March 30, 1954 L. F. KELCH ET AL 2,673,419

TOY SMOKING LOCOMOTIVE

Filed Oct. 9, 1948

2 Sheets-Sheet 1

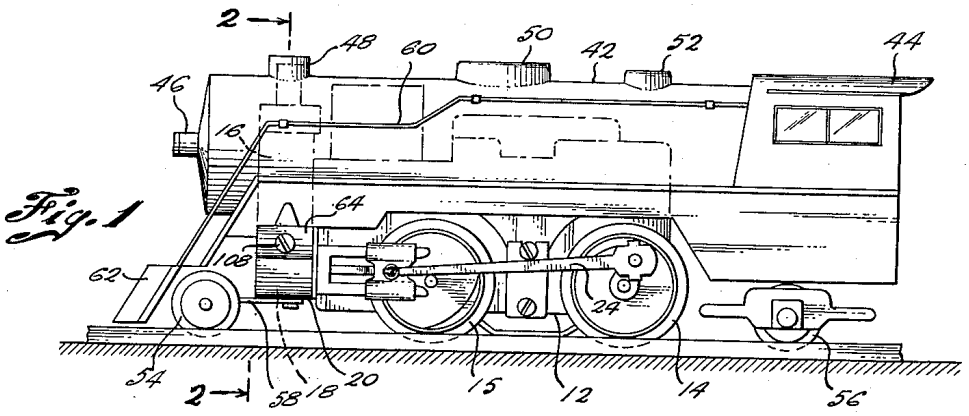

Fig. 1

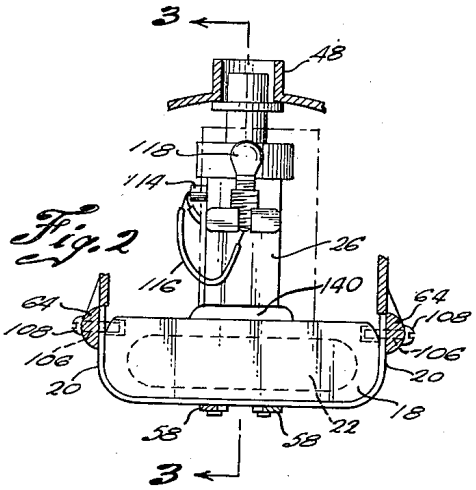

Fig. 2

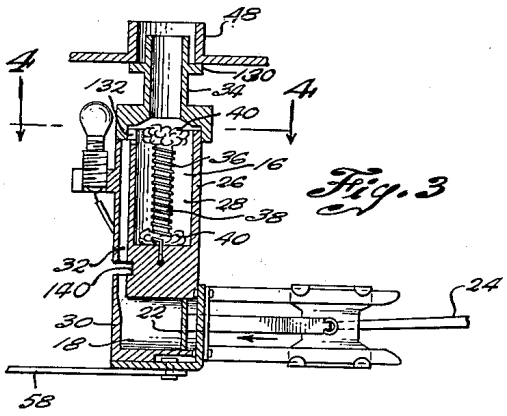

Fig. 3

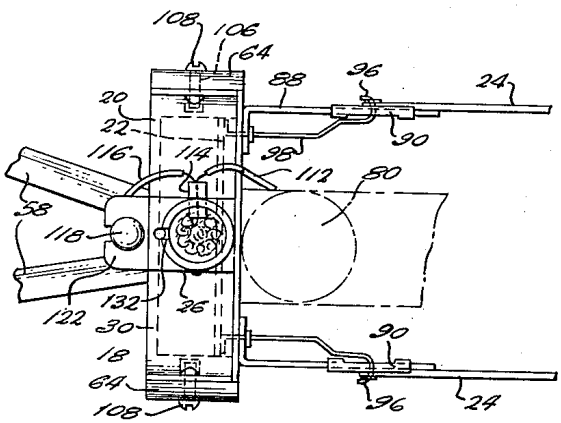

Fig. 4

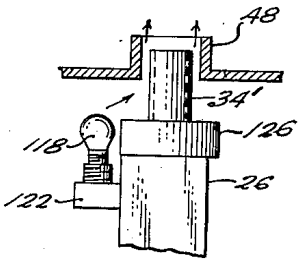

Fig. 5

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Fig. 6

