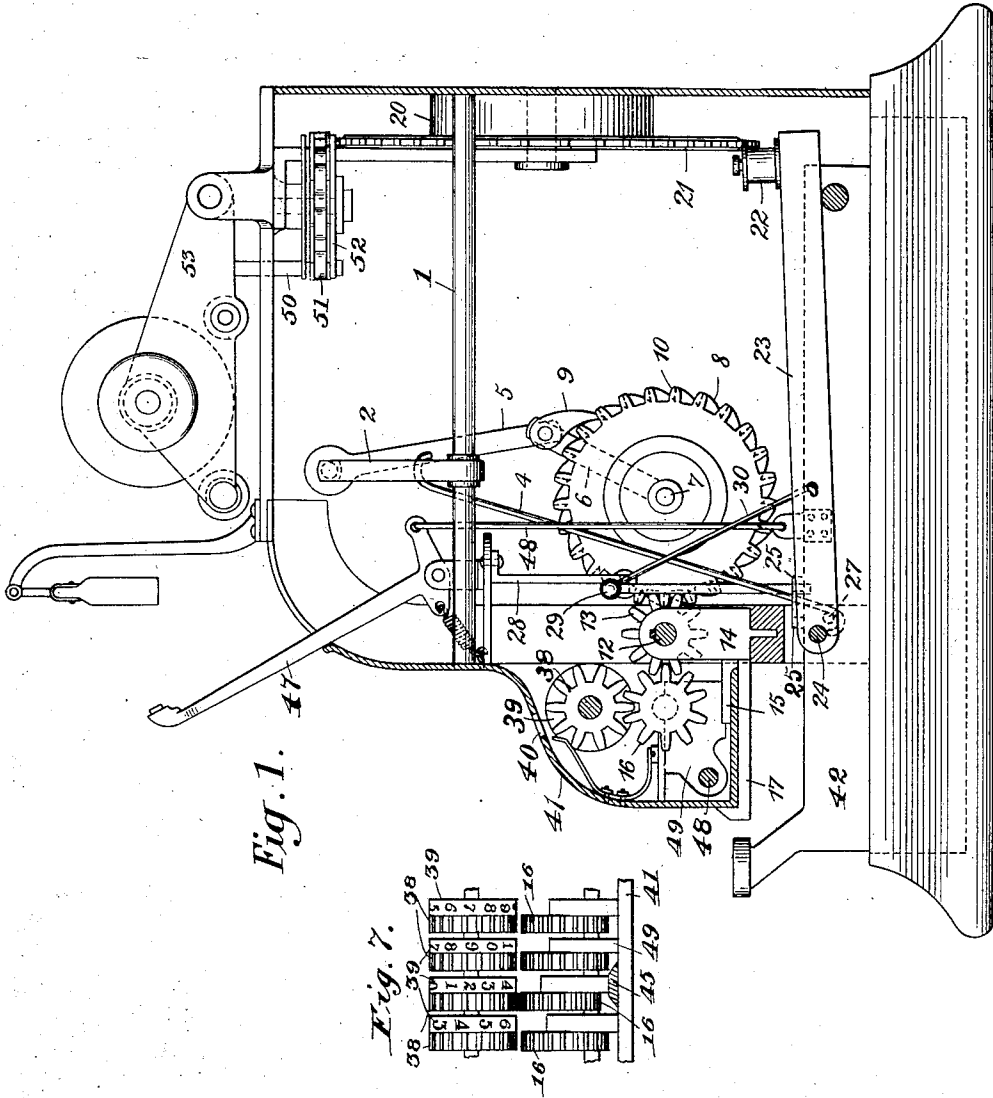


H. KAUSSEN.
CALCULATING MACHINE.

APPLICATION FILED MAY 5, 1902. RENEWED NOV. 20, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses.
H. L. Beil
Barbara Cambis

Inventor,
Heinrich Kausen
 by *H. L. Reynolds.*
his atty.

