April 12, 1927. F. SWEARINGEN 1,624,813

AUTOMATIC GATE

Filed Nov. 14, 1925 3 Sheets-Sheet 1

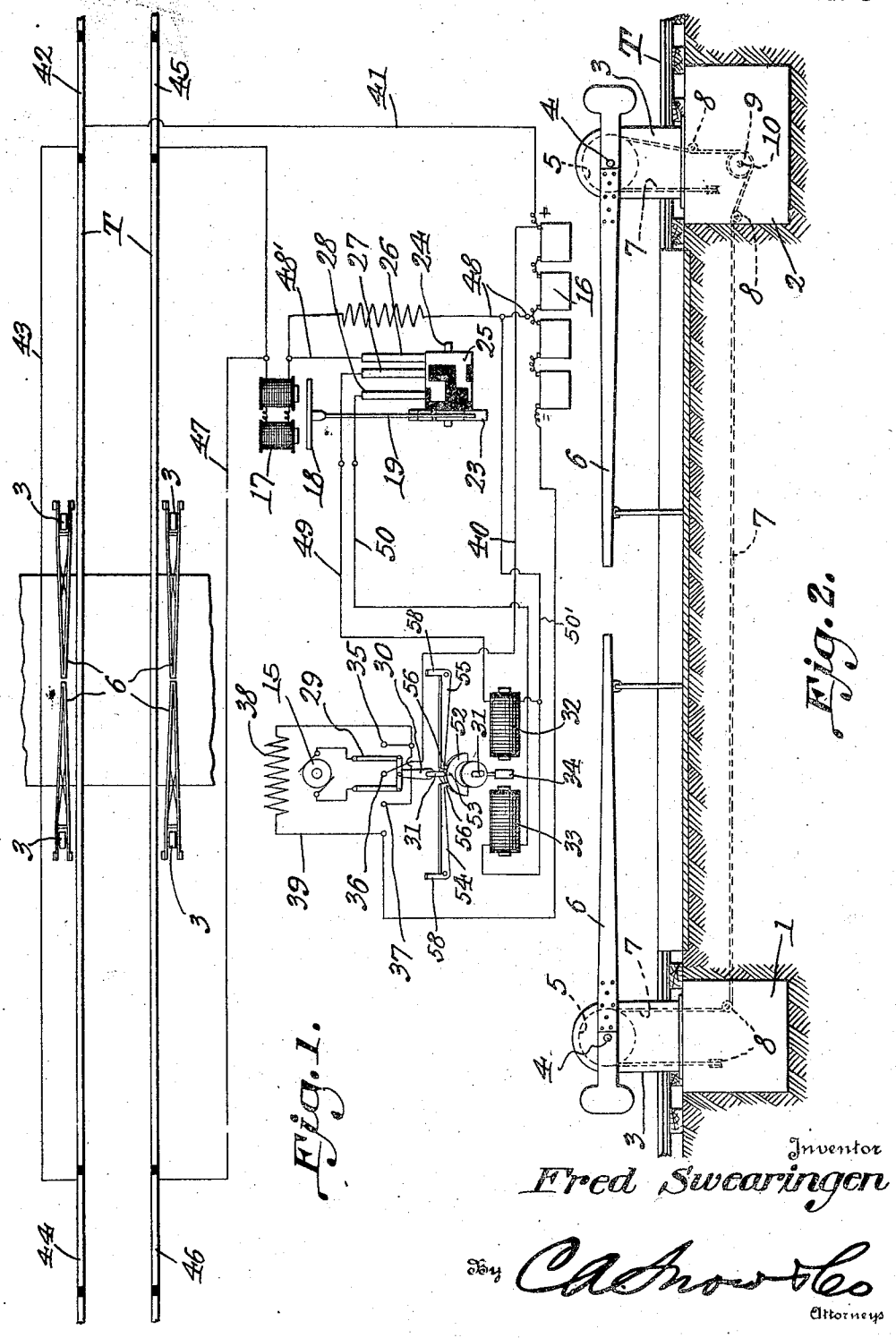

Fig. 1.

Fig. 2.

