

**June 19, 1923.**

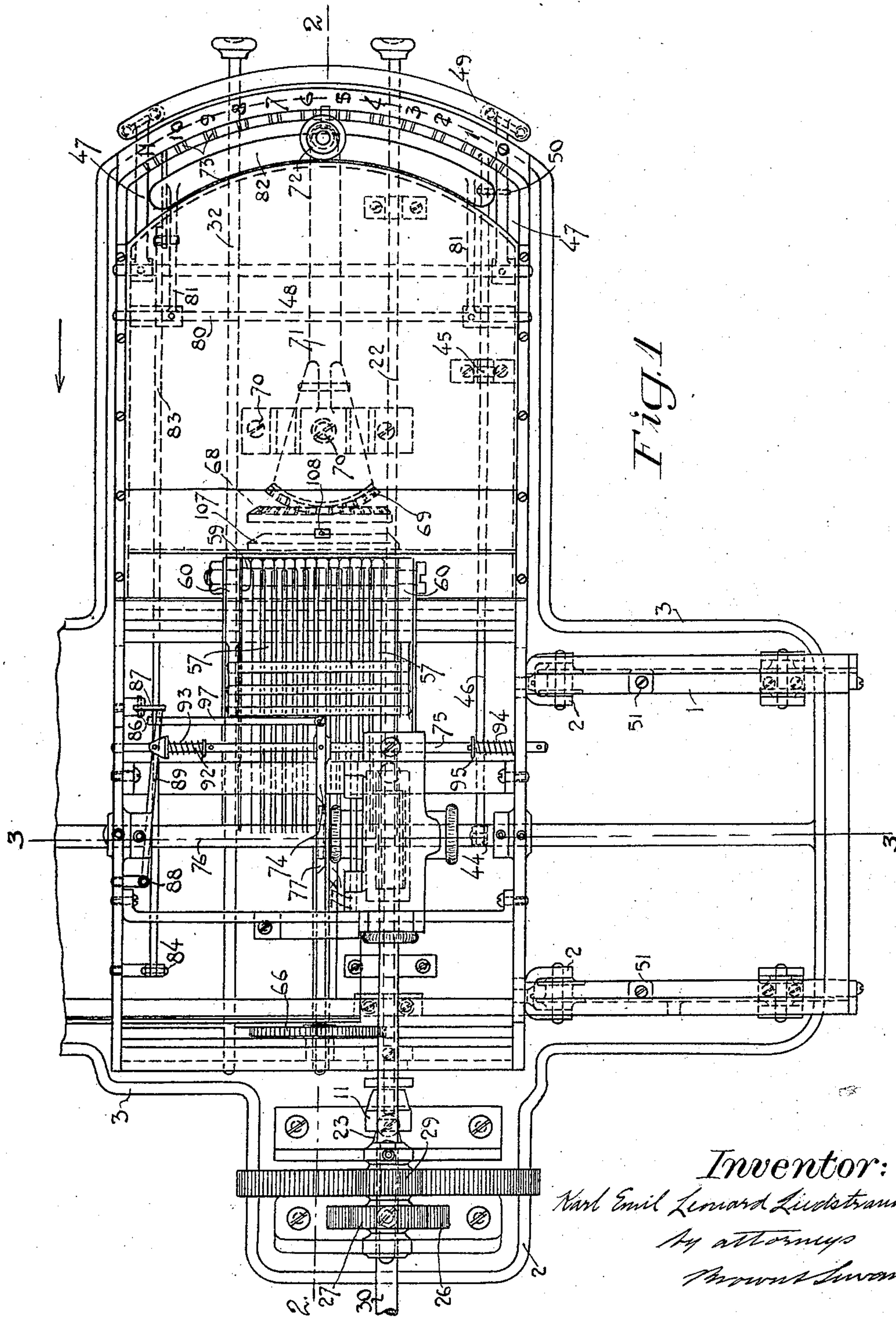
**1,459,407**

**K. E. L. LIEDSTRAND**

MACHINE FOR EFFECTING SLOTS IN CARDS FOR STATISTIC OR SIMILAR PURPOSES

Filed July 16, 1919

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June 19, 1923.

