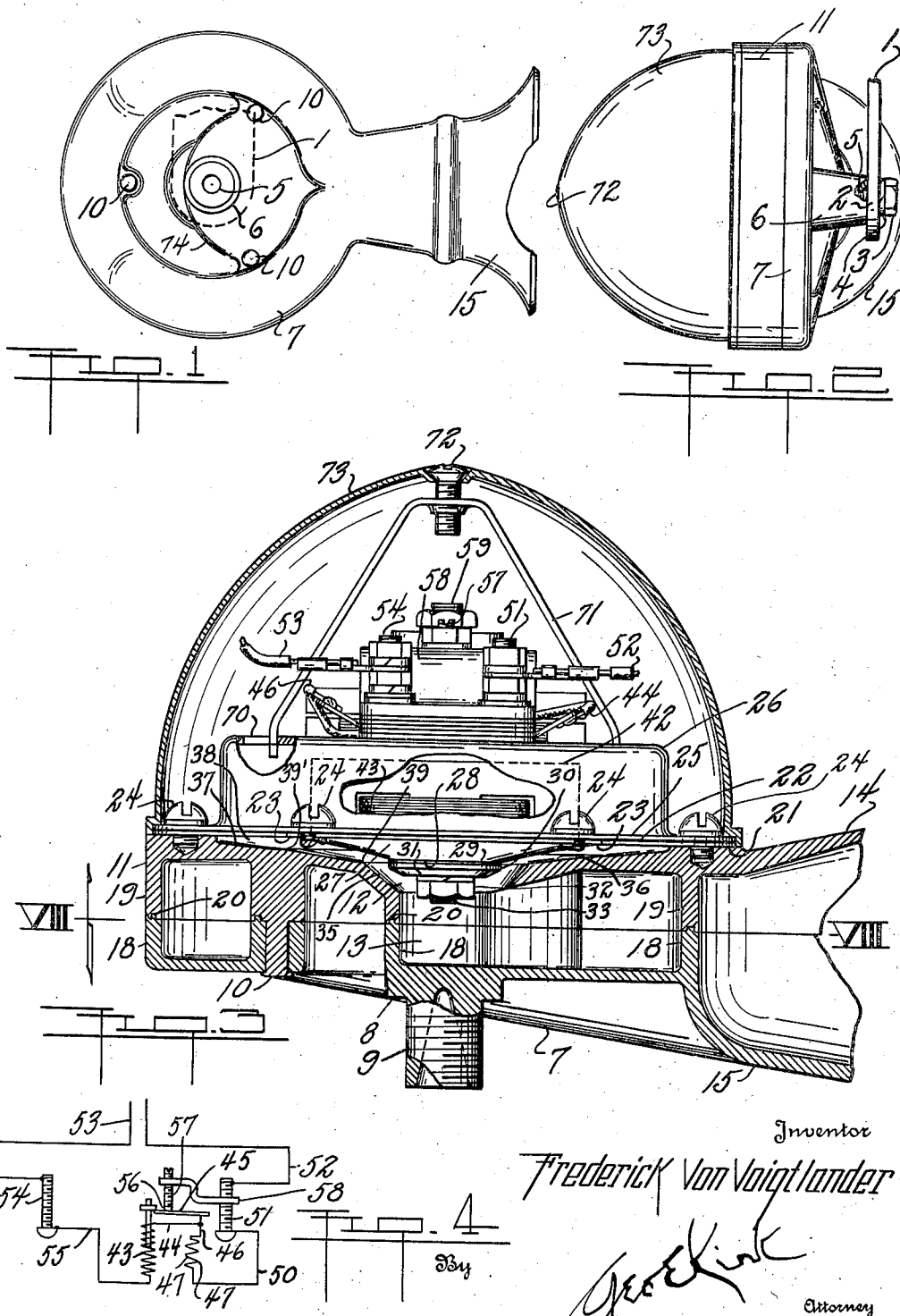


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May 16, 1939.

