No. 765,488. PATENTED JULY 19, 1904.

W. KAISLING.

TELEPHONE TRANSMITTER.

APPLICATION FILED APR. 17, 1903.

NO MODEL.

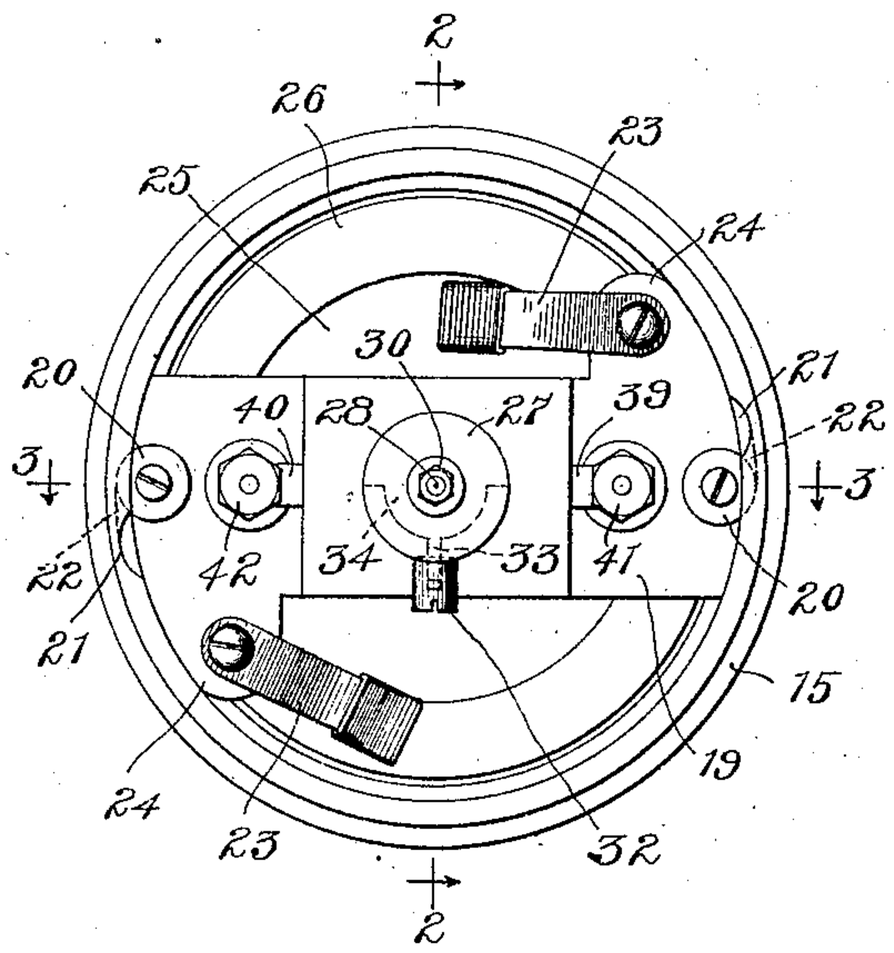

Fig. 1.

