

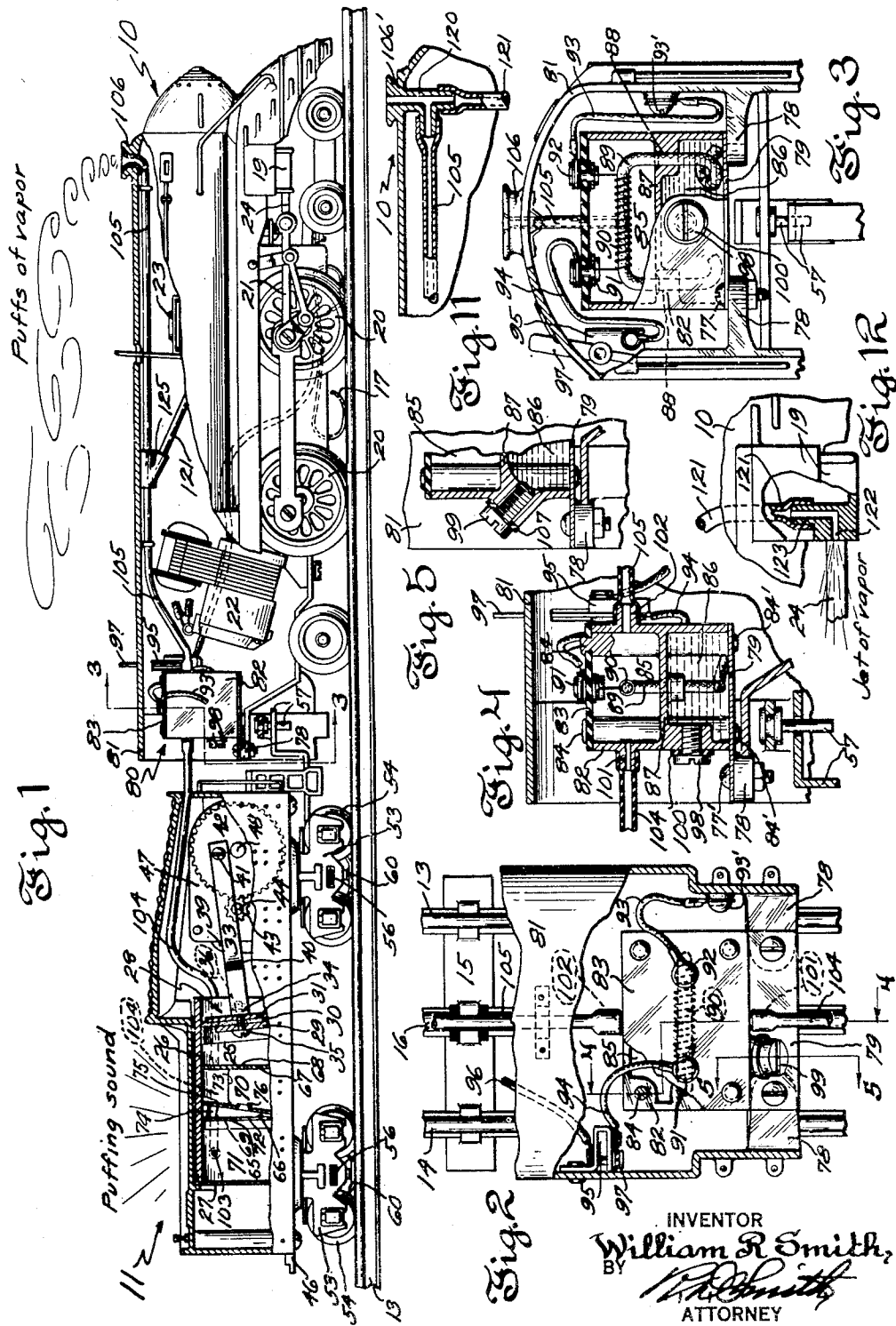
Feb. 15, 1949.

W. R. SMITH
VAPOR GENERATION AND PUFFING WITH
AUDIBLE EFFECTS IN TOYS

2,461,664

Filed Aug. 30, 1941

2 Sheets-Sheet 1



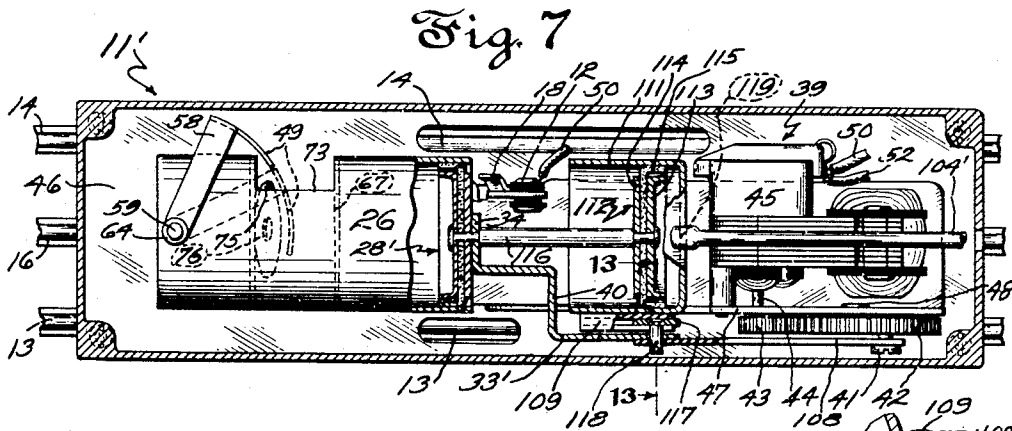
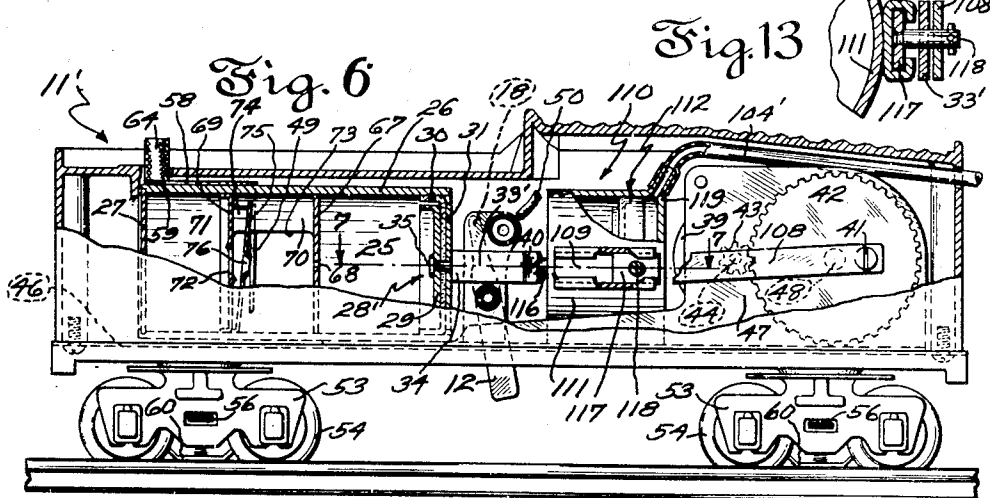
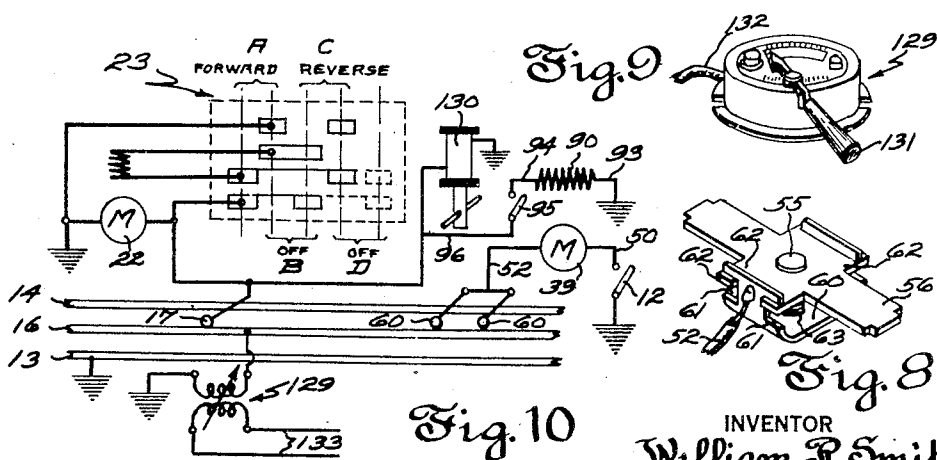
Feb. 15, 1949.

