(No Model.) 2 Sheets—Sheet 1.

C. W. WILHELM.

AUTOMATIC RAILWAY SIGNAL.

No. 449,990. Patented Apr. 7, 1891.

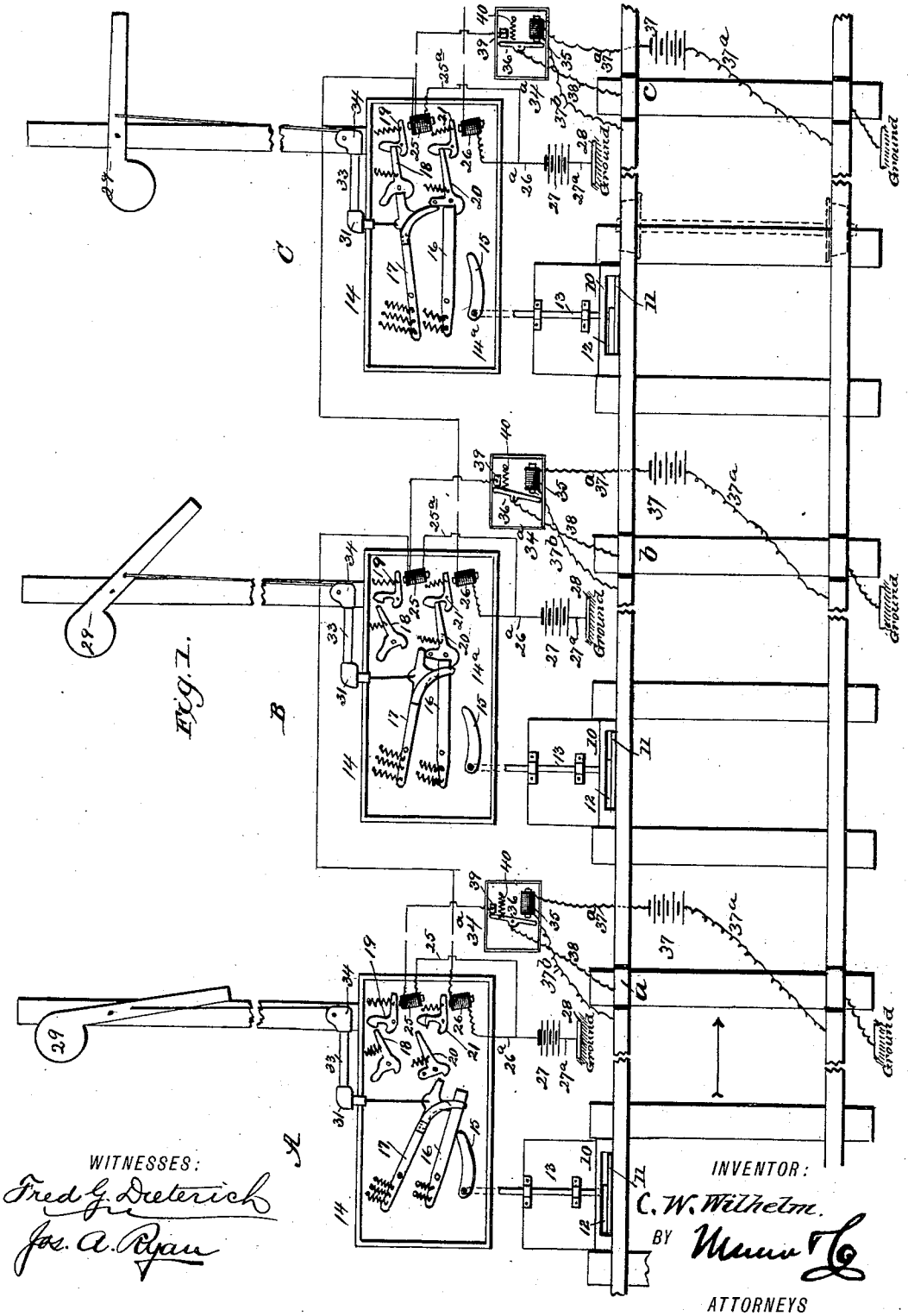

