May 8, 1923.

1,454,286

N. JOHNSON

TURBINE LOCOMOTIVE

Filed March 15, 1922

3 Sheets-Sheet 1

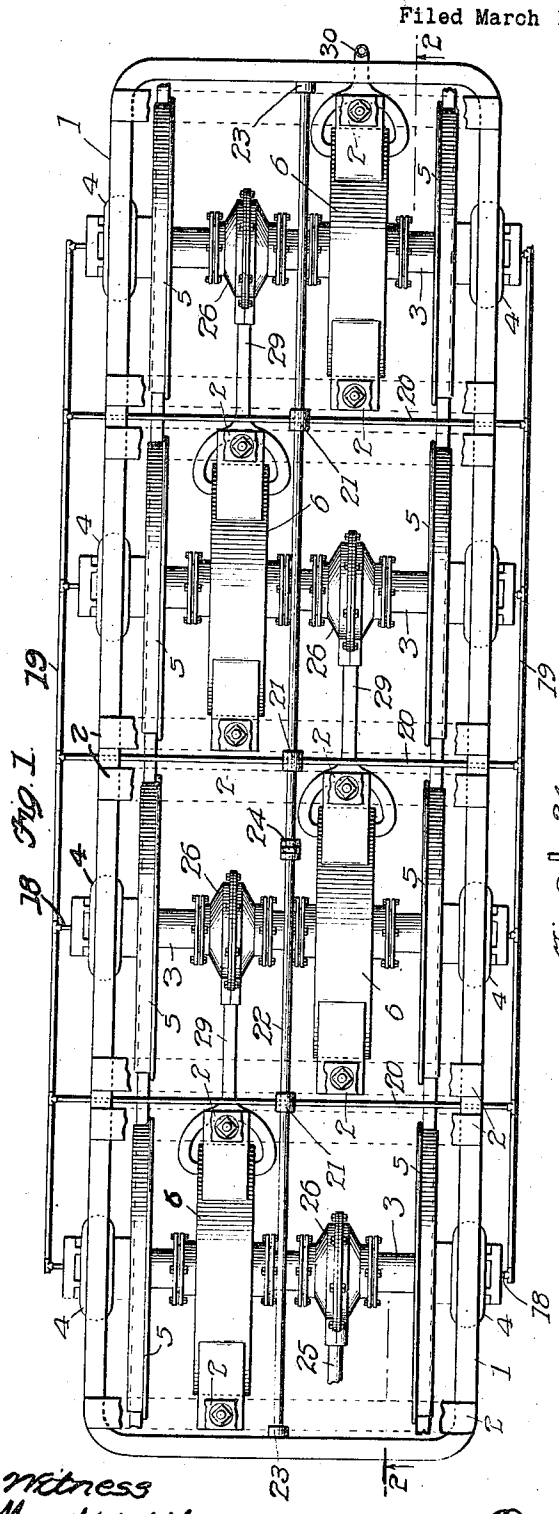


Fig. 1.

