

No. 717,325.

Patented Dec. 30, 1902.

F. B. BEHR.

APPARATUS FOR AUTOMATICALLY BLOCK SIGNALING ON RAILWAYS.

(Application filed Mar. 5, 1901.)

(No Model.)

Fig. 1.

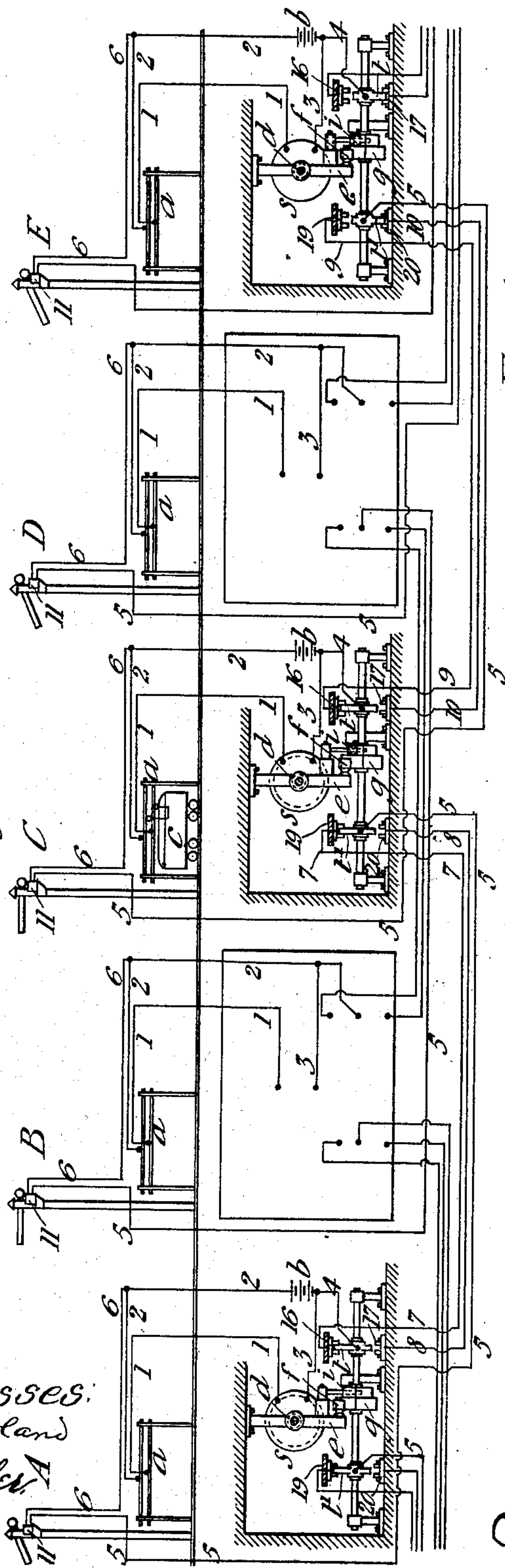


Fig. 4.