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

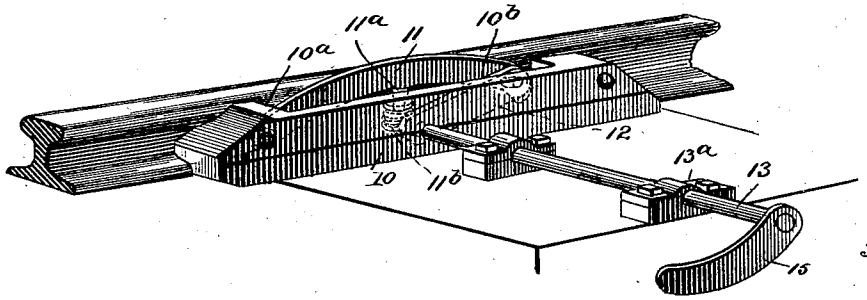


Fig. 3.

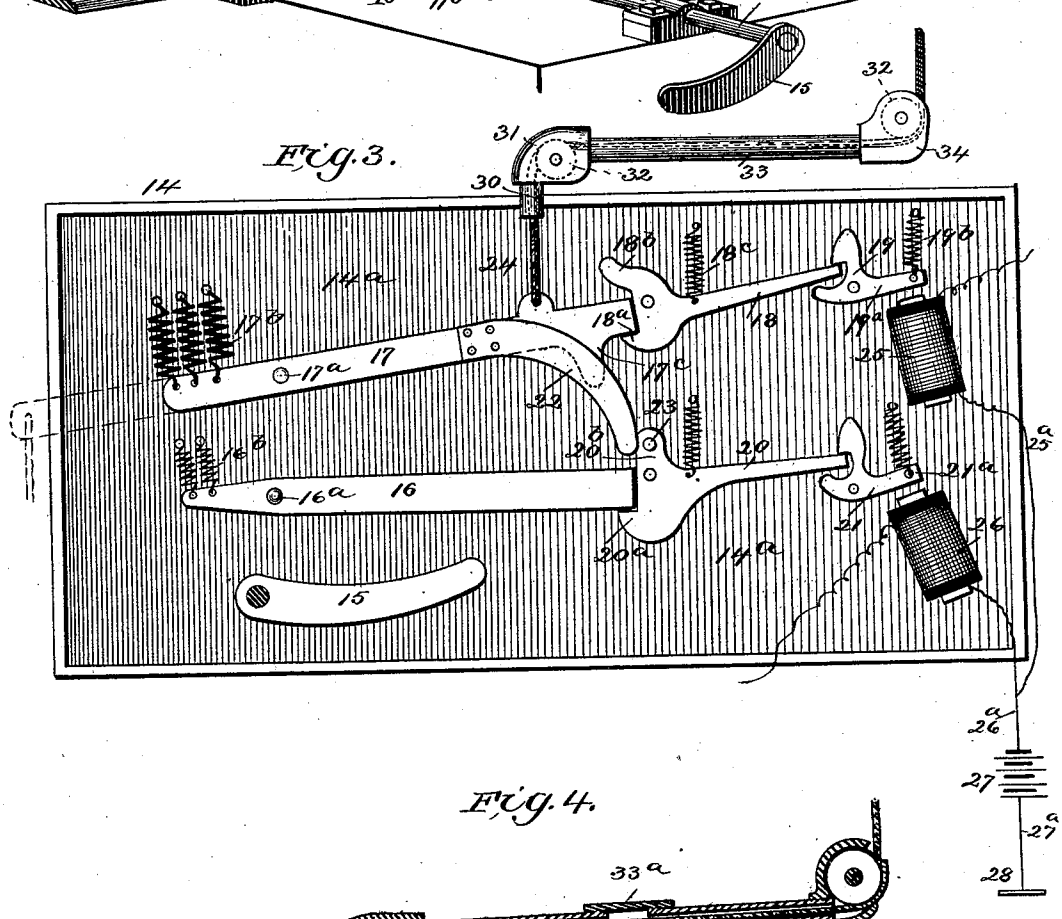
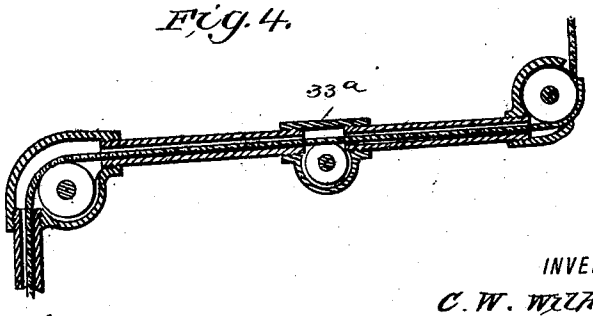