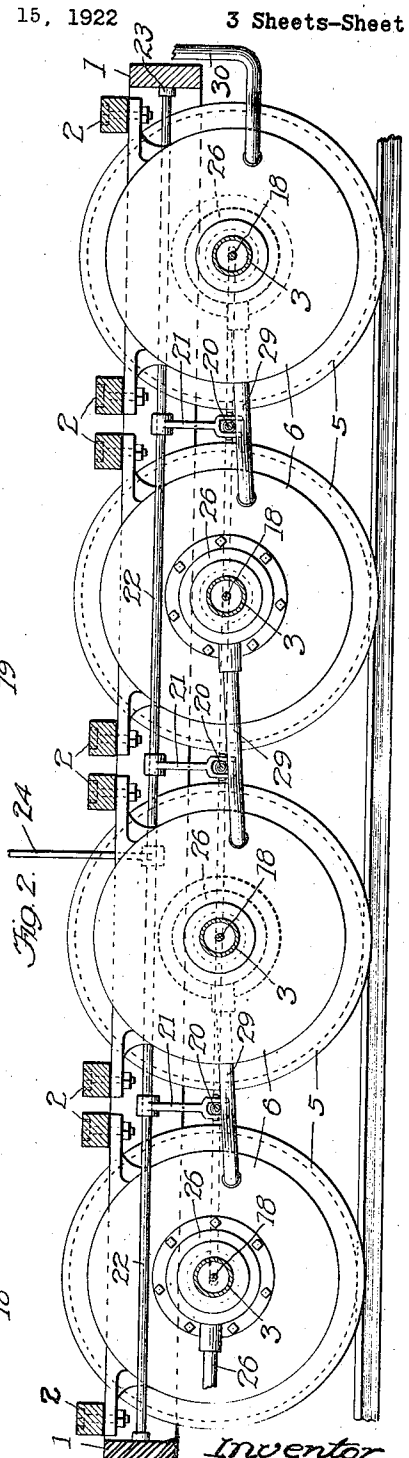


Fig. 2.

Witness
Martin N. Olsen

Inventor
Nels Johnson
By Cummings & Cummings
Attys.

May 8, 1923.

