

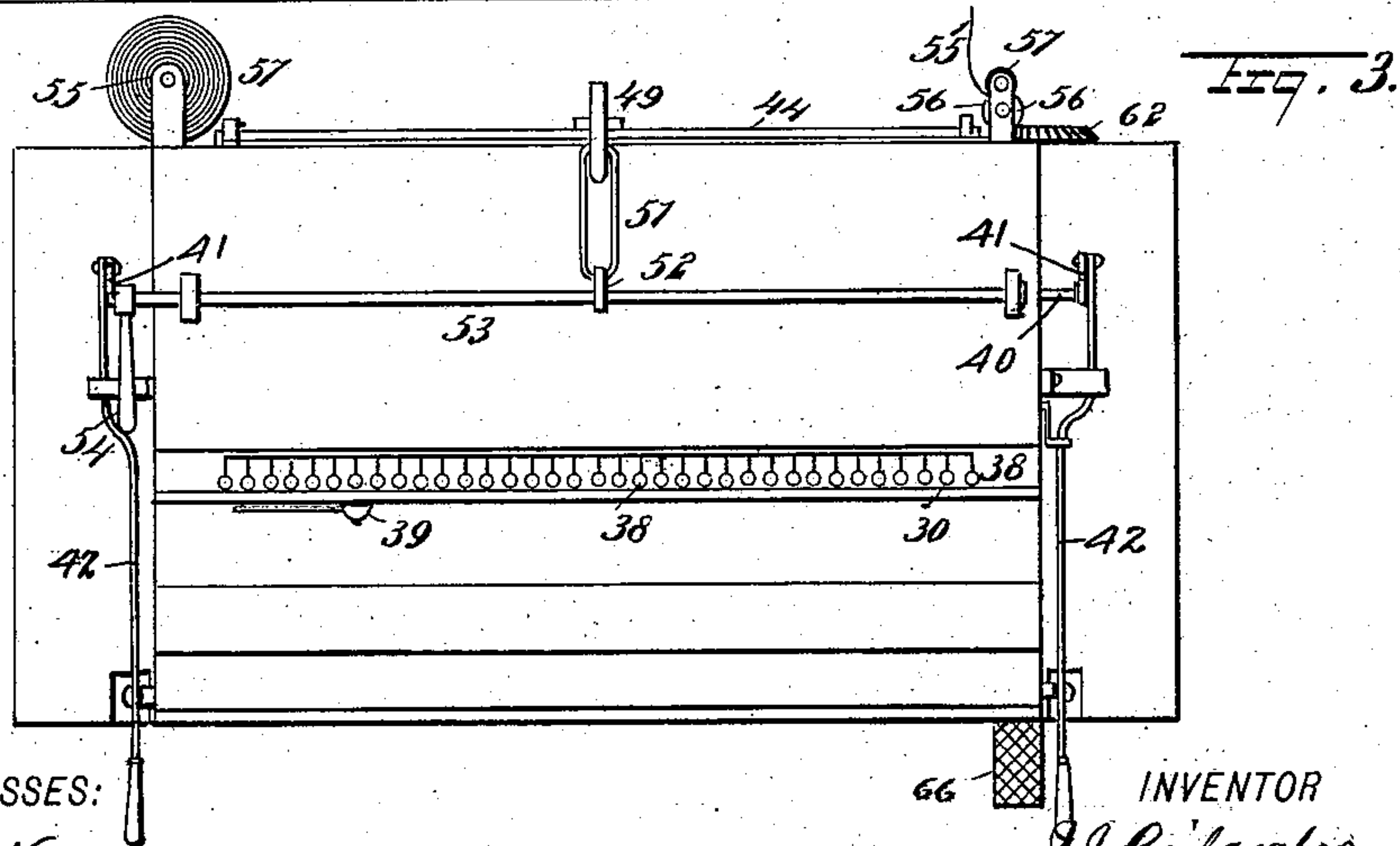
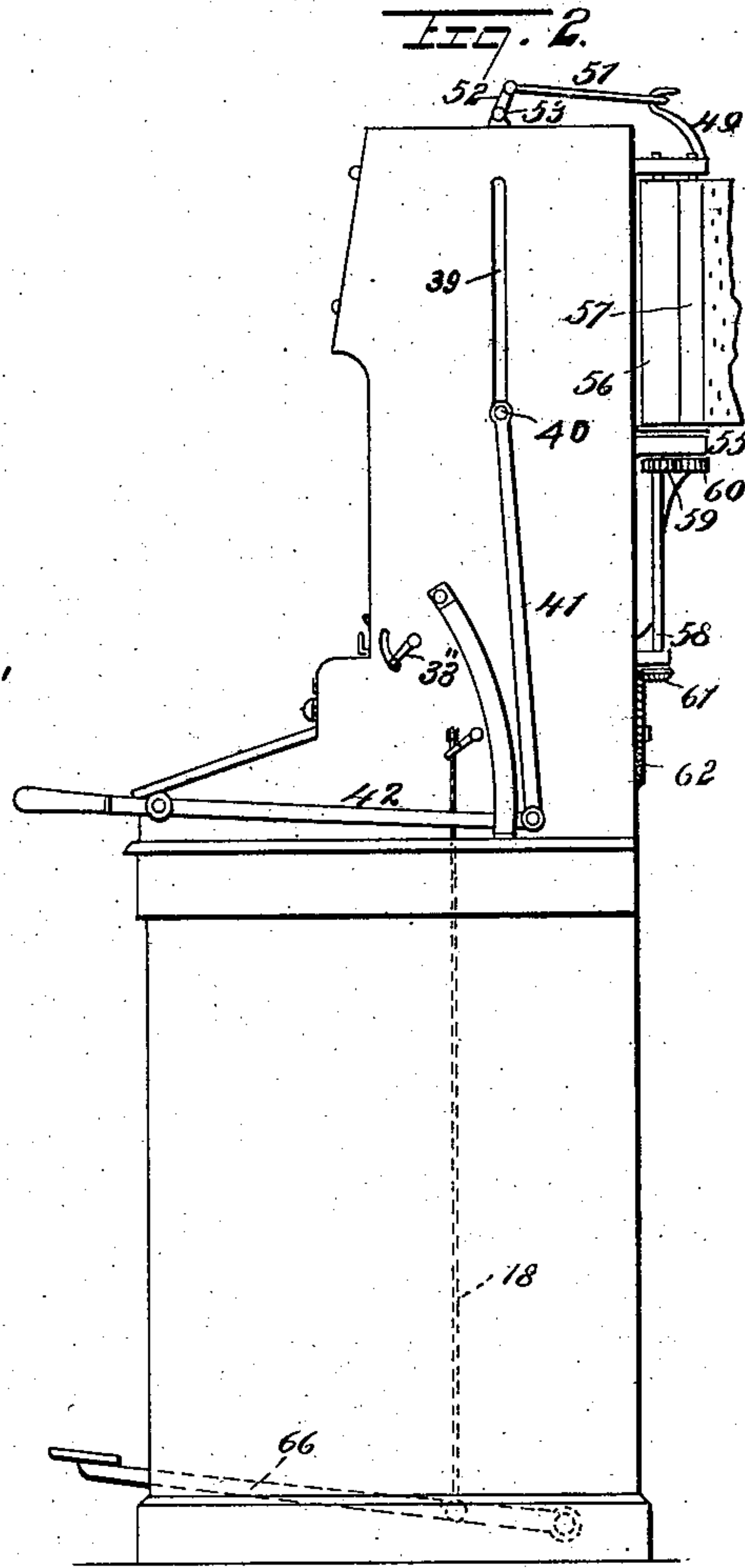
