

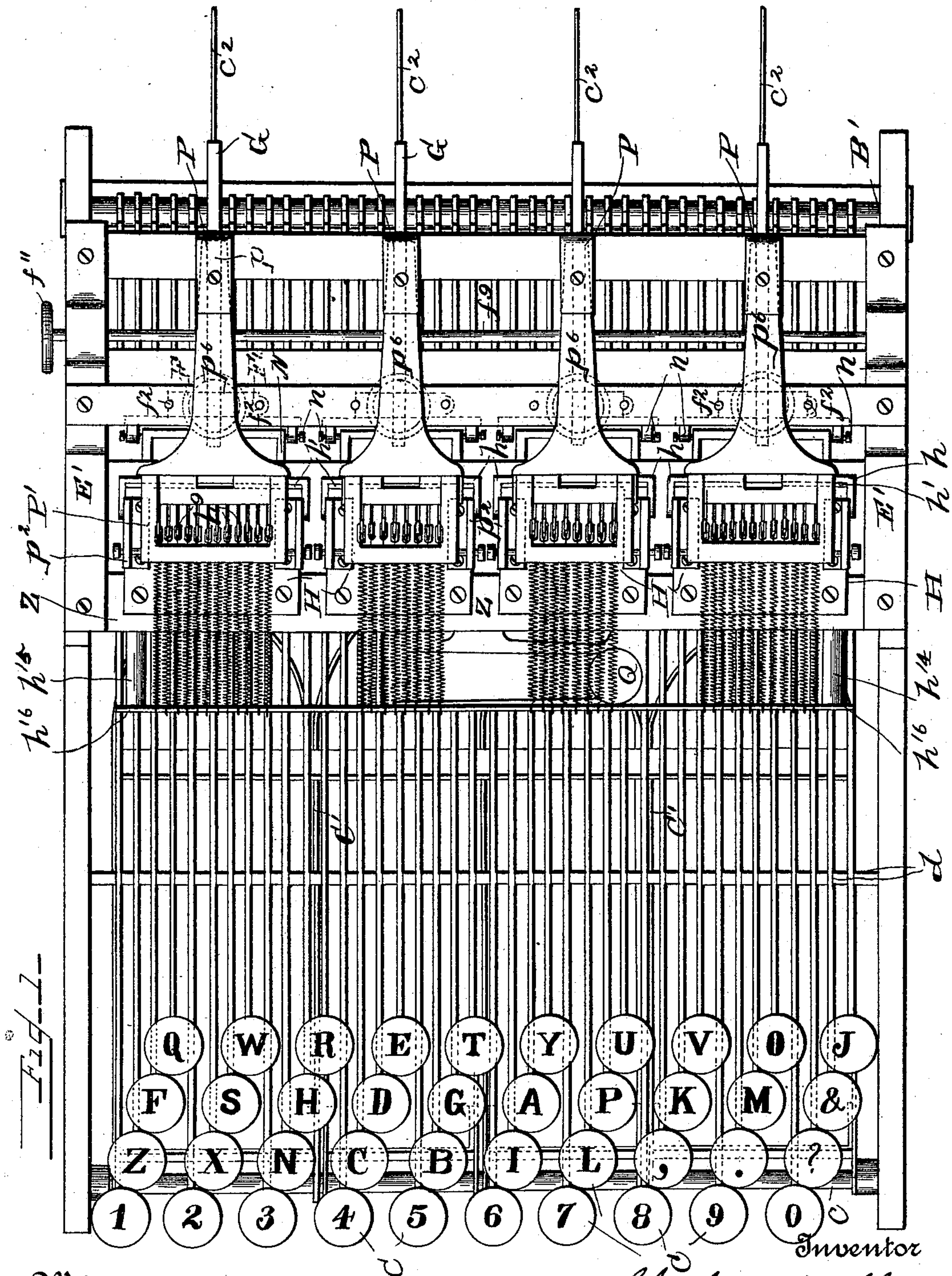
(No Model.)

4 Sheets—Sheet 1.

C. WILLOUGHBY.  
TELEGRAPH TRANSMITTER.

No. 506,294.

Patented Oct. 10, 1893.