Fig. 4.



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CALVIN W. WILHELM, OF MAUCH CHUNK, PENNSYLVANIA.

AUTOMATIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 449,990, dated April 7, 1891.

Application filed September 23, 1890. Serial No. 365,925. (No model.)

To all whom it may concern:

Be it known that I, CALVIN W. WILHELM, residing at Mauch Chunk, in the county of Carbon, State of Pennsylvania, have invented certain new Improvements in Automatic Railway-Signals, of which the following is a specification.

My invention relates, generally, to railway-signals, and more particularly to automatic railway-signals adapted for use upon a double or quadruple railway system, and is intended to signal only to trains running in the same direction.

The object of my invention is to provide a signaling apparatus of the character described in which a signal is set at a certain station by a passing train and partially released when the said train has passed a specified point and totally released when the train has passed a more distant point, the train having set a second signal after partially releasing the first signal, but before totally releasing the same.

A further object of my invention is to so construct and arrange the electrical parts that only one battery is necessary at each signal-station to operate two different magnets, whereby the signal is partially and then totally released.

With these ends in view my invention consists of a lever arranged adjacent to the sides of the rail and adapted to be depressed by the tread of the wheel, a series of locking-levers, latches, &c., adapted to be operated by the track-lever to set and lock the signal, a plurality of electro-magnets each adapted to release its respective latch to operate upon the signal in a definite manner, and a single battery at each station for operating the magnets at the station.

My invention consists, further, in providing a series of signal-stations and a series of insulated track portions each connected with its respective signal-station in a manner hereinafter explained; and my invention consists, further, in the peculiar construction of various parts and their novel combination or arrangement, such as shown in the accompanying drawings, and more fully hereinafter described, and designated in the appended claims.

In the drawings forming a part of this specification, and in which the same reference-characters indicate the same parts, Figure 1 is a plan view of a section of track in sections, showing the relative arrangement of the track-lever mechanism, signal setting and releasing devices, and the circuit-controlling devices. Fig. 2 is a perspective view of a track-lever mechanism. Fig. 3 is a plan view of the signal setting and releasing mechanism. Fig. 4 is a sectional view of the pipe for carrying the rope.

In the practical embodiment of my invention I employ a metallic plate or casting 10, bolted to the outer side of an ordinary rail, the inner face of said plate being recessed at 10^a, and within the said recess is mounted and pivoted a lever 11, said lever being bowed or curved, as shown, the central portion of the same projecting slightly above the tread of the rail, the ends resting below the surface of the plate. A crank-arm 12 is pivotally connected to the free end of the lever 11, said arm 12 being arranged in a supplemental recess 10^b and rigidly secured to a rock-shaft 13, which enters the plate at right angles to the length of the same, the said shaft being journaled in the boxes 13^a, secured to the cross-ties of the track. The upper corners of the plate or casting are beveled or rounded, as shown, to prevent chains, brake-beams, snow-plows, and the like catching therein.

The track-lever 11 is usually so arranged that it will be depressed by the tread of the locomotive or car wheel; but, if it be desired, it may be set back some distance from the rail and a supplemental wheel attached to either the locomotive or car for operating the same.