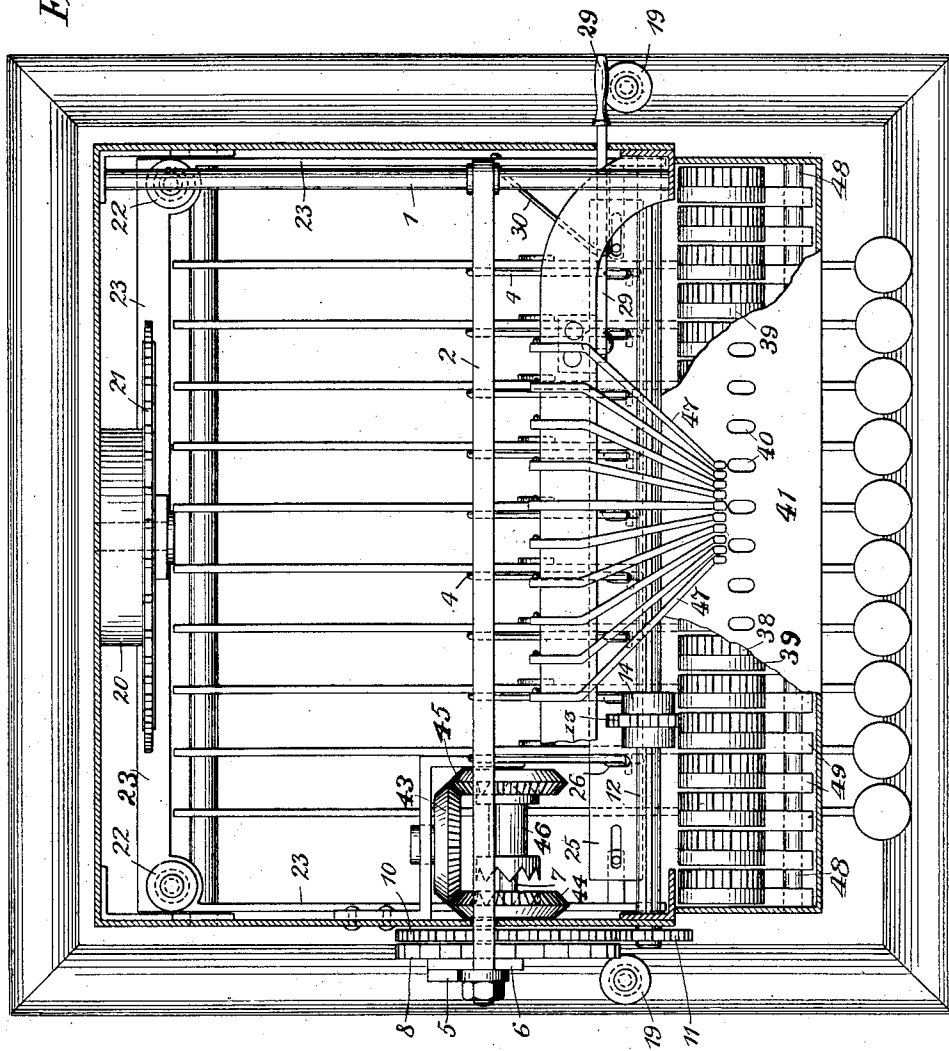
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4 SHEETS—SHEET 2.

Fig. 2.



