

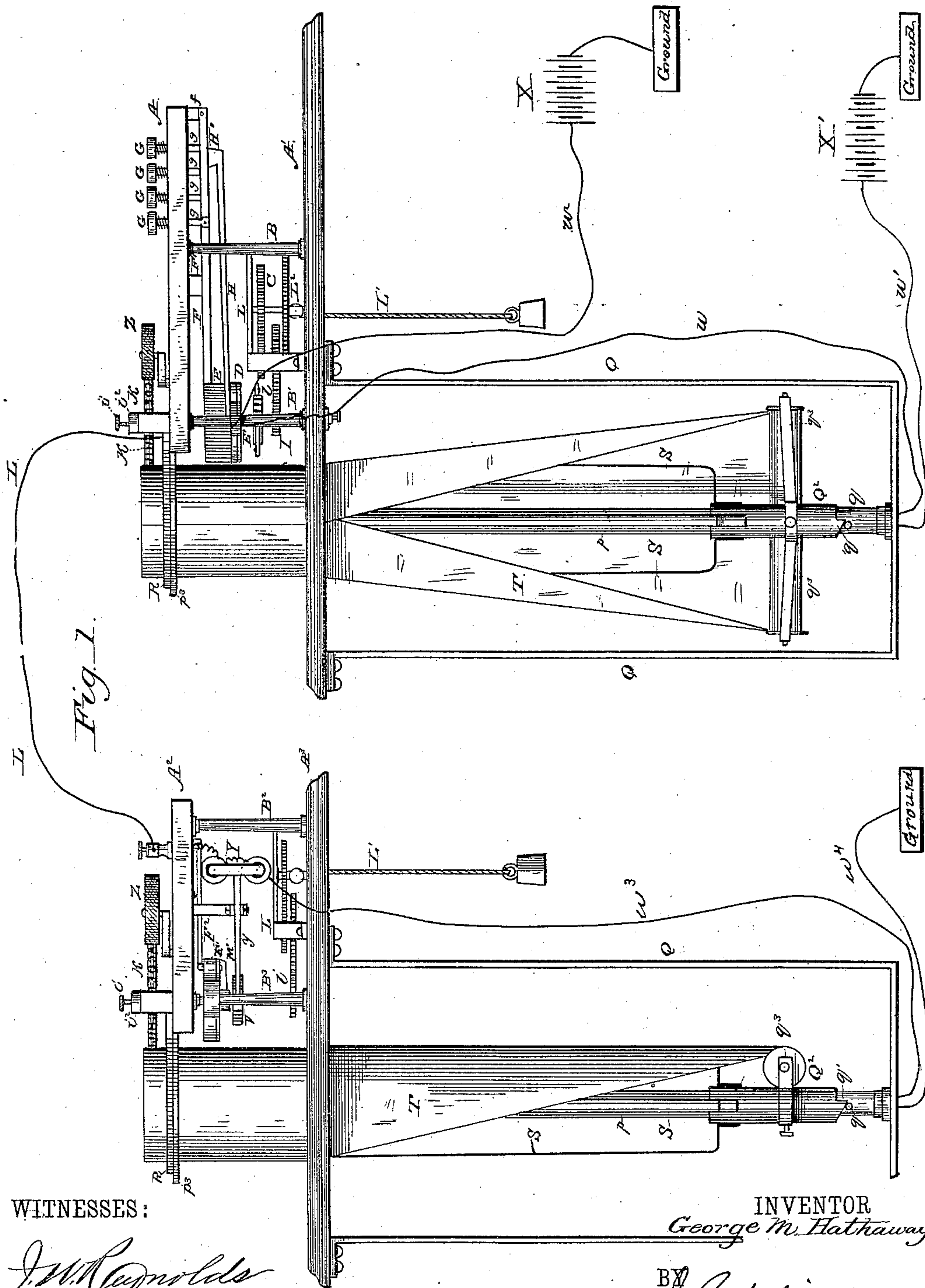
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9 Sheets—Sheet 1.

G. M. HATHAWAY.
PRINTING TELEGRAPH.

No. 310,587.

Patented Jan. 13, 1885.



WITNESSES:

