

A. STUCKI.  
LOCOMOTIVE.

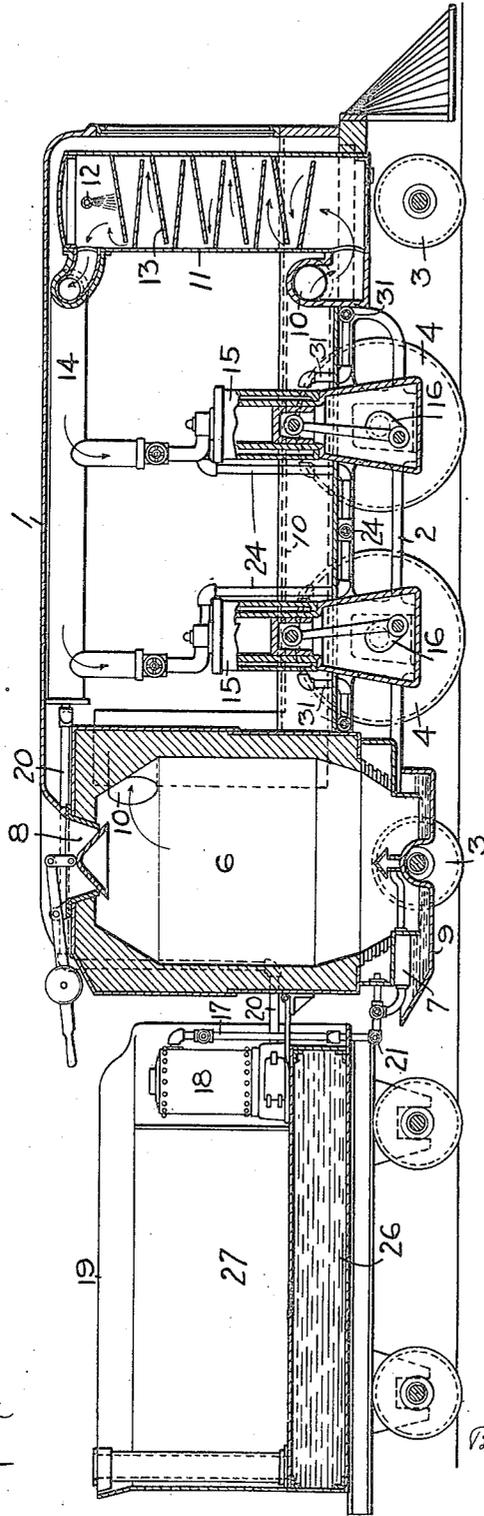
APPLICATION FILED JUNE 29, 1907.

1,001,703.

Patented Aug. 29, 1911.

3 SHEETS—SHEET 1.

FIG. 1



WITNESSES.

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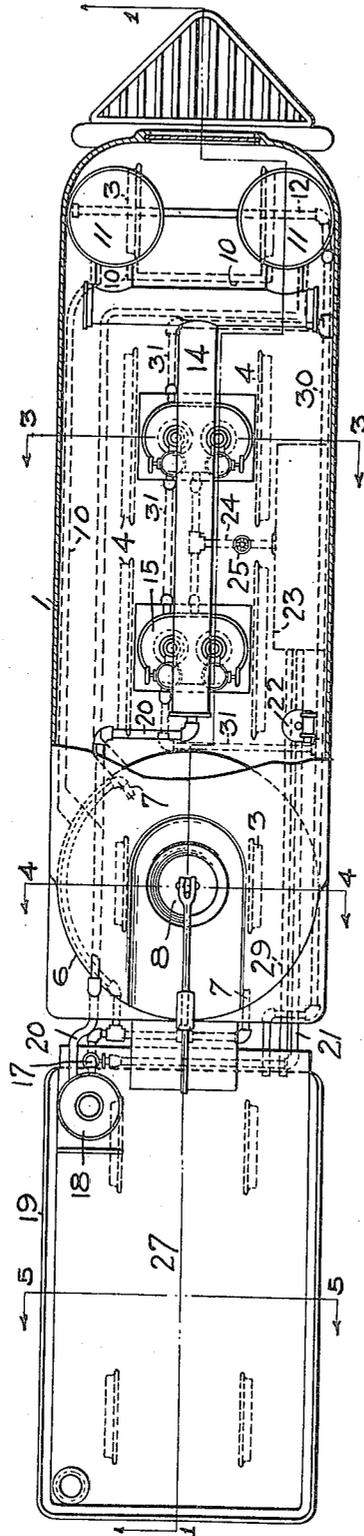
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3 SHEETS—SHEET 2.

