

H. MAULE.
MODE OF TRANSMITTING MAGNETIC SIGNALS ON RAILROADS.

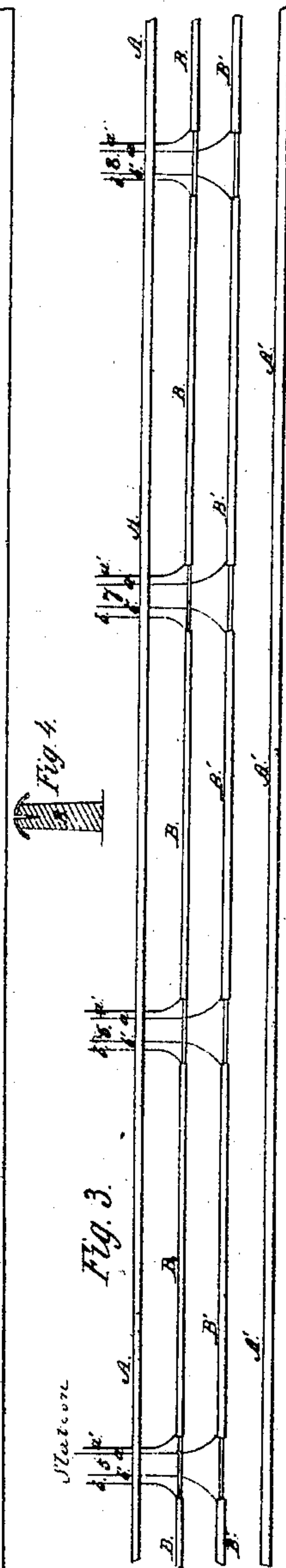
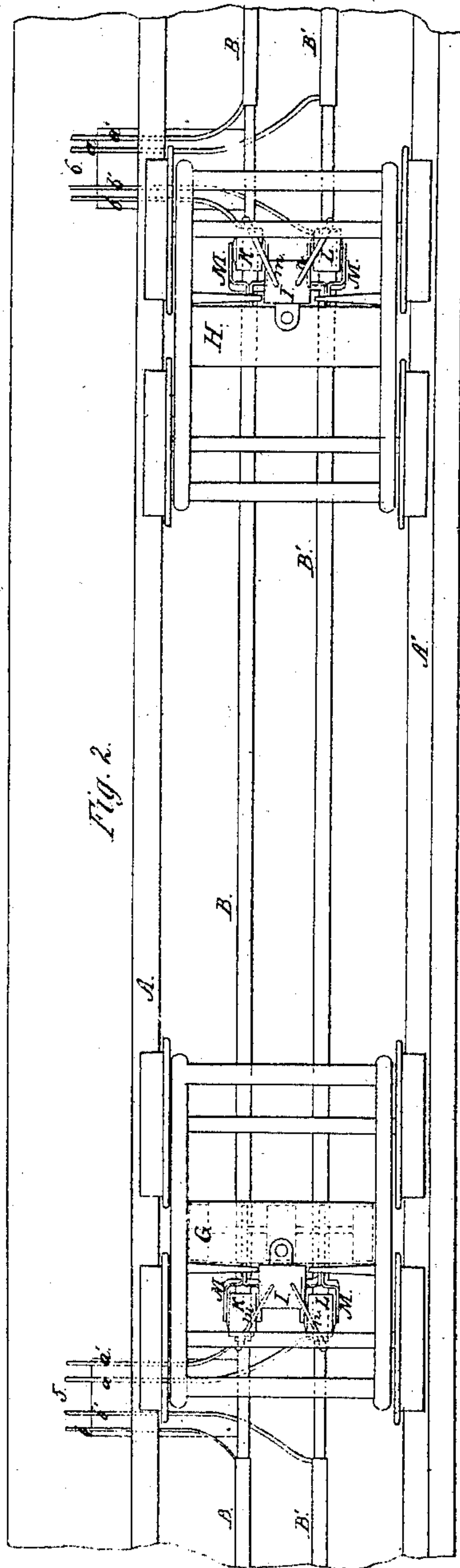
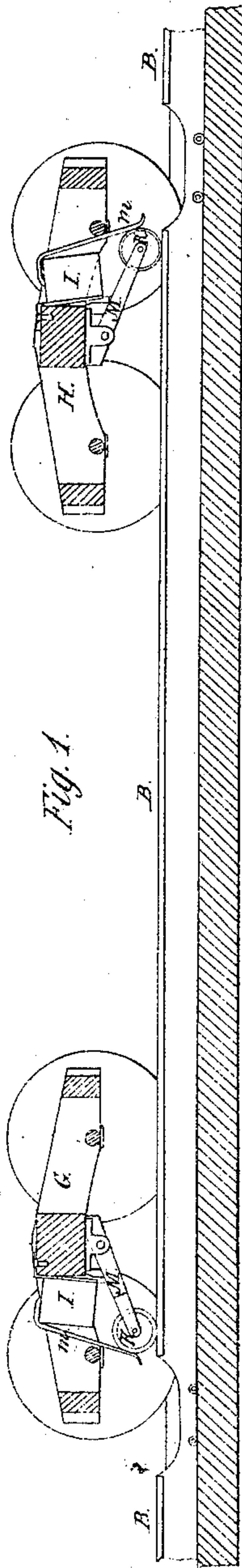


Fig. 4.