W. R. SMITH
VAPOR GENERATION AND PUFFING WITH
AUDIBLE EFFECTS IN TOYS

2,461,664

Filed Aug. 30, 1941

2 Sheets-Sheet 2



INVENTOR
William R. Smith,
BY
R. R. Smith
ATTORNEY

UNITED STATES PATENT OFFICE

2,461,664

VAPOR GENERATION AND PUFFING WITH
AUDIBLE EFFECTS IN TOYS

William R. Smith, Philadelphia, Pa., assignor to
The A. C. Gilbert Company, New Haven, Conn.,
a corporation of Maryland

Application August 30, 1941, Serial No. 409,056

53 Claims. (Cl. 46—113)

1

A copending application Serial No. 366,892, now U. S. Patent No. 2,317,974, discloses sound producing apparatus incorporated in electrically powered toy trains or model trains for effectively imitating the puffing noise of a steam locomotive.

The present invention relates to ways and means for producing either in conjunction with such puffing sounds, or in the absence thereof, the emission of visible fume laden smoke-like vapor from a toy locomotive or other toy structure in realistic puffs, and in the case of a toy locomotive so that the performance of the vapor shall simulate the familiar puffs of smoke and steam which are discharged by a real locomotive at each stroke of the pistons in their power cylinders and without of necessity being limited to synchronism with the traction wheel speed of my toy locomotive.

An object of the invention is to produce puffs and wafting billows of visible vapor in miniature form which shall resemble in color and density, and in wafting and dwelling behavior the actual puffs of steam and smoke given off by a real steam engine such as drives a locomotive.

A further object is to augment the effectiveness of the above mentioned imitative puffing sound by the added spectacle of visible smoke puffs given off preferably in predetermined time relation, and if desired in substantial synchronism, with the occurrence of the puffing sounds.

A further object is to generate and store for thus being ejected from a toy locomotive or other toy structure visible vapor smoke or fumes which shall be entirely harmless to a child playing with the toy, even if he were to breathe such vapors or if they were to come in sustained contact with sensitive tissues of the body. It is also an object to produce realistic visible vapor which shall be harmless to any of the home furnishings with which it may come in contact, and which shall be non-corrosive with respect to all metal and other materials of which the track or rolling stock of a toy train is composed.

A further object is to provide apparatus for generating and storing a continuous supply of such harmless vapor in sufficient quantity to produce under both stopped and running conditions of the toy train a satisfactory volume of vapor for the indicated purpose and yet which apparatus shall be of miniature size and be containable entirely within the unenlarged interior of a conventional toy locomotive or other piece of toy rolling stock hauled thereby, so that neither the presence nor the location of the vapor generating and storing apparatus shall in any way be indicated to the casual observer.

2

A further object is to produce the visible vapor from a consumable material which shall undergo a small rate of consumption in proportion to the volume of vapor produced so that in the process of generating the vapor the material will last for a maximum period before needing replenishment.

A further object is reliably to confine the material from which the vapor is generated against spilling or accidental escape regardless of whether the toy rolling stock by which it is carried is overturned or violently shaken. Another object is to provide for very convenient replenishment of the material whenever required.

A still further object is to generate visible vapor in sufficient volume by the use of heat of such low degree that no temperature capable of burning or harming children can be built up in any of the structure of the toy rolling stock, locomotive or other toy structure which can come into contact with the person of a child playing with it.

A still further object is to utilize, for generating the heat that is made use of to convert the material into visible vapor, electric current derived from the same track rails by which the locomotive is powered.

A further object is to produce visible vapor in the form of fumes free from unpleasant odor, and scented with any agreeable odor desired. It will enhance the realism of the toy to scent the fumes to simulate the odors of steam and smoke given off by a real steam locomotive.

A further object is to make use of a common source of fluid pressure for producing the puffing noise and for ejecting the visible vapor, and to cause such pressure to act through instrumentalities involving fluid communication between the sound producing device and the means for generating or storing the vapor.

A still further object is to make use of a common motivator or a common prime mover separate from the tractional motor of the toy locomotive for operating the sound producing devices and the vapor ejecting devices.

Still another object is to make the vapor generating and ejecting apparatus easily applicable to and removably from an otherwise conventional toy locomotive or other form of hollow toy or rolling stock, and to make the vaporizable substance easily replenishable when needed without so removing the apparatus.

The above and other objectives will become more thoroughly apparent from the following description of an illustrative embodiment of the invention in which description reference is had to the accompanying drawings, wherein:

Fig. 1 is a side elevation showing partially in section an electrically impelled toy locomotive fashioned after a real steam locomotive together with the toy tender hauled thereby as part of a full toy train (not shown) incorporating apparatus embodying the present inventions.

Fig. 2 is a plan view of the rear end or cab section of the locomotive drawn on an enlarged scale and showing the roof of the cab broken away to expose certain vapor generating and storing apparatus contained therein.

Fig. 3 is an end view of the cab compartment of the toy locomotive taken partly in section on the planes 3—3 in Fig. 1 looking in the direction of the arrows.

Fig. 4 is a fragmentary view taken in section on the planes 4—4 in Fig. 2.

Fig. 5 is a fragmentary view taken in section on the plane 5—5 in Fig. 2.

Fig. 6 is a view showing on an enlarged scale in side elevation with side walls partially broken away a toy tender incorporating apparatus embodying a modified form of the invention.

Fig. 7 is a plan view taken partially in section on the plane 7—7 in Fig. 6.

Fig. 8 is a perspective view of one of the current collector shoes detached from one of the wheel trucks of the tender of Fig. 1 or 7.

Fig. 9 is a perspective view of a voltage modulating and current switching electrical controller which may be employed in the electrical system of Fig. 10.

Fig. 10 is a diagram of the electrical apparatus and circuit connections.

Fig. 11 shows a modified provision for tubing connection at the stack.

Fig. 12 is a fragmentary view of the cylinder section of the locomotive shell broken away to expose interior construction.

Fig. 13 is an enlarged fragmentary view taken in section on the plane 13—13 in Fig. 7 looking in the direction of the arrows.

As in the aforesaid Patent No. 2,317,974, Fig. 1 of this application shows the ordinarily empty hollow space within the enclosing walls or body shell of locomotive tender 11 to contain a sound producing apparatus which operates to imitate faithfully puffing sounds made by the intermittent exhaust of steam and smoke in a real steam locomotive. The structure of the fluid impulsing or fluid activating sound producing apparatus includes a horizontal hollow cylinder 26 one end of which may be completely closed by a cap 27 and the other end of which is open and receives in sliding engagement therewith an impuler or reciprocator here shown in the form of a conventional composite air pump plunger 28 made up of a rigid disc 29 of somewhat smaller diameter than the inside of the cylinder 26 to which disc is secured a cupped washer 30 of very flexible material, such as oil-soaked leather, whose flexible peripheral flange fills and slidably engages with the interior surface of the cylinder 26 in a manner fully to partition the latter even when disc 29 occupies positions of oblique inclination to the axis of the cylinder as indicated in Fig. 1. The inner face of plunger 28 thereby serves as an air impelling instrumentality for generating air flow. Flexible washer 30 is backed up by a stiff plate 31. Plunger 28 is pulled and pushed back and forth lengthwise of the cylinder by a pitman bar 33 whose bent over end 34 has threaded engagement with screw 35 and is clamped fixedly against backing plate 31 by means of this screw which penetrates and holds together the disc 29, cup

washer 30, and backing plate 31. A lock nut 36 prevents these parts from working loose.