Witnesses

*G. A. Taubenschmidt.*  
*Le. P. Whitaker*

Inventor  
*Charles Willoughby*  
By *Edwin S. Clarkson*  
his Attorney

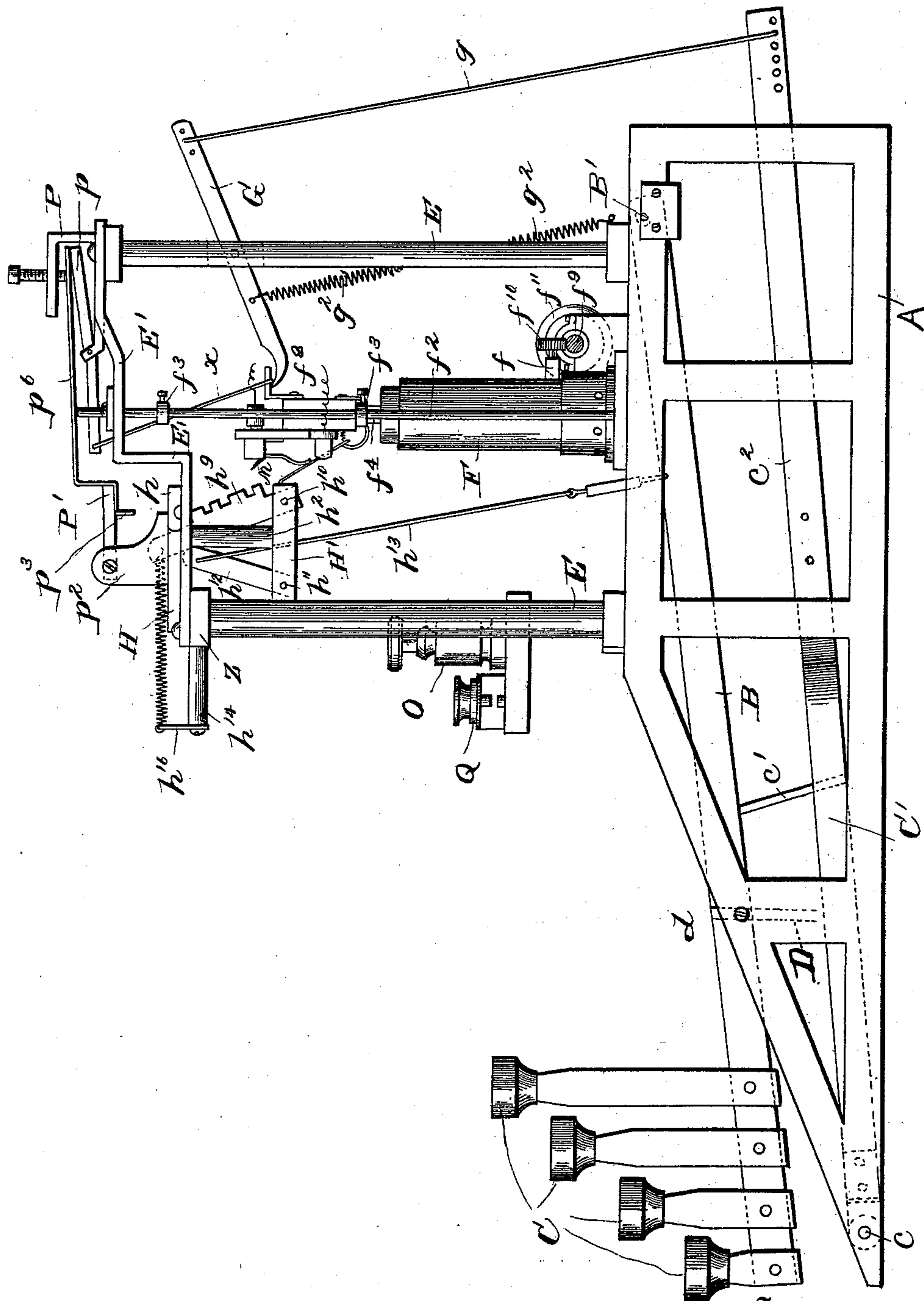
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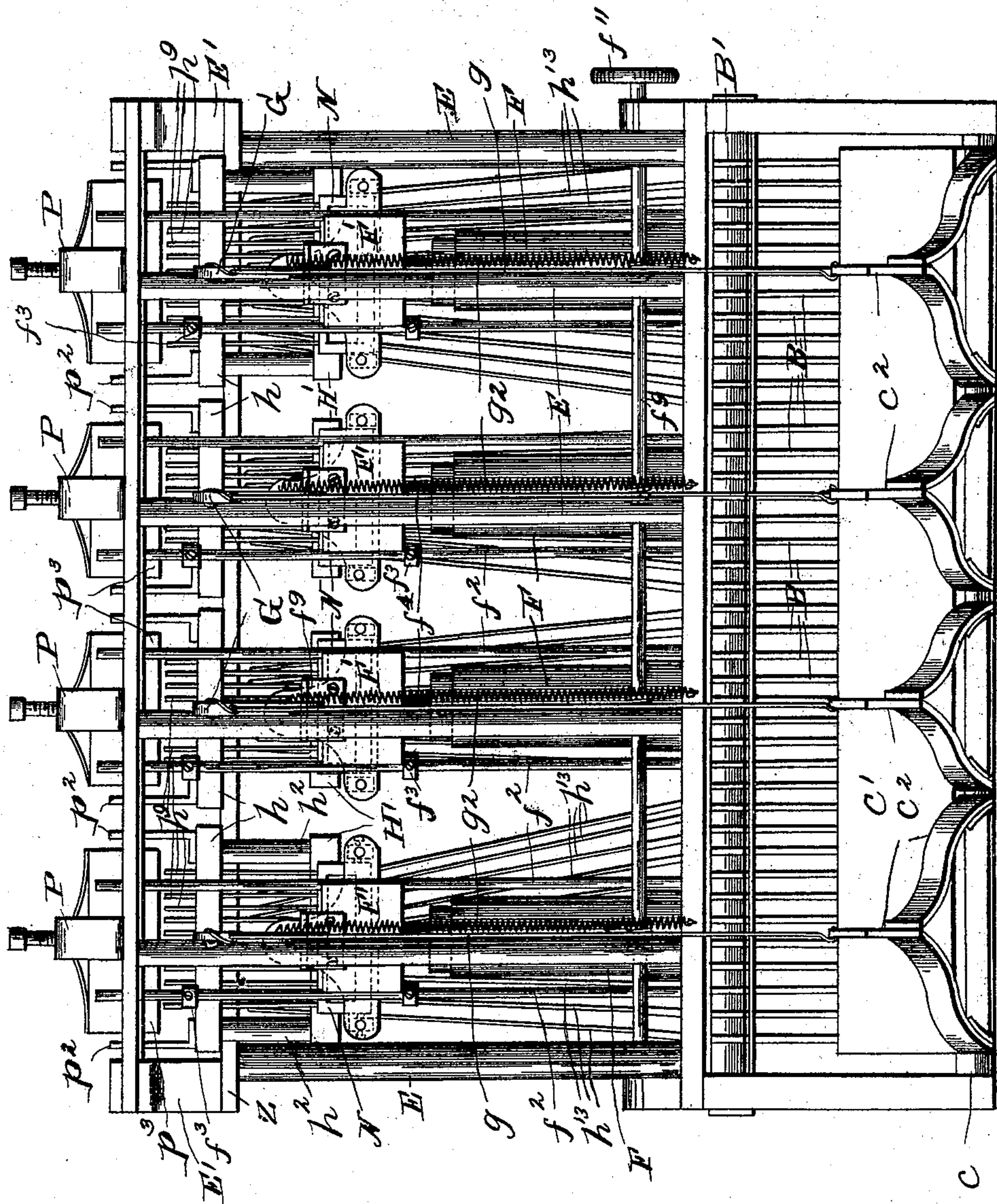
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