E. M. TORMIN.

ELECTRICALLY OPERATED SIGNALING HORN.

APPLICATION FILED JULY 6, 1909.

976,159.

Patented Nov. 22, 1910.

3 SHEETS—SHEET 1.

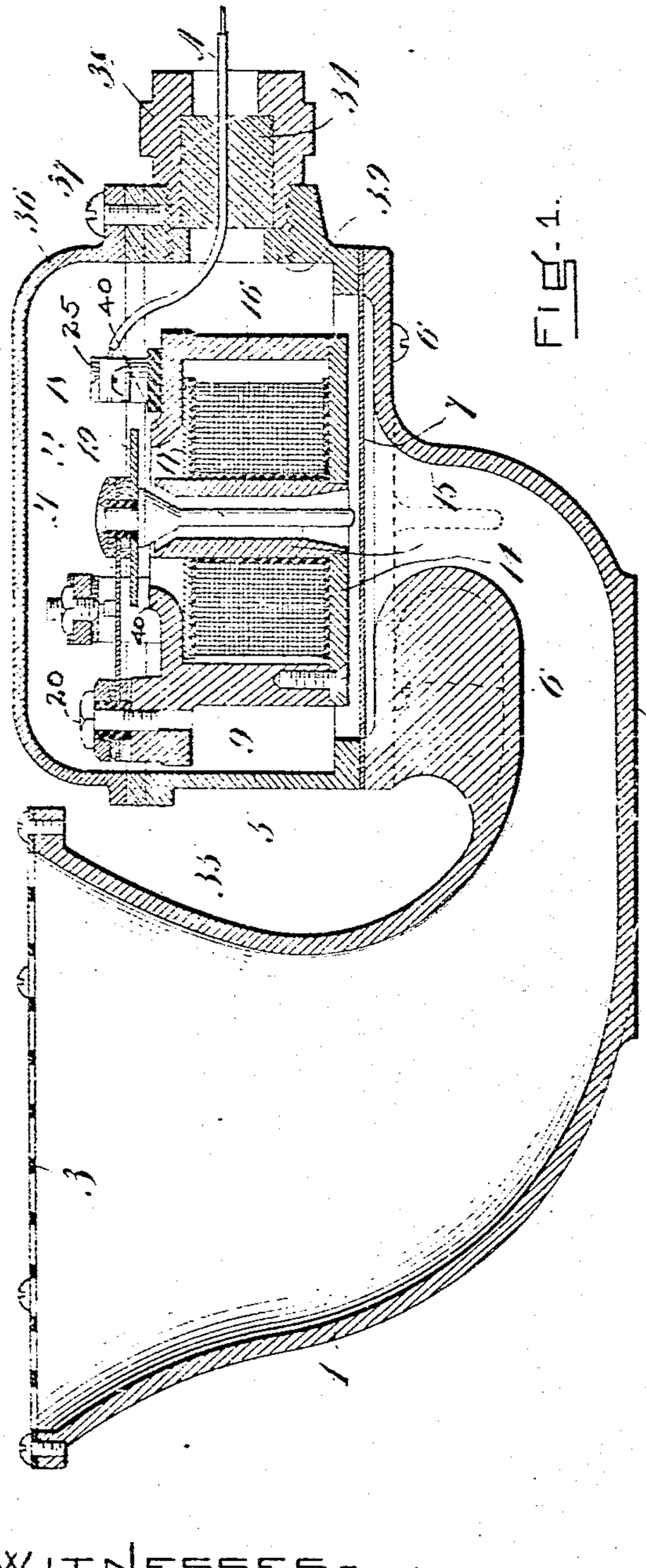

FIG. 1.