FIG. 2



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3 SHEETS—SHEET 3.

1,001,703.

FIG. 5

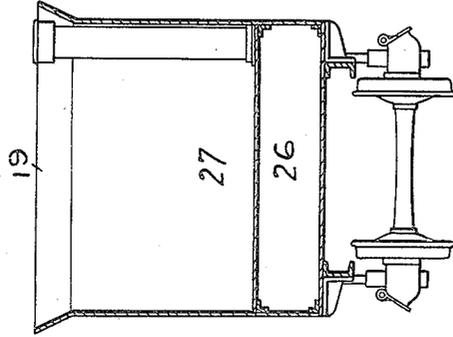


FIG. 4

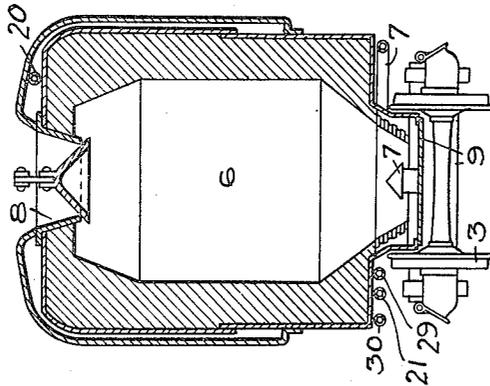
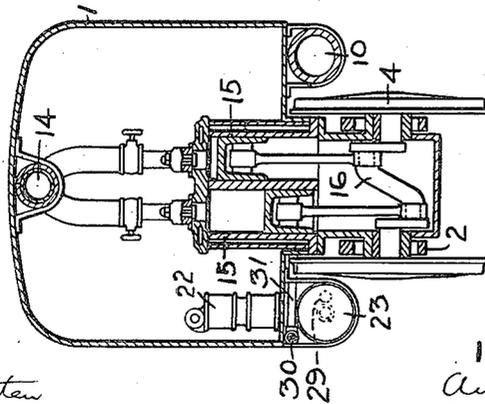


FIG. 3



WITNESSES.

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# UNITED STATES PATENT OFFICE.

ARNOLD STUCKI, OF ALLEGHENY, PENNSYLVANIA.

LOCOMOTIVE.

1,001,703.

Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed June 29, 1907. Serial No. 381,511.

To all whom it may concern:

Be it known that I, ARNOLD STUCKI, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Locomotives; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to locomotives. Its object is to provide a locomotive which is much less costly than ordinary locomotives, which does away with boiler explosions, which will produce no smoke or sparks, which consumes only a small portion of the fuel and water now used so that the divisions may be lengthened and less frequent stops and delays necessary to take on coal and water, one which is not affected by impure water, and especially one in which the fuel cost is very greatly reduced.

In modern railway practice the steam locomotive is the only one in general use on account of its large capacity and cheapness in running, although electric locomotives have been applied in a few instances and there have also been several attempts to use special air and gasolene locomotives but without any great amount of success. For the general railway practice, however, the steam locomotive is used exclusively. There are many serious objections to such locomotives, such, for instance, as the large amount of fuel and water necessary and it also being necessary to have practically pure water to prevent foaming and incrustation of the boiler, so that frequent stops for coaling and watering are necessary and expensive water softening and purifying plants have also been required. Furthermore, on account of the large amount of fuel consumed and no safe and convenient way having been devised for cleaning the fire box *en route*, it is necessary to limit the length of divisions in order to clean the fire box. Such locomotives also produce a large amount of smoke which is a source of annoyance and inconvenience to the passengers as well as to buildings near the track, and also throw out a large amount of sparks causing frequent disastrous fires. The steam boilers are not only costly of construction and maintenance but are also quite dangerous.

My invention is intended to overcome all of these objections to present steam locomotives.

To this end my invention consists, gener-

ally stated, in providing a locomotive with apparatus for producing gas from coal and for cleaning said gas, together with an internal combustion engine or engines supplied from said gas producer and connected to the wheels of the locomotive in order to drive the same. The invention also comprises certain arrangements and details of parts hereinafter described and claimed.

In the accompanying drawing Figure 1 is a longitudinal sectional view showing a locomotive and tender embodying my invention; Fig. 2 is a diagrammatic plan view of the same, and Figs. 3, 4 and 5 are transverse sectional views taken respectively on the lines 3-3, 4-4 and 5-5, Fig. 2.

