

993,266.

W. O. MEDFORD.  
 TRAIN CONTROLLING SYSTEM.  
 APPLICATION FILED MAR. 14, 1910.

Patented May 23, 1911.

3 SHEETS-SHEET 1.

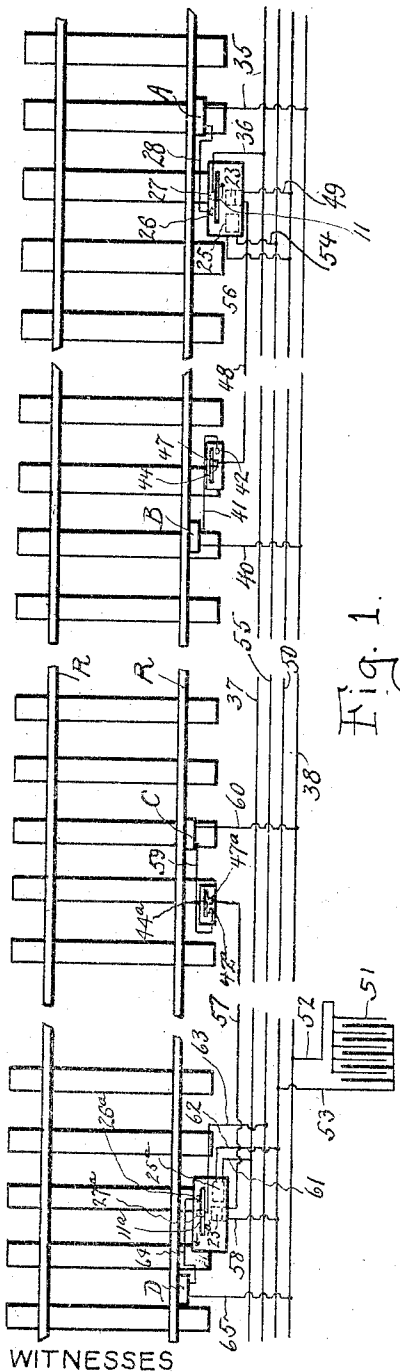


Fig. 1.

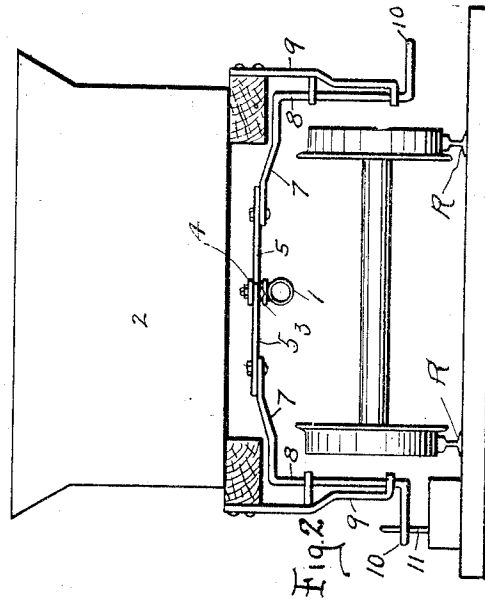


Fig. 2.

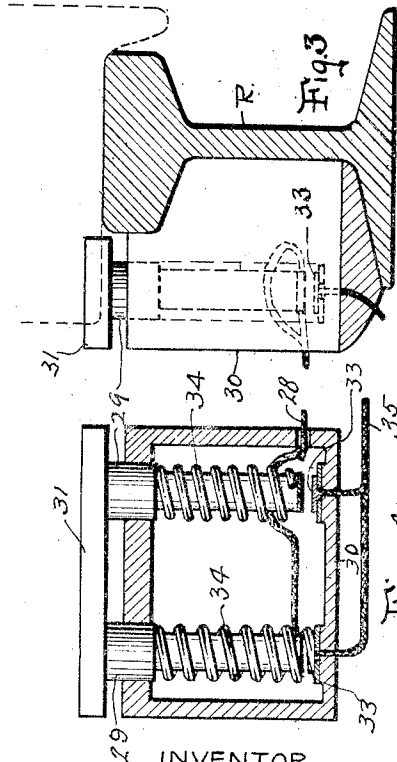


Fig. 3.