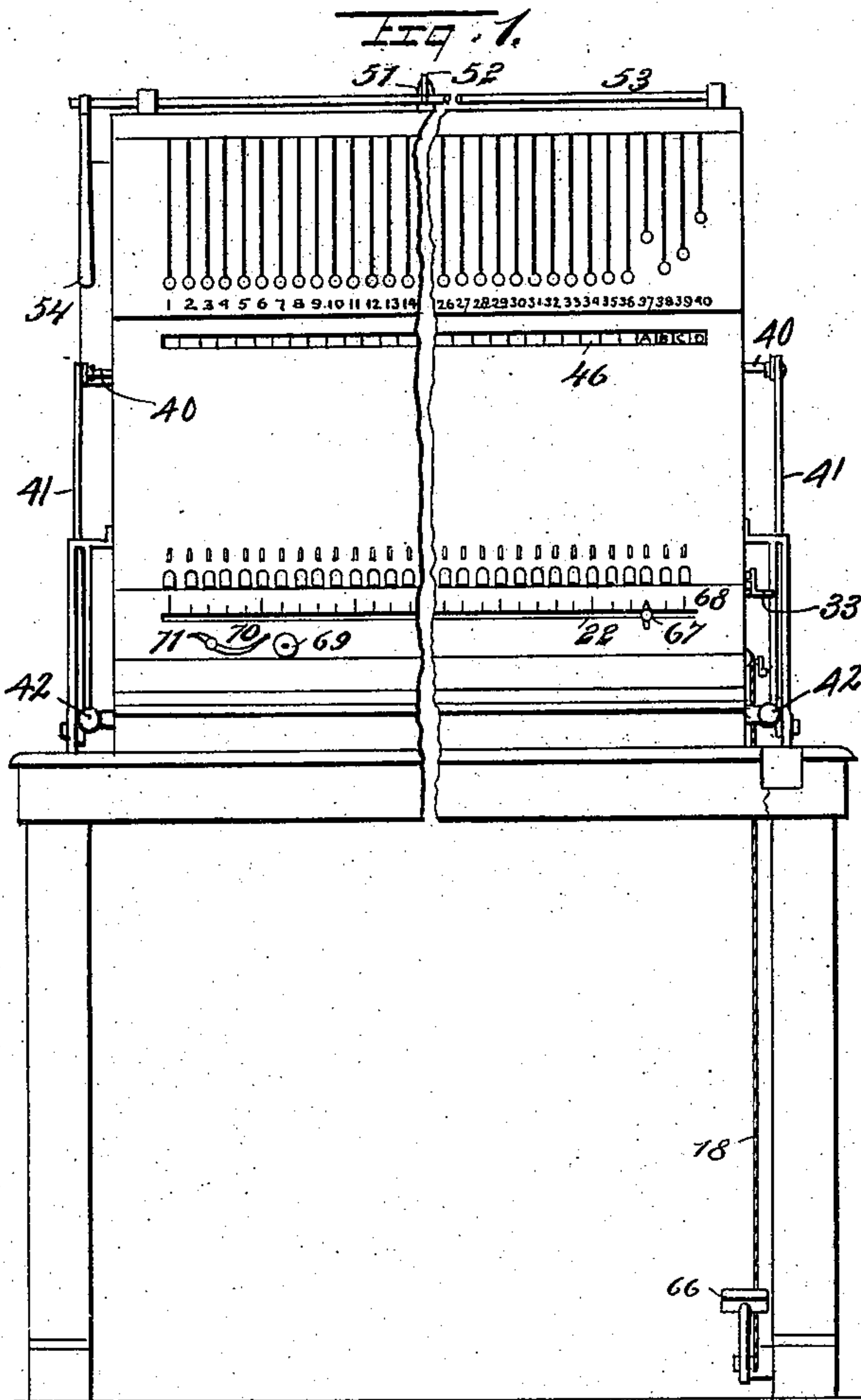
(No Model.)

