C. F. JOHNSON.

ELECTRIC TELEGRAPH.

No. 5,568. Patented May 16, 1848.

Fig. 3.

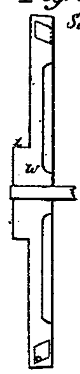


Fig. 2.

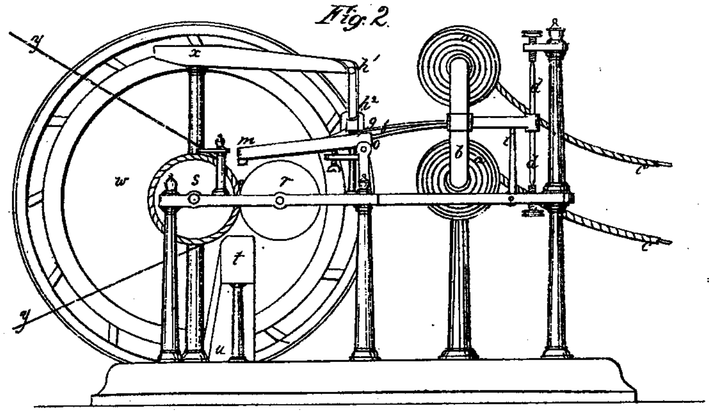


Fig. 4.

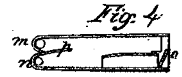


Fig. 5.

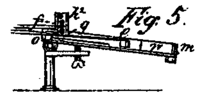
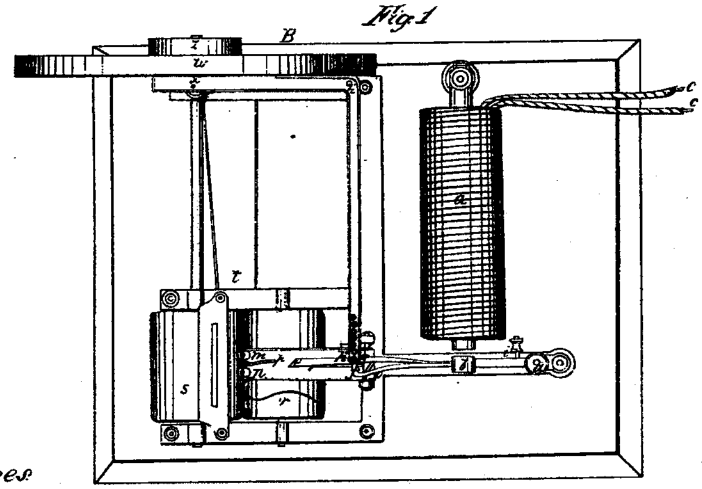


Fig. 1



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UNITED STATES PATENT OFFICE.

CHARLES F. JOHNSON, OF OWEGO, NEW YORK.

IMPROVEMENT IN ELECTRIC TELEGRAPHS.

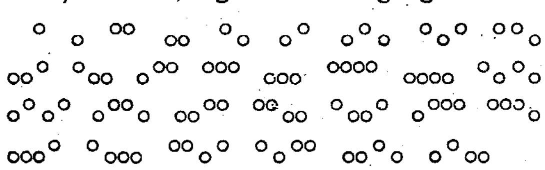
Specification forming part of Letters Patent No. 5,568, dated May 16, 1848.

To all whom it may concern:

Be it known that I, CHARLES F. JOHNSON, of Owego, in the county of Tioga, State of New York, have invented certain new and useful Improvements in Electric Telegraphs; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, to wit:

I employ in operating my telegraph a galvanic battery, a single galvanic circuit with the means of breaking and closing said circuit at pleasure, and an electro-magnet; but as I claim nothing new as respects any of these parts, and they have been long well known, it is unnecessary particularly to describe them.

I form signs in making communications by dropping, as hereinafter particularly described, small metallic balls—say one-twelfth of an inch in diameter, or common shot of that size—upon an endless belt moving with a uniform velocity. The balls dropped upon the belt, upon either side of a longitudinal line, (the belt being in motion,) are, as dropped in succession, distributed upon it and spaced off in groups of one or more balls, thus forming the following signs:



I thus form thirty signs by the use of four balls and under. For additional signs, as may be required, I employ five balls. With the signs thus formed any communication can be made, and the communication can be read off directly from the signs as they appear upon the endless belt, such length being given to the belt as may seem most advisable—as, say, six feet; but in order to the more convenient reading off, and to obtain permanent signs, I propose to take off impressions from the balls thus forming signs by passing the belt with the balls upon it under a roller with an elastic periphery and carrying a strip of paper. The roller with the paper being pressed down upon the belt, the balls, as they pass under it in succession, make impressions or indentations on the paper, and thus fac-similes of the signs formed by the balls upon the belt are taken off on the paper. These indentations on the paper, or copies of the signs formed by the balls, may be obtained more directly, and without the intervention of the belt, by dropping the balls directly in contact with the paper as it passes perpendicularly downward, carried between two rollers moving with a uniform velocity, the only difference being that in this case the indentation is taken off from the ball immediately on its being dropped and before the other balls forming with the first a sign are all dropped; and, as this may be regarded as the most simple and convenient mode of operating, I now proceed to describe the form of apparatus proper for it, reference being had to the drawings accompanying and making part of this specification.

