May 4, 1954

E. VOLLENWEIDER

2,677,332

MODEL LOCOMOTIVE

Filed Nov. 19, 1949

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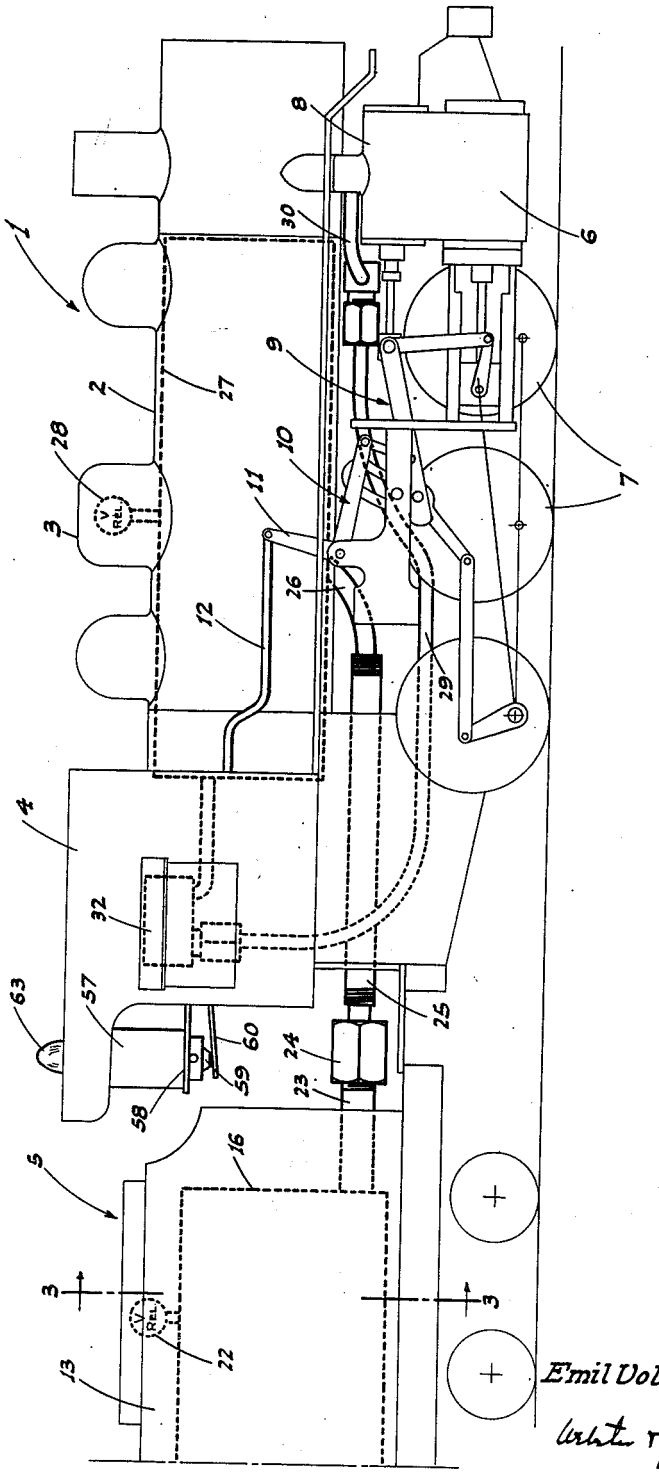

