Feb. 16, 1926.

1,572,958

H. REID ET AL

TURBINE DRIVEN LOCOMOTIVE

Filed May 5, 1925

4 Sheets-Sheet 1

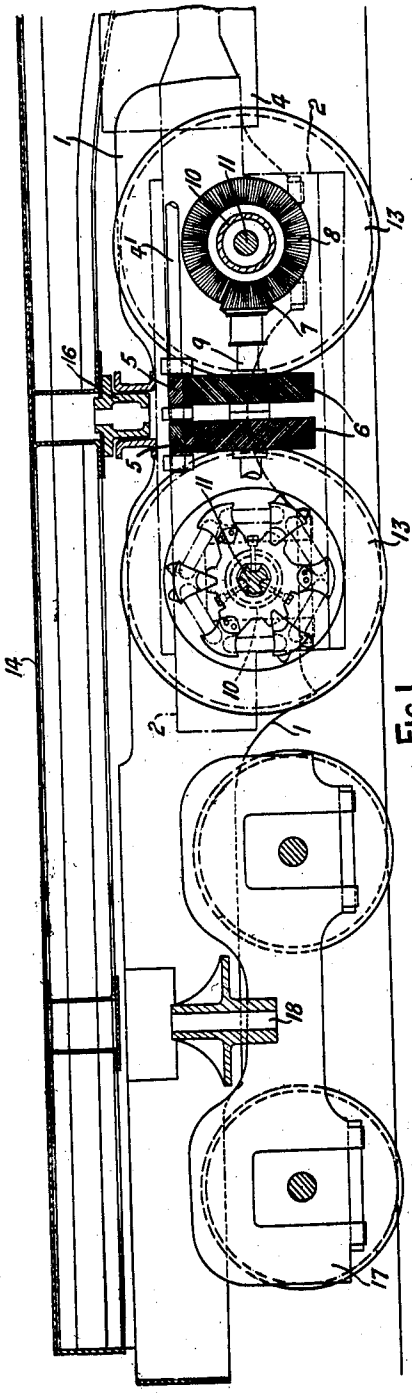


Fig. 1.

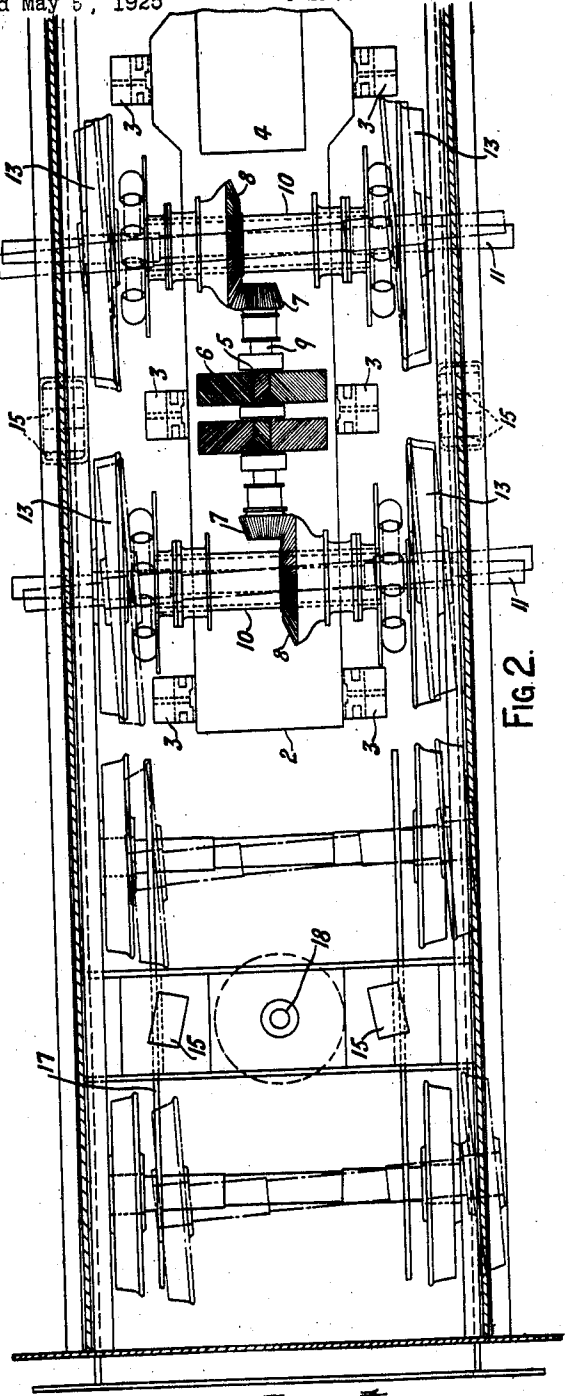


Fig. 2.