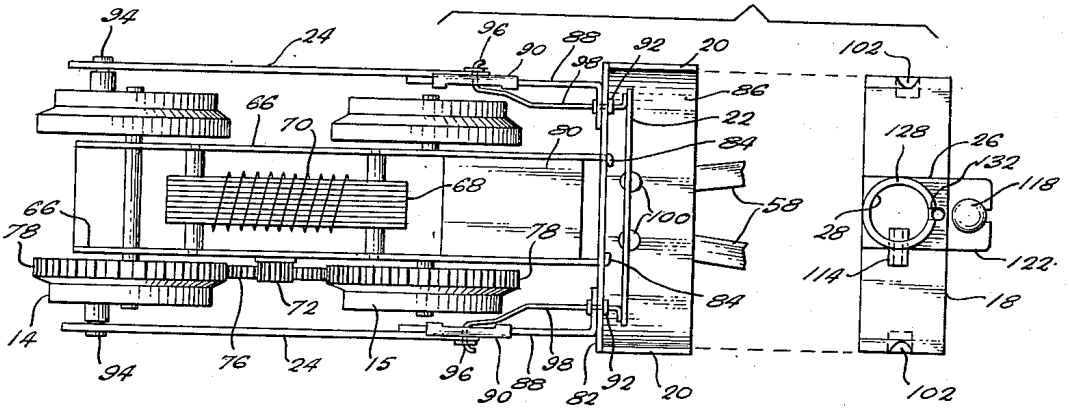
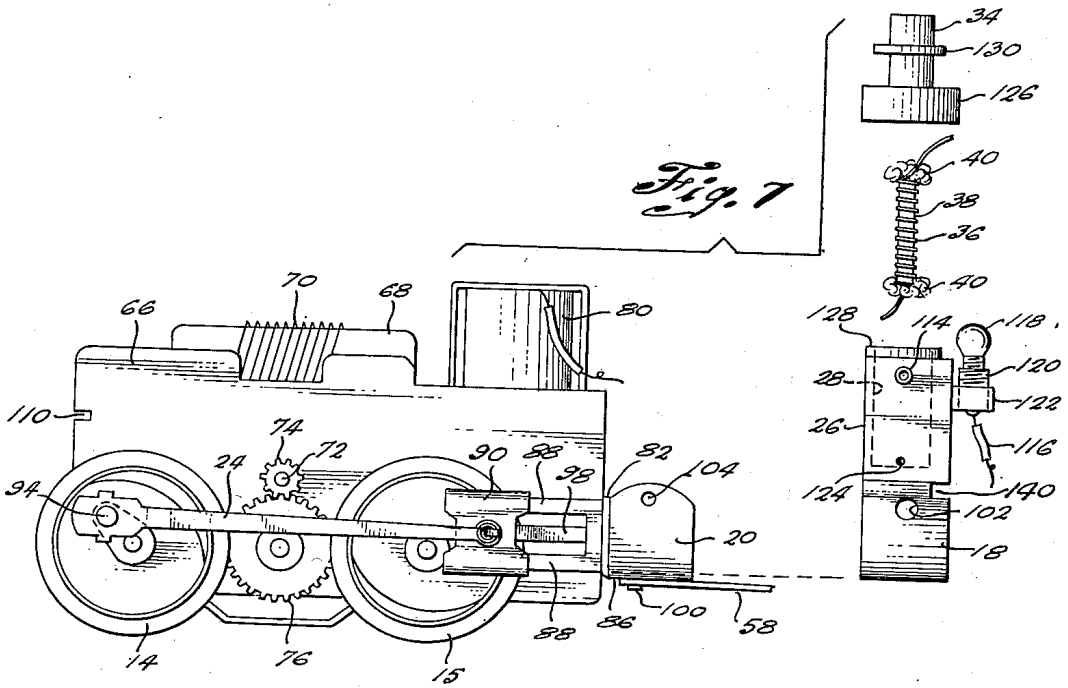


Fig. 7



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TOY SMOKING LOCOMOTIVE

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8 Claims. (Cl. 46—9)

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This invention relates to toys, especially toy locomotives, and more particularly to smoking locomotives.