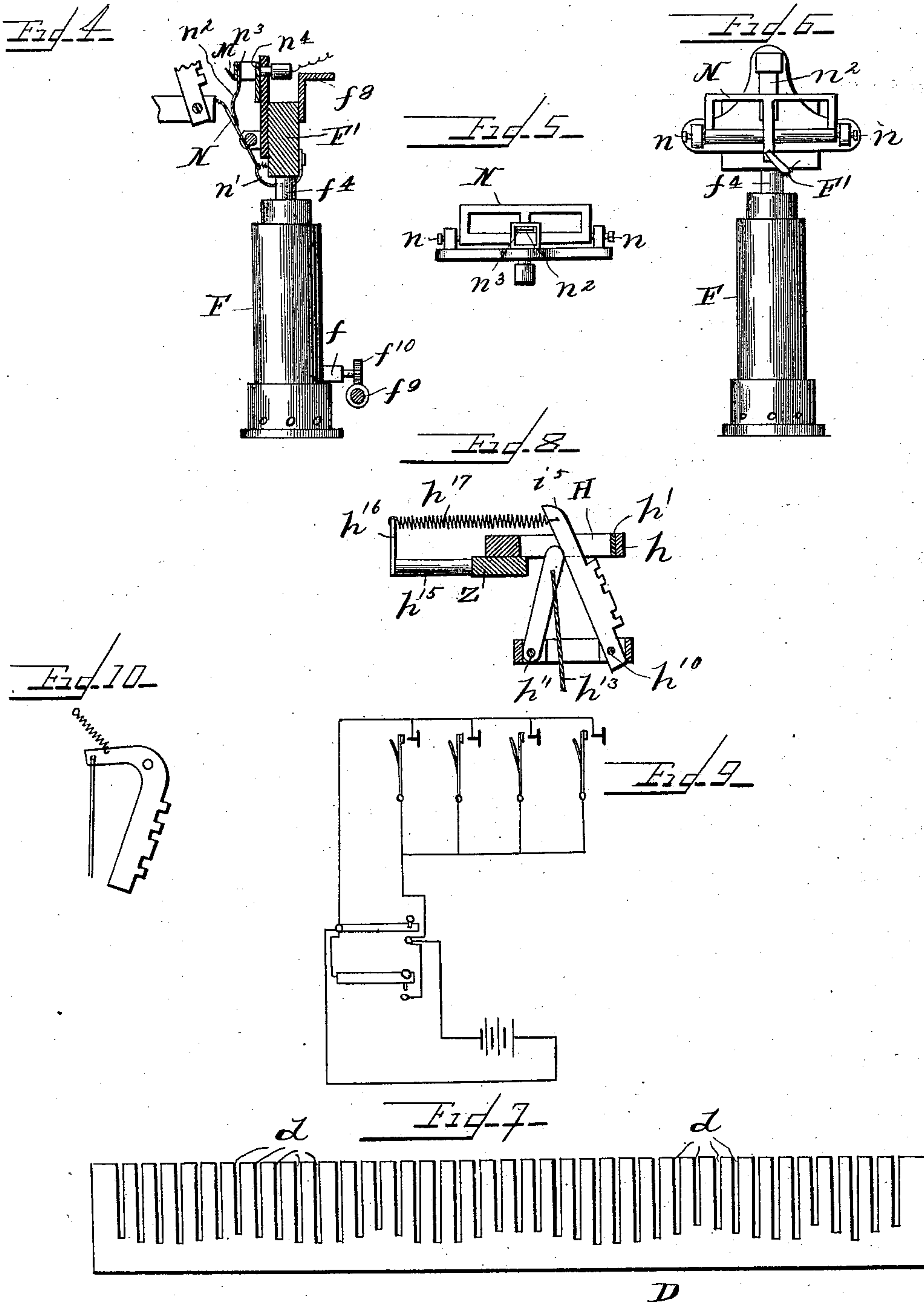
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# UNITED STATES PATENT OFFICE.