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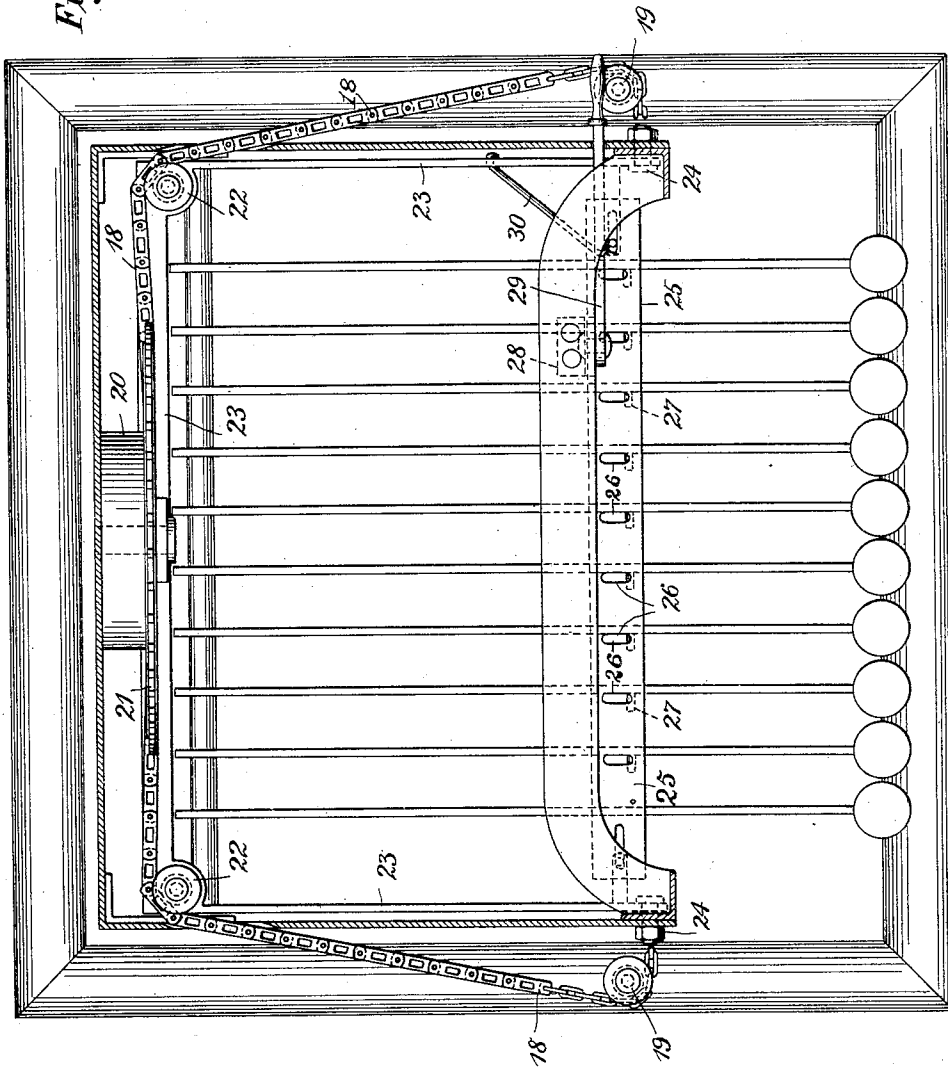
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