It has already been proposed to provide a toy locomotive with a smoke generator and an air displacement device to help eject the smoke in puffs. One object of the present invention is to provide such a toy locomotive with air displacement means which is simple and inexpensive to manufacture, and which is compact enough to fit in a small locomotive, yet which displaces a large volume of air.

Another object is to provide an accessory or smoke generating and puffing unit which may be inserted in a toy locomotive which locomotive otherwise and in other respects is of standard construction. Still another object is to provide a smoke generator which does not require special chemicals or fuel, but which instead may be readily fuelled, anywhere, and at negligible cost.

To accomplish the foregoing general objects, and other more specific objects which will hereinafter appear, our invention resides in the smoke generating, smoke puffing and toy locomotive propulsion mechanism and their relation one to another as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

Fig. 1 is a side elevation of a toy locomotive embodying features of our invention;

Fig. 2 is a transverse section taken approximately in the plane of the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal section taken in elevation approximately in the plane of the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary plan view taken approximately in the plane of the line 4—4 of Fig. 3;

Fig. 5 is a detail explanatory of a modification;

Fig. 6 is a plan view with the locomotive body removed and the smoke unit separated from the motor unit; and

Fig. 7 is an elevational view showing the motor unit and the parts of the smoke unit separated from one another.

Referring to the drawings, the toy locomotive comprises a motor unit 12, including drive wheels 14, a smoke generating device 16, and air displacement means to eject smoke in puffs, said means including a flattened cylinder 18 extending across the locomotive from side to side at about the position of the simulated steam cylinders 20, and a relatively elongated air piston 22 (Figs. 2 and 3) in the flattened cylinder 18. There are also simulated connecting rods 24 at the sides of the drive wheels 14. These are arranged to operate in unison rather than in alternation, the forward ends of the connecting rods being operatively connected in common to the aforesaid elongated piston 22.

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The smoke unit comprises a die casting in the shape of an inverted T, the stem portion 26 of the T being hollowed to form a smoke chamber 28 (Fig. 3). The air cylinder 18 previously referred to is formed in the crossbar of the T, said cylinder being closed at the front by a wall 30, and open at the back. There is a passage 32 which leads from the air cylinder 18 to the smoke pipe 34. The passage might connect the air cylinder to the bottom of the chamber 28, but we prefer to make the connection at the top, the air being admitted above or at the top of the smoke chamber, where it is closed by a smoke pipe 34.

The smoke generator itself comprises an approximately cylindrical, oil saturable wick 36 (Figs. 3 and 7) and a resistance wire heater 38 wound about the wick. The ends of the coil pass sidewardly through the wall of the chamber, one end, in this case the lower end, being grounded to the metal unit, and the other end, in this case the upper end, passing through a thin tube of insulation 114 (Figs. 2, 4 and 7), preferably porcelain or ceramic insulation. In Figs. 3 and 7 it will be noted that the ends of the wick are flattened, upset or expanded, as indicated at 40. This helps center the coil in the chamber, and prevents the metal wall of the chamber from short-circuiting the turns of the coil.

Considering the illustrated toy in greater detail, and referring first to Fig. 1, the toy locomotive there shown comprises a locomotive body including a boiler portion 42 and a cab portion 44. These may be formed out of a single piece of sheet metal or a single die casting. There are the usual simulations of headlight 46, smoke stack 48 and steam domes 50 and 52. In the present case the locomotive is eight-wheeled, and of the 2–4–2 type, that is, there is a pilot truck with two small wheels 54, four main drive wheels 14 and 15, and a rear pilot truck beneath the cab with small wheels 56. The forward pilot truck is suitably articulated, as by means of the pivoted arms 58, to help the locomotive negotiate turns in the track. The articulation of the rear truck is not shown. In accordance with conventional practice, the pilot trucks may be

mounted on the locomotive body, while the drivers 14 and 15 remain with the motor unit when the motor unit is separated from the locomotive body. The locomotive body may include additional details, such as the hand rails 60, cow catcher 62, and valve cylinders 64.