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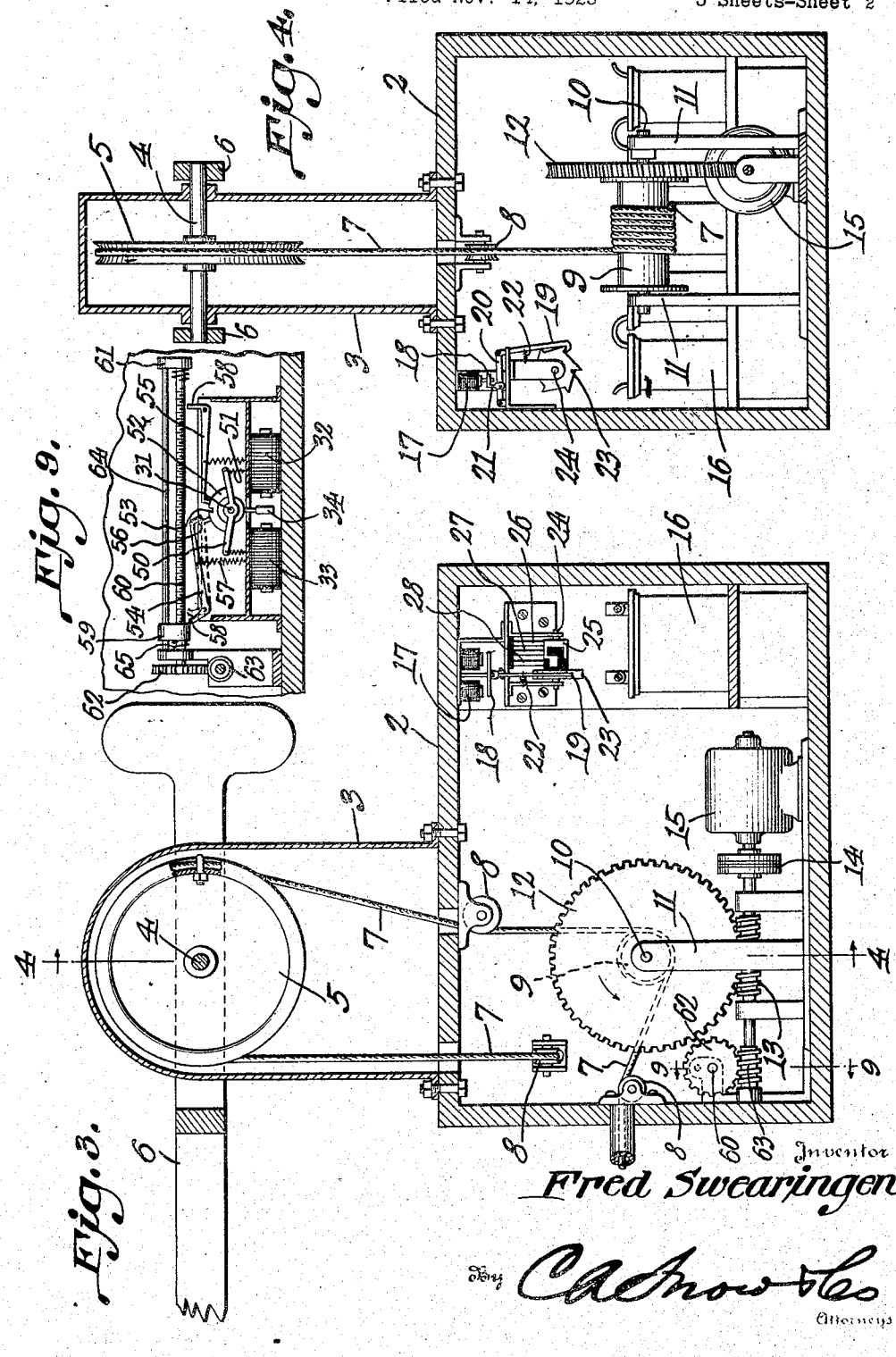

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AUTOMATIC GATE

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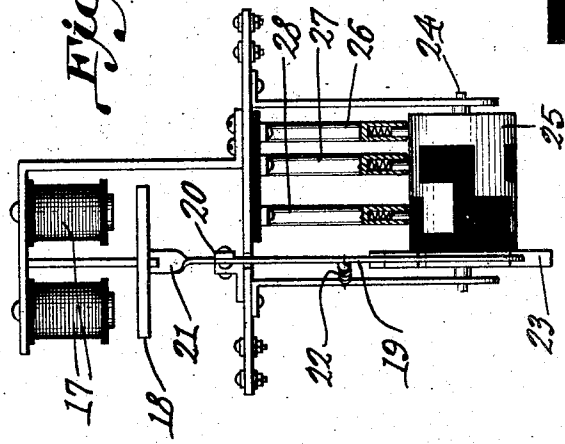

Fig. 5.