The under side of the track-lever 11 is formed with a depending lug 11^a, upon which fits a coiled spring 11^b, the lower end of said spring resting on the cross-tie, said spring being adapted to throw the lever up to its normal position after being once depressed by the train. If desired, the spring 11^b can be omitted from beneath the lever and a coiled spring used upon the rock-shaft 13 to throw the same back, thereby operating the track-lever.

The rock-shaft 13 is made any suitable length, the outer end projecting into a box or case 14, said box being made as small

such shape as will occupy the least room possible, said box being secured to one or more cross-ties, as desired. Upon the rear side 14^a of the box or case are mounted all the signal locking and releasing devices. A tripping-arm 15 is rigidly secured to the outer arm of the shaft 13 and rests adjacent to the rear side of the box 14. Directly above the tripping-arm 15 is pivoted a lever 16 upon the stud 16^a, the shorter arm of said lever having a series of springs 16^b attached thereto and to the side 14^a above the lever, whereby the longer arm of the lever is normally thrown down. A lever 17 is pivoted upon a stud 17^a above the lever 16, the said lever 17 being slightly longer than the lever 16 and rests within the same vertical plane. The shorter arm of the lever 17 has a series of springs 17^b, connected therewith to throw the longer arm down, and near the outer end of said longer arm upon the lower side is constructed a depending lug or projection 17^c. When the levers 16 and 17 are not set, they are thrown down by means of the springs 16^b and 17^b, the long arm of lever 16 resting on the free end of the tripping-arm 15, the projection 17^c resting on the upper side of the lever 16. When the track-lever is depressed and the arm 15 elevated, the lever 16 is raised, carrying with it the lever 17. To hold the lever 17 in its elevated position, I employ a locking-lever 18, pivoted to the rear side of the box opposite the end of the long arm of lever 17, the lever 18 being so pivoted that its short arm is adjacent to the long arm of lever 17. The short arm of lever 18 is somewhat enlarged and constructed with the lower or square jaw 18^a and the upper or curved jaw 18^b. Springs 18^c are connected to the long arm of the lever 18, which throw the shoulder 18^a out of the path of the end of lever 17 when the same is being elevated; but the curved jaw 18^b projects a sufficient distance to be engaged by the end of lever 17, and as said lever strikes the jaw 18^b the lower jaw 18^a is thrown upward and catches beneath the end of the lever 17, holding the same in an elevated position as long as the locking-lever 18 is held in this position, and to hold it in this position I use a spring-catch 19, the said catch being pivoted opposite to the long arm of lever 18, and is adapted to catch and hold the same the moment the long arm is thrown down. The member 19^a of the catch to which the spring 19^b is attached is of soft iron, the purpose of which will appear farther on. A locking-lever 20 is pivoted opposite the long arm of lever 16, said locking-lever having its shorter arm enlarged, as shown, and formed with the lower horizontally-projecting shoulder 20^a and the upper vertically-projecting portion 20^b, the shoulder 20^a being adapted to catch beneath and hold the lever 16, and to secure the locking-lever 20 I use a spring-catch 21, similar in construction to the catch 19, the member 21^a being made of soft iron also. The lever 20 is also locked by means of an arm 22, secured to the side of the lever 17, projecting downwardly and adapted for laterally-projecting engagement with the lug 23, arranged upon the portions 20^b.

When the arm 15 moves the lever 16 up, the lever 17 is thrown up and locked, as already described, and as the lever 17 moves upward the arm 22 engages the lug 23, throwing the shoulder 20^a upward, and when the lever 16 drops it is caught upon the said shoulder 20^a and supported there, the locking-lever 20 being secured by the catch 21, as before stated. A cable 24 is secured to the outer end of lever 17 and connected with a semaphore or other signal in a manner hereinafter set forth. Upon the side 14^a, adjacent and beneath the members 19^a and 21^a, respectively, are arranged the electro-magnets 25 and 26, the magnet 26 being connected to a battery 27 by means of a wire 26^a, and the magnet 25 has its wire 25^a connected with the wire 26^a. The battery 27 is connected with the ground-plate 28 by the wire 27^a. It will thus be seen that both magnets are connected with the same battery, and, furthermore, it will be shown how each is operated at different times. Referring to Fig. 1, it will be seen that I arrange my improved signal apparatus at the stations A, B, and C, along the line of track, each station having the semaphore 29 arranged in connection with the mechanism hereinbefore described, all of which is arranged in the case 14.