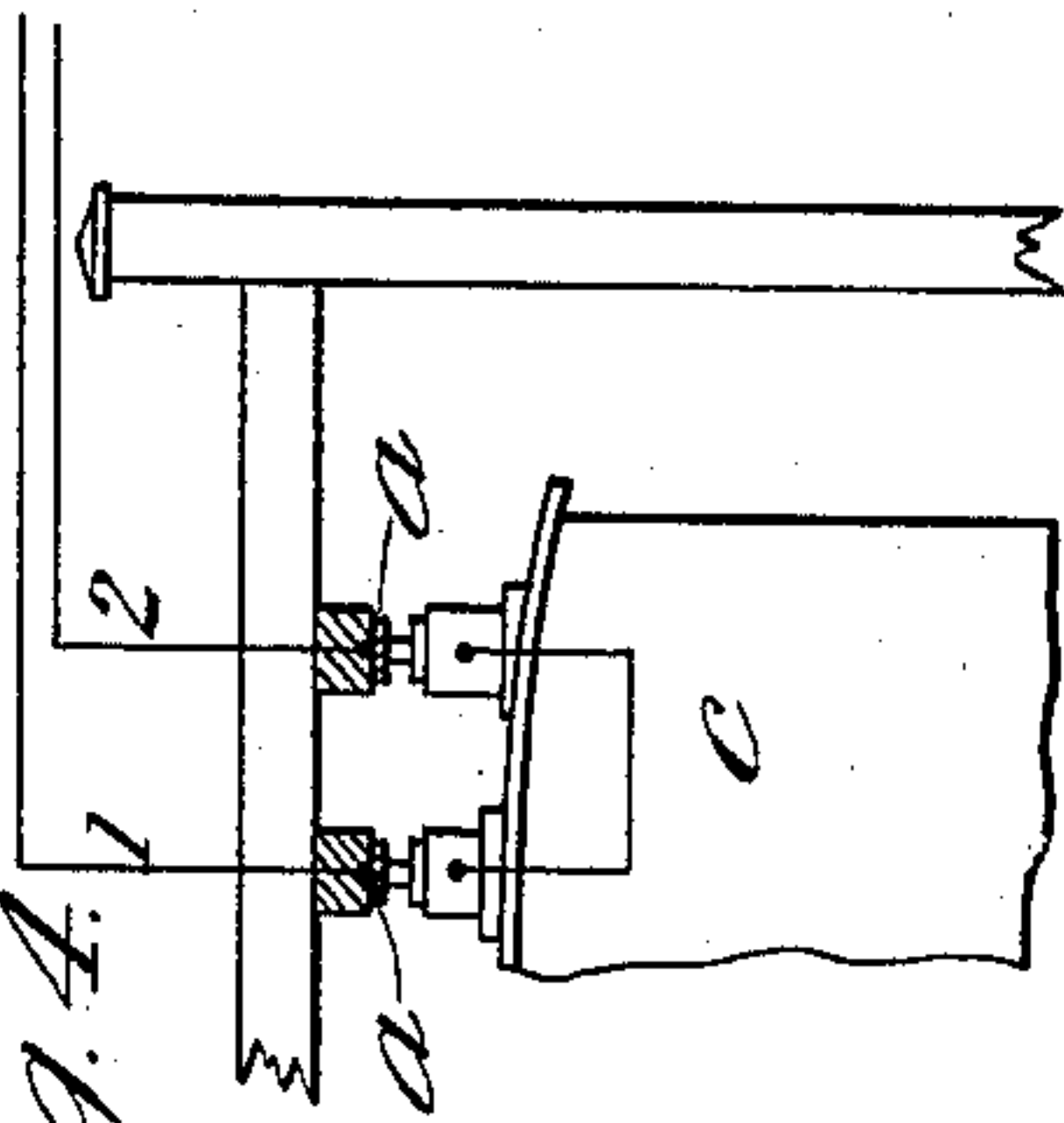


Fig. 3.