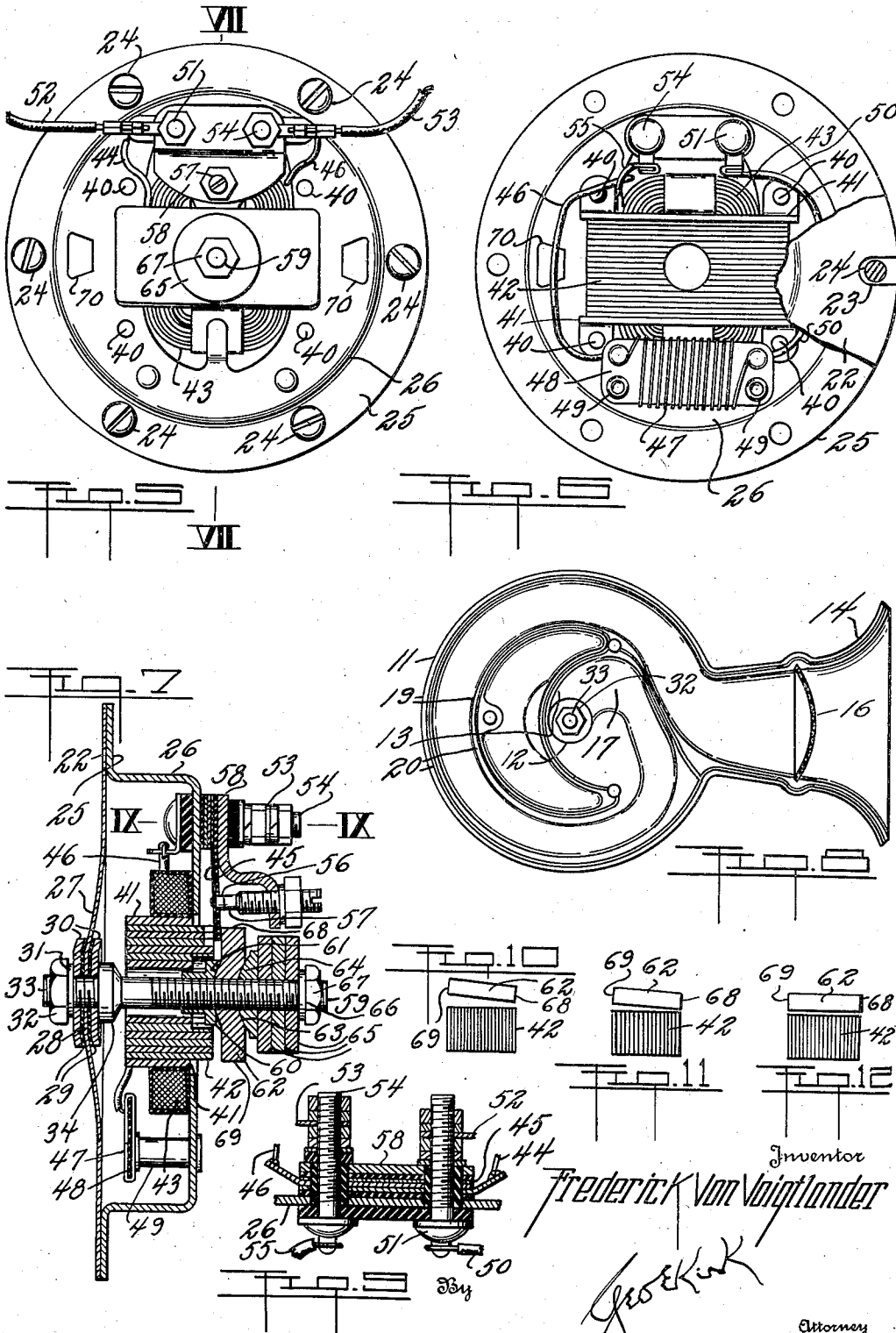
F. VON VOIGTLANDER

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SOUND SIGNALING

Filed Aug. 15, 1936

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UNITED STATES PATENT OFFICE

2,158,209

SOUND SIGNALING

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Application August 15, 1936, Serial No. 96,285

1 Claim. (Cl. 116—142)

This invention relates to tone control and pro-
duction.

This invention has utility when incorporated
in electrically actuated horns, especially of the
diaphragm type, equipped with elbow or whorl
trumpet therefrom.