Referring now to Figs. 6 and 7, the motor unit may be conventional, and comprises side plates 66 carrying a propulsion motor therebetween, the field laminations being shown at 68, and the field winding being schematically indicated at 70. The armature is mounted on a shaft 72 (Fig. 7) carrying a pinion 74 meshing with an intermediate gear 76. The latter meshes with gear teeth 78 (Fig. 6) formed on both the wheels 14 and 15 just inside the flanges thereof. If the locomotive is of the remote control type, it may be provided with a suitable relay, the coil of which is shown at 80, the said relay serving to reverse the direction of operation of the locomotive. It will be understood that the axles of the wheels, and the shaft of the intermediate gear, as well as the armature, are all carried in the side plates or bearing plates 66.

At the forward end of the motor unit, a vertical plate 82 is rigidly secured to the side plates 66, as by means of bent tongue and slot connections 84 (Fig. 6). This plate 82 carries a horizontal bottom plate 86, and curved end plates 20. For simplicity these are all formed of a single piece of sheet metal, the bottom plate 86 being bent forwardly, and the end plates being bent upwardly. The latter are preferably bent on a radius to simulate the outside of steam cylinders.

The plate 82 carries near its ends spaced, horizontal guides or ways 88 on which a simulated crosshead 90 is slidable. The ways 88 are stamped from a single piece of heavy gauge sheet metal and are bent inwardly at their forward ends, where they are eyeletted to the plate 82, as is indicated at 92 (Fig. 6). The crossheads 90 are made of sheet metal and are bent around the ways 88.

The simulated connecting rods 24 are carried at their rear ends on suitable crank pins 94 projecting from the rear wheels 14. The forward ends of the connecting rods are pivoted to the crossheads 90. For simplicity they are here pivoted by means of sidewardly bent ends 96 of simulated piston rods 98, the intermediate portion of the piston rod being visible from outside the locomotive between the ways 88, and the forward ends of said piston rods passing through the eyelets 92, and being connected to the piston 22. The piston 22 is itself a piece of sheet metal having an outline best shown in dotted lines in Fig. 2. This outline is such as to fit the air cylinder formed in the base or crossbar portion of the die cast smoke unit previously referred to.

The bottom wall 86 serves to pivotally carry the pilot truck arms 58, the pivotal connections for which are indicated at 100 (Fig. 6). The bottom wall 86 and the end walls 20 also serve to receive the smoke unit, which is shown separated from the motor unit in Figs. 6 and 7 of the drawing. More specifically, the base portion or crossbar of the inverted T-shaped smoke unit fits above the plate 86 and between the ends 20. The ends of the die cast unit have blind holes 102 which register with threaded holes 104 in the end pieces 20.

Referring now to Figs. 2 and 4 of the drawing, the holes 102 and 104 register with holes 106 in the depending side pieces or steam valve simulations 64 previously referred to. Screws 108 hold

all of these parts in assembled relation; that is, the screws pass through the parts 64 of the locomotive body into and through the threaded holes 104 of the motor unit, and thence into the blind holes 102 in the ends of the smoke unit. The screws 108 are conventionally employed in this particular toy locomotive to hold the locomotive body and motor unit in assembled relation. In the present case the same screws additionally hold the smoke unit in desired position. While not important to the present invention, it may be mentioned that the rear end of the motor unit is connected to the locomotive body by means of notches in the side plates of the motor unit, such as the notches indicated at 110 in Fig. 7, these notches fitting around a cross ledge in the locomotive body. In consequence the two screws 108, one at each side of the locomotive, are the only screws needed to hold the motor unit and locomotive in assembled relation, and they also hold the smoke unit.