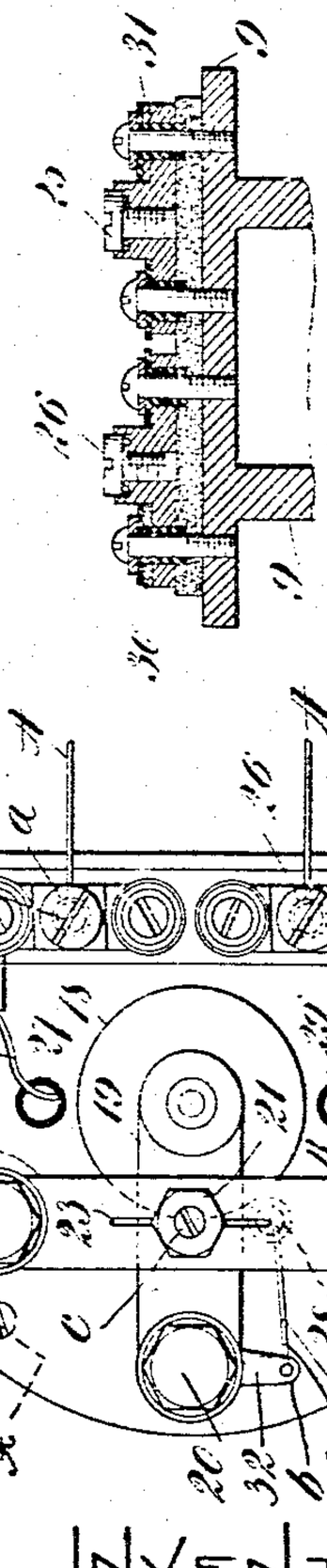

FIG. 4

FIG. 3

WITNESSES=

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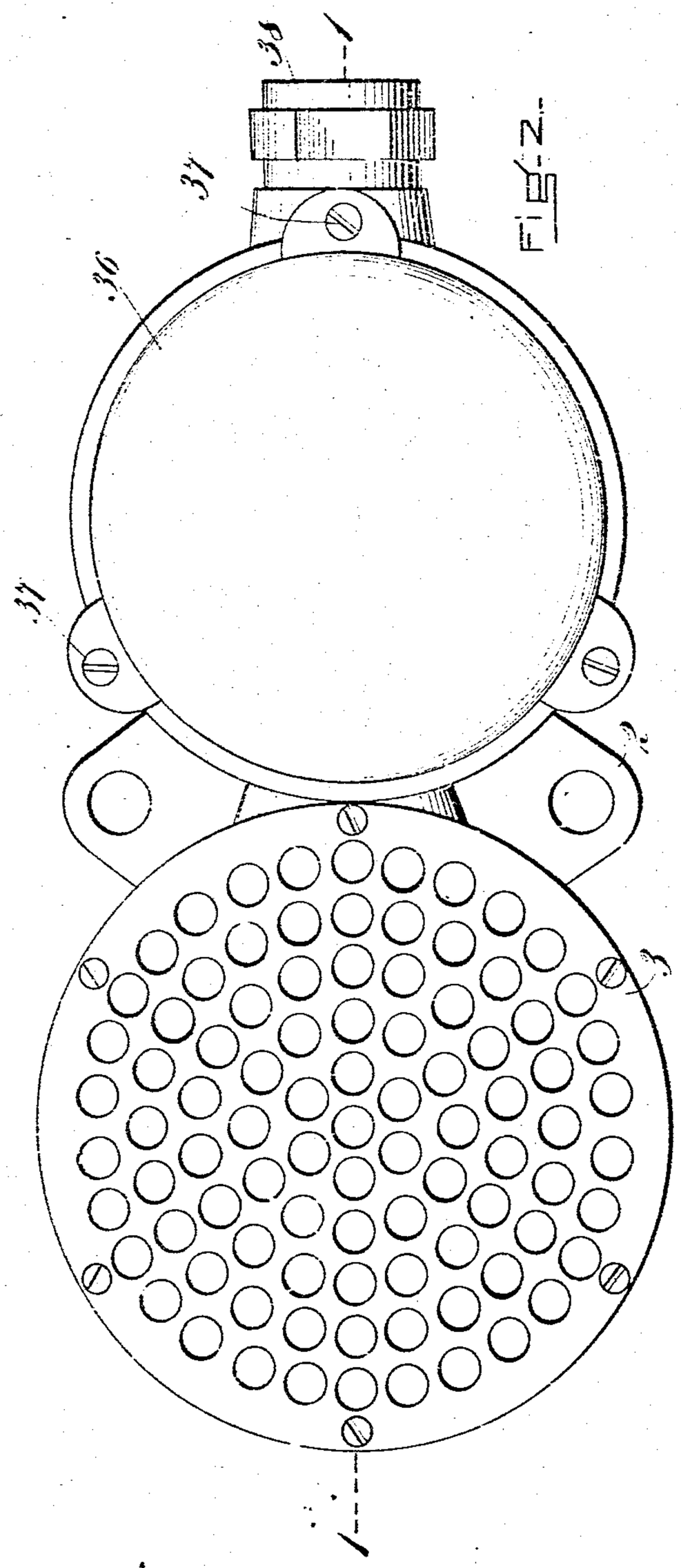

