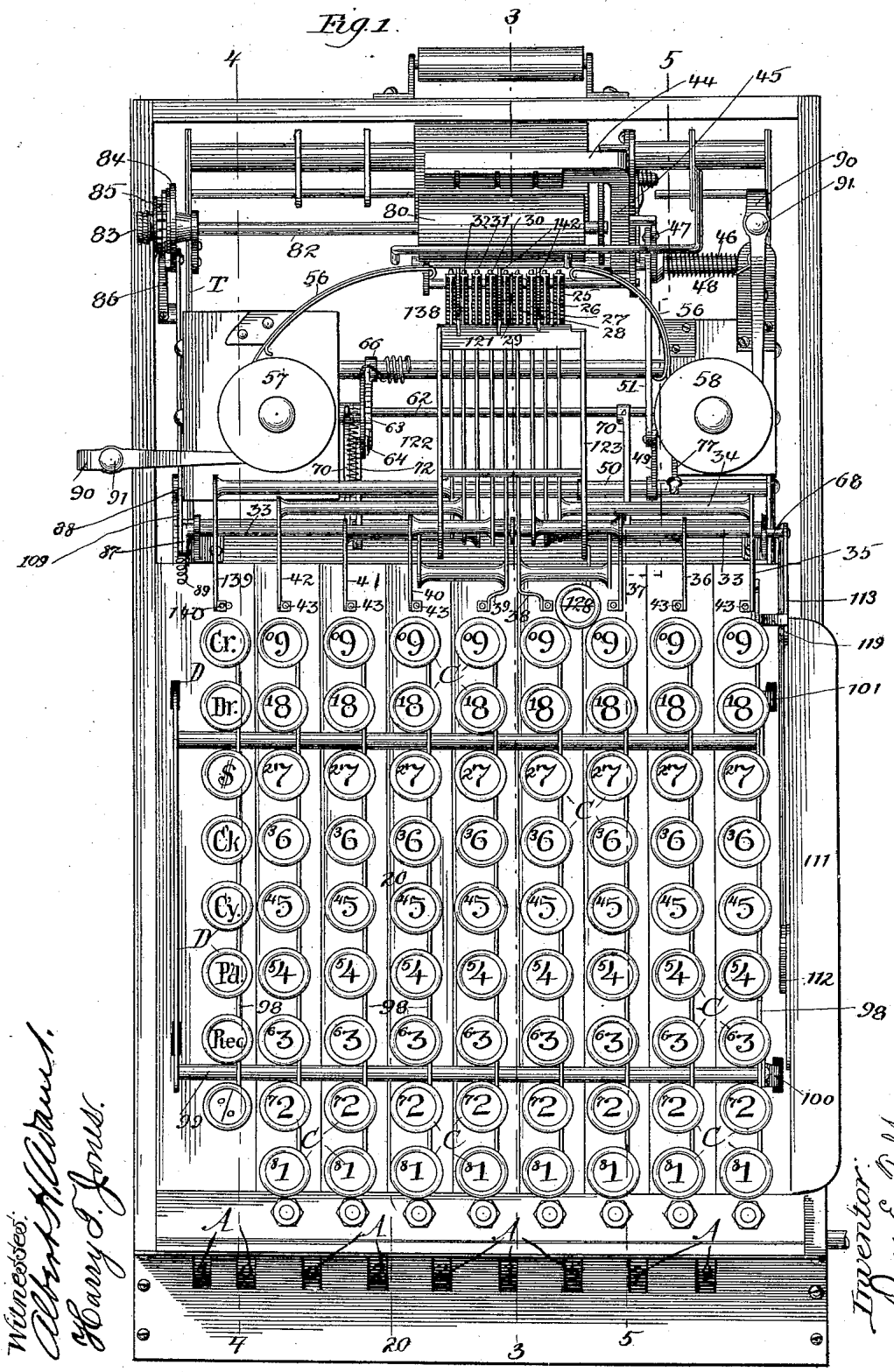
(No Model.) 12 Sheets—Sheet 1.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 1.



Witnesses:
Albert H. Walker.
Harry E. Jones.

Inventor:
Don E. Felt.

(No Model.) 12 Sheets—Sheet 2.

D. E. FELT.

TYPE WRITING MACHINE.

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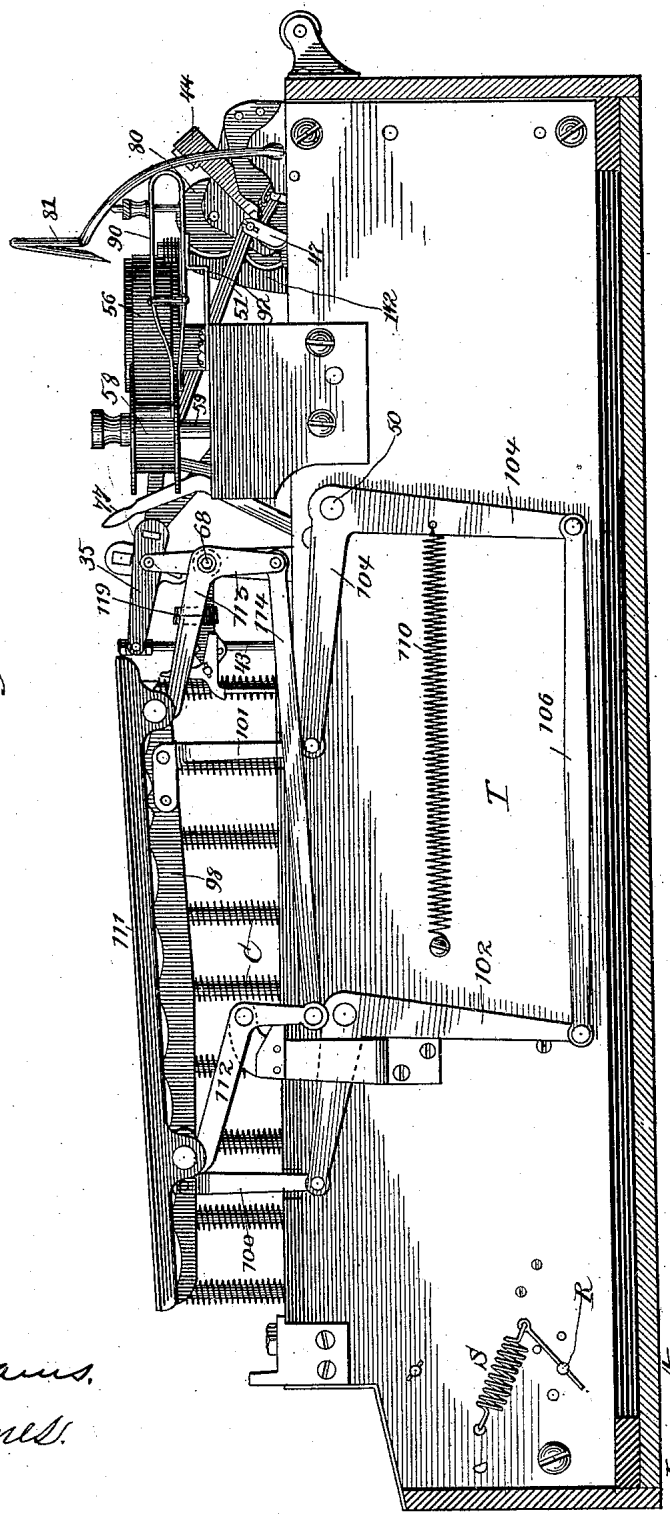

Fig. 2.

Witnesses:
Albert H. Adams.
Harry T. Jones.

Inventor:
Dan E. Felt.

(No Model.) 12 Sheets—Sheet 3.

D. E. FELT.

TYPE WRITING MACHINE.