Referring now to Figs. 3 and 4, it will be understood that when the smoke unit is slid rearwardly into the position at the front of the motor unit, the piston 22 is received in the air cylinder 18. The air cylinder is of exceptionally large volume because instead of being merely a cylinder having a diameter equal to the height of the piston 22, it extends all the way across the locomotive from one side to the other for many diameters. With this large area of piston, it becomes unimportant to provide a close fit, and the parts may be made with very large tolerance, which, of course, is important in the manufacture of inexpensive toys. For the same reason a simple, inexpensive, light-weight sheet metal part may be used as a piston. Moreover, we have found that it is unnecessary to provide valves, for the desired effect of producing puffs of smoke will be obtained even without special valves. The connecting rods on both sides operate in unison instead of in alternation, but this does not detract from the realistic appearance of the locomotive, because the observer sees the locomotive on only one side or the other, and not on both sides at the same time.

It has already been mentioned that the smoke generator itself is a wick surrounded, and in fact compacted, by a coil of resistance wire. This wick may be made of asbestos or other suitable heat resistant material. To fuel the unit it is merely necessary to supply it with a few drops of oil from an ordinary oil can. The oil may be supplied through the smoke pipe 34 and stack 43, and it is not necessary to remove the locomotive body from the motor unit. The electric power supply is partially shown in Fig. 4. There is an insulated wire, not shown, constantly connecting the third rail shoe to relay coil 80. There is an insulation wire 112 extending forwardly from that wire or/and the relay 80 to a porcelain or other refractory insulation tube 114. This leads to the upper end of the resistance coil.

The same supply wire may be continued forwardly, as shown at 116, to the base of a lamp socket, in order to energize a small head lamp 118. Thus the third rail shoe is connected in shunt to the relay, the heater coil, and the lamp. The socket 120 may be made of sheet metal and is held in position by forwardly extending arms 122 cast integrally with the smoke unit. The outside of the socket is grounded, while the center terminal is insulated and connected to the wire 116. The lamp bulb is disposed immediately behind a suitable lens holder marked 46 in Fig. 1.

The wire leading from the lower end of the heater coil is grounded, and this is most simply done by passing it through a small diameter hole 124 (Fig. 7) in the smoke unit. The metal near the hole may subsequently be hammered or staked inwardly by means of a centering punch or the like, in order to insure a good ground connection, and to help physically position the coil in the center of the smoke chamber.

The smoke pipe 34 is preferably a separate die casting having an enlarged base 126 which is dimensioned to fit over a circular flange 128 with a tight fit. Fig. 7 clearly shows the smoke pipe 34 separated or lifted upwardly from the flange 128 formed at the top of the die cast smoke unit. The smoke pipe 34 is dimensioned to connect with the simulated stack 48 (Figs. 1, 2 and 3), thus guiding the smoke out of the stack. The pipe 34 may, if desired, be flanged, as shown at 130, the said flange closing the bottom of the stack 48, as is best shown in Figs. 2 and 3 of the drawing. However, it is not essential to use such a flange, and Fig. 5 shows a modification in which the flange has been omitted. In this case the smoke pipe 34' guides the smoke to the stack 48, much as previously described, but the space around pipe 34' is left open. This may be done if it is desired to permit some of the light from the lamp 118 to escape up the stack, in which case it may help illuminate the smoke emitted from the stack. This is of no effect in the daytime, but may increase the visibility of the smoke when operating the locomotive in the dark.

It has already been mentioned that the air cylinder is connected to an upright passage 32. In the present case this passage is disposed outside of and forwardly of the smoke chamber 16. At the top of the unit a notch is cut radially, indicated at 132 in Figs. 3, 4 and 6. The effect of this notch is that when the smoke pipe 34 is pressed down over the smoke unit, the pipe not only closes the top of the smoke chamber, but provides a communication from passage 32 through the notch to the top of the smoke chamber, or, from another viewpoint, to the point of connection between the smoke chamber therebeneath and the smoke pipe thereabove. We have found that with this arrangement the puffs of air produced by the action of the piston causes the smoke to flow out of the stack in intermittent puffs. The absence of valves causes some suction effect between puffs, which helps interrupt or better separate the individual puffs of smoke from one another. The omission of valves greatly simplifies and reduces the cost of manufacture of the toy.