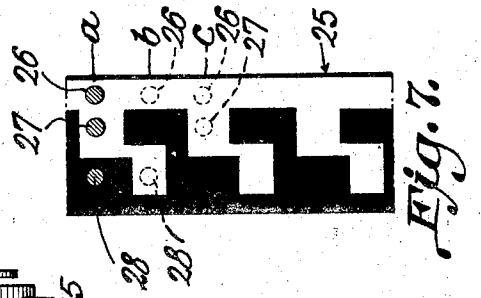

Fig. 7.

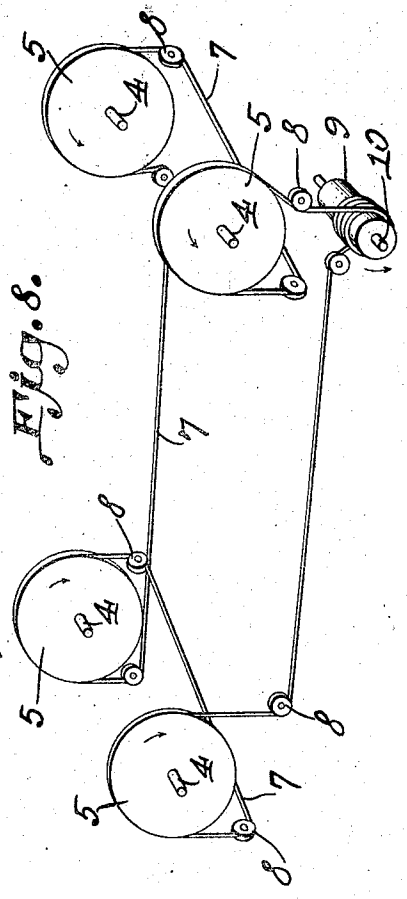

Fig. 8.

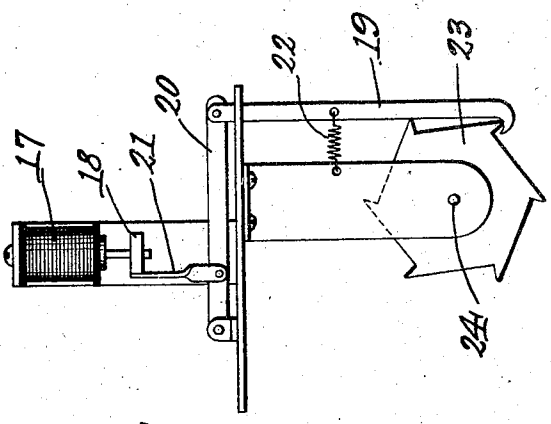

Fig. 6.

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UNITED STATES PATENT OFFICE.

FRED SWEARINGEN, OF PUEBLO, COLORADO.

AUTOMATIC GATE.

Application filed November 14, 1925. Serial No. 69,111.

This invention relates to automatically operated gates designed primarily for use at railway crossings, one of the objects of the invention being to provide electrically operated means under the control of an approaching train for causing the gate to move to closed position prior to the arrival of the train at the crossing, the said mechanism also acting to open the gate after the crossing has been passed by the train.

A further object is to provide mechanism of this character which is simple and efficient and can be installed readily.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction, hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings,

Figure 1 is a diagram showing the complete apparatus.

Figure 2 is an elevational view showing the crossing gates closed.

Figure 3 is a vertical section through one of the housings for the mechanism, a portion of one of the gates being shown.

Figure 4 is a section on line 4—4 Figure 3.

Figure 5 is an enlarged elevation of the commutator and a part of its operating mechanism.

Figure 6 is an end view of the mechanism shown in Figure 5.

Figure 7 is a diagram of the commutator.

Figure 8 is a perspective view showing the operating connections between the gate.

Figure 9 is an enlarged section on line 9—9 Figure 3, the screw actuated block being shown in normal position.

Referring to the figures by characters of reference 1 and 2 designate housings of concrete or any other suitable material preferably located below the surface of the ground at opposite sides of the crossing where the gates are located. On each of these housings is arranged a hollow pedestal 3 in which is journaled a shaft 4 carrying a wheel 5 located in the pedestal. A crossing gate 6 is secured to one end of each shaft, this gate being of the usual counterbalanced type.

It is to be understood that additional pedestals 3 are located at the opposite side of the track T. Mounted in each of these other pedestals are shafts 4 carrying wheels 5. Gates 6 rotate with these shafts 4. Thus it will be seen that when all of the shafts are rotated all of the gates will be lowered or raised simultaneously. To insure this simultaneous movement a belt 7 is mounted on the different wheels and extends under guide pulleys 8 which are suitably located, said belt being wrapped about and connected to a drum 9 mounted within the housing 2. It is to be understood, of course, that the belt is of sufficient length to extend transversely under the road where it approaches the railroad track at opposite sides thereof and also extends transversely under the track. The drum 9 is secured to a shaft 10 mounted in suitable bearings 11 and provided with a gear 12. This gear is driven from a worm 13 the shaft of which is connected by a suitable clutch 14 to the shaft of an electric motor 15, said motor being of the reversible type.

