

No. 889,671.

PATENTED JUNE 2, 1908.

D. E. FELT & C. P. WETMORE.

TOTAL PRINTING MECHANISM FOR LISTING MACHINES.

APPLICATION FILED SEPT. 17, 1903.

6 SHEETS—SHEET 1.

Fig. 1

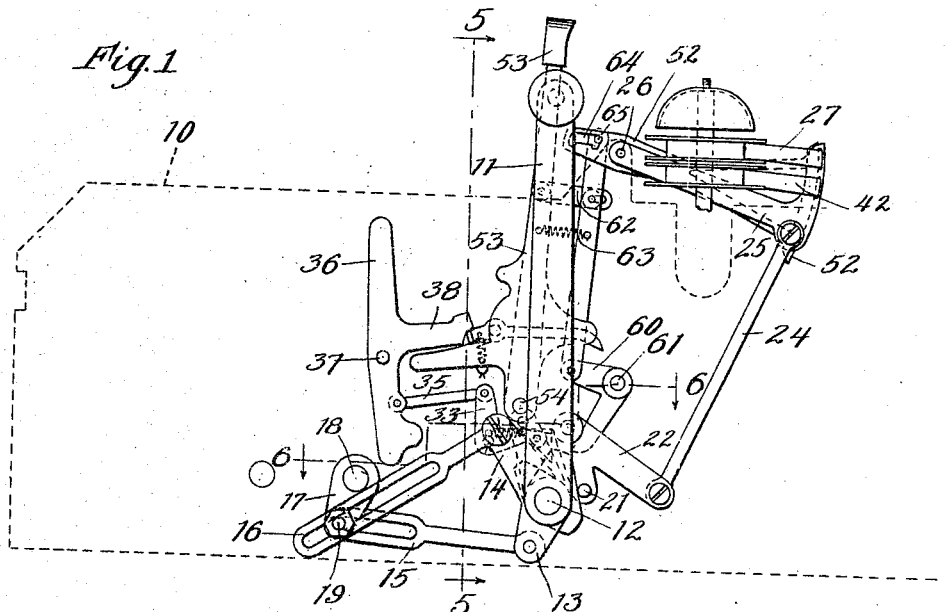
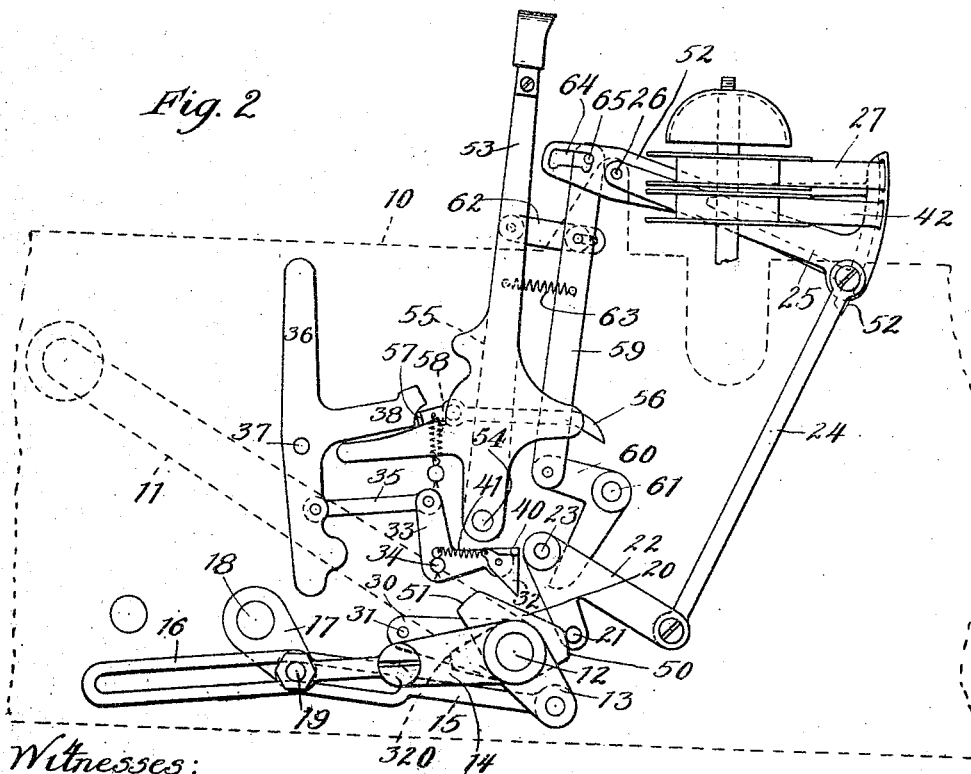


