Sept. 5, 1950 J. DASENBROCK 2,520,916

TOY PUFFING LOCOMOTIVE

Filed Feb. 25, 1944 2 Sheets-Sheet 1

Fig. 1

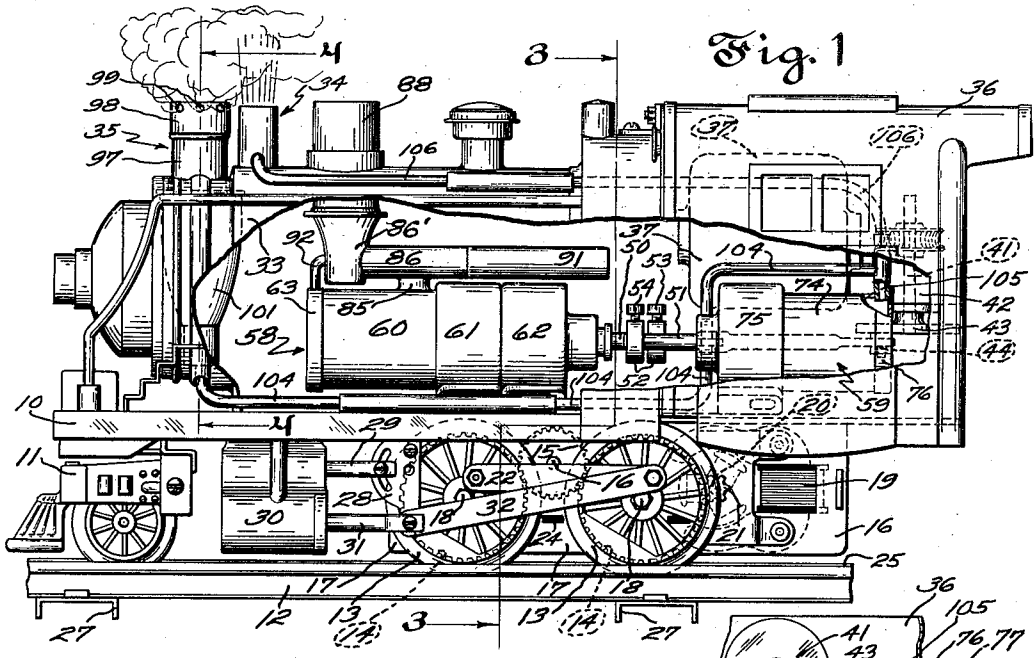


Fig. 3

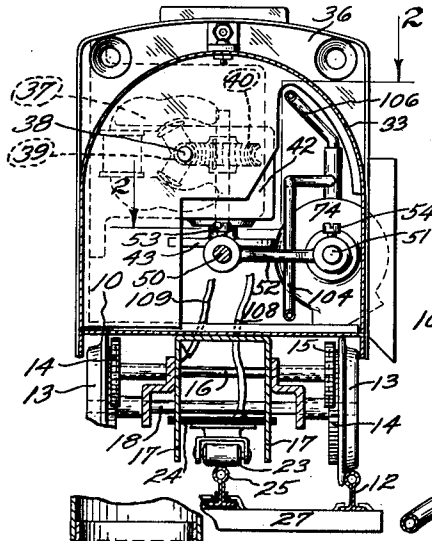


Fig. 4