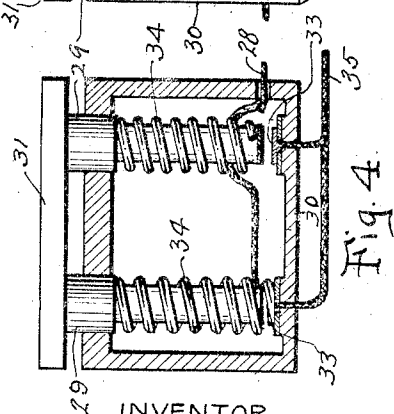


Fig. 4.

WITNESSES

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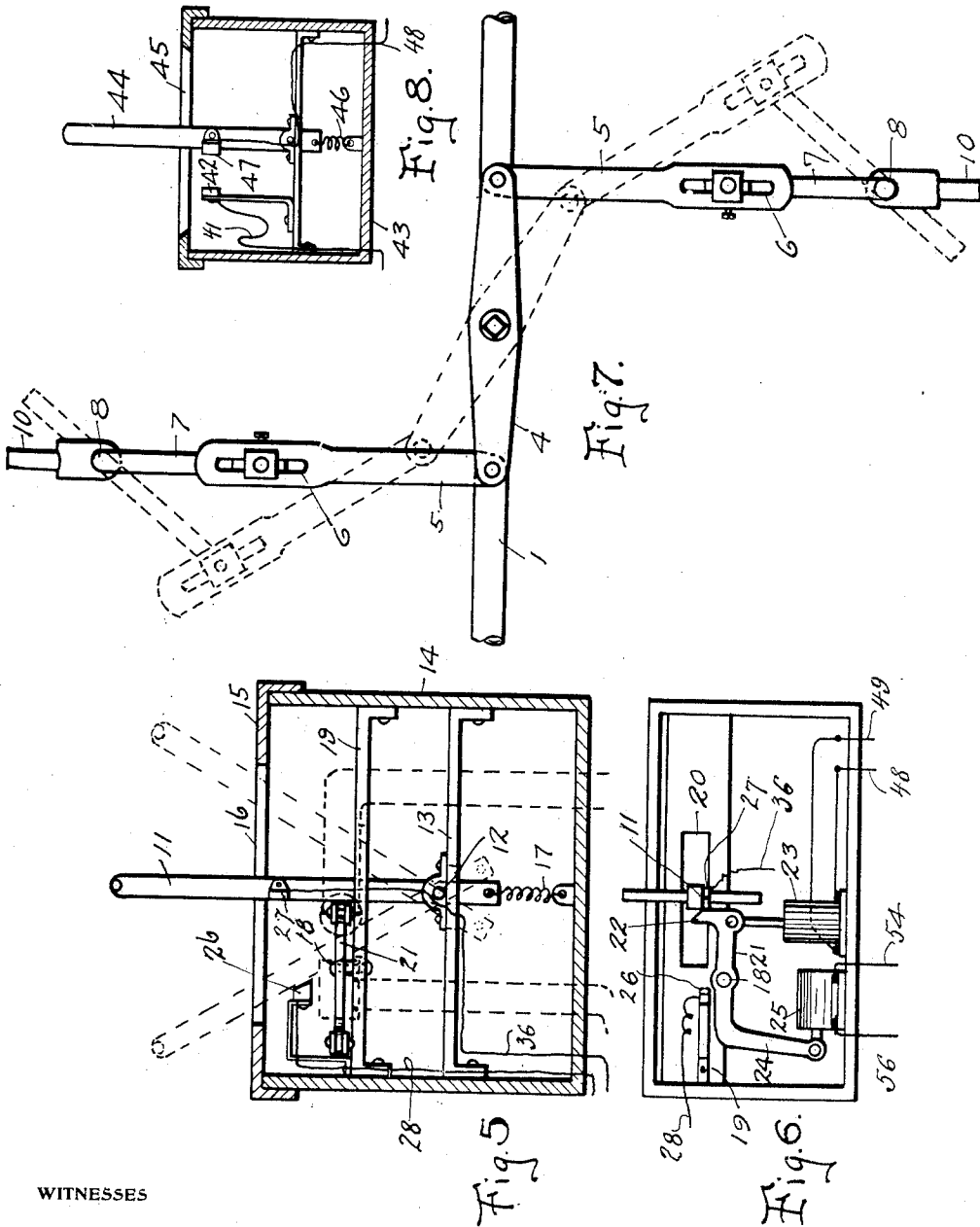
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3 SHEETS—SHEET 2.