Fig. 2



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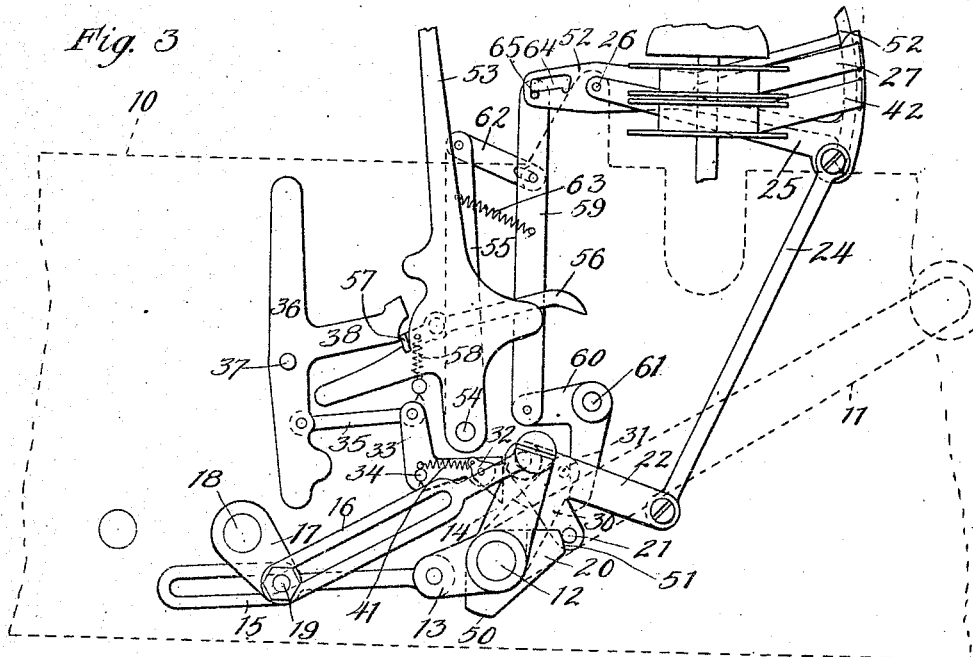
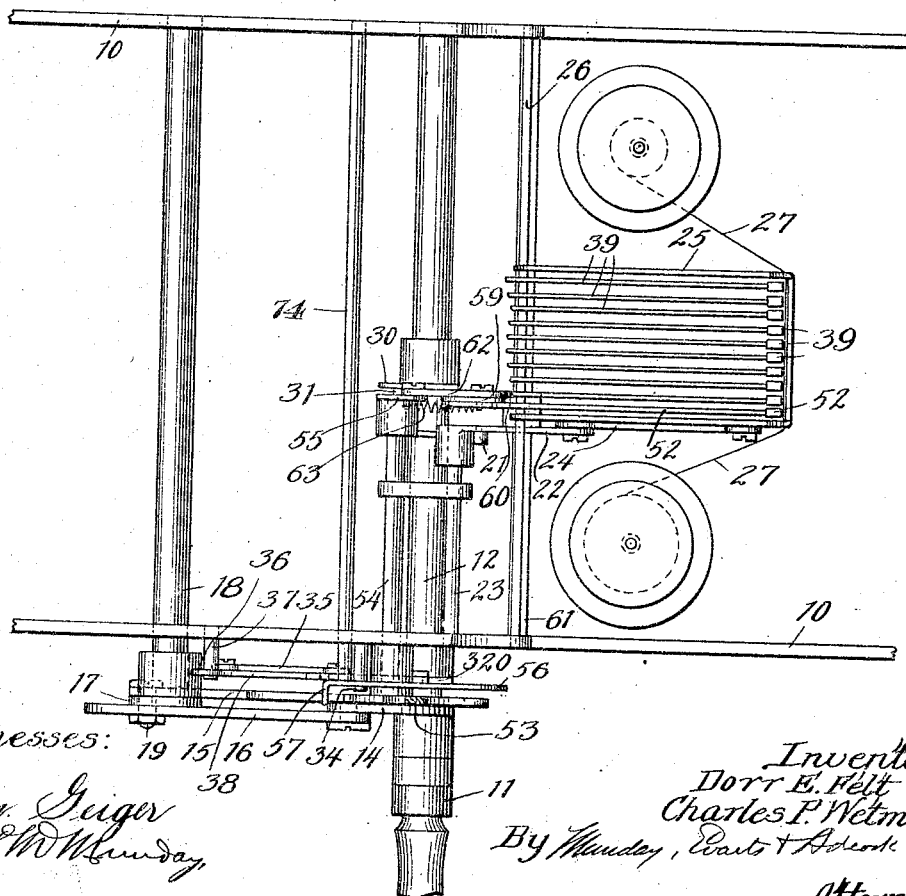


Fig. 4



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6 SHEETS—SHEET 3.

