

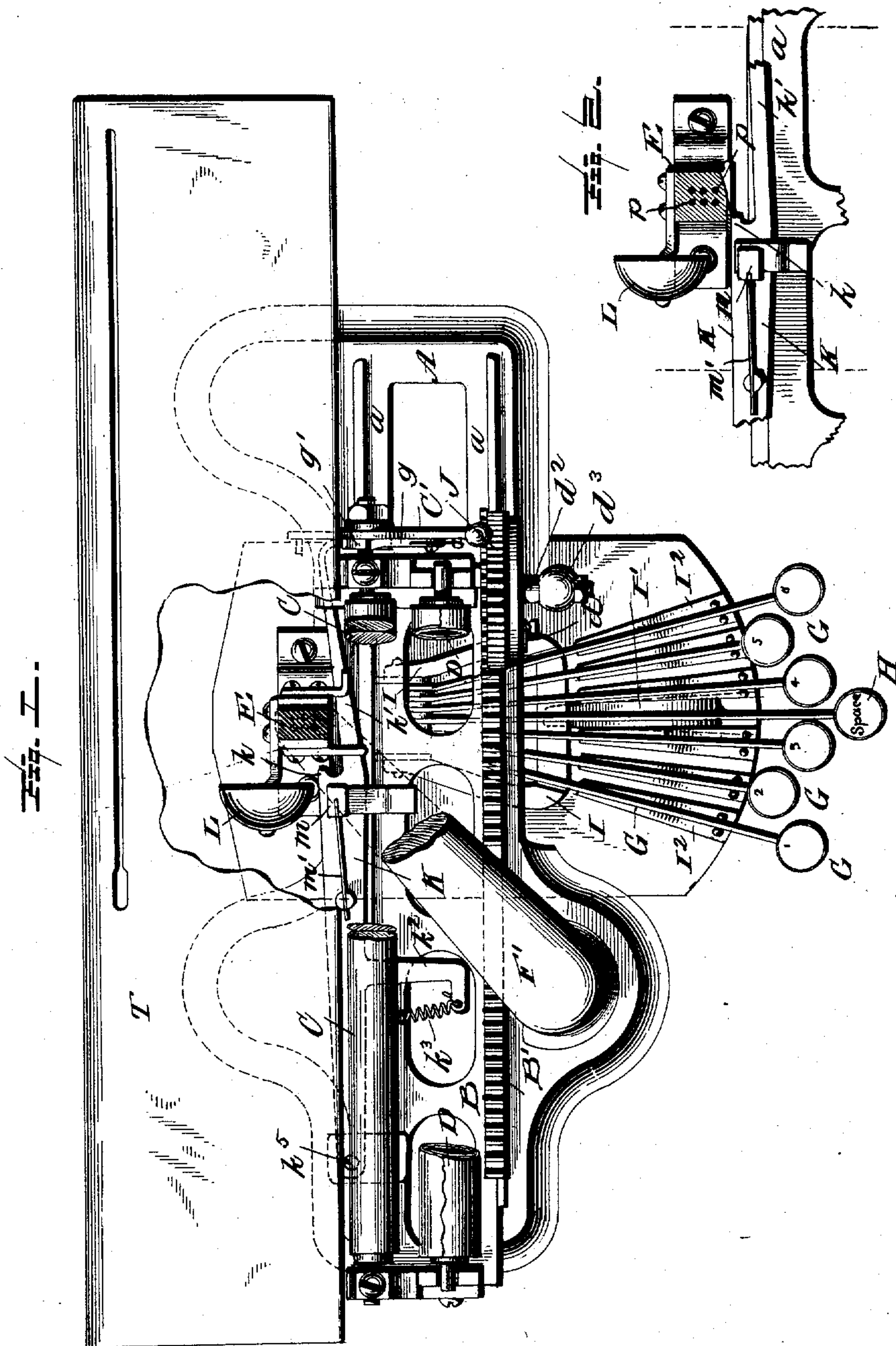
(No Model.)

3 Sheets—Sheet 1.

T. C. ORNDORFF.  
EMBOSSING MACHINE.

No. 477,062.

Patented June 14, 1892.



Witnesses

*L. C. Hills*  
*Ewellasick*

Inventor

*Thomas C. Orndorff*  
*by Marcus Bailey*  
his Attorney

(No Model.)

3 Sheets—Sheet 2.

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Fig. 3.

