Sept. 16, 1952 W. R. SMITH 2,610,438

STACK RECHARGED PUFFING UNIT FOR TOYS

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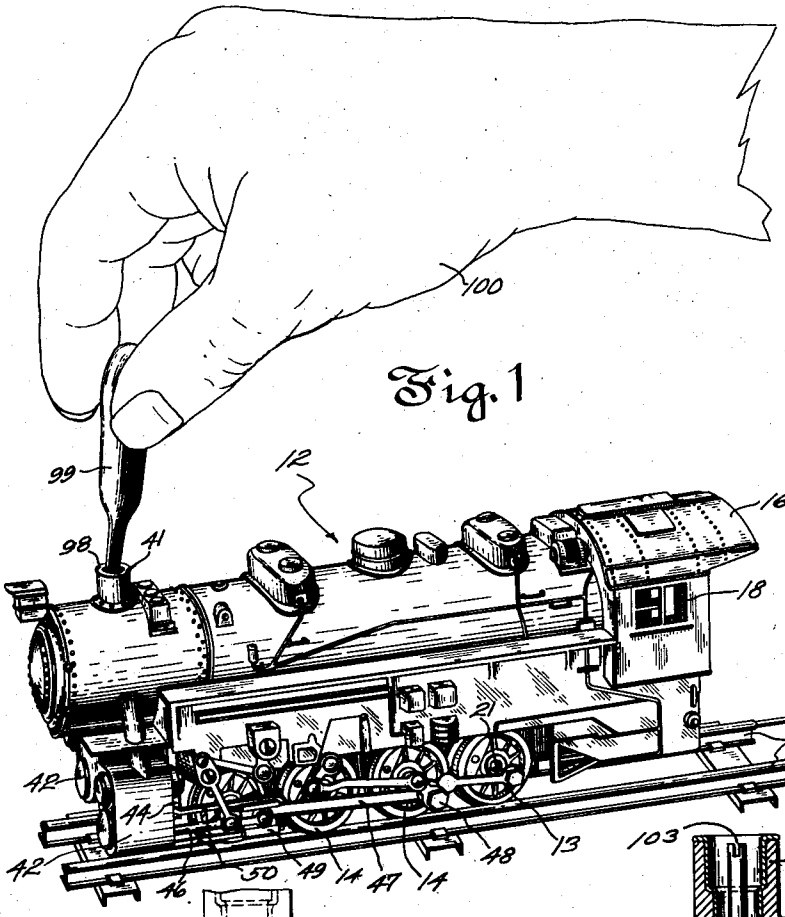


