A. LIPETZ.

THERMOLOCOMOTIVE.

APPLICATION FILED AUG. 14, 1912.

1,047,129.

Patented Dec. 10, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

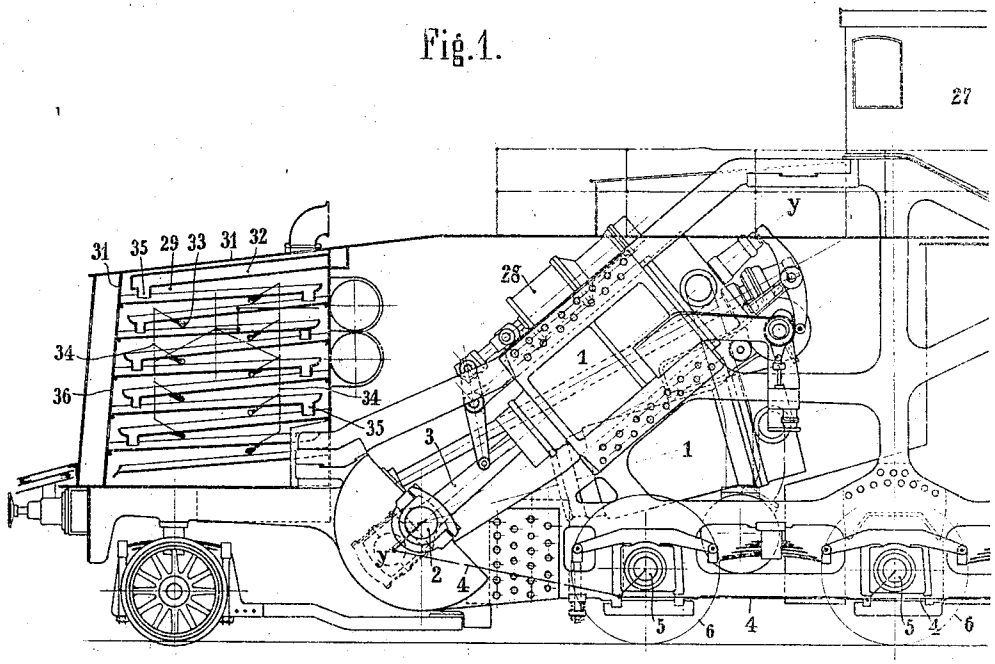
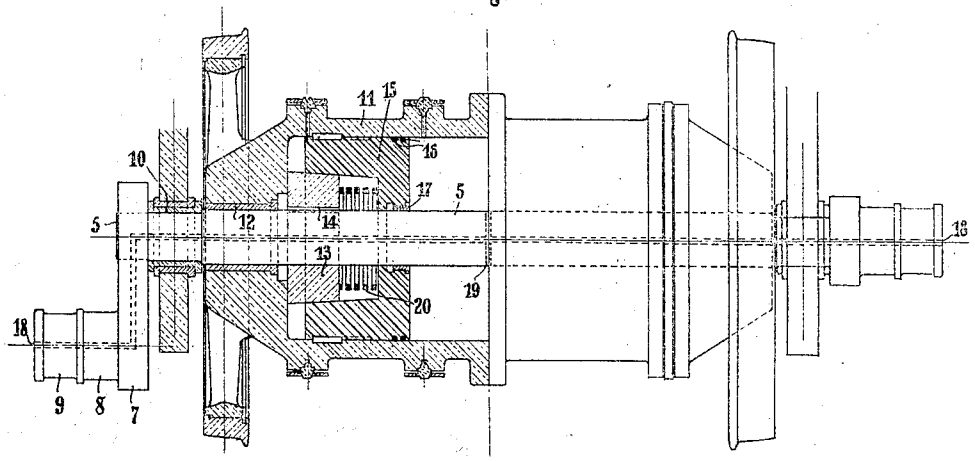


Fig. 5.



Witnesses:

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3 SHEETS—SHEET 2.

Fig. 2.