To permit a prime mover in the form of an electric motor, indicated as a whole by 39, to be located at the end of cylinder 26 within the tender 11, pitman bar 33 is provided with an offset bend 40. At its end remote from plunger 28 pitman 33 is pivotally connected at 41 to the outer face of a gear 42 which is rotatably supported on frame plate 47 at 48 and thus serves as a crank for reciprocating pitman 33. Gear 42 is constantly in mesh with a small pinion 43. Pinion 43 is fast on one end of the armature shaft 44 of motor 39 which shaft has bearings in bearing plates such as 47 of the motor which structural details are more fully shown in U. S. Patent No. 2,317,974. The motor is fixedly carried on the floor 46 of tender 11 by means of the aforesaid upright frame plate 47 which may be secured to floor 46 by spot welding, or if preferred in some detachable manner as by removable screws or the like.

An electrical switch 12 carried by tender 11 is connected to throw motor 39 into or out of circuit with the power rail 16 and traction rails 13, 14 through lead wires 50 and 52, the swingable blade 17 of which switch is grounded to the frame of the tender and is thus electrically in circuit with traction rails 13, 14 through the truck 53 and wheels 54 of the tender. A spring stud 55 is fixedly carried in the insulated bar 56 which spans the width of each wheel truck 53 and has its ends fixedly lodged in apertures in the side walls of the wheel truck. As best shown in Fig. 8, the U-shaped current collector shoe 60 has upwardly extending ends whose side edges are notched at 61 to be guided and limited as to vertical movement by forked arms 62 formed on the insulated bar 56 and occupying the notches 61 in the shoe. A coiled spring 63 is conductively anchored to the bottom end of stud 55 and extends to and presses downward against a central struck-up projection in shoe 60 by means of which the bottom end of spring 63 is retained against lateral displacement. The flexible lead wire 52 from motor 39 is soldered to shoe 60.

The use of the current collector shoe 60 on each of the two trucks of the tender insures uninterrupted performance of the vapor puffing effect even though one of these collector shoes might fail to be in contact with the current supply rail at some position in which the train comes to rest near a turn-out track switch or the like.

Cylinder 26 may be regarded as made up of three end-to-end tubular sections such as pump section 25 forming a pump compartment in which a pump piston such as plunger 28 reciprocates, section 70 forming an air discharge compartment, and section 71 forming the sound compartment. The pump and air discharge compartments are separated by a stationary partition 67 which may be cast integrally with the cylindrical walls or may take the form of a wall of sheet metal or other material thinner than shown in the drawing and peripherally fitting the interior of cylinder 26 so as to make a pneumatically tight joint. Partition 67 contains a small central orifice 68 at which a stream of air may be generated and projected toward the left in Figs. 1 and 6 when plunger 28 moves in that direction. The air discharge compartment and sound compartment are separated by a stationary partition 69 which is preferably rigid throughout and may take the form of a dished cup of sheet metal or the like whose peripheral flange fits and forms an air tight joint with the interior surface of cylinder 26.

Partition 69 is provided with means for fluctuating air flow in the form of an elongated aperture 72 which is both wider and longer than orifice 68, and whose ends are bordered by oppositely inclined lips 65 and 66 of eyelid shape formed by warping, in respectively opposite directions from the plane of the partition, the otherwise flat sheet material of which partition 69 is composed, as is more clearly set forth in the aforesaid Patent No. 2,317,974.

In the last said patent it is set forth that orifice 68 may be .076" in diameter, circular hole 76 may be $\frac{1}{8}$ " in diameter and aperture 72 may be $\frac{1}{4}$ " wide by $\frac{1}{4}$ " long, where the diameter of the sound chamber is $1\frac{1}{4}$ " and the spacing from partition 67 to partition 69 is $1\frac{1}{4}$ "; and that the foregoing are merely suggestive dimensions which may be varied proportionally or in degree. They in no way limit the scope of the appended claims. Gear 42 may have sixty-four teeth and pinion 43 may have ten teeth whereupon if the gear turns 80 to 120 R. P. M. the pinion would rotate six times as fast, these also being but illustrative specifications.

Whereas partition 69, having a lipped aperture as described, is adequate to produce sounds for some of the purposes of this invention, it has been found in practice that the realism of various sounds it is desired to produce can be enhanced by the addition of other means for fluctuating air-flow in the form of an auxiliary stationary baffle plate 75 containing a simple centrally disposed circular hole 76 spaced from aperture 72 toward the ejection orifice 68. It has further been found of advantage to incline plate 75 in relation to the axis of partition 69 and cylinder 26 and preferably at about the angle shown in Fig. 1. The entire periphery of hole 76 may be lipped toward the stream of air coming toward it from orifice 68 as shown in Fig. 1 and this lipped hole may be made $\frac{1}{4}$ " in diameter in which case $\frac{1}{8}$ " is a satisfactory width for aperture 72. For the purpose of so holding baffle plate 75 in relation to partition 69, mounting tabs such as 74 are provided having suitable differing axial length which may be secured to partition 69 by soldering, welding or in a removable manner if preferred. A cut-out 73 in the wall of the cylinder section 70 gives generous communication with ambient air which enables the jet or flow of air from orifice 68 to play upon the hole 76 and aperture 72 and thereby become fluctuated with desirably loud sound effect. This cutout 73 plays a further important part in the pneumatic performance of the fume puffing apparatus next to be described.

The present improvements involve in particular the addition of smoke-like visible vapor generating storing and ejecting apparatus to the means for producing puffing sounds which has hereinbefore been described, and in a form adapted, as is the sound producing means, to be contained entirely within the unenlarged interior of a conventional toy locomotive or other piece of toy rolling stock hauled thereby so that neither the presence nor the location of the vapor generating and puffing apparatus shall be obvious to a casual observer of the toy train while in natural position on its track.

In keeping with these objectives, the smoke-like vapor generating and storing unit or fume reservoir of these improvements, which is indicated as a whole by 80, is located within the rear end or cab section 81 of the locomotive 10 just back of the locomotive traction motor 22. It consists of a compartmented box-like container 82 the en-

closure of whose interior is completed by a top plate 83 of electrical insulating material secured to container 82 in any desirable fixed or removable manner as by means of screws or rivets. Herein for simplicity and permanence of construction the container is shown to be die cast from a preferably ductile metal to form the upstanding stud formations 84 which project through holes in plate 83 and are peened over atop the same. Similar stud formations 84' hold the floor plate 79 of container 82 in liquid tight contact with the bottom edges of the side walls of the container and plate 79 projects rearwardly beyond such walls to form a mounting flange removably secured by screws 77' on top of support bosses 78 cast on the interior of the locomotive cab 81. Container 82 is divided into an upper smoke storing chamber reservoir 85 and a repository receptive to a replenishable substance herein illustrated as a lower oil containing chamber 86. Such reservoir and repository may be separated by means of a horizontal partition 87 which may be cast integral with the side walls of the container. Holes 88 which extend through respectively thickened sections of partition wall 87 comprise the only openings between the two chambers and these holes are completely filled and plugged by spaced stretches of a continuous length of wicking 89 which extends unbroken from one hole 88 to the other hole 88 within smoke chamber 85 but which has its two ends dangling on the floor wall of container 82 within the oil chamber 86.

