(No Model.)

3 Sheets—Sheet 1.

S. E. MOSHER.

TELEGRAPHIC ALARM SIGNAL.

No. 361,020. Patented Apr. 12, 1887.

Fig. 1.

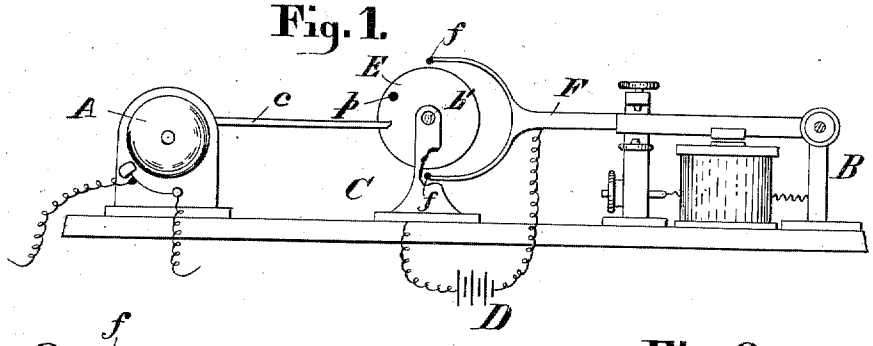


Fig. 2.

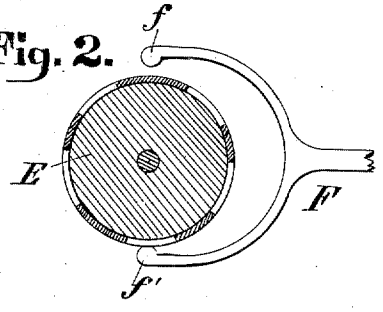


Fig. 3.

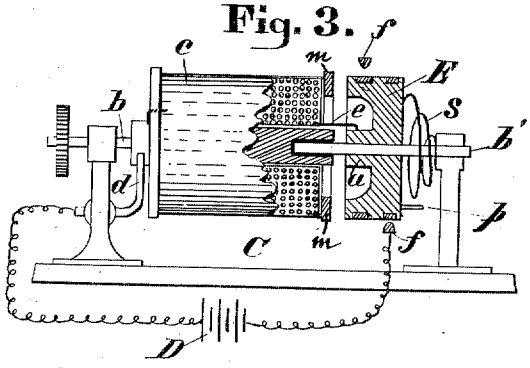


Fig. 4.

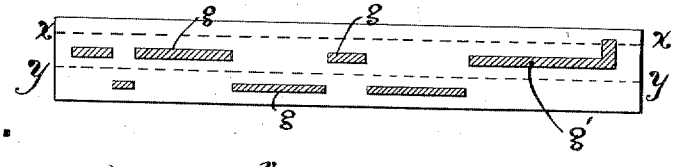


Fig. 5.

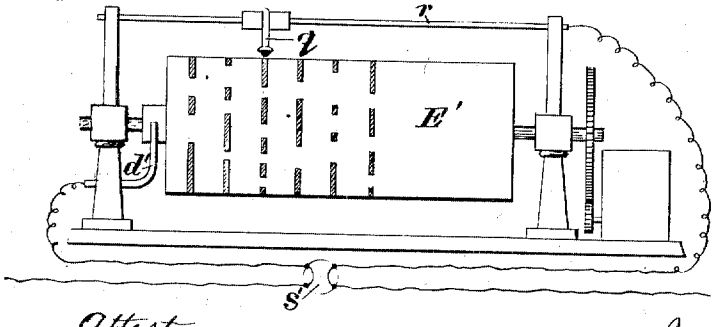
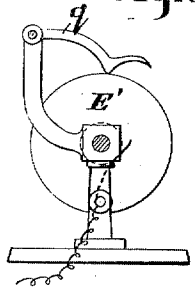


Fig. 6.



Attest.

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Inventor.

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TELEGRAPHIC ALARM SIGNAL.

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Fig. 7.