J. W. Reynolds
Edgar F. Gaddis

INVENTOR

George M. Hathaway

BY

J. R. Nottingham

ATTORNEY

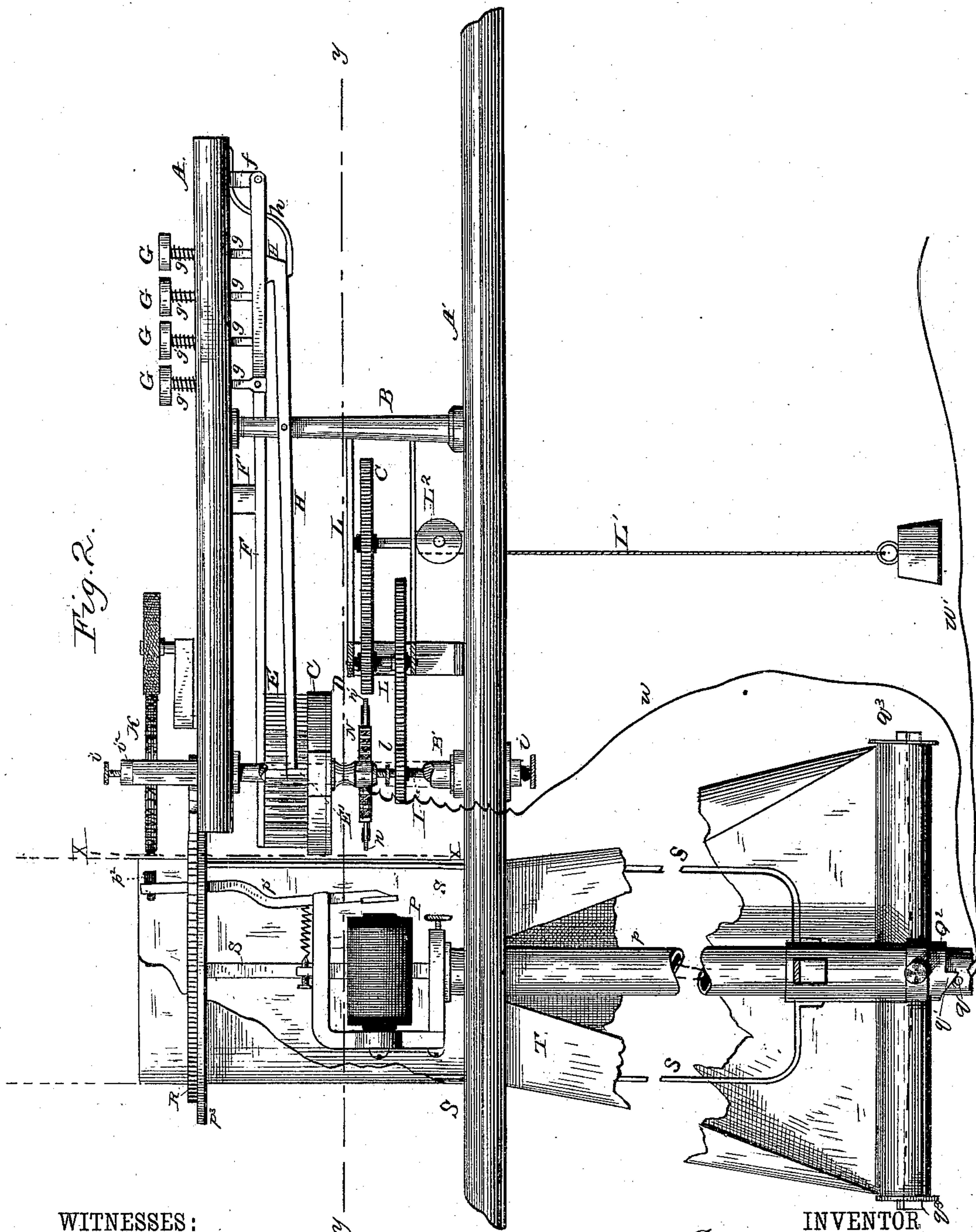
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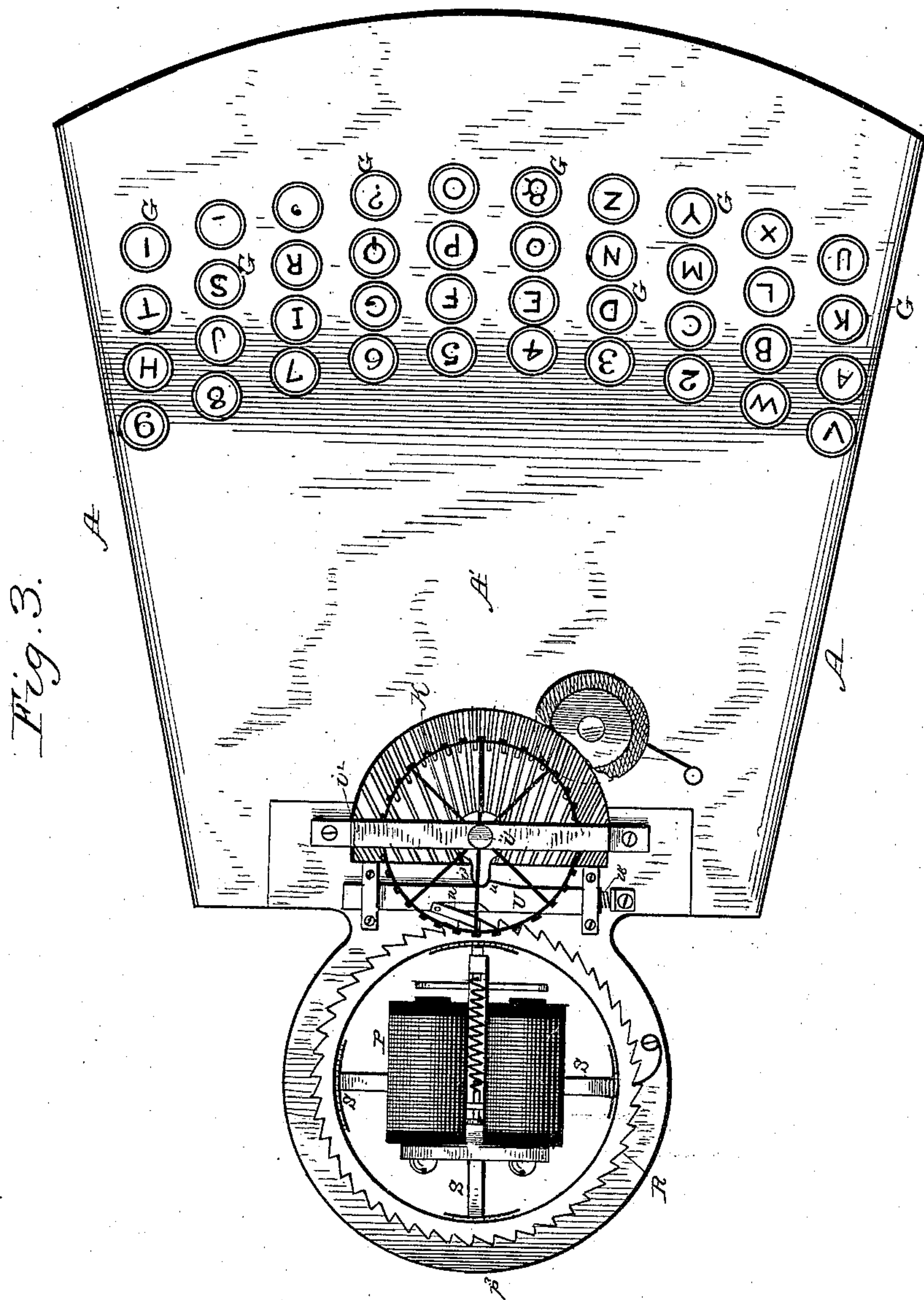
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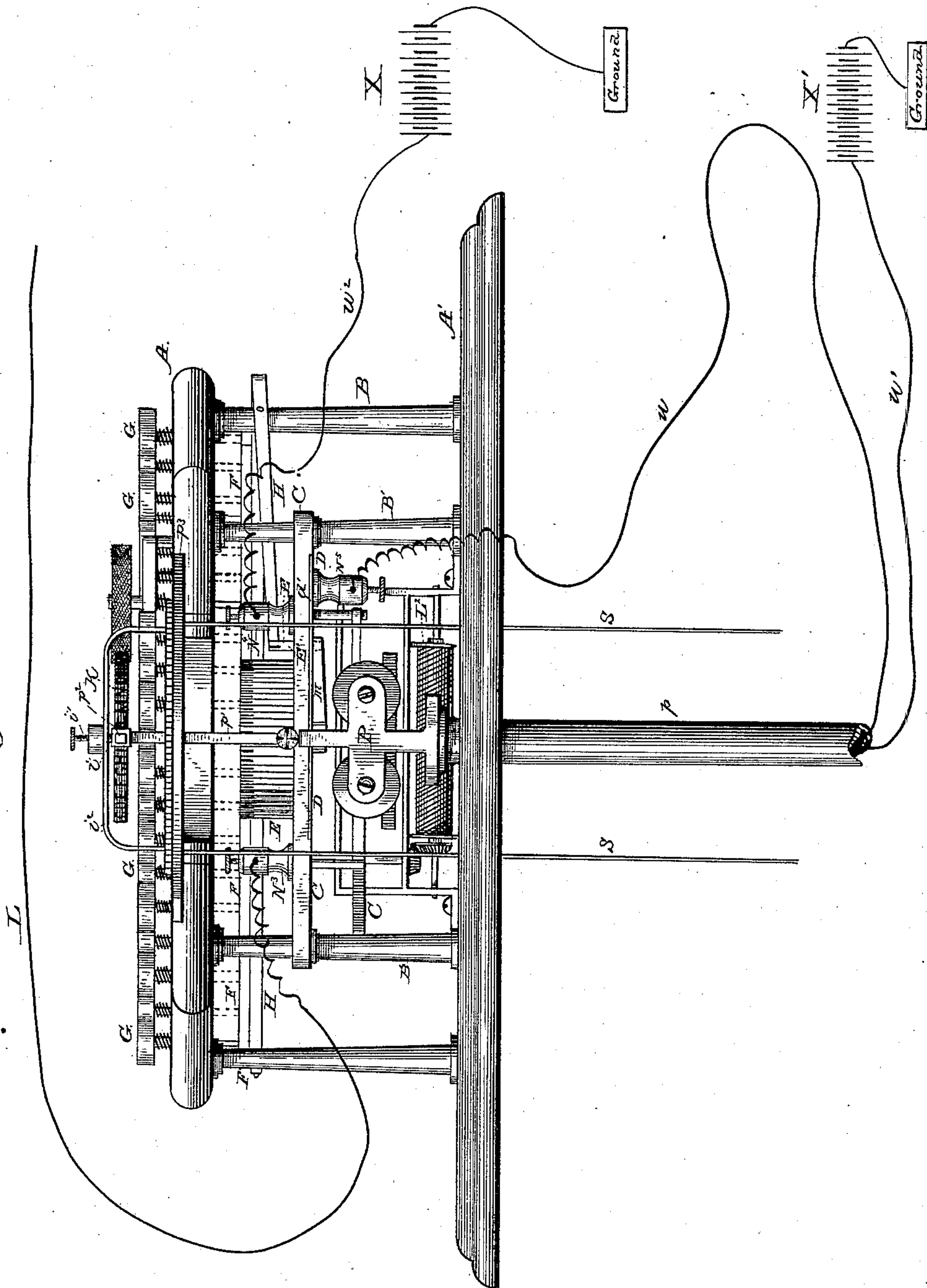
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Fig. 4.



