May 29, 1928. 1,671,132

T. SHOUDY

TOY FOR EMITTING SMOKE RINGS

Filed Jan. 21, 1924

Fig. 1.

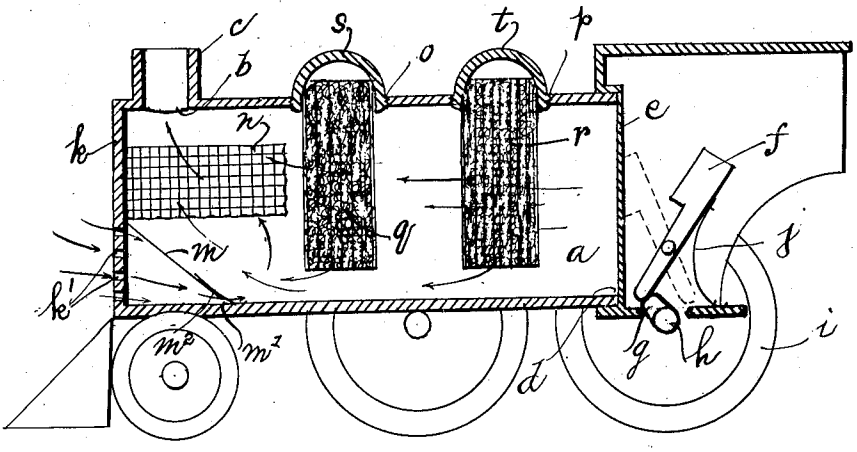


Fig. 2

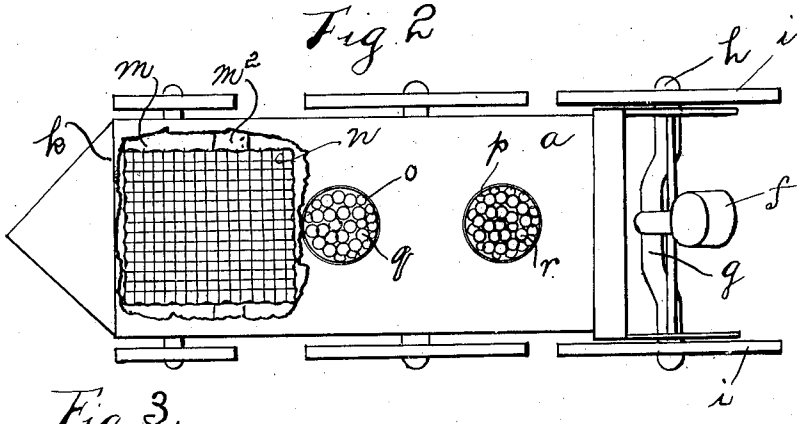


Fig. 3.

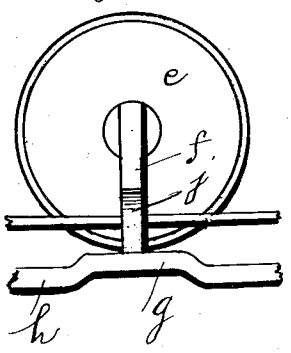
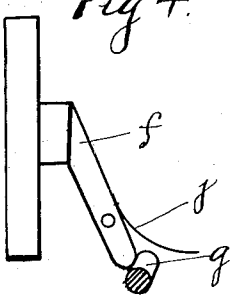


Fig 4.



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UNITED STATES PATENT OFFICE.

THEODORE SHOUDY, OF NEW YORK, N. Y.

TOY FOR EMITTING SMOKE RINGS.

Application filed January 21, 1924. Serial No. 687,416.

My invention relates to toys for emitting smoke rings, and more particularly to an article of this character which may be so actuated as to form a sequence of rings of smoke or visible fumes simulating smoke for the purpose of affording entertainment to children.

A toy embodying my invention may take a variety of different forms and the agencies employed for producing the smoke or visible fumes are also susceptible to wide variation.

The invention relates more particularly to the mechanism by which said smoke or fumes may be ejected through a circular opening in a manner to cause a perfect ring or a series of such rings of smoke or other fumes. Whatever may be the exterior configuration of the toy embodying my invention, such a toy must embody therein a chamber in which the smoke or other fumes are formed through which there is normally no circulation of air or draught, and in which chamber they would ordinarily accumulate and be confined, were it not for the provision of means for forcibly ejecting a small volume of such smoke or fumes through the substantially circular outlet opening in the chamber.