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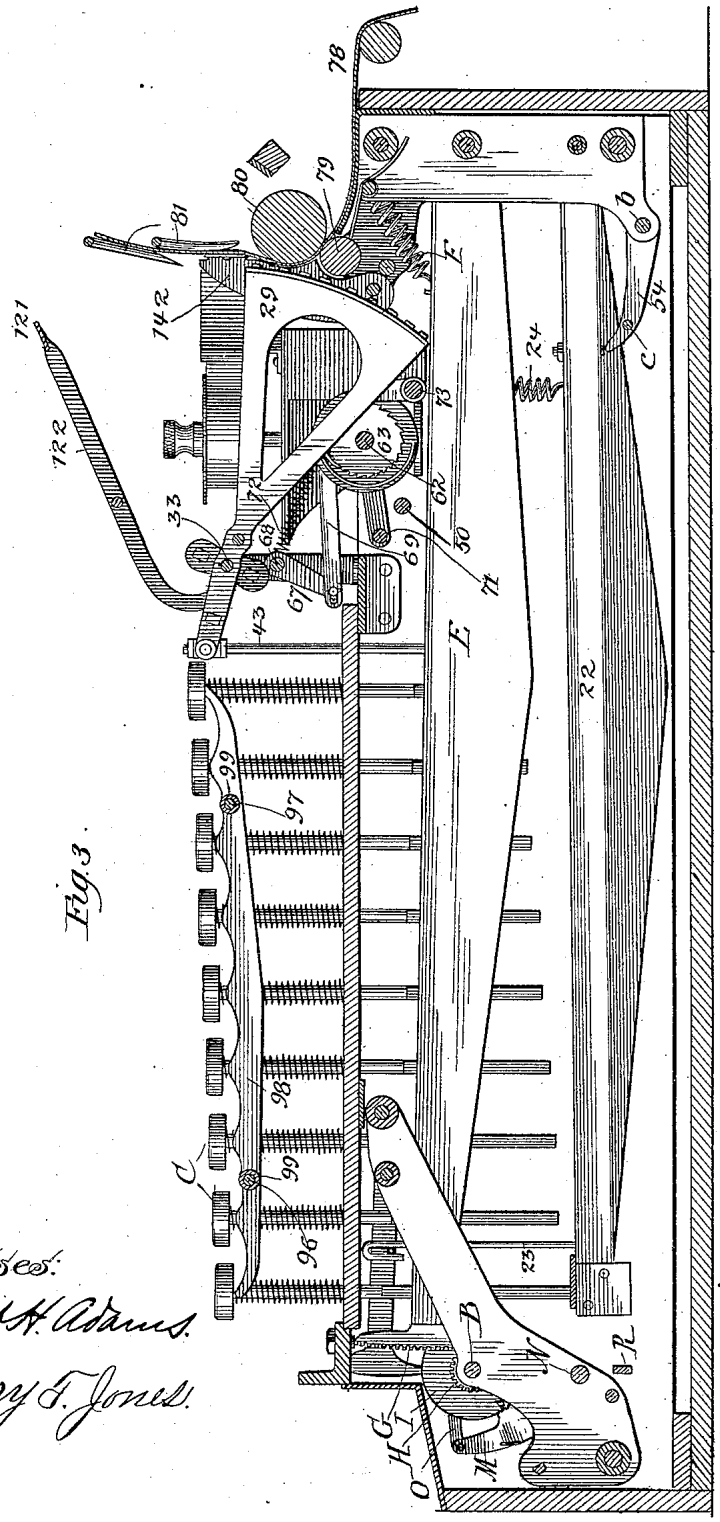

Fig. 3.

Witnesses:
Albert H. Adams.
Harry F. Jones.

Inventor:
Dorr E. Felt.

(No Model.) 12 Sheets—Sheet 4.

D. E. FELT.

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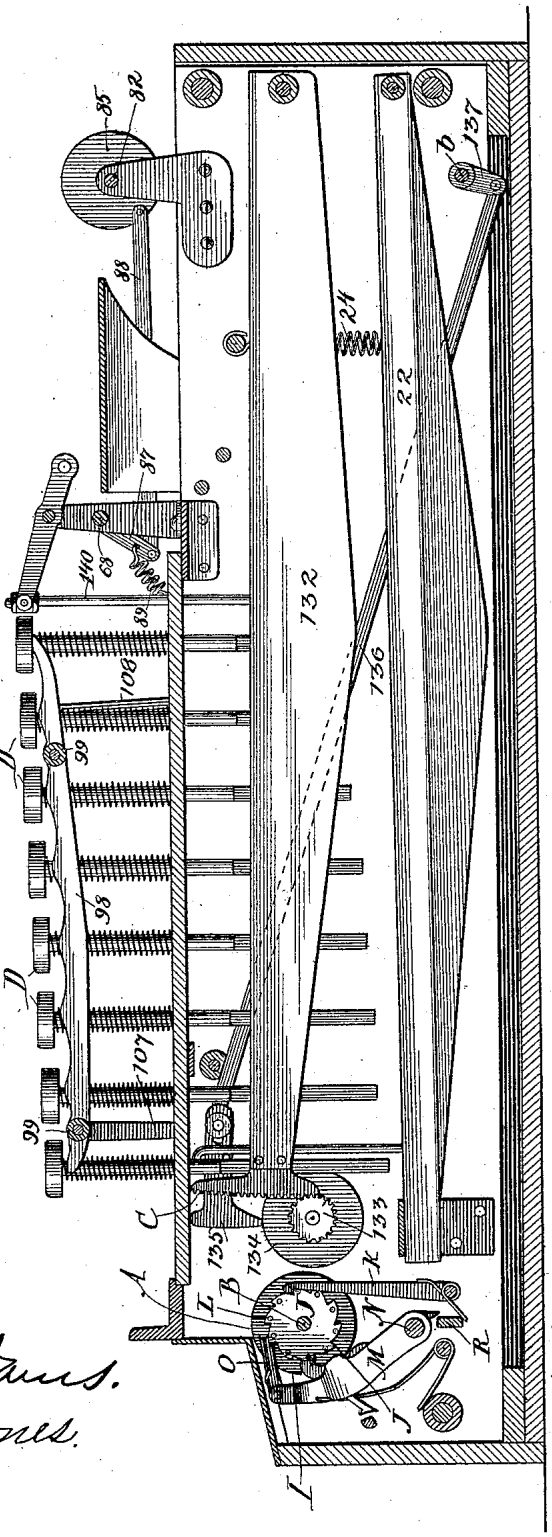

Fig. 4.

Witnesses:
Albert H. Adams.
Harry T. Jones.

Inventor:
Don E. Felt.

(No Model.) 12 Sheets—Sheet 5.

D. E. FELT.

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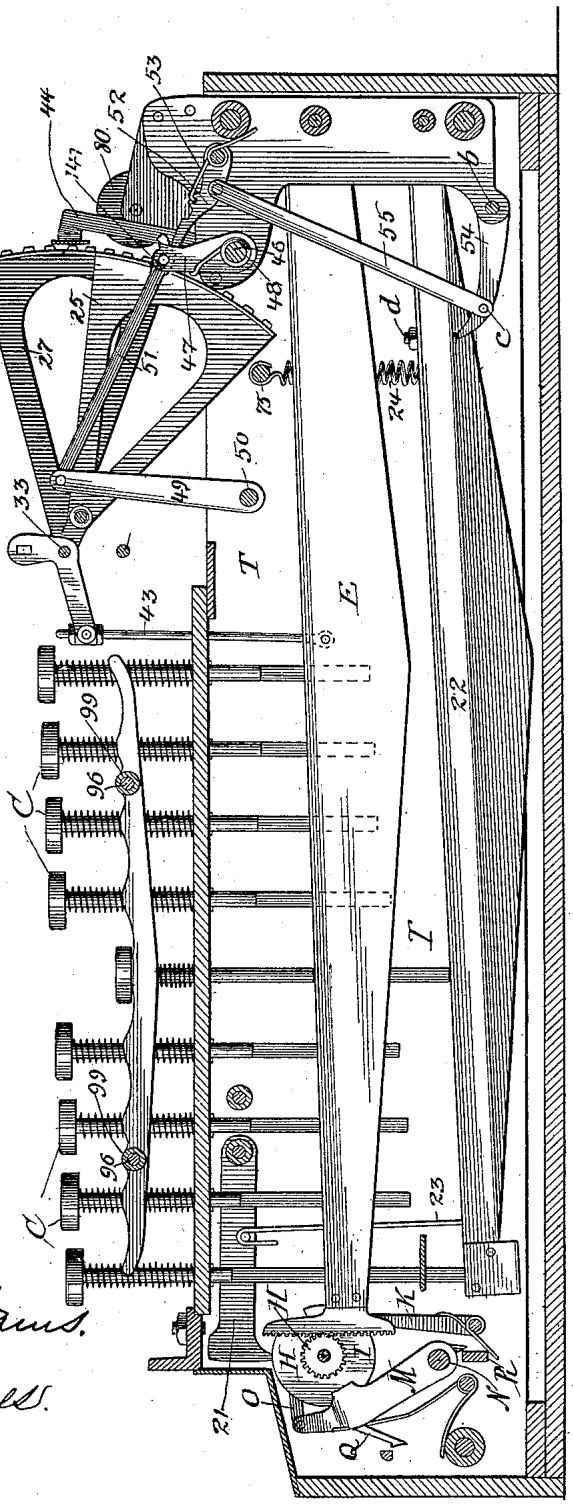

Fig. 5.

Witnesses:
Albert H. Adams.
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Inventor:
Dan E. Felt.

(No Model.) 12 Sheets—Sheet 6.