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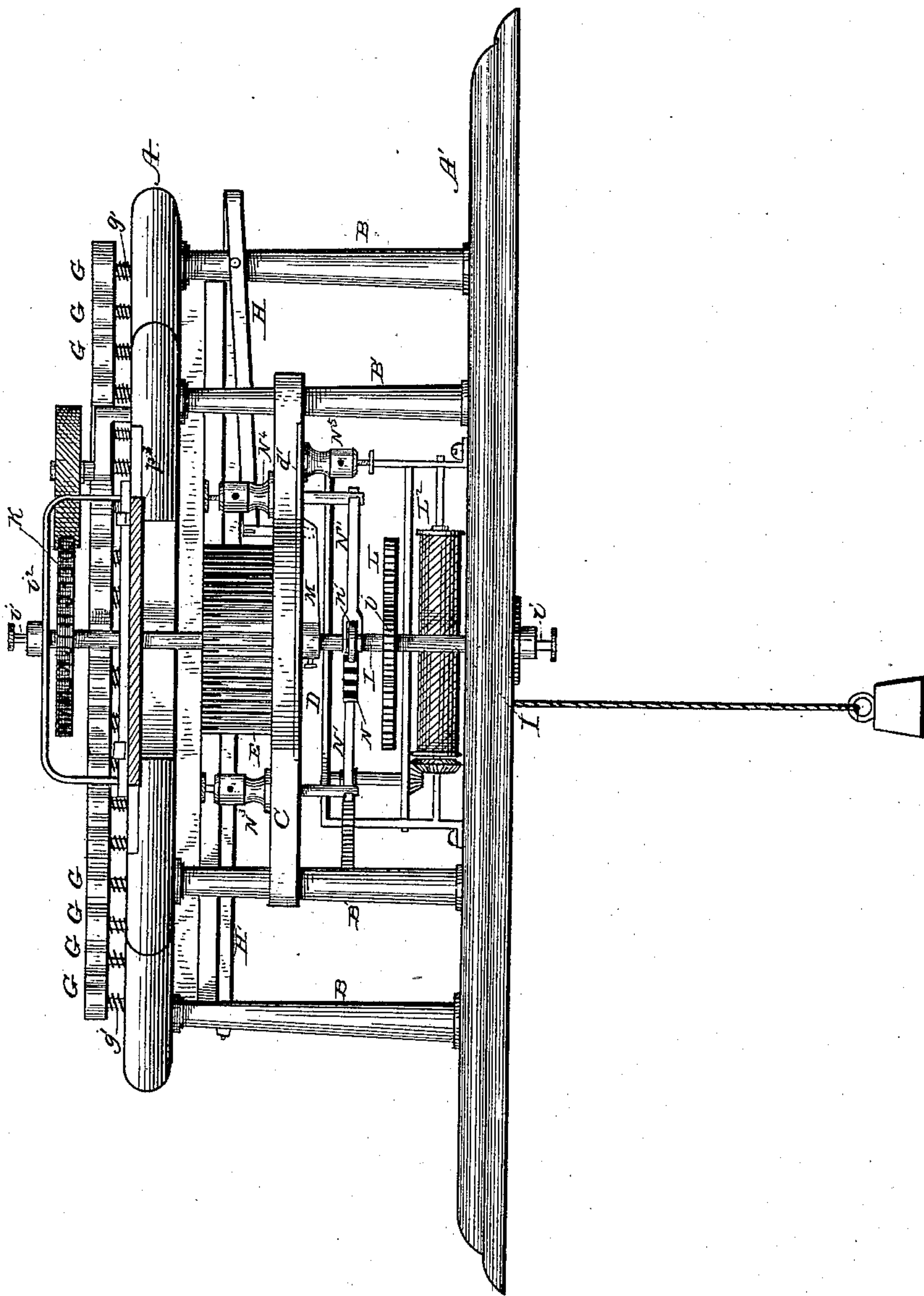
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Fig. 5.