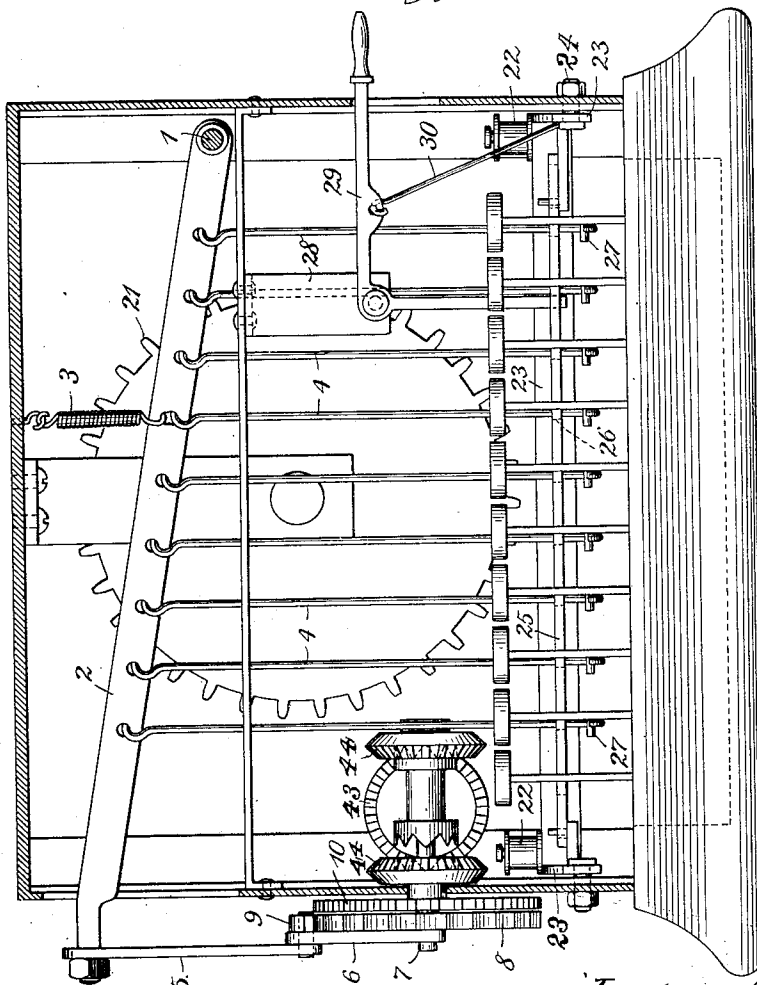


Fig. 5.

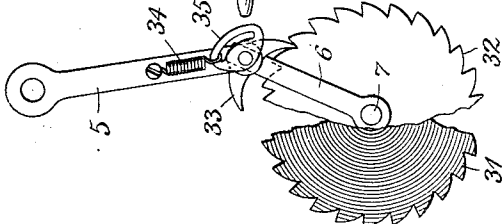
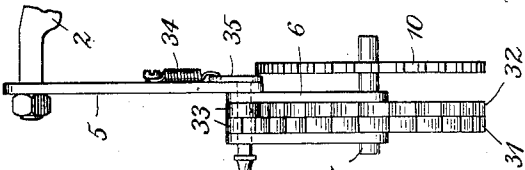


Fig. 6.



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UNITED STATES PATENT OFFICE.

HEINRICH KAUSSEN, OF ROTHE ERDE, NEAR AACHEN, GERMANY.

CALCULATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 747,977, dated December 29, 1903.

Application filed May 5, 1902. Renewed November 20, 1903. Serial No. 182,023. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH KAUSSEN, merchant, a subject of the King of Prussia, German Emperor, residing at Rothe Erde, near Aachen, Prussia, Germany, have invented certain new and useful Improvements in Calculating-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.

My invention relates to an improvement in calculating-machines, and comprises certain parts and combinations of parts, which will hereinafter be more particularly pointed out in the claims.

The drawings accompanying and forming a part of this specification show my invention embodied in the form which is at present preferred by me.

In all the figures of drawings the same reference character is used to denote the same part.

Figure 1 is a side elevation of my device. Fig. 2 is a plan thereof, the paper-carriage and related recording means being removed. Fig. 3 is a plan view of the lower parts of my device, the calculating or numeral wheels being omitted. Fig. 4 is an elevation taken from the front, the calculating or numeral wheels and the front casing being removed; and Figs. 5 and 6 are respectively side and edge views of a modified form of reversing-gear, the wheels 31 and 32 of Fig. 5 being each partly broken away. Fig. 7 shows in rear elevation the means employed for connecting the actuating mechanism successively with the numeral-wheels.

My machine as herein illustrated is capable of being used to successively perform a series of operations which may alternate in any desired manner between additions and subtractions, the same apparatus being employed for each, except that a reversing mechanism is employed to work the apparatus in one direction for additions and in the opposite direction for subtractions.

The calculating mechanism proper is herein shown as consisting of a series of numeral-disks 39, to each of which is connected a gear 38. One of these wheels represents units, the next tens, the next hundreds, the next thou-

sands, &c. The manner of connecting these various wheels so as to secure a correct summation of the various quantities used is immaterial. Such constructions are old and well known in connection with counters of all kinds and need not be herein illustrated or described. The front plate 41 of the casing has holes 40, through which the reading of said disks may be observed.