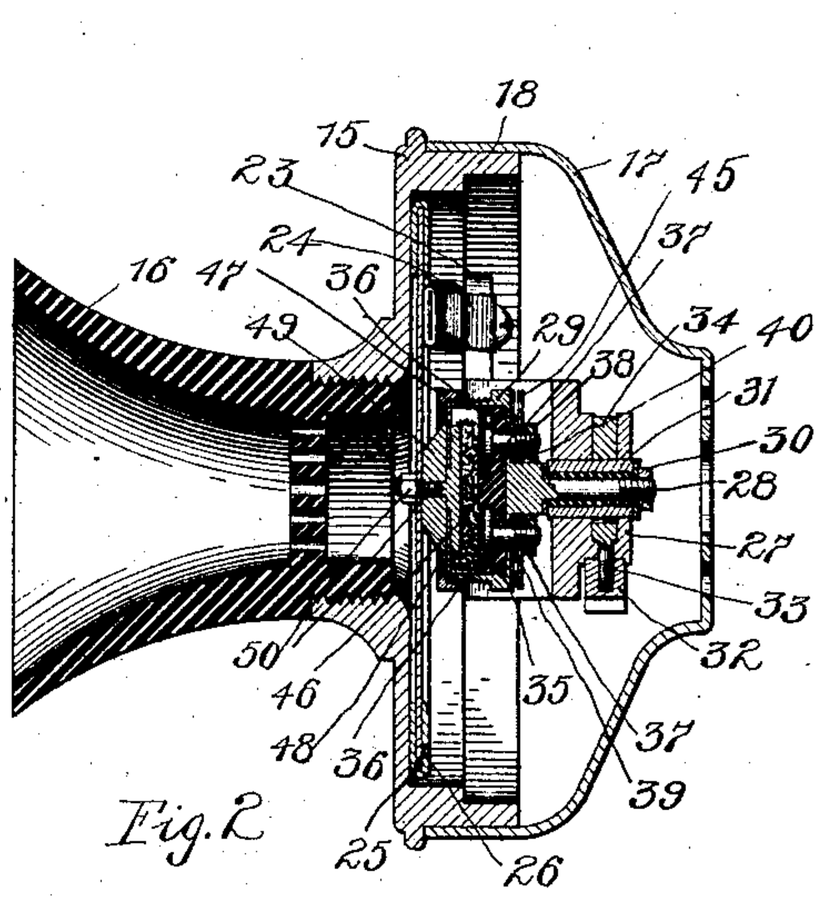

Fig. 2.

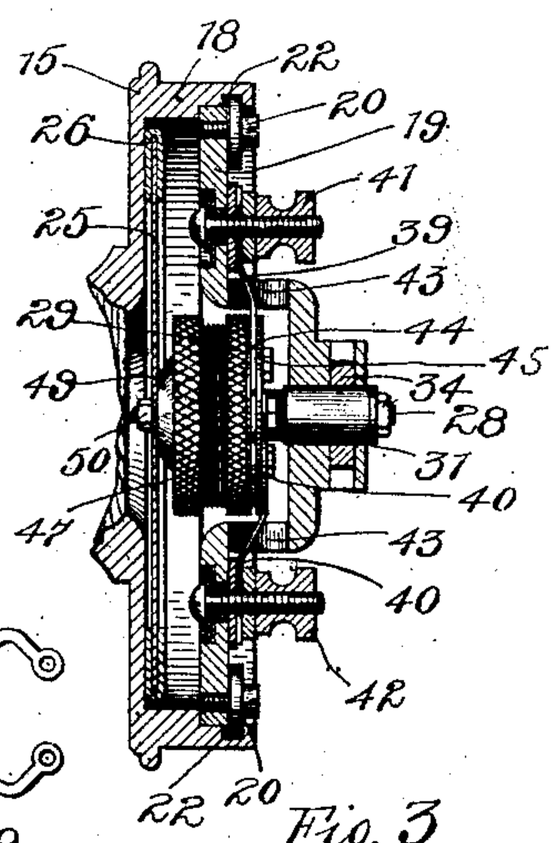

Fig. 3.

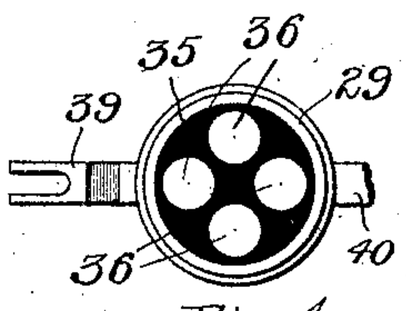

Fig. 4.

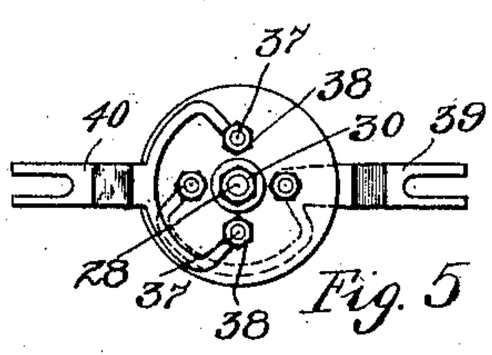

Fig. 5.