Fig. 5

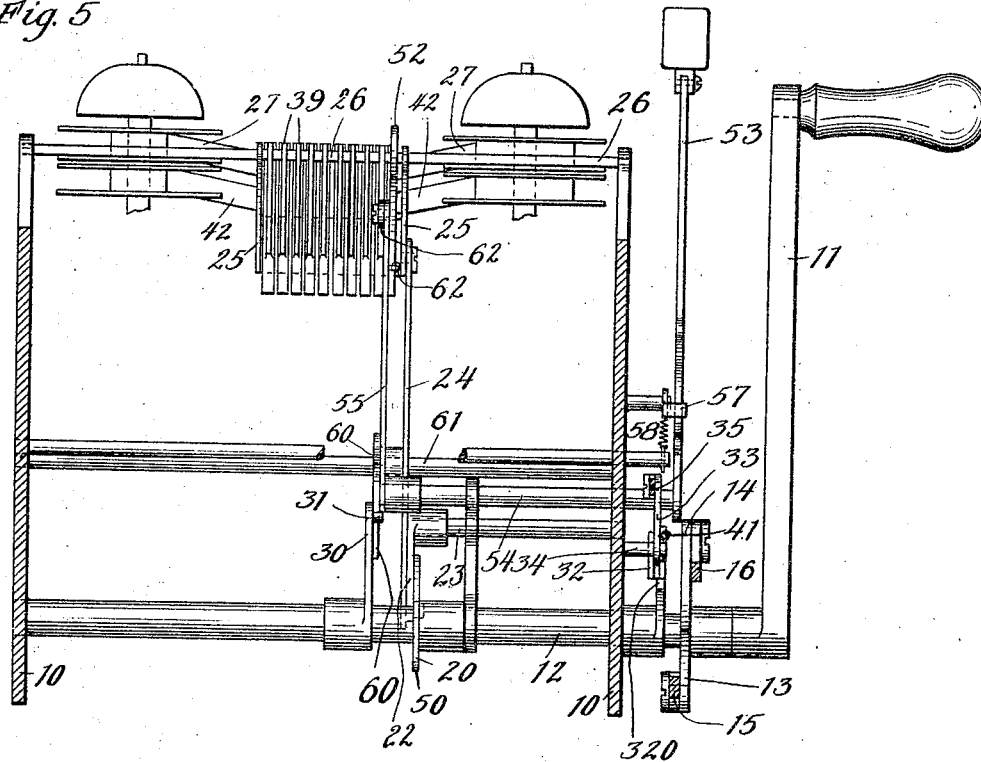


Fig. 6

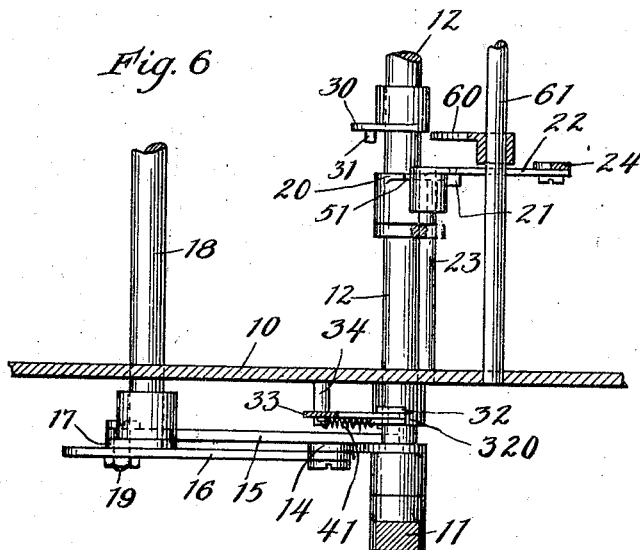
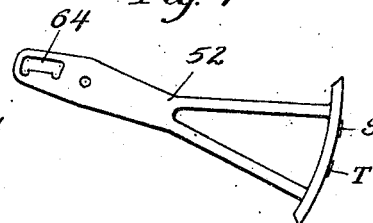


