Jan. 20, 1931. T. J. SCOFIELD ET AL 1,789,947

SIGNALING DEVICE

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FIG. 1.

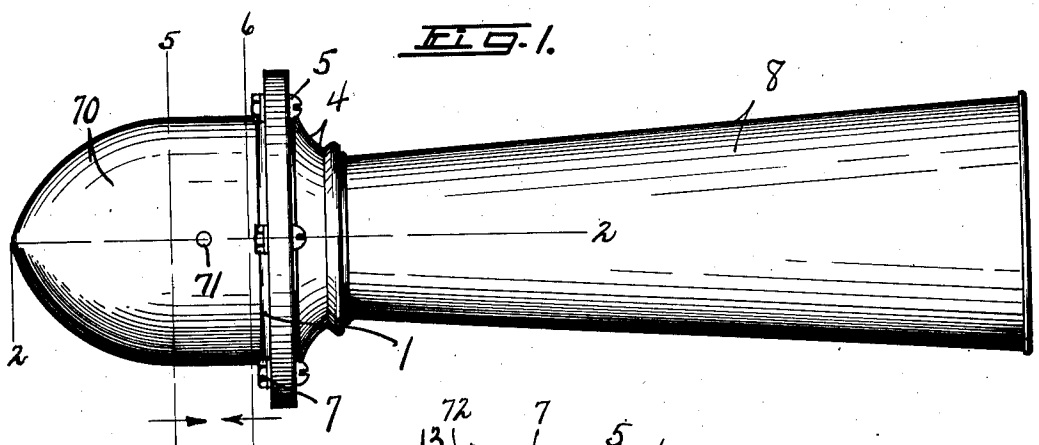


FIG. 2.

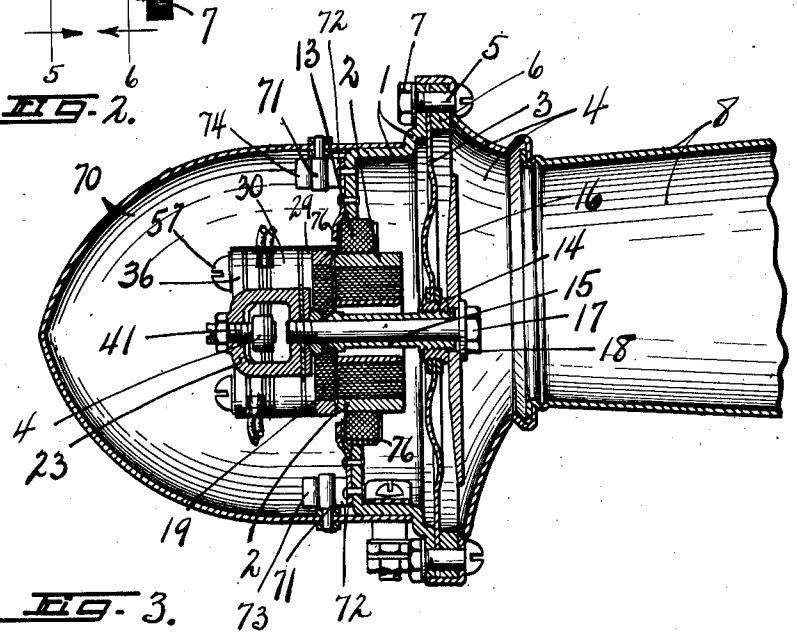
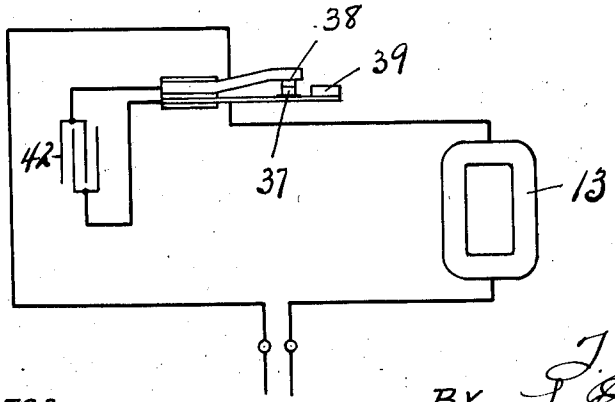


FIG. 3.