Fig. 1

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Fig. 2

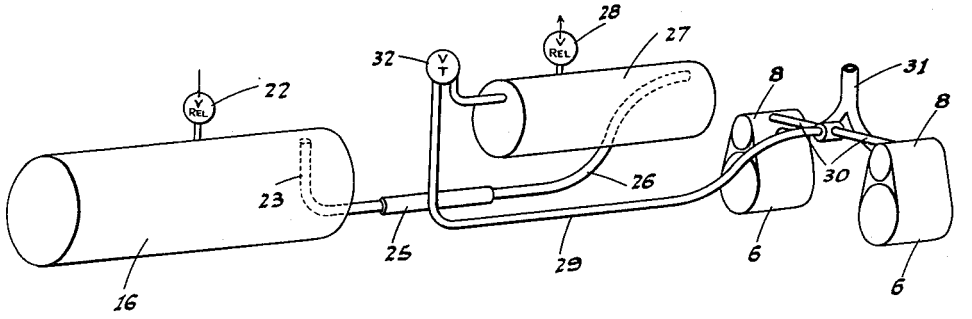

Fig. 3

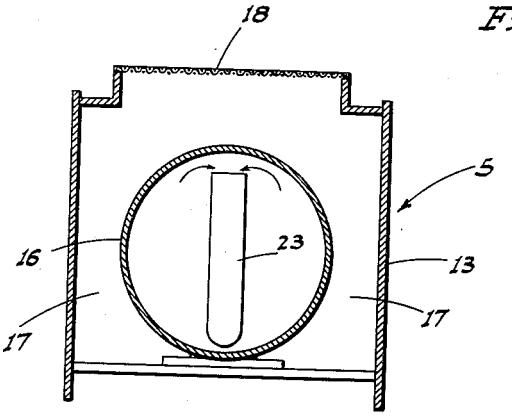

Fig. 4

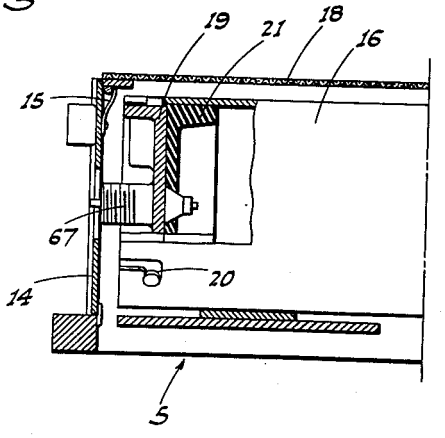

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Fig. 5

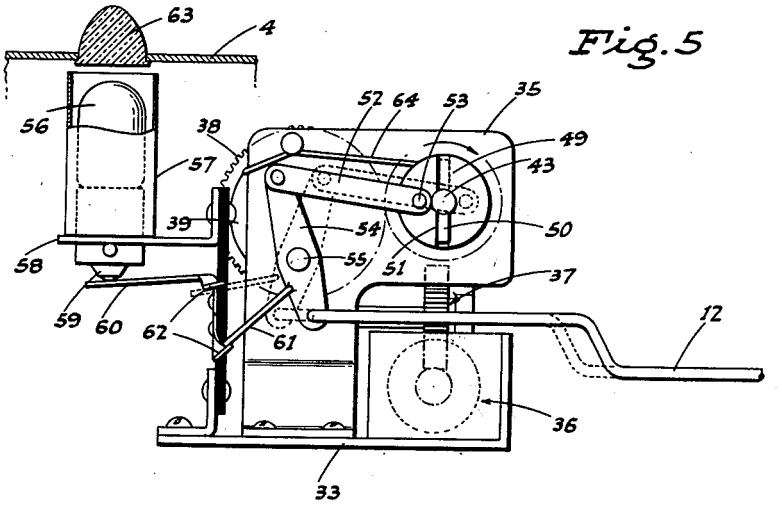


Fig. 6

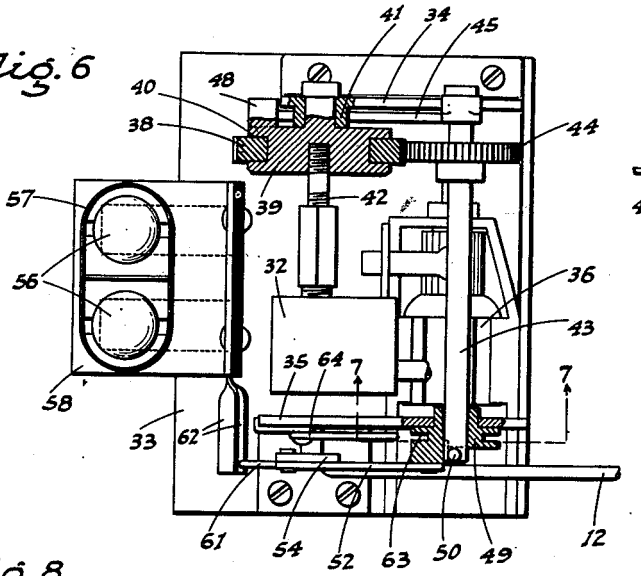


Fig. 7

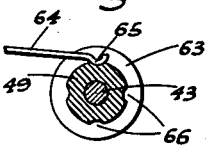
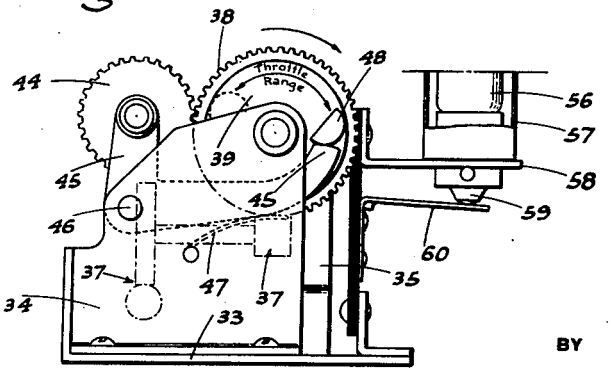


