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RESILIENT DRIVE UNIT

2 Sheets-Sheet 1

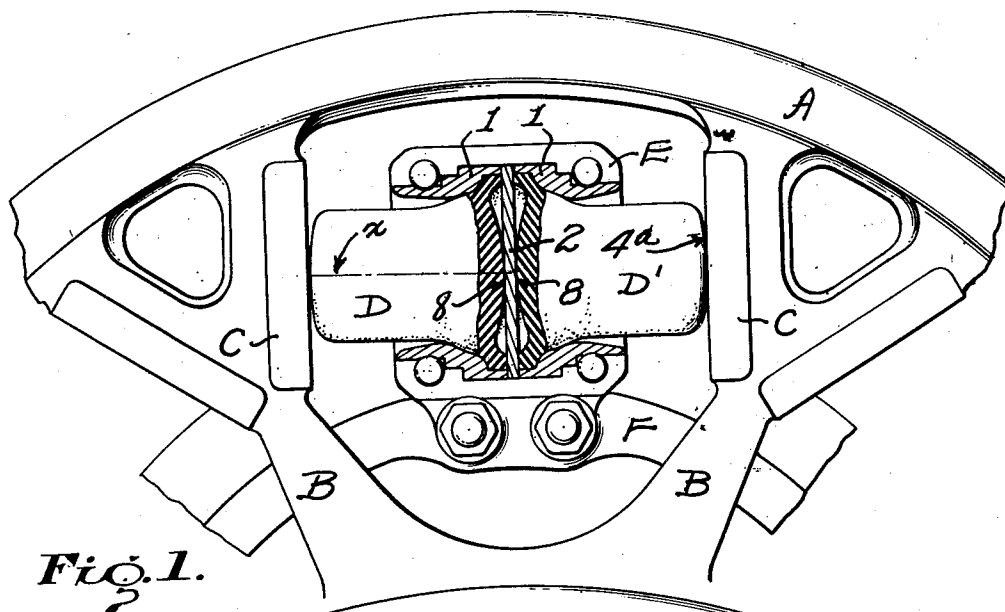


FIG. 1.

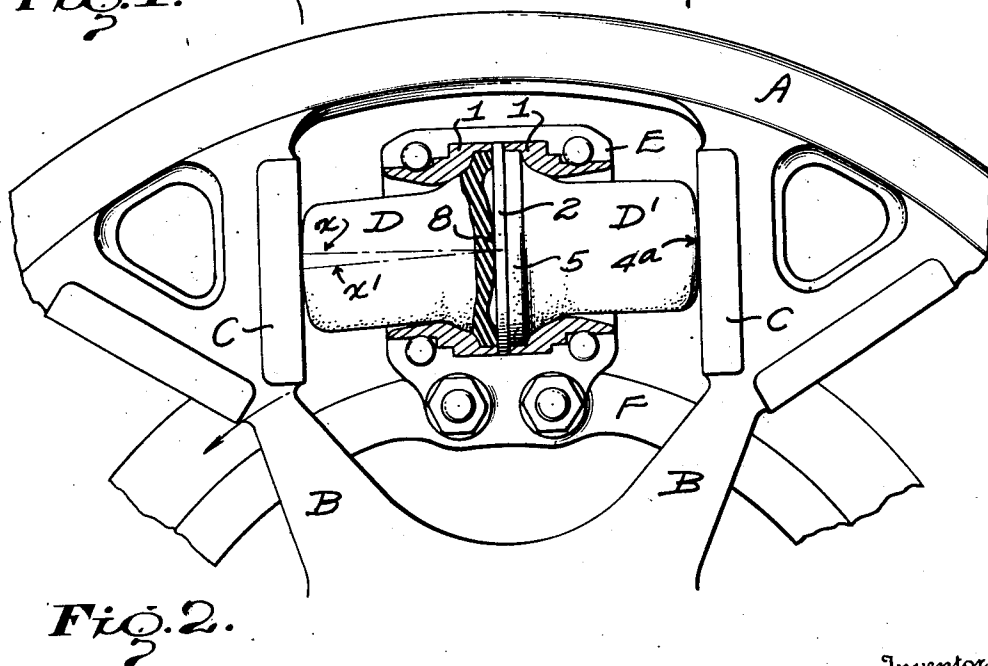


Fig. 2.