D. E. FELT.

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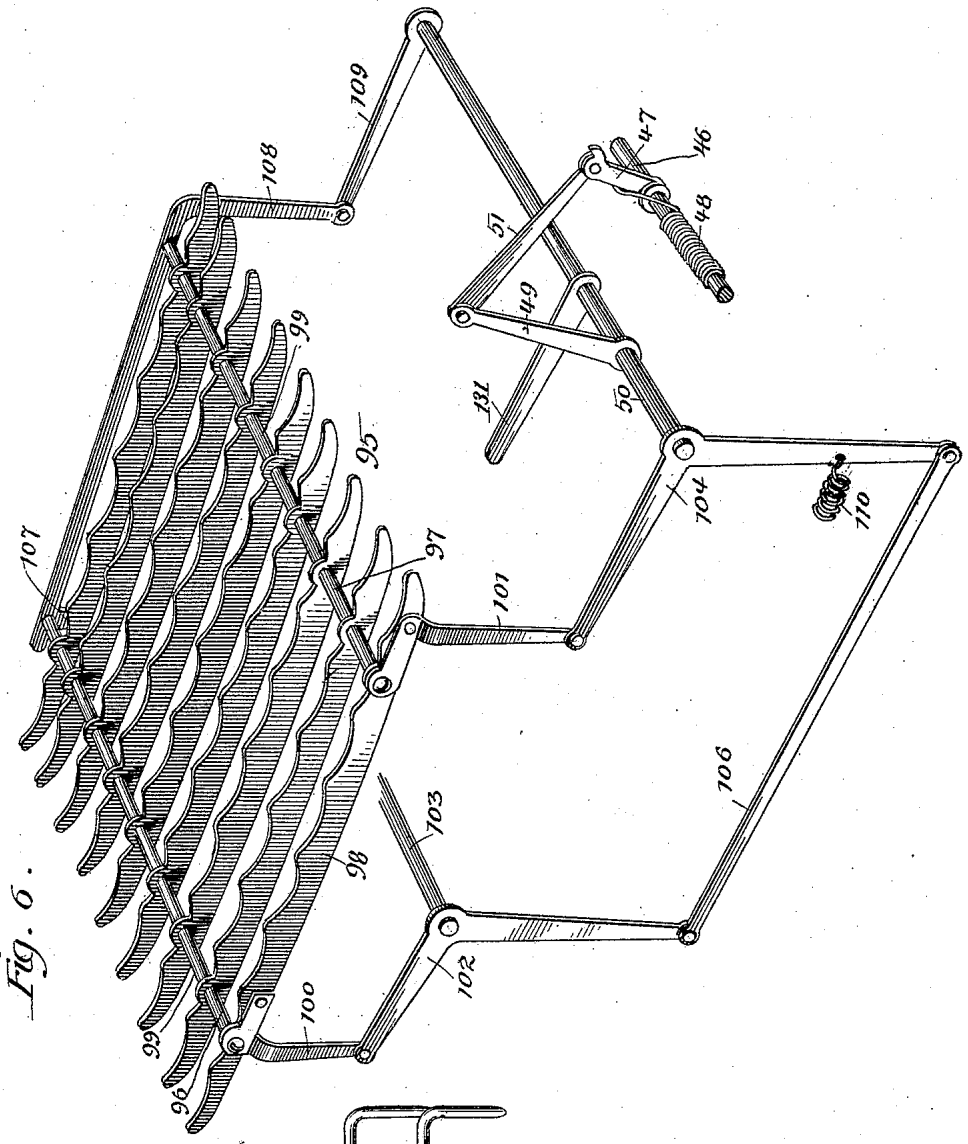

Fig. 6.

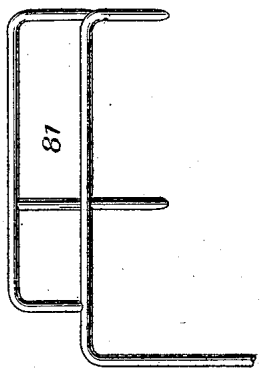

Fig. 7.

Witnesses:
Albert H. Adams.
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Inventor:
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(No Model.) 12 Sheets—Sheet 7.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 8.

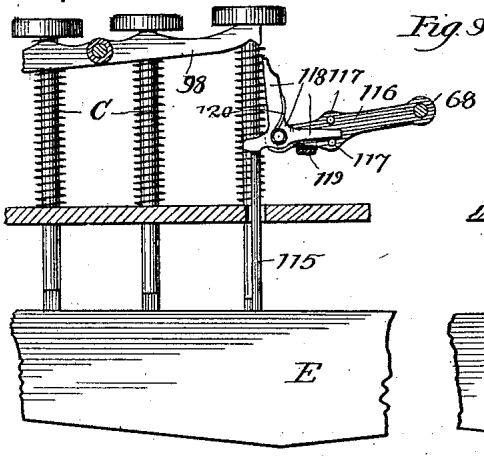


Fig. 9.

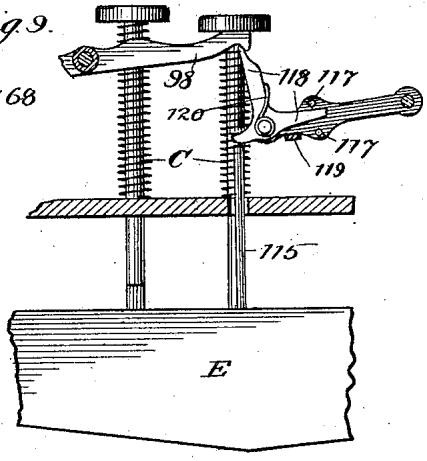
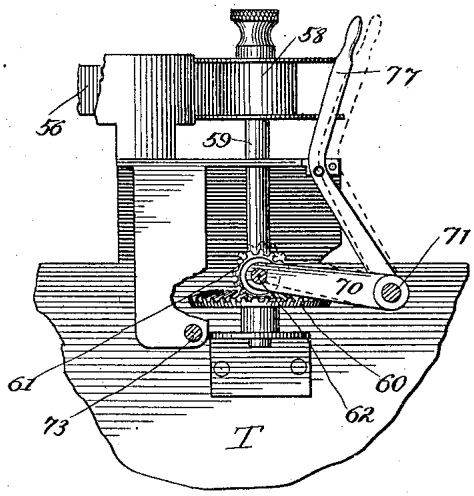


Fig. 10.



Witnesses:
Albert H. Adams.
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Inventor:
Dan E. Felt.

(No Model.) 12 Sheets—Sheet 8.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 11.

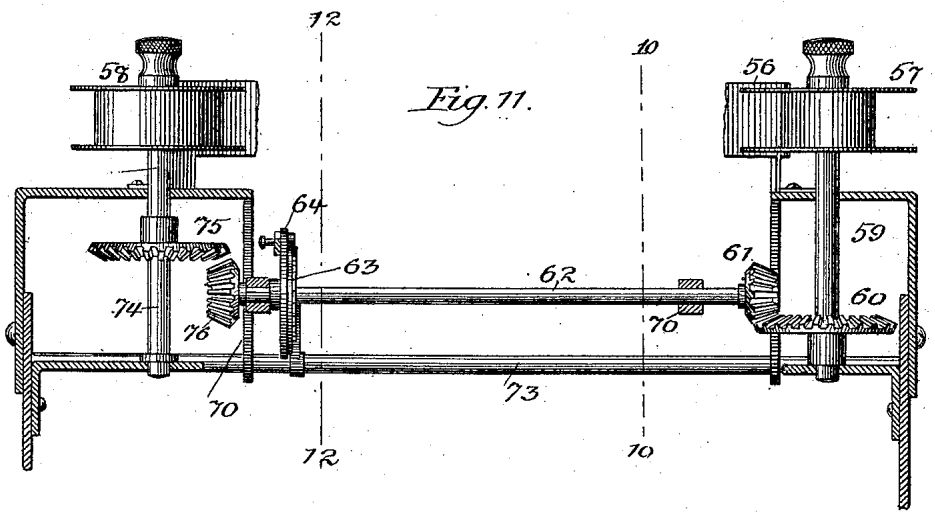


Fig. 12.

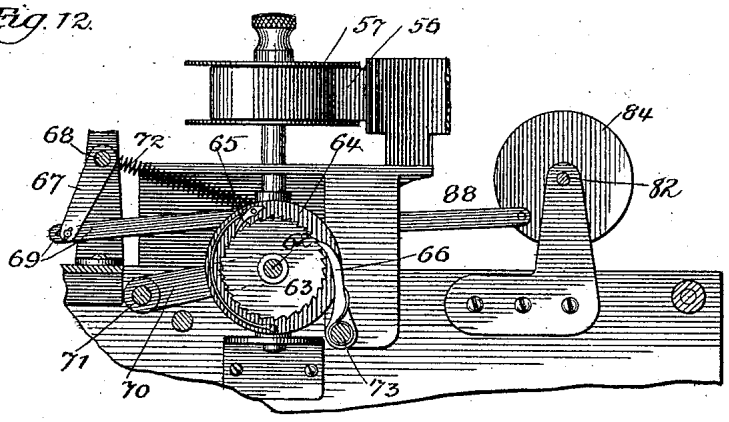
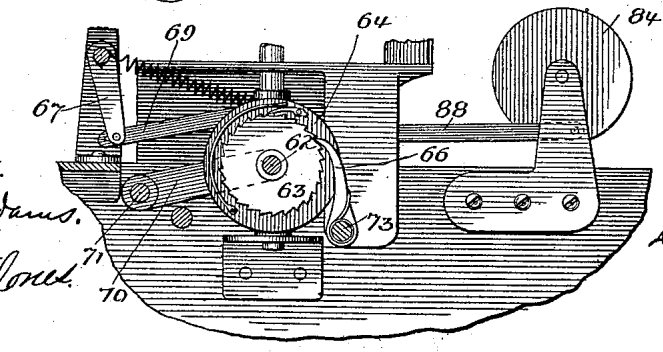


Fig. 13.