In the form of the invention shown, the construction is such that the smoke or fume producing agencies are in the form of small cartridges containing respectively an acid and an alkali which when combined will form visible fumes resembling smoke.

Associated with the chamber in which said cartridges are mounted, is a flexible diaphragm and means for imparting a staccato blow to said diaphragm to rapidly flex it and thus cause a sudden displacement of the air and fumes contained in the chamber to the extent required to produce a smoke or fume ring of the desired size and density. In order to secure the necessary air to support combustion or to form the fume as a result of the mixture of the acid and the alkali above referred to, I provide the chamber in which the fumes are formed, with a valve controlled air inlet, the valve of which will be automatically actuated as a result of the changing pressure contained within the chamber due to the flexure of the diaphragm.

The invention consists primarily in a toy of the character described embodying therein means forming a chamber for the reception of smoke or fume reducing media and having, through the walls thereof in spaced relation to each other, a small substantially circular outlet opening and a relatively larger opening, and a highly flexible imperforate diaphragm having its edge secured at every point thereof about said larger opening, whereby a blow upon said diaphragm will result in a flexure thereof having the greatest amplitude substantially centrally of the diaphragm, and cause a displacement of the gaseous contents of said chamber and the expulsion of a portion thereof through said outlet opening in the form of a visible ring; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a longitudinal view of a section of a toy embodying my invention, in the form of a miniature locomotive;

Fig. 2 is a plan view thereof with the top shell of the chamber adjacent the circular opening broken away;

Fig. 3 is a rear view of the diaphragm and the mechanism used for flexing same; and

Fig. 4 is a side view of the mechanism shown in Fig. 3.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, I employ a shell *a* forming a chamber in which smoke or visible fumes are formed and stored, this shell as shown in the drawings being made to simulate the boiler for a miniature locomotive. My experience, however, has demonstrated that neither the interior nor the exterior form of the shell need have any particular configuration to secure the desired operation of the toy.

This shell *a* has a small circular opening therein at *b* from which extends a tube *c* corresponding with the smoke stack of the locomotive. This stack, however, is merely for purposes of simulating a locomotive construction and is not essential to the formation of smoke rings or rings of visible fumes.

One end of the shell *a* has a large opening therethrough at *d*, this opening being closed by a flexible diaphragm *e*. In the form of the invention shown, this diaphragm *e* is located at the end of the shell *a* which

would be adjacent the cab of the locomotive so as to be within the operative range of a mechanism for flexing it, which mechanism is adapted to be actuated from the axle of what would correspond with the driving wheels of the engine. The diaphragm *e* may be formed of raw hide, parchment paper or other similar material which will readily flex, and be capable of being drawn sufficiently taut to ensure its desired rapid flexure and reflexure, as a result of a staccato blow delivered thereto, while being capable of yielding to an extent sufficient to ensure the desired displacement of air and smoke or fumes within the shell *a* with each flexure thereof. Such a diaphragm when used with a toy simulating a locomotive, also has the advantage of giving forth sound as it is struck by the actuating means, which sound will be substantially coincident with the ejection of a ring of smoke, thus giving an effect similar to that produced by the exhaust of a locomotive.

Pivotally mounted adjacent the diaphragm *e* is an oscillatory striker member *f*, one arm of which is adapted to impact with the diaphragm *e* and the other arm of which is in the path of movement of a crank or cam *g*, formed from, or carried by, the axle *h* of a pair of wheels *i* simulating the driving wheels of a locomotive. This striker member is acted upon by a spring *j*, the relation of the crank or cam *g* to said lever being such that with each rotation of the wheels *i*, said spring *j* will be tensioned so that the blow delivered by said striker member *f* will be a sudden sharp blow under the control of said spring.

The spring *j* is a light spring so that it may be tensioned as a result of any movement of the wheels *i* whether they be electrical or spring driven, or whether the toy be merely drawn by hand.