Fig. 7



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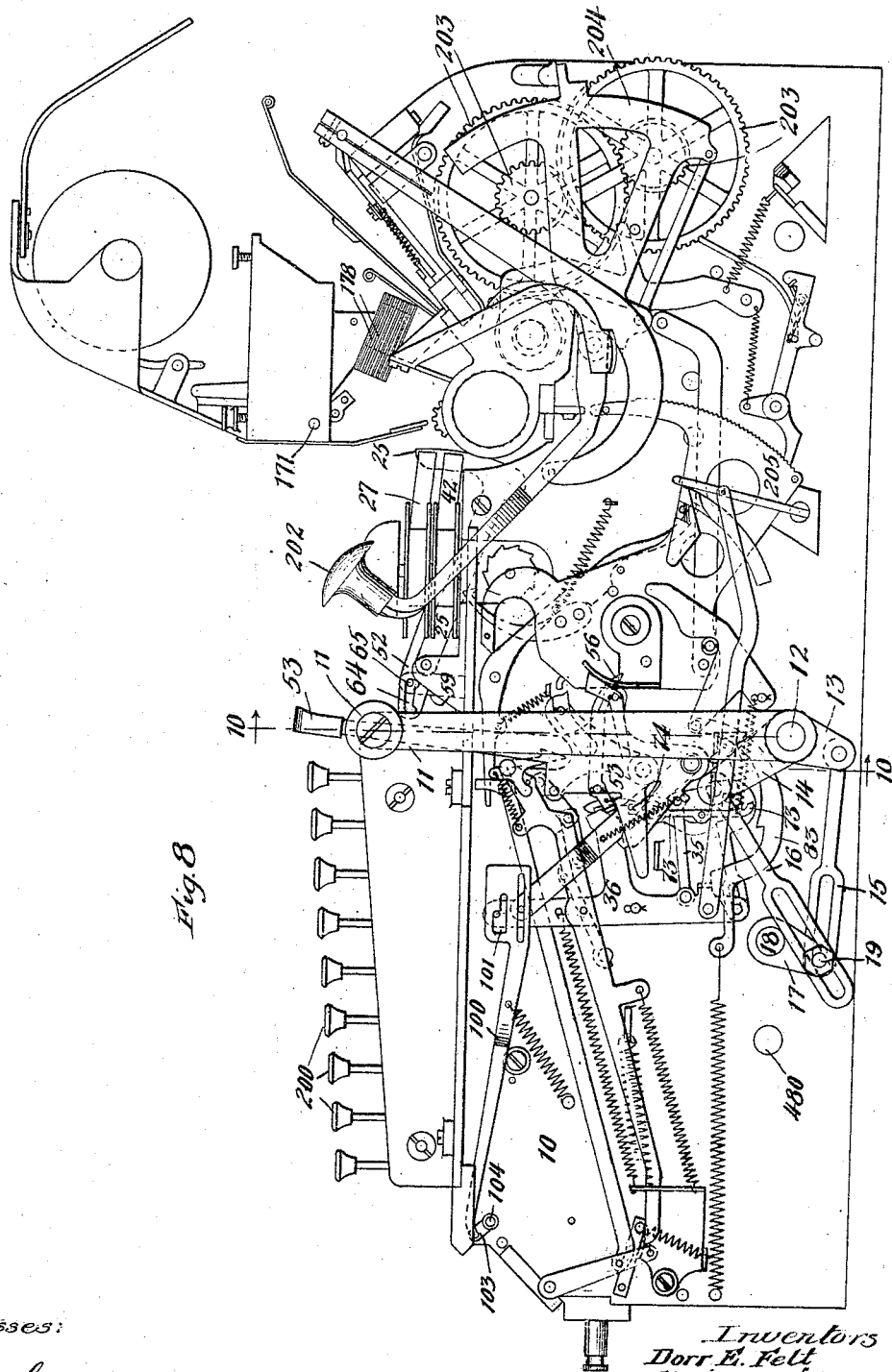
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6 SHEETS—SHEET 4.



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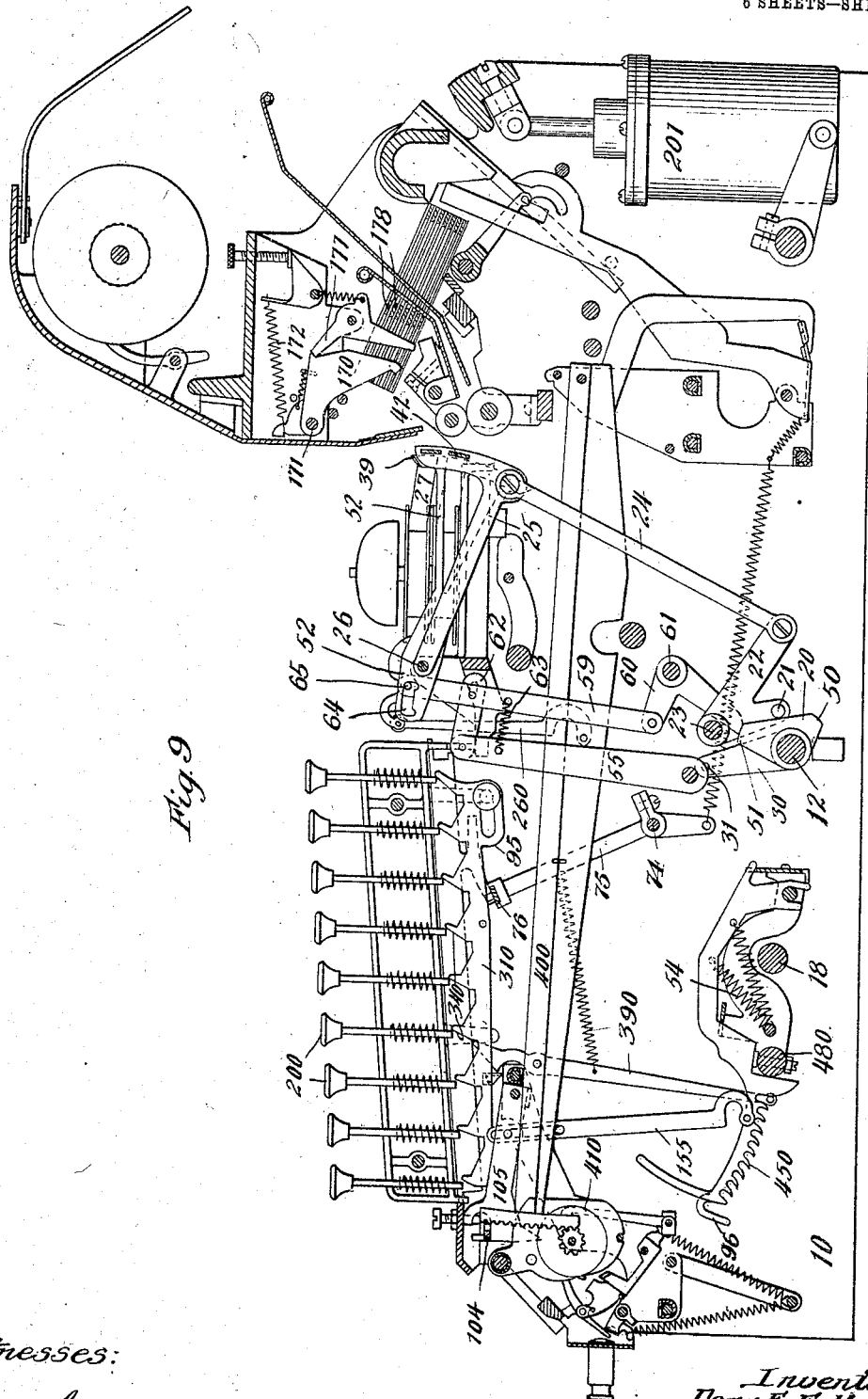


