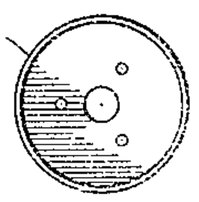

Fig. 4

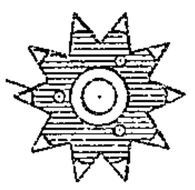

Fig. 3

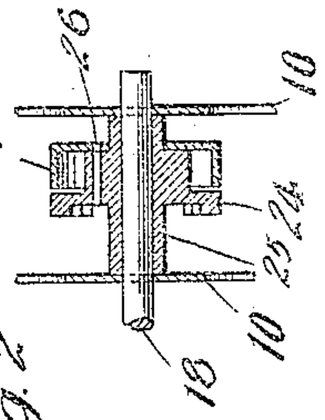

Fig. 2

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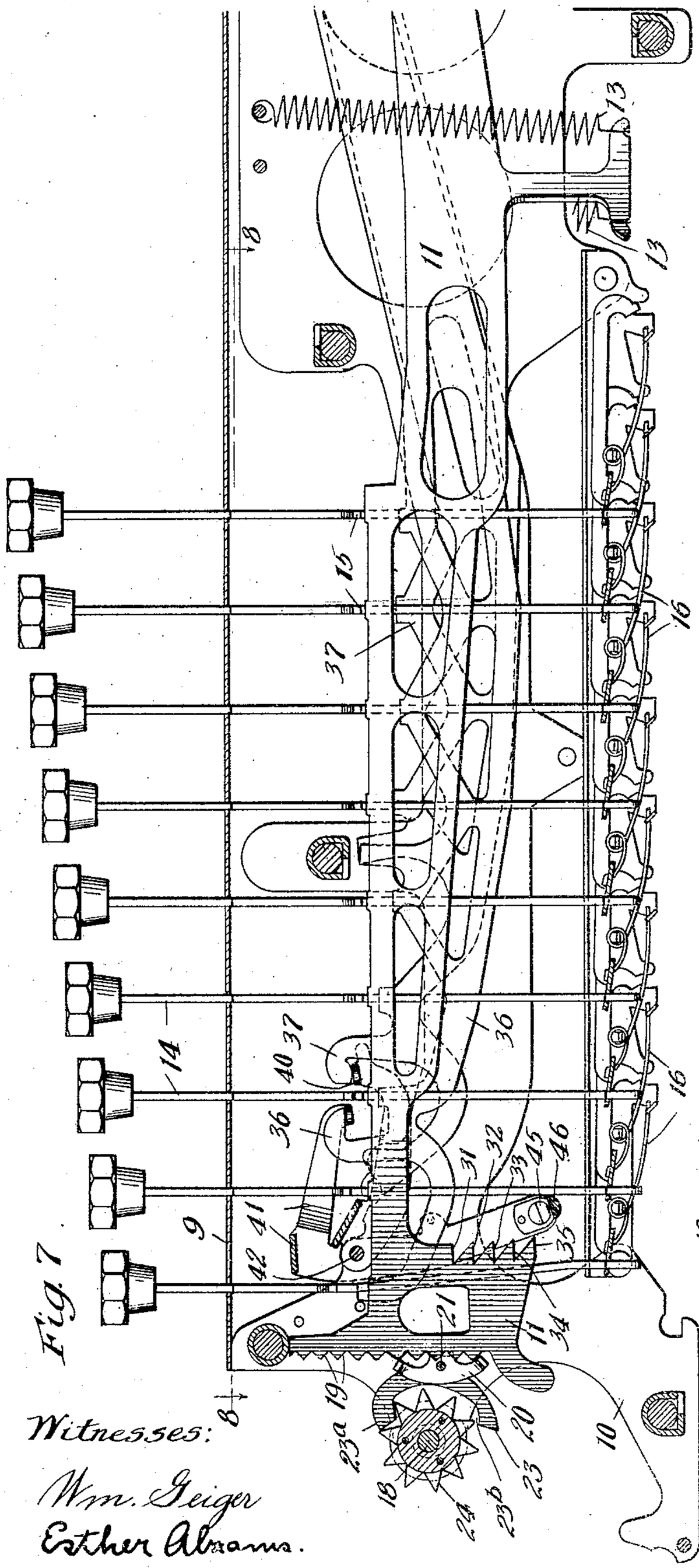

Fig. 7.