A series of ten key-levers 42 are provided, each representing a numeral, and said levers are pivoted upon the rod 24 to operate after the manner of the key-levers of a type-writer. A lever 2 is pivoted upon a shaft 1, which extends from front to rear upon one side of the machine or parallel with the key-levers, said lever 2 extending above and transversely of the key-levers and in its normal position at an angle with the horizontal. The free end of this lever is normally held up by a spring 3, and the lever is connected by a series of links 4 with all of the key-levers except the one which represents the cipher, said key-lever being shown as the one at the left. The key-levers are each capable of depression substantially the same amount; but being connected by links 4 with the lever 2 at different distances from its pivot the resulting depression of the outer or free end of the lever 2 will differ with each. This difference is relied upon to secure the proper variation in the actuation of the integrating mechanism. The outer or free end of the lever 2 is connected by a link 5 with the free end of an arm or lever 6, which is pivoted coaxially with a ratchet-wheel 8. The arm 6 carries a pawl 9, which engages the ratchet-wheel to advance it as the arm 6 swings. The motion of the ratchet-wheel is communicated by suitable mechanism to the integrating mechanism and a suitable device employed in connection with the transmission mechanism, so that the direction of motion may be reversed. As shown in Figs. 2 and 4, a gear 10 is loosely mounted on the same shaft 7 as that to which the ratchet-wheel 8 is fixed. A bevel-gear 44 is secured to wheel 10 and meshes with a bevel-gear 43, and this in turn with a bevel-gear 45, also mounted loose on shaft 7. Gears 44 and 45 each have a clutch device adapted to be engaged by corresponding devices carried at opposite ends of a sleeve 46, which is mounted

to slide upon and turn with the shaft 7. This may be shifted by any of the well-known mechanisms employed for this purpose. When the clutch is in engagement with one gear, the motion transmitted is opposite to that which results when the other gear is in engagement with the clutch. By engaging the clutch with the proper gear the machine may be used for either addition or subtraction. The gear 10 meshes with the gear 11, secured upon a shaft 12, which extends adjacent to and parallel with the numeral-disks of the integrating mechanism. Upon this shaft is mounted by a key and feather *a* or equivalent construction (see Fig. 1) a gear 13, so that it may be made to engage with any one of the idler or intermediate gears 16. The sliding gear 13 is mounted within a sliding block 14, which slides upon and supports the shaft 12. A chain 18, which passes about guide-pulleys 19 22, has its ends connected with the sliding block 14 and is also engaged by the teeth of a sprocket-wheel 21, which is connected with and turned by a spring 20, which also moves the carriage of the printing or recording mechanism, the latter being of the type common in type-writers, such as the Remington. Any form of connection desired may be adopted. The form herein illustrated consists of a chain 51, which resembles the chain 18, by which the block 14 is moved, and, like chain 18, engages with the teeth of the sprocket-wheel. It also passes around the guide-pulleys 52, one at each end of the machine, and is connected with an arm 50 or in any other suitable way with the type-writer carriage 53.

The type-bars 47 are shown in Figs. 1 and 2, ten being used, one for each of the numerals. The idler-gears 16, which connect the gear 13 with the gears 38 of the calculating mechanism, are each journaled on an individual frame or plate 49, (see Figs. 1 and 7,) which is pivoted at 48, so that it may drop down from the position shown in Fig. 1 to that shown by all but one in Fig. 7, and thus become disengaged from the gears 38. The sliding block 14 has a plate or web 15, which is beveled on each side and projects under the wheels 16, so that as the block 14 moves along it will in turn raise each of the plates or frames 49 and as it passes will permit it to drop. This plate or web 15 is, however, only wide enough to hold one of such gears raised at a time. In Fig. 7 this web or plate is shown in section and the block and its wheel omitted for clearness of illustration. A finger 17 extends from the block 14 beneath the calculating mechanism to the front, where it may be seen and the exact position of the gear 13 told.