Storage batteries 16 may be located within the housing 2 and supported at any suitable point within this housing is an electro-magnet 17 the armature 18 of which has a dog 19 connected thereto through a lever 20 and a link 21. The dog 19 is held by a spring 22 normally in engagement with one of the teeth of a ratchet 23 and this ratchet is secured to and rotates with the shaft 24 of a commutator 25. Three brushes 26, 27 and 28 engage the commutator so that when said commutator is brought to different positions by the rotation of the ratchet 23 an electrical connection will be established between any two predetermined brushes. The reversible motor 15 is provided with a reversing switch 29 of the pole changer type. This switch has an arm 30 connected to a shaft 31 which extends above the space between opposed electro-magnets 32 and 33. An armature 34 is connected to the shaft 30 and is supported normally midway between the electro-magnets 32 and 33. Contacts 35, 36 and 37 are provided for the pole changing switch and it will be obvious that when said switch is moved in one direction the motor will be caused to rotate in one direction whereas when the switch is shifted in

the opposite direction the motor will be reversed. A resistance coil 38 is included in an electrical connection 39 between the contact 37 and one pole of the battery 16. The other pole of the battery is electrically connected as at 40 to the contact 36 while the contact 35 is electrically connected to the contact 37 as shown particularly in Figure 1. That pole of the battery from which the connection 40 is extended is provided with an electrical connection 41 extending to a rail section 42 forming a part of the track T and located at a desired distance from the crossing. This section 42 is insulated from the balance of the track and is electrically connected, as at 43, to another rail section beyond the other side of the crossing and which has been indicated at 44. Directly opposite each of the sections 42 and 44 are insulated rail sections 45 and 46 respectively which are electrically connected as indicated at 47 and are also electrically connected to one pole of the magnet 17. The other pole of this magnet is electrically connected as at 48 to an intermediate portion of the battery and also by a connection 48′ to the brush 26 and to the solenoids 32 and 33. Brush 27 is electrically connected as at 49 to the magnet 32 while brush 28 is electrically connected as at 50 to the magnet 33.

The shaft 31 is provided with oppositely extending arms 50 and springs 51 are connected to these arms and serve to hold the pendulum or armature 34 normally centered between the electro-magnet as shown in Figure 9. A segmental plate 52 is also secured to the shaft 31 so as to rotate therewith and this plate is provided, at the center of its arcuate edge, with a notch 53. Upwardly disposed levers 54 and 55 are provided, at their free ends, with fingers 56 normally resting on the segmental plate 52. Springs 57 are attached to the levers 54 and cause the fingers 56 to press upon the segmental plate 52.

Extending from the outer end of each lever 54 and 55 is a tripping finger 58 extending into the path of a tripping block 59 mounted on and adapted to be shifted by a screw 60. This screw is journaled in suitable bearings 61 and is provided, at one end, with a gear 62 adapted to receive motion from a worm 63 carried by the shaft of the motor 13 as shown in Figure 3.

The block 59 is held against rotation with the screw 60 by guide rods 64 or the like and under normal conditions the block 59 is located upon the left portion of the screw. The threads are removed from the end portions of the screw and mounted on these end portions are springs 65.