4 Sheets—Sheet 1.

J. J. REIFGRABER.
PERFORATING MACHINE.

No. 564,100.

Patented July 14, 1896.



WITNESSES:

H. Walker
G. M. Hopkins,

INVENTOR

J. J. Reifgraber
BY

Munn & Co.
ATTORNEYS.

(No Model.)

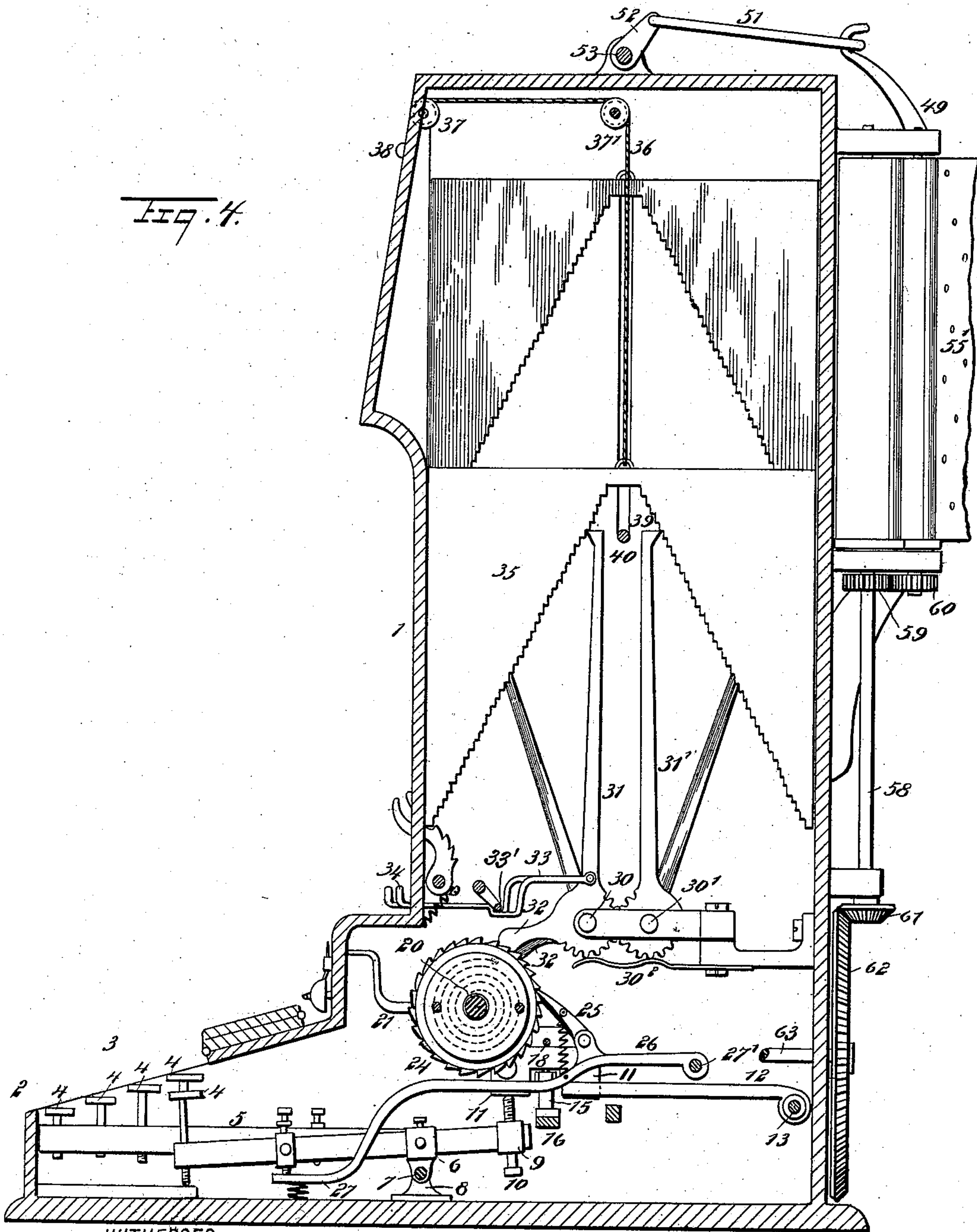
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Fig. 4.