Fig. 9

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6 SHEETS—SHEET 6.

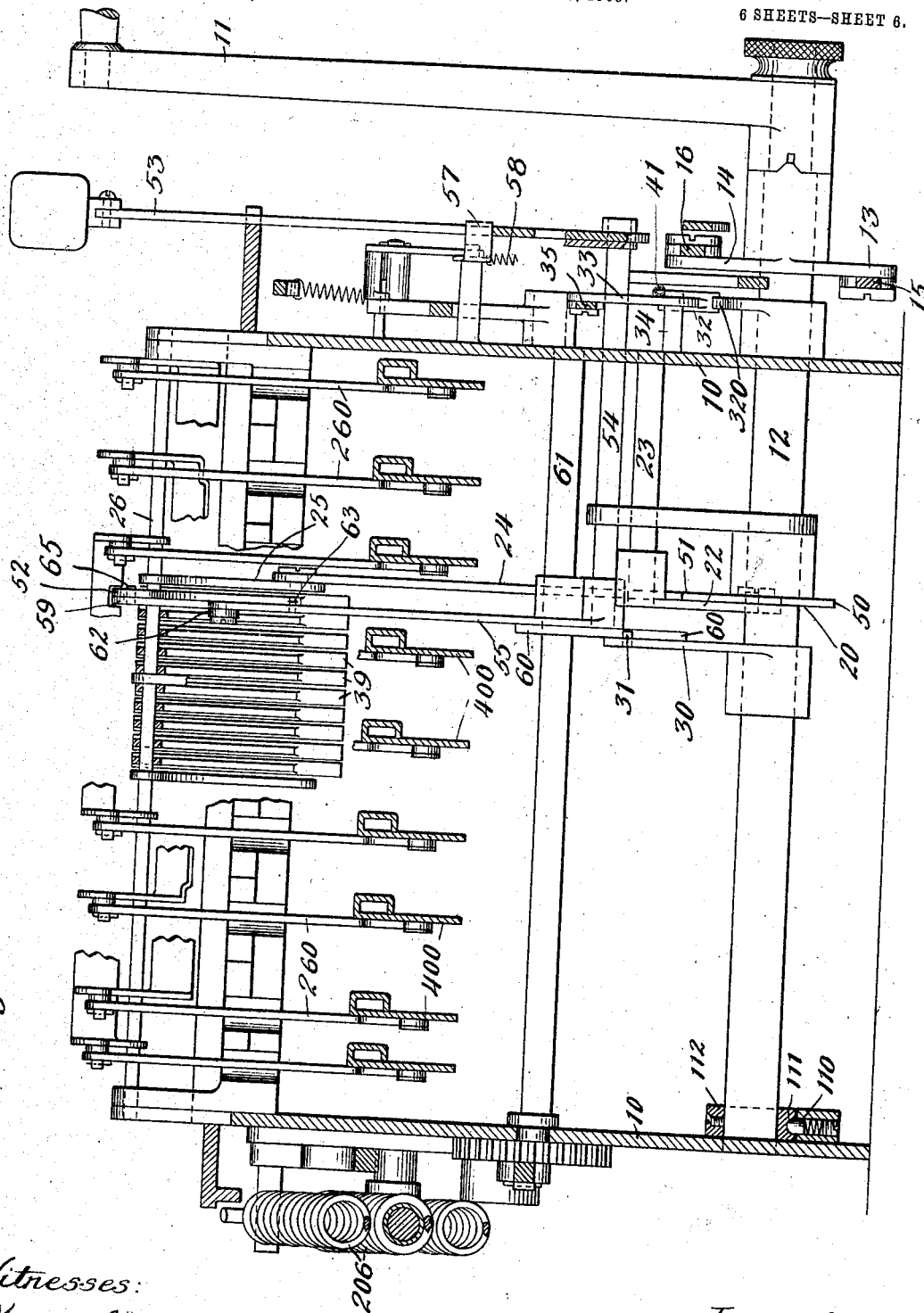


Fig. 10

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UNITED STATES PATENT OFFICE.

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TOTAL-PRINTING MECHANISM FOR LISTING-MACHINES.

No. 889,671.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed September 17, 1903. Serial No. 173,554.

To all whom it may concern:

Be it known that we, DORR E. FELT and CHARLES P. WETMORE, citizens of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Total-Printing Mechanism of Listing-Machines, of which the following is a specification.