Referring to the drawings:

Fig. 1 is a side view, with parts broken away,
of an embodiment of the invention in a horn as
for motor vehicles;

Fig. 2 is a view of the horn from the left of
Fig. 1;

Fig. 3 is a medial section on an enlarged scale
through the horn with a different type of mount-
ing;

Fig. 4 is a wiring diagram for the electrical
actuator for the horn;

Fig. 5 is a view of the horn actuator apart
from the housing;

Fig. 6 is a view of the actuator from the op-
posite side as to the showing in Fig. 5, with the
diaphragm broken away;

Fig. 7 is a section on the line VII—VII, Fig. 5;

Fig. 8 is a section on the line VIII—VIII, Fig. 3;

Fig. 9 is a section on the line IX—IX, Fig. 7;

Fig. 10 is a diagrammatic showing of the arma-
ture in normal inactive position as to the electro-
magnet core;

Fig. 11 is a view similar to Fig. 10, with the
armature partially shifted at energizing of the
electromagnet; and

Fig. 12 is a view of the armature in the fully
thrown position, which is, in practice, not a strik-
ing or impact.

Bracket 1 is shown with eye 2, in which may
be inserted bolt 3 through lock washer 4 to en-
gage internally threaded portion 5 of projecting
boss or stem 6, fixed with housing section 7.
This housing section 7, in lieu of the boss 6, may
be provided with boss 8 having externally thread-
ed portion 9 for mounting. It is to be noted, with
either the boss 6 (Figs. 1, 2) or the boss 8 (Fig. 3),
the structure may be disposed in a desired angular
relation. This housing section 7 has rivet con-
nection 10 with complementary housing section
11, centrally of which, concentric with the boss
8, is port 12 with elbow 13 therefrom in com-
munication with flare or bell 14 for this first sec-
tion 11 and bell portion 15 for the section 7. In
this complete bell portion 14, 15, there may be
located screen 16 to keep out foreign matter as
insects. The general direction of this projector
terminus or bell 14, 15, is radially from this
port 12.

For low frequency projector, there is desired

increase of duct distance between the port 12
and this bell 14, 15, over direct radial form, and
such is herein effected by curved duct or whorl
passage 17. In practice, this passage 17 is
definitely designed to coordinate with the fre-
quency of the diaphragm of this device. To such
end, the medial line or axis of this duct 17 from
the port 12 to the radial bell 14, 15, is generous at
the more abrupt turn portions, but of an in-
creasing cross section or area on a formula of

$$f(x) = \tan kx$$

where

k constant; y_0 equals area at small end or
port 12;

x equals axis or center line distance or length
from the center of the port 12; and

y equals the cross sectional area of this duct 17;
the equation being

$$y = y_0 e^{f(x)}$$

when e indicates the logarithmic function, in
this exponential formula initially checked ex-
perimentally.

This curved duct 17 is completed by flange 18
from the section 7, registering with opposing
flange 19 from the section 11 with interlocking
terminal groove and rib joint 20 more or less
continuous therebetween. The sections 7, 11, as
assembled by the rivet 10 are effective in the
complete duct assembly for this unit housing.

This housing section 11 has endless or annular
seat 21, against which may abut diaphragm 22
having peripheral notches 23 astride bolts 24
through flange 25 of actuator housing cup 26.
This diaphragm 22 say of steel has centrally con-
ical portion 27 terminating in flat central portion
28. Fiber washers 29 are on opposite sides of this
portion 28, and there nest with washers 30 against
the outer of which lock washer 31 is held by nut
32 on threaded stem 33 say of steel having shoul-
der 34 opposing the inner washer 30.

The port 12 in the housing 11 is concentric
with the diaphragm 22 and has about this mount-
ing on the diaphragm for the stem 33, a flare 35
at approximately 40° from the plane of the dia-
phragm 22, toward at-rest position of the dia-
phragm 22, approximately to the plane of the por-
tion 28 of the diaphragm. From this portion the
housing 11 has, opposing the conical portion 27
of the diaphragm 22, a flare or conical portion
36 of approximately 10° from the plane of the dia-
phragm 22 out to in excess of half the distance
from the flare 35 toward the seat 21. The latter
portion of this section of the housing between
the seat 21 and the conical tapered portion 36

is tapered portion 37 of approximately 2° away from the plane of the diaphragm 22. It is thus seen that between the diaphragm 22 and the housing 11 there is provided chamber 38 of concentric annular cross section increasing toward the port 12 in such dimension that throttling is not possible from diaphragm oscillation, but that in this oscillation with a height for the cone of the diaphragm of say .14 inch, its flexing from plane of rest or half-amplitude in operation would approximate .04 inch, with the total amplitude approximately .07 inch. This means that the performance hereunder is effective against restricting air flow in or out over shoulders 39, 39', between the flares 35, 36 and 37. This continuous dishing reactions are of practical worth in tonal value against disturbance of the frequency or undesired harmonics.