Fig. 1

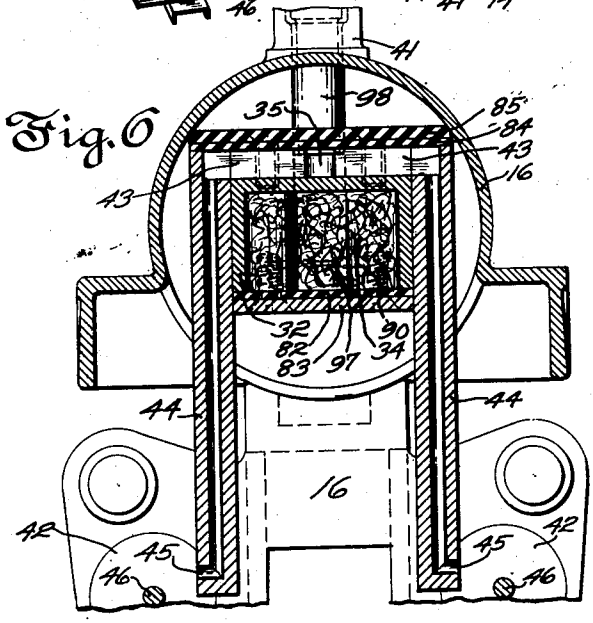


Fig. 6

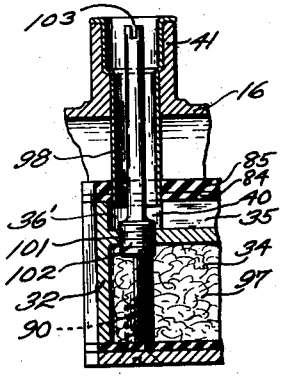


Fig. 7

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Fig. 2

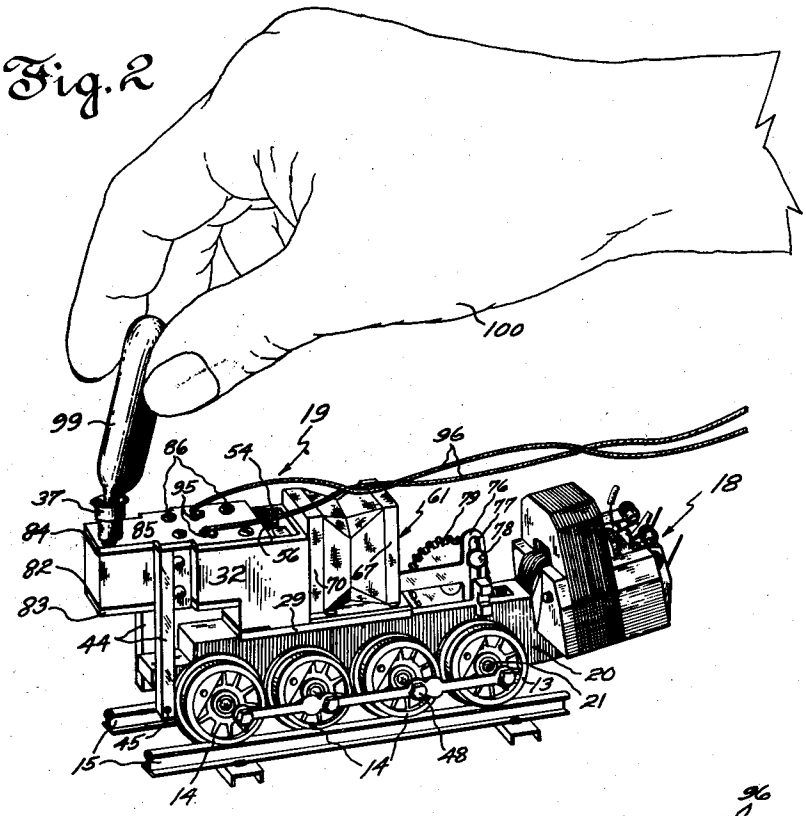
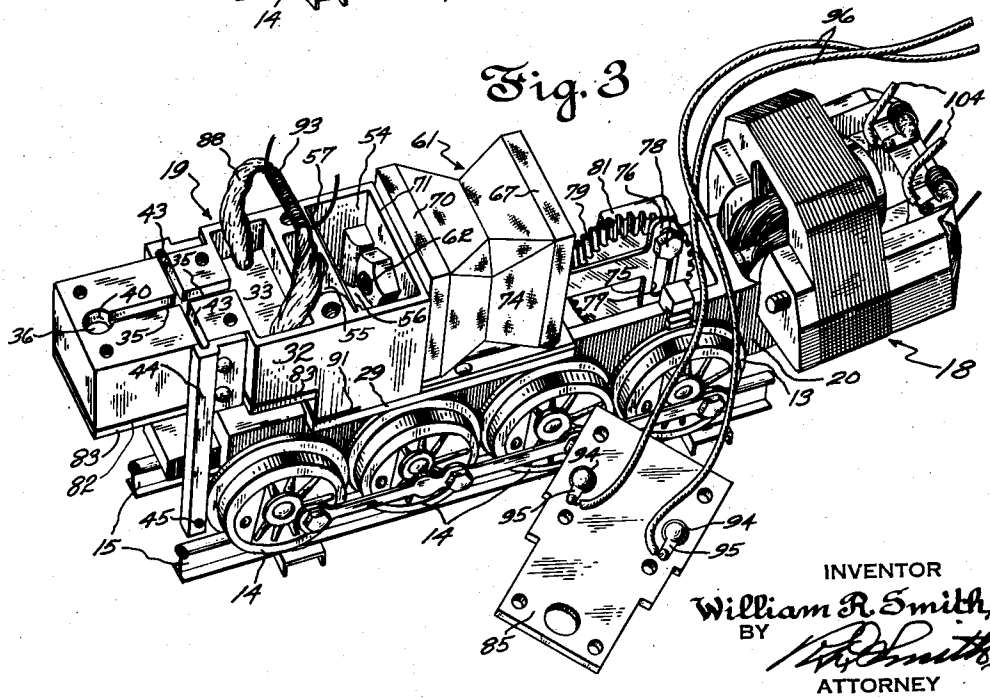