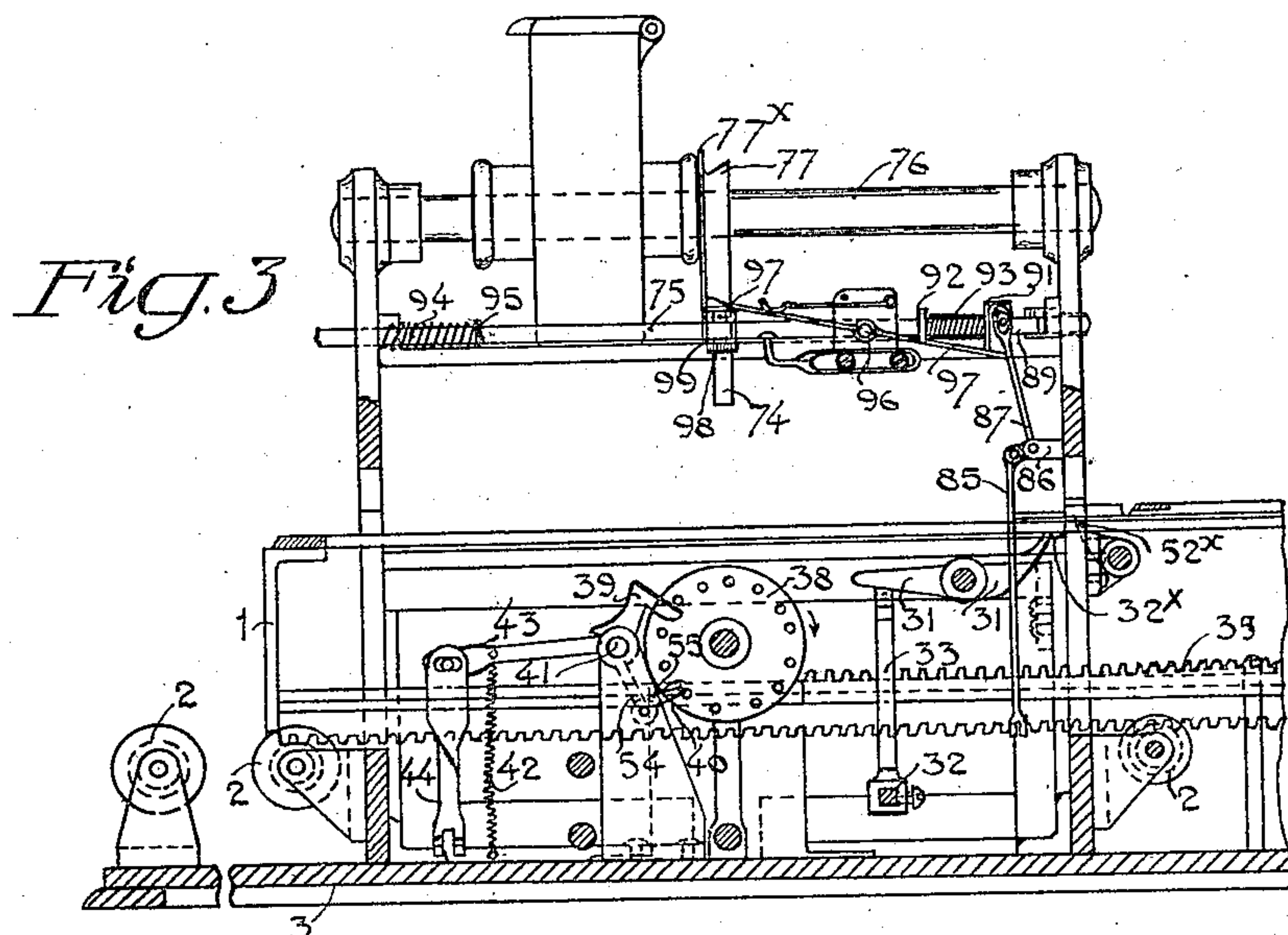
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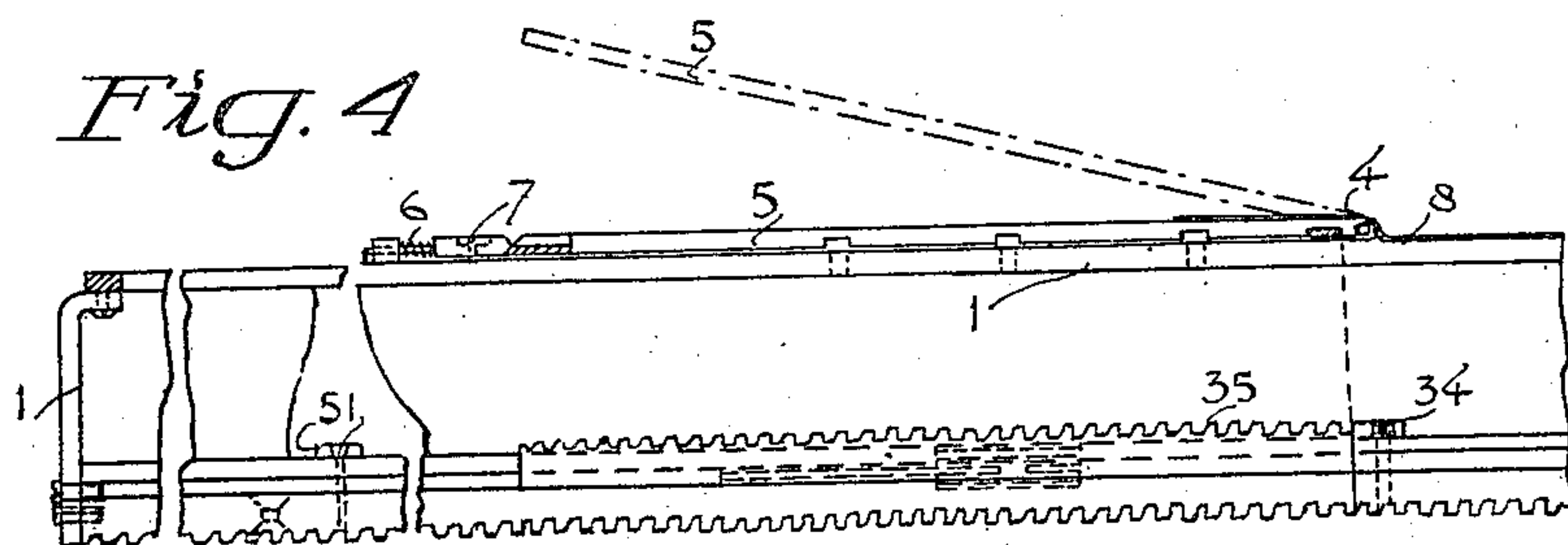
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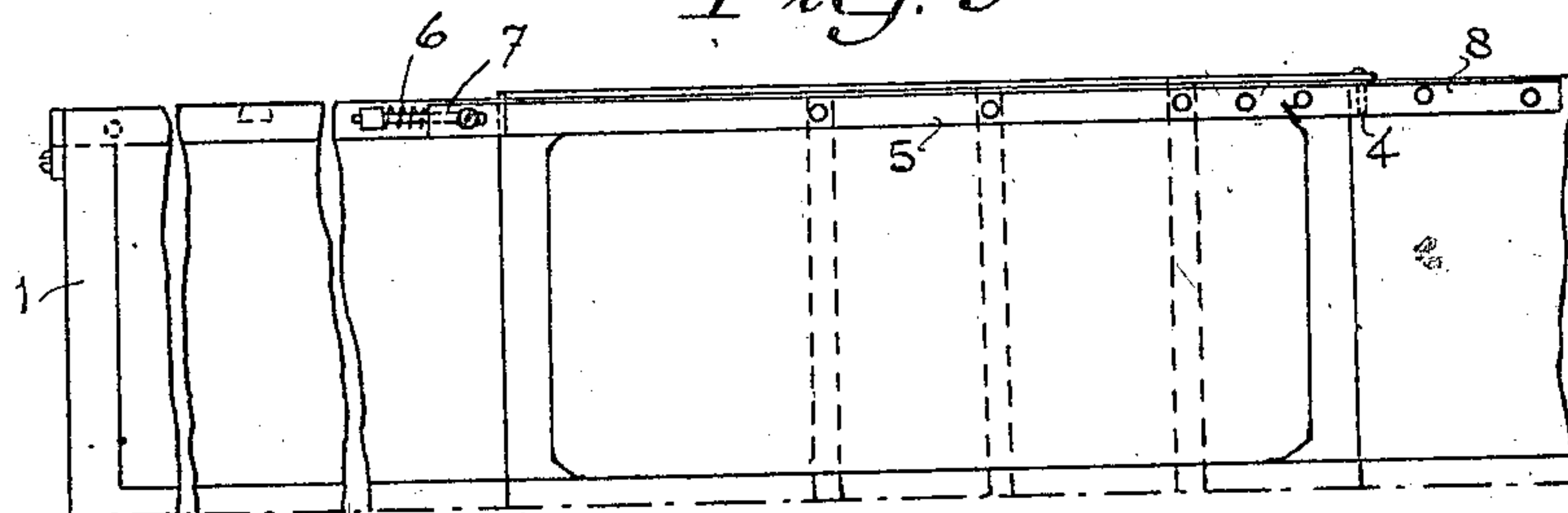
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*Fig. 4*