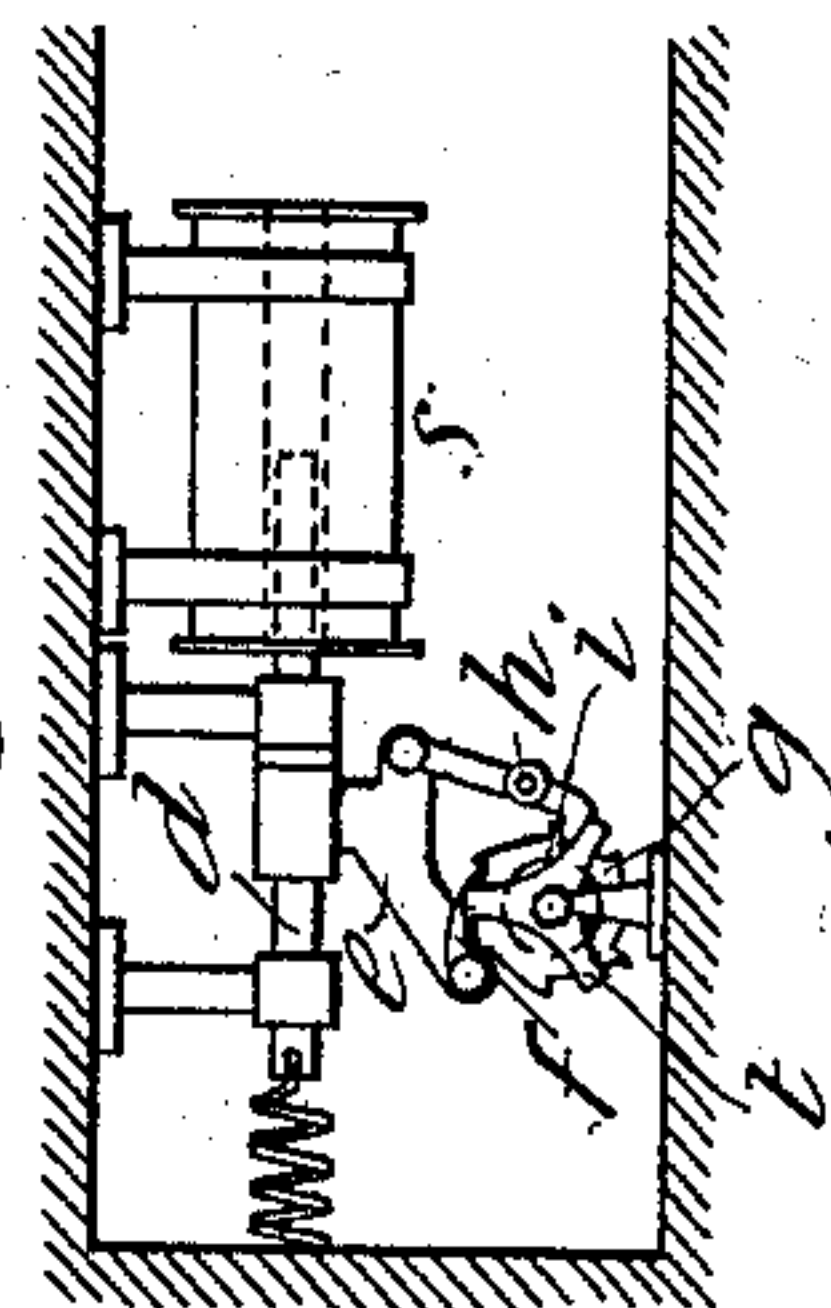
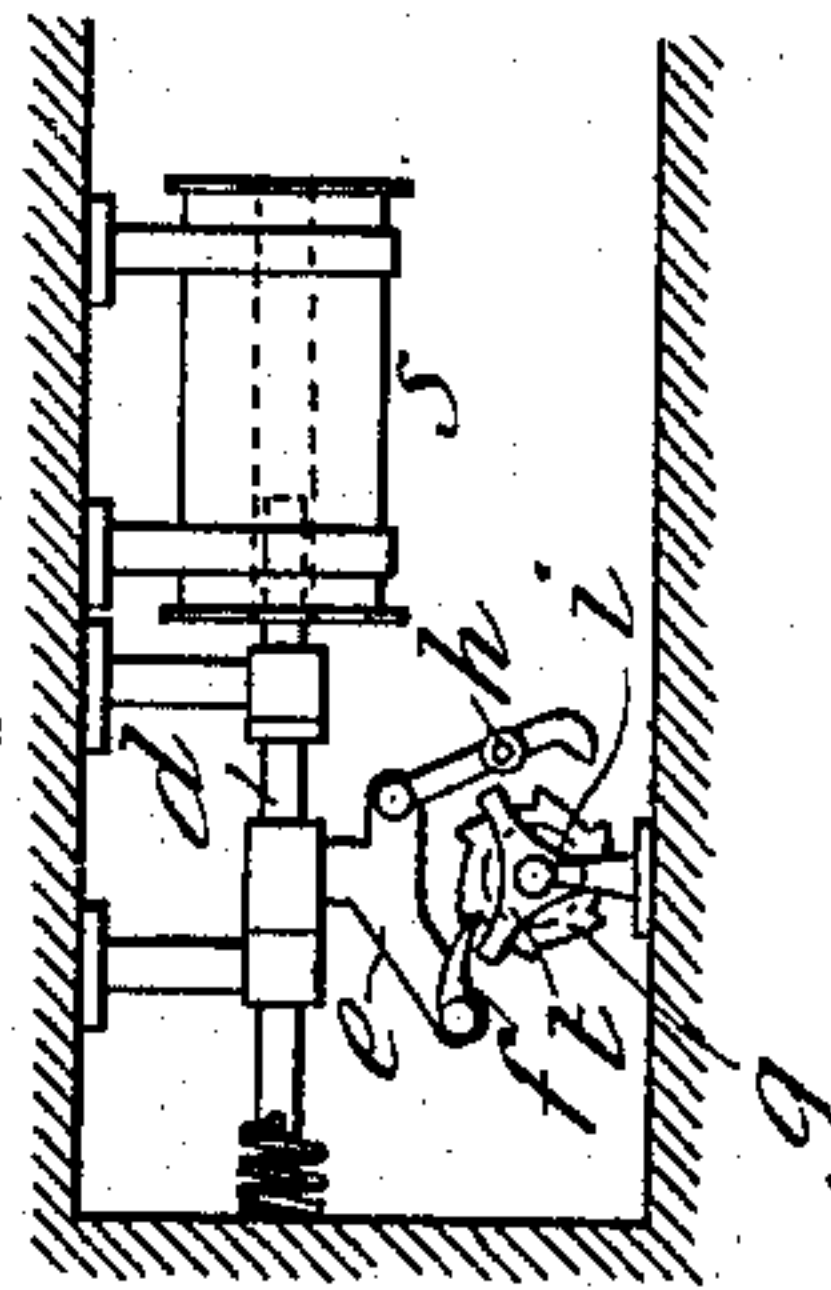


