

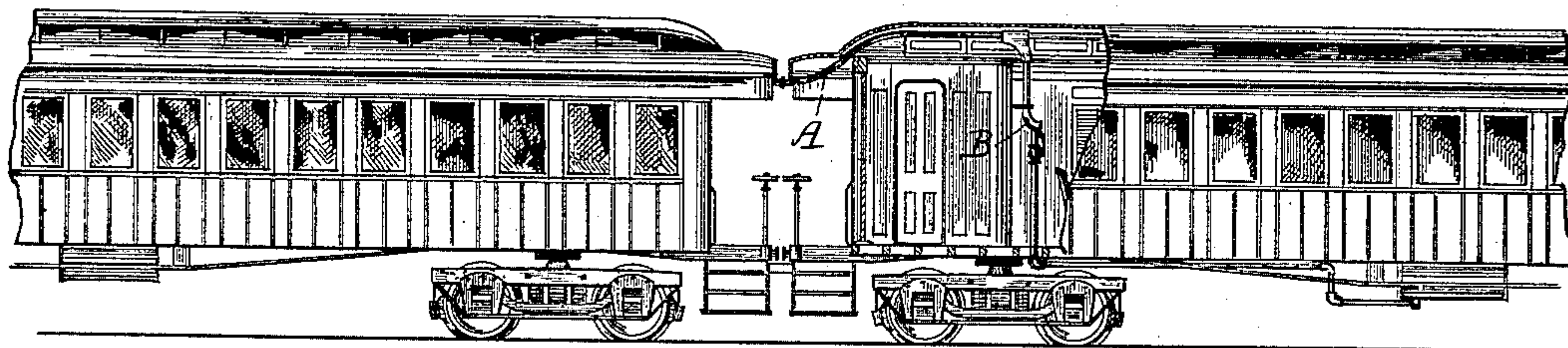
(No Model.)

C. M. RADFORD.  
RAILWAY TRAIN SIGNAL.

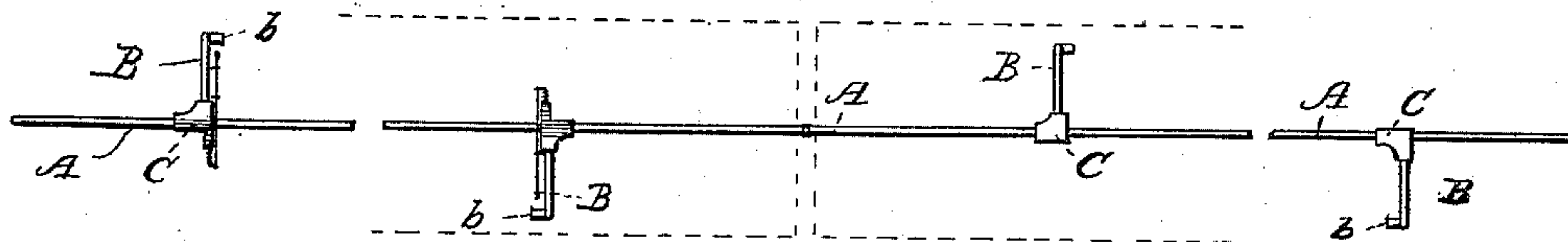
No. 369,657.

Patented Sept. 6, 1887.