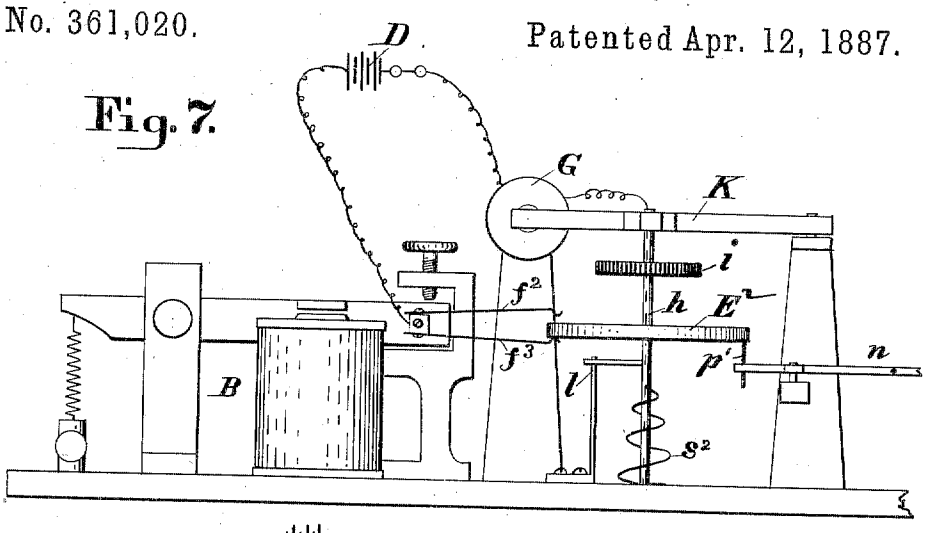


Fig. 8.

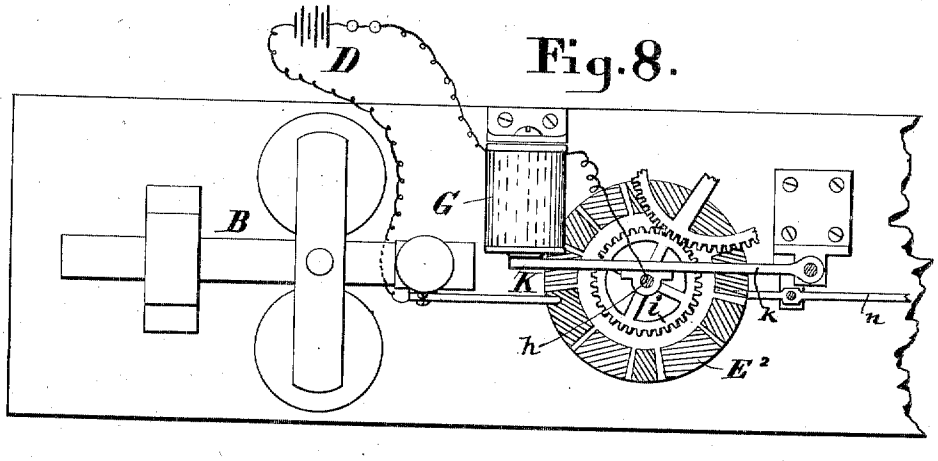
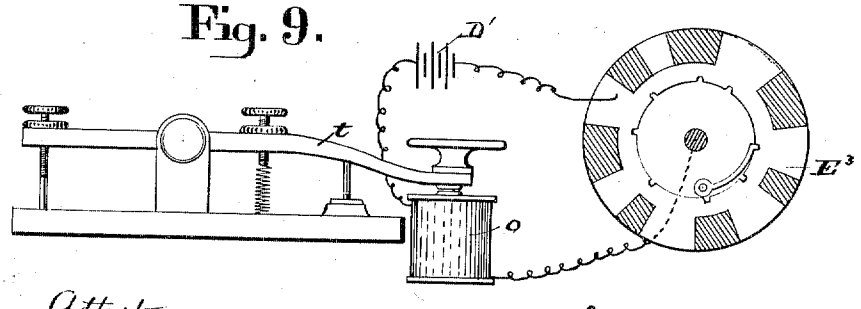


Fig. 9.



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TELEGRAPHIC ALARM SIGNAL.

No. 361,020. Patented Apr. 12, 1887.