This housing 26 has, on the concave side thereof, anchored therewith by rivets 40 (Fig. 6) plates 41 holding therebetween laminations 42 as the core of the electromagnet, between the legs of which is mounted coil 43 having lead 44 therefrom to spring plate terminal 45. From this terminal 45, there extends lead 46 to resistor winding 47 on insulation plate 48 mounted by rivets 49 fixed with the inside of this cup or housing 26. From this resistor 47 extends lead 50 to terminal 51 connected to supply line 52, say of 6 volt direct current in the event the device is used in an automobile. The companion supply power line 53 for current extends to terminal 54 having connection by lead 55 to the opposite side of the coil 43.

On this plate terminal 45 is contact 56 opposed by adjustable contact 57 (Figs 4, 7) as a switch. The contact 57 is carried by bracket 58 mounted on the terminal 51 and is a by-pass for the resistance 47, which resistance 47, as in series with the coil 43, precludes full cutting out of the coil 43, and, therefrom of high frequencies or harmonics, avoids deleterious actions at the terminals between the contacts 56, 57. This plate 45 extends toward the stem 33 and is accordingly laterally from the axis of the diaphragm 22.

Mounted on this stem 33 at threaded portion 59 is cup or concave bearing member 60 into which seats convex side 61 of armature 62 having outward therefrom concave seat 63 entered by convex washer 64. Loading washers 65 space lock washer 66 from holding nut 67 in the adjusted position for this armature 62 as to electromagnet laminated core 42.

In the adjustment hereunder, the side 68 (Fig. 10) of the armature 62 toward the contacts or switch 56, 57, is in closer proximity to the laminated core 42 than remote side 69. The resistance of the spring 45 retards the pull action of the energized electromagnet on the side 68,

thereby tending to flex the stem 33 as the armature 62 moves toward the laminated pole 42.

At the oscillation throw of the diaphragm 22, there is approximate parallelism between the armature 62 and the opposing faces of the laminated pole 43 with but slight clearance therebetween, say of the order of .005 inch. This uniform air gap throughout the effective area of the armature is a neutralizing of the resistance at the breakers or contacts 57, 58, contributing toward symmetrical flexing throughout for the diaphragm 22 against unequal disturbance therefrom in the oscillation periods, with tonal improvement therefrom.

The cup housing 26 for the actuator has openings 70 therein with which may be keyed arms 71 of U-shaped member rising to carry screw 72 centrally through dome 73 as a housing or closure for this actuator. Outer housing section as on the side of the resonant chamber 38 away from the housing section 11 provides a signal or horn exterior remote from the dome 73. Notwithstanding the progressive dimension for duct across section 17 between the port 12 and the bell 14, 15, this housing section 7 provides a symmetrical exterior portion 74 (Fig. 1).

In the design herein disclosed, there is purpose in availing of the frequency of the diaphragm as to air as well as the frequency of the column of air in the projector therefrom, one to build up on the other in resonance apart from metallic sound or resonance due to any impact.

In practice, it has been found that the mounting herein disclosed, located concentrically of the diaphragm, may be on such a vibrating structure as the motor block of an automobile propelled by an internal combustion engine. As so mounted concentrically of the diaphragm there is entire freedom from noise interference due to cross vibration. This means that the assembly for this signal may be rigid to this mounting.

What is claimed and it is desired to secure by Letters Patent is:

A signal device embodying a generally circular housing section having axially on one side a seat for mounting the section free to be positioned angularly in a desired direction range, said section having on the opposite side a spiral way to a radial projector, a second complementary housing section completing said spiral way and projector, said second section having axially thereof a port in communication with said spiral way, said port being on the side of the second section away from the mounting seat, and a diaphragm actuator for the device carried by the second section and spaced by both sections from the mounting seat, said mounting seat being effective to position the projector in the said range of desired directions.

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