3 Sheets—Sheet 1.

L. BIRGE & C. D. WILLIAMS.

Fire-Alarm Telegraph.

No. 209,645. Patented Nov. 5, 1878.

Fig. 1.

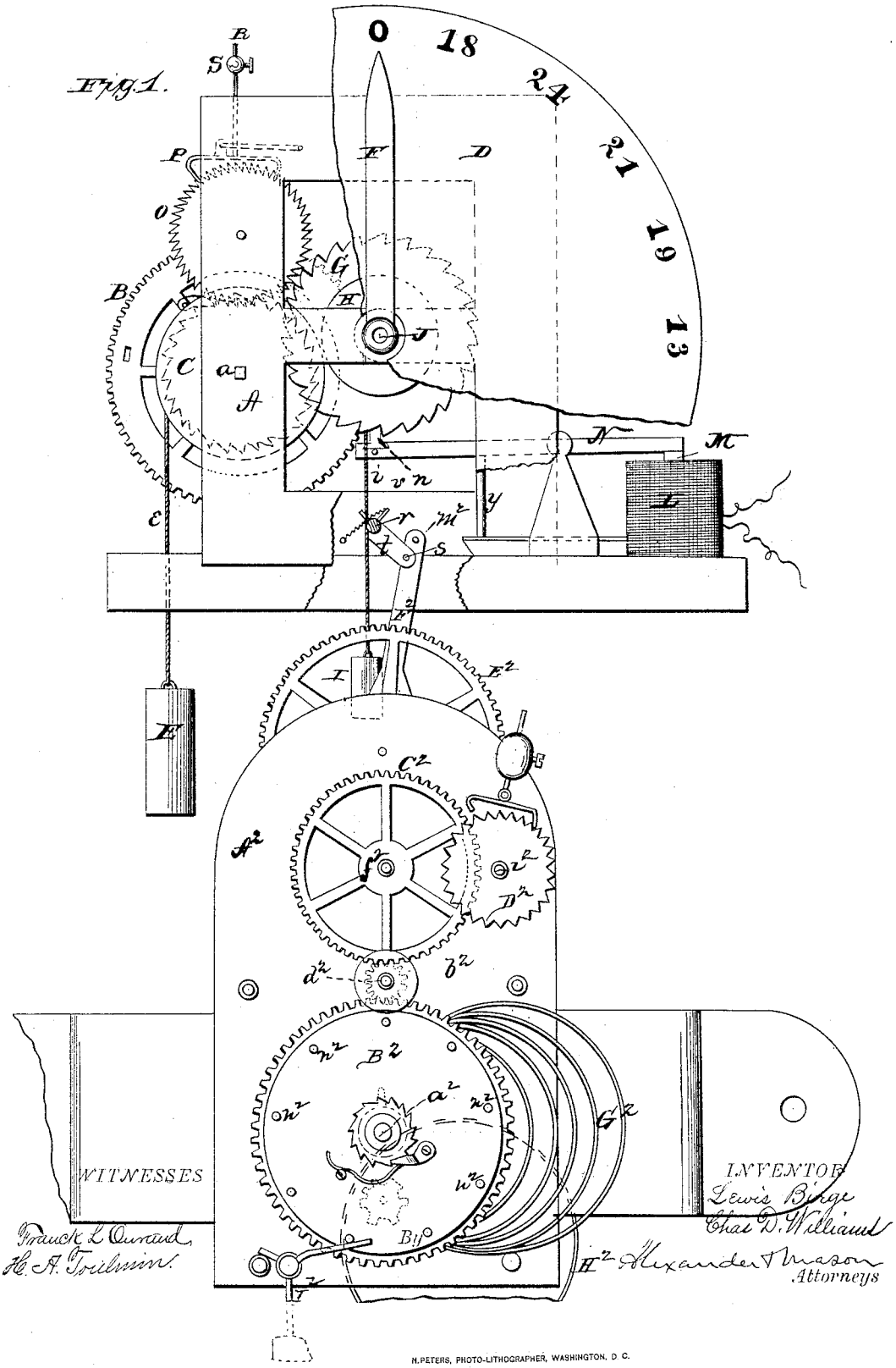

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Fig. 2.

