March 17, 1931. L. C. GREER ET AL 1,796,599

PNEUMATIC TOY

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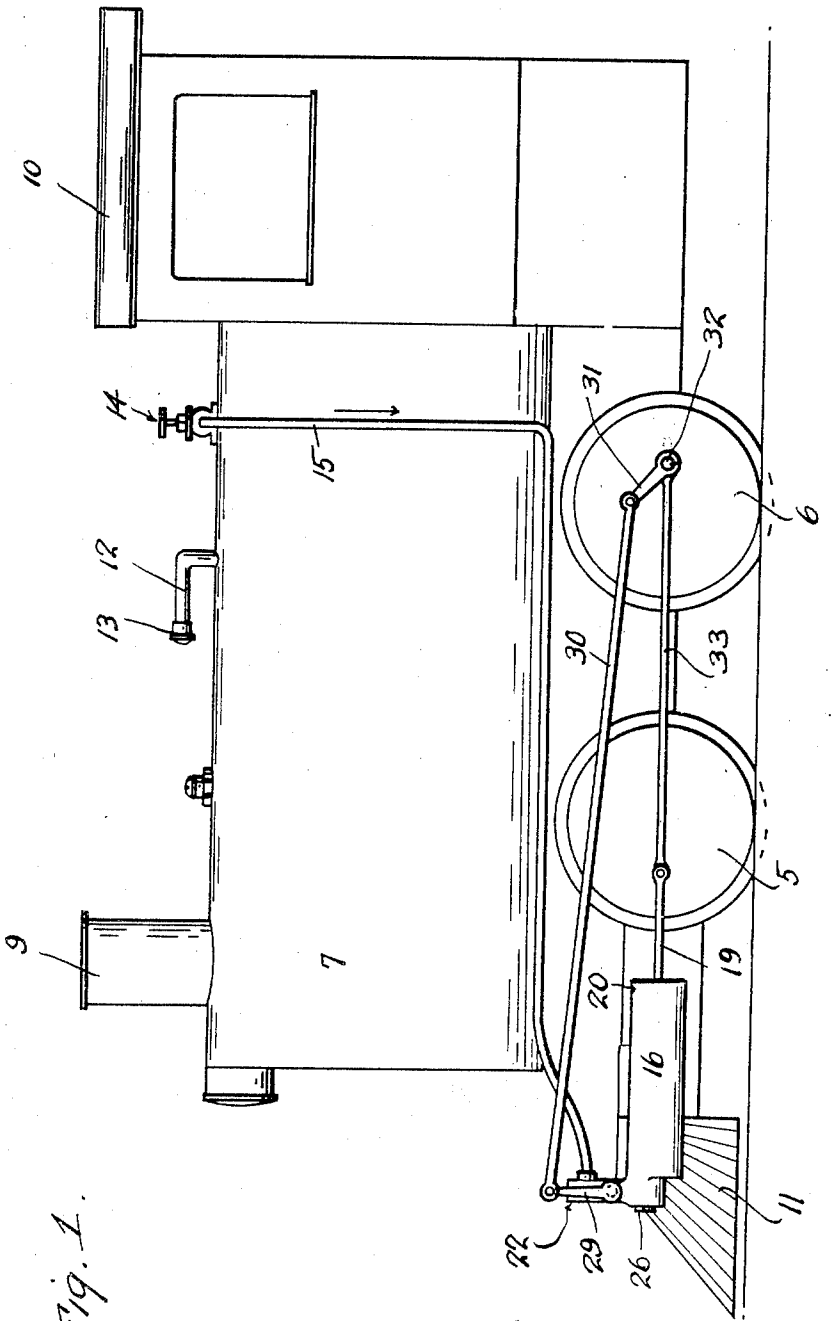


Fig. 1.