Witnesses:
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Inventor:
Don E. Felt.

(No Model.) 12 Sheets—Sheet 9.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 14.

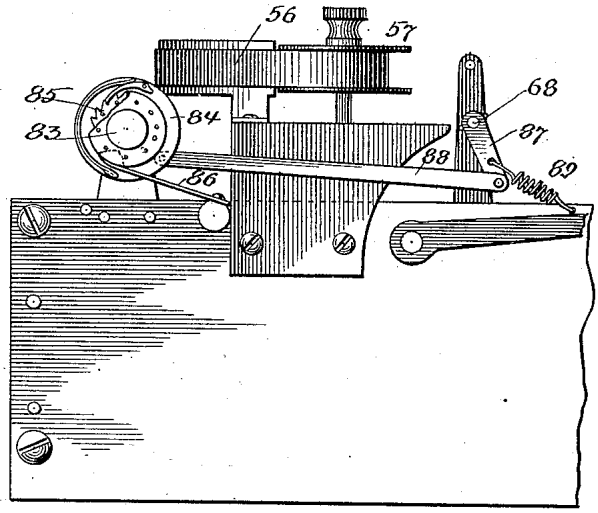
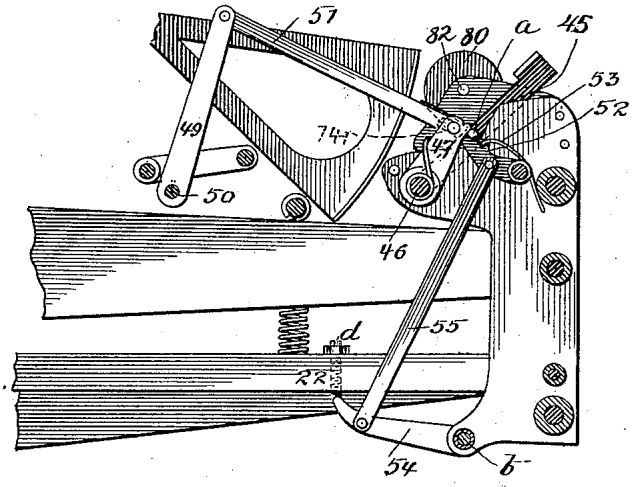


Fig. 15.



Witnesses:
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Inventor:
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(No Model.) 12 Sheets—Sheet 10.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 16.

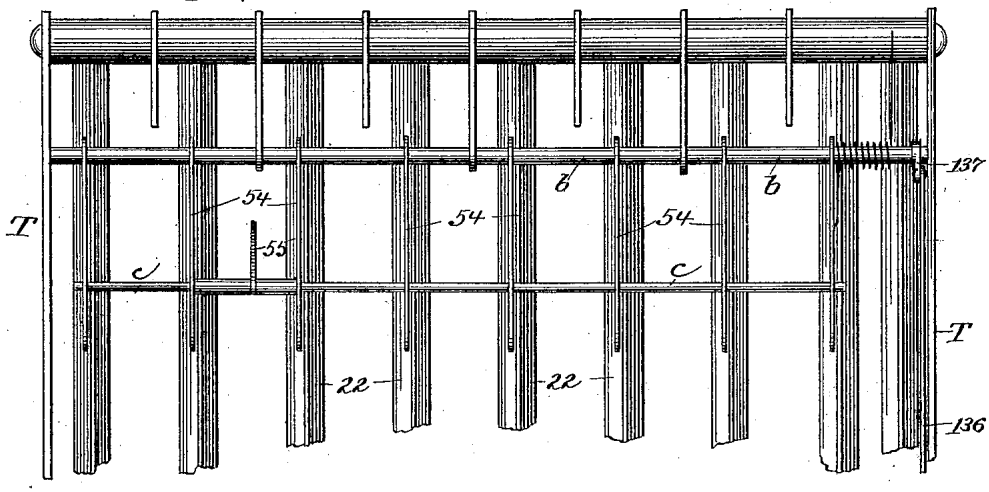
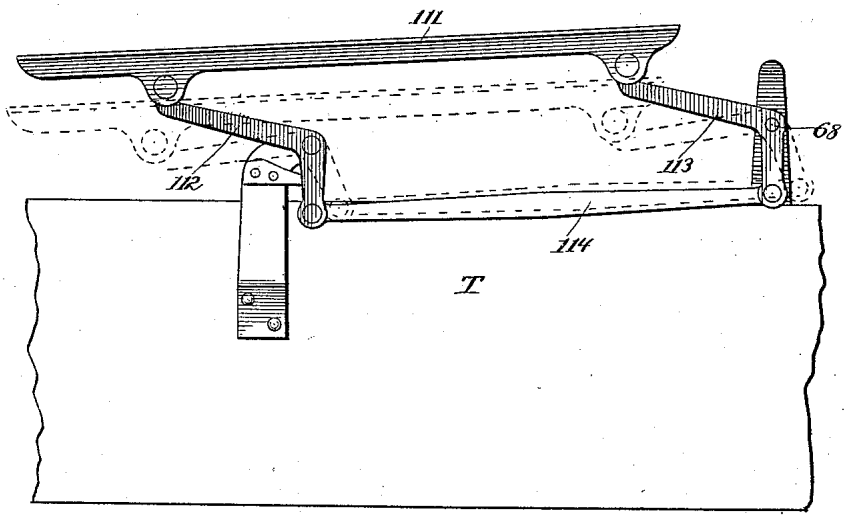


Fig. 17.



Witnesses:
Albert W. Adams.
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(No Model.) 12 Sheets—Sheet 11.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 79.

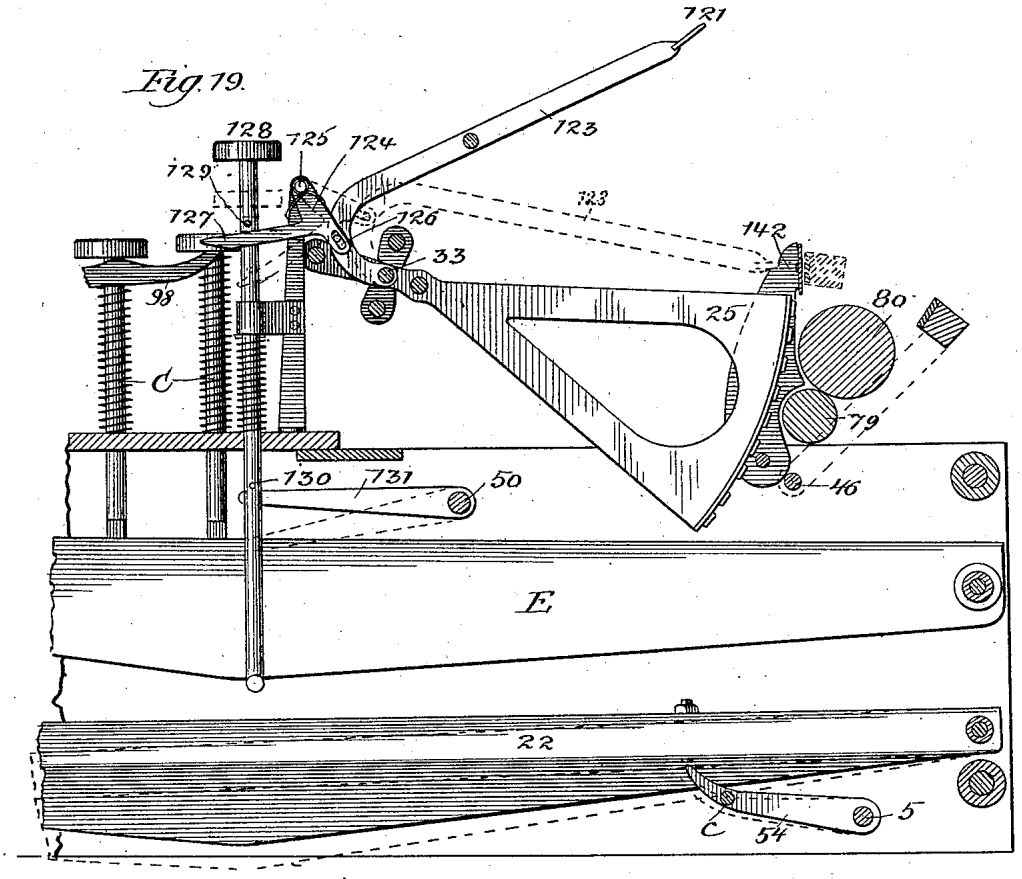
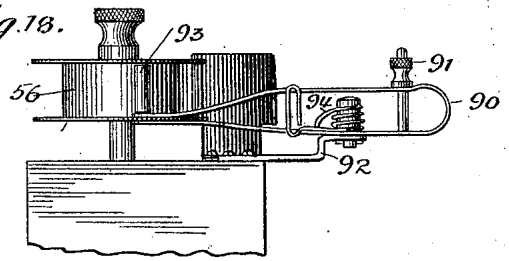


Fig. 18.