At points *a*, *b*, and *c*—say midway between the respective stations—the rails of the track are insulated from the rest of the track and from each other. One of each pair of insulated rails is connected with the ground, while the other rail is connected with the magnet 25 in its respective station, and the magnet 25 in station C is connected with the magnet 26 in station B, and magnet 25 in station B is connected with magnet 26 in station A, and so on. Each station has a single nest of batteries connected with its respective magnets, as already described. A train passing station A will depress the track-lever 11 and elevate the arm 15, which raises the levers 16 and 17, which levers are locked by the levers 18 and 20, respectively, said locking-levers being held by the catches 19 and 21, respectively, the members 19^b and 21^a serving as armatures to the magnets 25 and 26. When the levers 16 and 17 are raised, the cable 24 if slackened and the counterpoise 29^a of the semaphore raises the signal to a horizontal position. Thus the signal is set at "danger" by the train passing station A. The train passing the point *a* will close the circuit passing from said point through the magnet 25 and the battery of station A. The moment the circuit is closed the member 19^a is drawn down, releasing the locking-lever 18, which in turn lets the lever 17 drop, and the springs 17^b, secured to the opposite end, throw the lever down with such force that the semaphore is brought down to an intermediate po-

sition, thus indicating that the train has passed the point *a* midway between the stations A and B. The force of the springs 17^b is sufficient to raise a weight double the weight of the counterpoise, thus insuring safety of action. The downward movement of the lever 17 is limited by the depending projection 17^c striking the lever 16. The train now moves on to station B, where it depresses its track-lever and sets the semaphore of said station in a horizontal position indicating "danger," and when the point *b* is reached the circuit is closed, passing from the point *b* through the magnet 25, station B, and its battery, thus partially releasing the semaphore of station B, and, as the magnet 25 of station B is connected with the magnet 26 of station A, the current will pass from battery at B through magnet 25 at B to circuit-closer *b* and from battery at A through magnet 26 at A, then on to circuit-closer *b*, drawing down the member 21^a and dropping the lever 16, which allows lever 17 to be thrown entirely down, thus bringing the semaphore of station A down to an approximately vertical position. It will thus be seen how a single battery at each station operates two different magnets at different times. The train passing on will set the signal at station C and in passing the point *c* will partially release the semaphore at station C and totally release the semaphore at station B. In this manner a signal is set when a train has passed a certain block-station and partially released when it has passed half-way to the next station, setting a second signal at the second signal-station, partially releasing the second signal, and totally releasing the first signal when the train passes a point midway between the second and third stations, thus signaling a block and a half to the rear.

When the signal-stations are a great distance apart, it may be necessary to employ a relay in the circuit, and if so needed they will be arranged in the well-known manner.

The wire cable could be connected to a signal having different-colored curtains or glasses and the different colors thrown to show the progress of a train in the same manner as with the semaphore. I also provide an improved structure for carrying the cable 24, whereby the friction of the same is reduced to a minimum. In the top of the case 14 is screwed a short section of gas-pipe 30, and to said section is secured an elbow-joint 31, said joint being cast around a pulley 32, over which the cable passes. Another section of pipe 33 is secured to the joint 31, and upon its end is mounted another elbow-joint 34, which is also cast around a pulley 32. If the pipe 33 be very long, union-joints 33^a may be employed, such joints being cast around a pulley, all of which pulleys are free to turn in the joints, thereby reducing the friction to a minimum.