*Fig. 5*



*Inventor:*

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*by attorney*  
*Thos. J. Swann*

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1,459,407

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4 Sheets-Sheet 4

Fig. 6

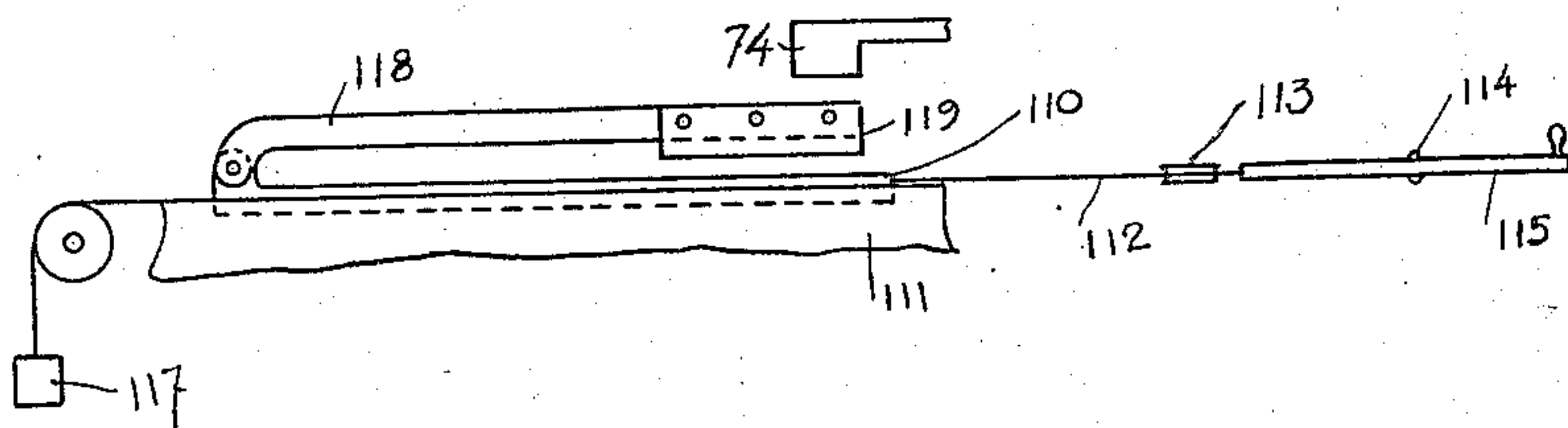


Fig. 7

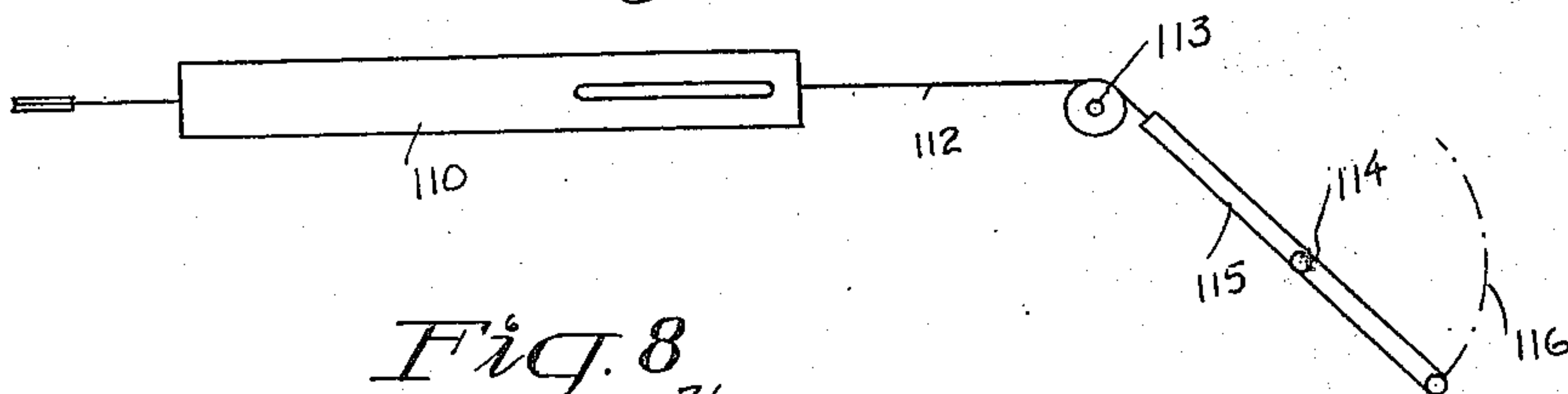


Fig. 8

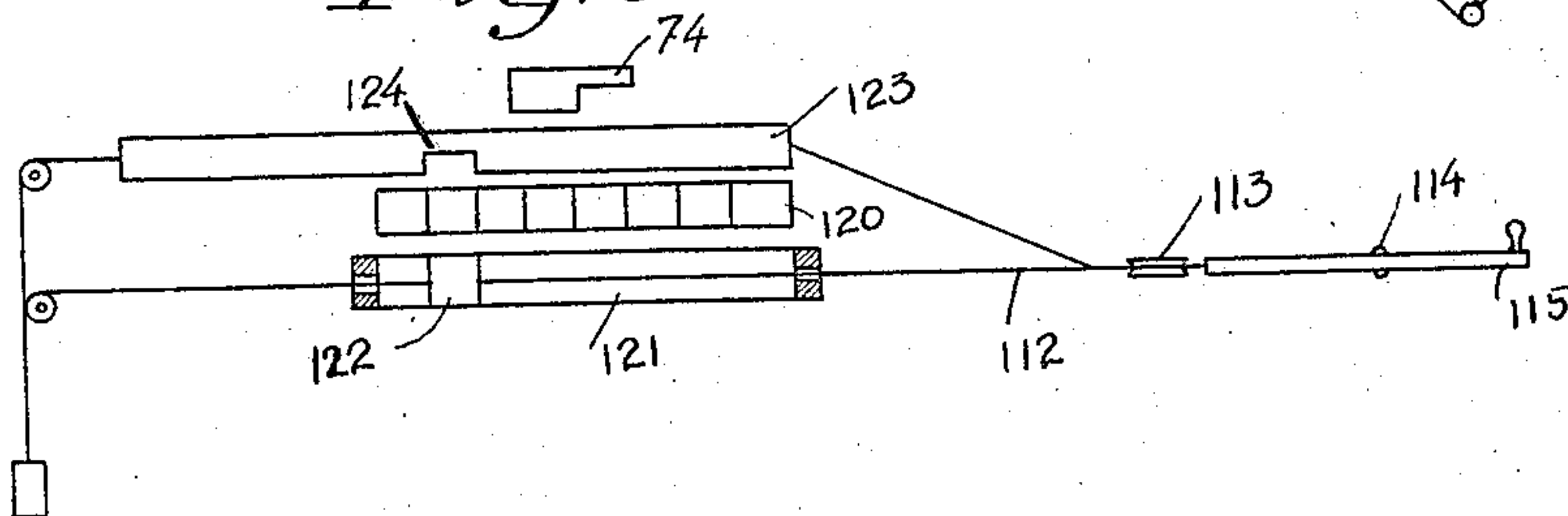
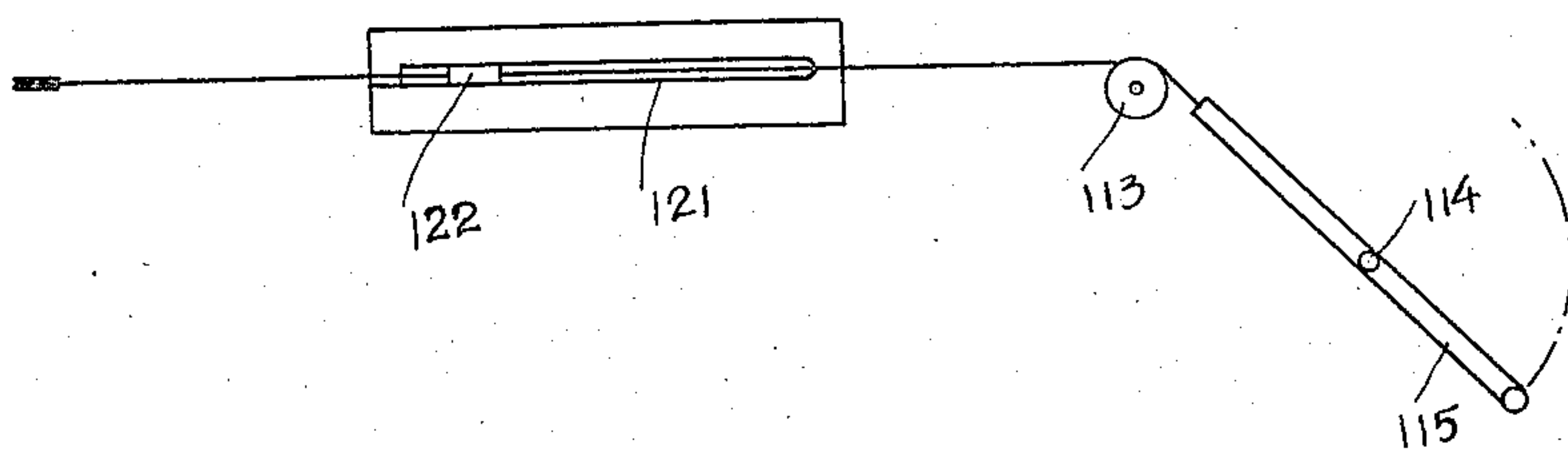