In the drawings no attempt has been made to show in detail the various mechanisms, but only to give a diagrammatic representation of the necessary appliances comprising the locomotive. As shown, the locomotive proper 1 is provided with a suitable frame 2 mounted on wheels, such as the small supporting wheels 3, and drivers 4, although if desired the wheels may all be drivers. The usual or any preferred form of spring mechanism is used between the frame and wheels.

Mounted on the frame is a gas producer 6 suitable for converting coal into gas, such producer preferably being operated with a blast 7, of steam and air, although if desired it might be operated under suction. This producer will be operated in the usual way of operating gas producers, the coal being fed in through the top through a hopper 8 and being maintained in ignition at the bottom, the ashes settling within the water sealed ash pan 9 from which they are removed in the usual way, by raking or the like. The producer 6 is thus a continuous producer and is adapted to run without stoppage for long periods of time, as distinguished from the old type of producers which require frequent stoppage of the apparatus to allow for cleaning. The water sealed ash pan 9 enables this cleaning to be performed while maintaining the continuous production of gas. An outlet pipe 10 leads from the top of the producer to suitable gas purifying apparatus, such as a scrubber or scrubbers 11, of any preferred construction, those shown being chambers in which the gas is caused to pass upwardly through a descending sheet of water supplied by pipe 12 and falling over the baf-

fies 13. Any other gas purifying apparatus would answer the purpose equally well.

From the scrubbers the gas passes into a large main 14 which acts as a small storage reservoir and from this the gas is taken directly to an internal combustion engine or engines 15, four such engines being shown, two located above each driving axle and connected to cranks 16 on said axle, the axles having a double bend to provide the two cranks. Consequently, there is no dead center for the engines. The engine piston rods can be connected directly to the driving shafts, as shown, or may be connected to intermediate or counter shafts provided with the cranks and which are in turn connected to the driving shafts or wheels by suitable intermediate gearing providing speed changing gearing and reversing gearing of any desired type. The engines shown are internal combustion hydrocarbon engines of the single acting and compression type and are supported directly on the axles, instead of on the locomotive frame, so as not to be subjected to the pulsations of the locomotive springs. By the use of such engines or motors I am enabled to dispense with any compression or like devices between the gas producers and the engine cylinders, the engines acting to suck the desired quantity of combustive mixture from the connection to the gas producer or purifying apparatus. Suitable controlling levers and valves (not shown) both to regulate the supply of fuel to the engines and to control the speed of the engines, are provided at some convenient place for manipulation of the engine driver. The internal combustion engines are not shown in detail and may be of any suitable type adapted for this purpose and they may be provided with the necessary appurtenances of such engines.

The blast 7 for the producer is shown as a steam and air injector supplied with steam by a pipe 17 from a small steam boiler 18 mounted on the tender 19. This boiler is heated by a gas burner supplied through a pipe 20 from the main 14. A pipe 21 also leads from the boiler 18 to an air pump 22, which is connected to a storage reservoir 23. From the latter, connections 24 lead to the engines 15, said connections being provided with suitable valves 25 so that compressed air can be used to start the engines and run the same until they suck in and compress their charge of gas. By admitting the air into the engine whose crank is in proper position, the locomotive can be started either forwardly or backwardly.

The tender 19 is provided with a water reservoir 26 at the bottom and a coal space 27 above the same so that the coal can be easily shoveled up into the hopper 8 of the producer, said hopper being set down into

the producer in order to gain in height. The water for cooling the engines and supplying the scrubbers may be circulated from the tank 26 by means of a pump, but is shown as forced by means of compressed air. For this purpose a pipe 29 leads from the air reservoir 23 to the tank 26, and a pipe 30 leads from the tank to the scrubbers, with a branch 31 going to the engines. One or more producers may be mounted upon the locomotive frame. If desired, an additional producer, or for that fact, the main producer, may be mounted on the tender. If desired, mechanism may be installed for elevating the coal and feeding into the top of the producer.