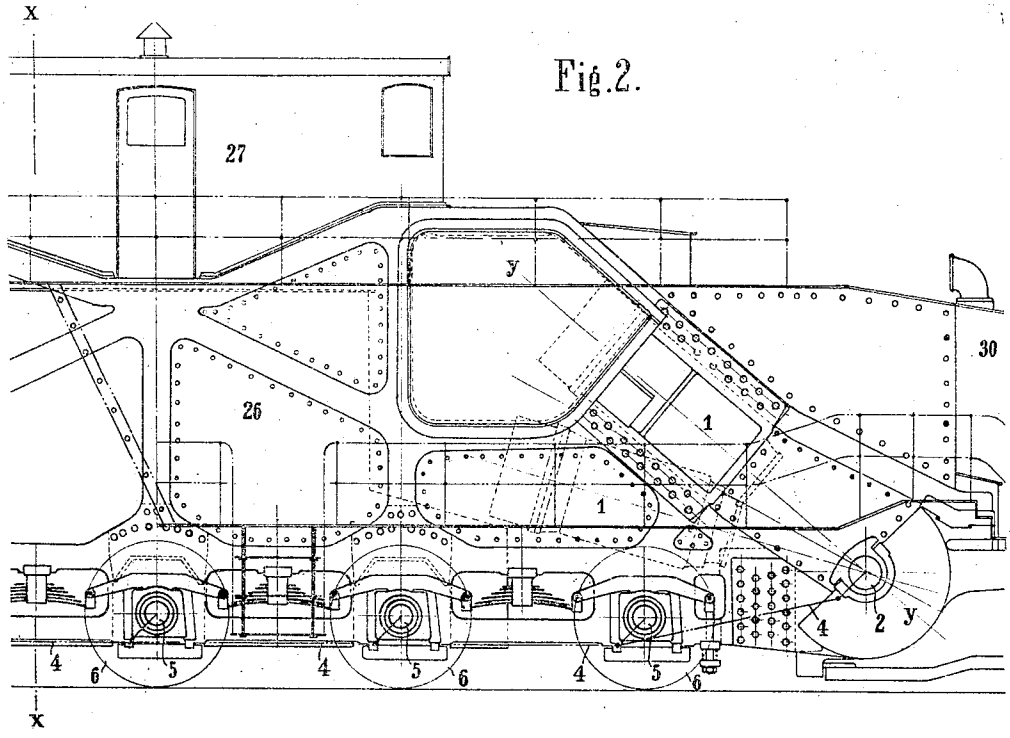


Fig. 6.

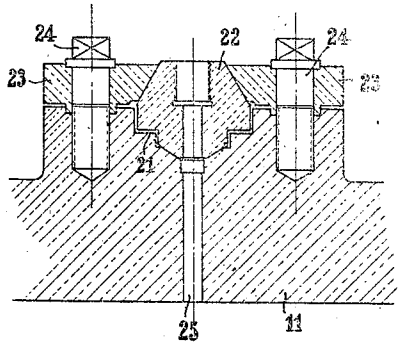
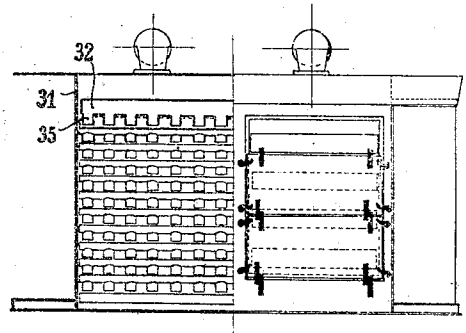


Fig. 7.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 3.

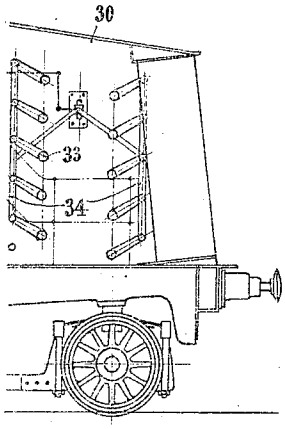


Fig. 4.

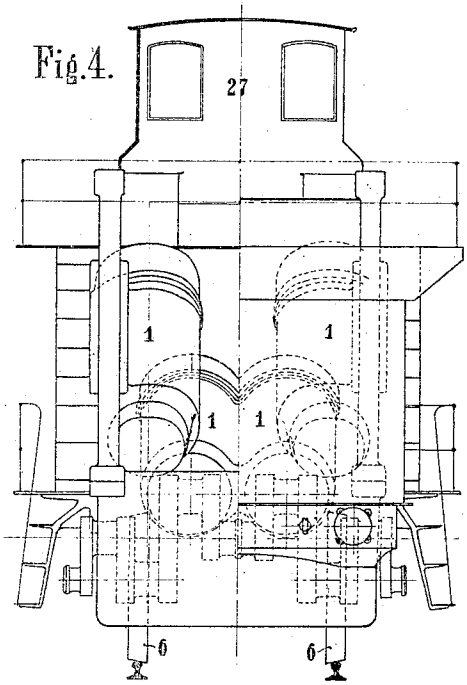
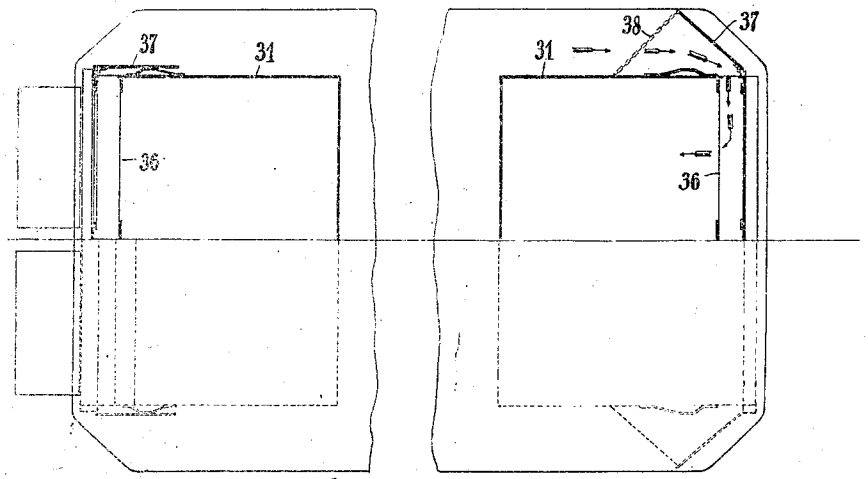