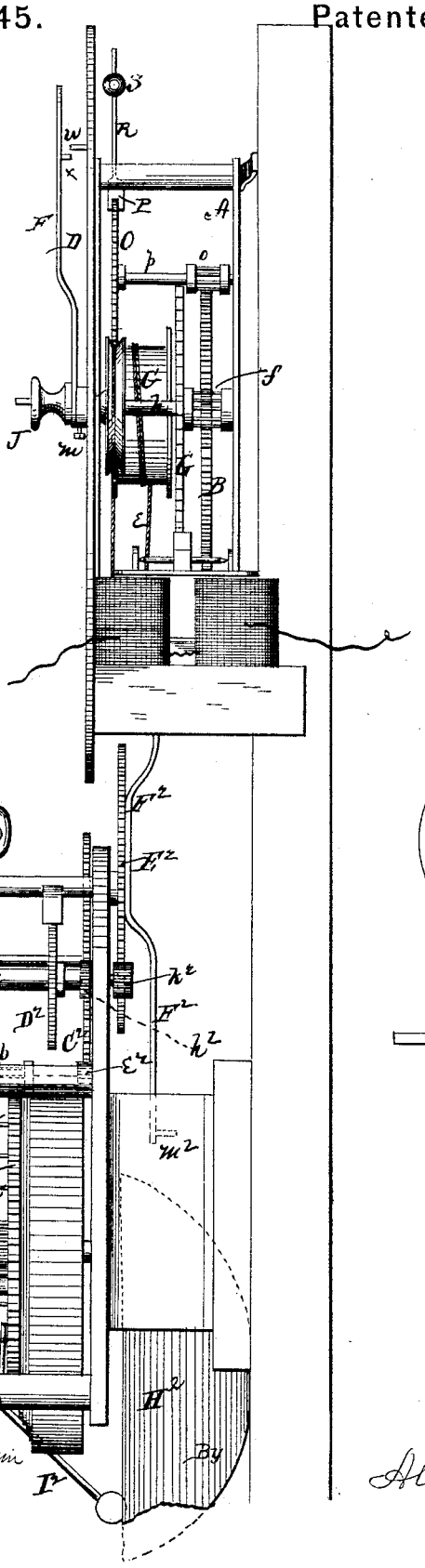
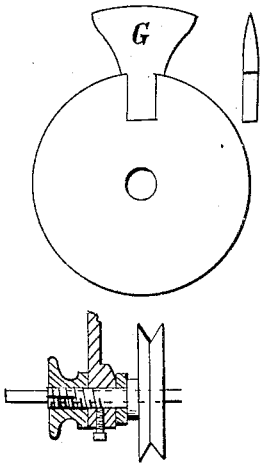


Fig. 3.



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Charles D. Williams
Alexander Mason
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Fig. 4.

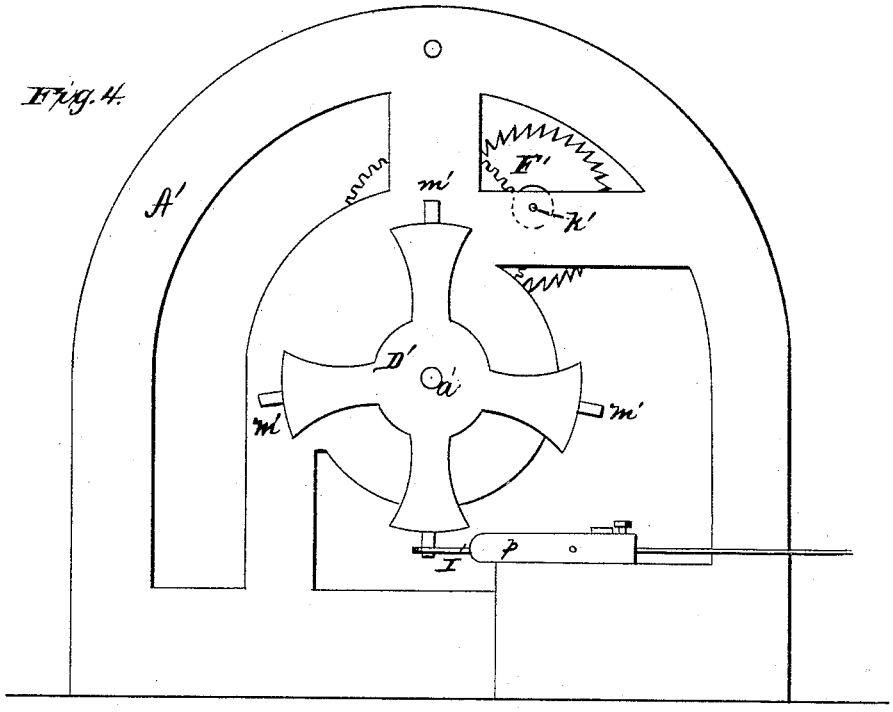


Fig. 5.

