

No. 858,646.

PATENTED JULY 2, 1907.

J. D. DAUGHERTY.
COMPUTING MECHANISM.
APPLICATION FILED MAR. 26, 1906.

5 SHEETS—SHEET 1.

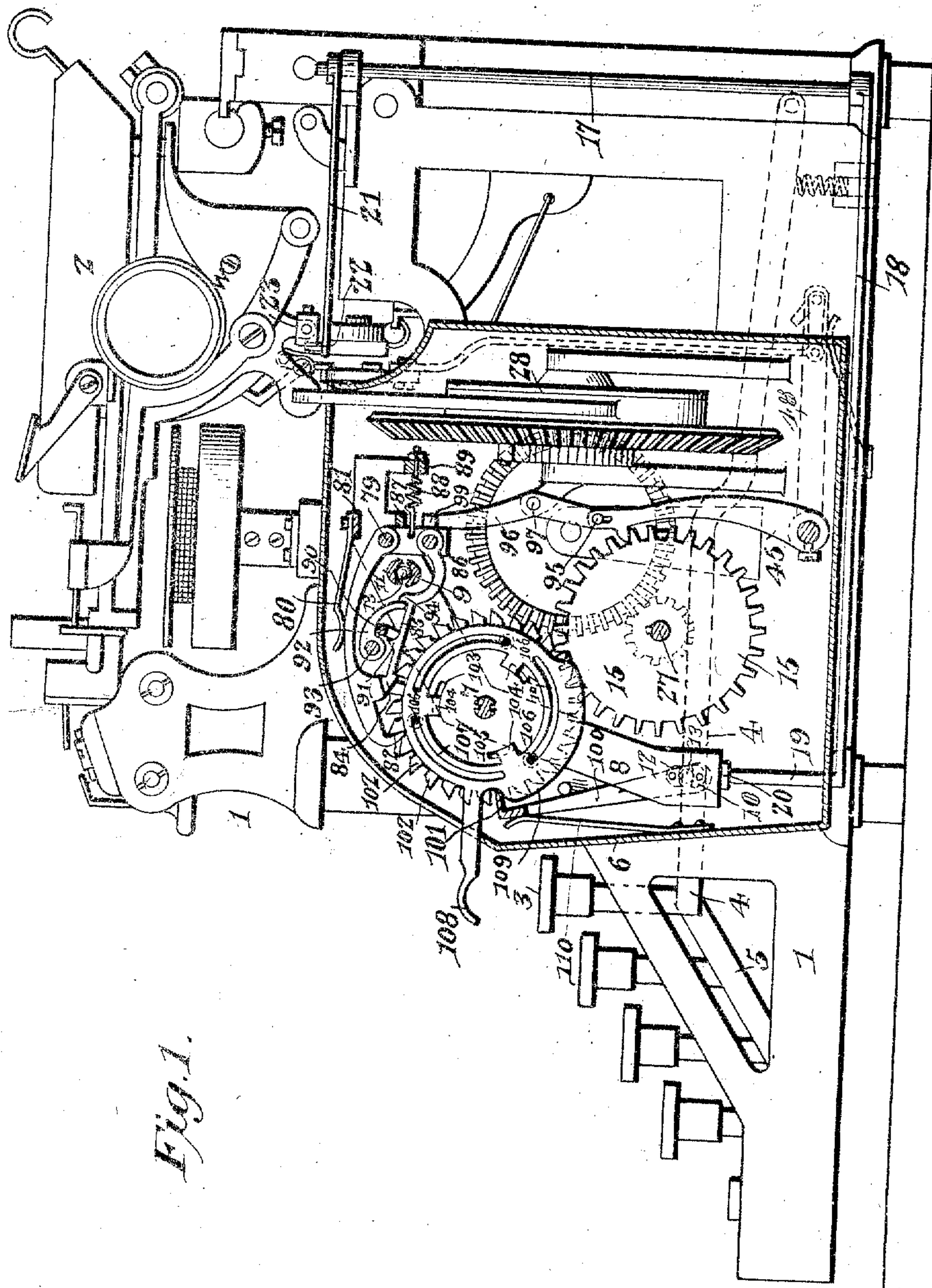


Fig. 1.

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5 SHEETS—SHEET 2.

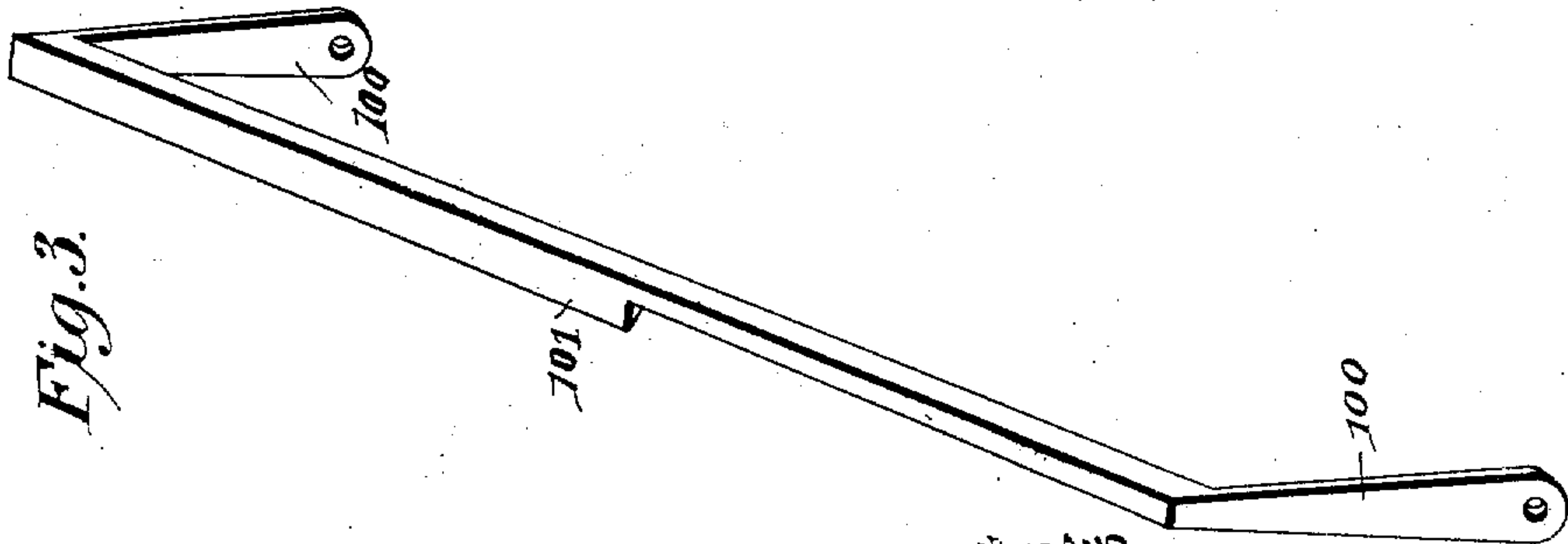
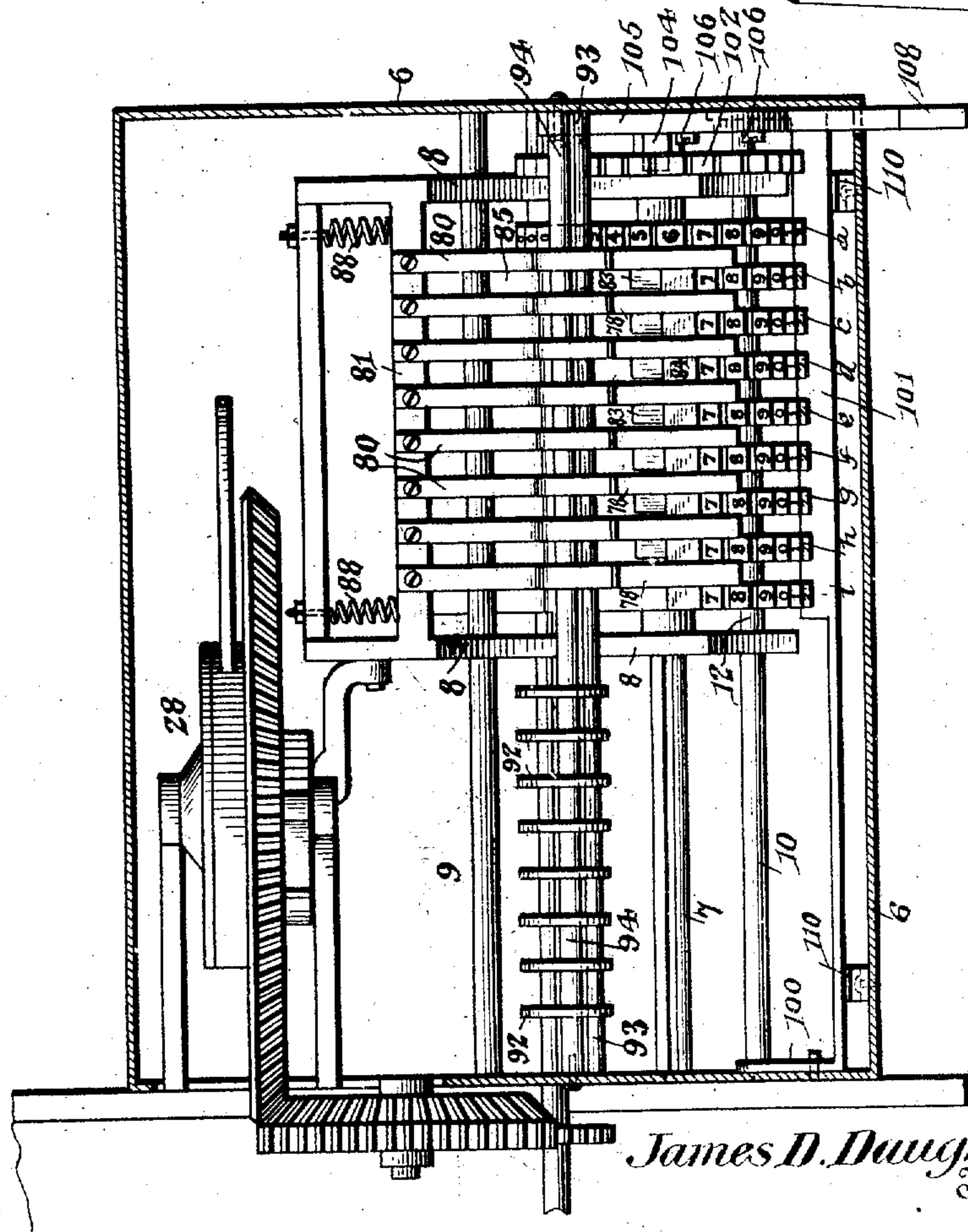