1,454,286

N. JOHNSON

TURBINE LOCOMOTIVE

Filed March 15, 1922

3 Sheets-Sheet 2

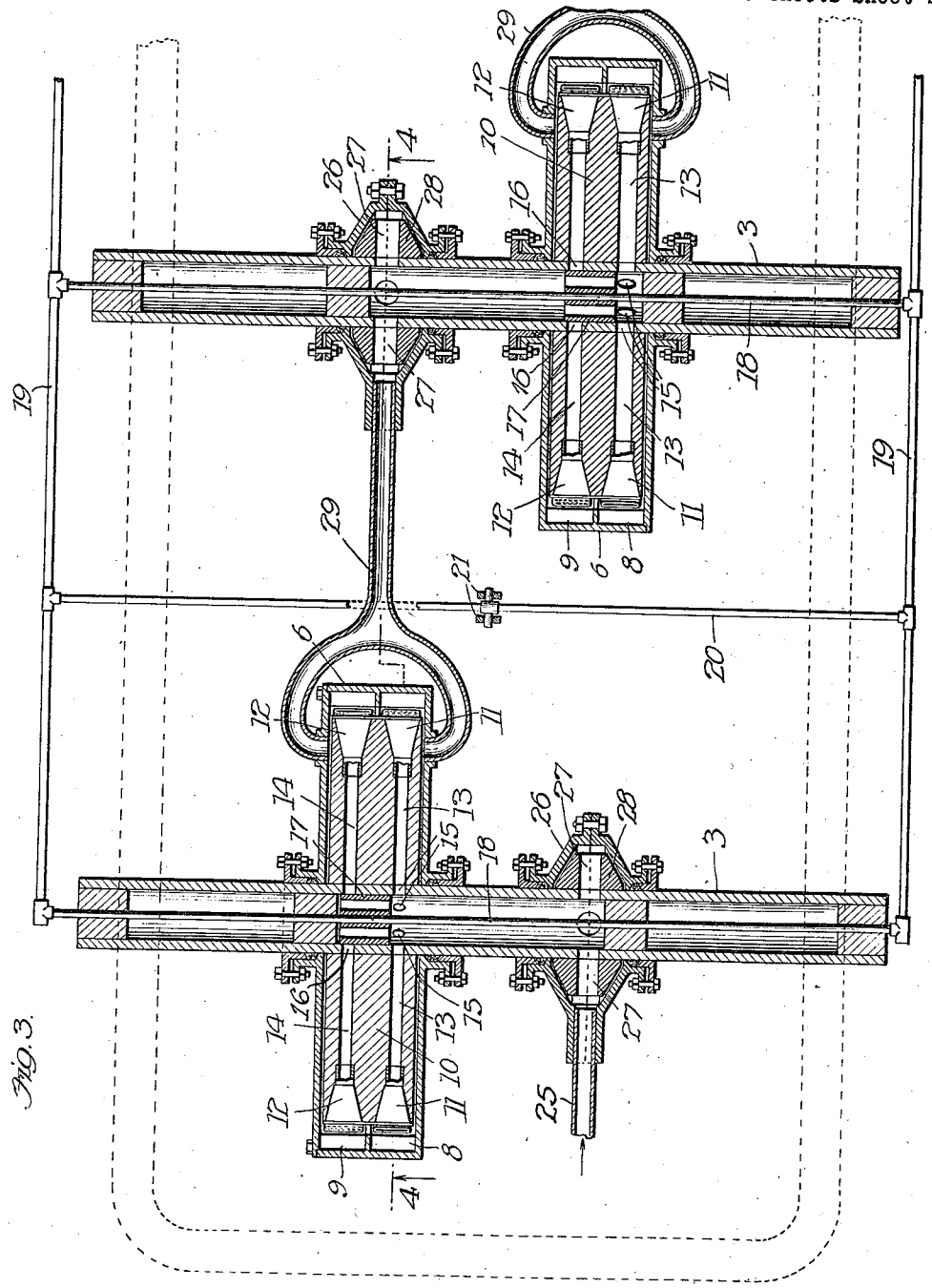


Fig. 3.

Witness
Martin H. Olsen

Inventor
Nels Johnson
By Rummler & Rummler
Atty's.

May 8, 1923.

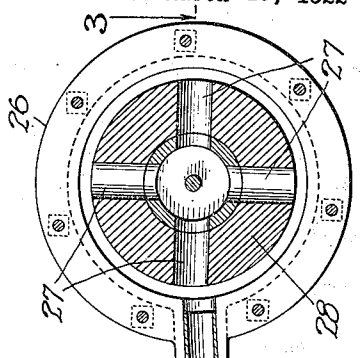
1,454,286

N. JOHNSON

TURBINE LOCOMOTIVE

Filed March 15, 1922

3 Sheets-Sheet 3



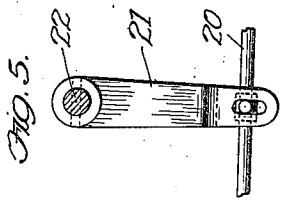


Fig. 5.

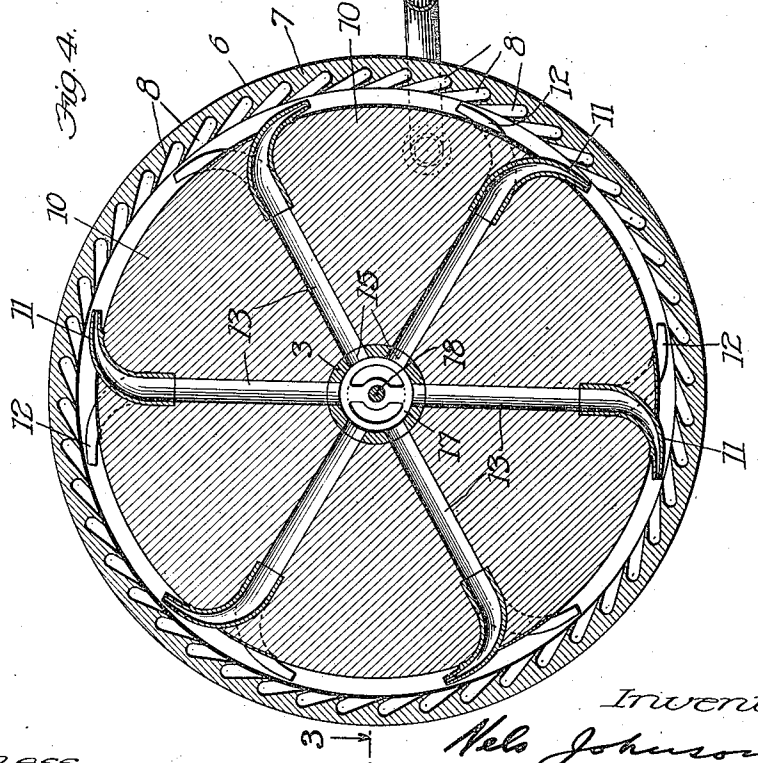


Fig. 4.