Witnesses:
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Inventor:
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(No Model.) 12 Sheets—Sheet 12.

D. E. FELT.

TYPE WRITING MACHINE.

No. 441,232. Patented Nov. 25, 1890.

Fig. 20.

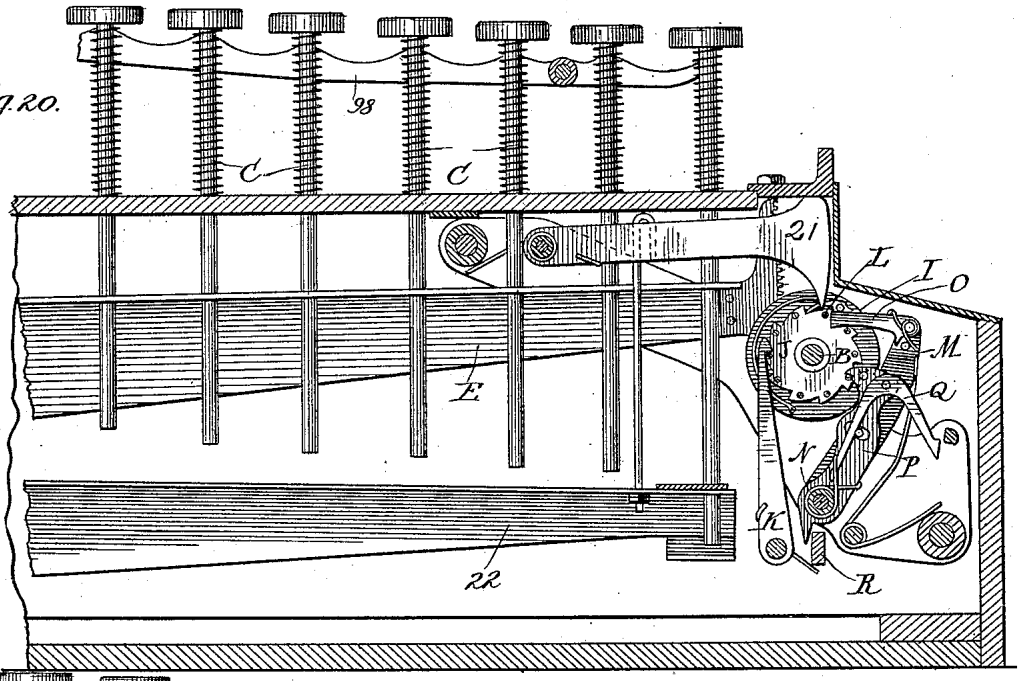


Fig. 21.

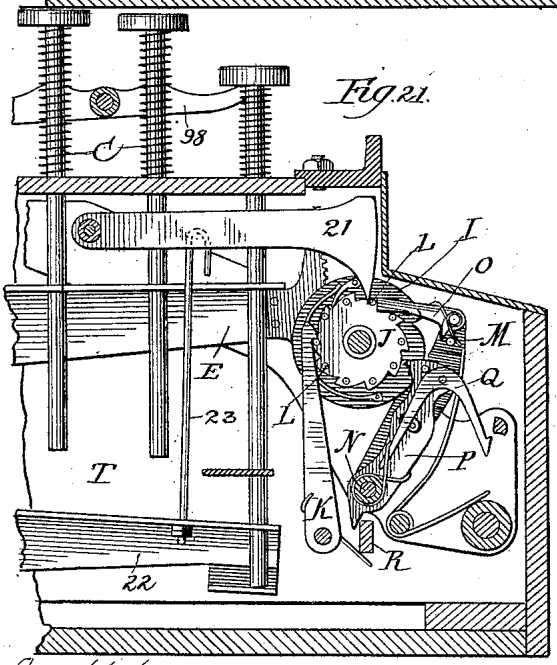
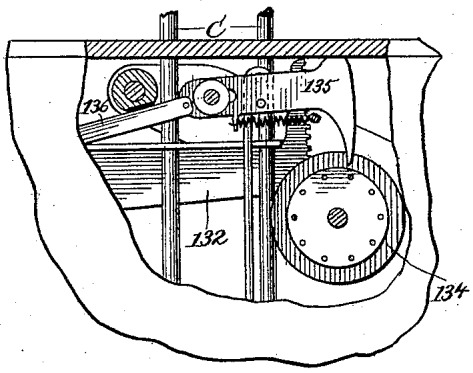


Fig. 22.



Witnesses:

Albert H. Adams.

Harry T. Jones.

Inventor:

Don E. Felt.

UNITED STATES PATENT OFFICE.

DORR E. FELT, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE FELT & TARRANT MANUFACTURING COMPANY, OF SAME PLACE.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 441,232, dated November 25, 1890.

Application filed March 8, 1889. Serial No. 302,549. (No model.)

To all whom it may concern:

Be it known that I, DORR E. FELT, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented new and useful Improvements in Type-Writing Machines, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan. Fig. 2 is a side elevation, the side of the case being removed. Fig. 3 is a vertical longitudinal section taken at line 3 3 of Fig. 1. Fig. 4 is a similar section at line 4 4 of Fig. 1. Fig. 5 is a vertical longitudinal section at line 5 5 of Fig. 1, some parts being omitted. Fig. 6 is a perspective of the intermediate devices between the keys and the hammer for transmitting to the hammer power applied to the keys. Fig. 7 is a rear view of the guide for the paper. Fig. 8 is a detail showing the devices for operating the shaft, through the movement of which the ribbon and paper are moved whenever a key in the unit-row is operated, the parts in this figure being in their normal position. Fig. 9 is a view similar to Fig. 8, the parts being shown in the position which they occupy when one of the unit-keys has been slightly depressed. Fig. 10 is a detail, being a section at line 10 10 of Fig. 11, showing also the arm and lever used for reversing the movement of the ribbon-wheels. Fig. 11 is a cross-section showing the ribbon-moving devices. Fig. 12 is a detail, being a section at line 12 12 of Fig. 11, showing the devices for moving the ribbon and paper in their normal position. Fig. 13 is a view similar to that shown in Fig. 12, but showing the parts in the position which they occupy when one of the unit-keys or the lever by the side of the machine for moving the ribbon and paper is depressed. Fig. 14 is a detail, being a side view, showing the device for moving the paper-feed roller. Fig. 15 is a detail, being a side view of the devices for operating the hammer. Fig. 16 is a detail under side view showing, among other things, devices for releasing the hammer when the blow is to be struck. Fig. 17 is a detail, being a side view of the compound lever for moving the ribbon and spacing the lines. Fig. 18 is a detail, being a side view of a friction device for preventing the ribbon from unwinding too freely. Fig. 19 is a detail section showing the devices for printing a horizontal line or other matter when desired. Fig. 20 is a detail, being a section at line 20 of Fig. 1, looking to the right, showing in elevation the devices for actuating and controlling the numeral-wheels, the parts being in their normal position. Fig. 21 is a similar view showing a key depressed. Fig. 22 is a detail, being a side view, the frame being broken away to show the devices for releasing the hammer when characters are to be printed without at the same time moving any of the adding devices.

Letters Patent of the United States No. 366,945, dated July 19, 1887, and Letters Patent of the United States No. 371,496, dated October 11, 1887, for adding-machines have heretofore been granted and issued to me, since which time I have made applications for other Letters Patent of the United States relating to the same machine and adapting it to record results.

My present invention relates to improvements upon the machine just mentioned.

The leading objects of this invention are to provide a hammer to strike a blow to make the record instead of making such record by pressure; to apply power for operating the recording devices directly by the movement of the several keys instead of providing for storing up power for that purpose; to provide for a more direct operation of the recording-heads; to provide improved means for stopping and holding the recording-heads in the proper position for printing; to provide improved devices for operating the inked ribbon; to provide one or more keys which can be operated independently of the adding mechanism to print characters, letters, or abbreviations by the side of the space occupied by the recorded figures, which characters, &c., are adapted to be used in connection with the recording mechanism of the machine; to provide means for printing a line or other matter, either below or above a column or columns of figures, without operating the adding mechanism for the purpose of separating the sum to be added from the result or for some other purpose; to provide improved mechanism for moving and holding the paper

on which the record is to be made; to provide improved intermediate devices between the keys and the hammer for transmitting to the hammer the power applied to the keys; to provide improved devices for moving the ribbon and spacing the lines, and to provide other minor improvements, all of which I accomplish as illustrated in the drawings and hereinafter described.