Fig. 3



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Fig. 5

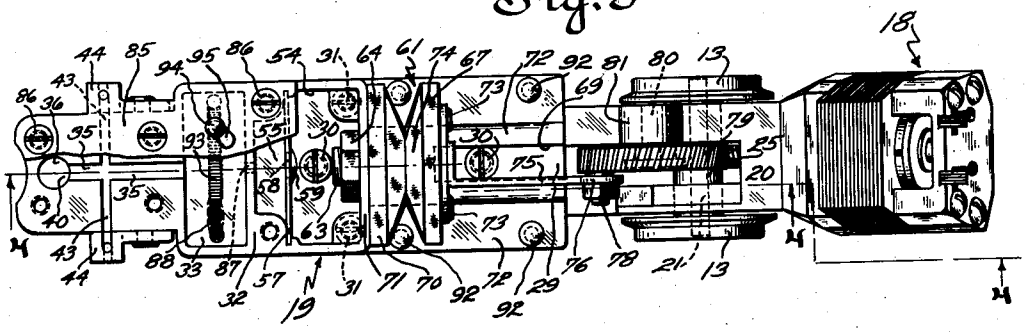


Fig. 4

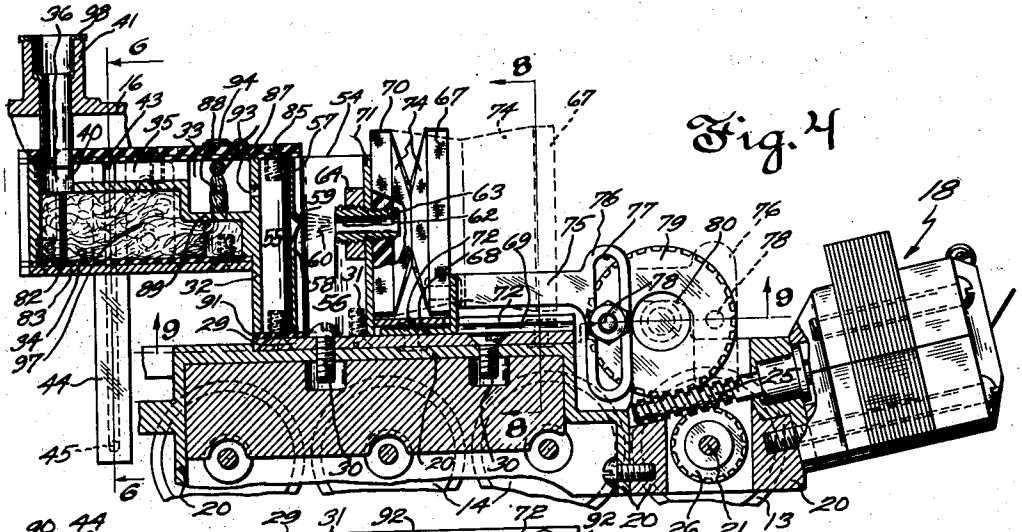


Fig. 9

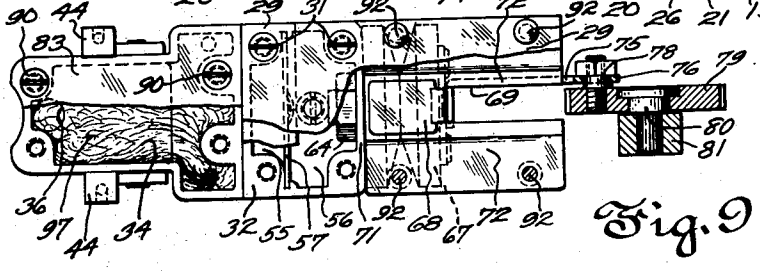
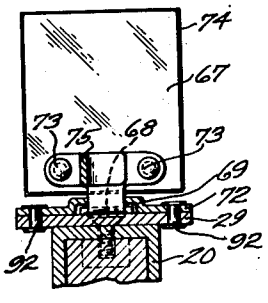


Fig. 8



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Patented Sept. 16, 1952 2,610,438

UNITED STATES PATENT OFFICE

2,610,438

STACK RECHARGED PUFFING UNIT FOR TOYS

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Application August 20, 1946, Serial No. 691,848

14 Claims. (Cl. 46—9)

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This invention relates to improvements in a general type of sound and smoke producing miniature apparatus disclosed in one form in my copending application Serial No. 677,932 filed June 20, 1946, in which there are claimed certain features of the invention that are disclosed but not claimed herein.