Inventors:
Hugh Reid,
James MacLeod,
by Talbot & Talbot
Attorneys.

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4 Sheets-Sheet 2

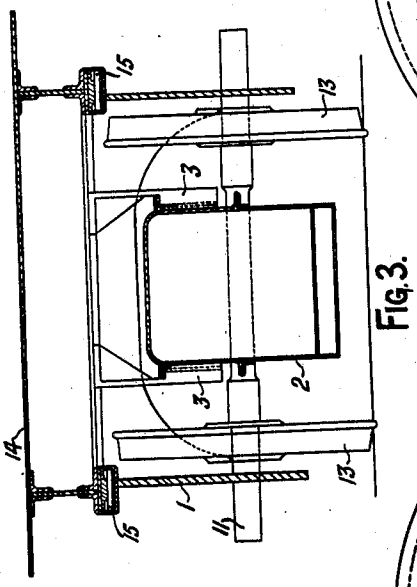


Fig. 3.

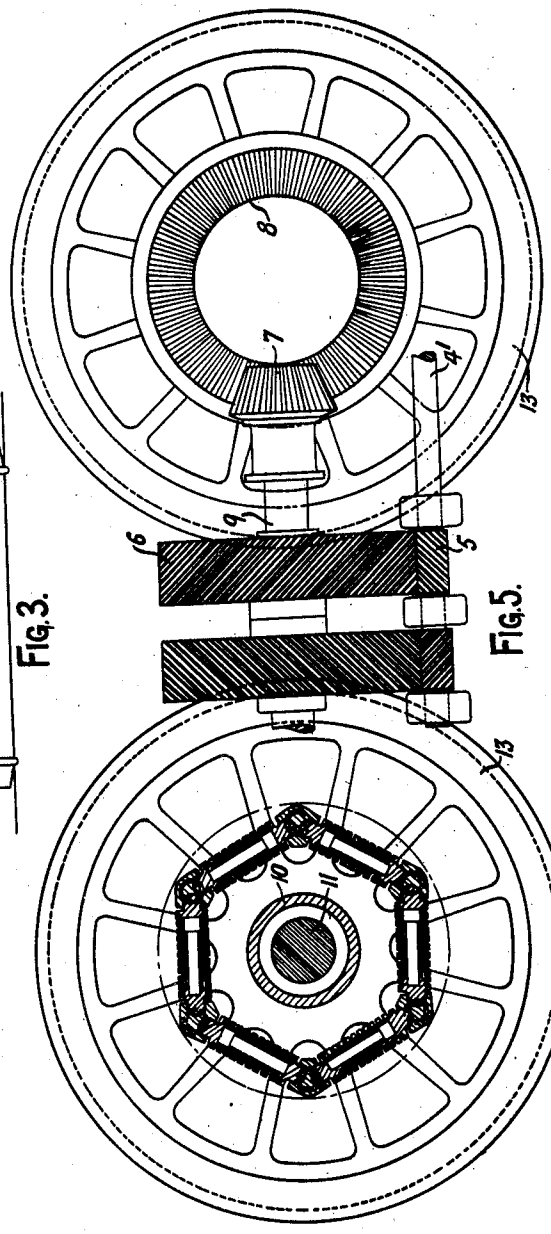


Fig. 5.

Inventors:
Hugh Reid,
James MacLeod,
by Fabian Kalaw,
Attorneys

Feb. 16, 1926.

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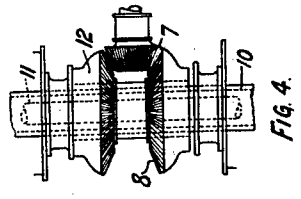


Fig. 4.