FIG. 2.

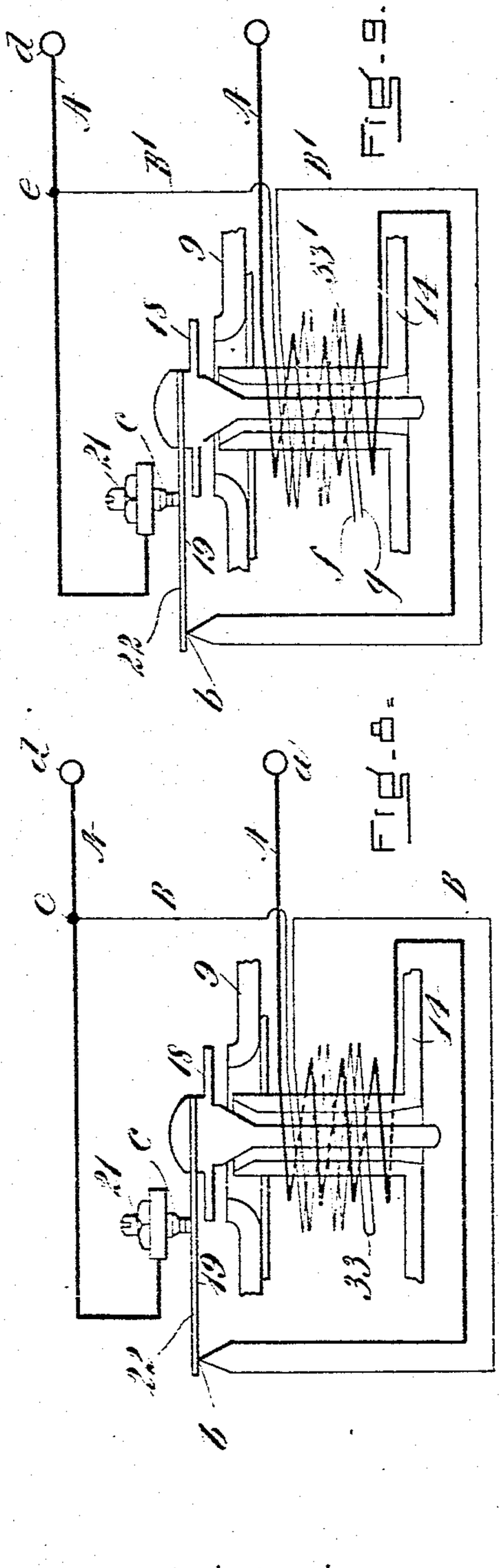

FIG. 3.

FIG. 4.