Fig. 8



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Patented May 4, 1954

2,677,332

UNITED STATES PATENT OFFICE

2,677,332

MODEL LOCOMOTIVE

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Application November 19, 1949, Serial No. 128,429

1 Claim. (Cl. 105—65)

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This invention is directed to, and it is an object to provide, certain novel improvements in self-propelled model or miniature railroad locomotives.

One object of the invention is to provide a novel railroad locomotive whose motive power is fluid pressure; such pressure being provided by the sublimation of Dry Ice enclosed within a reservoir preferably mounted in the tender of the locomotive.

Another object of this invention is to provide a novel, throttle valve controlled, fluid pressure feed system between the Dry Ice reservoir and the cylinder units of the locomotive.

An additional object of the invention is to provide the locomotive with a throttle and direction of travel control mechanism of novel construction and function; such mechanism being mounted in the cab of the locomotive and actuated—preferably—by a reversible electric motor which is energized by, and responds to, a remote control circuit.

A further object of the invention is to provide a throttle and direction of travel control mechanism, as in the preceding paragraph, which includes a novel arrangement of cooperative working parts adapted, upon actuation of the electric motor in one direction or the other, to open or close the throttle valve respectively, and when actuated in said other direction to act, after closing the throttle valve, to shift the locomotive valve link motion to forward and reverse travel positions alternately.

It is also an object of this invention to incorporate the fluid pressure feed system, and the control mechanism, in the locomotive and its tender, in a practical and effective manner.

A further object of the invention is to produce a model railroad engine which is unique in motive power, easy to control, and reliable in operation.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claim.

In the drawings:

Fig. 1 is a diagrammatic side outline of a model locomotive embodying the invention.

Fig. 2 is a perspective diagram of the fluid pressure feed system.

Fig. 3 is a cross section on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary longitudinal sectional elevation of the rear end of the tender and Dry Ice reservoir.

Fig. 5 is an end elevation of the throttle and direction of travel control mechanism, with the parts in position for forward travel.

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Fig. 6 is a top plan view of said control mechanism.

Fig. 7 is a cross section on line 7—7 of Fig. 6.

Fig. 8 is an end elevation, of the control mechanism, opposite from Fig. 5.

Referring now more particularly to the characters of reference on the drawings, the model or miniature railroad locomotive is indicated generally at 1, such locomotive including a simulated boiler shell 2 including a steam dome 3. Rearwardly of the boiler shell 2 the locomotive 1 is formed with a cab 4 in which certain mechanism is mounted, as will hereinafter appear; there being a tender, indicated generally at 5, coupled with the locomotive.

The locomotive 1 is propelled by transversely spaced cylinder units 6 connected in actuating relation to the driving wheels 7 of the locomotive; the driving connections being similar to those of a full size locomotive.

The cylinder units 6 each include a valve chest 8, and each valve chest 8 is connected to a valve link motion 9; the latter being jointly and simultaneously operated by a bellcrank lever 10.

The bellcrank lever 10 includes an upstanding leg 11 adapted to be shifted forwardly or rearwardly whereby to set the valve link motion 9 and the valve chest 8 for corresponding travel of the locomotive.

A longitudinal, reciprocable link 12 is pivotally connected to the leg 11 of the bellcrank lever 10 and extends rearwardly into the cab 4 for connection to actuating mechanism, as will hereinafter appear.

Fluid pressure is supplied to the valve chests 8 of the cylinder units 6, for the purpose of actuating the latter, in the following manner:

The tender 5 comprises a hollow body 13 having a removable rear end door 14 held in place by a suitable friction catch 15. The body 13 has a fluid pressure reservoir 16 mounted therein, and such reservoir is in the form of a cylindrical, longitudinally extending tank; there being space between opposite sides of the reservoir 16 and the body 13, as at 17, to permit of down-flow of air about said reservoir, in heat exchange relation. For this purpose the body 13 of the tender is open, top and bottom, as shown, with the top covered by a screen 18.

