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(56) Documents cited  
EP 0042876 A1

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(54) Smoke generation in steam models

(57) A smoky exhaust is caused to be emitted from a steam model by utilising pressurised steam to draw a potentially smoke-producing medium through a heating duct leading to a smoke outlet from the model. The medium becomes heated sufficiently within the duct to cause it to generate smoke which becomes exhausted with the steam through the smoke outlet.

In a steam locomotive the blast from a steam motor 40 is directed into a heating duct 18 which extends through a boiler flue 14. Oil from a tank 26 is introduced into the blast, so as to be drawn through the duct, and becomes heated sufficiently in passage through the duct to produce a smoky exhaust. An outlet end of the duct bears a diffusion cap 20 within a chimney 16 which serves to collect condensate and unburnt oil.

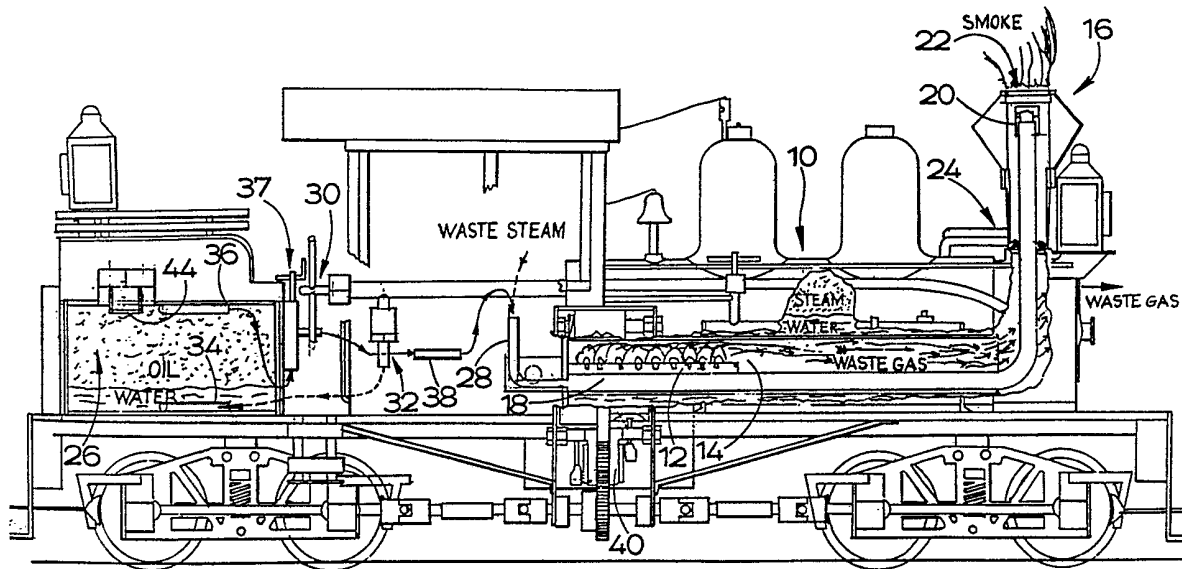


FIG.1.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

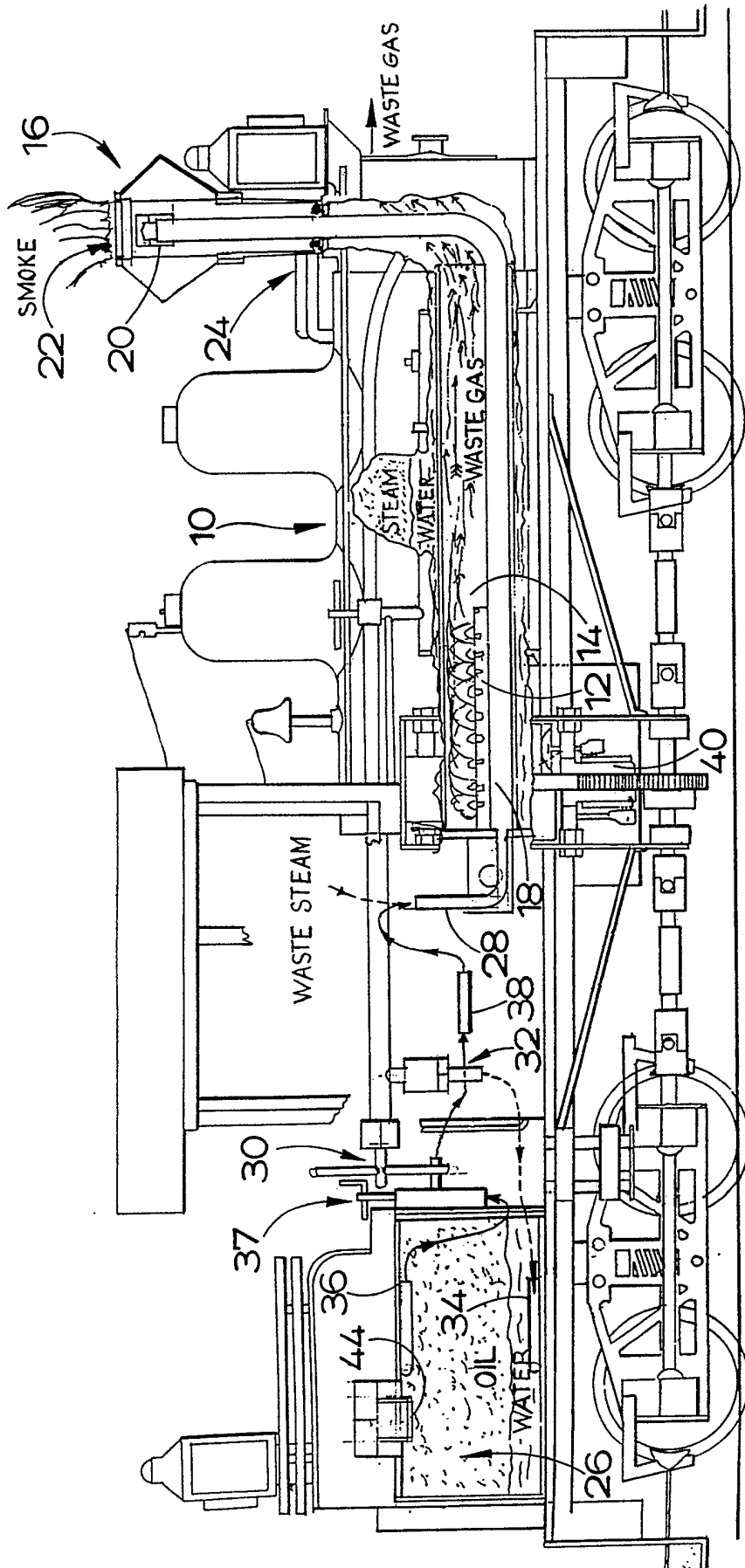


FIG. 1.