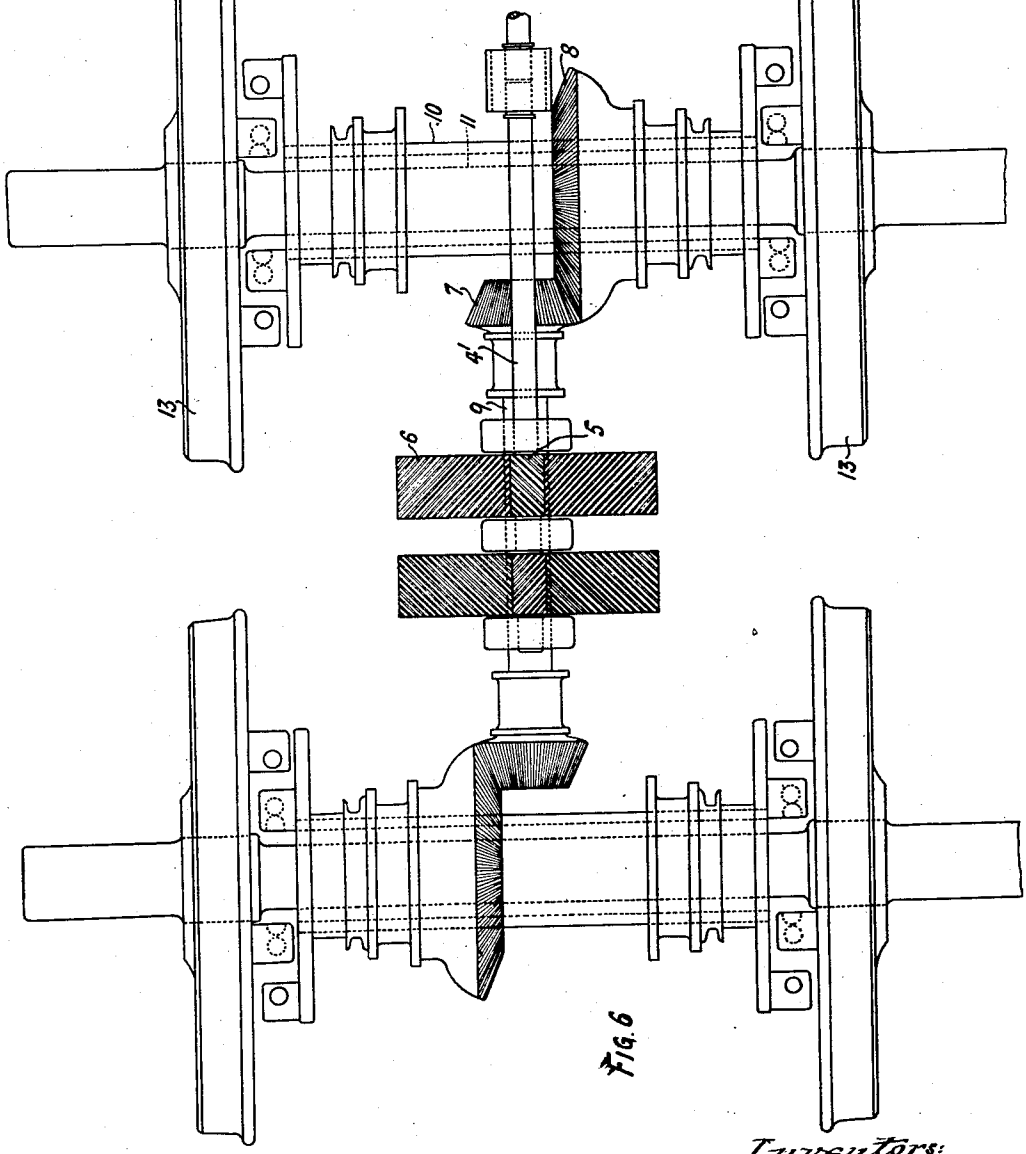


Fig. 6

Inventors:
Hugh Reid,
James Macleod
by Kalor Kalor,
Attorneys.

Feb. 16, 1926.

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H. REID ET AL

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4 Sheets-Sheet 4

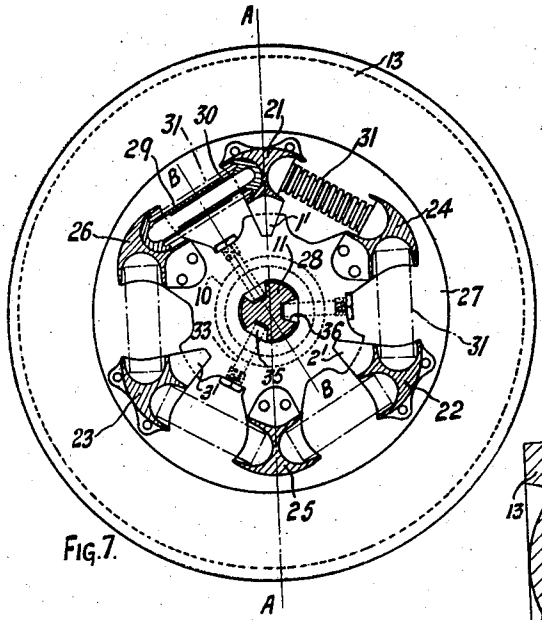


FIG. 7.