Figure 1 is a plan of the apparatus, showing the parts in their places; Fig. 2, elevation from side A of the plan; Fig. 3, section of the elevating-wheel; Fig. 4, detached plan of the chute; Fig. 5, section of chute and escapement in place, seen from side B of plan, Fig. 1.

The same letters in all the figures refer to the same parts.

a a is an electro-magnet, of the usual form and construction, placed in a galvanic circuit extended between the two stations communicating, with the means at the station making the communication of breaking and closing the circuit at pleasure; *b b*, the armature; *c c*, the ends of the wire forming part of the circuit, shown as detached.

Attached to the armature is what I call an "escapement," composed of an axis, *d d*, on which it turns, and of two arms extending beyond the armature. (Seen most clearly in the plan, Fig. 1, as *b g e* and *b f*.) These arms are separated, say, about one-fourth of an inch at the points *f* and *g*, as seen in the plan, Fig. 1, and one of them, *b f*, is at the point *f* about one-twelfth of an inch above the other at the point *g*, as seen most clearly in the section of the chute and escapement, Fig. 5. These arms are of wire, flattened at the points *f* and *g*. The upper one, *b f*, is bent at right angles at *f*, as seen in the plan, Fig. 1. The lower one, *b g*, is continued about an inch beyond the point *g* to *e*, where it has a diagonal lip turned downward. (Seen most clearly in Fig. 5 at *e*.) This escapement is connected with an inclined channel of brass, $h' h^2$, Figs. 1 and 2, in which are the balls, and constitute with it what I call the "dropping apparatus." This channel is terminated at its lower end, h^2, in a tube about one-fourth of an inch in length and about one-tenth of an inch in diameter. (Seen most clearly in Fig. 5 at h^2.) The balls pass by gravity along the channel $h' h^2$ to its lowest point, and thence into the short tube.

The lower arm of the escapement, when the apparatus is at rest, is directly under the end of the tube, and the most advanced ball rests upon it, as seen at *g*, Fig. 5. The upper arm of the escapement *b f* has its bent end, which is brought to an edge directly opposite the tube h^2, Fig. 5, and there is a transverse opening in the tube to admit this bent end whenever the escapement-arm is moved laterally toward it.

A light spring, *i*, Figs. 1 and 2, acts upon the escapement and removes the armature attached to the escapement-arms about one-sixteenth of an inch from the electro-magnet, and holds it at rest against a stop, with the arms of the escapement in positions relative to the tube, as described—that is to say, with the arm *b g* directly under the tube and the arm *b f*, with its bent end just entering the transverse opening in the tube.

The operation of the apparatus will be as follows: When the magnet is put in action by closing the circuit the armature will be attracted to it and will carry the lower arm, *b g*, of the escapement laterally from under the tube h^2, causing the ball resting upon it to drop. At the same time the bent end of the upper arm, *b f* of the escapement will be thrown into the tube h^2, and will arrest the descent of the ball next above the one dropped, it being understood that the balls in the tube and channel touch one another or follow each other in succession. When the circuit is broken and the magnet ceases to act the spring *i* carries back the armature and escapement-arms to their former position. The ball that was arrested by the bent arm of the escapement, as described, will immediately fall upon the lower arm, *b g*, of the escapement, thus occupying the position of the ball that was dropped, all the balls in the tube or inclined channel at the same time advancing a space equal to the diameter of one of the balls. All the parts will thus be brought into positions ready for dropping another ball on again closing the circuit. The balls, when dropped, fall upon an inclined chute, *m o*, Figs. 1 and 2, and seen separately in plan, Fig. 4, and also seen in section and in connection with the escapement in Fig. 5. This chute is of brass, about half of an inch in width and one and a half inch in length, with sides one-fourth of an inch high. It has at its lower end two orifices or short tubes, *m n*, Figs. 1 and 4, as shown at *m*, Figs. 2 and 5. These tubes are about one-tenth of an inch in diameter and one-fourth of an inch long. A partition, *p*, Figs. 1 and 4, extends about half an inch up the chute between the two orifices or tubes, and reaches from the orifices nearly to the diagonal lip *e*, Figs. 1 and 5, on the end of the lower and longer arm of the escapement *b g e*.