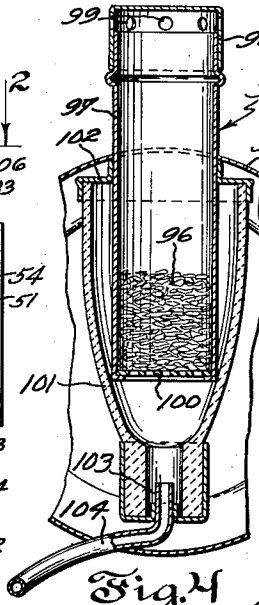


Fig. 2

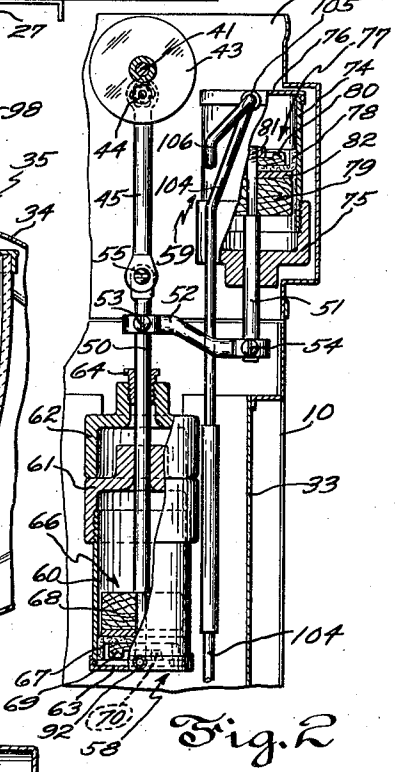
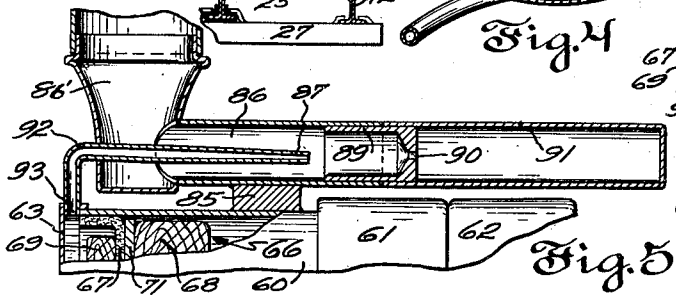


Fig. 5



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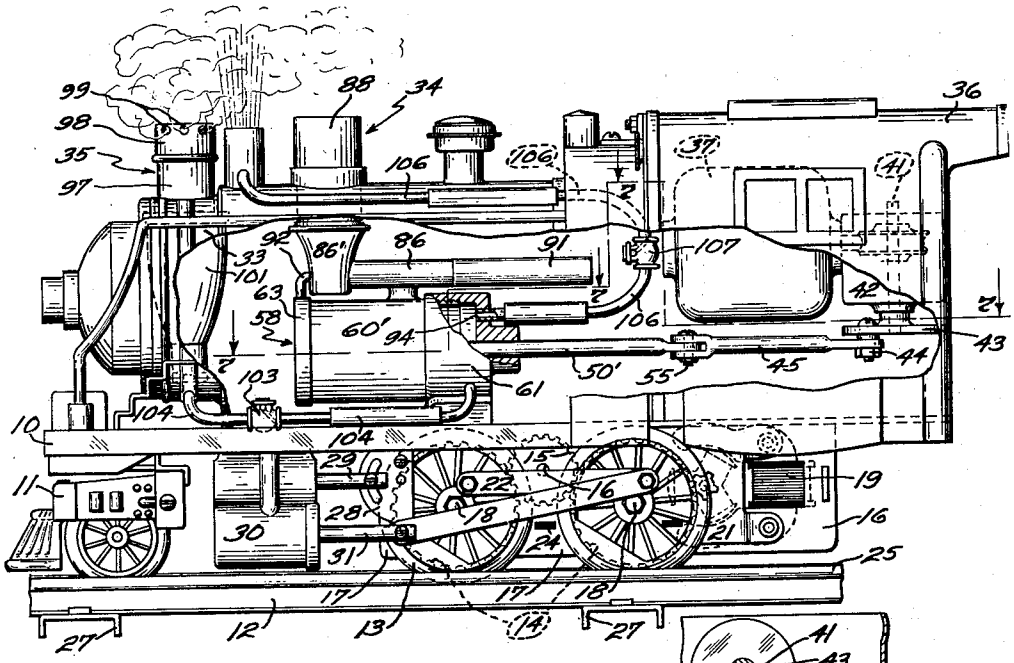


