

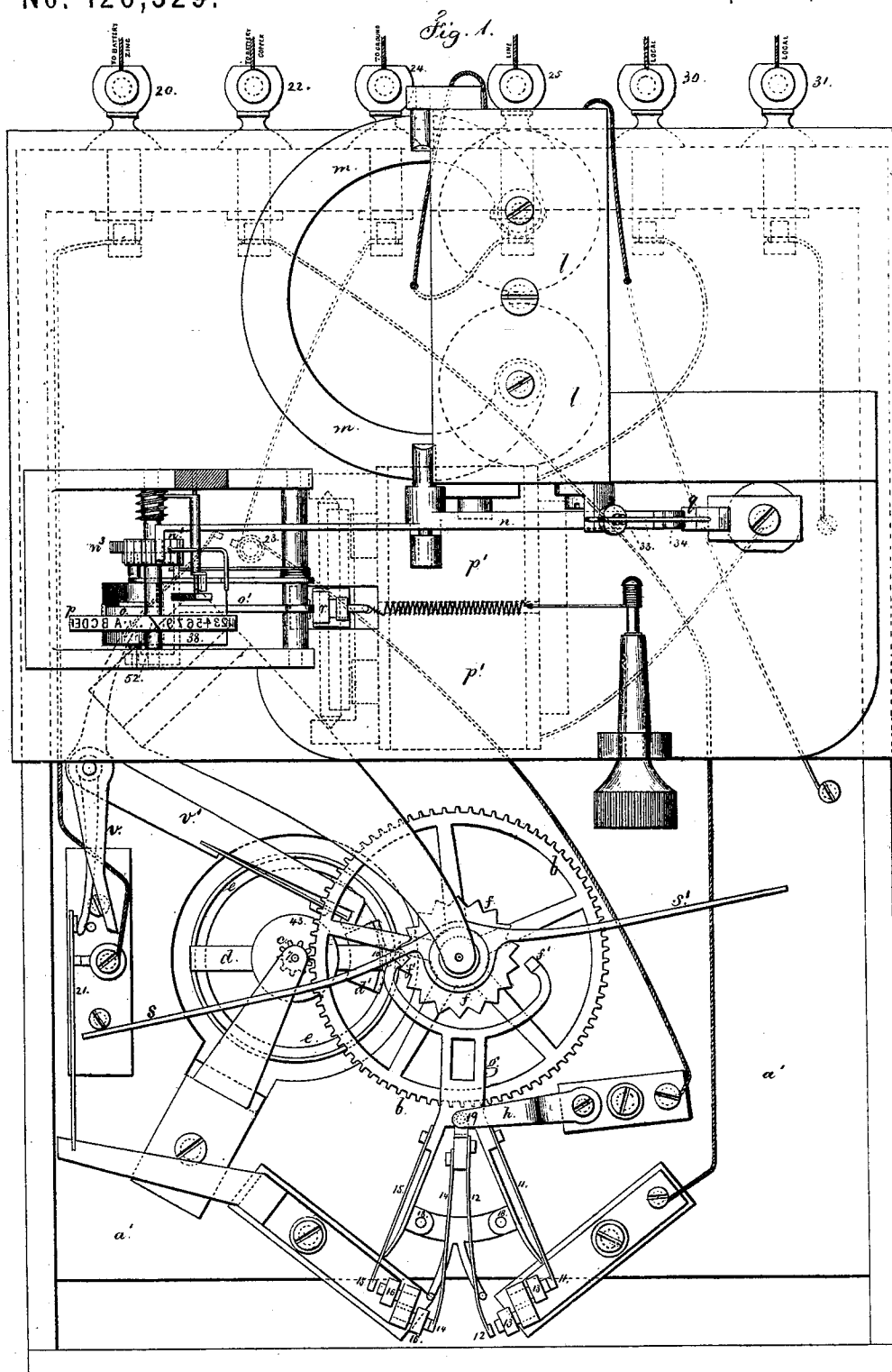
3 Sheets--Sheet 1.

GEORGE M. PHELPS.

Improvement in Printing-Telegraphs.

No. 126,329.

Patented April 30, 1872.



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Fig. 6.

2/3 3/4 5/6 7/9 5/6

Fig. 4.