Fig. 2.



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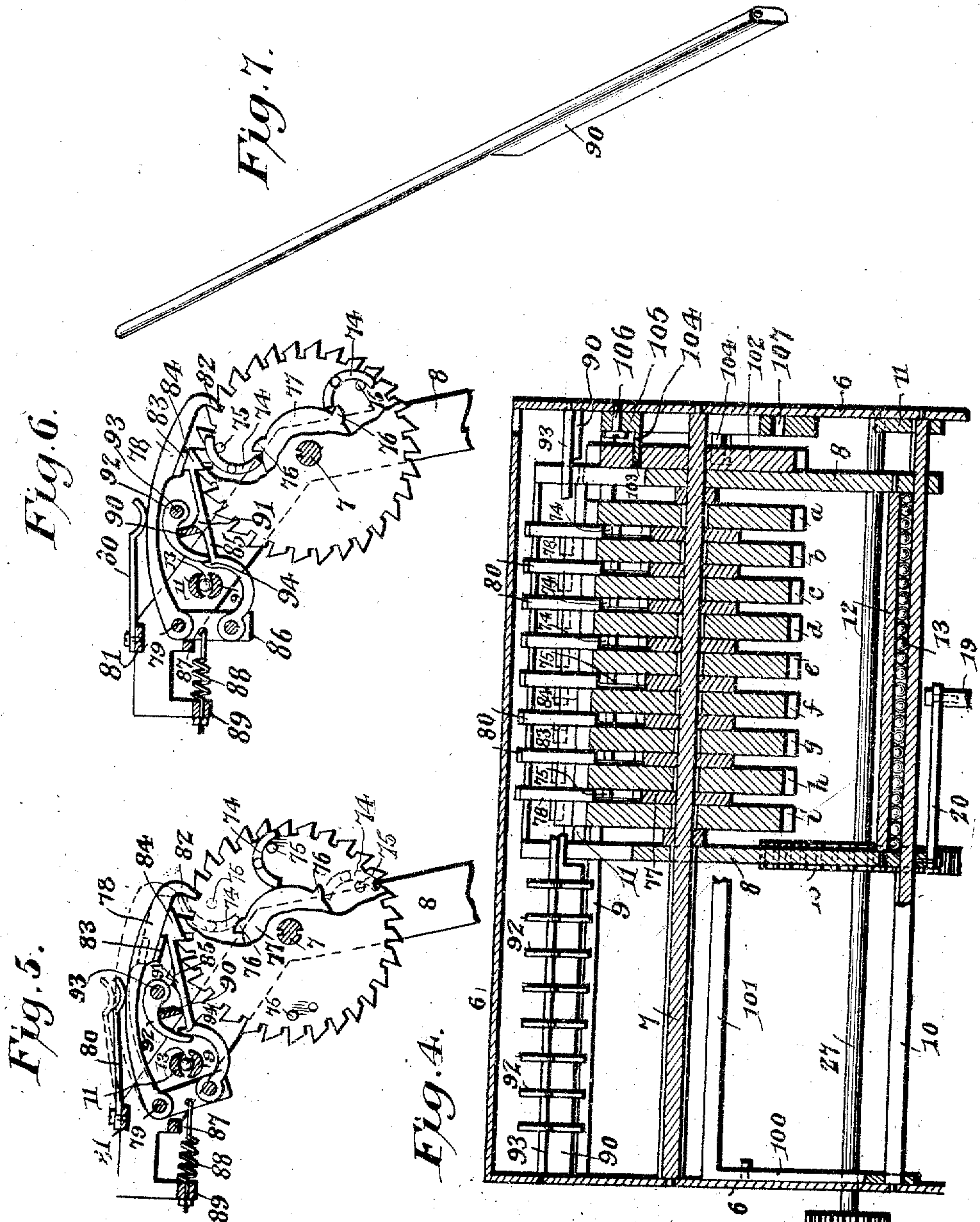
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