Witness
Martin H. Olsen

Inventor
Nels Johnson
By Rennebohm Rennebohm
Attys

Patented May 8, 1923. 1,454,286

UNITED STATES PATENT OFFICE.

NELS JOHNSON, OF CHICAGO, ILLINOIS.

TURBINE LOCOMOTIVE.

Application filed March 15, 1922. Serial No. 544,053.

To all whom it may concern:

Be it known that I, NELS JOHNSON, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Turbine Locomotives, of which the following is a specification.

This invention relates to turbine locomotives and utilizes the turbine construction disclosed in applicant's copending application for Patent No. 533,278, filed Feb. 1, 1922. The purpose of the present invention is to obtain more power, speed and safety in locomotives than is possible with the reciprocating engines which alternately deliver power strokes on opposite sides of the engine. It is also the object of the invention to attain a more effective balance and even application of power throughout the locomotive and to lower the center of gravity of the locomotive. A further purpose of the invention is to avoid the necessity of coupling rods between the driving wheels and to generally simplify the construction of locomotives.

These objects are accomplished by the locomotive illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a locomotive frame equipped with a plurality of driving axles and turbine units mounted thereon but with the boiler and other usual constructions mounted on the frame omitted.

Figure 2 is a longitudinal vertical sectional view taken on the line 2—2 of Figure 1.

Figure 3 is an enlarged horizontal sectional detail taken on the line 3—3 of Figure 4 and illustrating the hollow drive shafts or axles and the turbine units concentric therewith.

Figure 4 is a longitudinal vertical section taken on the line 4—4 of Figure 3.

Figure 5 is a detail of part of the valve operating mechanism.

In its general features the locomotive to which this invention relates consists of a frame structure with a plurality of transverse axles or shafts to which the drive wheels are rigidly secured. Concentric with each shaft is a turbine the rotor of which is fast with its respective shaft. Steam for driving the turbines passes from one to the other, these turbine units together making a multiple stage turbine. The axles are preferably hollow and serve to conduct the steam to the rotor of each turbine and these rotors are designed to be driven by reaction of the steam in impinging upon the stationary buckets. The preferred form of turbine is that described in applicant's copending application for patent above mentioned.

With the arrangement as described the center of gravity of the locomotive is lowered from that normally occurring with locomotives of the reciprocating engine type. Due to this low point of the center of gravity there is less danger of excess lateral swaying of the engine and also due to the fact that the power is uniformly applied upon all of the drive shafts, there is less tendency for the engine to rock as is the case when the power strokes occur alternately at two sides of the engine as in locomotives of the reciprocating engine type. Due to this arrangement the rails may be higher since with ordinary locomotives the height of the rails is limited by the swaying of the locomotive and the leverage which it has through the rails in loosening the fastening means thereof.

Referring to the drawings, the frame 1, shown as of rectangular form, is provided with cross beams 2 securely tying the two sides of the frame together. Journaled within this frame are the hollow shafts 3, the bearings 4 for these shafts being preferably located outside of the traction wheels 5 in order that these wheels may absorb and radiate heat passing along the shafts 3 from the turbine units 6 and thus guard the bearings against excessive heat.