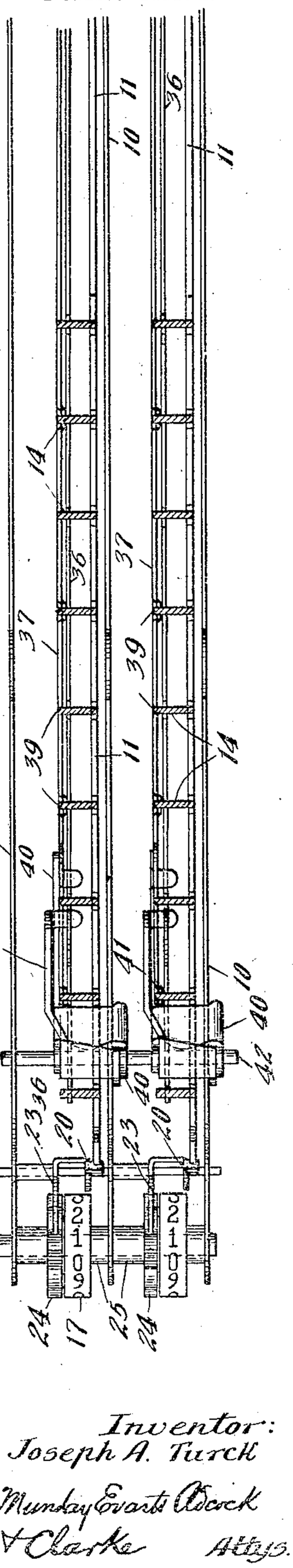

Fig. 6.

Witnesses:

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UNITED STATES PATENT OFFICE.

JOSEPH ABRAM TURCK, OF CHICAGO, ILLINOIS, ASSIGNOR TO FELT & TARRANT MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CALCULATING-MACHINE.

1,154,897. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed October 9, 1911. Serial No. 653,562.

To all whom it may concern:

Be it known that I, JOSEPH A. TURCK, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Calculating-Machines, of which the following is a specification.

This invention relates to prime-actuating mechanism for that type of keyboard calculating-machines in which the register operates in immediate response to the manipulation of the key designating the values to be registered, without requiring the intervening manipulation of any other power-providing or power-controlling keys or levers; and the invention relates more particularly to such calculating-machines as are typified by the disclosures in, for instance, the Felt Patents 762,520; 960,528; 1,028,344; 1,072,934 and 1,088,219.

One object of the invention is to provide a mechanism that will respond to exceedingly high-speed manipulation of the keyboard and at the same time minimize the effort required to manipulate the keys, and transmit positively to the numeral wheels the power imparted by the manipulation of the keys.

Another object is to provide a prime-actuating mechanism for such machines, in which a freely oscillating member shall transmit to the rotary numeral-wheel mechanism the power imparted by the keys of each column to the column-member that they directly actuate; whereby the said rotary mechanism may be actuated by an oscillating member pivoted relatively near it and independently of the pivoting of the long column-member extending under the column of keys. And the invention has for further objects such other improvements in structure and operation as may be found to obtain in the devices hereinafter described or claimed.

A particular exemplification of the invention is embodied, for purposes of illustration, in the accompanying drawings, forming a part of this specification; but the invention is of course not limited to such specific illustrative embodiment.

In said drawings:—Figure 1 is a longitudinal section of a machine embodying my invention. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a side elevation of the wheel by which the numeral wheel is controlled. Fig. 4 is a side view of the numeral wheel. Fig. 5 is a perspective of the escapements one of which engages the column actuator and the other of which engages the wheel of Fig. 3. Fig. 6 is a section on the line 6—6 of Fig. 1. Fig. 7 is a partial section taken in a plane adjacent to that of Fig. 1. Fig. 8 is a section on the line 8—8 of Fig. 7.

In said drawing 9 represents the top of a calculating machine embodying my invention, and 10, 10 represent the longitudinal plates separating the denominations from each other. The denominational or column actuators are shown at 11 and they are pivoted at 12. Retracting or lifting springs are provided for each actuator as indicated at 13. The keys 14 of which there are nine in each denomination, are arranged in denominational rows and are each adapted to be depressed by hand, and are also each provided with lateral projections 15 which when the keys are actuated, engage the actuator of the denomination to which the keys belong and move such actuator downward a greater or less distance proportioned to the power of the keys which may have been struck, the keys being also provided with individual lifting springs 16 by which they are raised after each depressing operation.

The numeral wheels are shown at 17 and are mounted on the shaft 18 and they are actuated from the column-actuator by the mechanism now to be described. The column actuators at the front end are provided with horizontally projecting teeth the sides of which slope in opposite directions from the crowns 19 to the bases, and are adapted to impart impulses or rocking movements to the oscillating device 20 which meshes with it without effecting any arbitrary arrest of the actuator. The device 20 is pivoted upon a horizontal cross wire 21, and its ends are turned so as to form lateral teeth 22 which alternately enter between the teeth of the actuator and by means of which the actuator compels the oscillation of the device 20 on the wire 21. A second oscillating device 23 is also pivoted on the same wire 21 and is desirably made in one piece with the oscillator 20 and oscillates therewith, and its office is to positively drive the numeral wheel of the denomination to which the actuator and the oscillating devices belong. The device 23 is fashioned as shown at Figs. 5 and 7, and its upper end is given a pro-

nounced and elongated hook form as shown at 23[a], and at the lower end its upper surface is cut out at 23[b]. By these features the operation of the two oscillating devices is as follows: Supposing the parts to be in the position of Fig. 1, the bottom of device 20 is in contact with the bottom tooth 19 of the actuator, and the upper tooth of the device 20 is disengaged. Consequently, whenever the actuator is depressed, the bottom of oscillator 20 will be first moved outward and its upper end forced inward, giving it an oscillation or impulse which is transmitted to the oscillator 23. If the movement of the actuator is continued after the action described has taken place, a like impulse will be given the oscillator 20 with each additional tooth 19 which passes and acts similarly against the bottom tooth of the oscillator 20, the number of impulses depending thus upon the exact extent to which the actuator is depressed.

