J. W. ABNEY.

AUTOMATIC RAILWAY CROSSING SIGNAL.

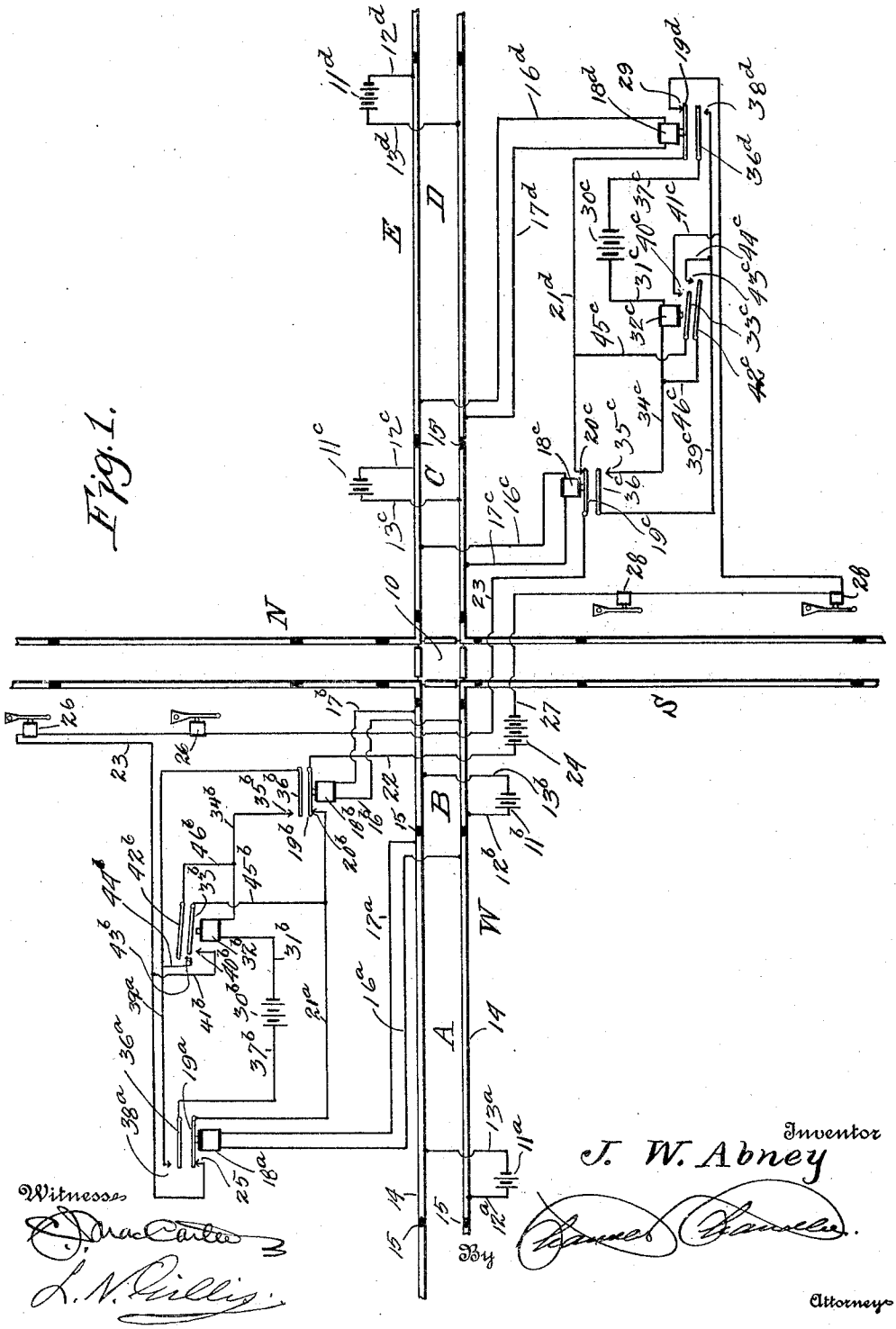
APPLICATION FILED SEPT. 14, 1916.

1,276,155.