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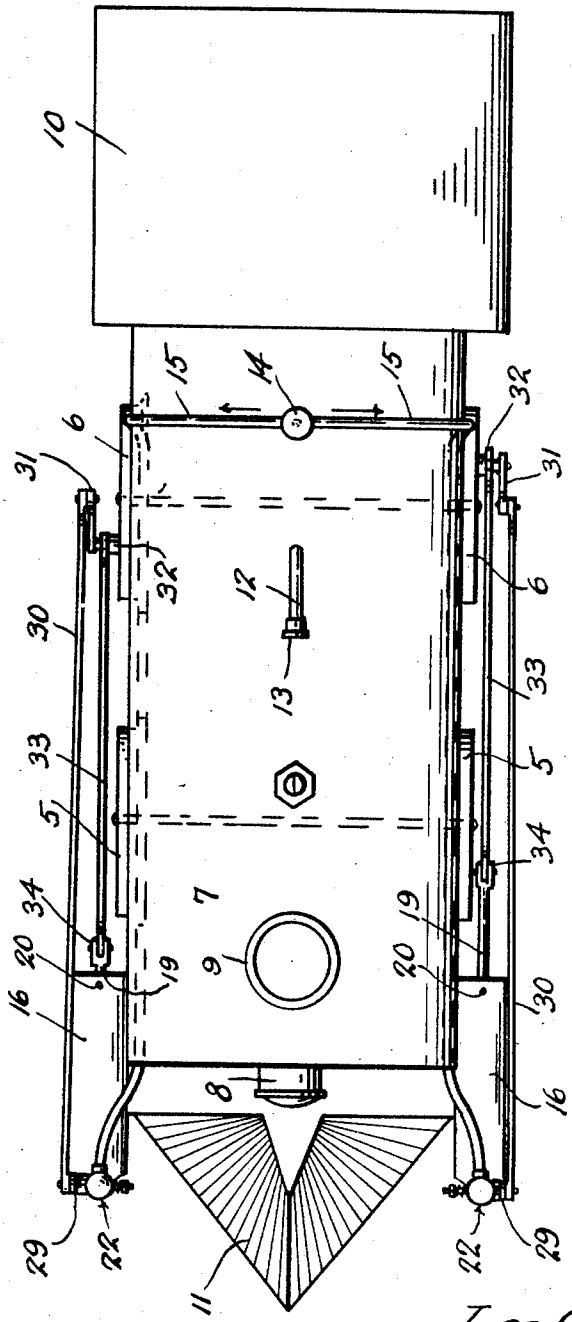


Fig. 2.

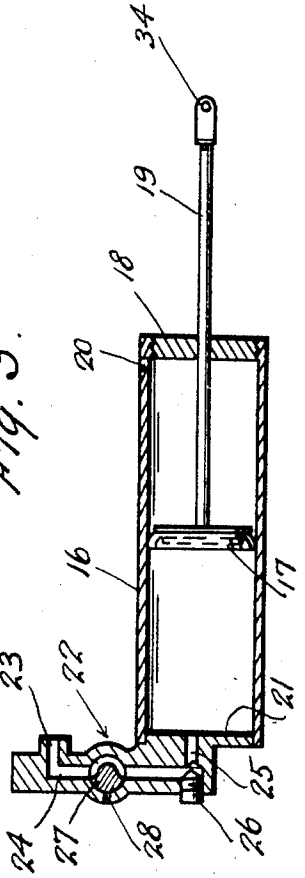


Fig. 3.

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UNITED STATES PATENT OFFICE

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PNEUMATIC TOY

Application filed June 17, 1930. Serial No. 461,753.

This invention relates to a miniature pneumatic power plant susceptible of being incorporated in various species of toys such as upright engines, stationary engines, portable trucks, tractors, fire engines and the like.

More specifically stated, the inventive conception embodied in this application is especially designed and arranged for embodiment in a toy locomotive, and the fundamental principle involves a compressed air container, which, in this form of the invention, constitutes the boiler and which has appropriate valved and operating connection with the propulsion wheels for producing a miniature self-propelled pneumatic toy.

In accordance with the fundamental principle herein illustrated and described, we have developed a practical arrangement of mechanically associated details forming a simple and economical structure which comprehends the invention and fulfills the requisite requirements of a toy of this class in an efficient and feasible manner.

In the accompanying drawings, in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevational view of a pneumatic locomotive developed in accordance with the present invention.

Figure 2 is a top plan view thereof showing the duplication of power transmission and valve means on opposite sides of the boiler.

Figure 3 is a longitudinal sectional view through the cylinder and piston construction.

In Figure 1, the frame is of appropriate construction and provided with front idler wheels 5 and rear propulsion wheels 6, these being located in opposed pairs on opposite sides of the structure. Supported on the frame is the imitation boiler 7 which here serves as the compressed air containing tank.

This is ornamented by the presence of a headlight 8, smokestack 9 and other such appurtenances as add to realistic appearance. At the rear is a suitable cab generally represented by the numeral 10. Then too, at the front is a fender 11. On top of the tank is an elbow 12 having suitable internal valve mechanism (not shown) concealed by the removable valve cap 13. Incidently the valve mechanism is similar to an ordinary pneumatic tire valve and the threaded end of the elbow is constructed to accommodate a conventional tire pump (not shown).

This suffices to build up sufficient pressure for operating the structure for a limited time. At 14 is an appropriate regulating and control valve, manipulated by hand and serving to control the passage of air through the opposed branch pipe 15.

Inasmuch as the valve and operating structure is duplicated on opposite sides, the same numerals are employed to designate corresponding parts. Referring to Figure 3 for example, it will be seen that the numeral 16 represents a cylinder to accommodate the piston head 17. This cylinder is of a length approximately twice that of the stroke of the piston.

At the right hand end is a removable plug 18 which constitutes the guide and support for the piston rod 19. This arrangement permits the piston to be removed and access to be had to the interior of the cylinder. At the point 20 is a vent opening which has the additional function of a lubricant hole for placing lubrication in the cylinder for facilitating reciprocation of the piston head. The piston head is appropriately packed.