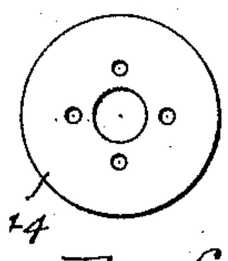

Fig. 6.

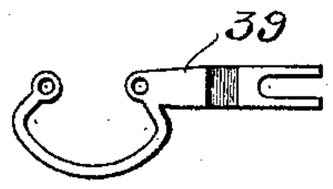

Fig. 7.

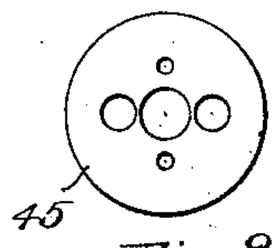

Fig. 8.

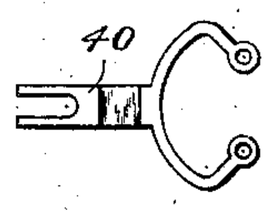

Fig. 9.

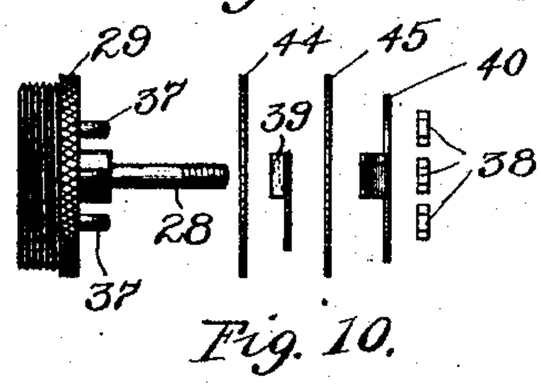

Fig. 10.

Witnesses,
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By Charles A. Brown
Attorney

No. 765,488. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 765,488, dated July 19, 1904.

Application filed April 17, 1903. Serial No. 153,101. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone-Transmitters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone-transmitters, and particularly to that class of telephone-transmitters in which the energy of sound-vibrations is transformed into variations in an electrical current by means of a resistance-varying medium included in the electric telephone-circuit.

As my invention is particularly well adapted for use in conjunction with battery-transmitters employing comminuted material, such as granular carbon, for the variable-resistance medium, I shall particularly describe my invention as embodied in such a transmitter.

Among the principal difficulties heretofore experienced in the use of transmitters of the prior art may be mentioned that of packing of the carbon granules employed and that of undue heating due to the excessive or unduly localized electrical currents.

It is the object of my invention to provide a transmitter in which the comminuted material or the granulated carbon employed shall be sufficiently agitated by the operation of the transmitter to prevent packing and which shall at the same time prevent heating due to excessive localized current-flow.

There are many other features of improvement in my transmitter, such as the novel arrangement of the electrodes, an improved construction of an electrode-chamber, and improved features of adjustment and assembly in manufacture.

In general, the further objects of my invention have been to provide a transmitter of improved transmitting qualities so far as loudness and clearness of articulation are concerned.

In accordance with my invention I have provided a transmitter-frame to which a suitable diaphragm is secured, there being provided a rigidly-mounted electrode-chamber containing comminuted material, such as granular carbon. Two or more electrodes are provided, all of which are stationarily mounted with respect to the electrode-chamber. A plunger having a piston-like action within the chamber is provided, which, on account of its mechanical connection with the main diaphragm of the transmitter, causes variations in the compression and distribution of the granular carbon within the chamber in conformity with the vibrations of the transmitter-diaphragm due to the sound-vibrations impressed thereupon. The electrical circuit through the granular carbon of the transmitter does not include any relatively movable part, such as the main diaphragm or the piston-like plunger, which vibrates in unison therewith. The movable plunger serves the purpose of varying the compression, and consequently the resistance, through the granular carbon contained within the electrode-chamber, whereby the resistance of the path between the stationary electrodes is varied to correspond with the sound-vibrations impressed upon the main diaphragm.