Fig. 6

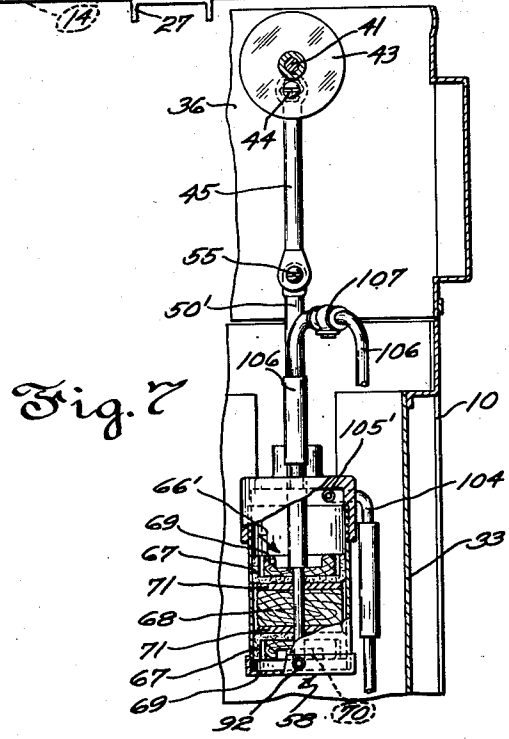


Fig. 7

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TOY PUFFING LOCOMOTIVE

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Application February 25, 1944, Serial No. 523,952

18 Claims. (Cl. 46—9)

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The present invention relates to apparatus that may be incorporated in toy railway rolling stock such as a toy locomotive for producing either in conjunction with puffing sounds, or in the absence thereof, the emission of visible smoke-like fumes from the toy locomotive in realistic intermittent puffs so that the performance of the fumes so discharged shall simulate the familiar puffs of smoke and steam emitted from the smoke stack of a real locomotive at each stroke of the power piston. Preferably the visible puffs of smoke and the accompanying puffing sounds shall not be limited to synchronous relation to the traction wheel speed of the toy locomotive. It is preferred however that the visible smoke puffs shall be given off in substantially synchronous relation to the occurrence of the puffing sounds as is the case in real railroading.

A further object is to provide apparatus for producing under both stopped and running conditions of a toy train puffing sounds along with the aforesaid visible puffs of fumes which apparatus shall be of such miniature size that substantially all of it may be contained and concealed within the boiler casing and/or engineer's cab of a toy locomotive fashioned in imitation of corresponding parts in a real steam locomotive.

A further object is to make use of a common source of operating power, that may be separate from the traction power which impels the locomotive, for producing the puffing noises and for ejecting the smoke-like fumes.

In some forms of the invention it is an object to make use of the same pumping apparatus or elements thereof in common for producing both the puffing sounds and the visible puffs of fumes.

Another object is to draw smoke fumes through one course of conduit into the pump cylinder, or into a passageway for air and fumes having fluid communication therewith, and to discharge said smoke fumes out of the locomotive through a different course of conduit.

Another object is to cause fumes or vapor to be discharged from a locomotive stack in forceful puffs and also to cause smoke-like fumes to gently waft out of the locomotive in sufficient proximity to the forceful puffs of fumes or vapors to simulate the performance of mixed wafting smoke and forcefully puffing steam as emitted from the stack of a real locomotive.

A still further object is to supply mechanically separate motors for traction power and for power to operate the puffing apparatus with electric current from a common electrified track at variable voltages regulatable from a point of remote

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control by means of a variable transformer, rheostat, or the like so that like voltages impressed on both said motors may serve to run or accelerate one motor more speedily than the other depending upon the electrical characteristics inherent in the respective motors and the relative load conditions imposed thereon.

The foregoing and other objectives will appear in fuller particular in the following description of a preferred embodiment of the invention which description has reference to the appended sheets of drawings wherein:

Fig. 1 is a side elevation of a toy locomotive incorporating the present improvements standing on a section of toy railroad track, the side wall of the hollow locomotive body being broken away to expose apparatus for producing smoke and sound effects.

Fig. 2 is a fragmentary plan view of the said apparatus taken partly in section on the horizontal planes 2—2 in Fig. 3.

Fig. 3 is an endwise view taken partially in section on the vertical planes 3—3 in Fig. 1, looking in the direction of the arrows.

Fig. 4 is an enlarged fragmentary view of the fume generator and smoke wafting stack taken in section on the vertical plane 4—4 in Fig. 1, looking in the direction of the arrows.

Fig. 5 is an enlarged view taken in longitudinal central vertical section through a portion of the sound producing apparatus.

Fig. 6 illustrates a modified form of the invention wherein a single pump cylinder and a single pump plunger having two working faces takes the place of plural cylinders and pistons.