Those things which I claim as new will be pointed out in the claims.

In the drawings, A represents numeral-wheels, each standing for an order of numbers, which wheels are mounted on a suitable shaft B.

C are operating-keys, of which there are eight series, one being provided for each order of numbers, each key having a number upon it, or, if desired, more than one number.

D is a series of keys used in connection with suitable devices for printing characters or abbreviations by the side of the space occupied by the recorded figures.

E are vibrating levers, one for each series of keys, which levers are pivoted at their rear ends to the frame.

F are springs for returning the levers E after they have been depressed.

G are toothed segments, one on the front end of each lever E.

H are pinions on the shaft B, one meshing with each segment G.

I are disks, one for each pinion H, each disk being made integral with or secured to its pinion. Each disk carries a spring-pawl arranged to engage with a ratchet-wheel J, (see Figs. 20 and 21,) one of which ratchet-wheels is secured to each of the numeral-wheels.

K are detents, one for each numeral-wheel A, to prevent its backward rotation. Each numeral-wheel is provided with a series of pins L.

M are levers pivoted on the shaft N, each being operated by a spring, which levers are for the purpose of carrying from one numeral-wheel to the next higher.

Connected with each numeral-wheel is a cam-wheel, (not shown, but the same as in my former patent,) with the periphery of which cam-wheel an arm from the lever M engages. When this arm is pushed back by the cam, the carrying-lever will be pushed back, and when the arm passes the highest point of the cam the spring will return the carrying-lever and the pawl O thereon, bringing the same into engagement with one of the teeth of the ratchet-wheel J, connected with the next higher numeral-wheel, moving it one number, and thus carrying.

P are spring-actuated detents on the shaft N, which prevent overrotation of the numeral-wheels by the impulse of the carrying-mechanism. There is a slot in each detent to receive a long pin which extends out from the adjoining carrying-lever. On the upper end of this detent there is a pin which rides on the periphery of the disk I, which acts as a cam to release the locking-detent P from the numeral-wheel of the order in which the key is struck.

Q are bell-crank levers pivoted to the detents P, each of which levers has a catch to engage with a cross-bar. The lever Q and said cross-bar detain the stop-detent P to permit the carrying-lever to move the numeral-wheel, the catch being released at the proper time by the pin in the slot in the detent P.

R is a flat bar, the ends of which are pivoted in the frame, with which bar the projections on the lower ends of the detents P engage. By rotating this bar R a little the detents P can be disengaged from the disks and ratchet-wheels and the parts be brought into such position that the numeral-wheels can be rotated by means of the key on the outside of the frame for the purpose of setting the machine before commencing an operation.

S is a spring which holds the bar R in its normal position.

T represents the main frame.

21 are vibrating stops, one for each numeral-wheel.

22 are levers pivoted at their rear ends to the frame, the forward ends of which have a limited vertical movement.

23 are rods, one connecting each stop 21 with its lever 22.

24 are springs to return the several levers 22 after they have been depressed. Each rod, which forms a part of each key, passes through the proper lever E, and is provided with a shoulder to engage therewith, and their lower ends are arranged to engage with the proper levers 22.

The operation of the adding mechanism with the stops and detents connected therewith and the devices for setting the numeral wheels in proper position before commencing operation, so that they will all indicate nothing, is substantially the same as the operation of the devices for those purposes shown and described in my former patent, No. 371,496, and therefore a more minute description of the construction and operation of the parts pertaining directly to the adding mechanism is not required.

25, 26, 27, 28, 29, 30, 31, and 32 are recording type-heads, one for each row of the keys C. Each head has upon its face figures from 1 to 9, inclusive, and each is pivoted on a shaft 33.

34 is a rod secured near the rear end of the type-head 25. To the outer end of this rod is secured a lever 35, which is pivoted on the shaft 33. With each of the other type-heads there is connected in a similar manner a similar lever, which other levers are marked 36, 37, 38, 39, 40, 41, and 42; but the location of the several rods or parts to which these levers are respectively secured varies as convenience requires.

43 are vertical rods, the lower end of each of which is pivoted to one of the levers E, and

the forward end of each of the levers 35, 36, 37, 38, 39, 40, 41, and 42 is adjustably connected with the upper end of one of these rods 43. Thus there is one type-head for each of the several series of keys C, and each key of each of these series of keys will when operated bring into action the particular recording-head belonging to that series of keys, because when one of the levers E descends the rod 43 connected with it will descend also and carry down the lever connected, as before stated, with such rod, and through which the proper type-head is operated, and the distance which the head rises will correspond with the distance which the lever E descends.

The first row of keys C on the right-hand side of the machine is for units, the second for tens, the third for hundreds, and so on, and the recording-head 25 is for the units and the next for the tens, and so on.

44 is a hammer from which extends downwardly upon one side an arm 45, which may be regarded as a part of the hammer, which arm is secured to a shaft 46, supported in suitable bearings.

47 (see Figs. 1, 5, and 15) is an arm or lever loose on the shaft 46.

48 is a coiled spring on the shaft 46, one end of which spring is secured to that shaft and the other end is connected with the lever 47.

49 is an arm or lever rigidly secured to the shaft 50, which is supported in the frame.

51 is a connecting-bar between the levers 47 and 49. When the lever 47 is moved forward, the tension of the spring 48, which operates the hammer, will be increased; but the hammer will be held until released, as subsequently stated. When the lever 47 returns, its upper end, being in contact with the pin *a*, will return the hammer to its normal position.

52 is a catch, which engages with the pin *a* on the hammer.

53 is a spring, the tendency of which is to hold the catch in engagement with the pin on the hammer.

54 are arms secured to a rock-shaft *b*, pivoted in the frame, the free ends of which arms are arranged to engage each with an adjustable pin *d*, which passes through one of the levers 22.

c is a rod which passes through all the arms 54.

55 is a connecting-bar between the latch 52 and the rod *c*. The descent of either one of the levers 22 operates not only one but all of the arms 54 (because they are all secured to the shaft *b*) and releases the latch 52 by the movement of the arm 55, which is connected at one end with the rod *c*.

56 is an inking-ribbon mounted on spools 57 and 58. The spool 57 is mounted on a shaft 59, which carries a beveled wheel 60, which engages with a pinion 61 on a shaft 62, on which there is secured a ratchet-wheel 63.

64 is a disk loose on the shaft 62 and provided with a spring-pawl 65, which engages with the ratchet-wheel 63.

66 is a spring-pawl to prevent the backward rotation of the ratchet-wheel 63.

67 is an arm or lever rigidly secured to the shaft 68.

69 is a connecting-arm, one end of which is connected with the lower end of the lever 67 and the other end is pivoted to the disk 64.

The shaft 62 is supported in bearing in the arms 70, which are rigidly secured to the shaft 71.

72 is a spring to return the disk 64.

73 is a rod which extends across the machine, the principal purpose of which is to support the upper ends of the springs 24.

The spool 58 is supported by a shaft 74, which carries a beveled wheel 75.

76 is a beveled pinion on one end of the shaft 62.

77 is a lever rigidly connected with the shaft 71. By moving this lever the shaft 71 can be rocked a little, which will rock the arms 70 up or down, and by the movement of such arms the position of the shaft 62 will be changed a little, so that the beveled pinion 61 can be made to engage with the wheel 60, as shown in Fig. 11, or the beveled pinion 76 can be made to engage with the wheel 75, the pinion 61 being at the same time disengaged from the wheel 60, and thus the movement of the spools can be reversed.

78 represents a strip of paper upon which the record is to be made, which paper passes between the rollers 79 and 80, and thence to the paper-guide 81.

The shaft 82, which carries the roller 80, is extended to the left-hand side of the machine and is there provided with a thumb-piece 83.

84 is a disk, which is loose on the shaft 82, which disk carries a spring-pawl arranged to engage with the ratchet-wheel 85, which is fast on the shaft 82.

86 is a spring-hook arranged to engage with pins on the ratchet-wheel 85 and prevent its backward rotation.

87 (see Fig. 14) is an arm or lever rigidly secured to the shaft 68.

88 is a connecting-bar, one end of which is connected with the lower end of the lever 87 and the other end is pivoted to the disk 84.

89 is a spring to return the rock-shaft 68 and the levers 67 and 87 and move the ribbon and the paper, motion being given to the shafts 62 and 82 through the ratchet-wheels 63 and 85 and other devices.

I have provided a friction device to retard the movement of the spools which carry the inking-ribbon, which consists of a spring 90 (see Fig. 18) bent over upon itself, between the two ends of which one of the rims of one of the spools is located. The tension of this spring can be adjusted by the thumb-screw 91. The spring 90 is pivoted on a support 92.

93 is a roller or bearing-piece pivotally or

otherwise secured to the end of the upper portion of the spring 90 and arranged to bear against the ribbon.

94 is a spring, which is arranged to force the roller or piece 93 against the ribbon.