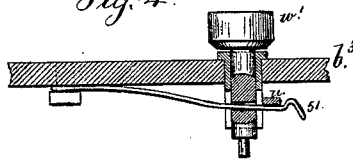


Fig. 5.

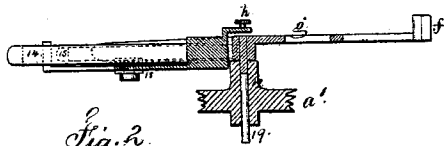
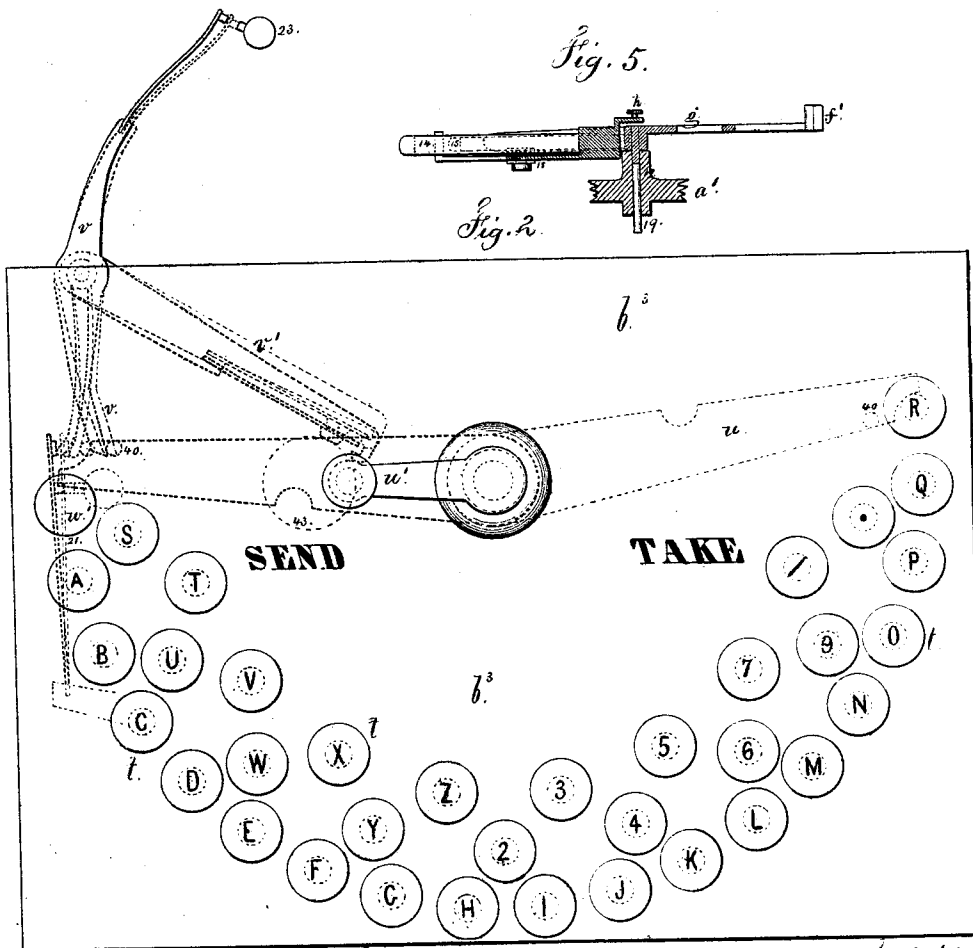


Fig. 2.