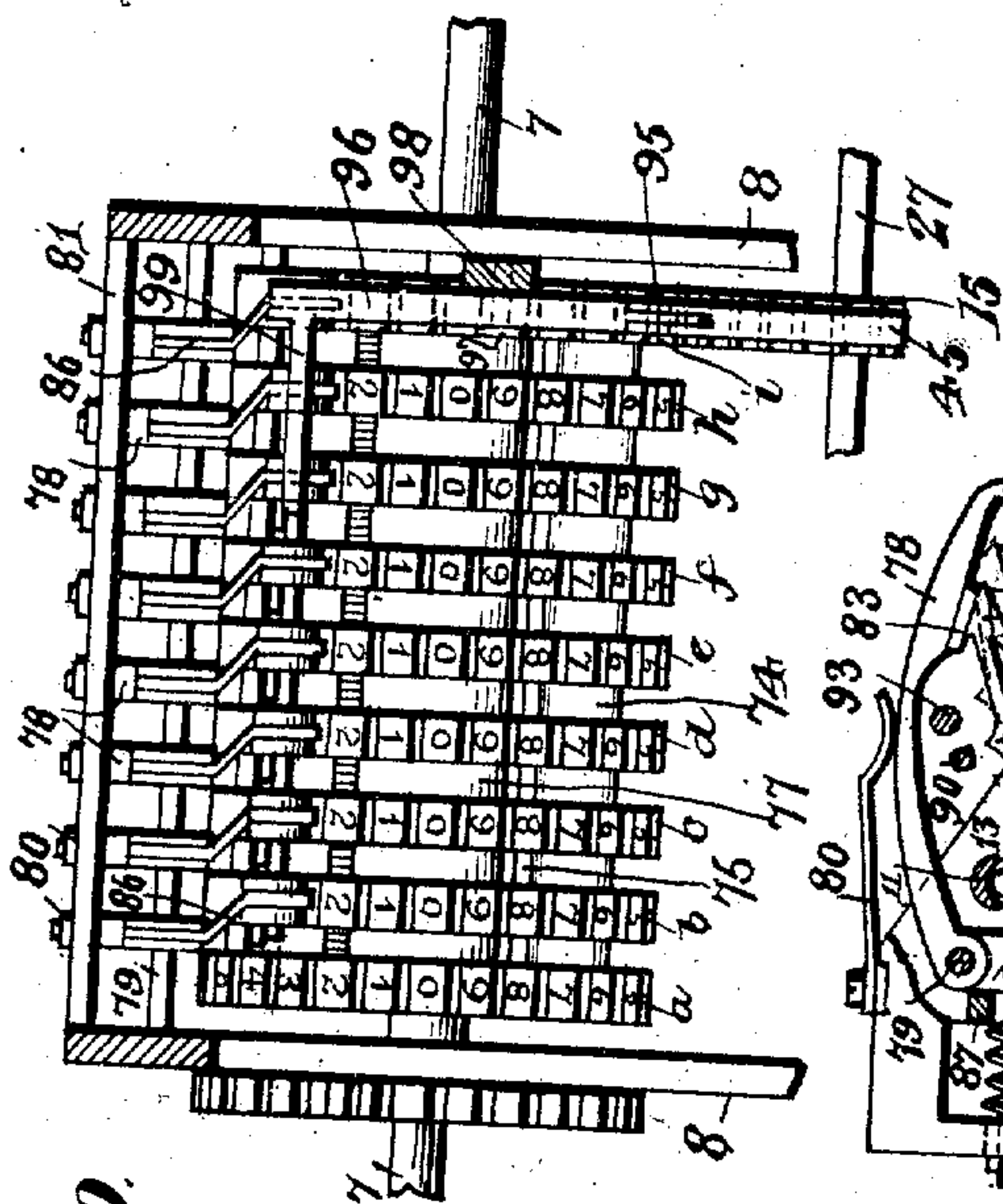


Fig. 10.

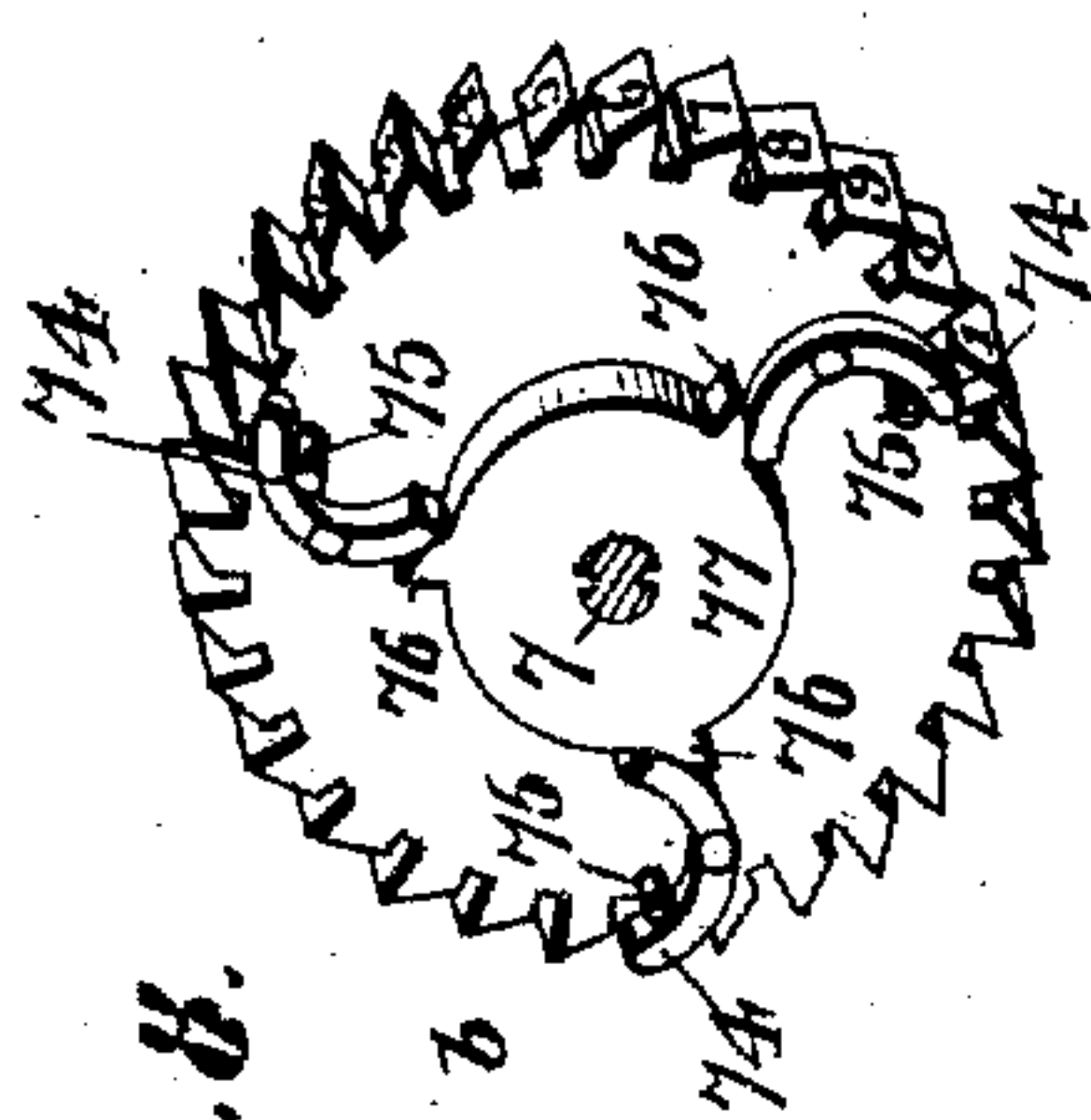


Fig. 8.

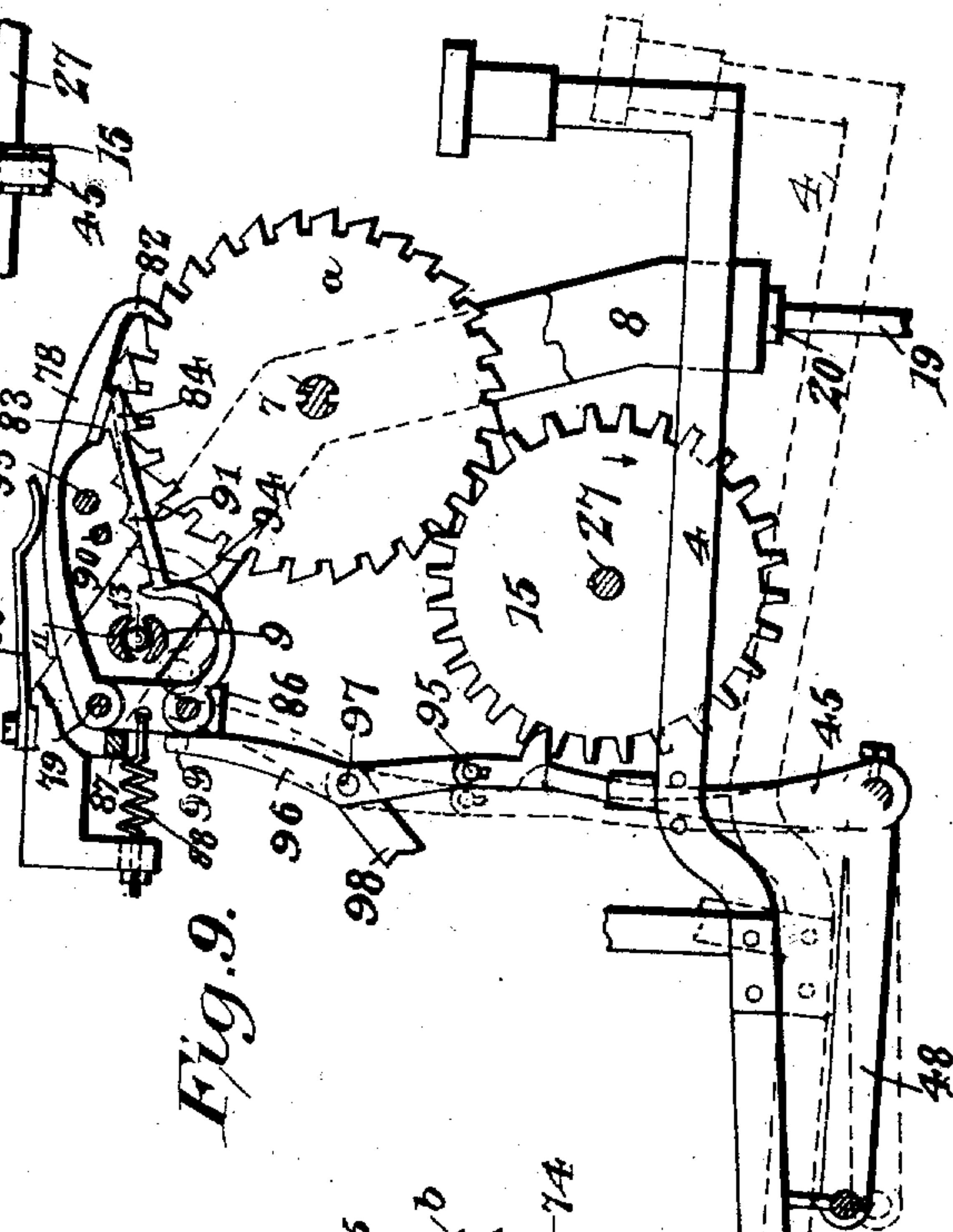


Fig. 9.