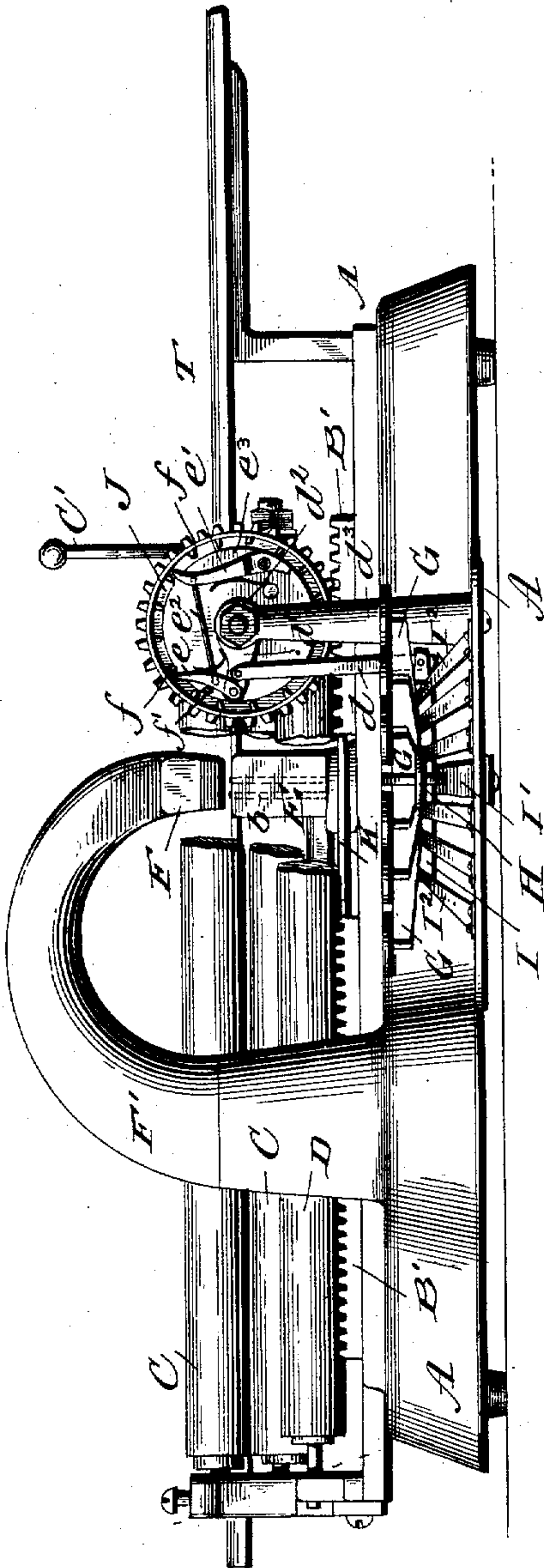
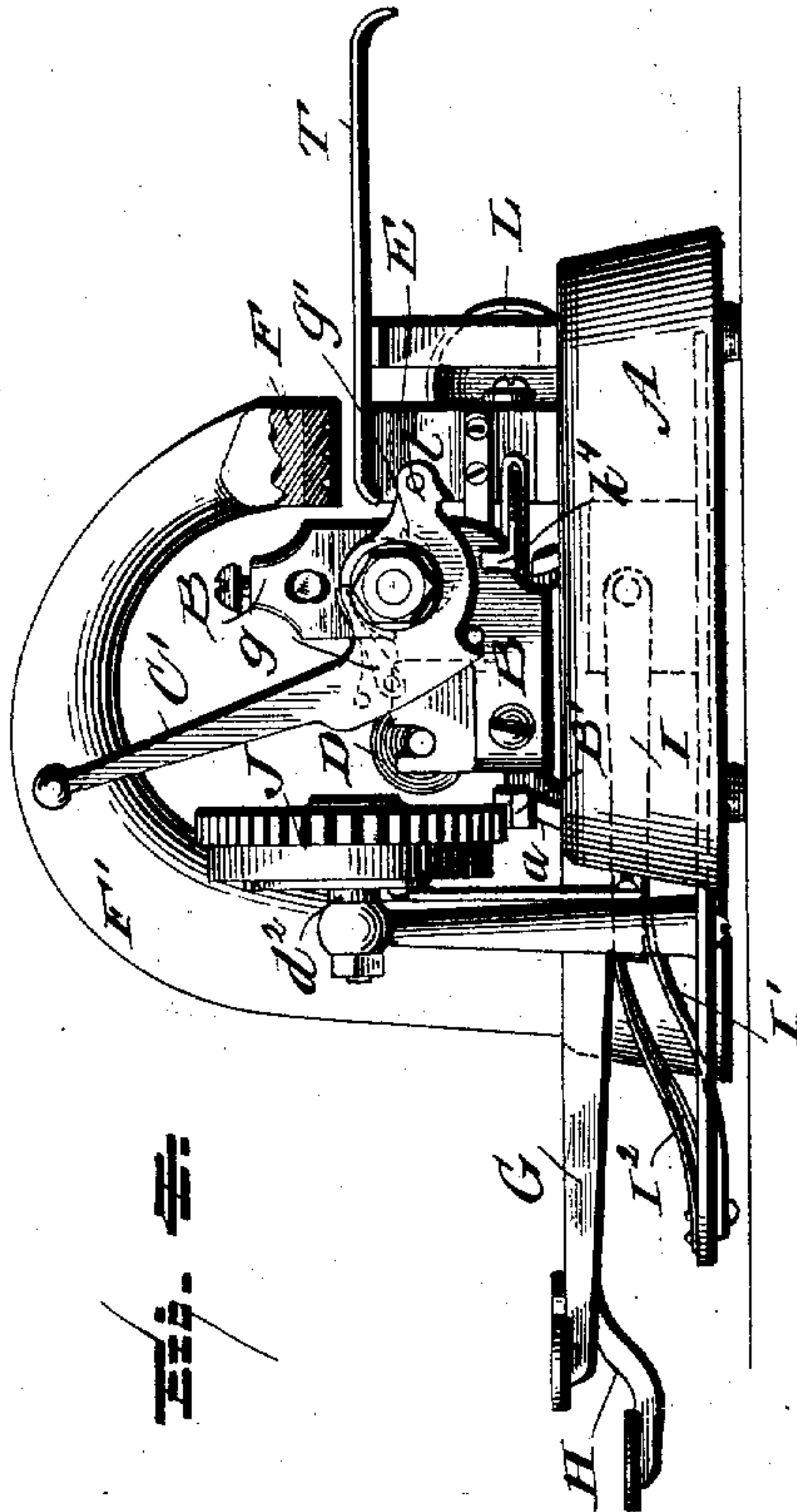