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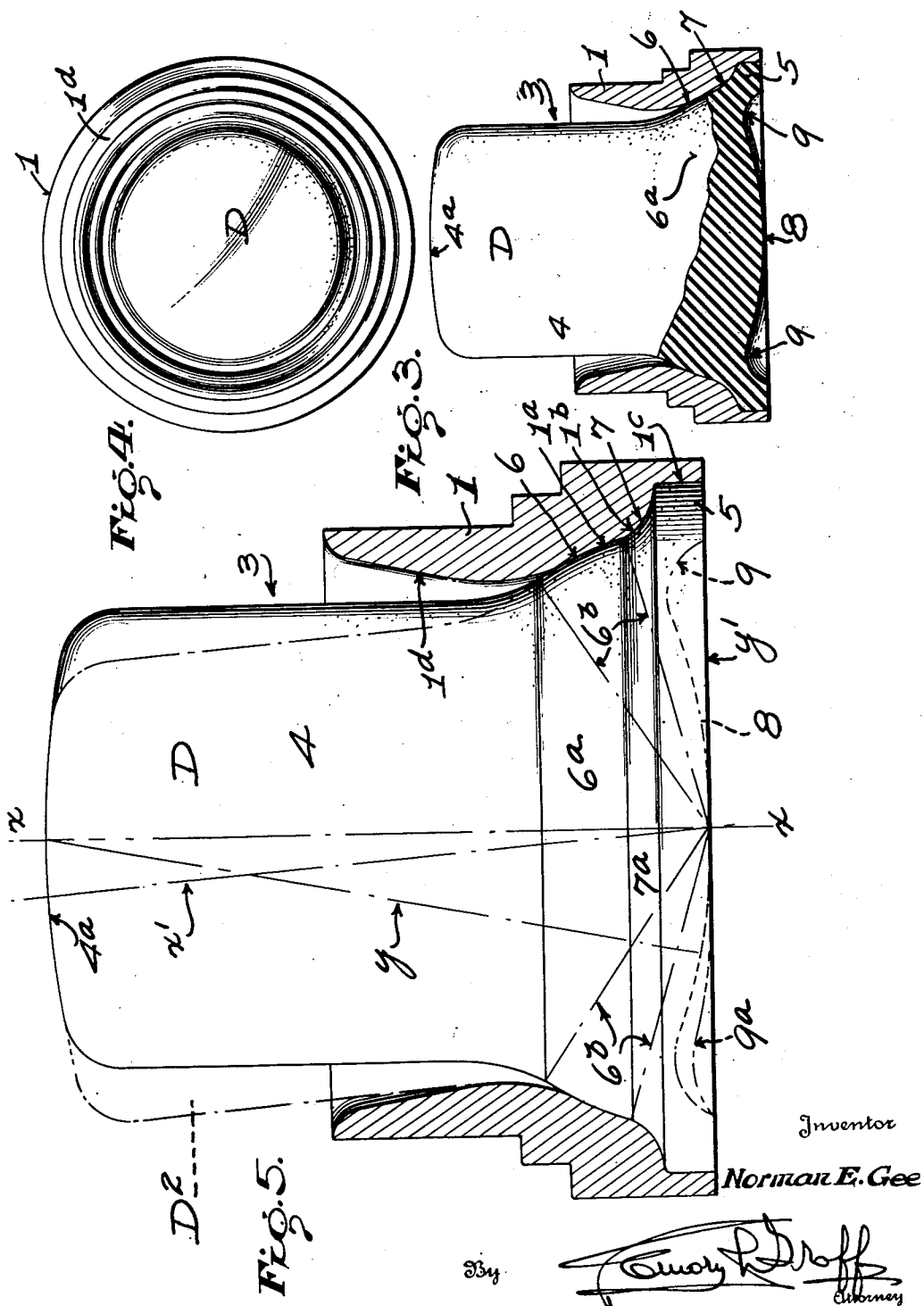
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N. E. GEE
RESILIENT DRIVE UNIT

2,566,985

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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,566,985

RESILIENT DRIVE UNIT

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Application November 30, 1946, Serial No. 713,306

1 Claim. (Cl. 64—27)

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This invention relates to an improvement in resilient driving units for electric locomotives.