Patented Aug. 20, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



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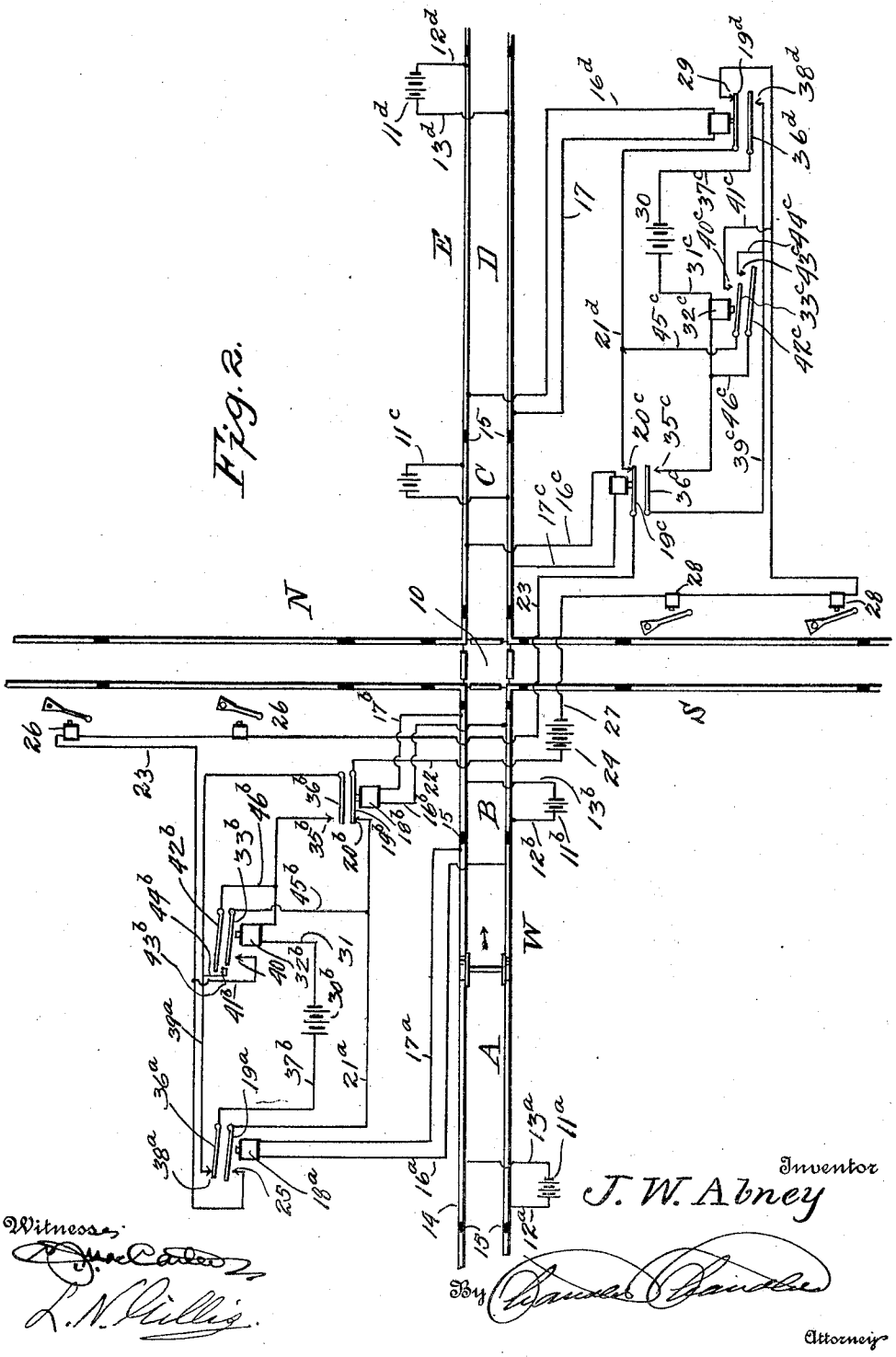
3 SHEETS—SHEET 2.

Fig. 2.