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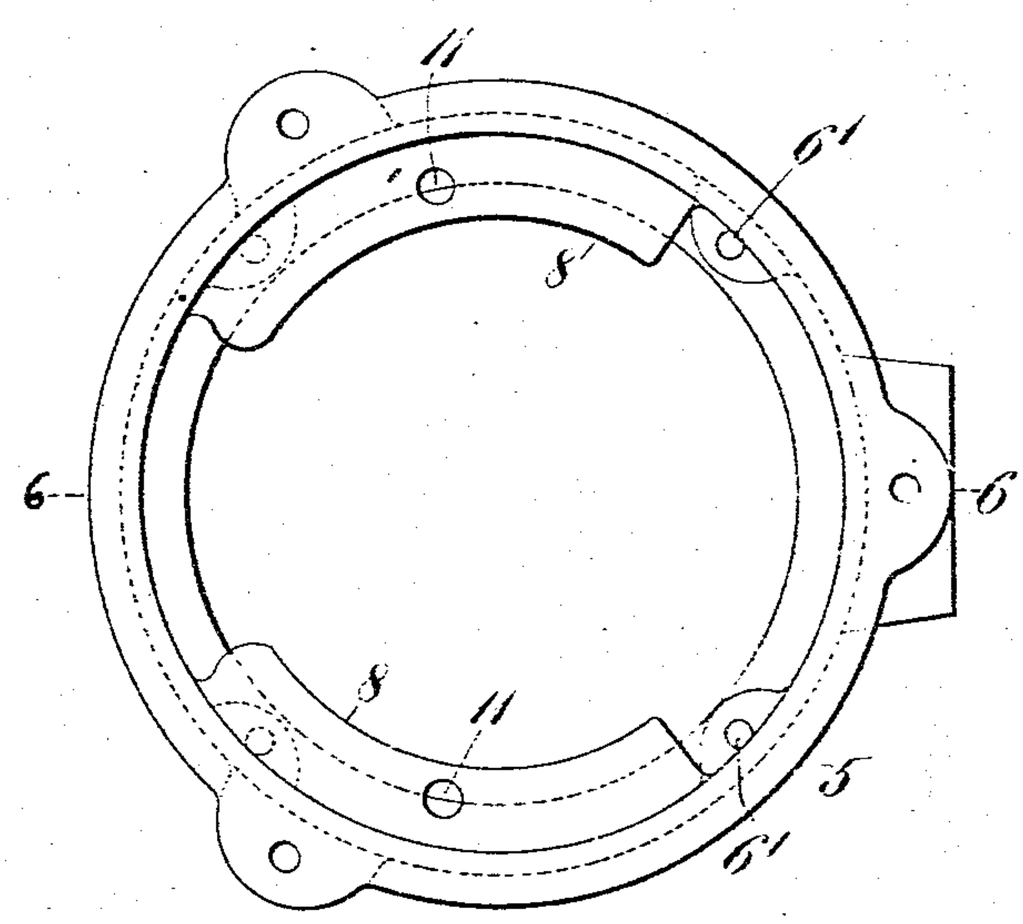

Fig. 5.

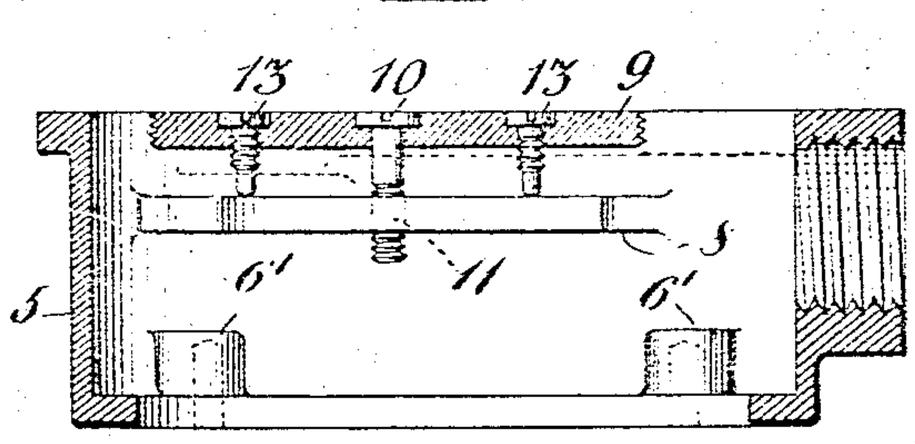

Fig. 6.