This invention relates to the total printing mechanism of that class of recording arithmetical machines commonly known as listing or tabulating machines. As heretofore constructed, these machines have either been provided with a separate operating lever for causing the printing of the total, or they have been provided with a setting key whereby the mechanism is set for the printing of the total, so that when the main operating lever is next operated, the total will be recorded.

In our present invention, we aim both to dispense with the total printing lever and with the setting key of previous machines, and we accomplish this result through the medium of the main operating lever which we now adapt both to set or prepare the mechanism for printing the total and for actuating the mechanism to the printing. In order that the operating lever may perform both these functions, in addition to its other functions, we give it a stroke different from the stroke which it receives when operating the machine in listing and adding. Thus in the case of machines whose operating levers are moved toward the front of the machine in the ordinary listing and adding operations, we give the lever a stroke backward from its position of rest for the total printing, of course, but, of course, we do not wish to be limited in this regard. During this stroke by which the total is printed and which is to be distinguished from the return stroke of the lever in its normal operation while listing the numbers, the lever in the first part of the stroke sets or prepares the mechanism for printing the total, and in the last part of the stroke, it causes the printing.

In addition to this, the invention also embraces other features of invention which together with the main improvement are fully set forth in the description which we give below.

In the accompanying drawing forming a part of this specification, Figures 1, 2 and 3 are partial side elevations of portions of a listing machine embodying our invention,

the operating lever being shown only in broken lines in Figs. 2 and 3 so as not to obscure the parts back of it. Fig. 4 is a plan of the mechanism shown in the other figures. Fig. 5 is a section on the line 5—5 of Fig. 1, and Fig. 6 is a section on the line 6—6 of Fig. 1. Fig. 7 is a detail elevation of the printing segment for printing the letters S and T opposite the total. Fig. 8 is a side elevation of a listing machine in which our improvements have been embodied. Fig. 9 is a longitudinal section of the same, and Fig. 10 is a section on the line 10—10 of Fig. 8.

The present invention is shown in Figs. 8, 9 and 10, as applied to a tabulating machine known as the comptograph, the construction of which is fully disclosed in an application filed by us on the 27th of December, 1904, as Serial No. 238,316. For the purposes of this application, it is only necessary to refer to a portion of the devices illustrated in these figures, and we therefore note that 200 represents the denominational keys, 310 one of the longitudinal movable bars having inclines 340 through which it is actuated by the keys, the inclines being adapted to impart varying movements to the bar so that the bars are thereby enabled to determine the action of the adding and printing mechanism. The bars 310 each actuate a corresponding variable acting link 390, each attached to a column actuator 400 by which the corresponding numeral wheel 410 is turned in adding and the corresponding type segment 39 is positioned through link 260 for printing. The link 390 engages the notched graduated arm 450 yieldingly mounted on and rocking with shaft 480 which we call the main actuator. The key determines which of the notches shall be engaged by the link, and when the main actuator is rocked forward by the lever 11 through any suitable connecting mechanism, one construction of which is fully disclosed in our said application, No. 238,316, and of which the springs 206 Fig. 10, form a part, the link depresses the column actuator in accordance with the digital value of the key, and actuates the numeral wheel and type segment accordingly. The hammers of the printing mechanism are shown at 170 and swing on shaft 171. They are actuated by springs 172 and are normally held by triggers 177 released by frames 178. The construction of the releasing frames and their mode of operation are set forth in

patent to D. E. Felt, No. 644,287 of February 27th 1900.

When the main lever is moved backward as hereinafter explained, it operates the lever 36 and causes the sliding of the cam bars 310 to a non-acting position, through the medium of swinging lever 73 mounted on an actuating rock shaft 74, link 83 operated by the main cam 56 and having a shoulder engaging the lower end of lever 73, the lever 75 on rocking shaft 74, and plate 76 carried by lever 75 and engaging the projecting shoulders 95 on the cam bars. When the lever 36 is thus operated, it also carries with it a bar 100. This bar has a slot 101 in which is a pin carried by the lever, and at its forward end the bar is attached to a crank 103 on a rock shaft 104 extending over the series of numeral wheels. Shaft 104 is angular, and when rocked, it depresses the series of locking stop levers 105, thereby locking the wheels. Said levers 105 are connected to arms 96 by links 155. When the main lever has accomplished these results by its backward movement, it is moved forward, as in adding and causes the printing of the total, imparting a rocking movement to the main actuator, carrying the arms 96 downward for variable distances, depending on the position of the numeral wheels at the time, and the column actuators stop when they have moved far enough to position the type correspondingly to the numbers expressed on the wheels.

In addition to the above, the drawing shows at Figs. 8, 9 and 10, a number of other features usually found in tabulating machines, as for instance, the governor at 201, the lever by which the paper is shifted and returned to starting position at 202, the gears and segment operated by said paper returning lever at 203 and 204, the cam with serrated edge for locking the machine when the bottom of the column is reached at 205; and the cushioning spring mechanism whereby the main lever is prevented from causing shocks or jars to the machine by too quick or powerful impulses at 206.