The end of the shell *a* opposite the diaphragm *e* is closed by a head plate *k* having one or more small openings *k'* extending therethrough, toward the bottom thereof, for the purpose of admitting air within the shell end, under conditions, however, which will set up no continued circulation of such air through the shell. Within the shell is a partition *m* forming with the parts of the shell adjacent the openings, a chamber communicating with other portions of the chamber within the shell through a port or ports *m'* only, said port or ports being positioned towards the bottom thereof. This partition is so positioned as to prevent air from entering the shell, except through the port or ports *m'*. The port or ports *m'* are closed by flap valve m^2 which will normally prevent air from passing from the chamber formed by the partition to within the main chamber within the shell, but will permit such flow of air as a result of that slight reduction of pressure within the shell due to the reflex action of the diaphragm *e*.

Air so introduced in the main chamber within the shell *a*, is required to replace the air which combines with the smoke or visible fumes, and is ejected through the opening *b* and stack *c* therewith, with each flexure of the diaphragm, and also to maintain combustion when a combustible medium is relied upon to form the smoke or fumes or to cause that movement of air throughout the shell *a* required when chemicals are relied upon as the medium for producing visible fumes.

In the form of the invention shown, it is possible to use either a combustible medium or chemicals, a reticulated partition *n* being secured below the opening *b* and stack *c* so that punk, incense or other substances may be ignited and dropped within the shell through the tube or stack *c*, in a position where air passing to the opening will ensure continued combustion of such material in addition to carrying the smoke through the stack *c* when the diaphragm *e* is flexed.

The shell *a*, in addition to the openings *b*, *d* and *k'*, has two openings through the top thereof at *o* and *p*, through which cartridges *q* and *r* containing different chemicals, (which when combined will produce visible fumes) depend within the main chamber of the shell *a*, so that the movement of air laden with fumes from such chemicals about said cartridges, will cause the admixture of these fumes in the desired manner.

These cartridges are carried by, or provided with, metallic tops *s* and *t*, which, in the form of the invention shown simulate the sand and the steam domes of the locomotive, said cartridges each being formed of a suitable absorbent material such as asbestos, or blotting paper, saturated with chemicals, one cartridge being saturated with an alkali, such as a weak solution of ammonia, and the other cartridge being saturated with an acid, such as a weak solution of hydrochloric acid.

The operation of the herein described toy is substantially as follows:—

The cartridges *q* and *r* having been properly positioned within the main chamber of the shell *a*, the toy is caused to have movement on its wheels. With each rotation of the axle *h* the crank or cam *g* therein will oscillate the striker member *f* against the tension of the spring *j* and immediately pass from such engagement so as to permit the spring to impart a rapid reverse oscillation to said striker member and cause it to sharply impact against the diaphragm *e*. The force of this blow will flex the diaphragm inwardly of the shell *a* sufficiently to displace the air, and fumes, within said shell or the main chamber of said shell, the air thus displaced being forced through the opening

b and stack *c* where used. The air and smoke or fumes thus passing through the said opening will invariably be in ring form, and all rings will originally have the same diameter.

If the rings are formed from the fumes from chemicals, they will dissipate fairly rapidly, although they will be forced some inches above the top of the stack before their dissipation occurs. If a smoldering material is used to produce smoke, however, such rings will have a slower rate of dissipation and they may become enlarged and irregular in contour as they float in the air.

In addition to displacing the air and smoke or fumes, and ejecting the rings in the manner above described, the impact of the striker member with the diaphragm will cause a noise, which being heard substantially simultaneously with the sight of the emitted smoke or fume ring, will create the impression of the noise of an exhaust, as in a real locomotive.

As the diaphragm *e* flexes inwardly of the shell *a*, the momentary increased pressure within the main chamber of said shell will ensure a firm seating of the flap valve m^2, and prevent the escape of any smoke or fumes to within the smaller chamber formed by the partition *m*, and therefrom through the ports *k'*. Upon the reflexure of the said diaphragm, however, the valve m^2 will be opened and admit from the smaller chamber to the main chamber within said shell *a*, fresh air entering said smaller chamber through the ports *k'*.