CHARLES WILLOUGHBY, OF SAN FRANCISCO, CALIFORNIA.

## TELEGRAPH-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 506,294, dated October 10, 1893.

Application filed December 6, 1892. Serial No. 454,266. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES WILLOUGHBY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Telegraph-Transmitters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to telegraph transmitters.

It consists of a bank of keys, one for each letter or character and other mechanism to be hereinafter fully described and claimed, and is an improvement upon the construction shown and described in my United States Patent No. 480,644, granted August 9, 1892. This invention differs from the one shown in said patent and the improvements are:—

First:—Instead of the raised characters being on two plates and sliding horizontally toward the center; they (the characters) are each mounted on separate levers and brought forward by the pressure of the key. The key board may be divided in one or more divisions having an electric carriage to be hereinafter referred to for each division and any number of letter bars and letters so that the "short words" can be placed on one character lever and made with one impression instead of spelling out separately, thus giving greater speed.

Second:—Instead of having a contact maker and breaker, narrow and pointed as in said patent, it is in this case a wide piece of metal very thin and covers all of the letters in its division as they are presented.

Third:—Instead of the letter bars being all depressed the same distance, they are depressed according to the length of the character represented, thus making the short letters in a proportionate length of time to the long ones.

Fourth:—Instead of the lever which raises the carriage tripping from it at the end of the stroke in this improved construction it always remains in contact with said carriage.

Fifth:—Instead of being confined to one electric carriage, there may be two or more

according to the number of divisions of the key board.

The objects of my invention are to produce a cheap, compact, efficient and thoroughly practical transmitter provided with a bank of keys each of which have a different and predetermined length of stroke, upon which operators who have become paralyzed may send messages very rapidly and one that may be rapidly operated by inexperienced operators; and with these and other important objects in view my invention consists of the parts and combination of parts as will be hereinafter more fully set out.

Figure 1 is a top plan view of the transmitter. Fig. 2 is a side elevation. Fig. 3 is a rear elevation of the same. Fig. 4 is a detail view of the electric carriage and air chamber. Fig. 5 is a top plan view of the maker and breaker detached. Fig. 6 is a front elevation of carriage and air chamber. Fig. 7 is a detail view of the letter bar guide having grooves or slots of different depths. Fig. 8 is a detail view of the character lever and connections. Fig. 9 represents the circuit. Fig. 10 is a detailed view of another form of character lever.

A represents the frame of the transmitter, B the letter bars working on center B' and having hooked ends and arranged on this center in such a manner that they may be lifted out singly without disturbing the other letter bars. This form of bar has been found very desirable, much stronger and less likely to break than the bar usually employed with the pivot opening. C are the keys attached in a suitable manner to the said bars.

C' is a rearwardly extending frame pivoted to the frame A at c and provided with an upwardly extending bar c' (on which rests the letter bars) and rearwardly extending bars or arms c<sup>2</sup>.

D is a bar extending across the frame and is provided with partitions d which form guides for the letter bars to work in. The depth of the guides vary according to the character the bar carries. For instance, for short words or characters the guide is shallow, and for long ones the guide is deeper as will be seen in Fig. 7.

E E are standards extending upward from



the frame A to which is secured a double L shaped frame E'.

Secured to the frame A is an air chamber F (there may be a series of them) provided with a screw valve  $f$  for regulating the escapement of air from the chamber, and a screw valve for regulating the entrance of air to said chamber and with a suitable valve to allow the air to enter the chamber when the piston, to be referred to, is raised and to prevent the air entering as the piston is lowered.

$f^9$  is a worm gear which engages with small gear wheels  $f^{10}$  on the stem of each of the valves  $f$  whereby all of the valves are operated (opened and closed) equally and simultaneously thus regulating each carriage to an equal speed.  $f''$  is a hand wheel for operating this worm shaft.

F' is an electric carriage sliding between guide posts  $f^2$  which are provided with sliding stops  $f^3$  to limit the movement of the carriage. This carriage is connected to the air chamber by means of the piston rod  $f^4$  which is provided with the usual piston head. A roller may be loosely mounted on the rear of this carriage but in the drawings I have shown a projection  $f^8$ .

Pivoted to the standards E in the rear of the machine is a lever G one end of which is adapted to engage a roller or the projection  $f^8$  of the carriage F'. On the rear end of this lever G I secure a wire  $g$  which is carried down and connected with the rearwardly extending arm  $c^2$ . At a suitable point the wire  $g$  may be twisted and formed into a spiral spring or the wire may be as shown.

$g^2$  is a coiled spring one end of which is connected to the lever G while the other end is secured to the frame.

Z is a bar extending across the front of the machine and resting on the standards E.

H represents frames secured on this bar Z. In the drawings I have shown four of these frames, and they are cut in a manner similar to a comb.

$h$  is a strip of metal secured to the frame H on its rear end and between this strip or bar and the ends of the teeth of the frame I secure a piece of rubber which serves as a buffer for the character levers, herein referred to. Depending from this frame H is a post or arm  $h^2$  to which is secured a frame H' in which are secured two rods  $h^{10}$  and  $h^{11}$ . In this frame H' are the character levers  $h^9$  and levers  $h^{12}$  which are journaled, respectively on the rods  $h^{10}$  and  $h^{11}$ . The lever  $h^9$  is the character lever of which there is a series each of which is provided with projections representing a letter, character or symbol. The upper ends of these character levers are beveled and work in the spaces between the teeth of the frame H'. The levers  $h^9$  are journaled on the rods  $h^{10}$  and are connected by means of a cord or other suitable medium to the key bars. This cord is provided with a turn buckle whereby it may be lengthened or shortened at will. The upper

ends of the levers  $h^{12}$  also work in the spaces between the teeth of the frame H' and they are constantly in engagement with the character levers.