WITNESSES

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3 SHEETS-SHEET 3.

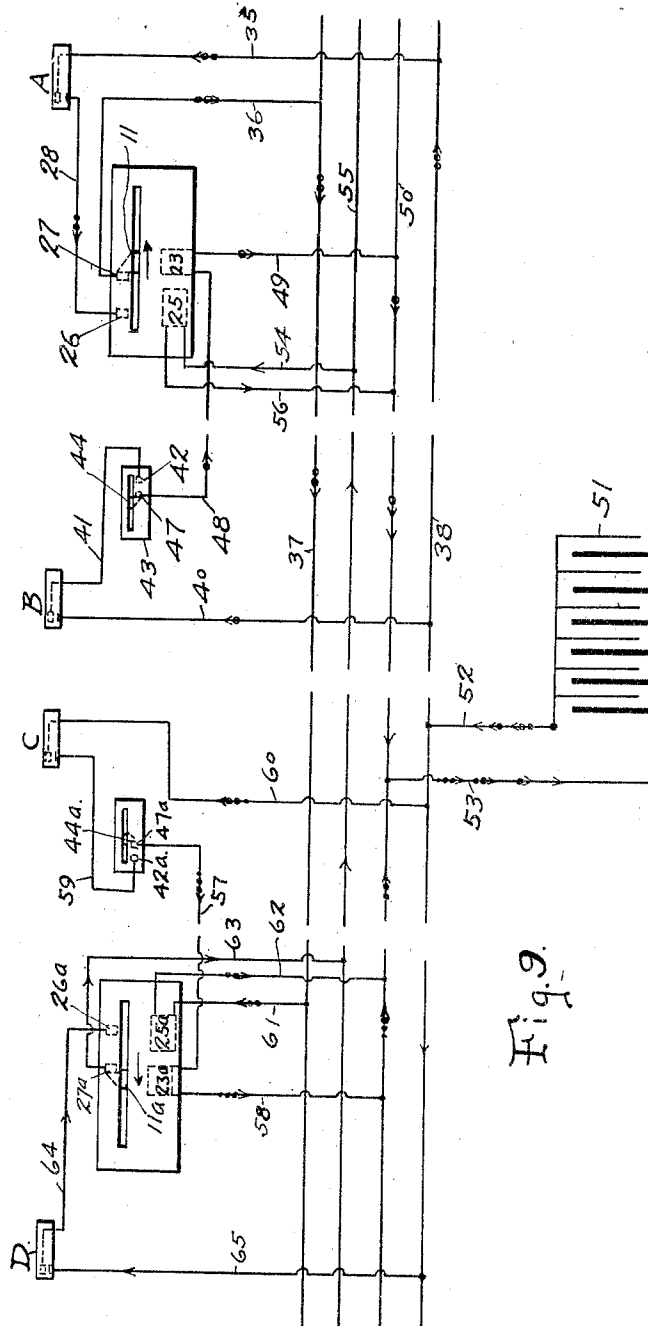


Fig. 9.

WITNESSES

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# UNITED STATES PATENT OFFICE.

WALDO O. MEDFORD, OF SPOKANE, WASHINGTON.

## TRAIN-CONTROLLING SYSTEM.

993,266.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed March 14, 1910. Serial No. 549,182.

*To all whom it may concern:*

Be it known that I, WALDO O. MEDFORD, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Train-Controlling Systems, of which the following is a specification.

This invention relates to that class of train-controlling systems which operate to automatically apply the brakes of a train entering a block already occupied by another train, the train first entering the block setting a trip at the remote end of the block, so that a second train entering the block from said end will be automatically brought to a stop by having its brakes applied.

It is the object of the present invention to provide improved means for controlling the trip, electro-magnets being provided for locking and releasing the same, together with devices operated by the first train entering the block for controlling the magnets.

