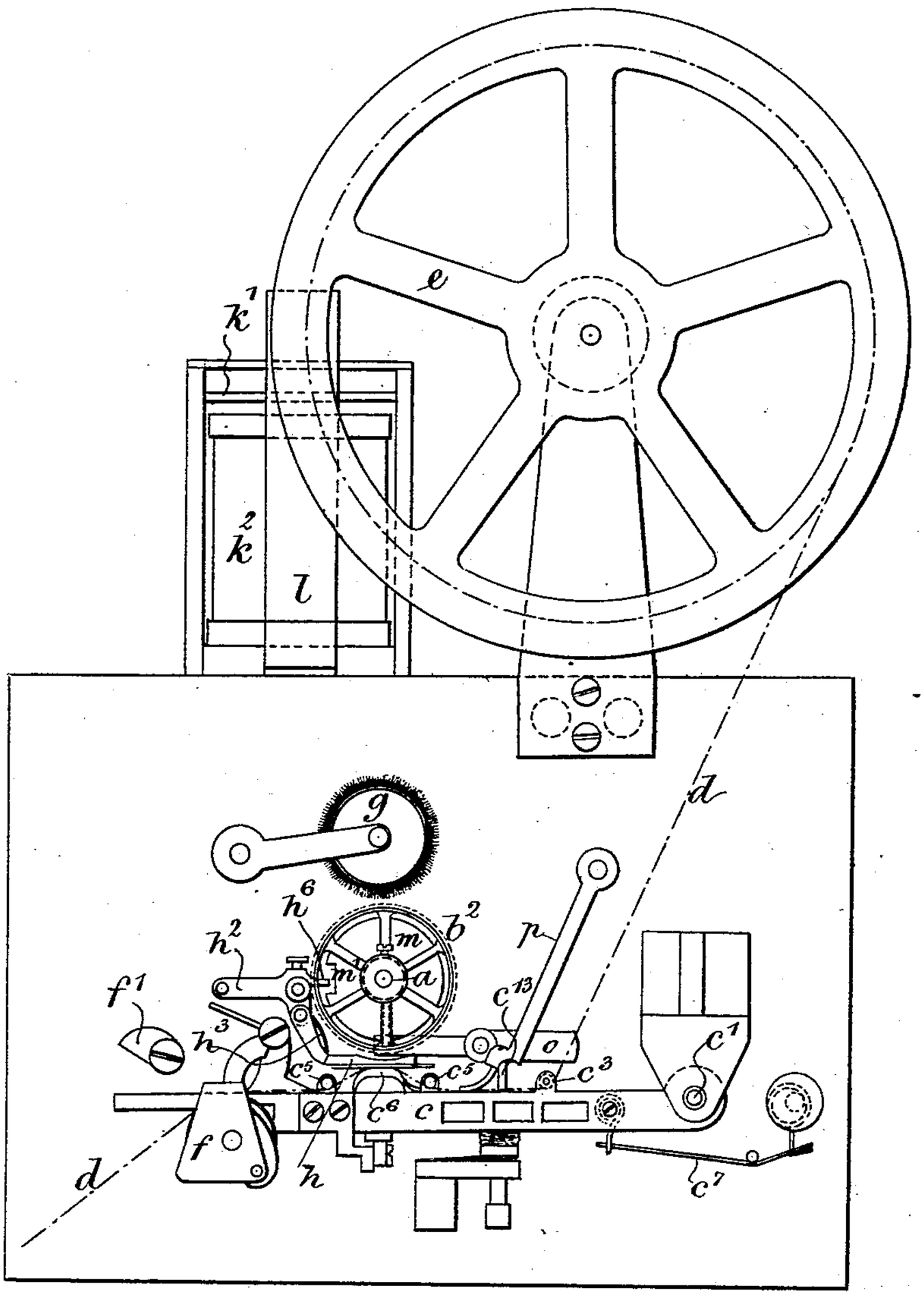
(No Model.) 3 Sheets—Sheet 1.