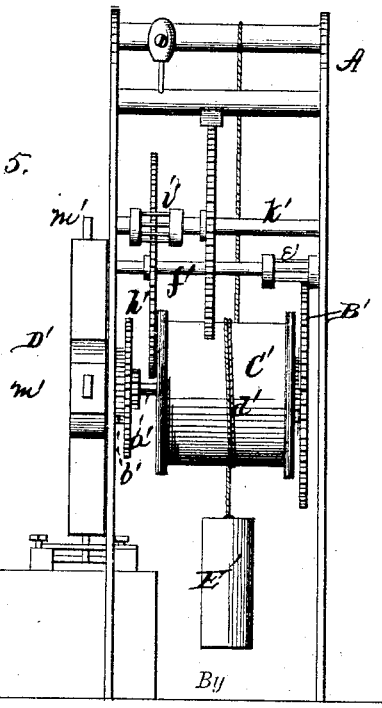
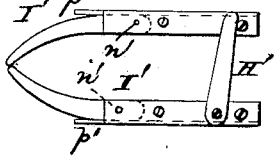


Fig. 6.



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UNITED STATES PATENT OFFICE.

LEWIS BIRGE AND CHARLES D. WILLIAMS, OF ST. PAUL, MINNESOTA; SAID BIRGE ASSIGNOR TO HENRIETTA HILDEBRAND, OF SAME PLACE.

IMPROVEMENT IN FIRE-ALARM TELEGRAPHS.

Specification forming part of Letters Patent No. **209,645**, dated November 5, 1878; application filed May 15, 1878.

To all whom it may concern:

Be it known that we, LEWIS BIRGE and CHAS. D. WILLIAMS, of St. Paul, in the county of Ramsey, and in the State of Minnesota, have invented certain new and useful Improvements in Telegraphic Fire-Alarms; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

Our invention relates to the telegraph fire-alarm for which Letters Patent No. 183,364 were granted to us October 17, 1876; and it consists in certain improvements thereon, as will be hereinafter more fully set forth, and pointed out in the claims.

In order to enable others skilled in the art to which our invention appertains to make and use the same, we will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a front elevation of the indicator and gong-striker. Fig. 2 is a side view of the same. Fig. 3 is a view of a cam used in the box mechanism. Fig. 4 is a front view, and Fig. 5 a side view, of the box mechanism. Fig. 6 is a plan view of the circuit-closer.

A represents the frame of the indicator of our telegraph fire-alarm. B is the driving-wheel upon the shaft *a*, and connected to said shaft by a pawl, *b*, and ratchet-wheel *d*. On the shaft *a* is secured a drum, C, or reel, having cord or chain *e* wound thereon, and a weight, E, suspended by said cord.

The driving-wheel B meshes into a pinion, *f*, on a shaft, *h*, which drives the hand F on the dial-face D to the number on said dial corresponding to the number on the box pulled. On the shaft *h* are also secured the lug-wheel G and grooved wheel H. This grooved wheel H is used, by means of a cord or chain, *i*, and weight I, to draw the hand F back to zero on the dial after it has gone to the number on the box sending in the alarm. The hand F is held on the shaft *h* by a slotted tube, *k*, and friction binding-nut J. The hand is fastened on the tube *k* by a set-screw, *m*, and the nut J screwed up on the slotted tube, which constitutes the friction holding the hand to the shaft. When the hand goes back to zero this binding-nut must be unscrewed to allow the slotted tube to revolve on the shaft, it being understood that the grooved wheel H is fast on said slotted tube and secured on the shaft by the tightening of the nut J.

L L represent the magnets, with armature M and lever N. On the inner end of the lever N is secured a lug, *n*, which may be made of ivory or other non-conducting substance, or it may be made of a conducting substance; but this is not as good as a non-conducting substance. When the circuit is closed this lug strikes into the depression on the wheel G, and holds the hand F to the number on the dial-face corresponding to the number of the box pulled. When the circuit is opened the lug *n* falls out of the depressions in the lug-wheel G, and permits a free revolution of said wheel G and hand F. The driving-wheel B also meshes with a pinion, *o*, on a shaft, *p*. On this shaft the escapement-wheel O is placed, with the escapement P above it, for the purpose of regulating the speed of the gears.