More particularly the present invention is directed to an improvement on my former Patents Nos. 2,188,042, issued January 23, 1940, and 2,314,085, issued March 16, 1943, both of which relate to the same general subject matter. Devices in accordance with the patents referred to have proved their merit in theory and long practice but it has been found desirable to make further improvements with a view to reducing the tendency of the rubber unit to bend along its longitudinal axis when the same is in use. Patent No. 2,188,042 illustrates the rubber driving unit consisting of a cylindrical body including a column which may be solid or provided with a conical pocket, the latter intended to relieve the tendency of the column to bend along its longitudinal axis. Patent No. 2,314,085 is intended to meet this phase of operation in a somewhat different manner as will be apparent by comparing Figs. 1 and 2. From Fig. 2 it will be observed that when the rubber driving unit is placed against the wheel pad and the wheel drops due to uneven track, the unit under compression substantially tilts or cocks from the normal position shown in Fig. 1, and to that extent is self-adjusting. However, the construction proposed in this patent involves a multiplicity of parts and with a view to simplifying the construction involved, while at the same time retaining its advantages, the present invention provides a solution to the problem in a different manner.

Accordingly, a primary object of the present invention is to provide a one-piece rubber driving unit having special features of construction which permit the major portion of the body or column to remain stiff while rocking or flexing at or on its base to substantially relieve the bending strains set up in the body of the unit along its longitudinal axis, particularly when the center of the driving axle and the center of the quill do not coincide, such for example as when the spider carried by the quill is transmitting power to the driving wheel and the wheel drops due to uneven track.

Another and more specific object is to provide a simple and practical one-piece resilient driving unit having a central spherical segment within the rim of its flanged base and which bears on the driving plate carried by the spider, so that as the unit is compressed and the axes of the driving axle and quill shift out of registry, the entire column will rock on the driving plate at

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the base of the unit. In other words, the arrangement of the present invention permits the outer end of the driving unit which engages the wheel pad to follow the wheel when the center of the quill is below the center of the axle due to wear in the spring rigging, quill cap bearings and motor suspension details, while at the same time preventing lateral bending in the column itself.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a detail view illustrating a portion of an electric locomotive driving wheel, motor spider, and the driving units, partly in section, to illustrate the invention.

Fig. 2 is a view similar to Fig. 1 illustrating the position of one of the driving units when power is transmitted from the motor spider to the driving wheel as the latter is driven in a counter-clockwise direction as shown by the arrow.

Fig. 3 is a vertical sectional view of the improved resilient unit and its housing collar.

Fig. 4 is a top plan view of the construction shown in Fig. 3.

Fig. 5 is a view similar to Fig. 3 on a further enlarged scale.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

Referring to the embodiment of the invention shown in the drawings, it will be observed that the present invention is intended to be used in connection with a driving wheel designated generally as A and having a plurality of spokes B which are provided with the driving pads C to be engaged by the driving units designated generally as D and D'. These units are appropriately supported by means designated generally as E on the spider F which is driven by the motor to transmit power to the driving wheel.

The driving units D and D' are, of course, preferably arranged in tandem so as to provide for driving the locomotive either forwardly or backwardly.

Means E which supports each of said units includes in its organization housing collar I for each unit and whose characteristics will be later

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described more in detail. As will be seen from the drawings, the said housing collars are arranged back to back and against a driving plate 2 upon which the novel bottom portion of the improved driving units of the present invention 5 bear when in use.

As will be seen from Fig. 1 of the drawings, and with reference to the driving units D and D', when the same are at rest, the longitudinal axis $x-x$ of each unit will substantially coincide with the center of its related driving pad C. However, when the unit D is subjected to compression in use, the longitudinal axis will assume substantially the position indicated by the line x' . The features of the unit D and its identical counterpart D' which make this action possible will now be described.

Referring to Figs. 3 and 5, for convenience, it will be seen that the unit D comprises a body designated generally as 3 which includes a cylindrical column portion 4 having a spherical segmental top or load receiving compression face 4a and an attaching portion, which includes a bottom flange portion 5 connected therewith by a system of compound arcs 6 and 7 which respectively provide, in effect, an external annular spherical segment portion or outwardly bowed rib 6a and a valley or groove 7a. The housing 1 is internally provided with arcuate portions 1a and 1b which are complementary to said arcuate portions 6 and 7 of the resilient unit, and likewise the said housing 1 is provided with an annular groove 1c for receiving the flange 5. In addition to the internal surfaces 1a just described, the housing is also provided with an internally flaring collar portion 1d which progressively widens outwardly from the spherical segmental portion 6a to the outer edge of the housing. The space thus provided will permit the rubber unit to rock on its base instead of bending along its longitudinal axis x , as will presently appear more in detail.