The main operating lever of the machine is shown at 11 and it is mounted on the shaft 12 supported in one of the side plates 10 of the machine, and is shown in its position of rest at Fig. 1. Its normal stroke received in printing and adding the numbers listed is from the position of Fig. 1 to that indicated in broken lines at Fig. 2 and toward the operator who usually sits at the front of the machine. Upon the shaft 12 are two cranks 13 and 14, one connected to a slotted link 15 and the other to a slotted link 16. The slotted links are both connected to a crank 17 on a cross shaft 18 by means of the pin 19 which passes through the slots of both links. With this construction it will be seen that whether the operating lever be moved from the position of rest to that of Fig. 2, or from the po-

sition of rest to that of Fig. 3, that the shaft 18 will be actuated in the same direction, one link causing its movement in the one case and the other link in the other case. The rock shaft 18 is connected to the numeral or adding mechanism of the machine, and when rocked causes the operation thereof. It is also the initial power receiving member of the printing mechanism, and positions the type and causes the printing, both in listing numbers and in printing the totals. It will also be noted that the actuations of the shaft are uniform whether due to link 15 or to link 16, because although the cranks connecting the links to the shaft 12 are of different lengths, one of them has a longer slot than the other.

The forward movement of the operating lever may also be made a means of lifting the type ribbon from its position of rest to its acting position, and we have shown means for accomplishing this result and which are as follows: On the shaft 12 is a cam 20 having two operating points 50 and 51, both of which come in contact with a pin 21 on a lever 22 pivoted at 23 and connected by a link 24 to the ribbon frame 25 pivoted at 26, and located between the spools operating the ribbon 27. This frame carries guides for the ribbon or ribbons, and when the lever is operated as in Fig. 2, the lower cam operating surface 50 causes such movement of the lever 22 and link 24 as raises the ribbon frame and carries the ribbon from its deflected position shown at Fig. 1 to its printing position shown at Fig. 2. Upon the return of the lever to its position of rest, the ribbon frame, of course, falls again to the position of Fig. 1. This ribbon frame is also operated by the other point 51 of the cam which gives it a greater movement, but this takes place only when the operating lever is moved back for printing the total, and will be described later on.

For printing the total, the operating lever is moved from the position of Fig. 1 to that of Fig. 3. As already explained, this operates the rock shaft 18, in the same manner as does the forward movement of the lever. It also causes the setting of the mechanism preparatory to printing the total, and this it does through the medium of a cam 320 on shaft 12. This cam, when the lever is moved backward for printing the total, presses against the latch 32 which is pivoted on the elbow lever 33 and is held by a stop 40 from swinging in one direction. A spring 41 maintains contact by the latch with the stop. The lever 33 is pivoted at 34 and connected by a link 35 with a lever 36 pivoted at 37. This lever has a horizontally extending arm 38, and through this arm the positioning of the type segments for answer printing is accomplished. The movement given the elbow lever 33 by the cam and latch, causes a rocking of lever 36 on its pivot, and the perform-

ance by arm 38 of its said function. The cam 320 may pass beyond the latch, but it is allowed to return to normal position by the yielding of the latch as will be understood.

5 The lever 36 corresponds closely so far as it aids in the total printing, to the lever 70, of the patent to Dorr E. Felt, No. 749,177, dated January 12, 1904, though the patented lever is operated directly by the hand of the operator instead of receiving its power from the main lever, and lever 36 causes the setting of the mechanism for the printing of the answer and the printing thereof, in the same way as the lever 70 of the patent accomplishes these results.

10 We have shown two ribbons in the application, the ribbon 27 being the blue or purple commonly used in printing the numbers added, and the ribbon 42 for the printing of the totals. The latter ribbon is preferably red or some other color differing from that of ribbon 27. The backward movement of the operating lever is intended to lift ribbon 42 into acting position and it does this by the following means: The point 51 of the cam 20 actuates the lever 22 and through it the ribbon frame, carrying it from the position of Fig. 1 to that of Fig. 3 and bringing ribbon 42 opposite the printing line, so that when the answer is printed, it will be done in red or some other color different from the ink used in listing.

It is frequently desirable to print what may be called sub totals, that is, totals of a portion only of the items listed, as, for instance, those in a particular column instead of the grand total, and it is desirable to distinguish such sub totals from the grand totals. For this purpose, we add to the series of type segments a special one 52 having upon it the letters T and S, T being used with the grand totals, and S with the sub totals. The type are arranged upon the segment as indicated at Fig. 7, the S being the upper letter. The segment is mounted upon the same shaft 26 with the numeral segments and the ribbon frame, and is operated in the manner now to be described.

At 53 is a hand lever for operating segment 52. It projects above the top of the machine so that it may be operated at will by the user. It is pivoted at 54 and on the same shaft 54 is a vertical standing lever 55. On the side frame of the machine is pivoted a latch 56 having its forward end 57 bent at right angles so that the bent portion stands in the plane of the hand lever. A spring 58 tends to keep the latch in its normal position. Adjacent to the lever 55 is a second vertical lever 59, the lower end of which is pivoted to an elbow lever 60 rocking upon shaft 61 and adapted to be engaged by the pin 31 on the arm 30 of shaft 12. The upper end of lever 55 is connected to lever 59 by link 62 slotted at its junction with lever 59, and a spring 63

also connects the upper portions of the two vertical levers. In the end of the type segment 52 is a slot 64 into which a pin 65 carried in the upper end of lever 59 enters. In normal position, the pin lies at the inner end of the slot, and remains there inoperative during the listing operations, but when the operating lever is moved for total printing, the pin 31 rocks the elbow lever 60 to the position shown at Fig. 3 and thereby pulls down the forward end of the type segment 52, raising the other end sufficiently to position the letter T at the printing line, and this is always the operation when the hand lever 53 is not shifted. If a sub total is desired, the lever 53 is shifted by hand to the position of Fig. 3 and this causes the shifting of pin 65 from the inner to the forward end of slot 64 so that a less movement of segment 52 is produced than would be the case if the pin remained at the rear end of the slot. With the parts in the positions just mentioned, the movement given to segment 52 positions the letter S at the printing line.