95 is a vertically-movable frame, which is best shown in Fig. 6. It consists of two horizontal rods 96 and 97 and a number of longitudinal bars 98, arranged one under the heads of each series of keys. There are washers 99 between the bars 98. 100 and 101 are two arms depending from this frame on one side.

102 is a bell-crank lever rigidly secured to a shaft 103, supported in the main frame. One end of this bell-crank lever is connected with the arm 100.

104 is another bell-crank lever rigidly secured to the rock-shaft 50, which is also supported in the main frame. One end of this bell-crank lever 104 is pivoted to the lower end of the arm 101.

106 is a bar which connects the two vertical arms of the bell-crank levers 102 and 104. On the other side of this frame 95 there are two depending arms 107 and 108.

109 is an arm which connects the lower end of the depending arm 108 with the shaft 50. The lower end of the arm 107 is connected with the shaft 103 by an arm similar to 109.

110 is a coiled spring, one end of which is connected with one arm of the bell-crank lever 104. The other end is connected with the main frame. When either one of the bars 98 of the frame 95 is forced down by one of the keys C, all parts of this frame descend together.

111 is a thin flat bar at the right-hand side of the keys, with which bar two bell-crank levers 112 and 113 are pivotally connected at one end, and the vertical arms of these levers are connected by a bar 114.

The bell-crank lever 113 is rigidly secured to the shaft 68, and when the piece 111 is depressed the shaft 68 will be rocked a little, moving the ribbon through the lever 67 and other parts and at the same time moving the paper through the lever 87 and some other parts, the said levers 67 and 87 being both fast on the shaft 68.

I have provided devices by means of which the depression of either one of the unit-keys will move the ribbon and the paper, which are as follows:

115 (see Figs. 8 and 9) is a rod, the lower end of which is secured to the lever E, which is operated by the unit-keys.

116 is an arm loosely placed on the shaft 68. In this arm there are two pins 117.

118 is a lever having three arms, which lever is pivoted to the forward end of the arm 116. One of these three arms extends out over the top of the pin 115. One is arranged between the two pins 117. The other extends upward and is arranged so that it can be brought beneath a notch in the under side of the bar 98, arranged beneath the unit-keys. Secured to the arm 116 is a bent arm 119, which is carried up and extended out over the bell-crank lever 113. (See Fig. 2.)

120 is a spring arranged to have a tendency to throw the vertical arm of the lever 118 toward the left, looking at Figs. 8 and 9.

If one of the unit-keys be depressed a little, as shown in Fig. 9, the rod 115 will be carried down a little and away from engagement with the short arm of the lever 118. Then the action of the spring 120 will force the lever 118 over, as shown in Fig. 9, and its upper end will be engaged by the bar 98, and the bent arm 119 coming in contact with the long arm of the bell crank-lever 113 it will be forced down, rocking the shaft 68, and through the arms 67 and 87 and other parts the ribbon and paper will be moved when the rock-shaft 68 is returned to its normal position by the action of the spring 89. This movement of the ribbon and paper by the depression of the unit-keys does not take place until after the other operations have been performed which result from such depression. The movement of the longer one of the two horizontal arms of the lever 118 is limited by the pins 117.

I have provided devices by means of which a line or other matter may be printed either below or above a column or columns of figures without operating the adding mechanism, which are as follows.

121 represents a strip of metal, the exposed edge of which may be provided with a line, dot, letters, or characters. This strip 121 is supported by two arms 122 123, which are pivoted to the shaft 33. These parts 121 122 123 form in effect an additional type-head.

124 is a lever pivoted at 125 to a standard. There is a slotted connection between this lever and the arm 123, and a pin on the arm 123 enters the slot 126 in the lever 124. Extending out from the front of the lever 124 is a long arm 127.

128 is a key provided with two pins 129 130. The former engages with the arm 127, and the latter engages with an arm or lever 131, which is fast on the rock-shaft 50. This key 128 has no connection with any of the levers E; but its lower end is bent and arranged to engage with one of the levers 22. By depressing the key 128 the strip or head 121 will be brought down to the position indicated by dotted lines in Fig. 19, and then when the hammer operates the line of letters, &c., on the face of the strip 121 will be printed upon the paper, because the descent of the key 128 will carry down the arm 131 by the action of the pin 130, which will rock the shaft 50 and increase the tension of the spring 48, as before described, and the hammer will be released by the depression of one of the levers 22 by the lower end of the key 128 in the same manner as described for the operation

of the releasing devices by the depression of the other keys.

I have also provided devices by means of which characters, letters, or abbreviations can be printed by the side of the space occupied by the recorded figures, which are as follows:

132 (see Fig. 4) is a lever similar to one of the levers E, except that it is shorter and has no connection with and does not operate the numeral-wheels. This lever is provided with a segment similar to the segments G, which segment engages with a pinion 133 on a disk 134, which disk and pinion are secured together and supported on a stud on the frame. There are also pins on the back side of the disk, with which the detent 135 can engage, the detent being operated in the same manner as the detents 21. The rear end of the detent 135 is slotted, through which slot there extends a pin connected with the rod 136, the rear end of which is pivoted to an arm 137, fast on the shaft *b*. There is a spring shown in Fig. 22, the tendency of which is to hold the detent 135 in its forward position.

138 is a type-head pivoted on the shaft 33, the same as the type-head 25, to which it is similar; but its face is provided with letters or characters corresponding with those on the keys D.

139 is a lever connected with the type-head 138, which lever is similar to the lever 36, and this lever 139 is connected with a rod 140, which is similar to the rods 43, the lower end of which rod 140 is pivotally connected with the lever 132. When one of the keys D is depressed, the lever 132 will be depressed, carrying down the rod 140, which will move the type-head 138. The operated key then being in contact with one of the bars 98, the frame 95 will be forced down and the shaft 50 will be rocked, as before described. The lower end of the key struck will come in contact with the lever 22, (seen in Fig. 4,) which will operate the detent 135, and when the point of this detent is struck by one of the pins in the disk 134 such detent will be pushed back, which will force back the rod 136 and the arm 137, which will rock the shaft *b*, and the hammer will be released, as before described, except that in this case the rock-shaft *b* is moved by the arm 137 instead of by one of the arms 54.

I have provided a slot in one end of the bar 51, which is indicated by 141, Figs. 5 and 15, into which slot the pin enters which connects this bar 51 with the arm or lever 47. This slot also allows a slight independent movement of the hammer, which is important to prevent blurring in printing, because after the blow has been struck by the hammer it can immediately rebound a trifle away from the paper. The slot 141 might be at the opposite end of the bar 51 or at some other suitable place.

142 are vertical pieces of thin metal, the lower ends of which are rigidly secured to a rod or bar suitably supported. The upper end of each of these pieces is provided with an edge arranged in front of the ribbon for the purpose of printing a vertical line or dots between adjoining rows of figures, if desired—as, for example, between cents and dollars. One of these pieces 142 has, as shown in Fig. 19, a notch on the front and near the upper end, which serves as a stop for the piece 121 when it is brought into position for printing, and this piece 121 is provided with notches in its rear edge, which permit it to pass down over the pieces 142, which notches are shown in Fig. 1, but are not numbered. The rear edges of these strips 142 opposite the roller 80 are curved and serve the purpose of a guide for the paper. (See Fig. 19.)

A partial description of the operation of the principal parts has already been given; but I will now describe consecutively the operation of the several parts of the machine so far as I deem such description desirable to a full understanding of the operation of the machine. The numeral-wheels and the parts connected therewith are operated by the depression of either one of the keys C, substantially as set forth in my former patent, No. 371,496. There are eight rows of keys (marked C) and there are eight type-heads 25 to 32, inclusive—one for each of said eight rows of keys. When either one of the keys C in either one of these eight rows is depressed, thereby operating the proper numeral-wheel, the corresponding type-head will at the same time be operated through the appropriate lever E and the rod 43 connected therewith and with the type-head to be moved, and the distance which the type-head moves will correspond with the movement of the proper numeral-wheel, so that the proper figure on the type-head will be brought into position to be struck by the hammer. At the same time that the type-head is raised, the key which is struck coming in contact with the bar 98 beneath such key, such bar will be forced down, carrying with it the frame 95, operating the bell-crank levers 102 and 104, and, the latter being fast on the shaft 50, such shaft will be rocked, which will, through the lever 49, bar 51, and lever 47, increase the tension of the spring 48. When the key which is being used comes in contact with the proper lever 22, it will be forced down, and one of the arms 54, all of which are fast on the rock-shaft *b*, will be forced down, and the bar 55, which is connected with the rod *c'*, will be moved, which will release the latch 52 from the hammer, and the hammer will then, by the action of the spring 48, strike a blow upon the paper, printing thereon the figure on the proper type-head. When the key is released, it will be returned to its normal position by the spring under it. The lever E will be returned to its normal position by the proper spring F, carrying with it to its normal position the type-head which has just been in use. The lever 22 will also, by the proper spring 24, be returned. The arms 54 will also be returned