Fig. 7 is a fragmentary plan view taken partly in section on the planes 7—7—7 in Fig. 6.

As the present improvements concern principally the locomotive contained apparatus for producing sound and smoke effects, it will suffice to describe the wheeled body of the locomotive as composed of a chassis frame 10 having a pivotal front wheel truck 11 and a traction or power truck 17 impelled along track 12 by means of its driving wheels 13 which carry spur gears 14 respectively. Each of gears 14 is in mesh with a common idler gear 15 on each side of the locomotive and idler gears 15 are fixed on a cross shaft 16 journaled in the same power truck structure 17 that affords bearings for the axles 18 of the driving wheels 13. An electric traction motor 19 on power truck 17 has an armature shaft 20 carrying at least one pinion 21 that drivingly meshes with at least one of the wheel gears 14.

In usual manner a current collector in the form of conductive roller 23 is resiliently mounted by means of leaf springs on a bed plate 24 of insulative material carried by power truck 17 so that these rollers ride in conductive contact with the third or power rail 25 that is supported between and in insulated relation to the track rails 26 by conventional sleepers 27 or other suitable form of toy railroad track structure. An imitative steam cylinder 30 depends fixedly from the chassis frame 10 and provides slide bearing for a piston rod 31 that is swingably coupled to one of the driving wheels 13 by means of a pitman link 32. This set of moving parts may also include a swing plate 28, valve rod 29, and wheel connecting link 22, imitative of valve gear linkage etc., and duplicated on the far side of the locomotive body in Fig. 1.

The superstructure of the locomotive body further includes a hollow boiler casing 33 and engineer's cab 36 superimposed on the chassis frame. From the boiler casing there upstands a smoke wafting stack 35 and a vapor puffing stack 34.

Cab 36 contains an electric motor 37 rigidly mounted therewithin which has a horizontal shaft 38 carrying a worm 39 in mesh with a worm wheel 40 fixed on a vertical shaft 41 to comprise speed reduction gearing. The lower end of shaft 41 projects downward out of the reduction gear case 42 and thereat fixedly carries a crank disc 43 having a crank pin 44 on which is pivotally retained one end of a connecting rod 45.

Link 45 serves to impel back and forth simultaneously the piston rods 50 and 51 which are rigidly joined by a cross bar 52 made fast to the piston rods 50 and 51 by set screws 53 and 54 respectively. Connecting rod 45 is pivotally connected to piston rod 50 at 55. Piston rod 50 extends into and operates a sounder pump 58 while piston rod 51 extends into and operates a fume and/or vapor impulsing pump 59.

The sounder pump 58 is composed of a cylinder 60 rigidly mounted on chassis frame 10. A cap 61 affords slide bearing for piston rod 50 and closes the rear end of cylinder 60 while an outer cap 62 made rigid with cap 61 by welding, soldering or otherwise affords an outer slide bearing 64 for piston rod 50. The opposite or forward end of cylinder 60 is closed fluidtight except for blow outlet 93 by a cover cap 63. Fixed to piston rod 50 inside of cylinder 60 is a composite pump plunger or piston structure 66 made up of a conventional hat leather 67 backed by a block 68 faced by washer 71 against which the central web of hat leather 67 is firmly clamped by a retaining disc 69 of smaller diameter held by a nut 70 having threaded engagement with the front end of the piston rod.

The fume impelling pump 59 comprises a cylinder 74 rigidly supported in cab 36. The front end of this cylinder is closed by a cap 75 that affords slide bearing for piston rod 51. The rear end of cylinder 74 is pneumatically sealed by a cover cap 76. Within cylinder 74 piston rod 51 is made rigid with a composite pump piston 77 composed of a conventional hat leather 78 backed by a round block 79 faced by washer 82 against whose flat face the central web portion of hat leather 78 is firmly clamped by a retaining disc 80 held by nut 81 which has threaded engagement with the rear end of piston rod 51.