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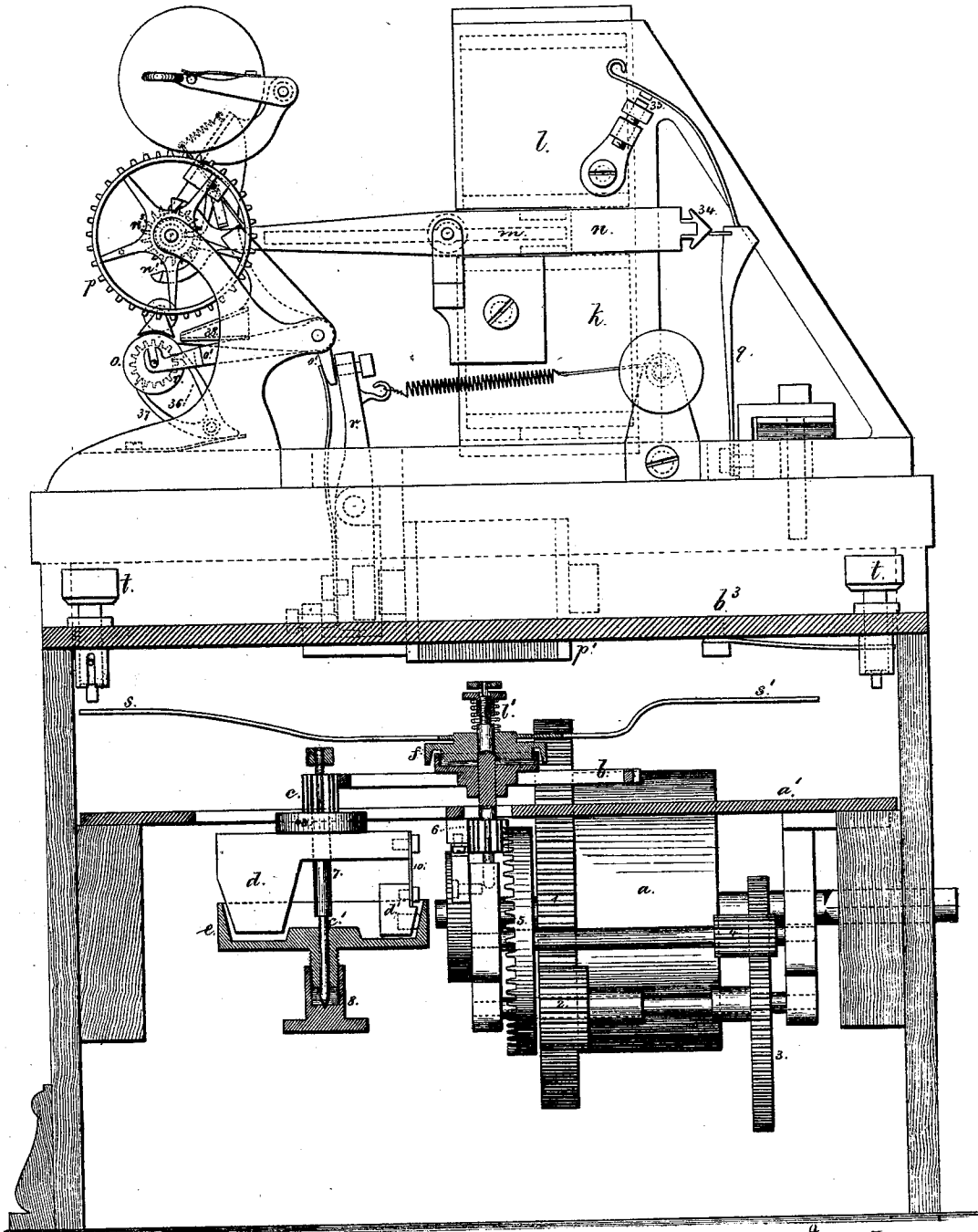
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Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE M. PHELPS, OF BROOKLYN, E. D., NEW YORK, ASSIGNOR TO
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IMPROVEMENT IN PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. 126,329, dated April 30, 1872.

To all whom it may concern:

Be it known that I, GEORGE M. PHELPS, of Brooklyn, (E. D.,) in the county of Kings and State of New York, have invented an Improvement in Telegraph Apparatus; and the following is declared to be a correct description of the same.

This invention is made for sending pulsations of alternate polarity over the main line to the receiving instrument, and there operating through electro-magnets and a polarized armature upon a lever, escapement, and type-wheel. A pause in the transmission brings into action the electro-magnet that effects the printing. The special features of my improvements relate to an adjustable governor for regulating the speed of the instrument; an escapement and alternate reverse circuit-closing mechanism; an arrangement for changing the connections by switches for receiving or sending messages; a permanent magnet vibrating between two electro-magnets by the reversal of the polarity of those magnets to actuate the type-wheel lever, and an impression-roller and lever actuated by a blow from the armature-lever of an electro-magnet.

