

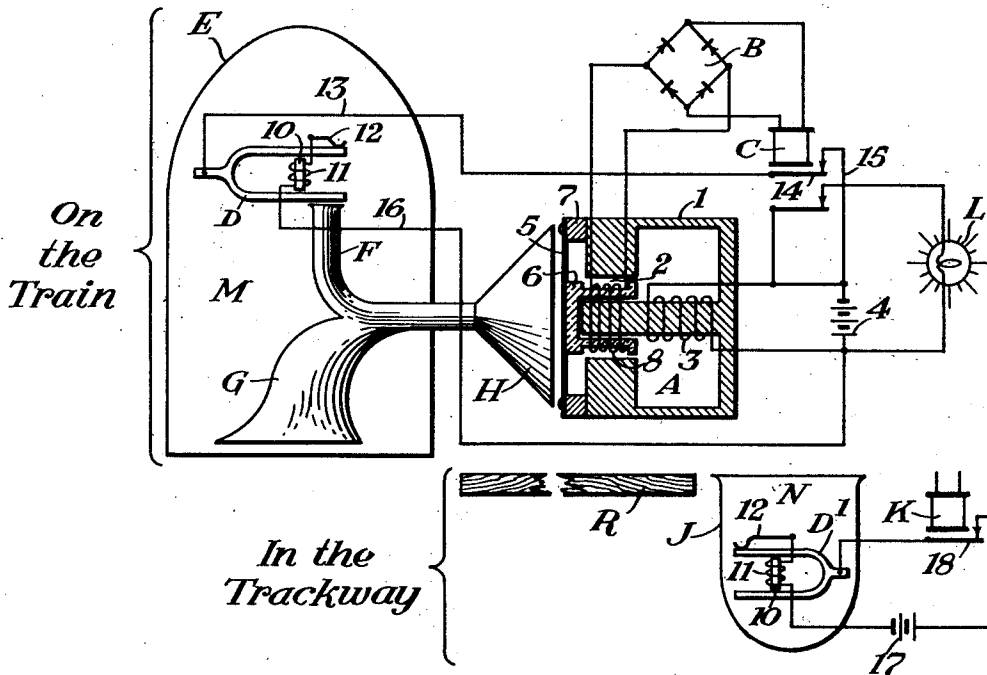
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RAILWAY TRAFFIC CONTROLLING APPARATUS

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RAILWAY-TRAFFIC-CONTROLLING APPARATUS

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My invention relates to railway traffic controlling apparatus, and particularly to apparatus of the type comprising train-carried governing means cooperating with devices located at intervals along the trackway.

I will describe one form of apparatus embodying my invention, and will then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view showing one form of railway traffic controlling apparatus embodying my invention.

Referring to the drawing, the reference character M designates a train-carried sound projector, comprising a reflector E containing a suitable source of sound waves such as a tuning fork D. The tuning fork D is electrically operated by means of a winding 11 mounted on a magnetizable core 10. When energy is supplied to winding 11, fork D vibrates, and sound waves are projected toward the trackway.

A portion of the sound waves from fork D are also transmitted to a sound responsive alternating current generator A by means of a tube F which terminates in a funnel-shaped member H. In the form here shown, the generator A comprises an electromagnet 1, having an annular air gap 2. This electromagnet is provided with a winding 3, which is constantly supplied with energy from a battery 4 to create a unidirectional flux in the magnetic circuit which includes the air gap 2. Facing the member H, and spaced from the electromagnet 1 by an annular ring 7, is a diaphragm 5, which is mechanically tuned to resonance at the frequency of the sound waves emitted by fork D. The diaphragm 5 carries a spool 6, which fits in the air gap 2 with considerable clearance, and which, in turn, carries a coil 8. Coil 8 is connected with a relay C through a full-wave rectifier B.

The relay C controls the supply of energy to winding 11 of tuning fork D. When contact 14 of relay C is closed, current flows from battery 4, through wire 15, front contact 14 of relay C, wire 13, tun-

ing fork D, contact 12 operated by fork D, winding 11, and wire 16 back to battery 4. Under these conditions fork D vibrates, and sound waves are transmitted by tube F to diaphragm 5. As a result, diaphragm 5 also vibrates, and an alternating electromotive force is induced in coil 8. The resultant current which then flows in coil 8 is rectified by rectifier B, and is supplied to relay C, as a pulsating unidirectional current. This current energizes relay C, so that fork D continues to vibrate and supply diaphragm 5 with sound waves.

Relay C also controls suitable train-carried governing means, here shown as a lamp L. When relay C is energized, lamp L is lighted to indicate proceed, but when relay C is deenergized lamp L is extinguished to indicate stop.