An important object of the present improvements is to provide an organization of the essential components of puffing sound and smoke effect apparatus so unified and compacted as to be housable entirely within the tiny locomotive simulating casing of an HO gauge toy electric train or within some comparably small space in a trackside hollow toy structure simulating a steam power house or the like.

Another object is to reduce the size, lower the cost and improve the performance of the air impulsing device which generates the puffing effect.

A further object is to store within a miniature apparatus for the indicated purpose successive limited supplies of vaporizable fluent substance in such manner that it is proof against spilling or draining out of the miniature locomotive or other toy containing the apparatus if the same accidentally be overturned.

A further object is to feed puffs of steam simulating vapor to a location near the imitative power cylinder of a toy locomotive and thereat cause the same to be intermittently discharged in a manner enhancing visibly the realism of performance of a toy train.

A particular objective of the present improvements is to coordinate passageways for discharging smoke or steam simulating fumes and for taking in a replenishing charge of the fume generating substance so that a single smoke stack will serve both purposes and so that the intake of a heavier-than-air fluid fume source substance to the wrong destination in the apparatus and the discharging of fumes into wrong compartments of the apparatus will be inhibited or deterred.

These and related objects will become clear in greater particular as the following description proceeds having reference to the accompanying drawings wherein:

Fig. 1 is a perspective view of a toy locomotive containing a concealed puffing apparatus in course of being charged with fume producing substance through the locomotive smoke stack.

Fig. 2 is a similar view with the outer casing of the toy locomotive, its piston rod and pitman link removed and the filling funnel restored to fuel receptive position on the interior puffing unit.

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Fig. 3 is an enlarged perspective view of the same subject as Fig. 2 showing the cover removed from the box-like structure of the puffing unit.

Fig. 4 is a side elevation of the apparatus shown in Fig. 2 taken partially in section on the planes 4—4—4 in Fig. 5.

Fig. 5 is a plan view of the subject of Figs. 2 and 4 with the cover of the puffing unit partly broken away.

Fig. 6 is a greatly enlarged view taken in section on the plane 6—6 in Fig. 4 looking in the direction of the arrows showing branch discharge conduits for leading fumes to outlet orifices proximate the imitative power cylinders of the toy locomotive.

Fig. 7 is a fragmentary view of a modified construction taken in section on the plane 4—4 in Fig. 5.

Fig. 8 is a view taken in section on plane 8—8 in Fig. 4 looking in the direction of the arrows.

Fig. 9 is a view looking upward from the plane 9—9 in Fig. 4 with parts broken away better to reveal internal construction.

In Fig. 1 a toy puffing locomotive is shown in approximately full or actual size equipped with two drive wheels 13 and six traction wheels 14 suited to ride on HO gauge toy railway tracks. The tiny size of rolling stock in so-called HO gauge toy trains becomes evident from the measurement of five-eighths inch between rail centers in the two-rail track 15 herein illustrated. It is apparent that the interior of such small, miniature, toy locomotives affords extremely little space for containing and concealing apparatus capable of successfully producing sound and smoke effects to enhance the realism of toy locomotive performance. This stringent restriction of available space heretofore has led to a distribution of the sound and smoke producing apparatus among plural pieces of the rolling stock of a toy train including or additional to the locomotive. For example, the tender of the locomotive is utilized to contain a part of the puffing apparatus in my copending application Serial No. 677,932, filed June 20, 1946.

The present improvements provide an organization of the essential components of the sound and smoke producing apparatus so unified and compacted as to enable them to be contained wholly within the tiny space of an HO gauge toy locomotive along with the electric motor by which the locomotive is driven.

