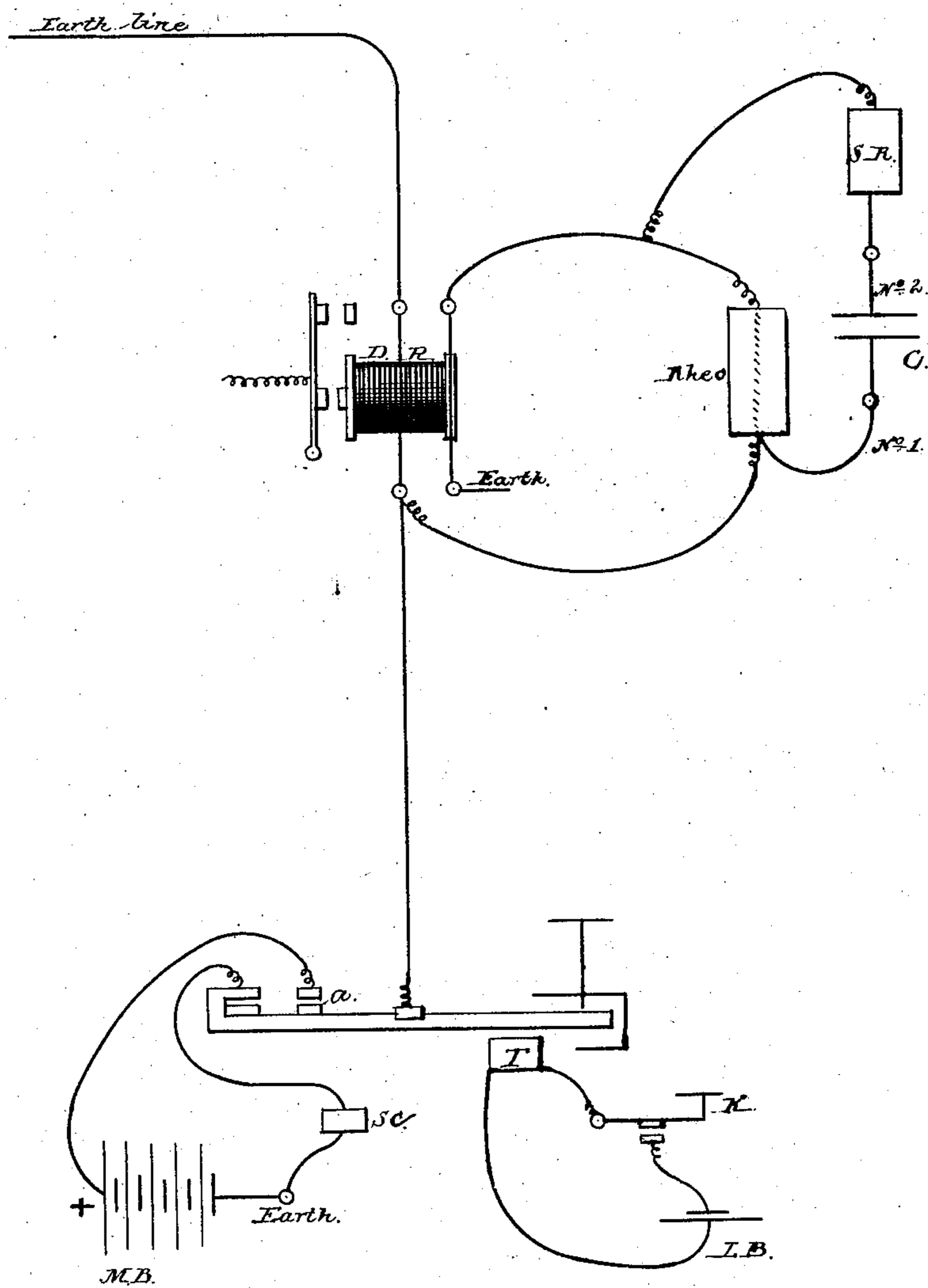


B. THOMPSON & C. SELDEN.

DUPLEX TELEGRAPH.

No. 258,957.

Patented June 6, 1882.



Witnesses;  
*J. Walter Fowler*  
*W. H. Morse*

Inventors;  
*Benjamin Thompson*  
*Chas. Selden*  
 by *A. H. Evans & Co.*  
 their attys.