The apparatus hereinbefore described is suitable for cooperation with devices located at intervals along the trackway. One such device is shown at R, and comprises a reflecting plate, which may have any suitable size and shape, and which is located in the trackway adjacent the path of travel of the train-carried sound projector M. When the projector M is directly opposite the trackway plate R, a portion of the sound waves projected toward the trackway are redirected into a train-carried receiver G, which communicates with the tube F. The receiver G is substantially bell-shaped and is located entirely within the projector M. The wave length of the sound waves produced by fork D, and the distance between the fork D and the trackway plate R, are such that when the projector M is opposite the plate R, the redirected sound waves which enter tube F through receiver G, counteract the effect on the diaphragm 5 of the waves entering tube F directly from the fork D. As a result of these two interfering trains of sound waves, the amplitude of vibration of the diaphragm 5 is greatly diminished. The current supplied to relay C is then decreased and the relay becomes de-energized. When this occurs lamp L is extinguished to indicate stop. At the same time, fork D becomes de-

energized, so that the supply of sound waves to diaphragm 5 is stopped. Relay C therefore remains de-energized until diaphragm 5 is again vibrated to energize the relay, or until the engineman manually closes the contacts of relay C to energize tuning fork D.

After the train has passed the plate R, the apparatus may, under some conditions, be restored to the normal operating condition by a sound transmitter N, also located in the trackway adjacent the path of travel of the sound projector M, and arranged in such manner that the train passes the transmitter N just after passing the trackway plate R. The sound transmitter N comprises a reflector J containing a tuning fork D¹, similar to the fork D. The fork D¹ is capable of emitting sound waves having the same frequency as fork D, so that diaphragm 5 may be vibrated at times by waves from fork D¹. Energy is at times supplied to fork D¹ from a battery 17 over a front contact 18 of a relay K. Relay K may be controlled in any suitable manner. For example, the relay may be controlled in accordance with traffic conditions, so that when traffic conditions are safe, relay K is energized, but that when traffic conditions are dangerous, relay K is de-energized. If traffic conditions are dangerous, fork D¹ is at rest, and when the train passes transmitter N, the transmitter has no effect on the train carried apparatus. If, however, traffic conditions in advance are safe, fork D¹ is energized, and when the train passes transmitter N, sound waves having the same frequency as the sound waves normally emitted by fork D are projected toward the train by reflector J. These waves enter receiver G, and since their frequency is the same as the waves which normally enter tube F, diaphragm 5 is vibrated by these waves. As a result, relay C becomes energized, and tuning fork D commences to vibrate, so that diaphragm 5 is again vibrated by sound waves from fork D. Relay C therefore remains energized, and the apparatus is restored to its normal operating condition so that lamp L is lighted to indicate proceed. The apparatus will remain in this condition until the train passes the next trackway plate R.

It should be understood that wherever, in the accompanying specification and claims, I have used the expressions "sound" and "sound waves", I have intended these terms to indicate pulsations or vibrations of the air at frequencies above or below the range of audibility as well as pulsations or vibrations within the range of audible frequencies.

It should also be pointed out that although I have, for purposes of explanation, illustrated tuning forks as sound sources,

any other suitable source of sound could be utilized.

Although I have herein shown and described only one form of railway traffic controlling apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, a train carried diaphragm, means on the train for normally supplying a first series of sound waves to said diaphragm, a reflector on the train for projecting sound waves from the train toward the trackway, means located partly in the trackway and partly on the train for supplying a second series of sound waves from said reflector to said diaphragm, and governing means on the train controlled by said diaphragm in accordance with the phase relation of the sound waves in said two series.

2. In combination, a train-carried relay, a train-carried device responsive to sound waves for supplying said relay with energy, means on the train for normally supplying sound waves to said device, a reflector on the train for projecting sound waves from the train toward the trackway, means located partly in the trackway and partly on the train for supplying sound waves from said reflector to said device, and governing means on the train controlled by said relay.

3. In combination, a train-carried magnetic circuit having an air gap, means for creating a unidirectional flux in said air gap, a coil in said air gap, a diaphragm supporting said coil, means on the train for normally supplying sound waves to said diaphragm, a reflector on the train for projecting sound waves from the train toward the trackway, means located partly in the trackway and partly on the train for supplying sound waves from said reflector to said diaphragm, a relay connected with said coil, and traffic governing means on the train controlled by said relay.

4. In combination, a train-carried relay, a device responsive to sound waves for supplying said relay with current, an electrically operated train-carried tuning fork controlled by said relay for normally supplying sound waves to said device, a reflector on the train for projecting sound waves from the train toward the trackway, means located partly on the train and partly in the trackway for supplying sound waves from said reflector to said device, and governing means on the train controlled by said relay.

5. In combination, a train carried magnetic circuit having an air gap, means for

creating a unidirectional flux in said air gap, a diaphragm, a coil located in said air gap and attached to said diaphragm, train-carried means for normally supplying sound waves to said diaphragm to vibrate said diaphragm, a relay connected with said coil and energized when said diaphragm is vibrating, a reflector on the train for projecting sound waves toward the trackway, means located partly on the train and partly in the trackway for supplying to said diaphragm from said reflector sound waves which are out of phase with the sound waves normally supplied to the diaphragm, and governing means on the train controlled by said relay.