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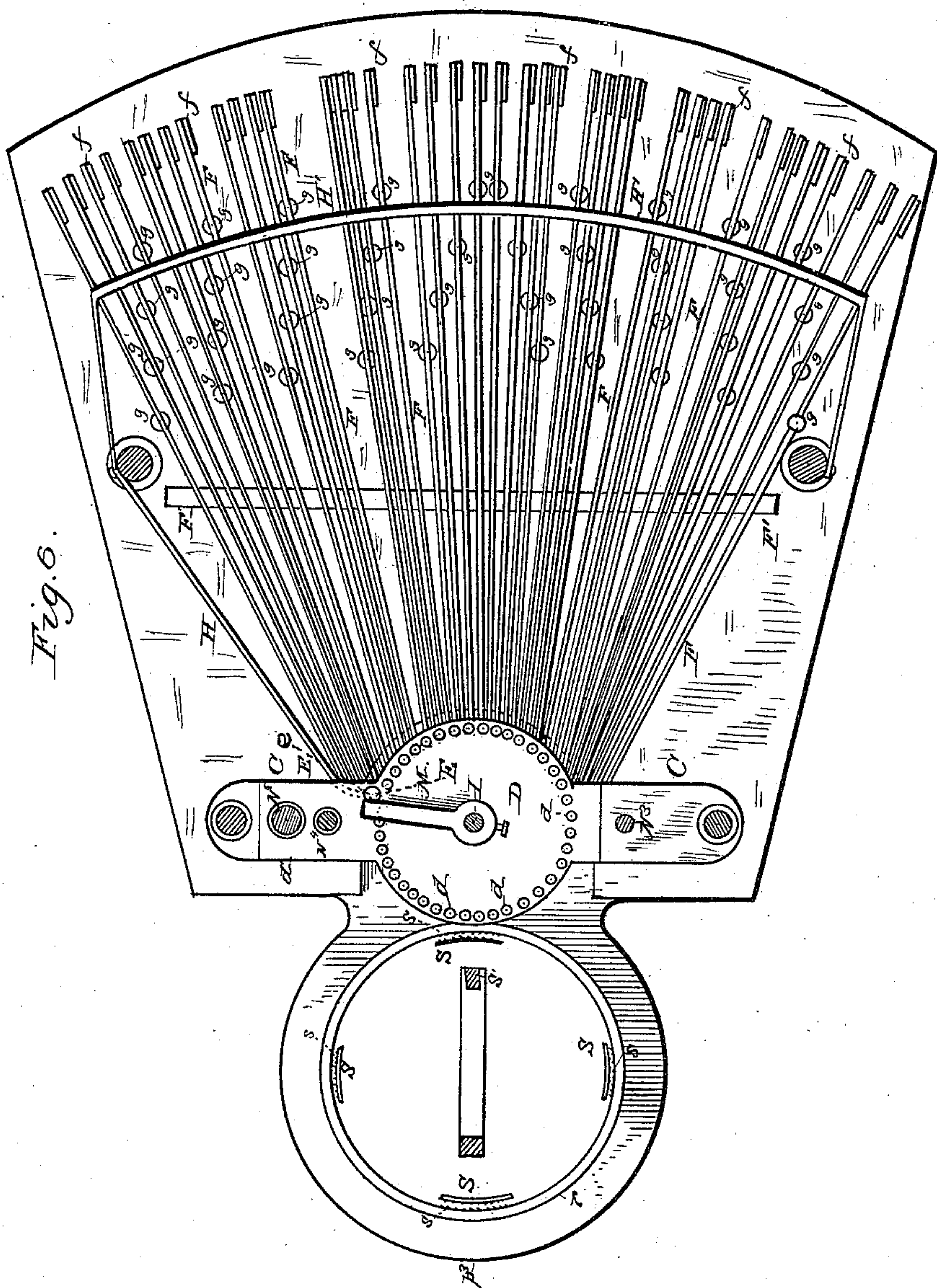
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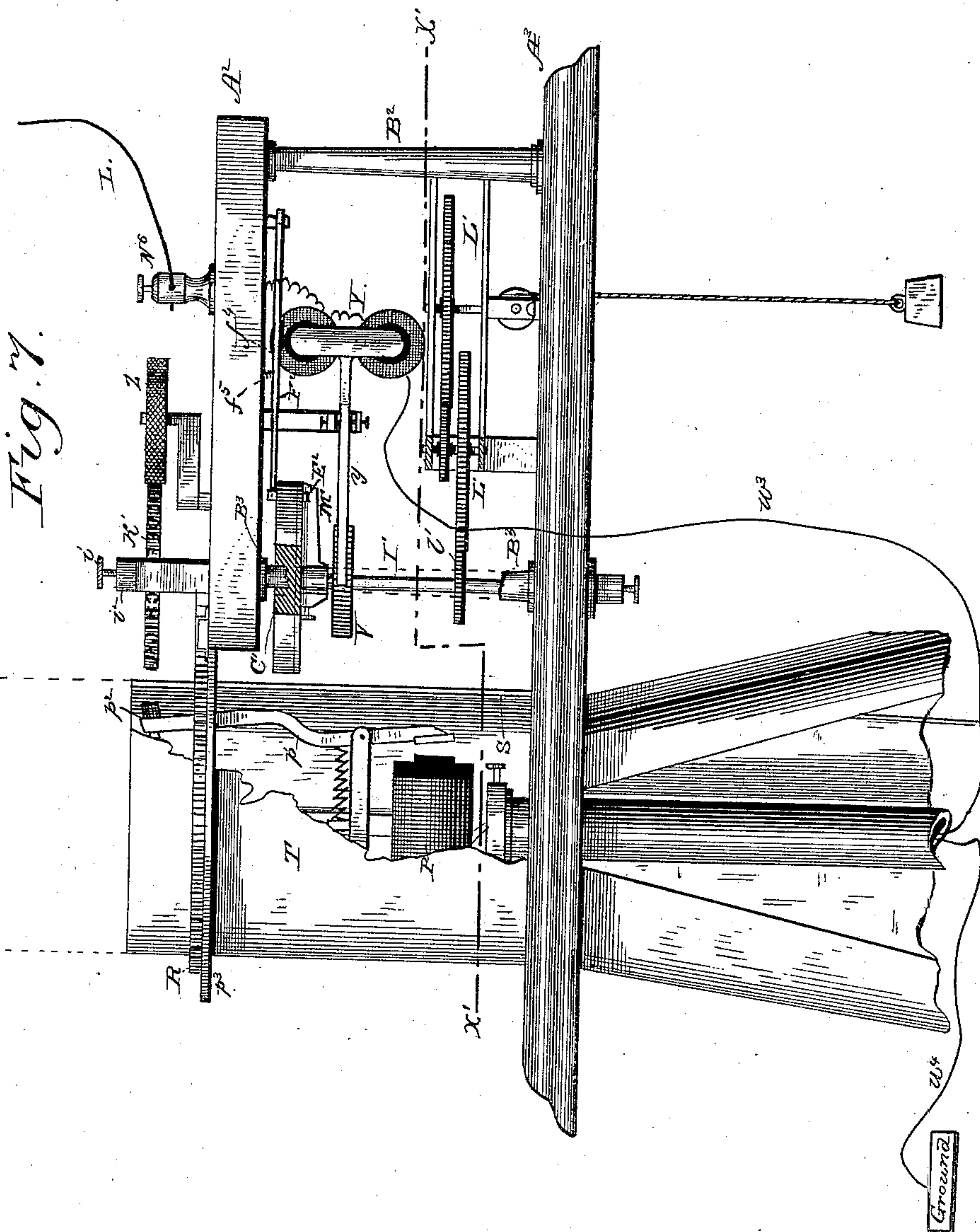
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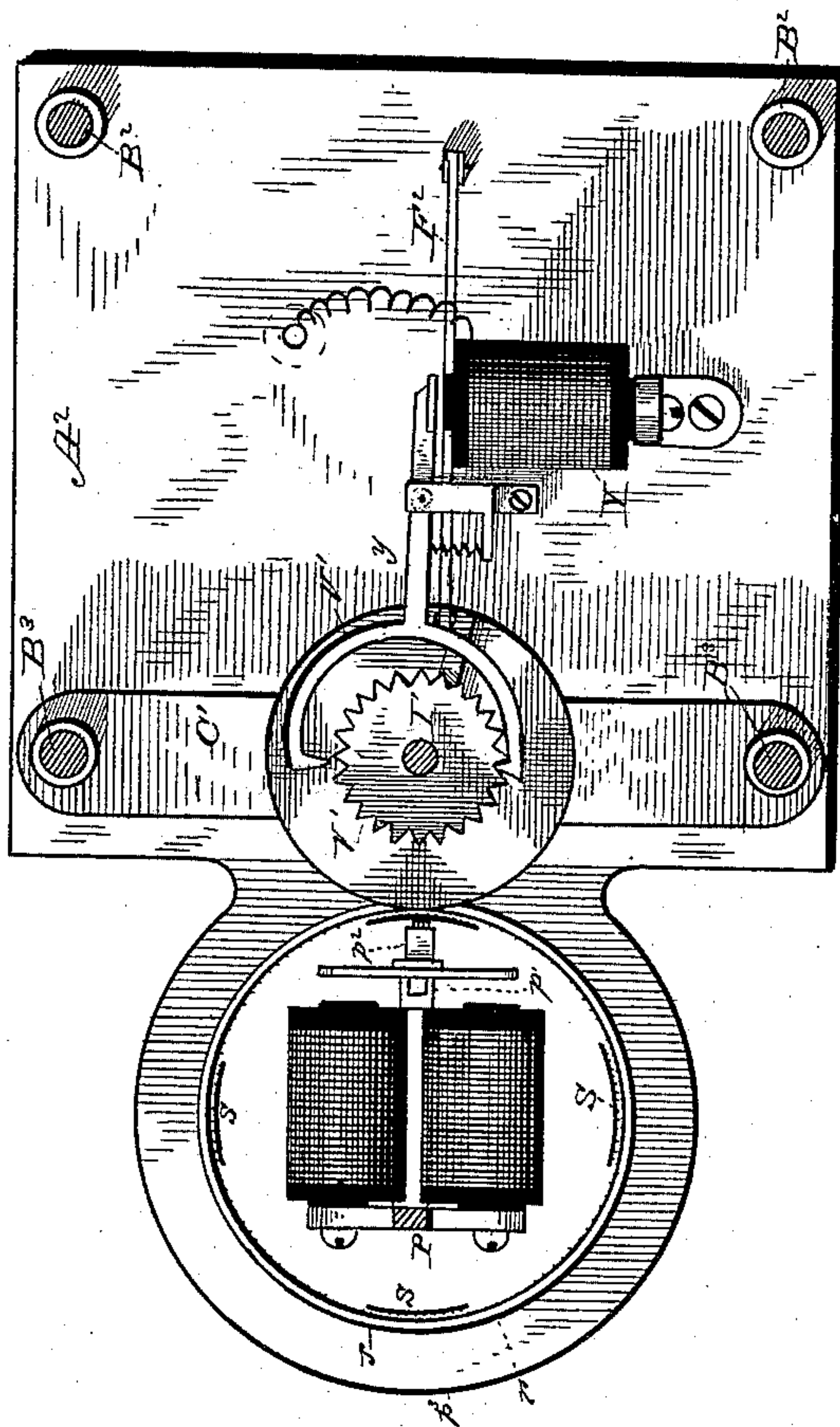
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Fig. 8.