Fig. 9



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by attorney  
Mason & Leonard



Patented June 19, 1923.

1,459,407

# UNITED STATES PATENT OFFICE.

KARL EMIL LEONARD LIEDSTRAND, OF STOCKHOLM, SWEDEN.

MACHINE FOR EFFECTING SLOTS IN CARDS FOR STATISTIC OR SIMILAR PURPOSES.

Application filed July 16, 1919. Serial No. 311,390.

*To all whom it may concern:*

Be it known that I, KARL EMIL LEONARD LIEDSTRAND, a subject of the King of Sweden, residing at 9 Volmar Yxkullsgatan, Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Machines for Effecting Slots in cards for Statistic or Similar Purposes, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a machine for effecting slots in cards for statistic or similar purposes, for instance slots of the type stated in the U. S. Letters Patent Nos. 1,261,413, 1,334,957, and U. S. application, Serial No. 311,389, and is described in the following specification adapted for effecting such slots in the cards as are shown in Fig. 1 of the Letters Patent No. 1,334,957.

Fig. 1 in the accompanying drawings shows in a plan view and as an example a machine arranged in accordance with this invention. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 1; the carriage together with the dies being omitted. Figs. 4 and 5 show in a side view and a plan view respectively a carriage supporting the card. Figs. 6 and 7 show in a side view and a plan view respectively a movable die together with the matrix and means for moving the same. Figs. 8 and 9 show in a side view and a plan view respectively a further modification of the die and the matrix.

The machine has a carriage 1 consisting of a frame and movable on rollers 2, journaled in the frame work 3 of the machine. A frame 5 is pivoted at 4 to the said carriage and between the said frame and the carriage the card is mounted, in which slots are to be provided. The frame 5 is held in its dropped position by two catches 7, movable on the carriage and acted upon by springs 6 respectively. As the said catches are disengaged, which is effected automatically in the manner stated below, the frame 5 is swung upward to the position indicated by dotted lines in Fig. 4 by springs 8, fixed to the carriage and connected with the frame 5 in any suitable manner, so that the card may be taken out. The lower side of the bottom part of the carriage is provided with teeth meshing with toothed wheels 9 on a rotatable shaft 11 mounted in bearings 10, Fig. 2. The said shaft is provided with a pinion 12

meshing with a pinion 13 on a shaft 14, which at one of its ends has a clutch member 15, which is conical inside and slidable on the shaft but is caused to rotate with the same by a pin and slot connection 16. The said member 15 may be shifted by a lever arm 17, which is pivoted at 18 in such manner, that it is able to swing forwards and backwards and also laterally to a certain extent. The said lever arm has a ring shaped central part and engages by means of pins 19 a slotted ring 20 provided on the clutch member 15. The lever arm 17 is acted upon laterally (i. e. perpendicularly to the plane of the drawing) by a spring, not shown, which tends partly to normally keep the lever arm in engagement with a notch 21, provided in a rod 22, which is slidably mounted in the frame of the machine and provided with a handle or button, partly to move the part 15 toward the right, Fig. 2. By moving manually the said rod 22 toward the left the clutch member 15 is brought into engagement with a conical clutch member 23 provided on a shaft 24, which by means of gearings 25, 26, 27, 28 29 is rotated by a shaft 30, connected for instance with an electric motor (not shown), so that the said member 23 is rotated continuously while the machine is used. The clutch 15, 23 is normally in disengaged position.