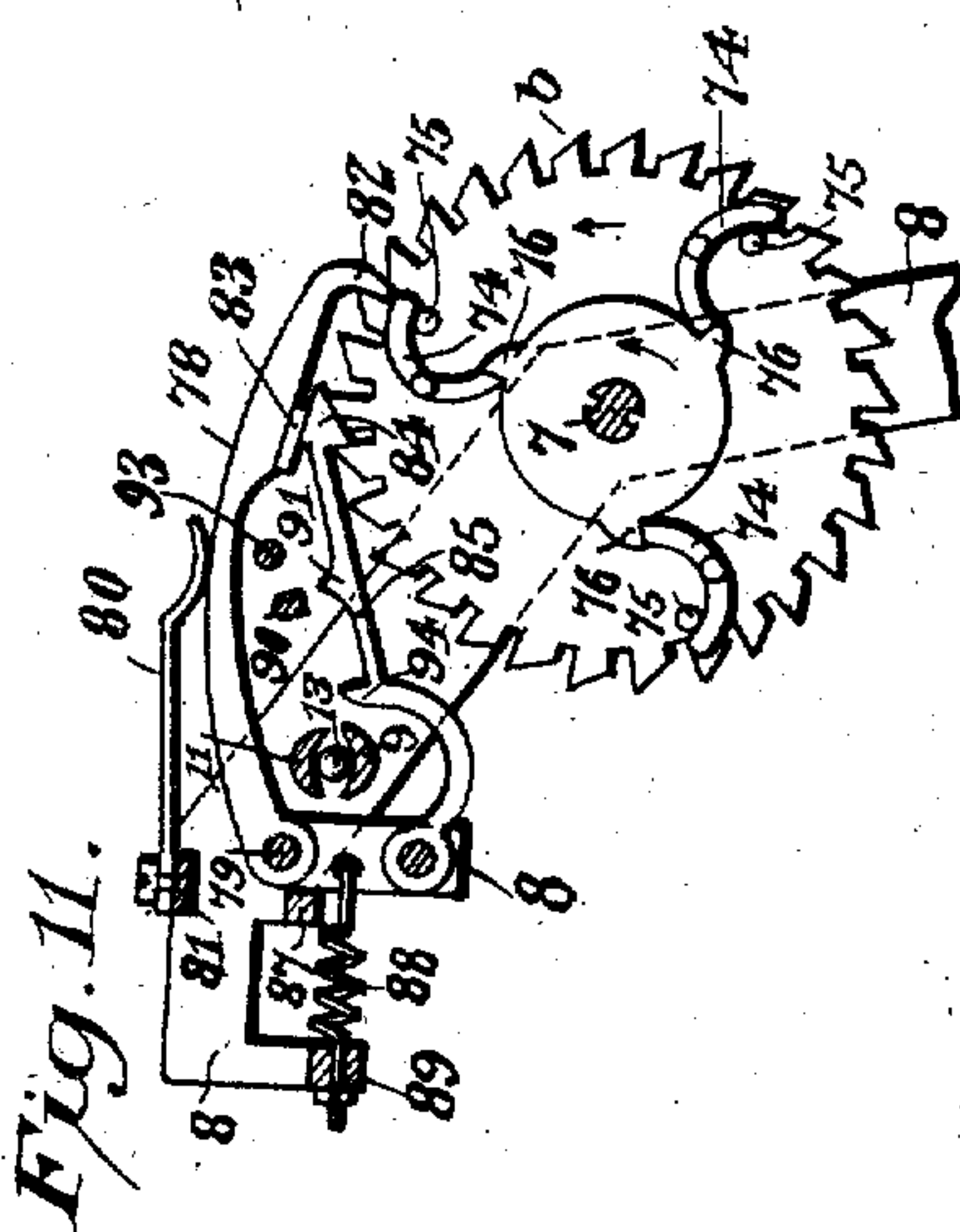


Fig. 11.

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5 SHEETS—SHEET 5.

Fig. 13.

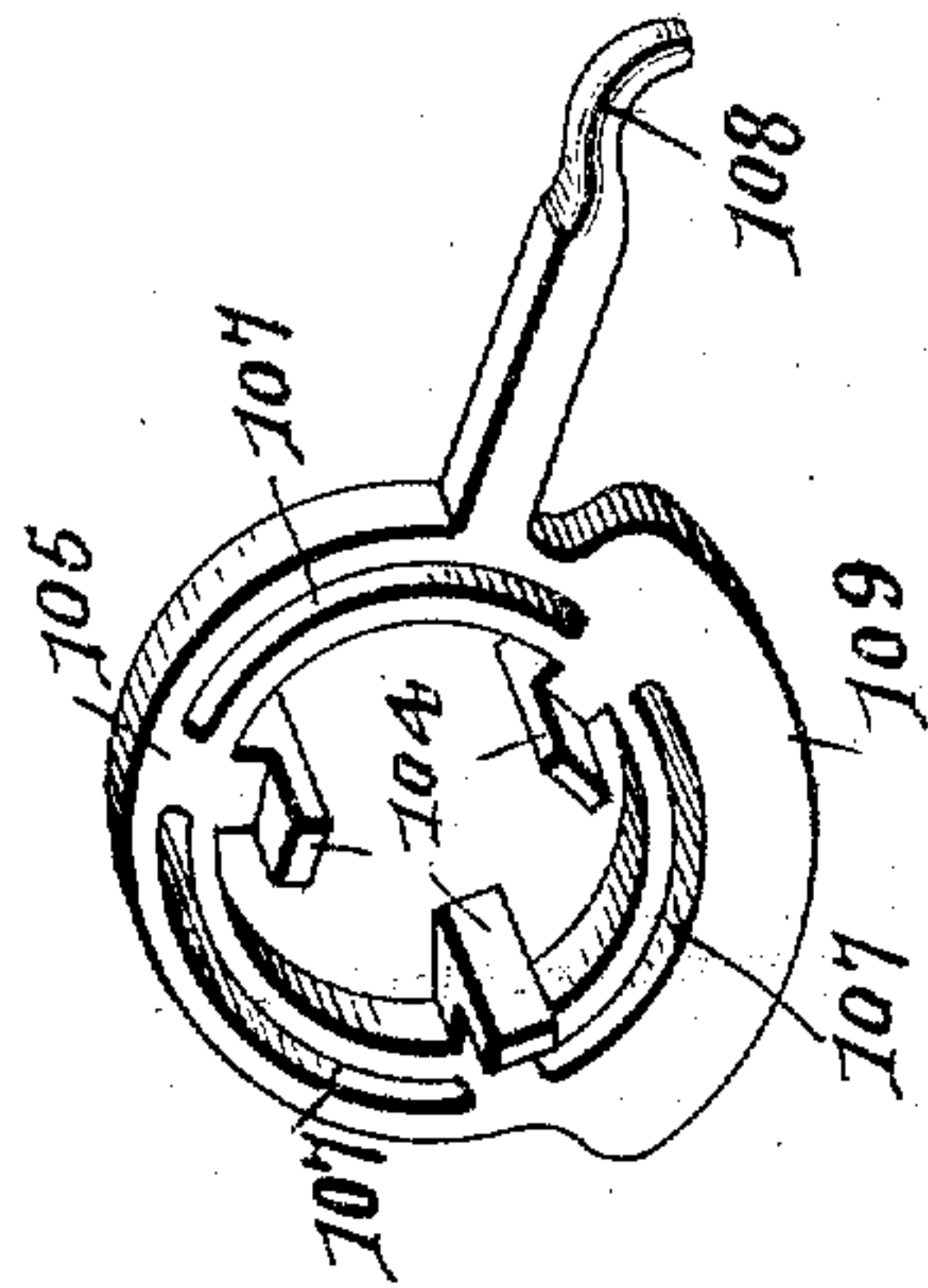


Fig. 14.