Around a stretch of wick 89 made of braided asbestos or any other suitable material affording good capillary attraction for oil and occupying smoke chamber 85 there is tightly wound a coil of electrical resistance wire 90 whose ends connect respectively to binding posts 91 and 92 which are mounted on and penetrate through plate 83 being thus insulated from the metal of container 82. Ordinary non-oxidizing resistance wire of about .004" diameter by 8" long will be found to produce an acceptable degree of heat for the present purpose of converting the oil in wick 89 into potentially visible fumes when subject to a range of 7 to 15 volts, although the size and length of wire may be varied at will to suit conditions. Binding post 92 is grounded to the frame of the locomotive at 93' by means of lead wire 93 or in any other desired manner to insure good electrical connection for placing binding post 92 in circuit with traction rail 13, 14 through the medium of locomotive wheels 20, etc. Binding post 91 is connected by lead wire 94 to one terminal of an electric cut-out switch 95 whose other terminal is connected by lead wire 96 to the current collector shoe 17 of locomotive 10 which shoe constantly wipes against the "third" or power rail 16 of the electrified track. A handle 97 projects from the locomotive as a means for manually furnishing or cutting off current supply to heating coil 90 at will.

For replenishing the oil in chamber 86 the filler plug screw 98 may be removed. Gasket washer 100 clamped under the head of screw 98 prevents leakage of oil. Completely filling chamber 86 with oil through the opening plugged by screw 98 requires turning the locomotive up on end. However, an alternatively usable filler plug screw 99 whose head clamps the gasket washer 107 may serve as means for completely filling chamber 86 with oil without even removing the locomotive from its track or separating it from tender 11.

Smoke chamber 85 comprises a reservoir of

hooded nature shaped to store therewithin and to hinder the escape in unwanted directions therefrom of residual smoke or fumes derived from the heating of oil in wick 89 and has a rearwardly directed nipple 101 and a forwardly directed nipple 102. The cylindrical wall of sound compartment 71 may carry a similar nipple at 103. A length of flexible tubing 104 of rubber or other suitable conduit material connects with and extends from nipple 103 to nipple 101 thus giving fluid communication between sound compartment 71 and smoke chamber 85 and forming part of a passageway giving pneumatic communication between reservoir 85 and certain fume inciting or impulsing apparatus including the impulser or reciprocator 28 hereinbefore described. Flexible tubing 104 permits freedom of locomotive 10 and tender 11 to swerve relative to each other when the locomotive is hauling the tender by means of pivotal coupling 57 around curves in the track. Another length of flexible tubing 105 connects with and extends from nipple 102 to a vapor outlet at which the tube gives freely to the exterior of the locomotive through the imitative smoke stack 106. The combined tubing helps form a course of conduit which includes the fume chamber or reservoir 85. As an example of workable dimensions which have been found satisfactory in practicing the invention, where the smoke chamber measures approximately $1'' \times \frac{3}{4}'' \times \frac{1}{2}''$, the orifice in nipple 103 may be $\frac{3}{8}''$ in diameter and the orifices in nipples 101 and 102 may respectively be $\frac{3}{8}''$ and $\frac{1}{8}''$ in diameter. The inside diameter of tubes 104 and 105 may be $\frac{1}{8}''$.

In Figs. 6 and 7 an extra and separate pump or second fluid impulser indicated as a whole by 110 is provided additional to the cylinder 26 of the sound apparatus which cylinder in this modified form of tender 11' may remain in all respects as shown in the aforesaid Patent 2,317,974. Pump 110 comprises a cup-like structure or pump casing 111 interposed between motor 39 and the cylinder 26 its open end facing the open end of the latter. A pump plunger 112 similar to the pump plunger 28' is composed of a dished core 113, a backing plate 114, and sandwiched therebetween a cupped flexible piston 115 of leather or other suitable substance saturated or coated with grease or the like to enable its turned-over peripheral edge to engage slidingly with the inner cylindrical surface of pump casing 111 in a manner to force air toward the right in Figs. 6 and 7. As usual in air pump operation, this peripheral edge collapses radially inward to permit plunger 112 to slide toward the left in said figures without creating appreciable suction between the plunger and the right end of the pump casing. The inner face of plunger 112 thereby serves as a fluid impelling instrumentality for generating air flow. Core 113, plate 114 and flexible piston 115 are clamped fixedly together on one riveted-over end of a rigid piston rod 116 of reduced diameter and the opposite end of piston rod 116 is also reduced in diameter and penetrates and is riveted over against the dished core 29 thus clamping fixedly together said core 29, piston 30 and backing plate 31 of the pump plunger 28'. Also and by the same means there is fixedly clamped against backing plate 31, the turned-over end 34 of a lengthwise reciprocative bar 33' having offset 40 and whose opposite end pivotally engages an outwardly projecting stud 118 fixedly carried by cross head 117, the latter constituting a rectangular block freely slidable, confined and guided in the chan-

nel bracket 109 which is of C-shaped cross section and welded or otherwise secured fixedly against the outside of pump casing 111 as shown in Fig. 13. The pitman link 108 is pivotally coupled to the cross head stud 118 and also to gear 42 at 41 thus enabling rotation of this gear to reciprocate cross head stud 118 horizontally of the channel bracket and thereby reciprocate both plungers 28' and 112 in unison as a single reciprocator having oppositely directed vapor pumping faces in their respective pump casings 26 and 111. In the construction of Figs. 6 and 7 it will be appreciated that neither of the pump plungers 28' nor 112 are required to incline away from perpendicular relation to the axis of their cylindrical casings as they reciprocate therewithin.

Pump casing 111 is equipped with a nipple 119 similar to nipple 102 of Fig. 4 and a length of flexible tubing 104' fits over this nipple and extends to nipple 101 of container 82 as does tubing 104 in Fig. 1. Either tubing 104 or 104' may easily be detached from nipple 101 when it is desired to separate the tender from the locomotive. If desired the stack also may be equipped with an internal nipple, as 120 in Fig. 11, for the convenient gas tight attachment of tubing 105. In some cases this nipple may be of the L-branch type, one of whose branches will receive the supplementary tubing 121 which leads to the location of the imitative locomotive cylinder 19. As shown in Fig. 12, this cylinder may incorporate directly beside the locomotive piston rod 24 a rearwardly directed small orifice 122 for vapor arriving through tubing 121, the latter connecting to a nipple 123. In order to effect more even distribution between stack 106 and cylinder 19 of the steam-like vapor which is blown out of the generator 80, tubing 121 may, if desired, branch off from tubing 105 by means of some Y-branch connector as at 125, instead of at the L-branch nipple 120. In that case the latter could be plugged. Or if the L-branch nipple were used the Y-branch connector could be plugged. Or when vapor is to be delivered only to the stack of the locomotive, both nipple 120 and connector 125 may be plugged or omitted from the construction.

The operation will be described with reference to the diagram of circuit connections in Fig. 10. In both Figs. 9 and 10, a toy transformer 129 of the voltage modulating type is equipped with a voltage varying control handle 131 which can be swung away from an extreme position that will cut out all current supply to power rail 16, and through a range of other positions wherein various voltages, up to say 15 volts, will be impressed on the track circuit. Transformer 129 by means of an attachment cord 132 is adapted to be tapped into any ordinary household electric outlet delivering the usual 125 volts through mains 133. At quite low voltages within the indicated range of variable voltage under 15 volts the motor 39 on the tender 11 or 11' as energized through circuit 16-60-52-M-50-12-13 will run at low speed for producing puffing effects if switch 12 is closed. Simultaneously the locomotive traction motor 22 will be energized through the A or C positions of reversing switch 23 which alternate with positions B and D as the commutator drum of this switch is advanced step by step by successive strokes of the plunger of solenoid 130 at each cut-off and restoration of current supply to power rail 16 through regulating transformer 129. In these improvements

the locomotive motor 22 may remain stalled even though the reversing switch 23 stands as shifted by electromagnetic actuator 130 into positions A or C for impressing the same voltage upon motor 22 through circuit 16-17-23-22-13 as is impressed on motor 39. In general the greater the load which locomotive 10 is called upon to haul the more sluggish will be the pick up of motor 22 responsive to increase of voltage delivered to the locomotive through the same power rail 16 which feeds the more easily accelerated puffing effect motor 39. Construction and operation of reversing switch 23 and electromagnet 130 are set forth in fuller detail in formerly co-pending application, Serial No. 364,818, now U. S. Patent No. 2,348,616.