Fig. 6.



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UNITED STATES PATENT OFFICE.

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THERMOLOCOMOTIVE.

1,047,129. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed August 14, 1912. Serial No. 715,135.

To all whom it may concern:

Be it known that I, ALPHONS LIPETZ, engineer, a citizen of the Russian Empire, residing at Orenburg, Russia, have invented certain new and useful improvements in or relating to thermolocomotives of the known type in which the power is transmitted to the axles of the road-wheels from a loose shaft driven by a combustion-engine, of which the following is a specification.

The present invention relates to a thermolocomotive of the known type, in which the power is transmitted to the axles of the road wheels from a loose shaft driven by a combustion engine.

The present invention consists firstly in that at the front and at the rear end of the locomotive each a primary power engine or a group of such is arranged together with their respective loose shafts in such a manner, that the engines and the loose shafts are arranged symmetrically to the vertical plane laid transversely through the middle of the locomotive.

According to a constructional form of the present invention the axes of the engine cylinders are arranged to converge toward the vertical plane laid transversely through the middle of the locomotive, where also the water tank and the driver's stand are arranged; and between the loose shaft and the axle or between the axle and the road wheel preferably a pneumatic engageable and disengageable clutch is provided. The member to be coupled (the crank of the loose shaft or the road wheel of the axle) is then rigidly attached to a compressed air cylinder concentrically surrounding the axle, in which cylinder two pistons, having a gliding fit on the axle will be simultaneously forced toward outside against the clutch members of the axle by the compressed air entering between them. The thermo-locomotive is further provided with open return-current irrigation coolers, the perforated pans of which arranged in a zigzag line above each other are inclosed by a casing which has apertures for the entrance of air in counter current with the cooling water only in the direction of the travel between the diverging ends of the pans, while the pans communicate at their converging ends with each other by means of closed overflows, so that the air may at the turning point flow without being obstructed in counter current over the pans above, and escape at the outlet after having passed over the uppermost pan.

The pans are joined together by means of hinges in such a manner, that their inclination may be varied. The cooler is provided with adjustable guides which can baffle the air in the rear cooler, considered in the direction of travel, in such a manner, that it can enter from the rear into the openings between the diverging ends, the same as with the cooler at the front end.

The arrangement of the engine cylinders with their respective loose shafts has the advantage, that the entire power of the locomotive is transmitted to the road wheels not by one but by two shafts, so that each of these may be made lighter. Considering the high demands put to a locomotive, and considering the limited dimensions which the railway cars admit of, the safety afforded by one single shaft is not sufficient. The second loose shaft may therefore in a way be considered as a reserve shaft, in case the first one should break.

By the engines with their shafts being arranged at both ends and by the position of these shafts relatively to the vertical plane transversely through the middle of the locomotive, a ready accessibility of the cylinder heads and of all parts of the distributing gear, valves, levers, cams and the like is obtained, as they are all arranged within the range of the driver's stand which is disposed in the said transverse central plane. One single driver may therefore very easily superintend the whole engine.

By arranging the water tank in the center of the locomotive the advantage is obtained, that no separate tender with axles and bogie frames is required; the load is distributed on the middle axles, as the weight of the water tank acts where the engines are not. The lid of the water tank forms the floor of the driver's stand.

A further great advantage of the thermolocomotive forming the subject of the present invention consists in that the expensive turntables may be dispensed with, so that also much time is saved otherwise spent in reversing the locomotives.