As the carriage 1 is in the position shown in Fig. 3, the card is placed on the same and the frame 5 is dropped and locked. For moving the carriage 1 toward the left, Figs. 1 and 3, and placing the card under the device of the machine providing the cards with slots, a cord fixed to the carriage may be used, which cord passes round a roller and is provided with a weight, or a spiral spring may be used, which actuates a shaft, provided with toothed wheels, meshing with the teeth of the carriage, or any other suitable means may be used. The carriage 1 is held in the position shown in Fig. 3 by two catches 31, engaging projections 32\* provided on the carriage. The said catches 31 are disengaged by means of a rod 32, slidably mounted in the frame of the machine and actuated manually. On the rod 32 cam pieces 33 are provided, which, as the rod is moved in one direction, force the catches 31 out of engagement with the carriage. The latter is then moved toward the left, until two projections 34, provided on the carriage 1, strike a second carriage 35, slid-



ably mounted on the carriage 1. The said carriage 35 is provided on its top side with teeth, engaging toothed wheels 36 on a shaft 37 journaled in the frame of the machine.

5 On the shaft 37 an escapement wheel 38 is fixed, co-operating with a double pawl 39, 40, swingable on a pin 41. From the said pawl an arm 43 extends, which is acted upon by a spring 42 and by a link 44 is connected with

10 a lever 46 pivoted at 45. A manually actuated key plate 49 is fixed to arms 47 swingable on a shaft 48. One of the said arms 47 is connected with the lever 46 by means of a pin 50, so that, by depressing the key plate

15 49 the lever 46 is swung on the pin 45 and shifts the pawl 39, 40 against the action of the spring 42. In this manner the escapement wheel 38 is permitted to rotate one step in the direction indicated by the arrow,

20 actuated by the carriage 1 and the carriage 35. Consequently, each time the key plate 49 is depressed, the carriage 1 will be moved one step toward the left, Fig. 3 and Fig 1 viewed in the direction of the arrow, so that

25 the sections of the cards, which are to be provided with slots, may be brought successively into position below the dies respectively. Instead of the escapement shown in the drawings any escapement of known or

30 suitable construction may be used. As the card has been provided with the desired slots and the carriage together with the card is to be brought back to its starting position, the clutch 15, 23 is engaged by pushing the

35 rod 22 inwards. The toothed wheels 9 then at first move the carriage 1 alone toward the right, until two projections 51 provided on the same strike the carriage 35 and bring the same with themselves. The said carriages

40 are then moved simultaneously toward the right. As the carriages reach the position shown in Fig. 3, a projection on the carriage 1 strikes a two-armed lever 53, pivoted at

45 52, which is thus swung and moves the lever arm 17 out of engagement with the notch 21 of the rod 22, so that the lever arm 17, acted upon by its spring disengages the clutch member 15 from the member 23 and the carriages 1 and 35 are brought to a standstill.

50 Immediately before the carriages come to a standstill, two spring actuated pawls 52\* pivoted to the frame of the machine engage projections on the catches 7 and disengage the same, so that the frame 5 is swung upward by the springs 8 and the card may be

55 removed. In order that the pawl 39, 40, during the return movement of the carriages to the starting position, may not prevent the escapement wheel from rotating in a direction opposite to that indicated by the arrow,

60 the pawl 40 is pivoted to the pawl 39 and is held by a spring 54 against an abutment 55 provided on the same. The machine may, evidently, be so arranged, that the carriage

65 1 may be returned manually (by means of a hand lever or the like) to the position, in which the card is placed on the same.

For providing the cards with slots of the type shown in Fig. 1 of the Letters Patent No. 1,334,957, the machine is provided with 70 two sets of dies 56, 57, located in two rows and actuated by pairs. The pairs of dies extend from points having the same position in respect to an imaginary plane in the machine. The operative parts of the said dies 75 have different lengths, such that the total length of the dies two by two is unvariable. The cards may then be sorted by means of an apparatus fully described in the said Letters Patent. The dies consist of arms, 80 swingably mounted on shafts 58, 59 respectively fixed to end pieces 60 of a carriage 61, which is movable in guides provided in the frame of the machine. In Fig. 1 only the one set of dies is shown. In the 85 said end pieces 60 rods 62 are fixed, with which and the dies respectively springs 63 are connected, which hold the dies respectively in raised or inoperative position. The carriage 61 is provided with slots 64, one for 90 each die, so that the carriage forms the necessary matrix. The said carriage may be moved toward the left and toward the right, Fig. 1, viewed in the direction of the arrow

95 for placing the necessary pair of dies under a hammer described blow, which actuates the dies and causes the same to cut a pair of slots in the card. For the moving of the carriage 61 teeth 65 are provided on its lower side, which are engaged by toothed 100 segments 66, fixed to a shaft 67 journaled in the frame of the machine. To the said shaft a third toothed segment 68 is fixed, meshing with a toothed segment 69, pivoted at 70. An arm 71, provided with a handle 105 72, is jointed to the segment 69. Consequently by swinging the arm 71 the carriage 61 together with the dies is moved. In the fore part of the frame of the machine notches 73 are provided, into which the arm 110 71 may be placed for fixing the position of the same. At the said notches figures are provided, indicating which pair of dies is located under the hammer. By moving the carriage 61 any pair of dies may be located 115 under a hammer 74, which is fixed to a shaft 75, journaled in the frame of the machine and movable longitudinally. The said hammer is normally held in raised position by a spring (not shown). The hammer actuates 120 the dies of each pair simultaneously. The hammer is caused to operate by an eccentric 77 provided on a shaft 76 journaled in the frame of the machine. The said shaft 76 is rotated continuously by the shaft 30, which 125 by means of screw threads 78 engages a worm wheel 79 on the shaft. The hammer is normally located at the side of the eccentric 77, so that the latter does not actuate the hammer. In order to place the hammer 130



below the eccentric and, after the hammer has operated, automatically return the same to its position at the side of the eccentric, the machine is provided with a device, which  
5 now will be described.