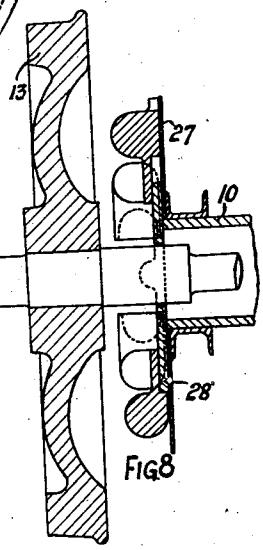


FIG. 8

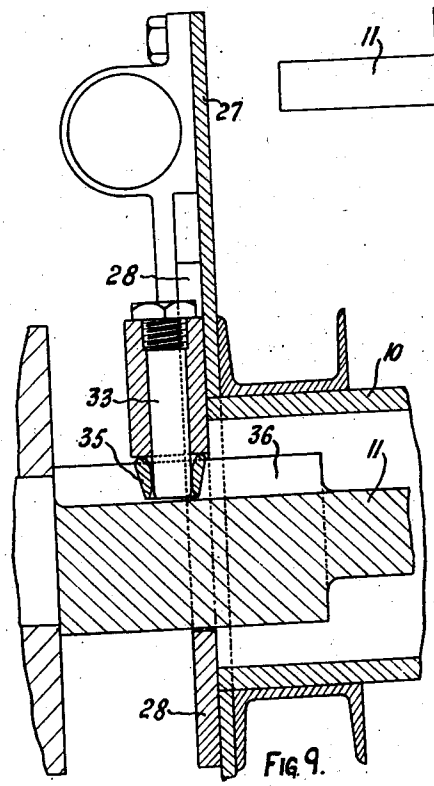


FIG. 9.

Inventors:
Hugh Reid,
James Macleod,
by Cabot Lodge,
Attorneys.

Patented Feb. 16, 1926. 1,572,958

UNITED STATES PATENT OFFICE.

HUGH REID AND JAMES MacLEOD, OF GLASGOW, SCOTLAND.

TURBINE-DRIVEN LOCOMOTIVE.

Application filed May 5, 1925. Serial No. 28,172.

To all whom it may concern:

Be it known that we, HUGH REID, engineer, and JAMES MacLEOD, engineer, both subjects of the King of Great Britain and Northern Ireland, and residing at Springburn, Glasgow, Scotland, and Mount Florida, Glasgow, Scotland, respectively, have invented a certain new and useful Improvement in Turbine-Driven Locomotives, for which we filed an application for patent in Great Britain on April 12, 1924, and of which the following is a specification.

This invention relates to a turbine-driven locomotive of any given wheeling arrangement having one or more driving axles in which transmission from the turbine or turbines to the wheels of the locomotive is effected exclusively by means of rotary gears and a flexible driving connection or connections.

More particularly, the invention comprises an improved transmission train, which, as hereinafter described, includes at least one driven gear on a hollow shaft surrounding the relative wheel axle, and a flexible driving connection so contrived as to permit endwise movement of the wheel axle relatively to the hollow shaft and gear thereon without displacement of the gears, the axle being also free to participate in angular movement of the main or bogie frames.

In the accompanying drawings, Fig. 1 is a longitudinal section, Fig. 2 a plan, and Fig. 3 a transverse section of the driving bogie of a turbine-driven locomotive with transmission train according to the invention. Fig. 4 is a fragmentary view of reversing gears, Figs. 5 and 6 are a longitudinal section and a plan, respectively, of a modification. Fig. 7 is a sectional elevation on a somewhat larger scale of the flexible driving connection shown in Fig. 1. Fig. 8 is a section on the line A—A of Fig. 7. Fig. 9 is a section drawn to a still larger scale on the line B—B of Fig. 7.