The invention also has for its object to provide means for adjusting certain parts so that a service stop or an emergency stop may be had.

Other objects and advantages will be apparent when the nature of the invention is better understood.

The preferred embodiment of the invention is shown in the accompanying drawings, it being understood that various changes and modifications in the structural details may be resorted to without a departure from the invention.

In the drawings, Figure 1 is a diagram showing the electric circuits employed. Fig. 2 is a sectional elevation of a tender showing the equipment thereon. Figs. 3 and 4 are details of a circuit closing device, Fig. 3 being an end view, and Fig. 4 a longitudinal section. Figs. 5 and 6 are sectional and plan views, respectively, of the trip. Fig. 7 is a plan view of the valve-operating devices. Fig. 8 is a sectional detail of another circuit-closer. Fig. 9 is another diagram showing by arrows the flow of the electric current through the system.

The invention is intended for application to trains equipped with a fluid-pressure brake apparatus in which the brakes are applied by a reduction of pressure in a train pipe, this reduction of pressure being effected by opening a valve in said train pipe.

In the drawings, 1, in Fig. 2, denotes the train pipe which runs along the entire train, and is fitted, beneath the tender, 2, with a valve 3, which, when opened, permits escape of air from the train pipe to reduce the pressure therein, and thus effect the application of the brakes. To the stem of the valve 3 is fastened, midway between its ends, a lever 4, to each end of which is pivotally connected, at one of its ends, a link 5, having a slot 6 at its other end. To the slotted portion of the link is adjustably connected a horizontal arm 7 located at the upper end of a rock-shaft 8 supported vertically by a bearing bracket 9 depending from the tender. At the lower end of the rock-shaft is another horizontal arm 10 which extends in the opposite direction from the arm 7. The arm 10 projects outwardly a sufficient distance so that it may be engaged by a trip 11 located adjacent to the track, on one side thereof. When this trip strikes the arm 10, the shaft 8 is rocked, and through the arm 7, link 5, and lever 4, opens the valve 3 to reduce the train-pipe pressure, and thus set the brakes. The extent of the opening movement of the valve is regulated by adjusting the connection between the link 5 and the arm 7. It is therefore possible to adjust the parts for a service or an emergency application of the brakes. A rock-shaft and associate parts are located on both sides of the tender so that the apparatus may operate with the train going in either direction.

The trip 11 is a stem pivoted at 12 on a bracket 13 in a box 14, the latter having a cover 15 in which is a slot 16 through which the stem extends. The stem is pivoted to swing in a vertical plane parallel to the track, and it rises a suitable distance from the box so as to extend into the path of the part 10, the box being properly located with respect to the track for this purpose. The stem is held normally erect by a spring 17, fastened at one end to the lower end of the stem, and at its other end to the bottom of the box 14. The stem is always free to swing in one direction, but is prevented from swinging in the opposite direction by a stop device, which, however, may be set to permit the stem to swing in this direction also. This stop device is an angle lever pivoted at 18 on a shelf 19 in the box 14, the shelf having a slot 20 through which the stem extends, said slot being of a length so as not to inter-

fere with the swing of the stem. One branch 21 of the angle lever has a laterally projecting finger 22, which, when extended across the stem, on one side, prevents it from swinging to that side. To the branch 21 is operatively connected an electro-magnet or solenoid 23 for the purpose of swinging the angle lever in a direction to remove the finger 22 from in front of the stem and thus release the latter so that it may swing in that direction. To the other branch 24 of the angle lever is connected an electro-magnet or solenoid 25 for swinging the angle lever in a direction to place the finger in front of the stem and thus prevent the latter from swinging in that direction. The box 14 also contains a contact 26 which is so positioned that it is engaged by a contact 27 carried by the stem 11 when the latter swings in one direction. The contact 26 is connected by a wire 28 to one of the members of a circuit-closing device A mounted in close proximity to one of the track rails R so as to be actuated by the wheels of a passing train. This circuit-closing device comprises two plungers 29, vertically supported in a box 30 placed close to the rail. The plungers project through openings in the top of the box and are connected on the outside thereof by a plate 31. The plungers are slidable up and down, and the plate 31 is so located with respect to the rail 28, that the wheels of a passing train will engage said plate and depress the plungers. The plungers are held elevated above contacts 33 by means of springs 34 coiled around the plungers between shoulders thereon, and the floor of the box, the contacts 33 being located on said floor in line with, and beneath the lower ends of the plungers, and said contacts being engaged by the plungers when they are depressed as stated. The wire 28 is connected to the plungers 29, and to the contacts 33 is connected a wire 35. When the plungers are depressed and engage the contacts 33, the wires 28 and 35 are electrically connected. To the contact 27 is connected a wire 36 which branches off from a wire 37. The wire 35 branches off from a wire 38.