Fig. 4.



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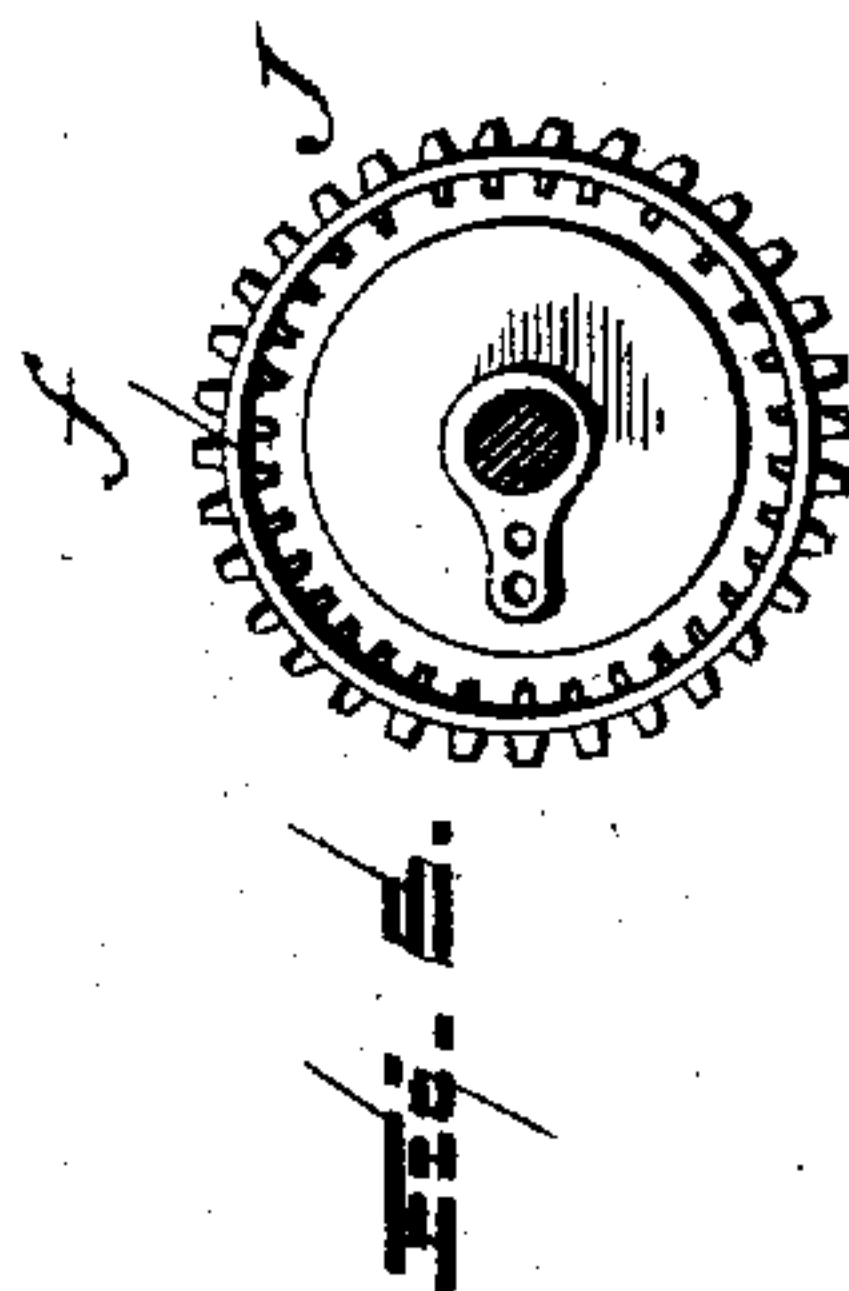