The rear end of the reservoir 16 is initially open, but is normally closed by an end plug 19 secured in place by a pin and bayonet slot lock 20. The end plug 19 is normally sealed by a pressure expansible cup 21 on the rear end of said plug bearing against the inner wall of the reservoir 16.

By removing the rear end door 14 on the body 13, the end plug 19 is accessible and may be manually removed so that pieces of Dry Ice may be placed in the reservoir 16 from its rear end. After placement of the pieces of Dry Ice in the reservoir 16 and return of the end plug 19 to its in-place locked position, such Dry Ice begins to sublime, creating a pressure in the reservoir 16; such sublimation being enhanced by virtue of the heat exchange which occurs upon air flow about the reservoir 16 downwardly through the screen 18, as previously explained.

A pressure relief or safety valve 22 is mounted atop the reservoir 16 for the purpose of preventing dangerously high pressure in said reservoir.

At its forward end the reservoir 16 is fitted with an upstanding pressure outlet tube 23 whose lower end portion extends forwardly from the tender to a coupling 24; such coupling being in communication with a flexible hose 25 which spans between the tender 5 and locomotive 1 to permit of relative turning motion therebetween. The flexible hose 25 connects, at its forward end, to a conduit 26 which leads into the forward end of a thermalizing reservoir 27; such thermalizing reservoir being a longitudinally extending, cylindrical tank mounted in the simulated boiler shell 2 of the locomotive 1, and having a pressure relief or safety valve 28 in the simulated steam dome 3. The purpose of the thermalizing reservoir 27 is to permit the fluid pressure, which results from sublimation of the Dry Ice in the reservoir 16, to sufficiently increase in temperature so that it will not freeze up working parts through which it later passes, in the manner hereinafter described.

Another conduit 29 leads from the rear of the thermalizing reservoir 27 forwardly to a point between the cylinder units 6, whence said conduit is branched, as at 30, with the branches feeding the corresponding valve chests 8. The numeral 31 indicates the exhaust conduits leading from said valve chests.

A throttle valve 32 is interposed in the conduit 29, and is employed as the locomotive speed control.

The throttle valve 32 and the rear end of the link 12 are both disposed in the cab 4, and—by means of the following mechanism in said cab—are actuated to control the speed of the locomotive, and its direction of travel, respectively.

Such control mechanism is shown in detail in Figs. 5–8, inclusive, and comprises a base 33 having upstanding end plates 34 and 35 spaced apart transversely of the locomotive. A very small reversible electric motor 36 is mounted on the base 33; such motor being actuated, reversibly, by a remote control circuit (not shown) which includes the rails upon which the locomotive travels. This is generally the type of remote control circuit used in connection with electric motor propelled model locomotives, and is therefore not here shown. The motor 36 drives a gear train, indicated generally at 37, which gear train includes a gear 38. The gear 38 is carried in a circumferential channel of a driving disc 39 whereby to form a slip clutch between said parts, as at 40. The driving disc 39 includes a hub 41 journaled in connection with the end plate 34, and said disc 39 is connected coaxially to the needle valve 42 which the throttle valve 32 includes.

Operation of the electric motor 36 in one direction rotates the needle valve 42 to closed position, while operation of the motor in the opposite direction rotates the needle valve 42 to open position, whereby to stop or start the locomotive. Also, by adjustment between such positions the speed of the locomotive is effectively controlled.

When the reversible electric motor 36 is run in said one direction to close the needle valve 42, the gear 38 will continue to be driven even though the needle valve 42 stops as it reaches its fully closed position; this for the reason that the slip clutch 40 comes into play, permitting continued rotation of said gear 38. This continued rotation of the gear 38, after closing of the needle valve 42, is employed to cause reciprocation of the link 12, and consequent control of the direction of travel, in the following manner:

In laterally offset relation to the needle valve 42, but substantially parallel thereto, there is a cross shaft 43 having a gear 44 thereon adapted to mesh with the gear 38; the adjacent end of the cross shaft 43 being journaled in the upstanding end portion of a bellcrank lever 45 pivoted, as at 46, on the end plate 34.

A leaf spring 47 normally urges the lower leg of the bellcrank lever 45 upwardly, whereby to swing the cross shaft 43 laterally away from the gear 38 a sufficient distance to unmesh the gear 44 from said gear 38. The opposite end of the cross shaft 43 has sufficient loose-play in its mount to permit of such lateral motion of said cross shaft.