In the drawing, Figure 1 is a general plan, the key-board being removed, and this key-board is shown detached in Fig. 2. Fig. 3 is an elevation of the printing mechanism and section of the adjustable speed-governor. Fig. 4 is a section of one of the keys. Fig. 5 is a section of the pulsator, and Fig. 6 represents the fractional characters printed.

The barrel *a* is rotated by a spring or weight, and is wound in any desired manner. It gives motion to the train of gearing 1 2 3 4 5, and the wheel 5 revolves the pinion 6 of the horizontal wheel *b*, and this rotates the pinion *c* of the governor. The arbor 7 of the pinion *c* is made to slide vertically in its bearings, and upon the lower bearing *c'* is a screw-step, 8, that can be adjusted from below, and raise or lower the arbor 7 and the governor, which is made of the weight *d* at one side and the spring 10 and centrifugal friction-brake *d'* at the other side, said brake being inside the stationary conical shell *e*, so that by raising the governor-spindle the distance between the surface at *d'* and *e* will be increased; hence the speed will not be checked until the centrifugal force is sufficiently powerful to bring the brake *d'* into contact

with the inside of the shell *e*. By adjusting the spindle 7 vertically by the screw-step 8 the speed of the instrument will be regulated with great accuracy. The pulsator-wheel *f* is upon the arbor of the wheel *b*, and held by an adjustable spring, *b'*, and friction-clutch, so that the pulsator can be stopped, but the clock movement continue. The pulsator-wheel *f* acts upon the inclined pallets *f'* of the pulsator *g*, and vibrates the same. The pallets may be double to give motion in both directions, as shown, or one pallet and a spring may be used.

The spring circuit-closers 11 and 12 are upon opposite sides of the contact-screws 13, and the circuit-closers 14 and 15 are on opposite sides of the contact-screws 16. The circuit-closers are all made to yield by being at the ends of spring-arms, but these are limited in their motions by stops, so that when 11 and 14 are in contact 12 and 15 will be out of contact with the respective screws 13 and 16, and the reverse, and the circuit-closers 12 and 14 are insulated at the points of connection 18 from the circuit springs 11 and 15. These circuit-closers 11 and 15 are in metallic contact, through the axis 19 of the pulsator, with the bed *a'*, while the circuit-closers 12 and 14 are in metallic contact, through the stud over the axis 19, (see Fig. 5,) with the insulated spring and plate *h*. The connections are from the battery-screw 20, through switch 21 to screws 16, and from the other battery-screw 22 to the screws 13, while the connection from *h* goes by the post 23 to the ground-connection 24, and from the plate *a'*, through the magnets *k l*, to the line-wire 25, to the same place on the distant instrument.

It will now be seen that, as the pulsator *g* is vibrated by the pulsator-wheel the positive current passes from the screw 22 to 13, thence, by 11, 19, bed *a'*, magnets *k l*, to the line 25 and distant instrument, and by the connections in the same instrument at the receiving-station when positioned to "take" the message, as hereafter stated, returns by the ground through 24, 23, *h*, 14, 16, and 21, to the negative battery-screw 20. When the pulsator *g* is moved the other way to that shown, the current is reversed, and comes from 22 13, through 12 *h* 23 24, to the ground, and returns, through 25, magnets *k* and *l*, bed *a'*, 19, 15, 16, and 21, to binding-screw 20. The magnets *k l*, at the sending and receiving stations, will always be

in the electric circuit, and the pulsations will correspond, and the polarity will be changed according to the direction of the current, and the permanent magnet armature *m* will be vibrated between them and held to either magnet alternately, according to the polarity, and this vibration of the armature *m* acts, through the lever *n*, upon the step-by-step mechanism or impelling pallets *n'* to move the type-wheel *p*, and set the same in the proper position, the type-wheels at sending and receiving stations corresponding. The impression is made of the paper against the type by the roller *o*, that is moved by the electro-magnet *p'*; this magnet is in a local circuit, the battery-wires of which are connected to 30 and 31, the wire from 30 going to the magnet *p'*; from *p'* the wire connects with the insulated spring *q* and spring-anvil at 33, thence by the frame and to 31. The spring *q* and anvil 33 are moved by the vibration of the lever *n* and double incline 34, so that the circuit at 33 is constantly being closed and broken, and the local battery does not exert sufficient power in the electro-magnet *p'* to move the armature and lever *r* thereof until the pause occurs in stopping the type-wheel; then the lever *r* acts by a blow upon the tail of the bent lever *o'* carrying the roller *o*, and imprints the paper against the type.