Owing to the pneumatic clutch the power will come gradually to effect, without any sudden jerks when the locomotive starts, as

notwithstanding the high speed of the engine the road wheels will be turned but slowly. It is necessary for the engine to have a high speed, as the ignitions would not be produced properly at a low speed. It is, however, not possible to reduce the revolutions so far as with a steam locomotive, as the pressure exists already with the latter, while it will be produced with the engine only after the ignition which will only occur, if the adiabatic counterpressure is quickly produced. It must therefore be rendered possible, to turn the road wheels at a speed increasing from *nil* to the maximum at a given minimum speed of the engine. This is obtained by the pneumatic clutch. On downward gradients, where the locomotive is to run by itself, the engines may then be cut out; the locomotive will then run the same as an ordinary car. If, on the contrary the velocity of the locomotive is to be somewhat retarded, the engines may be coupled up after the valves have been reversed. For obtaining a greater braking effect compressed air only is admitted into the cylinders provided that the action of the ordinary brakes on the wheels is not sufficient. The clutch may also be arranged to cause an accelerated reverse travel. Then it is only necessary to cut out the engine, while the locomotive continues running; the engine is then easily reversed under no-load, and when it is coupled up again, it will run slowly and smoothly.

In consequence of the engines and their shafts being arranged symmetrically also the coolers or radiators must be arranged in the same manner. These are made, as said above, in form of open irrigation coolers with counter current principle. The cold air is brought into contact with the hot water, and the heat exchange will be rapid, and increasingly so as the speed of the engine increases. Therefore a greater quantity of water is cooled when the output is greatest, namely at the highest velocity, and when the water consumption will also be the greatest. For this reason the counter current principle was employed for the cooler, in such a manner, that the counter current depends on the velocity. An open cooler will act more energetically than a tubular radiator, as a part of the water is evaporated by coming in direct contact with the air, whereby the temperature is considerably reduced. There will indeed be a loss in water, but the cooling effect will be the greater. If a tubular radiator were to be employed for the capacity of the locomotive, it would have to be of so large dimensions, that it would take up the whole space of the locomotive; the open cooler may be made considerably smaller.

In the accompanying drawings the invention has been exemplified.

In these drawings Figure 1 is the left half of the locomotive in elevation; Fig. 2 is an elevation of the central part of the locomotive forming the continuation of Fig. 1. Fig. 3 is the right hand end of the locomotive forming a continuation of Fig. 2, in elevation. Fig. 4 is an end view. Fig. 5 shows the pneumatic clutch partly in longitudinal section, partly in elevation. Fig. 6 is a detail for the supply of the compressed air to the pneumatic clutch. Fig. 7 is a front view of the cooler, open on the left, closed on the right. Fig. 8 is a plan of the cooler.

The locomotive comprises three chief parts: 1, the combustion engine with its cooler; 2, the water tank; 3, the axle clutches for coupling up the road wheels.

The combustion engine is a multiple cylinder reversible engine of any suitable system. In the constructional form shown each engine has four cylinders 1, which work on the crank shafts 2. The crank shaft 2 drive by means of connection rods 3 and coupling rods 4 the loose shafts 5, which drive the road wheels 6 by means of the pneumatic clutches. These clutches have the object of rendering the working of the engines independent of the wheels, of allowing of a smooth starting and a varying of the speed, besides an easy reversing of the locomotives. According to Fig. 5 the cranks 7 with crank pins 8, 9 are fitted to the wheel axles, on which pins act the coupling and connecting rods; this is the case with the two outermost wheel axles. For the three inner wheel-axles 5 only one pin 8 is provided. The axle 5 is journaled in axle boxes 10. The road wheels 6 are made in one piece with their long hub 11. Between hub and axle are inserted copper bushes 12, on which the wheels run loose when the locomotive travels while the engine is at a standstill, or in which the axles can revolve freely when the engine is working and the locomotive is going to stop.

At each end of the axle 5 is fitted a tapered ring 13, which is keyed to the axle by means of key 14. In the hub 11 moves a piston 15, which coöperates with the taper ring 13 and is packed by means of rings 16 and gland 17. A piston 15 is of course provided in each end of the hub 11. This piston is operated by means of compressed air, which is admitted through the bores 18, 19 into the space between the two pistons. The piston is disconnected from the clutch by means of a spring 20. If the pressure of the compressed air is allowed to rise from *nil* to a given maximum, the motion of the piston and the ring can be varied and the velocity of the locomotive can be increased or reduced without any jerks and very smoothly. For disconnecting the axles from the wheels air is allowed to enter from the ducts 18, 19

so that the spring 20 will come into action. If the wheels are not to be disconnected, it will be sufficient to put on the brakes without reducing the speed on the engine.