The main lever may be arrested at its position of rest by any suitable mechanism, such, for instance as the spring plunger 110 entering the notch 111 in collar 112 on the shaft of the lever. See Fig. 10.

We claim:—

1. A tabulating machine wherein are combined a printing mechanism adapted to print the numbers tabulated and also to print the totals, and a main operating device acting to cause the printing of the numbers tabulated and to set the printing mechanism for printing the totals.

2. A tabulating machine wherein are combined a printing mechanism embracing type segments for printing the numbers tabulated, and also adapted to print the totals, and a main operating device acting to cause the printing of the tabulated numbers and also acting to set the type segments for total printing.

3. The combination in a tabulating machine, of answer printing mechanism embodying denominational type segments, a movable member for transmitting motion to the answer printing mechanism, a device for regulating the setting of said type segments, and a main operating lever mechanically connected to said movable member and regulating device and actuating both of them.

4. A tabulating machine wherein are combined numeral wheels upon which the numbers tabulated are added, an answer printing mechanism embracing type segments, means acting to set said segments in accordance with the totals upon the wheels, and a main operating lever acting both to actuate said wheels in adding the tabulated numbers and to actuate said setting means for total printing.

5. The tabulating mechanism provided with a printing mechanism adapted to print both the numbers tabulated and the answers, a main operating device actuating the printing mechanism in both said operations and means for setting the printing mechanism for answer printing, said means being actuated by said lever.

6. The combination with the main operating lever, having a forward stroke for the listing and adding operations, and a backward stroke for printing the totals, of the listing and adding mechanism embodying a shaft 18, and connections between said lever and shaft whereby the latter is actuated in the same direction whether the stroke of the lever is forward or backward.

7. The combination with the listing and adding mechanism of a listing machine and the actuating means for such mechanism, of a main operating lever having a forward stroke for listing and adding and a backward stroke for printing the totals, and mechanism connecting said lever to said actuating means and acting to impart uniform movements to said means whether the lever is moved forward or backward.

8. The combination with the listing and adding mechanism of a listing machine and the actuating means for such mechanism, of a main operating lever having a forward stroke for listing and adding and a backward stroke for printing the totals, and link mechanism connecting the actuating means and said lever and acting to give uniform movements to the actuating means in both strokes of the lever.

9. The combination of the main operating lever, having both forward and backward strokes from its position of rest, its shaft 12, the shaft 18 and connections whereby the shaft 12 imparts uniform movements to shaft 18 regardless of the direction of the stroke of said lever.

10. In a tabulating machine, the combination of mechanism for printing the numbers tabulated and for printing the totals, a main operating lever having a stroke in one direction from its position of rest for actuating said mechanism in tabulating the numbers, and a stroke in another direction from its position of rest for actuating said mechanism in total printing, a shiftable ribbon guide, and connecting means by which said guide is shifted by the lever when the latter is operated for total printing.

11. The tabulating machine provided with

a main operating lever movable in both directions from a central position of rest; and a printing mechanism actuated by the lever when moved in either direction.

12. The combination with the ribbon guide frame of the main operating lever having different strokes and mechanical connections between the frame and the lever, a printing mechanism actuated by said lever both in tabulating and in printing totals the latter acting by one stroke to raise the frame for listing the numbers, and by the other stroke to position the frame differently for total printing.

13. The combination with the ribbon guide frame, of the main operating lever having a backward stroke for total printing, a printing mechanism actuated by said lever both in tabulating and in printing totals and connections between the frame and the lever whereby the latter in said stroke positions the frame for printing the total in a special color.

14. The combination with the lever and total printing mechanism, of a main operating lever having a forward stroke from its position of rest, and also a backward stroke from its position of rest in printing totals, and mechanism whereby said lever in its backward stroke operates said lever.

15. The combination with the lever, of listing and total printing mechanism, a main operating lever having a normal stroke in listing the numbers and a different stroke in printing the totals, and means whereby said main lever in its total printing strokes, actuates said levers.

16. The combination in a listing machine, of listing and total printing mechanism, a main operating lever having different strokes for adding and listing and for total printing, and a shaft for actuating the listing mechanism, and mechanical connections whereby said shaft is moved in its operating direction with either stroke of the operating lever.

17. The combination in a listing machine, of listing and total printing mechanism, a main operating lever having different strokes for adding and listing and for total printing, of means whereby said lever actuates said mechanism in the same direction, both in listing and in total printing.

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