Since the speed of motor 39 increases with increase of voltage as controlled by transformer handle 131, the rapidity and intensity of puffing effects can be varied at will by this means of remote control and quite independently of the motion or speed of running of locomotive 10 or its traction motor 22. These puffing effects may consist of puffing sounds emitted from an invisible source within tender 11 which sounds therefore seem to the observer to come from the locomotive, itself, and such effects in the present improvements, further consist in the giving off of puffs of billowy visible vapor through the stack of the locomotive very realistically simulating smoke and/or steam in appearance and performance.

The vapor is generated according to this invention by heating resistance wire 90 to a temperature less than red hot through current in electric circuit 16-17-96-95-94-90-93-13. This in no way impairs nor burns nor tends to consume the wick 89 but vaporizes the oil which is fed out of chamber 86 along the wick thus keeping chamber 85 full of a supply of vapor or fumes.

At each reciprocative excursion of plunger 28 in Fig. 1, or of plungers 28' and 112 in Figs. 6 and 7, a fricative sound such as is made by abruptly exhausted steam and smoke in a real locomotive is produced by the play of a jet of air from orifice 68 upon the lips of partition apertures 76 or 72, and in correspondence with such sound a puff or billow of visible smoke-like vapor is blown out of the vapor generator 80 intermittently by means of the air impulses occasioned by motion of piston 28 or 112 in working or return conditions and transmitted from compartment 71 through tubing 104. This fluid inciting or activating effect of piston 28 or 112 causes vapor to leave chamber 85 through 105 and thus produces the appearance of a puff of smoke-like vapor leaving locomotive stack 106. If desired, a portion of this visible vapor may be diverted through a branch tube such as 121 to an outlet in the make-believe steam cylinder 19 of the locomotive thereat to be rearwardly spurted out in the close neighborhood of the engine piston rod 24 as a momentary jet of vapor of steam-like appearance which realistically imitates steam that commonly escapes from the packing about the piston rod in a real locomotive.

While the play of a jet of fluid through the orifice 68 of partition 67 into the air discharge compartment 70 is featured by all of the noise producing functions proposed in the aforementioned U. S. Patent No. 2,317,974, an additional and very important function is attributable in the present improvements to partition 67, orifice 68 and compartment 70 in that they baffle

the ability of the return stroke of piston 28 in Fig. 1 to create a suction in tube 104 that is capable of drawing smoke or fumes from container 82 backward through this tube.

Thus, whereas cylinder 26 is but illustrative of any sort of vapor constraining passageway that might be provided to afford pneumatic communication between the impuser or reciprocator 28 and fume reservoir 85 for directing toward residual fumes in such reservoir successive impulses derived from working motion of reciprocator 28, the cut out 73 in compartment 70 constitutes a bleeder opening in such passageway disposed in branch relation thereto in the neighborhood of reciprocator 28 and permits vagrant vapors to flow therethrough away from the reciprocator as well as toward said reciprocator through jet orifice 68 in a manner to dilute pneumatically the forcefulness with which the motion of the reciprocator 28 acts upon the residual fumes in reservoir 85. Bleeder opening 73 may be sufficiently large and sufficiently near reciprocator 28 to prevent the exertion of appreciable suction on the said residual fumes in the said reservoir by the said return motion of said reciprocator 28 toward the right in Fig. 1.

In the above described manner it will be appreciated that the occurrence of the puffs of visible vapor are synchronized with the occurrence of the puffing sounds as is characteristic of these respectively visible and audible effects in a real steam locomotive while both the periodicity and rapidity both of the sounds and visible puffs may at times be independent of locomotives travel or speed. It is possible by suddenly shifting the controller handle 131 to maximum voltage position to cause rapid and billowy clouds of smoke and imitative steam to be discharged from the locomotive stack while the locomotive is in fact only very slowly picking up speed in response to the same increase in track voltage. Thus the familiar phenomenon of actual rail-roading namely sudden bursts of loud rapid puffing noise and billowy clouds of mixed smoke and steam as ejected under forced draft when a heavy train is beginning to pick up speed, is faithfully reproduced in a toy train both in audible and visible form under the remote control of the transformer handle 131.

When the sound effect is desired without the smoke effect, switch blade 18 is shifted by the handle of switch 12 to switch the heating resistance coil out of circuit. When the visible smoke or steam effect is desired without the sound effect, the baffle 49 is shifted to intervene between orifice 68 and aperture 76 which cuts out the sound. Baffle 49 may be of any suitable construction but is here shown as a segmental vane carried on an arm 58 pivoted at 59 and swingable by means of a handle or thumb knob 64 between full line position and broken line position in Fig. 7.

Suggestive of kinds of oil which have been found satisfactory for use in the vapor generator 80, there may be mentioned the use of lard oil as a base with which may be mixed selective quantities of any other oil conductive to opacity of varying degrees of whiteness or blackness or desired colors, and if desired capable of scenting the odor of vaporized lard oil to produce different odors. Among such supplementary oils are anise. Examples of other such oils are: Oil of lavender, sassafras oil, soy bean oil, peanut oil, pine oil, pine needle oil, oil of clove, cotton seed oil, linseed oil, sandalwood oil, cedarwood oil,

oil of menthol, camphor oil, many kinds and derivatives of crude or petroleum oil, etc. It is desirable to select oils which do not vaporize so fast as to require impractically frequent replenishment while the oils should be light enough to readily seep through the wicking 90 by capillary attraction.

The vapor, fumes, or smoke generated in the way and by means of the thermal vaporizing apparatus herein specified will in no way be harmful to person or property however long and intimate the contact with such fumes may be. The visible vapors thus puffed out of the toy locomotive stack intermittently will in miniature volume waft and disperse in close similarity to the behaviour of mixed smoke and steam as ejected from the locomotive of a real steam train, trailing out and hanging low over the train and track after the locomotive has passed. The heat generated in the electrothermal vaporizer never makes any of the surrounding parts of the toy hot enough to burn the hand. The insulative cover plate 83 serves also as a heat insulator to prevent escape of heat from coil 90 to container 82.

While the invention may be embodied in any vapor puffing toy where realistic sight and sound effects are desired and whereas various definite specifications have been given herein as a guide to practical embodiment of the invention it will be understood that many and in some cases wide departures may be made from such specifications within the intended scope of the following claims whose terms are inclusive of all substitutes and equivalents for the particular forms, sizes and arrangements of the parts herein disclosed that are commonly known or likely to be suggested by the disclosure hereof.

I claim:

1. In a hollow toy having a vapor outlet for the emission of fumes from said toy, a replenishable substance convertible by heat into fume-laden vapor, means to generate said heat, means for storing said fume-laden vapor simultaneously with the generation thereof, and means to liberate at least portions of the stored vapor from said toy at particular times through said outlet.

2. In a combined sight and sound effect toy, 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 reservoir supplied with smoke-like fumes, and apparatus in said toy structure for causing fumes derived from said reservoir to depart from said discharge outlet including a course of conduit constructed and connected to lead fluid from said impulser to said reservoir and also to lead fumes from said reservoir to said outlet.