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Fig. 4.

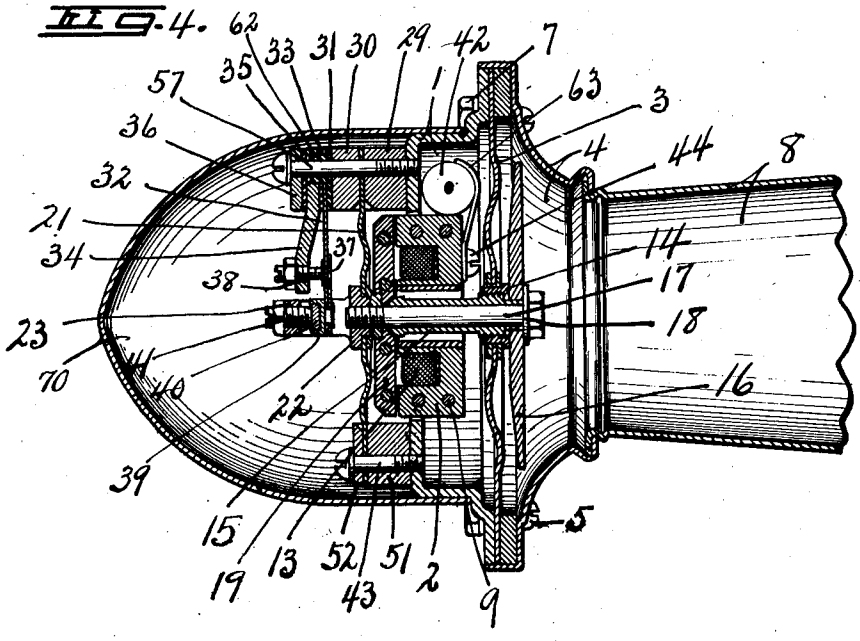


Fig. 5.

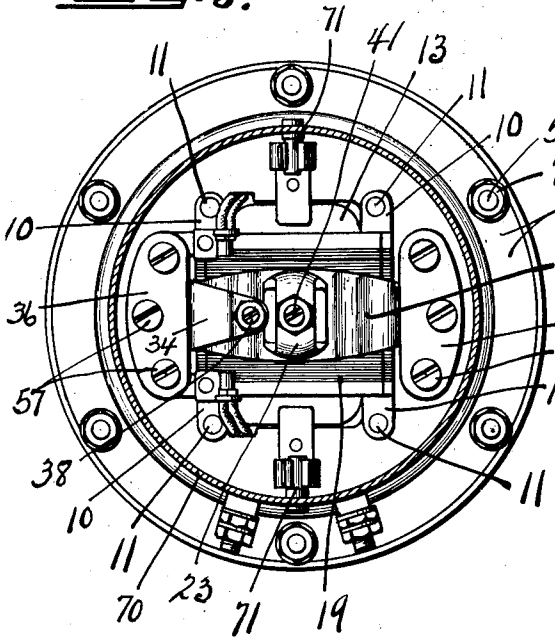
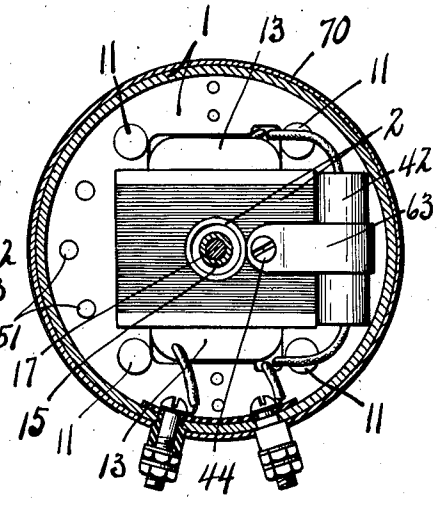


Fig. 6.



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Fig. 7.