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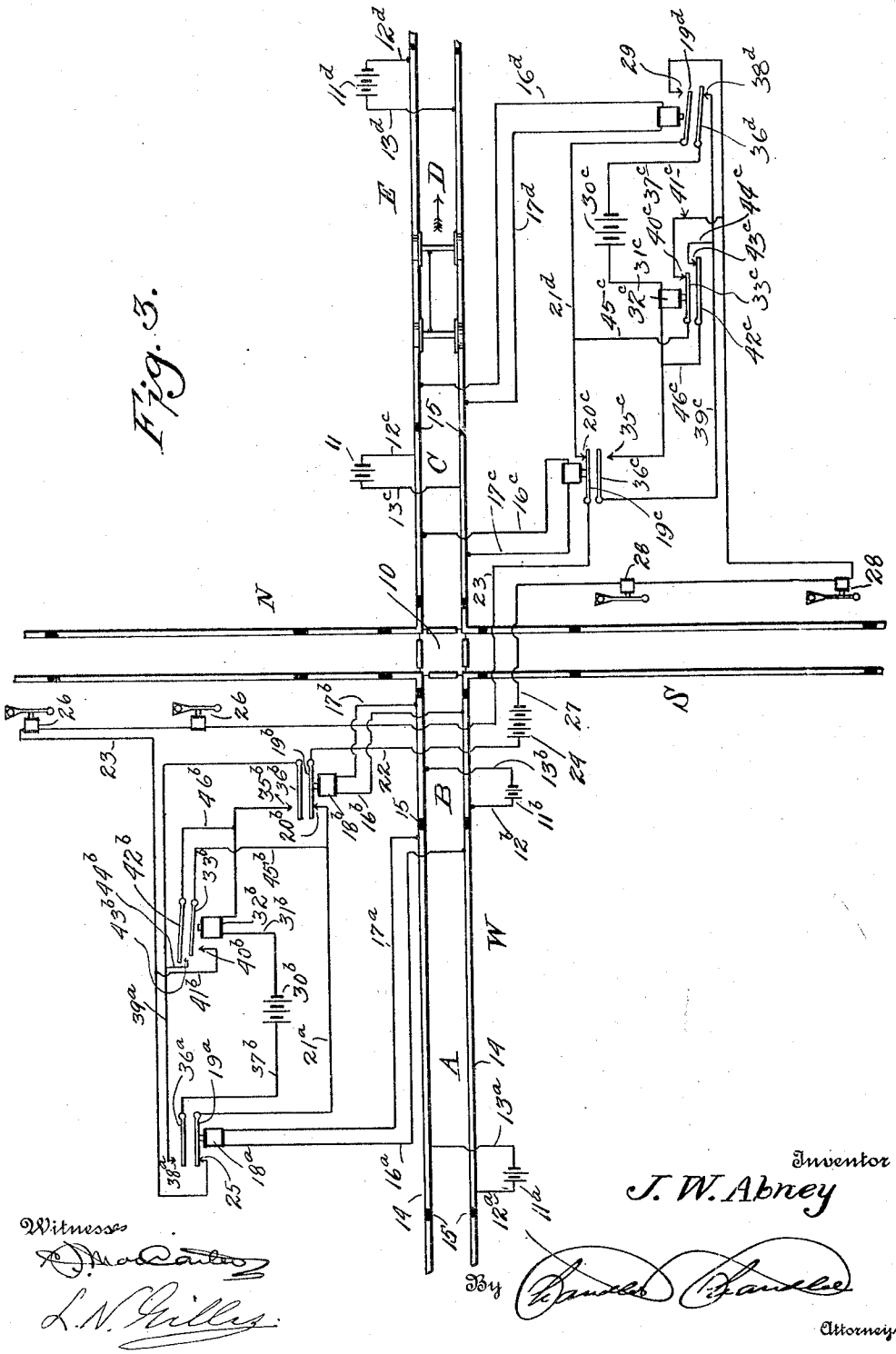
3 SHEETS—SHEET 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC RAILWAY-CROSSING SIGNAL.

1,276,155. Specification of Letters Patent. Patented Aug. 20, 1918.

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To all whom it may concern:

Be it known that I, JAMES W. ABNEY, a citizen of the United States, residing at Many, in the county of Sabine, State of Louisiana, have invented certain new and useful Improvements in Automatic Railway-Crossing Signals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to railway crossing signals and has special reference to an electrically operated signal of the class described.

One important object of the invention is to provide a simple and improved form of crossing signal which may be used to protect a crossing without regard to any other block signal system that either of the crossing roads may be provided with, the signal of this invention being substantially local in character.

A second important object of the invention is the provision of a crossing signal of improved construction and so arranged that no matter in what direction a train may approach the crossing on either track, suitable signals may be displayed on the other track at points remote from the crossing and at other points still more remote from said crossing, thus providing home and distance signals.

With the above and other objects in view, the invention consists in general of certain novel arrangements of blocks, circuits, relays, and signal controlling devices, hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:—

Figure 1 is a diagrammatic view of a pair of crossing tracks showing the device used in connection therewith, the signals being only used beside one track while the actuating relays and the like are used beside the other track so as to avoid duplication and confusion, the view showing the positions of the parts when the signals are all at clear.