It may at times be desirable to throw the calculating mechanism out of use. I have therefore provided means by which this may be done. The guide-pulleys 19 22 and chain 18 are carried upon a frame 23, which is pivoted at 24, so that if the frame is dropped the connection between the recording mechanism

and the calculating mechanism is broken. The links 4, connecting the lever 2 with the key-levers 42, are adapted to be disconnected from the key-levers. They are connected with the key-levers by means of hooks on the links and pins 27 on the key-levers. The links 4 pass through slots 26 in a bar 25, which lies just over the key-levers and which is movable lengthwise, so as to carry the hooked ends of the links 4 beyond the ends of the pins 27. In this position operation of the key-levers will not affect the lever 2 or the calculating mechanism. A lever 29 is pivoted upon a bracket 28 or other convenient support and by one end engages the bar 25 to move it. At the same time it is connected by a link 30 with the pivoted frame 23, so that throwing down the outer end of the lever 29 will free the hooked ends of the links from the key-levers and drop the chain from engagement with the sprocket-wheel.

Figs. 5 and 6 show a different form of reversing mechanism. In this two ratchet-wheels 31 and 32 are secured side by side and to the shaft 7, the teeth of the two wheels facing oppositely. Instead of the single pawl of Figs. 1 and 2 a double pawl 33 is employed, which may be made to engage with either of the ratchet-wheels to thereby reverse the action of the calculating mechanism. This pawl may be held in either adjusted position by any suitable mechanism. That shown consists of a spring 34, which engages a slot in the pawl or an arm connected therewith.

It is evident that the construction of many of the parts herein described might be changed without changing the essential features thereof or the principles of their operation. I do not, therefore, wish to be limited to the use of the exact constructions shown, but claim all substantial equivalents of the construction shown. The scope of my invention is to be determined by an inspection of the claims, in which the omission of any element or the failure to qualify any element is to be construed as a statement that such omitted element or qualification is not essential in that particular combination.

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

1. In a calculating-machine, the combination with a series of numeral-disks and attached gears mounted upon a common axis, a shaft parallel with said axis and a gear mounted to turn with and slide upon said shaft, of a series of idler or intermediate gears adapted to be engaged by said sliding gear and to be moved into engagement each with its respective numeral-disk gear, and a member moving with said sliding gear and adapted to successively move the intermediate gears into engagement with their numeral-disk gears.

2. In a calculating-machine, the combination with a series of numeral-disks and attached gears mounted upon a common axis, a shaft parallel with said axis and a gear mount-

ed to turn with and slide upon said shaft, a series of pivoted frames each carrying an idler or intermediate gear adapted each to be engaged with its respective numeral-disk gear but normally dropped out of engagement therewith, the idler-gears being also engageable with the sliding gear, and a member movable with the sliding gear and having inclines adapted to lift the idler-gears into engagement with the numeral-disk gears.

3. In a calculating-machine, in combination, a computing mechanism, means for operating it including a denomination-selecting member, a paper-carriage, a wheel for traversing the said carriage, a chain adapted to engage said wheel and connected with the denomination-selecting member, a pivoted frame supporting and carrying guides for said chain and a lever connected with said frame to move it at will so as to engage or disengage the chain with the said wheel.

4. In a calculating-machine, the combination, with a computing mechanism including a denomination-selecting member, a printing mechanism including a movable paper-carriage, and means for operating said mechanisms, of a flexible member connecting the car-

riage with the denomination-selecting member to move it, a frame having guides for said connecting member, and means for moving said frame to break the connection between the carriage and denomination-selecting member at will.

5. In a calculating-machine, the combination with a computing mechanism, numeral-keys, and means for actuating said computing mechanism an amount proportioned to the unitary value of the numeral used, of a paper-carriage controlled in position by the numeral-keys, a chain-wheel operated in unison with said paper-carriage, a denomination-selecting device interposed in the connections between the keys, and the computing mechanism, a chain connected with said selecting device and engaging said chain-wheel, and a movable frame having guides for said chain and adapted to be moved to disengage the chain and wheel when desired.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HEINRICH KAUSSEN.

Witnesses:

JOHN B. ADAMS,
H. QUADFLIEG.