In the present drawings the power motor of the locomotive appears at 18 and may be of the general type shown in U. S. Patent No. 2,348,616 granted to Marshall H. Frisbie, except that the

stator of the present motor is a permanent field magnet and the motor runs on direct current at a potential not usually in excess of 15 volts. This renders unnecessary an electromagnetic motor reversing circuit controller such as is employed in the toy locomotive of the said patent which leaves a space that may be occupied by the newly organized puffing unit 19 of the present improvements. Both motor 18 and puffing unit 19 derive their support from the chassis frame 20 of the toy locomotive in whose side walls are journaled the axles 21 of locomotive wheels 13 and 14. Regarding the speed reduction gearing by which motor 18 impels drive wheels 14, it will suffice to note that the motor shaft has worm teeth 25 cut therein which mesh with a worm gear 26 fixed on the axle to which drive wheels 13 are fixed at respectively opposite sides of the locomotive.

The puffing apparatus 19 of the present improvements is constructed as a sub-assembly unit removably attached to a base plate 29 by holding screws 31 which plate in turn is secured removably to locomotive chassis frame 20 by holding screws 30. A major portion of the puffing unit comprises a box-like structure 32 hollowed out and partitioned to provide a smoke reservoir or fume collecting chamber 33, a magazine 34 for heavier-than-air vaporizable substance capable of conversion into lighter-than-air smoke-like fumes, a horizontal fume outlet or discharge passageway or conduit 35, and a filler passageway or conduit 36 which by-passes chamber 33 and leads the fume source substance to magazine 34. While passageways 35 and 36, or conduits serving the same purposes, may have devious arrangements and relationships within the novel concepts of this invention they are herein shown to communicate with each other at a junction location 40 spaced beneath the smoke stack outlet 41 formed in the outer casing 16 of the locomotive. Thus, as hereinafter more fully explained, magazine 34 may be recharged with vaporizable substance through smoke stack outlet 41 out of which also will issue the puffs of smoke-like fumes produced by automatic operation of the puffing unit.

For leading steam-like fumes to the location of imitative power cylinders 42 of the toy locomotive, passageway 35 is intersected by transversely disposed passageways 43 each of which turns downward and extends throughout the length of vertical conduits 44 terminating in a laterally directed fume discharge orifice 45 near the bottom of each conduit 44 on opposite sides of the locomotive just at the slide bearing for piston rod 46 in each of the imitative power cylinders 42. Puffs of visible vapor will thereby be caused to spurt out of orifice 45 in synchronization with reversals of sliding movement of piston rod 46 lengthwise through the said cylinder bearing into and out of cylinder 42. The piston rod is impelled by the alternating pushing and pulling of pitman link 47 pivotally connected at 48 to each of the rear traction wheels 14. An imitative slide block 49 reciprocates lengthwise of stationary ways 50 for converting the swinging movement of pitman 47 into rectilinear motion of piston rod 46 as is conventional in the toy train art. If desired, the passageways 43 might communicate directly with smoke reservoir 33 instead of through the medium of a portion of passageway 35.

The space in the rear portion of box-like structure 32 is divided into a resonance box or sound chamber 55 and a jet compartment 56 by a vertical plate 57 that is preferably removably installed by means of its edges slidably fitting vertical grooves sunk in the inner surface of structure 32. Plate 57 contains an elongated aperture 58 lipped at 59 to cause sound producing diversion of the jet of air 60 expelled by bellows 61 through a jet orifice 62 shown in Fig. 4. Orifice 62 communicates with the bellows chamber through the hollow externally threaded nipple 63 which acts as a clamp bolt threading into stationary bellows head 70 while freely turnable in a clearance hole in rear wall 71 of the box structure. A nut 64 secures nipple 63. Jet compartment 56 opens freely to ambient air at 54. All of these sound producing parts are but briefly herein described for they may be constructed successfully in substantial accordance with my aforesaid copending application in which drawing Fig. 7 shows details of the plate 57.