Fig. 2 is a view showing the positions of the parts when a train enters one of the outer track blocks controlling the signals.

Fig. 3 is a view similar to Fig. 1 and showing the parts in the position assumed when the train lies in an outer controlling block on its way from the crossing.

In the construction herein disclosed there is provided a crossing 10 from whence extends a series of tracks indicated respectively by the letters N, E, S, and W, it being assumed for the convenience of description that the tracks extend from the crossing in the directions of the cardinal points of the compass. In the present showing the tracks W and E are disclosed as divided into a series of blocks of which blocks A and B lie on one side of the crossing 10 while blocks C and D lie on the opposite side of said crossing, the blocks in their alphabetical rotation thus running from west to east. Each of these blocks is provided with similar equipment and the equipment of one block will be distinguished from the other block in describing circuits by the use of small letters corresponding to the capitals indicating the block. At the end of the blocks remote from the crossing 10 there are provided batteries 11^a and 11^d which are connected by wires 12^a and 13^a and 12^d and 13^d to respective rails 14 of the block, the rails being insulated at their ends from the rails of adjacent blocks as by insulation 15. Leading from the end of the blocks opposite the ends to which the wires 12^a and 13^a and 12^d and 13^d are connected are other wires 16^a and 17^a and 16^d and 17^d connected to relay magnets 18^a and 18^d which control armatures 19^a and 19^d. Leading from each of the distant armatures 19^a and 19^d to the contacts 20^b and 20^c are wires 21^a and 21^d, the contacts 20^b and 20^c lying in the path of armatures 19^b and 19^c controlled by magnets 18^b and 18^c connected by wires 16^b and 17^b and 16^c and 17^c respectively to the rails of the blocks B and C to the west and east of the crossing. Batteries 11^b and 11^c are also connected by wires 12^b and 13^b and 12^c and 13^c with the block rails. The armatures 19^b and 19^c are connected by means of wires 22 and 23 respectively to a line battery 24 and to a contact 25 which is in the path of the armature 19^a. Signal controlling magnets are interposed in the wire 23 as at 26, these magnets being spaced along the track N to control home and distant signals. From the battery 24 leads a wire 27 which, after passing through signal controlling magnets 28 leads to a contact 29 in the path of the armature 19^d.

Now under normal conditions, it will be seen that the relay magnets 18^a, 18^b, 18^c and 18^d are energized by their respective batteries so that the armatures 19^a and 19^d are drawn against the respective contacts 25 and 29 and at the same time the armatures 19^b and 19^c are drawn against the contacts 20^b and 20^c. By reason of this a circuit is established from the battery 24 through the wire 22, armature 19^b, contact 20^b, wire 21^a, armature 19^a, contact 25, wire 23 through the magnets 26, armature 19^c, contact 20^c, wire 21^d, armature 19^d, contact 29 and wire 27 through the magnets 28 and back to the battery 24.

Now suppose a train to be moving from west to east. As the train enters the block A the battery 11^a will be short circuited through the wheels and axle W of such train. This will deënergize the relay magnet 18^a and permit the opening of the circuit previously traced through the signal magnets 26 and 28 by permitting the armature 19^a to move away from the contact 25. Now as long as any part of the train stays in A the contact will be broken at this point so that the magnets 26 and 28 will be deënergized and the signals to the north and south will move to danger.

As the train continues its motion toward the east the front end of the train will enter the block B and will thus short circuit the battery 11^b as before. The result of this will be that the relay 18^b will be deënergized and the signal circuit will be broken by movement of the armature 19^b away from the contact 20^b. Thus at this time the circuit will be broken at two points. As the train continues to move toward the east the same effects take place at each block in succession.

When the train has entirely left block A then the circuit will be again closed through the magnet 18^a so that the armature 19^a will engage the contact 25 and thus restore the break in the signal circuit at this point. In like manner, as each block is cleared by the east-bound train the broken signal circuit will be restored at the point of break for the respective block until all of the breaks have been closed whereupon the magnets 26 and 28 will again be energized with the result that the signals will be moved to clear position.