For producing intermittent sounds imitative of the puffing of real locomotive steam, pump cylinder 60 carries externally mounted thereon by

means of at least one rigid support 85 a horizontally elongated jet chamber 86 composed in part of a hollow elbow structure 86' the forward end of which opens upward through the top of boiler casing 33 when elongated by a vertical length of cylindrical tube 88. The rear end of jet chamber 86 is closely plugged by a bushing 89 containing the air fluctuating orifice 90. Removably supported on the rear projecting end of bushing 89 there is a totally closed horizontal resonance box 91 in the form of a horizontally elongated cylindrical cap having a snug slip fit on bushing 89. For playing a jet of air derived from sounder pump 58 into sound producing relationship to orifice 90, an L-shaped blow nozzle 92 has its lower air receiving end tapped into the sound pump cylinder 60 at 93 and has its tapering air discharge end directed toward and spaced from the lip of orifice 90 within the jet chamber 86. The opening through nozzle end 87 may measure in the neighborhood of $\frac{1}{32}$'' across while orifice 90 may be about $\frac{1}{16}$'' in diameter.

The beforementioned front or smoke wafting stack 35 of the locomotive may be formed by the projecting top end portion of a container of combustible substance 96 such as pipe tobacco or fragments of punk as is best shown in Fig. 4 where such container takes the form of a vertical tube 97 covered at its top end by a cap 98 containing lateral perforations 99. Tube 97 has its bottom end partially closed by a tobacco supporting screen or perforated floor plate 100. Tube 97 is shown to be seated in a bowl 101 or hollow cup-like structure whose walls may be of refractory material and joined in pneumatic sealed relationship to tube 97 by cap ring 102. Air and/or fumes can therefore reach or leave the bottom of combustible material 96 only through a length of conduit 104 leading rearward and communicating with the interior of the fume pumping cylinder 74 at 105. Figs. 2 and 3 show that a further course of conduit 106 leads the pumped out fluid contents of cylinder 74 upward and forward into the rear or puffing stack 34 of the locomotive. Combustion chamber 97, inclusive of tube 97, cap 99 and perforated floor 100, is removable as a unit from boiler casing 33 for emptying it of ashes and replenishing combustible material 96. For this purpose tube 97 may be made a snug slide fit in cap ring 102 and free to slide in and out of the boiler casing to which bowl 101 is removably attached.

Electrical connections, not fully shown, are partly indicated by insulated electric wires 108, 109 in Fig. 3, the former of which leads current from one electrical terminal of each of motors 37 and 19 to the current collector 23 and the latter of which serves to "ground" the opposite electrical terminal of each of said motors to the locomotive frame 10 whence through trucks 17 and wheels 13 circuit from power rail 25 is completed through track rail 12.

In the operation of the apparatus for producing combined audible and visible puffing effects herein described, it will be understood that whatever electrical potential is supplied to the rails 25 and 12 will be impressed in common and simultaneously upon traction motor 19 and traction-free motor 37, these two motors being constantly in shunt relationship across electrified rails 25, 12.

As motor 19 has the relatively heavy burden of impelling the locomotive with whatever train of rolling stock is hauled thereby while motor 37 has what may be a relatively light duty in

operating the sounder pump 58 and fume impulsing pump 59, any sudden increase of voltage impressed upon rails 25 and 12 by manipulating the control handle of a variable toy transformer or rheostat controlling current supplied to said rails may result in a more abruptly responsive speeding up of motor 37 than of motor 19.

This will enable the rapidity and forcefulness of puffing sounds produced by the play of successive jets of air pumped through nozzle 87 by piston 66 upon the edge of sound orifice 90 to be increased abruptly at will while the speed of locomotive travel only steadily and gradually picks up.

The piston 77 of pump 59 performs its strokes in unison with the strokes of the sounder piston 66 and by moving from right to left in Fig. 1 sucks air inward of the smoke wafting stack 35 through its apertures 99 and down through the burning supply of tobacco or other combustible fuel in the combustion chamber or smoke repository 97 and on through conduit 104 toward the cylinder 74 at the same time that sounder piston 66 forces a jet of air out of nozzle 92 to produce an audible fricative sound simulating the momentary escape of steam under pressure. Upon the return stroke of pistons 66 and 77 in unison air that has been impregnated by the fumes of smoke of the burning substances 96 in its travel toward or into cylinder 74 is forcibly puffed out of stack 34 through conduit 106. Fumes sucked toward pump 59 through conduit 104 may or may not reach that pump inasmuch as this conduit joins conduit 106 outside of such pump so that fumes from conduit 104 may pass directly into conduit 106 and therethrough to stack 34 without entering the pump.