My device, as shown and described, is supposed to be applied simply to a double-track system, and where it is used upon a quadruple system or a great number of tracks and it is necessary to run the cable beneath the said tracks the short arm of the lever 17 is made as long as the long arm, and the cable attached to the end of said arm and passed downward out of the lower side of box, as shown in dotted lines. In order to control the upper magnet 25 and hold the same inoperative until the last car has reached the insulated-track portion, I employ a circuit-controlling device 34^a at each insulated point. Each circuit-controlling device is mounted upon a board the same as the signal-setting apparatus and consists of a magnet 35 and armature-lever 36. The magnet 35 is connected with a battery 37 by the wire 37^a, the wire being connected, also, with one of the rails. A wire 37^b connects the magnet with the other rail. The wires 37^a and 37^b are connected to the rails very close to the insulated portion. 38 indicates a wire connecting one of the insulated rails and the armature-lever 36, and 39 is a contact-point forming the terminus of the wire extending to the magnet 25. Thus when a train approaches the insulated section it closes the circuit through the wires 37^a 37^b, magnet 35, and battery 37 and draws the adjacent end of the lever 36 to the magnet, thereby holding the remote end of the lever away from the contact-point 39 and keeping the magnet 25 inoperative until the last car has reached the insulated-track section. The circuit passing through the wires 37^a and 37^b now being broken, the lever 36 will be drawn by the spring 40 into contact with the point 39, thereby closing the circuit and operating the magnet 25.

Having thus described my invention, what I claim is—

1. In an improved automatic railway-signal, the combination, with a series of stations, each having a single battery, of a signal-setting device and a releasing device, the releasing devices at adjoining stations being connected with said batteries and with each other, and a series of circuit-closers intermediate the signal-stations, substantially as shown and described.

2. In an improved automatic railway-signal, the combination, with a series of semaphores, of a series of setting and releasing devices, said devices consisting of a series of levers and latches for holding the same in a set position and an electro-magnet for and adapted to release each latch, the magnets in each device being connected at one end with a single battery at its station, the opposite end of one magnet being connected with a circuit-closer on the track, and the opposite end of the other magnet being connected to the magnet in the next forward station that is connected with the circuit-closer, all arranged substantially as shown and described.

3. In an improved railway-signal, the combination, with a series of stations, each hav-

ing a single battery, a signal-setting device, and a releasing device, the releasing devices at adjoining stations being connected with said batteries and with each other, of a series of circuit-closers intermediate the signal-stations and a series of circuit-controlling devices adjacent to the circuit-closers, whereby the signal-releasing mechanism is not operated until a specified moment, substantially as shown and described.

4. The combination, with a series of levers, of a series of locking-levers and the catches for holding said locking-levers, and the electro-magnets 25 and 26, connected with a single battery and then to the ground, the magnet 25 being connected with a circuit-closer in the line of track, and the magnet 26 being connected with the magnet 25 of the next forward station, substantially as shown and described.

5. The combination, with the tripping-arm, of a lever arranged above the same, a second lever pivoted above the first and adapted to be raised by the same, the second lever being connected at one end with the cable of the semaphore, locking devices for holding said levers in an elevated position, and electro-magnets adapted to release the said locking devices, the upper lever being released first, whereby the semaphore is partially and then totally released, substantially as shown and described.

6. The combination, with a series of semaphores, of a series of devices for setting said semaphores, a pair of magnets 25 and 26, arranged in connection with each setting device, a series of circuit-closers arranged in the line of track, each being midway between two semaphores, the magnet 25 of each station being connected with the next forward circuit-closer and with the magnet 26 in the adjacent rear semaphore-station, and a single battery at each semaphore-station, the magnets 25 and 26 being connected to the said battery and thence with the ground, substantially as and for the purposes described.

7. The combination, with the track-lever, rock-shaft, crank-arm, and lifting-arm, of the levers 16 17, the locking-lever 18 and latch 19, the locking-lever 20 and catch 21, the arm 22 and lug 23, the cable 24, magnets 25 and 26, the battery 27 and connection between the magnets and ground, and the springs for operating the lever 17 when the same is released, substantially as shown and described.

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J. CLARK MOORE.