to their normal position by a spring on the rod *c*. (Shown in Fig. 16.) At the same time the action of the spring 110 on the bell-crank lever 104 will rock the shaft 50, returning the lever 47 and the hammer to their normal positions. By depressing the bar 111 the bell-crank levers 112 and 113 will be operated, and, the lever 113 being fast on the shaft 68, such shaft will be rocked, which will push back the arms or levers 67 and 87 on such shaft, partially turning the disks 64 and 84, and when the bar 111 is released from pressure the action of the spring 89 (see Fig. 14) will return the shaft 68 to its normal position, and at the same time the partial rotation of the two disks 64 and 84 will, through the pawls thereon and the ratchet-wheels connected therewith, move the ribbon and also the strip of paper a proper distance for the next operation. By means of the devices which are shown in Figs. 2, 8, and 9, the operation of which has before been described, the ribbon and paper can be moved by the depression of either one of the unit-keys. It is necessary to move the ribbon and the paper only when a unit-key has been operated, and the use of the unit-keys to move the ribbon and paper does not interfere with the other operations of the machine. By means of the devices described I have provided for moving the ribbon and paper by pressing down the bar 111 directly or through one of the unit-keys. By using the unit-keys for this purpose a little time is saved. The devices for moving the ribbon are clearly shown in Fig. 11, and their operation will be understood without further description. By means of the lever 77 the shaft 62, which carries the beveled pinions 61 and 76, can be raised or lowered a little, so that the pinion 61 can be disengaged from the wheel 60, and the pinion 76 can be engaged with the wheel 75, and by raising or lowering the shaft 62 the direction in which the ribbon moves can be changed. The key 128 does not operate any of the adding mechanism. Its use and operation have already been fully described. It is frequently desirable to print a character—such as a dollar-mark—or letters, or abbreviations, such as "Dr." for "Debit" or "Cr." for "Credit" before a line of figures. The keys D and devices which they operate are designed for this purpose, and the operation of these keys and parts connected therewith has already been fully described. These keys do not in any way operate any part of the adding mechanism proper, and the printing of the characters or letters indicated on these keys by means of the type-head 138 and other devices is intended to be done before the printing of the figures in a row opposite to such characters or letters. When either one of the keys C is struck one of the levers E and one of the levers 22 will be operated, and one of the detents 21, coming in contact with one of the pins 13 on the proper disk I, will arrest the movement of the lever E and at the same time positively stop the corresponding type-head and hold it firmly in the proper position for recording, the proper figure being presented to the ribbon. The detent 135 operates in the same manner to hold the type-head 138 in proper position for recording.

The several type-heads 25 to 32, inclusive, may each be properly considered as consisting of a head proper, which carries the type, one or more arms extending from such head pivoted on the shaft 33, a rod such as 34, and a lever such as 35, which lever is also pivoted on the shaft 33. A similar statement may also be made as to the type-head 138.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In an adding-machine provided with recording mechanism, the combination, with the keys C, of the frame 95, having depending arms, the shaft 103, the levers 102 and 104, the arms 109, rock-shaft 50, levers 47 and 49, bar 51, hammer-shaft 46, and spring 48, substantially as and for the purposes specified.

2. In an adding-machine provided with recording mechanism, the combination, with the keys C, of the frame 95, having depending arms, the shaft 103, bell-crank levers 102 and 104, bar 106, arms 109, rock-shaft 50, levers 47 and 49, bar 51, hammer 44, hammer-shaft 46, and spring 48, substantially as and for the purposes specified.

3. The keys C, levers E and 22, numeral-wheels A, detents 21, and rods 23, in combination with the frame 95, levers 102 and 104, bar 106, arms 109, rock-shaft 50, levers 47 and 49, connecting-bar 51, hammer-shaft 46, spring 48, and hammer 44, substantially as and for the purposes specified.

4. The combination of the keys C, frame 95, having depending arms, the levers 102 and 104, arms 109, rock-shaft 50, and the hammer-shaft 46, connected with said rock-shaft, substantially as described.

5. The combination of the keys C, frame 95, having depending arms, the levers 102 and 104, bar 106, spring 110, arms 109, rock-shaft 50, and hammer-shaft 46, connected with said rock-shaft, substantially as described.

6. The combination, with the ink-ribbon mechanism, of the bar 111, bell-cranks 112 and 113, bar 114, and rock-shaft 68, having an arm 67, substantially as shown and described.

7. The combination, with the ink-ribbon mechanism, of the bar 111, levers 112 and 113, rock-shaft 68, arms 67 and 69, shaft 62, disk 64, pawl 65, and ratchet-wheel 63, for actuating the ink-ribbon mechanism, substantially as described.

8. The combination, with the ink-ribbon mechanism, of the bars 111 and 114, bell-crank levers 112 and 113, rock-shaft 68, arms 67 and 69, shaft 62, disk 64, spring-pawl 65, and ratchet-wheel 63, substantially as shown and described.

9. The combination, with the inking mechanism and the paper-feeding roller, of the bar 111, levers 112 and 113, rock-shaft 68, arms 67

and 87, and spring 89, substantially as described.

10. The combination, with the paper-feeding roller, of the bar 111, levers 112 and 113, rock-shaft 68, arm 87, connecting-bar 88, disk 84, ratchet-wheel 85, and shaft 82, substantially as described.

11. The combination, with the paper and ribbon feeding mechanism, of the bars 111 and 114, bell-crank levers 112 and 113, rock-shaft 68, arms 67 and 87, and spring 89, substantially as shown and described.

12. The combination of the keys C, levers E, a series of type-heads, rods 43, hammer 44, levers 22, levers 54, secured to a shaft, a latch 52 to engage the hammer, and a connecting-bar 55, substantially as and for the purposes specified.

13. The combination of the keys C, levers 22, hammer 44, levers 54, secured to a shaft, latch 52, to engage the hammer, and a connecting-bar 55, substantially as and for the purposes specified.

14. The combination of the key 128, having pins 129 130 and arranged to engage at its lower end with a lever 22, a type-head consisting of the piece 121 and other parts connected therewith, a lever 124, an arm 131 on a rock-shaft 50, the hammer 44 and its connections to said rock-shaft, and means for releasing the hammer, substantially as and for the purposes specified.

15. The combination of the key 128, provided with a pin 130, lever 131, rock-shaft 50, levers 47 and 49, connecting-bar 51, and spring 48, substantially as and for the purpose specified.

16. A slotted stop or detent 135, in combination with the rod 136, arm 137 on the shaft *b*, arms or levers 54, hammer 44, latch 52, and connecting-bar 55, substantially as and for the purpose specified.

17. The combination of the keys C, frame 95, a lever E, rod 115, arm 116, loose on the shaft 68, lever 118, arm 119, paper and ribbon feed devices, and lever 113, substantially as and for the purposes specified.

18. The combination of the keys C, a series of type-heads and numeral-wheels, a series of levers E, a series of levers 22, rock-shaft 50, spring 48, levers 47 and 49, connecting-bar 51, hammer 44, and hammer-shaft 46, substantially as and for the purposes specified.

19. The shaft 62, supported in movable bearings, in combination with the beveled pinions 61 and 76 and the beveled wheels 60 and 75 of the ink-ribbon mechanism, substantially as and for the purpose specified.

20. The combination, with the hammer 44, having pin *a* and catch 52, of the levers 22, adjustable pins *d*, and arms or levers 54 on the rock-shaft *b*, substantially as and for the purpose specified.

21. The combination, with the hammer 44, hammer-shaft 46, and rock-shaft 50, of the levers 47 and 49, connecting-bar 51, and spring 48, substantially as specified.

22. A series of levers 54 on a shaft *b*, the levers 22, and hammer 44, in combination with a latch adapted to engage with the hammer, a spring to hold such latch in engagement with such hammer, and a connecting-bar 55, substantially as specified.

23. The combination, with the type-heads and the rolls 79 and 80, of the vertical pieces 142, one of which is notched near its upper end, the strip 121, and the pivoted arms 122 and 123, supporting said strip, substantially as specified.

24. The spools 57 and 58, mounted on rotating shafts, one carrying the wheel 60 and the other carrying the wheel 75, in combination with a shaft 62, mounted in movable bearings, carrying beveled pinions 61 and 76, substantially as and for the purpose specified.

25. A shaft 62, mounted in movable bearings and provided with beveled pinions 61 and 76, in combination with the ribbon-spool gears and a lever for moving the shaft up or down, substantially as and for the purpose specified.

26. The combination, with the ribbon-spool and ribbon, of a ribbon-brake consisting of a pivoted spring 90, bearing on one of the spool-rims and carrying a roller or bearing held in contact with the ribbon by a spring, substantially as specified.

27. The combination of the rock-shaft 50, hammer-shaft 46, levers 47 and 49, spring 48, and bar 51, having a slotted connection with one of said levers, substantially as and for the purpose specified.

DORR E. FELT.

Witnesses:
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