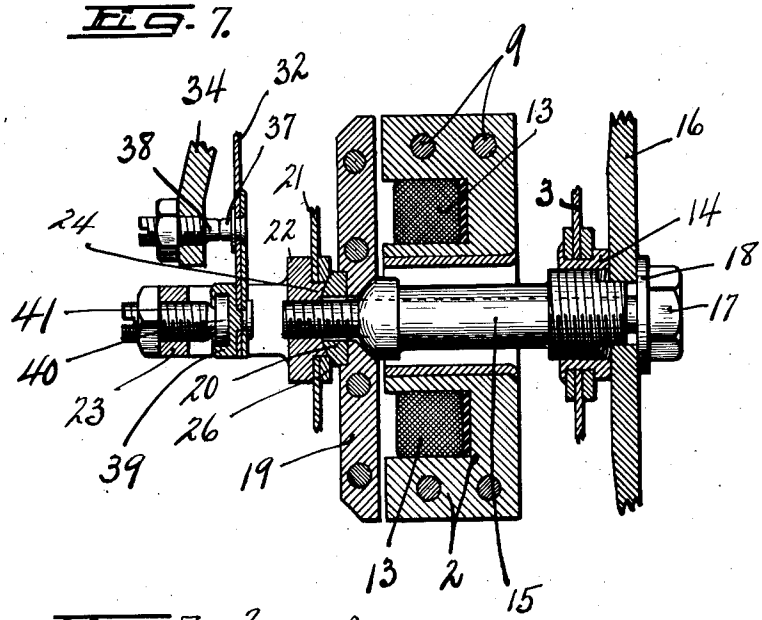


Fig. 8.

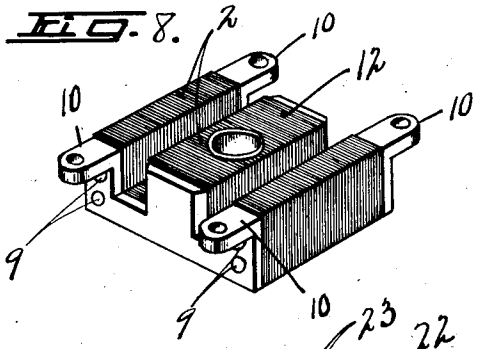


Fig. 9.

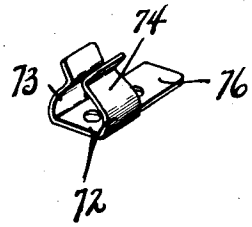


Fig. 10.

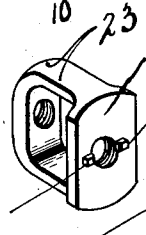


Fig. 11.

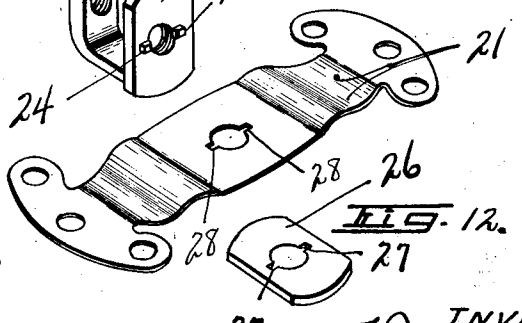
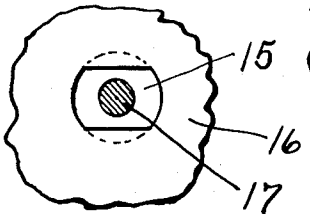


Fig. 12.

Fig. 13.



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Patented Jan. 20, 1931 1,789,947

UNITED STATES PATENT OFFICE

THEODORE J. SCOFIELD AND LLOYD E. JOHNSON, OF JACKSON, MICHIGAN, ASSIGNORS TO THE SPARKS-WITHINGTON COMPANY, OF JACKSON, MICHIGAN, A CORPORATION OF OHIO

SIGNALING DEVICE

Application filed December 22, 1924. Serial No. 757,424.

This invention relates to a certain new and improved signaling device, and more particularly to a signaling device or horn of the magnetically actuated type.

The main object of the invention is the production of an efficient signaling device of substantial construction, and of economic manufacture and arrangement, and which will produce a signal of the desired character pitch and amplitude.

Other objects and advantages relate to the details of the structure and the form, position, arrangement and association of the parts thereof, all as will more fully appear from the following description, taken in connection with the accompanying drawings, in which:—

Figure 1 is a top plan view of a signaling device of this invention.

Figure 2 is a longitudinal section on line 2—2, Figure 1.

Figure 3 is a diagrammatic illustration of suitable electrical circuits for operating the device.