Fig. 2.



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APPARATUS FOR AUTOMATICALLY BLOCK-SIGNALING ON RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 717,325, dated December 30, 1902.

Application filed March 5, 1901. Serial No. 49,880. (No model.)

To all whom it may concern:

Be it known that I, FRITZ BERNHARD BEHR, a citizen of England, residing at South End House, Twickenham, in the county of Middlesex, England, have invented certain new and useful Improvements in Signaling on Railways, (for which I have applied for a patent in Great Britain, dated September 11, 1900, No. 16,117,) of which the following is a specification.

This invention relates to apparatus for automatically block-signaling on railways by means of electrical appliances and arrangements, which I shall describe with reference to the accompanying drawings.

Figure 1 shows five successive semaphore-signals A B C D E, dividing the line into sections, which may be miles long. At A, C, and D are side views of the electrical contact apparatus mounted at each signal-station. The contact-points only are indicated at B and D to avoid unnecessary repetition. Figs. 2 and 3 are front views of this apparatus, showing the parts in different positions. Fig. 4 is a part transverse section of the train-contacts at each signal-station.

The action of the apparatus may be briefly described as follows: As a train passes a signal, such as C, it makes contacts, closing the circuit of a local battery, a current from which energizes a solenoid. The core of the solenoid being attracted by means of a pawl acting on a ratchet-wheel turns the wheel partly around. Two three-armed brushes fixed on the shaft of the ratchet-wheel are thus partly turned. One of these makes a contact by which a circuit is closed for a battery at A two stations behind, and a solenoid there energized moves the semaphore at that station to "safety" position. Also the other brush at C breaks a contact there, and thus the solenoid which had previously moved the semaphore at C to "safety" becomes inert, and thereupon the signal at C is caused by its counterweight to rise to "danger." As every train thus sets to "danger" every signal that it passes and lowers to "safety" the signal two stations behind it, if the trains implicitly obey the signals there never can be a train on the section of line immediately before or immediately behind any section on which a train is running.

I shall now explain more in detail the apparatus by the action of which this result is attained.