From a shaft 80, journaled in the frame of the machine, two arms 81 extend which carry a key plate 82, adapted to be operated manually. As the said plate 82 is depressed,  
10 a lever arm 83 is actuated, which is pivoted at 84. The said lever arm 83 is by means of a link 85 connected with a bell crank 87, pivoted at 86 and by a pin and slot joint connected with a swingable arm 89 pivoted  
15 at 88. The said arm 89 is connected with a washer 91, slidably mounted on the shaft 75. Between the said washer 91 and a flange 92 on the shaft 75 a coil-spring 93 is located, which as the arm 89 and the washer are  
20 shifted by means of the key plate 82, is compressed to such a degree, that its tension is greater than the tension of a second coil-spring 94, provided on the shaft 75 and bearing against the frame of the machine  
25 and a flange 95 on the shaft 75. The arm 89 is held in shifted position by a catch 97, pivoted at 96, as shown in Figs. 1 and 3. As the tension of the spring 93 is increased, the spring moves the shaft 75 toward the left,  
30 so that the hammer 74 is forced against the right hand side of the eccentric 77, Fig. 1, and, as the eccentric arrives to its upper position, the shaft 75 together with the hammer 74 are moved for a further distance, so  
35 that the hammer is located right under the eccentric. The latter position of the hammer is fixed by a flange 77\* provided on the eccentric. The rotating eccentric forces the hammer against the pair of dies, which for  
40 the present is located under the eccentric so that the said dies effect two slots in the card. During the working stroke of the hammer an adjustable screw 98 in screw-threaded engagement with a finger 99 on the hammer  
45 strikes the rear arm of the catch 97 and forces the catch out of engagement with arm 89, which results in the tension of the spring 93 being decreased and the spring 94 forcing the shaft 75 and the hammer 74 toward  
50 the right, as soon as the eccentric arrives to its upper position. Consequently, the hammer is automatically returned to the position, in which it is out of the path of the eccentric and effects only one blow at a time.  
55 As the arm 71, by means of which the carriage 61 together with the dies is shifted, is depressed into the notches 73 respectively, it actuates the key-plate 82 by means of a pin 100 provided for instance on the handle 72,  
60 so that the tension of the spring 93 is increased in the manner described above without any special manipulation. The machine may be so arranged, that the arm 71 actuates also the key-plate 49 for the shifting of the  
65 carriage of the dies. The machine shown in

the drawings is provided with twelve pairs of dies. Preferably, the sections of the cards, to be provided with slots are numbered. In order to indicate, which section of the card is located under the eccentric 77,  
70 the escapement wheel 38 is connected with a shaft 106 by means of a gearing 102, 103, 104, 105, the said shaft 106 carrying a disc 107 provided with figures corresponding to the sections respectively and visible through  
75 an opening 108 in the casing 109 of the machine.

The machine may be modified in many respects without departing from the scope of the invention. For instance the card may be  
80 stationary and the hammer together with its actuating mechanism and the carriage supporting the dies may be provided on a second carriage, so that not only the dies may be located under the hammer as stated above  
85 but the dies together with the hammer and its actuating mechanism may be shifted with relation to the card, and the dies, which should operate, may be placed above the section of the card, in which slots are to be  
90 effected.

In Fig. 2 of the Letters Patent No. 1,334,957 slots are shown, the inner end of which coincide, so that each pair of slots forms a  
95 single slot. In order that the machine may be able to effect slots of the said type in the cards, it may be provided with a single die with a corresponding matrix, in which case a relative movement of the said die and  
100 the card and longitudinally of the die and thus in respect to an imaginary plane in the machine is effected so that the total length of the parts of the die located at opposite sides of the said plane in each position of the die  
105 relatively to the card is unvariable. Preferably, the die and the matrix are movable longitudinally, as shown in Figs. 6 and 7. In the said figures 110 designates the matrix. The said matrix is movable in a guide 111  
110 and is connected, for instance by means of a wire 112 of steel or metal, passing round a guide roller 113, with an arm 115, which is swingable round a pin 114 and corresponds to the arm 71, mentioned above. The  
115 said arm 115 may be shifted along a scale 116 provided on the frame of the machine. By swinging the arm 115 the matrix 110 is moved against the action of a weight 117, adapted to move the matrix in opposite direction. An arm 118 is pivoted to the  
120 matrix and carries the die 119. 74 is the hammer actuating the die. The actuating mechanism of the said hammer may be arranged in the same manner as stated above. By shifting the matrix and the hammer the  
125 slot may be provided in the desired part of the sections respectively of the card.