The turbine units 6 are arranged in staggered relation with each other from end to end of the locomotive as shown in Figure 1 and each of these units consists of a stationary casing 7 provided with two sets of oppositely disposed internal buckets 8 and 9, and a rotor 10 having two sets of oppositely disposed nozzles 11 and 12 for projecting the steam into the buckets of the stationary casing. The nozzles 11 and 12 communicate with radial conduits 13 and 14 in the rotors and steam is supplied to these radial conduits through the hollow shafts 3. The ports 15 and 16 for the radial conduits are controlled by valves 17 slidably mounted within the shafts 3 to cover either of the said ports 15 or 16 and thereby control the direction of rotation of the rotors 10. These

valves are each rigid with a rod 18 extending axially along each shaft 3 and tied together outside of these shafts by the longitudinal rods 19. The rods 19 are also connected by the transverse rods 20 which are supported at the lower ends of arms 21 fast to a longitudinal shaft 22 having bearings 23 in the engine frame. By rocking the shaft 22 by means of a handle 24 thereon the valve supporting rods may be shifted from side to side and thus position the valves 17 and simultaneously control the direction of rotation of the rotors 10. Steam, preferably superheated up to 600° or more is admitted to the hollow shaft 3 at the front of the locomotive through the inlet conduit 25 which communicates with a stationary casing 26 surrounding this shaft. From the interior of the casing 26 the steam passes through radial ports 27 in a strengthening boss 28 surrounding the shaft and into the shaft and then into the rotor. The steam then passes from the first turbine unit to the next through a conduit 29 which likewise delivers the steam through a stationary casing 26 into the next hollow shaft 3. It leaves the turbine unit on this shaft through a similar connection to the next and finally is delivered to the stack by a conduit 30 at the opposite end of the locomotive.

In the operation of the locomotive it is assumed that the usual throttle controls the passage of steam to the inlet conduit 25 leading to the first turbine unit. The direction of rotation of the turbine is controlled by rocking the handle 24 to the right or left and thus adjusting the valves 17 to admit steam either into the ports 15 or 16. The steam passes in succession through the different turbines and thus power is applied to all of the traction wheel shafts. The arrangement of staggered rotors here disclosed not only provides for an equal distribution of work to the locomotive supporting wheels but also serves to effectively balance the entire locomotive and keep the center of gravity low. This balanced arrangement and uniform application of power at all times to the wheels on both sides of the locomotives avoids undue racking of the structure and thereby increase its life and renders the locomotive safer than the arrangements now generally in use.

Although but one specific embodiment of this invention has been herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A locomotive of the class described comprising a frame, a plurality of horizontally disposed hollow drive shafts journaled in said frame, traction wheels rigid with said shafts, a turbine unit concentric with each shaft and having a rotor rigid thereon, and means for delivering steam to each of said turbine units through said hollow drive shafts.

2. A locomotive of the class described comprising a frame, a plurality of horizontally disposed hollow drive shafts journaled in said frame, traction wheels rigid with said shafts, a turbine unit concentric with each shaft and having a rotor rigid thereon, and means for delivering steam in succession to each of said turbine units through one drive shaft and then from the turbine thereon to the next drive shaft.

3. A locomotive of the class described comprising a plurality of drive shafts each having traction wheels and a turbine rotor rigid and concentric therewith, a rigid stator concentric with each rotor, said stators and rotors being arranged to coact for either forward or reverse driving, and a valve for each turbine unit for controlling its direction of rotation, and means for simultaneously adjusting all of said valves.

4. A locomotive of the class described comprising a plurality of horizontal hollow drive shafts, traction wheels rigid with said drive shafts, a turbine unit mounted concentric with each drive shaft and having a rotor rigid with its respective drive shaft, means for delivering steam to said shafts, forward and reverse ports in said hollow drive shafts communicating with said turbine units, valves slidable in said hollow drive shafts to cover either the forward or reverse ports, and means for simultaneously adjusting all of said valves.

Signed at Chicago this 13th day of March 1922.

NELS JOHNSON.