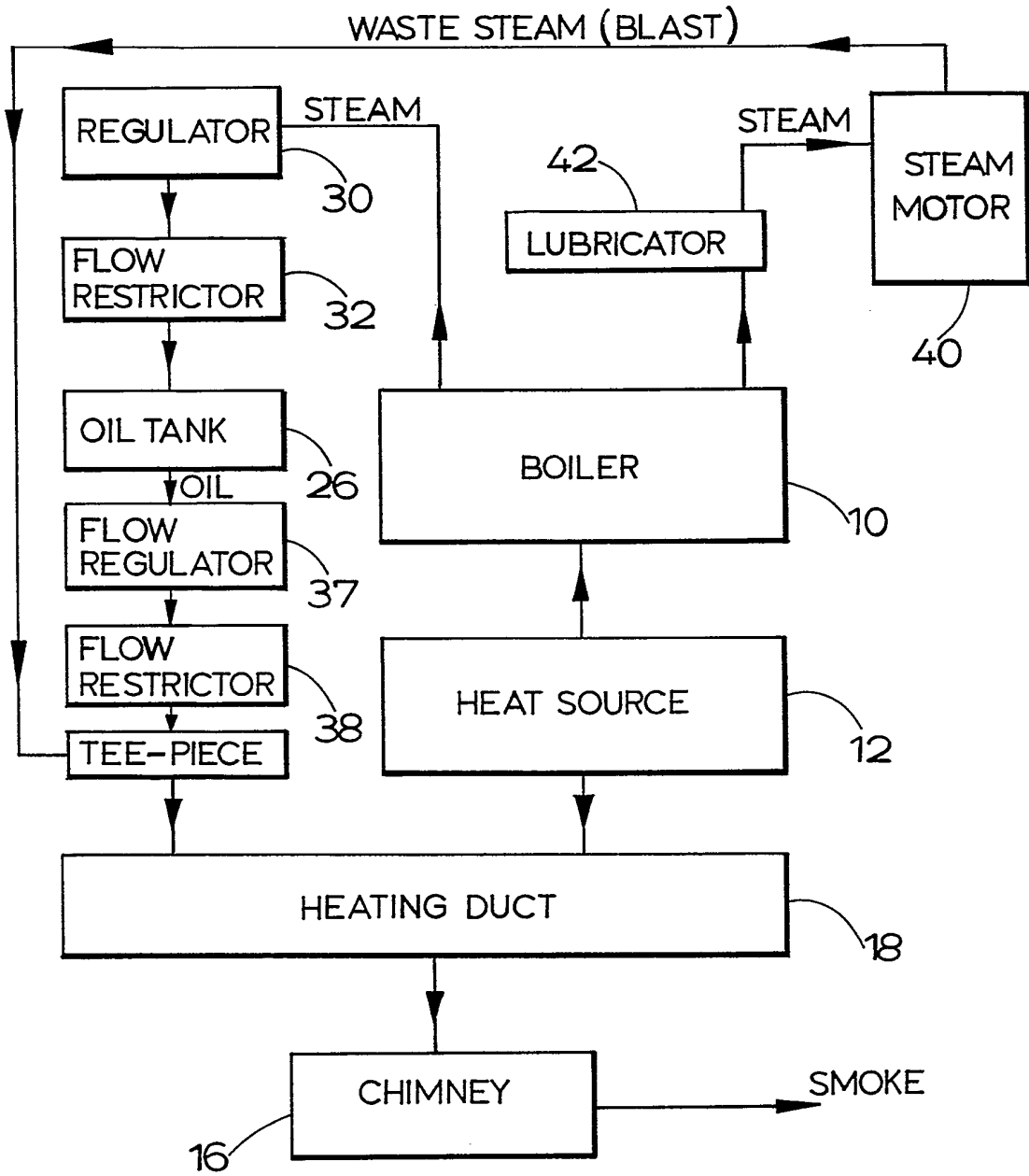


FIG. 2.

SMOKE GENERATION IN STEAM MODELS

Coal-fired steam boilers tend to produce a great deal of smoke exhaust, and smoke emission from steam-driven railway locomotives, traction engines, riverboats, stationary engines etc. is a very evident common characteristic amongst them.

Such steam-driven vehicles and engines are a popular subject for model makers, who strive to reproduce in working models the appearance of the original machines in operation as faithfully as possible.

The production of a realistic smoke emission from such steam models has long been a problem. Even if coal fired, the effects of scale mean generally that the amount of smoke emitted from the model's boiler will be less than it should be proportionately for accurate reproduction. Many steam models are not coal-fired at all but may, for example, have gas-fired boilers which produce by themselves virtually no visible smoke. Commonly waste steam may be exhausted through a chimney to give a smoke-like appearance, but the "smoke" quality produced is very dependent upon the ambient atmospheric conditions.

It is an object of the invention to enable a steam model to produce a more realistic smoke emission than has generally been provided hitherto.

In accordance with the invention in one of its aspects a method of causing a smoky exhaust to be emitted from a steam model comprises mixing oil with pressurised steam and heating the oil and steam mixture

sufficiently to cause the oil to smoke, the smoke being exhausted from the model through a smoke outlet.