Also slots, which extend inward from two parallel lines and the total length of which is unvariable may be effected by means of a  
130



single die and a matrix belonging to the same, if the parts are arranged as shown in Figs. 8 and 9. Cards provided with such slots may be sorted by sticks or the like threaded through the same and moved toward one another. In the said figures the die 120 and the matrix 121 are stationary. In the matrix 121 a movable piece 122 is provided, which divides the matrix into two parts. The die 120 consists of a plurality of laminae (eight in the shown example), which preferably have the same size and are movable toward and from the matrix in suitable guides (not shown). The said laminae are held in the normal position shown in Fig. 8 by springs (not shown) or the like. Above the die a rod 123 is movably mounted, which extends along the die and besides is movable toward and from the same. The said rod 123 may be brought by the hammer 74 to actuate the die. In the said rod 123 a notch 124 is provided, which is located right above the piece 122 and is somewhat longer than the laminae respectively. The piece 122 and the rod 123 may be moved for instance in the same manner as the matrix 110 and the die 119 in Figs. 6 and 7 and brought on a line with any one of the laminae of the die 120. As the rod 123 is forced against the die 120 by the hammer 74, one of the laminae is inactive viz. the lamina which is located right below the notch 124. Consequently, if the piece 122 and the rod 123 have the position shown in Fig. 8, two slots are effected in the card, as the hammer 74 is lowered. The length of one of the said slots corresponds to the length of the lamina, while the length of the other slot corresponds to the total length of six laminae. If the piece 122 and the rod 123 are moved into another position, slots are provided having another length. In each case, however, the total length of the slots is unvariable. Instead of the rod 123 and the piece 122 being movable, they may be stationary in which case the die and the matrix together with the card are movable.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention; and hence I do not intend to be limited to the details herein shown and described, except as they may be included in the claims.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine for slotting cards for statistical or similar purposes, a plurality of pairs of dies of different lengths, the dies of the said pairs extending from points with the same position in respect to an imaginary plane in the machine and the total effective length of the dies by pairs being unvariable, and means for actuating the dies.

2. In a machine for slotting cards for statistical or similar purposes, a carrier for the cards, means for moving the carrier, a plurality of pairs of dies of different lengths, the dies of the said pairs extending from points with the same position in respect to an imaginary plane in the machine and the total effective length of the dies by pairs being unvariable, and means for actuating the dies.

3. In a machine for slotting cards, a carrier for the cards, means actuating said carrier in one direction, a plurality of pairs of dies of different lengths, the dies of the said pairs extending from points with the same position in respect to an imaginary plane in the machine and the total effective length of the dies by pairs being unvariable, a rack slidably mounted on said carrier, a manually actuated escapement mechanism meshing with the said rack, and abutments provided on the carrier at each end of the rack and so located that the carrier may be moved part way toward a position in which the card may be mounted on the carrier and removed from the same before the rack is engaged, and then be moved all the way to said named position while the rack and escapement mechanism remain in engagement.

4. In a machine for slotting cards for statistical or similar purposes, a support for the cards, a plurality of pairs of dies, the dies of the said pairs extending from points with the same position in respect to an imaginary plane in the machine and the total effective length of the dies by pairs being unvariable, a carrier for the said dies, a hammer, an eccentric for actuating said hammer, means for rotating said eccentric, and means for moving said carrier and placing the dies under the hammer.

5. In a machine for slotting cards for statistical or similar purposes, a support for the cards, a plurality of pairs of dies, the said pairs extending from points with the same position in respect to an imaginary plane in the machine and the total length of the dies by pairs being unvariable, a carrier for said dies, an eccentric, means for moving the carrier and placing the dies under the eccentric, means for rotating the eccentric, a hammer for actuating the dies normally located at the side of the eccentric, said hammer being movable laterally, a spring for actuating the hammer in a lateral direction, a second spring for actuating the hammer in the opposite direction, means for increasing the tension of the first named spring in order to force the hammer toward the side of the eccentric so that the hammer will be under the eccentric when the latter is in its upper position and may be operated thereby, a device for maintaining the increased tension of the first named spring until the eccentric has actuated the ham-



mer, and means for disengaging said last named device so that the second spring may return the hammer to its normal position.

6. In a machine for slotting cards for statistical or similar purposes, a carrier for the cards, a plurality of pairs of dies, the said pairs extending from points with the same position in respect to an imaginary plane in the machine and the total effective length of the dies by pairs being unvariable, a carrier for said dies, an arm adapted to be swung horizontally and vertically, motion transmitting mechanism between the said arm and the carrier for the dies, means for actuating the card carrier in one direction, an escapement mechanism cooperating with the card carrier, a key plate for actuating said escapement mechanism, an eccentric, means for rotating the said eccentric, a hammer adapted to actuate the dies and normally located at the side of the eccentric, said hammer being movable laterally, means for placing the hammer under the eccentric when the latter is in its upper position, and a key plate for bringing the last named means into operation, said key plate being arranged to be actuated by the said arm when it is depressed.

7. In a machine for slotting cards for statistical or similar purposes, a longitudinally

movable die divided transversely into laminae, a matrix cooperating with the said die, an element mounted in said matrix, the size of the said element corresponding to the size of a lamina, and a rod adapted to actuate the die and movable as a hammer, said rod being provided with a notch in its side facing the die having substantially the same length as the said element, whereby relative movement of the rod and element and the die together with the matrix and card, will cause the rod to cooperate with different laminae.

8. In a machine for slotting cards for statistical or similar purposes a die, means for changing the position of the said die and the card relatively to one another longitudinally of the die and thus in respect to an imaginary plane in the machine, so that the total length of the parts of the die on opposite sides of the said plane in each position of the die relatively to the card is unvariable, and means for actuating the die.

In testimony whereof I have affixed my signature in presence of two witnesses.

KARL EMIL LEONARD LIEDSTRAND.

Witnesses:

ROBERT APELGREN,  
CHARLES H. SAFELY.