The speed of the crank or cam *g* will control the number of rings emitted during a given interval, and possibly a more forcible ejection of such rings will result from higher speeds of said crank or cam owing to a tendency towards the development of greater tension in the spring *j*, due to a greater range in the oscillatory movement of the striker member *f*, where it is subjected to more frequent impulses from said crank or cam. But whatever the speed of the striker member, and corresponding frequency in the emission of smoke rings, each ring will be accompanied by the sound of the impact of the striker member with the diaphragm and there will be a tendency toward a more forcible ejection of the smoke or fumes in ring form with any increased volume of said sound due to a more forceful impact of the striker with the diaphragm with higher speeds of the crank or cam.

While I have described my invention with especial regard to its application to a toy locomotive, it is apparent that it may be applied to other toys by which it is desired to form rings of smoke or fumes. It is also apparent that means for introducing chemicals in a form which will cause their fumes to slowly combine or mix, to within the closed chamber formed by the shell *a*, may be employed, other than that described. It is preferable to use absorbent material saturated with the chemicals, however, as this avoids likelihood of a child being injured by the chemicals, and ensures the slow formation of the fumes.

When the reticulated partition or shelf *n* is used, punk, incense or other slow burning combustible materials may be lighted and dropped through the opening *b* to upon the partition or shelf. The smoke from such smoldering substances will be ejected in the manner above described.

The air admitted through the ports *m'* will serve to cause the commingling of the fumes from chemicals in the main chamber of the shell *a* when chemicals are used, or to maintain combustion of the punk, incense or other similar substances, when such are used, as well as preventing a flow of air counter to that of the smoke or fumes adjacent the opening *b*.

Having described my invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A toy of the character described embodying therein means forming a chamber having a small substantially circular outlet opening, a relatively larger opening, and a plurality of openings in different portions of the walls thereof, cartridges saturated with volatile substances, the fumes of which when combined will become visible, extending into said chamber through, and closing, said plurality of openings, and a flexible diaphragm closing said larger opening, whereby the gaseous contents of said chamber may be displaced by the flexure of said diaphragm, and a portion of the contents of said chamber expelled through said substantially circular opening in the form of a visible ring.

2. A toy of the character described embodying therein means forming a chamber having a small substantially circular outlet opening, a relatively larger opening, and a plurality of openings in different portions of the walls thereof, cartridges saturated with volatile substances, the fumes of which when combined will become visible, extending into said chamber through, and closing, said plurality of openings. a flexible diaphragm closing said larger opening, a striker member pivotally mounted adjacent said diaphragm, and means operative upon said striker member, whereby it may be caused to strike said diaphragm a staccato blow to flex said diaphragm inwardly of said chamber and cause the gaseous contents of said chamber to be displaced and a portion of such contents to be expelled in the form of a visible ring through said substantially circular opening.

3. A toy of the character described em-

bodying therein means forming a chamber having a small substantially circular outlet opening, a relatively larger opening, and a plurality of openings in different portions of the walls thereof, cartridges saturated with volatile substances, the fumes of which when combined will become visible, extending into said chamber through, and closing, said plurality of openings, a partition within said chamber forming an air compartment, said chamber having a port through a wall thereof communicating with atmosphere, and said partition having a port therethrough communicating with the interior of said chamber, a flap valve closing said last named port, and a flexible diaphragm closing the larger of said openings in said chamber forming means, whereby the flexure of said diaphragm inwardly of said chamber will displace its gaseous contents and expel a portion thereof through said substantially circular opening in the form of a visible ring, and close said valve, and the reflex action of said diaphragm will open said valve and draw air within said chamber.

4. A toy of the character described embodying therein means forming a chamber having a small substantially circular outlet opening, a relatively larger opening, and a plurality of openings in different portions of the walls thereof, cartridges saturated with volatile substances, the fumes of which when combined will become visible, extending into said chamber through, and closing, said plurality of openings, a partition within said chamber forming an air compartment, said chamber having a port through a wall thereof communicating with atmosphere, and said partition having a port therethrough communicating with the interior of said chamber, a flap valve closing said last named port, a striker member pivotally mounted adjacent said diaphragm, wheels supporting said chamber forming means, a crank rotatable by said wheels in operative relation to an arm of said striker member, and a spring operative upon said striker member and normally tending to engage it with said diaphragm, whereby said striker member may be caused to strike said diaphragm a staccato blow to flex said diaphragm inwardly of said chamber and cause the gaseous contents of said chamber to be displaced and a portion of such contents to be expelled in the form of a visible ring through said substantially circular opening, and close said valve, and the reflex action of said diaphragm will open said valve and draw air within said chamber.