Oscillator 23 is actuated simultaneously with oscillator 20 and to the same extent. In these impulses or movements of oscillator 23, the lower end first moves upward, its extremity passing behind the nearest tooth of the wheel 24 which is attached to the numeral wheel as hereinafter explained, so that the cut out surface 23[b] then acts upon the wheel and starts it to rotate. While the lower end is thus starting the wheel, the upper or hook end of the oscillator is moving off of the tooth which at the time of starting is under its hook, and as soon as the upper end is free from said tooth it starts to move inward of the wheel in the space between said tooth and the next one in order. In thus entering between the last mentioned teeth, it exerts power upon them received by it from the actuator and thus continues the rotation of the wheel inaugurated by the lower end of the oscillator 23 until the upper end of the said oscillator reaches its innermost position in which it is adapted to arrest the wheel unless the oscillator should immediately receive one or more further impulses. The operations above described of both oscillators follow and occur with each impulse received by oscillator 20 from the column actuator.

The wheel 24 is provided with a long hub 25, which loosely encircles the numeral shaft 18, and the numeral wheel 17 of the same denomination is mounted upon said hub and secured permanently to the wheel 24 by pins 26 as shown. The wheel 24 may appropriately be termed the star wheel, its teeth being V-shaped and sloping equally on both sides.

By the mechanism above described, I am enabled to positively drive the numeral wheel from the column actuator, by positively acting camming devices without the use of springs acting on or assisting them in any way, the oscillators acting as cams with the column actuator and the star wheel and producing a cam action upon the star wheel and causing it to rotate to the extent indicated by the movement of the actuator.

To stop the column actuators at the end of the key strokes, and prevent any possible over-movement of the actuators, I employ the mechanism used for some time past in the machines known as the comptometer and illustrated in Patent No. 762520. In this mechanism, the vertical portion of the column actuators is provided with a series of shoulders 31, 32, 33, 34 and 35 in the form of ratchet teeth. Adjacent to each actuator are two swinging levers 36 and 37, pivoted on the cross rod 38 at the rear of the machine. These levers are engaged and depressed by projections 39 formed on the keys, the projections on the odd number keys engaging the lever 36, and those on the even number keys engaging the lever 37. The levers swing pivoted elbow levers or stops 40 and 41 pivoted on cross rod 42, and such stops are provided with teeth 45 and 46 adapted to arrest the actuator, the tooth 46 being in a lower plane than tooth 45 and acting later. Each stop is engaged by the goosenecks on the ends of the lever 36 and 37. Further details of the operation of this portion of the machine may be gathered from said patent to which reference is made.

I claim:—

1. In prime-actuating mechanism for a key-driven calculating-machine, in combination: a column of denominational driving-keys; a swinging column-member coacting with the keys and driven by them severally to swing a distance proportioned to their respective values; rotary numeral-wheel mechanism; and an oscillating member intermediate said driven column-member and said numeral-wheel mechanism and acting to transmit definitely to the numeral-wheel mechanism the power imparted to the column-member by the keys.

2. In prime-actuating mechanism for a key-driven calculating-machine, in combination: a column of denominational driving-keys; a swinging column-member coacting with the keys and driven by them severally to swing a distance proportioned to their respective values; rotary numeral-wheel mechanism; and an oscillating cam-member intermediate said driven column-member and said numeral-wheel mechanism and acting by repeated camming impulses to transmit definitely to the numeral-wheel mechanism the power imparted to the column-member by the keys.

3. In prime-actuating mechanism for a key-driven calculating-machine, in combination: a column of denominational driving-keys; a column-member co-acting with the keys and driven by them severally in proportion to their respective values; rotary

numeral-wheel mechanism; and a cam-member intermediate said driven column-member and said numeral-wheel mechanism and acting by repeated camming impulses to transmit definitely to the numeral-wheel mechanism the power imparted to the column-member by the keys.

4. In a calculating machine the combination of a numeral wheel and an actuating mechanism therefor, the latter embracing a series of keys, cam devices adapted to rotate the numeral wheel, and means whereby the keys may act upon and control said devices.

5. In a calculating machine a numeral wheel in combination with a segment and lever having cam faces, a series of keys for said lever, devices operated by said cam faces and acting to rotate the numeral wheel.

6. In a calculating machine, a numeral wheel and oscillating devices adapted to rotate said wheel, in combination with a series of keys and means for operating said devices by the keys.

7. In a calculating machine, a numeral wheel and oscillating devices adapted to rotate said wheel, in combination with a segment lever with cam faces, a series of keys actuating said lever, the said cam faces actuating the oscillating devices in rotating the wheel.

8. In a calculating machine a numeral wheel and an oscillating device adapted to move said wheel forward one tenth at each oscillation, in combination with a segment lever with cam faces engaging said oscillating device and oscillating the same, and a series of keys operating the segment lever.

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