When the driving disc 39 is rotated to a position with the needle valve 42 fully closed, a cam 48 on said driving disc strikes the lower leg of the bellcrank lever 45 and swings it downwardly to then place the gear 44 in mesh with the gear 38, whereby with the electric motor 36 running in the aforesaid one direction the cross shaft 43 is driven in the direction indicated by the arrow in Fig. 5.

At the end opposite the gear 44, and adjacent the inner end of the reciprocable link 12, the cross shaft 43 is fitted, in relatively turnable relation, with a crank disc 49; said crank disc being driven by a radial pin 50 on said cross shaft bearing against a stop shoulder 51 on said disc 49.

The crank disc 49 has a crank arm 52 pivotally connected thereto in eccentric relation, as at 53, and which crank arm extends rearwardly to actuate an upstanding motion converting lever 54 pivoted, intermediate its ends, as at 55, to the end plate 35. The lower end of the motion converting lever 54 connects to the rear end of the reciprocable link 12.

The above described mechanism, upon meshing of the gears 38 and 44, with resultant driving of the cross shaft 43 and crank disc 49, relatively slowly reciprocates the link 12 whereby to position the valve link motion 9 for forward or rearward travel of the locomotive, alternately.

To indicate whether the link 12 is set for forward or rearward travel of the locomotive, the following signal assembly is provided:

A pair of transversely spaced electric signal lights 56 in protective sleeves 57 upstand from a suitably mounted circuit plate 58, with the central terminals 59 of said lights exposed below the plate 58 and engaging corresponding, dielectrically mounted contact fingers 60.

A contact arm 61 on the motion converting lever 54 is adapted to engage, alternately, with vertically spaced, lateral contacts 62 on the fingers 60, whereby to cause illumination of one signal light 56 when the link 12 is advanced, and to cause illumination of the other signal light 56 when the link 12 is retracted.

Different colored glow buttons **63**, in the roof of the cab **4** directly above corresponding signal lights **56**, glow in response to energization of said lights, whereby to indicate to the operator at a remote station whether the locomotive is set to travel forwardly or rearwardly.

In order to hold the link **12** set in an advanced or retracted position for forward or rearward travel of the locomotive, or at intermediate points with the locomotive stationary, the following automatic holding mechanism is provided:

The crank disc **49** is formed with a circumferential groove **63**, and a spring finger **64** having a nub **65** on its free end runs in the circumferential groove **63**, successively engaging in notches **66** in the bottom of said groove, with opposed ones of said notches representing the advanced and retracted positions of the link **12**, while the other notches represent the neutral positions of said link. While this arrangement has sufficient friction drag to hold the link **12** in any selected position of adjustment, the arrangement does not prevent effective rotation of the crank disc **49** by the cross shaft **43**.

After any given operation to adjust the link **12** the electric motor **36** is energized in its other direction of travel, whereupon the radial pin **50** backs slightly away from the stop shoulder **51** and the cam **48** moves away from the bellcrank lever **45**, so that the spring **47** acting on said lever **45** laterally shifts the cross shaft **43** and unmeshes the gear **44**. Thereafter, with continued running of the motor **36** in said other direction the gear **38** driving the disc **39** opens the needle valve **42**, whereupon fluid pressure feeds through the described conduit system to the valve chests **8** and cylinder units **6** to cause the locomotive to travel; the speed of travel being dependent upon the extent of opening of the needle valve **42**.

Thus, with the described control mechanism, a single reversible electric motor **36**, regulated by a remote control circuit, is operative to control the direction of travel of the locomotive, its starting and stopping, and its speed.

Under certain running conditions where a greater supply of fluid pressure is desired, a second or supplemental tender, including a Dry Ice type, fluid pressure reservoir (not shown), may be coupled to the tender **5**. In this event the fluid pressure from the second tender is fed to the fluid pressure reservoir **16** by means including a fitting **67** in the end plug **19**; such fitting being of a check valve type.

The employment of fluid pressure, derived by the sublimation of Dry Ice as the motive power, is a novel feature in miniature or model locomotives, and further the described control mechanism provides a practical and reliable means for the remote control of the locomotive.

From the foregoing description it will be readily seen that there has been produced such a device as substantially fulfills the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claim.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

In a model Dry-Ice operated locomotive, a pressure tank to receive Dry Ice and simulating a tender, said tank having an entry opening in its rear end, and an outlet conduit leading from the tank to a point of use of the pressure generated from the Dry Ice; a removable plug unit to seal the opening, and a passage-fitting mounted in and projecting rearwardly from the plug unit and arranged for connection to an additional source of pressure supply, the fitting including an inwardly opening check valve.

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