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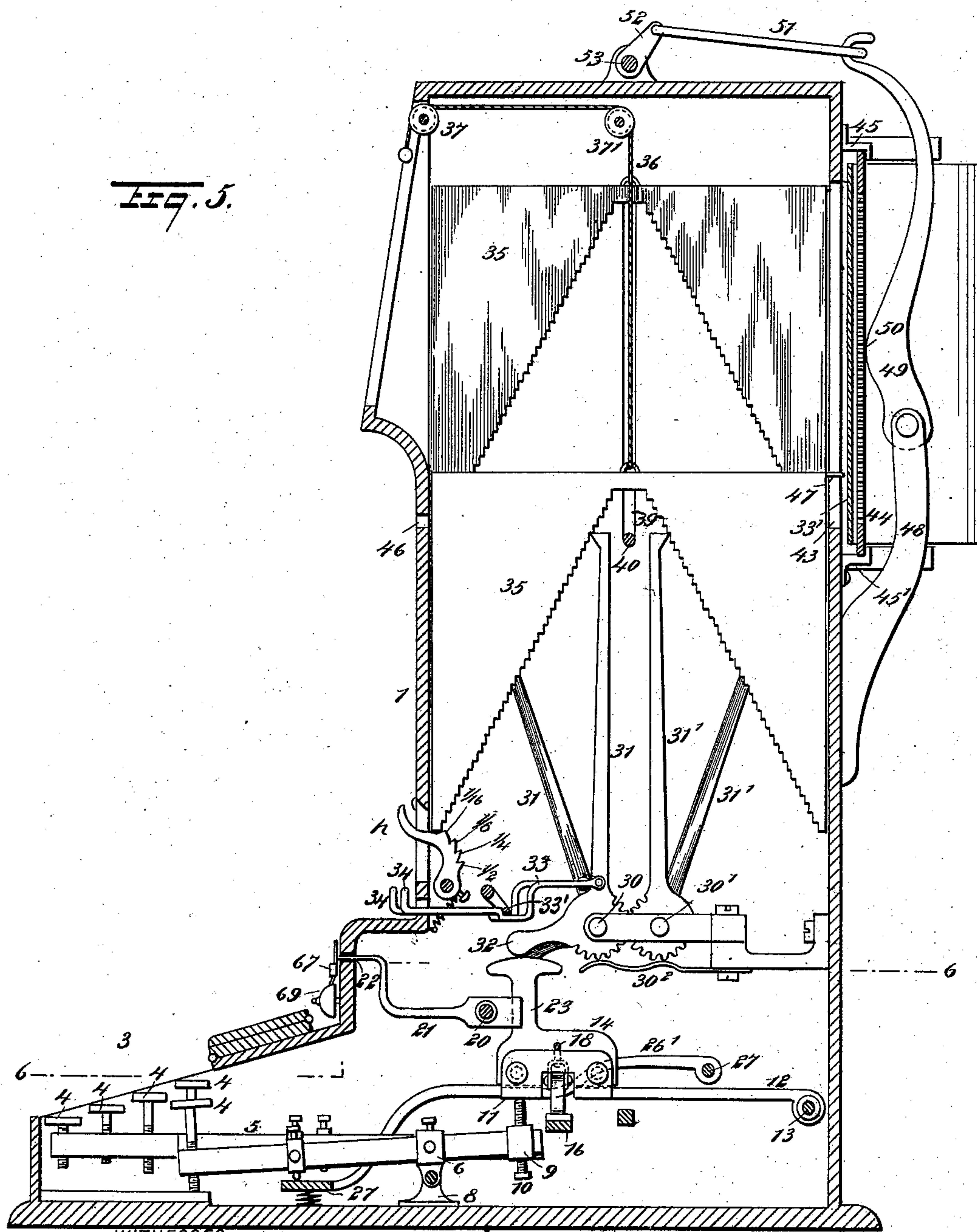
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Fig. 5.