The locomotive according to the example shown in Figs. 1 to 4 includes a driving bogie 1 pivoted at 16 to the main upper structure 14 carried on rollers 15, said driving bogie being associated with a leading or trailing bogie 17 pivoted to the main frame at 18. Associated with the driving bogie 1 is a gear casing 2 located longitudinally of the upper structure 14 within guides 3. To the casing 2 is fixed the casing 4 of a turbine and said gear casing contains multiple reduction rotary gear members 5, 6, 7, 8, namely the gears 5 and 6 between the rotor shaft 4′ of the turbine and the counter shaft 9, and the gears 7 and 8 between the shaft 9 and a hollow shaft 10 surrounding each of the driving axles 11, there being between each hollow shaft 10 and an associated axle 11 a flexible driving connection, hereinafter more fully described. Each gear 8 with an associated gear 12 may be fixed to a common sleeve slidable upon the relative hollow shaft 10 so as to bring either gear 8 or 12 into engagement with the gear 7 depending on the desired direction of travel of the locomotive (see Fig. 4).

The flexible driving connection shown clearly in Figs. 7 to 9 includes a set of three driving elements 21, 22, 23 grouped about the axis of the hollow shaft 10 and a set of three driven elements 24, 25, 26 alternating with the driving elements, said driving elements being fixed to the disc 27 and being formed with projections 1′, 2′, 3′ between which and the disc 27 is located the disc 28 to which are fixed the driven elements 24, 25, 26 and which is thus axially immovable relatively to the disc 27. Interposed between each driving element and each adjacent driven element are flexible interponents comprising telescopically arranged tubular members 29, 30 surrounded by helical springs 31 under compression, the tubular members 29, 30 each having a part-spherical head seated in the corresponding driving and driven element.

In the form illustrated the driving and driven elements are arranged at the corners of a hexagon, the sides of which are occupied by the members 29, 30, 31, the geometrical centre of the hexagon lying on the axis of rotation.

The disc 28 is operatively connected with the axle 11 by pins 33 each carrying a roller 35 entering a longitudinal groove 36 on the said axle. These pins 33 are carried by the disk 28, forming part of the flexible connection between the axle 11 and the hollow shaft 10, and the grooves 36, entered by said pins, permit an endwise movement of said axle relative to the hollow shaft 10; and as the disk 28 loosely encircles the axle 11, as shown in Figs. 8 and 9, angular movements of said axle within the hollow shaft are also permitted.

In the modification shown in Figs. 5 and 6 flexible driving connections are interposed

between the hollow shaft 10 and the driving wheels 13 coaxial therewith.

What we claim is:—

1. In a turbine-driven locomotive having wheeled axles, a hollow shaft surrounding at least one axle, a driving rotor, and a transmission comprising exclusively rotary gears and a flexible driving connection between said rotor and the wheels on said axle, said transmission including selectively engageable gears carried by said hollow shaft, said flexible connection being adapted to effect rotation in either direction and permitting endwise movement of said axle relatively to said hollow shaft, and also angular movement of said axle.

2. In a turbine driven locomotive, the combination with a rotor, of hollow shafts having driving gear connections with said rotor, disks fixed to said hollow shafts, driving elements mounted on said disks, wheeled axles passing loosely through said hollow shafts and provided with longitudinal grooves, disks loosely mounted on said axles and carrying driven elements, flexible connections between said driving and driven elements, and pins carried by said last-named disks and entering said grooves in said axles; whereby endwise and angular movements of said axles, relative to said hollow shafts, are permitted.

3. In a turbine driven locomotive, the combination with a rotor, of hollow shafts having driving gear connections with said rotor, disks fixed to said hollow shafts, driving elements mounted on said disks, wheeled axles passing loosely through said hollow shafts and provided with longitudinal grooves, disks loosely mounted on said axles and carrying driven elements, flexible connections between said driving and driven elements, and pins carried by said last-named disks and entering said grooves in said axles; whereby endwise and angular movements of said axles, relative to said hollow shafts, are permitted, said flexible connections comprising telescoping tubular members, and springs encircling said members.

4. In a turbine driven locomotive, the combination with a rotor, of hollow shafts having driving gear connections with said rotor, disks fixed to said hollow shafts, driving elements mounted on said disks, wheeled axles passing loosely through said hollow shafts and provided with longitudinal grooves, disks loosely mounted on said axles and carrying driven elements, flexible connections between said driving and driven elements, and pins carried by said last-named disks and entering said grooves in said axles; whereby endwise and angular movements of said axles, relative to said hollow shafts, are permitted, said flexible connections comprising telescoping tubular members, and springs encircling said members, said tubular members having semi-spherical end portions and said driving and driven elements having concave seats in which said end portions fit.

In testimony whereof we have signed our names to this specification.

HUGH REID.
JAMES MacLEOD.