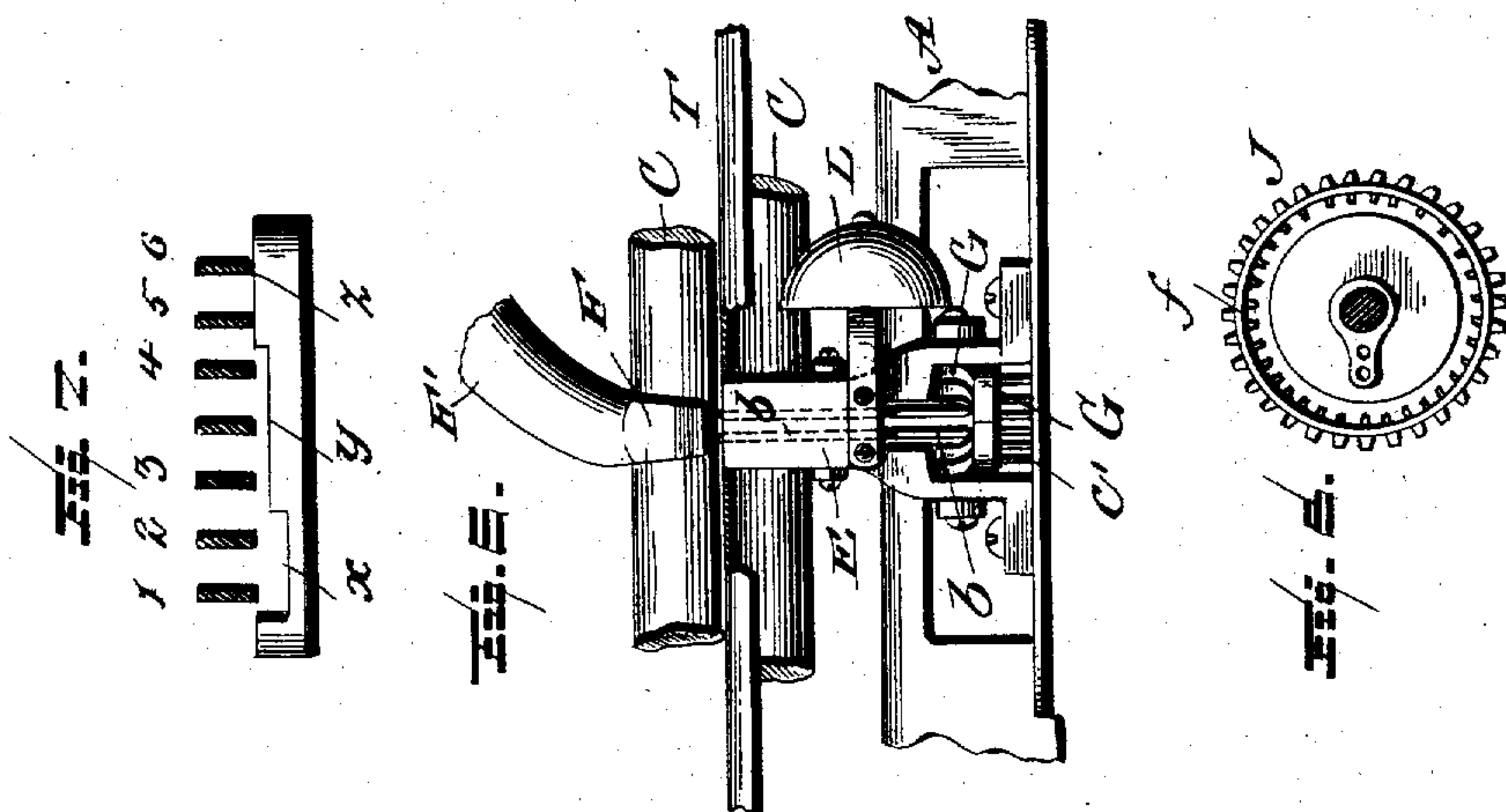
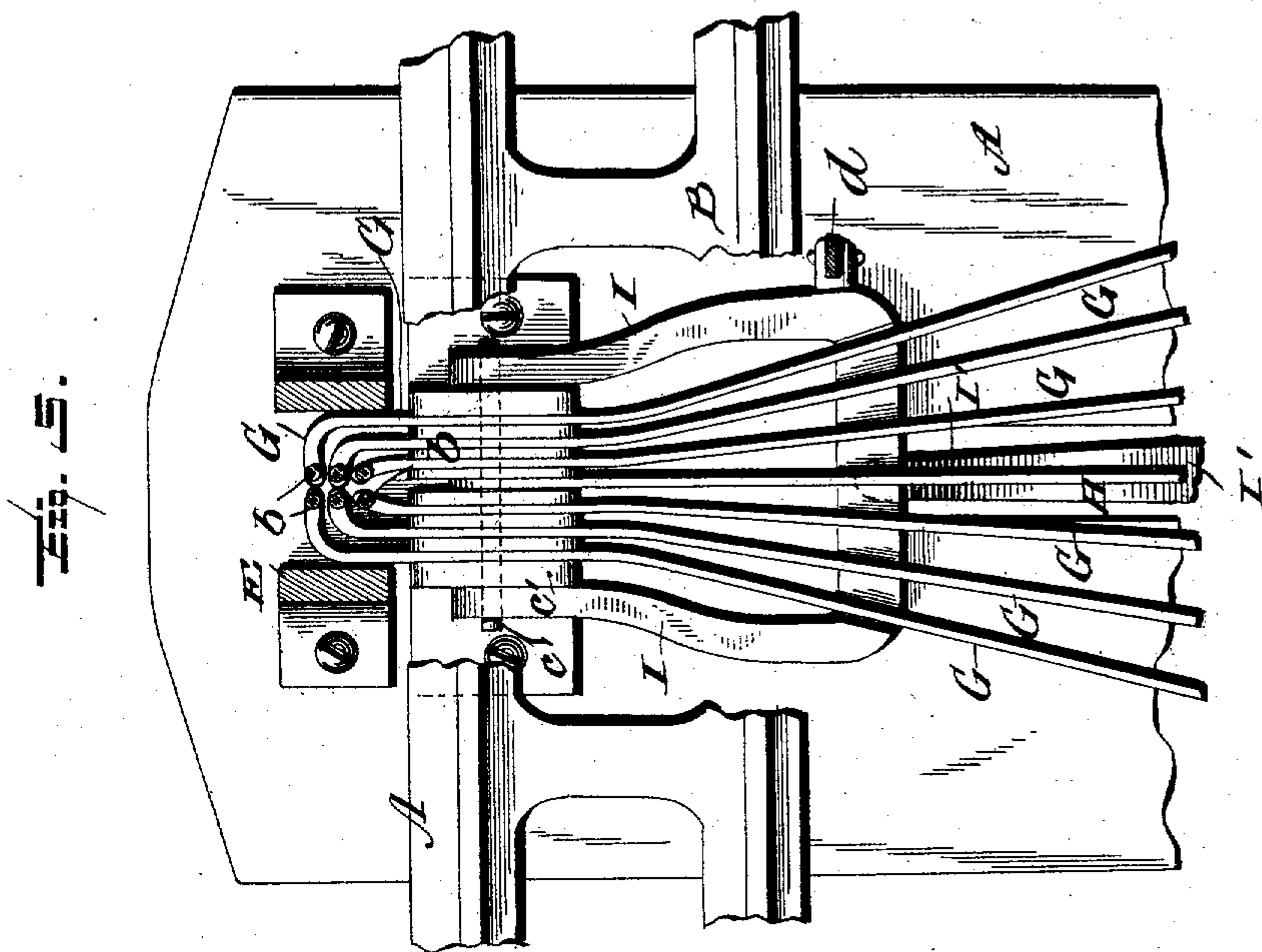
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