Figure 4 is a longitudinal sectional view taken at right angles to Figure 2.

Figure 5 is a section on line 5—5, Figure 1.

Figure 6 is a section on line 6—6, Figure 1.

Figure 7 is an enlarged view of certain portions of the structure as illustrated in Figure 4.

Figure 8 is a perspective view of the magnet or magnetic field.

Figure 9 is a view of the clip used for attaching the enclosing casing to the signaling structure, and for maintaining the field-coil in proper position.

Figures 10, 11 and 12 are perspective views of the yoke spring and washer and the interlocking means for said parts when assembled.

Figure 13 is an end view of the bushing or sleeve upon which the diaphragm is threaded and with the resonator mounted thereon.

The structure of signaling device here illustrated is of the magnetically operated diaphragm type, and as shown, comprises a pressed metal rear diaphragm case-section —1— having its central portion dished and of substantially cylindrical cup-shape, and formed at its central portion with an opening for the reception of the magnet or magnetic field —2—, as hereinafter described. The diaphragm —3— is clamped between the rear diaphragm case section —1— and the front diaphragm case section —4—, the ring or washer —6— being preferably interposed between the edge of the diaphragm and the front case-section —4—, with bolts —5— extending through the diaphragm case sections, the diaphragm and the ring, and provided with nuts —7— for tightly and rigidly clamping all of these parts together. The front diaphragm case-section —4— may, as shown, carry an elongated resonator —8—. The magnet or magnetic field —2— is preferably of the form best illustrated in Figure 8 and may be built up of similarly formed thin strips of metal secured together by transversely extending rivets —9—.

The side sections of this magnet are formed with laterally extending perforated ears —10— which, when the magnet is placed in the opening at the rear diaphragm case section —1—, project outwardly along the rear surface of the said case-section, and are secured thereto in any suitable manner, as by rivets —11—, so that in effect the magnetic field becomes a unitary rigid part of the rear diaphragm case-section —1—.

As illustrated, the magnet —2— is formed with a central substantially rectangular boss —12— which extends throughout the width of the magnet, but is separated from the opposite ends of the magnet by lateral grooves or channels within which channels the laterally-extending portions of a field coil —13— are positioned in the assembled structure. This field coil in a well-known manner is built up of coiled wire, and is externally taped so as to insulate it from the magnet —2—, and as perhaps best illustrated in Figures 4 and 7, lies wholly forward of the rear surface of the magnet —2— in the assembled structure.

The diaphragm —3— is provided with a central opening surrounded by a reinforcing internally-threaded ring or collar —14— permanently and rigidly secured in any suitable manner to the edge of the diaphragm

bordering the central opening. A sleeve —15— is provided with an externally threaded portion for coaction with the inlet threaded collar —14— which constitutes a rigid portion with the diaphragm, and one end of the sleeve projects forwardly from the diaphragm and is flatted upon diametrically opposite sides for the reception of a plate or disk —16— which has a non-circular, in the illustration a somewhat oval-shaped opening adapted to fit the end of sleeve —15— so that the disk can be used to rotate the sleeve, and the disk is secured in position upon the end of the sleeve by means of headed bolt —17— and clamped against bushing —14— in the center of the diaphragm, the head of the bolt being preferably separated from the disk —16— by means of washer —18—. The bolt —17— extends entirely through the sleeve —15— and projects from the rear portion thereof, and passes through the armature —19—, washer —20—, leaf-spring —21—, and is threaded into the flat base —22— of a yoke 23 which rests upon the upper surface of the spring —21—.

For the purpose of effecting a rigid and tight engagement between the diaphragm —3—, disk —16—, sleeve —15—, bolt —17—, armature —19—, washer —20—, spring —21— and yoke —23—, the rear end of sleeve —15— is somewhat enlarged and spherically shaped so as to seat tightly in a substantially similarly spherically shaped recess in the adjacent side of the armature —19—, and the opposite side of the armature is formed with a flat recess of circular form for the reception of washer —20—.

Washer —26— is provided with a substantially spherical seat for contact with the rear curved or spherical portion of the washer —20—, such washer —26— being interposed between the spring —21— and the washer —20— and having recesses —27— for the reception of the lugs —24— formed on yoke —23— and which extend through recesses —28— in the spring —21—, but do not contact with the rear spherical surface of washer —20—.