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(No Model.)

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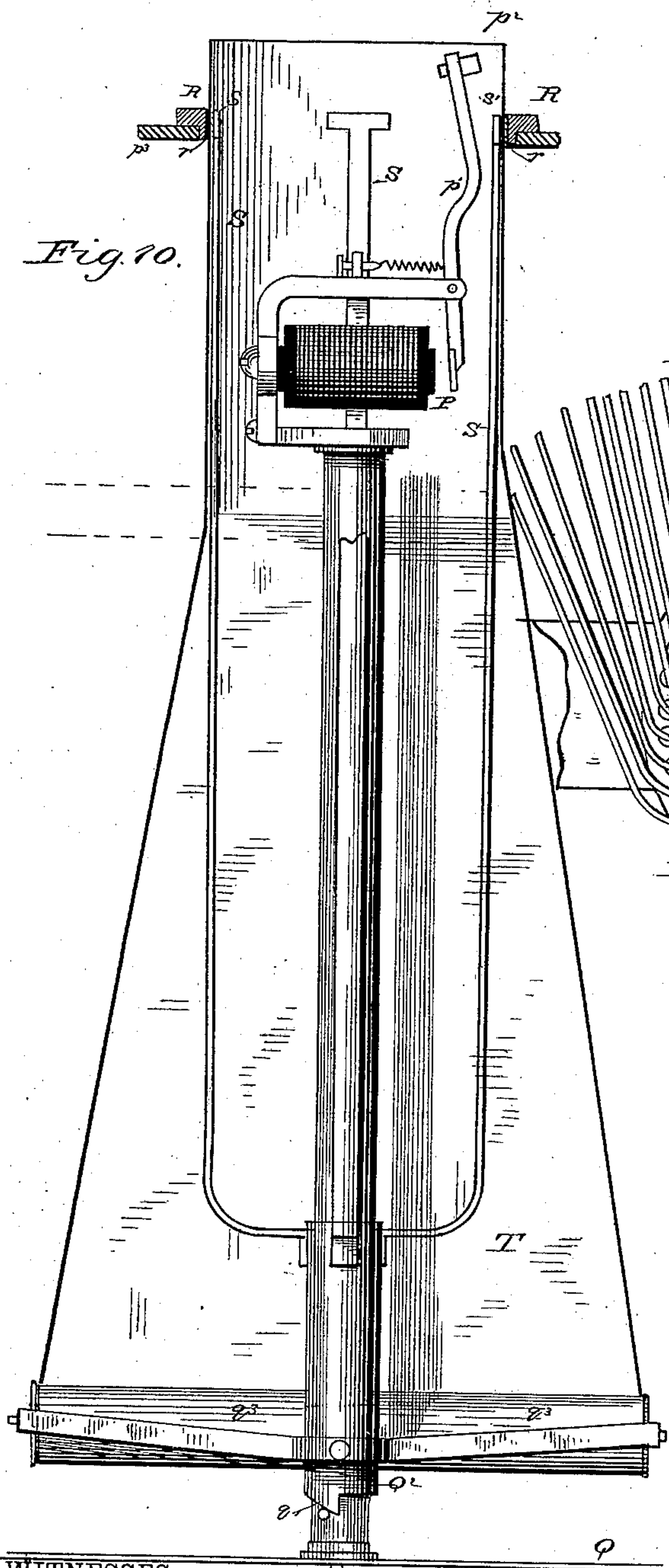


Fig. 10.