The operation of the locomotive will be readily understood from the foregoing description. The coal, instead of being fed into a fire box, which requires a fair degree of skill in order to produce even firing, is merely fed through the top of the producer and is there converted into gas which is then scrubbed and supplied to the internal combustion engines, which draw the gas from the gas producer as needed, the gas being drawn into the engines by suction and the producers operating to maintain the necessary supply, there being a practically direct connection from the producers through the washer or purifier to the combustion engines. The water is merely for scrubbing and cooling purposes and therefore does not need to be pure. Consequently, the expensive water softening and purifying plants necessary where steam boilers are used can be entirely dispensed with. Furthermore, the quantity of water and coal consumed is very much less than with existing steam locomotives, the water being reduced approximately from 28 to 2 pounds per H. P. hour and the coal reduced from 6 pounds to about 1 pound per H. P. hour. Furthermore, there is no waste of fuel when the locomotive is standing still. The result is that the tender can be very much smaller than heretofore, and fuel bill will be very materially reduced, much less frequent stops for coaling and water will be required and also the troughs and scoops along the tracks used for water can be entirely dispensed with. Furthermore, the small amount of coal consumed makes it possible to very greatly lengthen the divisions, the length of the latter now being determined by the length of time it takes to fill the fire box with ashes. This also will reduce the number of round houses. The locomotive also is not costly, as no expensive steam boilers are used, and it is also safe as there is practically no danger of explosion or other violent damage. The locomotive will produce no smoke or sparks or waste steam, thus adding very greatly to the convenience of passengers as well as do-

ing away with the smoke nuisance along the line and also preventing damage from fires.

As heretofore stated, the producer may be located on the tender although in order to add weight to the locomotive, it is preferred to have the same mounted on the locomotive frame. The auxiliary starting means comprising the air pump shown is also preferably carried on the locomotive frame. I thus provide a locomotive in which the motive power is normally supplied by an internal combustion engine, and I also provide means carried in connection therewith to start the said engine when the locomotive and train drawn thereby are at rest. My invention is thereby to be distinguished from motor cars or road vehicles in which cranking is necessary to start the engine, as well as from any proposed type of locomotive for the practicable starting of which no means has heretofore been suggested or provided.

What I claim is:

1. A locomotive having a suitable unit frame and wheels carrying the same, and provided with a continuous gas producing apparatus and an internal combustion engine connected thereto and adapted to drive the wheels, said gas producing apparatus and said internal combustion engine being carried on said unit frame.

2. A locomotive having a unit frame and wheels on which the same is mounted and provided with a gas producing apparatus, an internal combustion engine connected thereto, driving connections between said engine and wheels and separate power means for starting said engine, all carried on said frame.

3. In locomotives comprising a unit frame and wheels on which the same is mounted, and having thereon a gas producer, gas purifying apparatus connected thereto, an internal combustion engine supplied from said gas purifying apparatus, and a driving connection between said engine and the wheels.

4. A locomotive having a unit frame and a gas producer, a hydrocarbon engine connected thereto, and an air pump connected to said hydrocarbon engine and adapted to start said engine, all carried on said unit frame.

5. A locomotive having a unit frame and wheels carrying the same, said frame carrying a gas producer, gas purifying apparatus connected thereto, an internal combustion engine connected to said wheels and separate power means for starting said internal combustion engine.

6. A locomotive provided with wheels and having an internal combustion engine, a driving connection between the same and said wheels, a gas producing apparatus

adapted to continuously supply said engine with gas, and separate power means for starting said engine independently thereof.

7. A locomotive provided with wheels and having an internal combustion engine, a driving connection between the same and said wheels, a gas producing apparatus adapted to continuously supply said engine with gas, and a fluid pressure reservoir connected to said engine and adapted to actuate the same in starting.

8. A locomotive provided with wheels and having an internal combustion engine, a driving connection between the same and said wheels, a gas producing apparatus adapted to continuously supply said engine with gas, means for storing air to actuate said engine separately from said gas producing apparatus, and separate power means for maintaining said air at pressure.

9. A locomotive provided with wheels and having an internal combustion engine, a driving connection between the same and said wheels, a gas producing apparatus adapted to continuously supply said engine with gas, a steam boiler and air pump actuated therefrom, means for storing the air at pressure and actuating said engine independently of said producing apparatus, and a connection from said steam boiler to said producing apparatus.

10. In locomotives, the combination of a unit frame provided with wheels and carrying an internal combustion engine, a gas producing apparatus and a connection between the same and said engine and adapted to normally supply the engine with gas and an air pump connected to said engine and adapted to start the same, of a tender adapted to carry coal and having a steam boiler, a gas burner heating the same and connected to said gas producing apparatus, a connection from said boiler to drive said air pump and a connection from said boiler to supply said gas producing apparatus with steam.

11. In locomotives, the combination of a hydrocarbon engine adapted to propel the locomotive, gas producing apparatus connected thereto, means for producing compressed air and starting said engine thereby, a steam boiler having a gas burner connected to said gas producing apparatus and supplied therefrom, a connection from said steam boiler to said air compressing means and a connection from said steam boiler to said gas producing apparatus.

In testimony whereof, I the said ARNOLD STUCKI have hereunto set my hand.

ARNOLD STUCKI.

Witnesses:

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ROBERT C. TOTTEN.