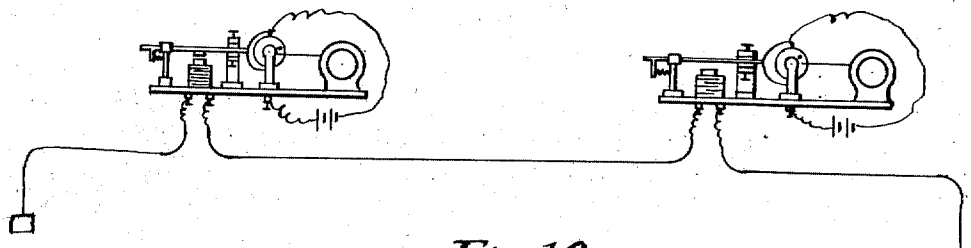
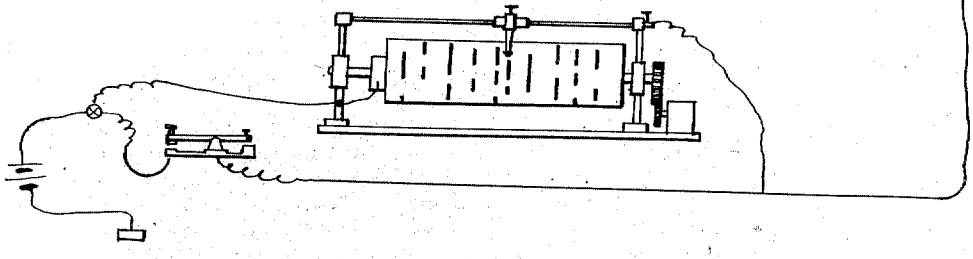


Fig. 10.



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Inventor
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By his Attorney Lenthall.

UNITED STATES PATENT OFFICE.

SAMUEL EARL MOSHER, OF CHILLICOTHE, OHIO.

TELEGRAPHIC ALARM-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 361,020, dated April 12, 1887.

Application filed March 6, 1884. Serial No. 123,291. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL EARL MOSHER, a citizen of the United States, residing at Chillicothe, Ohio, have invented new and useful Improvements in Telegraphic Alarm-Signals, of which the following is a specification.

My invention relates to the art of telegraphy, and is designed to enable the operator at a terminal or central station to call or arouse an operator at any one of a number of connected stations in a given line to the exclusion of the others. For example, on ordinary telegraph-lines it is necessary to signal to all stations, and all operators must be on the alert in order that the selected one may distinguish his "call." Moreover, from the peculiar nature of telegraph service it is necessary to employ a night as well as a day force at all principal stations, which of course entails great expense, while the less important ones are deprived of night service. The inconvenience of this condition of things is especially felt in railway service, where the running of trains both night and day is managed by the aid of the telegraph, and where the absence of an operator at a critical juncture is often a serious detriment. These inconveniences my invention seeks to remedy, and it does so by providing, in addition to the ordinary instrumentalities of telegraphy, a system and apparatus whereby an alarm may be sounded at any one of a number of connected stations in a given line without sounding at any other. It may be further premised that the invention may be employed in ordinary day service as a distinguishing-call merely and at night as a waking-alarm, thus enabling a single operator to remain practically on constant duty both night and day without loss of sleep except when specially called in an emergency.

The exact nature of my invention will be more clearly understood from the subjoined description and the accompanying drawings, illustrating a preferred form of mechanism in which the invention is embodied.

In the drawings, Figure 1 exhibits the alarm and its actuating apparatus in a side elevation; Fig. 2, a cross-section of the revolving armature, showing the relation of the insulated and non-insulated spaces and of the contact-points, hereinafter described; Fig. 3, a side elevation, partly sectional, of the revolving magnet and its armature; Fig. 4, a plan view, in an isometric plane, of the surface of the revolving armature, showing the relative positions of the contact-spaces and the path traversed by the contact-points when the armature is released; Fig. 5, a front elevation of the sending apparatus used at the terminal station; Fig. 6, an end elevation of the same; and Figs. 7, 8, and 9, elevations and plan of modified forms of sending and receiving apparatus embodying the same principles. Fig. 10 is a diagram representing the line-circuits of two stations and the main sending-station with connected apparatus.