As shown in Fig. 4, on an overhead framing are fixed two metal strips *a*, which may be several yards long, with their ends sloping upward. On the roof of the car *c* are mounted two spring-urged rollers or brushes which as the train passes roll or rub along the strips *a*. The rollers or brushes are electrically connected to one another, and therefore as the car passes they form a bridge, connecting two conductors 1 and 2. Of these, 1 leads to one end of the coil of a solenoid *s*, from the other end of which a conductor 3 leads to one pole of a battery *b*. The other conductor 2 leads to the other pole of the battery, and a circuit being thus closed through the solenoid-coil the core *d* of the solenoid is attracted and is thus moved from the position shown in Fig. 2 in opposition to a spring to the position shown in Fig. 3. On the core *d* is fixed a bracket *e*, carrying a pawl *f* and jointed to one arm of a lever mounted on a stationary pivot *h*, the other arm of which is hooked. As the core *d* makes its instroke the pawl *f* turns a six-toothed ratchet-wheel *g* one tooth, and the lever pivoted on *h*, being moved over to the position shown in Fig. 3, engages another ratchet-wheel *i*, which is on the same shaft as *g*, and so prevents further rotation. On the shaft of *g* are fixed the insulated three-armed contact-brushes *t* and *t'*. The center of *t* is connected through a brush and wire 4 to one pole of the battery *b*. The center of *t'* is similarly connected by wire 5 to one end of the coil of a solenoid 11 at signal A, the other end of the coil being connected by wire 6 and conductor 2 to one pole of the battery *b* at station A. The brushes *t* and *t'*, according as they are in the one position or the other, make the following contacts: Above the brush *t* is a contact 16, below it a contact 17, and above and below brush *t'* are contacts 19 and 20, respectively. As there are three arms to these brushes and as the ratchet-wheel with which they turn has six teeth, the successive movements of the wheel cause the brushes to make contacts above and below, alternately closing and opening circuits determined by the connections of the upper and lower contacts with contacts at other stations. As the connec-

tions from station to station are all alike, I need only describe those connecting station C with station A behind it and station E in front of it. 19 of C is connected by wire 7 to 16 of A, and 20 of C is connected by wire 8 to 17 of C. 16 of C is connected by wire 9 to 19 of E, and 17 of C is connected by wire 10 to 20 of E.

I shall now trace the effect of the contact made by the train at C on the signals at A and C. The upper pole of the battery *b* at A is connected by lines 2 and 6 to the coil of the solenoid 11, which is connected by line 5 to the center of *t*' at C. This making the upper contact 19 continues the connection by wire 7 to upper contact 16 at A, and this being connected through the center of *t* and wire 4 to the lower pole of the battery *b* at A the circuit of the battery through the coil of the solenoid 11 is completed. The solenoid therefore attracts its core and lowers signal A to "safety." Now tracing the circuit of the battery *b* and solenoid 11 at C we proceed from the upper pole of the battery through wires 2 and 6, coil of 11, wire 5 to center of *t*' at E. As there is then no upper contact 19 there and no lower contact 17 at C, there is no course through the line 9 to the battery *b* at C. Therefore the solenoid 11 at C is inert and the signal at C is raised by its counterweight to "danger."

As the apparatus and connections are similar for all the stations, actions similar to those above described take place whenever a

train passes a signal, the effect being to raise the signal to "danger" at that station and to lower the signal two stations behind to "safety."

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

Automatic block-signaling for a railway comprising at each successive station, a counterweighted semaphore-signal and a solenoid adapted to lower it to "safety," a pair of overhead conducting-strips adapted to be bridged by connected contact devices on the train, a battery, a solenoid having its coil connected to one of the conducting-strips and having a spring-actuated core, a ratchet-wheel and pawl actuated by said solenoid-core, two three-armed brushes on the shaft of said ratchet-wheel, upper and lower contacts for each brush, and conducting connections from the brushes to an adjacent signal-solenoid and to a preceding signal-solenoid, and also between the contacts and those of a station next to one before and those of a station next to one behind, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

F. B. BEHR.

Witnesses:

GERALD L. SMITH,
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