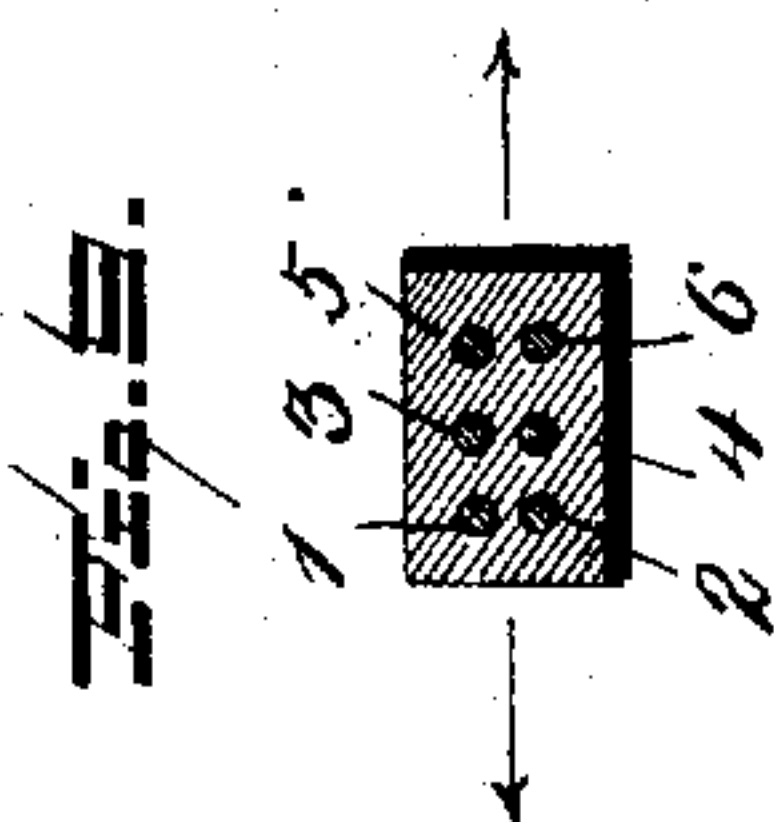
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*L. C. Hills.*  
*E. W. Hill.*