It will be obvious that by turning the bolt —17— so as to thread it into yoke —23—, the parts named will be rigidly secured together for unitary movement, the leaf spring —21— having its opposite end tightly secured, as hereinafter described, constituting an aligning means for the yoke and the washer —26— by reason of the fact that the lugs —24— project through the recesses —28— in the spring, and are positioned in the recesses —27— in the washer —26—. The armature is arranged in this construction so as to be spaced but a very slight distance from the adjacent surface of the field magnet —2—, and by the construction shown is maintained in parallelism with the adjacent face of the magnet —2—, so as to strike the same uniformly at substantially all points when drawn into contact therewith upon energizing the field magnet by current flowing through the coil —13—.

An automatic circuit breaker is provided, as is usual in horns of this type, whereby the field coil is automatically energized intermittently. A built-up pedestal is provided at the rear of and carried by the diaphragm case-section —1— and this for the purpose of carrying the contacts which are intermittently separated and brought together, as hereinafter described.

This pedestal, as shown, consists of a series of similarly shaped metallic blocks. For illustration, a block —29— rests against the rear face of the case-section —1— at one side of the opening in the case-section, and of the magnet —2—. One end of the spring —21— rests upon the outer surface of this block —29— and a second block —30— of similar form rests upon the outer surface of the spring —21—. An insulating strip —31— is then placed upon the outer surface of the block —30— and the end of a spring-bar —32— is placed upon the outer surface of this insulating plate —21—. A second insulating disk —33— is placed upon the outer surface of the flexible bar —32— and the end of a rigid bar —34— is placed upon the outer surface of this insulating disk —33—. Another insulating disk —35— is placed on the outer surface of the rigid bar —34— and a block —36— rests upon the outer surface of this insulating plate and all of the parts described as constituting the pedestal, are formed with a plurality, in this instance three openings aligned in the assembled structure for the reception of the three screws —57— the heads of which rest against the block —36— and the inner ends of which are threaded into properly interiorly threaded openings in the diaphragm case section —1—, to thereby form a rigid pedestal.

The flexible arm —32— carries one contact —37— while the offset end of the rigid arm —34— carries the other contact —38—, the latter contact being mounted upon the end of a screw threaded through the rigid bar —34— to permit its adjustability as desired.

For the purpose of insulating the flexible arm —32— and the rigid arm —34— from the screws —57—, the insulating disk —31— is formed with three upstanding cylindrical bosses —62— surrounding respective screws and spacing and insulating said arms from the screws.

The flexible arm extends beyond the contact —37— and into the central space in the yoke —23— and is provided at its end with a cup-shaped member —39— containing any suitable hard insulating contact material —40— for contact with the adjustable screw —41— carried by the yoke —23—, as illustrated.

The opposite end of the spring —21— is secured between a block —51— and plate —52—, the blocks and the spring being secured to the diaphragm case-section —1— by means of screws —43—.

As diagrammatically illustrated in Figure 3, a condenser —42— is shunted across the contacts —37— and —38— and is perhaps best illustrated in Figures 4 and 6. This condenser is here shown as of cylindrical form, and is contained in the dished portion of the diaphragm case section —1—, and is held in such position against the diaphragm case-section, and the field magnet —2— by means of curved spring —63— having one end secured to the field magnet by screw —44— and its opposite end curved about the cylindrical condenser to maintain it in desired position. This condenser tends to prevent arcing between the points —37— and —38—, as contact is being made and broken.

The operation of the structure will be well understood.

As the circuit is closed by means of any suitable circuit-closer or switch, current will flow through the field coil —13—, energize the field magnet —2— and the armature 19 will be drawn into contact with the field magnet taking along with it spring —21— and yoke —23—.

Movement of the yoke —23— by contact of adjustable screw —41— with the cup —40— will depress the flexible arm —32— and separate the contacts —37— and —38— whereby the circuit will be broken, whereupon the armature —19— will be returned to normal position by operation of the spring —20— and the diaphragm —3—. Upon its return the spring-arm —32— will likewise move to normal position bringing contact —37— against contact —38— whereby the circuit will again be completed, and again the armature —19— will be drawn into contact with the magnet. During this operation, vibration of the diaphragm —3— and plate —16— will be effected.