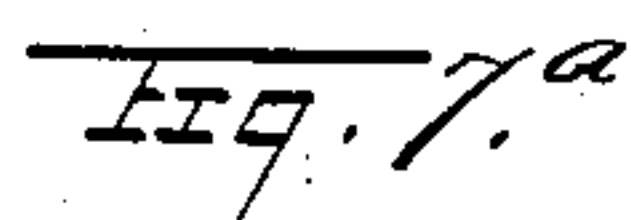
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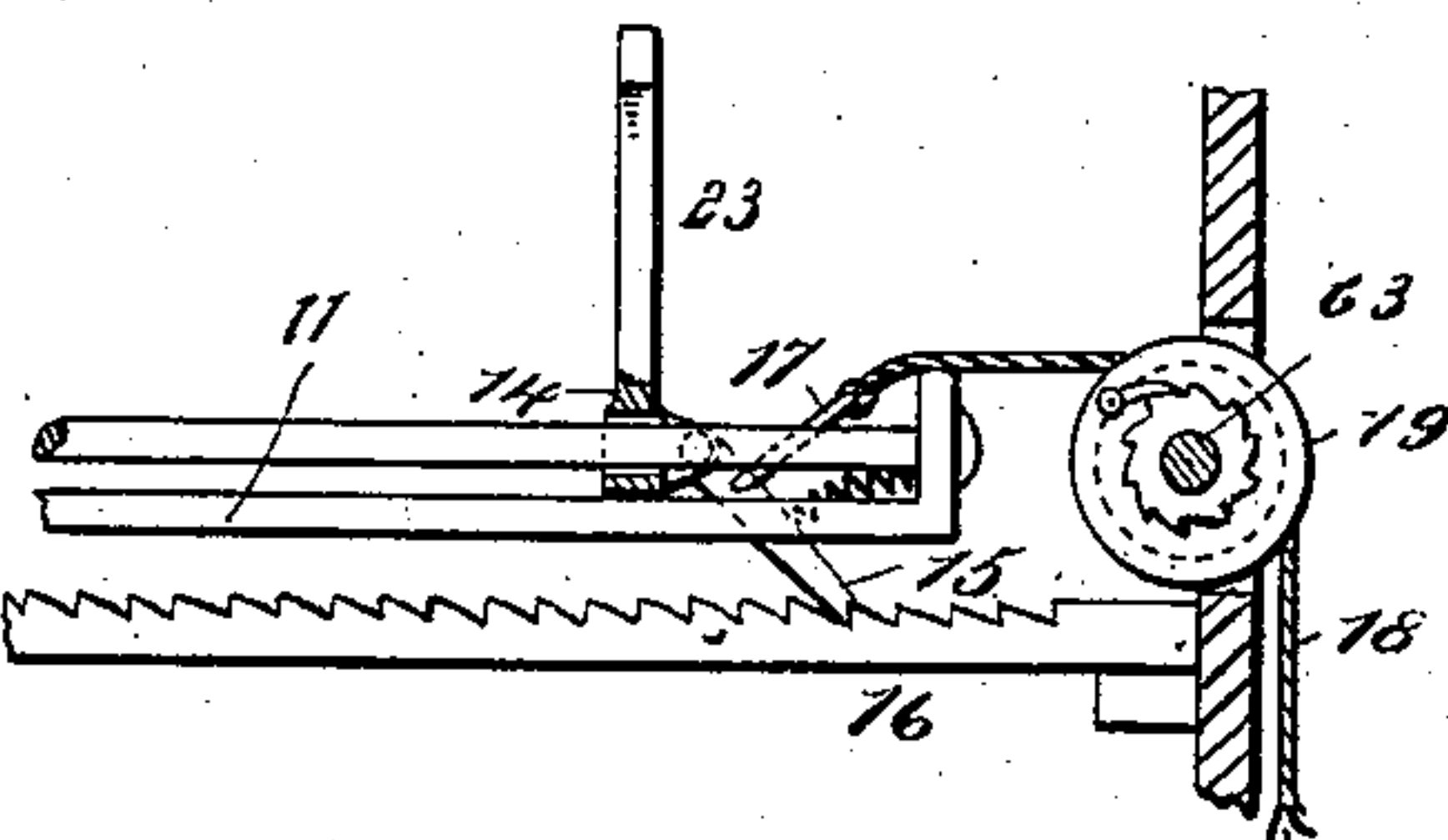
4 Sheets—Sheet 4.

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UNITED STATES PATENT OFFICE.

JOSEPH JOACHIM REIFGRABER, OF ST. LOUIS, MISSOURI.

PERFORATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 564,100, dated July 14, 1896.

Application filed April 25, 1895. Serial No. 547,161. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH JOACHIM REIFGRABER, of St. Louis, Missouri, have invented a new and Improved Perforating-Machine, of which the following is a full, clear, and exact description.

The object of my invention is to construct an apparatus by means of which a strip of paper or other non-conducting material is properly perforated to represent printing-characters to be electrically transmitted to one or more distant stations by a special transmitter, and there to be received by a special receiving mechanism in type-written Roman characters or figures, or said characters or figures may be impressed in a strip of fiber or other suitable material from which stereotype or other printing may be cast, arranged in columns, and printed like other matter, or said characters may be received on a strip of paper in type-written print and at the same time on another strip in perforations.

A further object is to compose by means of the machine and perforate into a transmitting-strip "solid" or "display" matter, having the same appearance as hand-work in type-setting, to make long or short lines, and to justify and correct every line before it is perforated into the transmitting-strip.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the perforating-machine with parts broken away. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view. Fig. 4 is an enlarged transverse section on the line 4 4 in Fig. 6, showing the internal construction of the originator. Fig. 5 is a vertical transverse section on the line 5 5 in Fig. 6. Fig. 6 is a horizontal section taken on line 6 6 in Fig. 5. Fig. 7 is a side elevation, partly in section, of the movable slide and pawl-and-ratchet mechanism for operating the same. Fig. 7^a is a transverse section of the sleeve and the ratchet-wheel.