As stacks 34 and 35 are so related that fumes or air or both discharged from stack 34 will be blown into and through hovering smoke or fumes that waft out of apertures 99, such wafting smoke or fumes will be upheaved momentarily by the vapor puffed out of stack 34 into successively rising billows of mixed smoke and air in realistic imitation of the visible puffing of a real steam locomotive.

While in the form of apparatus here shown, piston 77 may exert some blowing effect outward through stack 35 as well as through stack 34, the constriction afforded by apertures 99 will at least dampen any puffing effect at stack 35 and entirely prevent any actual ashes or soot or ignited particles from being blown out of this wafting stack.

Referring now to the modified apparatus shown in Fig. 6, the sound producing parts comparable to those shown in Figs. 1 to 5, inclusive, are designated by similar reference numerals. But a condensed form of pumping apparatus, in which pump cylinder 74 is omitted, is incorporated in this modification for producing puffs of smoke-like fumes in conjunction with the puffing sounds.

In Fig. 6, cylinder head 61 provides the sole slide bearing for piston rod 50' and contains an orifice 94 at the rear which is connected with puffing stack 34 through a line of conduit 106 in which is placed a check valve 107 restricting all flow of air and/or fumes through conduit 106 to a direction outward from cylinder 60' toward and through puffing stack 34. Intake of air through stack 34 by the suction of pump piston 66 is thus inhibited. Also in the modification of Fig. 6 conduit 104 leads into cylinder 60' and incorporates a check valve 103 which permits flow of air and/or fumes only in a direction away from the combustion chamber tube 97 toward and into cylinder 60' and inhibits flow of air or fumes in the opposite direction. Piston 66' is provided with parts like 67, 69, 70 and 71 on its rear as well as on its front face.

In Fig. 6, each stroke of piston 66' toward the left not only produces the hereinbefore described puffing sound but simultaneously sucks smoke or smoke-like fumes from combustion chamber 97 downward through the burning substance 96 and through check valve 103 and conduit 104 into the pump cylinder 60' so that on the return stroke of piston 66 toward the right in Fig. 6 such smoke or fumes are forced out of cylinder 60' through a different orifice 94, tube 106 and check valve 107 into the puffing stack 34. Return to combustion chamber 97 of fumes pumped out of cylinder 60' is prevented by check valve 103. Intake of air into cylinder 60' through conduit 106 is prevented by check valve 107. Hence the fumes of combustion in chamber 97 can never be forced out of the apertures 99 of wafting stack 35 by the action of pump 66' with the result that stack 34 alone will blow fumes through the smoke or fumes that buoyancy causes to waft from and hover above apertures 99 of stack 35. Such hovering smoke or fumes are thereby upheaved momentarily by fumes puffed forcefully out of stack 34 into successive rising billows of smoke in realistic imitation of the visible puffing of a real steam locomotive. The use of mechanically independent traction motor 19 and traction-free motor 37 enables motor 37 to operate pump 58 while the locomotive is standing still on the track and may thus operate to imitate the panting noise produced by the air pump of a locomotive which is commonly heard in the train shed of a railway station. Features of the sound producing apparatus disclosed herein are claimed in my copending application, Serial No. 523,953, filed February 25, 1944.

The foregoing and other modifications will be suggested by the disclosure hereof to those skilled in the art wherefore the appended claims are intended to cover all equivalents of structure and arrangement herein disclosed which fairly come within their terms.

I claim:

1. In a combined sight and sound effect apparatus for incorporation in toy structures the combination of, a toy structure having a discharge outlet for pseudo engine exhaust, a producer of pneumatic puffing sounds including a fluid impulser, a repository supplied with smoke-like fumes, and apparatus in said structure for causing fumes derived from said repository to depart from said discharge outlet including a course of conduit constructed and connected to lead fumes from said repository toward said fluid impulser and thence to said outlet.