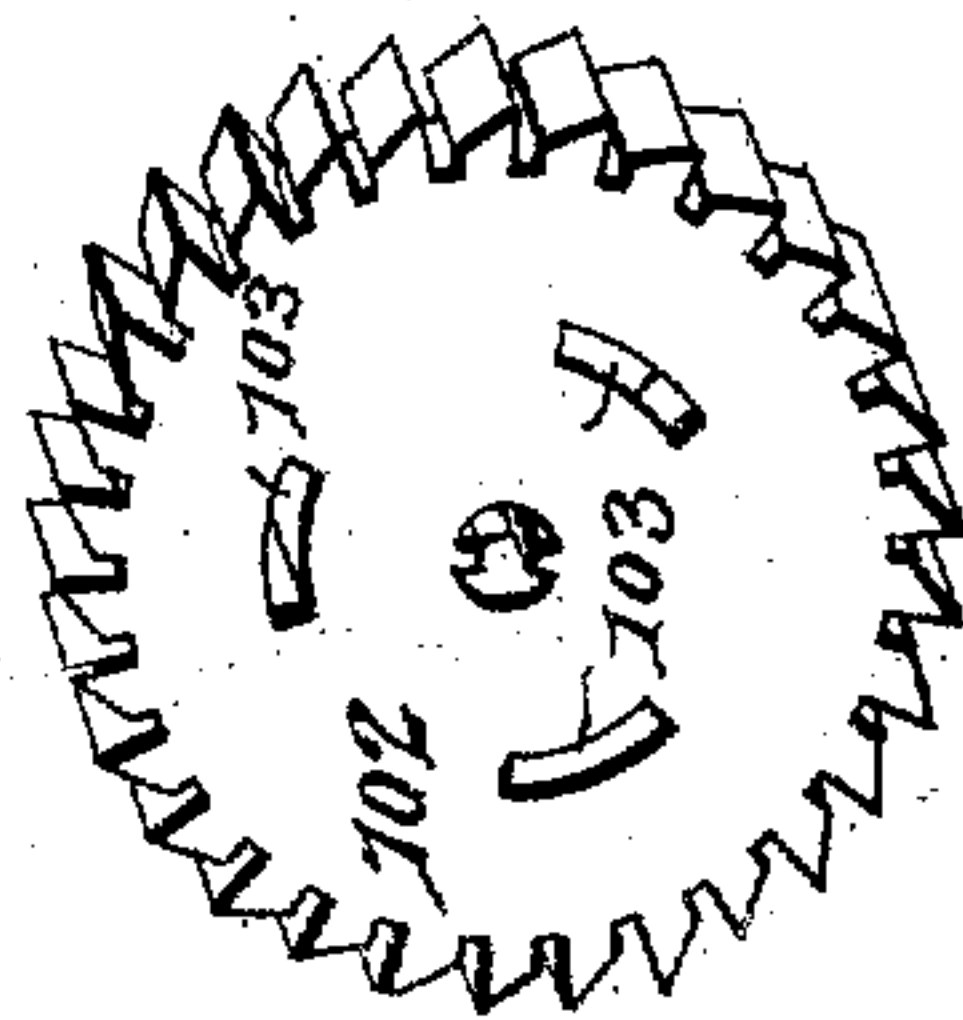
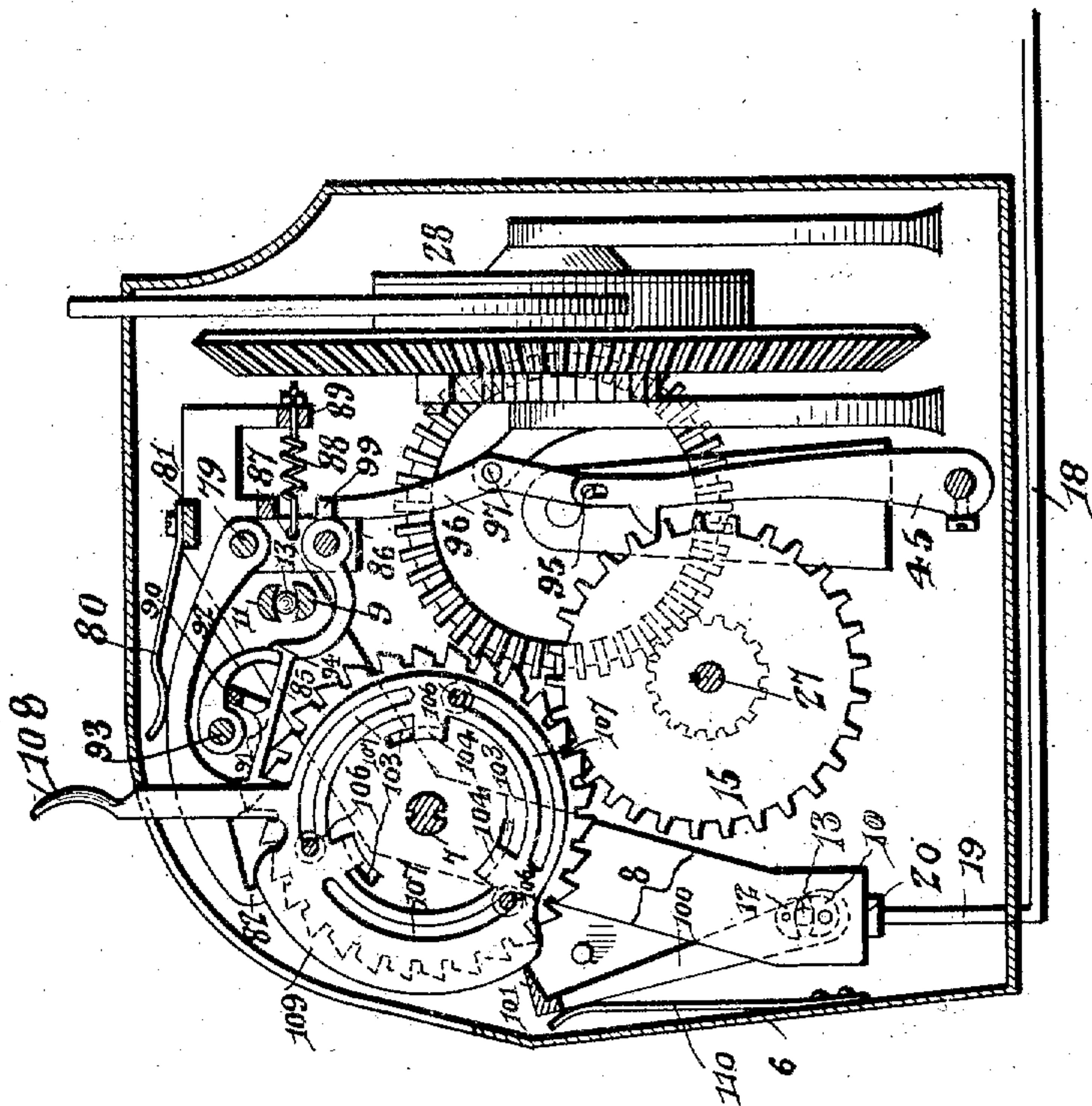


Fig. 12.



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UNITED STATES PATENT OFFICE.

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COMPUTING MECHANISM.

No. 858,646.

Specification of Letters Patent.

Patented July 2, 1907.

Original application filed May 10, 1901, Serial No. 59,631. Divided and this application filed March 26, 1906. Serial No. 308,072.

To all whom it may concern:

Be it known that I, JAMES D. DAUGHERTY, a citizen of the United States, residing at Kittanning, in the county of Armstrong and State of Pennsylvania, have invented a new and useful Computing Mechanism, of which the following is a specification.

This invention relates to computing mechanism especially adapted for use as a part of the organization of a combined typewriting and adding machine disclosed in my copending application for Letters Patent filed May 10, 1901, Serial Number 59,631, of which the present application is a division.

The invention is directed particularly to the improvement of that part of the machine organization which is known in the art as the register or totalizer, which, in the present instance, embraces a series of denominational members or number wheels, transfer mechanism by means of which the limit of value accumulated upon one wheel is automatically transferred to the wheel of next higher order, resetting mechanisms for the wheels and transfer mechanism respectively, and locking mechanism for the wheels.