5 Such a technique can, of course, be employed  
whether or not the model is actually steam driven.  
That is to say, models are sometimes powered  
electrically, or otherwise, but a steam boiler can be  
incorporated for the realistic provision of steam  
effects. Provided there is a pressurised steam supply  
10 available, the invention may be put into effect.

Any suitable oil may be used. Additives, for  
example potassium nitrate, may be included to increase  
the smoke output. The steam and oil mixture may be  
15 passed through a hot heating duct leading to the smoke  
outlet, the oil being introduced into the steam  
entering the duct. The steam may conveniently comprise  
the blast (ie the exhausted waste steam) from a steam  
motor which powers the model. The heating duct may  
20 pass through a heating chamber which contains a burner  
employed in a steam boiler, the duct so being heated  
(at least indirectly) by heat from the burner; the  
duct may extend through a flue passage which takes hot  
waste gases away from the burner.

25 Some provision is most preferably made to capture  
unburnt oil from the heating duct and prevent its  
being discharged through the smoke outlet. This may  
comprise a suitable kind of diffuser and/or baffle  
30 arrangement at the outlet end of the heating duct. The  
captured oil may be collected for disposal.

In another of its aspects the invention provides a  
method of causing a smoky exhaust to be emitted from a  
35 steam model, the method comprising utilising steam  
under pressure to draw a smoke-producing medium through

a hot heating duct leading to a smoke outlet from the model, the medium being heated sufficiently in the hot duct to cause the medium to generate smoke and the smoke being exhausted through the smoke outlet.

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The smoke-producing medium could comprise, for example, potassium nitrate to generate the smoke.

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There now follows a detailed description, to be read with reference to the accompanying drawings, of a model steam locomotive which in its construction and operation illustrates the invention by way of example.

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In the accompanying drawings:

Figure 1 is a cut-way drawing of a model steam locomotive; and

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Figure 2 is a flow chart illustrating the operation of a smoke generator of the locomotive.

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A steam-powered model railway locomotive comprises a boiler 10, of a broadly conventional construction. A gas burner 12 is positioned within one end of a burner tube 14 which extends through the boiler to heat water in the boiler. The tube serves also to provide a flue to take waste gases away from the burner to an outlet (not shown) at the front end of the locomotive; the outlet is separate from a chimney 16, and the waste gases are not led to the chimney. Air can be supplied to the burner, and water in the boiler turned to steam, in a conventional manner of operation of the boiler.

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Additionally within the burner tube 14 there is a heating duct 18 forming an expansion pipe of a smoke

generator. The duct extends horizontally the full length of the tube 14, and beyond the boiler is directed vertically upwards into the chimney 16. An outlet from the duct 18, within the chimney 16, is fitted with a diffusion cap 20. The chimney forms a vertical cylindrical chamber housing the duct outlet to capture unburnt oil coming from the duct, as hereinafter referred to. The chamber is covered at its upper end by a perforate baffle 22 and closed at its bottom end. Oil drain pipes 24 lead from adjacent to the bottom end to drain away the captured oil to a collecting tank (not shown).

A bunker of the locomotive serves as an oil storage tank 26 from which oil can be fed steadily to an inlet 28 of the duct 18. Suitable feed lines provide for steam to be fed by way of a regulator 30 and a flow restrictor 32 into a bottom inlet 34 of the tank 26. Feed lines also provide for oil so displaced from a top outlet 36 of the tank 26 to be fed through an oil flow regulator 37 and a flow restrictor 38 to one of two available inlet arms of a tee-piece junction (not shown) fitted with its outlet arm to the duct inlet 28.

The locomotive is arranged to be driven by means of a steam motor 40. Steam from the boiler 10 is passed to the motor through a lubricator 42 in a conventional way. Further feed lines are provided to direct the blast (i.e. the waste steam) exhausted from the motor 40 into the other inlet arm of the tee-piece fitted to the duct inlet 28.