The circuit-closer A is located on one side of the trip device 11, and on the opposite side of said device is located a similar circuit-closer, shown diagrammatically at B in Figs. 1 and 9, and designed to make electrical connection between a wire 40 branching off from the wire 38, and a wire 41 leading to a contact 42 located in a box 43 in which is mounted a normally erect stem 44 extending through a slot 45 in the top of the box, and rising a suitable distance therefrom, and so located that it may be engaged by the part 10. This stem is held normally erect by a spring 46 in the same manner as the stem 11. The stem 44 carries a contact 47 adapted to engage the contact 42 when

the stem swings in that direction. To the contact 47 is connected a wire 48 which is electrically connected with the wire 41 when said contact engages the contact 42. The wire 48 leads to the release magnet 23, and from the latter, a wire 49 leads to a wire 50. One pole of a battery or other source of electric energy 51 is connected by a wire 52 to the wire 38, and the other pole is connected by a wire 53 to the wire 50. The locking magnet 25 is in a circuit including a wire 54 branching off a wire 55 and a wire 56 branching from the wire 50.

The trackway to which the apparatus is applied is divided into blocks, and a track apparatus as herein described is located at one end of the block, and also duplicated at the other end of the block. The trip corresponding to the trip 11 is indicated at 11<sup>a</sup>, and its release and locking magnets at 23<sup>a</sup> and 25<sup>a</sup>, respectively. The release magnet is in a branch circuit comprising wires 57 and 58, respectively, the former being connected to a contact 47<sup>a</sup> similar to the contact 47, and carried by a stem 44<sup>a</sup> similar to the stem 44, and the wire 58 being connected to the wire 50. A contact 42<sup>a</sup> similar to the contact 42 is connected by a wire 59 to a circuit closing device C, similar to the device A, to which a wire 60 leads from the wire 38. The locking magnet 25<sup>a</sup> is in a branch circuit including a wire 61 leading from the wire 37, and a wire 62 connected to the wire 50. The box containing the trip 11<sup>a</sup> also contains contacts 26<sup>a</sup> and 27<sup>a</sup> similar to the contacts 26 and 27, the contact 27<sup>a</sup> being connected by a wire 63 to the wire 55, and the contact 26<sup>a</sup> by a wire 64 to a circuit-closer D similar to the circuit-closer A and connected by wire 65 to the wire 38. The stems 44 and 44<sup>a</sup> are free to swing in either direction, and the stems 11 and 11<sup>a</sup> are always free to swing in a direction to let a train pass out of the block without having its brakes applied. The valve 3 works sufficiently tight so that it will not be opened by the light tap given the part 10 by the trips 11 or 11<sup>a</sup> when the train passes out of the block. The springs 34 are sufficiently strong so that the weight of the engine or tender is necessary to depress the plungers to close the circuit. This is to prevent any tampering with the device.

The system operates as follows: Assume a train is entering the block from the east. The wheels upon passing over the circuit-closer A close the circuit at this point, but the apparatus remains inactive as the circuit is open between the contacts 26 and 27. The circuit-closer A and the stem 11 will be so located with respect to each other that when the circuit is closed between 26 and 27 by the part 10 swinging the stem 11 over, a wheel of the tender will be depressing the plungers 29 to close the circuit at A. The