3. A hollow toy including in combination, a vapor outlet for the emission of fumes from the toy, a repository in said toy receptive to a replenishable substance convertible by heat into potentially visible fumes, means to heat said substance sufficiently to convert the same progressively into said fumes, a hooded reservoir for storing residual fumes derived from said substance during heating of the latter having vapor communication with said outlet and shaped to hinder escape of said residual fumes from said reservoir whereby said residual fumes are retained by and caused to dwell within said reservoir, fume inciting apparatus including an impulser, a passageway affording pneumatic communication between said apparatus and said res-

ervoir in a manner to transmit to residual fumes in said reservoir successive pressure forces derived from said impulser thereby to crowd out of said reservoir and through said outlet at least portions of said residual fumes in intermittent puffs.

4. In a combined sight and sound effect apparatus for toys, a producer of puffing sounds including a fluid activating device, a vapor retaining reservoir containing vapor having an appearance simulating smoke and/or steam when liberated into free air, and apparatus for causing the vapor in said reservoir to be incited in a manner to leave the toy in visible smoke-like or steam-like puffs, said apparatus including a passageway arranged to afford fluid communication between said device and said reservoir thereby to cause vapor in said reservoir to be incited and liberated from the latter, together with means operatively associated with said passageway constructed and arranged to prevent withdrawal of fluid from said reservoir through said passageway by said device.

5. In a hollow toy having a vapor outlet for the emission of fumes from said toy, a repository in said toy receptive to a replenishable substance convertible by heat into potentially visible fumes, means to generate said heat, a reservoir hooded to sufficient extent to store therewithin residual fumes derived from said substance simultaneously with the generation of said heat, and fume inciting apparatus including an impulser pneumatically communicating with said reservoir in a manner to exert intermittent pressure but not appreciable suction upon residual fumes therein, thereby to crowd out of said reservoir and through said outlet in a course foreign to said apparatus at least portions of said residual fumes in intermittent visible puffs.

6. A hollow toy including in combination a vapor outlet for the emission of fumes from the toy, a repository in said toy receptive to a replenishable substance convertible by heat into potentially visible fumes, means to heat said substance sufficiently to convert the same progressively into said fumes, a reservoir of hooded nature for storing residual fumes derived from said substance during heating of the latter having vapor communication with said outlet and shaped to hinder escape of said residual fumes from said reservoir in unwanted directions whereby said residual fumes are retained by and caused to tarry within said reservoir, fume inciting apparatus including a reciprocator adapted to perform alternate working and return motions, a passageway affording pneumatic communication between said apparatus and said reservoir in a manner to direct toward residual fumes in said reservoir successive pressure impulses derived from working motion of said reciprocator thereby to crowd out of said reservoir and through said outlet at least portions of said residual fumes in intermittent puffs, together with a bleeder opening disposed in branch relation to said passageway permitting vagrant vapors to flow therethrough toward and away from said reciprocator in a manner to dilute pneumatically the forcefulness with which said motions of the reciprocator act upon the residual fumes in said reservoir.

7. A hollow toy as defined in claim 6, in which the said bleeder opening is sufficiently large and sufficiently near the said reciprocator to prevent exertion of appreciable suction on the said residual fumes in the said reservoir by the said return motion of said reciprocator.

8. The combination with a toy train including

13

a toy locomotive having a traction motor of, an electrified track adapted to feed current to said motor, a train carried electrically energizable generator of visible smoke-like vapor, a train carried impulsion apparatus cooperatively related to said generator in a manner to cause said vapor to depart from said generator and appear in visible puffs, an electrically energizable prime mover operatively independent of said motor connected to motivate said impulsion apparatus, and electrical connections from both said generator and said prime mover to said track for collecting current from the latter for separately energizing said generator and said prime mover as said toy train rides along said track.

9. The combination with toy railway rolling stock having traction wheels and including a toy locomotive of, devices carried by said rolling stock operative to produce imitative steam puffing sounds including an instrumentality movable independently of said traction wheels, a reservoir carried by said rolling stock containing vapor having an appearance simulating smoke and/or steam when liberated into free air, and apparatus carried by said rolling stock cooperatively relating said devices to said reservoir in a manner to cause said vapor to leave said reservoir and depart from said locomotive in visible smoke-like puffs at a frequency predetermined in relation to the occurrence of said puffing sounds by said apparatus independently of the wheel speed of said rolling stock.

10. The combination defined in claim 9, together with a generator of visible smoke-like vapor including an electrically energizable vaporizer, a prime mover carried by said train connected to operate both the said movable instrumentalities and the said apparatus, an electrified track, and electrical connections from both said vaporizer and said prime mover to said track for collecting current therefrom as the said toy train rides along said track.

11. The combination with electric toy railway rolling stock including an electrically driven toy locomotive of, a producer of pneumatic imitative steam puffing sounds carried by said rolling stock including a pump piston and cylinder, a reservoir carried by said rolling stock shaped to contain and retain vapor having an appearance simulating smoke and/or steam when liberated into free air, apparatus carried by said rolling stock operative to cause the vapor in said reservoir to be incited so that some of said vapor leaves said locomotive in visible smoke-like puffs, and operative connections between said sound producer and said apparatus constructed and arranged to synchronize the occurrence of said visible puffs with the occurrence of said puffing sounds.

12. The combination with toy railway rolling stock including a toy locomotive of, a producer of imitative steam puffing sounds carried by said rolling stock including a fluid activating device, a vapor retaining reservoir carried by said rolling stock containing vapor having an appearance simulating smoke and/or steam when liberated into free air, and apparatus carried by said rolling stock for causing the vapor in said reservoir to be incited in a manner to leave said locomotive in visible smoke-like puffs, said apparatus including a passageway arranged to afford fluid communication between said device and said reservoir thereby to cause vapor in said reservoir to be incited and liberated from the latter.

13. The combination defined in claim 12, in which the said vapor inciting apparatus includes

14

a plurality of fluid impelling pump pistons mechanically interconnected to move in predetermined time relationship.

14. The combination with toy railway rolling stock having traction wheels and including a toy locomotive of, devices including an instrumentality movable independently of said traction wheels carried by said rolling stock operative to produce imitative steam puffing sounds, a reservoir carried by said rolling stock containing vapor having an appearance simulating smoke or steam when liberated therefrom into free air, apparatus carried by said rolling stock including an instrumentality movable independently of said traction wheels operatively related to vapor in said reservoir in a manner to incite said vapor for causing the same to leave said locomotive in visible smoke-like puffs, and a common prime mover carried by said rolling stock operatively independent of said traction wheels connected to motivate said movable instrumentalities of both said sound producing devices and said vapor inciting apparatus.

15. The combination with toy train rolling stock including a toy locomotive and its traction motor of, a producer of imitative steam puffing sounds carried by said rolling stock, a reservoir carried by said rolling stock containing vapor having an appearance simulating smoke and/or steam when liberated into free air, and impulsion apparatus carried by said rolling stock including a prime mover independent of said traction motor, said apparatus being cooperatively related to both said sound producer and said vapor reservoir in a manner to cause vapor to depart from said generator and appear in visible puffs at a rapidity constant in proportion to the rapidity of said puffing sounds and variable in proportion to the speed of said traction motor.

16. The combination with toy train rolling stock including a toy locomotive of, a train carried device for fluctuating flowing fluid in a manner to imitate steam puffing sounds, a train carried generator of vapor visible upon discharge into free air, and train carried impulsion apparatus including means both to impel said flowing fluid and to impel a separate flow of fluid into disturbing relation to said vapor in a manner to cause the latter to be discharged into free air in the form of visible puffs predeterminedly related in timing to said puffing sounds.