Some of the benefit of using valves may be and preferably is obtained by the provision of a slot at an appropriate location in the unit. Such a slot is best shown at 140 in Fig. 3, it crossing the upright air passage 32. The slot may be made in a number of ways, one being that shown in Figs. 2, 3 and 7, in accordance with which a recess or groove is machined or molded entirely across the unit at the forward face thereof.

With this arrangement considerable air is drawn inwardly through the slot 140 during the suction stroke of the piston. However, during the forward or pressure stroke of the piston air tends to be blown directly upward through the air passage 32, rather than outwardly through the slot 140. This improves the smoke puffing action. For this purpose the slot should be located above the cylinder across the air passage, rather than at the end of the cylinder. The use of such an air passage or port is an optional, and not an indispensable feature of the invention.

It will be understood that while we have obtained excellent results with the air passage 32 connected above the smoke chamber, it is not essential that this be done, and if desired it may be connected to the smoke chamber itself at an intermediate point, or even at the bottom, instead of at a point above the smoke chamber.

It is believed that the construction, operation and method of use of our improved smoking locomotive, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while we have shown and described our invention in a preferred form, changes may be made in the structure disclosed, without departing from the spirit of the invention as sought to be defined in the following claims.

We claim:

1. A toy smoking locomotive of small dimension comprising motor driven drive wheels, a smoke generating device, and air displacement means of relatively large dimension to eject smoke from the smoke generating device in puffs, said means including a flattened cylinder extending continuously across the locomotive all the way from one side to the other side at about the position of the simulated steam cylinders, a relatively elongated air piston extending from side to side across the locomotive in said flattened cylinder, simulated connecting rods at the sides of the drive wheels arranged to operate in unison rather than in alternation, the forward ends of said connecting rods being connected in common to the aforesaid elongated piston with one rod at one end and the other rod at the other end of the piston, said smoke generating device comprising a relatively slender smoke chamber disposed in upright position, an upright oil-saturable smoke-producing wick with an electrically heatable resistance coil wound thereabout disposed in said chamber for generating smoke, an upright smoke pipe leading from the top of the chamber to the smoke stack of the locomotive, and means establishing a flow passage connecting the flattened cylinder to the smoke chamber and to the smoke pipe at the point where they meet in order to cause a discharge of smoke in puffs.

2. A toy smoking locomotive comprising simulated steam cylinders and a smoke generating and puffing accessory received in said locomotive ahead of the drive wheels, said accessory comprising a die casting in the shape of an inverted T, the stem of said T being partially hollowed to form an open smoke chamber blocked off from the crossbar of the T, a flattened air cylinder formed in the crossbar of the T and closed at the front and open at the back, the dimension of said crossbar being such as to extend across the locomotive from side to side at about the position of the simulated steam cylinders, an elongated piston in said flattened cylinder substantially conforming in shape thereto, an electrically energized smoke generator comprising an approximately cylindrical oil-saturable smoke-producing wick, an electrically heatable resistance wire heater wound about the intermediate portion of said wick, one end of said wire passing sidewardly through the wall of the chamber, and the ends of said wick outside the ends of the resistance coil being upset to help center the coil in the chamber and to prevent the metal wall of the chamber from short-circuiting the

turns of the coil, an upright smoke pipe leading from the top of the chamber through the top of the locomotive, and said casting having a flow passage connecting the air cylinder to the point of connection between the smoke chamber and the pipe so that it is connected above the smoke generator, in order to cause a discharge of smoke in puffs.