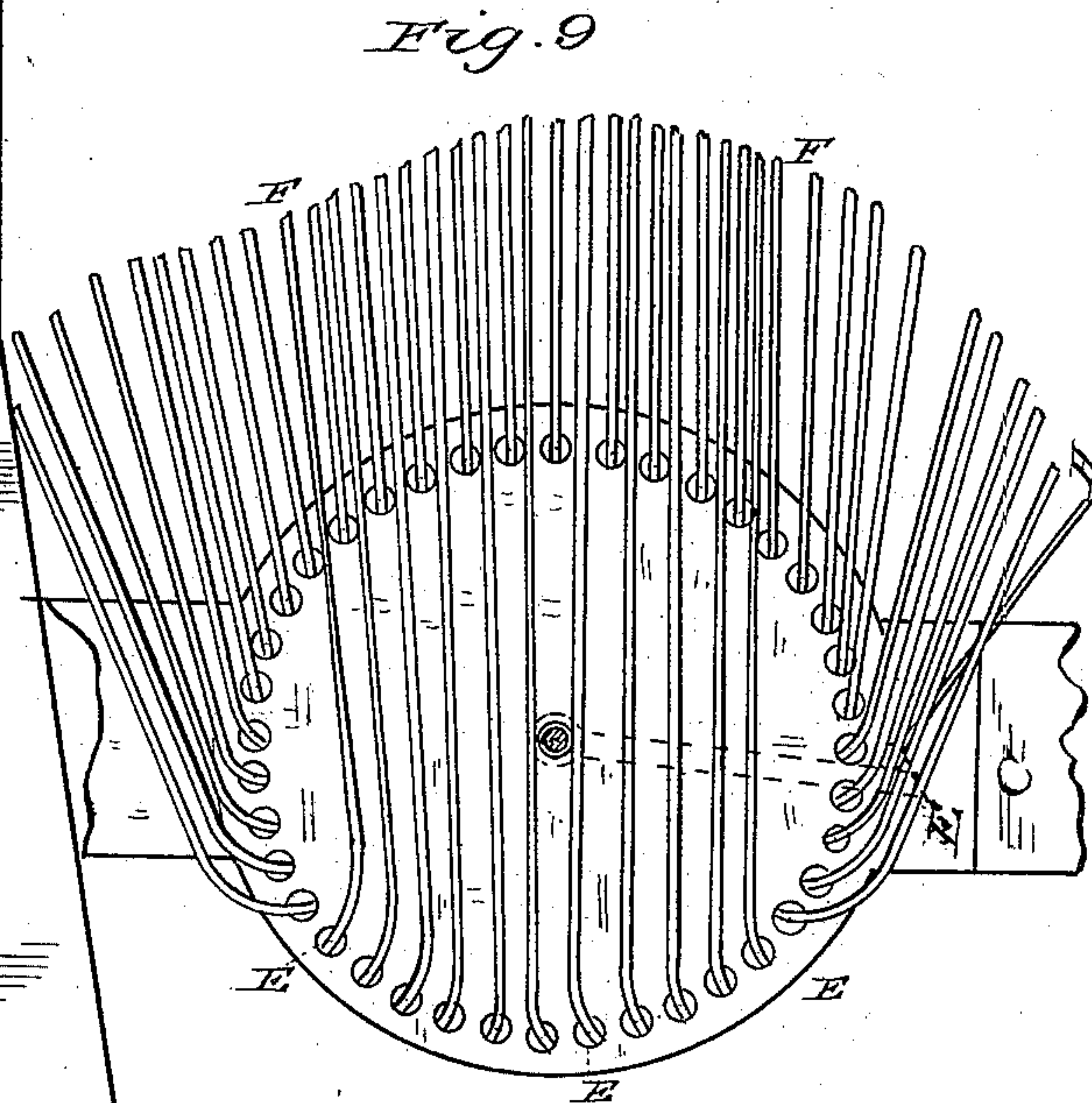


Fig. 9.

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UNITED STATES PATENT OFFICE.

GEORGE M. HATHAWAY, OF NEW YORK, N. Y., ASSIGNOR TO HATHAWAY'S
PRINTING TELEGRAPH AND TELEPHONE COMPANY.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 310,587, dated January 13, 1885.

Application filed April 18, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. HATHAWAY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Printing-Telegraphs, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a printing-telegraph system and apparatus of the class in which rotating type-wheels are used in connection with impression devices operated by electromagnets, the objects of the improvement being to accomplish the transmission of printed telegraphic messages with increased rapidity as compared with the previously-existing state of the art, to print at the transmitting-station a message simultaneously with its transmission to a receiving-station, and to print messages in pages of parallel lines, though the apparatus may be used for printing in a continuous line on a narrow strip or fillet.

The invention consists in the improved system and the apparatus comprising certain novel constructions and combinations of devices, which will be hereinafter particularly described, and pointed out in the appended claims, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of a printing-telegraph apparatus constructed and arranged for operation according to my invention. Fig. 2 is a side elevation of the transmitting apparatus. Fig. 3 is a top view of the same. Fig. 4 is a front view. Fig. 5 is a vertical section on the line *x x* of Fig. 2. Fig. 6 is a horizontal section on the line *y y* of Fig. 2. Fig. 7 is a side elevation of the receiving apparatus. Fig. 8 is a horizontal section of the same on line *x' x'* of Fig. 7. Fig. 9 is a detail top view illustrating the devices for releasing and arresting the type-wheel of the transmitting apparatus and for closing the circuit through its printing-magnet. Fig. 10 is a view, partly in vertical section and partly in elevation, illustrating the paper supporting and feeding devices and the impression devices.

Referring, now, to Figs. 2, 3, 4, 5, and 6, the letters A and A' indicate, respectively, the

top board and base of the supporting-frame, the top board being supported by suitable posts or pillars, B B', standing on the base.

Between the front posts, B', is supported a cross-piece, C, upon the under side of which is secured a metallic plate, D, having near its margin an annular series of perforations, *d*, coinciding with similar perforations in the cross-piece C.

In the perforations of the cross-piece and metallic plate D are arranged metallic pins E, the upper ends of which are pivoted, respectively, to the ends of key-levers F, the outer ends of which are pivoted to supports *f*, secured to the under side of the top board, A. Through this top board are perforations, in which are loosely arranged pins *g*, having their lower ends pivoted to the levers F, respectively, while their upper ends, above the top board, are provided with heads or finger-pieces G, between which and the top board are arranged spiral springs *g'*, for holding up the pins and the levers F. The pins and their heads form the keys for operating the levers F, which normally are held up by the springs against a stop, F', so that the lower ends of the pins E will not project below the metallic plate D.