In addition to the relays just described there is provided for the west and east ends of the track batteries 30^b and 30^c from whence lead wires 31^b and 31^c to relay magnets 32^b and 32^c controlling armatures 33^b and 33^c, wires 34^b and 34^c leading from said magnets 32^b and 32^c to connect 35^b and 35^c in the path of armatures 36^b and 36^c controlled by the magnets 18^b and 18^c. From the other poles of the batteries 30^b and 30^c lead wires 37^b and 37^c to armatures 36^a and 36^d controlled by the magnets 18^a and 18^d respectively. These armatures 36^a and 36^d engage the contacts 38^a and 38^d when the magnets 18^a and 18^d are deënergized and leading from these contacts 38^a and 38^d to the armatures 36^b and 36^c are wires 39^a and 39^c. Now by reason of this construction whenever both of the magnets 18^a and 18^b or 18^c and 18^d, the construction being the same on the opposite sides of the crossing, are deënergized, a circuit will be closed from the battery 30^b or 30^c. Upon deënergizing the magnets 18^c and 18^d the current extends through the wire 31^c, magnet 32^c, wire 34^c, contact 35^c, armature 36^c, wire 39^c, contact 38^d, armature 36^d, and wire 37^c back to the battery 30^c. This will energize the magnet 32^c and cause it to draw the armature 33^c into contact with a contact 40^c connected by a wire 41^c with the wire 27. At the same time the energization of the magnet 32^c attracts an armature 42^c and draws it against a contact 43^c connected by a wire 44^c with the wire 39^c. Furthermore, the armature 33^c is connected by a wire 45^c with the wire 21^d while the armature 42^c is connected by a wire 46^c with the wire 34^c. Associated with the magnet 32^b are similarly a contact 40^b, wire 41^b, armature 42^b, contact 43^b and wires 44^b, 45^b and 46^b.

Now when the east-bound train arrives in such position that its rear end is in block C and its front end is in block D the magnets 18^c and 18^d will be deënergized and consequently the armatures 36^c and 36^d will close on the contacts 35^c and 38^d respectively. Thus a circuit will be established from the battery 30^c as previously described and it will be noted that the magnet 32^c will remain energized even though the magnet 18^c be energized to break the circuit between the armature 36^c and the contact 35^c because under these circumstances current will still continue to flow from the battery 30^c through the wire 31^c, magnet 32^c, wire 34^c, wire 46^c, armature 42^c, contact 43^c, wire 44^c, wire 39^c, contact 38^d, armature 36^d, wire 37^c back to the battery 30^c. This energization of the magnet 18^c takes place when the train has moved entirely into the block D. Under these circumstances involving energization of the magnet 32^c or the magnet 32^b the magnets 26 and 28 will again be energized as a circuit will be established in the instance of the magnet 32^c from the battery 24 through the wire 27, wire 41^c, contact 40^c, armature 33^c, wire 45^c, wire 21^d, contact 20^c, armature 19^c, wire 23, contact 25, armature 19^a, wire 21^a, contact 20^b, armature 19^b, and wire 22, back to the battery 24. Thus a train moving from west to east will establish the signal circuit upon arriving wholly in the distant block D and in like manner a train moving in the opposite direction will establish the signal circuit upon arriving in the distant block A.

Now, if the train arrives in block D and the operator backs up just as soon as the rear end of the trains arrives in block C the magnet 18ᶜ will be deënergized and the signal circuit will be broken, as before.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

Having thus described the invention, what is claimed as new, is:—

1. The combination with a pair of intersecting tracks constituting a railroad crossing; one of said tracks being divided into a pair of blocks on each side of the crossing, a signal controlling circuit extending along the other track and arranged to normally hold a series of signals in clear position, means including a circuit in each block for opening the signal controlling circuit, each of said block circuits being arranged for short circuit upon entry of the train into block, and means for closing the signal circuit operable by simultaneous short circuits of the block circuits on one side of the track and subsequent energization of the block circuits adjacent the crossing.

2. The combination with a pair of intersecting tracks constituting a railroad crossing; one of said tracks being divided into a pair of blocks on each side of the crossing, a signal controlling circuit extending along the other track and arranged to normally hold a series of signals in clear position, said circuit including a contact and armature for each of said blocks, a normally energized magnet for each of said blocks, said magnets being arranged for deenergization upon entry of the train into the respective block and for energization upon passage of the train from that block; a normally open restoring circuit on each side of the crossing points, said restoring circuit constituting a local circuit and arranged to be closed upon deënergization of both of the relay magnets on one side of the crossing points and subsequent energization of the inner relay magnet.

In testimony whereof, I affix my signature, in the presence of two witnesses.

JAMES W. ABNEY.

Witnesses:
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W. H. VANDEYVER.