My invention will be clearly understood by reference to the accompanying drawings, in which—

Figure 1 is a rear elevation of the transmitter constructed in accordance with my invention, the inclosing case being removed to more clearly illustrate the details of construction. Fig. 2 is a cross-sectional view of my improved transmitter, taken on line 2 2 of Fig. 1. Fig. 3 is a partial cross-sectional view taken on line 3 3 of Fig. 1. Fig. 4 is a front elevation of the electrode-chamber, parts being removed to more clearly illustrate the arrangement of the stationary electrodes. Fig. 5 is a rear elevation of the electrode-chamber, showing the electrical connections with the electrodes. Figs. 6, 7, 8, and 9 show details of the conductors for electrically connecting the electrodes. Fig. 10 illustrates in side elevation the parts shown in Figs. 4 and 5.

I have illustrated a front plate 15, into which is screw-threaded a hard-rubber mouthpiece 16 and to which the inclosing casing 17 is secured. The flange 18 of the front plate extends to the rear, and a solid metal bridge 19 fits concentrically within this flange 18, the bridge being provided with flange-headed screws 20 20, which being brought into register with the notches 21 21 permit the forward movement of the bridge to seat itself at the bottom of the flange 18, whereby a slight rotation of the bridge 19 in a clockwise direction causes the flanges of the screws 20 to engage with suitable slots 22 22, cut into the flange 18, as best illustrated in Fig. 3. Upon being thus brought into place a slight turn of the screws 20 in a direction adapted to unscrew them from the bridge 19 causes the engagement of the upper side of the flanges of the screws with the under side of the grooves 22, causing a downward pressure upon the bridge 19 to maintain this bridge firmly seated against the front plate 15. The rubber-soled spring-clips 23 23, secured to projecting ears 24 24 of the bridge 19, serve to press the main diaphragm 25 forward against the front plate 15, a rubber washer 26 being provided in a manner well known to those skilled in the art. A boss 27 is provided at the rear of the bridge 19 through a suitable opening, in which there is clamped a stem 28, carrying at its forward end a cup-like electrode-chamber 29. A nut 30 serves to clamp the metal bushing 31 to the stem 28, there being provided a suitable bushing and washers to prevent an electrical connection between the stem and the bridge 19. An adjustment of the cup-like electrode-chamber with respect to the transmitter-frame and diaphragm may be effected by a suitable longitudinal movement of the stem 28 and its metal bushing 31 within the boss 27, the electrode-chamber being clamped in position by means of a slotted nut 32, which acting upon a screw-threaded stem 33 causes a lateral movement of the ring 34, which surrounds the metal bushing 31, there being provided, as shown, a suitable slot in the boss 27 to permit the movement of this ring 34. Within the cup-like electrode-chamber 29 is placed a hard-rubber disk 35. This disk is held in position at the rear of the electrode-chamber by means of the metal electrodes 36 36 and their projecting stems 37 37, which in turn are engaged by the nuts 38 38. The stems 37 are insulated through the rear wall of the metal electrode-chamber 29, where they make electrical connection with the conductor-clips 39 and 40.

It will be seen that the four electrodes shown are connected in diametrically opposite pairs, one pair to the insulated binding-post 41 and the other pair to the insulated binding-post 42, there being provided suitable openings 43 43 in the bridge 19 to accommodate the terminal ends of the clips 39 and 40. Suitable disks of insulating material 44 and 45 are placed one on either side of the connecting-clip 39 to insulate the connecting-clips one from the other and from the end of the electrode-chamber 29.

While I have described a disk 35 of insulating material, such as hard rubber, at the rear of the electrode-chamber 29, it will be readily understood that other constructions may well be employed, the principal requirement being that the electrodes 36 shall be insulated one from the other. These electrodes are preferably symmetrically arranged with respect to the axis of the electrode-chamber, as best illustrated in Fig. 4.

While the electrodes are shown with their faces slightly below the face of the disk 35, this arrangement is not necessary, and the electrodes may be flush with the disk 35 or may extend slightly above this disk.