The bottom surface of the unit D is formed with a spherical base portion 8 struck on an arc whose radius is indicated at y in Fig. 5 and whose center lies in the longitudinal axis x at the outer end of the unit. This arc is such that the outer edges of the said spherical portion terminate inwardly of the plane y' of the base of the unit while the zenith of the spherical portion terminates in said plane y' . The outer edges of the spherical base portion 8 are connected by an arc 9 with the inner part of the flange 5 of the base, thereby providing a flexing annular cavity within the flange 5. Thus, it will be seen that when the unit D is held by the housing 1 against the driving plate 2, the spherical portion 8 may roll or rock on said driving plate, thereby permitting the longitudinal axis $x-x$ of the collar portion of the unit to move to the position x' shown in Fig. 5. When the base portion of the unit rocks in the manner just described, the annular cavity at one edge of the spherical portion will be reduced as indicated by the dot and dash line 9a in Fig. 5.

The portions 4a, 6a, and 8 constitute a plurality of segmental portions which cooperate with complementary parts of the unit housing and wheel pad to transmit motor torque to the driving wheels.

When the unit D rocks on the driving plate 2 by reason of the spherical surface 8, it will be seen from Fig. 5 that the annular spherical segmental portion 6a at the left of the figure is compressed as the column portion is deflected to the dotted line position D² in Fig. 5. In other words,

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as the longitudinal axis $x-x$ moves to the position x' in Fig. 5, the annular spherical segmental portion 6a held in the housing will be compressed at one side and stretched at the other while the lower portion of the column 4 will easily and readily follow the curvature of the surface 1d at the inner surface of the collar 1.

As will also be observed from Fig. 5, the arcuate surface 6 of the segmental portion 6a is a segment defined by the radii 6b whose axis coincides with the zenith of the spherical portion 8 in the plane $x-x$. Therefore, when the body of the unit D rocks or rolls on the spherical surface 8 as it contacts the driving plate 2, all portions of the rubber unit yield evenly and equally responsive to torque on the rubber unit under driving conditions, and that said unit instead of bending along its longitudinal axis $x-x$ will rock as a whole, thereby avoiding the concentration of bending stresses in the column which otherwise would cause the same to fracture and break.

From the foregoing, it will be seen that the present invention provides a resilient driving unit having special features and characteristics which will permit it to be clamped by the housing 1 against the driving plate 2 in such a way that when the said driving unit is placed under operating stress, the body or column of the unit as a whole will rock on its longitudinal axis. Such bending as occurs between the base of the rubber unit and the housing is concentrated within the housing itself where the unit is firmly clamped, and such movement manifests itself by compression and tension at a location where forces otherwise intending to bend the unit are confined and concentrated at the most desirable point, namely, where they are held clamped in the housing 1 where the spherical base 8 forms a surface on which the resilient body D as a whole may rock. It will of course be seen that the annular cavity in the base formed by the arc 9 provides easement within the base flange 5 which permits and insures the rocking or rolling of the spherical portion 8 on the driving plate 2.

When motor torque is being transmitted to the driving wheels and the center of the driving wheel no longer coincides with the center of the motor quill, the unit D which impinges against the driving wheel takes the position shown in Fig. 2, the driving unit D having rotated or rocked in the manner shown to follow the driving wheel to its new position. When the conditions shown in Fig. 2 no longer prevail, the driving unit D will again assume the original position shown in Fig. 1. Should the center of the motor quill be below the center of the axle, the position of the driving unit D in Fig. 2 will be reversed, that is, the outer end of the driving unit D will be pointed up, instead of down, as shown.

From the foregoing it will be seen that the present invention provides a resilient driving assembly for electric locomotives, and which, under all normal operating conditions, will function without unit failure due to the rapid change in position of the unit which occurs when the center of the driving axle and the center of the motor quill are not in axial alinement.

Without further description, it is believed that the invention will be readily understood by those skilled in the art, and of course be understood that changes may be resorted to within the scope of the appended claim.

I claim:

A resilient driving unit for electric locomotives, comprising, a body including a column portion

and a base flange connected therewith by an outwardly bowed rib and an annular groove, the profile of said rib being formed on an arc whose radius has its axis coinciding with the longitudinal axis of the body and the outer edge of the base flange, and a spherical base formed within the base flange on an arc having a radius whose axis coincides with the longitudinal axis of the body and the outermost extremity of the column portion of the body, said spherical base being surrounded by an annular flexing cavity also formed entirely within a plane defining the outer edge of the base flange.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
1,571,713	Emery -----	Feb. 2, 1926
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2,314,085	Gee -----	Mar. 16, 1943