In operation of the locomotive, the gas burner 12 is operated to raise steam in the boiler 10. That steam is used to drive the motor 40 and so propel the

locomotive. Some of the steam is directed through the restrictor 32 as a low flow supply to the inlet 34 at the bottom of the oil tank 26.

5           The tank 26 is initially almost filled with oil (optionally containing a certain amount of potassium nitrate) through a filler 44, but is topped up with a small amount of water which sinks to the bottom. The steam fed into the tank through the inlet 34 causes  
10 corresponding displacement of oil through the outlet 36 at the top of the tank. The displaced oil so becomes fed, by way of the regulator 37 and restrictor 38, to the tee-piece at the duct inlet 28. The regulator 37 is suitably adjusted.

15           As previously referred to, the blast from the motor 40 is also supplied to the tee-piece and the pressurised steam and oil become thoroughly mixed as they enter the duct inlet together. The oil and steam  
20 mixture then passes through the hot duct 18 within the burner tube 14 and so becomes heated. The system is arranged so that the degree of heating is sufficient for the oil to be caused to smoke strongly. At the diffusion cap 20, at the outlet from the heating duct  
25 within the chimney 16, liquids are so far as possible separated from the gases and a smoky exhaust leaves the chimney 16 through the smoke outlet at the baffle 22. The baffle serves both to stop particles of hot oil escaping into the atmosphere (which could be a safety  
30 hazard) and to diffuse the smoke. The liquids (oil and condensed steam) captured within the chimney are drained off through the drain pipes 24 for collection.



CLAIMS

1. A method of causing a smoky exhaust to be emitted from a steam model, the method comprising utilising  
5 pressurised steam to draw a potentially smoke-producing medium through a heating duct leading to a smoke outlet from the model, the medium being heated sufficiently within the heating duct to cause it to generate smoke which becomes exhausted with the steam through the  
10 smoke outlet.
2. A method according to claim 1 in which the blast from a steam motor is utilised to draw the smoke-producing medium through the heating duct.  
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3. A method according to either of claims 1 and 2 in which the smoke-producing medium comprises oil.
4. A steam model comprising a heating duct leading to  
20 a smoke outlet, means for heating the duct, means for introducing a flow of steam from a pressurised source into the duct, and means for introducing a potentially smoke-producing medium into the steam flow so that the medium becomes drawn through the duct, the arrangement  
25 being such that in operation of the model the medium can be heated sufficiently in the heating duct to cause it to generate smoke which becomes exhausted with the steam through the smoke outlet.
- 30 5. A steam model according to claim 4 in which the heating duct extends through a boiler flue in order to be heated by boiler-heating means.
- 35 6. A steam model according to either of claims 4 and 5 comprising a steam motor, blast from the motor

being directed into the heating duct to provide the steam flow through the duct.

5 7. A steam model according to any one of claims 4, 5 and 6 comprising a reservoir for oil and means for introducing steam into the reservoir to cause oil to be displaced and discharged into the steam flow through the heating duct.

10 8. A steam model according to any one of claims 4 to 7 in which an outlet end of the heating duct is enclosed within a collection chamber arranged to collect any condensate and unburnt medium leaving the duct.

15 9. A method of causing a smoky exhaust to be emitted from a steam model substantially as hereinbefore described.

20 10. A steam model adapted to operate substantially as hereinbefore described.

25 11. A steam locomotive constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

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Patents Act 1977  
 Examiner's report to the Comptroller under  
 Section 17 (The Search Report)

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Relevant Technical fields

(i) UK Cl (Edition K ) A6S

(ii) Int Cl (Edition 5 ) A63H

Search Examiner

CASLING

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

13 FEBRUARY 1992

Documents considered relevant following a search in respect of claims

1-11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	EP 0042876 A1 TAMURA	CLAIM 1 AT LEAST



Category	Identity of document and relevant passages	Relevant to claim(s)

**Categories of documents**

**X:** Document indicating lack of novelty or of inventive step.

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