In the present improvements the reciprocating head 67 of the box style bellows 61 is maintained in parallel relation to stationary bellows head 70 as it reciproates broadsidewise because it is maintained erect in a horizontal rectilinear path and prevented from skewing by means of a slide and follower mechanism including a depending slide foot 68 carried fixedly on reciprocating bellows head 67 and riding in a horizontal slot or elongated guideway 69 formed in part by base plate 29 and in part by a channeled cap plate 72 as best shown in Fig. 8. The horizontally elongated guide foot 68 has a profile shape that accords in transverse cross section with slot 69. Stationary bellows head 70 is fixed to the end wall 71 of box-like structure 32 and is pierced by the tubular nozzle 63 containing jet orifice 62 that threads into head 70 thus serving also as a bolt to clamp head 70 fixedly to structure 32. The bellows head steering function of slide foot 68 promotes uniform flexing of the bellows walls 74 and prolongs their life, these walls consisting of appropriate limber or limp plicate sheet material such as thin balloon cloth coated with "Vinylite" and cemented air-tight to the edges of each bellows head. Cap plate 72 is secured on base 29 by rivets 92.

Bellows head 67 is caused to reciprocate from left to right in Figs. 2 to 5 by means of a movement transmitting stiff T-shaped bar 75 fixed thereon by rivets 73 and containing a vertically elongated slot 77. Bar 75 is reciprocated horizontally by the impelling action of a revolving crank pin 78 consisting of a shoulder stud threaded into the flank face of worm gear 79 which is rotatably supported at 80 on a standard 81 rigid with chassis frame 20.

Much in the manner of the automatic puffing unit of my aforesaid copending application the box-like structure 32, including smoke reservoir 33 and the communicating passageways 35, 36 is closed and sealed fluid-tight at the top by a cover plate 85 of insulating material secured removably against the top of structure 32 by six holding screws 86 threading into structure 32. A soft sealing gasket 84 may be interposed between plate 85 and the top wall edges of structure 32. A floor plate 83 and soft gasket 82 interposed between the same and the bottom wall edges of structure 32 similarly close and seal the magazine 34 at the bottom, being secured removably by four holding screws 90. A supplementary gasket 91 seals the junction of the closed sound chamber 55 with base plate 29. Cover plate 85 also closes the top of sound chamber 55 and serves to hold the sound plate 57 in place. Sound

chamber 55, however, has a measure of fluid communication with smoke reservoir 33 through a tiny hole 87 that enables pulsations of air pressure, occasioned in sound chamber 55 by intermittent jets of air 60, to be transmitted to the smoke reservoir 33.

Smoke is generated in reservoir 33 by the electrical heating and vaporization of a replenishable supply of fume source substance derived from magazine 34. This substance, usually of oily, liquid nature, is automatically fed upward by being absorbed and led upward by capillary attraction from magazine 34 through a loop of preferably fibrous glass wicking 88 which fittingly plugs and passes through holes in the horizontal partition wall 89 which otherwise isolates magazine 34 from reservoir 33. A fine electrical resistance wire 93 is close-wound tightly about a horizontal stretch of the wicking 88 and is anchored by being soldered to the outside of eyelets 94 at each of its ends. These eyelets pierce the insulative cover plate 85 and their interiors, through which wire 93 passes, may be plugged fluid-tight with solder. Eyelets 94 hold binding clips 95 to which are attached respectively the ends of electrical lead wires 96 for delivering current to resistance wire 93.

In Fig. 3 the lower ends of wicking 88 are shown to be pulled up somewhat through their holes in partition wall 89 to show that they may be untwisted or relatively loosely twisted so as to form a sufficiently bulky mass when stuffed into magazine 34 completely to fill the latter and in this manner constitute a capillarity tight packing 97 of finely intersticed wicking fibers. This packing of fibrous wick material thoroughly absorbs whatever content or charge of vaporizable liquid is delivered to magazine 34 and the interstices of the material become saturated with the supply of liquid yet because of the capillary attraction they tend strongly to retain the liquid in the magazine and thus keep it from leaking out if the toy locomotive is accidentally overturned.

The supply of fume producing liquid is replenishable in the manner made evident by Figs. 1 and 2 wherein a liquid dropper, or the spout of a throw-away gelatin oil can 99, is shown inserted downward into the fume outlet 41 of the locomotive stack and preferably far enough down therein to enter the filler passageway 36 of the puffing unit. The latter is provided with a removable upstanding tubular projection 98 which may flare outward like a funnel within or beneath smoke stack 41 to prevent filling liquid delivered by the oil can from escaping at any point between the locomotive's outer casing 16 and the puffing unit 19. In the form illustrated in the drawings a type of oil can comprising a transparent capsule with resilient flexible walls is shown being manipulated by the hand 100 of the user in the manner described in greater particular in my aforesaid copending application.