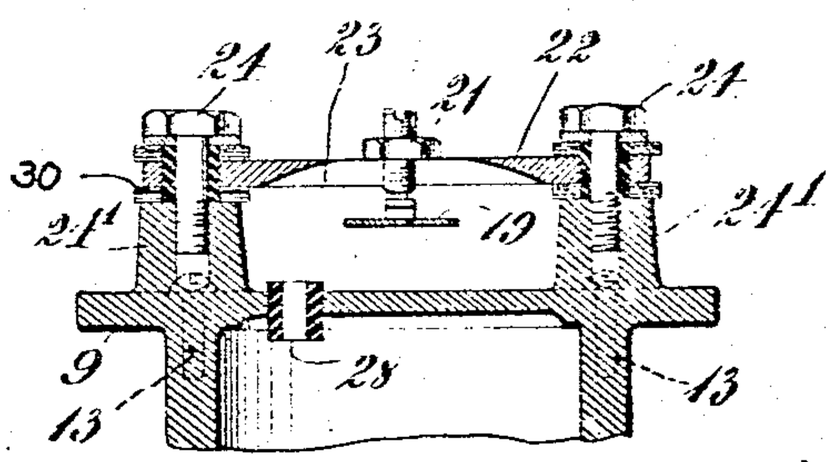

Fig. 7.

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UNITED STATES PATENT OFFICE.

EGMONT MAX TORMIN, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO HOLTZER-CABOT ELECTRIC COMPANY, OF BROOKLINE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ELECTRICALLY-OPERATED SIGNALING-HORN.

976,159. Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed July 6, 1909. Serial No. 506,085.

To all whom it may concern:

Be it known that I, EGMONT M. TORMIN, a subject of the Emperor of Germany, and a resident of Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Electrically-Operated Signaling-Horns, of which the following is a specification.

My invention relates to electrically-operated signaling-horns for use on boats, motor vehicles, in factories, etc., and its object is to improve and simplify the construction of such horns in the manner hereinafter set forth whereby the horn is rendered compact, water-tight and dust-proof, and capable of ready adjustment.

The drawings which accompany and form a part of this specification illustrate the preferred embodiment of my invention.

In the drawings Figure 1 is a longitudinal section of my improved electric horn, the section line being shown at 1—1, Fig. 2. Fig. 2 is a plan view of said electric horn. Fig. 3 is a plan view of the top of the magnet frame. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is a plan view of the magnet casing with the magnet frame removed. Fig. 6 is a section of the casing 5 taken on the line 6—6 of Fig. 5 showing a portion of the magnet frame 9 taken on the section line X X of Fig. 3. Fig. 7 is a section taken on the line 7—7 of Fig. 3. Fig. 8 is a diagram showing the circuits that may be employed when the horn is actuated by a source of relatively high voltage. Fig. 9 is a diagram showing the circuits that may be employed when the horn is actuated by a source of relatively low voltage.

In that particular embodiment of my invention selected for illustration and shown in the accompanying drawings, 1 represents a horn of any suitable material, which may be cast iron, when the horn is to be used in factories, or brass or suitable composition when intended for use on vessels or motor vehicles.

The horn may be provided with a base 2 for securing the same to a support, and preferably is provided with a perforated cover 3. It will be understood of course that any suitable horn or sound-amplifying device may be employed and that my invention is not limited to the particular horn herein disclosed.

Secured to a flange on the inner end of the horn by the screws 6 is a casing 5 provided with lugs 6′ into which said screws are threaded, and the diaphragm 7 of phosphor-bronze or other suitable sonorous material is interposed between said casing and horn.

In the preferred construction means should be employed for adjusting the magnet-frame 9 with respect to the diaphragm 7, and for this purpose I may provide the inner surface of said casing with two oppositely arranged flanges 8, 8, each provided with a threaded hole 11 adapted to receive the screws 10 which pass through unthreaded holes in the top of the magnet-frame, and each flange arranged to support the ends of one of the two pairs of leveling screws 13, 13, which are threaded through the top of said magnet-frame.

The magnet coil 16, and the windings 33 or 33′, if either of the latter is employed, are placed within the magnet-frame, the hollow core 15 is inserted and the bottom-piece 14 secured in any suitable manner, as by a screw, to the magnet-frame, thereby securely holding the coil, or the coil and windings, in position.

