

J. FELBEL.
 MEANS FOR PREVENTING OR SUBDUING NOISE IN RUNNING MACHINERY.
 APPLICATION FILED MAY 28, 1906.

1,031,636.

Patented July 2, 1912.

4 SHEETS—SHEET 1.

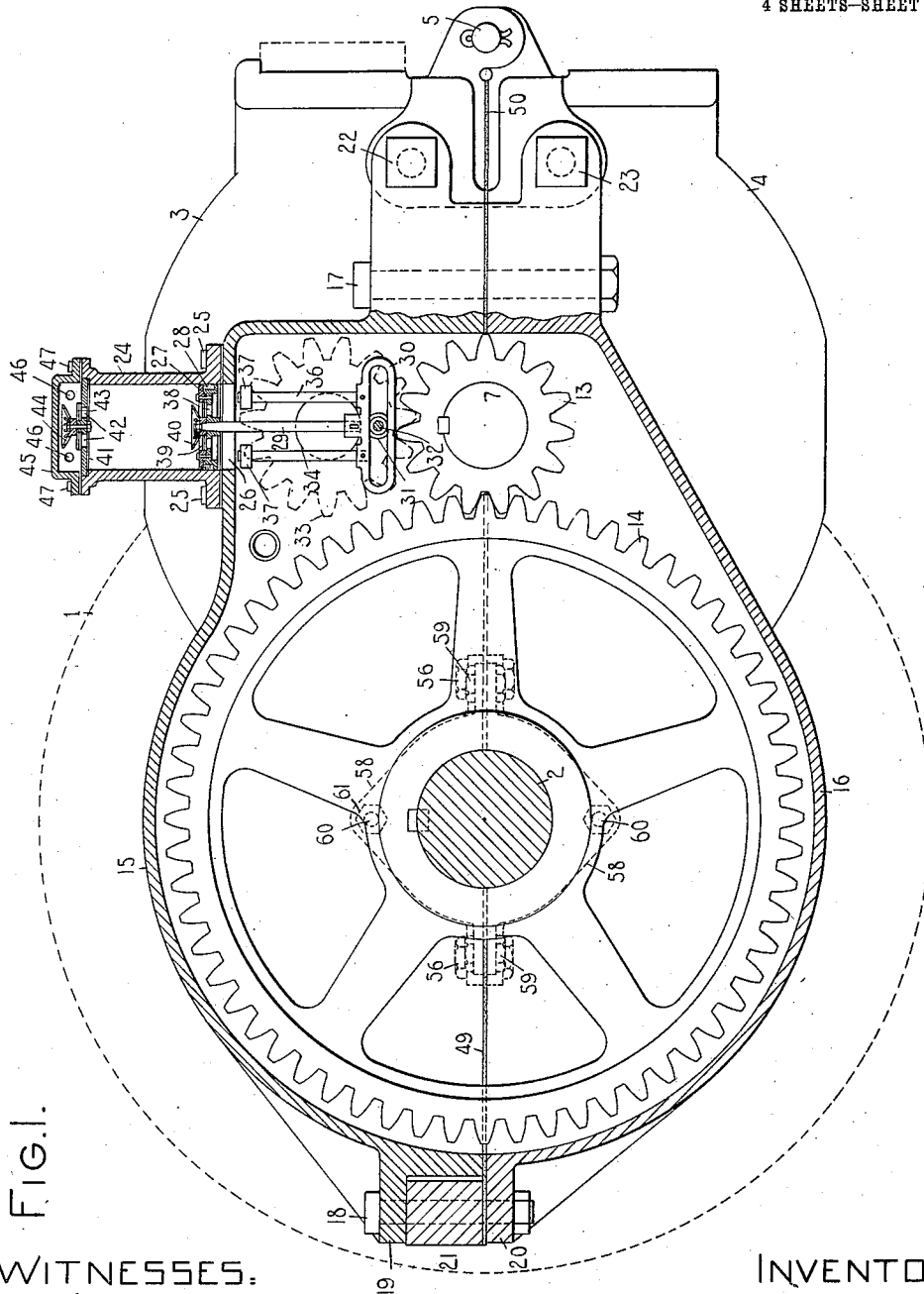


FIG. 1.

WITNESSES:

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R. H. Strother

INVENTOR.