Inventor  
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# UNITED STATES PATENT OFFICE.

THOMAS C. ORNDORFF, OF WORCESTER, MASSACHUSETTS.

## EMBOSSING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 477,062, dated June 14, 1892.

Application filed July 9, 1891. Serial No. 398,876. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS C. ORNDORFF, of the city and county of Worcester, and State of Massachusetts, have invented a new and  
5 useful Improvement in Embossing-Machines, of which the following is a specification.

The machine in which my present invention is comprised is one which while adapted for use in any connection where it would be  
10 useful for embossing purposes is intended primarily for the production of embossed reading-matter for the blind; and it is particularly designed to form the embossments for this purpose in parallel lines upon a sheet  
15 of paper.

The machine shown in the main figures of the drawings hereto annexed, and which presently will be more particularly referred to, is one intended to emboss characters in accordance with what is known as the "Braille"  
20 system, a system under which the letters or characters are formed from various combinations of one or more of six dots or embossments arranged in two parallel lines of three  
25 dots each, these lines being vertical or at right angles to the line of embossed characters on the paper sheet which form words and sentences.

With some modifications, which also are  
30 illustrated and will be hereinafter referred to, the machine can also be used for embossing characters in accordance with what is known as the "New York point" system, a system under which the letters or characters are  
35 formed from various combinations of one or more of six dots or embossments arranged, like the Braille, in two parallel lines of three dots each, these lines, however, unlike the Braille, being horizontal or parallel with the  
40 line of embossment or printing on the paper sheet. The machine involves, generally speaking, the employment of six character levers or keys and a space lever or key, six punches or embossers arranged in two parallel lines of three each, an anvil against which  
45 the punches or embossers operated by the character-keys act, a step-by-step feed-movement in the direction of the line of printing or embossing actuated by both the character-  
50 keys and the space-keys, a feed for the paper in the direction of its length, so that after one

line of embossing has been completed a fresh portion of the paper sheet can be presented for the formation thereon of another line of embossing, a lock against the return of the  
55 carriage, which is separate from and forms no part of the carriage-feed mechanism, but which is so connected or placed in such operative relation to the paper-feed rolls or their operating-lever that after it once locks the  
60 carriage it can be operated to release the same by the feed-rolls or their lever only when the rolls are moved to feed the paper, and, if desired, a bell or equivalent mechanism which indicates to the operator when the  
65 step-by-step feed has advanced the paper near to the end of each line of embossing.

The machine in its details of organization can best be explained and understood by reference to the accompanying drawings, in  
70 which—

Figure 1 is a plan of the machine, with the anvil and its supporting goose-neck partly broken away and partly in section, and with the sheet-supporting table also partly broken  
75 away. Fig. 2 is a horizontal section through the punch block or guide, representing, also, the bell and that portion of the sounder adjacent thereto. Fig. 3 is a front elevation of the machine, with the feed-rolls and the pa-  
80 per-roll broken away. Fig. 4 is an elevation of the machine from that end on which the feed appliances are located. Fig. 5 is an enlarged top plan, partly in section, of the keys or levers, their fittings, and a portion of the  
85 base of the frame, the ways on which the paper-carriage travels from end to end of the machine being broken away to more fully disclose the keys. Fig. 6 is rear elevation of that portion of the machine containing the  
90 punches or embossers, their opposing anvil, and the keys for operating said punches or embossers. Figs. 7, 8, and 9 are views of modified parts intended for the New York point system, which will be hereinafter more  
95 particularly referred to.

I shall first describe the machine represented in Figs. 1 to 6, inclusive.

A is the supporting-frame of the machine.

B is a carriage, which slides lengthwise in  
100 ways *a* of the frame and carries the feed-rolls C and the paper-roll D, which is a spindle



supported in open bearings in the carriage and having on it the roll of sheet paper to be embossed.

E is the punch block or guide fixed to frame A, and F is its anvil supported by a goose-neck F', secured to the frame. The paper drawn from roll D passes between the rolls C and between the anvil F and block E, and its free end is supported by the table T, fixed to the frame.

The punch-block contains six vertical perforations *p*, arranged in two parallel lines which are at right angles to the path of movement of the carriage B. In each perforation is contained, loosely, a punch or embosser *b*, each of which at its lower end rests upon the inner end of its particular character-key lever G, these six keys, together with a space lever or key H, being hung on an axle or pivot *c* in the frame, and near said pivot move between guides *c'*, which assure their movements and prevent their lateral displacement. By depressing any one or more of the character-keys the punch or punches appropriate to the same will thereby be lifted against the anvil (which on its under face has six slight concavities or recesses corresponding to the punches) and so will emboss the paper between them and the anvil.

The lateral feed of the paper necessary in order to form a line of embossing is effected by the carriage B, which for this purpose has a step-by-step movement, and such movement is brought about by the keys, each of which (including the space-key) is capable of imparting said movement to the carriage. The mechanism for this purpose is as follows: Under the keys or levers in front of their pivot is the vibratory yoke I, which is hung on the same axis with the keys, and is pressed up against them by a spring I'. Additional springs I<sup>2</sup> are used, one for each character-key, the object of this being to prevent any one of these keys from dropping unless it is individually depressed by hand. This provision, however, is not required for the space key, because it controls no punch or embosser. Under this arrangement it will be seen that whenever any one of the keys is depressed the yoke I will be correspondingly depressed. The yoke I, by a link *d*, is connected to an arm *d'*, mounted to vibrate upon a horizontal cylindrical stud *d*<sup>2</sup>, fast to a vertical standard *d*<sup>3</sup>, fixed to the frame A. The arm *d'* carries a spring-pressed pawl *e*, which engages teeth or pins *f* on the inner edge of a spur-wheel J, mounted to revolve on stud *d*<sup>2</sup> and engaging a rack B' on the carriage B. Thus when the yoke I is depressed, as it will be by the act of depressing a key in order to emboss the paper, the pawl *e* will be pulled down to engage a fresh pin or tooth on the spur-wheel J, and then when the key is released the spring I' throws the yoke up, with the effect of raising the pawl and consequently of partially revolving the spur-wheel, which will cause the carriage to travel a corresponding distance,