The casing 1 is provided with a broad base and a desk-like extension 2 in front, having a folding top and containing a keyboard 3. The keys 4, representing the different char-

acters to be transmitted, are attached to key-levers 5, passing through slides 6, pivoted on the rod 7, the rod being supported by ears 8, attached to the bottom of the casing. The inner ends of the key-levers are provided with mortised blocks 9, carrying set-screws 10, having their upper ends rounded. Upon the set-screws 10 rests a bar 11, which is attached to arms 12, pivoted on a rod 13, extending across the casing. The bar 11 is slotted throughout its entire length and forms a guide for a slide 14. The slide 14 carries a pawl 15, which engages a ratchet-bar 16, supported in a fixed position in the casing 1. The pawl 15 is pressed into engagement with the ratchet-bar by means of a spiral spring, and to the pawl is connected a looped arm 17, one end of which is attached to a cord 18, the other end of which extends to an opening in the side of the casing and over a pulley 19, placed loosely on the shaft 63, journaled in the casing between the collar *a* and the ratchet-wheel *b*, fixed to the shaft 63. The pulley 19 carries a pawl which engages the ratchet-wheel *b*. The cord 18 is wrapped once or twice around the pulley to insure a good frictional contact with the pulley. The outer end of the cord is attached to the foot-lever 66.

In the casing, above the bar 11, is journaled a screw 20, upon which is placed an index 21, which is offset at its outer end and extends through a slot 22 in the front of the casing. The screw 20 is provided with a ratchet-wheel 24, which is operated by a pawl 25, carried by an arm 26 of the space-bar 27. The pawl 25 is kept in engagement with the ratchet-wheel 24 by a spiral spring attached to the pawl and to the arm 26. The space-bar 27 is provided at one end with the arm 26 and at the other end with the arm 26', the said arm being pivoted on a rod 27', extending lengthwise through the casing. The bar 27 is pressed upwardly by a spiral spring which rests upon the bottom of the casing 1. The pivot of the pawl 25 is extended through the casing and provided with a thumb-piece 28. Upon the end of the screw 20, between the ratchet-wheel 24 and the end of the casing, is placed a spiral spring 29, which turns the screw in the reverse direction after the ratchet-wheel 24 is released by the removal of the pawl 25 by means of the thumb-piece

28, thus returning the index 21 to the point of starting.

On rods 30 30', supported in a fixed position in the casing parallel with the bar 11, are placed arms 31 31', which are connected mechanically at one pivoted end by segmental gearing formed integrally with the arms, and each arm 31 is furnished with a finger 32, which is capable of being engaged by the upward extension of the slide 14 when the said slide is moved underneath one of the arms in the manner presently to be described. Each arm 31 is provided with a rod 33, which is bent downwardly and offset, and which extends through the front of the casing, where it is provided with a finger-piece 34.

There are as many keys and key-levers as there are characters to be transmitted, and the apparatus is provided with the same number of pairs of levers 31 31', and in the casing 1 are formed guides for receiving weights 35, there being one or more weights for each character. The said weight consists of a rectangular plate of metal with a V-shaped notch cut therein, the edges of the plate along the sides of the notch being provided with smaller notches for receiving the ends of the arms 31 31', there being one notch at each side of the weight for each character, and each weight has engraved or impressed on its front edge all the characters that can be made by the machine. To the top of each weight 35 is attached a cord 36, which runs over pulleys 37 37' and is attached to a small weight 38 outside of the casing 1. In each end of the casing 1 is formed a slot 39 for receiving a bar 40, which extends through the casing lengthwise and is connected by links 41 with levers 42 at the ends of the casing. The said bar 40 passes through the notches of the weights 35 and is used for lifting all of the said weights simultaneously.

In the rear of the casing 1 is formed an oblong opening 43, opposite which on the outside of the casing is supported a perforated plate 44 by brackets 45 45', the perforations of the plate 44 being arranged in vertical rows, each row having as many perforations as there are characters to be represented. The characters are all impressed upon the front edge of each weight 35, and are visible through the slot 46. In the front of the perforated plate 44 at the top of the weight is carried a punch 47, which is fitted to apertures of the plate 44. To the back of the casing 1 is secured an arm 48, to which is pivoted a lever 49, which is curved near its fulcrum, forming a bearing 50 for engagement with the plate 44, and the lever 49 is provided with a hook for receiving the link 51, which is pivotally connected with an arm 52 on a rock-shaft 53, journaled in bearings on the top of the casing. One end of the rock-shaft 53 is furnished with a hand-lever 54, by means of which it may be operated.