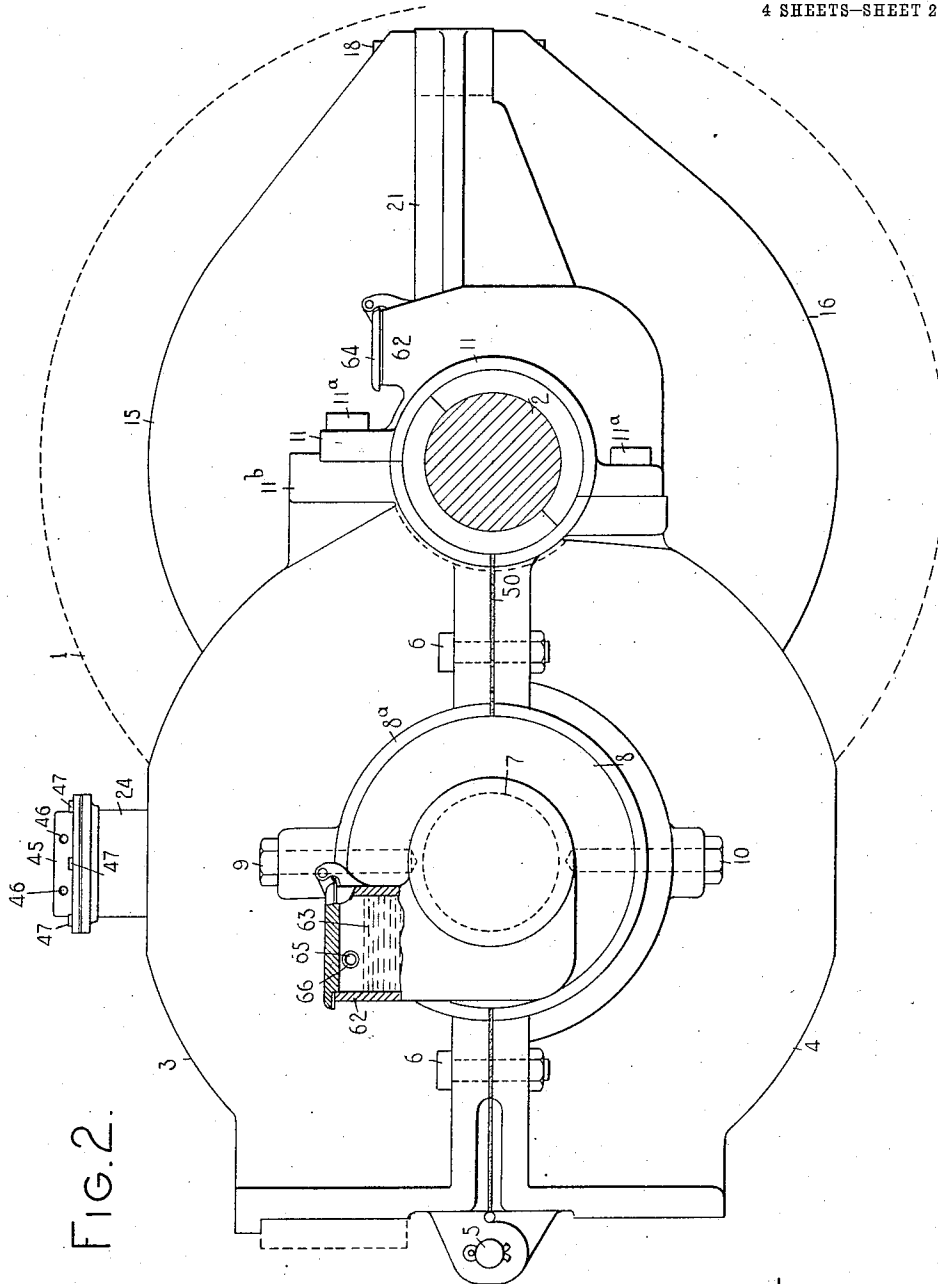
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WITNESSES:

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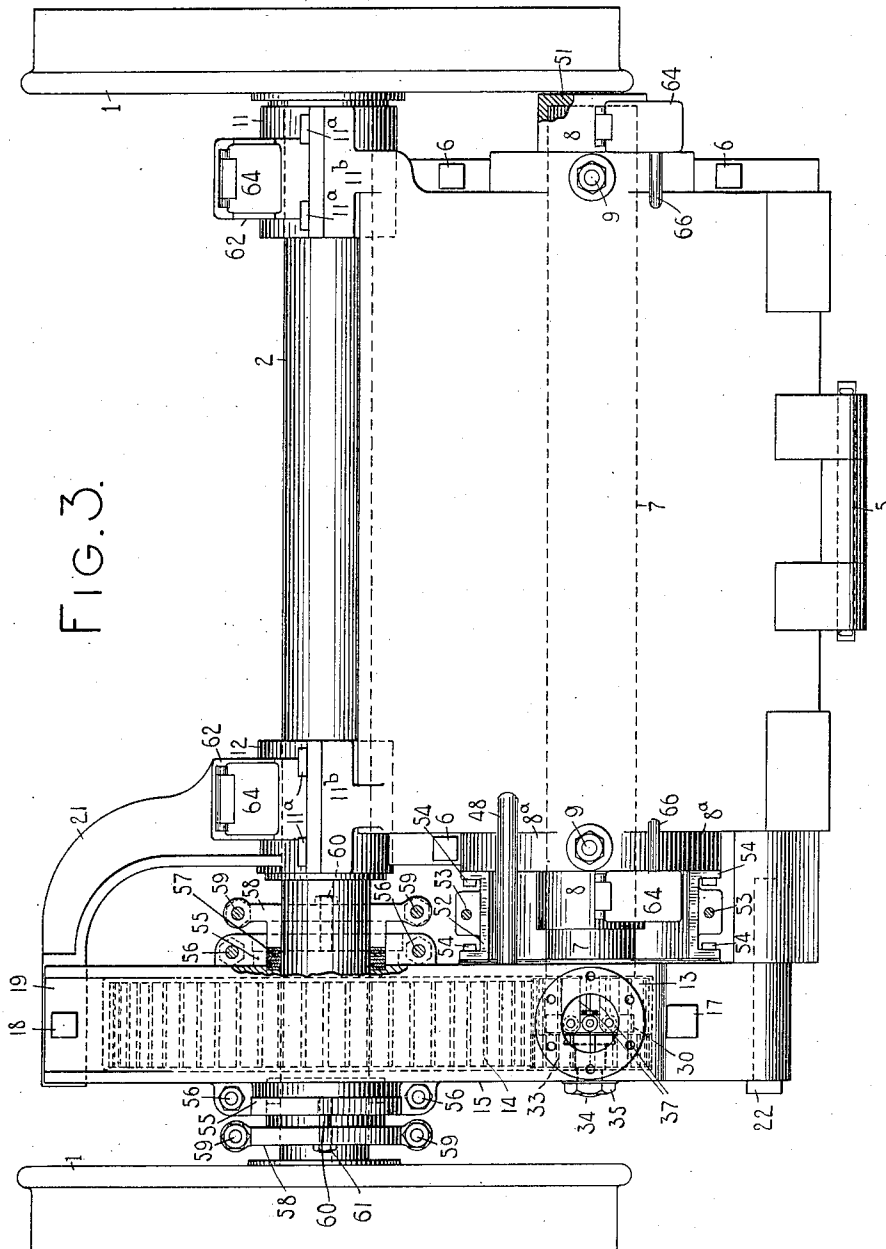


FIG. 3.

WITNESSES:

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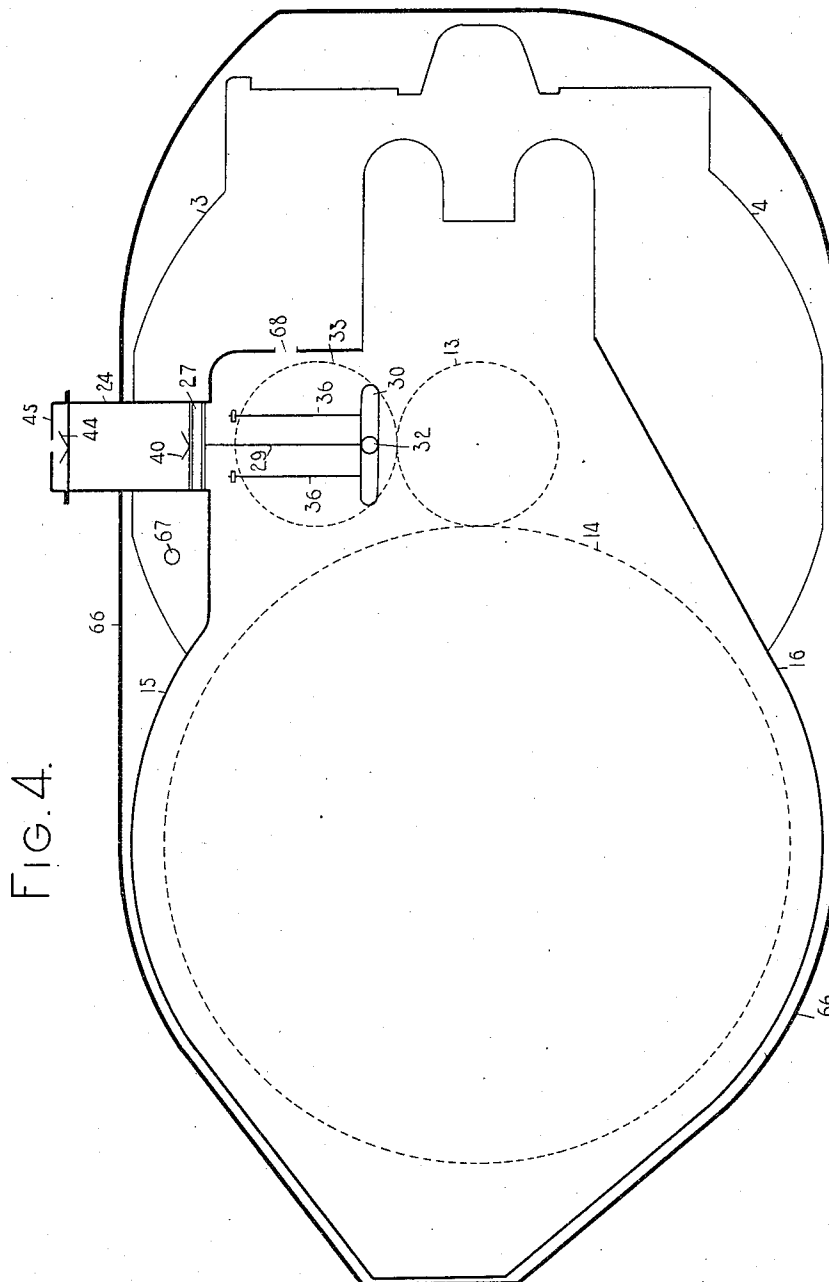


FIG. 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JACOB FELBEL, OF NEW YORK, N. Y.

MEANS FOR PREVENTING OR SUBDUING NOISE IN RUNNING MACHINERY.

1,031,636.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed May 28, 1906. Serial No. 319,228.

To all whom it may concern:

Be it known that I, JACOB FELBEL, citizen of the United States, and resident of the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Means for Preventing or Subduing Noise in Running Machinery, of which the following is a specification.

My invention relates to means for eliminating or reducing the noise made by various machines. It has for one of its principal objects to eliminate or reduce the noise made by the driving mechanism of electric railway cars although it is also applicable to other machines the noise of which is objectionable.

My invention consists in the various features of construction and combinations and arrangements of parts, all as will be fully set forth herein and particularly pointed out in the claims.

Sound vibrations cannot be communicated at all through a perfect vacuum, and they are communicated but feebly through a partial vacuum. By my invention I inclose in a vacuum or partial vacuum those working parts of a machine that produce an objectionable noise, or interpose a vacuum, or partial vacuum, between such working parts and the outside air.

In the accompanying drawings I have shown my invention applied to the motor mechanism of a railway car, this being a machine the noise of which is a source of great annoyance and discomfort.

In said drawings, Figure 1 is a side elevation of an electric railway motor, certain parts being shown in section, said view showing my invention applied to the motor mechanism. Fig. 2 is an elevation of the same as seen from the side opposite to that shown in Fig. 1, certain parts being shown in section. Fig. 3 is a top plan view of the same on a reduced scale, with the cylinder and other parts of the air pump removed. Fig. 4 is a diagrammatic sectional view showing the invention carried out in another form.

Electric railway motors usually comprise a casing that incloses the armature, and the armature shaft is usually geared to the car axle, the gearing being inclosed in another casing. In the form of my invention shown in Figs. 1, 2 and 3, I have provided an air

pump to exhaust the air from one or both of these casings, have made the casings themselves air tight, and have also provided means to prevent the vacuum from interfering with the lubrication of the bearings. The motor, the gearing and the casing or casings may be of any suitable construction, and, except in the respects indicated above, these parts, as shown in the drawings, do not differ materially from a well known form thereof.

The car wheel is designated by reference numeral 1, and the car axle by reference numeral 2. The motor casing consists of an upper section 3 and a lower section 4. These sections are hinged together at 5, and they are formed at their proximate edges with the usual flanges, through which pass bolts 6, by which the two sections are fastened together. The armature shaft 7 is journaled in bearings 8, into which are threaded bolts 9 and 10, to retain said bearings in the upper or lower half of the casing as desired when said casing is opened. The motor casing is hung on the car axle by suitable bearings which, as here shown, comprise axle caps 11 and 12, which are secured by bolts 11^a to lugs 11^b on the motor casing in the usual manner.