In Fig. 7 there is illustrated a modified construction wherein the filler passageway 36' is partitioned crosswise by a wall 101 containing a threaded filler aperture sealed by the removable threaded plug 102 which can be turned and removed by means of its screw driver slot 103.

In operation current is picked up from the rails of track 15, from which locomotive 12 is insulated by the non-conductive material or chassis connections of wheels 13 and 14, by means of a tender as disclosed in the aforesaid copending application Serial No. 677,932. From

such tended come the flexible lead wires 96 which energize heating coil 93. Motor 18 is electrically energized in shunt relation to coil 93 by additional flexible lead wires 104 coming from the same locomotive tender (not shown).

By turning worm 25, the motor simultaneously drives the locomotive wheels 13 and causes bellows head 67 to reciprocate between its full line and broken line positions in Fig. 4. The strokes of the bellows head may be brought into any desired synchronous relation with the revolutions of the wheels 13, 14 and thereby with the strokes of piston rod 46 by a proper choice of gear ratio between worm gear 79 and worm gear 26. For example, bellows head 67 can be caused to make a blowing compression of the bellows-contained air corresponding to each stroke of piston rod 46 which will realistically cause spurts of steam simulating fumes to escape out of concealed orifices 45 proximate the rod bearings in power cylinders 42 as in a real locomotive. At the same time bursts of steam-like or smoke-like fumes, depending on the color producing composition of the oily fuel in magazine 34, will billow upward through smoke stack 41 as forced out of reservoir 33 through passageway 35 when intermittent jets of air 60 are projected toward and through lipped opening 58 in the sound plate 57 and thence into sound chamber 55. This builds up a temporary pressure in the sound chamber which exerts intermittent fluid pressure impulses through hole 87 in a reservoir 33 which causes fumes dwelling in the latter to leave through passageways 35 and 43. These fumes as in my earlier applications for patent are constantly generated by the heating of the constantly fuel soaked wick 88 by resistance wire 93. Also as disclosed in my aforesaid copending application the play of air jets 60 on the lip 59 of aperture 58 in the sound plate makes realistic puffing sounds augmented by the resonance of the trapped body of air in sound chamber 55.

Many of the purposes of the present improvement will be served by variations of the kinds and arrangements of parts herein chosen to illustrate the invention. Hence all such variations of and recognized substitutes for elements of the particular apparatus herein disclosed will be understood as comprehended by and within the coverage of such definitions of the appended claims as fairly include the same.

I claim:

1. In a toy puffing locomotive having an upwardly directed smoke stack outlet for the discharge of visible fumes, the combination with said outlet of, a source of fumes within said locomotive including a magazine for storing a charge of heavier-than-air vaporizable fume source substance, a fume collecting chamber, a fume discharge conduit connected to lead lighter-than-air fumes from said source and direct them toward said stack outlet, and a filling conduit in communication with said discharge conduit connected to by-pass said fume collecting chamber and lead charges of said substance from said fume discharge conduit to said magazine.

2. In a toy puffing locomotive having a smoke stack outlet for the discharge of visible fumes, the combination defined in claim 1, in which the said fume discharge conduit joins the said filling conduit at a junction below the said stack outlet and above the said magazine thereby to deliver the said fumes to said filling conduit at such point that they will ascend therethrough to said

outlet more readily than they will descend into the said magazine.

3. In a toy puffing locomotive having a smoke stack outlet for the discharge of visible fumes, the combination defined in claim 1, in which the said filling conduit joins the said fume discharge conduit and near their junction extends in a direction more nearly vertical than does the said discharge conduit thereby to facilitate dropping of the said heavier-than-air substance into the said magazine past instead of into said fume discharge conduit.

4. In a toy puffing locomotive having a smoke stack outlet for the discharge of visible fumes, the combination defined in claim 1, together with a shapeless fleece of filaments filling and confined by the said magazine in a sufficiently close mass to inhibit spilling of the said fume source substance out of the said smoke stack in the event of overturning the said toy locomotive.