F. H. W. HIGGINS.

TYPE PRINTING TELEGRAPHIC APPARATUS.

No. 570,852. Patented Nov. 3, 1896.

Fig. 1.



Witnesses.
B. H. Miller.
Guy E. Davis.

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Baldwin Davidson & Wright

(No Model.) 3 Sheets—Sheet 2.

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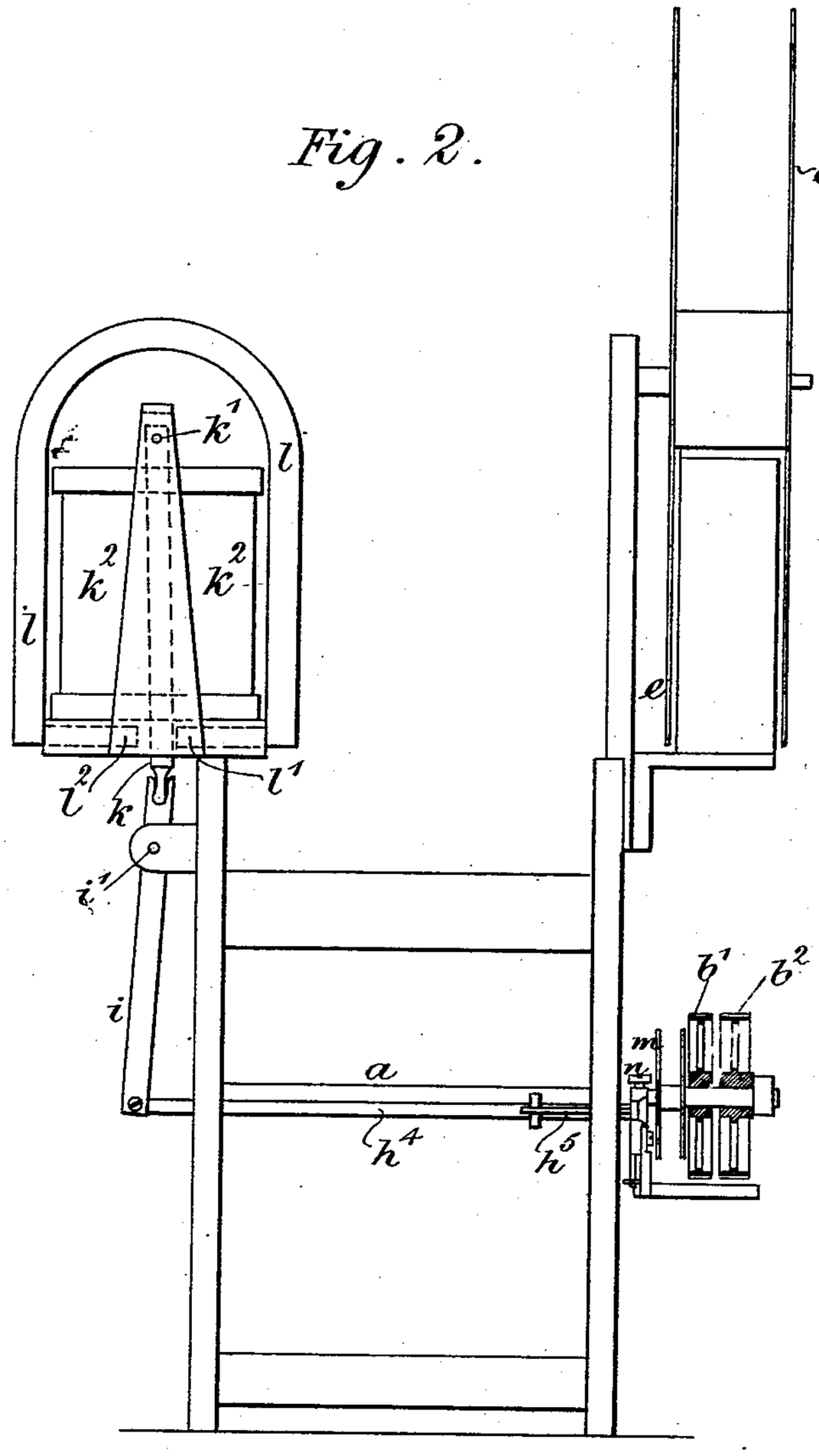
No. 570,852. Patented Nov. 3, 1896.

Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 3.

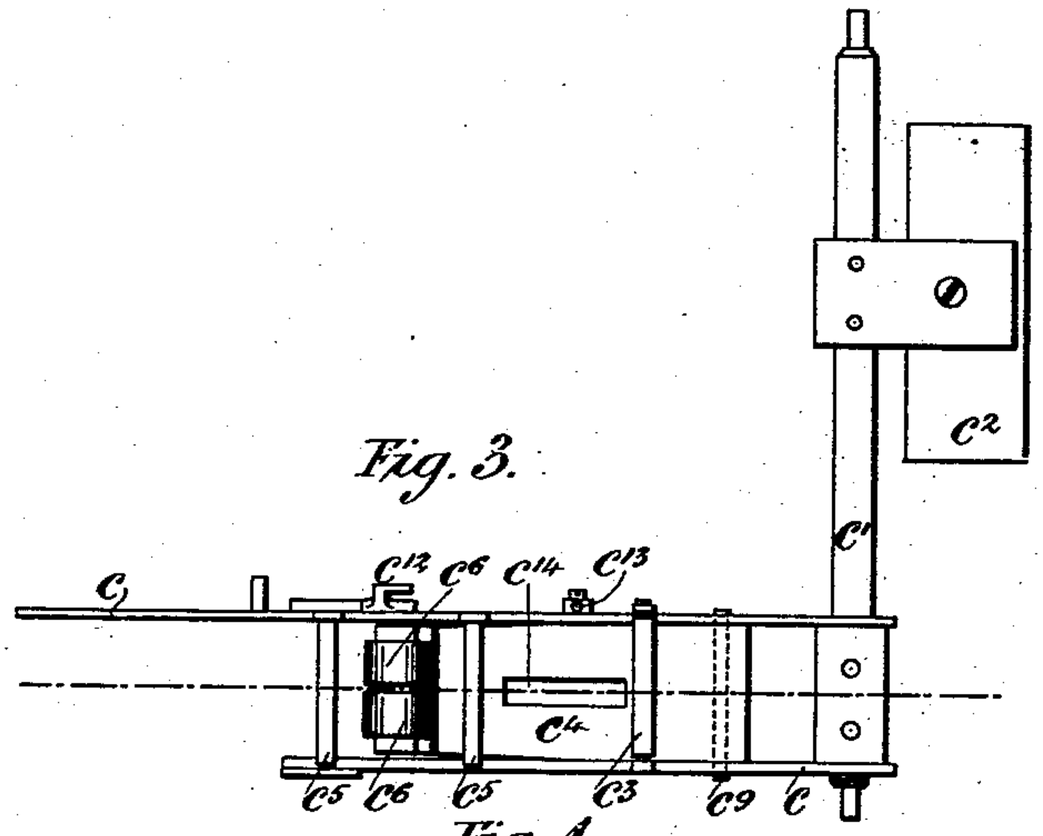


Fig. 6.

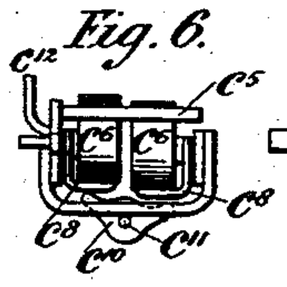


Fig. 4.

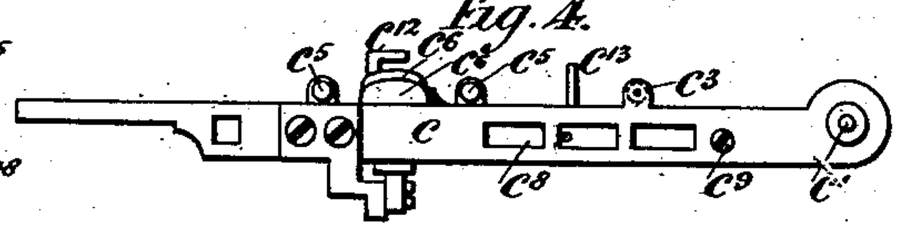


Fig. 7.