17. The combination with toy train rolling stock including a toy locomotive and its traction motor of, a train carried device for fluctuating flowing fluid in a manner to imitate steam puffing sounds, a train carried generator of vapor visible upon discharge into free air, and train carried impulsion apparatus including a prime mover operatively independent of said traction motor with means driven by said prime mover both to impel said flowing fluid and to impel a separate flow of fluid operative to cause vapor originating at said generator to be discharged into free air in the form of visible puffs predeterminedly related to said puffing sounds in timing and changeably related to the speed of said locomotive traction motor.

18. Means for producing visible smoke-like fumes in successive puffs at variable frequency embodying, in combination with toy railway rolling stock including a toy locomotive having traction wheels, means carried by said rolling stock to generate smoke-like fumes, and apparatus carried by said rolling stock for producing intermittent discharges of said smoke-like fumes from

15

15 said toy locomotive including a mechanical reciprocator constructed and arranged to perform time impulsive strokes with varying rapidity unproportioned to the speed of said traction wheels and in a manner to cause discharge of said fumes with variable frequency unproportioned to the speed of travel of said rolling stock.

19. Means for causing fumes to waft out from toy railway wheeled rolling stock in visible smoke-like puffs of variable frequency unproportioned to the wheel speed of said rolling stock, including in combination with said rolling stock, a container of fumes adapted to be visible upon liberation into free air carried by said rolling stock, and apparatus carried by said rolling stock for effecting a pulsating discharge of said fumes from the rolling stock including a reciprocator constructed and arranged to perform fume impulsive strokes with variable rapidity unproportioned to the wheel speed of said rolling stock.

20. A toy train set incorporating the combination of, a toy track, a toy locomotive, rolling stock hauled by said locomotive, a producer of imitative steam puffing sounds carried by said rolling stock, a source of fumes having the appearance of smoke and/or steam when liberated into free air carried by said locomotive, apparatus operative to cause the fumes in said reservoir to be incited so that some of said fumes depart from the locomotive into free air in visible smoke-like puffs including connections extending between said locomotive and said rolling stock operative to synchronize the occurrence of said visible puffs with the occurrence of said puffing sounds.

21. A toy train set as defined in claim 20, in which the said sound producer includes a fluid impulser, and the said connections extending between the said locomotive and said rolling stock include a flexible fluid conduit leading from said impulser to the said source of fumes.

22. A toy train set as defined in claim 20, in which the said sound producer includes a fluid impulser, and the said connections include a flexible conduit communicating respectively with said fluid impulser and with the said source of fumes, said conduit being detachable at least in part to permit separation of the said locomotive from the said rolling stock.

23. A toy train set including the combination of, a toy locomotive adapted to travel on a toy track, toy rolling stock adapted to travel on the same track separably coupled to said locomotive to be hauled thereby, pumping means carried by said rolling stock operative to incite vapor into intermittent streams of flow, conduit means to guide said streams of vapor into a controlled path of flow outward of said locomotive, apparatus carried by said locomotive operative to generate and admix with said vapor fumes giving to said vapor the appearance of smoke and/or steam issuing from the locomotive, and means carried by said rolling stock to fluctuate said streams of vapor in a manner to produce pneumatic noises imitative of sounds produced by escaping steam and/or air.

24. Means for causing visible vapor having the appearance of steam and/or smoke to exhaust intermittently out of toy railway rolling stock in synchronous relation to the occurrence of intermittent sounds imitative of escaping steam, including the combination with said rolling stock of, a mechanical piston-like reciprocator having oppositely directed vapor pumping faces, a pneumatic sounder in said rolling stock, an outlet for

16

vapor in said rolling stock, 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 to impregnate with visible fumes the vapor led through said second passageway to impart thereto the appearance of steam and/or smoke.

25. Means for causing visible vapor having the appearance of steam and/or smoke to exhaust intermittently out of toy railway rolling stock in synchronism with the occurrence of intermittent sounds imitative of escaping steam, including the combination with said rolling stock of, two piston-like reciprocators mechanically connected to move in synchronous relation, a pneumatic sounder in said rolling stock, an outlet for vapor in said rolling stock, a passageway leading vapor from one of said reciprocators to said sounder, and a second passageway leading vapor from the other of said reciprocators to said outlet, together with a means to impregnate with visible fumes the vapor led through said second passageway to impart thereto the appearance of steam and/or smoke.

26. The combination of, a toy train adapted to ride on an electrified track including a toy locomotive, a variable speed electric tractional motor carried by said locomotive, a second variable speed electric motor carried by said train, means to maintain both of said motors in electrical connection with the track on which said train travels, a source of fumes in said train having the appearance of smoke and/or steam when liberated into free air, and pumping apparatus carried by said train and operated by said second variable speed motor arranged to impulse said fumes for driving the latter intermittently out of said locomotive into free air.

27. The combination of, a toy train adapted to ride on an electrified track including a toy locomotive, a variable speed electric tractional motor carried by said locomotive for driving the latter, a second variable speed electric motor carried by said train, means to maintain both of said motors in electrical connection with the track on which train travels, a source of fumes in said train having the appearance of smoke and/or steam, pumping apparatus carried by said train and operated by said second variable speed motor arranged to impulse said fumes for driving the latter intermittently out of said locomotive, and voltage regulating means to vary simultaneously the electrical energy furnished to both of said motors, the power of said second motor in relation to the load imposed thereupon by said apparatus being greater than the power of said tractional motor in relation to the load imposed thereupon by said locomotive, whereby an equal increase of electrical energy delivered simultaneously to said two motors will result in more abrupt increase of speed of said second motor than of said tractional motor.

28. A toy train set incorporating the combination of, a toy track, rolling stock including a toy locomotive having an outlet for vapor, a driving motor carried by said locomotive connected to impel the latter along said track, fluid pumping means carried by said rolling stock having sufficient vapor displacing capacity to incite vapor into intermittent streams of flow reaching to said vapor outlet, means to guide said streams of vapor into a controlled path of flow between said pumping means and said vapor outlet, an auxiliary motor carried by said rolling stock me-

chanically connected to furnish power to said pumping means and electrically connected to derive current supply from said track, means to generate and admix to said vapor fumes capable of giving thereto the appearance of visible puffs of smoke and/or steam issuing from said outlet, and means to fluctuate said streams of vapor in a manner to produce pneumatic noises imitative of sounds produced by escaping steam and/or air so that the occurrence of said visible puffs is synchronized with the occurrence of said sounds at different frequencies irrespective of the travel of said rolling stock.

29. In a combined sight and sound effect apparatus for toys, a producer of pneumatic puffing sounds including a pump piston and cylinder, a reservoir shaped to contain and retain vapor having an appearance simulating smoke and/or steam when liberated into free air, apparatus operative to cause the vapor in said reservoir to be incited so that some of said vapor leaves the toy in visible smoke-like or steam-like puffs, and operative connections between said sound producer and said apparatus constructed and arranged to synchronize the occurrence of said visible puffs with the occurrence of said puffing sounds.

30. In a combined sight and sound effect apparatus for toys, a producer of puffing sounds including a fluid activating device, a vapor retaining reservoir containing vapor having an appearance simulating smoke and/or steam when liberated into free air, and apparatus for causing the vapor in said reservoir to be incited in a manner to leave the toy in visible smoke-like or steam-like puffs, said apparatus including a passageway arranged to afford fluid communication between said device and said reservoir thereby to cause vapor in said reservoir to be incited and liberated from the latter.

31. In a combined sight and sound effect apparatus for toys, a device for fluctuating flowing fluid in a manner to imitate steam puffing sounds, a generator of vapor visible upon discharge into free air, and impulsion apparatus including means both to impel said flowing fluid and to impel a separate flow of fluid into disturbing relation to said vapor in a manner to cause the latter to be discharged into free air in the form of visible puffs predeterminedly related in timing to said puffing sounds.