3. A toy smoking locomotive comprising simulated steam cylinders and a conventional boiler, cab, drive wheels, a motor unit for driving said wheels, and a smoke generating and puffing accessory received in said locomotive ahead of said drive wheels, said accessory comprising a die casting in the shape of an inverted T, the stem of said T being partially hollowed to form a smoke chamber open at the top and closed at the bottom, an oil-saturable smoke-producing wick with an electrically heatable resistance wire wound about the same disposed in said chamber, a flattened air cylinder formed in the crossbar of the T and closed at the front and open at the back, the dimension of said cross-bar being such as to extend across the locomotive from side to side at about the position of the simulated steam cylinders, said casting having a passage leading upward from said air cylinder through the stem of the T alongside the smoke chamber, a smoke pipe disposed over said chamber and over said passage for guiding the air into the chamber and for guiding the smoke to the locomotive stack, an elongated piston in said cylinder substantially conforming in shape thereto, a connecting rod for connecting a driving wheel to the piston to send intermittent puffs of air through the passage to the smoke generator and smoke pipe, said motor unit including side plates, said drive wheels being outside said plates, and gearing between said motor and drive wheels, said simulated boiler being open at the bottom to receive the motor unit, said boiler having depending supports at the simulated steam cylinders, said motor unit having sides mating with said supports, screws passing inwardly to hold the motor unit and simulated boiler in assembled relation, and the ends of said crossbar of said T receiving and being supported in position by the aforesaid screws.

4. A toy smoking locomotive comprising simulated steam cylinders and a smoke generating and puffing accessary received in said locomotive ahead of the drive wheels, said accessory comprising a die casting in the shape of an inverted T, the stem of said T being partially hollowed to form an open smoke chamber blocked off from the crossbar of the T, a flattened air cylinder formed in the crossbar of the T and closed at the front and open at the back, the dimension of said crossbar being such as to extend across the locomotive from side to side at about the position of the simulated steam cylinders, said casting having a passage leading from said air cylinder to the smoke chamber, and an elongated piston in said flattened cylinder substantially conforming in shape thereto.

5. A toy smoking locomotive comprising simulated steam cylinders and a conventional boiler, cab, drive wheels, and a motor for driving said

wheels, and a smoke generating and puffing accessory received in said locomotive ahead of said drive wheels, said accessory comprising a die casting in the shape of an inverted T, the stem of said T being partially hollowed to form a smoke chamber open at the top and blocked off from the crossbar of the T at the bottom, an oil-saturable wick with a resistance wire wound about the same disposed in said chamber, a flattened air cylinder formed in the crossbar of the T and closed at the front and open at the back, the dimension of said crossbar being such as to extend across the locomotive from side to side at about the position of the simulated steam cylinders, said casting having a passage from said air cylinder to said smoke chamber, an elongated piston in said cylinder substantially conforming in shape thereto, and a connecting rod connecting a driving wheel to the piston.

6. A toy smoking locomotive comprising simulated steam cylinders and a conventional boiler, cab, drive wheels, and a motor for driving said wheels, and a smoke generating and puffing accessory received in said locomotive ahead of said drive wheels, said accessory comprising a die casting in the shape of an inverted T, the stem of said T being partially hollowed to form a smoke chamber open at the top and closed at the bottom, an oil-saturable smoke-producing wick with an electrically heatable resistance wire wound about the same disposed in said chamber, a flattened air cylinder formed in the crossbar of the T and closed at the front and open at the back, the dimension of said crossbar being such as to extend across the locomotive from side to side at about the position of the simulated steam cylinders, said casting having a passage leading upward from said air cylinder through the stem of the T alongside the smoke chamber and terminating near the open end thereof, a smoke pipe capping the top of said stem and disposed over said chamber and passage for guiding the air into the chamber and for guiding the smoke to the locomotive stack, an elongated piston in said cylinder substantially conforming in shape thereto, and a connecting rod connecting a driving wheel to the piston.

7. A toy smoking locomotive as defined in claim 4, in which there is an auxiliary air entrance slot disposed transversely of and communicating with the air passage.

8. A toy smoking locomotive as defined in claim 5, in which there is an auxiliary air entrance slot disposed transversely of and communicating with the air passage.

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