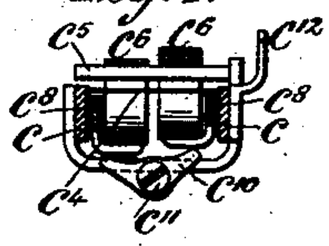


Fig. 5.

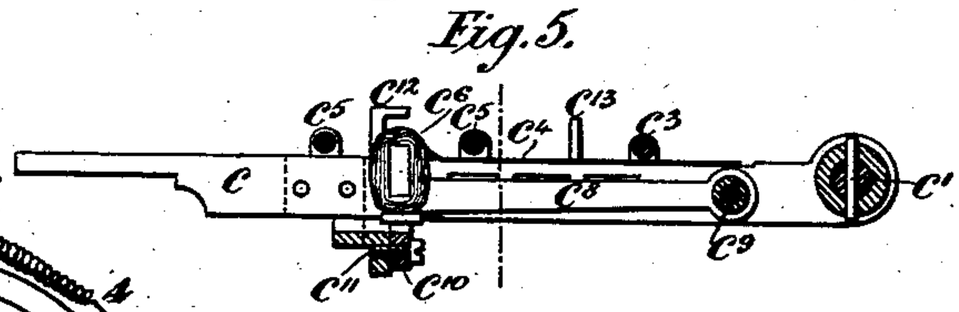


Fig. 11.

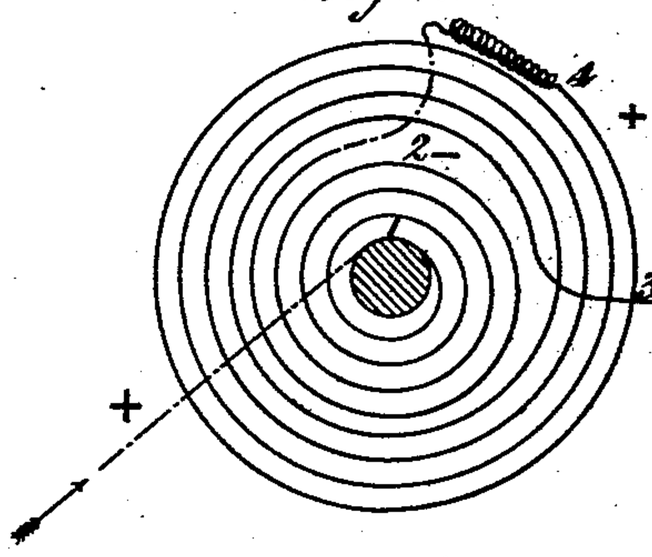


Fig. 9.

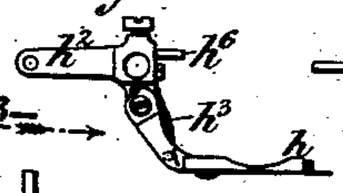


Fig. 10.

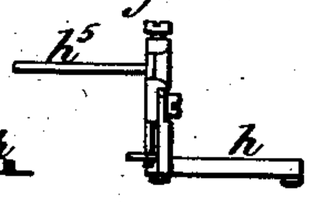


Fig. 8.