2. In a combined sight and sound effect apparatus for incorporation in toy structures the combination of, a toy structure having a discharge outlet for pseudo engine exhaust, a producer of pneumatic puffing sounds including a fluid impulser, a repository supplied with smoke-like fumes, and apparatus in said structure for causing fumes derived from said repository to depart from said discharge outlet including a fluid impulser mechanically associated with the first said impulser together with a course of conduit constructed and connected to lead fumes from said repository toward said associated fluid impulser and thence to said outlet.

3. Means for causing visible vapor having the appearance of steam and/or smoke to exhaust intermittently out of a toy locomotive in synchronous relation to the occurrence of intermittent sounds imitative of escaping steam, including the combination with said locomotive of, a mechanical piston-like reciprocator in said locomotive having oppositely directed vapor pumping faces, a pneumatic sounder in said locomotive, an outlet for vapor in said locomotive, a passageway leading vapor from one face of said reciprocator to said sounder, and a second passageway leading vapor from the other face of said reciprocator to said outlet, together with means independent of and apart from said second passageway to impregnate with visible fumes the vapor forced through said second passageway by said other face of the reciprocator in a manner to impart to only the last said vapor the appearance of steam and/or smoke.

4. The combination with toy railway rolling stock including a toy locomotive having an outlet for the discharge of smoke-like fumes of, a repository carried by said rolling stock supplied with smoke-like fumes, a fluid motivating device, and apparatus carried by said rolling stock for causing fumes to flow from said repository and depart from said locomotive including a course of conduit constructed and arranged to lead fumes from said repository to said fluid motivating device and from the latter to said locomotive outlet through a passageway separated from said repository.

5. The combination defined in claim 4, in which the said course of conduit is so constructed that the said fumes in flowing therethrough from the said repository to the said outlet may or may not reach the said fluid motivating device.

6. The combination with toy train rolling stock including a toy locomotive of, a train carried sounder operative to fluctuate a flowing fluid in a manner to imitate steam puffing sounds, a train carried repository supplied with smoke-like fumes, and train carried pumping apparatus including common means operative to impel said flowing fluid and also to suck fumes toward said pumping apparatus away from said repository and thence to discharge said fumes from said locomotive.

7. The combination defined in claim 6 in which the said pumping apparatus includes at least one pump cylinder and a single reciprocative pump piston structure operatively arranged so that upon stroking in one direction the said flowing fluid is impelled and upon stroking in the same direction the said fumes are sucked away from the said repository.

8. A toy fume wafting and puffing locomotive including in combination, a fume container, a fume impulser, a fume wafting stack pneumatically connected to receive fumes from said container and disposed to permit said fumes to escape waftingly from said locomotive, and a puffing stack pneumatically connected to receive intermittent forced streams of fumes from said impulser and disposed sufficiently close to said wafting stack to direct escaping puffs of said fumes into and through said wafting fumes outside of said stacks.

9. The combination with toy train rolling stock including a toy locomotive of, a train carried sounder operative to fluctuate a flow of fluid in a manner to imitate steam puffing sounds, a train carried container of smoke-like fumes, and train carried fluid pumping apparatus including a pump cylinder and a unitary pump piston structure operatively arranged therein so that by stroking in one direction said flow of fluid is impelled and by stroking in the same direction fumes are sucked out of said container.

10. The combination defined in claim 9, together with a fume wafting locomotive stack and a vapor puffing locomotive stack both pneumatically connected with the said cylinder, wherein the said unitary pump piston structure is operatively arranged in said cylinder so that by stroking in the said one direction ambient air is sucked inward of said wafting stack through the said fume container into said cylinder and by stroking in the opposite direction mixed air and fumes are forced out of said puffing stack.

11. The combination defined in claim 9, together with a fume wafting locomotive stack and a vapor puffing outlet both pneumatically connected with the said cylinder, wherein the said unitary pump piston structure is operatively arranged in said cylinder so that by stroking in the said one direction ambient air is sucked inward of said wafting stack through the said fume container into said cylinder and by stroking in the opposite direction mixed air and fumes are forced out of said puffing stack, there being a check valve automatically operative to prevent passage of air from said piston structure to said puffing stack, and another check valve automatically operative to prevent passage of air from said puffing stack to said piston structure.