Station

UNITED STATES PATENT OFFICE.

HENRY MAULE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN THE MODE OF TRANSMITTING MAGNETIC SIGNALS ON RAILROADS.

Specification forming part of Letters Patent No. 21,688, dated October 5, 1858.

To all whom it may concern:

Be it known that I, HENRY MAULE, of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Transmitting Signals on Railroads; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to an improvement in appliances heretofore proposed for transmitting telegraphic signals from one train to another on railways; and my improvement consists in securing to the railroad a series of conducting-rails independent of those of the track, and placed in pairs, one pair being disconnected from the next pair throughout the series, and one conducting-rail of each pair being arranged to connect with one pole and the other conducting-rail with the other pole of a galvanic battery situated on the train, by devices fully described hereinafter, and the batteries of the trains being connected with suitable indicating apparatus, in order that the engineer of one train may be cognizant of the presence of another train on that portion of the track traversed by that pair of conducting-rails with which the engine is in communication.

In order to enable others to make and use my invention, I will now describe its construction and operation.

On reference to the drawings, which form a part of this specification, Figure 1 is a sectional view of part of a railroad illustrating my improvement; Fig. 2, a ground plan; Fig. 3, an extended ground plan, drawn to a reduced scale; Fig. 4, a sectional view of one of the conducting-rails.

A and A' represent the rails of an ordinary railroad-track. Between the rails are what I term the "conducting-rails" B and B', which consist of strips of wood secured to the sleepers and surmounted with metal plates curved to the form represented in the enlarged sectional view, Fig. 4. The metal strips are not continuous throughout the entire track, but are interrupted at intervals, as seen in Fig. 3, in which 5, 6, 7, and 8 are supposed to represent stations of several miles apart. Wires are

conveyed from each end of both conducting-rails to the station near which the said rails terminate. Thus from one end of the rail B a wire, *a*, is laid to the station 5, and from the opposite end a wire, *b*, to the station 6. From one end of the conducting-rail B' a wire, *a'*, extends to the station 5, and from the opposite end a wire, *b'*, to the station 6. Each station has two other wires communicating with the ends of conducting-rails, separated from those above alluded to and communicating with wires at the next station. This system of conducting-rails placed in pairs, one pair detached from the next pair, exists throughout the whole length of the track, the disconnection of the pairs taking place at those stations or other points between which it is desirable that the engineer of one train should know whether another train is approaching.

G represents the truck of the locomotive, or of one of the cars of one train, and H that of the locomotive, or of one of the cars of another train. Each truck is furnished with an ordinary galvanic battery, I, from the positive pole of which passes a wire, *m*, arranged to bear on the pulley K, and from the negative pole a wire, *n*, bearing on the edge of the pulley L. Both of these pulleys are hung to arms M, which are secured to shafts turning in boxes of glass or other non-conducting material attached to the truck in such a manner that the pulleys may be entirely insulated from each other. The pulleys are so hung as to bear on the conducting-rails, the pulley K on the rail B and the pulley L on the rail B'.

It should be understood that each train has a magnetic indicator acted upon by wires connected to the negative and positive poles of the battery, this indicator being under the observance of the engineer and conductor. Similar indicators connected to the wires *a* and *a'* and *b* and *b'* may also be situated at the stations. It will suffice for these indicators to show the existence or non-existence of an electric circuit and the amount of electricity traversing that circuit. Now, supposing a train of cars of which the truck G forms a part to be at any point of the road between the stations 5 and 6, and all other trains absent, the conducting-rail will be charged with electricity, but no circuit formed. The moment another

train enters upon this portion of the track, however, a circuit will be formed, the existence of which will be announced to the engineers or conductors of both trains by their respective indicators, both becoming aware, therefore, that the trains are within a certain distance from each other.

The conducting-wires *a* and *a'* and *b* and *b'* leading to the stations, form no immediate part of my present invention, being merely introduced to show that an attendant at the station may be made aware of the approach of a train.

I am aware that plans for transmitting telegraphic signals on railroads from one train to another have been heretofore devised, as in the rejected application of Joseph Baker, December, 1855, and the plan of Bonelli described in the *Mechanics' Magazine*, volume 63. I therefore limit my claim to the arrangement herein described—that is to say,
I claim—

Securing to a railroad a series of conducting-rails independent of those of the track, and placed in pairs, one pair being disconnected from the next pair throughout the series, and each pair of conducting-rails being arranged to connect with a galvanic battery on the train, by the devices herein described or their equivalents, one rail of each pair to one pole and the other to the other pole of the said battery, and the latter being connected to any suitable indicating apparatus situated on the train, as herein set forth, and for the purpose specified.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

HENRY MAULE.

Witnesses:

HENRY HOWSON,
CHARLES D. FREEMAN.