locking device of the stem 11 is normally in release position so that the swing of the stem just described may take place. The circuit now being closed at A and between 5 26 and 27, the locking magnet 25<sup>a</sup> is energized, and the stem 11<sup>a</sup> at the west or remote end of the block is locked. If now a train should enter the block from the west, its brakes will be applied, and the train thus 10 brought to a stop, and the engineer would then know that another train was on the block, and his duty then would be to back out of the block, out of the way of the train approaching from the east, or to take such 15 other action as would prevent a collision. The circuit of the locking magnet 25<sup>a</sup> may be traced as follows: from one pole of the battery 51 by wires 38 and 35 to A, thence by wire 28 to 26, and from 27 by wires 36, 20 37, 61, to magnet 25<sup>a</sup>, and by wires 62, 50 and 53 to the other pole of the battery. In the meantime the eastern train passes the stem 44, but will not close the circuit controlled by said stem, the latter being swung 25 in the opposite direction from that bringing the contacts 42 and 47 together. The train next passes over the circuit-closer B, but this also has no effect on the system. The train next reaches the circuit-closer C and the 30 stem 44<sup>a</sup>, whereupon the circuit is closed which releases the stem 11<sup>a</sup>. The circuit-closer C and the stem 44<sup>a</sup> are arranged to be simultaneously actuated to close the circuit, in the same manner as the circuit-closer A 35 and the stem 11. The parts B and 44, and D and 11<sup>a</sup> are also arranged in the same manner. The release circuit may be traced as follows: from one pole of battery 51 by wires 52, 38 and 60 to C, thence by wire 59 40 to 42<sup>a</sup> and from 47<sup>a</sup> by wire 57 to magnet 23<sup>a</sup>, and from the latter by wires 58, 50 and 53 to the other pole of the battery. The eastern train can now pass out of the block without having its brakes applied, and it 45 passes the stem 11<sup>a</sup> and the circuit-closer D without affecting the system. The block is now clear for a train approaching from the west, and this train operates to set the trip 11 against a train approaching from the 50 east, the parts operating the same as already described, but reversely, circuit-closers D, and 26<sup>a</sup> and 27<sup>a</sup> controlling the circuit of the locking magnet 25, and circuit-closers B, and 42 and 47 controlling the circuit of the 55 release magnet 23. The purpose of having two simultaneously operating circuit closers is to prevent a current from flowing through the system as each wheel on each car of a train passes over the rail contacts. The circuit is closed only as both devices are actuated. Thus, as the rest of the train is passing, there will be no action through the sys-

tem. A further object of the two simultaneously operating circuit closers is to prevent the system from being tampered with. 65 As already stated, the strength of the springs 34 will be such that the weight of the tender is required to depress the plungers 29. Without this wheel-actuated circuit closer, it would be possible to actuate the trip-con- 70 trolled circuit closer manually, and thus set the trip at the distant end of the block, thereby stopping a train entering the block from that end.

I claim:

1. In a system for controlling railway trains, a trip located adjacent to the track, an angle lever carrying means for locking the trip against movement in one direction, electro-magnets to which the branches of the 80 lever are connected, one of said magnets swinging the lever in a direction to place the locking means in operative position, and the other magnet swinging the lever in the opposite direction to place the locking means 85 in release position, electric circuits in which the magnets are included, means located at a point remote from the trip, and operated by the train for closing the circuit of the first-mentioned magnet, and means located 90 between said train operated means and the trip, and operated by the train for closing the circuit of the other magnet.

2. In a system for controlling railway trains, a pair of train-operated trips located 95 adjacent to the track at the ends of a block section, contacts carried by the trips, contacts engageable by the trip contacts when the trips swing in one direction, means for locking and releasing the trips, electro-mag- 100 nets for actuating the locking and releasing means, electric circuits in which the magnets are included, the trip contact and the contact associated therewith at one end of the block controlling the locking magnet circuit 105 of the trip at the other end of the block, and means located between the trips and operated by the train for closing the circuit of the release magnet of the trip which has been locked. 110

3. In a system for controlling railway trains, an electric circuit open at two points, circuit closers at said points, one of said circuit closers being actuated by a wheel of a train, a device carried by the train for actuating the other circuit closer, said device 115 operating simultaneously with the wheel, and an obstacle controlled by the circuit.

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

WALDO O. MEDFORD.

Witnesses:

H. E. SMITH,  
NETTIE KING.