In this construction, the momentum of *o o'* effecting the printing, the roller *o* and paper instantly fall sufficiently from the type to prevent blurring the impression, as the type-wheel commences to move even while the magnetism still remains in *p'*. The paper is fed by the pawl 36 turning the ratchet-wheel of the roller *o* as the roller descends; and 37 is a stop-arm. 38 is the paper-guide.

The mechanism for arresting the transmitting pulsator *g*, and thereby stopping the type-wheels at the designated letters, consists of the arms *s s'*, that revolve with the pulsator-wheel *f* of the pulsator, and the keys *t*, shown in Figs. 2, 3, and 4. For convenience these keys are arranged in two semicircles, and the arm *s* acts with the outer range and the arm *s'* with the inner range. Each key is made as a sliding-stem, kept up by a spring, but when depressed the arm *s* or *s'* is arrested, and the pulsator stopped until the key is liberated, when the motions of the pulsator and type-wheels are resumed. The marks on the finger-keys and the letters of the type-wheel are properly arranged, so that when either arm *s* or *s'* is stopped the letters on the type-wheels corresponding to the mark on the key *t* will be in position for printing.

It is to be understood that the pulsator is operative at the sending station only, the description of the connections aforesaid relating to the sending. Upon reference to Figs. 2 and 4, it will be seen that beneath the key-plate *b*³ there is an arm, *u*, operated by a handle, *w'*, above the plate. When the handle *w'* is turned to "send," the arm *u* is simply out of the way, in the position shown by the light dotted line in Fig. 2. When the handle *w'* is turned to

"take," the arm *u* is in the position shown by the heavy dotted lines. As *u* is turned its end overrides the spring 51 of the blank key *w'*; (see Figs. 2 and 4,) thereby that key is depressed and stops the arm *u*; at the same time a pin, 40, on *u* acts against the lever *v*, opening the circuit at 21 and closing the circuit at the post 23, so that at the receiving station the pulsator being stopped the current will come in either by the line or ground and pass through 23, lever *v*, bed *a'*, and wire to the magnets *k l*.

The movement of the lever *v* is by preference availed of to stop the unnecessary movement of the train of gearing when receiving a message. For this purpose the arm *v'* and a spring friction-brake is employed to take against the wheel 43 on the arbor 7, and stop the movement of the parts.

The type-wheel is made with letters and figures, also punctuation marks, and a diagonal dash is also employed, as shown at 52, Fig. 1; and by means of this dash I am enabled to print fractions by three impressions, as indicated in Fig. 6: thus, the numerator of the fraction is first impressed, then the diagonal dash, and afterward the denominator.

I claim as my invention—

1. The adjustable governor, made with a centrifugal brake revolving within a conical shell, in combination with the revolving arm or arms *s s'* and range of finger-keys, substantially as set forth.

2. The revolving arms *s s'*, driven by a frictional connection to the motor, in combination with the spring finger-keys *t* and pulsator *g*, substantially as and for the purposes set forth.

3. The pulsator *g* and switch 21, with their respective connections to the battery, line, and ground, substantially as shown, in combination with the lever-arm *u* and lever *v*, substantially as set forth.

4. The armature *m*, vibrating between two electro-magnets by the change of polarity in the current, in combination with the lever *n* impelling pallets *n'* and wheel *n*³ for moving the type-wheel, substantially as set forth.

5. The vibrating circuit-closer, *g*, actuated by the type-wheel lever *n*, in combination with the printing-magnet and percussion impression-roller, substantially as set forth.

6. The pulsator *g*, made with the yielding circuit-closers 12 and 14, insulated from the circuit-closers 11 and 15 and in contact with the spring *h*, in combination with the circuit-closers 13 and 16 and connections, substantially as set forth.

7. The inclined dash 52 on the type-wheel for printing fractions, as set forth.

8. The pallet or pallets *f f'* and actuating-wheel *f*, in combination with the pulsator *g*, substantially as and for the purposes set forth.

Signed by me this 21st day of February, A. D. 1872.

GEO. M. PHELPS.

Witnesses:

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CHAS. H. SMITH.