The material of which the electrodes are formed is immaterial so long as they are of an electrically-conductive material. The preferred form of electrode is made of brass, the front face being gold-plated to prevent corrosion and to make good electrical contact with the granular carbon or other comminuted conducting material 46, placed within the chamber 29. A screw-threaded ring 47 serves to retain the flexible wall 48, of mica or other suitable material, in place over the front end of the electrode-chamber. This flexible mica wall of the electrode-chamber is desirably clamped between the two halves of the plunger 49, this plunger having mechanical connection by means of the screw and nut 50 with the main diaphragm 25. As will be apparent from an inspection of Fig. 2, there is a peripheral space intervening between the part of the plunger extending within the chamber 29 and the walls of this chamber. The flexible wall 48 permits a movement of the plunger 49 with respect to the chamber 29 in conformity with the vibrations of the main diaphragm 25. The piston-like action of the plunger 49 within the chamber 29 serves to stir up and agitate the carbon granules within the chamber to prevent their packing. This plunger 49, and particularly the part of the plunger extending within the flexible wall 48, may be either of conducting or non-conducting material, the sole purpose of this plunger being to vary the compression, and consequently the electrical resistance of the granular carbon within the chamber 29. The method of electrically connecting the transmitter will be apparent to those skilled in the art, the circuit leading between the binding-posts 41 and 42 first to one diametrically opposite pair of electrodes 36, thence through the intervening granular carbon to the other part of electrodes 36, and thence through the connecting-clip to the other binding-post. Variations in the degree of compression of the granules within the chamber cause corresponding variations

in the resistance between the binding-posts 41 and 42.

While I have herein shown and described one particular means for closing the electrode-chamber to prevent the escape of granular carbon and at the same time permitting the piston-like movement of the plunger within the chamber, it will be apparent that many other means may be employed to accomplish the same purposes, and I do not therefore wish to limit myself to the precise construction herein shown and described.

Many other modifications in this preferred embodiment of my invention will occur to those skilled in the art, and I therefore do not wish to limit myself to the precise construction herein set forth; but,

Having described my invention, I claim as new and desire to secure by Letters Patent—

1. In a telephone-transmitter, the combination with a circular front plate 15, of a flange 18 thereon, a bridge fitting concentrically within said flange, slots 22 in said flange, notches 21 leading to said slots, and flange-headed screws on said bridge registering with said notches to permit the assembly of the bridge and said front plate.

2. In a telephone-transmitter, the combination with a circular front plate 15, of a flange 18 thereon, a bridge fitting concentrically within said flange, slots 22 in said flange, notches 21 leading to said slots, screws on said bridge and extensions from said screws registering with said notches to permit the assembly of the bridge and said front plate and adapted to engage said slots to retain said bridge in position.

3. In a telephone-transmitter, the combination with a bridge 19, of a boss 27 on said bridge having an opening for the reception of a stem for supporting an electrode-chamber, a ring 34 within a suitable slot in said boss and surrounding said stem, a screw-threaded stem 33 for said ring, and a nut engaging said screw-threaded stem to cause a movement of said ring to clamp said first stem in position.

4. In a telephone-transmitter, the combination with a main diaphragm, of a cylindrical electrode-chamber, comminuted conducting material in said chamber, four electrically-insulated electrodes symmetrically placed at one end of said chamber and insulated from each other, conductor-plates 39 and 40 each connecting diametrically opposite pairs of electrodes in parallel, means for insulating said conducting-plates from each other and from the frame of the transmitter, binding-posts with which the ends of said conducting-plates connect, and a plunger within said chamber having mechanical connection with said main diaphragm.

5. In a telephone-transmitter, the combination with a main diaphragm, of a cylindrical electrode-chamber, comminuted conducting material in said chamber, a disk of insulating material forming an end wall for said electrode-chamber, four electrodes extending through said disk into said electrode-chamber, terminal plates 39 and 40, each plate connecting diametrically opposite pairs of electrodes in parallel, said terminal plates being insulated from each other and from the transmitter-frame, binding-posts with which the end of said terminals engage, and a plunger in said chamber having mechanical connection with said main diaphragm.

6. In a telephone-transmitter, the combination with a main diaphragm, of a cylindrical electrode-chamber, comminuted conducting material in said chamber, four electrodes extending from said chamber through the rear wall thereof, said electrodes being insulated from each other and from said chamber-walls, terminal plates 39 and 40, each terminal plate connecting diametrically opposite pairs of electrodes in parallel, disks of insulating material 44 and 45 for insulating said terminal plates from the electrode-chamber and from each other, terminal posts with which the ends of said terminal plates engage, and a plunger in said chamber opposite said electrodes having mechanical connection with said main diaphragm.