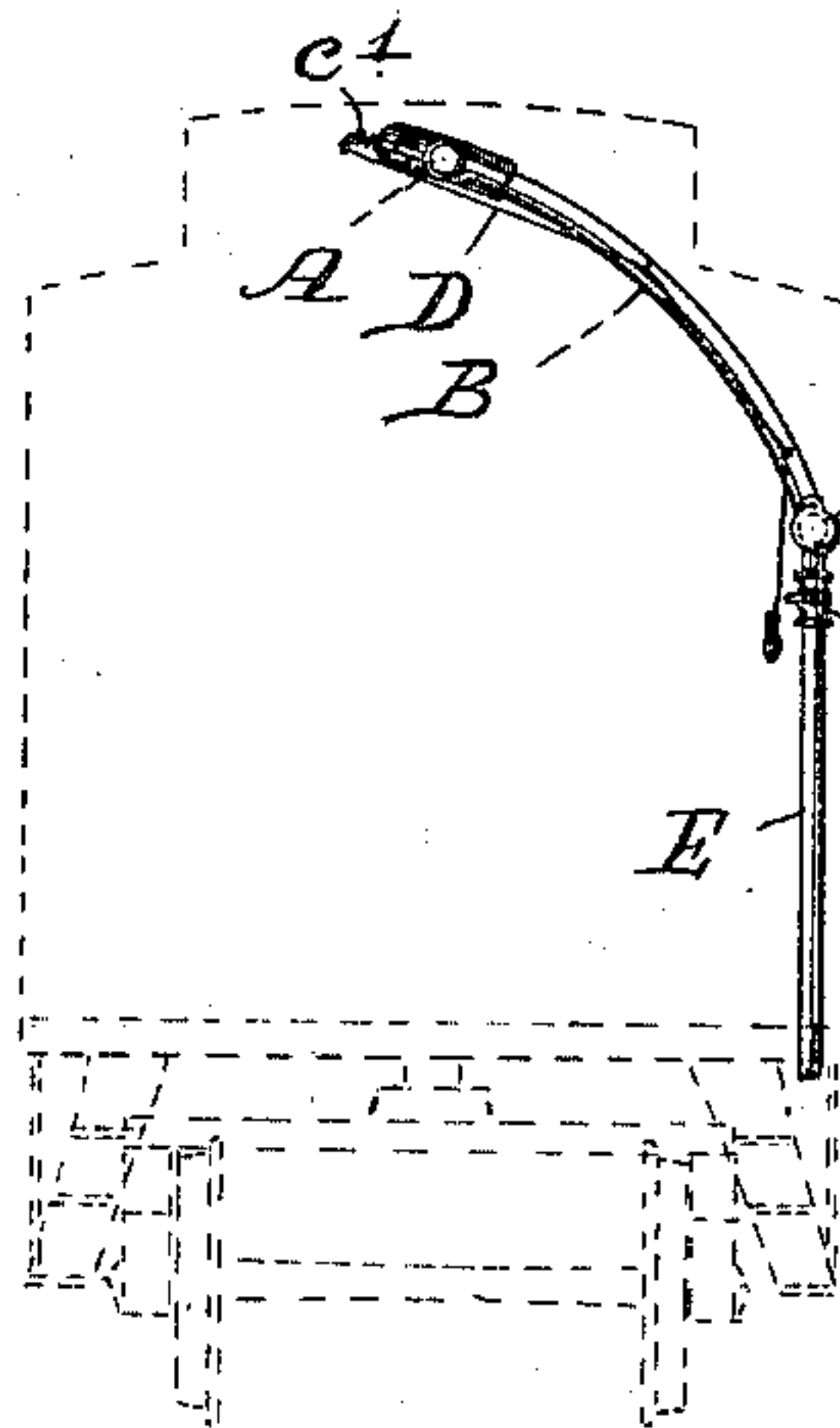
*Fig. 1*



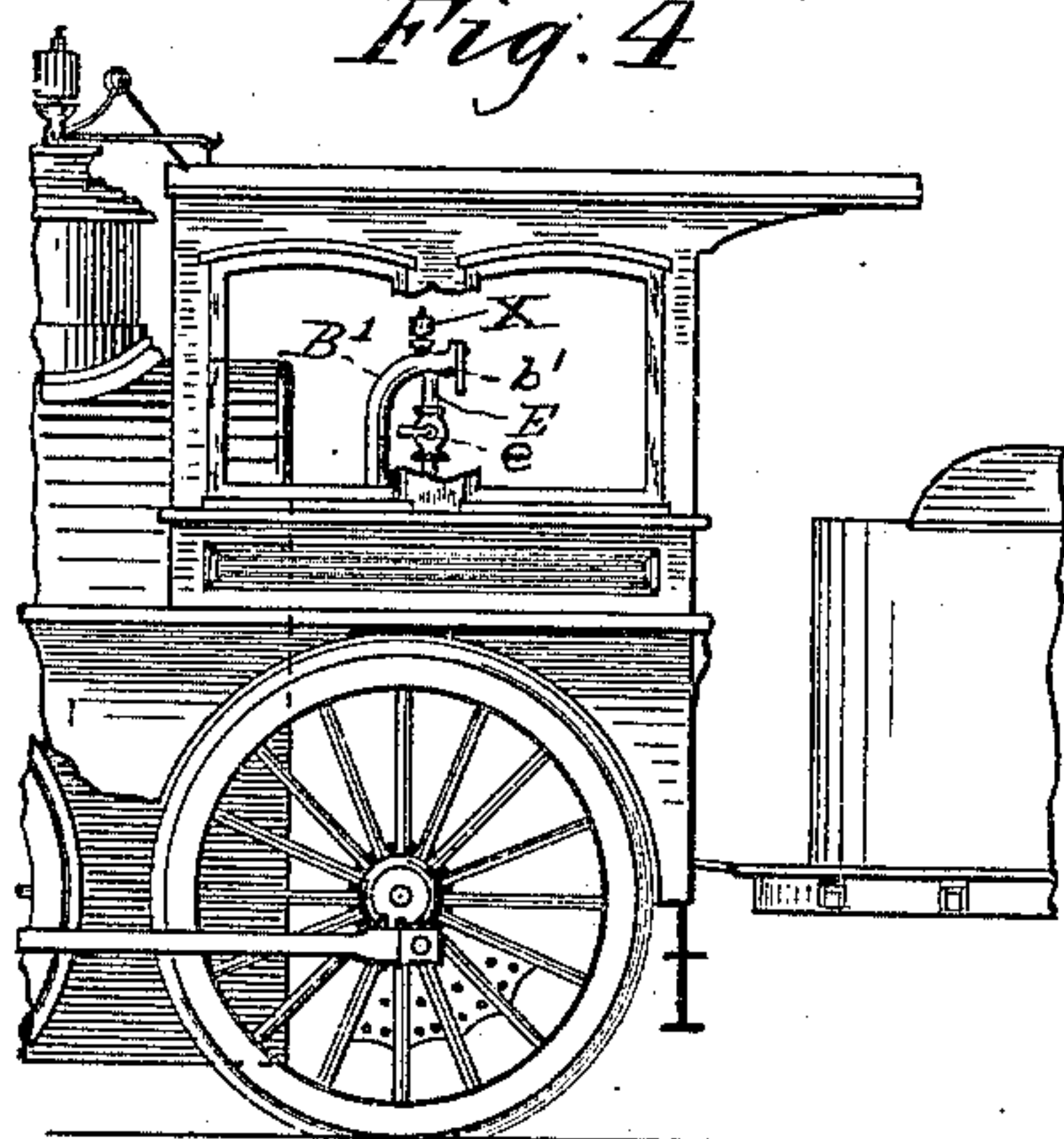
*Fig. 2*



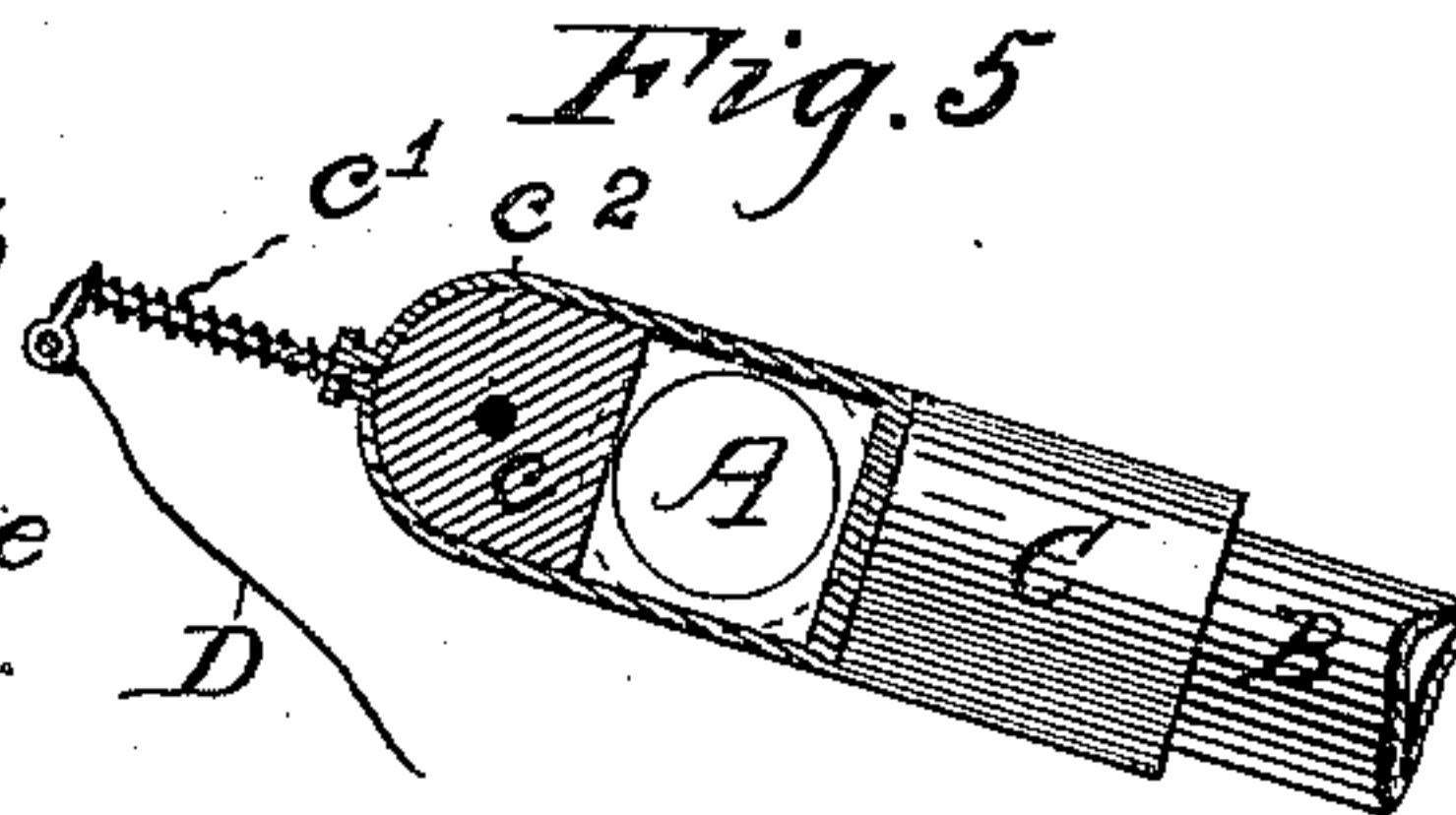
*Fig. 3*



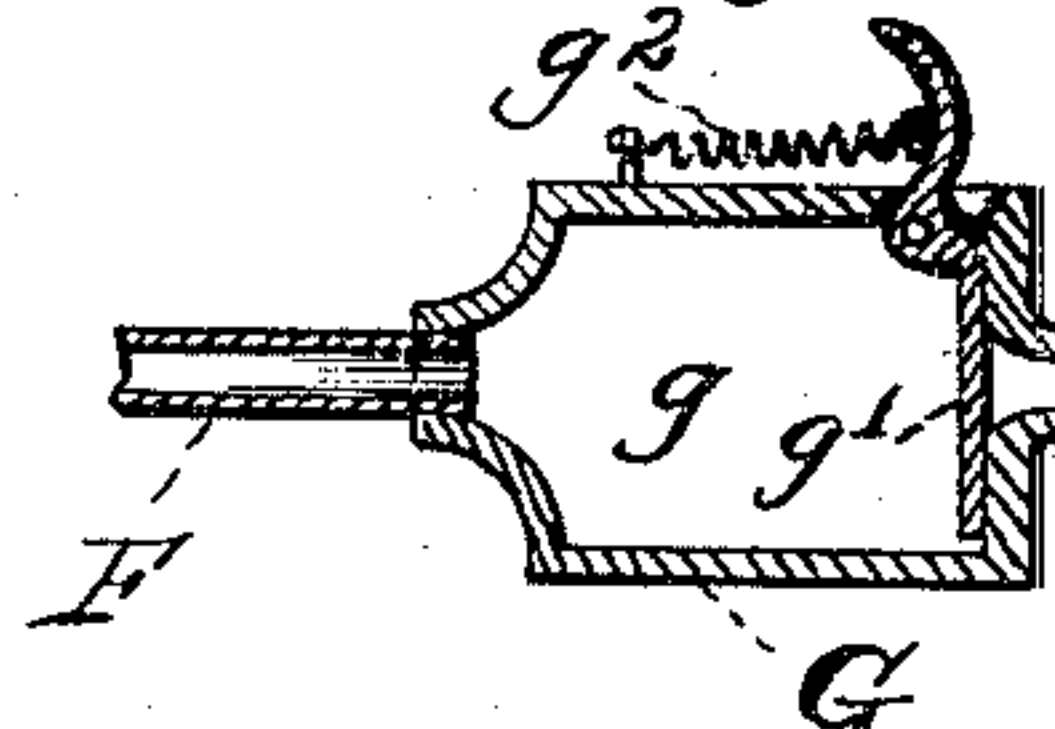
*Fig. 4*



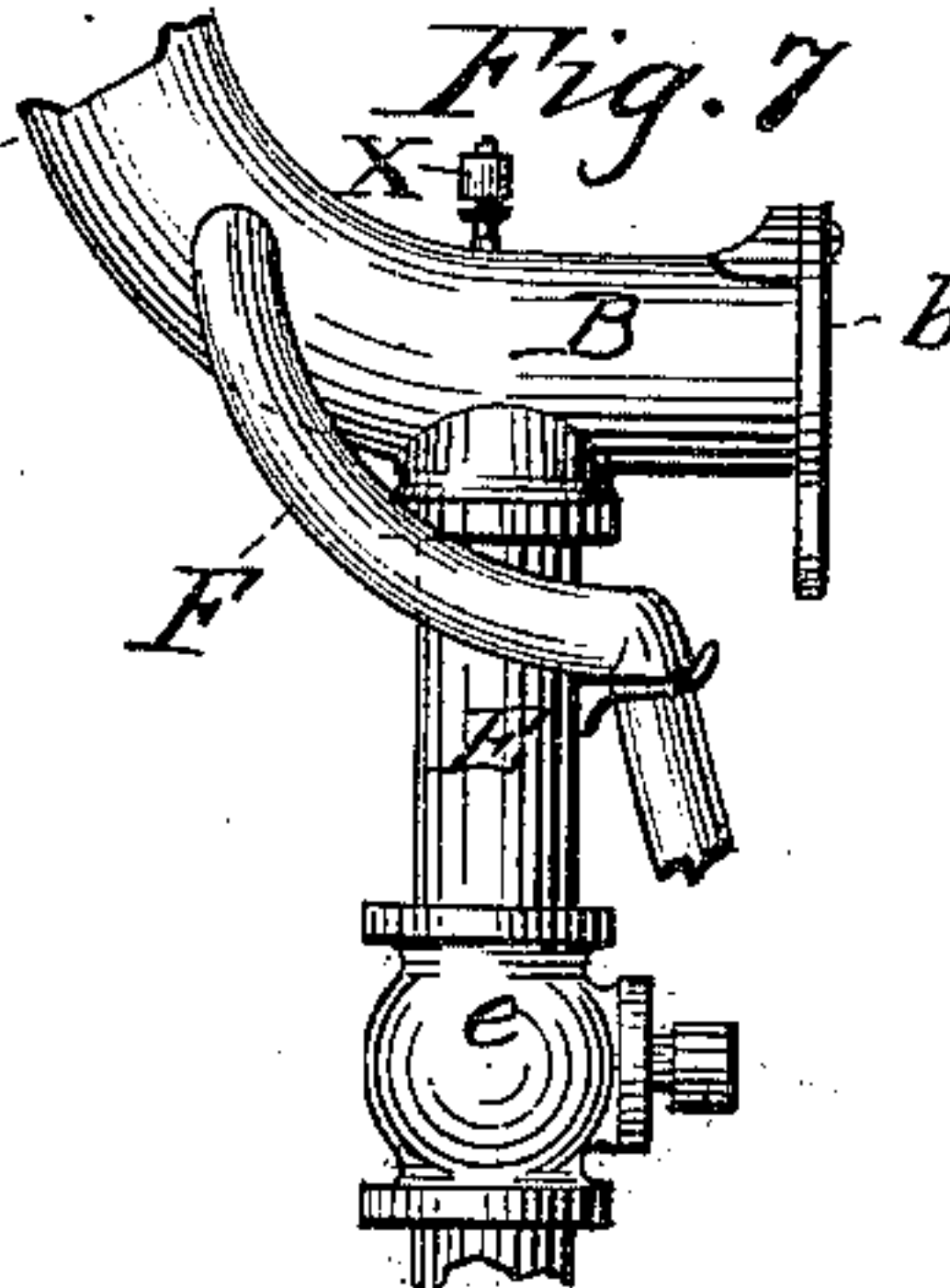
*Fig. 5*



*Fig. 6*



*Fig. 7*



Witnesses.

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# UNITED STATES PATENT OFFICE.

CASSIUS M. RADFORD, OF EAST CONCORD, ASSIGNOR OF ONE-HALF TO  
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## RAILWAY-TRAIN SIGNAL.

SPECIFICATION forming part of Letters Patent No. 369,657, dated September 6, 1887.