Extending horizontally from the bar Z toward the front of the machine are two posts  $h^{14}$  and  $h^{15}$  which are connected by means of a plate  $h^{16}$  having a series of perforations, in each of which, is secured one end of a coiled spring  $h^{17}$ . The other end of this coiled spring is attached to a character lever.

It is obvious that I may dispense with the lever  $h^{12}$  and employ the form of character lever shown in Fig. 10 which in some cases is preferable.

Secured to the rear of the double L shaped frame is a substantially U shaped frame P the lower end of which is provided with a notch in which is pivoted a weighted lever  $p$  one end of which is secured in a suitable manner (as by the cord  $x$ ) to the electric carriage while the weighted end is free.

P' is a frame pivoted between two L shaped pieces  $p^2$  secured to the frame H. This frame terminates in a rearwardly extending tongue  $p^6$  which extends in the U shaped frame and rests upon the free end of the weighted lever  $p$ .  $p^3$  is a suitable catch depending from the frame P'. These catches are in a vertical plane with the back of the character levers when said levers are thrown forward into position. Each of the U shaped frames are provided with set screws which regulate the upward movement of the rearwardly extending tongue  $p^6$ .

N is a metal frame working on the centers  $n$ , secured to the electric carriage F, and is held in its normal position by means of a spring  $n'$ .

$n^2$  is a tongue secured to the frame N and extending above and bent back from said frame, on which is one of the electric points  $n^3$  which when the frame is vibrated, as hereinafter described, makes and breaks the circuit at  $n^4$ . This frame N extends across and takes in all the letters in one division of the machine, so that any letter brought forward presents its projections over which pass the edge of the frame N thus making a signal to correspond to the character presented by said lever.

M is a hinged catch secured to the top of the electric carriage F. The hinge connecting these parts is of such character that the catch M is held at an angle to the carriage when in its normal position. This catch is adapted to engage the projections on levers  $h^9$  and prevent a character being presented while another one is making as will be more fully explained. It is obvious that I may dispense with this catch M.

O is a suitable switch to which electrical connection is made with the electric contact points  $n^3$  and  $n^4$  and to which wires are attached going from the machine to the main wire.

Q represents the ordinary telegrapher's key



which is used in case any one of the keys *b* become damaged or this key may be used alternate with the key bars thus providing an alternate key or sender.

5 The operation is as follows:—The operator presses down the desired key bar, thus through the projection *c'* forcing the rearwardly extending arm *c*<sup>2</sup>, and through the wire *g* operates the lever *g* which is in engagement with the roller or projection *f*<sup>8</sup> and thus raise the electric carriage *F* to a height governed by the depths of the guide *D*. At the same time the wire or rod *h*<sup>13</sup> is pulled down by the key bar thus bringing forward the lever *h*<sup>12</sup> which  
10 pushes the lever *h*<sup>9</sup> before it until it strikes the buffer *h'* where it is held by means of the projection *p*<sup>3</sup> riding up the incline *i*<sup>5</sup> on the end of the character lever and dropping back of said lever. When the pressure is taken  
20 from the key bar the electric carriage descends under its own weight and the frame *N* intercepts in its downward passage, the raised surfaces or projections on the character lever thus making the required signal which is transmitted by suitable wires to the switch *O* from which it goes to the main line wires. When the carriage has returned to its normal position it pulls the cord *x* tight which raises the weighted lever *p* thus disengaging  
25 the projection *p*<sup>3</sup> from the lever *h*<sup>9</sup> which is pulled back to its normal position by means of the coiled springs *h*<sup>17</sup>. The hinged catch *M* as it passes down with the carriage offers very little friction, but should one key be depressed before the other character had been  
30 completed and the carriage be forced upward before the lever *h*<sup>9</sup> has returned to its normal position the hinged catch *M* would catch against the points on said lever and prevent the frame *N* from being damaged and the carriage raised.