the advance in each case being a distance equivalent to that between one tooth *f* of the spur-wheel and the next tooth. To prevent the pawl from throwing the wheel more than the prescribed distance at each stroke, a spring-pressed detent *e'* is provided, mounted upon a plate *e*<sup>3</sup>, fixed to the stud *d*<sup>2</sup>. The detent is connected by a link *e*<sup>2</sup> to the arm *d'* or its pawl, so that when the arm is pulled down by the yoke the detent will be pulled back out of engagement with the wheel. A pin or stud *f'*, fixed to plate *e*<sup>3</sup>, is provided, against which the free end of the pawl (when the yoke is fully pressed down) will bear sufficiently to be lifted out of engagement with the toothed wheel, thus allowing the carriage to be freely run back again by hand to the place of beginning. In this system it will be noted that by the action of each character-key the space required between the letters or characters which form any one word is secured. The space-key is used only to space one word from the next. The key or combination of keys depressed to form the last letter of any one word will of itself feed the carriage one tooth, (which is the distance between successive characters of the same word,) and then by operating the space-key a feed of an additional tooth is obtained, this distance—viz., one equal to two feed-teeth—being the distance between successive words. The feed-rolls C are those which are used to feed forward the paper a distance equal to that which should intervene between one line of embossing and the next. In order to thus actuate them at the desired time, I mount loosely upon the axis of one of them—in this instance the lower one of the two rolls—a hand-lever C', which by a spring-pressed pawl *g* engages a ratchet *g'*, fixed on the hub of the roll, the arrangement being such that when the lever is thrown forward the pawl will engage the ratchet and thus correspondingly revolve the feed-roll, and when the lever is drawn backward the pawl will ride over the ratchet without imparting movement to it.

It is essential in an instrument of this character for the blind that means should be provided for compelling the operator to give the forward feed to the feed-rolls before beginning a fresh line of embossing. Otherwise it might happen, by reason of forgetfulness or from other causes, that the carriage would be brought back to the starting-point and embossing recommenced without the forward feeding, and in this event the operator, unable to see, would merely superimpose one set of embossments upon another on the same line. To prevent anything of this kind from occurring, I provide a lock which after the carriage has traveled a certain portion of its course engages the frame in such manner as to prevent the return of the carriage to the starting-point, and I so connect this lock to the roll or paper-feed that it cannot be disengaged, except by the movement of the feed-lever needed to produce the requisite feed of the paper. Va-



rious devices for this purpose can be employed. One simple means for the purpose is shown in the drawings. As there shown, it consists of a vibratory bar K, pivoted at  $k^5$  to the top of the carriage-base. It is provided with a locking-shoulder  $k$ , a reduced outer end  $k'$ , which reaches out as far as the plane of vibration of the roll-feed lever C', and an arm or extension  $k^2$ , to which a spring  $k^3$  is attached, which spring at its other end is attached to the carriage and tends to draw the lock-bar toward and against the adjoining face of the punch-block, (which in this case is the stationary part to be engaged by the locking-shoulder  $k$ , although any other conveniently-located stationary part would answer equally well.) The reduced outer end of the bar K carries at its extremity a lug or projection  $k^4$ , Fig. 4. Upon the shorter arm of the lever C' is a hook  $l$ , which when the lever is thrown forward to effect the feed of the paper is adapted to engage the projection  $k^4$  and to retract the vibratory lock-bar K against the pull of its spring  $k^3$ .

The operation is as follows: When the carriage is in starting position, (at the extreme right of the machine,) the straight edge of the locking-bar is opposite to the adjoining face of the punch-block. During the step-by-step movement of the carriage to the left this condition of affairs is maintained until the carriage has nearly reached the end of its course, at which time the locking-shoulder  $k$  passes beyond the block, and then (by reason of the clearance in the bar behind the shoulder) the bar by its spring  $k^3$  is pulled over, so as to bring the shoulder  $k$  in the path of the block, as seen in Fig. 1. So long as the parts are in this position it is impossible to return the carriage to the starting-point. The lock thus formed can only be broken by the lever C', which when thrown forward will at its inner end engage the lock-bar and retract it far enough to allow the shoulder  $k$  to clear the block; but in thus moving the lever the rolls C have been caused to feed the paper, and consequently when the carriage is returned to its starting-point the paper is in proper position to receive a fresh line of embossments.

In order to notify the operator when the carriage has nearly run its course, I provide a bell and sounder. A convenient arrangement for this purpose is to fix the bell L to the punch-block, Figs. 1, 2, and 6, and to attach the sounder to the lock-bar. The sounder consists of a hammer-head  $m$ , attached to a thin flexible spring-strip  $m'$ , secured to the lock-bar. When the locking-shoulder  $k$  snaps past the punch-block, the sudden inward movement of the lock-bar throws the hammer-head inward and so sounds the bell. Thus the bell does not sound until after the carriage has been locked against retraction.