The objects of the invention are to provide simple and efficient locking mechanism for preventing premature or accidental movement of the number wheels; to provide said wheels with transfer mechanism which, while controlled by the wheels, is operated by transfer motors which relieve the primary operating mechanism of the burden ordinarily imposed upon it by the carrying operation; to provide means common to all of the carrying devices for returning them to normal position and for restoring the energy expended by the transfer motors; and to provide a simple and positively operating form of wheel resetting mechanism by means of which the wheels may be quickly and conveniently reset to zero upon the completion of a given computation.

Subordinate objects of the invention will appear hereinafter, as the description of the illustrated structure is developed.

In the accompanying drawings—Figure 1 is a side elevation of an Underwood typewriter equipped with my computing mechanism, the casing of which is broken away to disclose interior parts. Fig. 2 is a horizontal section through the computing device casing, showing in plan the mechanism contained therein. Fig. 3 is a detail perspective view of the locking bail. Fig. 4 is a sectional view of a portion of the computing mechanism. Figs. 5 and 6 are detail elevations designed to illustrate the operation of the carrying mechanism. In Fig. 5 the positions assumed by the parts prior to carrying are shown in full lines and in dotted

lines the locking arm is shown in the position it assumes when releasing the carrying mechanism. In Fig. 6 are shown the positions assumed by the parts after the carrying has been effected. Fig. 7 is a detail perspective view of the locking bar. Fig. 8 is a perspective view of one of the number wheels, the trip levers carried thereby, and the cam disk cooperating with the trip levers. Fig. 9 is an end elevation of the mechanism whereby the transfer mechanism is reset, the positions assumed by the parts prior to resetting being shown in full lines, and the positions assumed by said parts after resetting being shown in dotted lines. Fig. 10 is a sectional view of the computing carriage showing the number wheels, the transfer mechanism, and a portion of the transfer resetting mechanism in rear elevation. Fig. 11 is a detail elevation designed to show the positions assumed by certain of the parts during the resetting of the number wheels and more particularly the manner in which the trip levers of a wheel are engaged by the adjacent resetting disk or cam, and the manner in which the transfer mechanism yields to permit the rotation of the number wheel which is necessary to the resetting thereof. Fig. 12 is a sectional view of the computing device casing, disclosing the interior mechanism, the number wheel resetting lever and associated parts being moved to the positions they assume at the completion of the number wheel resetting operation. Fig. 13 is a detail perspective view of the resetting member, and Fig. 14 is a similar view of the locking wheel.

Since the mechanism embodying the present invention has been designed with special reference to its use in connection with a typewriter, I have illustrated said mechanism as applied to an Underwood typewriting machine, although it should be understood that the computing mechanism *per se* is the only structure claimed herein and that it is useful in many relations other than that which has been selected for illustrative purposes.

1 indicates the frame of the typewriter, 2 the traveling carriage thereof, which is power driven and escapement controlled, as usual, 3 the numeral keys, 4 the numeral key levers, and 5 the letter key levers. The computing device casing 6 is attached to the right hand side of the typewriter frame and incloses the computing mechanism, with which the present invention is concerned. This computing mechanism includes a series of nine denominational members in the form of wheels *a, b, c, d, e, f, g, h, and i*, representing different denominational values, as for instance, units, tens, hundreds, thousands, tens of thousands, hundreds of thousands, millions, tens of millions, and hundreds of millions; or, if money values are computed, the two wheels

of lowest denomination may represent units and tens of cents.

The computing carriage. The number wheels are loosely mounted on a number wheel shaft 7 extending across the computing carriage 8 movably mounted upon rods or tracks 9 and 10 extending across the casing 6 directly under a pair of bars 11 and 12 which rest upon antifrictional elements, as for instance, balls 13, interposed between the bars and tracks, as shown in Fig. 4, and serving to render the movement of the computing carriage substantially antifrictional. Each number wheel in the present embodiment of the invention is provided with thirty teeth, bearing three series of digits each ranging from "0" to "9" inclusive, one digit on each wheel being exhibited opposite a sight opening 14 in the casing 6. The several number wheels *a*, *b*, etc., are designed to be presented successively in cooperative relation with an actuator or master wheel 15 during the movement of the computing carriage upon the tracks 9 and 10, said carriage being normally located at the extreme right hand side of the casing 6 so that the number wheel of highest order will be to the right of and out of engagement with the actuator 15, as shown in Fig. 4.

The advance of the computing carriage to the left to present the number wheel of highest order and thereafter successive number wheels opposite the master wheel or actuator 15 is effected by the propelling mechanism of the typewriter carriage 2 through the medium of the latter. The particular means whereby this end is attained constitutes no part of my present invention, however, and it is therefore deemed to be sufficient to state that it includes a rock shaft 17 mounted in suitable bearings adjacent to the rear side of the typewriter and provided at its upper and lower ends with forwardly extending arms 21 and 18 respectively, the latter having a vertically disposed extremity 19 connected by a link 20 to the computing carriage 8, see Figs. 1 and 4, and the former, to-wit, the arm 21, having a vertically disposed extremity 22 arranged to be engaged by projections 23 on the typewriter carriage. As the typewriter carriage moves to the left during the operation of printing digits in the column to be computed, the shaft 17 will be rocked to advance the computing carriage 8 and thus cause the number wheels to be successively presented to the actuator 15, as the denominational positions of the column are successively presented to the printing point of the machine. In a similar manner the retraction of the typewriter carriage effects the retraction of the computing carriage 8. It may also be stated, in a general way, that the actuator 15 is mounted in a shaft 27 driven by a motor 28 and controlled by the numeral keys 3 of the typewriter, so that, upon the depression of a key, the master wheel 15 will be permitted to rotate, under the impulse of the motor 28, a distance proportionate to the value of the particular key depressed, a corresponding rotary movement being thus imparted to that number wheel which corresponds in denominational position to the order or denominational position in which the digit is printed in the column on the work sheet.

It is unnecessary to describe in detail the mechanism whereby the master wheel is controlled from the keys, but attention may be directed to the fact that

this mechanism includes a detent 45 normally engaging and holding the master wheel and arranged to be withdrawn therefrom by a bail 48 disposed for operation by any one of the several numeral key levers, see particularly Fig. 9.

The carrying or transfer mechanism. Coming now to the subject-matter hereinafter claimed, it is in order to describe the mechanism for locking the number wheels against accidental movement and for automatically imparting a single increment of movement to a given wheel as the wheel of next lower order moves from "9" to "0". As is well understood in the art, this mechanism is designed to transfer to a wheel of higher denomination the amount accumulated upon a wheel of lower order when such amount reaches the limit of denominational value of the wheel last named. Thus the denominational value of each wheel being 10, it will rotate independently of the wheels of higher order for nine increments or units of movement, the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 being successively exhibited before the sight opening. The next or tenth increment will be the limit of denominational value, and therefore, as this movement is effected to present "0" at the sight opening, a single increment of movement will be imparted to the wheel of next higher order or denomination, thus causing the latter to exhibit, for instance, the numeral "1," which will be the equivalent of the ten increments accumulated by the lower wheel.

Each number wheel, except the wheel of highest order, is equipped on the left hand side face thereof with three small segmental trip levers 74, see Fig. 8, fulcrumed intermediate of their ends and associated each with a stop pin 75 which limits the swinging movement of the lever in one direction. The trip levers 74 cooperate with cam lugs or projections 76 extending from the peripheries of a series of resetting cams or disks 77, mounted on the number wheel shaft 7 and alternating with the number wheels, Fig. 4. Thus one of these disks 77 is appropriated to each wheel, except the wheel of highest order, and is equipped with three of the projections 76 each of which cooperates with a trip lever 74 in the resetting operation, to be presently described. It will be understood that each wheel is equipped with three of the levers 74 for the reason that the wheel has thirty teeth and must, therefore, operate three times in each complete rotation thereof for the purpose of causing the advance of the next higher wheel. So far as this carrying or transferring function is concerned, however, only one of the cam projections 76 is effective, the uppermost projection in Fig. 8 serving to swing each of the lever 74 in succession as they ride over said projection, and the other two projections 76 in said figure having no special utility so far as the carrying operation is concerned.