17 is a plunger provided with an armature 18 integral therewith, or else fastened thereto in any suitable manner, and secured, as by riveting, to the flat spring 19 which is held on the magnet-frame by the screw 20. The spring 19 forming part of the circuit herein described, is insulated as shown from the plunger and magnet-frame.

A bridge 22 provided with a longitudinal slot 23 is secured to the bosses 24′ by the screws 24 and is insulated from the magnet-frame in any suitable manner. The adjustable back-stop screw 21 passes through said bridge and its lower end, which may be capped with iridium normally rests against a contact piece secured to the spring 19. Secured to and insulated from the top of

the magnet-frame are the binding-post screws 25, 26, to which the leading-in wires A A are connected. A clip 31 is conductively connected to the screw 25 and a clip 30 is conductively connected with the screw 26 and one of the screws 24, 27, 28 and 29 are insulating bushings passing through the top of the magnet-frame. One terminal of the magnet-coil 16 passes through the bushing 27 and is connected to the clip 31 and the other terminal of said winding passes through the bushing 28 and is connected to the clip 32 secured to the screw 20.

When the leads A A are connected with a source of direct current, the magnet is energized and the plunger 17, the outer end of which normally is adjacent to, but not in contact with, the diaphragm 7 is brought sharply in contact with said diaphragm, whereupon the circuit which includes the magnet-coil is broken at the contact *c* between the contact screw 21 and the spring 19, so that the plunger resumes its normal position and the circuit is again closed, the sound so produced by the plunger striking the diaphragm being regulated by the adjustable back-stop 21 and the adjusting screws 10 and 13 hereinbefore referred to.

In order to prevent sparking at the contact *c*, when the horn is operated by relatively high voltages, I may connect across said contact the non-inductive resistance 33, which may be, and preferably is, in the from of a winding surrounding the magnet coil 16. The leads B B of this winding pass respectively through the bushings 28 and 29 and are connected at the points *b* and *c* respectively to the clips 32 and 30.

When the apparatus is to be used with relatively low voltages I may connect across the contact at *c* a winding 33′ consisting of two parallel insulated wires terminating at *f*, *g*. The leads B′ B′ of the winding 33′ are connected at *b* and *c*, respectively, and the arrangement operates as a condenser in shunt to the contact *c*.

In the diagram shown in Figs. 8 and 9, *a* and *d* represent the terminals of the magnet-coil circuit shown by the same letters in Fig. 3.

The casing 5 may be provided with a cover 36 secured thereto by the screws 37 which pass through lugs in the casing, and the rubber gasket 35 may be interposed between said cover and casing. The leads A A pass through the soft rubber bushing 34 arranged between the nuts 38 and 39 which are threaded into the end of said casing and form a conduit for said leads, the joint between said conduit and casing as well as that between the cover and casing, being filled with white lead.

It will readily be apparent that the diaphragm 7, gasket 35, and said conduit render the casing 5 water-proof, this being quite essential when the apparatus is intended for use on shipboard.

It will be noted that the magnet-frame 9 with its inclosed apparatus constitutes an electrical vibrator which is complete in itself and which may be removed in its entirety from the rest of the apparatus.

I prefer to make the ends of the hollow core conical in shape to get the best results. Inasmuch as the movement of the plunger as a whole is not absolutely vertical, the lower end thereof has a circular or elliptical motion, and hence the lower end of the core is made conical to accommodate this movement. By providing the upper end of said core with a conical opening, and shaping the head of the plunger to conform thereto, I am enabled to reduce the air gap and decrease the reluctance of the magnetic circuit, so that the vibrator will start more easily and operate more efficiently. By arranging the upturned end of the magnet-frame directly under the outer edge of the armature 18, the pull on the plunger is rendered more nearly vertical.

While I have specifically described the preferred form of my invention which has given good results in practice, it will be understood that both the apparatus and circuit arrangements may be subjected to a wide range of variation by those skilled in the art without departing from the spirit of my invention.