Application filed September 1, 1886. Serial No. 212,420. (No model.)

*To all whom it may concern:*

Be it known that I, CASSIUS M. RADFORD, a citizen of the United States, residing at East Concord, in the county of Merrimac and State of New Hampshire, have invented certain new and useful Improvements in Train-Signals, of which the following is a specification.

The object of this invention is to provide means whereby the conductor of a railway-train may send oral or written messages to his engineer, and vice versa. This is attained by the use of pneumatic tubes which are placed in some convenient part of the cars, those parts which pass from car to car being formed of some flexible material and provided with couplings for disconnecting when the cars are to be separated. The air for transmitting a written message or order through the tubes is taken from a storage-reservoir which is provided at some convenient point under each car, and these are supplied by the aid of a pump located on the engine; or a pump may be provided for each car and operate directly upon the air-reservoir of the same.

Those parts necessary to the perfect operation of this appliance are illustrated in the accompanying drawings, forming part of this specification, of which—

Figure 1 represents a sectional elevation of two ordinary passenger-cars, showing the pneumatic tubes located under the roof of the cars, a portion of the side of one of the cars being broken out for this purpose. Fig. 2 is a sectional plan view of the tubes, the dotted lines representing the connecting ends of either car. Fig. 3 shows the position of the tubes as if viewed in cross-section, the dotted lines representing the outlines of a car and its trucks. Fig. 4 is a sectional elevation of an engine and tender, showing the combined receiver and transmitter in convenient reach of the engineer. Fig. 5 represents an enlarged view of the coupling which unites the combined receiving and transmitting tubes with the main tubes near either end of a car, of which the stop-valve is shown in cross-section. Fig. 6 is a sectional view of one of the speaking-tube receivers or transmitters; and Fig. 7 is an enlarged side view of one of the com-

bined receivers and transmitters for the conductor's use, showing a portion of the supply-tube, its cut-off valve, and the flexible speaking-tube.