In the drawings accompanying and illustrating my invention, I have shown a form of apparatus to be provided at each of the connected stations, a portion of which is in constant and synchronous operation with similar apparatus at the other stations, and so arranged that a tripping or set-off device may be brought into operative connection therewith by a peculiar manipulation of the line-current, for the purpose of actuating an alarm to awaken or call the attention of the operator.

A in the drawings designates an alarm-gong provided with any suitable mechanism for its automatic operation. It may be, for example, an ordinary clock-work or spring-driven alarm-gong provided with a catch controlled by a tripping-finger.

B designates an ordinary sounder, employed in connection with the sending and receiving key at a telegraph-station; or, for the purposes of this invention, may be a relay-instrument of any kind in the working line.

C designates the apparatus for actuating the alarm, and is constructed and operated as follows:

In its preferred form, as illustrated in the drawings, it consists of a rotating electro-magnet, *c*, mounted upon insulated pivots *b b'*, and normally and synchronously rotated with the other similar apparatus at the various stations of the line by suitable clock-work, which I have not thought necessary to be shown in the drawings. At one end the helix of the magnet is connected by the ordinary "brush" contact, *d*, with one of the poles of a local battery, D, and at the other by a similar contact,

e, with a cylindrical armature, E, loosely mounted upon but insulated from the pivotal axis *b'*, the amature being preferably constructed of metal, and forming a conductor, as hereinafter described, and arranged to be drawn into operative contact for the purpose of rotation with the rotating magnet *c*. For the latter purpose, the armature E is provided at one end with an annular recess surrounding a core or "hub," *a*, approximating the magnet in diameter in order to accommodate the brush-contact *e* and preserve the electrical connection at all times during the rotation and lateral movement of the armature. The parts are so proportioned and arranged as that when the armature is attracted toward the magnet it is brought into contact with a ring or annular washer, of rubber or other material, *m*, secured to the end of the magnet-spool, and by frictional contact rotated in unison therewith against the force of a coiled spring, *s*, arranged at the opposite end of the armature, by which it is returned to its normal position of rest when released.

The cylindrical surface of the armature E is divided into insulated and non-insulated portions, as hereinafter described, operative in connection with a bifurcated switch-bar, F, attached to and operated by the armature of the sounder or relay B, and carrying a wire connection with the remaining pole of the local battery D. The switch-bar F terminates in two spring prongs, *f f'*, arranged, respectively, above and below the armature E, so that in the vertical movement of the latter one or the other is always in contact with the armature alternately, the arrangement being such that when electrical connection is made between the vibrating bar and the armature the circuit of the local battery D is closed, and the armature is attracted to and caused to rotate with the magnet *c*; but when such circuit is broken the magnet *c* ceases to be operative, and the armature E is at once drawn back and returned to its normal position of rest by the spring *s*.

The insulations and non-insulations of the surface of the armature E are arranged in peripheral planes with reference to the paths traversed by the contact-points of the arms *f f'*. It is more convenient to arrange them in two such planes, allowing a separate path for each. The precise nature of the arrangement will be clearly understood by reference to the diagram, Fig. 4, showing the peripheral surface of the armature in an isometric plane. The arms *f f'* are arranged in corresponding planes with the spaces, and it will be obvious that in order to maintain a continuous rotation of the armature E the conducting or non-insulated spaces must be so arranged that when one contact-point has reached its limit of travel on one such space the other will be brought in contact with a similar space in its path—that is to say, when by the manipulation of the key the armature E of sounder B is attracted downward the contact-prong *f* is brought in contact with the peripheral surface of the cylindrical armature E, and, striking a conducting-space, the circuit from the local battery D is closed, the current passing through the armature E and conductor *e* into and through the coil of the rotating electro-magnet *c*, and by conductor *d* back to battery. The electro-magnet *c*, thus charged, attracts the armature E, which by frictional contact is rotated with the magnet *c*. The release of the key throws the prong *f'* into contact with the peripheral surface of the armature E, and if the given arrangement of conducting-spaces corresponds with the "makes and breaks" of the key, the alternations of contact of the prongs *f f'* preserve the local circuit of battery D closed, and so long as this condition remains the rotation of the armature E is continuous. In the diagram, *g* designates the metallic or non-insulated portions of the surface, the remainder being faced with insulating material. The length of the spaces *g* is determined by the prearranged alternations of broken and closed circuit of the main-line current, measured with reference to the rotative speed of the armature E in seconds of time, constituting the "combination" or "signal" for the given station, it being understood that the rotation of the armatures at the various stations is uniform in speed, and such as to produce a given travel of the surface of the armature relatively to contact-points *f* in a given time.