In a perforation, *e*, of the metallic plate D is arranged a pin, E', of non-conducting material, having its upper end pivoted to the inner end of a lever, H, which is pivoted to one of the posts B, and has its outer end secured to a segmental bar, H', which lies under and against the levers F, and is pressed upward by a spring, *h*, Fig. 2. It will now be seen that if either one of the levers F is pressed downward by its key the metallic pin E, attached to said lever, will be pressed down through and beyond the metallic plate D, and at the same time the said lever F will act on the segmental bar H', to cause the inner end of the lever H to be raised and draw up the non-conducting pin E', which normally projects below the metallic plate D.

Through the center of the metallic plate D and cross-piece C is an opening, through which is arranged a vertical shaft, I, the lower end of which has a bearing in a step, *i*, on the base-board, while its upper end projects

through the top board and has a bearing in a screw, i' , which is arranged through a bracket, i^2 , resting on the top board.

Under the bracket i^2 and above the top board a type-wheel, K, of ordinary construction is fixed upon the shaft I. Upon said shaft I, near its lower end, is a pinion, l , which is in gear with a train of wheels, L, arranged to be driven by a cord, L' , properly weighted, and connected to a barrel, L^2 , connected with the train L, for driving the same in an ordinary manner.

To the shaft I, directly under the metallic plate D, is secured a radial metallic arm, M, (see Figs. 4 and 6,) projecting outwardly a little beyond the perforations in said plate, so that if revolved it will strike the non-conducting pin E' when said pin projects below the plate D, and if this pin is drawn out of its path the arm will strike any pin E which may be projected below the plate. The shaft I has normally a tendency to rotate under stress of the train L, and so the arm M ordinarily rests against pin E' , and when a key-lever and its pin E is depressed the pin E' will be raised and release the arm M, which then flies around and strikes the depressed pin E.

Just above the pinion l on the shaft I a circuit-breaking wheel, N, is fixed upon the shaft, and against its periphery bear two metallic friction-wheels, n n' , carried by spring-arms N' N'' , which are secured to the downwardly-projecting ends of two binding-posts, N^3 N^4 , arranged upon the cross-piece C. The "makes" or metallic spaces in the periphery of the circuit-breaking wheel are the same in number and coincide in position with the characters on the type-wheel, as do also the metallic pins E, each of which represents a letter or other character. A binding-post, N^5 , is electrically connected with an arm or lateral extension, d' , of the plate D, and from this post N^5 a wire, w , leads to the printing-magnet, as will presently be more particularly described.

P is the printing-magnet of the transmitter. It is mounted upon the upper end of a tubular post, p , the lower end of which rests upon a bracket, Q, depending from the base-board. (See Fig. 1.) The armature-lever p' of this magnet extends upward, and carries a printing-pad, p^2 , arranged to drive the paper against the type-wheel when the magnet attracts the armature.

Above the magnet P is a plate, p^3 , projecting from the front end of the top board, A, and having a circular opening, through which the upper or pad end of the armature-lever projects. Within this circular aperture fits a flange, r , Figs. 6 and 10, projecting from a ratchet-wheel, R, which lies upon the plate p^3 . Below the magnet, upon its tubular supporting-post p , is a sleeve, Q^2 , the lower edge of which is arranged to bear against a pin, q , projecting from the post. A lug, q' , beveled or inclined on one edge, projects from the lower edge of the sleeve, and when said sleeve

is rotated in the proper direction, and the inclined edge of the lug comes in contact with the pin, it will ride upward over said pin, forcing up the sleeve, which will fall back by gravity when the lug has passed the pin.

From the sleeve Q^2 spring-arms S stand out and extend upward through the ratchet-wheel R, and bear outward against its inner periphery. These arms have on their surfaces next the wheel slight upwardly-inclined serrations s , and there are similar serrations, s' , on the inner periphery of the wheel. From the sleeve project arms q'' q''' , which support a reel, q^4 , which carries the paper T. The paper T is to be led up through the ratchet-wheel R, and formed into a tube around the spring-arms, S.

As before stated, the wire w leads from binding-post N^5 to one coil-terminal of the printing-magnet P, passing up through the tubular supporting-post, and from the other coil-terminal a wire, w' , leads to one pole of supplementary battery X' , which has its other pole connected to ground. From one pole of the main battery, as at X, a wire, w^2 , leads to binding-post N^4 , and the line-wire W is connected to post N^3 . The batteries X and X' have similar poles to the ground.

The operation of the printing-transmitter, as now described, is as follows: When the circuit-breaking and type wheels are at unison against pin E' , and at this time the friction-contact rollers bear against makes or conducting portions of the break-wheel, a key is depressed and a metallic pin, E, forced down through the plate D, the arm M, being released, flies around and strikes the depressed metallic pin, and the type-wheel is arrested with that letter or character opposite the printing-pad which is represented by the depressed pin. At this moment the main circuit is closed through the break-wheel, and the circuit of supplementary battery X' is closed through the printing-magnet to the line, owing to the fact that electrical connection is now made from post N^5 through extension d' , plate D, the depressed pin E, which the arm M forces in contact with said plate, through said arm M and the shaft I, to the break-wheel and spring-arm N' , supported by post N^3 , and which has a roller on a make of said break-wheel. The printing-magnet is thus energized and operates its armature-lever to force the paper against the letter of the type-wheel when opposite the printing-pad. When the pin E is allowed to rise, the circuit through the printing-magnet is broken and the arm M continues its movement quickly till it again strikes the unison-pin E' , which is then depressed by spring h . When the shaft I begins its movement after the arm M is released by the unison-pin, a lug, i^3 , projecting from the shaft I, strikes a shoulder, u , on a slide, U, arranged on a plate, p^3 , and drives said slide endwise against the force of a retracting-spring, u' . The slide U carries a spring-pawl, u^2 , which at each forward movement of the slide strikes a

tooth of the ratchet-wheel R, thus moving said wheel the space of one tooth and turning the paper tube correspondingly to feed the space for one letter. When the lug leaves the shoulder of the slide, the latter is thrown back to its original position by its retracting-spring, ready to again operate the ratchet-wheel for feeding. The space of the type-wheel, which stands normally opposite the printing-pad, is blank, and there is a pin of the series E corresponding to this space. The key corresponding to this pin is to be operated for making blank spaces in the lines of printing for feeding and for making margin.

As the makes and breaks of the break-wheel correspond to the letters on the type-wheel, it will be understood that an instantaneous closing of the circuit occurs for every letter of the type-wheel which passes a given point between the instant it starts to move and the instant it is arrested by a depressed pin, E, and a corresponding number of impulses are sent over the line to operate a receiving-instrument at the other end, which will be presently described.