Arranged to cooperate with the several sets of trip levers 74 are a series of locking arms 78 independently pivoted upon a shaft 79 extending across the computing carriage 8, Figs. 2, 5 and 6. These locking arms 78 extend forwardly from the shaft 79 and each is urged downwardly by a spring 80 secured to a bar 81. At the front end of each arm 78 is formed a curved beak or projection 82 disposed to cooperate with the trip levers 74. Opposite the adjacent wheel and in rear of the beak, each arm is formed with a locking lug 83, which,

in the normal position of the arm, shown in Fig. 5, extends behind the spear-shaped head 84 of a transfer member 85, one of these transfer members being provided for each wheel, except the wheel of lowest order or denomination. The head of each transfer member 85 normally rests upon a tooth of a number wheel, the outer faces of the teeth being inclined, as shown, so as to permit the head of the transfer member to drop down in front of the tooth in rear of the one upon which the head rests. Attention is directed to the fact that by the described arrangement of parts, each locking arm 78 is arranged to cooperate with a set of trip levers 74 mounted on one wheel, and locks against rearward movement a transfer member 85, the head of which is hooked over a tooth of the number wheel of next higher order.

Each transfer member 85 is pivoted at its rear end to a swinging arm 86 depending from the shaft 79 and limited as to rearward movement by a transverse stop bar 87 extending across the computing carriage and serving as a stop common to all of the arms. To each arm 86 is secured the front end of a spring 88 having its rear end secured to a bar 89 on the carriage 8. The several springs 88 constitute independent transfer motors, since each spring exerts a constant tendency to retract a transfer member 85 and to thus impart a single increment of movement to the number wheel engaged by said member. This operation of the transfer member is normally prevented, however, by the locking arm 78 and is not permitted until the next lower number wheel, having completed nine increments of independent movement, presents a trip lever 74 to a lug 76 during its next or tenth increment of movement and thus causes said trip lever to swing on its pivot and engage and elevate the front end of the locking arm 78, thereby withdrawing the locking lug 83 from behind the head of the transfer member 85 and releasing the latter to permit it to impart a single increment of movement to the next higher number wheel under the impulse of the motor spring 88, see Figs. 5 and 6.

The means for locking the number wheels after carrying. It is desirable to utilize the transfer mechanism to securely lock the wheels after the same have been carried, and it will be understood that no wheel will be carried, that is to say, no number wheel will be caused to rotate by another number wheel until the former has moved to the left of the actuator 15, since said actuator constitutes the prime mover of the computing device, and it is therefore impossible to release the carrying mechanism of any wheel unless it is located to the left of the one in engagement with the actuator.

Extending across the casing 6 is a locking bar 90, the right hand half of which is cut away, as indicated in Figs. 4 and 7, so that its effective portion is located to the left of the actuator 15, or, in other words, opposite the wheels which may be to the left of the actuator and therefore in position to be carried. The bar 90 is arranged to be engaged by a projection 91 formed on each transfer member, and serves to prevent the latter from moving back too far and also retains the member securely in engagement with the carried wheel, thus preventing the overthrow of the latter in either direction. In this, the retracted position of the transfer member, shown in Fig. 6, the projection 83 on the locking arm 78 rests upon the head 84 of the transfer member 85 and as-

sists in holding the said member in engagement with the wheel. It will now be seen that the transfer member is held rigidly against further rearward movement by the locking bar 90 and the stop bar 87 and that its forward movement is resisted by the locking arm 78. Inasmuch, however, as it is desired to positively lock the transfer member against forward as well as backward movement, after it has been operated, I provide a series of pivoted locking dogs 92 hung from a rod 93 extending across the casing 6 above the transfer members. These dogs 92 extend rearwardly over the bar 90 and their extremities are normally located behind locking lugs 94 on the transfer members 85, as shown in Fig. 5. When, however, the transfer member is retracted in the act of carrying, the lug 94 lifts the dog 92, and the latter subsequently drops down in advance of the lug, as shown in Fig. 6, and thus positively prevents accidental forward movement of the transfer member.

As shown in Figs. 2 and 4, the locking dogs 92 are located to the left of the actuator 15, one dog being provided for each transfer member. Therefore, as there are eight of these members in a machine equipped with nine wheels, (no transfer member being provided for the wheel of lowest order) there are eight dogs, and as a wheel which has been carried and locked by one dog is advanced to the left by the movement of the computing carriage, its transfer member will move into engagement with the next dog of the series. The dog out of engagement with which the transfer member has just moved, will, however, remain in its normal position, so that it will be disposed either before or behind the lug 94 of the transfer member which now moves into engagement with it, depending of course upon whether or not said member is in its set or retracted position. When the computing carriage is retracted, the transfer members 86, moving therewith, will pass out of engagement with the dogs 92 and with the effective portion of the locking bar 90, so that when the number wheels have been restored to their normal positions at the right hand side of the casing 6, the transfer members will be unlocked, in order to permit the resetting thereof in position to again carry the wheels.

The means for resetting the transfer mechanism. The resetting of the transfer mechanism is effected by power derived from the numeral keys of the typewriter, which, as we have seen, operate the master wheel locking arm 45 through intermediate connections. The upper end of the arm 45 has a loose pivotal connection, as indicated at 95, with a transfer mechanism resetting lever 96 fulcrumed intermediate of its ends, as indicated at 97, upon a fixed support 98, Figs. 9 and 10. The resetting lever 96 is disposed opposite that arm 86 to which is connected the transfer member engaging the wheel located opposite the actuator, assuming the computing carriage to be in operative position. The horizontal end 99 extends, however, a sufficient distance to the left to engage the next two arms 86, shown in Fig. 10.

In order to clearly understand the manner in which the resetting of the transfer mechanism is effected, let it be assumed that the computing device has been operated and that it has been retracted to the right hand side of the casing 6 with all of the transfer members drawn back. If now, the typewriter carriage is ad-

vanced into proximity to the column, further movement of the carriage will advance the computing device to dispose the number wheel of highest order in mesh with the master wheel or actuator 15. If now, a numeral key is depressed, the locking arm or detent 45 will be withdrawn from the actuator 15, thus simultaneously releasing the latter and swinging the resetting lever 96 from the position shown in full lines in Fig. 9 to that shown in dotted lines in said figure. This movement of the resetting lever will swing forward that arm 86 which is connected to the transfer member of the number wheel opposite the actuator, the projection 83 on the adjacent locking arm 78 dropping behind the head of the transfer member and retaining the same until elevated by one of the trip levers 74 in the subsequent act of carrying when the transfer mechanism thus reset shall have moved with its wheel to a position to the left of the actuator. As the resetting lever is provided with the horizontal end 99, the described movement of the lever will not only effect the resetting of that transfer member which is opposite the actuator, but will also simultaneously effect the resetting of the two transfer members of next lower order, the purpose being to guard against failure by having most, if not all, of the transfer devices disposed opposite the upper end of the resetting lever during two or more actuations of the latter. Of course, if a given transfer member is properly reset the first time it is urged forward by the resetting lever, it will not be affected by subsequent operations of the latter. If, however, for any reason, there should be a failure upon the first throw, an opportunity or opportunities will be afforded for the proper resetting of the member before it moves out of coöperative relation with the resetting lever and before it moves into position to be utilized for carrying, that is to say, before it moves to the left of the actuator. As the computing carriage moves to the left, the transfer mechanisms will be successively brought opposite the resetting lever, and therefore all of said mechanisms will be reset during the advance of the carriage, and the resetting of each will occur in time to permit the proper performance of its function.

The means for locking the number wheels located at the right of the actuator. We have seen that the transfer mechanism serves to lock against accidental movement such of the number wheels as may be located to the left of the actuator. The wheel in engagement with the actuator will of course be locked by the latter and it remains to be seen how those wheels located to the right of the actuator are locked.

Mounted to swing from the bar 10 is a number wheel locking bail 100 which extends entirely across the casing 6, as shown in Fig. 2, and which is provided with a locking flange 101 which extends from the right hand end of the bail to a point sufficiently near the plane of the actuator to enable the bail to engage and lock the wheels which may be located to the right of the actuator, but no others. The flange 101 of the locking bail 100 extends between the teeth of the wheels engaged by it, thus serving to accurately align the teeth of the wheels and to lock the same against accidental movement in either direction.

When the computing carriage moves to the left from

its normal inoperative position, the successive number wheels move out of engagement with the locking bail and into engagement with the actuator 15.