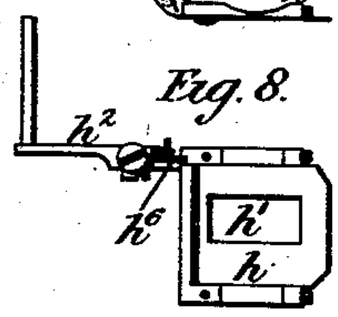
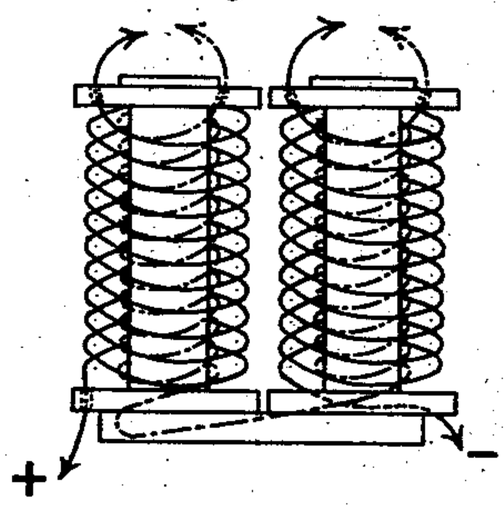


Fig. 12.



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UNITED STATES PATENT OFFICE.

FREDERICK HERBERT WILLIAM HIGGINS, OF LONDON, ENGLAND.

TYPE-PRINTING TELEGRAPHIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 570,852, dated November 3, 1896.

Application filed October 11, 1895. Serial No. 565,358. (No model.) Patented in England October 6, 1891, No. 16,991; in Victoria June 7, 1892, No. 9,706, and in New South Wales June 10, 1892, No. 3,805.

To all whom it may concern:

Be it known that I, FREDERICK HERBERT WILLIAM HIGGINS, electrician, a subject of the Queen of Great Britain, residing at 17 and 18 Cornhill, in the city of London, England, have invented certain new and useful Improvements in Type-Printing Telegraphic Apparatus, (for which I have received Letters Patent in Great Britain, No. 16,991, dated October 6, 1891; in Victoria, No. 9,706, dated June 7, 1892, and in New South Wales, No. 3,805, dated June 10, 1892,) of which the following is a specification.

According to my invention I employ two type-wheels upon a single axis, which is rotated, as usual, either by an escapement or propelment. I also provide a movable shield, which is operated by an electromagnet or magnets in the same circuit with but independent of those employed for the rotation of the type-wheel or for moving the impression-lever and incapable of impeding the motion of either. In this circuit currents alternately positive and negative pass. The movement of the shield in one direction or the other is determined by the direction of the currents, but under the control of a slotted disk on the type-wheel axis, which permits the transit of the shield only in one or other of two positions, or the disk may be dispensed with and the motion obtained by strengthening the current when required.

In order that the interposition of the shield between the type-wheel not being printed from and its impression-pad may not interfere with the printing from the other type-wheel, I provide a separate impression-pad for each type-wheel, and these impression-pads I mount upon a rocking lever supported in the middle. Thus the impression-pads are made self-adjusting and the displacement of one pad by the thickness of the shield raises the other pad to the same extent, thus insuring a perfect impression.

In order to insure as prompt an action as possible in the electromagnets which control the type-wheels, or, in other words, to accelerate the magnetization and demagnetization of the electromagnets, I wind two helices or coils on each magnet-coil, one above the other. They are wound in opposite directions and connected in the circuit in such a manner as to cause the inside and outside of each magnet-coil to be of the same polarity under the influence of the current. The adjoining layers of the inner and outer helices in the middle of the coil are also of the same polarity.

In order that my said invention may be fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

Figure 1 is an elevation of a type-printing telegraph instrument in accordance with my invention. Fig. 2 is an end view, partly in section, of the same, but without the impression-lever, and in these figures also many parts are omitted with which my invention is not concerned. Fig. 3 is a plan of the impression-lever with parts in connection therewith. Fig. 4 is a side view of the impression-lever. Fig. 5 is a longitudinal section, Fig. 6 is an end elevation, and Fig. 7 is a transverse section, of the impression-lever. Fig. 8 is a plan, Fig. 9 is an elevation, and Fig. 10 is an end view, of the shield and parts in connection therewith. Figs. 11 and 12 are diagrams illustrating my improved method of winding the electromagnets by which the type-wheels are controlled.

a is the type-wheel axis. It is rotated in the usual way under the control of the telegraphic currents to bring the type into position for printing.

b' b^2 are the two type wheels or rings which I employ. One has letters upon it and the other has figures, or if desired, one of the type-wheels might have capital letters and the other small letters, or there might be any other desired difference between the characters upon the two wheels.

c is the impression-lever. It is upon an axis c', which also carries an armature c^2. As is usual, an electromagnet is provided to attract the armature c^2. The very rapid alternate currents which control the rotation of the type-wheel have not sufficient permanence to cause the impression-lever to move; but when a current of sufficient duration passes in the line-wire the impression-lever rises and then usually it brings the paper tape into contact with the type.