It will be observed that the paper used is much wider than is used in ordinary printing-telegraphs, and, as has been stated, the printing is arranged in parallel lines. The tubular paper is preferably lapped at its edges to form a proper margin, and when after starting to print a line from a proper point near one edge of the paper the operator observes the line of printing to have approached sufficiently near the other edge, he operates a designated key, which depresses a pin corresponding to the blank space on the type-wheel in order that the wheel and connected feeding mechanism may be operated a sufficient number of times to feed the paper around to leave a proper margin. The inclined lug at the lower edge of sleeve Q² at each revolution of the ratchet-wheel R strikes the pin *q*, projecting from the tubular shaft, so that the sleeve and its arms S are driven upward as the lug rides over the pin. As the arms S rise upward their serrations *s* carry the paper also upward a space proper to receive a line of type, and as the sleeve and its arms fall after the lug rides over the pin, the serrations on the inner periphery of wheel R engage the paper and hold it up, while the arms slip down ready for a new feed.

I will now describe the receiving apparatus which is to be used at the opposite end of the line from the transmitter.

Referring to Fig. 7, the letters A² and A³ indicate, respectively, the top board and base of the receiver, the top board being supported by suitable posts, B² and B³.

Between the two front posts, B² B³, is a cross-piece, C', having a circular opening, through which is arranged a vertical shaft, I', having a step-bearing at its lower end, while its upper end carries a type-wheel, K', and is supported in the same manner as in the transmitter. Near its lower end the shaft I' has a

pinion, I', geared with a train, L', the same as in the transmitter, for driving the shaft I'. Upon this shaft, below the cross-piece C', is secured a star-wheel, V, in which is arranged to play a double escapement pawl or anchor, V', which is secured to the armature-lever of an electro-magnet, Y. When this magnet is intermittently energized by rapidly successive electric impulses, the wheel V, and consequently the type-wheel on the same shaft, are allowed to have a very rapid movement under the influence of the driving-weight, but are always under control, so as to be stopped instantly when the magnet Y ceases to be active.

Through the cross-piece C' is loosely arranged a pin, E², carried by a lever, F², which carries a small armature, *f*¹, arranged to be attracted by an adjacent pole of the magnet Y. When the magnet is inactive, the armature is held up by a spring, *f*², and the tip of pin E² then stands above the lower surface of the cross-piece C'; but when the magnet is active the armature is attracted and the pin E² projects below the cross-piece in the path of a radial arm, M', which projects from the shaft I', so that it will be seen that the said arm and the pin E² effect a positive stoppage of the type-wheel independent of the escapement. The line L, which leads from the transmitter, is connected to a binding-post, N², which is connected with one terminal of the magnet Y, from the other terminal of which a wire, w², leads to the printing-magnet, which is connected to ground by a wire, w¹, the same as in the transmitter. The printing, paper-supporting, and feeding devices of the receiver are the same as those of the transmitter, and are similarly lettered in the drawings, and both the transmitter and receiver are provided with inking-wheels Z, for inking the type-faces of the type-wheel in the usual manner. It will now be understood that when the transmitter has one of its keys depressed for printing and transmitting a certain letter its type-wheel, as has already been explained, revolves with great rapidity until that letter is brought opposite the printing-pad. At the same time the circuit-breaking wheel of the transmitter causes a sufficient number of rapid makes and breaks of the circuit to cause the magnet Y of the receiver and its connected devices to operate the receiver type-wheel for bringing a similar letter opposite its printing-pad, the type-wheel of the receiver pausing exactly as the transmitter-wheel pauses, and during this pause the printing-magnet is energized and operates the printing-pad, the feeding for letters and lines and forming the margin of the page corresponding in the receiver with the similar operations of the transmitter. At every closing of the circuit by the transmitter break-wheel the circuit is closed through the printing-magnet of the receiver; but the printing-magnet of the receiver-magnet is so adjusted that it does not operate its printing-pad

at the time the type-wheel presents the proper letter in correspondence with the pause of the transmitter, when its arm M strikes a depressed pin, E, and thus throws the current of the auxiliary battery on the line. When the first break of the main circuit occurs, the receiver-magnet releases the armature f^1 , and the lever F^2 raises the pin E^2 to release the arm M' , to permit the shaft I' to revolve, and when the arm M' completes its revolution the magnet draws down said armature and projects the pin E^2 to arrest the arm M' at unison.

Having now fully described my invention, I wish it to be understood that I do not limit myself to the precise construction and arrangement of devices as shown in my drawings, but may vary the same in any manner to better carry out the principle of my invention without departing from the true scope thereof.

What I claim is—

1. The combination, in a printing-telegraph apparatus, of a type-wheel, devices for operating the same, means, as shown and described, for supporting a sheet of paper in tubular form adjacent to the periphery of said type-wheel and for feeding the paper circularly step by step and longitudinally line by line, and the electro-magnetic impression devices, all arranged and operating essentially as set forth.

2. In a printing-telegraph apparatus, the combination, with the type-wheel shaft carrying the revolving arm, of a series of stops arranged to arrest said arm at different points, suitable keys for operating said stops, a main-battery circuit, and a make and break wheel therein carried by the type-wheel shaft, and a supplementary battery circuit arranged to be closed to the main line each time the revolving arm strikes one of said series of stops, substantially as and for the purpose set forth.

3. The combination, with the type-wheel shaft of the transmitter, of the perforated plate D, the metallic pins E, arranged to pass through the perforations of said plate, the non-conducting-pin E' , the lever arranged to be operated by all the other levers for raising said non-conducting pin, and the arm M, attracted to the type-wheel shaft, substantially as and for the purpose set forth.

4. The combination, with the type-wheel, its shaft, the break-wheel on said shaft, and suitable electrodes in contact with said wheel, and arranged in a main circuit, of the devices, substantially as described, for propelling the said shaft and arresting the same at desired points, a supplementary battery circuit including a printing-magnet, and connections for closing said supplementary circuit to the main line each time the type-wheel is arrested in position for printing, substantially as described.

5. The combination, with the main and supplementary battery circuits and the transmitting-instrument constructed as described, and provided with means, as shown and described, for automatically closing the supplementary circuit to the main line each time a letter is to be printed, of the receiving-instrument having the magnet Y in circuit with said transmitter, and provided with an armature-lever carrying escapement-pallets, said receiver having also the type-wheel shaft provided with a type-wheel and escapement-wheel controlled by said pallets, and a printing-magnet in circuit with the magnet Y, and adjusted to attract its armature only when the transmitting-instrument closes the supplementary circuit, suitable mechanical motive devices being provided for propelling the type-wheel shaft of the receiving-instrument, said motive devices being controlled by the magnet Y through intermediate mechanism, substantially as described.

6. The combination, with the feeding ratchet-wheel R, having serrations on its inner periphery, and the devices, substantially as described, for rotating said wheel step by step in accordance with the movements of the type-wheel, of the elastic arms S, having serrations on their outer faces, and the automatic mechanism, as set forth, for temporarily lifting said arms for feeding the paper for lines, as set forth.

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

GEORGE M. HATHAWAY.

Witnesses:

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WILLIAM FITCH.