Similar reference-letters indicate corresponding parts throughout the various views.

The main tubes A may be formed of rubber or metal, and may be placed under the floor of a car or near the roof, and be provided with suitable couplings midway between either car. Branch tubes B serve both as receiver and transmitter for written messages. These are located, one near either end of a car, and connected to the main tube A by a coupling, C, as best shown in Figs. 1, 2, and 5, which is provided with a valve, *c*, for cutting off the rearward flow of the compressed air, to be hereinafter fully explained. The other end of these branch tubes B may be bent, as seen in Figs. 1, 2, and 7, and their ends be provided with a suitable cover, *b*, of such form as to be conveniently opened when it is desired to send a written message to the engineer. After inserting the said message the cover *b* must be closed, the cord D pulled, which closes the valve *c*, and so held while turning on the compressed air by aid of the valve *e*, located in the air-supply tube E, substantially as seen in Fig. 7. While the paper on which the message is written is being conveyed through the tubes A, a small whistle, X, similar in construction to a steam-whistle and located on the tube B' in the locomotive-cab, will be blown, which will notify the engineer, and by opening the cover *b'* he can remove the same. If a reply be required, he can insert the same in his tube B', close the cover *b'*, and turn on the compressed air by opening the valve *e* of the tube E. It is desirable to provide these valves *e* with means for closing the moment one's hand shall be removed, in order that the compressed air may not be applied in both directions at the same time; but this is not essential. Whistles may also be applied upon the tubes B on the cars throughout a train, so as to enable the engineer to call up the conductor.

The valves *c* in the couplings C are very important, as without them the compressed air would be as likely to take one as the other di-



rection in the tubes A. For instance, if the conductor were on some car midway in the train and inserted his message in the tube B, the message would be as likely to go rearward 5 as to go to the engine. On this account the valves *c* are so constructed as to be at all times open, by means of some suitable spring, *c'*, as shown in Fig. 5, so that in whatever car the conductor happens to find himself he is sure of 10 open communication with the engine and of cutting off rearward.

In order that there may be no cushioned air against the valves *c*, a small vent, *c''*, is formed in the same, as in Fig. 5. The tube B' in the 15 cab of the locomotive is represented in the drawings as if coming from below, as would be the case were the tubes A hung underneath the floor of the cars.

When it is desired to carry on a conversation through the tubes A, any prearranged 20 signal may be blown on the whistles X. The flexible tubes F are then used, which are connected to the tubes B just forward of the supply-tubes E and provided with receivers G, 25 having expansion air-chambers *g* and valves *g'*, which may be held closed when not in use by a spring, *g''*. A small supply of compressed air may be passed through the tubes A with verbal messages. These flexible tubes F, with 30 their receivers G, may be provided upon all the tubes B and also on tube B'.

It will be noticed that two of these tubes B are provided on every car, one near either 35 end, the conductor always taking care to use that one at the forward end of the car. With

but one valve *c* in the couplers C, two branch tubes B become necessary; but by providing two of the valves *c* in the coupler C, one at either side of the connection with the branch 40 tube B, one tube B to every car would suffice.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the main tubes A, branch tubes B, provided with cover *b*, couplings C, having one or more valves, *c*, compressed-air-supply tube E, having a valve, *e*, the branch tubes B', located in the locomotive-cab, having a cover, *b'*, and suitable whistles 50 located upon or near either of the branches B B', all operating substantially as and for the purpose set forth.

2. In a pneumatic train-service, the combination, in a car, of the central longitudinal main tube, its branch tubes serving as receiver and transmitter of written messages 55 and provided with signal-whistles, and flexible speaking-tubes having a combined receiver and transmitter for oral messages, and the compressed-air-supply tube connecting said 6c branch tube with a compressed-air reservoir, and a valve for governing the supply of air, as set forth.

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

CASSIUS M. RADFORD.

Witnesses:

J. B. THURSTON,  
NATHANIEL E. MARTIN.