At the left hand end is a fitting embodying a disc 21 and an appropriate extended casting 22. This is formed with an air inlet bore or passage at 23 communicating with the valved passage 24 and leading into the intake port 25 communicating with the cylinder. The numeral 26 merely designates a removable regulating plug for controlling the velocity of air.

The intermediate portion of this casting 22 is fashioned to accommodate the oscillatory plug valve 27 whose passage is constructed to regulate the intake and exhaust of air. Incidently the numeral 28 designates the exhaust port leading to the atmosphere.

The horizontal branch of the pipe 15 is connected with the inlet 23. As seen in Figure 1, the plug valve is provided on one end with a crank arm 29 with which a valve actuating rod 30 is connected. This rod extends rearwardly and is connected with a similar rocker arm 31 carried by the eccentric or crank pin 32 on the wheel 6. Incidently this arm 31 is formed integral with the pin and occupies a fixed relation. In fact, the terminal end thereof is disposed slightly off center with respect to the axis of rotation of the wheel 6.

The numeral 33 designates the push-rod which has one end pivotally connected with the crank pin 32 and the opposite end pivotally connected with the clevis 34 on the piston rod 19. This arrangement of mechanism serves to automatically control the air regulating valve 27 under the turning action of the wheel 6. The wheel 6 is turned through the medium of pushrod and crank pin and the operating connection thereof with the reciprocatory piston 17 in the cylinder 16 as is obvious.

It is to be stated that the duplicate mechanism on the opposite side of the boiler construction is identical with that already described except that it is in reverse order so that the mechanism on opposite sides operates simultaneously but in an alternate manner to produce the desired continuity of movement of the complete toy. In other words, the valves 27 on the opposite sides are alternately operated.

In practice, the valve cap 13 is removed and an ordinary tire pump is attached thereto and the tank 7 is pumped with air under pressure. When desired, the valve 14 is open, permitting the air to flow through the pipe 15 into the valve mechanism. By placing the toy on the floor or a similar surface and giving it a start, the valve mechanism is set into operation and the air then builds up sufficient pressure in the cylinder 16 for continuously and alternately operating the respective pistons for actuating the wheels 6. In this manner the toy is propelled over the surface until the energy of the air in the tank 7 has been substantially and completely expended.

As before stated, the same fundamental principle of construction and operation may be applied to toys other than locomotives. The valve arrangement in the structure is novel and the complete construction is inexpensive, susceptible of rapid assembly and expeditious output, easy to repair and dependable in operation.

The valve mechanism is particularly important in that it is automatic and positive in action. The air passages in the core or plug valve are so related and timed to those of the casting that one intake and one exhaust stroke is developed for each complete revolution of the drive wheel on each side.

This therefore provides an appropriately timed throttle valve arrangement permitting the toy to run with little vibration and speed on a pressure variation from seventy-five pounds down to one pound pressure on each throttle opening. Another outstanding feature of the construction is the relation of the throw of the two main crank pins on the fly wheels on either side of the engine, there being one hundred and eighty degrees on the crank pin or stated otherwise, the two cylinders operate exactly one-half turn apart on the drive wheel.

The front wheels may, if desired, be connected operatively with the rear traction or drive wheels, in any suitable manner, as on other toy locomotives. The locomotive can be propelled by steam with the use of metal pistons instead of leather.

An outstanding feature of this toy however is that it is much safer than a steam engine in respect to fire and explosion and more simple and positive in operation, and realistic in its appearance and thus a novel contribution to the prior art.

It is thought that persons skilled in the art to which the invention relates will be able to obtain a clear understanding of the invention after considering the description in connection with the drawings. Therefore, a more lengthy description is regarded as unnecessary.

Minor changes in shape, size, and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice if desired.

We claim:

1. In a toy of the class described, an air receiving and storage tank, supporting wheels therefor, wheels on opposite sides of said tank and being provided with crank pins, cylinders mounted on opposite sides of the tank, pistons slidable in said cylinders, push rod connections between the pistons and crank pins, piping leading from said tank on opposite sides, a main control valve located in said piping, valved connections between the respective pipe ends and companion cylinders on opposite sides of said tank, an actuating rod connection between said crank pins and the last named valves, together with a valved air injector on top of the tank adapted to accommodate a conventional tire pump whereby to permit air to be pumped into said tank for compression and subsequent utilization.

2. In a structure of the class described, a cylinder, a vent being formed at one end of said cylinder, a removable plug in said one end having a central guide opening, a piston head mounted for reciprocation in said cylinder, a rod connected with said piston head and slidable through the opening in said plug, a fitting in the opposite end

of the cylinder including a lateral casting having an air delivery passage formed therethrough and communicating with said cylinder, an oscillatory valve mounted for oscillation in the casting for controlling the air passing through said passage, and a needle regulating valve on the casting projecting through the passage.

In testimony whereof we affix our signatures.

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