According to Fig. 6 the compressed air is supplied in another manner to the piston 15. In an annular groove 21 in the hub 11 is fitted a split ring 22 which is secured to the hub 11 by means of a sleeve 23 and screws 24. To this ring 22 is admitted compressed air through small pipes and conducted through bores 25 into the space between the pistons.

For preventing the conical ring 13 from heating and likewise also the piston 15, which may occur in starting in consequence of the gliding friction, small apertures, not shown in the drawing are provided in the hubs 11, through which water or oil may be conducted to the rings 13. These apertures may be on the inside provided with valves and springs, which hold them closed when compressed air is admitted, but ordinarily will maintain the atmospheric pressure.

The water required for cooling the engine is contained in the tank 26 which is arranged, the same as the driver's stand 27 in the transverse central plane x—x of the locomotive. The axes y, y of the engine cylinders converge upward toward this central transverse plane. The circulation of the water is produced by two pumps 28, which receive their motion from the connecting rods 3.

29, 30 are the coolers in front and at the rear end, to which the water is forced by the pumps 28. The communication between cooler and water tank is obtained by separate pipes. Two further pumps are provided for producing the compressed air, which is kept in special reservoirs.

The arrangement of the cooler is as follows: In the chamber 31, which is made of thin sheet iron, are arranged a number of pans 32 above each other and hinged at the sides. The free ends of the pans bear on studs 33 which are coupled by means of bars 34, so that the incline of all pans can be simultaneously adjusted. The converging ends of the pans communicate with each other by closed overflows 35 so that the water on the uppermost pan will flow through such overflow to the second pan, thence to the next converging ends of the third pan and so on. Each chamber has openings 36 at its front face end only, through which the air can enter. It is obvious, that water and air will proceed in counter current. For the air to be able to likewise enter the openings 36 which are at the rear with the rear cooler seen in the direction of the travel, baffling plates 37 are provided, which are coupled to each other by chains 38 running over pulleys. According to Fig. 8 these baffling plates 37 are so adjusted at the rear cooler, that the air is forced to enter the openings 36 at the back.

I claim:

1. A locomotive having combustion engines, one at its front and one at its rear end, said engines being arranged symmetrically to a vertical plane through the center of the locomotive, driving wheels having loose-shafts, means for transmitting power from the combustion engines to said shafts and clutches between the said loose-shafts and the driving wheels.

2. A locomotive having combustion engines, one at its front and one at its rear end, said engines being arranged symmetrically to a vertical plane through the center of the locomotive, the axes of the engine cylinders converging toward the said central vertical transverse plane, the driver's stand and the water tank being arranged in said plane, driving wheels having loose-shafts, means for transmitting power from the combustion engines to said shafts and clutches between the said loose shafts and the driving wheels.

3. A locomotive having combustion engines, one at its front and one at its rear end, said engines being arranged symmetrically to a vertical plane through the center of the locomotive, the axes of the engine cylinders converging toward the said central vertical transverse plane, the driver's stand and the water tank being arranged in said plane, driving wheels having loose-shafts, means for transmitting power from the combustion engines to said shafts and pneumatically-operated clutches between the said loose shafts and the driving wheels.

4. A locomotive having combustion engines, one at its front and one at its rear end, said engines being arranged symmetrically to a vertical plane through the center of the locomotive, driving wheels having loose-shafts, means for transmitting power from the combustion engines to said shafts, clutches between the said loose-shafts and the driving wheels, the member to be coupled up rigidly connected to compressed-air cylinders concentrically encircling the respective shafts, clutch members secured to said shafts, two pistons guided on each of said shafts in said cylinders, and means for admitting compressed air between said pistons to force them outwardly to clutch said cylinders to said shafts.

5. A locomotive having combustion engines, one at its front and one at its rear end, said engines being arranged symmetrically to a vertical plane through the center of the locomotive, driving wheels having loose-shafts, means for transmitting power from the combustion engines to said shafts, clutches between the said loose-shafts and the driving wheels, the member to be coupled up rigidly connected to compressed-air cylin-

ders concentrically encircling the respective shafts, clutch members secured to said shafts, two pistons guided on each of said shafts in said cylinders, and means for admitting compressed air between said pistons to force them outwardly to clutch said cylinders to said shafts, said air-admission means comprising a ring encircling the members to be coupled and through which the compressed air is conducted.

In testimony whereof I affix my signature in presence of two witnesses.

ALPHONS LIPETZ.

Witnesses:
CHARLES BLAKEY,
HARRY BLAKEY.