7. In a telephone-transmitter, the combination with a main diaphragm, of a cylindrical electrode-chamber, comminuted conducting material in said chamber, a rear wall for said chamber composed of insulating material, two sets of electrode-plates disposed against said rear wall, stems passing from said electrode-plates through said rear wall, terminal plates for receiving said stems and for connecting together in parallel the electrodes of each set, insulating-washers for insulating said terminal plates from each other, binding-posts to which the end of said terminal plates lead, a flexible front wall for said electrode-chamber, and a plunger secured to said flexible front wall and the main diaphragm.

8. In a telephone-transmitter, the combination with a front plate, of a bridge secured to the rear of said front plate, an opening through said bridge, a stem adapted to be adjustably secured in said opening and terminating at its front end in a cup-shaped electrode-chamber, a disk of insulating material at the rear of said chamber, two sets of electrode-plates held against said disk by stems passing through said disk and the rear wall of said electrode-chamber, terminal plates receiving said stems and connecting in parallel the electrode-plates of each set, insulating-washers for insulating the terminal plates from each other and from the transmitter-frame, openings in said bridge through which said terminal plates pass, binding-posts to which the ends of said terminal plates lead, a flexible front wall for said electrode-chamber, a plunger extending

into the front end of said electrode-chamber and secured to said flexible wall, and a main diaphragm with which said plunger is mechanically connected.

9. In a telephone-transmitter, the combination with a main diaphragm, of a cylindrical electrode-chamber, comminuted material in said chamber, a disk of insulating material forming a rear wall of said electrode-chamber, circular recesses in said disk, electrode-plates in said recesses, stems passing from said electrode-plates through said disk, terminal plates receiving said stems and connecting together in parallel the electrodes of each set, insulating-washers receiving said stems for insulating said terminal plates from each other and from the transmitter-frame, and a plunger extending into the front end of said electrode-chamber, said plunger being mechanically connected with the main diaphragm.

10. In a telephone-transmitter, the combination with a front plate, of a bridge secured to the rear of said front plate, a boss on said bridge having an opening, a bushing in said opening, a stem secured in said bushing but insulated therefrom, a cup-like chamber supported from the forward end of said stem, two sets of electrode-plates supported from the rear wall of said electrode-chamber, terminal plates connecting in parallel the electrodes of each set, means for insulating said electrodes and terminals from each other and from the transmitter-frame, a plunger extending into the front end of said electrode-chamber, a main diaphragm mechanically connected with said plunger, a slot in said boss leading to said bushing, a ring in said slot, a threaded stem extending from said ring, and a nut engaging said threaded stem, whereby said ring may be clamped against said bushing to hold said electrode-chamber in any adjusted position with respect to the said plunger.

11. In a telephone-transmitter, the combination with a front plate, of a bridge secured to the rear of said front plate, a boss on said bridge having an opening, a bushing in said opening, a stem secured in said bushing but insulated therefrom, a cup-like cylindrical electrode-chamber supported from the front end of said stem, a disk of insulating material secured to the rear wall of said chamber, a plurality of circular recesses in said disk, two sets of electrode-plates in said recesses, stems leading from said electrode-plates through said disk, terminal plates receiving said stems and connecting in parallel the electrode-plates of each set, insulating-disks receiving said stems for insulating said stems from each other and from the transmitter-frame, nuts engaging said stems for clamping said terminal plates in position, openings through said bridge through which the terminal plates pass, binding-posts to which said terminals lead, a slot in said boss leading to said bushing, a ring in said slot engaging said bushing, a threaded stem extending from said ring, a nut engaging said threaded stem, said nut and ring serving to clamp said bushing in any position of adjustment in said opening, a flexible front wall for said electrode-chamber, a plunger secured to said flexible wall, a main diaphragm secured to said plunger, and comminuted material in said electrode-chamber.

In witness whereof I hereunto subscribe my name this 14th day of April, A. D. 1903.

WILLIAM KAISLING.

Witnesses:
LYNN A. WILLIAMS,
HARVEY L. HANSON.