On the escapement P is the pendulum R, with adjustable ball S, by which the speed of the gears is regulated and the motion equalized.

In the bottom of the frame A is a rocker-shaft, *r*, having a projecting arm, *t*, which has a pin, *s*, connecting with a pin, *v*, on the armature-lever N, for the purpose of holding the revolving arms on the gong-striker, and striking at the same time the armature-lever in such a way as to throw the ivory lug *n* out of the depressions in the lug-wheel G, so that when the circuit breaks it allows the gears and hand F to revolve freely to the number of the box on the dial-face, and remain there until liberated.

It will be seen that the pin m^2 in the arm F^2, attached to the gear of the gong-striker, comes in contact, while revolving, with the pin *s* on the arm *t* of the rocker-shaft *r* of the indicator, the effect of which is to throw the arm and pin of the rocker-shaft forward. The pin *s* on said arm is thus brought in contact and engages with the pin or lug *v* on the side of the armature-lever N, and stops the movements of the gearing of the gong-striker when the circuit is closed.

The propelling-weight E, attached by the

cord *e* to the drum C of the driving-wheel-shaft *a*, is for the purpose of driving the gears, &c. The small weight I is used to draw the hand back to zero.

In the front part of the frame is a pin, *w*, which, in connection with a pin, *x*, in the hand F, is for the purpose of stopping the hand at zero. The general effect of the above combination is to send the hand on the dial-face of the indicator instanter to the number of the box sending in the alarm, and at the same instant to ring the bell attached to give notice that an alarm has come in.

When the pin in the gong-striker arm becomes released from the pin in the armature-lever by opening the circuit, the gong-striker, when wound up, is at once set in motion and strikes the blows on the gong of the indicator.

y is a post, with adjusting-screw placed under the armature-lever N, to govern the fall or descent of the lever when the lug *n* falls out of the depressions on the lug-wheel G. Another post should also be used to govern the armature in such a way that it cannot freeze to the magnets. By this device we avoid the use of spiral springs, which, on account of the delicacy of their construction, are liable to be affected by temperature, and the entire line of the alarm is rendered useless, as every-day experience shows in all boxes in the case where magnets are used in the boxes. We use magnets only in our indicator. This device avoids the effects of temperature and its results, as aforesaid.

The cord *i* on pulley-wheel H, will in practice, run up and over another pulley attached to the case in which the instrument is placed, and then descend with the weight I attached to it.

The box connected with and forming part of our fire-alarm system is as follows: A^1 is the frame-work; B^1, the driving-wheel, with ordinary pawl and ratchet and drum C^1, all on the shaft a^1. There is also on this shaft a ratchet, b^1, for the purpose of holding the circuit-breaker wheel D^1 in its place while the box is being wound up. The drum C^1 serves for the cord d^1 and weight E^1, and supplies the motive power for driving the gears, it being wound up by means of a crank. The driving-wheel B^1, meshed with a pinion, e^1, on the shaft f^1, and a gear, h^1, on this shaft, drives a pinion, i^1, on a shaft, k^1, to drive the escapement-wheel F^1, and regulate the speed by raising and lowering the ball on the pendulum of the escapement.

The automatic circuit-breaker wheel D^1 may be made of any suitable metal, and provided with non-conductors m^1, inserted in its edge in the form of spokes. These spokes or pins may be any distance apart desired; or the wheel may be made of all non-conducting material.

The operation of this circuit-breaker, when in motion, is to separate the jaws of the automatic circuit-closer, by means of passing between them the non-conducting substances, thus opening the circuit and holding it open any desired length of time, and with spaces between such times corresponding to the numbers on the box, and strikes the number of blows on all the gongs in all the engine-houses and on the tower-bell in the exact ratio the circuit is thus opened and closed. This wheel also causes the hand on the dial-face to move at each passage of a non-conductor through or between the jaws of the circuit-closer, so that with each blow on the gongs the hand on the dial-face moves at every break and close of circuit to the figures or number of the box giving the alarm; or, in other words, when the rounds are all in, the hand will indicate the number of the box pulled. When this box is used for the indicator alone, and the number of the alarm-box does not send in an alarm by blows struck on the gongs and tower-bell, the circuit-opener wheel D^1 is removed and the cam G^1 is put on the same shaft in its place, and the speed of the gears is increased by changing the position of the ball on the pendulum. The operation of this cam G^1 is to keep the circuit-closer open long enough to give the hand on the dial-face of the indicator time to travel to the number of the box giving the alarm. The face or width of the cam must vary in proportion to the distance the hand has to travel and the speed of the gears. This cam, or that part of it passing between the jaws of the circuit-closer, must be made of non-conductor.