The armature shaft 7 carries a pinion 13 which meshes with a gear 14 on the driven axle 2. The gear casing comprises an upper section 15 and a lower section 16, secured together at their ends next the pinion 13, by a bolt and nut 17 and at their opposite ends by a bolt and nut 18. This bolt 18 passes through flanges 19 and 20 formed on the sections 15 and 16 respectively, said flanges being spaced apart and having interposed between them the end of a bracket 21 formed on the axle cap 12. At their ends next the pinion 13, the gear casing sections 15 and 16 are respectively secured to the sections 3 and 4 of the motor casing by bolts 22 and 23. The construction thus far described is old and well known, and permits of the opening of either the upper or the lower half of either the motor casing or the gear casing.

My invention comprises an air pump for producing a vacuum. This vacuum pump may be of any suitable construction, and it may be operated by any suitable power, although in this example of my invention I prefer to operate it from the car motor

itself. The vacuum pump may be situated at any convenient place and connected with one or both of the casings in any suitable manner. I prefer, however, to have said
 5 air pump mounted in or on the gear casing, and to have it open directly into said casing. As shown in the drawings, the vacuum pump comprises a cylinder 24, secured by bolts 25 to the top of the upper section 15 of the gear
 10 casing directly above the pinion 13, and above an opening 26 formed for the purpose in said gear casing. A piston 27, provided with suitable packing 28, plays up and down in said cylinder, said piston being
 15 mounted on the upper end of a piston rod 29 that extends downward through the opening 26 and is secured at its lower end to a cross-head 30 having a horizontal slot therein. In said slot there plays an antifriction
 20 roller 31, journaled on a wrist pin 32 projecting from the face of a pinion or gear 33 that meshes with the driving pinion 13. The pinion 33 is journaled on a headed and shouldered bolt or screw 34 which passes
 25 through the wall of the casing section 15 and has a nut 35 threaded on its outer end. The construction is such that if the upper section 15 of the gear casing be removed, the pinion 33 and the entire air-pump mechanism
 30 will be removed with it.

The cross-head 30 has secured thereto two guide rods 36 which pass freely through openings in brackets 37 projecting from the casing section 15. The piston has holes 38
 35 which are normally covered by a flap or other suitable valve 39, which, on the down stroke of the piston, yields upward and permits the air to pass through the holes 38 into the upper part of the cylinder. The
 40 upward motion of the valve 39 is limited by a conical arrester 40. The cylinder head 41 has holes 42 covered by a flap-valve 43, for which a conical arrester 44 is provided. A cap 45, having holes 46 opening into the
 45 air, is preferably provided to cover the cylinder head and its valve, said cap being secured in place by bolts or screws 47. The construction is such that whenever the car is running, the air-pump is in operation,
 50 exhausting the air from the gear casing. It will be perceived that I have placed the working parts of the air-pump itself in the vacuum so as to reduce the noise of this mechanism.

55 Much of the noise produced by the motor mechanism of a railway car would be prevented by exhausting the air from the gear casing alone, and the invention may therefore be used only in connection with said
 60 casing if desired. I prefer, however, to exhaust the air from the motor casing also. In order to do this, it is only necessary to connect the two casings by a pipe or other open connection. In the present instance,
 65 I have shown a pipe 48 connecting the two

casings. Any suitable means as, for example, a screw coupling, may be provided for disconnecting this pipe when one of the casings is opened.

It is necessary to make the casings air
 70 tight. To this end, a gasket or packing 49 may be placed between the two sections of the gear casing and a gasket or packing 50 between the two sections of the motor casing. The covers of hand holes and the lids
 75 of oil or grease cups are made air-tight in the same way. The commutator end of the armature shaft is usually exposed, but in order to make the bearing air-tight I prefer to cover this end of said shaft with a cap 51,
 80 forming part of, or secured to the bearing 8. Any suitable means may be provided for making air tight the bearing of the armature shaft at the pinion end thereof. I prefer to connect the bearing 8 with the
 85 gear casing by a hollow casing 52. This casing is preferably formed in semi-cylindrical sections, the lower one of which only is shown in Fig. 3. The two sections are secured together by bolts 53 passing through
 90 flanges on the two sections of the casing. The casing 52 has flanges at its ends through which pass bolts 54 which fasten the sections of the casing 52 to the sections of the gear casing and to the bearing 8, part of
 95 which fits within the flange 8^a of the motor casing. The joints between the two sections of the casing 52 and at the ends of this casing are all made air-tight.