A casing of cup shape cap —70— is provided for enclosing the magnet, armature contacts and other operative parts at the rear of the diaphragm case section —1—, and novel means is provided for maintaining this casing in desired position in the form of studs —71— projecting inwardly from diametrically opposite portions of the casing —70— and adapted to pass between two opposed spring portions of clips —72— having their flat bases secured to the rear diaphragm case section —1— in any suitable manner, as by means of rivets.

These clips, as perhaps best illustrated in Figure 9, may be formed of a single strip of spring metal as steel, and in the structure of the horn have two functions. The flanges —73— and —74— bent upwardly and inwardly from the base and then turned outwardly as illustrated, constitute jaws for gripping the inwardly extending studs —71— in a flexible manner to maintain the case —70— in tight relation with respect to the case-section —1—. End pieces are provided with laterally extending flanges —76— which, as shown, extend above and partially across the field coil —13— when positioned in the magnet —2— and maintain the field coil in its position in the grooves formed in the magnet. In order to assemble the case with the other portion of the structure, it is only necessary to aline the studs with the opening between the diverging ends of the jaws —73— and —74— to press the case inwardly until the studs pass by the contracted portion of the jaws when the case will be maintained in desired position. To remove the case, it is only necessary to apply sufficient power to withdraw the studs past the contracted portions of the jaws.

It is of extreme importance in this horn that the armature be adjusted the proper distance from the field, and the clearance is slight, and this adjustment can be effected and maintained in the present structure with great ease and efficiency in that the sleeve 15 against which the armature rests is threaded through the diaphragm, and by revolving the sleeve 15 the armature 19 is moved nearer to or farther from the field, permitting very accurate relationship, and as the sleeve has two flat sides mounted on the end to receive the resonator which has a non-circular opening to fit the end of the sleeve by merely rotating the disk —16—, the sleeve is screwed through the diaphragm and adjustment effected, and the parts can then be locked together by tightening screw —17—.

Altho we have shown and described a specific structure and particular details of form and arrangement of the parts thereof as constituting a perhaps preferred embodiment of our invention, we do not desire to restrict ourselves to the details of form, construction or arrangement, as various changes may be made within the scope of the appended claims.

We claim:

1. In a signal, a sheet metal rear diaphragm case section having a substantially central opening, a magnet core secured in the opening and having grooves, a coil seated in said grooves, a clip secured to the case-section and having a flange extending across the adjacent portion of the coil to maintain the same in the groove in the magnet core, said clip having a pair of inwardly inclined spring jaws projecting outwardly from the case-section, and a cup-shape cap having an inwardly projecting stud engaged by said jaws to maintain the cap in proper relation with respect to the case section.

2. A signal comprising a rear diaphragm case-section formed of sheet metal, a dia-

phragm having a central opening, means for securing the diaphragm to the case-section, a sleeve threaded into the central opening in the diaphragm and having a part extending forwardly from the diaphragm and formed with opposite flat sides, an armature on the other end of the sleeve, a disk mounted on the forward extending portion of the sleeve and having an opening adapted to fit the flattened portion thereof whereby rotary movement of the disk will cause rotary movement of the sleeve, and means for securing the disk and the sleeve in fixed relation to the diaphragm.

3. A signal comprising a rear diaphragm case section, a diaphragm having a central opening, means for securing the diaphragm to the case section, a sleeve threaded into the central opening in the diaphragm and having a part extending forwardly from the diaphragm, such part being of an out of round form, an armature on the other end of the sleeve, a disk mounted on the forward extending portion of the sleeve and having an opening adapted to fit the out-of-round portion whereby rotary movement of the disk will cause rotary movement of the sleeve, and means for securing the disk and the sleeve in fixed relation to the diaphragm.

4. In a signal, a sheet metal rear diaphragm case section having a substantially central opening, a magnet core secured in the opening and having grooves, a coil seated in said grooves, a sheet metal member secured to the case section having a portion extending over a part of the coil to hold the latter in the magnet groove and another portion bent to form a latching member and a cup-shaped cap having an inwardly projecting stud for engagement with the latching member.

In witness whereof we have hereunto set our hands this 12th day of December, 1924.

THEODORE J. SCOFIELD.
LLOYD E. JOHNSON.