The automatic circuit-closer consists of two jointed jaws, I^1 I^1, which work on pivots at n^1, with flat side springs, p', and having perforations or holes in the opposite ends for making connections with the line by inserting the line-wires, and thus forming and completing the circuit. The side springs, p', operate to close the jaws the instant the non-conductors pass between, thus closing the circuit instantly. The connecting line-wires are secured by screws. H^1 is a cut-out, one end of which is movably attached to one side of the jaws on the end of the same. When this conductor is depressed so that it comes in contact with the end of the opposite jaw, the box is cut out and the circuit is established through it, and does not reach the other jaw or end of the circuit-closer. The operation and meaning of this cut-out is to enable repairs or changes made in the box, and not break the circuit anywhere else on the line, and hence give no false alarms. Any number of boxes may be struck by this circuit-opener by properly arranging the non-conductors on the wheel and by varying its diameter.

The gong-striker is constructed as follows: A^2 is the frame; B^2, the driving-wheel on the shaft a^2, which wheel meshes with a pinion, b^2, on a shaft, d^2. A pinion, e^2, on this latter shaft drives the gear-wheel C^2 on a shaft, f^2, said wheel C^2 running in a pinion, h^2, on a shaft, i^2, for the purpose of driving the escapement-wheel D^2, with pendulum and regulator-ball attached. On the shaft i^2 is a pinion-gear, k^2, for driving gear-wheel E^2, for the purpose of

driving the arms F^2 F^2, into which pins m^2 m^2 are inserted, for connecting with and holding the arms while the circuit is closed, and released when the circuit is opened, so as to strike blows on the gong.

The mainspring G^2 is used as motive power to propel the machinery; but a weight may be used in its place, if desired.

On the driving-wheel B^2 are pins n^2, to raise the hammer on the shaft I^2 to strike blows on the gong H^2. The driving-wheel B^2 is connected with the shaft a^2 by suitable pawl and ratchet.

The results of our improvements change the manner of striking the gong and the manner of using the hand on the dial-face of the indicator from those described in our former patent, above referred to. We now continue to send the hand on the dial-face of the indicator to any number desired, the hand starting from zero on the dial-face, and going to the number on the dial-face corresponding to the number of the box from which the alarm emanates, and remains there until released by turning the thumb-nut on the end of the shaft, and the slotted tube turning on the shaft to which the hand is attached, when the hand automatically returns to zero, from whence it started, and is ready to attend to another alarm.

At the instant when the hand starts from zero to go to the number of the box sending in the alarm, the gong-striker strikes the gong a number of blows, for the purpose of calling attention to the movement of the hand on the dial-plate, and to notify engineers and others on duty that a fire-alarm has come in.

We can use this section of our system by itself in cases where a tower-bell is not desired for public notice of fire; but when a tower-bell is desired the hand on the dial-plate will go to the figure nearest to zero and stop until the circuit is again broken, when it will proceed to the next figure or number on the dial-plate and stop again, as before, and so continue to do just as many times as the circuit is opened and closed, preserving the exact intervals and spaces of time parallel with the numbers of spaces of time and of blows struck on the gongs in the fire-engine houses and on the tower-bell, thus actually counting and registering automatically the number of blows struck on the gongs and tower-bell. This improved box may also be used separately from the indicator, and strike the blows on the engine-house gongs and other places where gongs are attached to the telegraph-lines, so that while our system as a whole can be used together, if desired, yet we can employ sections of it to accommodate the public with either an indicator or the use of blows on a bell and gongs alone without the indicator.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of the shaft h, slotted and threaded tube k, wheel H, with cord i and weight I, the hand F, and thumb-nut J, substantially as and for the purposes herein set forth.

2. The rocking shaft r, with arm t, having pin s, in combination with the pin v on the armature-lever N, for the purposes herein set forth.

3. The combination of the automatic circuit-breaker D^1, provided with non-conducting pins m^1, the automatic circuit-closer, consisting of the pivoted jaws I^1 and springs p', and the cut-out H^1, all substantially as and for the purposes herein set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 23d day of April, 1878.

LEWIS BIRGE.
CHARLES D. WILLIAMS.

Witnesses:
J. P. ALLEN,
JOHN NEFF.