Having described the operation of the machine generally I will proceed to describe several parts and groups of parts.

45 When the carriage descends as above set out the frame *N* comes into contact with and rides over the projections or raised surfaces on lever *h*<sup>9</sup> which thus vibrates under this action, being always returned to its normal position  
50 by the spring *n'*, and makes and breaks the circuit by means of the contact point *n*<sup>3</sup> on the tongue *n*<sup>2</sup> coming into contact with the contact point *n*<sup>4</sup>. This frame *N* extends across one division of the machine, there being several, so that any letter which is brought  
55 forward presents the raised surfaces over which pass the edge of the frame *N* making a signal to correspond with the character.

In Fig. 7 I have shown the bar *D* which extends across the machine under the letter bars in which slots are cut or formed for the letter bars to pass down and which holds them in position and steadies them. The open work represents the slots, some of which  
60 are deeper than others, the object of which is to allow some of the letter bars to be de-

pressed a greater distance than others. For instance, in making the short letters *a e T I*, &c., it is only necessary that the letter bar be depressed a short distance raising the electric carriage *F'* far enough to take in the projections representing the respective letter or character, while for the long letters and characters it is necessary to depress the letter bars the full length, so as to raise the carriage  
70 to its full height.

The movement of the electric carriage may be regulated at will by means of the worm gear *f*<sup>9</sup> meshing with the gear wheels *f*<sup>10</sup>. For instance, if it is desired that the operator at the receiving end of the line take the message by sound the sending operator simply turns the hand wheel thus operating the worm gear and gear *f*<sup>10</sup> thus closing the valves *f* and  
80 retarding the downward movement of the carriage *F'*. On the other hand if the message is to be received on tape the operator turns the hand wheel in the opposite direction thus opening the valves *f* wide and permitting the air under the piston head to readily escape  
85 whereby the carriage descends very rapidly. The springs (shown in dotted lines) herein mentioned as desirable, in some cases, on the rods or wires *g* and *h*<sup>13</sup> serve to take the strain or shock which may be given by striking the letter bar too hard, thus relieving the more delicate parts of the machine from the same. At the same time these springs are sufficiently strong to give a positive movement to the rod or wire.  
90  
95  
100

It is evident that many slight changes and alterations may be made in the relative construction and arrangement of the parts and combination of parts without departing from the spirit of my invention and hence, I would  
105 have it understood that I do not confine myself strictly to the parts herein shown, and described, but—

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—  
110

1. In a transmitter substantially as described the electric carriage provided with a hinged catch, in combination with the character levers provided with the raised surfaces  
115 or projections.

2. In a transmitter of the character herein described, of an electric carriage having a contact point, a frame centered on said carriage and provided with a rearwardly extending tongue having a contact point on its end which is adapted to contact with the contact point on the carriage.  
120

3. In a transmitter, the combination with the electric carriage having contact points, of the character levers provided with a beveled upper end, and a catch connected to and operated by said carriage and adapted to engage the character lever and hold it in operative position.  
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130

4. In combination with a transmitter, its electric carriage and letter bars, of the guide



D having grooves or slots of varying depths substantially as and for the purposes specified.

5 5. In a transmitter the combination with the key bars the pivoted frame provided with the rearwardly extending arm the guide D, for character levers, and lever G suitably connected to said bars and arm, of the air chamber, the electric carriage provided with a piston working in said air chamber, the hinge catch and the frame N attached to said carriage and the catch suitably connected with the carriage and adapted to hold the character lever in an operative position.

10 6. In a transmitter the combination with the electric carriage and character levers of the plate located in the path of and limiting the forward movement of the character levers, and a lever pivoted above said plate and provided with a catch adapted to engage said character levers and means to connect said pivoted lever to the electric carriage.

7. In a transmitter the combination of the character bodies, movable carriages provided with contact points, two or more air chambers to which the carriages are connected respectively, valves for said air chambers and means connected to said valves for simultaneously regulating the movement of the same. 25 30

8. In a transmitter the combination with the keys and character lever, of air chambers provided with valves, a gear wheel secured to the stem of said valves, and a worm gear meshing with said gear wheels, an electric carriage connected to said air chamber by means of a piston. 35

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

CHARLES WILLOUGHBY.

Witnesses:

EDWIN S. CLARKSON,  
G. A. TAUBERSCHMIDT.