The chute has a slight lateral inclination toward the side of the orifice *m*, Fig. 1, so that the ball, when dropped, will naturally pass along that side of the chute to the orifice *m* and pass through it. In order to make it pass to the other orifice, *n*, it must be diverted from its natural course, and this is done by the diagonal lip *e*, Fig. 5, attached to the lower arm of the escapement. This lip reaches down to just above the bottom of the chute, as seen at *e*, Fig. 5, and is diagonal to its direction, as seen at *e*, Fig. 1.

When the armature and escapement are in their position at rest, held by the spring *i* against the stop, the distance of this lip from the side *m* of the chute is such as to allow the ball to pass freely along that side to the orifice *m*; but when the armature is brought up to the magnet to drop a ball this lip will also be brought up to the side *m* of the chute, and if it be kept there it will interrupt the line of motion of the ball and divert it to the opposite side of the chute, or to the side *n* of the partition *p*, Fig. 4, and it will pass to the orifice *n*. Now, as the interval of time required for the ball, when dropped, to arrive at the point in the chute opposite the diagonal lip *e* is greater than that required by the spring *i*, Fig. 2, to throw back the arm with the diagonal lip when the ciruit is broken instantly after being closed, the consequence is that when the ball is dropped by an instantaneous action of the magnet—that is, if the circuit be closed and instantly broken—the ball dropped will pass to the orifice *m*; but if the action of the magnet be prolonged by keeping the circuit closed a short interval of time, it will pass to the orifice *n*.

Having thus the means of dropping balls and causing them to drop at pleasure through either of the two orifices or tubes, *m* or *n*, they may be dropped and distributed upon an endless belt moving just below the orifices with a uniform velocity, thus forming the signs before described.

In order to take off impressions from the balls upon paper as they are dropped, two rollers, *r* and *s*, Figs. 1 and 2, mounted upon axis and turning with a uniform velocity, are placed at right angles to the chute, with their peripheries in contact, their line of contact being directly below the two orifices or tubes, *m* and *n*, as seen most clearly in Fig. 2. These rollers are of wood, about one and a quarter inch in diameter and about an inch long. They have grooves around them, (not seen in the drawings,) forming at their point of contact circular orifices—say about one-eighth of an inch in diameter—perpendicularly below the orifices in the chute. One of these rollers, *s*, is covered with an elastic cloth or buckskin;

or it may be made of cork, in which case it would require little or no groove. These rollers carry between them a narrow strip of paper, *y y*, Fig. 2, (not shown in Fig. 1,) which they draw off from a roll by their motion and deliver out. When a ball is dropped and passes out of the orifices in the chute it falls directly in contact with the paper and in the grooves in the roller *r*, and is carried through between the rollers by their motion, indenting the paper on a line corresponding with the orifice through which the ball dropped. It is easy to see how the indentations thus made on the paper, corresponding, as they will, with the balls dropped, will be copies of the signs before mentioned.

The balls, as they pass from between the two rollers, by their motion fall into an inclined channel of wood, *t u*, Figs. 1 and 2, about three inches long, placed below the rollers and parallel to their axes. The balls then pass by gravity along this channel, and are delivered from it into the buckets of the elevating-wheel W, Figs. 1 and 2, upon the same axis with the roller *s*. This wheel is shown in section, Fig. 3. They are raised by this wheel, and delivered from it at its most elevated point into the inclined channel *x*, Figs. 1 and 2, placed parallel to and close to the side of the wheel. From this channel they pass to the channel $h' h^2$, with which the former is connected, as seen at h', Fig. 1. They are thus returned to the dropping apparatus, and a succession of them is constantly kept up, their number being such as always to afford a supply at the dropping-point h^2.

Uniform motion may be given to the apparatus in any convenient way by power applied to the pulley *z*, Figs. 1 and 3, upon the axis of the elevating-wheel.

If an endless belt is used, it is best to make its outer surface of some rough substance, as velvet, that the balls, when dropped upon it, may have no tendency to change their places on it.

I have also contemplated employing two circuits to form signs for telegraphic purposes by dropping balls of differents sizes or different colors, and made numerous experiments to test the operation, as also the employing the deflective power of the current upon a needle, using a single circuit for the purpose of dropping balls of two descriptions, and thus forming telegraphic signs; but I regard all these methods as inferior to the method of operating above described.

Having thus fully described my invention, what I claim in it as new, and desire to secure by Letters Patent, is—

1. The forming signs for telegraphic purposes by the dropping of balls upon an endless belt moving with a uniform velocity, substantially in the manner described.

2. The taking off impressions on paper from balls as dropped, substantially in the manner described, for telegraphic purposes.

In witness whereof I have hereunto set my hand this 3d day of April, in the year 1848.

CHAS. F. JOHNSON.

Witnesses:

STEPHEN DEXTER,

F. J. FAY.