# UNITED STATES PATENT OFFICE.

BENJAMIN THOMPSON AND CHARLES SELDEN, OF TOLEDO, OHIO.

## DUPLEX TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 258,957, dated June 6, 1882.

Application filed July 10, 1879.

*To all whom it may concern:*

Be it known that we, BENJAMIN THOMPSON and CHARLES SELDEN, of Toledo, county of Lucas, State of Ohio, have invented a new and useful Improvement in Telegraph Apparatus; and we do declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon, in which is shown the transmitting end of the line with the other or receiving end to earth.

The nature of this invention relates to the application of the condenser and rheostat to multiple telegraphs, by which means the line may be balanced and the static discharge of the line fully neutralized; and it consists of the peculiar arrangement of the rheostat and the condenser, substantially as hereinafter described.

In the drawing, L B is a local battery; M B, a main battery; T, an ordinary duplex transmitter; S C, a spark-coil; K, a Morse key; D R, a differential relay; Rheo., a set of resistance-coils; C, a condenser, and S R, a set of small resistance-coils.

When operator at key K closes his key local battery L B charges magnet of transmitter T and places main battery M B to line through points *a*. The battery, in passing to line, is rendered neutral on the differential relay D R by the adjustment of the rheostat Rheo., which is so adjusted that it will balance the line or oppose about the same resistance to the battery that the line offers to earth at distant end, and as the battery to the line passes in an opposite direction to the battery which goes through the rheostat the effect on the relay is neutralized, and while the line is charging the condenser C takes up its charge, and by carefully adjusting the condenser C its charge may be made to fully neutralize the static discharge from the line when it is placed to earth by operator at key K opening his key. The line being charged with a + battery, and the condenser C being also charged on No. 1 side with a + battery, a charge will be induced on No. 2 side of condenser C and bound there while the line is charged. Now, if the line be placed to earth, the + discharge of the line is made neutral on the differential relay D R by the — discharge from No. 2 side of condenser

C, the neutralization being also assisted by that portion of the discharge from No. 1 side which flows to line and meets directly the static discharge.

By the use of small resistance-coils S R the condenser C, No. 2 side, may be made to discharge itself slower, and if the charge of No. 2 side has a potential a little higher than the line it may be reduced by the coils S R. The rheostat is so placed that the current shall go through it before passing through the relay.

The condenser arrangement differs from the arrangement of J. B. Stearns in the following particulars: In his arrangement of the condenser the discharge from No. 1 side only is utilized, the discharge from No. 2 side going directly to earth without exerting any neutralizing or counterbalancing effect upon the static discharge from the line.

By our arrangement we utilize the discharge from both sides of the condenser, the discharge of No. 2 side tending to neutralize the static discharge of the line by flowing through the coils of the artificial line in relay D R, while the discharge from No. 1 flows directly to the junction of the artificial line with the main line, and there divides, a portion going to earth and another portion to line. The latter portion, which flows to line, meets the static discharge directly, and helps the discharge of No. 2 side in neutralizing its effects.

We are aware that the discharge of a condenser has been utilized by J. B. Stearns and others for the purpose of neutralizing the effects of the static discharge in duplex working, and do not make any broad claim to connecting the condenser to the artificial line; but in every previous arrangement of which we are aware the condenser has been connected to the artificial line at a point between the coils of the differential relay and the ground, so that the discharge of but one side thereof has been utilized.

What we claim is—

1. The combination, with the equating-circuit in a multiple telegraph, of an artificial resistance placed in said equating-circuit between the key and the equating-coils, and a condenser connected in a loop of the equating-circuit, one end of said loop being connected to said circuit at a point between the resist-

ance and the main-line circuits and the other end at a point between the resistance and the equating-coils, substantially as and for the purpose described.

- 5 2. The combination, with the equating-circuit of the condenser C, connected to the same at a point between the key and the equating-coils, and the rheostats Rheo. and S R, all ar-

ranged substantially in the manner and for the purposes set forth.

BENJAMIN THOMPSON.  
CHARLES SELDEN.

Attest:

WM. SCHULTZ,  
E. H. RHOADES.