5. A toy of the character described embodying therein means forming a chamber for the reception of smoke or fume producing media and having, through the walls thereof in spaced relation to each other, a small substantially circular outlet opening and a relatively larger opening, and a highly flexible imperforate diaphragm having its edge secured at every point thereof about said larger opening, whereby a blow upon said diaphragm will result in a flexure thereof having the greatest amplitude substantially centrally of the diaphragm, and cause a displacement of the gaseous contents of said chamber and the expulsion of a portion thereof through said outlet opening in the form of a visible ring.

6. A toy of the character described embodying therein means forming a chamber for the reception of smoke or fume producing media and having, through the walls thereof in spaced relation to each other, a small substantially circular outlet opening and a relatively larger opening, a highly flexible imperforate diaphragm having its edge secured at every point thereof about said larger opening, whereby a blow upon said diaphragm will result in a flexure thereof having the greatest amplitude substantially centrally of the diaphragm, and cause a displacement of the gaseous contents of said chamber and the expulsion of a portion thereof through said outlet opening in the form of a visible ring, a striker member pivotally mounted exteriorly of said chamber forming means, and in operative relation to said diaphragm, and means operative upon said striker member, whereby it may be caused to intermittently strike said diaphragm a staccato blow.

7. A toy of the character described embodying therein means forming a chamber for the reception of smoke or fume producing media and having, through the walls thereof in spaced relation to each other, a small substantially circular outlet opening and a relatively larger opening, a partition within said chamber forming an air compartment having a port therethrough communicating with the interior of said chamber, said chamber having a port through a wall thereof communcating with atmosphere, a flap valve closing the port in said partition, and a highly flexible imperforate diaphragm having its edge secured at every point thereof about said larger opening, whereby a blow upon said diaphragm will result in a flexure thereof having the greatest amplitude substantially centrally of the diaphragm, and cause a displacement of the gaseous contents of said chamber and the expulsion of a portion thereof through said outlet opening in the form of a visible ring, and the closing of said valve, and the reflex action of said diaphragm will open said valve and draw air within said chamber.

8. A toy of the character described embodying therein means forming a chamber for the reception of smoke or fume producing media and having, through the walls

thereof in spaced relation to each other, a small substantially circular outlet opening and a relatively larger opening, a partition within said chamber forming an air compartment having a port therethrough communicating with the interior of said chamber, said chamber having a port through a wall thereof communicating with atmosphere, a flap valve closing the port in said partition, a highly flexible imperforate diaphragm having its edge secured at every point thereof about said larger opening, whereby a blow upon said diaphragm will result in a flexure thereof having the greatest amplitude substantially centrally of the diaphragm, and cause a displacement of the gaseous contents of said chamber and the expulsion of a portion thereof through said outlet opening in the form of a visible ring, and the closing of said valve, and the reflex action of said diaphragm will open said valve and draw air within said chamber, a striker member pivotally mounted exteriorly of said chamber forming means, and in operative relation to said diaphragm, and means operative upon said striker member, whereby it may be caused to intermittently strike said diaphragm a staccato blow.

9. A toy of the character described embodying therein means forming a chamber for the reception of smoke or fume producing media and having, through the walls thereof in spaced relation to each other, a small substantially circular outlet opening and a relatively larger opening, a highly flexible imperforate diaphragm having its edge secured at every point thereof about said larger opening, whereby a blow upon said diaphragm will result in a flexure thereof having the greatest amplitude substantially centrally of the diaphragm, and cause a displacement of the gaseous contents of said chamber and the expulsion of a portion thereof through said outlet opening in the form of a visible ring, a striker member pivotally mounted exteriorly of said chamber forming means, and in operative relation to said diaphragm, wheels supporting said chamber forming means, a crank rotatable by said wheels and in operative relation to an arm of said striker member, and a spring operative upon said striker member and normally tending to engage it with said diaphragm.

In witness whereof I have hereunto affixed my signature this 4th day of January, 1924.

THEODORE SHOUDY.