The paper tape is indicated by a dotted

line marked *d*. It passes from a reel *e* under the guide c^3 on the impression-lever, along the surface of a plate c^4, under guides c^5 c^5, over impression-pads c^6 c^6, which are between the guides c^5, and through the nip of the paper-feeder. This paper-feeder, the parts of which are marked *f*, is of the ordinary sort, and a description of it is therefore unnecessary. It draws the paper forward a short distance each time that the impression-lever rises.

f' is a stop which operates in conjunction with the paper-feeder.

c^7 is a spring which causes the rapid descent of the impression-lever when the armature c^2 is not attracted.

The impression-pads c^6 c^6 are carried by arms c^8 c^8, which are jointed to the impression-lever at c^9, and the pads are further supported by a rocking lever c^{10}, pivoted to the impression-lever at c^{11}.

g is a roller which applies ink to the type.

h is the shield, and h' is a hole in this shield through which the type are able to be brought into contact with the paper. When the impression-lever rises, one of the pads c^6 will be impeded in its upward movement by the shield, but the other pad c^6, being beneath the hole in the shield, will not be so impeded and will press the paper tape *d* against one or other of the type-wheels. The shield *h* is jointed to a block h^2, and a spring h^3 is provided at the joint, which allows the shield to yield to the upward movement of the impression-lever. The block h^2 is fixed upon a rod h^4, (see Fig. 2,) and it is furnished with a guide-stem h^5. This stem and the rod h^4 pass through holes in the framing, and the rod h^4 is jointed to a lever *i*, which has its fulcrum on the frame at i'.

k is a soft-iron rod pivoted on the frame at k' and at its lower end free to play between the pole-pieces l' l^2 of the permanent magnet *l*. The rod *k* is contained within a solenoid-coil k^2, which is in the line-circuit, and is traversed by the currents passing therein. The currents which control the type-wheels do not cause movement of the rod *k*, but currents of longer duration, such as those which move the impression-lever, magnetize the rod *k* sufficiently to induce movement, and movement of the lower end of the rod from one pole-piece to another takes place, provided the rod *k* be free to move and the attractions and repulsions are in suitable directions. The lower end of the rod *k* is jointed to the upper end of the lever *i*. In this way the movement of rod *k* is transmitted to the shield *h*. The block h^2 has upon it a projection h^6, and fast with the type-wheels are two thin metal disks *m m*, similar in all respects the one to the other and with corresponding notches at m'. It is only when the notches m' are opposite to the projection h^6 that any effective movement of the shield can take place. At other times the projection comes against the outer side of one or other of the disks *m*, and so movement is prevented. The notches m' are of such dimensions as to correspond to two steps of the type-wheel. Hence the shield is left free twice in each revolution of the type-wheels, namely, after a step brought about by a positive current in the line-wire and after another step brought about by a negative current in the line-wire. In neither case, however, does the shield move unless the current be prolonged, as for printing.

There are blanks upon the type-wheels in the parts which are over the paper when the shield is shifted, as these parts are not required to print. The impression-lever also is prevented from rising when the projection h^6 corresponds with the notches m' by an adjustable finger *n* on the type-wheel axis, which then stands over the stop c^{12} upon the impression-lever.

o is a zeroizing-finger. Its action is well known and need not be described. It is controlled by a pin c^{13}, projecting up from the impression-lever.

p is a stop-lever. Its lower end rests upon the paper tape, and when the paper passes away from beneath it the end of the stop-lever drops through the hole c^{14} in the plate c^4. The stop-lever then engages with the guide c^3, and the impression-lever is so held down.