In the brackets 45 at one end of the casing is journaled a roller 55, upon which is wound

a strip of paper 55', which extends across the face of the plate 44, then around the roller 56, against which it is pressed by a roller 57. The rollers 56 57 are journaled in brackets 45 45' at the opposite side of the casing. The shaft 58 of the roller 56 is prolonged downward and provided with a spur-wheel 59, which engages a spur-wheel 60 on the shaft of the roller 56, thus connecting the rollers so that they will revolve with a positive movement. The lower end of the shaft 58 is provided with a bevel-pinion 61, which is engaged by a bevel-wheel 62, secured to a shaft 63, extending transversely in the casing 1. The shaft 63 is furnished with the ratchet 64, as already described, which is engaged by a pawl pivoted to the pulley 19, so that when the pedal 66 is depressed not only is the pawl disengaged from the ratchet-bar 16, but the shaft 63 is turned, thereby moving the paper strip 55' through the mechanism already described.

The arm 21, which extends through the slot 22 in the front of the casing, carries an index 67, which slides in front of a scale 68 on the front of the casing above the slot 22. To the front of the casing is attached a bell 69, and a hammer 70, pivoted to the front of the casing, is capable of striking the bell. The hammer-arm is provided with a finger 71, which is capable of being struck by the index 67 as it passes the bell-hammer, thus indicating the completion of a line.

To regulate and insure the proper stoppage of the weights 35 at the proper notch and character by the key producing the character, the set-screw 10 is provided on the inner end of the key-lever 5. The said set-screw is adjusted so that when the key of the character engraved or represented at the lower end of the weight 35 is depressed it will lift the bar 11 with the slide 14 only enough to move the bars 31 31' far enough to allow the weight 35 to drop one notch. The set-screw 10 on the key-lever 5, representing the uppermost character engraved on the weight 35, is screwed in completely, so as to lift the bar 11 with the slide 14 high enough to press up the finger 32 of the arms 31 31' sufficiently to bring the tops of said arms completely together, and dropping the weight 35, so that it will rest on the space-increasing lever 7. In this manner every key is adjusted to its character on the weight 35. The spring 30² holds the arms 31 and 31' in the position in which they are placed.

To enable any one to mechanically justify a line or make any desired length of line, it is necessary to divide the letters or characters into units. I have divided the characters used in my machine into ems, half-ems, one-quarter ems, one-eighth ems, and one-sixteenth ems, one whole em representing the largest character, requiring the most space, one-sixteenth of an em representing the smallest character, requiring the smallest space, used for justifying only. There are therefore

five different sizes of spaces and characters. To use the five different spaces in justifying, there are provided two space-keys and a space increasing or decreasing lever *h*. One space-key gives the largest space, the other space-key gives a space of one-sixteenth of an em, and I have provided a space-increasing lever *h* for every weight 35.

The operator, for example, starts a line with a full em-space, and then composes four words, between which he places one of the smallest spaces, (one-sixteenth.) The bell rings, and by investigation he finds that the line is not quite full, and to justify it he must place in it one-half em or eight one-sixteenth spaces. The word, however, which is next to be composed will not go in the line, nor can it be divided, therefore the line must be justified by introducing spaces. The compositor or operator will then have to add eight more one-sixteenth spaces, when the line will be justified. The spaces are added in the following manner: The five uppermost notches in every weight 35 represent the five different sizes of spaces, as before stated. The sixteenth-space key drops the weight 35, so that it rests on the space-increasing lever *h*, thereby giving a sixteenth space. The uppermost notch of the said space-increasing lever represents a space of one-eighth, the next below represents a space of one-fourth, while the last notch of the said lever represents the space of one-half em. To add to the sixteen spaces already in the line to be justified, the operator pulls out the first tow of the space-increasing levers, to drop the weights 35 to the notch representing the one-quarter space, the two others to a notch representing one-eighth space, thereby adding eight sixteenth spaces to the first four, making a total of twelve sixteenth spaces, and the line is justified.

Should the operator discover an error in one of the characters in the line thus composed and justified, he can change any character individually by pushing or pulling the rod 34, hinged to the arm 31, and at the same time lowering or lifting the weight 35 by the small weight on the outer end of the cord 36 at the outside of the casing. When a line is thus composed, corrected, and justified, the operator reaches with his left hand for the lever 54, by means of which he causes the plate 44 to move forward and form all of the perforations at one movement. By pressing down the levers 42 all the weights 35 are lifted simultaneously to the place of starting. On the upward movement of the levers 42 the pawl 25 must be disengaged from the ratchet-wheel 24 by lifting the finger-piece 28 of the pawl to allow the screw 20 to move backward. During their upward movement one of the levers 42 will engage and rock an arm 33', extending from a shaft journaled in the casing, and to which is attached a cross-bar 33', engaging with the rods 33, pivoted to the arms 31, thereby spreading said arms to their ex-

treme outward position to hold all the weights at their starting position. When the levers 42 move down, the pawl 25 must be again engaged with the ratchet-wheel 24. At the same time the operator presses down the levers 42 the right foot of the operator presses down the foot-lever 66, thereby returning the slide 14 and index 21 to their original position, also moving the transmitting-strip 55' forward for another line, when the machine is ready for a repetition of the same operation.

My device is a machine which enables the operator to form any word or any arrangement of figures or characters, and also enables the operator to produce long or short lines, and to space, justify, or correct errors, as may be required, and should mistakes occur only the one line of stereotype containing the error will have to be thrown out.