6. In combination, a train carried magnetic circuit having an air gap, means for creating a unidirectional flux in said air gap, a diaphragm, a coil located in said air gap and attached to said diaphragm, a rectifier on the train, a relay on the train connected with said coil through said rectifier, a train carried electrically operated tuning fork controlled by said relay for producing sound waves, a tube for transmitting sound waves from said fork to said diaphragm to vibrate said diaphragm and energize said relay, a reflector on the train for projecting sound waves from the train toward the trackway, means in the trackway for redirecting sound waves from said reflector back toward the train, a train-carried receiver communicating with said tube for transmitting to said diaphragm said redirected sound waves for at times counter-acting the vibration of said diaphragm, and traffic governing means controlled by said relay.

7. In railway traffic controlling apparatus, the combination of a train carried source of sound waves, a diaphragm subjected to said sound waves, a relay, means responsive to vibration of said diaphragm for controlling said relay, and governing means on the train controlled by said relay.

8. In combination, a train carried electrically operated tuning fork for producing sound waves, a diaphragm subjected to said sound waves, a relay, means responsive to vibration of said diaphragm for controlling said relay, and governing means on the train controlled by said relay.

9. In railway traffic controlling apparatus, the combination of a train-carried magnetic circuit having an air gap, a coil located in said gap, a diaphragm attached to said coil and responsive to sound waves for vibrating said coil, a relay connected with said coil, a source of sound waves controlled by said relay, a tube for transmitting sound waves from said source to said diaphragm, and governing means on the train controlled by said relay.

10. In railway traffic controlling apparatus, the combination of a train-carried sound

projector, a diaphragm having one side exposed to sound waves from said projector and arranged to vibrate in response to said sound waves, a relay, means responsive to vibration of said diaphragm for supplying said relay with current, and governing means controlled by said relay.

11. In combination, a train-carried relay, train-carried means responsive to sound waves for supplying said relay with current, a train-carried sound projector for projecting sound waves toward the trackway, a tube for transmitting sound waves from said projector to said train-carried means, a plate located in the trackway in the path of travel of said train-carried sound projector and arranged to reflect sound waves back toward the train, a train-carried receiver communicating with said tube for transmitting reflected sound waves to said train-carried means, and governing means on the train controlled by said relay.

12. In combination, a train-carried diaphragm, means located on the train for normally supplying sound waves to said diaphragm, means located partly on the train and partly in the trackway for at times supplying said diaphragm with sound waves from the trackway, and governing means on the train controlled by said diaphragm.

13. In combination, a train-carried diaphragm, a train-carried source of sound waves for normally vibrating said diaphragm, a reflector on the train for projecting sound waves from the train toward the trackway, means located partly on the train and partly in the trackway for at times supplying said diaphragm with sound waves from said reflector to counteract the effect on said diaphragm of the sound waves normally supplied to the diaphragm, means located in the trackway for at times projecting sound waves from the trackway toward the train to cause said diaphragm to vibrate, and governing means on the train controlled by the vibration of said diaphragm.

14. In combination, a sound projector on a train, a relay on the train, a generator on the train responsive to sound waves for supplying said relay with current, a tube on the train for transmitting sound waves from said projector to said generator, a reflecting plate in the trackway for redirecting sound waves from said projector, a receiver communicating with said tube for transmitting redirected sound waves to said generator in such manner that said redirected waves counteract the effect on said generator of sound waves transmitted to the generator by said tube, a sound transmitter in the trackway controlled by traffic conditions for at times supplying said generator with sound waves through said receiver, and governing means on the train controlled by said relay.

15. In combination, a train-carried dia-

phragm, means located partly on the train and partly in the trackway for at times supplying said diaphragm with a first series of sound waves to vibrate said diaphragm, a
5 relay responsive to vibration of said diaphragm, train-carried means controlled by said relay for at times supplying said diaphragm with a second series of said sound waves to vibrate said diaphragm, and governing means on the train controlled by said
10 relay.

16. In combination, a train carried relay, a train carried source of sound waves controlled by said relay, a train carried dia-
15 phragm mechanically tuned for resonance with waves from said source, a tube for transmitting a first series of sound waves from said source to said diaphragm to vibrate said diaphragm, means responsive to
20 vibration of said diaphragm for controlling said relay, a reflector on the train for projecting sound waves from said source toward the trackway, a receiver in said reflector communicating with said tube, a reflect-
25 ing plate in the trackway for redirecting sound waves from said reflector into said receiver to supply said diaphragm with a second series of sound waves which counter-act the effect on said diaphragm of said first
30 series of waves, a source of sound waves in the trackway in advance of said plate and having the same frequency as the first source, and controlled by traffic conditions, a reflector in the trackway for projecting sound
35 waves from said trackway source into said receiver for at times vibrating said diaphragm, and governing means on the train controlled by said relay.

In testimony whereof I affix my signature.

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