It will now be readily understood that if the main-line current is not manipulated to correspond with the arrangement of spaces *g* at the given station, the movement of the arms *f f'* will not maintain an unbroken local circuit with the battery D; but the circuit will be broken after a short interval of time, and consequently the armature E will be released and returned by its spring to its original position. This position is such that a forward movement sufficient to actuate the trip *p* will not take place, except when the local circuit is closed continuously, and although the trip *p* on a circuit which is not "called" may approach nearly to position to start its call, yet, as the instant it is released the spring not only draws the armature away from the magnet but moves it back to its starting-point, it is evident that only the proper signal will be given. In order to maintain the apparatus in a state or position for immediate use, the terminal space *g'* of the primary series is extended laterally at its beginning end to accommodate the lateral movement of the armature, so that the contact-point *f* is first brought into contact with the space *g'* at such extended portion, and remains in contact during such lateral movement. The non-insulated spaces are further so arranged as to be in the paths traversed by the contact-points only when the armature is held in such a position with relation to the magnet, so that when the release occurs the lateral movement of the armature at once brings the contact-points upon the insulated portion of the armature-surface and permits the armature to return to its normal position

unimpeded, the contact-points in such case traversing the paths indicated by the dotted lines *x x y y* in the drawings, Fig. 4.

Having shown the means and method of obtaining a continuous rotation of the armature, it remains to explain its purpose. In Fig. 1 the armature is shown in its normal position of rest, in which a tripping-pin, *p*, projecting from the end of the armature E, rests above the tripping-arm of the alarm mechanism. It will be obvious that a complete rotation of the armature will bring the pin beneath and lift the arm, which operation releases the restraining-catch and allows the spring-driven mechanism to operate, and thus sets off the alarm. The contact-spaces are so arranged that at that point the contact-points *f* run off upon the insulated portion of the armature-surface, and the armature, as already explained, flies back to its original position.

In Fig. 5 is shown a side elevation of an apparatus embodying the same principles, designed to operate as a sender at the terminal station. In this a metallic roll, E′, is employed having an insulated surface, excepting certain portions, arranged as "contact-spaces" in separate peripheral planes and corresponding, respectively, with the several armatures at the receiving-stations, excepting that in this case each set of contact-spaces is brought into one plane instead of two. The roll E′ is in continuous rotation synchronously with the several revolving magnets at the various stations, and consequently with the armatures when the latter are brought into play. Above the roll is arranged a contact-finger, *q*, adjustable laterally upon a cross-bar, *r*, forming a conductor, so as to form a sliding contact with the roll at any of the several planes of the contact-spaces. The apparatus is placed in a loop of the main line, provided with a suitable switch, *s′*, so that upon adjusting the finger to the proper contact-spaces the main-line current is broken in proper alternations to actuate the desired signal at the designated receiving-station upon turning the switch directing the line-current into the roll E′ at one side and the cross-bar and finger *q* upon the other, the line-contact with the roll being made with the ordinary sliding brush *d′*.

The modifications exhibited in Figs. 7, 8, and 9 involve no departure in any essential principle from the foregoing. In the apparatus shown in Figs. 7 and 8 the sounder B carries two conducting-arms, f^2 f^3, corresponding in arrangement and function with those before described, (*f f′*,) but operating in connection with a flat disk, E^2, mounted on a vertical shaft, *h*, resting in a fixed socket below and journaled above in an arm, *k*, pivoted to move horizontally under the influence of an electro-magnet, G. The shaft *h* carries a spur-wheel, *i*, which by the movement of the shaft laterally is carried into and out of engagement with an intermeshing gear of the operating clock-work. Connection is made between the arms f^2 f^3 and the local battery D, the other pole of the battery being connected with the magnet-coil C and thence with the shaft *h*.