I claim:

1. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, a plunger arranged within said core and having one end normally adjacent to, but not in contact with said diaphragm, a resilient supporting-member secured to the other end of said plunger, a circuit including the coil of said electromagnet, and means whereby said circuit may be automatically opened and closed.

2. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, a plunger arranged within said core and having one end normally adjacent to, but not in contact with said diaphragm, a resilient supporting-member secured to the other end of said plunger, a circuit including the coil of said electromagnet, means whereby said circuit may be automatically opened and closed, and means surrounding said hollow core and connected to said cir-

cuit for preventing sparking when said circuit is opened.

3. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between the horn and casing, an electromagnet having a hollow core, a plunger arranged within said core and having one end normally adjacent to, but not in contact with said diaphragm, a resilient supporting-member secured to the other end of said plunger, a circuit including the coil of said electromagnet, means whereby said circuit may be automatically opened and closed, and a non-inductive resistance consisting of a winding surrounding said hollow core and connected to said circuit for preventing sparking when said circuit is opened.

4. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, a magnet-frame, an electromagnet having a hollow core secured in said frame, a plunger arranged within said core and having one end adjacent to, but not in contact with said diaphragm, a resilient supporting member secured to the other end of said plunger and to said magnet-frame, a circuit including the coil of said electromagnet, means whereby said circuit may be automatically opened and closed, an interior flange on said casing, and means adjustably securing said magnet-frame to said flange.

5. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, a magnet-frame, an electromagnet having a hollow core secured in said frame, a plunger arranged within said core and having one end adjacent to, but not in contact with, said diaphragm, a resilient supporting member secured to the other end of said plunger and to said magnet-frame, a circuit including the coil of said electromagnet, means whereby said circuit may be automatically opened and closed, an interior flange on said casing, means adjustably securing said magnet-frame to said flange, and screws threaded to said magnet-frame and bearing against said flange for adjusting the position of said electromagnet and plunger with respect to said diaphragm.

6. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, the upper end of said hollow core having a conical opening, a plunger arranged within said core and having its lower end adjacent to said diaphragm, said plunger having a conical head conforming to the opening in the upper end of said hollow core, a resilient supporting member secured to the upper end of said plunger, a circuit including the coil of said electromagnet and means whereby said circuit may be automatically opened and closed.

7. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, the upper and lower ends of said hollow core having conical openings, a plunger arranged within said core and having its lower end adjacent to said diaphragm, a resilient supporting member secured to the upper end of said plunger, a circuit including the coil of said electromagnet, and means whereby said circuit may be automatically opened and closed.

8. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, the upper and lower ends of said hollow core having conical openings, a plunger arranged within said core and having its lower end adjacent to said diaphragm, said plunger having a conical head conforming to the opening in the upper end of said hollow core, a resilient supporting member secured to the upper end of said plunger, a circuit including the coil of said electromagnet and means whereby said circuit may be automatically opened and closed.

9. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, a magnet frame for said electromagnet having an upturned end, said magnet frame forming part of the magnetic circuit of said electromagnet a plunger arranged within said core and having its lower end adjacent to said diaphragm, a resilient supporting member secured to the upper end of said plunger, an armature secured to said plunger and having its outer edge arranged directly over said upturned end of said magnet frame, a circuit including the coil of said electromagnet, and means whereby said circuit may be automatically opened and closed.

10. An electrically-operated signaling-horn comprising in combination a horn, a casing secured to the inner end thereof, a diaphragm interposed between said horn and casing, an electromagnet having a hollow core, a magnet frame for said electro-

magnet having an upturned end, said magnet frame forming part of the magnetic circuit of said electromagnet a plunger arranged within said core and having its lower end adjacent to said diaphragm, an armature secured to said plunger and having its outer edge arranged directly over said upturned end of said magnet frame, a circuit including the coil of said electromagnet and means whereby said circuit may be automatically opened and closed.

In testimony whereof, I have hereunto subscribed my name this 1st day of July 1909.

EGMONT MAX TORMIN.

Witnesses:

GEO. K. WOODWORTH,

E. B. TOMLINSON.