In order to make air-tight the bearings
 100 between the gear casing and the car axle 2, packing is provided at these points. A stuffing box 55 is formed on each side of the gear casing, each of said stuffing boxes, of course, being made in two parts, one on
 105 each section of the casing. These stuffing boxes have flanges through which pass bolts 56 that assist in holding the two sections of the gear casing together. Packing 57 is placed in the stuffing boxes and held in position by rings 58, each formed in two pieces
 110 secured together by bolts 59. Bolts 60 extend from flanges on the stuffing boxes through holes in the rings 58, and have nuts 61 threaded thereon, whereby said rings
 115 may be tightened.

One of the oil or grease cups is shown partially in section in Fig. 2 at 62. It will be perceived that if this cup be filled with
 120 oil or grease 63 and the lid 64 be closed air-tight, when the air is exhausted from the casing, the expansion of the air above the oil or grease would force said oil or grease through the bearing into the casing. To prevent this an opening 65 is provided
 125 between the upper part of the grease cup and the interior of the casing. The effect of this opening is to keep the air pressure above the oil or grease always the same as that inside the casing. The opening 65 may
 130

be provided in any suitable way. As shown in the present instance, said opening is through a pipe 66 that leads from the oil cup 62 into the upper section of the motor casing. All grease or oil cups that lead to bearings inside the vacuum, are provided with some such opening as that described.

In Fig. 4, I have illustrated diagrammatically a construction in which the entire motor mechanism is inclosed in an air-tight casing 66. In said Fig. 4 the parts of said motor mechanism are designated by the same reference numerals as in the first three figures of the drawing. In this construction the pump cylinder 24 may project through the casing 66 as indicated, or the air pump may be situated entirely inside or entirely outside the casing. It is not necessary nor desirable in this construction to make the motor and gear casings air-tight, and I have indicated at 67 an opening in the motor casing whereby the interior of said casing communicates freely with the interior of the casing 66, and a similar opening into the gear casing is indicated at 68. I have indicated the gear casing in the diagram, but said gear casing may be dispensed with entirely in this construction, if preferred. The casing 66 may be constructed in two pieces to be taken apart, when it is desired to inspect the motor, and it may be provided with stuffing boxes where the car axle passes through it.

The motor casing and the gear casing constitute in each case a vacuum-chamber which incloses the noise-producing parts and from which the air is exhausted by the vacuum pump; in this instance shown as operatively connected to the motor proper. Other forms of vacuum-chambers might be provided for the noise-producing parts without departing from the spirit of my invention.

When in the claims I refer to a vacuum, I do not necessarily mean the absolute absence of air, since rarefaction of the air sufficient to prevent or substantially reduce the noise of the machinery is deemed to be within the scope of my invention.

Various changes may be made in the details of construction and arrangement without departing from my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. The combination of a train of gears, means for driving said gears, a casing surrounding said gears, and an air-pump geared to one of said gears and acting to exhaust the air from said casing.

2. In a motor, the combination of the working part or parts of said motor, said working part or parts comprising a shaft, a casing inclosing said working part or parts and having a bearing for said shaft, an air-tight cap secured to said casing and covering the end of said shaft, and means for exhausting the air from said casing.

3. The combination of a train of gears, a casing inclosing said gears and an air pump for exhausting the air from said casing, said air pump having its working parts inclosed in said casing.

4. The combination of mechanism inclosed in a casing having a vacuum therein, and an oil or grease cup for said mechanism, said oil or grease cup having an opening above the oil or grease, said opening communicating with the interior of said casing.

5. In a railway car, the combination of a motor having a casing, a driven car axle, gearing between said motor and said axle, a casing for said gearing, an air pump connected with said gear casing and operating to exhaust the air therefrom, and an opening between said gear casing and said motor casing.

6. In a railway car, the combination of a motor having a casing, a driven car axle, gearing between said motor and said axle, a casing for said gearing, an air pump connected with said gear casing and operating to exhaust the air therefrom, and an opening between said gear casing and said motor casing, and stuffing boxes between said gear casing and said car-axle.

Signed at the borough of Manhattan, city of New York in the county of New York and State of New York this 25th day of May A. D. 1906.

JACOB FELBEL.

Witnesses:

E. M. WELLS,
R. H. STROTHER.