The marginal surface of the disk E^2 is divided into insulated and non-insulated spaces, arranged upon the principle already described, the spaces being alternated upon the upper and lower surfaces to operate in connection with the arms f^2 f^3. A spiral spring, s^2, is arranged upon the shaft to return it to its normal position of rest when released, a suitable stop, *l*, being provided to determine its ultimate position, and a tripping-pin, *p′*, upon the disk, to engage the lever *n* of the alarm mechanism, substantially as before described.

For the sending-station a duplicate of each of the disks is provided, any one of which can be placed upon suitable rotating mechanism in proper relation with a contact-arm constituting part of a loop in the main line, which can be switched in at the will of the operator. I prefer, however, to arrange an electro-magnet, *o*, beneath the ordinary sending-key *t*, the magnet being in local circuit with a battery, D, and the disk E^3, the latter being one of a number, as before stated, which can be substituted upon or in connection with the rotating mechanism, and thus automatically control the line-current by actuating the ordinary key.

It will also be obvious that, knowing the time occupied by the contact-arms in traversing the spaces as arranged for the given armature, a given alarm can be actuated by the ordinary manipulation of the key by the sending-operator, and that if the arm of the striking hammer *u* is made to constitute a switch in the main line, so as to break contact at each movement, as shown in Fig. 1, notice that the alarm is sounded may thus be returned to the sending-operator.

I claim and desire to secure by Letters Patent—

1. In combination with a series of alarm mechanisms at the various stations, each consisting, essentially, of, first, an alarm-gong provided with striking mechanism; second, driving mechanism constantly and synchronously in operation; third, set-off mechanism normally inert, but brought into coaction with the driving mechanism by a local-battery circuit selectively controlled from the main office by a prearranged succession and duration of "makes and breaks" in the main line, substantially as set forth.

2. In combination with the alarm apparatus and a relay-armature employed as a contact-switch in the local circuit, a set-off device or apparatus consisting, substantially, of a rotatable conductor provided with a definite system of surface insulations and non-insulations arranged in peripheral paths to coact with the contact-switch, said rotatable conductor being the armature of a constantly-rotating electro-magnet, and brought into temporary rotative connection with said magnet by manipulations of the line-current corre-

sponding with said system of conducting-surfaces of the conductor, substantially as set forth.

3. The alarm-actuating apparatus consisting, substantially, of a rotating electro-magnet, *c*, its rotatable armature E, and the relay-armature F—all in local circuit—in combination with the main line and the alarm-gong, operating as set forth.

4. The rotating electro-magnet *c*, mounted upon axial pivots, and provided with brush-contacts *d e*, in combination with a cylindrical armature, E, constructed as described, provided with a retractile spring, *s*, and tripping-pin *p*, and arranged in local circuit with a battery, D, and vibrating switch F, as a means of setting off alarm mechanism, substantially as and for the purpose set forth.

5. In combination with alarm apparatus arranged at the receiving-stations of a telegraph-line, and adapted to be actuated by definite predetermined manipulations of the line-current, an automatically-rotated cylinder, E′, provided with surface insulations and non-insulations arranged in separate peripheral planes corresponding with said predetermined manipulations, and with a sliding contact-finger, *q*, adjustable to any one of said planes, the whole arranged in a loop of the main line for the purpose of actuating any one of the alarm mechanisms exclusively, as set forth.

In testimony whereof I have hereunto set my my hand in the presence of two subscribing witnesses.

SAMUEL EARL MOSHER.

Witnesses:
L. W. HOSEA,
C. SHAPPELL.

Correction in Letters Patent No. 361,020.

It is hereby certified that in Letters Patent No. 361,020, granted April 12, 1887, upon the application of Samuel Earl Mosher, of Chillicothe, Ohio, for an improvement in "Telegraphic Alarm-Signals," certain words were erroneously omitted in printing the specification, which should be supplied, to wit: In line 111, page 3, after the words "In combination with" the words *a line of telegraph* should be inserted; and the Letters Patent should be read with this correction therein to conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 14th day of June, A. D. 1887.

[SEAL.]

H. L. MULDROW,
Acting Secretary of the Interior.

Countersigned:

BENTON J. HALL,
Commissioner of Patents.