5. In a toy puffing locomotive having a smoke stack outlet for the discharge of visible fumes, the combination defined in claim 1, together with structure externally on the said locomotive fashioned to simulate the appearance of a steam power cylinder, together with an auxiliary passageway leading away fumes derived from the said source of fumes and giving outwardly of the locomotive at a point sufficiently proximate said cylinder simulating structure so that fumes emitted from said auxiliary passageway at said point will appear to issue from said cylinder.

6. In a toy puffing locomotive having a smoke stack outlet for the discharge of visible fumes, the combination defined in claim 1, together with a removable external casing shell on the said locomotive said shell carrying structure fashioned to simulate the appearance of a steam power cylinder, together with an extension of said fume discharge conduit structurally separate from said casing shell containing a branch passageway leading away fumes derived from the said fume discharge conduit and opening outwardly of the locomotive at a point proximate said cylinder simulating structure.

7. Pseudo steam puffing apparatus for hollow toys, including the combination with means to generate and store fumes, of a box-like bellows for impulsing air to displace said fumes comprising, a stationary bellows head containing a jet orifice, another bellows head movable in a path to approach and recede from said stationary bellows head, a limp plicate sheet material encompassing the space between and connected to said bellows heads, and a slide and follower mechanism cooperatively related to said movable bellows head in a manner to maintain the same in parallel relation to said stationary bellows head as the former approaches and recedes from the latter.

8. Pseudo steam puffing apparatus as defined in claim 7, in which the said slide and follower includes a guide foot carried by the said movable bellows head and an elongated guideway traversable by said guide foot toward and away from the said stationary bellows head.

9. Pseudo steam puffing apparatus as defined in claim 7, in which the said slide and follower includes a guide foot rigid with said movable bellows head elongated in directions toward and away from said stationary bellows head, and a stationary guideway elongated in the said directions traversable by said guide foot and fitting the latter in a manner to constrain said movable bellows head against departure from parallel relation to said stationary bellows head.

10. Pseudo steam puffing apparatus as defined in claim 7, in which the said slide and follower mechanism causes the said movable bellows head to travel in a horizontal path, together with a stiff bar fixed on and projecting horizontally from said movable bellows head, containing a vertically elongated slot, and a crank pin disposed to revolve in a vertical plane having a free sliding fit in said slot.

11. Miniature unitary apparatus for emitting visible fumes comprising a box-like structure and partitions shaped and disposed to divide the interior of said structure into chambers and passageways including a fume reservoir, a horizontal passageway leading from said reservoir, and a magazine for fume source liquid underlying both said reservoir and said passageways, together with means to feed said liquid upward automatically from said magazine into said fume chamber.

12. Miniature unitary apparatus as defined in claim 11, together with a hollow toy locomotive shell housing said apparatus, a smoke stack outlet in said shell, and a tubular conduit extending between said outlet and the said box-like structure arranged to afford a passageway communication between the said fume reservoir the said magazine and said stack outlet.

13. Miniature unitary apparatus as defined in claim 11, together with a hollow toy locomotive shell housing said apparatus, a smoke stack outlet in said shell, and a funnel-like conduit disposed to give passageway communication between the said fume reservoir the said magazine and said stack outlet.

14. In a toy puffing locomotive, the combination of an inverted hollow shell modeled externally in imitation of a real locomotive including an engineer's cab at the rear, an inverted box-like wheeled chassis frame having side walls joined by a platform affording roof wall nested upward at least partially and separably within said shell, a locomotive propelling electric motor carried on said chassis frame substantially beneath and partially nested upward in said cab, and apparatus comprising movable elements operative to produce pseudo locomotive puffing effects organized as a sub-assembly of apparatus parts mounted on said roof wall of the chassis frame ahead of said cab and constructed to be separable as a unit from said shell and from said chassis frame, the said apparatus including a bellows, a crank and pitman link operating said bellows, and a worm gear impellingly related to said crank, the said locomotive propelling motor having a worm meshable with said worm gear.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,287,767	Schanschieff	Dec. 17, 1918
1,287,768	Schanschieff	Dec. 17, 1918
1,287,769	Schanschieff	Dec. 17, 1918
1,737,787	Dombrow	Dec. 3, 1929
2,076,145	Hall	Apr. 6, 1937
2,253,610	Coderre	Aug. 26, 1941
2,324,359	Callan	July 13, 1943
2,520,916	Dasenbrock	Sept. 5, 1950