32. In combination with sight and sound effect apparatus as defined in claim 31, sound throttling means manually shiftable to and from a position wherein said means are operative to prevent the making of puffing sounds by the said device for fluctuating fluid flow.

33. In combination with sight and sound effect apparatus as defined in claim 31, generator disabling means manually shiftable to and from a position wherein said means are operative to prevent supply of visible vapor by the said generator.

34. In combination with sight and sound effect apparatus as defined in claim 31, separately manipulatable sound throttling means and generator disabling means individually operative on occasions respectively and alone to prevent the making of puffing sounds by the said sound producer and to prevent the supply of visible vapor by said generator.

35. In a combined sight and sound effect toy, 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 reservoir supplied with smoke-like fumes, and apparatus in said toy structure for causing fumes derived from said reservoir to depart from said discharge outlet including a second fluid impulser mechanically associated with the first impulser, together with a course of conduit constructed and connected to lead fluid from said second impulser to said reservoir and to lead fumes from said reservoir to said outlet.

36. A fume generating toy as defined in claim 33, in which the said liquid reservoir and the said fume collecting chamber comprise adjacent compartments defined by wall structure including a partition section baffling free gravity flow of liquid from the said liquid reservoir into the said chamber, and the said wick extends through said partition section and has at least one of its two opposite ends located in said liquid reservoir and has a looped intermediate portion of its length located in said fume collecting chamber, and said heating element comprises a length of electrical resistance wire held in surface contact with said wick in said fume collecting chamber.

37. A fume generating toy as defined in claim 33, in which the said liquid reservoir and the said fume collecting chamber comprise adjacent compartments defined by wall structure including a partition section baffling free gravity flow of liquid from the said liquid reservoir into said chamber, and the said wick extends through said partition section and is supportedly lodged therein and has at least one of its opposite ends located in said liquid reservoir and has a looped intermediate portion of its length located in said fume collecting chamber, and said heating element comprises a length of electrical resistance wire wound about and in surface contact with said wick in said fume collecting chamber.

38. A fume generating toy as defined in claim 33, in which the said liquid reservoir and the said fume collecting chamber comprise adjacent compartments defined by wall structure including a partition section baffling free gravity flow of liquid from the said liquid reservoir into said chamber, and the said wick extends past said wall structure from one to the other of said compartments, and said heating element comprises electrical resistance wire held in surface contact with said wick in said fume chamber, together with binding posts on the outside of said wall structure supported thereby and insulated therefrom and connected to said resistance wire by electrical conductors extending inside of said chamber.

39. A fume producing and fume storing toy including a hollow unit housed within the confines of said toy, embodying in combination, a box-like structure including a base wall, side walls and a top wall, a partition integral with said side walls dividing said structure into upper and lower compartments and containing at least one opening leading from one to the other of said compartments, wicking tightly filling said opening and extending into both of said compartments, electrical conductors extending through said top wall, and an electric heating unit in said upper compartment connected to said conductors for electrical energization therethrough.

40. A fume producing and fume storing toy as defined in claim 39, in which the said side walls have a filler opening located so as to admit the pouring of liquid into the said lower compartment therethrough, together with a removable cover adapted to seal said filled opening liquid-tight.

41. A fume producing and fume storing toy as defined in claim 39, in which the top of the upper compartment is sealed against escape of fumes and the said side walls have a discharge opening located so as to give vent to vapors contained in the said upper compartment at a lower level than the top thereof.

42. A fume producing and fume storing toy as defined in claim 39, in which the said top wall is removably attached to said side walls and includes insulating material.

43. A fume producing and fume storing toy as defined in claim 39, in which the said bottom wall is removably attached to said side walls for cleaning out the said lower compartment.

44. The method of producing puffs of visible vapor imitative of steam engine exhaust from the stack of a portable toy power plant, which consists in, storing within a closed chamber a dispensible supply of liquid capable of conversion by heat into smoke-like fumes, transferring said substance by capillary seepage gradually and continually out of said space and into vaporizing proximity to a zone of heat, collecting in a stack vented confined space isolated from said chamber a volume of fumes constantly generated from said transferred liquid by said heat, and intermittently forcing gaseous charges into said collected volume of fumes in a manner to drive intermittently out of said confined space through said stack successive charges of said fumes in smoke-like puffs.

45. The method of safely generating and retaining a supply of fumes within the limited confines of an overturnable hollow toy which consists in, storing vaporizable liquid within a reservoir chamber, forming said liquid progressively into a dispersion within said chamber, drawing said dispersion gradually out of said chamber, heating at least a portion of said withdrawn liquid dispersion outside of said chamber to a vaporizing temperature to convert the same into fumes, collecting said fumes in a confined space outside of said closed chamber having a restricted vent to atmosphere, and intermittently forcing gaseous charges into said collected fumes in a manner to eject intermittently outward through said vent successive puffs of said fumes.

46. In a hollow toy having a vapor outlet for the emission of fumes from said toy, a replenishable substance convertible by heat into fume-laden vapor, means to generate said heat, means for collecting said fume-laden vapor until the same is designedly emitted from the toy, and means isolating said fume-laden vapor from said replenishable substance.

47. A fume generating toy including the combination of, a reservoir constructed and arranged to seal a contained body of liquid against escape therefrom by gravity flow in all positions of said reservoir, a fume collecting chamber isolated from said reservoir, a capillary feeder partly immersed in said body of liquid operative to conduct said liquid gradually by capillary attraction from said reservoir into said chamber, and a heating element in said chamber arranged to heat the feeder conducted liquid to a temperature for producing fumes in said chamber isolated from surface con-

tact with said reservoir contained body of liquid.

48. A fume generating toy as defined in claim 47, in which the said capillary feeder comprises a fibrous asbestos wick arranged to conduct the said liquid upward from the said reservoir into the said chamber, together with a wall structure separating said reservoir and chamber in a manner to limit travel of said liquid therebetween to capillary seepage along said wick.

49. A fume generating toy as defined in claim 47, in which the said fume collecting chamber is outside of and closely above the said reservoir, together with a wall structure separating said chamber from said reservoir in a manner to limit travel of the said liquid therebetween to seepage along the said capillary feeder.

50. A fume generating toy as defined in claim 47, in which the said fume collecting chamber is outside of and closely above the said reservoir, and the said capillary feeder comprises a wick extending upward from said reservoir into said chamber, together with a wall structure separating said chamber from said reservoir in a manner to limit travel of the said liquid therebetween to seepage along said wick.

51. A fume generating toy as defined in claim 47, in which the said heating element comprises loops of a coil of electrical resistance wire and the said capillary feeder comprises a stretch of wick passing axially through said coil of wire, together with top and bottom housing walls bordering the said fume collecting chamber, said wire being in part supported by said top wall and said wick being in part supported by said bottom wall.

52. A fume generating toy as defined in claim 47, in which the said heating element comprises loops of a coil of electrical resistance wire and the said capillary feeder comprises a stretch of wick passing axially through said coil of wire, together with a housing wall overlying the said fume collecting chamber and supporting said coil by means of extensions of said wire attached to and suspended from said overlying housing wall.

53. A fume generating toy as defined in claim 47, in which the said heating element comprises loops of a coil of electrical resistance wire and the said capillary feeder comprises a stretch of wick passing axially through said coil of wire, together with a housing wall underlying the said fume collecting chamber and supporting said stretch of wick by means of extensions of said wick attached to and upstanding from said underlying housing wall.

WILLIAM R. SMITH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,287,768	Schanschieff	Dec. 17, 1918
1,303,117	Roe	May 6, 1919
1,737,787	Dombrow	Dec. 3, 1929
1,972,600	Reboni et al.	Sept. 4, 1934
2,253,610	Coderre	Aug. 26, 1941