Normally the gates are open and the motor 15 is out of circuit with the battery. When a train approaches the crossing from either direction it completes a circuit either between rails 42 and 45 or between rails 44 and 46 before it reaches the crossing. Assuming that the train is approaching from the right in Figure 1 the rail sections 42 and 45 will be electrically connected thereby so that a circuit will be set up from the right end of the batteries 16 to rail 42, thence through the car to rail 45 and thence to magnet 17 which will be energized so as to attract armature 18 and shift the commutator from position *a* in Figure 7 to position *b*. The current flowing from the energized magnet 17 will split, a portion thereof flowing to the intermediate portion of the battery through the connection 48 while the remainder of the current will pass through the connection 48′ to the brush 26 and thence through the commutator to brush 28, connection 50 and magnet 33. From this magnet current will flow back to the intermediate portion of the battery through the connection 50′. Thus the armature 34 will be attracted by the magnet 33 with the result that arms 50 will be moved out of their normal positions and the segmental plate 52 will be rotated to the right in Figure 9 until the notch 53 comes to position beneath the finger 56 of lever 55. Spring 57 will promptly shift lever 55 so that its finger will drop into the notch 53 and, therefore, the pole changing switch will be moved into engagement with the contacts 36 and 37. Thus a circuit will be set up through the motor so that it will be driven in one direction and, consequently, the worm 13 will drive gear 12 and cause all of the wheels 5 to rotate simultaneously and the gate to swing downwardly to closed position. At the same time worm 63 will actuate gear 62 with the result that the screw 60 will be rotated and the block 59 shifted toward the right in Figure 9. Thus the block will come against finger 58 and lever 55 and cause the finger 56 to lift out of the notch 53. Before the block 59 reaches finger 58 the train approaching the gate has passed off of the rails 42 and 45 so that the circuit through the apparatus has been broken. The motor will of course continue to operate because the switch is locked on the contacts 36 and 37. When the switch is released, however, by the pressure of the block 59 against finger 58, springs 51 will return the switch to its normal positions shown in Figure 1 and the current to the motor will thus be cut off. This cutting off of the current to the motor occurs simultaneously with the closing of the gate. When the train reaches the rail sections 44 and 46 after passing the crossing, the circuit through the apparatus is reversed, the current flowing from the right end of the battery 16 through the conductor 41 and rail 42 to conductor 43 and rail 44. At this point the current flows through the car to the rail 46 and thence by way of conductor

47 to the magnet 17 which is energized. This causes armature 18 to be attracted and rotate the commutator to bring the brushes 26 and 27 into circuit. Consequently the current, leaving the magnet 17, will split, a portion flowing through the conductor 48 to the intermediate portion of the battery while the remainder of the current will flow through conductor 48′ to brush 26, commutator 25, brush 27, conductor 49, magnet 32 and conductor 50′ back to the conductor 48. The operation heretofore described will be reversed with the result that the gates will be raised and, when they reach their uppermost position, the pole changing switch will be released and the motor stopped.

The end portions of the screws 60 are left free of threads so that, should the blocks 59 travel too far along the screw after engaging the finger 58, no injury will be caused. Instead the block will come against and compress spring 65 in the path thereof and when the rotation of the screw is reversed this spring will force the block into engagement with the thread and cause the block to travel along this screw in the direction desired.

What is claimed is:

1. The combination with an electric motor, a crossing gate, and means operated by the motor for actuating the gate, of a pole changing switch for controlling the direction of rotation of the motor, a commutator, means controlled by a train at points remote from the crossing for actuating the commutator, and separate circuits controlled by the commutator for throwing the pole changing switch to operate the motor and raise or lower the gates.

2. The combination with a crossing gate, a reversible electric motor for actuating the same, and a pole changing switch for controlling the flow of current to the motor, of a commutator, electrically operated means under the control of the train at a point remote from either side of the crossing for actuating the commutator, and electric circuits controlled by the commutator for shifting the pole changing switch to either of two extreme positions.

3. The combination with a crossing gate, of a drum, flexible means for transmitting motion from said drum to the gate, a reversible electric motor, means operated thereby for actuating said flexible means to open and close the gate, a pole changing switch for controlling the flow of current to the motor, a commutator, means under the control of the train at a point remote from the crossing for actuating the commutator, and electric circuits controlled by the commutator for shifting the pole changing switch.

4. The combination with a reversible electric motor, a gate, and means operated by the motor for closing the gate, of a pole changing switch for controlling the flow of current to the motor, a commutator, electrically operated means for actuating the commutator, means at points remote from the gate and cooperating with a train approaching or leaving the gates for closing a circuit to said actuated means, separate circuits controlled by the commutator, and means operated by the closing of the respective circuits for throwing the pole changing switch to either of two extreme positions.

5. The combination with a gate, and a reversible electric motor for opening or closing the gate, of a pole changing switch for controlling the flow of current to the motor, a rotatable commutator, an electro-magnet, ratchet mechanism controlled by the electro-magnet for intermittently rotating the commutator, means at points remote from the gate cooperating with a train approaching or leaving the gates to close a circuit to the electro-magnet and actuate the commutator, separate magnets for shifting the pole changing switch to either of two extreme positions, circuits controlled by the commutator to the respective electro-magnets, and yielding means for holding the pole changing switch normally in open or inactive position.

6. The combination with an electric motor, a crossing gate, and means operated by the motor for actuating the gate, of a pole changing switch for controlling the direction of rotation of the motor, a commutator, means controlled by a train at points remote from the crossing for actuating the commutator, and separate circuits controlled by the commutator for throwing the pole changing switch to operate the motor and raise or lower the gates, and means for automatically cutting off the circuit to the motor simultaneously with the complete opening or the complete closing of the gate.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

FRED SWEARINGEN.