In the machine thus far described, and illustrated in Figs. 1 to 6, the embossers are ar-

ranged in two parallel lines of three each, these lines being at right angles with the path of feed movement of the carriage, and this arrangement fully meets the needs of the Braille system and renders it feasible to emboss any of the characters of that system; but in the case of a system such as the New York point system a different arrangement must be employed. That system, in order to emboss under it by means of a machine such as I have devised, requires six several punches or embossers arranged in two parallel lines of three each, as is required in the Braille system; but these lines must be parallel with instead of at right angles to the path of movement of the carriage. The rearrangement of the embossers and keys to adapt them to the needs of this last-named system is simple and easily accomplished. All that would be required would be to turn the punch-block in a horizontal plane ninety degrees from the position it occupies in Fig. 6, so as to bring the two rows of embossers parallel with the path of movement of the carriage, as indicated in Fig. 9, which is a sectional plan of the punch-block, with arrows indicating the direction of movement of the carriage, and the inner ends of the character-levers would be correspondingly changed in position, so that each, as before, should be under its appropriate embosser; but the carriage-feed in Figs. 1 to 6, inclusive, could not well be used with the parts thus modified, if uniform spaces between letters or characters making up a word were to be preserved, and such uniformity of spacing is very necessary—for example, referring to the embossers in Fig. 9, which are numbered from 1 to 6, inclusive. In the New York point system the letter "I" is formed by the combination of embossers 1 and 2, the letter "L" by numbers 1, 2, and 3, and the letter "Z" by numbers 1, 3, 4, 5, and 6. Manifestly after forming the letter "L" by the simultaneous action of the embossers 1, 2, and 3 it would be necessary to feed the carriage farther, in order to preserve the same space between that letter and the next, than it would to form the letter "I," and after forming the letter "Z" it would be necessary to feed the carriage farther than it would be after forming the letter "L." To obtain this result I so construct the feed-yoke I that some of the character-keys will impart more movement to it than others. This will be understood by reference to Fig. 7, which is a front elevation of the modified yoke with the character and space keys in section. The character-keys are numbered to correspond with the numbered embossers in Fig. 9. The varied range of movement of the yoke is obtained by forming that part of it which is struck by the character-keys when depressed with three steps  $x y z$ . Over the lowest step  $x$  are placed keys 1 and 2, which require the least feed movement in order to obtain a given space between one letter and the next of a word. Over the middle step  $y$  are placed the keys



3 and 4, which require a somewhat greater feed movement to preserve the spacing between the letters, and over the highest step  $z$  are placed the keys 5 and 6, which require 5 for this purpose the most extensive feed movement. The space-key is placed over the middle step  $y$ . Under this arrangement it will be seen that the movement of the yoke is varied according to the character-keys used. It will 10 be more or less depressed according to the step which is pressed on, and by this means the stroke of the feed-pawl controlled by the yoke will be correspondingly varied. To meet these changed conditions of movement 15 of the feed-pawl, I correspondingly increase the number of feed pins or teeth  $f$  on the spur-wheel J, as indicated in Fig. 8, which is a face view of the spur-wheel thus modified, so that while the throw of the pawl will be commensurate with that step  $x$ ,  $y$ , or  $z$  of the yoke 20 which is pressed on it will always find a tooth which it will at once engage without lost motion. With these modifications (described by reference to Figs. 7 to 9) the machine will 25 be adapted to emboss under the New York point system. In other respects it can remain the same as illustrated in Figs. 1 to 6.

Having described my invention, what I claim as new, and desire to secure by Letters 30 Patent, is as follows:

1. The combination of the carriage and mechanism for actuating the same, the paper-feed rolls, the lever for actuating said rolls to feed the paper, and the lock separate from 35 and independent of the carriage-actuating mechanism, whereby the carriage is prevented from returning, operated by the feed-roll le-

ver to release the carriage and permit its return to the starting-point at the time and in the manner substantially as hereinbefore set 40 forth.

2. The combination of the embossing mechanism, the carriage, mechanism for imparting to the carriage a step-by-step movement of progression, connected to and operated by 45 the embossing mechanism, a lock separate from and independent of the carriage-actuating mechanism to prevent the return of said carriage, feed-rolls mounted on the carriage, and a feed-roll lever, which when moved to 50 cause the rolls to feed operates the lock to release the carriage, substantially as and for the purpose hereinbefore set forth.

3. The punchers or embossers arranged in two rows of three each, the opposed anvil for 55 the same, the character keys or levers, one for each embosser, and the space-key, in combination with the carriage and step-by-step feed mechanism for the same, actuated by the said keys or levers, and the paper-feed rolls 60 mounted on said carriage, the feed-roll lever, and the lock separate from and independent of the carriage-feed mechanism and connected to and operated by the feed-roll lever, these parts being constructed and arranged to- 65 gether for joint operation in the manner hereinbefore set forth.

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

THOMAS C. ORNDORFF.

Witnesses:

FRANK D. HUNT,  
MIRICK H. COWDEN.