The means for resetting the number wheels to zero. Mounted upon the right hand end of the number wheel shaft 7 is a locking wheel 102, Figs. 2, 4 and 14, engaged by the locking bail 100 to securely lock the shaft 7 and the cams 77 against rotary movement. This wheel 102 is provided with one or more, preferably three, arcuate slots 103 concentric with the shaft 7 and disposed, when the computing carriage is moved to the extreme right hand side of the casing 6, to be engaged by one or more lugs 104 projecting from an annular number wheel resetting member 105. The member 105 is retained against the right hand wall of the casing 6 by screws 106 extended through arcuate slots 107 in the member 105, as shown in Fig. 4. Projecting forwardly from the member 105 is a wheel resetting arm or handle 108 below which the member 105 is formed with an unlocking cam 109 arranged to engage the locking bail 100 and to move the same back to an inoperative position, as shown in Fig. 12, when the arm 108 is swung up. When it is desired to reset the number wheels to zero, the arm 108 is elevated to rotate the resetting member 105. The first part of this movement causes the unlocking cam 109 to throw back the bail 100, the lugs 104 on the resetting member meanwhile traversing the slots 103 in the wheel 102. When the lugs 104 reach the ends of the slots 103, a positive connection will be established between the resetting member and the wheel, and continued movement of the former will therefore cause the wheel 102, the number wheel shaft 7, and the resetting cams 77 to rotate in the direction of the arrow in Fig. 12. This movement of the cams 77 will cause the lugs 76 thereon to engage the trip levers 74 in the manner shown in Fig. 11, thus establishing a positive connection between the cams 77 and the number wheels, since the trip levers will be prevented by the pins 75 from moving out of engagement with the lugs 76. Continued movement of the resetting member in the same direction will thus cause the number wheels to rotate with the shaft until said wheels have reached the zero position, it being evident that when the shaft 7 has been given one-third of a complete rotation, all of the number wheels will necessarily be in position to exhibit "0" before the sight opening. The number wheels having been reset, the resetting arm 108 is swung back to its normal position, thus restoring the shaft 7, the cams 77, and the wheel 102 to their normal positions and withdrawing the unlocking cam 109 from engagement with the locking bail 100 and thus permitting said bail to be restored to its normal or locking position by a spring 110.

It is thought that from the foregoing, the construction and operation of my invention will be clearly comprehended. It should be distinctly understood, however, that I reserve the right to effect such changes, modifications and variations of the illustrated structure as may come fairly within the scope of the protection prayed.

What I claim is:—

1. The combination with a series of toothed denominational members, of a series of transfer members each having a head engaged over a tooth of a denominational mem-

ber, transfer motors arranged to move the transfer members endwise, holding devices each engaging behind the head of a transfer member, and trips movable with the denominational members and arranged to engage the holding devices to move the same out of engagement with the transfer members.

2. The combination with a series of denominational members, a series of transfer members and transfer motors therefor, of a series of locking arms for the transfer members, pivoted trips carried by the denominational members to engage the locking arms, and fixed cams cooperating with the trips.

3. The combination with a series of denominational members, a series of transfer members, and a series of transfer motors, of a series of holding devices for the transfer members, a fixed cam, and a series of trips mounted on a denominational member and presented successively in cooperative relation with the fixed cam and a holding device.

4. The combination with a series of denominational members and a series of transfer members provided at their front ends with heads engaging the denominational members, transfer motors connected to the rear ends of the transfer members and arranged to move the same endwise, holding means normally engaging the heads of the transfer members, and trips operated by the denominational members for moving the holding means to release the transfer members.

5. The combination with a plurality of denominational members, of transfer members therefor, transfer motors arranged to move said members, holding means normally preventing effective movement of the transfer members and disposed for operation by the denominational members, and dogs for holding the transfer members after the latter have been operated.

6. The combination with a plurality of denominational members, of transfer mechanism therefor including transfer members, means for locking the same in their normal positions, and means for locking the transfer members after the same have been operated, said last named means including a series of locking dogs and a locking member.

7. The combination with a plurality of peripherally toothed denominational members, of a series of transfer members each engaging a tooth of a denominational member, transfer motors for moving the transfer members, and locking means cooperating with each transfer member to cause said member to lock a denominational member against movement in either direction after the same has been operated by a transfer member.

8. The combination with a plurality of denominational members, of a plurality of transfer members therefor, and locking mechanism engaging the transfer members to cause the latter to lock the denominational members both before and after the transfer members are operated.

9. The combination with a plurality of denominational members, of a plurality of transfer members therefor, and locking mechanism cooperating with the transfer members and including a locking member, a plurality of locking dogs, and a plurality of locking arms.

10. The combination with a plurality of denominational members, of a plurality of swinging arms, transfer motors connected to said arms, transfer members having pivotal connection with said arms and engaging the denominational members, locking arms normally holding the transfer members against effective movement, means movable with the denominational members for operating said arms to release the transfer members, and means for locking the transfer members after the same have been operated.

11. The combination with a plurality of denominational members provided with trips, of a plurality of swinging arms, transfer motors connected to said arms, transfer members also connected to said arms and engaging the denominational members, locking arms normally holding the transfer members against movement and disposed for actuation by the trips, and locking dogs arranged to lock the transfer members after the same have been operated.

12. The combination with a series of denominational members, of a series of transfer or carrying devices therefor, and a resetting member presentable to several trans-

fer devices in succession and operative to reset the transfer devices in position to advance the denominational members.

13. The combination with a series of denominational members, locking means therefor, and resetting mechanism arranged to operate the locking mechanism to release the members and having continued movement to reset said members.

14. The combination with a series of denominational members, of a single locking device engaging all of said members, and a resetting member arranged to operate the locking device and to have continued movement to reset the denominational members.

15. The combination with a series of denominational members, of a locking bail engaging the same, a resetting device for the denominational members, and a cam operated by said device to operate the bail.

16. The combination with a shaft, of a series of denominational members rotatable thereon, means for operatively connecting the shaft with the denominational members to reset the latter, a resetting member normally disconnected from the shaft, and means for connecting the resetting member and shaft.

17. The combination with a computing carriage, a series of denominational members, and a locking wheel movable with the carriage, of a shaft connected to the locking wheel to rotate therewith, means for connecting the shaft with the denominational members to effect the resetting of the latter, a locking device engaging the denominational members and the locking wheel in the normal position of the computing carriage, and a resetting member arranged to move the locking device out of engagement with the denominational members and the locking wheel and to subsequently rotate the latter to reset the denominational members.

18. The combination with a shaft, a locking wheel rotatable therewith and provided with arcuate slots and radial recesses, a series of denominational members arranged to be reset by the rotation of the shaft, a locking device engaging one of the radial recesses in the locking wheel and also engaging the denominational members, and a rotary resetting member provided with lugs extended into the arcuate slots of the locking wheel and also provided with a cam arranged to operate the locking device.

19. The combination with a series of denominational members having toothed peripheries and a series of transfer members each having a head engaged over a tooth of a denominational member, of transfer motors arranged to move the transfer members longitudinally, holding devices extended between the denominational members and each having a projection engaged behind the head of a transfer member, and trips movable with the denominational members and arranged to engage the ends of the holding members to move the same out of interfering relation with the transfer members.

20. The combination with a series of peripherally toothed denominational members, of a series of holding devices, a series of swinging arms, a supporting member common to the holding devices and arms, and transfer members carried by the swinging arms and each engaged with a tooth of one of the denominational members and with a holding device.

21. The combination with a series of peripherally toothed denominational members, of a series of holding devices, a series of swinging arms, a supporting member common to the holding devices and arms, transfer members pivotally connected to the arms, each of said members having a head engaging a tooth of a denominational member and also engaging one of the holding devices, and transfer motors connected to the swinging arms.

22. The combination with a series of denominational members, of a supporting bar extending lengthwise of said series, a series of holding devices pivotally mounted on the bar, a series of arms swung from said bar, a series of transfer members each normally engaging a denominational member and held against movement by one of the holding devices, means for operating the holding devices to release the transfer members, and transfer motors connected to the swinging arms to operate the transfer members when released.

23. The combination with a series of denominational members, of transfer devices therefor, holding members for the transfer devices, and a pivotal support common to the transfer devices and holding members.
- 5 24. The combination with a series of denominational members, of a series of holding devices, a series of swinging arms, a pivotal support common to the holding devices and arms, transfer members pivotally connected with the arms and provided with enlarged heads, each of said heads
- 10 engaging a transfer member and a projection on the adjacent holding device, transfer motors for swinging the

arms to operate the transfer members, and means for operating the holding devices to permit the operation of the transfer members.

In testimony, that I claim the foregoing as my own, I 15 have hereto affixed my signature in the presence of two witnesses.

JAMES D. DAUGHERTY.

Witnesses:

GEO. C. RUSSELL,
ISAAC MILLER.