In the use of the apparatus the person transmitting the message, when he wishes to make a change from letters to figures, or vice versa, proceeds as if to print with the type-wheels about in the position shown in Fig. 1, with the notches m' opposite the projection h^6. No printing takes place, but the shield moves in one direction or the other, according as the stoppage is made on one or other of the free positions, so the type-wheel which was before covered by the shield and out of use is uncovered and allowed to print, while for the other type-wheel the case is reversed.

I may vary the arrangement by dispensing with the disks *m m* and sending a current of extra strength to move the shield. In this case the movement of the shield is mechanically resisted, so that it remains at rest so long as currents of the ordinary working strength alone are sent.

Figs. 11 and 12 illustrate my method of winding the electromagnets which control the rotation of the type-wheels. The inner coils are, as here represented, wound in one direction and the outer coils in the other direction. Then the coils are joined up so that the current flows around the core in the same direction in each coil. The coils are therefore, electrically considered, wound in the same direction, the inner coil being wound from the inside out in the direction of movement of the hands of a watch and the outer coil from the outside to the inside in the same direction, and both coöperate on the passage of current to magnetize the core. Assuming the two coils shown in Fig. 11 to be equal and that the total discharge at the moment of

breaking circuit to be equal to twenty units, there will be a potential difference between the points marked "1" and "2" of ten units, "1" being positive and "2" being negative. In like manner between the points marked "3" and "4" there will be a potential difference of ten units, "4" being positive and "3" negative. Thus the adjacent layers or surfaces "2" of the inner coil and "3" of the outer coil are of the same sign or polarity, and their mutual repulsion facilitates the discharge of the magnet or the dispersal of the extra current.

I claim—

1. A type-printing telegraph instrument having two type-wheels, a shifting shield adapted to cover or be brought in front of either type-wheel and leave the other type-wheel exposed, two impression-pads, one for each type-wheel, the impression-lever on which the pads are mounted, a single line-circuit, electromagnetic devices in the line-circuit for actuating the impression-lever, and electromagnetic devices also in the line-circuit, independent of those actuating the impression-lever, for shifting the shield to interpose it between either type-wheel and its impression-pad and leave the other type-wheel exposed to its pad so that an impression may be taken therefrom, substantially as set forth.

2. A printing telegraph instrument, having two type-wheels, an impression-lever, two impression-pads, one for each wheel, mounted on the impression-lever, means for actuating the impression-lever, a shield adapted to be interposed between either type-wheel and its pad, means for operating the shield, and a rocking lever pivoted on the impression-lever and operatively connected with and supporting each pad, whereby when one pad strikes against the shield the other one is thrown up into operative position.

3. A type-printing telegraph instrument having two type wheels or rings and a shield which allows one only to print at a time, an electromagnetic device in the line-circuit serving to shift the shield and notched disks rotating with the type-wheels which at the proper time permit the shield to be moved.

4. In a type-printing telegraph instrument the combination of parts as follows: the type-wheel axis a, the type wheels or rings b' b^2; the notched disks m m the shield h with its projection h^6 and the magnet and coil k and l serving to move the shield.

5. In a type-printing telegraph instrument, the combination of parts as follows: the type-wheel axis a; the type wheels or rings b' b^2; the shield h; the impression-lever c; and the two impression-pads c^6 c^6, these pads being carried by and independently mounted upon the impression-lever and supported by a rocking lever on opposite sides respectively of its pivot so that in the act of printing they move inversely, the pad which comes against the shield yielding and the other pad rising as it carries the paper into contact with the type.

6. An electromagnet having two windings, one superposed upon the other, which, electrically considered, are respectively wound from the inside to the outside, and from the outside to the inside, and connected so that the current will pass around the core in the same direction, substantially as and for the purpose set forth.

FREDERICK HERBERT WILLIAM HIGGINS.

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EDMUND S. SNEWIN.