12. The combination with toy train rolling stock including a toy locomotive of, a train carried sounder operative to fluctuate a flow of fluid in a manner to imitate steam puffing sounds, a train carried container of smoke-like fumes, and train carried fluid pumping apparatus including a pump cylinder and a unitary pump piston structure operatively arranged therein so that by stroking in one direction said flow of fluid is impelled and by stroking in the opposite direction fumes are sucked out of said container.

13. A toy fume wafting and vapor puffing locomotive including in combination, a fume container, a vapor impulser, a fume wafting stack pneumatically connected to receive fumes from said container and disposed to permit said fumes to escape waftingly from said locomotive, and a puffing stack pneumatically connected to receive intermittent forced streams of vapor from said impulser and disposed sufficiently close to said wafting stack to direct escaping puffs of said vapor into and through said wafting fumes outside of said stacks.

14. Means for causing fumes having the appearance of steam and/or smoke to exhaust intermittently out of a toy locomotive in synchronous relation to the occurrence of intermittent noises having the sound of puffing steam, including the combination of, air pumping apparatus including a pump cylinder and a piston-like reciprocator therein having oppositely directed air pumping faces, a pneumatic sounder in said toy locomotive, an outlet for vapor and fumes in said toy locomotive, a passageway to said sounder leading from said cylinder a flow of air pumped by one face of said reciprocator, a second passageway leading to said cylinder a flow of air pumped by the other face of said reciprocator, a third passageway leading from said cylinder to said outlet a flow of air pumped by said other face of the reciprocator, and means to impregnate with smoke like fumes the air led through said second passageway.

15. The combination with a toy locomotive of, an electric motor carried by said locomotive operative to impel the same, a producer of pseudo steam puffing sounds carried by said locomotive including a pneumatic pump, a repository carried by said locomotive supplied with smoke-like fumes, fume impulsing apparatus carried by said locomotive including another pneumatic pump operative to incite fumes derived from said repository and to cause said fumes to depart from said locomotive in successive visible puffs, connections cooperatively associating said sound producer and said fume impulsing apparatus constructed and arranged to relate synchronously the occurrence of said visible puffs with the occurrence of said puffing sounds an electrical prime mover carried by said locomotive operatively connected to impel both of said pumps, and circuit connections arranged to transmit to said motor and to said prime mover sufficient energizing current to operate said motor and/or said prime mover at respectively independent speeds.

16. The combination with a toy locomotive of, an electric motor carried by said locomotive operative to impel the same, a producer of pseudo steam puffing sounds carried by said locomotive including a pneumatic pump, a repository carried by said locomotive supplied with smoke-like fumes, fume impulsing apparatus carried by said locomotive including another pneumatic pump operative to incite fumes derived from said repository and to cause said fumes to depart from said locomotive in successive visible puffs, connections cooperatively associating said pumps in a manner to synchronously relate the occurrence of said visible puffs with the occurrence of said puffing sounds an electrical prime mover carried by said locomotive operatively connected to impel both of said pumps, and circuit connections arranged to transmit to said motor and to said prime mover sufficient energizing current to operate said motor and/or said prime mover at respectively independent speeds.

17. A toy locomotive comprising a wheeled chassis carrying superimposed thereon a horizontally elongated casing fashioned externally to simulate a locomotive having a puffing outlet at the forward end thereof and an engineer's cab at the rear end, said chassis carrying at a higher level than its wheels and within said casing a horizontal series of puffing devices arranged in the following order, an electrically powered rotary crank within the cab end of said casing, a push-pull device connected to be reciprocated by said crank, a reciprocative pump operable by said device, and a chamber supplied with smoke-like fumes, together with passageways for said fumes affording fluid communication between said chamber and said puffing outlet and between said pump and said chamber.

18. A toy locomotive comprising a wheeled chassis carrying superimposed thereon a horizontally elongated casing fashioned externally to simulate a locomotive having a puffing outlet at the forward end thereof and an engineer's cab at the rear end, said chassis carrying at a higher level than its wheels and within said casing a horizontal series of puffing devices arranged in the following order, an electrically powered rotary crank within the cab end of said casing, a push-pull device connected to be reciprocated by said crank, a reciprocative pump operable by said device, a pump operated pneumatic sounder, and a chamber supplied with smoke-like fumes, together with passageways for said fumes affording fluid communication between said chamber and said puffing outlet and between said pump and said chamber.

JOHN DASENBROCK.

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