The operation of the machine is as follows: A strip 55' of paper having been placed in front of the perforated plate 44 in the machine in the manner described, the key representing the character to be printed is depressed and the upward projection 23 of the slide 14 is thereby raised, tilting the arms 31, thus releasing the weight 35, allowing it to drop until a pair of teeth on the inclined inner edges of the weight are engaged by the arms 31 31', and on releasing the key the rising of the lever 26 causes the pawl 25 to engage the ratchet 24 and turn the screw 20, so as to move forward the index 21. The arms 31 31' as they are brought into position are held by a spring 30'. When the bar 11 is lifted up by any of the keys, the T-shaped upright slide 14 and the pawl 15 are lifted. The pawl 15, being pressed by the spiral spring, will engage a tooth of the rack-bar 11 as soon as the pawl is pressed down, and the slide 14 and pawl 15 will drop again by their own weight. The pawl 15, when pressed down by the spiral spring, will engage the next tooth of the ratchet-bar on the left and will push the slide 14 one step farther to the left. In this manner the slide will be carried forward, step by step, whenever a key is depressed. The teeth on the ratchet-bar 16 are of a suitable size to move the slide 14 through the distance required to carry it from one finger 32 of the rod 31 to the next. The cord 18, fastened to the eye 17 of the pawl 15, will be drawn forward by the moving of the slide 14, so as to lift the foot-lever 66. When a line is full, the depression of the foot-lever 66 will lift the pawl 15 and pull back the slide 14, at the same time turning the shaft 63 by the engagement of the cord 18 with the pulley 19 on the said shaft. This operation moves the paper strip 55' to the right through a space equivalent to the length of a line. The slide 14 moves independently of the index 21 as it goes forward in the operation of setting, but when the said slide 14 is returned to the point of starting it carries with it the index 21, and it may turn the screw 20 in a reverse direction, or the said screw can be turned by the

spiral spring in the drum 24, as already described. The key representing the second character to be formed is depressed and the operation is repeated, and this occurs throughout the entire series, or until a line or the required portion of a line is represented by the letters showing through the slot 46 in the face of the machine. When the line is complete, the perforated plate 44 is carried forward against the punches 47, carried by the weights 35, thus making perforations in the paper which represent a character. After the paper is withdrawn from the punches it is moved forward a space representing one line by pressure of the foot upon the pedal 66, which revolves the shaft 63 and thereby causes the shaft 58 to rotate, thus revolving the rollers 56 57, which are connected with the shaft 58, when the operation just described is repeated.

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

1. A perforating-machine, for perforating a transmitting-strip, comprising a casing, a series of notched weights having characters impressed upon their front edges and provided with punches, means for releasing the notched weights and arresting them in their downward movement in a position corresponding to the character to be represented, a perforated plate, and means for bringing the perforated plate into engagement with the punches after they are arranged in positions representing the characters for a line or a part of a line of type, substantially as specified.

2. In a perforating-machine, the combination, with sliding weights provided with a V-shaped opening in the lower part and having notches along the sides of the opening, of arms for engaging the notched edges of the weights, a slide provided with an upward projection for operating the arms, keys for raising the slide in its successive positions and thus operating the arms in succession, a ratchet-bar, and a pawl pivoted to the slide and adapted to move the slide one space for each movement of a key, as herein specified.

3. In a perforating-machine, the combination with sliding weights, key-levers and arms for engaging the weights of the index, the screw, and pawl-and-ratchet mechanism for

operating the same, the slide 14, the pawl-and-ratchet mechanism for moving the slide, and a cord and pedal-lever for returning the slide and index to the point of starting, substantially as specified.

4. In a perforating-machine, the combination of a perforated plate, a series of punches capable of entering the perforations of the plate, vertically-movable weights carrying the punches, means for moving the weights and punches to bring the punches into positions to represent letters or characters, means for supporting a strip of paper passing between the perforated plate and the punches, and means for moving forward the strip of paper after the completion of each line, substantially as specified.

5. In a perforating-machine, the combination with a series of weights, carrying punches of a weight-lifting rod, and a lever for operating the same to simultaneously raise all the weights, substantially as specified.

6. In a perforating-machine, the combination with a slotted bar in the casing, a slide mounted on said slotted bar, a pawl pivoted to the slide, a fixed ratchet-bar with which said pawl is adapted to engage, a cord attached to the pawl whereby it may be released from the ratchet-bar to return the slide to its starting-point, the weights, and weight-releasing mechanism operated by said slide, substantially as specified.

7. In a perforating-machine, the combination with the punch-carrying weights, of cords and handles for lifting the weights separately, substantially as specified.

8. The combination, with the weights carrying the punches, and having the characters impressed on their front edges, of notched justifying and spacing levers, one to each weight, substantially as specified.

9. The combination, with the weight-holding and weight-releasing levers, of rods for releasing any pair of weight-holding levers independent of the key-operated mechanism, and punches carried by the weights, as herein specified.

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Witnesses:

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JACOB HANDELMAN.